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Potential Surplus Energy : A Summary

Briefing jointly prepared by IESO and OPA

IESO0003786

CONFIDENTIAL

March 1, 2012

Purpose of this briefing is to consolidate the analysis /outlook/options around Potential Surplus energy

Bottom Line:

- **Mitigation of potential surplus energy requires use of ALL supply sources – no "scapegoats", no one "off the hook", no "panaceas"**
- **All jurisdictions are moving in this direction as they integrate renewables into their existing systems**

Background on this issue includes :

- Identification of integration of renewables as a priority (2007, IPSP 1)
- Reference to potential surplus and operability implications (IPSP2 , started in 2010, completed in summer 2011)
- Discussions by IESO in reliability outlooks, draft Variable Generation Report and 18 month reports
- An assessment of the potential surplus and factors affecting it (OPA march 24,2011)

More recent focus :

- IESO Stakeholder Engagement on integration of renewables (SE91)
- IESO paper (Efficient Dispatch – Managing SBG and Variability) as part of CEO working group
- Presentation by IESO/OPA
- Proposals by market participants (Bruce Power, OPG) offering mitigation options
- contract amendments options to facilitate renewables to be dispatched

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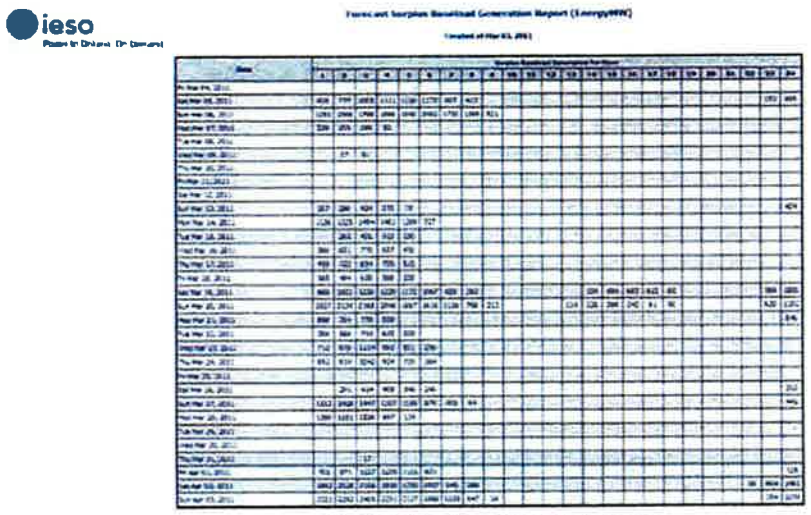
Potential Surplus Energy in context

- Production of electricity must match exactly the demand .
- Shortages result in cuts to demand and surplus to cuts in supply
- The IESO provides information and administers processes that help participants match supply to demand .
- Market participants take actions that mitigate the potential for surplus:
  - Maintenance Coordination :schedule maintenance at times of potential surplus
  - Exports – traders schedule exports that depend on system conditions and arbitrage opportunities.
  - Ontario customers can decide to increase consumption at periods of low or negative prices. Currently this is a small amount.
- Timing of new additional supply affects the potential surplus
- There are wide bands of uncertainty about the amount of potential surplus as the drivers change (water conditions, demand, nuclear availability) and mitigating actions at any one day (export capability, wind production, river flows) .
- Other markets encounter similar experiences to varying degrees (New York, Midwest, New England)

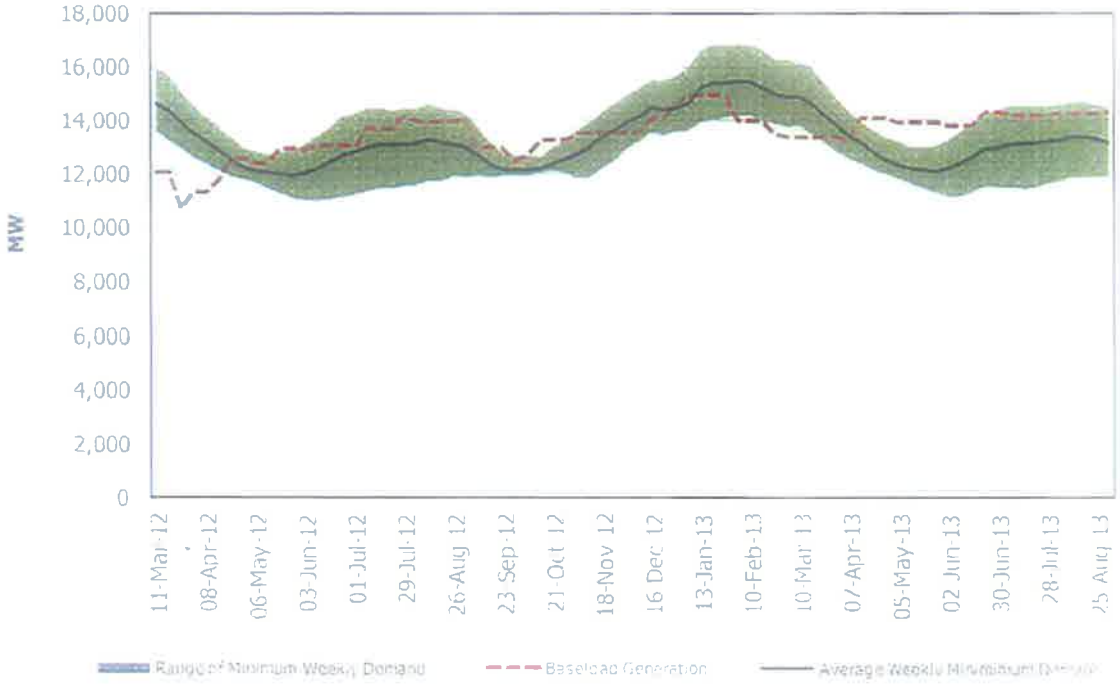
Information to help participants schedule production include IESO Forecast that is Issued daily forecasting out to 1 month

- The IESO issues a daily report that forecasts the short term potential for surplus energy for the next 1 month forward. The forecast is for surplus to Ontario needs, it does not take into account the potential for exports.
- Pre-dispatch prices over a 36 hour period are published by the IESO that are consistent with future potential of surplus energy.



Information that help participants schedule maintenance outages include IESO 18 months outlook

- In the recent IESO 18 month outlook report there is a forecast of the potential range of surplus energy periods and amounts throughout 2012 and 2013.



