

BOMA INTERROGATORY 1

INTERROGATORY

*Ref: Exhibit B, Tab 3, Schedule 1*

Please provide the costs to date, for each year commencing in 2016 and including 2017 and 2018 of developing and implementing the third party access ("TPA") together with the forecast for 2019 and to the extent possible 2020. Please break down the costs into traditional components, such as:

- compensation of employees;
- consultants' costs;
- fully allocated management and overhead costs from the SME and the IESO; and
- all other capital and OM&A costs shown separately.

RESPONSE

Please see the response to OEB Interrogatory 8 at Exhibit I, Tab 4.0, Schedule 1.08.



1 BOMA INTERROGATORY 2

2 INTERROGATORY

3 *Ref: General*

4 Please provide the methodology for calculating net revenues and for allocating those net  
5 revenues to ratepayers.

6 RESPONSE

7 Please see the response to OEB Interrogatory 8 at Exhibit I, Tab 4.0, Schedule 1.08.

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BOMA INTERROGATORY 3

INTERROGATORY

*Ref: General*

Please provide a copy of a template (model) third party access agreement. BOMA understands that the actual agreement with any particular user will be customized to provide specific information as to the package of data being offered, price, and agreement term, but the model agreement would be very helpful to place the proposed terms and conditions in context.

RESPONSE

It is not expected that a single templated Data Use Agreement (“DUA”) will be used for all potential customers requesting access to the data. The specific terms and conditions of a DUA will vary given a number of factors, these include the nature of the data being accessed, the use of the information, and the specific needs of the requestor.

The nature of the data being accessed will have different controls attached, for example, a highly aggregate publicly posted report will not need the same controls as a very granular request for electricity consumption information that may have a higher risk of re-identification. The use of the information will also impact terms and conditions, for example, where the information is to be linked with other data sets, additional assessments and restrictions may be applicable. There may also be changes to the contract terms to address specific requests from persons accessing the data.

In addition to the forgoing, the SME anticipates that specific terms and conditions may evolve over time as the SME learns more about the market. Accordingly, the SME is not in a position to set out a template data use agreement. However, the SME would like to provide guidance as to the particular obligations, protections and restrictions being placed on persons accessing the data as well as the data itself.

The terms and conditions will speak to, *inter alia*, the following:

- the permitted use of the data;
- restrictions on the use of the data for purposes other than the permitted use, which includes the obligation not to identify or attempt to identify any premise associated with the data;

- 1                   • the obligations to protect the data, through physical, organizational and  
2                   technological safeguards;
- 3                   • restrictions on the disclosure of the data except to authorized persons, with the  
4                   consent of the SME or as required by law;
- 5                   • the obligation to comply with applicable laws;
- 6                   • notice to the SME in the event disclosure is required by law, or in the event there  
7                   is any unauthorized disclosure; and
- 8                   • the requirement for the counterparty to cooperate with the SME enabling the  
9                   SME to comply with its legal obligations, audit rights and remedies.

1 BOMA INTERROGATORY 4

2 INTERROGATORY

3 *Ref: General*

4 What are the objectives of the TPA access program over and above generating additional  
5 revenue for ratepayers? Please discuss fully.

6 RESPONSE

7 The objectives of the TPA program, over and above generating additional revenue for  
8 ratepayers, are to provide third parties with non-discriminatory access to electricity  
9 consumption data and to achieve the value inherent in a single provincial repository of  
10 electricity consumption data from over 5 million smart meters.

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1 BOMA INTERROGATORY 5

2 INTERROGATORY

3 *Ref: General*

4 Please discuss the privacy issues raised by, and dealt with, in the third party access proposal, as  
5 well as a proposed solution to those issues. Please provide a copy of any background studies  
6 on the privacy issue commissioned by SME.

7 RESPONSE

8 Please see the responses to OEB Interrogatory 13 at Exhibit I, Tab 10.0, Schedule 1.13, and  
9 BOMA Interrogatory 15 at Exhibit I, Tab 0, Schedule 2.15.

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1 BOMA INTERROGATORY 6

2 INTERROGATORY

3 *Ref: General*

4 How many FTEs are currently, or will be, dedicated to the implementation and operation of the  
5 program (in 2018 and 2019)?

6 RESPONSE

7 There are currently no FTEs dedicated to Third Party Access ("TPA"). After the OEB issues its  
8 decision on this application, staff and resources will be assigned to TPA as required and the  
9 time of SME staff, IESO staff and external resources used for TPA will be tracked and charged  
10 to TPA. As stated in the application the SME reviewed the Cost Allocation Study prepared for  
11 the IESO's 2018 revenue requirement submission by BDR North America and will be following  
12 the recommendations and conclusions in the study to ensure that SME ratepayers will not be  
13 subsidizing TPA.

14 Please see the response to OEB Interrogatory 11 at Exhibit I, Tab 9.0, Schedule 1.11.

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BOMA INTERROGATORY 7

INTERROGATORY

*Ref: General*

*Ref: Exhibit A, Tab 1, Schedule 1, p3*

- a) Please explain SME's understanding of the existing market for the data proposed to be sold? Is there currently a transparent market in Ontario from which a range of prices can be determined? If not, how does SME propose to establish a market price?
- b) Please confirm that the SME will be the sole provider of the referenced data in Ontario.
- c) How will the SME determine what a buyer is prepared to pay or can afford to pay?
- d) Please provide any studies that SME has commissioned with respect to the market, pricing, and economic viability of the program, as well as any analogous programs and/or precedents.

RESPONSE

- a) The reports included in the response to OEB Staff Interrogatory 2(d) at Exhibit I, Tab 1.0, Schedule 1.02, provide details on the existing market for the electricity consumption data. Refer to the "Project Background" section of the Market Analysis and Costing Model MNP Final Report and the "Potential for Third Party Data" section of the Value Potential of Smart Meter Data Report.

Electricity consumption data as provided by the SME will be an emerging, and therefore small, segment in the overall big data market. The SME has researched the market for electricity consumption data by undertaking pilots to determine whether demand exists for the data and by researching what other entities providing similar sets of data have charged. The SME is aware of an interest in access to reliable electricity consumption information among parties including, but not limited to, local distribution companies, retailers of energy related and other products, researchers, and various levels of government.

While the SME has undertaken significant work to prepare for third party access and data monetization, the exact scope of the market will not be known until the products are

1 launched and have gained traction in the marketplace. As such, the SME will undertake a  
2 period of price and market discovery after the OEB issues its decision on this application.

3 Through this licence amendment application, the SME seeks to be able to price the products  
4 it is offering competitively, and work with potential customers to provide the data they are  
5 seeking at a price that is both acceptable to customers and benefits rate payers.

6 b) The SME will not be the sole provider of smart meter data. Ontario's electric LDCs possess  
7 electricity consumption data and, presumably, could provide it to third parties.  
8 Additionally, this data is only one stream of data available to interested parties as described  
9 in the response above to BOMA 7(a) at Exhibit I, Tab 0, Schedule 2.07.

10 c) Please see the responses to OEB Staff Interrogatory 2, and EDA Interrogatory 5(c) at  
11 Exhibit I, Tab 1.0, Schedule 4.05.

12 d) Please see the response to OEB Staff Interrogatory 2.

1 BOMA INTERROGATORY 8

2 INTERROGATORY

3 *Ref: Exhibit D, Tab 1, Schedule 1, p2*

4 *Please confirm that the SME will maintain a separate account which reflects the costs and the revenues of*  
5 *the TPA program, which will allow the Board and parties to ascertain the performance of the program on*  
6 *a ("standalone basis").*

7 RESPONSE

8 Confirmed, as described in the evidence at Exhibit B, Tab 4 the SME proposes a new sub-  
9 variance account, the Benefits Account, be formed. All net revenues resulting from TPA will be  
10 tracked in this account and the balance of this account will be provided in the Annual cost and  
11 variance Report that is provided to the OEB under case file number EB-2017-0290.

12 Please also see the response to OEB Staff Interrogatory 8 at Exhibit I, Tab 4.0, Schedule 1.08.

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BOMA INTERROGATORY 9

INTERROGATORY

*Ref: Exhibit D, Tab 1, Schedule 1, p3*

Please describe the remedies that the SME will have either contractually or otherwise, in the event that a third party is determined to be breaching the terms of the data use agreement.

RESPONSE

The SME reiterates that the data is not personal information, it pertains to dwellings (and not individuals) and therefore, any risk is for the re-identification of a dwelling. Even though the data is not personal information, the SME is taking steps to protect the data. The first step is to ensure adequate security is in place as described in the response to EDA Interrogatory 9 at Exhibit I, Tab 2.0, Schedule 4.09.

Reference is made to the fact that the data use agreement is not a static document and its terms and conditions may be negotiated, changed and modified for the reasons noted in the response to BOMA Interrogatory 3 at Exhibit I, Tab 0, Schedule 2.03.

The data use agreement will contain a number of provisions to protect the data that range from detecting a breach, to halting any potential ongoing breach, and providing for indemnification in the event of a breach. Specifically, the SME may include the right to audit the contract counterparty to ensure its use of the Data conforms to the data use agreement. It will also contain provisions enabling the SME to seek an injunction in the event of disclosure of confidential information, including the Data, and immediately terminate the data use agreement. Counterparties to the data use agreement may also undertake specific indemnity obligations.

The IESO reserves the right to avail itself of all remedies in law and equity.

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BOMA INTERROGATORY 10

INTERROGATORY

*Ref: Exhibit D, Tab 1, Schedule 1, p3*

Please provide examples of what the SME considers unethical use of acquired data, as well as a definition of "ethical purposes".

RESPONSE

The SME abides by the guidance and definitions provided by the Information and Privacy Commissioner of Ontario and FIPPA (Freedom of Information and Protection of Privacy).

Opportunities for unethical use of the data in the MDM/R are limited given the de-identification protocols applicable to the data that would be made available to third parties. Some examples of unethical uses of data include, but are not limited to:

- enabling stigma (for example, maliciously exposing a low-income population in a certain geography through studying the electricity consumption patterns),
- discrimination (for example, an insurance company raising rates based on profiling a certain geographical area as high electricity intensity and therefore assuming higher propensity to pay higher insurance rates),
- unauthorized surveillance (for example, ongoing data feeds of high electricity consumers for establishing a correlation with unlawful activities),
- uses that conflict with IESO's Code of Conduct, and
- uses to damage the reputation of the IESO/SME or its stakeholders.

In contrast, the OEB's EB-2015-0297 Decision and Order dated January 26, 2016, outlines some of the uses of the data that the SME would consider ethical:

- support the design of conservation and demand management programs,
- the assessment of the effectiveness of time of use pricing,
- the design of distribution rates and time of use prices,
- the regional planning of transmission and distribution systems, and
- the development of new innovative products and services that will enhance customer choice and control.

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1 BOMA INTERROGATORY 11

2 INTERROGATORY

3 *Ref: Exhibit D, Tab 1, Schedule 1, p3*

4 Please provide a list of public sector bodies, or categories of public sector bodies, that have been  
5 determined to have free access to the data. Will these entities be required to sign the data access  
6 agreement, and if not, why not?

7 RESPONSE

8 Please see the response to OEB Staff Interrogatory 9 at Exhibit I, Tab 4.0, Schedule 1.09.

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1 BOMA INTERROGATORY 12

2 INTERROGATORY

3 *Ref: Exhibit D, Tab 1, Schedule 1, p3*

4 Why will the SME only track costs in providing the TPA where the TPA related work is not  
5 required by regulatory or licensed requirements. Please explain fully. (BOMA does not  
6 understand the distinction SME is making between the two categories of costs because all costs  
7 of the TPA originate from regulatory decisions).

8 RESPONSE

9 Please see the response to OEB Staff Interrogatory 9 at Exhibit I, Tab 4.0, Schedule 1.09.

1

2

1 BOMA INTERROGATORY 13

2 INTERROGATORY

3 **Ref:** *Exhibit D, Tab 1, Schedule 1, p3*

4 In SME's view, who owns the customer data to be provided under the TPA?

5 RESPONSE

6 As stated in the response to EDA Interrogatory 4 at Exhibit I, Tab 1.0, Schedule 4.04:

7 *The SME does not believe the question of title to or who owns the smart meter data is relevant to*  
8 *this application. The issue is whether the SME has the authority to provide access to the smart*  
9 *meter data and the SME takes the position that it has the lawful ability to collect, use and provide*  
10 *access to the data and this has been affirmed through OEB decisions requiring this.*

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1 BOMA INTERROGATORY 14

2 INTERROGATORY

3 *Ref: Exhibit D, Tab 1, Schedule 1, p3*

4 Please provide a copy of the financial model.

5 RESPONSE

6 Please see the response to OEB Staff Interrogatory 2 at Exhibit I, Tab 1.0, Schedule 1.02.





BOMA INTERROGATORY 15

INTERROGATORY

*Ref: Exhibit D, Tab 1, Schedule 1, p3*

*Ref: Ibid, p14*

Please provide a copy of the privacy analytics report to the IESO.

RESPONSE

Provided as attachments to this exhibit please find the following reports:

- Attachment 1: IESO Third Party Use Case Re-identification Risk Determination (RRD) / Third-Party Access to De-identified Data / Preliminary observations and discussion points – December 13, 2017.
- Attachment 2: IESO Third-Party Access to De-identified Data Roadmap / Data Strategy Advisory Council Meeting / A summary of the presentation given to Council on 15 June 2017.
- Attachment 3: IESO Third-Party Access to De-identified Data Roadmap / Data Strategy Advisory Council Meeting / Overview of presentation on 2 August 2017.



# IESO – Third Party Use Case Re-identification Risk Determination (RRD)

## Third-Party Access to De-identified Data

*Preliminary observations and discussion points*

*December 13, 2017*



# Proposed agenda

- Context
- What we've done
- What we've observed
- What we may recommend
- What's next





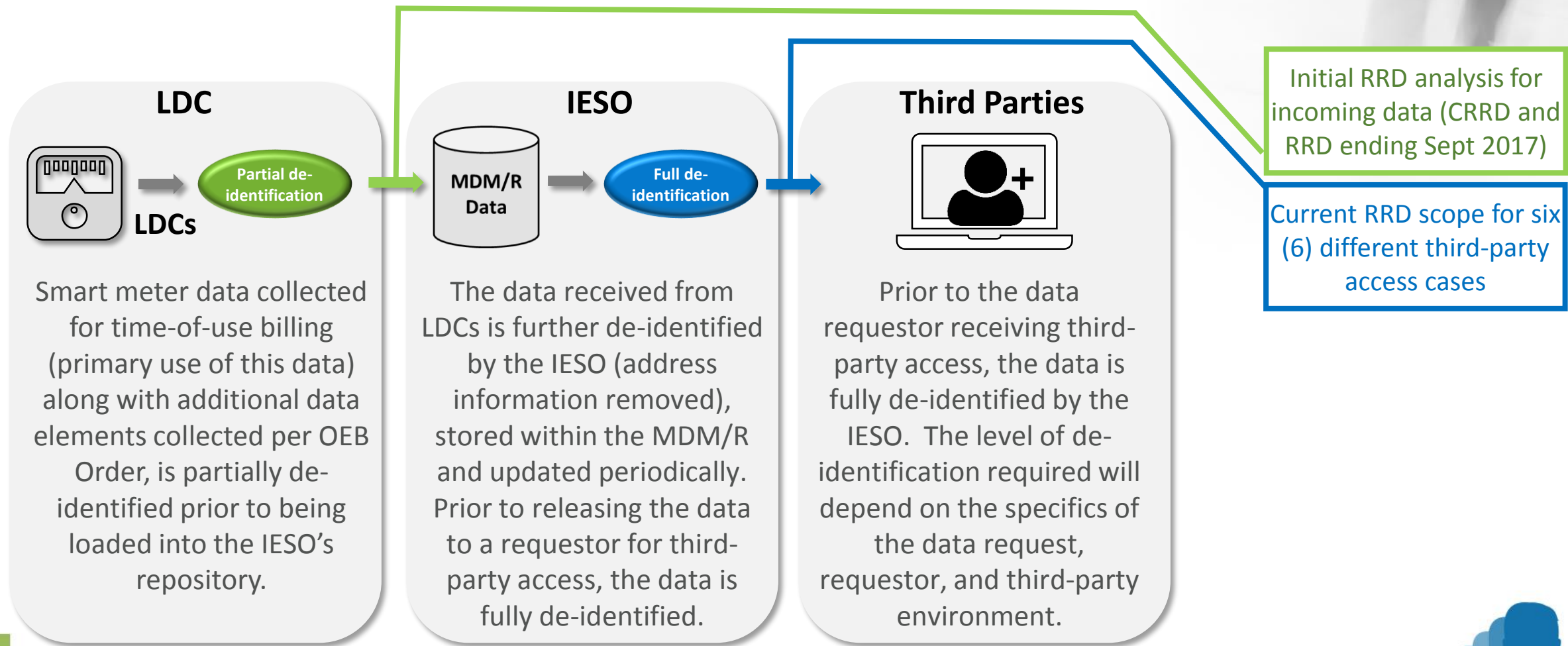
# 1. Context

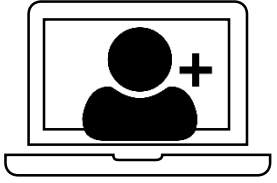
- In November 2017, the IESO engaged Privacy Analytics to determine the re-identification risk for six (6) distinct test cases for third-party access.
- This “re-identification risk determination” project (or “RRD” project) follows previous engagements with Privacy Analytics as follows:
  - A. Performing a conceptual risk determination for incoming MDM/R data (Conceptual RRD)
  - B. Developing a de-identification roadmap spanning people, process, technology
  - C. Performing an empirical risk measurement for the incoming MDM/R data (Actual RRD)
- This RRD project is similar to the previous RRD performed, except it focuses on outgoing data for third-party access, for various recipients and use cases.



## 2. What we've done

- The following identifies the scope of this RRD, versus previous RRDs:





## 2. What we've done

- The scope of this RRD project includes six (6) test cases as follows:

1. Enbridge	} Aggregated data test cases	4. Guelph	} Row-level data test cases
2. Oxford County		5. OEB	
3. IESO 'A'		6. IESO 'B'	

- For these 6 cases, we've performed preliminary analysis and risk measurement.
- All observations being shared today and in this document are preliminary and are subject to change as our work continues.
- We are sharing preliminary observations and recommendations with the intent of sharing knowledge early. The final validated results will be documented in a report.





### 3. What we've observed

- Our observations are organized by the case type – aggregate or row-level data.
- For **aggregate data** test cases, we have noted the following in our initial investigations (currently being further reviewed, validated and expanded on):
  - **Uniqueness:** Aggregated reports include many aggregations that are only made up of one premise – a 'uniqueness' problem. We will recommend a minimum group size for premises to avoid uniqueness.
  - **Minimum threshold:** We are also examining specific risks related to minimum thresholds, such as for reporting standard deviations that may inadvertently disclose consumption information about all individuals in the aggregation group. The specific threshold is currently being investigated.







### 3. What we've observed

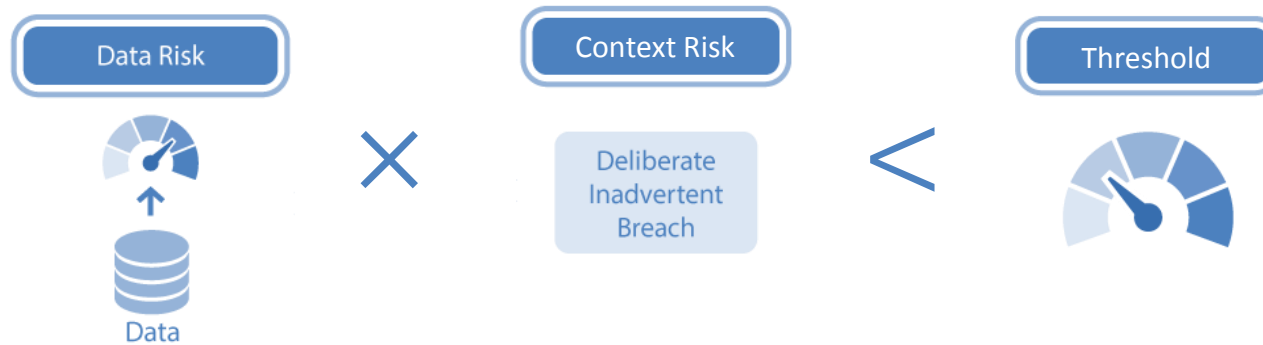
- For **row-level data** test cases, we have noted the following in our initial investigations (currently being further reviewed, validated and expanded on):
  - **Uniqueness:** We noted individual residences to be identifiable as unique within a postal code (observed in all row-level test cases).
  - **Further de-identification required:** The average data risk levels of the master data correspond to previous RRD findings pertaining to the incoming data. The data risk increased with the addition of consumption data in addition to a higher-risk context (average of medium recipient trust, and medium privacy & security controls across test case recipients), and exceeds threshold. Further de-identification will be necessary to reduce risk below threshold.
  - **Identifiability being investigated.** We're currently analyzing the consumption data impact on overall risk. As examples, discontinuity reflecting a period of lower consumption could imply absence from the residence, and higher average consumption can imply a larger residents or more occupants. Combined premise consumption patterns may be equivalent to additional Quasi-identifiers (QIs) that will further increase the data risk.





## 4. What we may recommend

- Recall that risk is comprised of data risk and context risk:



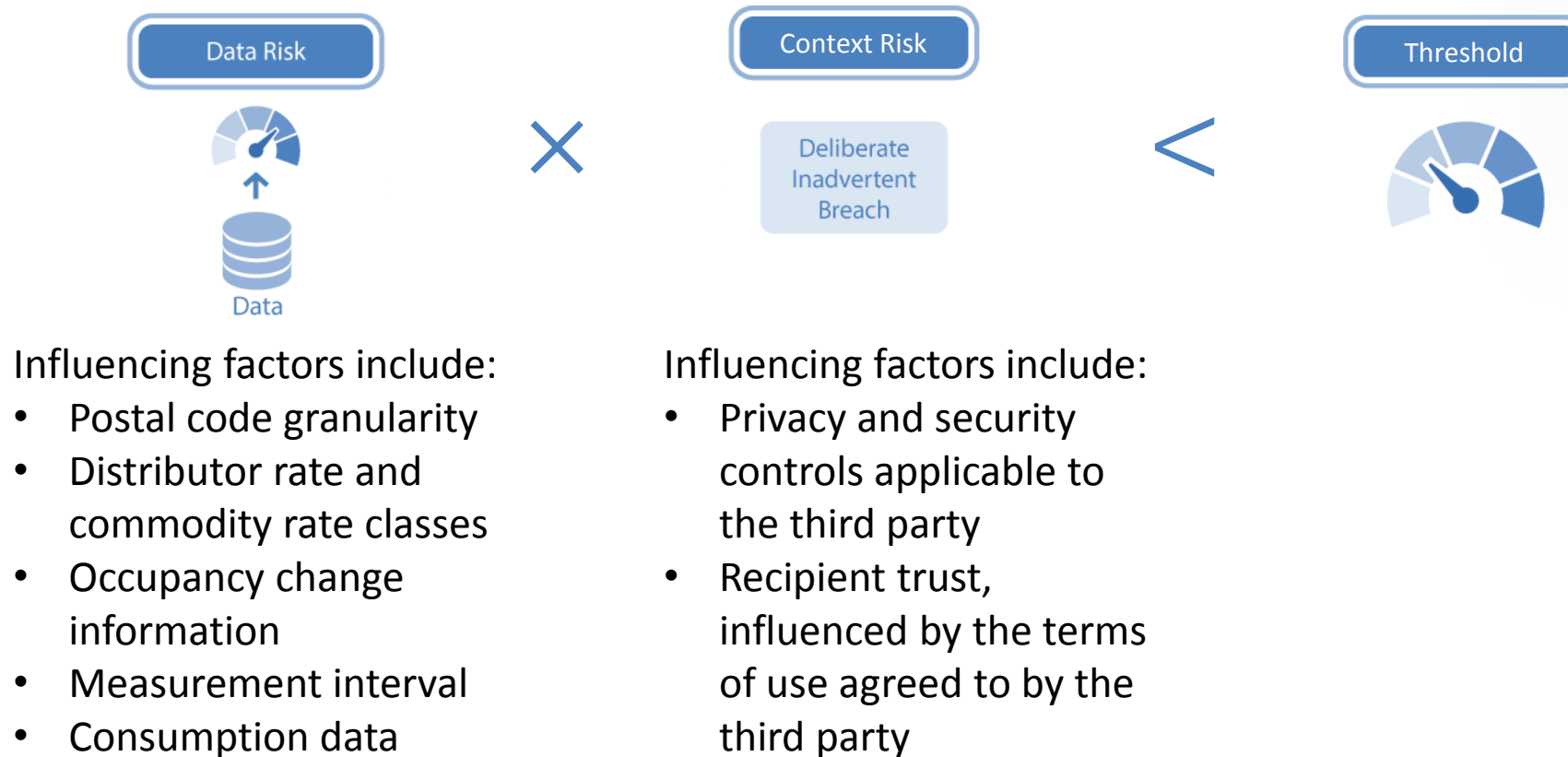
- The context risk is higher for these test cases than it was for the MDM/R environment, and the data risk also increases with consumption data.
- We expect to provide a combination of recommendations, such as the postal code being a maximum of 5 characters (maybe less) with occupancy change date removed, removal of unique premises in a postal code, and case-specific recommendations (e.g. aggregating all consumption intervals to 60 minutes in certain cases).





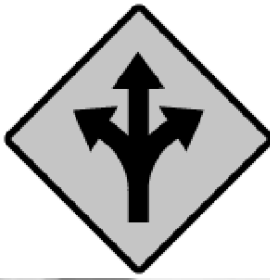
## 4. What we may recommend

- There are often options to reduce the overall risk, such as the following factors:



## 5. What's next

- Privacy Analytics continues to perform the RRD work.
- We are working on an accurate measurement inclusive of consumption data.
- We are in continued dialogue with the IESO as the project progresses.
- The final deliverable will be an RRD report with detailed findings as well as a summary report with the results.



# **Independent Electricity System Operator Third-Party Access to De-identified Data Roadmap**

## **Data Strategy Advisory Council Meeting**

**A summary of the presentation given  
to Council on 15 June 2017**



**PRIVACY  
ANALYTICS**

NOW PART OF IMS HEALTH

# Agenda

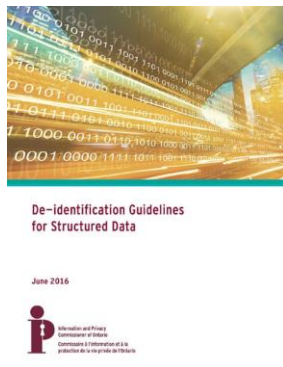
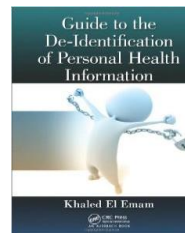
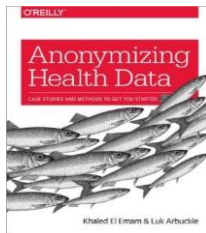
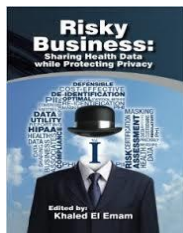
1. Introduction
2. Context
3. Privacy & Compliance by Design
4. Examples: The Good, the Bad, the Ugly
5. Methodology
6. Roadmap to Third-Party Access to De-Identified Data



# 1. Introduction



We enable customers to effectively **leverage data assets for secondary use** through proven risk based data de-identification solutions.



- **Experts** – recognized global leader in risk-based de-identification practises
- **Trusted** – 150+ peer reviewed publications, 25+ pending and current patents, strong working relationships with regulators and international organizations
- **Proven** – end-to-end risk based de-identification solutions that encompass software technology and professional services (customers include 3M, pharmaceutical companies, governments)

## 2. Context

- In January 2016, the Ontario Energy Board issued Order EB-2015-0297, which required the Independent Electricity System Operator (IESO), as the Smart Metering Entity, to collect additional smart meter information from Local Distribution Companies (LDCs) and to develop an implementation plan for **third-party access** to the data within the Meter Data Management and Repository (MDM/R). IESO operates the MDM/R, which processes smart meter consumption data from MDM/R service recipients in Ontario to support Time-of-Use billing.
- IESO has a long term vision to **add value** to the electricity system and customers (to support regional and provincial planning).
- IESO plans to implement a **6-9-Month Pilot** to offer Smart Meter data to third parties in 2017, with plans to fully launch third-party access in 2018.
  - IESO will pilot the implemented systems and processes while providing useful information to a segment of the stakeholder community.
  - IESO will determine any necessary adjustments to systems, processes and legal agreements based on the results of the Pilot.





### 3. Privacy & Compliance by Design

- Core to the third-party access implementation plan is a **de-identification strategy and methodology** aligned to Guidelines from the Ontario Information and Privacy Commissioner, which reflect **industry standards** and best in class practices.
- De-identification **removes personal information** (PI). PI is information that relates to an identifiable human being, governed by privacy laws. Data that is “de-identified” is no longer considered PI. De-identification does not reduce the risk of re-identification to zero – the risk of re-identification is instead very small.
- The de-identification methodology that the IESO plans to adopt is the **standard approach** in the disclosure control community. Re-identification **risk measurement** is an integral part of the process, with the **context** of the data disclosure taken into account when deciding what transformations to apply to the data. The process is **evidence-based**, building on strong precedents.
- Access to data and use of data for secondary purposes is becoming increasingly important across industries (e.g., transparency in clinical trials). The need to de-identify properly is becoming even more important – “locking data up” is not an option, and **privacy is paramount**.



### 3. Privacy & Compliance by Design

**Value chain: Driving outcomes for Ontario rate payers, the broader public, the environment and potential other sectors through access to Ontario electricity usage data.**



- ✓ Ontario residents
- ✓ Environment
- ✓ Broader public



- ☐ Governments
- ☐ Municipalities
- ☐ Academia
- ☐ Commercial
- ☐ Not-for-profits



**Protecting the privacy of Ontario residents is paramount to achieving public good outcomes, maintaining stakeholder trust, and meeting the IESO's commitment to "Privacy & Compliance by Design".**

## 4. Examples: The Good, the Bad, the Ugly

### The Good



Doctors can log into CancerLinQ to search de-identified information on similar patients to confirm their decision or adjust treatment plans based on other patients' experiences. CancerLinQ also enables researchers to see patterns in cancer and cancer treatments, as well as develop hypotheses for further research.

### The Bad



Netflix publicly released movie ratings data in the context of a competition. However, the data hadn't been sufficiently de-identified. Researchers re-identified a few records by matching with a publicly-available and identifiable movie ratings database. This re-identification resulted in backlash and litigation.

### The Ugly



In 1997, Governor William Weld's medical data was re-identified from an insurance data set that had been stripped of direct identifiers. This re-identification was achieved by an MIT student using a voter registration list. This re-identification had a significant impact on the development of de-identification provisions in privacy legislation that followed.

## 5. Methodology

### 5.a) Background

- IESO requires a comprehensive roadmap that focuses on early wins, building towards a larger long-term goal.
- A key aspect of this roadmap is considering privacy and the personal information contained in the data.
- Third-party access to de-identified data requires a **holistic** approach to managing data risks with consideration for people, process and technology:



#### People

Organization and privacy culture, governance committees, regulatory monitoring, training, performance management.



#### Process

Procedures to manage information flows end-to-end and provide data access, implement security, and manage re-identification risk.



#### Technology

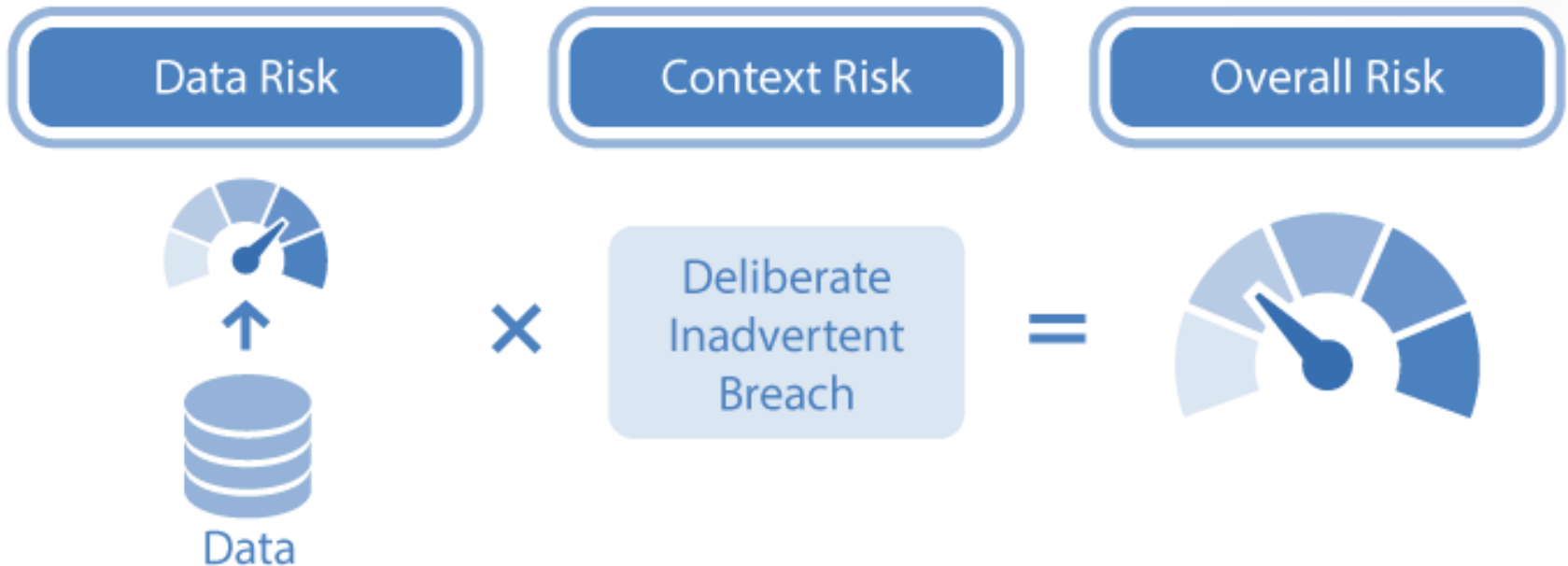
Methods of protecting PI while preserving data utility, such as tools to enable and automate the de-identification methodology.



## 5. Methodology

### 5.b) What is a risk-based approach?

The risk-based approach considers data risk and context risk. **Data risk** is based on the characteristics of the dataset whereas **context risk** relates to the likelihood of an attempt to re-identify an individual (either deliberately, inadvertently, or by way of an accidental breach). The importance of these risks is explained on the next slide.



## 5. Methodology

### 5.c) Why is context important?

Context risk includes the likelihood of an **adventent (or deliberate)** attempt by the data recipient to re-identify an individual, or by way of a **breach** to other recipients. Context risk also includes the risk of an **inadvertent** re-identification by a data recipient who recognizes an acquaintance in the dataset.

**Context risk** evaluates the likelihood that re-identification will be “attempted” (based on the circumstances in which de-identified data is disclosed) whereas **data risk** evaluates the likelihood that re-identification will be successful if attempted (based on the identifiability of the actual data).

To evaluate context risk, several factors are considered, such as the motives and capacity of the data recipient to attempt re-identification. Data-sharing agreements (DSA) and enforcement of DSA terms are an important control in mitigating the risk. Security controls within the environment are also an important factor. Formally and consistently evaluating these factors leads to the evaluation of **context risk**.



## 5. Methodology

### 5.d) How do you perform risk-based de-identification?

#### 1. Set Risk Threshold

Based on the characteristics of the data (e.g. the data sensitivity) and precedents, a quantitative risk threshold is set.

Set  
Threshold

#### 2. Measure Risk

Appropriate metrics are selected and used to measure re-identification risk from the data and context.

Measure  
Risk

#### 4. Apply Transformations

If the measured risk is not below the threshold, specific transformations are applied for further de-identification of the data to reduce the risk below the threshold.

Transform  
Data

Compare to  
Threshold

#### 3. Compare to Threshold

The actual risk is measured and compared to the risk threshold.

## 6. Roadmap to Third-Party Access to De-identified Data

- IESO requires a comprehensive roadmap that focuses on early wins, building towards a larger long-term goal.
- Privacy Analytics is developing a recommended **de-identification roadmap** for implementing third party data access, considering:



People (e.g. organizational roles, capacity)



Process (e.g. data management procedures)



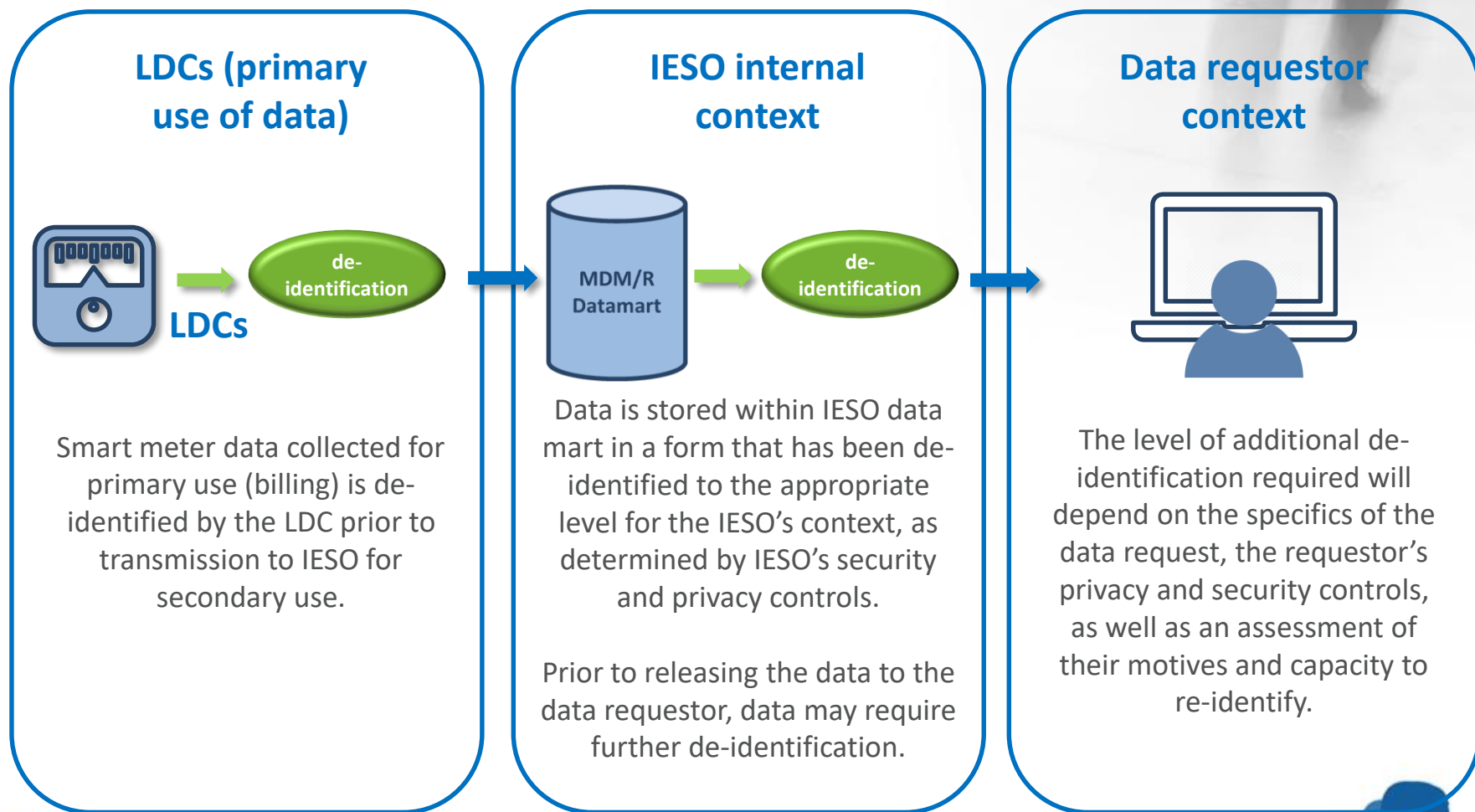
Technology (e.g. tools and de-identification automation)

- The roadmap will align to the existing Third-Party Access Framework, design principles and schedule.
- The roadmap will consider **pilot use cases** that will be used to refine the Third-Party Access Framework and establish early success.
- Related projects performed by Privacy Analytics for the IESO are examining the actual data to inform de-identification specifications.



## 6. Roadmap to Third-Party Access to De-identified Data

The following is a high-level overview of two key de-identification steps in the information flow from LDCs to data recipients.



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# Independent Electricity System Operator (IESO)

## Third-Party Access to De-identified Data Roadmap

*Data Strategy Advisory Council Meeting  
Overview of presentation on  
2 August 2017*



PRIVACY  
ANALYTICS



# Agenda

1. Introduction
2. Context
3. Options Analysis
4. Roadmap



# 1. Introduction

In January 2016, the Ontario Energy Board issued Order EB-2015-0297, requiring the IESO, as the Smart Metering Entity (SME)\*, to:

- ▶ Collect **additional smart meter information** from Local Distribution Companies (LDCs)
- ▶ Develop an **implementation plan for third-party access** to data contained within the Meter Data Management and Repository (MDM/R)

In May 2017, Privacy Analytics was engaged to deliver a **de-identification options analysis and roadmap** for third-party access to de-identified data. The roadmap was delivered on 28 July 2017.

\* The IESO is designated as the SME for Ontario and the SME division of the IESO carries out the “SME” mandate of the IESO through its provincial Meter Data Management and Repository (MDM/R). References to the IESO, the SME or the MDM/R, as organizations, entities or data systems, may be used, to some extent, interchangeably in this document.

Privacy Analytics enables customers to effectively **leverage data assets for secondary use** through proven risk-based data de-identification solutions.

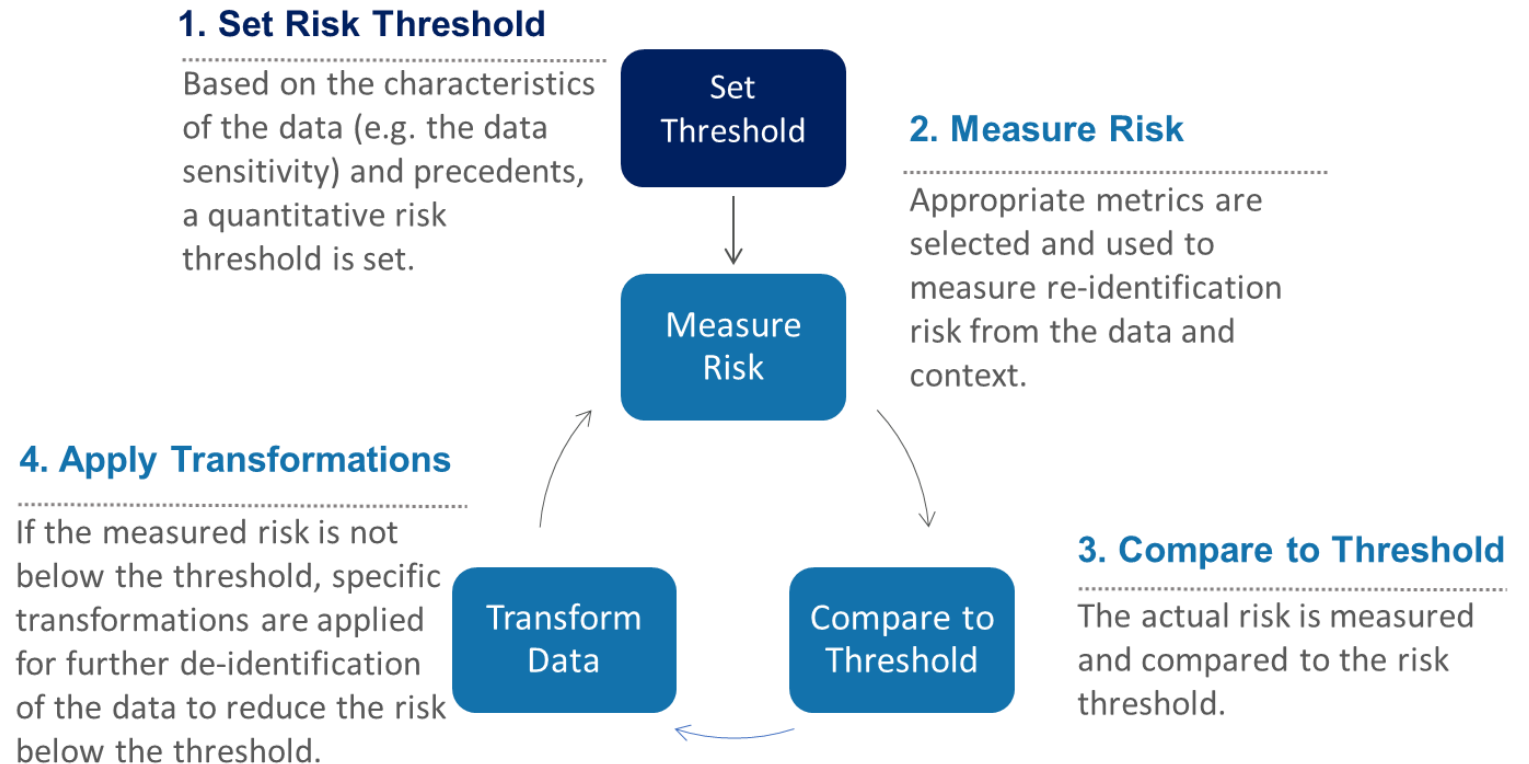


- **Experts** – recognized global leader in risk-based de-identification practises
- **Trusted** – 150+ peer reviewed publications, 25+ pending and current patents, strong working relationships with regulators and international organizations
- **Proven** – end-to-end risk based de-identification solutions that encompass software technology and professional services (customers include 3M, pharma companies, governments)

## 2. Context

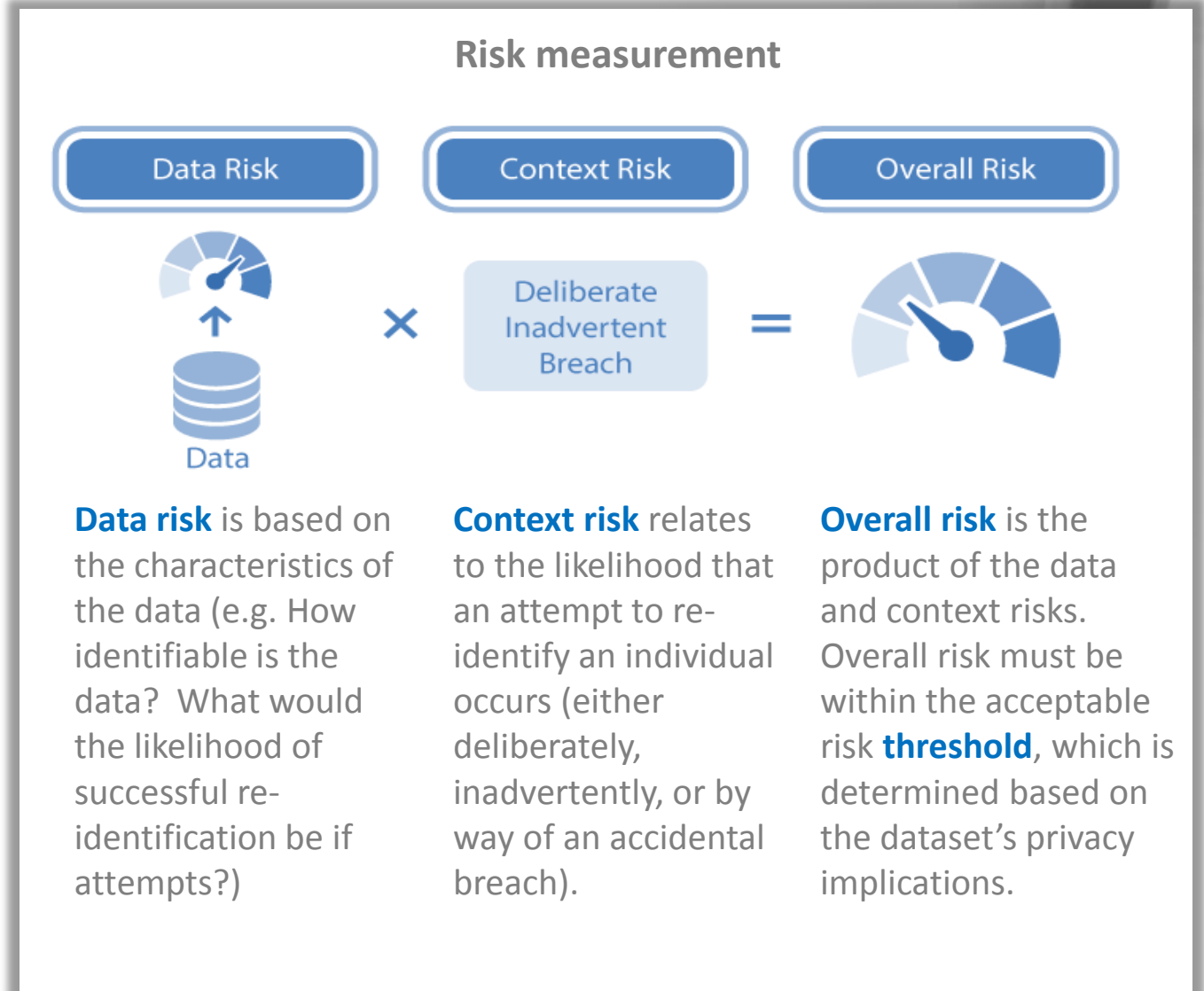
- Core to the implementation plan is a de-identification methodology that is the **standard approach** in the disclosure control community.
- This methodology is aligned to the **Information & Privacy Commissioner's** (IPC) De-identification Guidelines, which reflect industry standards and best practices and were written in collaboration with Dr. Khaled El Emam, President of Privacy Analytics.

### Methodology for risk-based de-identification



## 2. Context

- Re-identification risk measurement is an integral part of the process.
- Re-identification **risk measurement** considers data risk and context risk.
- Context risk evaluates the likelihood that re-identification will be “attempted” deliberately or inadvertently (based on the circumstances in which de-identified data is disclosed) whereas data risk evaluates the likelihood that re-identification will be successful if attempted (based on the identifiability of the actual data).





## 2. Context

The illustration below presents the **value chain** for driving **outcomes** for Ontario rate payers, the broader public, the environment and potential other sectors through access to Ontario electricity usage data.



**Protecting the privacy of Ontario residents is paramount to achieving public good outcomes, maintaining stakeholder trust, and meeting the IESO's commitment to "Privacy & Compliance by Design".**

- ✓ Ontario residents
- ✓ Environment
- ✓ Broader public



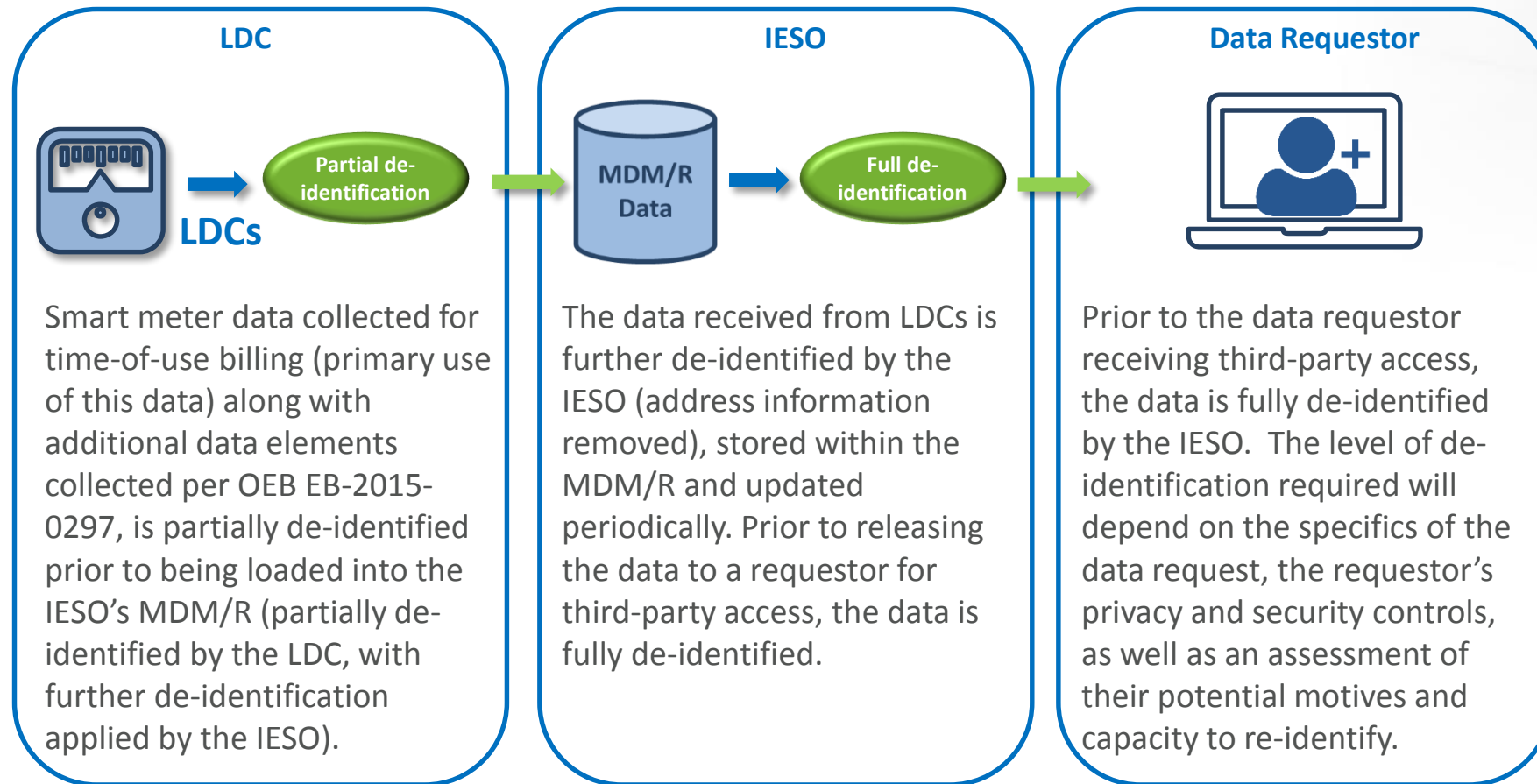
- ☐ Governments
- ☐ Municipalities
- ☐ Academia
- ☐ Commercial
- ☐ Not-for-profits





## 2. Context

IESO operates the MDM/R and processes smart meter consumption data to support Time-of-Use billing in Ontario. Secondary uses of MDM/R data are becoming increasingly important, and a core objective of third-party access. The de-identification process is evidence-based and justifiable, building on strong precedents.



## 3. Options Analysis

As part of our engagement to develop a recommended roadmap, we considered and compared different options for the IESO's implementation of third-party access to de-identified data.

Our focus was on enabling IESO's third-party data access outcomes while properly implementing the IPC De-identification Guidelines.

Our options analysis considered the:

- Types of data available for third-party access.
- Potential future volumes and complexity of data requests.
- Schedule for the third-party access implementation plan (i.e. pilot, implementation, and value generation steady-state)

Three option areas were considered to enable third-party access:

1. Options for the types of MDM/R de-identified data offered (**“data offerings”**)
2. Options for **provision** of the re-identification risk assessment and de-identification of data products
3. Options for the technology platforms to **request** and **deliver** MDM/R de-identified data



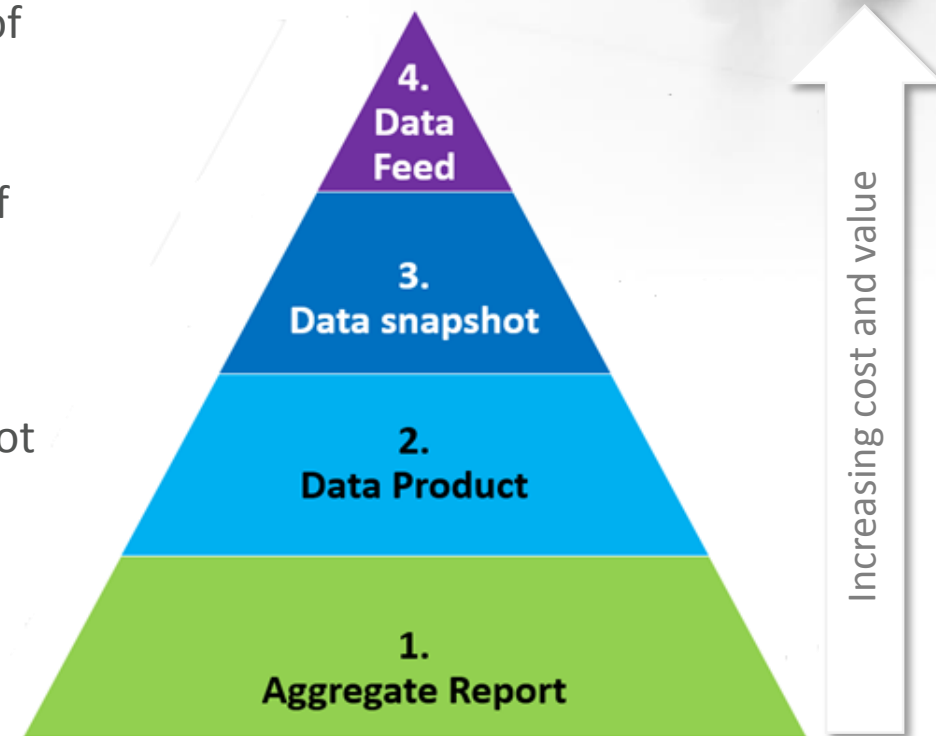
## 3. Options Analysis

### Option Area 1: MDM/R De-identified Data Offering Types



We considered four potential types of data offerings:

4. **Data Feed** – This type is a continual feed of the raw de-identified data in MDM/R
3. **Data Snapshot** – This type is a snapshot of the data from MDM/R
2. **Data Product** – This type is a pre-determined report or analytics product, not for public use
1. **Aggregate Report** – This type is aggregated report that is de-identified for unrestricted or public use



### 3. Options Analysis

#### Option Area 1: MDM/R De-identified Data Offering Types



For these offerings, the risk assessment and de-identification options include:

#### Option 2: Pre-determined Offerings

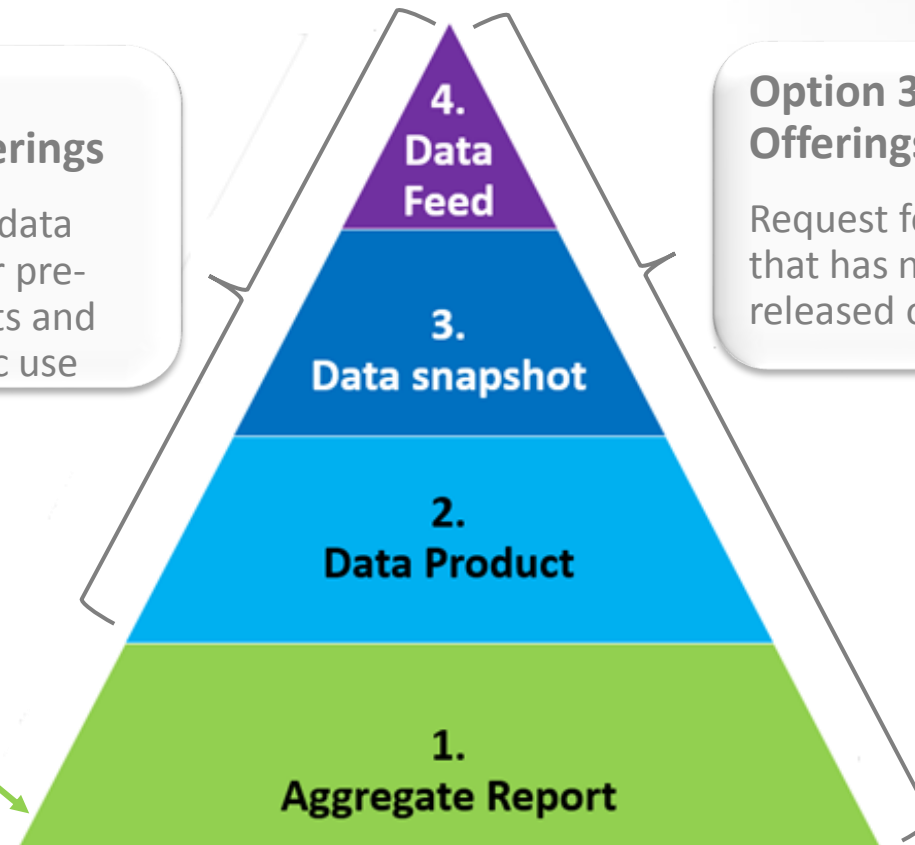
A pre-determined data that is available for pre-approved recipients and uses, not for public use

#### Option 1: Open Context Offerings

Standardized aggregated data set that is de-identified for public use

#### Option 3: Custom Offerings

Request for a new data set that has not been previously released or used



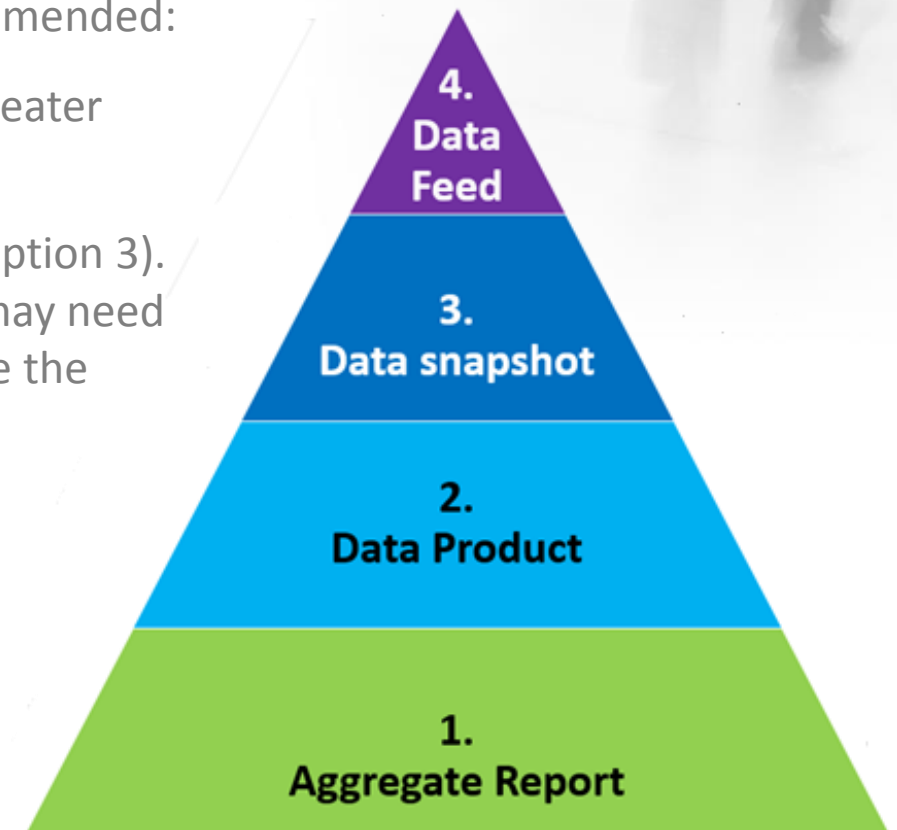
## 3. Options Analysis

### Option Area 1: MDM/R De- identified Data Offering Types



For the types of data offerings, we recommend a combination of offerings that emphasize standardization based on early (e.g. test case) customized releases. Specifically, we recommended:

- Developing **standardized products** over time for greater efficiency (Options 1 and 2)
- Considering a **premium fee** for custom requests (Option 3). Initial data sets (e.g. pilot, early implementation) may need to be customized to build the know-how and refine the framework.



