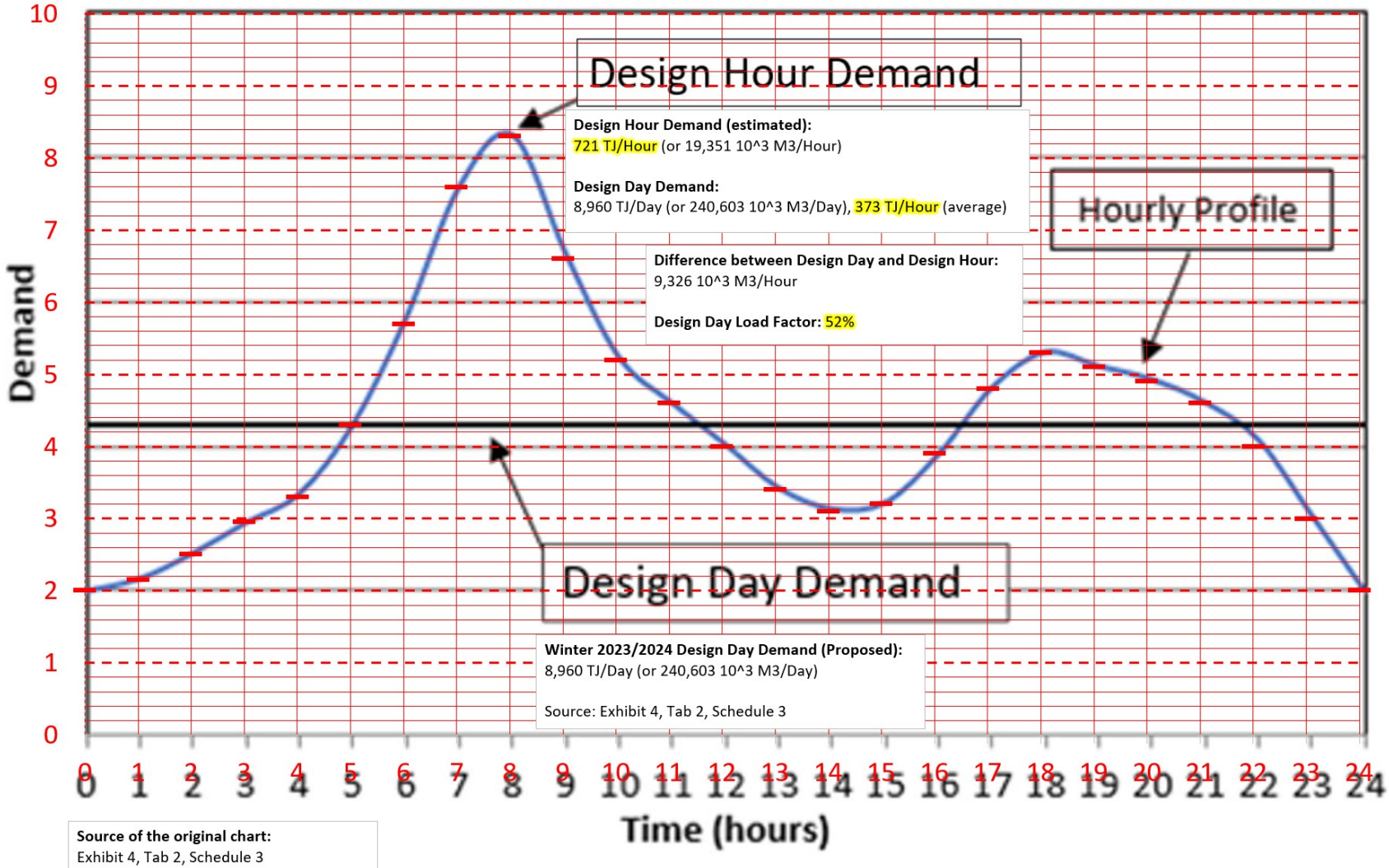
BOMA Compendium
EGI Panel 11 Capex and AMP

Figure 1: Relationship Between Design Day and Design Hour Demand



Source of the original chart:
Exhibit 4, Tab 2, Schedule 3

"46. **Design day demand**, or the highest expected firm demand for natural gas on a day, is used for gas supply planning, and transmission and storage system planning.