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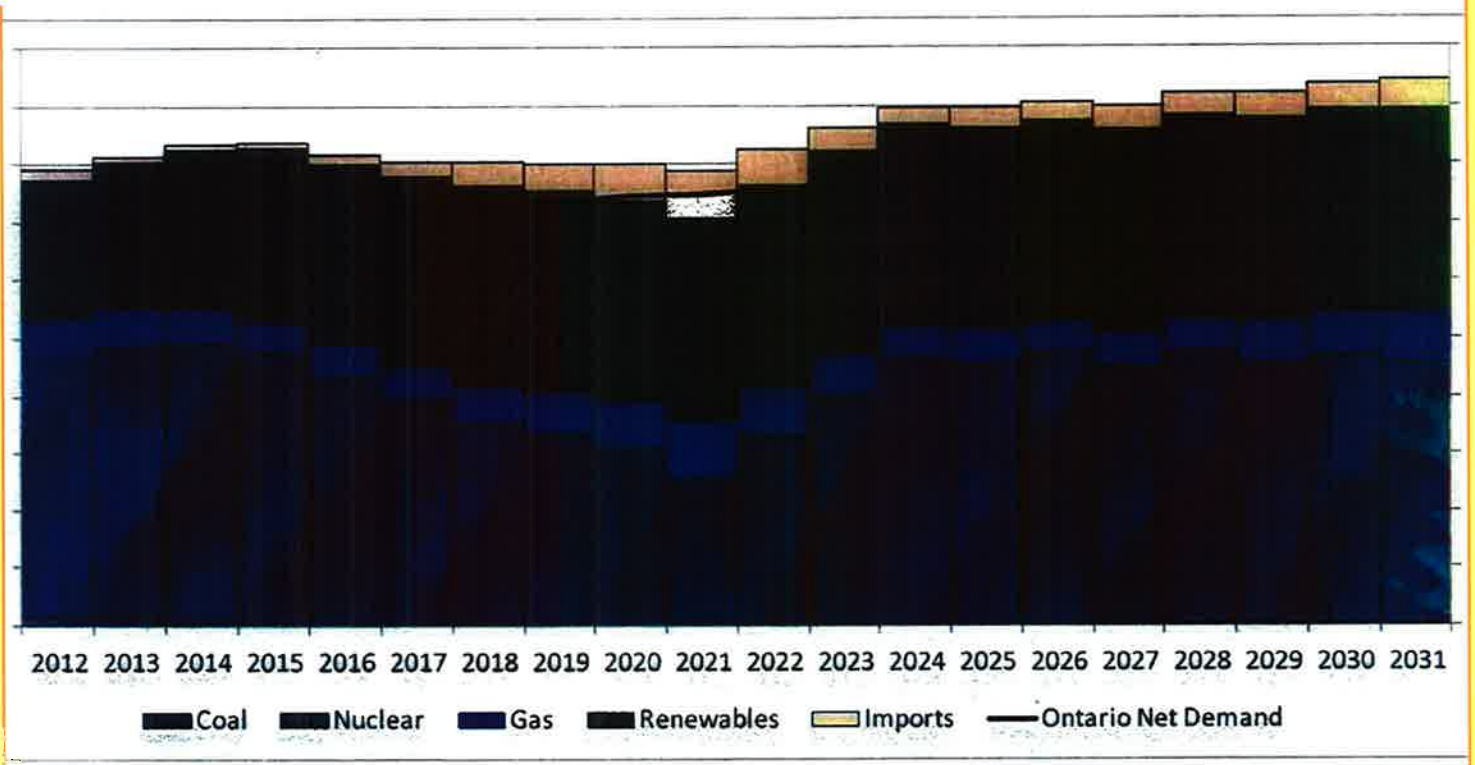
Information for resource planning adjustments include Long term energy production(consistent with LTEP)



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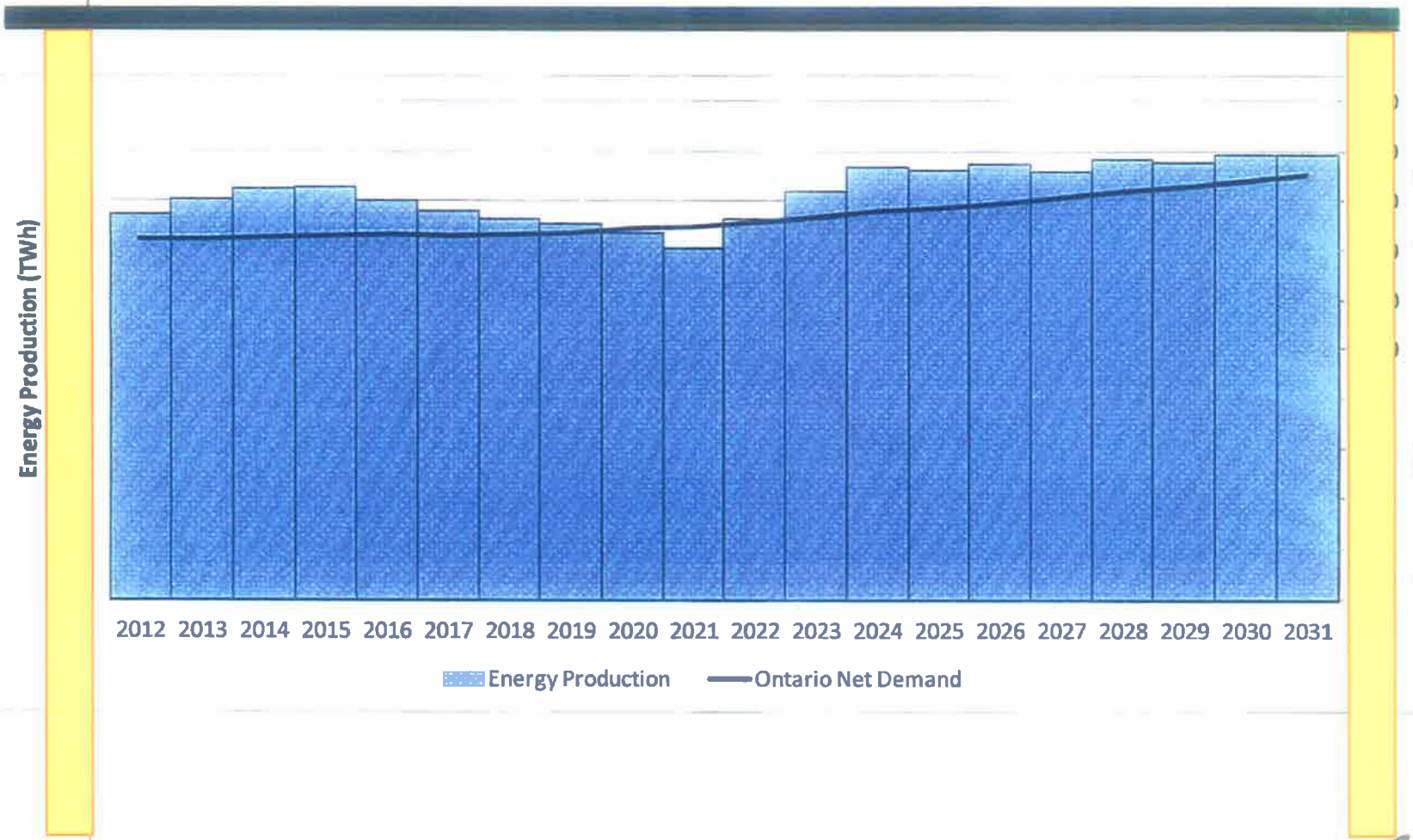
Current projections are that energy production exceeds Ontario demand in most years