## 3. Options Analysis

### Option Area 2: Provision of the Risk Assessment and De- identification of Data Offerings



For the provision of the risk assessments and de-identification determinations, we considered two general options as follows:



#### Option 1: Build in-house capacity

Develop in-house skills,  
competency and tools



#### Option 2: Outsource

Focus efforts on core  
business activities

Within the first option of building in-house capacity, we considered various methods of measuring risk and applying risk-based determination (e.g. rules-based methods, process-based methods, and automation).

Based on discussions with the IESO, we recommended an **outsourcing model** where re-identification risk determination and de-identification specifications are provided as a service by a trusted third party, allowing the IESO to focus on core business and customer satisfaction.

## 3. Options Analysis

### Option Area 3: Technology Platforms to Request and Deliver MDM/R De- identified Data



For the provision of the risk assessments and de-identification determinations, we considered two general options as follows:



#### Intake Options:

There are two generalized technology options for the **application** process:

- Option 1: Email (Manual)
- Option 2: Portal (semi-automated)



#### Delivery Options:

There are three generalized technology options for the **delivery** process:

- Option 1: Email/file share
- Option 2: Portal download
- Option 3: Other electronic exchanges

Based on our review of the options and discussion with the IESO, we recommended using a **portal** for the application and delivery processes for MDM/R de-identified data.

## 3. Options Analysis

### Option Area 3: Technology Platforms to Request and Deliver MDM/R De- identified Data



Within the “portal” option, there are different approaches as follows:

#### 1. Leverage

Leverage exiting IESO technology platforms

#### 2. Implement

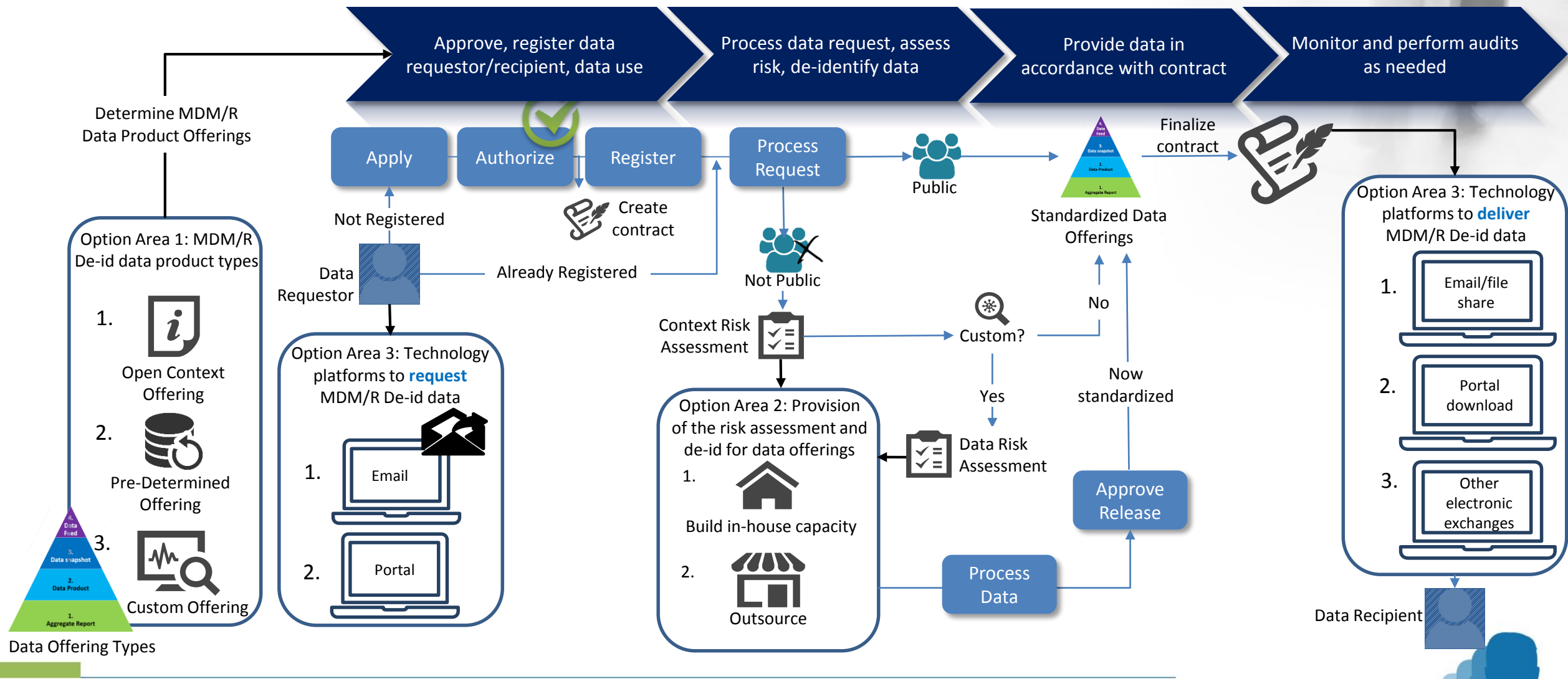
Implement a new, custom portal solution to receive and deliver data requests from third parties

We recommended that the IESO **assess the “leverage” option for feasibility** in meeting its current and future needs. If the current platforms cannot meet these needs, the second option is the alternative.



# 3. Options Analysis

This illustration summarizes where the options are applicable to the IESO’s third-party access process



## 4. Roadmap

The roadmap contains **15 recommendations**, where some of these include multiple activities and span across one or more of the three domains:



People (e.g. organizational roles, capacity)



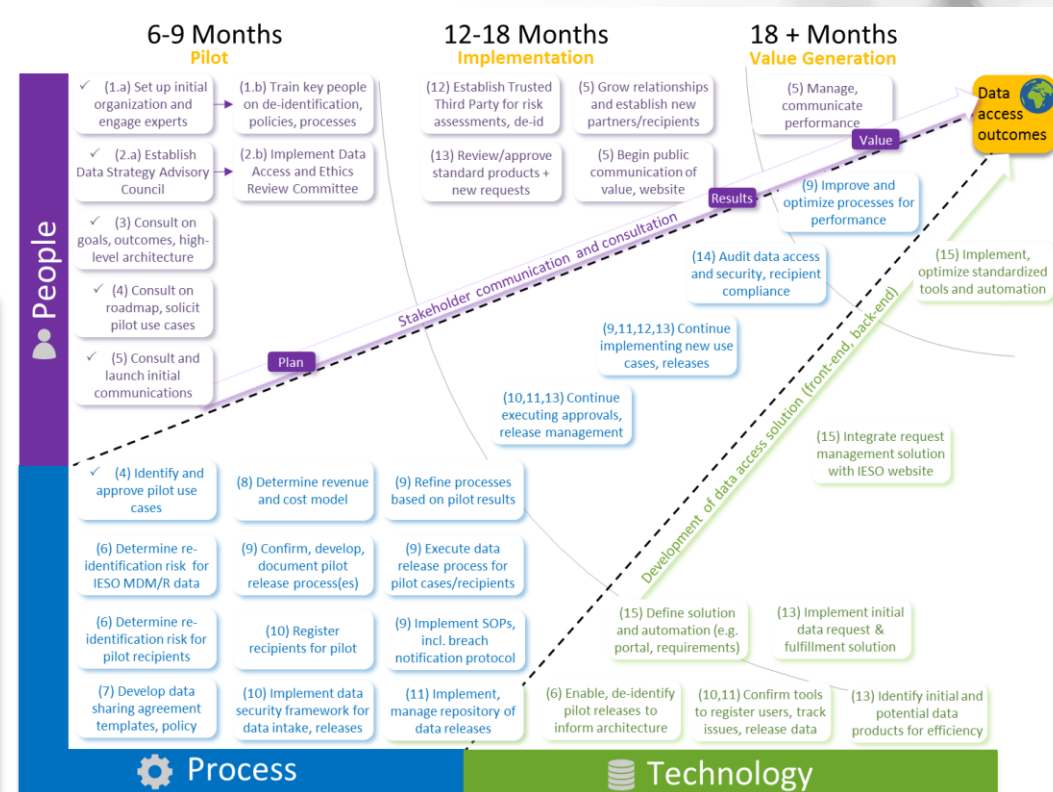
Process (e.g. data management procedures)



Technology (e.g. tools, automation)



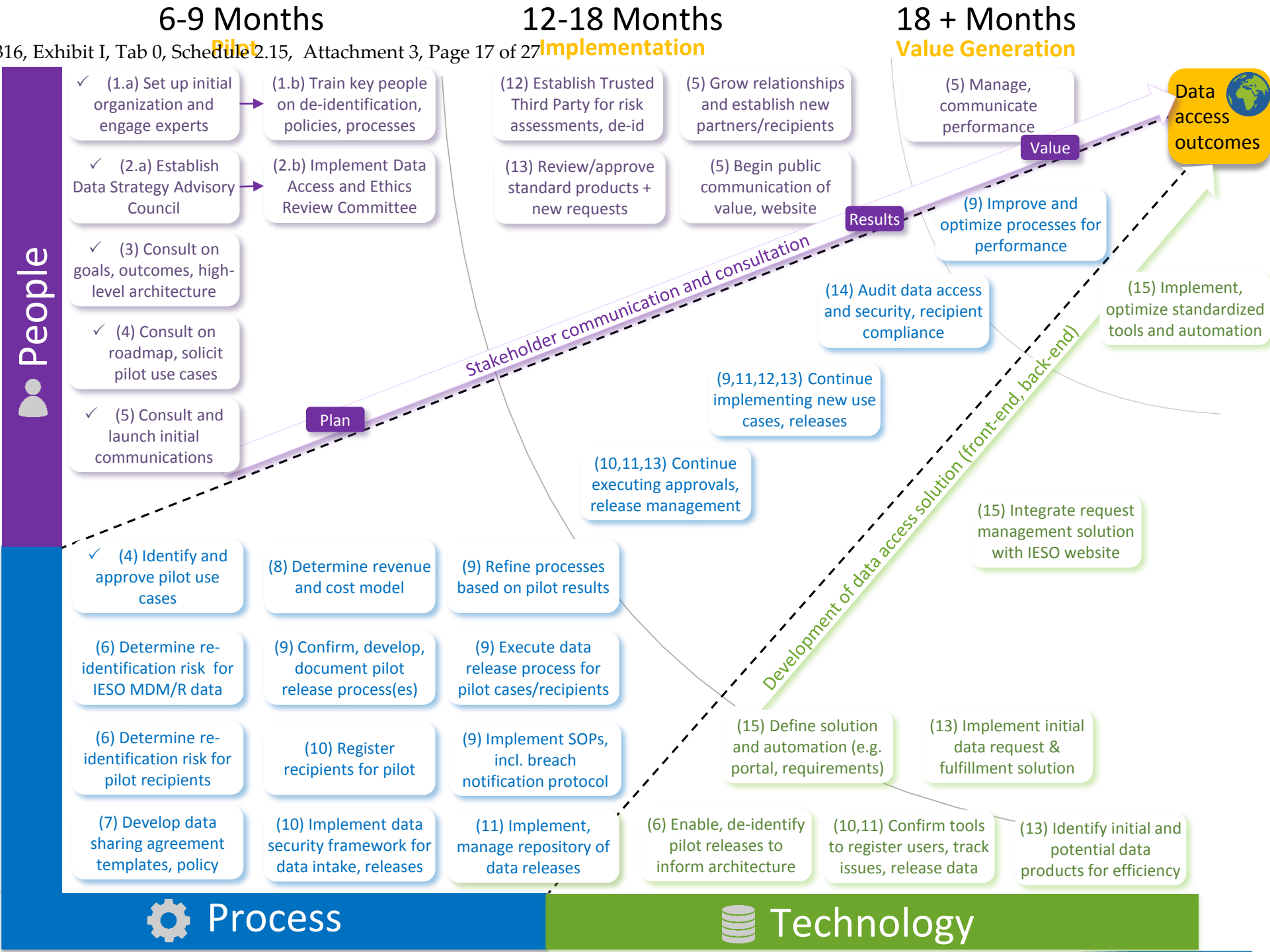
All 15 recommendations are intended to support a **broader data governance framework** for the IESO. Our recommendations focus on enabling effective data de-identification, with the roadmap assuming an effective data governance foundation is already in place to support the development and release of quality data offerings.



# 4. Roadmap

Other important activities to achieve data access outcomes may fall outside the scope of this engagement, such as the overarching data governance framework.

Activities mostly completed already by the IESO are denoted by a ✓



# Appendices

## Supplementary details






PRIVACY  
ANALYTICS






# Appendix A: Roadmap recommendations

The following table presents the recommendations and the associated phases and activity requirements mapped in the roadmap. These recommendations span **people**, **process**, and **technology** domains, which generally require close integration for an effective implementation.




#	Recommendation	Phase & Activity Requirements			
1	Acquire expertise	<b>For the Pilot:</b> The following two activities are recommended in the Pilot to acquire expertise: <ul style="list-style-type: none"> <li><b>a) Set up initial organization and engage experts</b> – This activity is completed. The initial organization is in place and IESO has engaged external expertise (including consulting with the IPC) to assist with the implementation plan.</li> <li><b>b) Train key people on de-identification, policies and processes</b> – We recommend that IESO implement a privacy training program that provides foundational knowledge that can be tailored to audiences and that can evolve over time (training should create a common understanding, terminology, and approach to risk management, including core concepts for risk-based de-identification).</li> </ul>	✓		
2	Establish advisory and review committees	<b>For the Pilot:</b> The following two activities are recommended in the Pilot to establish the appropriate committees: <ul style="list-style-type: none"> <li><b>a) Establish Data Strategy Advisory Council</b> – The Data Strategy Advisory Council was established on June 8, 2017.</li> <li><b>b) Implement Data Access and Ethics Review Committee</b> – We recommend that IESO Implement an ethics and access review committee responsible for approving requests for data access and usage according to a defined review process.</li> </ul>	✓		
3	Consult on goals, outcomes, high-level architecture	<b>For the Pilot:</b> <ul style="list-style-type: none"> <li><b>Consult on goals, outcomes, high-level architecture</b> – Consultation for the goals, outcomes, and high-level architecture have occurred. To support performance management, benefits realization should be incorporated into the plans with clearly defined outcomes that can be measured and demonstrated through program evaluation.</li> </ul>	✓		






# Appendix A: Roadmap recommendations

#	Recommendation	Phase & Activity Requirements			
4	Consult on roadmap, identify use cases	<b>For the Pilot:</b> <ul style="list-style-type: none"> <li><b>Consult on roadmap and solicit pilot use cases</b> – IESO engaged PA to collaboratively develop this roadmap. IESO will continue to refine the roadmap from what is learned in the Pilot and during implementation.</li> <li><b>Identify and approve pilot use cases</b> – Pilot use cases were submitted on 19 July 2017. For the Data Strategy Advisory Council on 2 August 2017, the IESO will discuss the “summarized” test cases that were received and will advise that the selection process is underway.</li> </ul>	✓	✓	
5	Consult, communicate, build stakeholder relationships	<b>For the Pilot:</b> <ul style="list-style-type: none"> <li><b>Consult and launch initial communications</b> – IESO has engaged with potential key stakeholders on the submission of pilot use cases, and has started to publish the activities of the Data Strategy Advisory Council on their website for open and transparent communications. Continued communication, including on core concepts related to how the IESO will manage privacy and re-identification risks, could help promote stakeholder understanding, alignment and buy-in.</li> </ul>	✓		
		<b>For Implementation:</b> <ul style="list-style-type: none"> <li><b>Grow relationships and establish new partners/recipients</b> – We recommend that the IESO continue to work with Data Strategy Advisory Council members as well as pilot data requestors and key stakeholders to ensure that that the processes supporting third-party data access are suited to the volume and type of data that will be requested.</li> <li><b>Begin public communication of value and enhance website</b> – We recommend that the IESO continue its messaging with key stakeholders and the public to raise awareness of the types of data products being offered and the business value being generated as use of data is implemented by third parties.</li> </ul>	✓		
		<b>For Value Generation:</b> <ul style="list-style-type: none"> <li><b>Manage and communicate performance</b> – We recommend that IESO establish results-oriented performance management objectives and measures to continuously improve and promote effective responsiveness and customer (i.e. recipient) satisfaction. Program evaluation is an important component to measuring performance against defined outcomes. The performance objectives should embed privacy awareness and performance across the value chain activities. As IESO matures and evolves to meet the demands and exploit opportunities, greater emphasis may be placed on data utility in support of specific analytics use cases. There should be consideration for data utility within performance measures to help refine processes to increasingly optimize data utility over time.</li> </ul>	✓		

# Appendix A: Roadmap recommendations




#	Recommendation	Phase & Activity Requirements			
6	Perform initial risk assessments and pilot de-identification	<b>For the Pilot:</b> <ul style="list-style-type: none"> <li><b>Determine re-identification risk for IESO MDM/R data</b> – Receive re-identification risk assessments from PA on September 8, 2017 to validate data being received by the IESO from LDCs is properly de-identified.</li> <li><b>Determine re-identification risk for pilot recipients</b> – Assess the re-identification risk of pilot use cases.</li> <li><b>Enable and de-identify pilot releases to inform architecture</b> – Utilize a manual application and delivery process during the pilot and engage an external service provider to assess the requirements of the process for current and future volume and complexity of requests.</li> </ul>		✓	✓
7	Develop data sharing template, policy	<b>For the Pilot:</b> <ul style="list-style-type: none"> <li><b>Develop data sharing agreement templates and policy</b> - Implement a standardized third-party registration process with defined tiers of recipients and associated requirements in contractual agreements (i.e. data sharing agreements, data use templates). Also establish centralized management and oversight of data releases, agreements and contractual obligations.</li> </ul>		✓	
8	Develop revenue and cost model	<b>For the Pilot:</b> <ul style="list-style-type: none"> <li><b>Determine revenue and cost model</b> – Determine revenue and cost models as well as pricing options for access to MDM/R de-identified data.</li> </ul>		✓	
9	Develop, implement, optimize processes and SOPs	<b>For the Pilot:</b> <ul style="list-style-type: none"> <li><b>Implement Standard Operating Procedures (SOPs), including a breach notification protocol</b> – Implement SOPs to establish consistency, including for responding to reported breaches (i.e. suspected re-identification).</li> <li><b>Confirm, develop, document pilot release process(es)</b> – Introduce sound processes for re-identification risk assessment and de-identification (where applicable). Document the processes to be followed for pilot releases, identifying what activities are performed in-house by the IESO and any activities to be performed by the trusted third party.</li> <li><b>Refine processes based on pilot results</b> – Examine processes used in the pilot release to determine what processes and types of data products would generate the most value to IESO and data recipients.</li> <li><b>Execute data release process for pilot cases/recipients</b> – Deliver de-identified data to pilot data recipients while examining options to improve the workflow for application for and delivery of data products.</li> </ul>		✓	✓

# Appendix A: Roadmap recommendations




#	Recommendation	Phase & Activity Requirements			
9	Develop, implement, optimize processes and SOPs (continued)	<b>For Implementation:</b> <ul style="list-style-type: none"> <li>• <b>Continue implementing new use cases and releases</b> – Continue to facilitate third-party access to MDM/R de-identified data by implementing new use case and releases, refining the processes established in the Pilot, while also continuously monitoring volume and complexity of data requests and the best process to support third-party access.</li> </ul>		✓	
		<b>For Value Generation:</b> <ul style="list-style-type: none"> <li>• <b>Improve and optimize processes for performance</b> – Continue to optimize processes from implementation phase to provide efficient, effective and seamless application and delivery of MDM/R de-identified data. Implement mechanisms to solicit, measure, analyze and improve customer satisfaction. Other performance measures can include financial (e.g. measured through revenue, volumes of releases), customer satisfaction (e.g. measured through surveys), compliance (e.g. measured through audits, monitoring reports), outcomes (e.g. measured through public good, sentiment analysis).</li> </ul>		✓	
10	Implement security framework for data intake, releases	<b>For the Pilot:</b> <ul style="list-style-type: none"> <li>• <b>Register recipients for pilot</b> – Register the pre-determined recipients for the pilot.</li> <li>• <b>Implement data security framework for data intake and releases</b> – Promote a strong culture of security and privacy by design, with security controls in place to safeguard MDM/R data coming into the IESO as well as to secure the end-to-end workflows, from data request/application to data release.</li> <li>• <b>Confirm tools to register users, track issues, and release data</b> – Evaluate existing tools for ability to register users, track issues and release data. In the short-term (Pilot), modify existing tools or add manual process to performs use cases.</li> </ul>		✓ ✓	✓
		<b>For Implementation:</b> <ul style="list-style-type: none"> <li>• <b>Continue executing approvals and release management</b> – Shift from the pilot phase and formalize the implementation by continuing the executive approvals and release management for de-identified data products.</li> </ul>		✓	



# Appendix A: Roadmap recommendations

#	Recommendation	Phase & Activity Requirements			
11	Implement, manage repository of data releases	<b>For the Pilot:</b> <ul style="list-style-type: none"> <li><b>Implement and manage repository of data releases</b> - Institute centralized tracking of all data releases with indexed documentation/libraries to demonstrate compliance (coordination with service provider is required if outsourced to a trusted third party). Specifically, each data use, release, and supporting approval/re-identification risk report should be centrally consolidated with effective metadata for ease of searching. This central library with complete and indexed documentation for each use/release can be used to demonstrate compliance and enable proper monitoring and audit of analytics uses, outputs and other activities.</li> <li><b>Confirm tools to register users, track issues, release data</b> – Review tools to register requestors/recipients, track issues, and release data in light of the determination of re-identification risk (for IESO and recipients). Track all releases through central tracking with associated details, including agreements.</li> </ul>		✓	
		<b>For implementation:</b> <ul style="list-style-type: none"> <li><b>Continue executing approvals and release management</b> – In light of the determination of re-identification risk (for IESO and recipients) and consideration of other factors (e.g. ethics, fairness), continue executing approvals and managing releases of data.</li> <li><b>Continue implementing new use cases and releases</b> - In light of the determination of re-identification risk (for IESO and recipients), continue implementing new use cases and releases.</li> </ul>		✓ ✓	✓
12	Establish Trusted Third Party for risk assessments, de-id	<b>For implementation:</b> <ul style="list-style-type: none"> <li><b>Establish Trusted Third Party for risk assessments and de-identification</b> – Assuming IESO proceeds with an outsourcing model, engage trusted third party for ongoing re-identification risk assessment and de-identification services (envisioned to services to specify the level of de-identification needed, which the IESO would then implement in house).</li> <li><b>Continue implementing new use cases and releases</b> - In light of establishing the trusted third party for risk assessments and de-identification, continue implementing new use cases and releases.</li> </ul>	✓	✓	
13	Review, approve, implement data releases/products	<b>For the Pilot:</b> <ul style="list-style-type: none"> <li><b>Identify initial and potential data products for efficiency</b> – In alignment with the options analysis that suggested different types of products, consider identifying standardized products for efficiency. Over time, the catalogue of available products can evolve. The IESO has already identified a list of potential publicly-accessible data products.</li> </ul>			✓

# Appendix A: Roadmap recommendations

#	Recommendation	Phase & Activity Requirements			
13	Review, approve, implement data releases/products (continued)	<b>For implementation:</b> <ul style="list-style-type: none"> <li>• <b>Review/approve standard products plus new requests</b> – Examine and decide which data products will generate the most value for IESO and data recipients.</li> <li>• <b>Continue executing approvals and release management</b> – In light of the transitioning from the Pilot to the implementation phases, review approval release management processes for continued execution of approvals and release management.</li> <li>• <b>Continue implementing new use cases and releases</b> - In light of the transitioning from the Pilot to the implementation phases, consider new use case and releases.</li> <li>• <b>Implement initial data request &amp; fulfillment solution</b> – Develop and implement a technical solution based on the results of the Pilot that allows data products to be released to authorized parties, further to an effective registration and assessment process. The initial solution may be partially automated, and partially manual, as the longer-term solution is developed, implemented and optimized.</li> </ul>	✓	✓	✓
14	Audit data access and security, recipient compliance	<b>For Implementation:</b> <ul style="list-style-type: none"> <li>• <b>Audit data access and security as well as recipient compliance</b> - Implement a set of centralized audit processes spanning the value chain services.</li> </ul>		✓	
15	Define, develop, implement, integrate and manage automation	<b>For the Pilot:</b> <ul style="list-style-type: none"> <li>• <b>Define solution and automation (e.g. portal, requirements)</b> – Examine business requirements definitions for the Pilot and the short-term solution and automation tools to be used. In parallel, identify the long-term business requirements definition, solution design, detailed design and implementation plans for building, testing, and deploying the solution.</li> </ul>			✓
		<b>For Implementation:</b> <ul style="list-style-type: none"> <li>• <b>Integrate request management solution with IESO website</b> – Integrate final request management solution for third-party access with current IESO website for a more seamless user experience.</li> </ul>			✓
		<b>For Value Generation:</b> <ul style="list-style-type: none"> <li>• <b>Implement and optimize standardized tools and automation</b> – Refine and improve the automated application and delivery process to meet ongoing volume and complexity of data request.</li> </ul>			✓

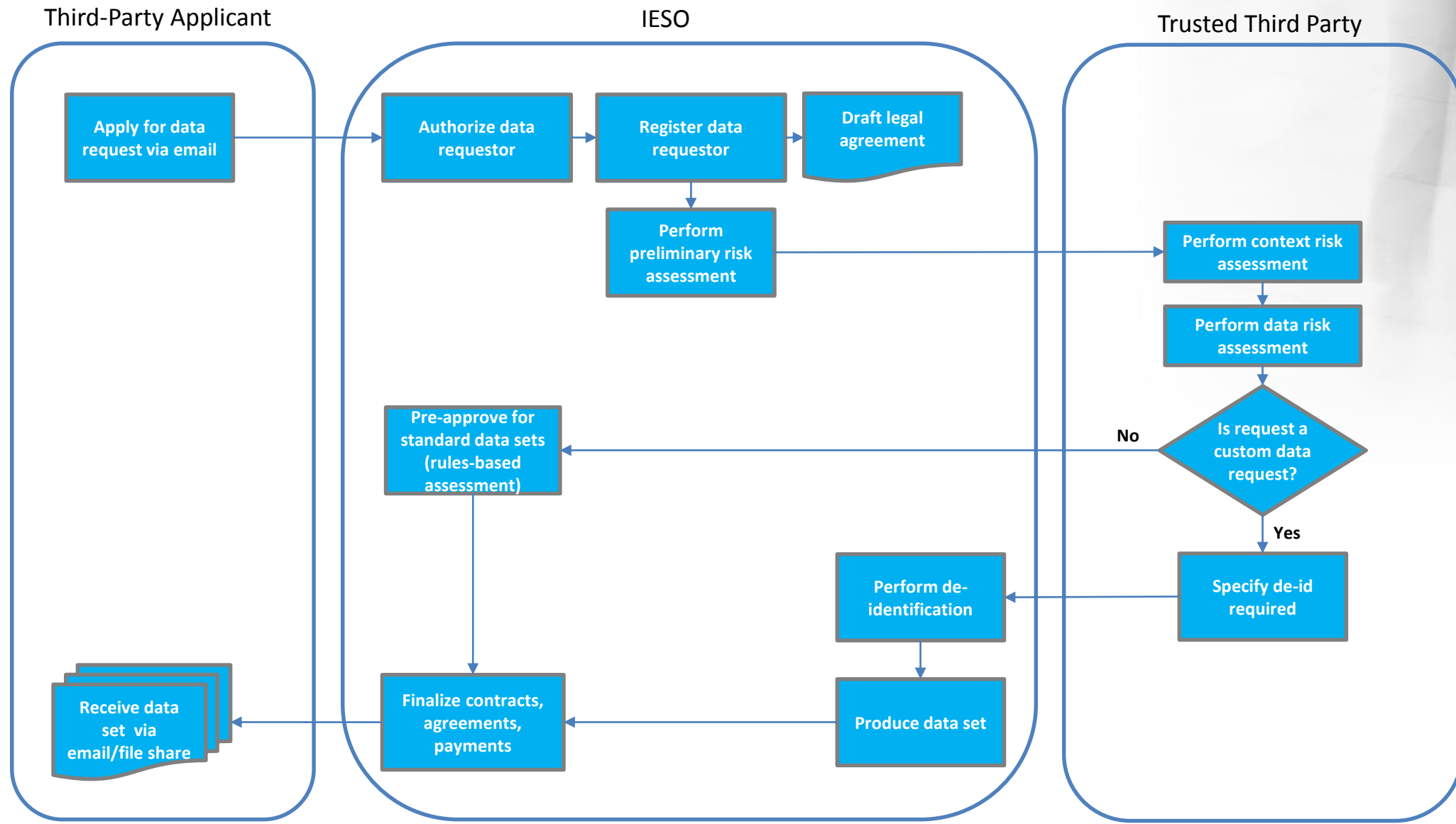
# Appendix B: Process considerations

- The following slides present the application and delivery workflows recommended for initial test use cases in the pilot phase of implementing third-party access to MDM/R data as well as initial portal implementation.
- Two workflows are presented as follows:
  - A. Initial pilot workflow (manual):**
    - This diagram provides a high-level overview of the processes for manual intake and delivery of data requests, which largely situates the process within current IESO architecture and builds in-house capacity.
    - We understand that IESO has been accepting data requests for initial test use cases via email, and so this process is suited for the pilot phase and also for a low volume and complexity of data requests.
  - B. Portal implementation workflow:**
    - This diagram provides a high-level overview of the processes for automated intake and delivery of data requests, which requires new architecture (a Portal) to contain the full application process, as well as host the standard de-identified data products.
    - We understand that IESO is looking to utilize de-identification software and/or services in order to perform the context and data risk assessments. This recommended option would rely on an external provider (trusted third party) to provide these risk assessment services.



## A. INITIAL PILOT WORKFLOW (MANUAL)

Filed: March 18, 2019, EB-2018-0316, Exhibit I, Tab 0, Schedule 2.15, Attachment 3, Page 26 of 27



NOTE: Process models to be confirmed with the IESO.

## B. PORTAL IMPLEMENTATION WORKFLOW

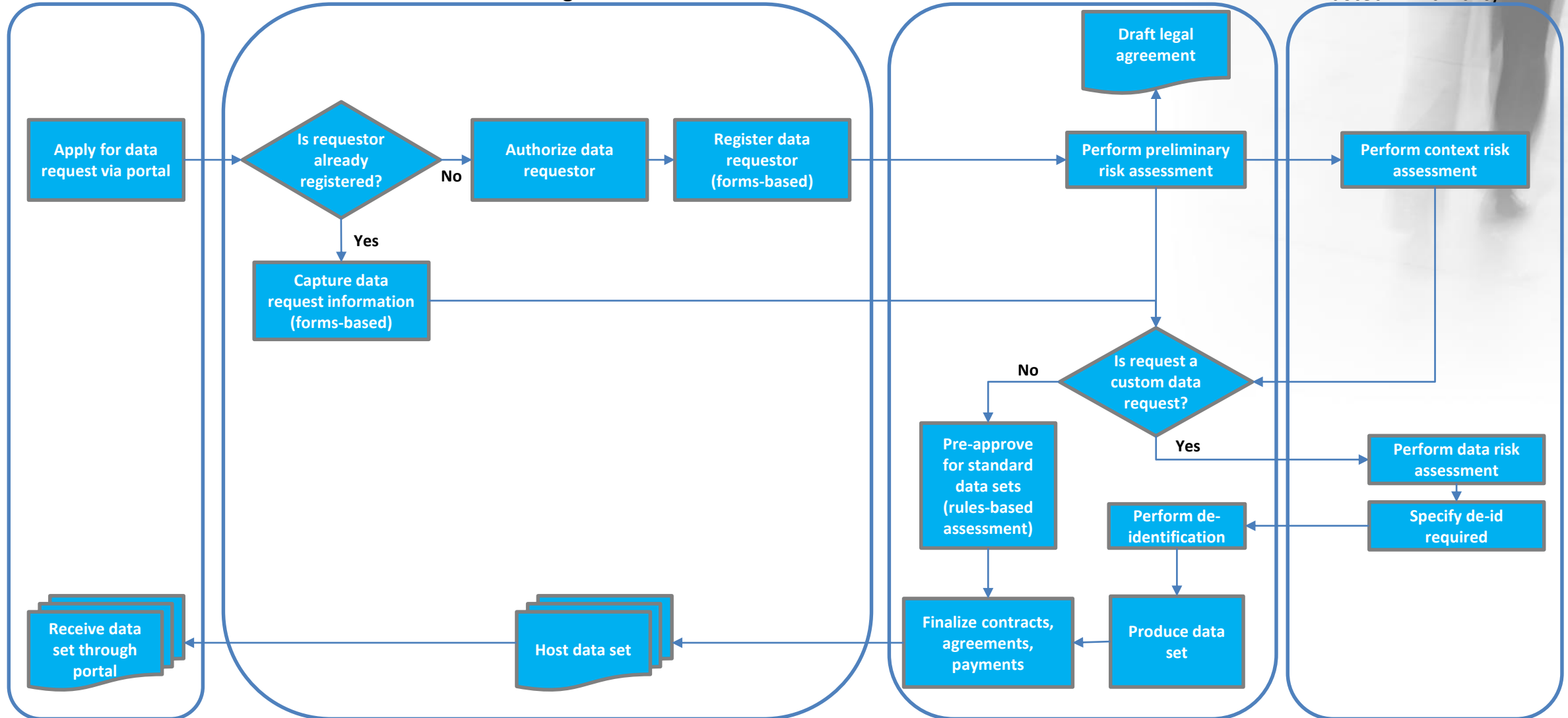
Filed: March 18, 2019, EB-2018-0316, Exhibit 1, Tab 0, Schedule 2.15, Attachment 3, Page 27 of 27

Third-Party Applicant

Client-facing Portal

IESO

Trusted Third Party



NOTE: Process models to be confirmed with the IESO.



1 BOMA INTERROGATORY 16

2 INTERROGATORY

3 *Ref: Third Party Access Update, October 17, 2018, p5*

4 *Ref: Ibid, p15*

5 Did the SME charge the participants in the pilot plans for the use of the data?

6 RESPONSE

7 Please see the responses to OEB Staff Interrogatories 1(c) and 11(a) at Exhibit I, Tab 1.0,  
8 Schedule 1.01, and Exhibit I, Tab 9.0, Schedule 1.11, respectively.

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BOMA INTERROGATORY 17

INTERROGATORY

*Ref: General*

Why did the Data Advisory Committee not include any end use energy consumers? Please explain fully.

RESPONSE

The IESO/SME is committed to an inclusive, transparent and genuine consultation process and provided opportunity for end use energy consumers to hear about and contribute to the Third Party Access Implementation Plan. In establishing the Data Strategy Advisory Council (“DSAC”), the IESO put out a public [call for nominations](#) that outlined that the IESO was seeking 12 to 15 members with representation within the following five categories:

- electricity consumers (representing a mix of sectors),
- local distribution companies (representing different size utilities and different regions),
- consultants, academia representatives, service providers/delivery agents,
- municipalities representatives, and
- IESO Chair (plus staff support and any appointed presenters).

The selection of DSAC members was limited to those parties that applied. Following the establishment of the DSAC, the IESO/SME also took steps beyond the advisory council to ensure broader engagement was conducted for all interested parties in Ontario through its public engagement stream on the Third Party Access Implementation Plan (such as province wide public webinars) and presenting before and taking questions and input from the IESO’s Stakeholder Advisory Committee, which does have a consumer representative.



1 BOMA INTERROGATORY 18

2 INTERROGATORY

3 *Ref: General*

4 In the event revenues from the TPA program are less than the cost of developing and operating  
5 that program, what entity would be responsible for the deficit? Please confirm that the  
6 ratepayers would not be responsible for absorbing any program deficit.

7 RESPONSE

8 Please see the response to OEB Staff Interrogatory 7 at Exhibit I, Tab 4.0, Schedule 1.07.

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OEB STAFF INTERROGATORY 1

**1.0 Is the SME's proposal that access should be provided at Market Prices appropriate?**

**Staff – 1**

INTERROGATORY

Reference: B-5-1, Attachment 2 – Third Party Access Update: Presentation and Discussion with IESO's Stakeholder Advisory Committee

Preamble: At Slide 5 of the presentation, the SME states:

“Since the last SAC discussions, the SME has been focusing on the following key areas of the project:

- Finalizing Data Pilots and collecting learnings...”

Questions:

- a) Please describe how the lessons learned through the various pilot projects support the IESO's proposal that a market based approach to data pricing is viable/appropriate.
- b) Please describe how the lessons learned through the various pilot projects support the IESO's proposed Terms of Access Principles.
- c) Please identify through what budget pilot projects are funded and how the costs of these pilots will be recovered (e.g. SME ratepayers versus IESO fees case).

RESPONSE

- a) The key objectives of the pilot test cases were to test the designed processes, policies, and procedures to understand the value proposition of the data request based on “real-life” examples in a controlled, transparent, and representative environment. The pilot cases confirmed that organizations, both private and public, have been highly interested in electricity consumption data for several years.

The learnings from the pilots confirmed the value of the data sets and the insights they are providing to requestors. Oxford County provided feedback on the value of their pilot to Data Strategy Advisory Council members through a series of maps, visualizations and early analysis used for the creation of a comprehensive and current base-load profile of all energy generated and consumed in Oxford County being used to support their plan to achieve 100% net renewable energy by 2050. All pilot participants have verbally confirmed the

1 quality of the data, its high level of accuracy and completeness and that these were factors in  
2 its value for application to their projects.

3 That a market based approach to data pricing is viable and appropriate is further supported  
4 by the market research study conducted by MNP Inc., and the report on the value potential  
5 of Ontario smart meter data, which have been attached to the response to OEB Staff  
6 Interrogatory 2(d) at Exhibit I, Tab 1.0, Schedule 1.02.

- 7 b) The IESO's Terms of Access Principles were defined to ensure compliance with the *Freedom*  
8 *of Information and Protection of Privacy Act*, non-discriminatory access to electricity data, as  
9 established in the Electricity Act, and to realize the value of a province-wide database of  
10 customer consumption data; the learnings from the test cases confirmed the importance and  
11 relevance of the established principles.

12 With respect to privacy, each of the test cases underwent a Risk of Re-Identification  
13 Determination ("RRD") conducted by the expert firm Privacy Analytics Inc. ("PAI"). The  
14 results and recommendations of the RRDs, allowed the SME to establish the rules and  
15 protocols for data access by third parties maintaining the security and privacy of the data.  
16 The learnings from the cases allowed for a re-evaluation of the de-identification rules in a  
17 concrete manner with reference to actual data sets. The results concluded that by following  
18 de-identification practices the risk of re-identification of a dwelling (note that the records in  
19 the MDM/R pertain to dwellings and not individuals) can be maintained below the  
20 established risk threshold for electricity consumption data, the organizations could also  
21 assess the resultant data utility.

22 With respect to security, the risk-based methodology utilized by PAI included a context  
23 assessment, consisting of a series of questionnaires regarding privacy and security controls  
24 to be completed by each requesting organization. The results from the context assessments  
25 gave the SME the opportunity to learn the varying levels of controls organizations have in  
26 place to protect the security of data; the pilots reinforced the importance of the provisions in  
27 the Data User Agreement, between the SME and the person that will be granted access to  
28 the data, to guarantee that the appropriate safeguards and security obligations are in place.

29 The number of records in the different pilot test cases ranged from 140,256 to 2.3 billion. A  
30 number of pilot requestors needed to involve their Information Technology teams to be able  
31 to receive, download and handle the large amounts of data for their pilot test cases. This has  
32 confirmed the importance of adopting a technology-related principle to ensure that users  
33 can derive the value anticipated through their technologies and so that the data can be  
34 technically safeguarded as agreed in the contractual terms.

- 1 c) Third Party Access related work conducted prior to the OEB issuing its decision on this
- 2 application is standard operations to develop TPA as required by prior OEB decisions and is
- 3 being recovered through the Smart Meter Charge.





OEB STAFF INTERROGATORY 2

**1.0 Is the SME's proposal that access should be provided at Market Prices appropriate?**

**Staff – 2**

INTERROGATORY

Reference: B-5-1, Attachment 1 – Third Party Access Implementation Plan

Preamble: At Slide 11 of the presentation, the SME states:

“Since the last SAC discussions, the SME has been focusing on the following key areas of the project:

- Market research, costing and valuation analysis, financial model and data products catalogue...”

Questions:

- a. Please describe the scope and results of the costing and valuation analysis completed.
  - i. Who performed the costing and valuation analysis?
  - ii. Did the analysis result in the determination of a market price/value – or range of prices/value – for the available data? If applicable, what prices/value for data were determined to be likely acceptable by the market?
- b. Please elaborate on the “financial model” described on slide 11.
  - i. What is the purpose of the financial model and how was the model used to inform the SME's application?
- c. Please provide the data products catalogue identified on slide 11.
  - i. To the extent available, please provide the costing and valuation analysis for each product included in the catalogue.
  - ii. Please confirm which of the products included in the catalogue will be available to third parties.
- d. Please file all materials supporting the market research, cost and valuation analysis, financial model and data products catalogue.

1 RESPONSE

2 a.

3 i. MNP Inc., an independent national accounting, tax and business consulting firm,  
4 working with Canada's most recognized public, private and non-for profit  
5 organizations.

6 ii. The determination of specific market prices/value – or range of prices/value for the  
7 data that can be made available for Third Party Access ("TPA") was not completed  
8 in this engagement. The smart meter data as it can be provided by the SME is a  
9 "new" product and through this licence amendment application the SME seeks the  
10 latitude to work with potential customers to provide the data they are seeking at a  
11 price point that is acceptable to the customers and at the same time benefits rate  
12 payers. MNP examined and interviewed a wide range of sources to establish  
13 options leading to a model that will support monetizing smart metering data for  
14 TPA. MNP's research also identified a diverse list of organizations that have already  
15 implemented some type of TPA to their data, with an already operationalized  
16 monetization model. Service and product pricing varied significantly between the  
17 organizations depending on the organization type and business model (e.g. cost  
18 recovery, cost recovery + surplus targets, for profit). Most public organizations apply  
19 at least a cost recovery model to their data access costs, and many organizations  
20 support differential pricing structures including some offering subscription, bulk-  
21 based, or bundling type discounts.

22 b.

23 i. On slide 11, the SME referred to exploring financial models that could inform the  
24 decision on how to create additional benefits to ratepayers from the third parties use  
25 and access of a smart metering data at a charge. The SME conducted some  
26 theoretical research on how data is valued as an asset, a review of industry practices  
27 as described in the MNP Inc. report, and engagement with stakeholders through  
28 DSAC and the IESO's SAC. These stakeholder engagements provided the SME with  
29 valuable feedback which was incorporated into the analysis. Variations of a pricing  
30 model were tested on a significant number of scenarios which allowed the SME to  
31 refine the inputs. The inputs account for the costs incurred to provide access to the  
32 data and for generating revenue based on the breadth and depth as described in the  
33 SME's application. The exercise also informed the SME's decision to propose in its  
34 application a pricing model fairly basic in nature to allow time for a better "real-life"  
35 understanding of market interest and opportunities prior to proposing more

- 1 advanced models for value creation such as differential pricing, discounting, royalty  
2 fees or subscriptions.
- 3 c.
- 4 i. The enclosed report contains the data products mentioned on slide 11. This report  
5 with potential data products was prepared by a consultant for consideration of  
6 possible product offerings.
- 7 ii. The SME has not performed costing and valuation analysis or determined which of  
8 the products in this report are feasible and can be made available to third parties.  
9 The SME would initially focus its offering on the public, standard and, as requested,  
10 the custom reports described in the SME's application.
- 11 d. The following materials are provided as attachments to this exhibit as follows:
- 12 • Attachment 1: IESO SME Third Party Data Access - Market Analysis and Costing  
13 Model - MNP Final Report - October 18 2018
- 14 • Attachment 2: Value Potential of Ontario Smart Meter Data





# **IESO SME Third-Party Data Access Market Analysis and Costing Model Final Report**

**October 18, 2018**

**PREPARED BY:** MNP LLP  
300 – 111 Richmond Street West  
Toronto, ON M5H 2G4

# Table of Contents

<b>DISCLAIMER.....</b>	<b>3</b>
<b>PROJECT BACKGROUND .....</b>	<b>4</b>
<b>PROJECT OVERVIEW .....</b>	<b>6</b>
<b>MNP APPROACH.....</b>	<b>7</b>
<b>INITIAL DESIGN CONSIDERATIONS .....</b>	<b>8</b>
<b>STAKEHOLDER AND THIRD-PARTY RESEARCH .....</b>	<b>10</b>
<b>KEY CONSIDERATIONS FOR THIRD-PARTY DATA ACCESS .....</b>	<b>15</b>
<b>SME DATA COSTING MODEL .....</b>	<b>16</b>
<b>APPENDIX .....</b>	<b>18</b>

## Disclaimer

The material presented in this report contains a general overview of the subject, is provided solely for information purposes and may not be applicable to a specific case, set of circumstances or facts. This material is based on laws and practices that are subject to change and may not represent the views of MNP LLP. This information is current as of the date of publication and should not be regarded as a substitute for professional advice. Although the course material has been carefully prepared, MNP LLP and the authors accept no responsibility or liability for any loss or damage caused by your reliance on information contained in this presentation. Please feel free to contact your local MNP professional for advice specific to your circumstances.

# Project Background

## The Independent Electricity System Operator

The Independent Electricity System Operator (IESO) works at the centre of Ontario's power system. The IESO delivers key services across the electricity sector including: managing the power system in real-time, planning for the province's future energy needs, enabling conservation and designing a more efficient electricity marketplace to support sector.

## Smart Meter Entity

The IESO is designated as the Smart Metering Entity (SME) by the Government of Ontario. The SME operates under licence by the Ontario Energy Board (OEB). In its role as the SME, the IESO is responsible for the implementation, integration and operation of province's Metering Data Management/Repository (MDM/R).

The MDM/R is a central hub, providing a common platform for storing, processing, validating and managing hourly electricity consumption information of nearly five million smart meters sending hourly data to the MDM/R. With Ontario's over 65 Local Distribution Companies ("LDCs") integrated into the system, Ontario's MDM/R is one of the largest shared systems in the world, adding 100 to 120 million records every day.

## Smart Meter Data Access

Meter data offers the SME an opportunity to take raw consumption data – stripped of all personal identifying information – and leverage it for other purposes. When it comes to using its own data for the benefit of customers and other third parties, there are evolving uses of this data that represent significant untapped potential in the market.

For example, a province-wide database of electricity consumption data could be used in a number of ways:

- Conservation and demand management program design
  - Conservation and demand management programs using data accumulated through smart meters have been developed and successfully develop across the world. According to research published by Damien P. Giurco Stuart B. White and Rodney A. Stewart from Australia's University of Technology and Griffith University "there are avoided monetary and environmental costs associated with the construction and use of redundant urban infrastructure due to effective demand management strategies being informed by the smart metering technology<sup>1</sup>. The data available through the MDM/R will allow for better program development which will align with usage patterns observed through the data.
- Load forecasting and modelling
  - The availability of data through smart meters provides an opportunity to use almost real time data to develop enhanced load forecasting models that are more precise, also

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<sup>1</sup> <https://www.mdpi.com/2073-4441/2/3/461/pdf>



providing an opportunity for load estimation and electrical demand at the local level, e.g. estimation of loads at substations and feeders.

- Pricing analysis
  - The availability of extensive energy-use data allows a more accurate analysis of alternative electricity rate structures. This includes dynamic pricing models such as real time pricing or hourly pricing which have the potential of providing larger savings to the customer base.
- Transmission and distribution planning
  - Smart-meter data presents an opportunity for the industry to improve database records and develop a low-voltage (LV) models that may be useful for outage management and fault detection, isolation and response, phase balancing, and network planning. In addition, impact assessment studies on new technologies can be performed<sup>2</sup>. Through better power quality assessments, transmitters and distributors can also prioritize reinforcement and replacement capital spend which can reduce overall investment as well as improve network reliability.
- Development of apps and other energy management tools
  - Data made available through smart meters provide energy management service providers and end users an opportunity to leverage energy management systems in homes and businesses, providing more monitoring capability, control, tools and insights into consumption behaviour and its effect on electricity tariffs and costs. EnergyHub and Google Powermeter are examples of tools in use. Smart meter data will enhance the development of products and services for energy management and decision making.

The SME is conducting consultations and stakeholder engagement related to third-party access to the MDM/R data, with a broad range of experts and various organizations in the sector such as: consultants LDCs, government and regulatory bodies, the public at large, the IESO's Stakeholder Advisory Committee, and a Data Strategy Advisory Council ("DSAC"), and with the Information and Privacy Commissioner of Ontario ("IPC") closely engaged in the project. A key aspect of the implementation of the third party data access project is a data de-identification methodology that follows the IPC's Ontario's De-identification Guidelines and represents the gold standard in the disclosure control community.

DSAC is a committee of representatives within Ontario's electricity sector and other sectors as applicable, appointed by the SME, to provide input in the review and development of products and processes for the implementation of third party access to the data with the province's Meter Data Management/Repository (MDM/R). A number of test case pilots have been conducted through DSAC to inform important learnings on third party access, in the areas of privacy controls, processes and legal agreements, prior to implementation of a third-party data access program.

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<sup>2</sup><http://digital-library.theiet.org/content/journals/10.1049/joe.2016.0033?crawler=true&mimetype=application/pdf>

## Project Overview

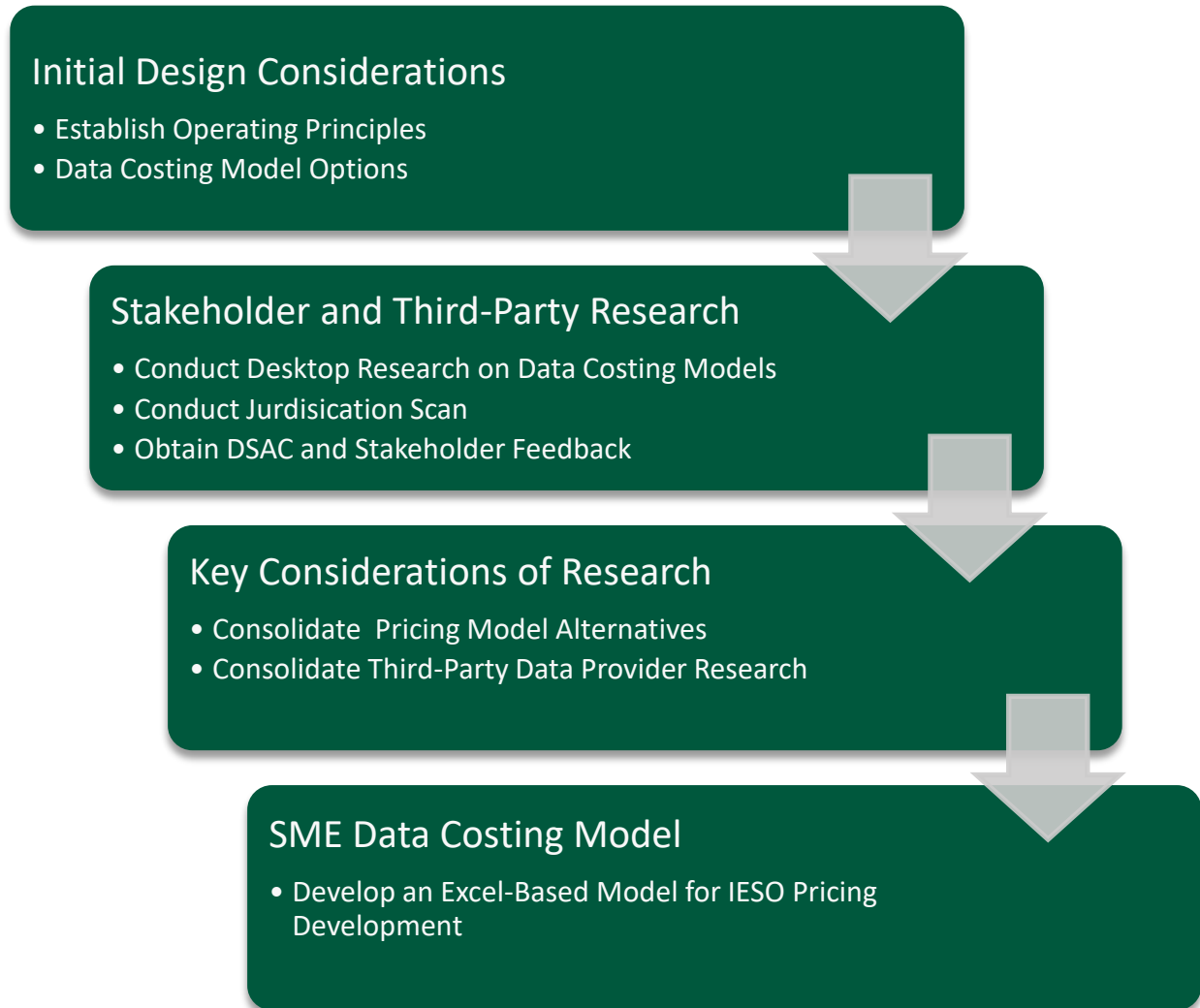
As part of the Smart Metering Entity (SME) deliverable to develop and implement a detailed project plan for enabling various third parties with access to de-identified electricity consumption data in the provincial MDM/R, in 2018 and beyond, the SME retained MNP LLP (MNP) to assist in the development of a Market Analysis & Costing Model for electricity consumption data. The MNP scope of work included:

- Collect and interpret economic and financial information specific to the use and value of data in various sectors (energy and non-energy) and for various types of purposes (e.g. public, private or research).
- Perform high and detailed level analysis and modeling based on the market and business inputs.
- Establish viable options leading to a business model that will support SME's future policy for assessing fees to third parties to access de-identified electricity data.
- Develop a data valuation model, and analytical support, to support the implementation of a preferred business model.

The purpose of this report is to consolidate MNP's observations and analysis to inform the SME's development of its third-party data access initiative.

# MNP Approach

Further to the assigned scope of work, MNP structured its analytical approach as follows:



# Initial Design Considerations

## Leading and Operating Principles

Given the sensitivities involved with the concept of monetization of the de-identified electricity consumption data in the MDM/R, the IESO's development efforts are guided by these leading principles, established in collaboration with a number of stakeholders and interested audiences:

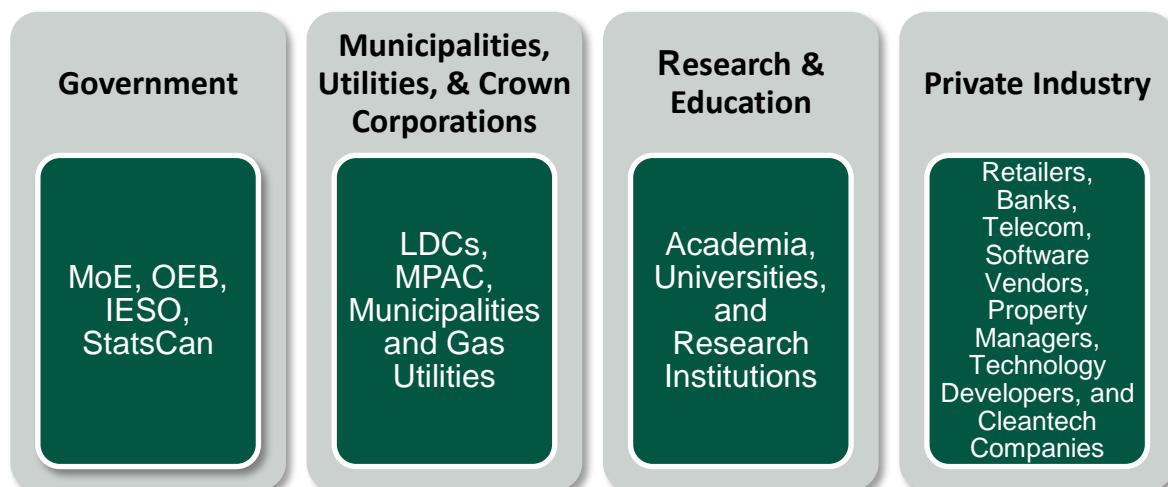
- Privacy, security and ethical uses of the information in the MDM/R are paramount, while maximizing the utility of the data for requestors.
- Value creation is critical for both ratepayers (to maximize opportunities for offsetting additional SME costs, beyond just simple cost recovery) and the data beneficiaries (to ensure requestors get the maximum value out of the data products through high quality outputs and streamlined processes).
- Striking the right balance between public-good and private-good data applications (what will be commercially available vs. publicly available).

Other operating criteria to help guide the assessment of the various business model options include:

- Simplicity – ensuring that the pricing models are straightforward and easy to understand for third-party users
- Stability – limited volatility in fee structure changes for data products and services.
- Transparency – following the IESO's stakeholder engagement practices throughout the third-party data access development process.