Design hour demand, used for distribution system planning, is the highest expected hourly firm demand for natural gas within a day. Design hour demand is assumed to occur on the design day."

Source:
4.2.The Relationship Between Design Day Demand and Design Hour Demand
Exhibit 4, Tab 2, Schedule 3

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental Housing Providers of Ontario (FRPO)

Interrogatory

Reference:

Exhibit B, Tab 1, Schedule 1, Section 3,
Exhibit D, Tab 2, Rate Order Working Papers Schedule 11 and
EB-2020-0095 Exhibit I.FRPO.3, .5 and .6
EB-2019-0159 Exhibit A, Tab 7, Schedule 1

Preamble:

In last year's proceeding in FRPO. 5, we asked:

> *Please provide the resulting design day simulation results for this applications Dawn-Parkway system assuming that Parkway deliveries moved to Dawn as a result of the PDO settlement agreement:*
> *a) Were moved*
> *b) Were not moved (i.e., before and after application of existing PDO to show effect)*

While EGI provided a high-level answer, we did not receive the simulation results for that winter.

Question(s):

Please provide the resulting design day simulation results for this applications Dawn-Parkway system assuming that Parkway deliveries moved to Dawn as a result of the PDO settlement agreement:

a) Were moved
b) Were not moved (i.e., before and after application of existing PDO to show effect)
c) Please provide the resulting pressures and flows on a schematic like the example referenced from EB-2019-0159 (even if the minimum inlet design pressure at Parkway is not achieved)
d) Please provide the minimum inlet design pressure required at:
   i) Parkway to compress to TCPL
   ii) Inlet to legacy EGD facilities at Lisgar (entrance to EGD rate zone)

Response:

a - b)

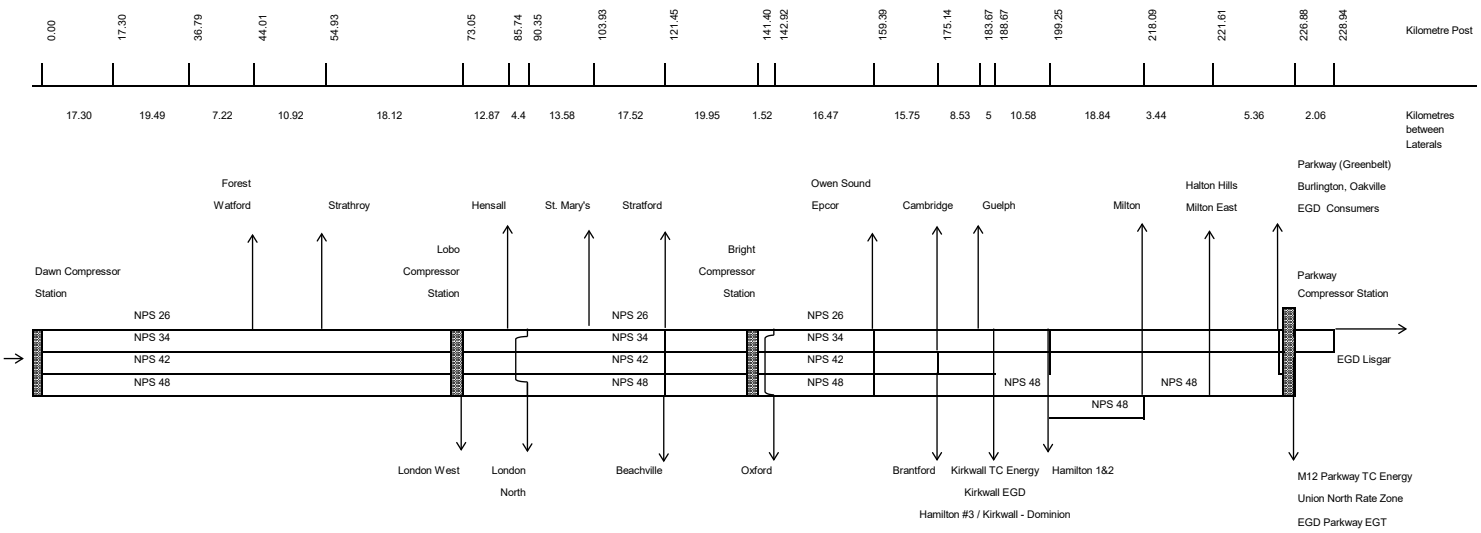
Firm obligated deliveries at Parkway increase the Dawn Parkway System capacity by an equivalent amount. Assuming that firm obligated Parkway deliveries were shifted to Dawn, the Dawn Parkway System capacity would decrease by approximately 244 TJ/d in winter 2022/2023. The 244 TJ/d is equal to the PDO by direct purchase customers without M12 service provided at Exhibit B, Tab 1, Schedule 1, Appendix A, page 1, column (g), row 13. The schematic for Winter 2022/2023 is provided in Attachment 1.