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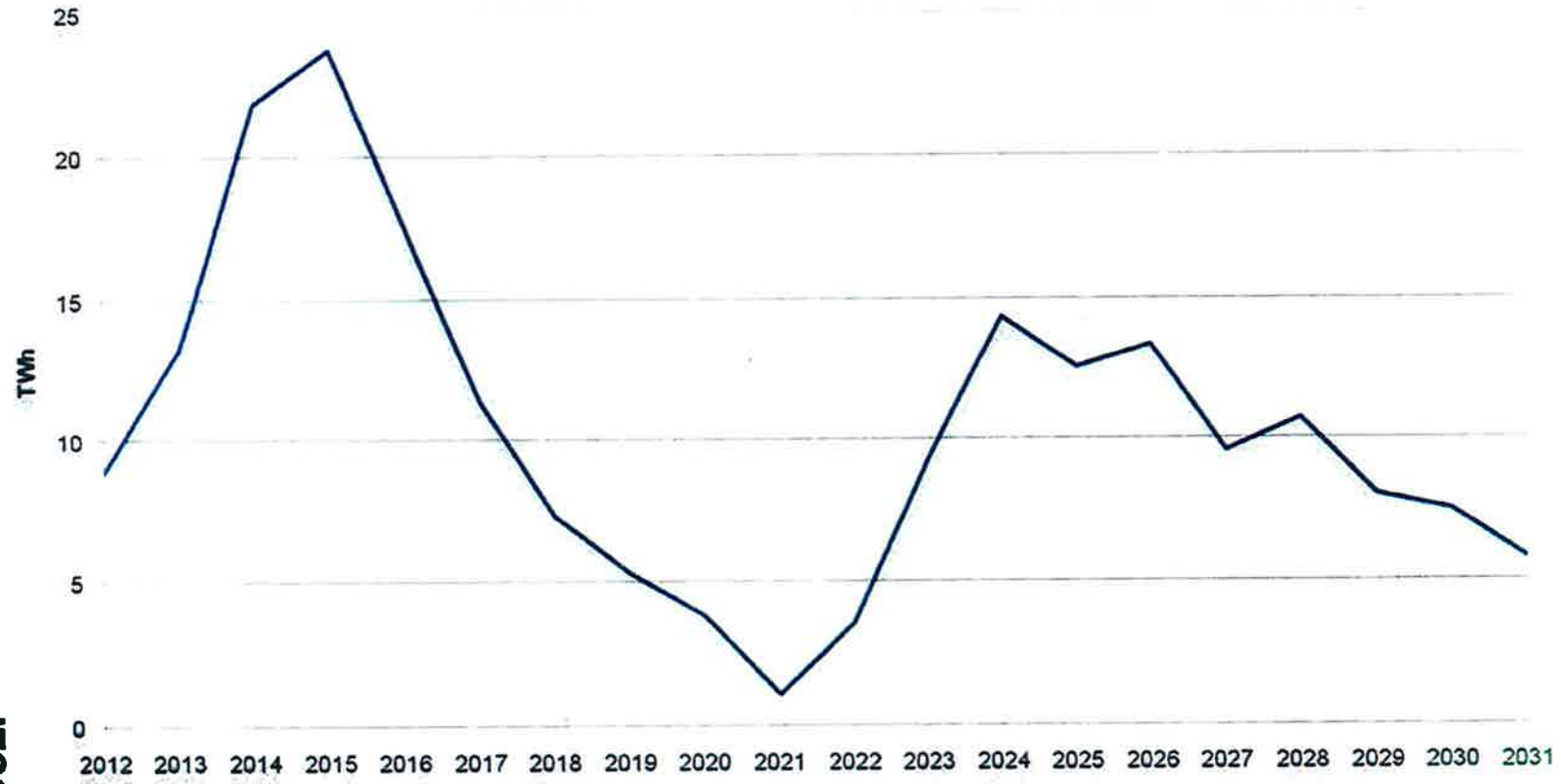
Therefore there will be Potential Surplus Energy in all years . 2013-2017 are at unprecedented levels



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Impacts of surplus energy

Impacts on generation resources

- exports increase, and if not enough then generation is reduced (primarily nuclear, hydroelectric, wind and NUGs), hourly price declines,

Who can take advantage of surplus energy?

- Ontario's Industrial and Commercial customers that can benefit from lower system marginal costs
- Export licence holders (opportunities to export surplus power)

Who bears the costs of surplus energy?

- Most Ontario customers because they top up Ontario generation market revenues . The costs to Ontario customers are generally incurred regardless of whether the facility generates or not.

Developing a wide range of options is the best strategy to mitigate surplus

- IESO is developing with stakeholders new rules and tools to integrate renewables better into the market.
  - More precise forecasting of load and intermittent generation
  - Visibility of generators (including small or behind the meter)
  - Ability to dispatch facilities that to date are not being dispatched except for reliability
- OPA is working on renewable contract amendments to facilitate Dispatch
- Planned outages to some nuclear units at Pickering and/or at Bruce B in order to preserve life of critical nuclear components or asset manage at times of surplus :
  - This is primarily to better manage end of life and refurbishment or asset management.
  - Can take place between 2012 – 2016, for one or two units for periods of up to 6 months/year
- Re-contracting natural gas generation (non utility contracts or NUGS) so that the facilities are dispatchable and do not contribute to surplus energy.
- Load management options to increase off peak consumption as part of conservation programs
- Stage the yet to be contracted wind to be in service closer to 2017/2018 while meeting the 10,700 MW renewable target.