## Identified User Profiles

Data may be acquired by various types of user groups identified below. While the SME may initially assess uniform data access fees across user groups, there is potential to assess differentiated fees for different user groups based on ability to pay, the intended use of data or other factors.



## Pricing Structure

The structure and level of data access fees (pricing) will vary based on the types of data products made available to customers.

$$Price = Cost + (Value - Discount)$$

### Cost Recovery

MNP developed a cost recovery model for pricing to allow for the full recovery of different types of input costs. The model incorporates fixed costs, variable costs, and a hybrid of fixed and variable. Research findings indicated that organizations providing data-related products utilize similar cost recovery methods.

Fixed costs are associated with activities such as registration and enrolment requiring a fee regardless of the quantity or data type requested by the third-party user. As part of the delivery of data products, the SME will require an assessment of the scope of the data request, and whether it is within the capacity of the SME's MDM/R operations. The costs to conduct an assessment are fixed regardless on the scale of the data product or service. Fixed costs include legal fees, system registration, authentication controls, and minimum analytical resources.

Variable costs would be assessed to reflect needs that vary with individual data requests. Variable costs could be driven by the amount, frequency, or format of the request. Variable costs could include confirmation of requests, privacy analysis, processing time, quality assurance, packaging of data requests, mode of delivery, analytics and post delivery data services.

### Value Creation

In addition to recovery of costs, the IESO may also consider a markup to drive profitability for the data access function within the SME. Under the SME's current mandate, any profit could be accounted for within its deferral accounts and reinvested in the business to lower operational business costs; ultimately lowering customer charges.

### Discounts

Discounts may be applied based on pre-determined factors such as volume, frequency and loyalty (repeat business). As noted above, discounts may also be applied in the future based on the profile of the user group, accounting for ability to pay (i.e. profit vs. non-profit) or the intended use of the data (i.e. research/analysis vs. competitive/profit-making).

## Stakeholder and Third-Party Research

MNP conducted primary research by collecting market information from a set of interviews with organizations identified collaboratively with the IESO project team. A jurisdictional review included desktop research and outreach to utility sector organizations in the U.S. and Australia. Also, MNP researched and connected with third-party data providers from various types of organizations in Canada. The following chart summarizes high level feedback from our market research discussed in

Market Potential	Utilities in Other Jurisdictions	Third Party Data Providers
<p><b>Research Purpose:</b> To understand expectations and potential uses of data in the market in addition to potential types of clients and their risks or concerns</p> <p><b>General Feedback</b></p> <ul style="list-style-type: none"> <li>• MNP interviewed LDCs in Ontario, Ministry of Energy and Ontario Energy Board and other public and private sector organizations to assess interest in data access and utilization through SME.</li> <li>• General feedback included concerns around pricing of data, security and privacy.</li> <li>• OEB and MoE showed interest in using data for policy decisions and upgrading in-house analytical capabilities.</li> <li>• Private sector also showed interest in having access to a fairly priced data</li> </ul>	<p><b>Research Purpose:</b> To identify current structure of data access within electric utilities in other jurisdictions and identify any lessons learned</p> <p><b>General Feedback</b></p> <ul style="list-style-type: none"> <li>• MNP researched energy utilities and government agencies in multiple jurisdictions in US and Australia</li> <li>• General feedback highlighted while utilities are increasingly capturing more data through smart meters and other programs, use of data is still in its infancy even within those utilities.</li> <li>• There was very little comparator information within the electricity sector on third party data access and costing models.</li> </ul>	<p><b>Research Purpose:</b> To assist in identifying potential data costing models and products/services to consider across multiple sectors</p> <p><b>General Feedback</b></p> <ul style="list-style-type: none"> <li>• MNP researched various private and public organizations providing 3rd party access and identified five organizations for detailed investigation and review (MPAC, CIHI, CCO, StatsCan and Teranet).</li> <li>• Public sector organizations have multiple government level sources of funding including provincial, federal, municipal or a combination of these.</li> <li>• Most public sector 3rd party data providers work on a cost recovery or a cost recovery plus a predefined surplus</li> <li>• All 3rd party data providers have multiple product and service offerings with different pricing structures with many providing bulk or customer category discounts</li> </ul>

detail in subsequent sections:

### Market Potential

MNP engaged various interested audiences and stakeholders to provide feedback on changes to the data costing model. Stakeholders engaged operate within Ontario's energy sector or within an environment that relies upon the provision of commercially available data. Of the interested audiences engaged, MPAC, Hydro One, Enbridge and Hydro Ottawa are current members of the DSAC. MNP obtained feedback on potential consumption data needs and uses, appropriateness of data accessibility, considerations of pricing model options, and any risks or concerns with the provision of data. The engaged parties included:

- Hydro One
- Veridian Connections
- Hydro Ottawa
- Fortis

- Enbridge Gas Distribution
- Ontario Ministry of Energy
- Ontario Energy Board (OEB)
- Municipal Property Assessment Corporation (MPAC)

## **Interview Findings**

More in depth telephone Interviews were conducted with relevant staff within some of the organizations mentioned in the previous section. We have summarized key themes and considerations from each group of interviewees below:

### **Local Distribution Companies (LDCs) Feedback**

Due to the sensitivity of the data, local distribution companies (LDCs) are concerned with the privacy and security of data collection. However, they remain supportive of the process and role the IESO plays to provide information to third parties both in energy and non-energy sectors. LDCs current primary utilization of data is for customer billing. LDCs, other energy companies and businesses will typically use data requests for various purposes, including:

- Asset analytics
- Support for Conservation and Demand Management initiatives
- Development of pricing for energy-related products and services
- Advocate for policy developments
- Lend support to local and provincial government in decision making

MNP also observed the following sentiments in our discussion with the utilities:

- Some LDCs observed their users may want the additional flexibility of opting out of having their data shared which resonates with concerns around privacy and security of data collection.
- While this may not hold true for smaller utilities, larger utilities with more sophisticated data management capabilities may have the expertise in-house to serve their data analytics needs. This can lead to less reliance on SME for custom data requests or analytics services.

Acknowledging these concerns, there was in general good support from the LDC community for data monetization that is being considered by SME.

### **MPAC Feedback**

MPAC is well-established in the business of selling data, therefore drawing from direct experience. MPAC shared the perspective that a profit generating model is more advantageous to a pure cost recovery model as profits generated with third-party customers will reduce overall costs to the broader consumer base. MPAC also noted that there may be future opportunities for external partnerships with the IESO to refine and package evolving data products in the market.

### **OEB Feedback**

The OEB foresees useful applications for consumption data to support energy sector evolution, policy support and rate regulation. As with other Data initiatives, data protection is imperative and a primary

concern for the OEB. Access to data is preferred using an online portal or an equivalent web-based online service.

## Utilities in Other Jurisdictions

MNP also conducted a jurisdiction scan of various utilities in the U.S. The approach on how costs were recovered varied from state to state and included legislation that regulates providing data products or services in the utility sector varied between states. For example, according to California Public Utilities Commission recent decision, utility companies are instructed to provide aggregated data to federal, provincial and municipal levels of government and pre-identified research institutions after entering a confidentiality agreement with those institutions making such requests<sup>3</sup>. Incremental costs of providing this data are to be recovered by the utilities through their rate filings and in some cases as part of their revenue requirement.

On the other hand, Oklahoma allows electric utility companies to charge a reasonable fee for real-time data to recover the actual costs incurred by providing data, and Colorado utility companies must provide access to standard format data without a charge. In instances where third party access is provided, utilities follow their respective state's privacy policies. For example, in Colorado the data provided is aggregated so individual data is not available for the customer, unless authorised by the customer in writing.

Identified below are the consumption data protocols by State in the U.S.

Area of Evaluation	States in the US
Requirement for provision of individual energy-use data to third parties, upon authorization by the customer	California, Colorado, Connecticut, Illinois, Maine, Maryland, New York, and Texas, D.C.
Guidelines established regarding process for third-party access to customer energy data	Florida, Georgia, Massachusetts, Michigan, New Jersey, New York, North Dakota, Rhode Island, Vermont, and Washington don't have these guidelines
Requirement for provision of individual energy-use data to customers, in a common electronic format such as Green Button	California, Colorado, Illinois, Maine, Texas, and D.C.
Utilities provide energy-usage data for customers to download in an electronic format	D.C. and every state except for Maryland, New York, and Pennsylvania
Requirement for provision of aggregate data to public agencies	California, Connecticut, Illinois, Maine, and D.C.

<sup>3</sup> <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M090/K845/90845985.PDF>



MNP noted that commercial data access is not widespread, and that specific information is generally not publicly available. MNP did however acquire pricing data from one utility that provides third-party data access, Commonwealth Edison Company (ComEd) in Illinois. ComEd charges \$900/month for five-digit zip code-based data and \$145 per hour for custom data compilations. ComEd also provides discounts for researchers, government agencies and educational institutions.

## Third-Party Data Providers

A description and an assessment of these organizations' data access models is summarized in the tables below. Please refer to the Appendix for detailed information on funding formulae, pricing lists and revenue generation within these organizations.

Stakeholder	Description
Municipal Property Assessment Corporation (MPAC)	An independent, non-profit corporation funded by all Ontario municipalities that assess and classifies all properties in Ontario in compliance with the Assessment Act. (note MPAC is a member of the DSAC).
Cancer Care Ontario (CCO)	The Ontario government's principal cancer advisor, providing up to date cancer knowledge and tools to prevent cancer and deliver high-quality patient care. CCO collects and analyzes data about cancer services, monitors and measures performance and oversee funding and governance models that tie into funding performance, and designs, delivers and evaluations Ontario's cancer system.
Teranet	A subsidiary of OMERS Infrastructure, Teranet is Canada's leader in delivery and transformation of statutory registry services with extensive expertise in land commercial registries, Services government, financial services, real estate, utilities and legal clients.
StatsCan	An agency of the government of Canada commissioned with producing statistics to help better understand Canada, its population, resources, economy, society and culture.
Canadian Institute for Health Information (CIHI)	An independent, not-for-profit organization that provides essential information on Canada's health system and the health of Canadians. Provides comparable and actionable data.

The following table summarizes the service offerings, revenue models and pricing structures of third-party data providers.

Organization Name	Revenue Model	Pricing Structure & Discounts	Types of Products	Additional Details
Municipal Property Assessment Corporation (MPAC)	Cost Recovery + Surplus Targets	<ul style="list-style-type: none"> <li>• Per Request</li> <li>• Annual Subscription</li> <li>• Bundle pricing for tax agents</li> </ul>	<ul style="list-style-type: none"> <li>• Multiple Dataset Products</li> <li>• Custom Requests</li> </ul>	<ul style="list-style-type: none"> <li>• Standard and custom datasets available as per request.</li> <li>• Bundle pricing available for tax agents.</li> <li>• Availability of multi-year, quarterly and monthly pricing based on request.</li> </ul>
Cancer Care Ontario (CCO)	Cost Recovery	<ul style="list-style-type: none"> <li>• Per Request</li> <li>• Level of Effort</li> </ul>	<ul style="list-style-type: none"> <li>• Aggregate Report</li> </ul>	<ul style="list-style-type: none"> <li>• Number of hours (level of effort) depends on complexity of data request (number of databases to be linked, number of data elements, size of the cohort etc.).</li> </ul>
Teranet	For Profit	<ul style="list-style-type: none"> <li>• Subscription &amp; Per Request</li> <li>• Bulk Discounts for all clients</li> </ul>	<ul style="list-style-type: none"> <li>• Standard and Custom Requests</li> </ul>	<ul style="list-style-type: none"> <li>• Pricing available for transactions (property searches, writ searches etc.) and Software pricing (subscription based).</li> </ul>
StatsCan	Re-spendable Cost Recovery Revenues	<ul style="list-style-type: none"> <li>• Per Request</li> <li>• Level of Effort</li> <li>• No discounts</li> </ul>	<ul style="list-style-type: none"> <li>• Custom Requests</li> </ul>	<ul style="list-style-type: none"> <li>• Standard hourly fee per request compatible with StatCan's mandate.</li> </ul>
Canadian Institute for Health Information (CIHI)	Cost Recovery	<ul style="list-style-type: none"> <li>• Annual Subscription</li> <li>• Level of Effort</li> <li>• Public Sector Discounts</li> </ul>	<ul style="list-style-type: none"> <li>• Standard and Custom Requests</li> </ul>	<ul style="list-style-type: none"> <li>• Portal access annual fee per analyst for each organization with 25% discount for additional analyst annual fee.</li> <li>• Certain provincial and territorial ministries of health under agreements with CIHI are provided 1 analyst user free of charge.</li> <li>• Data requests charged at \$155/hr for price A clients (e.g Canadian health care facilities, public sector and not-for-profit. Private commercial operations charged \$310/hr.</li> </ul>

## Key Considerations for Third-Party Data Access

In consideration of leading principles, pricing model options, stakeholder feedback and research into prevailing data access models, the following is a summary of the key considerations for the SME:

Source of Funding	Revenue Model	Products and Services	Pricing Structures
<ul style="list-style-type: none"> <li>• SME's current charge is comparable to MPAC's municipal levy.</li> <li>• Depending on how SME intends to monetize the data, the funding model with the OEB may need to evolve.</li> </ul>	<ul style="list-style-type: none"> <li>• SME can consider developing a cost recovery model with an annual budgeted surplus target.</li> <li>• This surplus can form a profit generating vehicle contingent on SME (or a new subsidiary) branching off a separate entity (with OEB approval); or</li> <li>• The surplus could represent an offset to the regulated revenue requirement.</li> </ul>	<ul style="list-style-type: none"> <li>• 3<sup>rd</sup> party data providers have a broad range of products and service offerings.</li> <li>• Some basic information can be provided free of cost or at minimal cost.</li> <li>• Additionally, SME can develop specific services to cater to specific needs of potential customers including government and government agencies as well as commercial organizations looking to monetize data.</li> </ul>	<ul style="list-style-type: none"> <li>• SME to consider Level of Effort in pricing for data requests and analysis.</li> <li>• Volume and bulk discounts can also be considered when setting pricing.</li> <li>• 3<sup>rd</sup> party data providers also provide discounts to customers belonging to certain categories like governments and research institutions.</li> <li>• These discounts and customer types are cross subsidized from revenue generated through other customers.</li> </ul>

## SME Data Costing Model

MNP developed a Microsoft Excel-based financial model to support the IESO's development of costing and pricing for third-party data access. The model incorporates identified costs throughout the process of data request and provision, and offers the opportunity to create scenarios for different inputs, including:

- **Types of Resources:** The model provides the option of defining what type of resource will be required to execute a data request. It is assumed each resource will have a separate hourly rate and level of effort to complete a data request. Some of the resources identified are provided as an example below:
  - Project Managers
  - Quality Assurance Manager
  - Data Analyst
  - Developer
- **Resource Costs (Hourly, Fixed):** This is the hourly rate or in some cases a fixed cost of using a resource to execute data or analysis requests. As mentioned earlier, the model has the option of using a separate resource cost for each individual resource.
- **Level of Effort by Resource:** This is the number of hours required or estimated for a resource to complete the data request or analysis task. The model has the option of pre-defining the number of hours that will be needed from each resource or take it as a user input.
- **System and Overhead Costs:** These are the costs associated with developing and maintaining a customer relationship management software or a database that will help with manage the data and analysis requests that are received by SME. This is estimated to be a fixed cost including overhead costs like administration
- **Type of Data Request:** The model has an option of choosing between the type of data requests that are received by the SME. It is assumed that each data request may have a different requirement in terms of resources and their associated level of effort. For better user interaction, the following three scenarios of data requests have been pre-populated in the model:
  - Standard
  - Custom
  - Data Analytics
- **Type of Intended Usage:** To provide an additional layer of flexibility, the model also gives the user an option to choose an intended usage for the data request. This caters to individual request that may differ in complexity and hence require more or less level of effort from the same types of resources involved. Types of usage include research, product development, planning, etc.

- **Markup Percentage:** To provide SME an estimate of how to monetize the third-party access, the model also has a custom mark-up function which can be applied on top of the total costs that are estimated to be recovered for each data request.

In addition to this, the model has the capability to estimate total costs on an annual basis depending on what type and number of requests received by SME and has the analytical capability to test various combinations of cost and price elements.

# Appendix

## Third-Party Data Provider Pricing Model Summaries

Organization Name	Revenue Model	Source of Funding	Pricing Structure & Discounts	Service Offering	Sample Product Pricing	Pricing	Additional Details
<b>Municipal Property Assessment Corporation (MPAC)</b>	Cost Recovery + Surplus Targets	<ul style="list-style-type: none"> <li>Municipalities of Ontario</li> <li>Revenues through selling data</li> </ul>	<ul style="list-style-type: none"> <li>Per Request</li> <li>Annual Subscription</li> <li>Bundle pricing for tax agents</li> </ul>	<ul style="list-style-type: none"> <li>Multiple Dataset Products</li> <li>Custom Requests</li> </ul>	Electronic Property Profile Reports	\$4,000	<ul style="list-style-type: none"> <li>Standard and custom datasets available as per request.</li> <li>Bundle pricing available for tax agents.</li> <li>Availability of multi-year, quarterly and monthly pricing based on request.</li> </ul>
					Assessment Roll Products 2016-2020	\$58,000	
					Propertyline (software) license	\$6,000	
					Residential Custom Analysis	\$7,500	
					Lineage Analysis	\$8,500	
					Sales Database for Tax Consultants	\$25,000	
<b>Cancer Care Ontario (CCO)</b>	Cost Recovery	<ul style="list-style-type: none"> <li>Ontario Ministry of Health and Long-Term Care</li> <li>Public Health Ontario</li> <li>Canadian Partnership Against Cancer</li> </ul>	<ul style="list-style-type: none"> <li>Per Request</li> <li>Level of Effort</li> </ul>	Aggregate Report	Administrative Fee	\$2,100	<ul style="list-style-type: none"> <li>Number of hours (level of effort) depends on complexity of data request (number of databases to be linked, number of data elements, size of the cohort etc.).</li> </ul>
					Regular Hourly	\$75	
					Additional, Pathology Hourly	\$37	
<b>Teranet</b>	For Profit	Client Funded	<ul style="list-style-type: none"> <li>Subscription &amp; Per Request</li> <li>Bulk Discounts for all clients</li> </ul>	Web-Services	Getting Stated Package	\$595	<ul style="list-style-type: none"> <li>Pricing available for transactions (property searches, writ searches etc.) and Software pricing (subscription based).</li> </ul>
					Additional Users	\$345	
<b>StatsCan</b>	Cost Recovery	Government Funded	<ul style="list-style-type: none"> <li>Per Request</li> <li>Level of Effort</li> <li>No discounts</li> </ul>	Custom Requests	Standard Fee Per Hour	\$78	<ul style="list-style-type: none"> <li>Standard hourly fee per request compatible with StatCan's mandate.</li> </ul>
<b>Canadian Institute for Health Information (CIHI)</b>	Cost Recovery	<ul style="list-style-type: none"> <li>Provincial/territorial Government Funding</li> <li>Federal Funding</li> </ul>	<ul style="list-style-type: none"> <li>Annual Subscription</li> <li>Level of Effort</li> <li>Public Sector Discounts</li> </ul>	Web Services	Annual Fee (First Analyst)	\$7,355	<ul style="list-style-type: none"> <li>Annual fee per analyst for each organization with 25% discount for additional analyst annual fee.</li> <li>Certain provincial and territorial ministries of health under agreements with CIHI are provided 1 analyst user free of charge.</li> </ul>
					Annual Fee (Additional Analyst)	\$5,795	

Sources of Funding	Revenue Model	Revenue Generation
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	Sources of Funding	Revenue Model	Revenue Generation														
Municipal Property Assessment Corporation (MPAC)	All Ontario municipalities fund MPAC through municipal levies. In 2017, municipal funding accounted for \$201 M in revenue.	MPAC follows a cost recovery model and surplus hybrid model. Surplus targets for 2017 account for over \$10M. There is an interest to provide profit generating models as a means to reducing overall costs to customers. Royalty structures are also given consideration.	<p>MPAC provides data to five major markets including real estate, eCommerce, Financial, Property and Casualty Insurance and Custom. In 2017 MPAC generated \$20.3 million in revenues through data driven sales by providing annual subscription for the majority of its products, revenues collected on a per requests basis, bundle pricing and discount available to tax agents using multiple products.</p> <p>A graphic of the revenue generation is shown in the figure below. Although funded by Ontario municipalities, MPACs customers are diverse including nearly a fifth of revenue generated from custom requests.</p> <div><p>MPAC Top Six Markets Served (2017)</p><table><thead><tr><th>Market</th><th>Percentage</th></tr></thead><tbody><tr><td>Real Estate</td><td>49%</td></tr><tr><td>eCommerce</td><td>12%</td></tr><tr><td>Property Casualty Insurance</td><td>12%</td></tr><tr><td>Custom</td><td>12%</td></tr><tr><td>Financial</td><td>10%</td></tr><tr><td>Energy Sector</td><td>5%</td></tr></tbody></table></div>	Market	Percentage	Real Estate	49%	eCommerce	12%	Property Casualty Insurance	12%	Custom	12%	Financial	10%	Energy Sector	5%
Market	Percentage																
Real Estate	49%																
eCommerce	12%																
Property Casualty Insurance	12%																
Custom	12%																
Financial	10%																
Energy Sector	5%																



	Sources of Funding	Revenue Model	Revenue Generation
<b>Cancer Care Ontario – CCO</b>	CCOs is primarily government funded with more than \$2.43 B in total funding.	<p>Cancer Care Ontario follows a cost recovery model. Its model is based off fixed and variable costing as stated below:</p> <ul style="list-style-type: none"> <li>• \$2,100 administrative fee per request</li> <li>• \$75 /hr analytical fee for level of effort required.</li> </ul> <p>The fees account for the time and effort required for request intake, feasibility assessment, as well as bringing research data requests before the Data Disclosure Subcommittee (DDSC). The fee also accounts for execution of the Dataset Creation Plan, which may include identifying study cohort(s), data extraction, linking multiple datasets, as well as multiple quality assurance steps.</p>	<p>Revenue is generated from researchers, health system planners, government organizations. Providing a variety of products including:</p> <ul style="list-style-type: none"> <li>• iPort - CCO's web-based analytic portal for cancer system planners, decision makers and clinicians (free)</li> <li>• SEER Stat Package - for incidence and mortality data, software for conducting analysis and developing statistics on the data (free tool)</li> <li>• Research data request – Feasibility and cost assessment based on research, privacy and data subject matters which may take several months to complete.</li> <li>• Health System Planning Data request – Provides health management and planning or research study</li> </ul>
<b>Teranet</b>	As of 2011 Teranet is a privately-run entity and is funded through its operational revenues.	Being a privately-run entity, revenue is generated using a profit generation model.	<p>Revenue information is unavailable due to the organization being a private entity.</p> <p>There are various data products and typically iand the cost is typically a combination of both fixed and variable cost per search item.</p> <p>Product offerings include:</p> <ul style="list-style-type: none"> <li>• Property searches</li> <li>• Writes Search</li> <li>• Document Registration</li> <li>• Maps per Parcel</li> </ul>

	Sources of Funding	Revenue Model	Revenue Generation
<b>StatsCan</b>	StatsCan is a crown agency and is financed by the government of Canada through parliamentary appropriations and cost recovery revenues. As stated in the 2017-2018 Departmental Plan and presented by Minister of Innovation, Science and Economic Development, Statistics Canada has the authority to generate \$120 million annually in revenue related to two streams: statistical surveys and related services, and custom requests and workshops.	StatsCan follows a cost recovery model with re-spendable revenues planned each year. Statistics Canada produces on-demand, high-quality, cost-recovered statistical services that meet specific needs of federal, provincial and territorial institutions and other clients that are not met by the core statistical program.	Statistics Canada provides access to micro data to research institutions through an annual fee.. Statistics Canada produces on-demand, high-quality, cost-recovered statistical services that meet specific needs of federal, provincial and territorial institutions and other clients that are not met by the core statistical program. It plans to generate at least \$124M in funding annually over the next three years including both re-spendable revenue, approximately \$112M and statutory funding at approximately \$12.5M.
<b>Canadian Institute for Health Information CIHI</b>	<p>CIHI is funded by federal and provincial /territorial governments through various funding initiatives. Almost 3% of operational budget is based on sale of data/services:</p> <ul style="list-style-type: none"> <li>Federal government through the Health Information Initiative – planned at \$81.7 million for 2017/18</li> <li>Provincial Territorial government through the Core Plan – planned at \$17.7 million for 2017/18</li> <li>Annual revenues – planned at \$6.5 million for 2017/18</li> </ul>	<p>CIHI follows a cost recovery model that is based on a variable costing methodology based on the number of billable hours required for the following:</p> <ul style="list-style-type: none"> <li>Review data request</li> <li>Consult and develop specifications</li> <li>Manipulate and analyze the data</li> <li>Perform data quality assurance</li> </ul>	<p>CIHI price provides two public and private sector clients with the two categories of pricing:</p> <ul style="list-style-type: none"> <li>Type A clients: Canadian health care facilities, universities, governments, research facilities, not for profits</li> <li>Type B clients: private commercial operations, foreign clients</li> </ul>

## Research Sources

### MPAC

- Property Taxation in Ontario: A guide for Municipalities, Chapter 2: Assessment Legislation, Who Prepares the Assessment? <https://www.mfoa.on.ca/MFOA/WebDocs/HEMSON%20-%20Property%20Tax%20Guide%20May%2012%202012.pdf>
- MPAC Annual Report 2016. <https://www.mpac.ca/sites/default/files/imce/pdf/2016AnnualReport.pdf>

### Cancer Care Ontario

- Cancer Care Ontario Financial Statements, March 2017. <https://archive.cancercare.on.ca/common/pages/UserFile.aspx?fileId=383529>
- Cancer Care Ontario Funding, November 2016. <http://www.cqco.ca/common/pages/UserFile.aspx?fileId=365997>
- Research Data Requests at CCO. <https://archive.cancercare.on.ca/common/pages/UserFile.aspx?fileId=354112>

### Teranet

- Teraview Pricing Considerations. <http://www.teraview.ca/en/teraview-pricing>

### StatsCan

- How to access data, Statistics Canada. <https://www.statcan.gc.ca/eng/health/acces>
- StatsCan Financial Statements, March 2016. <https://www.statcan.gc.ca/eng/about/dpr/2015-2016/s02p01#n12a>
- StatsCan, Results: What we achieved. <https://www.statcan.gc.ca/eng/about/drr/2016-2017/s06#a5>

### CIHI

- CIHI Portal Pricing, April 2017. [https://www.cihi.ca/sites/default/files/document/cihi\\_portal\\_pricing\\_policy\\_bulletin\\_en.pdf](https://www.cihi.ca/sites/default/files/document/cihi_portal_pricing_policy_bulletin_en.pdf)
- CIHI Annual Report, 2016-17. <https://www.cihi.ca/sites/default/files/document/cihi-annual-report-2016-2017-en-web.pdf>
- CIHI Health Information Initiative Roadmap. [https://www.cihi.ca/en/profile\\_roadmap\\_launch\\_pdf\\_en.pdf](https://www.cihi.ca/en/profile_roadmap_launch_pdf_en.pdf)

## Glossary

Term	Organization	Definition
Multiple Dataset Products	<ul style="list-style-type: none"> <li>• MPAC</li> </ul>	This service offering consists of a product line that draws from the same database in order to prepare specific sub-datasets.
Aggregate Report	<ul style="list-style-type: none"> <li>• CCO</li> </ul>	A dataset that includes a report outlining recommendations and analysis on the dataset.
Web Services	<ul style="list-style-type: none"> <li>• All Organizations</li> </ul>	This service offering utilizes computer aided software in the form of online portals or software that access data in order to be presented, manipulated or analyzed.
Custom Requests	<ul style="list-style-type: none"> <li>• MPAC</li> <li>• StatsCan</li> </ul>	This service offerings allows the user to request specific headings in their dataset to the service provider.
Subscription	<ul style="list-style-type: none"> <li>• MPAC</li> <li>• Teranet</li> <li>• CIHI</li> </ul>	This service offering allows access to an annual fee based subscription
Per Request	<ul style="list-style-type: none"> <li>• MPAC</li> <li>• CCO</li> <li>• Teranet</li> <li>• StatsCan</li> </ul>	This service offering provides a specific dataset based on a one-time fee.
Dataset	<ul style="list-style-type: none"> <li>• MPAC</li> <li>• CCO</li> <li>• Teranet</li> <li>• StatsCan</li> <li>• CIHI</li> </ul>	A set of data that is organized by headings and is typically a portion derived from a large database.
Micro Data	<ul style="list-style-type: none"> <li>• StatsCan</li> </ul>	Information at the level of the individual respondents. For census data, this will include home address, education level and employment status.
Special Statistical Services	<ul style="list-style-type: none"> <li>• StatsCan</li> </ul>	Includes “CANSIM Data Feed – Standing request for custom retrieval of data” which is based on a client's specific customized selections. A standing request refers to a client

Term	Organization	Definition
		who requires regular direct updates for customized requests.
Cost-Recovered Statistical Services	<ul style="list-style-type: none"> <li>• StatsCan</li> </ul>	This program designs, implements, analyses and disseminates the results of a large-scale of complex surveys for external clients to provide useful information to the broadest possible spectrum of users.
Level of Effort	<ul style="list-style-type: none"> <li>• MPAC</li> <li>• StatsCan</li> <li>• CIHI</li> </ul>	Number of hours estimate for a team member involved in executing a custom or standard request.



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## **Value Potential of Ontario Smart Meter Data**

A Study for the IESO's Smart Metering Entity to Develop and Monetize Energy Data Products

**Alex Bettencourt**  
Managing Director, Elletrica

August 2018



## Executive Summary

The Independent Electricity System Operator (IESO) for the Ontario electricity system maintains the Meter Data Management Repository (MDM/R) for Ontario's smart meter data. This is operated by the Smart Metering Entity (SME) within the IESO. As part of their mandate to perform centralized meter data validation, by estimating and editing the function on behalf of Ontario's 66 Local Distribution Companies (LDCs), the SME has been collecting the smart meter data from LDCs since 2008. This has created a vast store of hourly electricity consumption data at the household level. The MDM/R currently approaches a quarter-trillion hourly meter reads.

The SME is investigating how to leverage this data and possibly earn new revenue streams. These revenue streams would be used to offset the costs of running the SME and in turn, reduce rates for Ontarians. This model is already being successfully employed by another Ontario agency: the Municipal Property Assessment Corporation (MPAC). The current SME fee applied to customer power bills is set at \$0.57 per month.

The objective of this white paper is to identify the value associated with Ontario smart meter data to determine if there is a viable business model for the SME to monetizing its data.

The SME hired Elletrica to understand what valuable data products could be created using Ontario's smart meter data. In consultation with staff from the SME, the team was able to identify more about 50 data products that could be of value. These data products spanned 11 product categories ranging from system planning to rate design. Based on this analysis, there is a viable business model for the SME to providing data products.

The analysis identified which client groups could benefit from these data products. Through the course of investigation, it was found that nearly 30 different client groups could benefit in some way from the SME data products. Some key areas of value identified for the client groups include:

- Government – insights into impact of policy decisions
- Regulator – insights into impact of rate design decisions
- Utilities – better conservation program targeting and more granular load forecasting
- Industry – insights into consumer behaviour based on electricity consumption
- Academia – a broad and deep data set for further research
- IESO – improved load forecasting and tracking of solar and electricity vehicle penetration

A full listing of the data products identified is included as an appendix to this white paper. With almost 50 data products identified, a prioritization is required to ensure that the high value products with the highest feasibility are brought to market first. A three-year roadmap has been developed and included as part of this white paper to guide product development.

The SME is committed to protecting the privacy of Ontarians. While the data that the MDM/R holds does not contain any personally identifiable data (PII), any products developed by the SME will follow processes designed to ensure the risk of re-identification of any individual dwellings is minimized. This is done by ensuring data products are aggregated to a level that ensure no one individual can be identified.

The recommended next steps for the SME are:

- 1) review the data products with its Data Strategy Advisory Council (DSAC) as well as prospective clients to gauge the appetite in the market;
- 2) develop an architecture and corresponding cost estimate for a system that can reliably produce and securely publish data products;
- 3) and, create a legal agreement and commercial terms for data products.





## Privacy by Design Principles

At the outset of this endeavour in 2016, the SME engaged Privacy Analytics to evaluate the risks associated with providing data products using Ontario's smart meter data. It set out some key principals that will ensure that consumer privacy is maintained. Any data disclosed to Third Parties by the SME needs to be anonymized at the Service Delivery Point (SDP) level. This is accomplished through an anonymization process that both masks and de-identifies SDP level data.

The objective is to provide high value data products, while balancing the privacy regulatory requirements. This ensures that the risk of re-identification in the data set is very small.

In order to preserve as much analytic value of the data set as possible within an acceptable risk threshold, identifying fields have been categorized as direct or quasi-identifiers. Direct identifiers would be defined as any field containing values that are unique to a service delivery point. Quasi-identifiers represent fields whose values could be known to an adversary and used in combination to identify a dwelling.

The de-identification strategy ensures there are no unique smart meters (based on postal code and year of occupancy change) in any data products provided.

## Value of Derived Data

The initial data products that can be offered by the SME are based on aggregation of existing interval meter consumption data. This class of products aggregates smart meter data at different levels to provide insights on power consumption. For example: identifying which postal codes use the most electricity during the summer and winter months. This data can be correlated with other third party data to provide additional data products.

There is another class of products derived from individual dwelling level consumption. These products require that the SME examine the data at the meter level to make an inference about the consumption at that dwelling. These inferences are then aggregated up to a level that de-identifies any particular dwelling. For example, to identify which households have electric vehicles, each dwelling is analyzed for a consumption pattern that matches electric vehicle consumption. These identified dwellings are then aggregated up to make a general insight about the electric vehicle penetration for a given geography.

Many of the most valuable data products are based on this derived set of data products. The SME will need to establish a protocol and technology that is able to make an inference at the dwelling level, create an aggregation that de-identifies the individual dwellings, and deletes the original dwelling-level inference in order to maintain the privacy of Ontarians.

When external datasets are received, the SME will be required to do additional analysis in order to establish authorities and permission for use of access.

## Available SME Data

The SME receives the following data that can be used for smart meter analysis:

### **Electricity Consumption Data**

- Hourly Electricity Consumption data for each dwelling
- Daily register reads



### **Meta Data**

- Postal Code
- Distributor Rate Class
  - Residential
  - Residential - Condo
  - Residential - Seasonal
  - Small General Service
- Commodity Rate Class
  - Time-of-Use
  - Regulated Price Plan
  - Net Metering
  - Spot Pricing
- Occupancy Change Flag (generalized to year)
- Data quality flags
  - Power Outage
  - Pulse Overflow

This metadata, postal code in particular, enables the SME to create a set of geographically segmented data products that can provide value to different client groups.

## **Potential for Third-Party Data**

The electricity consumption data has the potential to be made even more valuable by enriching it with both publicly available and privately sourced third-party data. Based on the data products identified, the third-party data that could be combined with consumption data to create new valuable data products are:

### **Publicly Available Data**

- Environment Canada weather data (publicly available)
- Rate and tariff structures (OEB & LDCs)
- Natural gas availability maps (gas utilities)
- Socioeconomic data (Statistics Canada)

### **Privately Available Data**

- MPAC data on size and age of dwelling (privately available)
- Solar potential (i.e. Google's Sunroof)
- Solar production from Feed-in-Tariff and Net Metering installations (LDCs)
- Distribution asset information (LDCs)
- Conservation program participation (LDCs)

### **Internally Available Data**

- Bulk Electric System data (IESO)
- Conservation program participation (IESO)

## **Potential Clients**

A broad view was taken when identifying potential clients and use cases for the smart meter consumption data. Based on the analysis, the following client groups were identified as potential candidates for the SME data products.



Client Group	Sample Use Case
<b>Utilities</b>	
IESO Market Forecasting Group	Develop more accurate forecasting models for residential loads to improve daily demand forecasts.
IESO System Planning	Develop demand forecasts at the postal code level to better plan system upgrades.
IESO Conservation	Target postal codes for conservation programs with the highest potential for energy savings to improve program cost-effectiveness.
Local Distribution Companies*	Avoid cost of developing internal smart meter data analytic systems by leveraging SME analytics.
Gas Utilities	Estimate hourly gas consumption at a postal code level by inferring monthly gas consumption to hourly electricity consumption.
Water Utilities	Estimate hourly water consumption at a postal code level by inferring monthly water consumption to hourly electricity consumption.
Generators	Develop load forecasting models for residential loads to better plan large generation capital investments
<b>Government</b>	
Ontario Ministry of Energy	Determine the impact of policy decisions faster and model the impact of future policy decisions using real historical consumption data.
Ontario Ministry of Transportation	Identify postal codes with electric vehicles in order to plan infrastructure in a more timely and efficient manner.
Ontario Energy Board	Calculate the direct financial impact of different rate models using real consumption data to inform rate design.
Electrical Safety Authority	Identify postal codes with electric vehicles and solar panel installations to correlate with their own permit process.
Municipalities	Determine the energy intensity of dwellings in a new subdivision neighbourhood to determine impact of building code changes on energy consumption.
Natural Resources Canada	Provide actual data on solar panel and electric vehicle adoption by Ontario residences.
Measurement Canada	Provide rate of error for register reads to predict if there will be an eminent failure of meters.
Statistics Canada	Provide data energy consumption by postal code that can be used to estimate the number of people between census years.
<b>Industry</b>	
Market Researchers / Advertising Agencies	Provide electricity consumption profile by postal code to enable market researchers to better profile behaviour based on energy usage.
Heat, Ventilation & Air Condition (HVAC) Companies	Identify postal codes that have inefficient dwelling performance relative to other postal codes to focus sales campaigns.



Client Group	Sample Use Case
White Good Manufacturers	Identify postal codes that have different appliance profiles (i.e. air conditioning, space heating, etc) for marketing campaigns.
Property Developers	Validate the energy efficiency of their property developments relative to industry averages as a differentiator.
Electric Vehicle Companies	Determine which areas have high penetration of at-home electric vehicle charging to prioritize charging infrastructure.
Class A Electricity Consumers	Forecast residential loads using historical data to better predict the five system peaks of the year.
Solar Companies	Determine which areas have high penetration of at-home solar panels to prioritize marketing efforts.
Energy Retailers	Enable energy retailers to calculate the likely bill impact of their retail plan for a given area based on real consumption data.
Realtors	Identify the areas with the highest rate of move-in and move-outs to focus marketing efforts.
Financial Institutions	Calculate the expected power bills of any customer for a given postal code so that it can be factored into the mortgage affordability calculations.
Media Companies (Facebook/Google)	Provide electricity consumption profile by postal code to enable media companies to better profile behaviour based on energy usage.
Insurance Companies	Correlate postal codes with high vacancy status (i.e. low/no consumption) with fire/theft/flood claims to improve actuary tables.
Academia & Research	
Think Tanks	Research and verify the impact of policy/rate decisions and forecast the effects of future decisions on customer electricity consumption and power bills.
Academia	Provide a broad robust data set for future analytics.

#### **\*Special Case for Local Distribution Companies**

As the smart meter consumption data originates from the LDCs themselves at a dwelling level, the SME provide this data back to the LDC at a dwelling level for billing purposes. This enables the SME to provide a set of data products unique to LDCs that do not require the same de-identification rules required for other clients of data products.

This enables the SME to create a common platform for large data analysis that can be leveraged by the many Ontario LDCs. This helps LDCs avoid the cost associated with developing their own algorithms and lets them benefit from a single common computing platform. It also enables LDCs to share in the benefits of similar of leveraging the data products/algorithms of other LDCs for their own purposes.

## Potential Data Products

Through the process of developing the potential set of data products, the team was able to categorize the various data products across eleven (11) categories. The categories can provide value to multiple client groups.



Data Product Category	Value
System Planning	Provides accurate load data for residential customers that can be used in concert with other system-level data sets (i.e. SCADA, transmission loads, weather) to provide better predictive models at the bulk electricity system and local level.
Rate Making	Provides direct assessment of rates on historical power bills and enables accurately modeling of future rate impacts.
Conservation	Enables better targeting of conservation programs that improve the return on investment from marketing.
Behaviour	Enables new and better ways of predicting consumer behaviour. This can be especially valuable when combined with existing behaviour data from other sources (i.e. customer segmentation, socioeconomic, etc).
Grid Insights	Provide smart meter-based reliability reporting to LDCs. This helps LDCs avoid the costs associated with developing these reports themselves and building the required computing infrastructure.
Policy Making	Provide insights into the impact of policy on electricity consumption and power bills and model the future impact of policy changes.
Revenue Protection	Provide revenue protection reports to local distribution companies based on consumption patterns and usage outliers. This helps LDCs avoid the costs of developing these reports themselves and building the required computing infrastructure.
Academia	Provide broad and robust data sets for future analysis.
Meter Quality	Provide indication and trend analysis of register reads not matching interval reads.
Electric Vehicle	Identify areas where there at-home electric vehicle charging is taking place. This enables the IESO and LDCs to better plan their systems.
Solar	Identify areas where there residential solar is being installed. This enables the IESO and LDCs to better plan their systems.

## Computational Challenges of Large Data Sets

Ontario's smart meter data could constitute one of the largest data sets in the world. As the SME has the mandate to provide an MDM/R for all of Ontario, it houses the electricity consumption data for almost 5 million Residential and General Service <50 kW SDPs. This combined with the fact that Ontario was one of the first jurisdictions to implement smart meters, means that smart meter consumption data has been collected for more than nine years. This creates over 200 billion records that need to be analyzed in order to provide valuable data products.

## Potential for Machine Learning

The SME's large data set of electricity consumption data over a long period provides a great opportunity to leverage new tools in machine learning. While the majority of data products do not require the advanced capabilities of machine learning, there are likely additional valuable data products that could be



discovered when using machine learning to compare consumption data with third-party data sets. Further analysis and prototyping is required to assess the opportunity of using machine learning on the SME data.

## Data Product Development

In summary, the analysis on the value potential of Ontario Smart Meter Data yielded more than 50 data products across 11 product categories that could be valuable to nearly 30 different client groups. While there is a great opportunity for the SME to extract value from this data, there will be a need to prioritize which data products to develop and offer to the market first.

The recommended prioritization for the data product development is based on ease of development, value for clients and requirement for third-party data. The following data product development is proposed.

### Data Product Development

Tranche 1	Tranche 2	Tranche 3
Electricity intensity per household	Electricity intensity per sqft	Conservation evaluation, measurement & verification (EM&V)
Small General Service customer consumption segmentation	Electricity intensity by age of house	Total energy consumption (electricity & gas) intensity
Energy consumption by IESO Zones	Conservationist identification	Appliance survey
Residential loads relative to overall system load	Reliability reporting	Energy reports relative to neighbors
Electricity consumption by postal code (public policy)	Peak prediction	High bill alerts
	Register read error identification	Cost of residential EV charging
	Low income program targeting	Voltage monitoring
	Low income program design	Phase balancing
	Residential consumption relative to overall system consumption for rate design	Impact of tree cover on electricity consumption
	Impact of TOU rates on consumption	Solar benefit calculator for residential customers
	TOU vs other rate plans calculator	Solar capacity planning
	Rate class review	Distributed energy resource location
	Average power bill by postal code	Gas consumption by hour (inferred from electricity)
	Outlier identification	Water consumption by hour (inferred from electricity)
	Energy profile by postal code	
	Standard deviation of electricity intensities	



## Appendix: Potential Data Products

#	Product Category	Data Product	Product Description	Business Value	Target Customers	Internal Data Required	External Data Required
1	Academia	Raw data extracts	Provide data extracts for academic study that has not been pre-processed.	Enables research in a variety of academic areas.	Academia	Consumption data	
2	Behaviour	Energy peak by postal code	Provide average peak by postal code while respecting privacy rules	<p>Market researchers - Utilized to enrich their existing consumer profiles (i.e. PRIZM5). Enables more accurate behavioural profiling.</p> <p>Advertising Agency/Amazon/Facebook - Utilize peak data to better profile customers.</p> <p>Insurance companies - Add energy peak data to actuarial models to determine if there is a meaningful impact to life/disability/critical illness/fire risks.</p>	<p>Market researchers</p> <p>Advertising agencies</p> <p>Amazon/Facebook</p> <p>Insurance companies</p>	Consumption data	
3	Behaviour	Occupant change rate	Rate of move in and move outs	<p>Municipalities - Inform public policy and social programs by enabling them to understand dwelling occupancy.</p> <p>Advertising agency - Enables targeting of marketing in areas with high move-in/move-out rates as people spend a lot of money when they move.</p> <p>StatsCan – Provide an understanding of population changes between census years.</p>	<p>Public</p> <p>MPAC</p> <p>Realtors</p> <p>StatsCan</p>	Occupancy change flag	
4	Conservation	Conservation evaluation, measurement & verification (EM&V)	Provide hour electricity consumption for customers that are participating in IESO SaveOn Energy conservation programs and use the large data sets to provide statistically significant samples (including identifying randomized matched control groups).	<p>Reduces LDC/IESO's cost of performing EM&amp;V for various conservation programs targeted to residential and small general service customers.</p> <p>With this broad data set, the IESO will have an easier time finding a randomized match control group to use in EM&amp;V analysis.</p>	<p>IESO Conservation</p> <p>LDCs</p>	Consumption data	Participation in conservation program



#	Product Category	Data Product	Product Description	Business Value	Target Customers	Internal Data Required	External Data Required
5	Conservation	Electricity consumption of indigenous communities	Provide energy consumption information specific to indigenous postal codes/areas of the province.	<p>IESO - Enable better conservation program designs for indigenous customers.</p> <p>Government - Enable better design of indigenous programs and assess success of existing programs.</p>	<p>IESO Conservation</p> <p>Government of Canada</p> <p>Government of Ontario</p>	Consumption	Postal codes for indigenous communities
6	Conservation	Identify postal codes with oil/propane space heating	Identify the residences that space heat with oil/propane using load profiles and weather data along with the availability of gas information.	<p>LDC/IESO - Enables targeted marketing for conservation programs that significantly reduce GHG emissions by converting oil/propane space heating to electricity.</p> <p>HVAC/White Good Companies – Enables the targeting marketing for services and products.</p>	<p>LDCs</p> <p>IESO Conservation</p> <p>HVAC Companies</p> <p>White goods companies</p> <p>Market researchers</p>	Consumption data	<p>Weather data</p> <p>Natural gas available</p> <p>postal codes</p>
7	Conservation	Identify postal codes with oil/propane water heating	Identify the residences that heat water with oil/propane using load profiles and weather data along with the availability of gas information.	<p>LDC/IESO - Enables targeted marketing for conservation programs that significantly reduce GHG emissions by converting oil/propane water heating to electricity.</p> <p>HVAC/White Good Companies – Enables the targeting marketing for services and products.</p>	<p>LDCs</p> <p>IESO Conservation</p> <p>HVAC Companies</p> <p>White goods companies</p> <p>Market researchers</p>	Consumption data	<p>Weather data</p> <p>Natural gas available</p> <p>postal codes</p>
8	Conservation	Identify postal codes with air conditioning	Identify residences that have air conditioning and the likely type of air condition (central, window, ductless) using load profiles and weather data	<p>LDC/IESO - Enables the targeted marketing for conservation and demand response programs related to air conditioning.</p> <p>HVAC/White Good Companies – Enables the targeting marketing for services and products.</p>	<p>LDCs</p> <p>IESO Conservation</p> <p>HVAC Companies</p> <p>White goods companies</p> <p>Market researchers</p>	Consumption data	Weather data
9	Conservation	Electricity intensity per household	Provide average consumption per household along with standard deviation of the households in a postal code.	<p>IESO/LDC - Enables analysis of electricity usage to target conservation programs</p> <p>Developers – Demonstrate the energy efficient nature of their homes relative to other developers. Used as a selling feature (i.e. "our homes are the most energy efficient as ranked by the IESO").</p> <p>Municipalities - Validate the effectiveness of different building code changes. Example: Assess the energy efficiency of different subdivisions built at different times under different building codes.</p>	<p>IESO - Conservation</p> <p>LDC - Conservation</p> <p>Developers</p> <p>Municipalities</p>	Consumption data	





#	Product Category	Data Product	Product Description	Business Value	Target Customers	Internal Data Required	External Data Required
10	Conservation	Electricity intensity per sqft	Provide average consumption per sqft per household with standard deviation of the households in a postal code.	Enables analysis of electricity intensity to target conservation programs	IESO - Conservation LDC - Conservation	Consumption data	MPAC data on sqft
11	Conservation	Electricity intensity by age of house	Provide average consumption per household based on age.	Enables analysis of electricity intensity for different residences based on ages to target conservation programs	IESO - Conservation LDC - Conservation Municipalities	Consumption data	MPAC data on residence age
12	Conservation	Total energy consumption (electricity & gas) intensity	Determine the energy intensity of the entire household by combining electricity consumption data with gas consumption data.	Enables analysis of total energy intensity (electricity and natural gas) to target conservation and climate change programs.	IESO - Conservation LDC - Conservation Gas utilities NRCan	Consumption data	Gas consumption
13	Conservation	Conservationist identification	Identify postal codes that have taken positive actions on conservation over the years.	<p>Gas utilities - enables better targeting of gas conservation programs by focusing on customers who conserve electricity (i.e. good candidate for gas program).</p> <p>Water utilities - enables better targeting of water conservation programs by focusing on customers who conserve electricity (i.e. good candidate for water program).</p> <p>LDCs/IESO Conservation - enables better targeting of electricity conservation programs by focusing on customers who conserve electricity (i.e. good candidate for LDC program).</p>	Gas utilities Water utilities LDCs IESO Conservation	Consumption data	
14	Conservation	Appliance survey	Identify the large appliance loads for residential household (includes space heating, water heating, air conditioning, stove usage).	<p>Market researchers - Utilized to develop better profiles for individual postal codes. Data can be sold on to HVAC and white goods companies looking to target market specific postal codes.</p> <p>Gas utilities - Use data to target future system expansions by finding postal codes with electric heating appliances.</p> <p>LDCs - Used to target conservation programs as well as in system planning by providing better load forecasting. Save costs of developing these analytics internally.</p>	Market researchers HVAC companies White good companies Gas utilities LDCs	Consumption data	Natural gas availability



#	Product Category	Data Product	Product Description	Business Value	Target Customers	Internal Data Required	External Data Required
15	Conservation	Energy reports relative to neighbors	Provide energy reports by household relative to similar households in the neighborhood.	<p>LDCs - Enables customer-specific reports on energy consumption relative to their neighbors to encourage energy efficiency (i.e. studies show 2-3% savings for these types of behavioural programs). Save costs of developing these analytics internally or paying a service provider.</p> <p>IESO Conservation - Neighborhood energy reports could be a service provided directly by SaveOn Energy as a centralized managed provincial program.</p>	LDCs IESO - Conservation	Consumption data	MPAC data
16	Conservation	High bill alerts	Track customer usage relative to the same period in prior years to determine if a customer will have an unexpectedly high bill this month.	LDCs – Provide customers with notifications of when they are trending towards a particularly high bill. This aids them in managing customer satisfaction as well as collections. Save costs of developing these analytics internally or paying a service provider.	LDCs	Consumption data Occupancy change flag	
17	Electric Vehicle	Residential EV charging rates	Calculate the average cost of charging EVs and provide a mechanism to enable low cost off-peak EV charging.	LDCs - Enables different rates for EV charging without installing of separate smart meters on EV charging podiums.	LDCs	Consumption data	
18	Grid Insights	Standard deviation of electricity intensities	Provide the standard deviation of load profiles within a given postal code as well as across regions.	<p>LDCs - Enables accurate modeling of customer load profiles (i.e. relationship of average energy consumption relative to actual energy consumption of individual customers within the region).</p> <p>IESO - Enables accurate modeling of customer load profiles.</p> <p>Financial Institutions - Enables the banks to know if the household is likely to have a normal power bill or merits additional investigation on affordability.</p>	LDCs IESO - Market Forecasting Financial Institutions		



#	Product Category	Data Product	Product Description	Business Value	Target Customers	Internal Data Required	External Data Required
19	Grid Insights	Reliability reporting	Provide reliability metrics using meter data: - System Average Interruption Duration Index SAIDI (how many hours are people out of power each year) - System Average Interruption Frequency Index SAIFI (how many times are people out of power each year) - Customer Average Interruption Duration Index CAIDI (how long are the outages on average)	LDCs - Enables meter-based reliability reports. Save costs of developing these analytics internally or paying a service provider.  LDC - Saves costs of providing reliability reporting to the OEB.  LDC - Validate the reliability reports produced from LDC's Outage Management Systems records.  OEB - Utilize data as a means of validating reliability data provided by LDCs are part of the regulatory reporting requirements.	LDC OEB	Meter Interval Power Outage Flag	
20	Grid Insights	Voltage monitoring	Provide reports back to LDCs where power quality is poor as well as identify opportunities to for conservation voltage reduction.	LDC - Enable the collection of voltage information and provide reports back to LDCs where they have poor power quality.  Identify opportunities to improve voltage, use voltage conservation. Use 3-5% voltage reduction without impact.  OEB – Assess the opportunity to use LDC conservation voltage reduction.	LDC OEB		Voltage data
21	Grid Insights	Phase balancing	Provide consumption by phase and highlight feeders that are out of balance.	LDCs - Identify feeders that are out of balance so they can take action to rebalance loads. This reduces line losses and improves power quality.	LDCs	Consumption data	Feeder ID and phase (from LDC)
22	Grid Insights	Peak prediction	Predict residential peaks in order to more accurately predict system peaks.	IESO MF&I - Enables more accurate modeling of residential peaks so they can better estimate the overall system peak to plan lower cost resource dispatch.  Class A Customers - Utilize data to inform their own predictions on when the overall system peaks will occur.	IESO - Market Forecast Class A Customers	Consumption data	IESO system data



#	Product Category	Data Product	Product Description	Business Value	Target Customers	Internal Data Required	External Data Required
23	Meter Quality	Register read error identification	Provide the rate of error for register reads that do not match their interval reads.	LDCs - Provide LDCs with proactive notification of meter errors that could impact their billing.  Measurement Canada - Identify LDCs and areas that have poor quality meter reads and require investigation.	LDCs Measurement Canada	Register reads Consumption data	
24	Policy Making	Low income program targeting	Identify postal codes with highest energy consumption and lower incomes.	Enables the targeting of low income programs (e.g. Affordability Fund) to those areas with customers most in need of the program.	OEB LDCs Ministry of Energy IESO Conservation	Consumption data	Income Data (StatsCanada)
25	Policy Making	Low income program design	Provide the load profile of postal codes of residential customers in low income areas for different geographies and calculate the financial impact of the program.	Aids policy makers in designing the low income programs by understanding their energy consumption and enabling them to calculate the impact of the program on customer bills.	OEB LDCs Ministry of Energy IESO Conservation	Consumption data	Income Data (StatsCanada)
26	Policy Making	Impact of tree cover on electricity consumption	Calculate the load profile and energy consumption differential between postal codes with high tree cover vs those with low tree cover.	Enables policy makers to determine the need and effect of tree cover on electricity consumption.	Municipalities	Consumption data	Tree cover data (city-provided or Google)
27	Rate Making	Residential consumption relative to overall system consumption for rate design	Compare the aggregate customer consumption by hour with the system consumption and the system generation mix/cost.	Enables the development of residential and small general service rates that enable the lowest cost operation of the electricity system.  This could be used to design a more optimal time of use schedule.	OEB IESO - Market Forecast Think tanks Ministry of Energy	Consumption data	IESO Generation Data IESO Marginal Cost Data



#	Product Category	Data Product	Product Description	Business Value	Target Customers	Internal Data Required	External Data Required
28	Rate Making	Small General Service customer consumption segmentation	Identify the load profiles of SGS customers that below a certain threshold (i.e. 10kW) and above a certain threshold (i.e. 10kW - 50kW) and determine the bill impact of different TOU rate structures. (Current OEB Pilot Use Case)	Enables the development of small general service rates that are specific to small SGS customers and large SGS customers that reduce bills for small commercial customers and help the system.	OEB LDCs Think tanks	Consumption data	
29	Rate Making	Impact of TOU rates on consumption	Provide the average residential customer consumption before and after the implementation of TOU pricing.	Enables the validation that TOU rates have lowered energy consumption in Ontario.	OEB Ministry of Energy Think tanks	Consumption data	Consumption data pre-TOU (from LDC ODSs)
30	Rate Making	TOU vs other rate plans calculator	On an individual customer basis, calculate the commodity portion of a customer bill between TOU and various other rate plans and provide a report of percentage better/worse and the distribution of the bill impact by geography.	Enables policy makers to determine if changes from TOU rates would increase or decrease the commodity portion of customer bills by different geographies.  Can also be reported by urban/rural, socioeconomic, high volume users vs low volume users.	OEB Ministry of Energy Think tanks	Consumption data	Alternative rates structures Income Data (StatsCanada)
31	Rate making	Rate class review	Flag customers that should move from Small General Service rate class (<50kW) to General Service Rate Class (>50kW).  Enhancement: Should other rate classes be required for the LDC (i.e. seasonal, net metering, etc) provide the correct assignment to the LDC.	LDC - ensures customers are classed in the correct rate class	LDCs	Consumption data	



#	Product Category	Data Product	Product Description	Business Value	Target Customers	Internal Data Required	External Data Required
32	Rate Making	Average power bill by postal code	Provide the average power bill by postal code. (Pilot Use Case for Oxford County)	<p>OEB/Ministry of Energy - Enables rate making and public policy decision making. Replaces the anecdotal information about power bills and enables the scientific assessment of bills.</p> <p>IESO Conservation - Focus conservation programs on initiatives that reduce customer bills instead of just focusing on consumption.</p> <p>Financial Institutions - Utilized by financial institutions to calculate non-discretionary spending on energy by postal code to be included in mortgage calculations for customers.</p> <p>Realtors/HVAC - Utilize the profile the neighbor as a selling point (i.e. this neighborhood has some of the lowest power bills in Brampton).</p> <p>HVAC - Enables HVAC companies to have a baseline by postal code to enable comparison pre/post HVAC work as well as compare a customer usage with their neighbor's power usage as a means of selling the customer on undertaking upgrades.</p> <p>Gas utility - Enables them to calculate the bill savings associated with converting from electricity to natural gas.</p>	<p>OEB</p> <p>Ministry of Energy</p> <p>IESO - Conservation</p> <p>Financial institutions</p> <p>Realtor</p> <p>HVAC</p> <p>Gas utilities</p> <p>Municipalities</p>	Consumption data	LDC delivery charge formula
33	Revenue Protection	Outlier identification	Analyze the consumption data and identify any outliers (too high, too low, too different, no consumption, etc.).	LDCs - Enables LDCs to identify any SDPs that may have issues associated with the billing. This includes CT multipliers, PT multipliers, underbilling, overbilling, etc. Helps LDCs avoid the costs of doing this themselves and maintaining these systems.	LDC	Consumption data	
34	Revenue Protection	Grow op identification	Analyze the data for a grow operation pattern of consumption and identify customers back to LDCs	LDC - identifies grow ops and avoids them making investments internally	LDC	Consumption data	



#	Product Category	Data Product	Product Description	Business Value	Target Customers	Internal Data Required	External Data Required
35	Revenue Protection	Energy theft	Analyze the energy consumption downstream of a certain metered point to identify areas of high energy theft.	LDC - Identifies areas of energy theft for further investigation by LDCs	LDC	Consumption data	SCADA data from LDC Feeder ID by SDP
36	Solar	Residential solar PV tracking	Track the installation of solar PV.  "Where are solar PVs today?"	IESO MF&I - provide data on the adoption of solar PV to enable better forecasting  Government - inform public policy  ESA/LDC - verify that solar PV installations match their records  Solar providers - provide neighborhoods that would be good targets for solar PV offerings	IESO - Market Forecast Government ESA LDCs Solar companies Energy retailers	Consumption data	FIT output Net metering
37	Solar	Solar benefit calculator for residential customers	Utilize solar insolation data, roof top data (i.e. SolarRoofs) along with residential electricity consumption data to determine which customers would benefit from installing solar PV at their residences.  Enhancement: Utilize land use data to determine if the customer has the room for ground-based solar (e.g. cheaper).  "What would be the bill impact be of installing solar PV for a customer?"	IESO Conservation - Provide a portal to customers enabling them to calculate the benefits from solar net metering.  Solar providers - provide a accurate modeling tool for them to sell their product.	IESO Conservation Solar providers	Consumption data	LDC delivery rate calculations Solar potential from customer roof top (Google)



#	Product Category	Data Product	Product Description	Business Value	Target Customers	Internal Data Required	External Data Required
38	Solar	Solar capacity planning	<p>Provide the consumption data relative to the grid capacity in a given neighborhood along with the potential solar output data to provide an accurate view of available solar capacity and bill savings to customers.</p> <p>"What will the impact to the local grid based on the expected uptake by customers?"</p>	<p>LDCs/IESO - Provides a map of where customers could potentially install solar to inform forecasts.</p> <p>Example: "In 3 years time, how much solar could be generated in a neighborhood and would it be economic for them to inform an assumed adoption rate."</p>	LDCs IESO - Market Forecasting	Consumption data VNM data	FIT output Solar insolation
39	Solar	Net metering	Calculate the net metering billing determinants for customers with both load and generation.	LDCs - Avoids the cost of them updating billing systems to provide net metering based billing as well as avoiding the labour.	LDCs	Consumption data	Solar generation data
40	Solar	Virtual net metering	Calculate the net metering billing determinants for customers with both load and subscription to community solar or other DERs.	LDCs - Avoids the cost of them updating billing systems to provide virtual net metering based billing as well as avoiding the labour.	LDCs	Consumption data	Solar generation data Subscription percentage of central generation
41	System Planning	Energy consumption by IESO Zones	Provide the 8760 hour consumption data (TWH) at the IESO zone level	<p>Enables Market Forecasting &amp; Integration to forecast what will happen to residential and small general service customer loads over time.</p> <p>Generators - enables them to perform their own shadow forecast to the IESO.</p>	IESO Market Forecasting OPG Bruce Nuclear Gas generators	Consumption data	Postal Codes by IESO Zone
42	System Planning	15-Min energy consumption IESO Zones	Provide the 15-min consumption data (TWH) at the IESO zone level. Requires creating a load profile for each hour using the meter data with 15-minute granularity.	<p>Enables Market Forecasting &amp; Integration to forecast what will happen to residential and small general service customer loads will occur over time.</p> <p>Generators - enables them to perform their own shadow forecast to the IESO.</p>	IESO Market Forecasting OPG Bruce Nuclear Gas generators	Consumption data	Postal Codes by IESO Zone





#	Product Category	Data Product	Product Description	Business Value	Target Customers	Internal Data Required	External Data Required
43	System Planning	Residential loads relative to overall system load	Provide the aggregate residential and SGS consumption hour-by-hour relative to the Tx-connected loads (i.e. market participants).	<p>Enables IESO to calculate what proportion of load is from residential customers for any given historical hour.</p> <p>This would serve the forecasting and system planning group to provide better short and long term forecasting</p> <p>This would serve the control room to understand what is the proportion of residential, market participant, and LDC commercial/industrial loads are on the system in any given hour.</p> <p>Class A/Peak Prediction - Enables them to model residential loads more accurately to improve their peak estimation accuracy.</p>	<p>IESO Market Forecasting</p> <p>IESO System Planning</p> <p>IESO Control Room</p> <p>Class A Customers</p> <p>Peak Predication Companies</p>	Consumption data	
44	System Planning	Distributed energy resource location	Provide analytics to estimate which meters associated with distributed energy resources are located (i.e. storage, solar PV, load control).	Enables the IESO to include LDC DER capacity into their system planning.	<p>IESO Market Forecasting</p> <p>IESO System Planning</p> <p>IESO Control Room</p>	Consumption data	
45	System Planning	Electricity consumption by postal code (public policy)	Provide a long term report of energy consumption by different geographies and for residential vs small general service.	<p>Provides a metric and patterns on the electricity consumption of Ontarian homes and small businesses.</p> <p>Can be utilized to inform public policy and track the effectiveness of government programs.</p>	<p>NRCan</p> <p>Ministry of Energy</p> <p>Ministry of Environment</p> <p>Municipalities</p> <p>OEB</p>	Consumption data	



#	Product Category	Data Product	Product Description	Business Value	Target Customers	Internal Data Required	External Data Required
46	System Planning	Energy profile by postal code	<p>Provide profile category at as granular level possible (i.e. postal code).</p> <p>Need to identify 5-15 profile types to categorize customers.</p>	<p>Market researchers - Utilized by market research agencies to enrich their existing data sets used to profile postal codes (i.e. PRIZM5). Enables more accurate profiling of the behaviours within postal codes.</p> <p>Advertising agencies/Amazon/Facebook - Utilize profile data to better profile customers.</p> <p>Insurance companies - Enables the use of energy profile to be added into the actuarial models to see if there is a meaningful impact to life/disability/critical illness/fire.</p> <p>Gas utilities - Enables the analysis of when to employ hybrid systems with the intention of reducing GHG. (Enbridge Pilot Use Case)</p>	<p>Market researchers</p> <p>Advertising agencies</p> <p>Amazon/Facebook</p> <p>Insurance companies</p> <p>Gas utilities</p>	Consumption data	
47	System Planning (gas)	Gas consumption by hour (inferred from electricity usage adjusted for weather)	Estimate the gas consumption of customers on an hourly basis by inferring customer gas consumption from hourly electricity consumption.	<p>Gas utilities - enables better system planning and capacity planning.</p> <p>Currently gas utilities only get monthly or bi-monthly gas reads. Using hourly electricity consumption could give them insights in to how customers use gas on an hourly basis.</p>	Gas utilities	Consumption data	Gas consumption
48	System Planning (water)	Water consumption by hour (inferred from electricity adjusted for weather)	Estimate the water consumption of customers on an hourly basis by inferring customer water consumption from electricity consumption.	<p>Water utilities - enables better system planning and capacity planning.</p> <p>Currently water utilities only get monthly or bi-monthly gas reads. Using hourly electricity consumption could give them insights in to how customers use water.</p>	Water utilities	Consumption data	Water consumption data

OEB STAFF INTERROGATORY 3

**1.0 Is the SME's proposal that access should be provided at Market Prices appropriate?**

**Staff – 3**

INTERROGATORY

Reference: B-5-1, Attachment 1 – Third Party Access Implementation Plan

Preamble: At Slide 27 of the presentation, the SME identifies potential third party clients for MDM/R data.