c) Under design day conditions, if the 244 TJ/d of PDO were moved to Dawn, the resulting Dawn Parkway System simulation would be infeasible and will not solve for the design day. The suction pressures at Parkway compressor station would drop below minimum requirements preventing the compressors from being operable. As a result, Parkway's discharge pressure would drop below contractual requirements.

d) i) At Parkway the absolute minimum inlet design pressure to operate the compressors is 3,380 kPag.

ii) The minimum inlet design pressure to legacy EGD facilities at Lisgar is 3,450 kPag.

Dawn Parkway System Demands Winter 2022/2023



Dawn Parkway System Design Day Demands

Infranchise

Union South Rate Zone	(GJ/d)
Forest, Watford	10,804
Strathroy	19,058
London West	147,589
Hensall	46,115
London North	107,297
St. Mary's	8,972
Stratford	43,965
Beachville	60,153
Oxford	47,921
Owen Sound	288,308
Cambridge	84,065
Brantford	111,919
Kirkwall - Dominion	86,453
Guelph	98,693
Hamilton 3	63,779
Hamilton 1&2	288,788
Milton	71,757
Milton East	9,211
Halton Hills	136,834
Parkway (Greenbelt)	24,007
Burlington, Oakville	187,464
Total Union South Rate Zone	**1,943,152**
Union North Rate Zone	**442,149**
EGD Rate Zone	
Kirkwall	70,895
Parkway EGT	800,000
Consumers 1 and 2 / Lisgar	1,393,961
Parkway TC Energy	957,933
Total EGD Rate Zone	**3,222,789**

M12 Exfranchise

Kirkwall	49,500
Parkway TC Energy	2,325,135
Total M12	**2,374,635**
M17 Exfranchise	
Epcor	8,863
Total M17	**8,863**
Total Design Day Demands	**7,991,588**