Effectiveness of surplus mitigation options

Options	Effectiveness in Reducing Surplus	Effectiveness in Reducing Costs to Consumers
IESO Integrating Renewables (SE-91)	High	High
Planned Outages to preserve nuclear life	High	Cost upfront, savings long term
Re-contracting NUGS	Low	Medium
Load Management	Low	Low
Delay in-service of new supply additions	High	High

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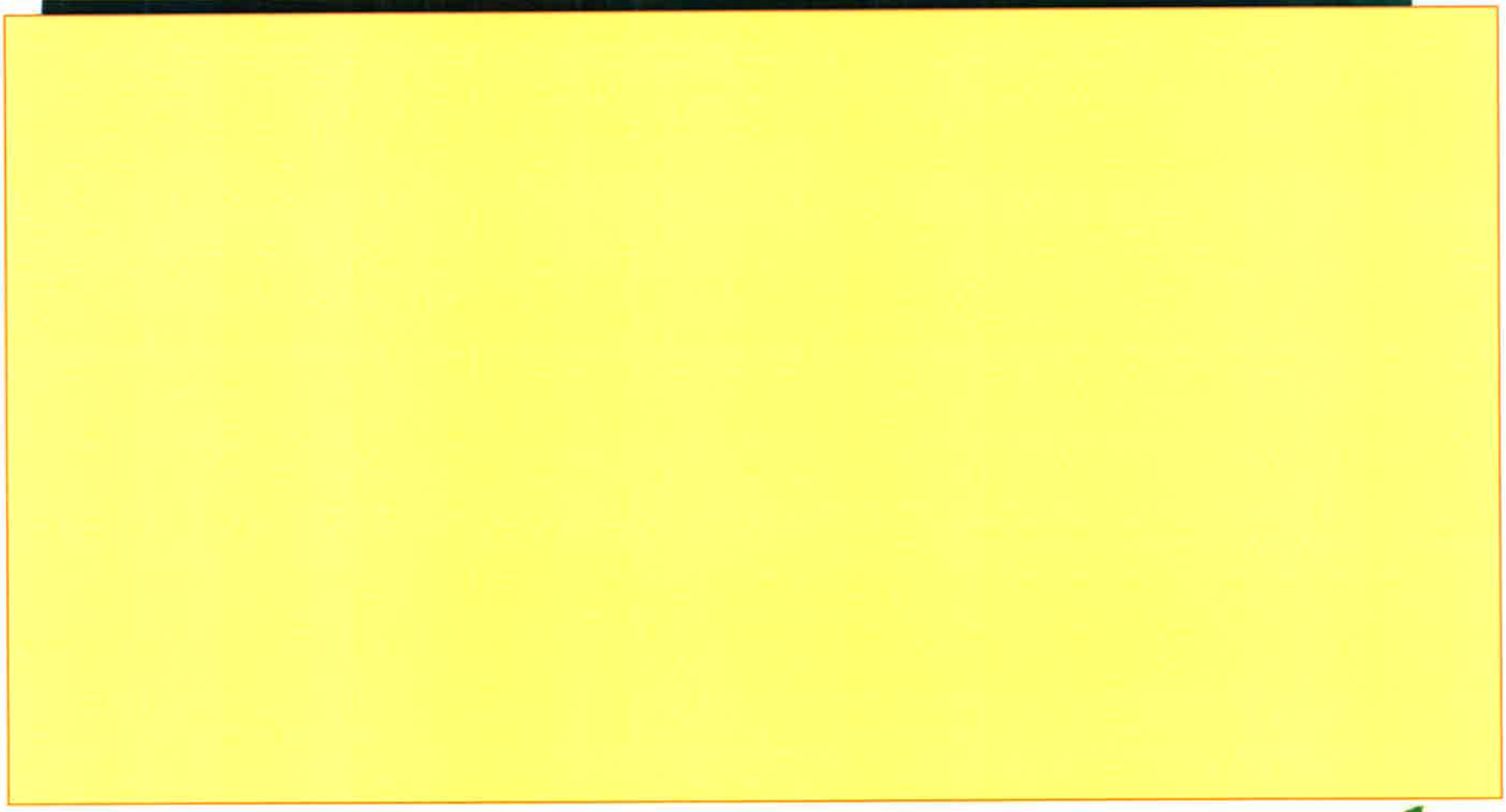
Mitigation of potential surplus energy with wind curtailment (Illustrative sequence, start the sequence from top of chart and move down)



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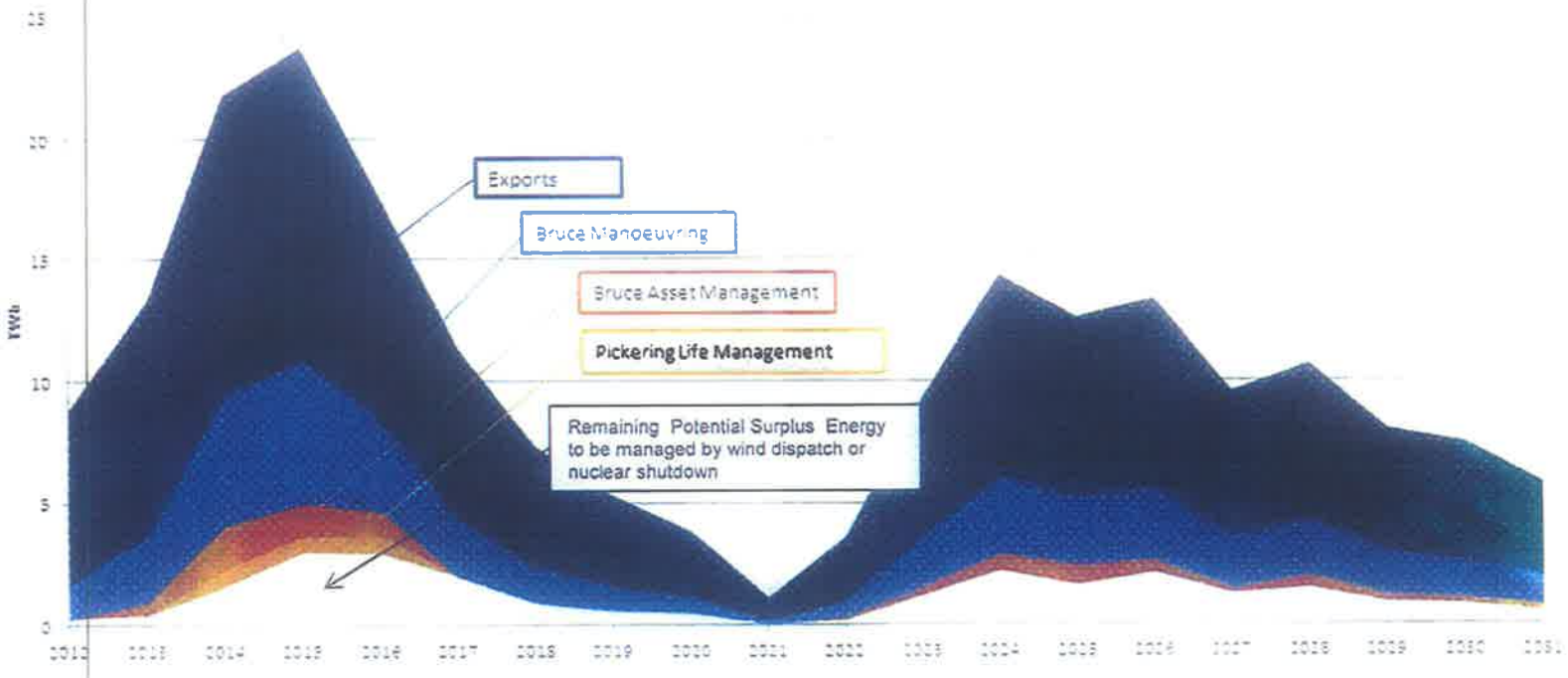
Mitigation of potential surplus energy without wind curtailment (Illustrative sequence, start the sequence from top of chart and move down)