Questions:

a. Will the SME market/advertise its products to potential customers, and if so, how?

b. Has a budget been established to fund these marketing/advertising activities?

i. Please provide the forecast budget for marketing/advertising (if applicable).

ii. How will costs associated with marketing/advertising be recovered?

RESPONSE

a. While the SME expects to market/advertise its products to potential customers the marketing/advertising strategy is currently in the development phase. The SME website is expected to be an important marketing channel which will leverage the existing platform. The public reports which will be available and accessible on the SME website will provide a high level view of the data, while explanations of the underlying data will allow users to understand the level of granularity that can be accessed and to review how some of the organizations have used the data (initially this information will come from the pilots). A contact form which will enable communication with the SME will also be available on the website.

The SME will be examining having a section on the website which will provide potential users with information on the standard products, when these are available, and the estimated cost for access to these.

b.

i. A forecast budget has not yet been determined for marketing/advertising.

ii. Costs associated with marketing/advertising will be recovered through the charges to customers for third party access. All costs and revenues associated with providing Third Party Access at a charge will be tracked in the proposed Benefits Account.

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OEB STAFF INTERROGATORY 4

**1.0 Is the SME's proposal that access should be provided at Market Prices appropriate?**

**Staff – 4**

INTERROGATORY

Reference: Exhibit A, Tab 1, Schedule 1, Page 2

Preamble: The application states in paragraph 4:

Any reference to “data” in this application means any of the information and data related to the metering of consumers' consumption or use of electricity in Ontario, including the information required to be collected by the OEB as noted in paragraph 3, above.

The information noted in paragraph 3 is:

...the following information associated with each smart meter (modified where necessary to sufficiently render it non-personal information):

- (a) The postal code;
- (b) The distributor rate class;
- (c) The commodity rate class; and
- (d) Occupant change data.

Question: Please clarify whether the data to be released to third parties will include consumption information aside from what is tied to the 4 factors identified above.

RESPONSE

Yes, the data that third parties will be provided access to will include consumption data.

Please note that the Occupant Change is not flagged or provided as part of the data available for Third Party Access, based on a recommendation from the Risk of Re-Identification analysis done by Privacy Analytics Inc. This field is only used as an exclusionary factor i.e. third parties can specify if they want premises with an occupant change included/excluded in the aggregated data that will be provided.

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CCC INTERROGATORY 1

**1.0 Is the SME's proposal that access should be provided at Market Prices appropriate?**

**CCC-1**

INTERROGATORY

Did the SME consider pricing models other than the proposal to provide access at market prices? If so, what models were considered and what was the basis for rejecting those proposals?

RESPONSE

Please refer to OEB Staff Interrogatory 2(b) at Exhibit I, Tab 1.0, Schedule 1.02.





## CCC INTERROGATORY 2

**1.0 Is the SME's proposal that access should be provided at Market Prices appropriate?**

**CCC-2**

### INTERROGATORY

Is there currently a significant demand for TPA to the IESO data? Please provide 5 examples of how this data would be used by those entities seeking access. What types of entities are requesting access to the data?

### RESPONSE

There is a demand for access to the SME data. Summaries of the six pilots, including the parties that requested the data, are provided below.

User	Objective	Details
<b>Oxford County</b>	To create an accurate electricity baseline for improving energy efficiency, and aiding in the transition to renewable energy.	Four years of Hourly Electricity Consumption Data for consumers in Oxford County (54 million records, 480Mb)
<b>City of Guelph</b>	To identify priority areas for energy efficiency/ distributed generation programs via energy mapping; support GHG targets with an emissions inventory.	Four years of Daily Electricity Consumption grouped by Postal Code and by Distributor Rate Class for all Guelph postal codes (3.2 million records, 115Mb)
<b>OEB</b>	To better understand small commercial energy use patterns and to make more informed pricing decisions.	Four years of hourly consumption data for Small General Service customers, for the entire province (400 million records 17Gb)
<b>IESO (outside SME)</b>	To improve short- & long-term demand forecasting through better system modelling.	Hourly consumption data for all Consumers in Ontario by DRC, for the period January 1 <sup>st</sup> 2014 to December 31 <sup>st</sup> 2017 (140,256 records, 8Mb)
<b>Enbridge Gas</b>	To establish load profiles to help predict the GHG impact of the power system and support emission reduction.	Four years of aggregated hourly consumption data for residential customers for postal codes L4C, L4B, L1G, L6S, and L5M with commodity rate class (2.3 billion records, 1.4 Gb compressed)
<b>MENDM</b>	The project will explore spatial and temporal electricity consumption patterns in four distinct cities. It will	De-identified hourly electricity consumption at the 6 digit postal code level from January 1st 2016 to June30th, 2018, both inclusive, for a

	<p>provide insight into potential drivers of consumption and will demonstrate how these data can be used effectively to inform energy policy.</p>	<p>list of postal codes provided to the SME by the Ministry of Energy, Northern Development and Mines, corresponding to the following cities:</p> <ul style="list-style-type: none"><li>1- Thunder Bay</li><li>2- Sudbury</li><li>3- Mississauga</li><li>4- Windsor</li></ul> <p>Each record will specify the number of premises and the Distributor Rate Class associated to the consumption data aggregated by each 6 digit postal code.</p>
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CCC INTERROGATORY 3

**1.0 Is the SME's proposal that access should be provided at Market Prices appropriate?**

**CCC-3**

INTERROGATORY

How, specifically, would the market prices be determined by the SME? How will the IESO/SME demonstrate that the prices are market based?

RESPONSE

Please see the reply to BOMA Interrogatory 7(a) at Exhibit I, Tab 0, Schedule 2.07.

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EDA INTERROGATORY 1

Issue 1

EDA Interrogatory #1

INTERROGATORY

Reference: *Electricity Act*

Pre-amble: The *Electricity Act* states:

**Objects or nature of the business of the Smart Metering Entity**

53.8 The objects of the Smart Metering Entity, if it is a corporation, or the nature of its business activities, if the Smart Metering Entity is a limited partnership or a partnership, include, in addition to any other objects or business activities, the following:

1. To plan and implement and, on an ongoing basis, oversee, administer and deliver any part of the smart metering initiative as required by regulation under this or any Act or directive made pursuant to sections 28.3 or 28.4 of the *Ontario Energy Board Act, 1998*, and, if so authorized, to have the exclusive authority to conduct these activities.
8. To recover, through just and reasonable rates, the costs and an appropriate return approved by the Board associated with the conduct of its activities.

Question:

- a. Please discuss whether the SME is a monopoly provider of access to SME data.
- b. Please provide the reference to the SME's evidence on the state of competition in the market for smart meter data; if a reference is not available please characterize the level of competition (e.g., perfect, workable) and provide objective information that supports this characterization.
- c. Please compare and contrast the SME's evidence and analysis of the state of competition, similar to the evidence filed in by CANDAS EB-2013-0324, in particular the evidence of Church and Jackson (e.g., Table 2 at page 32 of Jackson's evidence).
- d. Please reconcile the SME's proposal to charge market-based prices with s.53.8(8) of the *Electricity Act*.
- e. Please explain how a sole source provider can establish market based price levels.

1 RESPONSE

2 a) The SME will not be the sole provider of smart meter data. Ontario's electric LDCs provide  
3 the data to the SME and, presumably, could provide it to third parties. Additionally, this  
4 data is only one stream of data available to interested parties as described in the response to  
5 BOMA Interrogatory 7 at Exhibit I, Tab 0, Schedule 2.07.

6 b) Please see the responses to OEB Staff Interrogatory 2(a) at Exhibit I, Tab 1.0, Schedule 1.02,  
7 and BOMA Interrogatory 7.

8 c) For the reasons stated in response to a) above, and based on the OEB's Strategic Blueprint  
9 and the report of the OEB's Advisory Committee on Innovation, the SME does not believe  
10 an analysis of the competitive environment is required to support this application.

11 One of the key objectives in the OEB's Strategic Blueprint was: "Working with LDCs and  
12 other agencies and market participants to identify and understand emerging new energy-  
13 related "value streams" and service models."<sup>1</sup>

14 Through this application the SME is seeking a licence amendment to provide it with  
15 flexibility in providing data and products to third parties that it has not previously provided  
16 (except through pilot projects). The SME seeks to provide these products without ongoing  
17 OEB review of each product and price, as well as to allow it to generate revenues to benefit  
18 ratepayers. The SME believes that this application is consistent with the objective of the OEB  
19 described in the Strategic Blueprint as the TPA program is a new value stream.

20 The SME proposes to provide data to interested parties, as was required by a 2016 Order of  
21 the OEB. Since 2017 the SME has consulted with stakeholders through the DSAC, SAC and  
22 other mechanisms and developed the plan for third party access. This plan has evolved to  
23 be a monetization plan based on the input of its DSAC, of which the EDA was an observer  
24 and multiple LDCs were active members.

25 The provision of data to third parties is not a traditional service of entities regulated by the  
26 OEB and to the best of the SME's knowledge the OEB has not previously regulated the  
27 provision of data to third parties at greater than cost for the benefit of ratepayers by the  
28 entities it licences.

---

<sup>1</sup> OEB Strategic Blueprint: Keeping Pace With an Evolving Energy Sector, 2017-2022, page 14, Printed February 15, 2018.

1 Work on the provision of data to third parties by the SME began with the OEB's Decision  
2 and Order of January 26, 2016 renewing the SME's licence in which the OEB stated:

3 *..., the OEB has long recognized that there are potentially much greater benefits to*  
4 *consumers from this consumption data, in particular by making non-personal*  
5 *information available to third parties to assist them in developing new innovative*  
6 *products and services that will enhance customer choice and control....*

7 Innovation is about creating new value. The SME, through its provision of reliable  
8 provincial energy consumption data from almost 5 million meters, was in part established to  
9 provide an opportunity for provincial electricity agencies, individual local distribution  
10 companies, and third parties seeking to create new value to benefit consumers. Ontario's  
11 head start on smart meters is an opportunity that could be leveraged to enhance innovation.  
12 The opportunity must be pursued in a timelier way.<sup>2</sup>

13 In its decision, the OEB also required "the Smart Metering Entity to prepare an  
14 implementation plan to be included with its next application for a licence renewal."<sup>3</sup>

15 The SME filed a subsequent application for a licence renewal with an implementation plan,  
16 and in its decision on that application the OEB stated that "The OEB is overall satisfied with  
17 the SME's implementation plan."<sup>4</sup>

18 In 2017, the SME filed an application with the OEB for approval of the Smart Meter Charge.  
19 As part of its evidence it included a section specifically dealing with third party access to  
20 data as Exhibit C-1-1: Third Party Access Implementation Status and Next Steps. In  
21 Exhibit C-1-1 the SME stated:

22 *The SME intends to make a submission to the Board in 2018 with a proposed model for*  
23 *third party access to data in the MDM/R, which may include monetizing this access.*  
24 *This model will be informed by the work of the DSAC and other engagements as*  
25 *previously described.*<sup>5</sup>

26 The SME's filed evidence through interrogatories, including evidence on third party access  
27 related issues, which was open to examination by all intervenors and OEB staff. The SME  
28 reached settlement on all issues in the application with all intervenors and the settlement  
29 proposal was approved by the OEB.

---

<sup>2</sup> OEB Decision and Order, EB-2015-0297, Smart Metering Entity, page 2

<sup>3</sup> Ibid, page 4

<sup>4</sup> OEB Decision and Order, EB-2016-0284, Smart Metering Entity, Application for renewal of the Smart Metering Entity Licence, page 1

<sup>5</sup> EB-2017-0290, Filed: August 31, 2017, Exhibit C-1-1, page 7

Filed: March 18, 2019

EB-2018-0316

Exhibit I

Tab 1.0

Schedule 4.01 EDA 1

Page 4 of 4

- 1 d) As the SME believes that its application for a licence amendment as allowed under the
- 2 *Ontario Energy Board Act, 1998* is not inconsistent with section 53.8 (8) of the *Electricity Act*,
- 3 *1998* there is no reconciliation required.
- 4
- 5 e) Please see the response to a) above.



## EDA INTERROGATORY 2

## Issue 1

## EDA Interrogatory #2

INTERROGATORY

Reference: N/A

Question:

Please provide any OEB precedent that authorized a monopolist to charge market-based prices and for each precedent please summarize the evidence, arguments and OEB findings on the state of competition.

## RESPONSE

Please see the response to EDA Interrogatory 1, at Exhibit I, Tab 1.0, Schedule 4.01.

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EDA INTERROGATORY 3

Issue 1

EDA Interrogatory #3

INTERROGATORY

Reference: Exhibit A/Tab 3/Schedule 1/p. 1 lines 18-23

Preamble: The SME's presentation to stakeholders, "Third Party Access Update: Presentation and Discussion with IESO's Stakeholder Advisory Committee" (October 17, 2018) references a phased approach (p.7 and p. 13).

Question:

- a. Please explain the status of the phased approach and the SME's current position on a phased approach.
- b. Please compare and contrast the phased approach to the unphased approach (e.g., using resourcing, costs, timeline).
- c. Please explain how the Orders sought in the subject application align with a phased approach.

RESPONSE

a. b. and c.

A phased approach had been considered where the SME would seek OEB approval for a monetization Third Party Access model through more than one application. In the referenced presentation on page 7, Phase 2 is described as "(TBD)". After making the presentation, it was determined that a phased approach requiring multiple OEB applications was not efficient. Rather, a single application seeking a licence amendment to allow monetization of Third Party Access would result in the same outcome and be less costly for rate payers. All costs associated with any application by the SME, including intervenor and OEB costs associated with the application, are ultimately borne by the Smart Metering Entity Charge rate payers, all of whom are LDC customers.

Additionally, on page 13 of the referenced presentation the reference to the phased approach was as a question for SAC input. There were no questions from the SAC members on the phased approach.

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## EDA INTERROGATORY 4

## Issue 1

## EDA Interrogatory #4

INTERROGATORY

Reference: Exhibit B/Tab 1/Schedule 1/p.3 line 9

Question:

Please identify the party that has title to Smart Meter data, the party or parties that have custody of Smart Meter data.

## RESPONSE

As stated in the response to BOMA Interrogatory 13 at Exhibit I, Tab 0, Schedule 2.13. The SME does not believe the question of title to or who owns the smart meter data is relevant to this application. The issue is whether the SME has the authority to provide access to the smart meter data and the SME takes the position that it has the lawful ability to collect, use and provide access to the data and this has been affirmed through OEB decisions requiring this.



EDA INTERROGATORY 5

Issue 1

EDA Interrogatory #5

INTERROGATORY

Reference: Exhibit B/Tab 3/Schedule 1/p. 1, lines 6-11

Question:

- a. Please provide the formula and discuss how it supports providing service at a market based price.
- b. Please discuss the data inputs to the formula and the available data source(s), and whether the data is gathered from competitive market place.
- c. Please assume that a party seeks more granular data; please describe the relationship between greater granularity and
  - a. Costs
  - b. Price

RESPONSE

a. and b.

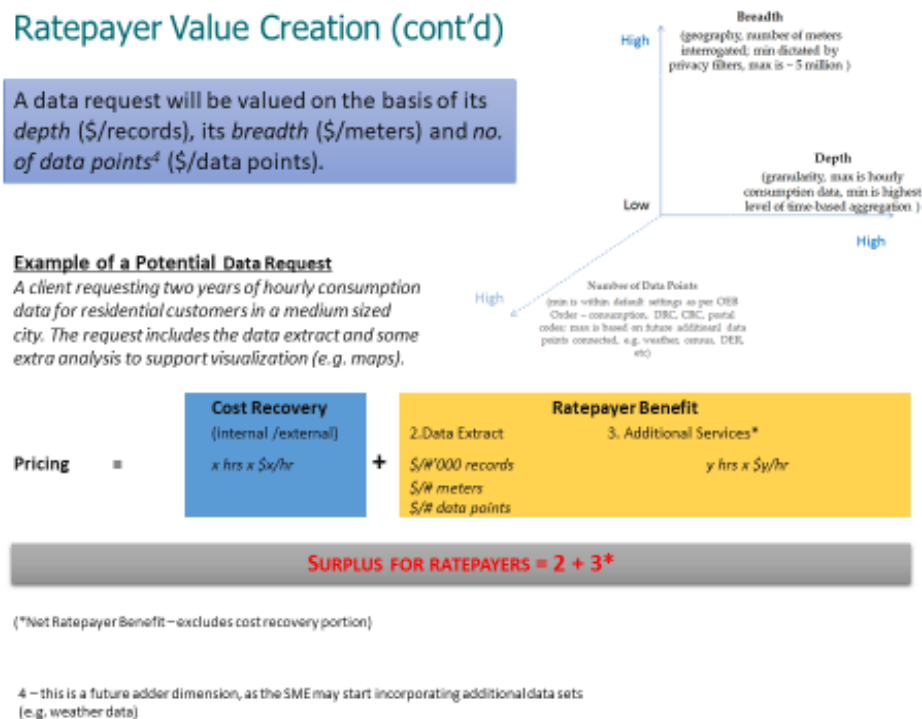
The formula to provide service at a market based price is as follows:

$$\text{Price} = \text{Cost Recovery} + \text{Value Creation}$$

The inclusion of Cost Recovery in the formula is to ensure that all operational costs are recovered for each data extract request. Due to the varying nature of data requests, the cost recovery component will be comprised of fixed costs, and variable costs (which are tied to an hourly rate), and external expenses (which will be billed as a pass through cost).

Fixed costs are costs that are not expected to change and include elements such as recipient registration and legal costs for completing the Data Use Agreement. Variable costs are costs that are expected to fluctuate depending on the size and complexity of each data request including the effort to develop and run the data extract queries, data quality validation, and data transfer effort. External Expenses are costs that the SME may incur on non-standard or complex data requests that may require engaging the services of a Privacy Analysis firm, external legal

- counsel, expert advice such as an Ethics advisor, or advanced Database analysts to assist with complex queries and extracts.
- Over time additional costs may be incurred, including costs related to marketing, research and product development work, which will be included in “cost recovery” in the model.
- c. Provided below is a slide presented to the IESO’s SAC on October 17, 2018 on Third Party access to the MDMR. This slide provides a graphic description of the proposed pricing model described in the section of the application this IR references.



- For a third party that seeks more granular data, the cost will reflect an increase in variable costs and external resources or expenses necessary to provide greater granularity.
- The Value Creation formula envisages two data opportunities:
- Data Extracts** – for these products the SME will charge on the basis of the granularity of the extracts; and
  - Value Added service** (shown as additional services in the Slide) – services to facilitate access to data, ranging from visualizations (such as: maps of electricity consumption by territory), to insights & analytics from segmentation, clustering, trending analysis.



1 In providing access to third parties the SME will be using the three of the four data points the  
2 OEB has required it to collect and consumption data. The three data points that will be utilized  
3 are:

- 4 • Postal Code,
- 5 • Distributor Rate Class, and
- 6 • Commodity Rate Class.

7 The Occupant Change is not flagged or provided as part of the data available for TPA based on  
8 a recommendation from the Risk of Re-Identification analysis done by Privacy Analytics Inc.  
9 This field is only used as an exclusionary factor i.e. third parties can specify if they want  
10 premises with an occupant change included/excluded in the aggregated data that will be  
11 provided.



EDA INTERROGATORY 6

Issue 1

EDA Interrogatory #6

INTERROGATORY

Reference: Exhibit B/Tab 3/Schedule 1/p. 1, lines 17-19

Question:

- a. Please explain the origin of the market pricing position.
- b. Please provide the document that initially proposed the provision of data/services at market prices.
- c. Please provide the alternatives to market based pricing and the analysis of each alternative.

RESPONSE

- a. The SME consulted with various experts to understand, develop, and establish a market-based pricing model which allows the SME to recover all operational costs for each data request and generate revenue that can be credited back to Ontario ratepayers - please see the response to OEB Staff Interrogatory 2(d) at Exhibit I, Tab 1.0, Schedule 1.02 for materials related to this. Variations of the model were tested on a significant number of scenarios which has allowed the SME to refine the inputs and propose a model that balances market acceptance (business viability, or what the market can bear) and ratepayer benefit (a return to ratepayers). The model covers a first or initial phase which is critical to allowing the SME to develop a better "real-life" understanding of market interest and opportunities, prior to proposing more advanced models for value creation models such as differential pricing, discounting, subscriptions, etc.

Please also see the response to EDA Interrogatory 16(d) at Exhibit I, Tab 8.0, Schedule 4.16.

- b. Attachment 1 to this exhibit is the presentation deck that was prepared based on prior DSAC discussions and presented at the January 31, 2017 DSAC meeting.
- c. The alternatives to market based pricing would be cost recovery or not charging for access.  
  
Cost recovery is to ensure that all operational costs are recovered for each data extract request. Due to the varying nature of different data requests the cost recovery component

will be comprised of fixed costs and variable costs which are tied to an hourly rate, and external expenses which will be billed as a pass through cost. Fixed costs are defined as costs that are not expected to change and include elements such as recipient registration and legal costs for completing the Data Use Agreement; however, variable costs are expected to fluctuate depending on the size and complexity of each data request and this includes the effort to develop and run the data extract queries, data quality validation and data transfer effort. External expenses are costs that the SME may incur on non-standard or complex data requests that may require engaging the services of a privacy analysis firm, currently Privacy Analytics Inc., external legal counsel, expert advice such as an Ethics advisor, or advanced Database analysts to assist with complex queries and extracts.

Cost Recovery is comprised of Internal and External Expenses. The Internal Expenses incorporate Fixed Costs and Variable Costs.

Fixed Costs include:

- Initial Assessment
- Registration & Enrolment Costs
- Documentation
- Legal Costs and
- Post Delivery

Variable Costs include:

- Query Development & Execution
- Privacy Analysis
- Data Quality Checks
- Data Transfer
- Operational Support

External Expenses include:

- Privacy Analysis
- Legal Counsel
- Committees
- Technical Solutions.

Not charging would mean all parties receive access to the data without payment, effectively having the Smart Metering Entity Charge rate payers subsidize this access.

# Market Analysis & Costing Model for Electricity Consumption Data

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January 31, 2017

# Project Overview

- IESO has engaged MNP to assist in valuing the de-identified SME data for third party use. The scope of the project includes the following:
  - Collect and interpret economic and financial information specific to the use and value of data in various sectors (energy and non-energy) and for various types of purposes (e.g. public, private or research);
  - Performs high and detailed level analysis and modeling based on the market and business inputs; and
  - Establish viable options leading to a model that will support IESO's future policy for charging on various third parties using and accessing the de-identified electricity data from the provincial MDM/R.

# Operating Principles

Given the sensitivities involved with the monetization of de-identified consumption data, the following principles will be followed:

Principle	Operating Guideline
<b>Transparency and Accountability</b>	<ul style="list-style-type: none"> <li>• Clear visibility for clients with respect to fees charged for the product IESO produces. Establishing an understanding of the rates and fees charged to respective client groups, and the clearly defined rationale for each, will allow for minimal issues once a pricing model has been established.</li> </ul>
<b>Fairness</b>	<ul style="list-style-type: none"> <li>• Establishing a pricing methodology which allows for both cost recovery for IESO as well as allows customers to feasibly afford the data products produced by IESO employees.</li> </ul>
<b>Simplicity</b>	<ul style="list-style-type: none"> <li>• The pricing model is straight forward and easy to understand for clients.</li> </ul>
<b>Price Stability</b>	<ul style="list-style-type: none"> <li>• Limited volatility with respect to the costs of the data products produced by IESO for customers.</li> </ul>
<b>Customer Value</b>	<ul style="list-style-type: none"> <li>• The customer receives the appropriate level of value for money paid for data products.</li> </ul>

# Customer Profiles

- Government Municipalities, Utilities & Crown Corporations
- Research and Education
- Private Industry

Each group has their own unique needs with respect to the data.



# Pricing Model Alternatives

- Based on research, the following models have been considered:
  - Fixed Fee Business Model;
  - Fixed and Variable Fee Business Model
- The models have taken into consideration the following:
  - Cost recovery only
  - Revenue generation
  - Differentiated Fees (Non-Profit & For Profit)
- IESO will determine the appropriate fees for each customer group based on defined operating principles.

# Interviews

- Participants
  - Veridian;
  - MPAC;
  - OEB;
  - Fortis;
  - Hydro One; and
  - Ministry of Energy.

# Key Themes

- LDC Consideration:
  - Privacy and security of data is primary concern;
  - Supportive of the process;
  - LDCs have capacity to do data analytics in house;
  - LDCs primary uses of data is for customer billing;
  - Customers may want the option to opt out of having their data shared;
  - Various business uses for custom data requests (e.g. Asset analytics, pricing, CDM business decision and initiatives, drive policy changes, support Municipalities and Government decision making.)

# Key Themes

- MPAC Considerations:
  - Royalty structure (Potential future initiative);
  - Profit Generating > Cost Recovery (Profits reduce costs to consumers); and
  - Fair pricing is critical.
- Regulatory Considerations:
  - Fair pricing;
  - Estimated request frequency – Bi-annually;
  - Support policy decisions and rate changes;
  - Data protection is primary concern;
  - Prefer ‘easy to use’ online method;
  - Supports fixed and variable costing model.

# Data Request Costs

- The costs associated with data requests include the following:

Cost Categories	
Registration & Enrolment	Data Processing
Evaluation	Request Confirmation
Legal	Process Request
System Registration	Quality Assurance
Confirm Authentication Controls	Package Data
Finalize registration	Data Verification
Privacy Analysis	Deliver Data

# Preliminary Findings

- Fixed Fee Business Model
- Pros
  - Consistent fee for every request
  - Reduces the burden of tracking level of effort for requests
- Cons
  - Third Parties will have to pay the same rate regardless of the complexity of data requests
  - Fees may not reflect the cost of data requests for the IESO as the amount of effort greatly varies

# Preliminary Findings

- Fixed and Variable Fee Business Model
- Pros
  - Variable pricing reflects the level of effort required for IESO to prepare data requests
  - Fixed pricing is simple to employ for IESO
  - Clients will be able to pay for the amount of information required and scale to fit their needs
- Cons
  - Determining the appropriate rates will be critical to ensure cost recovery for IESO
  - Dependent on the rates, the initial fixed fee may be a deterrent if it is too high

## Next Steps

1. Finalize the pricing model
2. Submit for approval to the OEB
3. Implement Pricing Model for Third Party Data Access Project.



EDA INTERROGATORY 7

Issue 1

EDA Interrogatory #7

INTERROGATORY

Reference: Exhibit B/Tab 1/Schedule 1/p.1, line 13

Preamble: The SME has been acquiring and de-identifying data since January 1, 2017.

Question:

- a. Please provide an itemized list of the data requests received to date and the frequency of each request.
- b. Please quantify the costs incurred to acquire data and to manage requests for data; please state the methodology used to quantify these costs (e.g., fully allocated, marginal, incremental).

RESPONSE

a. The SME has accepted one other pilot request in addition to the pilots undertaken within Data Strategy Advisory Council. A description of the pilots is provided in the response to VECC Interrogatory 6 at Exhibit I, Tab 1.0, Schedule 5.06.

b. Based on the OEB Decision and Order EB-2015-0297 dated January 26, 2019, the SME was mandated to collect effective January 1, 2017, the following information associated with each meter (modified where necessary to sufficiently render it non-personal information):

- Postal Code,
- Distributor Rate Class,
- Commodity Rate Class, and
- Occupant Change Data.

These additional data elements were collected by utilizing the existing infrastructure in place between the LDCs and the SME. The costs associated with the pilots were considered standard operations and recovered through the Smart Meter Charge.

Please also see the response to OEB Staff Interrogatory 11 at Exhibit I, Tab 9.0, Schedule 1.11.

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VECC INTERROGATORY 1

*1. Is the SME's proposal that access should be provided at market prices appropriate?*

INTERROGATORY

1.1 Reference A/T1/S1/pg.3 & B/T3/S1

Please describe the mechanism by which the SME proposes to determine "market price" for the offered data?

Reference A/T1/S1

Please explain what a "principled assessment of each request to the data" entails.

RESPONSE

Please describe the mechanism by which the SME proposes to determine "market price" for the offered data?: Please see the responses to OEB Staff Interrogatory 2(a) at Exhibit I, Tab 1.0, Schedule 1.02, and EDA Interrogatory 5 at Exhibit I, Tab 1.0, Schedule 4.05.

Please explain what a "principled assessment of each request to the data" entails.: Please see the reply to EDA Interrogatory 9(a) at Exhibit I, Tab 2.0, Schedule 4.09.

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VECC INTERROGATORY 2

1. *Is the SME's proposal that access should be provided at market prices appropriate?*

INTERROGATORY

1.2 Reference B/T1/S1, pg.3

a) Please provide the form of the Data Use Agreement (DUA) reflecting the contractual terms identified at B/T1/S1/. If such a form of contract is not available please explain what form of contract will be presented to prospective third parties seeking purchase of data.

b) Specifically identify any terms related to re-sale rights.

RESPONSE

a) Please see the reply to BOMA Interrogatory 3 at Exhibit I, Tab 0, Schedule 2.03.

b) There are none currently.

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1 VECC INTERROGATORY 3

2 1. *Is the SME's proposal that access should be provided at market prices appropriate?*

3 INTERROGATORY

4 1.3 Reference B/T2/S1

5  
6 Does the SME's intend to make available publicly the names of parties  
7 purchasing data from the SME? If not please explain why not.

8 RESPONSE

9 The SME does not plan to make the names of parties purchasing the data public. As these  
10 parties will be purchasing non-personal data from the SME there is no benefit seen to  
11 publishing their names. Additionally, it is expected that some parties may require that their  
12 access of the data remain confidential.

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VECC INTERROGATORY 4

*1. Is the SME's proposal that access should be provided at market prices appropriate?*

INTERROGATORY

1.4 Reference B/T2/S1

Please provide and describe (give example of) the different data sets that might be offered under the three types of offering described at Exhibit b (i.e. Public Offerings, Standard Private Offerings and Custom Offerings).

RESPONSE

Public Offerings would be a catalogue of highly aggregated reports. These reports may be provided at a Postal District level (K, L, M, N and P), by IESO Electricity Regional Planning Zone (21) or Census Sub-Division and include:

- Total quarterly consumption or by TOU bucket,
- By customer type: Residential & Small General Service <50 kW, and
- Total number of premises.

Standard Private Offerings could be Provincial, Municipal, Regional data products for pre-defined recipients. These would be "pre-canned" extracts based on the most popular data requests with privacy analysis previously completed. For example: Daily aggregated Interval Consumption Data by 3,4,5 or 6-digit postal code for a given municipality identifying the Distributor Rate Class and Count of premises for each 6-digit postal code. Standard offerings would be delivered in formats pre-defined by the SME (e.g. pipe delimited files).

Custom Offerings would be data requests that are developed based on specific user requests that require a specific assessment from a privacy or technical aspect. For example, a request may need a new privacy analysis, if the requestor would like the SME to acquire and link the data to another set (e.g. weather data) and provide additional insights or, a technical analysis if the delivery format needs to meet specific needs e.g. type of visualization not standard for the SME.

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VECC INTERROGATORY 5

*1. Is the SME's proposal that access should be provided at market prices appropriate?*

INTERROGATORY

1.5 Reference B/T1/S1/pg.4

Please identify the members of the "Ethics Review Committee". If the committee has not yet been struck please identify the institutions or interest groups from which the SME proposes to nominate members.

RESPONSE

The ethics committee has not been struck at this time. The Ethics Committee will be comprised of a minimum of three people, at least one of which will be IESO management at the level of a director or above; one member of the IESO's legal team; and one external consultant with experience in the field of ethics. While a consensus view will be sought, in the event the members of the committee cannot arrive at a consensus, the majority will make the determination whether to proceed with the request. The IESO may change the composition of the ethics committee as its decision making matures.

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## VECC INTERROGATORY 6

**1. Is the SME's proposal that access should be provided at market prices appropriate?**

### INTERROGATORY

1.6 Reference B/T2/S1

Please provide the summary reports of the DSAC pilot described at the above reference.

### RESPONSE

The pilots were discussed with the DSAC members from the August 2, 2017 meeting through to the final DSAC meeting on January 30, 2019. There has been one other pilot with the Ministry of Energy, Northern Development and Mines which is in addition to those undertaken with DSAC members.

The summary of the pilot cases is shown below:

User	Objective	Details
<b>Oxford County</b>	To create an accurate electricity baseline for improving energy efficiency, and aiding in the transition to renewable energy.	Four years of Hourly Electricity Consumption Data for consumers in Oxford County (54 million records, 480Mb)
<b>City of Guelph</b>	To identify priority areas for energy efficiency/ distributed generation programs via energy mapping; support GHG targets with an emissions inventory.	Four years of Daily Electricity Consumption grouped by Postal Code and by Distributor Rate Class for all Guelph postal codes (3.2 million records, 115Mb)
<b>OEB</b>	To better understand small commercial energy use patterns and to make more informed pricing decisions.	Four years of hourly consumption data for Small General Service customers, for the entire province (400 million records 17Gb)
<b>IESO (outside SME)</b>	To improve short- & long-term demand forecasting through better system modelling.	Hourly consumption data for all Consumers in Ontario by DRC, for the period January 1 <sup>st</sup> 2014 to December 31 <sup>st</sup> 2017 (140,256 records, 8Mb)
<b>Enbridge Gas</b>	To establish load profiles to help predict the GHG impact of the power system and support emission reduction.	Four years of aggregated hourly consumption data for residential customers for postal codes L4C, L4B, L1G, L6S, and L5M with commodity rate class (2.3 billion records, 1.4 Gb compressed)

<b>MENDM</b>	<p>The project will explore spatial and temporal electricity consumption patterns in four distinct cities. It will provide insight into potential drivers of consumption and will demonstrate how these data can be used effectively to inform energy policy.</p>	<p>De-identified hourly electricity consumption at the 6-digit postal code level from January 1st 2016 to June30th, 2018, both inclusive, for a list of postal codes provided to the SME by the Ministry of Energy, Northern Development and Mines, corresponding to the following cities:</p> <ul style="list-style-type: none"><li>1- Thunder Bay</li><li>2- Sudbury</li><li>3- Mississauga</li><li>4- Windsor</li></ul> <p>Each record will specify the number of premises and the Distributor Rate Class associated to the consumption data aggregated by each 6 digit postal code.</p>
--------------	---	---

1 CCC INTERROGATORY 4

2 *2 – Is the SME's proposal that access should only be provided to any person who meets the*  
3 *criteria for access established by the SME and enters into a Data Use Agreement with the SME*  
4 *appropriate?*

5 CCC-4

6 INTERROGATORY

7 Please explain why type of relief the SME is seeking from the OEB with respect to access to its  
8 data. Does the SME expect the OEB to approve the criteria for access? Is the SME seeking  
9 approval of its Data Use Agreement?

10 RESPONSE

11 The SME is seeking a licence amendment to allow it the flexibility to set the prices for third  
12 party access and to be able to adapt the Data Use Agreement it will require parties to sign, as  
13 required. The SME is not seeking OEB approval of the Terms of Access Principles or the Data  
14 Use Agreement.





EDA INTERROGATORY 8

Issue 2

EDA Interrogatory #8

INTERROGATORY

Reference: Exhibit B/Tab 1/Schedule 1/p.3, line 9

Question:

- a. Please provide the proposed Data Use Agreement and all other standard agreements that the SME proposes to apply when providing data to a third party.
- b. Please provide an analysis (e.g., by stakeholder) of the indemnifications and liabilities of the Data Use Agreement.
- c. Please assume that a third party has been given access to SME data and makes inappropriate use of the data; please describe the actions that the SME could take and assess their efficacy.

RESPONSE

a. Please see the response to BOMA Interrogatory 3 at Exhibit I, Tab 0, Schedule 2.03.

b. and c.

Please see the response to EDA Interrogatory 18 at Exhibit I, Tab 10.0, Schedule 4.18.

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EDA INTERROGATORY 9

Issue 2

EDA Interrogatory #9

INTERROGATORY

Reference: Exhibit B/Tab 1/Schedule 1/p. 1 line 11 – Exhibit B/Tab 1/Schedule 1/p. 3, line 2

Question:

- a. Please provide the IESO's rationale for including each of the 8 identified principles that will be applied prior to granting access.
- b. Please describe the enforceability of each of the 8 conditions. Please describe the SME's testing of the principles and process governing access to data.
- c. Please describe the threshold that a proponent must satisfy to be able to access data (e.g. if all 8 principles must be satisfied, if all of the mandatory principles must be satisfied, if a simple majority of principles must be satisfied).
- d. Please discuss whether the SME could rely on "Conditions of Service" to administer the conditions under which data is accessed.
- e. Please describe the skills, training, experiences of SME staff that will support decision making on a party's application to access SME data.
- f. Please describe the skills, training, experiences of SME staff that will support decision making on a party's application to access SME data.

RESPONSE

- a. The IESO's Terms of Access Principles were defined to ensure compliance with the *Freedom of Information and Protection of Privacy Act*, non-discriminatory access to electricity data, as established in the *Electricity Act, 1998* and to realize the value of a province-wide database of electricity consumption data; the learnings from the Data Strategy Advisory Council pilot cases confirmed the importance and relevance of the established principles.

With respect to privacy, each of the test cases underwent a Risk of Re-Identification Determination ("RRD") conducted by the expert firm Privacy Analytics Inc. The results and recommendations of the RRDs helped the SME to establish the rules and protocols for data access by third parties maintaining the security and privacy of the data.

b. The SME shall modify or decline a request if the request is not consistent with the Terms of Access Principles. The pilots evaluated the de-identification rules in a concrete manner with reference to actual data sets. The results concluded that by following a series of de-identification practices the risk of re-identification of a dwelling (note that the records in the MDM/R pertain to dwellings and not individuals) can be maintained below the established risk threshold for electricity consumption data as per the Information and Privacy Commissioner of Ontario Guidelines.

Please also refer to the reply to OEB Staff Interrogatory 1(b) at Exhibit I, Tab 1.0, Schedule 1.01.

c. The SME will expect all of the Terms of Access Principles are met for a proponent to be able to access data.

d. The SME will rely on the execution of a Data Use Agreement ("DUA") and not a "Conditions of Service" that must be adhered to before fulfilling as data request.

e. The SME staff that will support the decision making on a party's application to access SME data will consist of the SME Data Analysts, SME Managers, IESO Legal (for DUA execution) as well as external Privacy Analysts and Ethics advisors, if required. The SME staff have been on the Third Party Access initiative since the inception (OEB Decision and Order EB-2015-0297 issued on January 26, 2016). Their skills and experiences have been enhanced and/or developed throughout the initiative by working with experts of the various fields including privacy, market research, data analytics, querying data, legal and regulatory.

Decision making will also be supported by the ethics committee which will be comprised of a minimum of three people: at least one of which will be IESO management at the level of a director or above; one will be a member of the legal team; and one will be an external consultant with experience in the field of ethics. While a consensus view will be sought, in the event the members of the committee cannot arrive at a consensus, the majority will make the determination whether to proceed with the request.

f. N/A (duplication of e).

1 VECC INTERROGATORY 7

- 2 2. *Is the SME's proposal that access should only be provided to any person who meets the*  
3 *criteria for access established by the SME and enters into a Data Use Agreement with the*  
4 *SME appropriate?*

5 INTERROGATORY

6 2.1 Reference: A/T3/S1

7  
8 Please provide the recent Third Party Access Implementation Plan.

9 RESPONSE

10 The Third Party Access Implementation Plan was filed with the OEB as part of the SME's Smart  
11 Meter Charge application filed on August 31, 2017. This plan was further developed through  
12 stakeholdering with DSAC, the SSC and the IESO's SAC and this application (EB-2018-0316) is  
13 the culmination of those efforts.



OEB STAFF INTERROGATORY 3

**1.0 Is the SME's proposal that access should be provided at Market Prices appropriate?**

**Staff – 3**

INTERROGATORY

Reference: B-5-1, Attachment 1 – Third Party Access Implementation Plan

Preamble: At Slide 27 of the presentation, the SME identifies potential third party clients for MDM/R data.

Questions:

a. Will the SME market/advertise its products to potential customers, and if so, how?

b. Has a budget been established to fund these marketing/advertising activities?

i. Please provide the forecast budget for marketing/advertising (if applicable).

ii. How will costs associated with marketing/advertising be recovered?

RESPONSE

a. While the SME expects to market/advertise its products to potential customers the marketing/advertising strategy is currently in the development phase. The SME website is expected to be an important marketing channel which will leverage the existing platform. The public reports which will be available and accessible on the SME website will provide a high level view of the data, while explanations of the underlying data will allow users to understand the level of granularity that can be accessed and to review how some of the organizations have used the data (initially this information will come from the pilots). A contact form which will enable communication with the SME will also be available on the website.

The SME will be examining having a section on the website which will provide potential users with information on the standard products, when these are available, and the estimated cost for access to these.

b.

i. A forecast budget has not yet been determined for marketing/advertising.

ii. Costs associated with marketing/advertising will be recovered through the charges to customers for third party access. All costs and revenues associated with providing Third Party Access at a charge will be tracked in the proposed Benefits Account.

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OEB STAFF INTERROGATORY 5

**3.0** *Is the SME's licence amendment proposal appropriate?*

**Staff – 5**

INTERROGATORY

Reference: Exhibit B, Tab 6, Schedule 1, Page 2

Preamble: The application states:

In this application, the SME is seeking similar licence amendments as those provided in the decision on wireless attachment as described above to allow it to:

- provide access to the data to any person who meets the terms of access established by the SME and enters into a Data Use Agreement with the SME; and
- annually report the net revenue generated by Third Party Access which will be tracked in the Benefits Account, a sub-account of the BVA.

Question:

- a. Please file specific proposed language for the requested licence amendments, for the OEB's consideration. Please include any appropriate conditions concerning privacy protection, as contemplated in section 53.8, paragraph 4, of the *Electricity Act, 1998*.

RESPONSE

Please note that the SME will assess requests in accordance with the principles described in the application to determine if access can be granted (for example, if the requester does not have the appropriate technical capabilities, the SME won't be able to accept the request; or if it is determined that the request does not meet the ethical standards, the SME will not be able to accept the request).

The specific language of the amendments the SME is seeking are provided below and includes one new definition.

Add a new definition:

**"De-identified Information"** means information regarding Distributors, consumers, Retailers, or any other person where the information has been sufficiently de-identified such that the

1 Distributors', consumers', Retailers', or other person's particular information cannot reasonably  
2 be identified.

3 Rename Section 9: **9. Restrictions on Provision of Information and Third Party Access**

4 Delete the existing Section 9.3 and replace with the following:

5 9.3 Notwithstanding any other term of this License, the Licensee shall provide access to  
6 De-identified Information to any person who:

7 a) meets the terms of access established by the Licensee; and

8 b) enters into an agreement with the Licensee governing access to the De-identified  
9 Information.

10 Add a new section 15:

11 15. Third Party Access Net Revenues

12 15.1 The Licensee shall annually report the net revenue generated from third party  
13 access to De-Identified Information to the Board using a methodology and form  
14 determined by the Board.

1 CCC INTERROGATORY 5

2 *3 – Is the SME's licence amendment proposal appropriate?*

3 CCC-5

4 INTERROGATORY

5 (Ex. A/T1/S1/p.3) The SME is seeking approval to amend its licence to allow it to provide access  
6 to the data to any person who meets the terms of access established by the SME and enters into  
7 a Data Use Agreement with the SME. Is the SME seeking approval from the OEB of the DUA?

8 RESPONSE

9 As stated in the response to CCC Interrogatory 4 at Exhibit I, Tab 2.0, Schedule 3.04, the SME is  
10 not seeking OEB approval of the Data Use Agreement ("DUA"). It is not expected that a single  
11 templated DUA will be used for all parties requesting access to the data.

12 Please also see the response to BOMA Interrogatory 3 at Exhibit I, Tab 0, Schedule 2.03.

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1 VECC INTERROGATORY 8

2 3. *Is the SME's licence amendment proposal appropriate?*

3 INTERROGATORY

4 3.1 Reference: B/T6/S1

5  
6 Is the SME seeking to amend its licence to have the Board forebear both from  
7 setting the rates (fees) and the terms and conditions for the TPA services?  
8

9 RESPONSE

10 The SME is seeking a licence amendment to allow it the flexibility to set the prices for third  
11 party access and to be able to adapt the Data Use Agreement it will require customers to sign, as  
12 required.



1 VECC INTERROGATORY 9

2 3. *Is the SME's licence amendment proposal appropriate?*

3 INTERROGATORY

4 3.2 Reference: B/T6/S1

5  
6 What other parties provide access to customer electricity metering data that  
7 would underpin the competitive market-based model postulated by the  
8 SME/IESO?

9 RESPONSE

10 The SME will not be the sole or monopoly provider of smart meter data, Ontario's electric LDCs  
11 possess the data, provide it to the SME and, presumably, could provide it to third parties.  
12 Additionally, this data is but one stream or type of data available to interested parties as  
13 described in the response to BOMA Interrogatory 7 at Exhibit I, Tab 0, Schedule 2.07.

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OEB STAFF INTERROGATORY 6

**4.0** *Are the IESO/SME's proposals and methodology for calculating net revenues generated by third party access and the proposed allocations of those revenues to Smart Metering Entity Charge rate payers appropriate?*

**4.0 Staff – 6**

INTERROGATORY

Reference: B-5-1, Attachment 1 – Third Party Access Implementation Plan

Preamble: At Slide 19 of the presentation, the SME states:

“The products the SME will offer, will provide ratepayer value through their public benefit and/or financial return.”

Questions:

a. Please clarify what is meant by ratepayer value through their public benefit and how these public benefits might be measured.

RESPONSE

The statement on slide 19 was further refined and provided in the SME's application to clarify that the SME will create value by returning net revenues to the ratepayer as well as providing a public benefit through the generation of accessible reports for the public good. While the SME may be unable to continuously determine the ultimate use given to the public reports, website visitor analytics, compliant with privacy and security protocols, can be implemented to estimate the number of visitors to the public report pages and their engagement with the context. While the market strategy is in its early development stage, a channel (most likely online) may be enabled to allow users of public reports to provide feedback and share information about the projects in which the data is being used.



OEB STAFF INTERROGATORY 7

**4.0** *Are the IESO/SME's proposals and methodology for calculating net revenues generated by third party access and the proposed allocations of those revenues to Smart Metering Entity Charge rate payers appropriate?*

**4.0 Staff – 7**

INTERROGATORY

Reference: Exhibit B, Tab 3, Schedule 1, Page 1

Preamble: At Exhibit B, Tab, Schedule 1, Page 1, the SME states:

“The market price that the SME will be charging will ensure full cost recovery of all of its costs related to data extraction and additional analysis, as required, from third parties, such that the SME's ratepayers will not subsidize third party access.

The SME will track its costs associated with providing third party access and recover these through the price charged to third parties for access.”

Questions:

a. How will the SME ensure that revenues exceed costs (e.g., is there a true-up mechanism for unforeseen costs)?

RESPONSE

The prices charged for access by third parties to the smart meter data by the SME will be greater than the estimated costs the SME incurs in providing access to the data. Built into the final price to be charged to requestors, which will be provided to each requestor prior to the SME initiating work to fulfill the request, will be a provision for future associated and general costs, which may include but not be limited to legal costs, external consultants, the Ethics Committee and additional work by Privacy Analytics Inc.

All costs and revenues will be tracked in the proposed Benefits Account.

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OEB STAFF INTERROGATORY 8

**4.0** *Are the IESO/SME's proposals and methodology for calculating net revenues generated by third party access and the proposed allocations of those revenues to Smart Metering Entity Charge rate payers appropriate?*

**4.0** **Staff – 8**

INTERROGATORY

Reference: Exhibit B, Tab 3, Schedule 1, Page 2

- a. Please file the BDR cost allocation study referenced at Exhibit B, Tab, Schedule 1, Page. 2.
- b. Has the SME adopted all recommendations provided in the BDR report? If no, please identify the recommendations not adopted and provide an explanation as to why it has not been adopted.
- c. On what basis does the SME propose to allocate net revenues to SME ratepayers?
- d. How does the SME propose to return the allocated net revenues to SME ratepayers and over what time period?

RESPONSE

- a. The BDR cost allocation study is attached. This study was originally filed in the IESO's 2018 Revenue Requirement Submission, EB-2018-0143.
- b. Yes, as stated in the application the SME reviewed the BDR Cost Allocation Study and will be following the recommendations and conclusions in the study.
- c. The net revenues will be tracked in the proposed Benefits Account, a sub-account of the Balancing Variance Account ("BVA"). Please see the reply below which describes the methodology to clear any surplus in the BVA. The clearing of any surplus in the BVA will be done on a pro-rata basis using the number of meters in the OEB's most recently published *Yearbook of Electricity Distributors*.
- d. The SME proposes to track net revenues generated from third party access in the proposed Benefits Account, which will be one of three sub accounts of the BVA. A methodology for clearing the BVA and providing these funds to Smart Metering Entity Charge rate payers was approved in the SME's Smart Meter Charge application, EB-2017-0290, and the SME is

1 not proposing to alter this except for the creation of the Benefits Account. The methodology  
2 for clearing any surplus in the BVA is described below:

3 Any year-end balance in the BVA exceeding \$2.5 million (the “surplus”) will be provided to  
4 the Smart Metering Entity Charge ratepayers if the year-end surplus in the BVA, as reported  
5 in the SME’s May 31<sup>st</sup> annual report to the OEB, when divided by the number of meters in  
6 the OEB’s most recently published *Yearbook of Electricity Distributors*, results in an amount of  
7 \$0.05 per meter or greater. If the surplus in the BVA meets the threshold of \$0.05 per meter  
8 or greater the SME’s annual report to the OEB will include a description of the total amount  
9 to be provided and the amount to be provided to each smart meter account. The surplus  
10 funds would be administered two months after the SME files the annual report with the  
11 OEB on May 31<sup>st</sup> unless the OEB provides alternative direction.

*Report on  
Methodology for the  
Allocation of Shared Costs  
To Certain Identified Activities*

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*Submitted To The  
Independent Electricity  
System Operator  
July 16, 2018*

**BDR**

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Report on Methodology for the  
Allocation of Shared Costs  
To Certain Identified Activities  
Page 1

## Table of Contents

<b>EXECUTIVE SUMMARY .....</b>	<b>2</b>
<b>1 INTRODUCTION.....</b>	<b>5</b>
1.1 BACKGROUND.....	5
1.2 PURPOSE AND CONCEPTUAL BASIS OF THIS REVIEW .....	6
1.3 SCOPE .....	6
<b>2 METHODOLOGY .....</b>	<b>7</b>
<b>3 ANALYSIS .....</b>	<b>8</b>
3.1 SELECTION OF THE CLIENT FUNCTIONS.....	8
3.2 DESCRIPTION OF CLIENT FUNCTIONS AND SERVICES RECEIVED .....	9
3.2.1 <i>GreenON Programs</i> .....	9
3.2.2 <i>Smart Metering Entity (“SME”)</i> .....	11
3.2.3 <i>Market Renewal Program (“Market Renewal” or “MRP”)</i> .....	12
3.3 SERVICES PROVIDED BY FUNCTION.....	13
3.3.1 <i>Services Overview</i> .....	13
3.3.2 <i>IESO’s Timekeeping System</i> .....	14
3.3.3 <i>Human Resources (“HR”)</i> .....	14
3.3.4 <i>Information Technology</i> .....	15
3.3.5 <i>Finance</i> .....	16
3.3.6 <i>Legal</i> .....	17
3.3.7 <i>Buildings and Facilities</i> .....	17
3.3.8 <i>Regulatory Affairs</i> .....	17
3.4 SUMMARY OF SERVICES USED AND ALLOCATION APPROACH BY CLIENT FUNCTION .....	18
<b>4 CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>19</b>
4.1 GENERAL CONCLUSIONS AS TO DIFFERENCES IN APPROACH TAKEN FOR DIFFERENT CLIENT FUNCTIONS.....	19
4.1.1 <i>GreenON</i> .....	19
4.1.2 <i>Smart Meter Entity</i> .....	20
4.1.3 <i>Market Renewal</i> .....	21
4.2 CONCLUSIONS AND RECOMMENDATIONS AS TO SPECIFIC COST ELEMENTS.....	21
4.2.1 <i>General Principle</i> .....	21
4.2.2 <i>Coded Time (Other than Senior Management)</i> .....	22
4.2.3 <i>Management Time</i> .....	22
4.2.4 <i>Human Resources Support</i> .....	23
4.2.5 <i>Information Technology</i> .....	24
4.2.5.1 <i>Staff Time</i> .....	24
4.2.5.2 <i>Workstation Hardware and Software</i> .....	25
4.2.5.3 <i>Corporate Systems</i> .....	25
4.2.6 <i>Finance and Administration</i> .....	26
4.2.6.1 <i>Accounts Payable</i> .....	26
4.2.6.2 <i>Accounts Receivable</i> .....	26
4.2.6.3 <i>Payroll</i> .....	27
4.2.6.4 <i>Procurement</i> .....	27
4.2.7 <i>Communications and Stakeholder Engagement</i> .....	27
4.2.8 <i>Office Facilities, Furniture and Equipment</i> .....	28
4.2.9 <i>OEB Costs</i> .....	28



## EXECUTIVE SUMMARY

As the system operator for Ontario's electricity grid, the IESO also provides certain non-core services to third parties. As part of the OEB-approved settlement agreement reached between the IESO and parties in the IESO's application for approval of 2017 expenditures, revenue requirement and usage fees, the IESO agreed to conduct a corporate cost allocation study on the charges associated with staff and other resources used to provide those non-core services.

The IESO retained BDR NorthAmerica Inc. ("BDR") in February 2018 to prepare the independent study of the IESO's corporate cost allocation methodology required by the settlement agreement. This Report sets out the scope, methodology, findings and recommendations resulting from BDR's review. Through review of documents and interviews with IESO staff, BDR gathered information as to the nature of the non-core services, the services provided to them by the IESO, the resources used, and how the level of usage or other measure of cost causation is now being tracked. BDR then assessed these approaches, and made recommendations where applicable to retain or refine the methodology.