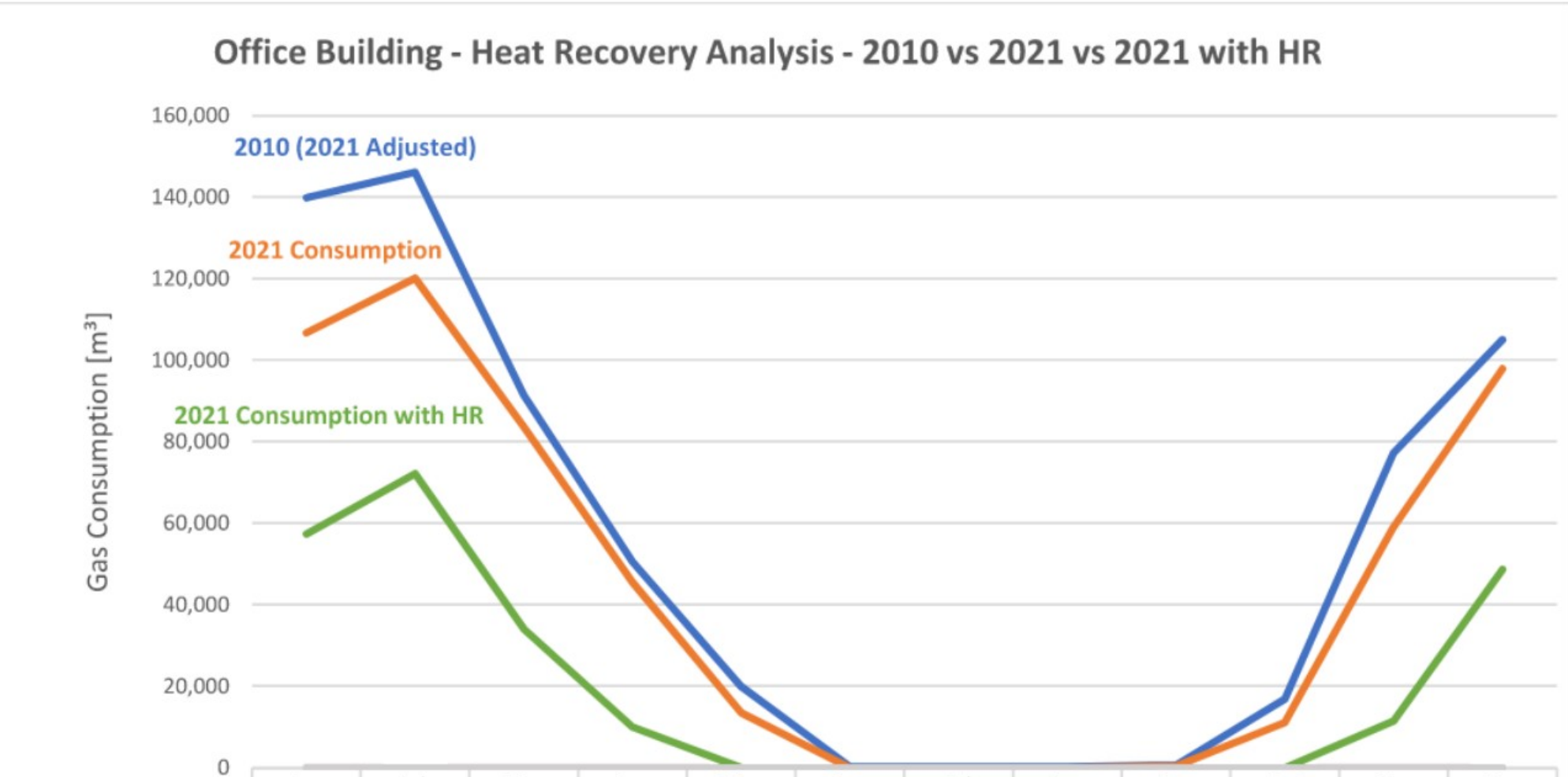
System Capacity

	(GJ/d)
Total System Capacity	**7,974,631**
(Including Firm Service Receipts of 249,860 (GJ/d)	
Total Requirements	**7,991,588**
Total (Shortfall) Surplus	**(16,957)**

Winter Design Day
Dawn Parkway System
Winter 2022/2023

Compressor Stations Operating Conditions at Peak Hour

STATION	LOBO	BRIGHT	PARKWAY
Power Available (MW)	102.9	129.0	88.1
Power Required (MW)	102.9	129.0	88.1
Pressure			
Suction (kPa)	3,725	3,482	3,592
Discharge (kPa)	5,518	5,930	6,453
Compression Ratio	1.48	1.70	1.80
Flow (GJ/d)	7,325,796	6,902,533	4,287,513
Daily Fuel (GJ/d)	34,529	28,403	18,267



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010 (2021 Adj)	139,785	146,068	91,387	50,508	19,850	250	258	258	598	16,798	77,193	104,961
2021 Total	106,636	120,140	83,671	45,491	13,363	0	0	0	292	11,131	58,976	97,779
2021 with HR	57,279	72,110	34,035	9,969	0	0	0	0	0	0	11,424	48,672
Reduction	59%	51%	63%	80%	100%	100%	100%	100%	100%	100%	85%	54%

Figure 8: Monthly consumption office building

overarching requirement is to align all parties, frameworks, scorecards and proceedings with the urgent need to scale up reductions in gas use and emissions now.