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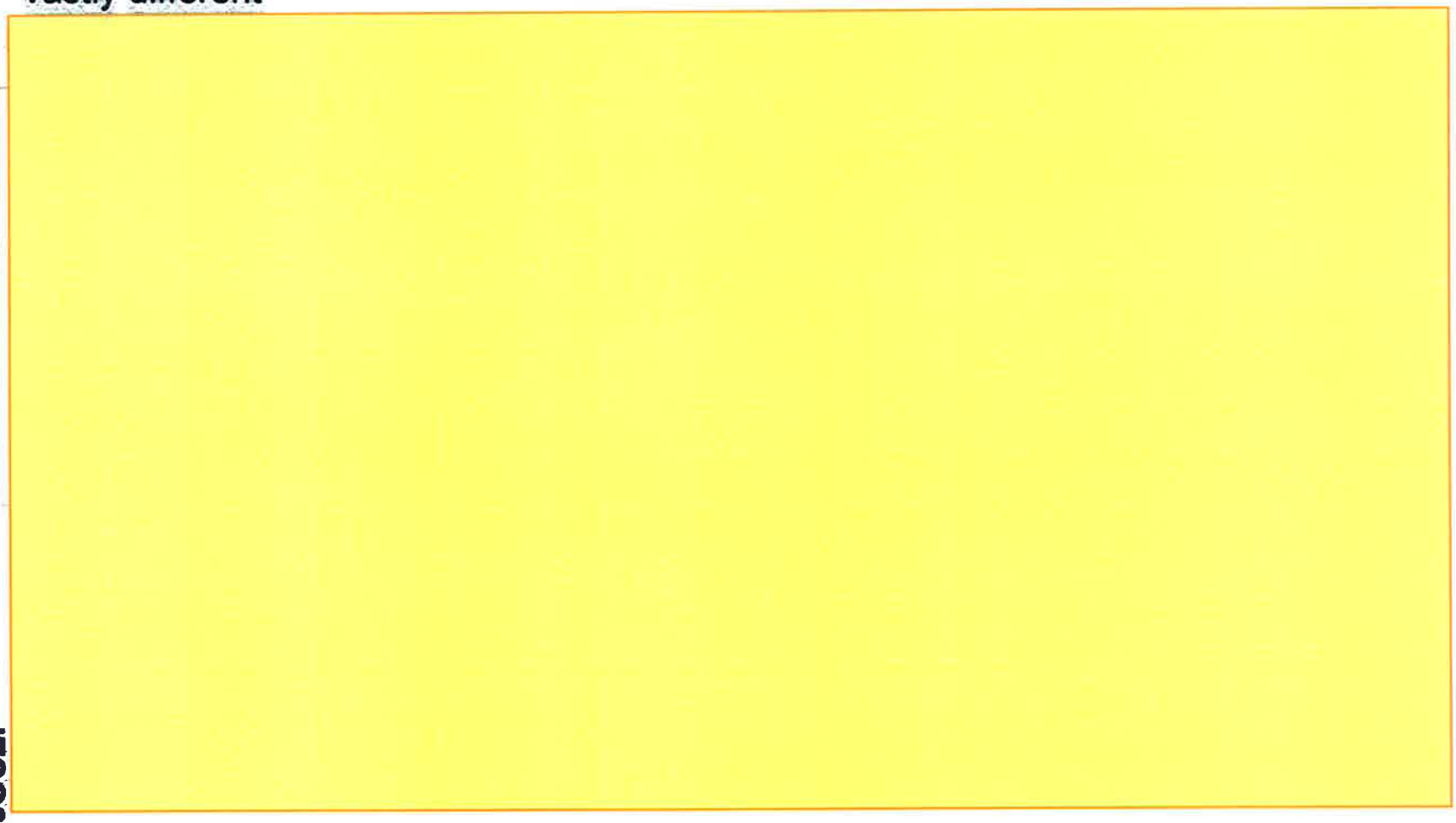
On a typical low demand day, resources and mitigation measures could be vastly different



To summarize

- Potential surplus will increase to 2015
- There are many complementary options that can work together to mitigate impacts
- Most options contribute to Province wide solutions, but in addition dispatch management (SE 91) can also address regional congestion and operability requirements
- There is uncertainty in any one hour as what options maybe available to mitigate.
- It is prudent to pursue and develop all the options that will reduce costs and increase reliability of supply, including both contractual provisions and operating capabilities.

Bottom Line:

- **Mitigation of potential surplus energy requires use of ALL supply sources – no "scapegoats", no one "off the hook", no "panaceas"**
- **All jurisdictions are moving in this direction as they integrate renewables into their existing system**

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appendix

- The appended presentation is jointly prepared by IESO and OPA.
- It updates an assessment of nuclear option's contribution to mitigating the potential surplus
- It expands on the conclusions of the summary presentation.

Update to the IESO/OPA briefing "Potential Surplus Energy: A Summary" dated March 1, 2012.
Please replace the Appendix (pages 17 and following) with this presentation.

Efficient Dispatch: Managing SBG and Variability
Updated Comparison of Nuclear Options

March 2, 2012

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Power to Ontario. On Demand.

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Efficient Dispatch: Managing SBG and Variability
Updated Comparison of Nuclear Options

Background: Bruce Power has advised that its facilities will have increased manoeuvring capability and has also proposed an asset management approach that could assist in reducing the overall SBG.

The IESO has met with Bruce Power and jointly reviewed the operating regime available with the increased manoeuvring capability, and the OPA has confirmed the Bruce Power illustrative asset management schedule.