For purposes of this study, IESO staff identified non-core Client Functions that receive services from and/or share resources with the functions of the IESO performing activities supported by usage fees, which included:

- GreenON Fund ("GreenON") supported by the Ontario Climate Change Solutions Deployment Corporation ("OCCSDC");
- Smart Metering Entity ("SME"), and
- Market Renewal Program ("Market Renewal")<sup>1</sup>.

Recommendations for each of the non-core client functions are consistent where appropriate but also reflect the differences in these functions and the services they use. GreenON recommendations reflect the closure of the programs following the June 2018 provincial election and change of government. Recommendations for the SME reflect the expectation that the SME will continue as part of the IESO for the foreseeable future. Recommendations for Market Renewal reflect the fact that this program is funded by the IESO's usage fees, but costs are allocated to facilitate management control and transparency of costs to the OEB and stakeholders.

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<sup>1</sup> Unlike GreenON and the SME, the Market Renewal Program is supported by the IESO's usage fees. However, it has been included as a client function for this study because it is a special program with dedicated staff, and the IESO, for purposes of internal management and review by the OEB, has committed to separately identify the costs associated with the program.

Report on Methodology for the  
Allocation of Shared Costs  
To Certain Identified Activities  
Page 3

The non-core functions have access to and may use, each to a different degree, the following resources that are either direct resources of the IESO or third party services procured and made available by the IESO:

- Dedicated employees<sup>2</sup>;
- Specialists as needed on a tracked time basis<sup>3</sup>;
- Human Resources (“HR”) services, including recruitment, training, and other corporate programs;
- Information Technology (“IT”) services, including individual workstation hardware and software, corporate systems and systems specific to the needs of the individual non-core function;
- Financial Services, including accounts payable and receivable, payroll, financial records and statement preparation, and procurement;
- Internal legal services;
- Office facilities, furniture and equipment; and
- Third party services as required for the function.

In addition, the SME uses the services of the IESO’s specialist Regulatory staff, and benefits from sharing the costs of the Ontario Energy Board with the IESO’s core functions. The SME and Market Renewal both use the IESO’s Communications department for activities related to stakeholder engagement.

The majority of costs that the non-core functions incur are either for third party services that can be clearly identified as to benefitting the non-core functions and directly assigned, or for the time of IESO staff identified through a time record system as specific to the non-core functions. Allocations for tracked hours include both salary and “burdens” (benefits and pension costs). Since these can be specifically identified as to the function that cause them, allocations of tracked time are effectively a direct assignment, just as third party cost are.

***These assignments of cost reflect cost causation, and are therefore in accordance with accepted principles of cost allocation.***

In no case is any senior management time tracked in the system to specific non-core functions. BDR was advised that the justification for this approach is that senior management and the Board of Directors would not typically have any direct involvement in the client functions. ***BDR believes that senior decision-makers represent a cost, and***

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<sup>2</sup> For purposes of this Report, a “dedicated employee” is an IESO employee holding a position that involves all or most of the work being for the specific non-core function.

<sup>3</sup> For purposes of this Report, a “specialist as needed” is an employee whose position is not in, or primarily for the specific non-core function, but who performs work on request, such as a project basis. For example, GreenON has a complement of employees dedicated to it, but might, or may have before the program closed, used resources in the IESO’s Conservation department to assist with projects.

*provide value to all business activities, and that therefore some component of such costs are appropriately included in the fully allocated costs of those activities. Such an allocation, if adopted by the IESO, could reasonably be applied to Market Renewal and the SME. Given that GreenON is being phased out, BDR does not recommend that a similar allocation be applied to GreenON.*

HR, most corporate IT, and payroll are all services provided by the core IESO that is for the benefit of all FTE's equally. Currently, the cost of HR, most corporate IT, and payroll are not time-tracked to specific non-core functions. ***BDR considers that number of employees, or FTEs, represent a key factor in cost causation for these services. Therefore BDR recommends that the IESO adopt this methodology in the case of the non-core client functions that do not currently receive an allocation, when and as a move is made to a fully-allocated cost approach.***

For Market Renewal, the purchased costs of direct-use hardware have been directly charged. Incremental cost of other assets is charged.

Non-core functions that make significant use of procurement, accounts receivable, legal, communications or regulatory services are allocated the costs as time is coded to the activities in the time system. ***As for all other coded time, BDR considers this method highly accurate and consistent with accepted principle of cost allocation.***

For GreenON, office space is allocated using an FTE approach, consistent with the approach used for other supporting costs. For the SME and Market Renewal, a cost is directly assigned, given that they occupy a facility separate from the work location of most other IESO staff.

***BDR considers the difference in methods to be appropriate given the different approaches by which space is made available to these three non-core functions.***

***Overall, BDR's high level conclusions are as follows:***

- ***The detailed tracking of time use by employees on tasks that directly serve a non-core function represents the most complete and accurate approach possible for this type of cost.***
- ***Management time and certain time in other supporting functions are not allocated to non-core functions. This understates the costs that the IESO incurs on their behalf on a fully allocated basis. BDR recommends as a general practice that the IESO move in the direction of including an allocation based on cost causality to non-core functions, with the following exceptions:***
  - ***Given that GreenON is being closed down over the next several months and that the current practice includes an allocation of support function costs, no changes should be made in the allocation approach being used for GreenON; and***

- *In cases where the non-core function has paid for a facility, resource or asset on a directly assigned basis and does not also use similar resources for which it has not paid directly, that non-core function should be carefully excluded from allocation of costs of the facilities or resources that it does not share.*

## 1 INTRODUCTION

### 1.1 Background

As the system operator for Ontario's electricity grid, the IESO ensures there is enough power to meet the province's energy needs in real time while also planning and securing energy for the future. The IESO is a not-for-profit corporate entity established in the *Electricity Act, 1998*. The IESO's operating licenses and usage fees are regulated by the Ontario Energy Board ("OEB"). For purposes of this Report, the term "usage fees" means the usage fees approved by the OEB to recover the costs of the IESO's core functions as the system operator.

The IESO usage fees are based on a regulated revenue requirement approved by the OEB and are intended to recover only the costs to provide specific monopoly services. As with any rate regulated service provider, the regulator has a mandate to ensure that the regulated fees and charges recover only the costs of providing those services. Therefore, if a regulated entity such as the IESO uses its staff, systems, assets or other resources to provide other services, the fairly determined cost of providing the other services must be deducted from the revenue requirement used in determining the charges for the regulated services. The service provider can then recover the costs allocated to these other services through appropriate separate mechanisms.

In addition to its services as the system operator, the IESO provides certain other services which include but are not limited to its activities as the Smart Metering Entity ("SME") and the implementation of the GreenON program for the Ontario Climate Change Solutions Deployment Corporation ("OCCSDC"). As part of the OEB-approved settlement agreement reached between the IESO and parties in the IESO's application for approval of 2017 expenditures, revenue requirement and usage fees, the IESO agreed to conduct a corporate cost allocation study on the charges associated with staff and services the IESO provides to third parties, such as the SME and the OCCSDC.

The IESO retained BDR NorthAmerica Inc. ("BDR") in February 2018 to prepare the independent study of the IESO's corporate cost allocation methodology required by the settlement agreement. This Report sets out the scope, methodology, findings and recommendations resulting from BDR's review.

## ***1.2 Purpose and Conceptual Basis of this Review***

The purpose of the required corporate cost allocation study is to recommend a methodology for the allocation of the costs of IESO resources that are providing services to specified non-core functions.

Because sharing of resources and transfer pricing potentially offer a regulated entity an opportunity to transfer value from regulated ratepayers to unregulated service customers or shareholders, regulators and stakeholders typically scrutinize the cost allocation/transfer pricing methodology when there is an effect on the regulated revenue requirement and usage fees. For this reason, the OEB has issued its Affiliate Relationships Code for Electricity Transmitters and Distributors (“ARC”) to govern transfer pricing for goods and services between regulated electricity transmitters and distributors and their shareholders or unregulated business affiliates. In performing this study, BDR has used approaches and methodologies consistent with the ARC, which requires “fully allocated cost” to be the basis of the pricing of shared services, unless market pricing applies.

According to the ARC, where there is no competitive market to determine the value of the services, or where the services are defined by the regulator as being outside the scope of market pricing (“shared corporate services”), the cost of the services is determined by allocation. The allocation methodology is generally required by regulators to be supported by accepted cost allocation principles including, but not limited to, the principle that allocation should reflect causation of the cost. This principle is accepted by the OEB, as well as widely by other regulators, and is intended to avoid undue cross-subsidization.

Although the ARC was not drafted for specific application to the IESO, the principles of the ARC are understood to reflect the OEB’s policy in respect to similar resource sharing arrangements, and are therefore expected to be acceptable to the OEB and stakeholders in this context.

## ***1.3 Scope***

The scope of work for the study as initially defined included:

- Review the IESO Business Plan, Annual Report, Revenue Requirement and Usage Fee Methodology and other year-end financial documents as deemed relevant by the IESO.
- Review IESO cost drivers including: compensation & benefits, professional and consulting fees, operating and administration costs, amortization and interest fees.
- Review business units’ 2017 actual and forecasted spends.

**Report on Methodology for the  
Allocation of Shared Costs  
To Certain Identified Activities  
Page 7**

- Review the GreenON program and the SME for corporate drivers and current cost allocation methodology.
- Review and report on the IESO's current cost allocation methodology and advise on best practises from similar entities.
- Develop cost allocation guiding principles based on best practises and applicability to the IESO.
- Outline the development and application of a potentially modified cost allocation strategy (revised methodology) based on the above mentioned guiding principles.
- Prepare a report to be included in the IESO's next revenue requirement submission to the OEB (this document).

BDR's mandate in this assignment was restricted to a review of the methodology for sharing services and costs between the IESO's mandated activities (the "core" activities) and non-core activities. BDR did not:

- Complete an independent audit of activities, business processes, operational records or accounting information provided by the IESO, or
- Perform any research to determine a market based price for shared services, or
- Review the need for any services or the reasonableness of the costs incurred.

## **2 METHODOLOGY**

For this study, BDR adopted a research and analysis approach that has served well in similar assignments for regulated energy utilities in Canada.

We first reviewed documents provided by IESO staff to gain a general understanding of the organization, the core services, and the types and scope of the non-core activities that share resources with the core services. Such documents included the IESO Business Plan, Annual Report, Revenue Requirement and Usage Fee Methodology<sup>4</sup> and other year-end financial documents as deemed relevant by the IESO.

The next phase consisted of a series of interviews with members of IESO staff responsible for the non-core activities, referred to in this Report as the "Client Functions" because they are clients of the IESO for the services. The discussion provided BDR with an understanding of these activities, the shared and direct resources provided to it, and the basis on which, to the understanding of these staff, their cost centres are currently responsible for the costs of shared services received.

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<sup>4</sup> BDR's review of the Usage Fee Methodology was restricted to determining whether any cost allocation methodologies or principles of that Methodology should or would limit the choice of approaches to the allocation of costs to non-core activities. BDR determined that there were no such limitations.



Discussions with the non-core Client Functions resulted in a list of the types of resources and services being shared. Staff then arranged interviews by conference call for BDR with knowledgeable representatives of each of the functional departments *providing services*. These interviewees provided BDR with descriptions of the exact nature of what was being provided, what resources were being used, and whether and how the level of usage or other measure of cost causation is now being tracked.

Following these interviews, BDR documented these findings for review with IESO staff for accuracy and completeness. BDR then made an assessment of the existing approaches with a focus on:

- (a) Consistency of the method with the cost causation approach to cost allocation;
- (b) Consistency of the method in terms of application across the non-core recipients;  
and
- (c) The quality of the data and/or data collection mechanisms supporting the existing allocation.

BDR documented its assessment and developed the recommendations included in this report.

### **3 ANALYSIS**

#### **3.1 *Selection of the Client Functions***

For purposes of this study, IESO staff identified non-core Client Functions that receive services from and/or share resources with the functions of the IESO performing activities supported by usage fees, which included:

- GreenON Fund (“GreenON” supported by the OCCSDC)
- Smart Metering Entity (“SME”), and
- Market Renewal Program (“Market Renewal”).

Of these, only the Market Renewal Program is supported by the IESO’s usage fees. However, it has been included as a client function for this study because it is a special program with dedicated staff, and the IESO, for purposes of internal management and review by the OEB, has committed to separately identify the costs associated with the program.

In order to provide a basis for determining whether the supporting fees are adequate to ensure that these functions are not subsidized by the usage fees, this study includes a review of the allocation of costs to these specific activities.

The following sections of this Report provide a description of each of these non-core client functions, and of the services they share with or receive from the resources of the IESO.

### ***3.2 Description of Client Functions and Services Received***

#### **3.2.1 GreenON Programs**

GreenON programs are funded by the Province of Ontario through the OCCSDC from the proceeds of the province's cap and trade auctions. These programs are designed to reduce greenhouse gas emissions by providing incentives for residential and commercial building owners to install energy-saving technology and make improvements. The IESO's work in this area focused only on residential programs and included free installation of smart thermostats and rebates for smart thermostats, air-source heat pumps, ground-source heat pumps, insulation and windows.

Following the June 2018 provincial election and change of government, the IESO's GreenON programs have closed. However, free installation of smart thermostats will continue through August for appointments booked before the program close date. Rebates for measures installed by October 31, 2018 will be honoured, and rebates for smart thermostats may be submitted until July 31, 2018.

The IESO has two agreements with the OCCSDC to provide services to support GreenON: one to develop and maintain a GreenON website and provide call centre services, and secondly to design and implement GreenON residential programs. Each of these agreements has a unique code in the IESO's timekeeping system. Most staff providing a service to GreenON charge time to only one of these codes, so the time coding requirements are very clear. It should be noted that specific activities under these agreements have activity codes that are used for invoicing and billing purposes.

The call centre service provided for in the agreement to GreenON, along with other IESO programs (Save on Energy programs and the MicroFit program) with 18 call center staff dedicated to the GreenON programs, and another five to eight for the other programs. These staff members are employees of the call centre vendor and are located at the vendor's office. The resources that provide the service are therefore not shared IESO resources. The number of calls and emails for each of the various IESO programs are tracked by the vendor and invoiced to the IESO accordingly. Costs related to GreenON are therefore specifically identified and directly assigned to GreenON.

GreenON programs have been supported by a mix of dedicated full-time staff as well as IESO shared resources. IESO staff designed and managed the programs, using third-party vendors for program delivery. IESO staff time is captured by the IESO's timekeeping system while program vendors invoice the IESO for their program-specific



Report on Methodology for the  
Allocation of Shared Costs  
To Certain Identified Activities  
Page 10

activities. In general, the IESO's GreenON team receives core services from the IESO on an as-needed basis.

The IESO shared services used by GreenON include:

- Conservation - evaluation, measurement and verification ("EM&V") of the various GreenON programs is currently on hold. Work in this area is managed by staff in the Conservation department who record their time using the IESO's timekeeping system. The actual EM&V was to be performed by a third-party vendor following a procurement process.
- Compliance - compliance activities for GreenON programs are currently on hold. Work in this area is managed by staff in the Conservation department who record their time using the IESO's timekeeping system. Compliance work/auditing was being performed by a third-party vendor who had been procured by the IESO prior to being put on hold. The vendor monitors all costs by individual program and provides the IESO with invoices for their services that are specific to each program.
- Legal - legal support for GreenON work was outsourced to an external law firm with oversight by a dedicated IESO staff lawyer. IESO legal staff time is charged to the project and the services of external legal counsel are tracked through invoices to the IESO. These costs are then invoiced by the IESO to the OCCSDC.
- Information Technology (IT) - IESO employees dedicated to the GreenON program are issued a standard laptop, leased by the IESO on the same basis as is done for employees in core functions, and loaded with a standard suite of software. IT also provides hardware and software support (help ticket service). Several staff members in the GreenON programs are also provided cell phones issued from the IT department. IT and office facility charges are recovered through an overhead charge using hourly rates.
- Finance - prepares budgets, and performs other tasks with the time charged directly to the program through the time and reporting system. Time is tracked and allocated to the program by Accounts Receivable in the creation of invoices to OCCSDC. Services are provided by Accounts Payable but the support time is minimal. The Accounts Payable department does not record time spent on processing invoices for specific functions.
- Procurement - procurement services are provided by IESO procurement staff whose time is tracked using the IESO's timekeeping system. Procurement services are minimal as the programs wind down.

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### **3.2.2 Smart Metering Entity (“SME”)**

The SME maintains and operates the province’s smart meter data repository that processes, stores and protects electricity consumption data used for consumer billing by Ontario’s local distribution companies (“LDCs”). The SME is physically located at a site that is separate from the majority of the IESO. The office space is rented, and the cost is identified and directly attributed to SME.

The SME utilizes the following IESO shared services:

- Regulatory - the regulatory department leads and manages the SME’s filings with the OEB, including fees applications, the annual cost report and license renewal. The regulatory department is also involved in the SME’s 3<sup>rd</sup> Party Access Initiative, which will provide other entities with access to data collected by the SME. The IESO timesheet system is used to track the time spent on SME. The IESO also allocates a portion of the costs it is assessed by the OEB to the SME.
- Information Technology (“IT”) - the IT department issues SME staff a standard laptop or desktop computer loaded with the standard suite of software and provides hardware and software support. Several staff in the SME department are also provided cell phones issued from the IT department. In addition to the standard suite of software, the SME also requires several dedicated hardware and software systems such as the Meter Data Management Repository (“MDM/R”) System, Service Now and Data Mart. These systems are provided and supported by third-party vendors. The capitalized and operating costs associated with these dedicated hardware and software systems are both identifiable in the IESO accounting systems and directly allocated to the SME program.
- Legal - the SME utilizes both internal and external legal counsel. Services include legal support related to procurements, agreements and contracts, and regulatory filings. Internal services are provided mainly by a designated individual but others may also provide services. The IESO timesheet system is used to track internal legal costs, and external legal council is tracked through invoices directly charged to SME.
- Communications - The SME communicates extensively to external stakeholders in the industry and specifically to the LDCs that receive its services. The communication department services are utilized for external communications such as webinars and the costs are charged directly to the SME function. The time for Communication staff is recorded in the IESO timesheet system.

- Finance - the Finance department prepares the SME financial statements required for the OEB. The IESO timesheet system tracks the level of effort provided by Finance department staff. The Finance department also provides Accounts Payable services but the support time is minimal. The Accounts Payable department does not record time spent on processing invoices for specific functions. At present, the SME's Accounts Receivable function consists of an OEB approved fee per smart meter per month to LDCs, which is invoiced monthly along with charges for the IESO's core services. Work to support the SME's charges to users is automated in the market settlement system.
- Procurement - the Procurement department issues Requests for Proposals ("RFP's") and Requests for Vendors of Record ("RVOR") on behalf of SME. The cost for the various RFP's and RVOR's are tracked and charged directly to SME using the IESO timesheet entry system. While most procurements are specific and directly charged to SME, there are situations where procurements and the associated costs are shared. The Procurement department also provides office supplies. Certain services are provided by pre-selected Vendors of Record. Costs of those processes for services specific to the SME are identified.

### **3.2.3 Market Renewal Program ( "Market Renewal" or "MRP")**

The MRP includes several initiatives designed to improve the way electricity is priced, scheduled and acquired to improve reliability, efficiency and transparency. The costs for this program are expected to be significant and are tracked separately to other IESO business activities.

The program is staffed by existing IESO employees, external resources and consultants. IESO staff members are rotated into the project on a full-time basis if more that 75% of their time is needed on the project. There are IESO staff roles that support the program from outside of the MRP resource pool and they charge their time to the program accordingly. The IESO timesheet system is used to track the time spent on MRP. External resources are either hired as fulltime employees or on a contract basis for temporary positions. Full time employees (e.g. project managers) will be re-assigned once the program ends. Consultants are also being utilized and are directly invoiced to the project.

The MRP department operates from an office location that is separate from most other IESO departments. Office equipment has also been purchased specifically for this project.

MRP utilizes IESO shared services from the following departments:

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- Human Resources (HR) - The Market Renewal Program had significant support needs from the recruitment department during program startup and agreed to pay for an additional contract staff to help with resourcing. The additional contract staff has been used in the initial staffing phase of the program. Any additional recruitment support will be provided through the same recruitment process as the rest of the organization, without allocated cost to the program.
- Information Technology (IT) - standard issue laptop or desktop computers and software were purchased by the program and issued to each employee. The implementation stage of MRP will require the procurement of new systems or modifying existing systems to run the electricity markets. The incremental implementation costs will be captured within the program. Once the systems are in place operating costs will be considered business as usual and will be funded by the core IESO.
- Legal - external council is directly charged to program. Internal legal resources support the MRP group and all time is charged to the program through the time and reporting system.
- Communications - stakeholder engagement is critical to the future success of the MRP. Communication costs have been incurred for facilities rental and catering which have been directly charged to the MRP program. IESO Communications staff does charge time to MRP.
- Finance - prepares budgets, and performs other tasks with the time charged directly to the program through the time and reporting system.
- Procurement - bound by rules for government procurements and the costs are tracked by the requesting department. Consultants engaged for MRP are sourced and contracted by the IESO procurement group. IESO procurement staff charges their time for large procurement projects.

### **3.3 *Services Provided by Function***

#### **3.3.1 Services Overview**

The most important shared resource provided by the IESO to its non-core client functions is the time and expertise of staff. Services to these clients are provided by a combination of fully-dedicated IESO staff, and IESO staff whose time is shared between the IESO's core functions and the client functions.

All IESO staff up to the level of Manager, but excluding Managers that are directly assigned to a function, enter their time use into a system, coded by program, project or department to which the time is being dedicated. This means that, with certain exceptions documented in this report, the time of individuals spent on the client functions by employees other than those who are fully-dedicated is recorded and identified. The system allows all payroll related costs, including regular and overtime pay, benefits, etc. to be fully accounted for by activity.

In this situation, where the cost causation variable is employee time, a full record identifying the employee's time use is the ideal basis for the allocation of the cost. In BDR's experience and opinion therefore, the IESO has in place all that it needs to support the allocation of these costs.

For example, a specialist in some other department may be called on to assist the non-core client dedicated team in performing a specific study. In this case, the specialist codes the time spent to the code for that specific work, so that the cost can be allocated to the non-core client function. IESO staff using the system, and in the Payroll area responsible for administering the system, confirmed to BDR that this system is well developed and is being used as intended.

The main part of the review documented in this report therefore addresses two further components of the costs of services provided to the non-core clients:

- (a) Costs of employee-provided services that are not time-coded directly to the clients; and
- (b) Costs of shared resources other than employee time.

### **3.3.2 IESO's Timekeeping System**

The IESO's timekeeping system keeps track of staff time on an hourly basis. Effort is taken to ensure that time is allocated to project work and for IESO functions that are funded outside of the IESO usage fee. Management time is tracked to specific programs if they are designated resources. Executive time is focused on strategy and guidance and their time is not allocated to any specific programs.

As part of the timekeeping process, compensation costs related to staff benefits and pension are allocated based on hours charged to specific programs and functions. This ensures that the full compensation cost of an employee is being compensated by the funding source of that activity.

### **3.3.3 Human Resources ("HR")**

For recruitment, the related staff group has 3 permanent and 2 contract full time resources, but will also use the services of agencies for external recruitments.

Cost of external recruitment services is a line item on the HR budget, and the costs are currently not charged back to the department for which the recruitment is made. Time worked by internal staff for business-as-usual recruitment (whether for replacement staff or new positions) is not coded to the department for which the recruitment occurs.

GreenON and the Market Renewal Program required the addition of dedicated staff. For GreenON, the IESO staff time related to the recruitments was considered incremental to ordinary business needs, and therefore received a code in the time system. The Market Renewal Program had significant support needs from the recruitment department during program startup and agreed to pay for an additional contract staff to help with resourcing. The additional contract staff has been used in the initial staffing phase of the program. Any additional recruitment support will be provided through the same recruitment process as the rest of the organization, without allocated cost to the program.

The training function at the IESO can be split into 2 categories; (1) corporate training offered by the HR learning & development function; and (2) Employee requested training.

Corporate training offered by HR is to develop core IESO competencies as well as targeting management to develop management and leadership competencies. These training programs are funded from the learning and development budget and no costs are allocated back to the business.

Employee requested training is usually functionally or technically specific to the work that the employee does. These costs are approved and paid for by the requesting employee's home department.

BDR was advised that any other HR functions are treated as corporate programs, with value that cannot be directly identified with work functions or programs and provides a shared value to all.

### **3.3.4 Information Technology**

#### **(a) Workstation Hardware**

Each employee throughout the IESO receives a desktop or laptop computer as determined by the user department management. It is the general practice of the IESO that workstation hardware is leased; however, a decision was made to purchase outright computers for staff in the MRP, and to charge the purchase costs directly to MRP.

(b) Workstation Software

Workstation hardware is provided to users loaded with a standard suite of software that includes MS Office™, management and security software and some open source tools. Specialized software tools are also provided subject to request and approval, relevant to the work duties of any individual. Specialized software, such as project management or design tools, are therefore on the computers of some employees but not others.

Desktop software is procured on the basis of an annual fee. This applies to the computers purchased for the MRP, as well as to all leased computers.

(c) Corporate Systems

The IESO maintains certain central systems that are accessed by employees from their work stations through a link. Examples are the corporate financial system, human resources information system, and payroll system.

BDR notes that hardware and software associated with the IESO's control centre is considered as a core resource, and no part of these costs is allocated to the client functions.

**3.3.5 Finance**

(a) Payroll

- The IESO's Corporate Controller confirmed that the cost of payroll administration is the same for all employees.
- BDR considers the cost causation driver for payroll to be number of employees, and therefore recommends that the costs of the payroll function, including related systems and external services if any, be allocated per employee and to the clients by employee time.

(b) Accounts Receivable

- GreenON - the finance department charges staff time to the creation of invoices to the OCCSDC.
- SME - the accounts receivable from LDCs for the SME are added to the usage fee invoice that the IESO issues to all LDCs. The amount is fixed each month and the invoices are generated automatically through the market invoice process.
- Market Renewal - This function is funded by the IESO usage fees, and thus has no separate accounts receivable.



(c) Accounts Payable

- GreenON - the IESO processes payables for work contracted out in respect of the services that IESO provides. No charge is made to GreenON related to this, and the time is not tracked.
- SME - activity related to accounts payable is minimal, and time is not tracked.
- Market Renewal - activity related to accounts payable is minimal, and time is not tracked.

(d) Procurement

- GreenON - The IESO handles competitive procurements related to the services provided by the IESO to GreenON. Time is coded by procurement staff to these activities.
- SME - costs have been tracked and charges made only in respect of a large and complex procurement, not in the ordinary course of business.
- Market Renewal - costs have been tracked and charges made only in respect of a large and complex procurement, not in the ordinary course of business.

**3.3.6 Legal**

Internal legal time is charged to clients by time code. Invoices for external legal services are recorded directly to the client function.

**3.3.7 Buildings and Facilities**

The GreenON function operates from the IESO's rented facility in Toronto. A portion of the rent for this facility is allocated to the overhead rates in the charge out rate of the IESO to GreenON.

The SME and Market Renewal occupy a separately leased facility and are directly assigned that cost for its operations.

**3.3.8 Regulatory Affairs**

The regulatory affairs department leads and manages the SME's filings with the OEB, including the proposed expenditures, revenue requirement and fees applications, the annual cost report and the license renewal. The regulatory department is also involved in the SME's 3<sup>rd</sup> Party Access Initiative which will provide other entities with access to data collected by the SME. The IESO timesheet system is used to track the time spent on SME. The IESO also allocates a portion of the costs it is assessed by the OEB to the SME.



Report on Methodology for the  
Allocation of Shared Costs  
To Certain Identified Activities  
Page 18

### 3.4 Summary of Services Used and Allocation Approach by Client Function

The following table summarizes the services or resources used and the allocation approach applied to each Client Function.

#### Part A – Time-Based Resources

			Smart Meter Entity	GreenON	Market Renewal Program
<b>TIME SPENT, RECORDED BY TIME TRACKING SYSTEM</b>					
<b>Dedicated Complement of Client Functions</b>					
	(a) Time Coded to Client Function		Time Spent (see note)		
	(b) Time Coded to Core		If any, not included in allocation		
<b>Shared Staff in Other Accounting Units</b>					
	(a) Time of Specialists Outside Client Departments		Time Spent (see note)		
	(b) Time in Specified Supporting Departments				
	(i) Human Resources				
	Recruitment		Not Included	Time Spent (see note) for Start-Up Recruitments	Staff time not included; cost for additional contract resource to help with recruitment demand is being expensed to MRP.
	Training, Employee Requested		Costs Directly Charged to Home Department		
	Training, Corporate		Not Allocated		
	Corporate-wide HR Programs other than Training		Not Allocated		
	(ii) Information and Communications Technology				
	Provision of workstation hardware, software and corporate system access at workstations (administrative)		Not Allocated		
	User problem response ("help desk")		Not Allocated		
	Support for corporate systems		Not Allocated		
	(iii) Finance and Administration				
	Accounts Payable		Negligible, not tracked		
	Accounts Receivable		Negligible, not tracked	Time Spent (see note)	Not Applicable
	Payroll		Not Allocated		
	Preparation of Financial Statements and Budgets		Time Spent (see note)		
	Procurement		Large Procurements - Time Spent (see note) Small Procurements Not Tracked or Allocated		
	(iv) Communications		Time Spent (see note)		
<b>TIME SPENT, NOT TRACKED</b>					
	Senior Management (excluded from time reporting system)		Not Allocated		
	Board of Directors		Not Allocated		

*Note: All charges for time spent are at a rate that includes salary and "burden" (cost of benefits and pension).*

**BDR**

Report on Methodology for the  
Allocation of Shared Costs  
To Certain Identified Activities  
Page 19

## Part B – Other Resources

			Smart Meter Entity	GreenON	Market Renewal Program
<b>RESOURCES OTHER THAN TIME</b>					
		Workstation hardware and related peripherals (leased)	Lease cost specifically identified and charged	Lease cost specifically identified and charged	Purchased for program and direct charged
		Workstation software (by license)	Lease cost specifically identified and charged	Lease cost specifically identified and charged	Purchased for program and direct charged
		Corporate software	Not Allocated		
		Special Purpose Software	Directly Assigned		
		Office Space, Leased Premises	Separate facility, directly assigned	Rent assigned by FTE basis	Separate facility, directly assigned
		Furniture and equipment	Purchase cost expensed to function		
		Cost of capital on allocated fixed assets	Relevant to Directly Assigned Assets Only		
<b>THIRD PARTY COSTS</b>					
		Externally Procured Goods and Services	Directly assigned		
		OEB Costs	Allocated based on relative revenue	Not Applicable	Not Applicable

## 4 CONCLUSIONS AND RECOMMENDATIONS

### 4.1 *General Conclusions as to Differences in Approach Taken for Different Client Functions*

This section addresses the considerations pertaining to the nature and mandate of each of the client functions in determining the related costs, and the effect of the relationship of the client function to the IESO's core business on the choices the IESO has made in the allocation of costs. Because each client function is unique in terms of the IESO's mandate in performing the function, different decisions have been made as to the appropriate costs to be allocated to them and the methodology for allocation. These considerations were raised in discussion with IESO staff, and inform the recommendations in this report.

#### 4.1.1 GreenON

The IESO's relationship with GreenON was defined under specific agreements with the OCCSDC. Most of the services are provided using both dedicated and shared staff, for whom time-related costs are determined by time tracking, and also by vendors whose costs are directly assigned. At start-up, the costs of recruitment of staff for GreenON were considered incremental to the IESO's ordinary business needs, and therefore

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received a code in the time system. IESO employees dedicated to the GreenON program are issued a standard laptop, leased by the IESO on the same basis as is done for employees in core functions.

Charges from the IESO to GreenON are made on the basis of the hours coded to staff in the time system. When the IESO commenced provision of services to GreenON, a charge-out rate was determined, taking into account the burdened hourly compensation of internal staff<sup>5</sup> and an estimate of the associated costs of software licenses, corporate systems, office rent and office equipment. The rate does not include any provision for the services of HR, payroll, and routine IT support. The time of HR staff associated with recruitment for start-up of GreenON was charged to the program as time worked through the time reporting system, and not included in the charge-out rate.

Direct costs invoiced by vendors are invoiced on a pass-through basis and are not included in the hourly charge-out rate.

***On this basis, BDR concludes that except for the costs of on-going HR, payroll, and routine IT, which are minor in comparison to the total costs, the IESO's costs to provide services to GreenON are being recovered on an approximate basis by the fee structure. As mentioned previously, agreements exist that address the service relationship and fee arrangement between the IESO and GreenON.***

***Therefore, in view of the fact that GreenON's activity is being phased out over the next few months, BDR considers it reasonable that no change be made in current practice with respect to GreenON.***

#### **4.1.2 Smart Meter Entity**

At the present time, cost is not allocated to SME for supporting services such as Human Resources, IT, or Finance that are not clearly identifiable and incremental.

Unlike the other non-core functions, the SME is allocated an interest cost for its net capital.

***In BDR's view, the incremental cost approach taken for SME is not appropriate. The approach has the result of overstating the costs of the IESO's core functions and understating the costs of the SME functions.***

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<sup>5</sup> Salary, benefits and pension costs.

***Instead, the SME should be responsible for its fully-allocated costs. Specifically, the SME should receive appropriate allocations of supporting costs, including HR, IT and Payroll. Since staff time in these functions is not coded by the time system to client functions, a non-time-based allocator, such as the FTE method explained in Section 4.2 should be used.***

#### **4.1.3 Market Renewal**

An incremental approach has been taken to allocation of costs to Market Renewal, including not allocating certain support costs. In addition, exceptions have been made to costing practice by purchasing outright computers and software for this function and charging it directly, rather than providing these resources on a shared corporate basis. The result is that allocations to Market Renewal deviate from a fully-allocated cost approach.

In discussions with IESO staff, BDR has clarified that Market Renewal is funded through the IESO's usage fees, and that therefore the allocation of costs to it do not affect how the IESO's costs are recovered from consumers. Allocations are being made primarily so that the costs of the program can be tracked for management and decision-making purposes.

***In BDR's view, the approach taken supports the purpose of the allocation and is therefore justified on that basis.***

## **4.2 Conclusions and Recommendations as to Specific Cost Elements**

### **4.2.1 General Principle**

In this section, BDR has evaluated the approach used to allocate specific types of costs, using as a standard principles of cost allocation which are widely accepted for regulated entities. Specifically, these principles require that the allocation approach be rooted in cost causation. For example, costs of postage are caused by the volume of mail sent, and costs of vehicle fuel are caused by distance driven. Where the causation relationship is not as clear as in these examples, the allocation can be based on indirect causal relationships, identified by judgment. An example of this might be the cost of computer workstation hardware and software, which is a fixed cost per workstation, and for which the need might be driven by multiple projects and uses.

In its evaluation of the methods used by the IESO, BDR has considered approaches used by utilities and accepted by stakeholders in Ontario and Québec to allocate the costs of shared resources between a core (regulated) activity and non-core activities, which may take place either within the regulated business or in an affiliate corporation.

#### **4.2.2 Coded Time (Other than Senior Management)**

For all staff working in directly identified activities supporting a client function, whether the staff are dedicated to the function and within the function as a “home department”, or whether they are staff of other departments responding to support requests, time is coded to the non-core client function (or to a specific project of the non-core client function) by the employees using the IESO’s timesheets system.

Clearly the causal factor for costs of salaries and burden is time worked by the employees. While alternative methods, including estimation and also indirect allocations, are used in the absence of good data, the data on time spent from a compulsory recording-keeping system applicable to all activities of all employees is the best possible basis for allocation of compensation costs. Such data is available for all but the most senior management level of the IESO. BDR was assured that the data is complete and the level of accuracy of reporting is very high.

The quality of data for employee time is of the highest importance in this case, since time is the major resource shared between the IESO core functions and the client functions.

***BDR concludes that direct time to the non-core client functions is allocated by the IESO in accordance with accepted principles of cost allocation, and that the methodology makes use of high quality data.***

***Costs of time include the costs of salary and “burden”, which means benefits and pension costs. This is an appropriate treatment of these costs, since all are causally related to time spent.***

#### **4.2.3 Management Time**

BDR was advised by IESO staff that time at the Manager level is assigned to a function to the degree that the Manager is dedicated to that function and works directly on the relevant tasks for separate cost recovery.

The time of senior management and Board of Directors is not coded through the time system, and is not recovered in the client functions through any type of allocation (i.e., all of the costs are recovered through usage fees).

BDR was advised that the justification for this approach is that senior management and the Board of Directors would not typically have any direct involvement in the client functions.

BDR accepts the IESO staff’s information that senior decision-makers spend little or no time on activities that could be directly identified with the client functions. Furthermore,

**BDR**

BDR appreciates the difficulties entailed in maintaining function-related time records for senior decision-makers. BDR's experience in similar assignments has shown that senior decision-makers change from one activity to another as often as every several minutes, which would make their time use difficult to track, even if their time did include directly identifiable involvement with the client functions. Typically senior decision-makers perform tasks that provide value on a shared basis to all the activities of the business.

***BDR believes that senior decision-makers represent a cost, and provide value to all business activities, and that therefore some component of such costs are appropriately included in the fully allocated costs of those activities.***

Therefore, in corporate cost allocation studies previously performed (for distribution utilities with significant non-core or affiliate business activities), BDR worked with the utility staff to identify a reasonable way to include those costs. In some of BDR's previous studies, senior management were able to estimate time spent providing value to non-core or affiliate activities, for use as the basis of an allocation, with the relative allocation of executive time being applied also to the Board of Directors. It does not appear that such an estimate is available for the IESO.

In that case, a possible approach is to make an allocation based on a measure of the relative activity level in core and non-core functions, based on the assumption that the business activity is a driver of cost, and therefore an appropriate allocator of any cost supporting the activity. Possible relative activity estimates, which would be available without additional research or analysis, would be total relative other cost inputs or relative allocated staff time (direct and indirect).

***Such an allocation, if adopted by the IESO, could reasonably be applied to Market Renewal and the SME. Given that GreenON is being phased out, BDR does not recommend that a similar allocation be applied to GreenON.***

#### **4.2.4 Human Resources Support**

Time of the HR staff is not coded to specific non-core client functions, and therefore cannot be identified as being directly causally related. Each employee over the course of his or her career with IESO receives services for recruitment, termination, and the administration and delivery of various corporate programs. While the needs of specific employees and functions for these services vary over time, the capability exists for use when needed, and is sized to serve the whole organization. Since employees may move from one function to another within the IESO over their careers, it would not be appropriate to treat any individual's one-time use of a HR service as being caused by the employee's department or function at the time.

As a result, a widely used approach to the allocation of HR services is to base the allocation on the direct FTEs (“full time equivalent”) level of staffing used by the client function. The method is simple, and does not require any data that is not collected in the ordinary course of business. . The non-core functions either do not receive an allocation, or are charged only for identified incremental activities.

***BDR recommends that the IESO adopt this methodology in the case of the other non-core client functions when and as a move is made to a fully-allocated cost approach. Given that GreenON is being phased out, BDR does not recommend that a similar allocation be applied to GreenON.***

#### **4.2.5 Information Technology**

##### **4.2.5.1 Staff Time**

Except for work related to special purpose software projects and time-coded to such projects, staff IT time is considered a corporate resource in the same manner as HR, and is coded to the core function.

Time coded to the core function includes:

- Work on special projects or systems that may or may not have value to non-core functions; and
- Work of making available and supporting workstation hardware and software and certain corporate systems that are available to and used by all employees.

***BDR recommends that the activities of IT staff be reviewed to identify core projects that do not provide benefit to non-core functions, so that the estimated hours associated with these can be excluded from a general allocation to non-core functions.***

For activities in support of hardware, software and systems used by all employees, a widely used approach is to base the allocation on direct FTEs (level of staffing). This reflects the fact that while the requirements of a specific employee for support may vary over time, the capacity of this function is used by all employees over time as they work, and overall costs are determined by the combined needs of all staff.

The method is simple, and does not require any data that is not collected in the ordinary course of business. This is the approach applied by the IESO in its charge-out rates to GreenON. At present, the other non-core functions either do not receive an allocation, or are charged only for identified incremental activities.



***BDR considers that the FTE approach is consistent with accepted principles of cost allocation when applied to the cost of services that support every employee, and is appropriately applied in the case of GreenON. BDR recommends that the IESO adopt this methodology in the case of the non-core client functions when and as a move is made to a fully-allocated cost approach.***

#### **4.2.5.2 Workstation Hardware and Software**

These costs consist of annual licensing fees for software and in the cases of GreenON and the SME, lease costs for equipment.

For the SME, actual cost of assigned workstation equipment is charged to the function, but no allocation is made for software or shared corporate resources. For GreenON, the hourly charge-out rate includes an estimate of the associated costs.

***BDR recommends that the FTE approach be used for software for the SME, as and when the IESO moves to a fully-allocated approach in this client function. Continuation of the current process of charges for specifically identified workstation hardware is consistent with the accepted principles of cost allocation (essentially a direct assignment); however an FTE approach would also be acceptable in BDR's opinion, if the IESO chose to adopt this practice for all non-core functions.***

***BDR considers the current approach acceptable for the remaining duration of GreenON.***

For Market Renewal, workstation equipment was purchased outright for the program and directly charged.

***Having already incurred purchase costs, Market Renewal should not have to absorb annualized costs.***

***Recognizing that Market Renewal has funded its workstations directly, BDR recommends that in applying an FTE factor for allocation to other non-core functions, FTEs for Market Renewal are appropriately excluded in the denominator.***

#### **4.2.5.3 Corporate Systems**

Corporate Systems include the systems that support management, administration and reporting throughout the organization and include the financial and accounting systems, the human resources information system (HRIS), payroll system, etc.



*In order to ensure a consistent allocation approach for these costs, which are now not allocated to non-core functions, BDR recommends that the costs of each system be assigned for allocation purposes to the organizational department supported by the system: the financial system to the Finance department, the HRIS to the HR department, etc. Each of the related system costs would then be allocated to non-core functions using the same methodology recommended for the other costs of the related organizational department.*

#### **4.2.6 Finance and Administration**

##### **4.2.6.1 Accounts Payable**

IESO staff in this function process invoices related to GreenON, SME and Market Renewal, which are very small in number in comparison to the rest of the core IESO.

IESO staff advised BDR that the time spent is negligible; therefore this can be considered a time-based allocation, with time spent estimated at zero.

*BDR therefore considers that the client functions receive a time-based allocation of costs. Since time is the causal variable and the time spent is negligible, BDR considers that the methodologies used are consistent with accepted principles of cost allocation.*

##### **4.2.6.2 Accounts Receivable**

IESO staff in this function invoice users on behalf of each of the non-core client functions, as needed.

In the case of SME the invoicing is automated through the market invoicing system. No allocation of cost is currently being made for this function.

*Since the process is automated and requires no identifiable activity, BDR considers it reasonable at this time to exclude Accounts Receivable from an allocation of costs to the SME.*

Market Renewal is funded by the IESO usage fee, and does not have independent receivables.

The IESO staff that prepares the invoices in respect of the GreenON program record their time within the time reporting system, which is recovered from through the GreenON charge out rate.

*BDR therefore considers that GreenON receives a time-based allocation of cost which is consistent with cost allocation methodologies.*

#### 4.2.6.3 Payroll

BDR confirmed with IESO staff that payroll resources have capacity to serve the entire organization, and that there is no difference in the effort or cost associated with payroll for different employees.

*In BDR's view, this cost is causally related to the number of employees. The use of an FTE allocation as contrasted with staff complement in the client function would permit the numerator to consist of fully assigned employees in the non-core function plus the aggregate shared FTEs of any employees in other functions who charge time to the non-core function. BDR considers this a desirable refinement to the methodology if it can be done without significant data collection and analysis.*

*BDR recommends that an FTE approach be used for non-core functions, as and when the IESO moves to a fully allocated approach.*

#### 4.2.6.4 Procurement

In all functions, Procurement staff record time if a large and significant work effort is required. For routine procurements of shared supplies, no time is recorded and no allocations are made.

In BDR's experience, a staff with a large volume and changing mix of procurements, most of which are for supplies shared across the organization, would be unlikely to be able to estimate the value of its shared time to individual functions. In our prior studies, procurement has been variously allocated using value of supplies procured, number of purchase orders, etc. as proxies, but supplies and purchase orders can be as difficult to identify with a client function as time, given that so much of what is procured is for shared use.

*BDR therefore considers that the identification and direct charging of large procurements is a reasonable approach under the circumstances. To support full costing, in the absence of any usable causation-based allocator, an FTE allocation would be appropriate for the cost of small procurements on the assumption that all employees use a relatively equal share of the supplies being procured, or an allocator could be developed based on management judgment.*

#### 4.2.7 Communications and Stakeholder Engagement

Of the non-core client functions, Market Renewal and SME make significant use of the Communications function as a resource, and are charged for this on a time code basis.

***BDR recommends that use of Communications resources be reviewed from time to time to ensure that a zero cost allocation remains appropriate.***

#### **4.2.8 Office Facilities, Furniture and Equipment**

SME and Market Renewal occupy facilities separate from those occupied by the IESO's core staff, and the costs are directly assigned to the SME and Market Renewal. In the case of GreenON, an allocation of office space cost is made as part of the fees charged.

***BDR considers direct assignment to be consistent with accepted principles of cost allocation.***

An FTE allocation as used for GreenON reflects an assumption that total space requirements are caused by the number of employees. ***Therefore BDR considers this approach to reflect cost causation, and to be consistent with accepted principles of cost allocation.***

In the case of office furniture and equipment, the cost is expensed directly to the function when purchased.

***BDR considers this treatment to be a direct assignment, and therefore consistent with accepted principles of cost allocation.***

#### **4.2.9 OEB Costs**

OEB costs are relevant only to the regulated business units, which are the IESO core activity and SME. The OEB's charges to the IESO do not separate charges incurred on behalf of IESO core activities and those incurred with respect to the SME. The IESO has no direct information as to the resources used by the OEB in its various regulatory activities.

For this allocation, therefore, the IESO must use some proxy or judgment-based factor, and the IESO has chosen relative revenues.

***BDR considers that, in the absence of better information as to the relative complexity and level of effort associated with regulation of the two entities, relative revenues represents a reasonable factor for the allocation.***



OEB STAFF INTERROGATORY 9

**4.0** *Are the IESO/SME's proposals and methodology for calculating net revenues generated by third party access and the proposed allocations of those revenues to Smart Metering Entity Charge rate payers appropriate?*

**4.0** **Staff – 9**

INTERROGATORY

Reference: Exhibit B, Tab 3, Schedule 1, Page 3

**4.0** Preamble: At Exhibit B, Tab, Schedule 1, Page.1, the SME states:

“The SME will track all costs in providing third party access so that no third party access related costs will flow back or be charged to SME ratepayers unless third party access related work is required by regulatory or licence requirements.”

**Questions**

- a. Please clarify what is meant by “unless third party access related work is required by regulatory or licence requirements.”

RESPONSE

The SME is required to provide information to the OEB and the Ministry of Energy, Northern Development and Mines if requested to do so. As such, the fulfillment of a request from one or these entities is regarded as a part of the SME's standard operations and the cost of such work will be recovered through the Smart Meter Charge.

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1 CCC INTERROGATORY 6

2 *4 – Are the IESO/SME's proposal and methodology for calculating net revenues generated by*  
3 *third party access and the proposed allocations of those revenues to Smart Metering Entity*  
4 *Charge ratepayers appropriate?*

5 CCC-6

6 INTERROGATORY

7 Please describe, in detail, how the net revenues will be calculated. What methodology will the  
8 SME use to refund the net revenue to customers?

9 RESPONSE

10 Net revenues will be calculated by taking adding all revenues generated from providing Third  
11 Party Access at a cost less the expenses related to providing Third Party Access at a cost.

12 The methodology proposed to provide net revenues to Smart Metering Entity Charge  
13 ratepayers is through the clearance of the Balancing Variance Account, which is described in the  
14 reply to OEB Staff Interrogatory 8(d) at Exhibit I, Tab 4.0, Schedule 1.08.





1 CCC INTERROGATORY 7

2 *4 – Are the IESO/SME's proposal and methodology for calculating net revenues generated by*  
3 *third party access and the proposed allocations of those revenues to Smart Metering Entity*  
4 *Charge ratepayers appropriate?*

5 CCC-7

6 INTERROGATORY

7 Please file the BDR Cost Allocation Study.

8 RESPONSE

9 The BDR Cost Allocation Study is provided in the response to OEB Staff Interrogatory 8, at  
10 Exhibit I, Tab 4.0, Schedule 1.08, Attachment 1.

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1 CCC INTERROGATORY 8

2 *4 – Are the IESO/SME's proposal and methodology for calculating net revenues generated by*  
3 *third party access and the proposed allocations of those revenues to Smart Metering Entity*  
4 *Charge ratepayers appropriate?*

5 CCC-8

6 INTERROGATORY

7 (Ex. B/T3/S1/p. 2)

8 The evidence sets out three categories of costs – dedicated SME staff costs, costs for services  
9 from the IESO staff that are not dedicated to the SME and external costs. Has the IESO/SME  
10 prepared a budget for the service? If so, please provide that budget. What have been the costs  
11 incurred to date with respect to the development of the TPA program. How have those costs  
12 been recovered?

13 RESPONSE

14 A budget has not been prepared at this time.

15 Third Party Access (“TPA”) related work conducted prior to the OEB issuing its decision on this  
16 application is considered standard operations to develop TPA, as required by prior OEB  
17 decisions. Such costs are being recovered through the Smart Meter Charge. Please see the  
18 response to OEB Staff Interrogatory 11 at Exhibit I, Tab 9.0, Schedule 1.11.

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1 CCC INTERROGATORY 9

2 *4 – Are the IESO/SME's proposal and methodology for calculating net revenues generated by*  
3 *third party access and the proposed allocations of those revenues to Smart Metering Entity*  
4 *Charge ratepayers appropriate?*

5 CCC-9

6 INTERROGATORY

7 (Ex. B/T3/S1/p. 2)

8 Are there system related costs that will be allocated to the TPA program? If not, why not?

9 RESPONSE

10 No system related costs are specifically allocated to the TPA program. As stated in the  
11 application the SME reviewed the BDR Cost Allocation Study and will be following the  
12 recommendations and conclusions in the study in allocating costs to TPA. Please see the  
13 response to OEB Staff Interrogatory 8 at Exhibit I, Tab 4.0. Schedule 1.08.

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EDA INTERROGATORY 10

Issue 4

EDA Interrogatory #10

INTERROGATORY

Reference: N/A

Question: Please provide a detailed list of the SME's costs:

a. incurred to date

b. projected to be incurred.

Please describe the nature of each cost, the associated activity, the SME's funding source and the calculated net revenue.

RESPONSE

Please see the responses to OEB Staff Interrogatories 1(c) and 11(a) at Exhibit I, Tab 1.0, Schedule 1.01, and Tab 9.0, Schedule 1.11, respectively.

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EDA INTERROGATORY 11

Issue 4

EDA Interrogatory #11

INTERROGATORY

Reference: Exhibit B/Tab 6/Schedule 1/p.2, line 19-27

Question:

- a. Please provide the SME's business case in support of Third-Party Access.
- b. Please provide a summary of the scenarios analyzed and the working papers supporting the risk assessment component of the Business Case.

RESPONSE

a. and b.

As stated in the application, this is a service that the SME has not previously provided; prices for TPA will be set based on the characteristics of the data and what the market is prepared to pay. As such the SME cannot know what market demand will be for its products nor what products it will be providing over time as it gains experience. As also stated in the evidence, the SME will charge greater than cost for access and will not be hiring additional staff or incurring capital costs at the outset of providing TPA to enable TPA. Due to these factors, a business case was not required nor developed.

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## EDA INTERROGATORY 12

## Issue 4

## EDA Interrogatory #12

## INTERROGATORY

Reference: Exhibit B/Tab 6/Schedule 1/p.2, line 19-27

Question:

- c. Please provide the SME's business case in support of Third-Party Access.
- d. Please provide a summary of the scenarios analyzed and the working papers supporting the risk assessment component of the Business Case.

## RESPONSE

Please see the reply to EDA Interrogatory 11 at Exhibit I, Tab 4.0, Schedule 4.11.

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EDA INTERROGATORY 13

Issue 5

EDA Interrogatory #13

INTERROGATORY

Reference: Exhibit B/Tab 4/Schedule 1/p. 1, lines 14-16

Question: Please compare and contrast the SME's proposal to use a new variance account to track the net revenues to the alternative of treating the revenues generated by selling data to 3rd parties as a Revenue Offsets. Please state all supporting facts and assumptions.

RESPONSE

Please see the reply to OEB Staff Interrogatory 8 at Exhibit I, Tab 4.0, Schedule 1.08.



1 EDA INTERROGATORY 14

2 Issue 5

3 EDA Interrogatory #14

4 INTERROGATORY

5 Reference: Exhibit B/Tab 4/Schedule 1/p. 2, lines 6 -10

6 Preamble: Please assume that the rebate threshold is exceeded and the LDCs Smart Metered  
7 customer is to be rebated funds.

8 Question:

9 a. Please describe the SME's actions if a debit balance whose absolute value exceeds the  
10 threshold is incurred.

11 b. Please quantify the costs that will be incurred by LDC's; please state all supporting facts  
12 and assumptions and describe how the SME obtained this information.

13 RESPONSE

14 a. Please see the reply to OEB Staff Interrogatory 8 at Exhibit I, Tab 4.0, Schedule 1.08.

15 b. The SME does not have access to information on the costs LDCs would incur, if any, when  
16 funds in the BVA in excess of the approved operating reserve are cleared and provided to  
17 Smart Metering Entity Charge rate payers through the LDCs.

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VECC INTERROGATORY 10

5. *Is the SME's proposal to create a new variance account, the Benefits Account, to track the net revenues generated by third party access appropriate?*

INTERROGATORY

5.1 Reference B/T4/S1

What interest rate do balances in the proposed TPA Benefits Sub-Accounts attract?

RESPONSE

The IESO/SME complies with O. Reg. [280/14](#) IESO: *Eligible Investments and Borrowing* for its investments and borrowing activities.

During 2018, the weighted-average return on IESO's corporate investments was 1.64%.



1 VECC INTERROGATORY 11

2 6. *Is the SME's proposal to have the proposed Benefits Account be a sub-account of the*  
3 *Balancing Variance Account appropriate?*

4 INTERROGATORY

5 6.1 Reference B/T4/S1

6  
7 Please provide a copy of a typical SME/LDC agreement as referred to at  
8 Exhibit B, Tab 4, Schedule 1, page 1 line 11-13.

9 RESPONSE

10 The SME/LDC Agreement is no longer in place as per the OEB's November 24, 2016 Decision on  
11 the SME's licence renewal application, EB-2016-0284. The SME/LDC Agreement has been  
12 replaced by the MDM/R Terms of Service. Provided as Attachments 1 and 2 to this exhibit, is  
13 the original SME/LDC Agreement, and the MDM/R Terms of Reference, respectively.

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## SMART METERING AGREEMENT FOR DISTRIBUTORS

**THIS AGREEMENT** dated this • day of •, 20•.

**BETWEEN :**

**[INSERT DISTRIBUTOR NAME]**, a distributor licensed by the Ontario Energy Board under the *Ontario Energy Board Act, 1998* (Ontario)

(the “**Distributor**”)

and

**[INSERT NAME OF ORGANIZATION DESIGNATED AS THE SMART METERING ENTITY]**, designated as the Smart Metering Entity under the *Electricity Act, 1998* (Ontario)

(the “**SME**”)

### **WHEREAS:**

- A. The **[INSERT NAME]** has been designated as the Smart Metering Entity under the *Electricity Act, 1998* (Ontario) for the purpose of co-ordinating the implementation of the Government of Ontario’s Smart Metering Initiative, a key component of which is the MDM/R.
  - B. The functions required for the MDM/R were established by the Ministry of Energy and set out in the “Meter Data Management and Repository, Functional Specification, Issue 2.0, November 29, 2006”.
  - C. The MDM/R will be utilized to collect, manage, store and retrieve information related to consumers’ use of electricity in Ontario and the SME will, subject to any requirements prescribed by regulation and the protection of privacy, provide and promote non-discriminatory access to that information.
  - D. Pursuant to the procurement process managed by the Independent Electricity System Operator, IBM Canada Limited was engaged on December 5, 2006, as an Operational Service Provider for the design, engineering, delivery, installation, configuration, integration, implementation and operation of the MDM/R.
-

- E. The MDM/R Agreement between the SME and IBM Canada Limited establishes the service levels and certain other terms and conditions under which MDM/R services are provided to distributors.
- F. The OEB's Distribution System Code provides that a distributor shall, upon being requested to do so, enter into an agreement with the SME, in a form approved by the OEB, which sets out the respective roles and responsibilities of the distributor and the SME in relation to smart metering and the information required to be exchanged to allow for the conduct of their respective roles and responsibilities.
- G. The roles and responsibilities of the SME and the Distributor set out under this Agreement reflect the regulatory framework under which the Smart Metering Initiative is being implemented, including the role of the SME in administering the provision of services to distributors pursuant to all MDM/R Agreements.

**NOW THEREFORE**, in consideration of the mutual covenants set forth herein and of other good and valuable consideration, the receipt and adequacy of which is hereby acknowledged, the Parties agree as follows:

## **ARTICLE 1**

### **INTERPRETATION**

- 1.1 Definitions:** In this Agreement, the following terms and expressions shall have the meanings set out below unless the context otherwise requires:
- 1.1.1 **"Agreement"** means this Agreement, including the Schedules to this Agreement.
  - 1.1.2 **"AMI"** means the Distributor's advanced metering infrastructure, including the smart meter, Advanced Metering Communication Device (AMCD), Local Area Network (LAN), Advanced Metering Regional Collector (AMRC), Advanced Metering Control Computer (AMCC), Wide Area Network (WAN), and related hardware, software, and connectivity required for a fully functioning data collection system.
  - 1.1.3 **"Authorized Agent"** has the meaning ascribed to it in section 2.7.
  - 1.1.4 **"Billing Quantity Data"** means smart metering data that is ready for use in billing consumers for their consumption or use of electricity based on the time of day when the electricity was consumed or used;
  - 1.1.5 **"Distributor"** has the meaning ascribed to it above and includes the Distributor's directors, officers, employees, contractors, agents, advisors and consultants.
  - 1.1.6 **"Market Rules"** means the Market Rules for the Ontario Electricity Market.

- 1.1.7 **“MDM/R”** means the Meter Data Management and Repository developed by the SME within which Smart Metering Data is processed to produce Billing Quantity Data and such data is stored for future use.
  - 1.1.8 **“MDM/R Agreements”** means the Meter Data Management and Repository Development, Hosting and Support Agreement dated December 5, 2006 between the SME and IBM Canada Limited, and all other agreements between the SME and an Operational Service Provider.
  - 1.1.9 **“OEB”** means the Ontario Energy Board or its successor.
  - 1.1.10 **“Operational Service Provider”** means IBM Canada Limited and any other party engaged by the SME, excluding the Independent Electricity System Operator, to assist with the development and operation of the MDM/R.
  - 1.1.11 **“Party”** means a party to this Agreement.
  - 1.1.12 **“Smart Metering Charge”** means any fee payable to the SME in respect of its role and responsibilities in respect of the Smart Metering Initiative and approved by the OEB or otherwise required by law.
  - 1.1.13 **“Smart Metering Data”** means data derived from smart meters, including data related to the consumers’ consumption of electricity.
  - 1.1.14 **“Smart Metering Initiative”** means those policies of the Government of Ontario related to its decision to ensure Ontario electricity consumers are provided, over time, with smart meters.
  - 1.1.15 **“SME”** has the meaning ascribed to it above and includes the SME’s directors, officers, employees, contractors, agents, advisors and consultants.
  - 1.1.16 **“SME Steering Committee”** means the forum to represent the interests of the MDM/R service recipients to be established by the SME under section 3.2.
  - 1.1.17 **“Terms of Service”** means the terms and conditions made under section 3.1.
  - 1.1.18 **“VEE”** means those validation, estimating and editing services, as specified by the SME, that are performed on Smart Metering Data to identify and account for missed or inaccurate Smart Metering Data.
- 1.2 Interpretation:** In this Agreement, unless the context otherwise requires:
- 1.2.1 words importing the singular include the plural and vice versa;
  - 1.2.2 words importing a gender include any gender;
  - 1.2.3 other parts of speech and grammatical forms of a word or phrase defined in this Agreement have a corresponding meaning;



- 1.2.4 the expression “person” includes a natural person, any company, partnership, trust, joint venture, association, corporation or other private or public body corporate, and any government agency or body politic or collegiate;
  - 1.2.5 a reference to a thing includes a part of that thing;
  - 1.2.6 a reference to an article, section, provision or schedule is to an article, section, provision or schedule of this Agreement;
  - 1.2.7 a reference to any statute, regulation, proclamation, order in council, ordinance, by-law, resolution, rule, order or directive includes all statutes, regulations, proclamations, orders in council, ordinances, by-laws or resolutions, rules, orders or directives varying, consolidating, re-enacting, extending or replacing it and a reference to a statute includes all regulations, proclamations, orders in council, rules and by-laws of a legislative nature issued under that statute;
  - 1.2.8 a reference to a document or provision of a document, including this Agreement and any externally referenced documents, includes an amendment or supplement to, or replacement or novation of, that document or that provision of that document, as well as any exhibit, schedule, appendix or other annexure thereto;
  - 1.2.9 a reference to sections of this Agreement or of any externally referenced documents separated by the word “to” (i.e., “sections 1.1 to 1.4”) shall be a reference to the sections inclusively; and
  - 1.2.10 the expression “including” means including without limitation, the expression “includes” means includes without limitation and the expression “included” means included without limitation.
- 1.3 Headings:** The division of this Agreement into articles and sections and the insertion of headings are for convenience of reference only and shall not affect the interpretation of this Agreement, nor shall they be construed as indicating that all of the provisions of this Agreement relating to any particular topic are to be found in any particular article, section, subsection, clause, provision, part or schedule.