N. M3. Staff-2

a) *Should Enerlife's proposal to use a 30% reduction by 2030 in weather normalized gas use for the commercial buildings' sector be adopted as an alternative forecast for 2030, what level of reduction in design day or design hour demand would Enerlife recommend Enbridge Gas use for the commercial sector? Would this be less than, equal to, or greater than the proposed 30% reduction in overall gas use? Please provide supporting rationale for Enerlife's recommendation.*

The proposed 30% reduction by 2030 scenario is based just on widespread adoption of operational improvements and cost-effective energy efficiency retrofits, which have a greater impact on volume than peak gas demand. Common measures such as equipment scheduling, retro-commissioning, building automation programming, upgraded boiler controls and conversions from constant flow to variable volume systems avoid excessive heating demand under low load more than peak demand conditions and in some cases may cause spikes which actually increase peak gas demand. Other efficiency measures, such as improved control of outside air volumes and building envelope upgrades, can reduce peak demand as well as consumption. Our previous work in this area back in 2013 provided evidence for EB-2012-0451 (Enbridge Gas Pipeline Hearing), estimating peak demand savings in the range of 15% to 20% for commercial and apartment building segments in Toronto. While every building is different, we estimate that peak demand reductions due to energy efficiency in the order of 15% to 20% will accompany the 30% volume reduction.

Decarbonization measures have a far greater effect on peak demand. Commercial building owners are prioritizing peak heating demand reduction in order to reduce the size and cost of new low carbon plant and the expected ultra-high cost of energy on the peak coldest days. We have modeled the peak demand reductions due to exhaust air heat recovery and heat pump measures for the commercial office building (Heat Recovery Chiller HRC) and the K-12 school (Air Source Heat Pump ASHP) described in Sections 5.2 and 5.3 of our evidence.

Figure N1 shows the office building gas demand profile (blue) and the corresponding outdoor temperature (orange). Note the spike in demand each morning as the building returns to normal space temperatures following overnight setback. The impact of ventilation is also apparent as daytime demand jumps to around five times overnight levels when the fans are running. The yellow and green curves are the recoverable heat from exhaust air and heat recovery chiller respectively.