The OPA has met with OPG and been provided a tentative schedule for OPG life management outages.

Based on the information from Bruce Power and OPG, the IESO and OPA have updated the previous assessments for the following options:

Expanded Manoeuvring:
- Ongoing use of real-time nuclear reduction/shutdown and hydroelectric spill (status quo case– Jan 18, 2011 paper)
- Includes expanded manoeuvring capability, no economic wind dispatch

Dispatch Management for All Resources:
- Includes wind dispatch plus expanded manoeuvring capability

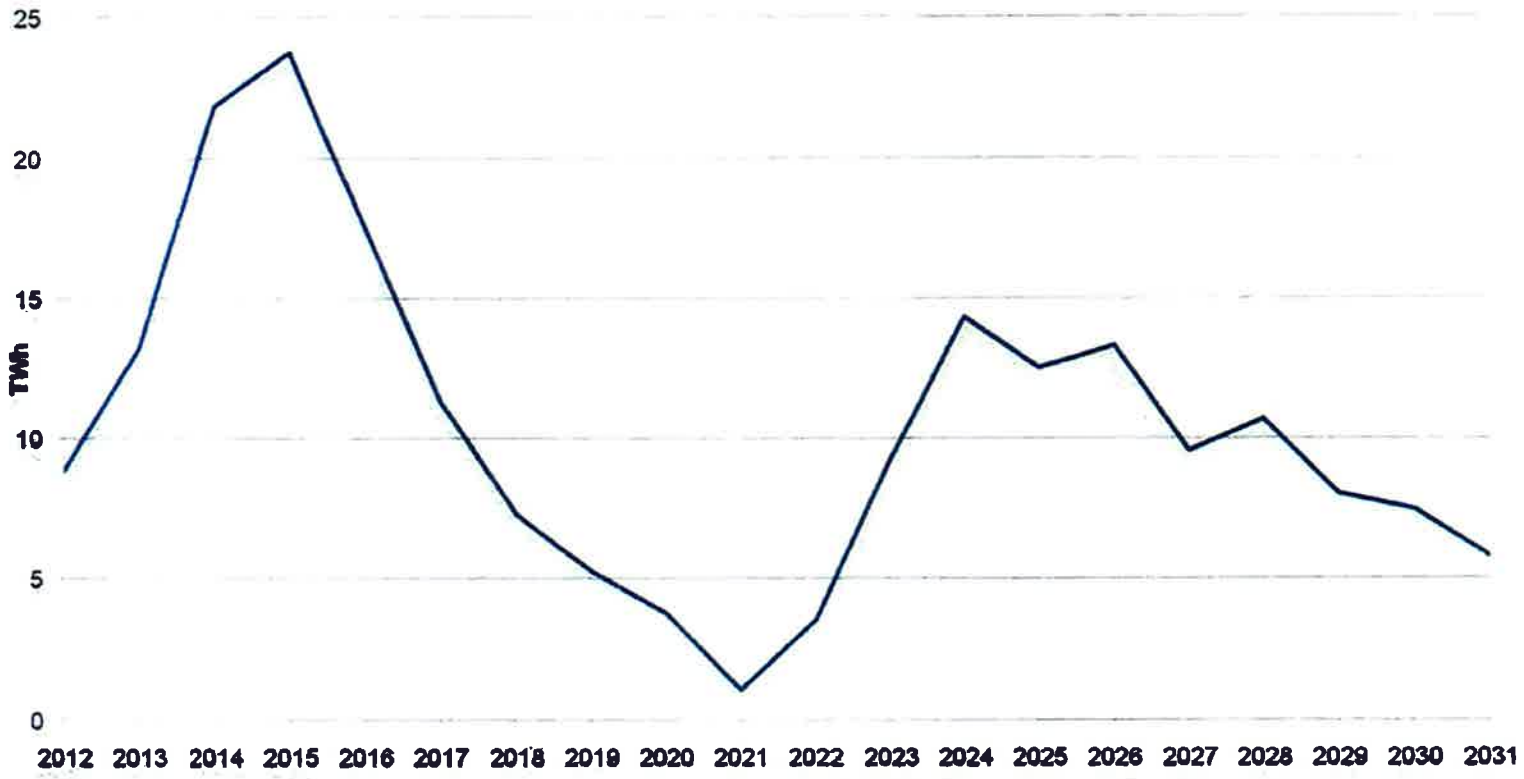
Nuclear Shutdown (3 alternatives) - Expanded Manoeuvring plus:
- Bruce Power asset management plan
- OPG updated life management outages
- Bruce Power plan & OPG life management outages

These options:
- Would reduce and help manage overall Provincial SBG
- Except for Dispatch Management, would not alleviate regional congestion issues
- Except for Dispatch Management, would not alleviate operability issues such as ramping requirements

Updated Comparison of Nuclear Options: Contribution to Managing SBG

	Expanded Manoeuvring	Dispatch Management for All Resources plus Expanded Manoeuvring*	Expanded Manoeuvring plus Bruce Asset Management	Expanded Manoeuvring plus Pickering Life Management	Expanded Manoeuvring plus Bruce Asset Management and Pickering Life Management
1.0	TWH of SBG Remaining after Exports and Mitigation Options**				

Production in excess of Ontario Demand Based on LTEP (Illustrative)