## **ARTICLE 2**

### **ROLES AND RESPONSIBILITIES**

- 2.1 Compliance with Applicable Law:** The Parties shall comply with the provisions of all applicable laws and any codes issued by the OEB that relate to the Smart Metering Initiative.
- 2.2 Roles and Responsibilities of the SME:** The SME shall:
  - 2.2.1 administer the ongoing development of the MDM/R and any associated SME infrastructure required to fulfill the Smart Metering Initiative;



- 2.2.2 co-ordinate with other bodies having regulatory functions with respect to the Smart Metering Initiative, including the OEB and the Ministry of Energy and Infrastructure, as appropriate;
- 2.2.3 conduct such testing as the SME determines appropriate of the MDM/R and the interfaces between the MDM/R and the Distributor's systems prior to authorizing the Distributor to operate using the MDM/R and in advance of a modification to the MDM/R;
- 2.2.4 cooperate with reasonable testing by the Distributor of the interfaces between the MDM/R and the Distributor's systems requested by the Distributor, including reasonable testing by the Distributor of the interoperation of the Distributor's systems with the MDM/R;
- 2.2.5 provide reasonable and effective training to staff of the Distributor and the Distributor's Authorized Agent on the MDM/R and any associated infrastructure provided by the SME to support the interoperation of the Distributor's systems with the MDM/R;
- 2.2.6 subject to any requirements prescribed by regulation, receive Smart Metering Data, and such other information required by the SME to fulfill its obligations in respect of the Smart Metering Initiative, from the Distributor or the Distributor's Authorized Agent, conduct the applicable VEE processes for such information, and transmit Billing Quantity Data to the Distributor or the Distributor's Authorized Agent in a form that allows the Distributor to bill in accordance with an OEB approved tariff;
- 2.2.7 provide the Distributor with remote access to the MDM/R on a non-discriminatory basis for the purposes of:
  - 2.2.7.1 retrieving and reviewing the Distributor's Smart Metering Data and Billing Quantity Data for any business purpose of the Distributor; or
  - 2.2.7.2 editing the Distributor's Smart Metering Data and other information the Distributor is authorized to edit;

provided that the SME may establish reasonable restrictions on remote access to safeguard the operational integrity of the MDM/R, ensure performance of the MDM/R in accordance with the applicable service levels prescribed in the Terms of Service, perform maintenance on the MDM/R, or resolve an outage of the MDM/R;
- 2.2.8 provide ongoing technical support to the Distributor in relation to the MDM/R and any associated SME infrastructure required to fulfill the Smart Metering Initiative;
- 2.2.9 ensure that Smart Metering Data transmitted to the SME by the Distributor is stored in the MDM/R for 26 months and available to the Distributor for 10 years in an archived format, or as otherwise required by law;

- 2.2.10 perform its obligations under the Terms of Service and make best efforts to ensure that the MDM/R services meet the applicable service levels prescribed in the Terms of Service;
- 2.2.11 work with stakeholders to achieve continuous service through any transition to any subsequent agreement or agreements relating to MDM/R operations;
- 2.2.12 carry out such other roles and responsibilities as are required to fulfill the Smart Metering Initiative.

**2.3 Smart Metering Charge:** The SME shall invoice the Distributor for and collect the Smart Metering Charge in accordance with settlement procedures identical to those set forth in sections 6.1 to 6.15 of Chapter 9 of the Market Rules *mutatis mutandis*. In any application to the OEB to set the Smart Metering Charge, the SME shall request that the OEB permit the Distributor to pass through the Smart Metering Charge to consumers.

**2.4 Audit of the MDM/R:** The SME shall cause independent audits of the MDM/R and the MDM/R internal control environment, including relevant controls performed by the SME and the MDM/R Operational Service Providers, to be conducted annually by a nationally recognized audit firm, the scope and objectives of such audits to be relevant to a user organization's internal control as it relates to an audit of financial statements. The audit shall be conducted in accordance with the standards or equivalent standards to those established by the Canadian Institute of Chartered Accountants for audits of controls at a service organization. The audit period shall be at minimum six months in duration, concluding not more than 3 months from the end of the calendar year. The audit report shall be made available to users of the report no later than November 15 of each calendar year. This report shall hereinafter be referred to as the "first audit report". As early as possible and no later than January 15 of the following calendar year, the SME shall issue a management representation letter from the SME Chief Financial Officer stating that controls continue to be in place and working effectively and that there is no change in the control environment between the date of the audit report and December 31, or, at the SME's option in lieu of the representation letter, a second audit report covering the eight month period up to and including November 30 (hereinafter referred to as the "second audit report").

In the event of any qualification or significant exception in an audit report, at the request of the Distributor and subject to the approval of an officer of the SME or a committee of the SME Board or the SME Board, the SME shall cause to have specified procedures performed by a nationally recognized audit firm. The approval of this request shall not be unreasonably withheld. The Distributor's request shall include the specified procedures requested by their external auditor to be performed by the SME's auditor. Notwithstanding the SME's requirement for approval by an officer of the SME or a committee of the SME Board or the SME Board, the SME shall (a) respond to the Distributor's request in writing within 5 business days of receipt of their request with the specified procedures that the SME shall cause to have performed and (b) advise when the results of the specified procedures will be provided to the Distributor. The SME will use commercially reasonable efforts to have the results of the specified



procedures provided to the Distributor within 5 weeks of the approval of the request for specified procedures pertaining to the first audit report and within 2 weeks of the approval of the request for specified procedures pertaining to the second audit report, if applicable, or as otherwise agreed between the Distributor and the SME. The SME may consolidate similar requests from multiple Distributors, provided that such consolidation does not negatively impact on the timing of any of the approvals or the delivery of the results of the specified procedures.

In the event of any qualification or significant exception in the audit report, and where all reasonable means have been exhausted with specified procedures to meet Distributors' financial reporting requirements, Distributors required by law to file audited financial statements with a securities commission and comply with National Instrument 52-109 or equivalent shall have the right to have their financial statement auditor conduct audit procedures of the MDM/R and MDM/R internal control environment, subject to all of the following:

- The scope and objectives of the audit are limited to supporting the audit of and/or certification of Distributor's financial statements;
- Reasonable costs of the audit, including costs of the SME and the MDM/R Operational Service Providers to support the audit, shall be borne by the Distributor; and
- Distributor's external auditor agrees to the SME and MDM/R Operational Service Providers' non-disclosure and information confidentiality terms and conditions.

The SME shall develop and execute a remediation plan to address significant exceptions on a timely basis.

**2.5 Interactions with Customers:** The Distributor shall be solely responsible for interacting with its customers in respect of individual customer data originating from the MDM/R or any individual customer information derived from the MDM/R regardless of whether such data is presented to the customer by the Distributor, the SME or their respective agents.

**2.6 Roles and Responsibilities of the Distributor:** The Distributor shall:

- 2.6.1 ensure that its AMI complies with all of the applicable functional and technical specifications published by the SME with respect to the Smart Metering Initiative and conduct such testing of its AMI as required by the SME to demonstrate such compliance;
- 2.6.2 participate in any testing of the MDM/R and the interfaces between the MDM/R and the Distributor's systems as required by the SME;
- 2.6.3 certify to the SME, in a form acceptable to the SME, that the Distributor has completed any testing required by the SME and is ready to operate using the MDM/R, its AMI and any associated infrastructure required to fulfill the Smart Metering Initiative;

2.6.4 transmit to the SME Smart Metering Data and any other information required by the SME under section 2.2.6, retain such information for a minimum of 5 days, and re-transmit such information to the SME upon request;

2.6.5 perform its obligations under the Terms of Service as an MDM/R service recipient; and

2.6.6 carry out such other roles and responsibilities as are required to fulfill the Smart Metering Initiative.

- 2.7 Authorized Agent Permitted:** On written notice to the SME, the Distributor may authorize one or more persons to act on the Distributor's behalf as an agent ("Authorized Agent") in any or all of the matters related to the Smart Metering Initiative and this Agreement. The authorization shall be in the form specified by the SME. The Distributor is responsible for ensuring that its Authorized Agent is aware of and complies with the terms and conditions of this Agreement.

### ARTICLE 3

#### TERMS OF SERVICE

- 3.1 Terms of Service:** The SME shall make Terms of Service for the management and operations of the MDM/R under this Agreement and shall publish the Terms of Service on its website.

- 3.2 SME Steering Committee:** The SME shall establish the SME Steering Committee as a forum to represent the interests of stakeholders. The SME Steering Committee shall have up to 13 representatives where:

3.2.1 a majority of the members shall represent local distribution companies that are receiving service from the MDM/R or otherwise eligible to receive service from the MDM/R;

3.2.2 following a date to be established by the SME in consultation with the Ministry of Energy and Infrastructure, up to three members shall represent retail companies that are receiving service from the MDM/R or otherwise eligible to receive service from the MDM/R;

3.2.3 up to two members will be members-at large; and

3.2.4 one member shall represent the interests of the SME.

- 3.3 Appointment of the SME Steering Committee:** Except for the members-at-large and the member representing the SME, members of the SME Steering Committee shall be appointed by the Board of Directors of the SME from among nominations made by persons that are receiving service from the MDM/R or otherwise eligible to receive service from the MDM/R. Distributor representatives may also be appointed from nominations submitted by the Board of Directors of the Electricity Distributors Association or any successor organization.



- 3.4 Amendment to the Terms of Service:** The SME may amend the Terms of Service at any time provided that the SME establishes and follows a process by which the SME Steering Committee may first provide advice and recommendations to the SME on the amendment. When amending the Terms of Service, the SME shall consider the overall cost and schedule impacts of the proposed amendment to the SME and any parties receiving service from the MDM/R, and any anticipated impact on electricity consumers.
- 3.5 Amendment Proposals:** The SME shall establish a process under which any party receiving service from the MDM/R may propose an amendment to the Terms of Service.
- 3.6 Manuals and Procedures:** The SME may make and amend manuals and procedures to provide more detailed descriptions of the requirements under the Terms of Service, including any forms required under this Agreement or the Terms of Service, and shall publish any manuals and procedures made under the Terms of Service on its website.

#### ARTICLE 4

##### REPRESENTATIONS AND WARRANTIES

- 4.1 Mutual Representations and Warranties:** Each Party represents and warrants to and covenants with the other Party as follows:
- 4.1.1 it has all the necessary corporate power to enter into and perform its obligations under this Agreement;
- 4.1.2 the execution, delivery and performance of this Agreement by it has been duly authorized by all necessary corporate and/or governmental action and does not (or would not with the giving of notice, the lapse of time or the happening of any other event or condition) result in a violation or a breach of or a default under or give rise to a right of termination, greater rights or increased costs, amendment or cancellation or the acceleration of any obligation under (i) any charter or by-law instruments of that Party; (ii) any contracts or instruments to which it is a party or by which it is bound; or (iii) any laws applicable to it;
- 4.1.3 the individual(s) executing this Agreement, and any document in connection with this Agreement, on its behalf has been duly authorized to execute this Agreement and has the full power and authority to bind the Party;
- 4.1.4 this Agreement constitutes a legal and binding obligation of the Party, enforceable against the Party in accordance with its terms; and
- 4.1.5 it holds all permits, licences and other authorizations that may be necessary to enable it to carry on the business and perform its roles and responsibilities under the Smart Metering Initiative and this Agreement.
- 4.2 Representations and Warranties of the SME:** The SME represents and warrants to the Distributor that it and any Operational Service Provider have adequate qualified

employees and other personnel and organizational and other arrangements that are sufficient to enable it to perform all of its roles and responsibilities under the Smart Metering Initiative and this Agreement.

**4.3 Representations and Warranties of the Distributor:** The Distributor represents and warrants to the SME that:

4.3.1 the Distributor is a [INSERT FORM OF BUSINESS ORGANIZATION] duly [INCORPORATED/ FORMED/REGISTERED] and existing under the laws of [JURISDICTION];

4.3.2 the Distributor and any Authorized Agent has the authority under any applicable laws to provide Smart Metering Data and any other information required under section 2.2.6 to the SME; and

4.3.3 the Distributor or its Authorized Agent have adequate qualified employees and other personnel and organizational and other arrangements that are sufficient to enable it to perform all of its roles and responsibilities under the Smart Metering Initiative and this Agreement.

## **ARTICLE 5**

### **ACCESS TO MDM/R DATA**

**5.1 Disclosure of MDM/R Data:** Subject to its OEB licence, the SME may disclose, use or reproduce any data contained in the MDM/R, including Smart Metering Data and Billing Quantity Data, for any purpose; provided that in making data available to any third party, the data shall be presented in a manner that prevents the specific data of an individual customer of the Distributor being identified with that customer or premises. If the SME is compelled by law, regulation or order of court or tribunal to disclose any data contained in the MDM/R to a third party in a manner other than as provided for under this section 5.1, the SME shall, to the extent permitted by law, provide the Distributor with reasonable notice and the Distributor may seek a protective order or other appropriate remedy to prevent disclosure of the data.

**5.2 Protocol for Access to MDM/R Data:** The SME shall consult with the SME Steering Committee and develop and publish a protocol setting out the procedures it will follow in providing access to MDM/R data while preventing identification of the specific data associated with an individual customer or premises.

**5.3 Freedom of Information and Protection of Privacy Act:** The Distributor acknowledges that SME is bound by the provisions of the *Freedom of Information and Protection of Privacy Act* (Ontario) and may be required by order of a court or tribunal to disclose information provided by the Distributor to SME. The SME acknowledges that the Distributor may be bound by the provisions of the *Freedom of Information and Protection of Privacy Act* (Ontario), the *Municipal Freedom of Information and Protection of Privacy Act* (Ontario) or other such legislation and may be required by order of a court or tribunal to disclose information provided by the SME to the Distributor.



## ARTICLE 6

### INTELLECTUAL PROPERTY

- 6.1 Intellectual Property Rights:** The Distributor shall not acquire any title, beneficial ownership interests or any intellectual property rights, including any proprietary rights provided under (i) patent law, (ii) copyright law (including moral rights), (iii) trade-mark law, (iv) design patent or industrial design law, (v) semi-conductor chip, integrated circuit topography or mask work law, or (vi) any other statutory provision or common law principle regarding intellectual or industrial property, including trade secret law, in the MDM/R or any associated infrastructure used by the SME to fulfill the Smart Metering Initiative. Similarly, the SME shall not acquire any such title, interests or rights in respect of the Distributor's AMI, customer information systems, billing systems or any associated infrastructure used by the Distributor to fulfill those objectives.
- 6.2 Survival:** Article 6 of this Agreement shall survive the assignment, transfer or termination of this Agreement.

## ARTICLE 7

### LIABILITY AND INDEMNIFICATION

- 7.1 Limitation of Liability of the SME:** Except as provided in sections 7.5, 7.6 and 7.7, the Distributor shall have no recourse against the SME in respect of any breach of this Agreement, or any loss or damage to the Distributor, which in either case is attributable to an act or omission of any Operational Service Provider. The SME's liability to the Distributor attributable to an act or omission of the SME shall be limited to:
- 7.1.1 actual direct damages and in no event shall the SME be liable to the Distributor in respect of punitive, consequential or indirect damages or loss of profit, loss of data or loss of revenue; and
  - 7.1.2 the cumulative liability of the SME to all MDM/R service recipients (including the Distributor) in connection with an act or omission of the SME under this Agreement shall not exceed an aggregate amount of \$1,000;
- except as provided for in section 7.3 or to the extent that any such damages are recovered by the SME from an Operational Service Provider under section 7.6.
- 7.2 Limitation of Liability of the Distributor:** The Distributor's liability to the SME attributable to an act or omission of the Distributor shall be limited to actual direct damages and in no event shall the Distributor be liable to the SME in respect of punitive, consequential or indirect damages or loss of profit, loss of data or loss of revenue. The liability of the Distributor to the SME in connection with an act or omission of the Distributor shall not exceed \$1,000.
- 7.3 Indemnification:** The SME shall indemnify and hold harmless the Distributor from any and all claims, losses, liabilities, obligations, actions, judgments, suits, costs,

expenses, disbursements and damages incurred, suffered, sustained or required to be paid, directly or indirectly, by, or sought to be imposed upon, the Distributor to the extent that such claims, losses, liabilities, actions, judgments, suits, costs, expenses, disbursements or damages arise out of a breach of Article 5 of this Agreement.

**7.4 Duty to Mitigate:** A Party has a duty to mitigate damages, losses, liabilities, expenses or costs relating to any claims that may be made under this Agreement.

**7.5 Cost Recovery:** The SME shall cooperate with the Distributor (acting individually or in concert with other licenced distributors that are parties to an agreement with the SME) in:

7.5.1 any proceeding before the OEB; and

7.5.2 any initiative to make a submission to, or obtain a legislative or regulatory amendment from, the Province of Ontario;

in which the Distributor seeks a change to any of its rates or charges or other appropriate relief for any of its losses or incremental costs related to any act or omission of the SME, the Operational Service Provider or a service provider of the SME. The SME shall assist in the coordination of the claim or initiative being put forward by the Distributor. Such cooperation by the SME shall include, but not be limited to, promptly providing to the Distributor and the OEB, at the request of the Distributor but at the SME's cost, accurate information, analysis, documents, and evidence. For greater certainty, the SME's obligation to provide assistance under this section shall not be limited to a cost of \$1000 by section 7.1.2.

**7.6 Reduction of Smart Metering Charge:** If an Operational Service Provider fails to meet the required service levels under an MDM/R Agreement, or otherwise breaches an MDM/R Agreement, and that failure or breach results in a reduction of the fees payable to the Operational Service Provider by the SME, or if any amount is recovered from the Operational Service Provider in respect of any such failure or breach, then an amount equal to the reduction or recovered amount will be:

7.6.1 set aside by the SME as an amount owing to MDM/R service recipients;

7.6.2 reported to the SME Steering Committee along with any pertinent information in the possession of the SME which may assist the SME Steering Committee in determining which MDM/R service recipients were affected by the MDM/R failure or breach; and,

7.6.3 subsequently distributed to MDM/R service recipients by the SME in the manner directed by SME Steering Committee.

The SME Steering Committee shall allocate such funds using any methodology it considers appropriate and resolve any disputes between the Distributor and any other MDM/R service recipient with respect to the allocation of such funds. The Distributor and the SME agree to adhere to all decisions made by the SME Steering Committee with respect to the allocation of such funds.



- 7.7 Monitoring of the Operational Service Provider:** The SME will use commercially reasonable efforts to monitor each Operational Service Provider's performance under, and to enforce the provisions of, its MDM/R Agreement (which shall include, for greater certainty, the diligent pursuit, through legal proceedings if necessary, of any appropriate reductions of fees or recovery of any amounts owing as damages, penalties or otherwise). The Distributor may seek an order of specific performance requiring the SME to take commercially reasonable actions to enforce the provisions of an MDM/R Agreement at the SME's cost.

## ARTICLE 8

### DISPUTE RESOLUTION

- 8.1 Dispute Resolution:** Subject to section 8.3, the Parties shall attempt to settle any dispute in connection with this Agreement or the Smart Metering Initiative through good faith negotiations. If the Parties are unable to resolve the dispute through good faith negotiation, either Party may apply to the OEB for determination of the dispute. A Party shall provide written notice to the other Party of its intention to apply to the OEB for determination of the dispute at least ten (10) business days before filing any application materials with the OEB.
- 8.2 Limitation Period:** Subject to section 8.3, a Party shall commence any proceeding in respect of a dispute under this Agreement or related to the Smart Metering Initiative within two years of the earlier of:
- 8.2.1 the date on which the claim is discovered; or
  - 8.2.2 the date on which this Agreement is terminated under section 11.1.
- 8.3 Smart Metering Charge:** Any dispute between the Parties in respect of the calculation of the Smart Metering Charge shall be determined in accordance with a dispute resolution procedure identical to that set forth in section 2 of Chapter 3 of the Market Rules *mutatis mutandis*. The Distributor shall commence any proceeding in respect of the calculation of the Smart Metering Charge invoiced to it by the SME within the applicable limitation period set forth in section 2.5.1A.3 or 2.5.1A.4 of Chapter 3 of the Market Rules.

## ARTICLE 9

### FORCE MAJEURE

- 9.1 Force Majeure:** If either Party is unable to satisfy any of its obligations under this Agreement due to causes beyond the Party's reasonable control, provided that the Party makes all reasonable efforts to avoid, or if unavoidable, to correct the reason for such delay or failure and gives the other Party prompt notice of such delay or failure, then such Party shall be excused and relieved from its obligation to satisfy such obligation for so long as the event continues and for such reasonable period of time thereafter as

may be necessary for the Party to resume performance of the obligation. For the avoidance of doubt, “causes beyond the Party’s reasonable control” include an event of fire, flood, earthquake, element of nature, explosions, acts of God, acts of war, terrorism, riots, civil or public disorders or disobedience, strikes, lock-outs, labour disruptions, acts of vandalism, sabotage, or other unlawful acts, and any other similar event beyond the commercially reasonable control of the Party.

## ARTICLE 10

### AMENDMENT AND ASSIGNMENT

- 10.1 Amendment Generally:** Except as otherwise provided in this Agreement, no amendment to this Agreement will be effective until approved by the OEB. A Party may apply to the OEB to amend this Agreement at any time provided that the Party has first consulted with the SME Steering Committee on the merits of the proposed amendment.
- 10.2 Amendment to Section 4.3:** The Distributor may amend the Distributor’s corporate information provided under section 4.3 at any time without the approval of the OEB.
- 10.3 Amendment to Schedule “A”:** The Distributor or the SME may amend their respective nominated representatives for official notifications listed in Schedule “A” at any time without the approval of the OEB.
- 10.4 Assignment Generally:** Except as provided for in section 11.2, neither Party may assign its rights and obligations under or transfer any of its interest in this Agreement without the prior consent of the other Party, which consent shall not be unreasonably withheld. An assignment under this section does not require the approval of the OEB.

## ARTICLE 11

### TERM AND TERMINATION

- 11.1 Term:** Unless otherwise extended by order of the OEB, this Agreement shall terminate on March 31, 2012.
- 11.2 Termination of the Smart Metering Entity Role:** If during the term of this Agreement, the SME is no longer designated under the *Electricity Act, 1998* (Ontario) as the Smart Metering Entity, this Agreement shall be assigned to and assumed by the successor Smart Metering Entity.
- 11.3 Delivery of Historical Data:** In the event that MDM/R services are no longer being provided under either this Agreement or any subsequent agreement or agreements relating to MDM/R operations, the SME shall, at the request of the Distributor, obtain and deliver to the Distributor the Distributor’s Smart Metering Data and Billing Quantity Data stored in the MDM/R. This section 11.3 shall survive the assignment, transfer or termination of this Agreement.
- 11.4 Deemed Release of the SME:** Subject to section 6.2, the Distributor will be deemed to release the SME from all obligations, liabilities, claims and demands against SME in



respect of the Smart Metering Initiative and this Agreement, whether known or unknown, upon the earlier of:

11.4.1 two years after termination of this Agreement; or

11.4.2 the assumption of any obligations, liabilities, claims and demands against SME in respect of the Smart Metering Initiative and this Agreement by another entity in accordance with section 11.2.

## ARTICLE 12

### MISCELLANEOUS

- 12.1 No Agency or Partnership:** The Parties do not intend that any agency or partnership be created between them by this Agreement.
- 12.2 No Warranty:** Except as specifically set forth in this Agreement, there are no representations, warranties, or conditions of either Party, express, implied, statutory or otherwise, regarding any matter, including warranties or conditions of merchantable quality or fitness for a particular purpose.
- 12.3 Successors and Assigns:** This Agreement shall enure to the benefit of, and be binding on, the Parties and their respective successors and permitted assigns.
- 12.4 Severability:** Any provision of this Agreement that is invalid or unenforceable shall be ineffective to the extent of that invalidity or unenforceability and shall be deemed severed from the remainder of this Agreement, all without affecting the validity or enforceability of the remaining provisions of this Agreement or affecting the validity or enforceability of such provision in any other jurisdiction.
- 12.5 Notices:** Any notice or other communication required or permitted to be given or made under this Agreement shall be sent by courier or other form of personal delivery, by prepaid first class mail, by facsimile or electronic mail and be addressed to the other Party in accordance with the contact information listed in Schedule "A" of this Agreement.
- 12.6 Governing Law:** This Agreement shall be governed by and construed in accordance with the laws of the Province of Ontario and the federal laws of Canada applicable therein. The Parties irrevocably attorn to the exclusive jurisdiction of the courts of the Province of Ontario.
- 12.7 Conflict or Inconsistency:** In the event of a conflict or inconsistency between this Agreement and the provisions of the Terms of Service, this Agreement shall prevail. In the event of a conflict or inconsistency between this Agreement and any code issued by the OEB under section 70.1 of the *Ontario Energy Board Act* (Ontario), the code shall prevail.
- 12.8 Amendment to the Market Rules:** If the SME proposes to or receives a proposal to amend any provision of the Market Rules incorporated in this Agreement by reference,

the SME shall provide the Distributor with reasonable notice of the proposed amendment and identify what impact the amendment will have upon this Agreement.

**12.9 Waiver:** No failure or delay by a Party in exercising any right, power or privilege under this Agreement shall operate as a waiver thereof. No provision of this Agreement may be waived except in writing by a Party at its sole discretion, and a waiver on any occasion shall not act as a waiver or bar to the enforcement of the rights of a Party with respect to any other breach or the same breach on any other occasion.

**12.10 Entire Agreement:** This Agreement represents the complete agreement between the Parties and supersedes all prior communications, understandings and agreements between the Parties, whether written, oral, expressed or implied.

**12.11 Counterparts:** This Agreement may be executed by the Parties by facsimile or electronic signature and in separate counterparts, each of which when so executed and delivered will be an original, but all such counterparts will together constitute one and the same instrument.

**IN WITNESS WHEREOF** the Parties have, by their duly appointed and authorized representatives, executed this Agreement.

**[INSERT DISTRIBUTOR NAME]**

By: \_\_\_\_\_

Name:

Title:

**[INSERT NAME OF SMART METERING  
ENTITY]**

By: \_\_\_\_\_

Name:

Title:

**SCHEDULE "A"**  
**NOMINATED REPRESENTATIVES FOR OFFICIAL NOTIFICATIONS**

**SME**

Name of SME Representative:	
Title:	
Address:	
City/Province/Postal Code	
Email address:	
Phone:	
Fax:	

**Distributor**

Name of Distributor Representative:	
Title:	
Address:	
City/Province/Postal Code	
Email address:	
Phone:	
Fax:	

# Meter Data Management and Repository

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# Terms of Service

<b>Library Record No.</b>	<i>SME_AGR_0002</i>
<b>Document Name</b>	<i>MDM/R Terms of Service</i>
<b>Issue</b>	Issue 3.0
<b>Reason for Issue</b>	Revision
<b>Effective Date</b>	March 27, 2018



# Table of Contents

<b>1.</b>	<b>MDM/R Governance .....</b>	<b>1</b>
1.1	Legal Force .....	1
1.2	SME Steering Committee.....	1
1.3	Amending the Terms of Service .....	4
1.4	MDM/R Manuals and Procedures .....	5
1.5	Urgent Amendments .....	6
<b>2.</b>	<b>Administration .....</b>	<b>6</b>
2.1	Administration of the Terms of Service .....	6
2.2	SME Compliance .....	6
2.3	Obligations of the SME .....	7
2.4	Audit of the MDM/R.....	9
2.5	Obligations of an MDM/R Service Recipient .....	9
2.6	Authorized Agent Permitted .....	10
2.7	Change Management.....	11
2.8	MDM/R Change and Release Management .....	11
2.9	MDM/R Configuration Change Management .....	12
2.10	Intellectual Property .....	12
<b>3.</b>	<b>Preparation, Registration and Enrolment .....</b>	<b>13</b>
3.1	Preparation and Registration .....	13
3.2	Enrolment.....	13
3.3	Status Reporting .....	13
<b>4.</b>	<b>Operation of the MDM/R.....</b>	<b>14</b>
4.1	MDM/R Functional Design .....	14
4.2	MDM/R Technical Interface Design .....	14
4.3	MDM/R Standards .....	14
4.4	MDM/R Incident Management .....	14
4.5	MDM/R Service Levels.....	17
4.6	MDM/R Business Continuity .....	18

4.7	Access to <i>MDM/R</i> Data .....	18
<b>5.</b>	<b>Settlement Invoicing and Payment Process.....</b>	<b>19</b>
5.1	Settlement Procedure .....	19
5.2	Invoicing Procedure .....	19
5.3	Payment Procedure .....	20
5.4	Payment Default .....	20
5.5	Allocation of Payment .....	20
5.6	Settlement Disagreements and Disputes .....	21
<b>6.</b>	<b>Supervision and Dispute Resolution .....</b>	<b>21</b>
6.1	Supervision by the <i>SME</i> .....	21
6.2	Remedies.....	22
6.3	Dispute Resolution .....	22
6.4	Limitation Period .....	22
<b>7.</b>	<b>Liability and Indemnification .....</b>	<b>23</b>
7.1	Limitation of Liability of the <i>SME</i> .....	23
7.2	Limitation of Liability of an <i>MDM/R Service Recipient</i> .....	23
7.3	Indemnification .....	23
7.4	Duty to Mitigate .....	24
7.5	Cost Recovery .....	24
7.6	Monitoring of the Operational Service Provider.....	24
<b>8.</b>	<b>Interpretation.....</b>	<b>24</b>
8.1	Italicized Expressions.....	24
8.2	General .....	25
8.3	Headings.....	26
8.4	Shall, Must and May.....	26
8.5	Explanatory Notes.....	27
8.6	Computation of Time.....	27
8.7	Currency .....	27
8.8	Definitions .....	27

# **1. MDM/R Governance**

## **1.1 Legal Force**

- 1.1.1 The *terms of service* are issued pursuant to sections 53.14 and 53.15 of the *Electricity Act, 1998* to specify the terms upon which each *MDM/R service recipient* and the *SME* will perform its respective obligations.
- 1.1.2 The *terms of service* set out the principles regarding the administration and operational framework of the *MDM/R* and any other infrastructure required to fulfill the obligations of the *SME* under the *Electricity Act, 1998*.
- 1.1.3 The *SME* shall make the *terms of service* accessible by accessing ServiceNow through the IESO website <https://mdmrsupport.service-now.com/>. Upon accessing ServiceNow, the *terms of service* can be located within the category Operations Manuals in the Knowledge Base section.

## **1.2 SME Steering Committee**

- 1.2.1 The *SME* shall establish the *SME Steering Committee (SSC)* as a forum to represent the interests of the *MDM/R service recipients*. The *SSC* will be provided with an opportunity to:
  - 1.2.1.1 provide input in the ongoing maintenance of the *terms of service* and the *MDM/R manuals and procedures*;
  - 1.2.1.2 provide input on the *SME*'s provision of *MDM/R* services and the committed service levels as prescribed in the *terms of service*;
  - 1.2.1.3 consider amendment proposals forwarded by the *SME*, *MDM/R service recipients*, or initiated by the *SSC*; and
  - 1.2.1.4 participate in the consultations, when requested by the *SME*, on amendments to the *MDM/R manuals and procedures*.
- 1.2.2 The *SME* will request members of the *SSC* to provide feedback on particular topics and/or respond to various surveys from time to time.
- 1.2.3 The *SSC* will:

**MDM/R Terms of Service**

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- 1.2.3.1 review, and make recommendations with respect to changes, service levels and the performance of the *MDM/R*;
- 1.2.3.2 review and make recommendations on emerging issues and risks to the *MDM/R* and *MDM/R service recipients* and act as a conduit for the broader *MDM/R service recipients*;
- 1.2.3.3 solicit input from *MDM/R service recipients* on proposed changes and issues, and communicate resolution, decisions and plans to *MDM/R service recipients*;
- 1.2.3.4 provide input to the operation of the *MDM/R*, including incident and problem management, change management, business continuity and disaster recovery;
- 1.2.3.5 provide input to the priorities of the *SME* and plans for proposed changes to the *MDM/R*;
- 1.2.3.6 provide advice and status updates to the Electricity Distributors Association (EDA) as requested; and
- 1.2.3.7 provide direction and feedback to the *MDM/R Technical Panel*, including the assessment of proposals and recommendations from the *MDM/R Technical Panel*.
- 1.2.4 The *SSC* shall have a minimum of 5 and a maximum of 13 members representing *distributors* that are *MDM/R service recipients*.  
The *SSC* will have one member that represents the interests of the *SME*.
- 1.2.5 Members of the *SSC* shall be appointed by the *SME* from among nominations made by *MDM/R service recipients* or entities eligible to become *MDM/R service recipients*. Distributor representatives may also be appointed from nominations submitted by the Board of Directors of the Electricity Distributors Association.
- 1.2.6 When selecting members for the *SSC*, the *SME* may consider factors such as providing representation from a range of *AMI* and *CIS* technologies as well as a range of utility size, geographic location, and demographics.
- 1.2.7 Members of the *SSC* shall serve for a term of two years. At the end of a member's term, he/she may continue to serve for a consecutive term if the majority of the committee members approve. There is no limit on the number of terms a member can serve.
- 1.2.8 The following persons are disqualified from being a member of the *SSC*:

**MDM/R Terms of Service**

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- 1.2.8.1 a person who is less than eighteen years of age;
- 1.2.8.2 a person who is of unsound mind and has been so found by a court in Canada or elsewhere;
- 1.2.8.3 a person who is not an individual;
- 1.2.8.4 a person who has the status of bankrupt; or
- 1.2.8.5 a person who is an employee of or has a material interest in any company or organization providing goods or services to the *SME* while acting in its capacity as the *SME*.
- 1.2.9 In the event that a member's position on the *SSC* becomes vacant prior to the end of the member's term, a new member in accordance with the procedure outlined in section 1.2.5 to fill the position for the remainder of that term may be appointed.
- 1.2.10 A majority of the members of the *SSC* shall be considered a quorum.
- 1.2.11 The *SSC* may establish its own procedures, documented in the *SME SSC Terms of Reference* that includes provisions relating to:
  - 1.2.11.1 the frequency, format, location and scheduling of meetings;
  - 1.2.11.2 attendance requirements for members of the *SSC*;
  - 1.2.11.3 procedures that govern the conduct of meetings;
  - 1.2.11.4 method of selecting a Chair of the *SSC*, who shall not be the *SME* member; and
  - 1.2.11.5 any administrative matters that are not otherwise stipulated by the *terms of service*.
- 1.2.12 The *SSC* may recommend that the *SME* form working groups or standing committees to consider topics in specific areas.
- 1.2.13 Material submitted to or discussed at meetings of the *SSC* will not normally be confidential. If confidential material is necessary for the consideration of a matter, the *SSC* will establish appropriate confidentiality safeguards prior to receipt of that material.

## 1.3 Amending the Terms of Service

- 1.3.1 An *MDM/R service recipient* or any other interested person may propose an amendment to the *terms of service* and shall file with the *SME* an amendment submission in a form specified by the *SME* and a statement of the reason for which such amendment may be necessary or desirable. The *SME* shall publish the amendment submission and the accompanying statement.
- 1.3.2 The *SME* may at any time propose on its own initiative to amend the *terms of service* as may be necessary or desirable. The *SME* shall publish an amendment submission in a form specified by the *SME* and a statement of the reason for which such amendment may be necessary or desirable.
- 1.3.3 Any *amendment proposal* to the *terms of service* from the *SME* or other parties shall be referred to the *SSC* for consideration unless the *SME* determines that the amendment is an *urgent amendment*, in which case, the *SME* shall file a statement with the *SSC* indicating that, in its opinion, an amendment to the *terms of service* is urgently required for one or more of the following reasons:
  - 1.3.3.1 To avoid, reduce the risk of or mitigate the effects of conditions that affect the ability of the *MDM/R* to function within defined service levels.
  - 1.3.3.2 To avoid, reduce the risk of or mitigate the effects of the abuse of *MDM/R* services by an *MDM/R service recipient* or any other party.
  - 1.3.3.3 To implement regulations or other any applicable law which requires immediate compliance by the *SME* or an *MDM/R service recipient*.
  - 1.3.3.4 To avoid, reduce the risk of or mitigate the effects of an unintended adverse effect of a provision or provisions in the *terms of service*
- 1.3.4 The *SSC* shall report to the *SME* its recommendation on each *amendment proposal* in a form specified by the *SME*. The *SME steering committee's* report shall include its recommendation on the *amendment proposal* and highlight any further additions, deletions or changes to the original *amendment proposal* recommended by the *SSC* and the reasons for each recommended change.
- 1.3.5 In its report to the *SME*, the *SSC* shall recommend a schedule for the implementation of an amendment to permit *MDM/R service recipients* a reasonable time to modify their systems and procedures to accommodate the change.

**MDM/R Terms of Service**

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- 1.3.6 The *SME* shall consider any recommendations received from the *SSC* and will make the best effort to accommodate the *SSC* when approving or rejecting the *amendment proposal* and shall publish its decision and provide a statement of the reason for any additions, deletions or changes to the *amendment proposal*.
- 1.3.7 The *SME* may approve or reject any *amendment proposal* and make any additions, deletions or changes to the *amendment proposal* that it deems necessary. The *SME* shall publish its decision and provide a statement of the reason for any additions, deletions or changes to the *amendment proposal*.
- 1.3.8 The *SME* shall implement any amendment to the *terms of service* in accordance with section 2.8 of the *terms of service*.
- 1.3.9 If in the judgment of the *SME*, an amendment to the *terms of service* would require a material increase in the *smart metering charge*, the *SME* may delay implementation of the amendment until a corresponding increase in the *smart metering charge* is approved by the OEB.

## **1.4 MDM/R Manuals and Procedures**

- 1.4.1 The *SME* may create *MDM/R manuals and procedures* to provide further detail on the implementation of the *terms of service* and shall *publish* any *MDM/R manuals and procedures*. The *MDM/R manuals and procedures* will address three main categories of activities:
  - 1.4.1.1 registration and enrolment with the *MDM/R*;
  - 1.4.1.2 steady state operations of the *MDM/R*; and
  - 1.4.1.3 managing changes.
- 1.4.2 An *MDM/R service recipient* or any other interested person may propose an amendment to the *MDM/R manuals and procedures* and shall file with the *SME* an amendment submission in a form specified by the *SME* and a statement of the reason for which such amendment may be necessary or desirable. The *SME* shall publish the amendment submission and the accompanying statement.
- 1.4.3 The *SME* may at any time determine on its own initiative or amend the *MDM/R manuals and procedures* as may be necessary or desirable. The *SME* shall publish an amendment submission in a form specified by the *SME* and a statement of the reason for which such amendment may be necessary or desirable.

**MDM/R Terms of Service**

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- 1.4.4 The *SME* shall establish a process for reviewing and considering *amendment proposals* to *MDM/R manuals and procedures*. Other than in the case of *urgent amendments*, the *SME* shall engage *MDM/R service recipients* in the development of amendments to the *MDM/R manuals and procedures*. Changes to forms and other supporting documentation referenced within the procedure will not be subject to a stakeholder process.
- 1.4.5 The *SME* may approve or reject *amendment proposals* to the *MDM/R manuals and procedures*. The *SME* shall report its decisions on such matters to *MDM/R service recipients* giving its reasons for the decision, including any further changes made to the *amendment proposal* by the *SME*.
- 1.4.6 The *SME* shall implement any amendment to *MDM/R manuals and procedures* in accordance with section 2.8 of the *terms of service*.

## **1.5 Urgent Amendments**

- 1.5.1 In urgent situations meeting one or more of the criteria set out in section 1.3.3 where the normal course of stakeholder engagement with *MDM/R service recipients* is not practicable, the *SME* may amend the *terms of service* or the *MDM/R manuals and procedures* by *urgent amendment* and shall provide *MDM/R service recipients* with the best information concerning the change as soon as possible.

## **2. Administration**

### **2.1 Administration of the Terms of Service**

- 2.1.1 The *SME* is responsible for the administration of the *terms of service* and the *MDM/R manuals and procedures*.

### **2.2 SME Compliance**

- 2.2.1 The *SME* shall comply with, observe and perform any duties and obligations imposed on the *SME* by the *terms of service* and the *MDM/R manuals and procedures*.



## 2.3 Obligations of the *SME*

- 2.3.1 Subject to any requirements prescribed by regulation, the *SME* shall receive *smart metering data*, and such other information required by the *SME* to fulfill its obligations in respect of the *smart metering initiative*, from each *MDM/R service recipient* or its authorized agent, conduct the applicable VEE processes for such information, and transmit *billing quantity data* to the *MDM/R service recipient* or its *authorized agent* in a form that allows the *MDM/R service recipient* to bill in accordance with an OEB approved tariff.
- 2.3.2 The *SME* shall provide an *MDM/R service recipient* with remote access to the *MDM/R* on a non-discriminatory basis for the purposes of retrieving and reviewing the *MDM/R service recipient's smart metering data* and *billing quantity data* for any business purpose of the *MDM/R service recipient*, or editing the *MDM/R service recipient's smart metering data* and other information the *MDM/R service recipient* is authorized to edit.
- 2.3.3 The *SME* shall provide access to the *MDM/R* for any *AMI* technology requested by *MDM/R service recipients*, provided that:
- 2.3.3.1 the *AMI* technology is compliant with the *Functional Specification for an Advanced Metering Infrastructure*, (Ontario Regulation 425/06 – as amended by Ontario Regulation 440/07);
  - 2.3.3.2 the *AMI* technology is compliant with all other applicable laws and regulations governing its use in the province of Ontario;
  - 2.3.3.3 the *AMI* technology is compliant with all of the applicable functional and technical specifications required by the *SME* and has successfully completed such testing of the *AMI* as required by the *SME* to demonstrate such compliance;
  - 2.3.3.4 the cost for implementing new interfaces to new *AMI* technologies shall be borne by the *SME* and recovered through the *MDM/R Fee*; and
  - 2.3.3.5 the *SME* shall have authority over the implementation schedule for new *AMI* technologies and in the course of planning its implementation activities, shall consult with the *SSC* to determine such matters as priority, scheduling and costing of such implementation, while the technical aspects of implementation shall be governed by the change management and release management processes described in sections 2.4 and 2.5 respectively.

**MDM/R Terms of Service**

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- 2.3.4 The *SME* shall monitor the operational performance of the *MDM/R* to ensure that the service levels in Appendix 'A' are met by the *OSP* on a continual basis.
- 2.3.5 The *SME* shall ensure the continuity of *MDM/R* services provided under the *terms of service*. This may include the completion a formal procurement process upon the expiry of the contract with the *OSP*.
- 2.3.6 Subject to applicable law, the *SME* shall have the right to make the final procurement decision.
- 2.3.7 The *SME* shall provide reasonable notice to an *MDM/R service recipient*, and its agents when required, should an event occur that may materially impact the *MDM/R service recipient's* use of the *MDM/R*. These events, the resulting notification process, and reporting mechanism will be detailed in the *MDM/R manuals and procedures*.
- 2.3.8 The *SME* may conduct such testing as the *SME* determines appropriate of the *MDM/R* and the interfaces between the *MDM/R* and the *MDM/R service recipient's* systems prior to authorizing the *MDM/R service recipient* to operate using the *MDM/R* and in advance of a modification to the *MDM/R*.
- 2.3.9 The *SME* shall provide ongoing technical support to *MDM/R service recipients* in relation to the *MDM/R* and any associated *SME* infrastructure required to fulfill the *smart metering initiative*.
- 2.3.10 The *SME* shall cooperate with reasonable testing by an *MDM/R service recipient* of the interfaces between the *MDM/R* and the *MDM/R service recipient's* systems requested by the *MDM/R service recipient*, including reasonable testing by the *MDM/R service recipient* of the interoperation of the *MDM/R service recipient's* systems with the *MDM/R*;
- 2.3.11 The *SME* shall provide reasonable and effective training to staff of an *MDM/R service recipient* and an *MDM/R service recipient's authorized agent* on the *MDM/R* and any associated infrastructure provided by the *SME* to support the interoperation of the *MDM/R service recipient's* systems with the *MDM/R*;
- 2.3.12 The *SME* may establish reasonable restrictions on remote access to safeguard the operational integrity of the *MDM/R*, ensure performance of the *MDM/R* in accordance with the applicable service levels prescribed in these *terms of service*, perform maintenance on the *MDM/R*, or resolve an outage of the *MDM/R*;
- 2.3.13 The *SME* shall ensure that smart metering data transmitted to the *SME* by an *MDM/R service recipient* is stored in the *MDM/R* for a minimum of 26 months

and available to the *MDM/R service recipient* for 10 years in an archived format, or as otherwise required by law.

## **2.4 Audit of the *MDM/R***

- 2.4.1 The *SME* shall cause independent audits of the *MDM/R* and the *MDM/R* internal control environment, including relevant controls performed by the *SME* and the *OSP*, to be conducted annually by a nationally recognized audit firm, the scope and objectives of such audits to be relevant to a user organization's internal control as it relates to an audit of financial statements. The audit shall be conducted in accordance with the standards or equivalent standards to those established by the Canadian Institute of Chartered Accountants for audits of controls at a service organization. The audit will follow the "*Ontario Public Service (OPS) Procurement Directive*" or procurement. The audit period shall be at minimum six months in duration, concluding not more than 3 months from the end of the calendar year. The audit report shall be made available to users of the report no later than November 15 of each calendar year. This report shall hereinafter be referred to as the "first audit report". As early as possible and no later than January 15 of the following calendar year, the *SME* shall issue a management representation letter from the *SME* Chief Financial Officer stating that controls continue to be in place and working effectively and that there is no change in the control environment between the date of the audit report and December 31, or, at the *SME*'s option in lieu of the representation letter, a second audit report covering the eight month period up to and including November 30 (hereinafter referred to as the "second audit report").
- 2.4.2 The *SME* shall develop and execute a remediation plan to address significant exceptions on a timely basis.

## **2.5 Obligations of an *MDM/R Service Recipient***

- 2.5.1 An *MDM/R service recipient* shall provide any information required by the *SME*:
- 2.5.1.1 during the course of the *MDM/R* registration and enrollment process set out in section 3.3 to produce a forecast of future transactional volumes and shall communicate to the *SME* material changes to forecasts as soon as practical. The forecast is required to ensure that the hardware and systems used by the *OSP* to provide the *MDM/R* services will meet the forecasted volumes;
  - 2.5.1.2 at any time to produce a forecast of future transactional volumes for the purposes of assessing the impact of any proposed material change

**MDM/R Terms of Service**

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to the smart metering initiative. The *SME* shall consult with the *SSC* prior to making any request under this provision; or

2.5.1.3 at any time to produce a forecast of future transactional volumes for the purposes of assessing the impact of a material change in the circumstances of the *MDM/R* service recipient. The *SME* shall consult with the *SSC* prior to making any request under this provision.

2.5.2 An *MDM/R service recipient* shall be solely responsible for interacting with its customers in respect of individual customer data originating from the *MDM/R* or any individual customer information derived from the *MDM/R* regardless of whether such data is presented to the customer by the An *MDM/R service recipient*, the *SME* or their respective agent.

2.5.3 An *MDM/R service recipient* shall ensure that its *AMI* complies with all of the applicable functional and technical specifications published by the *SME* with respect to the *smart metering initiative* and conduct such testing of its *AMI* as required by the *SME* to demonstrate such compliance.

2.5.4 An *MDM/R service recipient* shall participate in any testing of the *MDM/R* and the interfaces between the *MDM/R* and the *MDM/R service recipient's* systems as required by the *SME*.

2.5.5 An *MDM/R service recipient* shall certify to the *SME*, and maintain the certification process in a format acceptable to the *SME*, that the *MDM/R service recipient* has completed any testing required by the *SME* and is ready to operate using the *MDM/R*, its *AMI* and any associated infrastructure required to fulfill the *smart metering initiative*.

2.5.6 An *MDM/R service recipient* shall transmit to the *SME smart metering data* and any other information required by the *SME* under section 2.3.1, retain such information for a minimum of 5 days, and re-transmit such information to the *SME* upon request.

## **2.6 Authorized Agent Permitted**

2.6.1 On written notice to the *SME*, an *MDM/R service recipient* may authorize one or more persons to act on the *MDM/R service recipient's* behalf as an agent in any or all of the matters related to the *smart metering initiative*. The authorization shall be in the form specified by the *SME*. The *MDM/R service recipient* is responsible for ensuring that its *authorized agent* is aware of and complies with the terms with these *terms of service*.

## 2.7 Change Management

- 2.7.1 Subject to section 2.7.2, the *SME* shall establish and *publish* a change management process that will facilitate the evaluation of amendment proposals to the *terms of service*, the *MDM/R manuals and procedures*, the *MDM/R* or the specific configuration parameters for an *MDM/R service recipient*.
- 2.7.2 The transition to a new *OSP* or a new *MDM/R* may be subject to special release calendars and activities determined by the *SME*. The *SME* shall provide reasonable notice to all affected *MDM/R service recipients* prior to the commencement of any such transition activities.
- 2.7.3 The purpose of the change management process shall be to provide reasonable assurance that changes to the *terms of service*, the *MDM/R manuals and procedures*, the *MDM/R* or the specific configuration parameters of an *MDM/R service recipient* are identified, logged, communicated, assessed, prioritized, approved, designed and implemented in a controlled manner and in consultation with *MDM/R service recipients*.
- 2.7.4 For greater certainty, the change management process shall apply to any release of the *MDM/R* or the *MDM/R manuals and procedures* affecting:
- 2.7.4.1 the functionality of the *MDM/R*;
  - 2.7.4.2 the delivery of an *MDM/R* service;
  - 2.7.4.3 the *MDM/R* technical interface design set out in section 4.2;
  - 2.7.4.4 any *MDM/R* standard falling under the provisions of section 4.3; or
  - 2.7.4.5 a target *MDM/R* service level falling under the provisions of Appendix 'A'.

## 2.8 MDM/R Change and Release Management

- 2.8.1 The *SME* shall establish and publish a change and release management process by which changes to the *MDM/R* will be implemented.
- 2.8.2 The purpose of the change and release management process shall be to provide reasonable assurance that changes to the *MDM/R* are authorized, tested, and implemented in a controlled manner. The process shall include procedures for communicating, prioritizing and scheduling changes in consultation with *MDM/R service recipients*.

**MDM/R Terms of Service**

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- 2.8.3 The *MDM/R* change and release management process shall be governed by a baseline calendar that communicates the steps and timelines regarding the lifecycle of each scheduled release of the *MDM/R*.
- 2.8.4 The *MDM/R* change and release management process shall allow for interim changes to the *MDM/R* outside of the baseline calendar.

## **2.9 MDM/R Configuration Change Management**

- 2.9.1 The *SME* shall establish and publish an “*MDM/R* Configuration Change Management” process by which changes to *MDM/R* parameters or configuration settings that are configured for individual *MDM/R service recipients* are authorized and implemented.
- 2.9.2 The purpose of the “*MDM/R* Configuration Change Management” process shall be to provide reasonable assurance that changes to the *MDM/R* parameters or configurations that apply to individual *MDM/R service recipients* are authorized by *MDM/R service recipients* and implemented in a controlled manner. The process shall include procedures for scheduling and communicating implementation status of changes with affected *MDM/R service recipients*.

## **2.10 Intellectual Property**

- 2.10.1 An *MDM/R service recipient* shall not acquire any title, beneficial ownership interests or any intellectual property rights, including any proprietary rights provided under (i) patent law, (ii) copyright law (including moral rights), (iii) trade-mark law, (iv) design patent or industrial design law, (v) semi-conductor chip, integrated circuit topography or mask work law, or (vi) any other statutory provision or common law principle regarding intellectual or industrial property, including trade secret law, in the *MDM/R* or any associated infrastructure used by the *SME* to fulfill the *smart metering initiative*. Similarly, the *SME* shall not acquire any such title, interests or rights in respect of an *MDM/R service recipient's AMI*, customer information systems, billing systems or any associated infrastructure used by an *MDM/R service recipient's* to fulfill those objectives.

### **3. Preparation, Registration and Enrolment**

#### **3.1 Preparation and Registration**

- 3.1.1 *An MDM/R service recipient shall complete the preparation and registration process defined by the SME prior to utilizing the MDM/R. The MDM/R service recipient shall provide the SME with the information required by the SME for MDM/R administration and operation purposes.*

#### **3.2 Enrolment**

- 3.2.1 *An MDM/R service recipient shall complete an enrolment process defined by the SME prior to utilizing the MDM/R, which shall include the analysis, development and testing of the system and business process changes required for the MDM/R service recipient to integrate with the MDM/R and utilize the MDM/R services.*
- 3.2.2 *During the enrolment process, an MDM/R service recipient shall complete a self-certification assessment and provide a statement of readiness in the form specified by the SME at various stages of the preparation, registration and enrolment processes.*

#### **3.3 Status Reporting**

- 3.3.1 *The SME has the authority to require an MDM/R service recipient proceeding through the preparation, registration and enrolment process to provide status reports as required by the SME.*
- 3.3.2 *The SME may, at its discretion, delay the progression of an MDM/R service recipient through the preparation, registration and enrolment processes if that party fails to comply with the SME's status reporting requirements.*

## **4. Operation of the *MDM/R***

### **4.1 *MDM/R* Functional Design**

- 4.1.1 Subject to applicable law, the *SME* shall establish and maintain operational services in accordance with the functional design of the *MDM/R* documented in the “Meter Data Management and Repository Detailed Design Document” as amended from time to time.
- 4.1.2 The *SME* shall make the “Meter Data Management and Repository Detailed Design Document” available to a local distribution company that is an *MDM/R service recipient* or its agent during the preparation, registration and enrollment process for *MDM/R* operation upon the execution by the *MDM/R service recipient* of a confidentiality agreement that is satisfactory to the *SME*.

### **4.2 *MDM/R* Technical Interface Design**

- 4.2.1 The *SME* shall specify the interface to be used for the transfer of files between *the MDM/R service recipient* and the *MDM/R*. These interfaces will be required to support any *MDM/R* service as may be defined by the *SME* or applicable regulatory authority from time to time.
- 4.2.2 The *SME* shall document the technical interface design in the “Meter Data Management and Repository Technical Interface Specifications” and the “Meter Data Management and Repository Reports Technical Specifications”. The *SME* shall *publish* these documents.

### **4.3 *MDM/R* Standards**

- 4.3.1 The *SME* shall establish and publish standards, where required, regarding operational aspects of the *MDM/R*.

### **4.4 *MDM/R* Incident Management**

- 4.4.1 The *SME* shall *publish* an “*MDM/R* Incident Management Framework” to identify, track, mitigate and address incidents involving the failure to provide an *MDM/R* service in the manner described in the applicable *MDM/R manuals and procedures*, or in accordance with the service levels outlined in Appendix ‘A’.



**MDM/R Terms of Service**

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The “*MDM/R Incident Management Framework*” shall be detailed in the applicable *MDM/R manuals and procedures*, and include:

- 4.4.1.1 a means for *MDM/R* service recipients to notify the *SME* of any incidents regarding the provision of an *MDM/R* service;
- 4.4.1.2 a means for the *SME* to notify *MDM/R* service recipients of any incidents regarding the provision of an *MDM/R* service and any applicable interim steps being undertaken by the *SME* to mitigate such incidents;
- 4.4.1.3 where applicable, a means for the *SME* to communicate the status of incidents and known errors to *MDM/R service recipients* and any interim arrangements that should be observed by *MDM/R service recipients* until such time as a permanent solution to them is implemented;
- 4.4.1.4 a means for the *SME* to inform *MDM/R service recipients* of status updates of incidents including estimated time to resolution of incidents; and
- 4.4.1.5 a means for the *SME* to declare the resolution of problems and known errors to all affected *MDM/R service recipients* - including the implementation details involving the cutover from any interim arrangements that were put in place while the incident was in effect.
- 4.4.2 *MDM/R service recipients* shall make reasonable efforts to follow any direction from the *SME* to mitigate a known problem and to bring problems to the attention of the *SME* in a timely manner.
- 4.4.3 The *SME* shall establish and *publish* the procedures to manage operational incidents and problems encountered by organizations utilizing the services of the *MDM/R*.
- 4.4.4 The *SME* shall categorize reported incidents into different severity levels, and prioritize and respond to the incident based upon these categorizations. The *SME* shall publish the criteria used to categorize incidents.

**MDM/R Terms of Service**

4.4.5 The severity levels are as follows:

Severity	Characteristics
<b>Severity 1 Incident</b>	Severity 1 Incident means an incident that in the reasonable determination of <i>SME</i> results in one or more <i>MDM/R service recipients</i> not being able to receive: <ul style="list-style-type: none"> <li>• a critical <i>MDM/R</i> service as defined in Appendix 'A'</li> <li>• a critical <i>MDM/R</i> service at the Service Level required for that measured service</li> <li>• a Service functioning in accordance with <i>MDM/R</i> specifications and the incident is having a severe impact on the business of <i>MDM/R service recipients</i></li> </ul>
<b>Severity 2 Incident</b>	Severity 2 Incident means an incident that in the reasonable determination of <i>SME</i> , results in the <i>MDM/R</i> not functioning to specifications and demonstrates itself as an intermittent problem with high impact on the business of <i>MDM/R service recipients</i>
<b>Severity 3 Incident</b>	Severity 3 Incident means in the reasonable determination of <i>SME</i> : <ul style="list-style-type: none"> <li>• an incident causing non-critical degradation of performance</li> <li>• a non-critical <i>MDM/R</i> service as defined in Appendix 'A' not being available</li> <li>• an intermittent problem with low impact on the business of <i>MDM/R service recipients</i></li> <li>• serious deficiencies in documentation</li> </ul>
<b>Severity 4 Incident</b>	Severity 4 Incident means in the reasonable determination of <i>SME</i> : <ul style="list-style-type: none"> <li>• a problem with the Services for which a long-term bypass is provided</li> <li>• a minor documentation or cosmetic problem</li> </ul>

4.4.6 The *SME* shall not be responsible for incidents originating from a *MDM/R service recipient's* failure to comply with the technical interface specifications outlined in section 4.2.

4.4.7 Notwithstanding sections 4.4.1 to 4.4.4, the *MDM/R incident management framework* may designate separate incident management processes for specific *MDM/R* services such that:

4.4.7.1 the *SME's* duties to gather and disseminate information relating to incidents involving those specific *MDM/R* services may be assigned to a third party; and

4.4.7.2 the designated third party handling incidents for those specific *MDM/R*

services is legally bound to the *SME* to meet all applicable services levels for those specific *MDM/R* services as set out in Appendix 'A'.