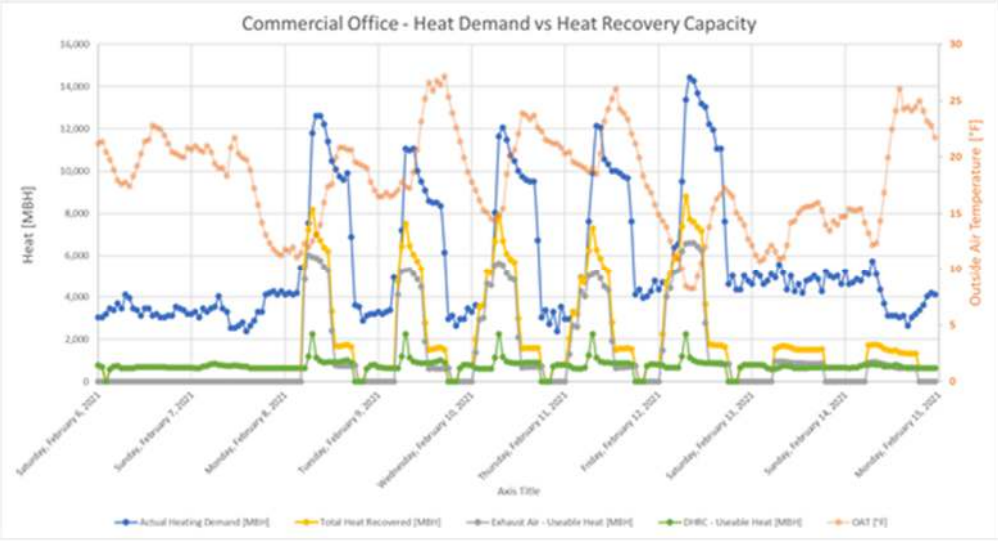


Figure N1 Office building gas demand and heat recovery profiles

Peak demand reductions due to these decarbonization measures are presented in Table N1, with the office building peak coming down by 50% and the school by as much as 80%. Heat recovery from washroom and general exhaust air systems to preheat incoming cold outside air is the dominant factor for reducing peak gas demand in commercial buildings. While every building is different, we anticipate these kinds of peak demand reductions in most buildings as net zero planning turns to implementation.

	Peak Demand MBH	Reductions (MBH) due to		Total Peak Reduction %
		Exhaust Air Heat Recovery	Heat Pump	
Commercial Office (Feb 2021)	14,433	6,596	1,147	53%
K-12 School (Jan 2019)	763	332	281	80%

Table N1 Peak gas demand reduction due to decarbonization measures

We again emphasize the importance of advanced gas metering (AMI), our recommendation 7, in enabling owners and Enbridge Gas to manage and significantly reduce peak gas demand. The modeling used for our evidence is based on hourly use data from two owners' independent metering systems. The data allow us to identify when peaks occur and take evidence-based action to reduce them. Very few owners now have this capability. The AMI will enable effective demand response by individual buildings and for the gas supply system as a whole (as we have had for well over a decade for electricity), providing additional insight for IRP, distribution system planning and customer connections.

b) *Enbridge Gas is proposing that the design criteria be determined using the coldest day on record, as measured by heating degree days (HDDs) for a specified timeframe, adjusted for wind speed, and is proposing to change the base temperature used to calculate HDD to 15°C. Does Enerlife recommend changes to this approach, based on its experience with commercial buildings? If so, please describe and provide rationale.*

Yes. As discussed in Sections 2.2 and 5.4 of our evidence, we see minimum outdoor temperatures rising steadily as a results of climate change, making "the coldest day on record" no longer appropriate. The 15°C base (balance) temperature is appropriate for commercial buildings today but will decline further over the coming years due to wider adoption of energy efficiency and decarbonization measures.

N. M3. Staff-3

a) *Enerlife notes the emissions reduction targets for the building sector in Canada's 2030 Emissions Reduction Plan as support for the proposed 30% reduction in gas use by 2030, as well as the technical potential arising from top quartile target gas savings potential results. Are there other factors that suggest to Enerlife that a 30% reduction in commercial sector gas volumes by 2030 has a reasonable likelihood of being achieved? If so, please describe.*

Yes. The Simcoe County District School Board and Cadillac Fairview are among the growing number of commercial owners taking systematic action for more than a decade to meet these top-quartile targets. There is ample evidence showing these targets to be achievable and demonstrating how. Climate Challenge Network's programs in healthcare, municipalities, K-12 schools and post-secondary institutions have documented case studies and savings achieved https://climatechallengenetwork.org/ . The data presented in Sections 4.1 and 4.2 of our evidence reinforce this conclusion, showing how previously unreported and unexplained gas use increases in hundreds of existing buildings have been masking actual progress being made while many new buildings are failing to meet, often by a wide margin, the energy efficiency levels they should be capable of. Fixing these issues with current and future DSM programming will