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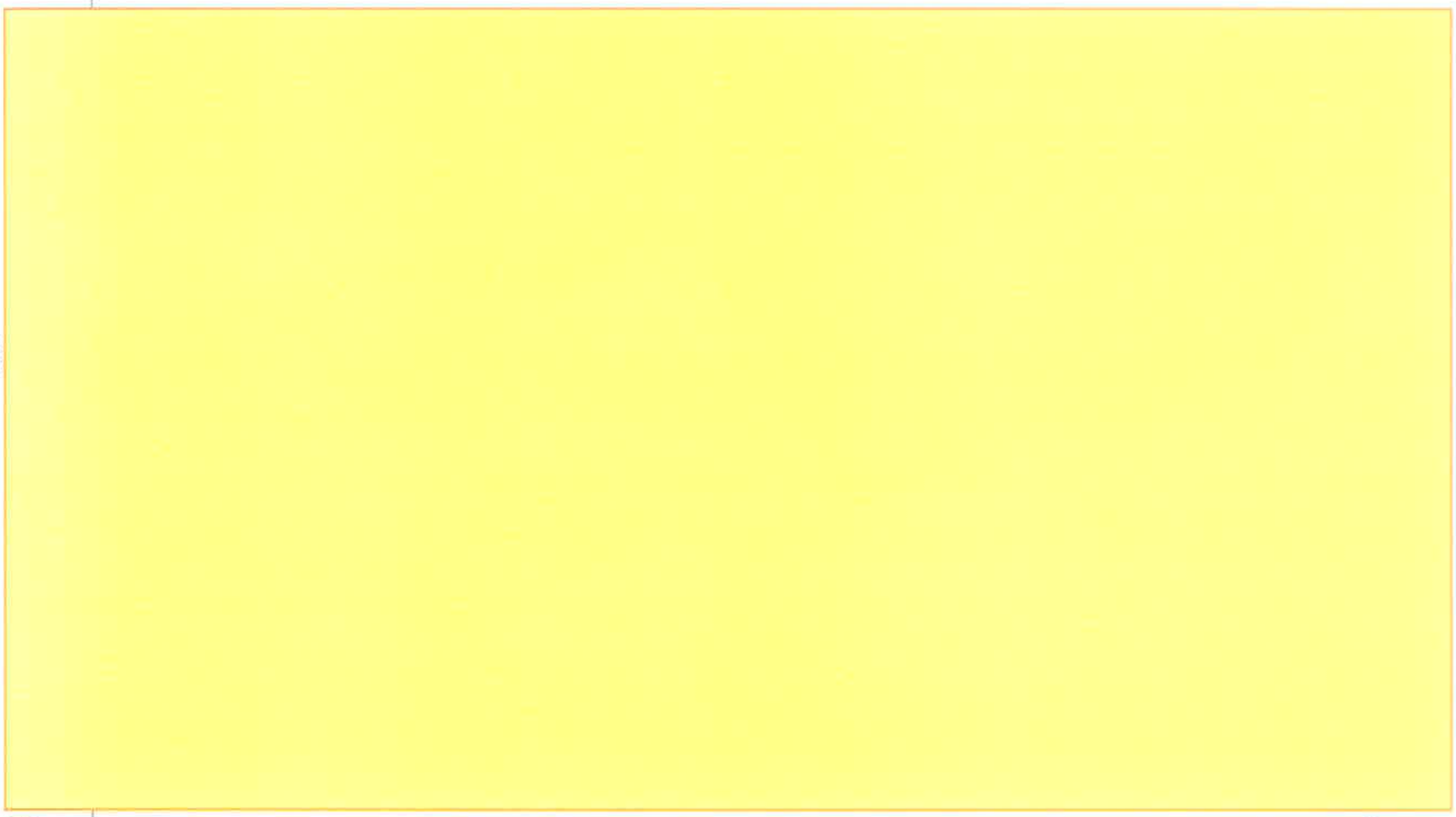
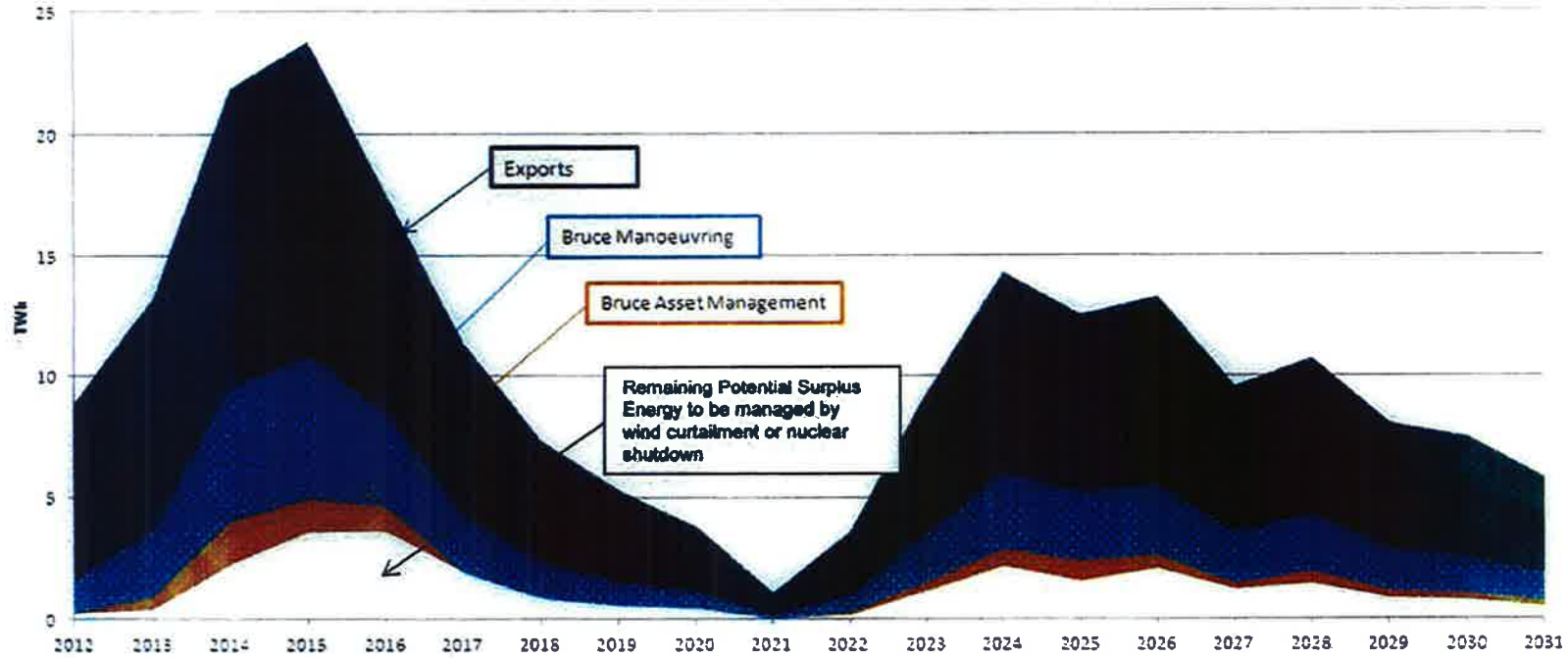
Production In Excess of Ontario Demand With Dispatch Management for all Resources and Expanded Bruce Manoeuvring, and Bruce Asset Management and Pickering Life Management (Illustrative)



Production In Excess of Ontario Demand Less Expanded Bruce Manoeuvring and Bruce Asset Management (Illustrative)