## **4.5 MDM/R Service Levels**

- 4.5.1 The *SME* will make best efforts to ensure that *MDM/R* operates in accordance with the applicable service levels for the benefit of all *MDM/R service recipients* prescribed in Appendix 'A', including:
  - 4.5.1.1 work with the *OSP* to monitor service levels and address issues and incidents as they arise;
  - 4.5.1.2 seek voluntary actions from *MDM/R service recipients* regarding the scheduling, frequency and volumetric restrictions of data flows to and from the *MDM/R*; and
  - 4.5.1.3 impose limitations on the frequency and volume of data flows to and from the *MDM/R* where such restrictions are necessary to safeguard the integrity of the *MDM/R* and its associated service levels for the benefit of all *MDM/R service recipients* using the affected *MDM/R* services
- 4.5.2 Before imposing any limitations on the frequency and volume of data flows to and from the *MDM/R* under section 4.5.1.3, the *SME* shall consider the impact of the limitations on *MDM/R service recipients* that will be affected by those limitations.
- 4.5.3 Where the *SME* imposes limitations on the frequency and volume of data flows, it shall, at the first opportunity:
  - 4.5.3.1 advise all affected *MDM/R* service recipients;
  - 4.5.3.2 raise the matter with the *SME steering committee*;
  - 4.5.3.3 propose to the *SSC* remedies to such restrictions, including the potential cost and service implications for each proposed option; and
  - 4.5.3.4 seek input from the *SSC* as to whether or not the service restriction warrants the necessary costs to remedy the situation.
- 4.5.4 The *SME* shall report to *MDM/R service recipients*, the performance of each critical *MDM/R service* and each non-critical *MDM/R* service against the

corresponding service level targets set out in Appendix ‘A’ on a schedule agreed to with the *SME Steering Committee*.

- 4.5.5 Notwithstanding section 4.5.4, the *SME* shall report to the *SSC* all information relating to the reporting and distribution of Service Level Credits payable by the *OSP* to the *SME*.

## **4.6 MDM/R Business Continuity**

- 4.6.1 The *SME* shall establish business continuity plans for the *SME* and ensure *OSP* establishes disaster recovery plans for the *MDM/R* for operating and recovering from an *MDM/R business interruption event* or an emergency situation requiring the *SME* to evacuate its principal control centre and move to a backup control centre.
- 4.6.2 The *SME* shall establish procedures for *SME*, *OSP*, and *MDM/R service recipients*’ coordination and communication in the event of an *MDM/R business interruption event* or an emergency situation requiring the *SME* to evacuate its principal control centre and move to a backup control centre. The *SME* shall *publish* those procedures in the “*MDM/R Business Continuity Manual*”.
- 4.6.3 The procedures described in section 4.6.2 shall define the roles and responsibilities of the *SME*, *OSP* and *MDM/R service recipients* for responding to, recovering from and operating during an *MDM/R business interruption event* or emergency event.

## **4.7 Access to MDM/R Data**

- 4.7.1 Subject to its OEB licence, the *SME* may disclose, use or reproduce any data contained in the *MDM/R*, including *smart metering data* and *billing quantity data*, for any purpose; provided that in making data available to any third party, the data shall be presented in a manner that prevents the specific data of an individual customer of an *MDM/R service recipient* being identified with that customer or premises. If the *SME* is compelled by law, regulation or order of court or tribunal to disclose any data contained in the *MDM/R* to a third party in a manner other than as provided for under this section 4.7, the *SME* shall, to the extent permitted by law, provide the affected *MDM/R service recipient* with reasonable notice and the *MDM/R service recipient* may seek a protective order or other appropriate remedy to prevent disclosure of the data. In its 2016 orders (EB-2015-0297 and EB-2016-0284), the OEB required the *SME* to collect, effective January 1, 2017, four additional data elements for each smart meter, specifically postal codes,

distributor and commodity rate classes, occupant change date in a manner that renders it non personal information and to develop a plan for third party access to this enhanced data by the end of 2017, with full operationalization in 2018. The *SME* is bound by the provisions of the *Freedom of Information and Protection of Privacy Act* (Ontario) and may be required by order of a court or tribunal to disclose information provided by the *MDM/R service recipient* to *SME*. The *MDM/R service recipient* may be bound by the provisions of the *Freedom of Information and Protection of Privacy Act* (Ontario), the *Municipal Freedom of Information and Protection of Privacy Act* (Ontario) or other such legislation and may be required by order of a court or tribunal to disclose information provided by the *SME* to the *MDM/R service recipient*.

## **5. Settlement Invoicing and Payment Process**

### **5.1 Settlement Procedure**

5.1.1 The *SME* shall report the *smart metering charge* to *MDM/R service recipients* on the *IESO* physical market settlement statements in accordance with section 1.2, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6., 6.7, 6.8 and 6.9 of Chapter 9 of the *market rules*.

5.1.2 An *MDM/R service recipient* may access its settlement statements in accordance with the above mentioned *market rules* and the applicable *SME* market manuals, including:

5.0 - Overview (MDP\_MAN\_0005);

5.1 - Settlement Schedule and Payments Calendars (SSPCs) (MDP\_PRO\_0031);  
and

5.5 - Physical Markets Settlement Statements (MDP\_PRO\_0033).

### **5.2 Invoicing Procedure**

5.2.1 The *SME* shall invoice *MDM/R service recipients* for the *smart metering charge* on the *IESO* wholesale market invoices in accordance with sections 1.2, and 6.10 of Chapter 9 of the *market rules*.

**MDM/R Terms of Service**

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5.2.2 An *MDM/R service recipient* may access its invoices in accordance with the above mentioned *market rules* and the applicable market manuals, including:

5.0 - Overview (MDP\_MAN\_0005);

5.1 - Settlement Schedule and Payments Calendars (SSPCs) (MDP\_PRO\_0031);  
and

5.6 - Physical Markets Settlement Invoicing (MDP\_PRO\_0035)

5.2.3 Charges for the *smart metering charge* will not be included in the prudential calculations for the *distributor* under the *market rules*.

## **5.3 Payment Procedure**

5.3.1 *MDM/R service recipients* shall pay the *smart metering charge* reported on their wholesale market invoice issued by the *SME* in accordance with sections 1.2, and 6.11 of Chapter 9 of the *market rules*.

5.3.2 *MDM/R service recipients* shall fulfill their obligation to pay their invoices in accordance with the applicable *IESO* market manuals, including:

5.0 - Overview (MDP\_MAN\_0005);

5.1 - Settlement Schedule and Payments Calendars (SSPCs) (MDP\_PRO\_0031);  
and

5.9 - Settlement Payment Methods and Schedule (MDP\_PRO\_0036)

## **5.4 Payment Default**

5.4.1 If the full amount due by an *MDM/R service recipient* has not been remitted by the *MDM/R service recipient* payment date, *default interest* shall accrue on all amount of the *smart metering charge* outstanding.

## **5.5 Allocation of Payment**

5.5.1 If an *MDM/R service recipient* is also a participant in the wholesale market and the *MDM/R service recipient*:

5.5.1.1 fails to remit the full invoice amount due by the *MDM/R service*

*recipient* payment date; and

- 5.5.1.2 does not direct the *SME* how to apportion the payment between the smart metering charge and all other settlement amounts on the invoice prior to the *IESO* payment date,

the *SME* shall allocate the payment made by the *MDM/R service recipient* first to satisfying any settlement amounts due under the *market rules* before being applied to the *smart metering charge*.

## **5.6 Settlement Disagreements and Disputes**

- 5.6.1 An *MDM/R service recipient* may register a disagreement concerning the *smart metering charge* with the *SME* in accordance with section 6.6 of Chapter 9 of the *market rules*.
- 5.6.2 An *MDM/R service recipient* may, after having made reasonable efforts to resolve with the *SME* any disagreement, submit the matter to dispute resolution in accordance with section 6.8 of Chapter 9 of the *market rules*.
- 5.6.3 An *MDM/R service recipient* must commence any proceeding in respect of the calculation of the *smart metering charge* invoiced to it by the *SME* within the applicable limitation period set forth in section 2.5.1A.3 or 2.5.1A.4 of Chapter 3 of the *market rules*.

# **6. Supervision and Dispute Resolution**

## **6.1 Supervision by the *SME***

- 6.1.1 The *SME* may monitor and supervise the use of the *MDM/R* by an *MDM/R service recipient*, including:
- 6.1.1.1 any aspect of usage of the *MDM/R*; and
- 6.1.1.2 the form and content of information transferred between the *MDM/R* and the *MDM/R service recipient* and/or its designated agent(s).

**MDM/R Terms of Service**

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- 6.1.2 The *SME* shall have the authority to monitor and supervise each *MDM/R service recipient's* compliance with the procedures developed in support of the administration and operation of the *MDM/R*.

## **6.2 Remedies**

- 6.2.1 If an *MDM/R service recipient* fails to comply with the *terms of service* and the *MDM/R manuals and procedures*, the *SME* may utilize any combination of following remedies:

- 6.2.1.1 the issuance of warnings and notices and the subsequent publication of any such notices, including details of any associated disruption to any underlying *MDM/R service* caused by the actions of that *MDM/R service recipient*; and
- 6.2.1.2 where necessary to safeguard the operational integrity of any *MDM/R service*, limit the *MDM/R service recipient's* access to one or more *MDM/R services*.

- 6.2.2 Nothing in the *terms of service* shall limit the *SME's* legal rights to further remedies for the breach of the *terms of service* by any party.

## **6.3 Dispute Resolution**

- 6.3.1 Subject to section 5.6, any dispute between the *SME* and an *MDM/R service recipient* under these *terms of service* shall be resolved using the dispute resolution provisions of Chapter 3 of the *market rules*.

## **6.4 Limitation Period**

- 6.4.1 Subject to section 5.6, a party shall commence any proceeding in respect to the *terms of service* within two years of the earlier of the date on which the claim is discovered.



## **7. Liability and Indemnification**

### **7.1 Limitation of Liability of the *SME***

Except as provided in sections 7.3 and 7.5, an *MDM/R service recipient* shall have no recourse against the *SME* in respect of any breach of the *terms of service*, or any loss or damage to the *MDM/R service recipient*, which in either case is attributable to an act or omission of the *OSP*. The *SME*'s liability to an *MDM/R service recipient* attributable to an act or omission of the *SME* shall be limited to:

- 7.1.1.1 actual direct damages and in no event shall the *SME* be liable to an *MDM/R service recipient* in respect of punitive, consequential or indirect damages or loss of profit, loss of data or loss of revenue;
- 7.1.1.2 the cumulative liability of the *SME* to all *MDM/R service recipients* in connection with an act or omission of the *SME* under these *terms of service* shall not exceed an aggregate amount of \$1,000; and
- 7.1.1.3 except as provided for in section 7.3 or to the extent that any such damages are recovered by the *SME* from the *OSP* under section 7.6.

### **7.2 Limitation of Liability of an *MDM/R Service Recipient***

The liability of an *MDM/R service recipient* to the *SME* attributable to an act or omission of the *MDM/R service recipient* shall be limited to actual direct damages and in no event shall the *MDM/R service recipient* be liable to the *SME* in respect of punitive, consequential or indirect damages or loss of profit, loss of data or loss of revenue. The liability of an *MDM/R service recipient* to the *SME* in connection with an act or omission of the *MDM/R service recipient* shall not exceed \$1,000.

### **7.3 Indemnification**

The *SME* shall indemnify and hold harmless an *MDM/R service recipient* from any and all claims, losses, liabilities, obligations, actions, judgments, suits, costs, expenses, disbursements and damages incurred, suffered, sustained or required to be paid, directly or indirectly, by, or sought to be imposed upon, the *MDM/R service recipient* to the extent that such claims, losses, liabilities, actions, judgments, suits, costs, expenses, disbursements or damages arise out of a breach of section 4.7 of these *terms of service*.

## **7.4 Duty to Mitigate**

A party has a duty to mitigate damages, losses, liabilities, expenses or costs relating to any claims that may be made under these *terms of service*.

## **7.5 Cost Recovery**

The *SME* shall cooperate with a *distributor* (acting individually or in concert with other licenced *distributors* that received service from the *MDM/R*) in:

7.5.1.1 any proceeding before the OEB; and

7.5.1.2 any initiative to make a submission to, or obtain a legislative or regulatory amendment from, the Province of Ontario;

in which the *distributor* seeks a change to any of its rates or charges or other appropriate relief for any of its losses or incremental costs related to any act or omission of the *SME*, the *OSP* or a service provider of the *SME*. The *SME* shall assist in the coordination of the claim or initiative being put forward by the *distributor*. Such cooperation by the *SME* shall include, but not be limited to, promptly providing to the *distributor* and the OEB, at the request of the *distributor* but at the *SME*'s cost, accurate information, analysis, documents, and evidence. For greater certainty, the *SME*'s obligation to provide assistance under this section shall not be limited to a cost of \$1000 by section 7.1.

## **7.6 Monitoring of the Operational Service Provider**

The *SME* will use commercially reasonable efforts to monitor the *OSP*'s performance under, and to enforce the provisions of, the *MDM/R Agreement* (which shall include, for greater certainty, the diligent pursuit, through legal proceedings if necessary, of any appropriate reductions of fees or recovery of any amounts owing as damages, penalties or otherwise).

# **8. Interpretation**

## **8.1 Italicized Expressions**

8.1.1 Italicized expressions used in the *terms of services* have the meanings ascribed thereto in the definitions set forth in section 8.8.

## 8.2 General

8.2.1 In the *terms of service*, unless the context otherwise requires:

- 8.2.1.1 words importing the singular include the plural and *vice versa*;
- 8.2.1.2 words importing a gender include any gender;
- 8.2.1.3 when italicized, other parts of speech and grammatical forms of a word or phrase defined in the *terms of service* have a corresponding meaning;
- 8.2.1.4 an expression importing a natural person includes any company, partnership, trust, joint venture, association, corporation or other private or public body corporate, any government agency or body politic or collegiate, and any other entity or body or class of entity or body designated by regulation made pursuant to the *Electricity Act, 1998* as coming within the definition of the word “person”;
- 8.2.1.5 a reference to a thing includes a part of that thing;
- 8.2.1.6 a reference to a section, provision, condition, part or appendix is to a section, provision, condition, part or appendix of the *terms of service*;
- 8.2.1.7 a reference to any statute, regulation, proclamation, order in council, ordinance, by-law, resolution, rule, order or directive includes all statutes, regulations, proclamations, orders in council, ordinances, by-laws or resolutions, rules, orders or directives varying, consolidating, re-enacting, extending or replacing it and a reference to a statute includes all regulations, proclamations, orders in council, rules and by-laws of a legislative nature issued under that statute;
- 8.2.1.8 a reference to a document or provision of a document, including the *terms of service* or a provision of the *terms of service*, includes an amendment or supplement to, or replacement or novation of, that document or that provision of that document, as well as any exhibit, schedule, appendix or other annexure thereto;
- 8.2.1.9 a reference to a person includes that person’s executors, administrators, successors, substitutes (including, but not limited to, persons taking by novation) and permitted assigns;
- 8.2.1.10 a reference to a body (including, without limitation, an institute, association or authority), whether statutory or not, which ceases to

**MDM/R Terms of Service**

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exist or whose functions are transferred to another body is a reference to the body which replaces it or which substantially succeeds to its powers or functions;

- 8.2.1.11 a reference to sections of the *terms of service* separated by the word “to” (i.e., “sections 1.1 to 1.4”) shall be a reference to the sections inclusively;
- 8.2.1.12 a reference to a time;
- 8.2.1.13 without the qualification “EST” is a reference to eastern time, which is the prevailing eastern standard or eastern daylight time in the Province of Ontario;
- 8.2.1.14 followed by the qualification “EST” is a reference to eastern standard time in the Province of Ontario;
- 8.2.1.15 without the qualification “am”, “a.m.”, “pm” or “p.m.” is a reference to time based on a 24-hour clock; and
- 8.2.1.16 a reference to a month, calendar month, year or calendar year shall mean the period that commences the first hour of the first trading day that starts in such month or year and terminates the last hour of the last trading day that commences in such month or year.

### **8.3 Headings**

- 8.3.1 Headings in the *terms of service* are inserted for convenience of reference only and shall not affect the interpretation of the *terms of service*, nor shall they be construed as indicating that all of the provisions of the *terms of service* relating to any particular topic are to be found in any particular section, subsection, clause, provision, part or appendix.

### **8.4 Shall, Must and May**

- 8.4.1 The words “shall” and “must” shall be construed as imperative and the word “may” shall be construed as permissive.

## **8.5 Explanatory Notes**

- 8.5.1 Any provision in this document which is indicated as being an “explanatory note” or a “rule note” shall be deemed not to form a part of the *terms of service*. Such explanatory notes or rule notes are inserted for convenience only and shall not affect the interpretation of the *terms of service* nor be binding on the *SME* or on any *MDM/R service recipient*.

## **8.6 Computation of Time**

- 8.6.1 In the computation of time under the *terms of service*, unless a contrary intention appears, if there is a reference to a number of days between two events, they are counted by excluding the day on which the first event happens and including the day on which the second event happens.

## **8.7 Currency**

- 8.7.1 All references to a monetary amount are expressed in Canadian dollars in:
- 8.7.1.1 the *terms of service*;
  - 8.7.1.2 *MDM/R manuals and procedures*
  - 8.7.1.3 a settlement statement; or
  - 8.7.1.4 an invoice.
- 8.7.2 Any payment required to be made by or to the *SME* or by or to an *MDM/R service recipient* shall be made in Canadian dollars.

## **8.8 Definitions**

- 8.8.1 *AMI* means advanced metering infrastructure, including the smart meter, Advanced Metering Communication Device (AMCD), Local Area Network (LAN), Advanced Metering Regional Collector (AMRC), Advanced Metering Control *Computer* (AMCC), Wide Area Network (WAN), and related hardware, software, and connectivity required for a fully functioning data collection.
- 8.8.2 *amendment proposal* means a proposal to amend the *terms of service* or an *MDM/R Manual or Procedure*.

**MDM/R Terms of Service**

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- 8.8.3 *authorized agent* means an agent authorized to act on behalf of an *MDM/R service recipient*.
- 8.8.4 *billing quantity data* means smart metering data that is ready for use in billing consumers for their consumption or use of electricity based on the time of day when the electricity was consumed or used.
- 8.8.5 *CIS* means the customer information system used by an *MDM/R service recipient* for customer support and billing functions.
- 8.8.6 *default interest* means interest charged at the base lending rate that the bank where the *SME* settlement clearing account is maintained charges for commercial loans to its best and most creditworthy commercial customers plus 2%.
- 8.8.7 *distributor* has the meaning ascribed to it under the *market rules* and includes the *distributor's* directors, officers, employees, contractors, agents, advisors and consultants.
- 8.8.8 *IESO* means the Independent Electricity System Operator established and continued under Part II of the *Electricity Act, 1998*.
- 8.8.9 *market rules* means rules made under section 32 of the *Electricity Act, 1998*.
- 8.8.10 *MDM/R* means the Meter Data Management and Repository developed by the *SME* within which meter read data is processed to produce billing quantity data and such data is stored for future use.
- 8.8.11 *MDM/R Agreement* means the Meter Data Management and Repository Development, Hosting and Support Agreement dated December 5, 2006 between the *SME* and IBM Canada Limited, and all other agreements between the *SME* and an *OSP*.
- 8.8.12 *MDM/R business interruption event* means an event involving the substantial loss of the *OSP's* primary *MDM/R* operations site availability that is expected to last longer than 24 hours.
- 8.8.13 *MDM/R manuals and procedures* means a series of documents specified by the *SME*, including the documents referred to in sections 4.1, 4.2, 4.3 and 4.4, that describe procedures, standards and other requirements to be followed, met or performed by *MDM/R service recipients*, the *SME* and other persons in fulfilling their respective obligations under the *terms of service*.
- 8.8.14 *MDM/R service recipient* means a party that has certified with the *SME* for integration and access to the *MDM/R* production system.

**MDM/R Terms of Service**

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- 8.8.15 *OEB* means the Ontario Energy Board or its successor.
- 8.8.16 *OSP* means the operational service provider engaged by the *SME* to assist with the development and operation of the *MDM/R*.
- 8.8.17 *publish* means, in respect of a document or information, to place that document or information on a website designated by the *SME*, and publication shall be interpreted accordingly.
- 8.8.18 *smart metering charge* means any fee payable to *SME* for the usage of an *MDM/R* service that may be prescribed by applicable law.
- 8.8.19 *smart metering data* means data derived from smart meters, including data related to the consumers' consumption of electricity.
- 8.8.20 *smart metering initiative* means those policies of the Government of Ontario related to its decision to ensure Ontario electricity consumers are provided, over time, with smart meters.
- 8.8.21 *SME* means the *IESO* acting as the Smart Metering Entity designated under the *Electricity Act, 1998* (Ontario) to accomplish the Government of Ontario's *smart metering initiative* and any subsidiary of the *SME*, including the *SME*'s directors, officers, employees, contractors, agents, advisors and consultants.
- 8.8.22 *SME Steering Committee* or *SSC*, means a consultative body constituted under the provisions of the *terms of service* which represents the interests of the *MDM/R* service recipients under section 1.2.1.
- 8.8.23 *terms of service* means the terms and conditions governing the administration and operation of the *MDM/R* and any other infrastructure required to fulfill the objectives of the *smart metering initiative*, including the interfaces between the *MDM/R* and any external systems.
- 8.8.24 *urgent amendment* means an amendment to the *terms of service* or the *MDM/R manuals and procedures* on an urgent meeting one or more of the criteria set out in section 1.3.3.
- 8.8.25 *VEE* means those validation, estimating and editing services, as specified by the *SME*, that are performed on *smart metering data* to identify and account for missed or inaccurate *smart metering data*.

## Appendix 'A' – *MDM/R* Service and Performance Levels

**Critical *MDM/R* Services:** The target service levels contained in the *Meter Data Management & Repository (MDM/R) Service and Performance Levels* document lists the target service levels set out in an agreement between the *SME* and the *OSP*. In the event that the *OSP* fails to meet the target service levels for Critical *MDM/R* Services set out, a service credit payable by the *OSP* to the *SME* may be triggered as per the contractual provisions in that agreement.

**Non Critical *MDM/R* Services:** The target service levels contained in the *Meter Data Management & Repository (MDM/R) Service and Performance Levels* document lists the non-critical service with the target service level set out in an agreement between the *SME* and the *OSP* or any other service provider providing the services listed below under contract with the *SME*.

Please refer to the *MDM/R* specification *Meter Data Management Repository (MDM/R) Service and Performance Levels (SME\_SPEC\_0005)* document for a complete listing of the service and performance levels of the *MDM/R* including Critical and Non- Critical service levels of the *MDM/R*.



OEB STAFF INTERROGATORY 10

**7.0 Is the SME's proposal to annually report on the net revenues generated and tracked in the Benefits Account in the annual report filed with the OEB by May 31st appropriate?**

**7.0 Staff – 10**

INTERROGATORY

Reference: Exhibit B, Tab 3, Schedule 1, Page 1

a) Please provide a template of what would be included in the annual report to show net revenues generated.

RESPONSE

A template of the report of the variance accounts including the proposed Benefits Account is shown below. In the example there is no net revenue in the Benefits Account in 2018:

	<b>Budget</b>	<b>Actual</b>	
Revenue 2013 - 2017	248,635,901	216,024,412	
Cost 2013 - 2017	<u>148,486,872</u>	<u>121,389,347</u>	
	<u>100,149,029</u>	<u>94,635,065</u>	<b>Debt Retired</b>
		<u>5,513,964</u>	<b>Debt Remaining</b>

<b>Balance Variance Account (BVA)</b> (In millions of dollars)	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
<b>Opening Balance (as of Jan 1)</b>	<b>(5.5)</b>				
Cost Account - Annual Variance	x				
Revenue Account - Annual Variance	x				
<b>Closing Balance (as of Dec 31)</b>	<b>(5.5)</b>				
<b>Opening Balance (as of Jan 1)</b>	<b>-</b>				
Benefits Account - Annual Variance	-				

<b>Closing Balance (as of Dec 31)</b>	-				
<b>Opening Balance (as of Jan 1)</b>	<b>0.4</b>				
Service Level Credit Account - Annual Variance	(0.4)				
<b>Closing Balance (as of Dec 31)</b>	-				
<b>Balance Variance Account (BVA)</b>	<b>(5.5)</b>	-	-	-	-

CCC INTERROGATORY 10

*7 – Is the SME's proposal to annually report on the net revenues generated and tracked in the Benefits Account in the annual report filed with the OEB by May 31<sup>st</sup> appropriate?*

**CCC-10**

INTERROGATORY

Please set out the level of detail that will form the annual report provided to the OEB.

RESPONSE

Please see the response to OEB Staff Interrogatory 10 at Exhibit I, Tab 7.0, Schedule 1.10.

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1 CCC INTERROGATORY 11

2 *8 – Were the stakeholder engagement efforts undertaken by the SME regarding third party*  
3 *access to data at market prices sufficient?*

4 **CCC-11**

5 INTERROGATORY

6 Are the LDCs supportive of the SME's proposals to provide data to third parties? If not, please  
7 explain what their concerns are.

8 RESPONSE

9 Multiple LDCs and the Electricity Distributors Association were active members of the SME's  
10 Data Strategy Advisory Council and the two LDC members of the IESO's SAC represent  
11 Ontario LDCs. Members of these committees have not stated any concerns with the SME's  
12 proposal to provide data to third parties at DSAC meetings or at SAC meeting where SME staff  
13 presented on third party access to the data held by the SME. The SME cannot speak on behalf of  
14 each LDC as to whether or not they support the proposal.



1 EDA INTERROGATORY 15

2 Issue 8

3 EDA Interrogatory #15

4 INTERROGATORY

5 Reference: Exhibit B/ Tab 5/ Schedule 1, p. 1 line 7

6 Question: Please provide the results of the SME's consultations on sharing data and  
7 how the SME incorporated the input from this consultation in their final design.

8 RESPONSE

9 The public webinar hosted by the SME on November 9, 2018, attended by 42 participants,  
10 resulted in no feedback or questions from the participants. A link to the webpage where the  
11 recorded presentation may be found is provided below:

12 [http://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Smart-](http://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Smart-Metering-Entity-Third-Party-Access-Implementation-Plan)  
13 [Metering-Entity-Third-Party-Access-Implementation-Plan.](http://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Smart-Metering-Entity-Third-Party-Access-Implementation-Plan)





EDA INTERROGATORY 16

Issue 8

EDA Interrogatory #16

INTERROGATORY

Reference: Exhibit B/Tab 2/Schedule 1/p. 1/lines 5-14

Preamble: The SME proposes to offer 4 product offerings: "Public", "Standard", "Custom", "Enhanced Custom".

Question:

- a. Please identify and describe the stakeholder engagement and input associated with the produce proposal and how each product will benefit the rate payer.
- b. Please quantify the costs expected to be incurred to provide Public offerings and describe how these costs are to be recovered.
- c. Please describe how the proposed Custom offerings will be costed.
- d. Please assume that "A" requests a Custom offering and that "B" requests the same Custom offering in a subsequent period. Please describe how the costs to satisfy B's request will be quantified and how the price will be quantified; please state all supporting facts and assumptions.
- e. Please describe whether a third party could be capable of realizing the additional value of an Enhanced Custom offering.

RESPONSE

- a. On May 8, 2018 and July 11, 2018 the SME presented the data products development strategy which included the potential types of data offerings to the Data Strategy Advisory Council, where it was discussed. This was also discussed on the Open Call portion (where all LDCs in the province are invited to participate) of the Smart Metering Steering Committee on June 20, 2018 and October 3, 2018.
- b. Costs associated with the Public Offerings will be recovered through the Smart Metering Charge.
- c. Please see the response to EDA Interrogatory 5 at Exhibit I, Tab 1.0, Schedule 4.05.

- 1 d. For each custom offering there will be costs associated with generating the offering. This  
2 includes the enrolment process, data analysis, data extract and validations. Over time there  
3 may be the opportunity to create “canned” data extract scripts, which will evolve over time  
4 with experience. As explained in the response to EDA Interrogatory 6 at Exhibit I, Tab 1.0,  
5 Schedule 4.06, the model currently proposed is fairly basic in nature and covers a first or  
6 initial phase which is critical to allowing the SME to develop a better “real-life”  
7 understanding of market interest and opportunities, prior to proposing more advanced  
8 models for value creation models such as differential pricing, discounting, subscriptions,  
9 etc.
- 10 e. The SME cannot respond on behalf of a third party and whether they could be capable of  
11 realizing additional value of an Enhanced Custom offering.

VECC INTERROGATORY 12

8. *Were the stakeholder engagement efforts undertaken by the SME regarding third party access to data at market prices sufficient?*

INTERROGATORY

Reference: A/T3

8.1 a) What form of notification was provided to Ontario residential and low-volume consumers of the SME's intent to sell their data?

b) Have ratepayers provided positive affirmation for their data to be sold to a third party? If not please explain why this is not required.

RESPONSE

There are no statutory obligations on the IESO to obtain consent in order to provide access to the data as the data the SME is collecting and will be providing is not personal data. As stated in the response to OEB Staff Interrogatory 13 at Exhibit I, Tab 10.0, Schedule 1.13, the IESO does not collect personally identifiable information.

The SME has spent several years exploring how best to collect and provide access to the data and this work has been publicly disclosed on the IESO/SME's website and in this application.

The SME is subject to and acts in accordance with the *Freedom of Information and Protection of Privacy Act*. This act sets the framework for both protecting individuals' privacy, but also providing access to public information. While there are provisions that speak to notification to individuals' where their personal information is obtained, these provisions are not applicable as the information being collected and disclosed by the SME is not personal information.

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VECC INTERROGATORY 13

8. *Were the stakeholder engagement efforts undertaken by the SME regarding third party access to data at market prices sufficient?*

INTERROGATORY

Reference: A/T3/S1/pg. 1 & B-5-1 Attachment 3

8.2 Please identify the residential and small volume consumer representatives on the: -Data Strategy Advisory Council ("DSCA");  
-SME Steering Committee ("SSC"); and,  
-IESO Stakeholder Advisory Committee ("SAC").

RESPONSE

Within the membership of the Data Strategy Advisory Council ("DSAC"), there were representatives from Local Distribution Companies ("LDCs") and observers from the Ontario Energy Board and the Ministry of Energy, Northern Developments and Mines.

The SME Steering Committee ("SSC") is comprised of members from and representing the LDCs and the SME. The LDCs represented on the SSC are as follows:

- Veridian Connections Inc.
- Synergy (formerly Thunder Bay Hydro)
- Hydro One Limited
- London Hydro
- Burlington Hydro
- Hydro Ottawa Network Inc.
- Toronto Hydro
- Alectra Utilities

The IESO's Stakeholder Advisory Committee has one member representing consumers: Julie Girvan of the Consumers Council of Canada.

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VECC INTERROGATORY 14

8. *Were the stakeholder engagement efforts undertaken by the SME regarding third party access to data at market prices sufficient?*

INTERROGATORY

Reference: A/T3/S1/pg. 1 & B-5-1 Attachment 3

8.3 Please explain to whom the Third Party Access Implementation Plan was circulated and provide the comments (or summary of) from these participants.

RESPONSE

The implementation plan included in the SME's September 30<sup>th</sup>, 2016 licence renewal application was prepared after receiving input during 2016 meetings of the Smart Metering Entity Licence Renewal Order Implementation Working Group. During the July 14<sup>th</sup>, 2016 and September 8<sup>th</sup>, 2016 meetings the working group members reviewed the plan, the high-level processes designed to support third party access ("TPA") and provided comments, which included: agreement on the importance of a data governance model to ensure a collaborative effort between LDCs and the SME, ensuring that the processes to support TPA include rules applicable to organizations requesting the data (e.g. legal agreements, procedures to balance data security with data availability), comments on the importance of a communication strategy for the program, developing a consistent and clear message to customers to address concerns, and the need to better understand the market that will be requesting the data. Participants commented on the importance to develop the plan and the processes further and in a phased approach incorporating learnings and best practices from other industries.

The updated version of implementation plan included in the Smart Meter Charge application was prepared based on the roadmap prepared by the Privacy Analytics Inc. ("PAI"), a privacy consultant, which had been shared with the SME's Data Strategy Advisory Council ("DSAC") at its August 2<sup>nd</sup> 2017 meeting, which was DSAC's second meeting.

At the first DSAC meeting, held on June 15<sup>th</sup>, PAI described the approach chosen to develop and implement a Roadmap for TPA as best practice and that PAI would deliver a draft roadmap, with de-identification options, by end of July 2017.

At the August 2<sup>nd</sup> meeting meeting PAI presented a De-identification Options Analysis and a Roadmap for TPA. The Roadmap included several recommendations around three domains: people, process and technology, focusing on enabling effective data de-identification to support

- 1 the development and release of quality data offerings. These recommendations were classified
- 2 within three stages of the TPA Plan: a Pilot Phase to last 6-9 months, an Implementation Phase
- 3 to be completed within the next 12 months followed by a Value Generation Phase.
  
- 4 The group discussed existing data sharing practices of the IESO, considered by some attendees
- 5 as practical and valuable to the public and to groups such as commercial users. It was proposed
- 6 by some members that the approach could be standard solutions and a basic infrastructure,
- 7 with processes that protect privacy but are proportional to the data offering, and avoid complex
- 8 solutions that may be unnecessary at this early stage.



OEB STAFF INTERROGATORY 11

9.0 *In the event revenues from the Third Party Access program are less than the cost of developing and operating that program, what entity would be responsible for such deficit?*

9.0 Staff – 11

INTERROGATORY

Reference: B-5-1, Attachment 1 – Third Party Access Implementation Plan

Preamble: At Slide 20 and 21 of the presentation, the SME overviews a potential financial formula that may be used to data pricing.

Questions:

- a. The pricing models demonstrated on slides 20 and 21 appear to demonstrate how the individual costs of fulfilling each data request will be recouped by third parties.
  - i. How will the costs incurred by the SME to-date to create the framework that will allow for third party data requests be recovered from third parties?
  - ii. How will the ongoing management and operational expenses related to the third party access program be recouped from third parties?
- b. The financial formula demonstrated on slide 21 suggests that external resources will be required in order to fulfil data requests. Please specify:
  - i. who these external parties are;
  - ii. the role they will play in fulfilling data requests;
  - iii. the level of access they will have to MDM/R data and if access to personal/confidential information is being provided, how the SME will ensure security is maintained.

RESPONSE

a.

- i. TPA related work conducted prior to the OEB issuing its decision on this application is considered standard operations to develop Third Party Access ("TPA") as required by prior OEB decisions and is being recovered through the Smart Meter Charge.
- ii. Upon an approval decision of this application the process for recouping any ongoing management and operational expenses related to the third party access program will be done by tracking net revenues from TPA all costs and revenues associated with providing TPA for a charge in the Benefits Account.

b.

- i. External resources may include but are not be limited to privacy analysis consultants, external legal counsel, expert advice such as an Ethics advisor, and advanced Database analysts to assist with complex queries and extracts resources.
- ii. The role played by these external resources will be determined by the need associated with the data request. For potential customers that seeks more granular data, there may be the need for additional work, and associated cost, by external resources. These costs will reflect an increase in variable costs and external resources or expenses necessary to provide greater granularity and will be recovered from the potential customer.
- iii. As described in response to OEB Staff Interrogatory 13(a) at Exhibit I, Tab 10.0, Schedule 1.13. Privacy Analytics Inc. noted that the records in the MDM/R pertain to dwellings (and not individuals) and therefore, the risks described are for the re-identification of a dwelling. External resources utilized by the SME would not have access to the MDM/R system directly. Any access to data by external resources will be facilitated by SME staff, will follow the IESO's security policies and the relevant terms of service.

1 CCC INTERROGATORY 12

2 *9 – In the event the revenues from the Third Party Access Program are less than the cost of*  
3 *developing and operating that program, what entity would be responsible for such a deficit?*

4 **CCC-12**

5 INTERROGATORY

6 In the event the program costs exceed the revenues please explain how any deficit would be  
7 treated.

8 RESPONSE

9 Please see the response to OEB Staff Interrogatory 7 at Exhibit I, Tab 4.0, Schedule 1.07.

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EDA INTERROGATORY 17

Issue 9

EDA Interrogatory #17

INTERROGATORY

Reference: Exhibit B/Tab 2/Schedule 1/p. 2, lines p. 19-22.

Question:

a. Please describe the steps the SME would take if a product:

a) breaks even

b) is profitable

c) is unprofitable.

Please state all assumptions and provide all supporting facts.

b. Please provide the SME's analysis of the risk of

a) the recoverability of costs

b) breaking even

c) not achieving a level of profitability that appropriately compensates the provider of capital for the risks incurred.

RESPONSE

Exhibit B/Tab 2/Schedule 1/p. 2, lines p. 19-22:

*Over time as market exposure increases and the SME gains a greater understanding of market demand for the data and combinations of the data with other information it is anticipated that the SME will expand its offerings with new and additional products and formats for value creation.*

a. As stated in the section of application referenced in this IR it is anticipated that the SME will expand its offerings with new and additional products over time. At this time the SME does not have products developed to offer. After receiving the OEB's decision on this application the SME will respond on a request by request basis.

b. Please see the response to OEB Staff Interrogatory 7 at Exhibit I, Tab 4.0, Schedule 1.07.

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VECC INTERROGATORY 15

9. *In the event revenues from the Third Party Access program are less than the cost of developing and operating that program, what entity would be responsible for such deficit?*

INTERROGATORY

9.1 Reference: B/T2/S1 & B/T3/S1

a) What are the 2019 and 2020 forecast costs of developing and implementing the SME data retail function?

b) Please provide the number of FTE's allocated to the TPA function in 2018, 2019 and 2020

c) Please provide the forecast consulting costs for the data access project for 2018, 2019 and 2020

d) What is the current cost incurred for the TPA/data access project?

RESPONSE

Please see the response to OEB Staff Interrogatory 11 at Exhibit I, Tab 6.0, Schedule 1.11.

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VECC INTERROGATORY 16

9. *In the event revenues from the Third Party Access program are less than the cost of developing and operating that program, what entity would be responsible for such deficit?*

INTERROGATORY

9.2 Reference: B/T2/S1& B/T3/S1

Please explain how costs for the free public offerings of data are proposed to be recovered.

RESPONSE

Costs associated with the public offerings are considered to be standard operations and will be recovered through the Smart Meter Charge.

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OEB STAFF INTERROGATORY 12

**10.0** *What steps has the IESO/SME taken to ensure that the data is sufficiently protected and to prevent its re-identification, and are those steps sufficient? What conditions, if any, should be included in the SME's licence to ensure privacy protection in respect of the data?*

**10.0 Staff – 12**

INTERROGATORY

Reference: Exhibit B, Tab 1, Schedule 1, Page 1

Preamble: The application states: "The data being collected by the SME is not personal information; it is de-identified information. As the risk of re-identification is not zero, the SME will take steps to protect the data and prevent its re-identification."

Question: Please elaborate on the risk of re-identification, and what steps the SME will take to mitigate that risk.

RESPONSE

Please see the response to OEB Staff Interrogatory 13 at Exhibit I, Tab 10.0, Schedule 1.13.

On December 13, 2017, Privacy Analytics Inc. ("PAI") presented at the Data Strategy Advisory Council Meeting on IESO – Third Party Use Case Re-Identification Risk Determination - Third-Party Access to De-Identified Data Preliminary observations and discussion points. The presentation is provided as Attachment 1 to the response to BOMA Interrogatory 15 at Exhibit I, Tab 0, Schedule 2.15.

PAI has noted that the data provided by LDCs and collected by the SME pertain to dwellings, not individuals, and therefore, the risks described are for the re-identification of a dwelling.

The risk of re-identification is inherently on the lower end of the spectrum, given the de-identified nature of the data the SME collects and will provide; however, as mentioned, the risk is not zero. Accordingly, the IESO has taken additional steps to mitigate this risk.

Mitigation of the risks to re-identification begins before the data is collected by the SME through the established protocols, which includes that the LDCs do not send and IESO/SME does not collect personal data. Where the risk of identification of data provided by LDCs is high, for example where there is one household in a postal code, the LDCs providing that data mask the

1 data by using a substitute non-existent postal code. Prior to disclosure of the data, the SME will  
2 assess the proposed use case. If required the IESO will work with its consultant, PAI, to mitigate  
3 the risks, for example, by increasing the level of aggregation of data provided.

4 The data will be released on appropriate terms contained in a data use agreement, which  
5 include protection of the data and prohibitions against re-identification.

6 The specific terms and conditions of a data use agreement will vary given a number of factors,  
7 which include the nature of the data being accessed, the use of the information and the specific  
8 needs of the requestor.

9 The nature of the data being accessed will have different controls attached, for example, a  
10 highly aggregate publicly posted report will not need the same controls as a very granular  
11 request for electricity consumption information that may have a higher risk of re-identification.  
12 The use of the information will also impact terms and conditions, for example, where the  
13 information is to be linked with other data sets, additional assessments and restrictions may be  
14 applicable.

15 In addition to the forgoing, the SME anticipates that specific terms and conditions may evolve  
16 over time as the SME learns more about the market. Accordingly, the SME is not in a position to  
17 set out a template data use agreement. However, the SME would like to provide guidance as to  
18 the particular obligations, protections and restrictions being placed on persons accessing the  
19 data as well as the data itself.

20 The terms and conditions will speak to, among other things, the following:

- 21 • the permitted use of the data,
- 22 • restrictions on the use of the data for purposes other than the permitted use, which  
23 includes the obligation not to identify or attempt to identify any premise associated with  
24 the data,
- 25 • the obligations to protect the data, through physical, organizational and technological  
26 safeguards,
- 27 • restrictions on the disclosure of the data except to authorized persons, with the consent  
28 of the SME or as required by law,
- 29 • the obligation to comply with applicable laws,
- 30 • notice to the SME in the event disclosure is required by law, or in the event there is any  
31 unauthorized disclosure,
- 32 • the requirement for the counterparty to cooperate with the SME enabling the SME to  
33 comply with its legal obligations, and
- 34 • audit rights and remedies.

OEB STAFF INTERROGATORY 13

**10.0** *What steps has the IESO/SME taken to ensure that the data is sufficiently protected and to prevent its re-identification, and are those steps sufficient? What conditions, if any, should be included in the SME's licence to ensure privacy protection in respect of the data?*

**10.0 Staff – 13**

INTERROGATORY

Reference: B-5-1, Attachment 1 – Third Party Access Implementation Plan

Preamble: At Slide 10 of the presentation, the SME states that in 2016 it undertook “Extensive privacy analysis and industry engagement.”

Questions:

- a. Please describe at a high level the privacy analysis completed and the extent to which the learnings from the analysis will be implemented by the SME.
- b. Since 2016, what privacy analysis has the SME undertaken?

RESPONSE

- a. On April 14, 2016 the SME ratified a contract with Privacy Analytics Inc. (PAI), a firm utilized by the health care industry for patient health data, one of the most sensitive data sets available.

PAI was contracted by the IESO/SME to perform a conceptual re-identification risk assessment for the data that will exist in the MDM/R once the OEB approves this application. The purpose of a conceptual re-identification risk determination is to establish an expected re-identification risk level on a dataset before the data elements are collected in order to avoid collecting data which is known to be at a high risk.

The report covers the data sharing scenario in which the Local Distribution Companies (LDCs) are the data providers and the IESO is the data recipient.

PAI noted that the records in the MDM/R pertain to dwellings (and not individuals) and therefore, the risks described are for the re-identification of a dwelling. PAI completed the

1 analysis and issued their confidential report on June 1st, 2016. In order to provide an  
2 estimate of the re-identification risk context in the MDM/R, PAI assessed:

- 3 • The Security and Privacy Controls in place at the IESO (deemed to be HIGH)
- 4 • The degree of Recipient Trust in place at the IESO (deemed to be HIGH)
- 5 • The potential invasion of privacy based on the sensitivity and potential harm to
- 6 those in dwellings represented in the data set.

7 From these assessments, the probabilities of re-identification attacks were estimated and an  
8 appropriate risk threshold was determined. PAI determined that with the recommended  
9 risk mitigation techniques, the risk would be very small that the information contained in  
10 the MDM/R smart meter data could be used, alone or in combination with other reasonably  
11 available information to identify a dwelling that is a subject of the information.

12 The SME has been entrusted with smart meter data. To protect privacy, while maximizing  
13 data utility, each potential customer will need to complete a Data Use Agreement prior to  
14 being able to access the data. Data available for disclosure is de-identified following rules  
15 and protocols, which ensure that the risk of re-identification of a dwelling remains below a  
16 pre-established threshold. The level of data de-identification required also depends on the  
17 specifics of a data request and on the requestor's controls, motives and capacity to re-  
18 identify data.

19 These rules and protocols for de-identification of electricity consumption data have been  
20 established with the expert input of PAI.

21 The rules and protocols for data de-identification include:

- 22 1. Establishing a minimum number of premises that a given group within a data  
23 extract must contain. This number ("k" value) is calculated based on the context  
24 assessment of the requestor (i.e. the level of maturity of their security and privacy  
25 controls and the level of trust on the requestor). For instance, an organization with a  
26 medium score (calculated based on a series of questions) may request data for  
27 residential customers in Postal Code: M1M1M1; in this case a k=5 is calculated,  
28 therefore there must be at least 5 residences in M1M1M1 for that data set to be  
29 shared. If the number of premises is less than 5, in order to maximize data utility,  
30 instead of removing the records or denying the request, the data undergoes an  
31 iterative process of reducing the digits in the Postal Code to 5,4,3 digits until the k  
32 value is reached. The requestor may receive data for records under the FSA M1M.

- 1           2. The Coefficient of Variation<sup>1</sup> within any given time period (e.g. month) of the  
2           consumption data is greater than 0.1. This ensures that there is a degree of dispersion  
3           in the data values, and that by providing the average consumption of a group there  
4           is no disclosure of the individual consumption.
  - 5           3. Dominance Rule, no individual premise has more than 75% of the total consumption  
6           of a group for a time period (e.g. month).
  - 7           4. Consumption data is aggregated or averaged for a given group, this means that the  
8           actual consumption of individual premises is not released, which maintains the risk  
9           of re-identification below the threshold, particularly when data is linked to other  
10          data sets.
  - 11          5. The SME may need to modify a data request or decline access to data that poses an  
12          unacceptable risk of re-identification of a dwelling (and the resident(s) of that  
13          dwelling).
- 14   b. In 2016, PAI provided: “A Conceptual Determination of Re-identification Risks for Ontario’s  
15   Independent Electricity Systems Operation (IESO) Meter Data Management and Repository  
16   (MDM/R)” The summary version of this report is filed as Attachment 1 to this exhibit.
- 17   In 2017, PAI provided: “Third Party Access to De-identified Data: Final Options Analysis  
18   and Roadmap” July 2017, and an amended version in Sept, 2017; and also in Sept, 2017 a  
19   report after 6 months of data collection titled: An Evaluation of Re-identification Risks for  
20   Ontario’s Independent Electricity Systems Operator (IESO) Smart Meter Data Management  
21   and Repository (MDM/R).
- 22   In 2018, PAI provided: “An Evaluation of Re-identification Risks for Third Party Data  
23   Sharing Use Cases of Smart Meter Electricity Consumption Data”, January, 2018. This  
24   report was presented and discussed at the January 31, 2018 DSAC and is filed as  
25   Attachment 1 to this exhibit. A preliminary version of this report, which was presented and  
26   discussed at the December 13, 2017 DSAC, is filed as Attachment 1 to the response to OEB  
27   Staff Interrogatory 12 at Exhibit I, Tab 10.0, Schedule 1.12.
- 28   On May 1, 2018 PAI won the Smart Metering Entity (SME) Professional Services RFP #176  
29   and have continued to work with the SME and DSAC on the pilot test cases.

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<sup>1</sup> Coefficient of variation CoV: It is defined as the ratio of the Standard Deviation  $\sigma$  to the Mean  $\mu$ . It shows the variability of the data with respect to the mean of the population. If values must have a CoV greater than 0.1, it means that values vary more than 10% from the mean.

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This Summary Letter for "A Conceptual Determination of Re-identification Risks for Ontario's Independent Electricity System Operator (IESO) Smart Meter Data Management and Repository (MDM/R)", by Privacy Analytics, Inc. prepared for the IESO, is made available for information purposes only, and is not intended to be relied upon or to provide advice or guidance with respect to the matters covered in this Summary Letter. This Summary Letter should not be circulated outside of your organization, except to your external legal counsel for information purposes only as described above, in order for your legal counsel to provide you with legal advice with respect to the matters covered in the Summary Letter.



June 6, 2016

**Summary Letter for “A Conceptual Determination of Re-identification Risks for Ontario’s Independent Electricity Systems Operator (IESO) Smart Meter Data Management and Repository (MDM/R)”**

**Introduction**

The Independent Electricity Systems Operator (IESO) has requested the assistance of Privacy Analytics, Inc. to: a) evaluate the risks of re-identification of the dwellings within the extended set of smart metering data that will be collected by IESO effective January 1, 2017 as per the Ontario Energy Board (OEB) Order EB-2015-0297, and b) recommend any required changes to the Meter Data Management and Repository (MDM/R) required to protect the privacy of the dwellings represented in the data set. This document provides a summary of the results of the conceptual risk determination performed for the IESO. The purpose of a conceptual re-identification risk determination is to establish an expected re-identification risk level on a dataset before the data are collected in order to avoid collecting data which is known to be at a high risk.

The report covers the data sharing scenario in which the Local Distribution Companies (LDCs) are the *data providers* and the IESO is the *data recipient*.

**Methodology overview**

Because this data is not yet being collected by IESO, this engagement was performed using a conceptual risk determination (CRD) methodology. A typical risk measurement involves measuring the risk on the data by calculating the risk of re-identification to each record in the dataset. This is done by comparing the quasi-identifier (the identifying information in the data) values across the records in the data and determining how many records look the same or similar to each other. In order to model the risk without the actual data, we use a process based on information theory to calculate the expected average identifying power of each field and combine these to obtain an overall risk measurement. The distributions of values in these fields are obtained from a variety of reputable sources, such as the Canadian census, in order to accurately calculate the associated information values.

It is important to note that the records in the MDM/R pertain to dwellings (and not individuals) and therefore, the risks described are for the reidentification of a dwelling.

**Risk Context and Risk Threshold**

In order to provide an estimate of the reidentification risk context in the MDM/R, we assessed:



- The Security and Privacy Controls in place at the IESO (deemed to be HIGH)
- The degree of Recipient Trust in place at the IESO (deemed to be HIGH)
- The potential invasion of privacy based on the sensitivity and potential harm to those in dwellings represented in the data set

From these assessments, the probabilities of reidentification attacks were estimated and an appropriate risk threshold was determined.

### **Results and risk mitigation recommendations**

#### ***Quasi-identifiers***

Based on the conceptual risk determination of the quasi-identifiers contained in the data schema, we determined that the inclusion of the full (6 character) postal code and the exact occupancy change date would represent an unacceptably high risk of re-identification.

We identified three possible risk mitigation strategies that would lower the estimated re-identification risk to an acceptably low level:

- Generalize postal code to 5 characters and occupancy change date to month
- Generalize occupancy change date to year
- Remove occupancy change date entirely

Under any of these recommendations, the expected average re-identification risk lies below the threshold of 0.071 and the data set would pass an additional uniqueness criterion (deemed to be prudent in this case, where the occupancy change date is particularly identifying).

#### ***Direct Identifiers***

We also recommend that *street address* – a field considered to be a *direct identifier* currently being submitted by the LDCs to IESO – be masked (notwithstanding the fact that not all LDCs populate this field with a valid value).

### **Additional Considerations**

In the future, the IESO will be acting as a data provider for various categories of external organizations interested in access to the MDM/R data. Because no specific organizations in these categories have been identified, it is not possible to complete a full re-identification risk determination for these recipients at this time. The report provides guidance to the IESO on



how MDM/R requests from external organizations might be handled in the future. At a high level, the IESO might adjudicate these requests along three dimensions: a) Security and Privacy Controls in place at a recipient organization, b) Degree of Recipient Trust and c) the data sharing mechanism used to provide access to the MDM/R data.

## **Conclusion**

Under the assumptions described in this report, we, Privacy Analytics Inc., have determined that with the recommended risk mitigation techniques, the risk would be very small that the information contained in the MDM/R smart meter data schema could be used, alone or in combination with other reasonably available information, by an anticipated recipient to identify a dwelling that is a subject of the information.

We confirm that:

1. The Risk Determination was conducted by qualified professionals with appropriate knowledge of and experience with generally accepted statistical and scientific principals and methods for rendering information not individually identifiable;
2. To the best of our knowledge, we have applied generally accepted statistical and scientific principles and methods for rendering information not individually identifiable in reaching our Determination; and
3. We have documented the methods and results of the analysis that justify our Risk Determination.

## **Limitations and Qualifications:**


The statement set out above is subject to the following limitations:

- a) The Risk Determination is based on the information provided to us by the IESO, and our Determination is contingent upon the assumption that such information is complete and accurate.
- b) The Risk Determination is based on a series of assumptions documented in this report which the IESO has confirmed are reasonable to make given its business.
- c) Where multiple options or alternatives for ensuring that the database has a very small risk of re-identification were provided to the IESO, an option or alternative is only valid if its assumptions are deemed to be reasonable given the business context of the IESO.
- d) The Risk Determination is contingent on IESO fully implementing any actions we recommended in writing (such as, changes to data sharing agreements, suppression, generalization of data and in particular, masking of direct identifiers).



Implementation and maintaining these actions is a necessary condition upon which we based our Determination.

- e) Our Determination that the risk of re-identification is very small is based on our professional judgment of probabilities relevant to the circumstances and assumptions documented in this report. Under no circumstances should our Determination be understood as, or represented as, a guarantee, warranty, or representation that it is impossible for one or more records in the database to be re-identified. Given that our Determination is that the risk of re-identification is very small, a residual possibility remains that one or more records in the database could be re-identified.
- f) Our Risk Determination is valid for 24 months, provided that there are no changes to the assumptions, the business of the IESO, or the nature of the database (e.g., variables and distributions).
- g) It is important to realize that performing a risk assessment in the absence of data will provide an estimate of the re-identification risk. Privacy Analytics, Inc. strongly recommends that when a complete data set is available, a data-based risk measurement should be performed within 6-12 months after data capture has been initiated in order to validate the results of this analysis.
- h) This Risk Determination is subject to all the terms and limitations set forth in the Consulting Services Agreement between the Independent Electricity System Operator and Privacy Analytics Inc. dated April 14, 2016.

  
Date:  
2016.06.06  
14:45:21 -04'00'

Geoffrey Green,  
Senior Research Analyst

  
Digitally signed by  
Khaled El Emam  
Date: 2016.06.08  
16:15:49 -04'00'

Khaled El-Emam,  
Chief Executive Officer

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# IESO – Third Party Use Case Re-identification Risk Determination (RRD)

## Third-Party Access to De-identified Data

*Observations and discussion points*

*31 January 2018*



# Proposed agenda

1. Background
2. What we did
3. What we found
4. What we recommend
5. What's next







# 1. Background (recap)

- In November 2017, the IESO engaged Privacy Analytics to determine the re-identification risk for six (6) distinct test cases for third-party access.
- This “re-identification risk determination” project (or “RRD” project) follows previous engagements with Privacy Analytics as follows:
  - A. October 2016 – Determined risk conceptually for incoming MDM/R data (Conceptual RRD)
  - B. July 2017 – Developing a de-identification roadmap spanning people, process, technology
  - C. September 2017 – Empirically measured risk for the incoming MDM/R data (Actual RRD)
- This RRD project is similar to the previous RRD performed, except it focuses on outgoing data for third-party access, for various recipients and use cases.





# 1. Background (recap)

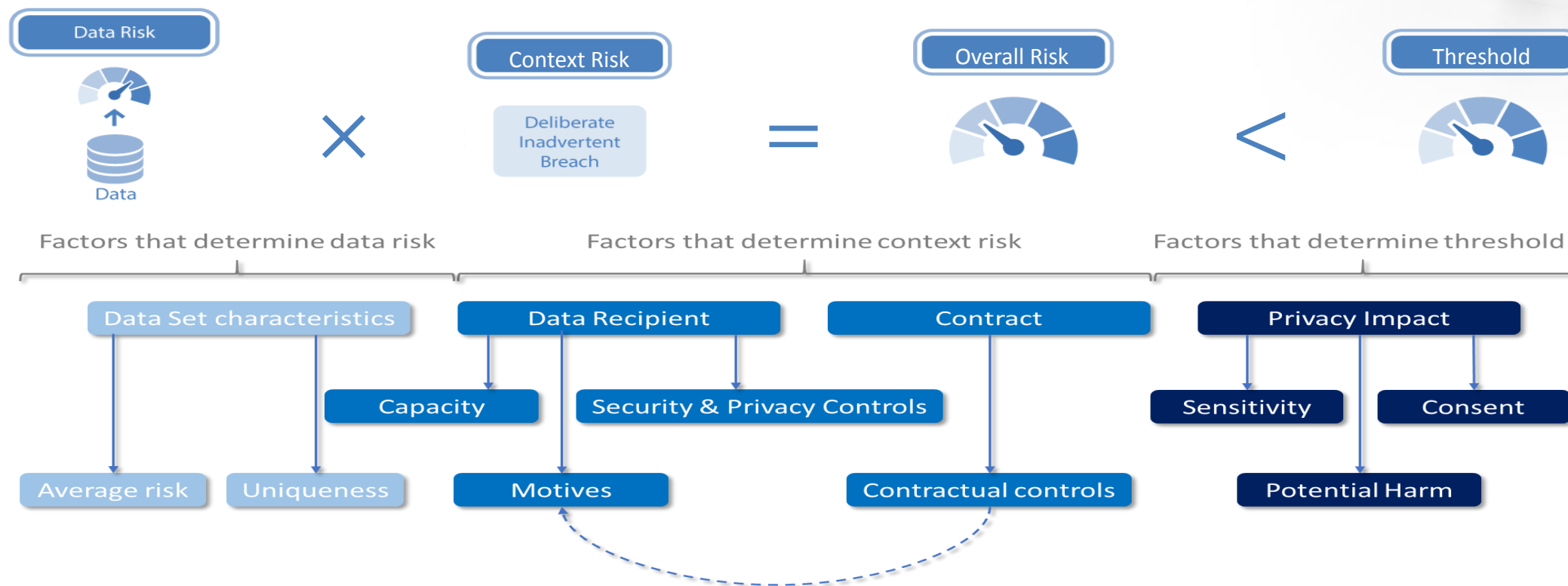
- The RRD measures the risk of re-identification for a given use case, and then advises on how to properly de-identify data in accordance with the Ontario Privacy Commissioner's *Guidelines for the De-identification of Structured Data*.  
(<https://www.ipc.on.ca/wp-content/uploads/2016/08/Deidentification-Guidelines-for-Structured-Data.pdf>)
- The IESO must remove any information that meets the following criteria in order for the data to be considered “de-identified” (page 3 of the Guidelines) prior to sharing with third parties, :
  - i. Information that identifies an individual, or
  - ii. Information for which there is a reasonable expectation that it could be used, either alone or with other information, to identify an individual.
- When data is properly de-identified, the risk of re-identifying an individual (or residence in this case) is very small, and demonstrated to be within the acceptable threshold.