Table 1
Utility Capital Expenditures by Asset Class

Line No.	Particulars ($ millions)	Utility(1)	2013 Actual (a)	2014 Actual (b)	2015 Actual (c)	2016 Actual (d)	2017 Actual (e)	2018 Actual (f)	2019 Actual (g)	2020 Actual (h)	2021 Actual (i)	2022 Actual (j)	2023 Bridge Year (k)	2024 Test Year (l)	2025 Forecast (m)	2026 Forecast (n)	2027 Forecast (o)	2028 Forecast (p)	
1	Compression Stations	EGI		13.9	26.8	19.9	22.6	10.6	25.5	26.5	42.3	106.8	321.8	46.3	64.3	50.3	127.6	19.2	/u
2	Customer Connections	EGI		175.4	162.0	154.8	147.0	151.1	190.4	178.7	260.7	297.0	286.3	304.1	248.1	256.9	254.0	250.1	/u
3	Distribution Pipe	EGI		119.6	120.5	144.0	144.2	139.8	175.1	192.8	447.2	477.5	237.5	357.1	414.4	282.7	250.2	316.4	/u
4	Distribution Stations	EGI		27.2	32.6	38.7	39.0	38.1	39.7	61.4	91.2	97.1	67.5	83.5	113.1	105.5	79.0	116.3	/u
5	Fleet & Equipment	EGI		28.6	22.1	7.8	18.9	15.3	26.3	20.2	26.7	30.6	8.9	31.5	35.4	40.1	45.7	52.3	/u
6	Growth - Distribution System Reinforcement	EGI		20.2	20.3	42.3	26.6	36.4	144.1	70.0	48.5	69.4	55.1	85.2	200.0	43.4	46.0	10.3	/u
7	Real Estate & Workplace Services	EGI		24.9	36.3	30.3	17.4	21.2	42.0	38.3	95.0	66.6	63.0	63.0	61.3	92.0	32.0	56.4	/u
8	Technology Information Services (TIS)	EGI		48.5	46.8	42.6	50.1	56.6	48.9	22.7	22.8	28.1	47.1	102.4	78.0	71.0	44.9	54.1	/u
9	Transmission Pipe and Underground Storage	EGI		12.1	26.8	13.0	21.5	18.5	20.3	33.5	79.5	62.6	79.0	69.2	144.8	201.5	268.4	169.9	/u
10	Utilization	EGI		66.9	71.7	73.3	74.6	75.2	99.3	62.9	80.7	98.4	160.7	152.3	160.1	172.6	152.0	168.4	/u
11	EA Fixed Overhead	EGI		13.7	17.0	17.3	17.1	15.8	17.8	19.5	25.4	27.0	25.6	39.8	40.8	41.9	43.0	23.2	/u
12	Capitalized Overheads	EGI		197.8	200.2	212.5	209.8	207.0	215.2	220.9	-	-	-	-	-	-	-	-	/u
13	Integration Capital	EGI		-	-	-	-	-	21.7	39.8	63.0	26.5	20.0	-	-	-	-	-	/u
14	Community Expansion	EGI		-	-	-	7.8	4.1	17.1	20.9	17.4	14.2	20.6	11.2	19.6	20.5	21.5	7.3	/u
15	GTA	EGI		172.4	551.1	114.8	4.8	-	-	-	-	-	-	-	-	-	-	-	
16	WAMS	EGI		19.3	27.5	35.7	2.0	-	-	-	-	-	-	-	-	-	-	-	
17	CPT	EGI		154.6	352.6	690.8	367.9	156.1	-	-	-	-	-	-	-	-	-	-	/u
18	Other	EGI		3.0	0.3	1.2	2.5	0.2	3.9	(0.9)	10.5	1.1	34.3	124.6	43.9	28.3	28.0	35.7	/u
19	Union Unregulated	EGI		(9.2)	(7.9)	(11.0)	(21.2)	(13.4)	-	-	-	-	-	-	-	-	-	-	
20	Total		886.0	1,089.2	1,706.7	1,627.9	1,152.4	932.5	1,087.4	1,007.2	1,310.8	1,402.9	1,427.2	1,470.3	1,623.8	1,406.7	1,392.3	1,279.5	/u

(1) 2013 to 2018 represents the combined values of EGD and Union.
(2) Total capital expenditures excludes Panhandle Regional Expansion Project amounts of $34.2 million in 2022, $22.7 million in 2023, $194.9 million in 2024 and $6.7 million in 2025.