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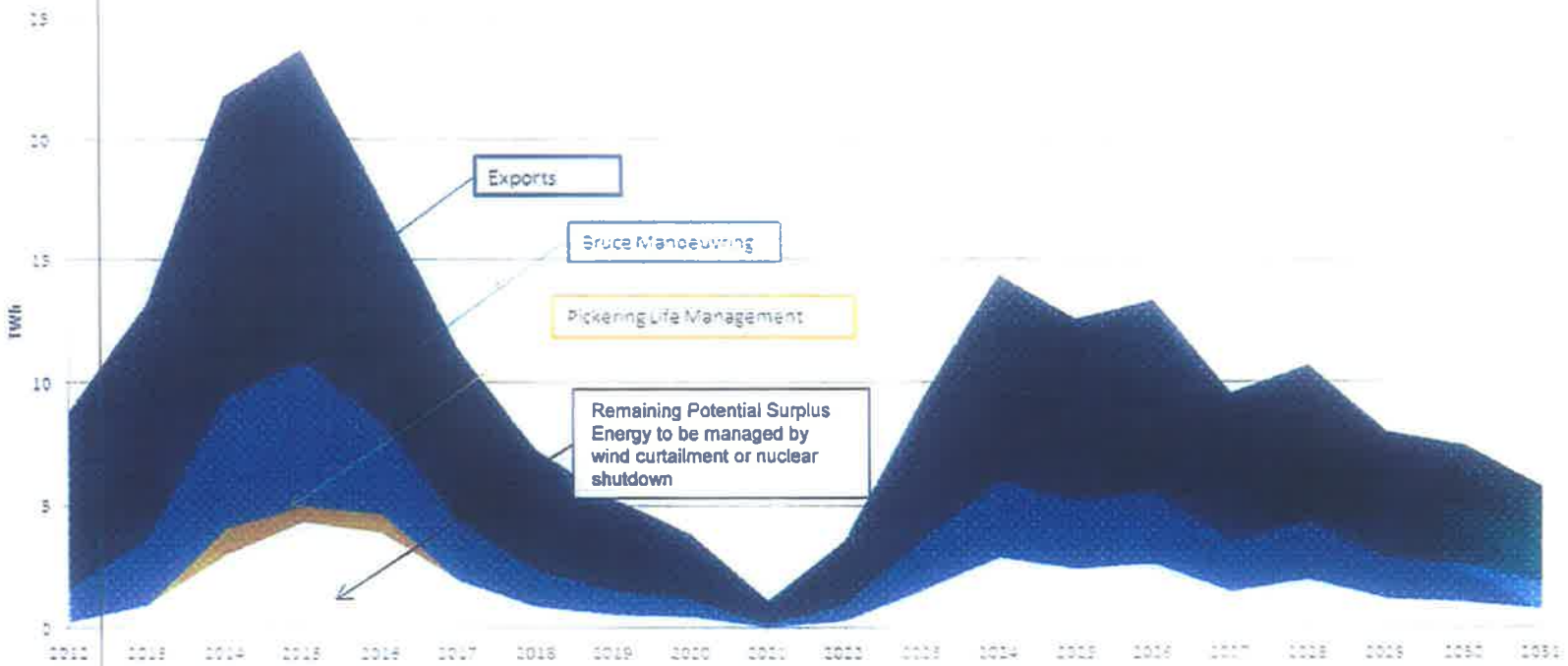
Production In Excess of Ontario Demand Less Expanded Bruce Manoeuvring and Pickering Life Management (Illustrative)



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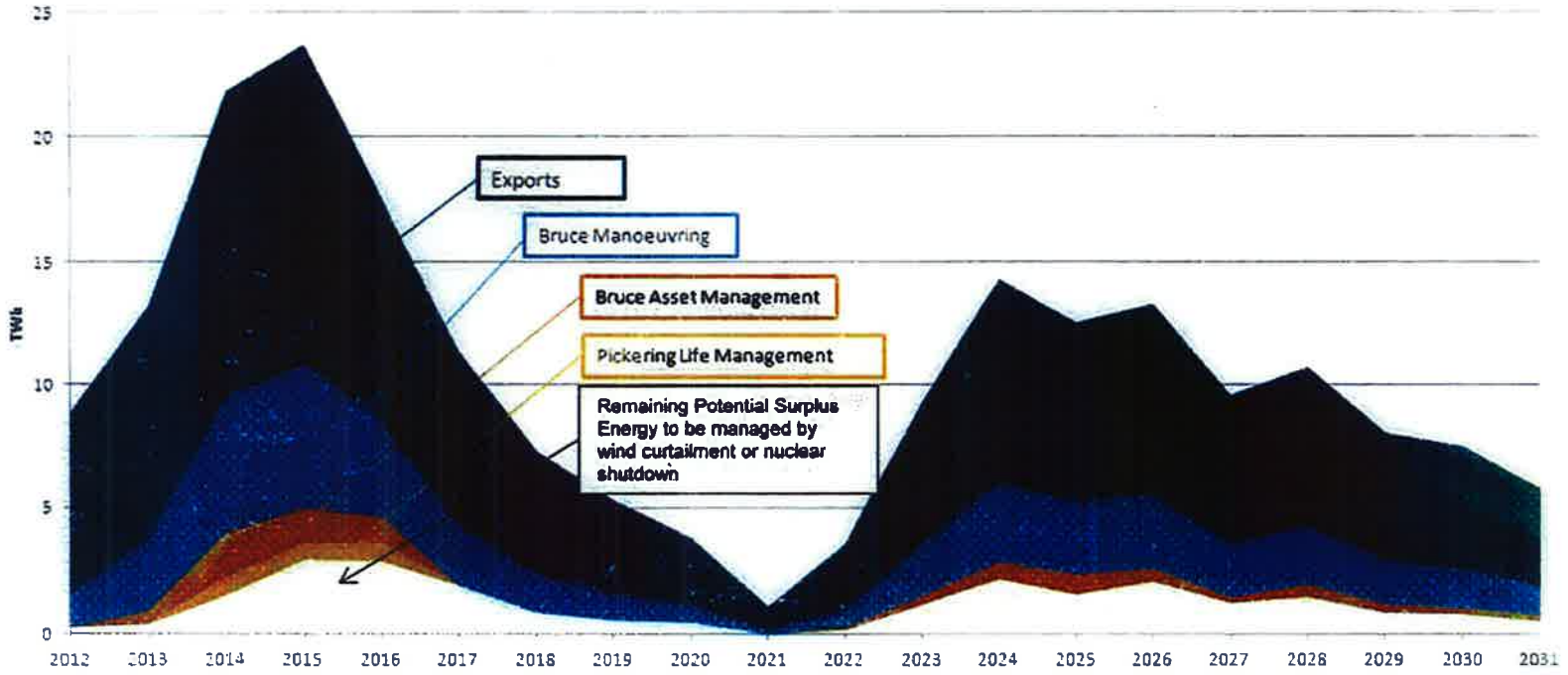
Production In Excess of Ontario Demand Less Expanded Bruce Manoeuvring, Bruce Asset Management and Pickering Life Management (Illustrative)



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