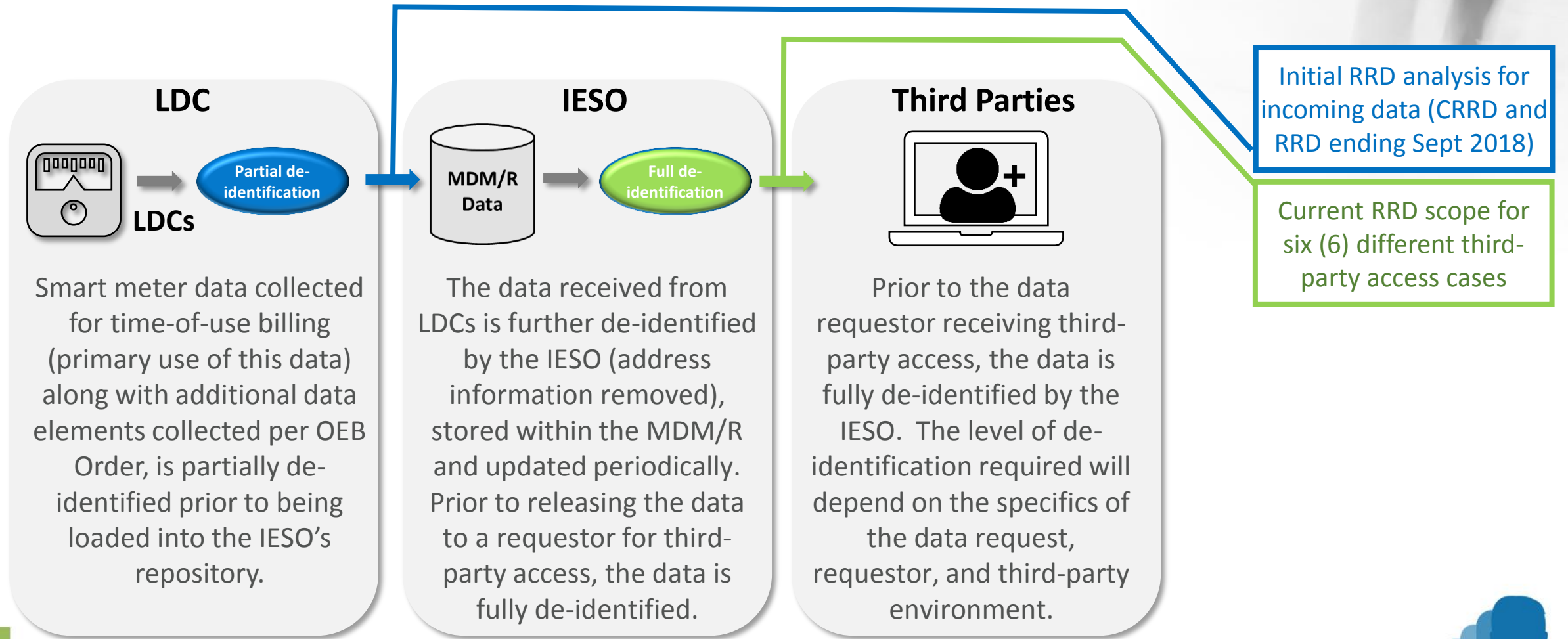
# 1. Background (recap)

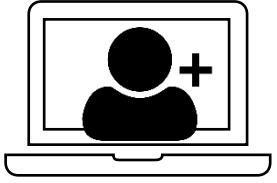
- To protect personal privacy, the amount of de-identification that is required to be applied is proportional to the level of re-identification risk involved in the release of the data set.
- The higher the re-identification risk of a data release, the greater the amount of de-identification required. *Guidelines for the De-identification of Structured Data* (<https://www.ipc.on.ca/wp-content/uploads/2016/08/Deidentification-Guidelines-for-Structured-Data.pdf>)



## 2. What we did

- The following identifies the scope of this RRD, versus previous RRDs:





## 2. What we did

- The scope of this RRD project includes six (6) test cases as follows:



- For these 6 cases, we've performed analysis and risk measurement.
- We are sharing preliminary observations and recommendations with the intent of sharing knowledge early.





### 3. What we found

- Our observations are organized by the case type – aggregate or row-level data.
- We determined the re-identification risk threshold to be 0.071 across all test cases.
- Context Risk ranged between 0.3 and 0.5 across test cases





### 3. What we found – Aggregated data

- We analyzed the data and confirmed the number of premises per record.
- For each, we determined a recommended “k” value, which is the minimum group size (i.e., in a group size of 5, there are 5 premises with the same characteristics). With the recommended k values implemented, overall risk is within the threshold.
- Context risk ranged from 0.3 – 0.5, and k value from 5 -8

Test case	Overall Risk	Threshold
Guelph	0.051	< 0.071
OEB	0.043	< 0.071
IESO ‘B’	0.00000036	< 0.071





### 3. What we found – Row-level data

- To reduce the risk to within the acceptable threshold for row-level data releases, the following was done: ensured **no unique** records, **avoided leaking** information about individual premises through inference; maintained **minimum group** (or “equivalence class”) size of 5; and reduced risk associated with consumption data by **averaging consumption data** within each equivalence class. Once these actions were taken, the risk levels were measured to be as follows:

Test case	Overall Risk	Threshold
Enbridge	0.0153	< 0.071
Oxford County	0.0105	< 0.071
IESO ‘A’	0.0108	< 0.071







### 3. What we found – Row-level data

- Based on the re-identification risks associated with the data, we developed and applied de-identification rules for row-level data
- As an example of the risks associated with the data, we manually attempted re-identification for a sample of dwellings with discontinuities in consumption for vacation – sampled dwellings could be re-identified with limited capacity on the part of the attacker
- To address risks such as discontinuities in consumption, we developed rules such as averaging consumption information within each equivalence class





### 3. What we found – Row-level data

- To further illustrate what was done to reduce the risk levels for row-level releases, we applied the following de-identification rules for row-level data:
  1. Removed occupancy change data
  2. Modified equivalence classes of less than 5 members (i.e. group sizes of less than 5) as follows:
    - Truncated postal codes to forward sortation areas (FSA)
    - Changed any postal codes in group sizes of less than 5 to a global group postal code
  3. Averaged consumption data within each equivalence class





### 3. What we found – Row-level data (sample illustration)

Premise ID	Postal Code	Consumption		Premise ID	Postal Code	Consumption
1001	A1A 1A1	13	De-identification	1001	A1A	10.6
1002	B1A 1A1	10.5		1002	B1A 1A1	8.2
1003	B1A 1A1	12.5		1003	B1A 1A1	8.2
1004	B1A 1A1	13		1004	B1A 1A1	8.2
1005	B1A 1A1	3		1005	B1A 1A1	8.2
1006	B1A 1A1	2		1006	B1A 1A1	8.2
1007	A1A 1A2	11		1007	A1A	10.6
1008	A1A 1A3	12		1008	A1A	10.6
1009	A1A 1A4	9		1009	A1A	10.6
1010	A1A 1A5	8		1010	A1A	10.6
1011	C1A 1A1	13		1011	Global group	11.5
1012	Global group	10		1012	Global group	11.5
1013	B1A 1A1	8		1013	B1A 1A1	8.2
TOTAL		125		TOTAL		125





### 3. What we found – Row-level data

- The following table summarizes the % of premises that had a postal code replaced with FSA during de-identification, as well as the % of premises moved to a global group postal code

Test case	Overall Risk	Threshold	% of premises with postal code replaced with FSA	% of premises with postal code changed to global group
Enbridge	0.0153	< 0.071	6.6%	0.01%
Oxford County	0.0105	< 0.071	5.2%	0.13%
IESO 'A'	0.0108	< 0.071	4.3%	0.01%





## 4. What we recommend – Aggregated data

- Minimum Cell Size
  - Any aggregation numbers are verified to ensure that they are composed of data from a minimum number of premises.
- Avoid Attribute Disclosure
- Minimum cell size should be K
  - Aggregate to 4 digit postal code
  - Aggregate to a 5 digit postal code and remove CRC and DRC columns
  - Bucket all rows that do not meet the minimum cell requirement
  - Delete all rows that do not meet the minimum cell requirement
- If necessary, remove rows with low standard deviation of consumption or remove standard deviation field altogether





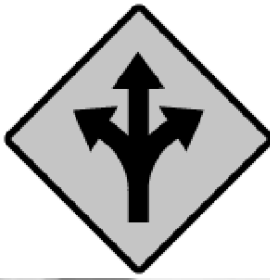
## 4. What we recommend – Row-level data

- Ensure zero (0) unique records. i.e. removing or combining data for single premise postal codes
- Ensure overall average risk is below the acceptable threshold
- Avoid leaking information about individual premises through inference
- Remove occupancy change data
- Ensure master data risk falls below the threshold
  - Measure size of all equivalence classes
  - Equivalence classes with under 5 members are modified as follows:
    - Truncate Postal Code to FSA
    - Measure size of new equivalence classes using truncated postal code
    - Equivalence classes with under 5 members are changed to W8W8W8
- Reduce risk associated with consumption data as follows:
  - For all members within the equivalence class the consumption data is averaged and written back into the consumption field for each row



## 5. What's next

- Privacy Analytics will deliver an RRD report with detailed findings as well as a summary report with the results.



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1 CCC INTERROGATORY 13

2 *10 – What steps has the IESO/SME taken to ensure that the data is sufficiently protected and to*  
3 *prevent it re-identification, and are those steps sufficient? What conditions, if any, should be*  
4 *included in the SME's licence to ensure privacy protection in respect of the data?*

5 CCC-13

6 INTERROGATORY

7 (Ex. B/T1/S1/p. 1)

8 The evidence states that “the risk of re-identification is not zero”. Please explain in detail how  
9 the data could be “re-identified”. Please explain in detail all measures the SME is taking to  
10 avoid this risk.

11 RESPONSE

12 Please refer to OEB Staff Interrogatory 12 at Exhibit I, Tab 10.0, Schedule 1.12.

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EDA INTERROGATORY 18

Issue 10

EDA Interrogatory #18

INTERROGATORY

Reference: Exhibit B/Tab 1/Schedule 1/p. 1, line 12

Question: For each type of data types please describe the steps taken to protect personal information. What indemnification exists if a privacy breach were to occur? Please outline the proposed steps to mitigate a privacy breach and if re-identification does occur, what steps would be taken to deal with this event. Please clarify what party would be held liable.

RESPONSE

The SME does not collect Personal Information. The data that will be made available through Third Party Access is aggregated data that does not contain personal information. The risk of re-identification of a premise (not an individual) of this aggregated data and the methods to prevent its re-identification are addressed in the reply to OEB Staff Interrogatory 12 at Exhibit I, Tab 10.0, Schedule 1.12. The presentations provided in the response to this OEB Staff 12, explain the steps taken by the SME, following IPC guidelines, to manage the risk of re-identification of a premise.

The SME will make the aggregated data available to potential customers through mechanisms that follow IESO security policies. Examples include: File transfers are completed using a secured FTP site where two levels of authentication are required and file formats and password protection follow the IESO's security policies.

The specific terms and conditions of a data use agreement will vary given a number of factors, which include the nature of the data being accessed, the use of the information and the specific needs of the requestor.

The SME will also protect the data by putting in place data use agreements ("DUA") with customers. The SME envisions that the DUA will contain indemnity provisions in the event of a material breach of the contract, and the disclosure of data or re-identification of an individual would be a material breach. Please see the response to EDA Interrogatory 9 at Exhibit I, Tab 2.0, Schedule 4.09 for further description of the contractual provisions.

1 Should there be re-identification of information and a privacy breach occurred, typically the  
2 SME would:

- 3 • Notify the relevant staff, including the Privacy Officer, of the incident,
- 4 • Assess the incident to determine if in fact, there was a privacy breach,
- 5 • If it was a determined that a privacy breach had occurred or likely had occurred, take
- 6 steps to contain the privacy breach,
- 7 • Investigate the cause of the privacy breach,
- 8 • Notify affected individuals of the privacy breach as well as the Information and Privacy
- 9 Commissioner, and
- 10 • Develop recommendations to improve processes to assist in mitigating future risk of re-
- 11 occurrence.

12 Any liability arising from a privacy breach that was not resolved by the parties would be  
13 determined by a dispute resolution process.

EDA INTERROGATORY 19

Issue 10

EDA Interrogatory #19

INTERROGATORY

Reference: Exhibit B/Tab 1/Schedule 1/p.1, line 13

Question: Please describe and discuss the steps that the SME or the IESO would take if a 3rd party attempted to de-identify SME data.

RESPONSE

Please see the reply to EDA Interrogatory 18 at Exhibit I, Tab 10.0, Schedule 4.18.

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1 EDA INTERROGATORY 20

2 Issue 10

3 EDA Interrogatory #20

4 INTERROGATORY

5 Reference: Exhibit B/Tab 1/Schedule 1/p. 1, line 11-18

6 Question:

7 c. Please provide the Information and Privacy Commissioner of Ontario's Guidelines.

8 d. Please describe and discuss the SME's expertise in and ability to correctly and  
9 appropriately apply these guidelines.

10 RESPONSE

11 c. The Information and Privacy Commissioner of Ontario's Guidelines are provided as  
12 Attachment 1 to this exhibit.

13 d. Please see the reply to EDA Interrogatory 9(e) at Exhibit I, Tab 2.0, Schedule 4.09.

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# De-identification Guidelines for Structured Data

June 2016



Information and Privacy  
Commissioner of Ontario

Commissaire à l'information et à la  
protection de la vie privée de l'Ontario

### **Acknowledgments**

**We would like to thank Dr. Khaled El Emam for reviewing an earlier version of these guidelines and providing helpful comments.**

## CONTENTS

Introduction.....	1
Scope of Guidelines .....	2
Overview of De-identification.....	3
Uses of De-identification .....	5
Open Data .....	5
Access to Information Requests.....	5
Data Sharing within and among Institutions.....	6
Process for De-identifying Structured Data .....	6
Step 1: Determine the Release Model.....	7
Step 2: Classify Variables.....	8
Step 3: Determine an Acceptable Re-identification Risk Threshold .....	9
Step 4: Measure the Data Risk.....	11
Step 5: Measure the Context Risk .....	13
Step 6: Calculate the Overall Risk .....	17
Step 7: De-identify the Data .....	17
Step 8: Assess Data Utility .....	19
Step 9: Document the Process.....	20
De-identification Governance.....	20
Protecting Against Attribute Disclosure.....	21
Ongoing and Regular Re-identification Risk Assessments.....	22
Conclusion.....	22

## INTRODUCTION

As the demand for government-held data increases, institutions require effective processes and techniques for removing personal information. An important tool in this regard is de-identification.

“De-identification” is the general term for the process of removing personal information from a record or data set. De-identification protects the privacy of individuals because once de-identified, a data set is considered to no longer contain personal information. If a data set does not contain personal information, its use or disclosure cannot violate the privacy of individuals.<sup>1</sup> Accordingly, the privacy protection provisions of the *Freedom of Information and Protection of Privacy Act (FIPPA)* and the *Municipal Freedom of Information and Protection of Privacy Act (MFIPPA)* would not apply to de-identified information.

It is important to note that de-identification does not reduce the risk of re-identification of a data set to zero. Rather, the process produces data sets for which the risk of re-identification is very small.

These guidelines will introduce institutions to the basic concepts and techniques of de-identification. They outline the key issues to consider when de-identifying personal information in the form of structured data and they provide a step-by-step process that institutions can follow when removing personal information from data sets.

De-identification can be a complex and technically challenging process. These guidelines take a conservative approach to risk in order to simplify the calculations involved in measuring it. However, some degree of complexity in the process is unavoidable.

When dealing with issues that may arise in de-identification, it is important that you seek advice from technical staff, or other experts in the field (such as your freedom of information and privacy coordinator, or legal counsel). The information contained in these guidelines can serve as a starting point for discussions with those individuals.

Some of the complexity and challenges of de-identification can be addressed through the use of automated tools. While it is possible (and may be appropriate in certain circumstances) to de-identify data sets manually, there are many software tools available that can automate some aspects of the process. When seeking to de-identify a data set, you may wish to consider using de-identification software.

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<sup>1</sup> Note, however, that the same cannot be said with respect to the rights of groups of individuals. For a discussion of how to protect against harms relating to groups of individuals when de-identifying data sets, see the section on “De-identification Governance” below.

## TERMINOLOGY

Some of the technical terms used in these guidelines are defined below.

**adversary:** individual or entity attempting to re-identify one or more individuals in the data set

**brute force attack:** trial-and-error attack that involves attempting all possible combinations to decode an encrypted value

**masking:** the process of removing a variable or replacing it with pseudonymous or encrypted information

**one-way hash function:** cryptographic mapping function that is practically impossible to reverse, that is, to recreate the input data from its encrypted value

**re-identification:** any process that re-establishes the link between identifiable information and an individual

**release model:** manner in which recipients of a data set are provided access to it

**structured data (data set):** collection of data in tabular form where every column represents a variable and every row represents a member or individual

**target individual:** individual targeted by an adversary for re-identification

**variable:** column of values in a data set representing a set of attributes

## SCOPE OF GUIDELINES

Approaches to de-identification range from simple “cookie cutter” lists of variables to be removed or modified, to general loosely defined techniques such as the “cell size of five” rule,<sup>2</sup> to systematic risk-based methodologies. While it may be possible to de-identify data sets in different ways, these guidelines offer direction on taking a *risk-based approach* to de-identification.<sup>3</sup>

Risk-based de-identification involves calculating an acceptable level of re-identification risk for a given data release. The calculation requires the consideration of a number of factors, including whether an adversary can know if a target individual is in the data set. If an adversary knows that a target individual is in the data set, this is called “prosecutor risk.” For example, if a teenager’s parents know that their child has participated in a survey and the results are to be released in de-identified form, the risk of the parents attempting to re-identify their child’s responses would qualify as prosecutor risk. If an adversary does not, or cannot, know if a target

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2 The cell size of five rule is the practice of releasing aggregate data about individuals only if the number of individuals counted for each cell of the table is greater than or equal to five.

3 The approach to de-identification presented in these guidelines is based largely on the risk-based de-identification methodology developed by Dr. Khaled El Emam. For a select list of books and articles written and co-authored by Dr. El Emam on the topic of de-identification, see Appendix A: Resources.

individual is in the data set, this is called “journalist risk.”<sup>4</sup> For example, if only a sample of de-identified rows from an original data set is released, this would qualify as journalist risk.

While some de-identification methodologies support both of the above types of risk—that is, prosecutor and journalist risk—these guidelines support prosecutor risk only—that is, they assume an adversary knows or can know whether a target individual is in the data set. Because prosecutor risk is always equal to or greater than journalist risk,<sup>5</sup> a consequence of this approach is that these guidelines err on the conservative side when it comes to calculating levels of re-identification risk.<sup>6</sup>

De-identification also involves a range of techniques, such as sub-sampling, randomization or swapping. While a number of techniques may be used to remove personal information from data sets, for simplicity these guidelines only discuss the application of the most commonly used techniques, namely *masking*, *generalization* and *suppression*. Therefore, when using these guidelines to de-identify data sets with a large number of variables, or “high-dimensional” data, the utility of the data sets may be lower than if other techniques were used.

## OVERVIEW OF DE-IDENTIFICATION

As noted above, de-identification is the process of removing personal information from a record or data set. “Personal information” is defined in *FIPPA* and *MFIPPA* as “recorded information about an identifiable individual.” The Office of the Information and Privacy Commissioner of Ontario (IPC) and the courts have elaborated on this definition, specifically on the meaning of “identifiable,” in various orders and reviews.<sup>7</sup> Based on these, de-identification may be defined more precisely as the process of removing any information that (i) identifies an individual, or (ii) for which there is a reasonable expectation that the information could be used, either alone or with other information, to identify an individual.

Throughout these guidelines, the term “de-identification” will be used to convey different aspects of this definition. The term may be used when referring to the *process* of de-identification, which involves a series of steps, considerations and possible outcomes. The term may also be used when referring to the *removal* of identifiable information. From the context, it should be clear in which sense the term is being used.

Applying a “reasonableness standard” to the definition of personal information means that you must examine the context to de-identify information. When de-identifying a data set, you must navigate and consider a number of issues, including:

- *Different release models.* In de-identification, a data set may be released publicly, semi-publicly (also called “quasi-public”) or non-publicly. In a public data release, the

4 See Khaled El Emam, *Guide to the De-identification of Personal Health Information* (Boca Raton, FL: CRC Press, 2013), 182.

5 See *ibid.*, 195.

6 Additional guidance on how to de-identify data sets under journalist risk may be found in El Emam, *Guide to the De-identification of Personal Health Information*.

7 See the test for whether a record can reveal personal information in the judicial review of Order P-1880 at *Ontario (Attorney General) v. Pascoe*, 2002 CanLII 30891 (ON CA), para. 14–15.



data set is available to anyone for download or use without any conditions. This kind of release provides the greatest availability, but the least amount of protection.

In contrast, a non-public data release limits the availability of the data set to a select number of identified recipients. As a condition of receiving the data, recipients must agree to terms and conditions regarding the privacy and security of the data (typically set out in a data sharing agreement). This kind of release provides the least availability but can provide a higher amount of protection.

A data set may also be released semi-publicly, which involves elements of both the public and non-public options. In a semi-public data release, the data set is available to anyone for download; however, as a condition of receiving the data, the recipient must register with the organization releasing the data set and agree to restrictions regarding the processing and sharing of the data (typically in the form of a terms-of-use agreement).

While additional privacy and security measures may be included in terms-of-use agreements for semi-public data releases, these are difficult to enforce due to the open nature of the release. Accordingly, data sets released in this way are limited in terms of the amount of protection they can provide. Depending on the release model used, the required amount of de-identification may vary.

- *Different types of identifiers.* In de-identification, you need to remove information that directly identifies an individual and information for which there is a “reasonable expectation” that the information could be used, either alone or with other information, to identify the individual. The first type of identifier is known as a “direct identifier,” and the second type is called an “indirect-” or “quasi-identifier.”
- *Different re-identification attacks.* The amount of de-identification that needs to be applied to a data set is determined by how likely it is that an adversary will attempt to re-identify one or more individuals in the data set. Different types of adversaries need to be considered and different types of re-identification attacks need to be analyzed, depending on the release model used. For example, for public data releases, you should assume that someone will attempt a demonstration attack on the data set. For non-public data releases, you should evaluate the threat posed by insiders and data breaches.
- *Different de-identification techniques.* Once you know the level of re-identification risk and have calculated the required amount of de-identification, a corresponding amount of information must be removed from the data set. This can be done in various ways—through techniques such as masking, generalization and suppression.

- *Different types of disclosures.* De-identification techniques protect against the disclosure of individuals' identities and linking information to them. They do not, however, protect against the disclosure of attributes relating to groups of individuals that may be stigmatizing. While you must protect against the disclosure of individuals' identities when releasing de-identified data sets, as a best practice, you should also consider protecting against attribute disclosures. To do this, you may be required to develop a governance model that includes an ethics review of data sets.

## USES OF DE-IDENTIFICATION

The primary objective of de-identification is protecting the privacy of individuals. If a data set contains any amount or kind of personal information, it cannot be considered de-identified.

At the same time, one of the main reasons for releasing de-identified data sets is to provide others with an opportunity to study the values and properties of the raw data for research purposes. De-identification, therefore, should also seek to preserve as much utility in the information as possible, while protecting the privacy of individuals.

This dual purpose of de-identification makes it an important tool to consider for use in a number of contexts, including open data, access to information requests and data sharing within and among institutions.

## OPEN DATA

De-identification may be used to enable data sharing in situations where an institution does not have the authority to disclose personal information. An example of such a situation is the growing number of "open data" initiatives in Ontario. Open data initiatives seek to increase government transparency and accountability by proactively releasing data sets and making them freely available to anyone for use and republishing. Given the increased amount and availability of information these initiatives provide, it is important that institutions release their data sets in a way that protects the privacy of individuals.

Open data initiatives also seek to promote research, innovation and the development of new applications and services. The greater the utility of open data sets, the better the chances of success for researchers, start-up companies and entrepreneurs seeking to use public data.

## ACCESS TO INFORMATION REQUESTS

De-identification may also be useful in responding to access to information requests for structured data or data sets. Under sections 10(2) of *FIPPA* and 4(2) of *MFIPPA*, institutions are required to "disclose as much of the record as can reasonably be severed" without disclosing any exempt information. By using de-identification, institutions can respond to requests in a



privacy-protective manner while preserving the utility of the information. De-identification is an innovative tool that may present institutions with an opportunity to further the transparency purposes of *FIPPA* and *MFIPPA* in ways that were not possible before.

## DATA SHARING WITHIN AND AMONG INSTITUTIONS

While access to information requests and open data initiatives provide information to the public, there is also a growing desire in government services for institutions to break down their “silos” and share more information within—and among—themselves. This may happen for a number of reasons. For example:

- information from one institution or program area may be relevant to the planning of a program or service in another institution or area
- one institution may have expertise in data processing or software development that another institution requires, but does not have
- an institution that funded a program or service that was delivered by another institution may want to evaluate the effectiveness of the program or service

Data sets that contain personal information may be shared within and among institutions only if the disclosure is permitted under section 42(1) of *FIPPA* or section 32 of *MFIPPA*. If the disclosure is not permitted and the institutions still wish to share data sets, then (similar to an access to information request or open data release) any personal information must be removed.

However, even if disclosure is permitted under *FIPPA* or *MFIPPA*, there may still be important privacy issues to consider. While information sharing among institutions can play an important role in providing better, more efficient services, the practice may also have the unintended consequence of undermining the privacy of individuals by diminishing the amount of control individuals have over their personal information. Therefore, as a best practice, institutions should always consider de-identifying data sets before sharing them.

## PROCESS FOR DE-IDENTIFYING STRUCTURED DATA

To protect the privacy of individuals while preserving as much utility in the information as possible, the amount and types of de-identification need to be determined through a systematic analysis of the level and kinds of re-identification risk involved in the release of a data set. When attempting to de-identify a data set, you should consider the following process:

1. determine the release model
2. classify variables
3. determine an acceptable re-identification risk threshold

4. measure the data risk
5. measure the context risk
6. calculate the overall risk
7. de-identify the data
8. assess data utility
9. document the process

## STEP 1: DETERMINE THE RELEASE MODEL

As noted above, a de-identified data set may be released publicly, semi-publicly or non-publicly. Each release model allows for different levels of availability and protection of information. Depending on the purposes and/or legislative requirements of the data release, the suitability of each model may vary.

The release model plays an important role in the de-identification process because the amount of de-identification required may vary, depending on the model. For example, because public data releases provide the greatest availability, but the least amount of protection, you may require a significant amount of de-identification to protect individual privacy. Non-public data releases provide the least availability but can provide a higher amount of protection, requiring a smaller amount of de-identification.

Access requests should be handled as though they are public data releases because *FIPPA* and *MFIPPA* do not require the person requesting information to agree to terms or conditions regarding the processing, privacy or security of the information.

Similarly, when publishing open data, it is common practice to place as few restrictions as possible on the information, including who can access it and how. Requirements for individuals to register and identify themselves to the organization publishing the data are considered barriers to access, use and the ability of individuals to find the information. As such, when individuals who download the data set cannot be identified, these disclosures should be handled as public data releases.

However, there may be instances where registration of individuals and verification of their identities is required. For example, a government- or university-sponsored programming competition, or “hackathon,” may involve the release of a de-identified data set to the public or student body, but restrict participants from using the data set in certain ways (including re-identifying any individuals in it and disclosing the information to third parties, through a terms-of-use agreement). If the terms-of-use agreement does not require participants to have in place additional privacy and security measures or such measures are not enforceable, these kinds of disclosures should be handled as semi-public data releases.

Finally, when sharing information among institutions, because access to the data set is limited to the receiving program area or institution, requirements regarding the privacy and security of the information can be set and enforced through a data sharing agreement. In these cases, such disclosures may be handled as non-public data releases.

For a data release to be treated as non-public, there must be a data sharing agreement in place between the parties. The data sharing agreement is an important part of the risk mitigation strategy in these releases.

## STEP 2: CLASSIFY VARIABLES

If a data set is about individuals, then each row in the file represents an individual, and each column represents a variable of information collected about the individuals. Depending on the type of information, some variables may be used to identify individuals, either directly or indirectly, while others may not. De-identification is only concerned with variables that may be used to identify individuals. As noted above, there are two kinds of such variables: direct identifiers and indirect or quasi-identifiers.

### DIRECT IDENTIFIERS

Direct identifiers consist of one or more variables that can be used to identify a single individual, either by themselves or in combination with other readily available sources of information.<sup>8</sup> Examples include name, address, email address, telephone number, fax number, credit card number, license plate number, vehicle identification number, social insurance number, health card number, medical record number, device identifier, biometric identifiers, internet protocol (IP) address number and web universal resource locator (URL).

Typically, direct identifiers are not useful for the purposes of data analysis. For example, the email addresses of individuals will likely not be relevant to a study of work commutes. However, if the values of a direct identifier are relevant, then you should classify it as a quasi-identifier and allow the variable to be de-identified. However, if a variable is not useful for data analysis it should be classified as a direct identifier and flagged for removal or replacement with a pseudonym regardless of its characteristics (see step 7).

### QUASI-IDENTIFIERS

Quasi-identifiers are variables with two important characteristics: (1) an adversary is assumed to have background knowledge of them, and (2) they can be used, either individually or in combination, to re-identify an individual in the data set.<sup>9</sup> A variable can be a quasi-identifier only if an adversary has background knowledge of it. A challenge with classifying quasi-identifiers

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8 Khaled El Emam and Bradley Malin, "Appendix B: Concepts and Methods for De-identifying Clinical Trial Data," *Sharing Clinical Trial Data: Maximizing Benefits, Minimizing Risk* (Washington D.C.: National Academies Press, 2015), <http://www.ncbi.nlm.nih.gov/books/NBK285994/>.

9 See *ibid*.

is in anticipating the possible sources of background knowledge. An adversary may obtain background knowledge about one or more individuals in the data set in different ways, including:

- information about individuals may be available in public registries (such as voter lists or court records), in the media (e.g., obituaries), from professional organizations (e.g., member lists) or employers (e.g., staff directories or biographies)
- the adversary may know one or more individuals (e.g., neighbour, co-worker or ex-spouse)
- one or more individuals may be a celebrity and there is publicly available information about them
- the adversary may have access to additional sources of information about individuals (e.g., data sets from other research projects)
- individuals may post information about themselves online (e.g., on social networking sites or personal blogs)<sup>10</sup>

Examples of quasi-identifiers include gender, date of birth or age, event dates (e.g., death, admission, procedure, discharge, visit), locations (e.g., postal codes, building names, regions), ethnic origin, country of birth, languages spoken, aboriginal status, visible minority status, profession, marital status, level of education, total years of schooling, criminal history, total income and religious denomination.

The value of a quasi-identifier may also be predicted from one or more variables in the data set that share a correlation with it. For example, an individual's age may be predicted from the date or year of their graduation. Because such variables may reveal the value of a quasi-identifier, you should classify them as quasi-identifiers.

## STEP 3: DETERMINE AN ACCEPTABLE RE-IDENTIFICATION RISK THRESHOLD

De-identification protects the privacy of individuals by removing information that identifies an individual or for which there is a reasonable expectation that it could be used, either alone or with other information, to identify an individual. To protect personal privacy, the amount of de-identification that is required to be applied is proportional to the level of re-identification risk involved in the release of the data set. The higher the re-identification risk of a data release, the greater the amount of de-identification required.

To determine an acceptable level of re-identification risk (or threshold) for a data set, you must assess the extent to which the release of the data set would invade an individual's privacy. The result of your assessment should be a qualitative value typically in the range of "low," "medium" or "high."

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10 See "What is a quasi-identifier?" *Electronic Health Information Laboratory*, <http://www.ehealthinformation.ca/faq/quasi-identifier/>.

When assessing the level of potential privacy invasion of individuals, assume that the information in the data set is identifiable and no de-identification has taken place. Under this assumption, the level of invasion of privacy is a function of different factors, including:

- the sensitivity of the information
- the scope and/or level of detail of the information
- the number of individuals
- the potential harms or injuries to individuals in the event of a breach or inappropriate use
- whether the disclosure of the information is permitted under *FIPPA* or *MFIPPA* without the consent of the individuals
- whether the information was unsolicited or given freely by the individuals, with little or no expectation of privacy
- whether the individuals explicitly consented to their information being disclosed in de-identified form for this secondary purpose and/or were properly notified at the time of collection of this data practice<sup>11</sup>

The result of the invasion of privacy assessment is a qualitative value; however, the amount of de-identification that is required to be applied to a data set is quantified numerically. To bridge this divide, once you have assessed the invasion of privacy value, you must translate the result into a numerical value, representing the amount of de-identification proportionate to that level of risk. This “re-identification risk threshold” represents, in general, the minimum amount of de-identification that must be applied to a data set in order for it to be considered de-identified, that is, for it to no longer contain personal information. Accordingly, it forms the baseline against which to compare your calculations concerning de-identification going forward.

When translating between the (qualitative) invasion of privacy value and the (quantitative) re-identification risk threshold, consider a key aspect of de-identification—namely, that de-identification does not produce data sets for which there is *zero probability* of re-identification. Rather, it results in data sets for which the probability of re-identification is *very low*, given the level of re-identification risk involved in the release. The amount of de-identification proportionate to the invasion of privacy value should be equal to a very low probability of re-identification given that level of risk.

The following table may be used as a guideline in determining what may be considered a very low value for the probability of re-identification for data sets with different invasion of privacy values.<sup>12</sup>

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11 See El Emam, *Guide to the De-identification of Personal Health Information*, 283–290. This section of El Emam’s book also contains an assessment tool that may help in determining the level of risk to individuals posed by the release of a data set.

12 See *ibid.*, 228.

Invasion of Privacy	Re-identification Risk Threshold	Cell Size Equivalent
Low	0.1	10
Medium	0.075	15
High	0.05	20

When combined with the calculations involved in step 5, the values listed in the table are consistent with data release precedents across Canada and the United States.<sup>13</sup> The table also includes the cell size equivalent for each probability of re-identification for illustrative purposes only. Cell sizes apply to aggregate count or frequency tables, not individual-level structured data. Nonetheless, the concept can be used to illustrate the general effect of de-identification on such data sets. For example, a data set with a probability of re-identification of 0.1 means that each row in the data set will in general have the same values for quasi-identifiers as nine other rows, that is, have a “cell size” of 10.

## STEP 4: MEASURE THE DATA RISK

Once you have determined an acceptable re-identification risk threshold, the next step is to measure the amount of re-identification risk in the data set itself. The data risk is used to determine the level of re-identification risk involved in the release.

Measuring the amount of re-identification risk in a data set is a two-step process. You must (1) calculate the probability of re-identification of each row, and (2) apply the appropriate risk measurement method based on the release model used.

### 4.1 CALCULATE THE PROBABILITY OF RE-IDENTIFICATION OF EACH ROW

Each row in a data set about individuals contains information about one individual. Accordingly, each row has a probability of re-identification. For a given row, the probability of re-identification is dependent on how many other rows in the data set have the same values for variables that are quasi-identifiers.

All the rows in a data set with the same values for variables that are quasi-identifiers form an “equivalence class.” For example, in a data set with variables for gender, age and highest level of education, all the rows corresponding to 35-year-old men with post-secondary degrees would form an equivalence class. The size of an equivalence class is equal to the number of rows with the same values for quasi-identifiers.

For each row, the probability of re-identification is equal to 1 divided by the size of its equivalence class. For example, each row in an equivalence class of size 5 has a probability of re-identification of 0.2.

<sup>13</sup> See *ibid.*, 279–282.

$$\text{Probability of re-identification for a given row} = \frac{1}{\text{Size of equivalence class}}$$

Rows with larger equivalence classes have lower probabilities of re-identification, since more rows and therefore more individuals in the data set have the same values for quasi-identifiers. Rows with smaller equivalence classes have higher probabilities of re-identification, since less rows (less individuals) have the same values for quasi-identifiers.

## 4.2 APPLY THE APPROPRIATE RISK MEASUREMENT METHOD

While the probability of re-identification of each row is equal to 1 divided by the size of its equivalence class, there are different ways to use these values to measure the amount of re-identification risk in the data set, depending on the release model used.

### Public Data Releases: Maximum Risk

For public data releases, you should assume that someone will attempt a demonstration attack for publicity. These kinds of attacks will target the most vulnerable rows in the data set, which are those with the smallest equivalence classes and highest probability of re-identification. Because of this, you should use the maximum probability of re-identification across all rows to measure the amount of re-identification risk.

### Non-Public Data Releases: Strict Average Risk

For non-public data releases, because access to the data set is limited to a select number of identified recipients, you should assume that no row is more vulnerable than others to a re-identification attack. Here, you should use the average probability of re-identification across all rows to measure the amount of re-identification risk in the data set. However, to protect against unique rows or equivalence classes with a high risk of re-identification, the average should be a “strict” average where no row may have a probability of re-identification that is greater than a specific value. A cut-off of 0.33 is often proposed, that is, the smallest size of equivalence class in the data set should be 3.<sup>14</sup> In practice, however, a maximum probability of re-identification of 0.5 may also be used, which in the case of strict average ensures that there are no unique rows and that the average risk is acceptably small.

### Semi-Public Data Releases: Maximum Risk

Because semi-public data releases are available to anyone for download, you should assume that the most vulnerable rows will be more at risk of attack than others. Because of this, like public data releases, you should use the maximum probability of re-identification across all rows to measure the amount of re-identification risk.

14 See El Emam and Malin, “Appendix B: Concepts and Methods for De-identifying Clinical Trial Data.”

## STEP 5: MEASURE THE CONTEXT RISK

While the risk from the data set plays an important role in determining the level of re-identification risk involved in the release of a data set, it is not the only factor to consider. The re-identification risk is also a function of the kinds of re-identification attacks that are possible on the data set given the release model used. Further analyzing the re-identification risk in terms of possible attacks produces the context risk. Together with the data risk, this value is used to calculate the overall risk of re-identification involved in the release of a data set (in step 6).

The context risk is the probability of one or more re-identification attacks being launched against a data set. While re-identification attacks may be launched on any de-identified data set once it has been released, the adversaries and kinds of attacks differ depending on the release model used.

### PUBLIC DATA RELEASES

The calculations used to measure the context risk for public data releases are straightforward. Because the data set is made available to anyone for download or use without any conditions, you should assume that someone will attempt a demonstration attack for publicity. The probability of an adversary launching a re-identification attack against the data set is therefore 1.

### NON-PUBLIC DATA RELEASES

In contrast, the calculations for measuring the context risk for non-public data releases, in particular the methods and equations used to determine the probabilities of possible re-identification attacks, are more complex and may require specialized knowledge or skills to carry out. As noted in the introduction, if you are not confident in your abilities to carry out these calculations, you may wish to seek advice from technical staff or other experts in the field.

If technical or expert advice is not available, another option is to measure the context risk as though it were for a public data release using the (much simpler) method above. While this may result in a data set with lower utility, the amount of protection against re-identification attacks would be equal to a non-public data release, if not greater.

For non-public data releases, the probabilities of three different re-identification attacks or threats need to be determined:

1. deliberate insider attack
2. inadvertent recognition of an individual in the data set by an acquaintance
3. data breach

You should use the highest of these probabilities when measuring the context risk.



## **Attack 1: Deliberate Insider Attack**

The probability of a recipient of a non-public data release attempting to re-identify one or more individuals in the data set is based on two factors:

1. the extent of the controls set out in the data sharing agreement regarding the privacy and security of the data
2. the motives and capacity of the recipient in regards to performing a re-identification attack

Both of these factors entail qualitative assessments, resulting in values typically in the range of “low,” “medium” or “high.”

### *Privacy and Security Controls*

Depending on the privacy and security controls set out in the data sharing agreement for a non-public data release, the probability of a recipient attempting to launch a re-identification attack may vary. The higher the level of privacy and security controls, the lower the probability of a re-identification attack being launched. While a more complete list of controls is available,<sup>15</sup> some privacy and security controls that may be considered in a data sharing agreement include:

- recipient allows only “authorized” staff to access and use data on a “need-to-know” basis (only when required to perform their duties)
- a non-disclosure or confidentiality agreement (pledge of confidentiality) is in place for all staff, including external collaborators and subcontractors
- data will be disposed of after a specified retention period
- data will not be disclosed or shared with third parties without appropriate controls or prior approval
- privacy and security policies and procedures are in place, monitored and enforced
- mandatory and ongoing privacy, confidentiality and security training is conducted for all individuals and/or team members including those at external collaborating or subcontracting sites
- a breach of privacy protocol is in place, including immediate written notification to the data custodian
- virus-checking and/or anti-malware programs have been implemented
- a detailed monitoring system for audit trails has been instituted to document the person, time and nature of data access
- if electronic transmission of the data is required, an encrypted protocol is used

15 See the list of privacy and security controls available in Appendix 1 of Khaled El Emam et al., “Evaluating the Risk of Re-identification of Patients from Hospital Prescription Records.” *Canadian Journal of Hospital Pharmacy* 62, no. 4 (Jul-Aug 2009): 307–319, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2826964/>.

- computers and files that hold the disclosed information are housed in secure settings in rooms protected by such methods as combination lock doors or smart card door entry, with paper files stored in locked storage cabinets<sup>16</sup>

### *Motives and Capacity*

Additional factors to consider when determining the probability of a recipient attempting to launch a re-identification attack are their motives and capacity. The more motivated and more capable the recipient is with respect to re-identifying one or more individuals in the data set, the higher the probability of a re-identification attack being launched. When assessing motives and capacity, consider:

- whether the recipient has worked with your institution in the past without incident
- whether possible reasons exist, financial or otherwise, for the recipient to attempt to re-identify one or more individuals
- whether the recipient has the technical expertise and/or financial resources to attempt any re-identification
- whether the recipient has access to other private databases or data sets that could be linked to the data to re-identify one or more individuals<sup>17</sup>

### *Probability of Re-identification Attack*

Based on the level of privacy and security controls in the data sharing agreement and the motives and capacity of the recipient, the probability of a deliberate re-identification attack being launched by an insider may be estimated. The following table may be used as a guideline in determining what may be considered an acceptable estimate for the probability of a re-identification attack being launched against non-public data sets.<sup>18</sup>

Privacy and Security Controls	Motives and Capacity	Probability of Re-identification Attack
High	Low	0.05
	Medium	0.1
	High	0.2
Medium	Low	0.2
	Medium	0.3
	High	0.4
Low	Low	0.4
	Medium	0.5
	High	0.6

<sup>16</sup> See El Emam, *Guide to the De-identification of Personal Health Information*, 290–371. This section of El Emam’s book also contains an assessment tool that may help in determining the level of privacy and security controls in a data sharing agreement.

<sup>17</sup> See *ibid.*, 373–376. This section of El Emam’s book also contains an assessment tool that may help in determining the level of motives and capacity of a recipient.

<sup>18</sup> See *ibid.*, 208.

## Attack 2: Inadvertent Recognition of an Individual by an Acquaintance

In addition to deliberately attempting a re-identification attack, the recipient of a non-public data release may also inadvertently re-identify one or more individuals. This could happen if, while analyzing the data, they recognize a friend, colleague, family member or acquaintance. The probability of such an “attack” occurring is equal to the probability of a random recipient knowing someone in the data set. To calculate this, the following equation may be used:

$$1 - (1 - p)^m$$

In this equation,  $p$  is the percentage of individuals in the population who have the condition or characteristic discussed in the data set and  $m$  is the number of people, on average, that an individual knows.<sup>19</sup> Take, for example, a data set about individuals who carpool to work. Based on values of  $p$  and  $m$ , the equation would give the probability that a random individual knows someone who carpools to work.

The value of  $p$  should be determined by recent population statistics. On the other hand, the value for  $m$  may vary depending on the kind of relationship with an individual required to have knowledge about them regarding the condition or characteristic discussed in the data set. For friends, you should in general use a value of  $m$  between an average of 150, that is, “Dunbar’s number,”<sup>20</sup> and 190.<sup>21</sup>

## Attack 3: Data Breach

The third attack to consider in the case of a non-public data release is that of a data breach on the part of the recipient. If a data breach occurs at the recipient’s facilities, you should assume that an external adversary will attempt a re-identification attack. Therefore, the probability of such an attack occurring is equal to the probability of a breach occurring at the recipient’s facilities. To calculate this value, you should use publicly available data on the prevalence of data breaches in the recipient’s respective industry.

## SEMI-PUBLIC DATA RELEASES

The possible re-identification attacks for semi-public data releases can be considered the same as those for non-public data releases. Accordingly, to measure the context risk for semi-public data releases, you should use the same method and equations as for non-public data releases, with one adjustment. With respect to “Attack 1: Deliberate Insider Threat,” you should assume that the recipient has high motives and capacity and, at best, low privacy and security controls. This is because semi-public data releases are available to anyone for download and are limited in terms of the amount of protection they can provide.

<sup>19</sup> See *ibid.*, 211.

<sup>20</sup> See “Dunbar’s number,” *Oxford Dictionaries*, <http://www.oxforddictionaries.com/definition/english/dunbar's-number>.

<sup>21</sup> See El Emam, *Guide to the De-identification of Personal Health Information*, 213.

When developing the terms-of-use agreement, you should include provisions that, at a minimum, prohibit recipients from:

- attempting to re-identify individuals in the data set
- linking to external data sets or information
- sharing the data set without permission

## STEP 6: CALCULATE THE OVERALL RISK

Once the data risk and the context risk have been measured, the overall risk of re-identification can be calculated. The overall risk is equal to the data risk multiplied by the context risk.

$$\text{Overall risk} = \text{data risk} \times \text{context risk}$$

The overall risk is equivalent to the probability of one or more rows being re-identified if an attack was launched. For example, if a data set has a data risk of 0.2 and a context risk of 0.5, the overall risk for the data set is 0.1.

## STEP 7: DE-IDENTIFY THE DATA

For a data set to be considered de-identified, any identifiable information must be removed. The values of a data set may be transformed in various ways to remove any information that identifies an individual or for which there is a reasonable expectation that the information could be used, either alone or with other information, to identify an individual. Depending on the type and nature of the identifiers, different techniques may be applied. To remove any identifiable information, you should:

1. mask direct identifiers
2. modify the size of equivalence classes
3. ensure that the overall risk is less than or equal to the re-identification risk threshold

### 7.1 MASK DIRECT IDENTIFIERS

Variables classified as direct identifiers are not used for data analysis because, as noted above, they are not normally useful for research purposes. Because of this, the simplest, most privacy-protective way of dealing with them is to suppress their values in the data set by removing the column of the directly identifying variable.

However, depending on the nature of the research, there may be a need to contact the individuals involved and notify them of the results. In such cases, the directly identifying variables should be transformed using a different masking technique, such as:

- replacing the values with pseudonyms and maintaining the linking database in a secure location
- encrypting the values and storing the encryption key in a safe place

Because directly identifying variables can be used, either by themselves or in combination with other readily available sources of information, to identify individuals, the utmost care must be taken when performing such transformations. If a directly identifying variable is transformed improperly or in an insecure manner, an adversary may be able to re-identify a large number of individuals.

For example, a common technique for creating pseudonyms is to transform the value of a directly identifying variable into an irreversible code using a one-way hash function. However, this technique may be vulnerable to brute force attacks if the total number of possible values of the variable is small enough that the adversary can compute the hash values of all the possible values of the variable in a reasonable amount of time and use this to create a reverse lookup table of hashed and original values. To protect against such attacks, you should always add random data to the input of a one-way hash function and maintain this “salt” or “key” along with the linking database in a secure location.

## 7.2 MODIFY SIZE OF EQUIVALENCE CLASSES

For a data set to be considered de-identified, the overall risk of re-identification must be less than or equal to the re-identification risk threshold. If the overall risk is greater than the re-identification risk threshold, you must modify the size of equivalence classes in the data set in order to reduce the data risk.

Depending on the values of its quasi-identifiers, a data set may have equivalence classes of different sizes. De-identification involves transforming the values of quasi-identifiers in various ways to modify the size of equivalence classes in a data set. Two techniques to do this are generalization and suppression.

### Generalization

Generalization is the process of removing precision from a value to produce a more general value. It may be applied in increasing amounts. For example, a full date may be generalized to month and year, which may in turn be generalized to year, which may in turn be generalized to five-year interval, 10-year interval, and so on.

When using generalization, you should apply it to all the rows of a variable. You should also ensure that the set of generalizations used within a variable are uniform and do not overlap. For example, a uniform set of five-year age intervals would be 10–14, 15–19, 20–24, 25–29, 30–34, and so on.

There is one exception to this. For continuous variables, you may introduce a cut-point at the top or bottom range of values to create a “catch all” category for outliers. For example, the age of individuals may be generalized to year, with a catch all category of “90+” for individuals who are 90 or older. This generalization technique is known as top- or bottom-coding, depending on where the cut-point is made.

## **Suppression**

Suppression is the process of removing values from a data set. In contrast to generalization, which applies to all the rows of a quasi-identifier, suppression affects single rows only. Suppression of a value of a quasi-identifier may happen at different levels. For example, it may involve removing the entire row, the set of quasi-identifiers in the row or only the individual cell. While the less information removed from a data set the greater potential for a higher utility data set, when suppressing a value of a quasi-identifier, you may need to remove the entire row or a set of quasi-identifiers in the row to ensure that the equivalence classes are of the appropriate size.

## **7.3 ENSURE THAT THE OVERALL RISK IS LESS THAN OR EQUAL TO THE RE-IDENTIFICATION RISK THRESHOLD**

If the size of any equivalence class in the data set has been modified, you must recalculate the overall risk of re-identification and compare it to the re-identification risk threshold. For a data set to be considered de-identified, the data risk must be sufficiently reduced so that the overall risk is less than or equal to the re-identification risk threshold.

## **STEP 8: ASSESS DATA UTILITY**

There may be a trade-off between the amount of de-identification applied to a data set and the utility of the resulting information. The more the variables that qualify as quasi-identifiers are de-identified using techniques such as generalization and suppression, the higher the potential for a corresponding loss in the utility of the data set.

While generalization and suppression may be applied to a data set to ensure that the overall risk of re-identification is less than or equal to the re-identification risk threshold, these de-identification techniques may be applied in different ways and combinations to achieve this result. For example, one approach may rely more on generalization and reducing the precision of categories to increase the size of equivalence classes. Another approach may rely more on suppression and removing rows or cells of variables with equivalence classes that are too small. Depending on the properties of the data set, different applications and/or combinations of generalization and suppression may preserve more utility in the information while protecting the privacy of individuals.

As a general rule, suppression should be considered before generalization, unless more than five per cent of the rows in the data set already have some form of suppression.<sup>22</sup> Because suppression removes information from single rows, in contrast to generalization, which reduces the precision of all the rows in the data set, you may wish to consider suppression as a starting point for de-identification.

If the utility of the data set is low or could be improved—for example, more than five per cent of the rows have some form of suppression or further generalization could be avoided by suppressing certain rows or values—you may wish to repeat steps 7.2 and 7.3 above. Applying and/or combining the techniques of generalization and suppression in a new way could produce a higher utility data set while ensuring that the overall risk of re-identification remains less than or equal to the risk threshold.

## STEP 9: DOCUMENT THE PROCESS

Each attempt at de-identifying a data set containing personal information should follow the same steps and evaluate the same set of issues. However, the variables and values, and the analysis to determine the amount and kinds of de-identification, will differ for each data release. To help guide you through the complexities and challenges involved in de-identifying personal information, you should consider producing a report documenting the process and its results. There are a number of benefits to this best practice, including:

- the ability to demonstrate due diligence and evidence of compliance, which may be important in the event of a privacy breach or complaint to the IPC
- confidence (of individuals, other institutions, partners and your own management) that best practices are being followed.
- increased transparency, awareness, understanding and trust in your organization's information management practices

## DE-IDENTIFICATION GOVERNANCE

Responsibility for releasing a de-identified data set does not end with the completion of the process for removing any identifiable information. Governance is an important aspect of releasing any de-identified data set. A robust de-identification governance process may include activities such as:

- protecting against attribute disclosure<sup>23</sup>
- ongoing and regular re-identification risk assessments

22 See Khaled El Emam et al., "A Globally Optimal k-Anonymity Method for the De-Identification of Health Data," *Journal of the American Medical Informatics Association* 16, no. 5 (Sep-Oct 2009): 670–682, <http://dx.doi.org/10.1197/jamia.M3144>.

23 See El Emam and Malin, "Appendix B: Concepts and Methods for De-identifying Clinical Trial Data."

- auditing data recipients to ensure that they are complying with the conditions of the data sharing agreement
- examining the disclosures of overlapping data sets to ensure that the re-identification risk is not increasing with new data releases, or that potential collusion among data recipients does not increase the re-identification risk
- maintaining transparency around the de-identification practices of the institution
- assigning responsibility and accountability for de-identification
- maintaining oversight of changes in relevant regulations and legislation as well as court cases
- developing a response process in case there has been a re-identification attack
- ensuring that individuals performing de-identification have adequate and up-to-date training<sup>24</sup>

While all of the above activities are important to consider when developing a de-identification governance process, the first two raise issues that are specific to de-identification.

## PROTECTING AGAINST ATTRIBUTE DISCLOSURE

One of the reasons for releasing de-identified data sets is to provide others with an opportunity to study the values and properties of the raw data and draw inferences from them. This is the primary purpose of statistics and data analysis.

While de-identification techniques protect against the disclosure of individuals' identities, they do not protect against the disclosure of attributes relating to groups of individuals that may be stigmatizing to those individuals. Some inferences may be desirable insofar as they may enhance our understanding of a particular issue or topic. Others may subject groups of individuals to unjust or prejudicial treatment or would be considered offensive. For example, a data set showing whether children of parents with a particular religious affiliation are being vaccinated against certain viruses could result in stigmatization.<sup>25</sup>

The privacy protections set out in *FIPPA* and *MFIPPA* relate to the personal information of individuals only and do not include measures to address potential harms affecting groups of individuals. Nonetheless, as a best practice, you should consider whether any group attributes in a de-identified data set are stigmatizing before releasing the data set. An ethics review of the data set may be needed to achieve this.

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24 See Khaled El Emam, "The Twelve Characteristics of a De-identification Methodology," *Risky Business: Sharing Health Data While Protecting Privacy* (Trafford Publishing: 2013), 134–146 at 141.

25 See El Emam, *Guide to the De-identification of Personal Health Information*, 9–10.



## ONGOING AND REGULAR RE-IDENTIFICATION RISK ASSESSMENTS

Another important step in the process of de-identifying a data set is to classify variables, above all, quasi-identifiers. A challenge with classifying quasi-identifiers is in anticipating the possible sources of background knowledge that an adversary may have, especially since new sources of information may become available at any time.

The potential for individuals to be re-identified by combining new sources of information with otherwise de-identified data is an important privacy concern to consider. Unanticipated sources of information that were not available at the time of de-identification may become available and be used to re-identify individuals.

Once you have released a de-identified data set, you should consider monitoring whether any new sources of information have become available and whether such sources may be used to re-identify individuals in the data set. If so, you should re-assess the classification of variables. Depending on the re-assessment, you may need to mask or de-identify additional variables to ensure that the overall probability of re-identification is less than or equal to the re-identification risk threshold.

In addition, you may also wish to commission a staged re-identification attack on a data set to determine how difficult (or easy) it would be for an attacker to re-identify one or more individuals. This would provide an empirical measurement of the risk of re-identification. While more expensive than statistical evaluations, commissioned attacks should be performed on particularly high-risk data sets, or every few years on other data sets, to understand the attack landscape.<sup>26</sup>

## CONCLUSION

De-identification is the process of removing information that identifies an individual or for which there is a reasonable expectation that the information could be used, either alone or with other information, to identify an individual.

De-identification can be a complex and technically challenging process. The risk-based approach developed in these guidelines outlines a step-by-step process for de-identifying data sets in accordance with *FIPPA* and *MFIPPA*.

When attempting to de-identify structured data or data sets, institutions may wish to seek advice from technical staff or other experts in the field, their freedom of information and privacy coordinator or legal counsel. Institutions may also wish to consider automated tools or de-identification software to facilitate the process.

De-identification results in data sets for which the probability of re-identification is very low, given the level of re-identification risk involved in the release. While de-identification techniques protect against the disclosure of individuals' identities, they do not protect against other risks, including the disclosure of stigmatizing group attributes. Institutions should consider instituting a robust de-identification governance process to address additional risks and concerns.

<sup>26</sup> See the "motivated intruder" test in the U.K. Information Commissioner's Office, *Anonymisation Code of Practice*, <https://ico.org.uk/media/for-organisations/documents/1061/anonymisation-code.pdf>.

## APPENDIX A: RESOURCES

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## ABOUT THE INFORMATION AND PRIVACY COMMISSIONER OF ONTARIO

The role of the Information and Privacy Commissioner of Ontario is set out in three statutes: the *Freedom of Information and Protection of Privacy Act*, the *Municipal Freedom of Information and Protection of Privacy Act* and the *Personal Health Information Protection Act*. The Commissioner acts independently of government to uphold and promote open government and the protection of personal privacy.

Under the three Acts, the Commissioner:

- Resolves access to information appeals and complaints when government or health care practitioners and organizations refuse to grant requests for access or correction,
- Investigates complaints with respect to personal information held by government or health care practitioners and organizations,
- Conducts research into access and privacy issues,
- Comments on proposed government legislation and programs and
- Educates the public about Ontario's access and privacy laws.



**Information and Privacy  
Commissioner of Ontario**

**Commissaire à l'information et à la  
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June 2016

VECC INTERROGATORY 17

10. *What steps has the IESO/SME taken to ensure that the data is sufficiently protected and to prevent its re-identification, and are those steps sufficient? What conditions, if any, should be included in the SME's licence to ensure privacy protection in respect of the data?*

INTERROGATORY

10.1 Reference B/T1/S1/pg.2

a) Please provide a list of all data fields which are proposed to be included in data offered for sale.

b) Please explain how any data fields with personal information are to be non-personalized to assure customer anonymity.

RESPONSE

a) The SME will only provide the data fields and consumption data that are being requested and the privacy rules will allow. The four data fields the OEB has ordered the SME to collect are shown below:

- Postal Code,
- Distributor Rate Class: market segment to which a customer belongs - e.g. small general service <50kW,
- Commodity Rate Class: price plan associated to the customer - e.g. retailer, and
- Occupant Change.

Of note, the Occupant Change is not flagged or provided as part of the data available for TPA, based on a recommendation from the Risk of Re-Identification analysis done by Privacy Analytics Inc. This field is only used as an exclusionary factor i.e. third parties can specify if they want premises with an occupant change included/excluded in the aggregated data that will be provided.

b) The data fields provided to the SME and that the SME will provide to third parties do not contain personal information. Please also refer to VECC Interrogatory 12 at Exhibit I, Tab 8.0, Schedule 5.12.

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VECC INTERROGATORY 18

10. *What steps has the IESO/SME taken to ensure that the data is sufficiently protected and to prevent its re-identification, and are those steps sufficient? What conditions, if any, should be included in the SME's licence to ensure privacy protection in respect of the data?*

INTERROGATORY

10.2 Reference B/T1S1/

Please provide the "De-identification Guidelines for Structured Data" referred to in the footnote on page 1 of Exhibit B, Tab 1, Schedule 1.

RESPONSE

The De-identification Guidelines for Structured Data are included in the response to EDA Interrogatory 20(c) at Exhibit I, Tab 10.0, Schedule 4.20.

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VECC INTERROGATORY 19

10. *What steps has the IESO/SME taken to ensure that the data is sufficiently protected and to prevent its re-identification, and are those steps sufficient? What conditions, if any, should be included in the SME's licence to ensure privacy protection in respect of the data?*

INTERROGATORY

10.3 Please confirm (or correct) that data related to Toronto Hydro-Electric System customers is not be part of the data sets offered for sale.

RESPONSE

Data from Toronto Hydro is part of the data set that the SME will offer. However, the Toronto Hydro consumption data is only available from October 2017 onward.



1 CCC INTERROGATORY 14

2 *11- What are the overall objectives of the IESO/SME regarding its proposals to provide data to*  
3 *third parties at market prices? How will the OEB determine whether these objectives have*  
4 *been met?*

5 **CCC-14**

6 INTERROGATORY

7 Please set out the overall objectives of the IESO/SME regarding its proposals to provide data to  
8 third parties at market prices. How will the IESO/SME demonstrate to the OEB that the  
9 objectives have been met?

10 RESPONSE

11 The objectives of the TPA program, over and above generating additional revenue for  
12 ratepayers, are to provide third parties with non-discriminatory access to electricity  
13 consumption data and to achieve the value inherent in a single provincial repository of  
14 electricity consumption data from over 5 million smart meters.

15 This will be demonstrated through the provision of data to third parties at a charge and the  
16 resulting net revenues. The net revenues generated will be reported to the OEB annually.

17 Please see the response to OEB Staff Interrogatory 6 at Exhibit I, Tab 4.0, Schedule 1.06.

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CCC INTERROGATORY 15

*11- What are the overall objectives of the IESO/SME regarding its proposals to provide data to third parties at market prices? How will the OEB determine whether these objectives have been met?*

CCC-15

INTERROGATORY

(Ex. B/T6/S1/p. 2)

The evidence states that there is the potential for significant financial benefit for the SME ratepayer. Has the IESO/SME estimated what the financial benefit might be for customers? If so, please provide those estimates.

RESPONSE

The SME has not estimated the financial benefit that Third Party Access may generate for Smart Metering Entity Charge ratepayers.

Please refer to OEB Staff Interrogatory 2 at Exhibit I, Tab 1.0, Schedule 1.02.

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