CLASS A CUSTOMERS

GLOBAL ADJUSTMENT DISPLACEMENT (GA)

A Case for Continuous Duty Gas Engines for GA Displacement

COGENERATION WORLD

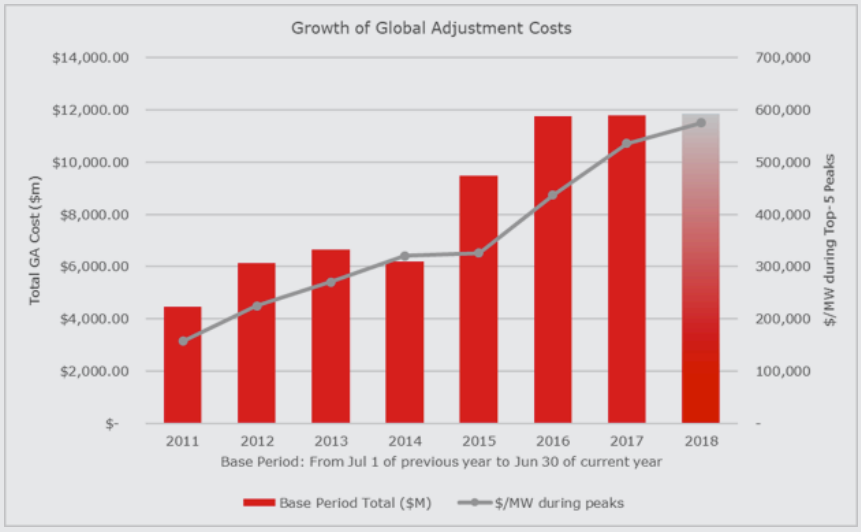
GA continues to be a significant cost to the Ontario (ON) electricity ratepayer

- GA charges constitute ~ 60% of the average Class A consumer bill
- There has been a steady increase in the $/MW paid by consumers as GA charges during the Top 5 ON grid peaks
- With GA Costs projected to be substantial in the near future, and with an increased number of consumers curtailing demand, those with no curtailment measures may stand to face increased GA charges on their utility bills
- For each MW of customer-side demand reduction during ON grid peaks a customer could currently stand to save more than $ 575,000/MW per year
- A typical 3 MW on-site power system has the potential to save more than $1.7 M annually

CAGR of GA Costs 2010 - 2018

Total GA Cost **21%**

$/MW During Peaks **22%**



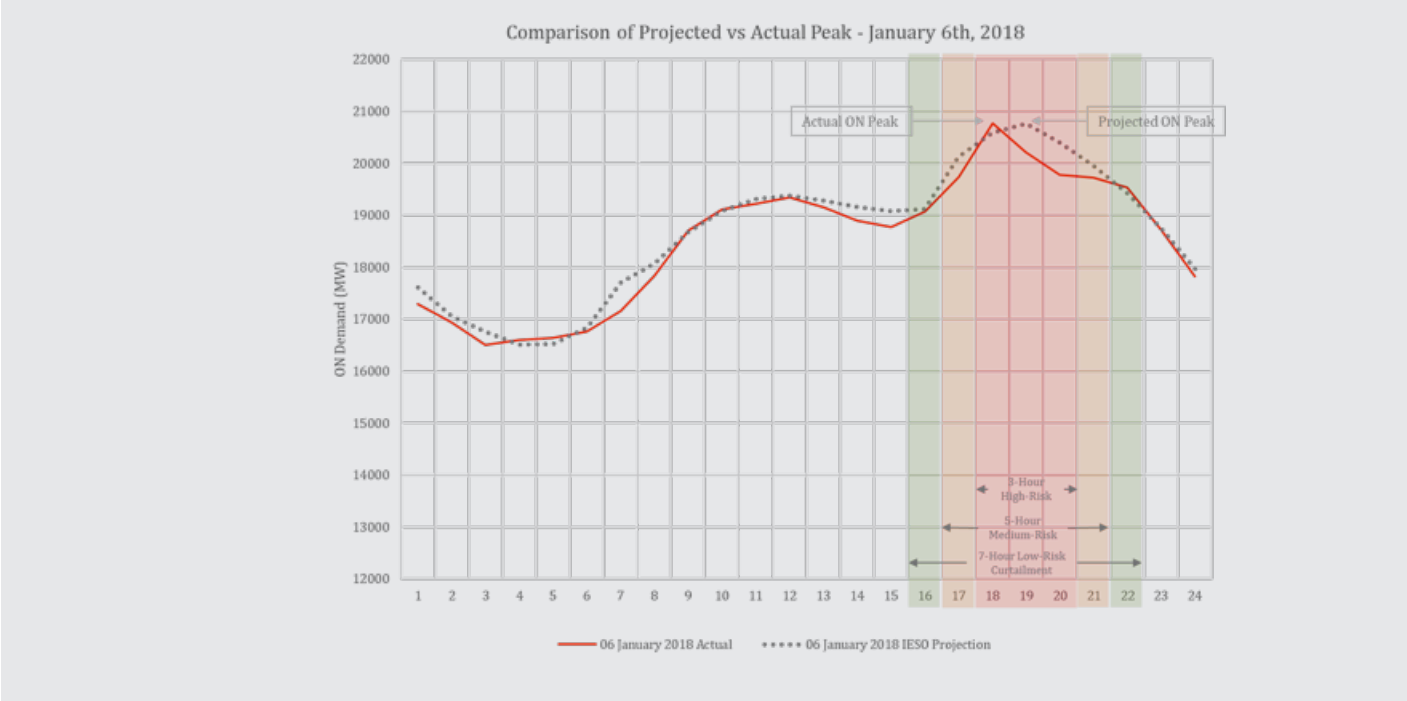
Source: Represented using IESO Global Adjustment data

EPS AB can support customers to define the opportunity, select an optimal system configuration AND financing option, and execute

[1] Ontario Electricity Board (OEB), Market Surveillance Panel Monitoring Report on the IESO, Oct 2017

Changing Landscape of GA Displacement Strategies

a) Lower predictability of intra-day peak hour due to larger number of Class A consumers displacing demand



- In 2010, when the concept of GA displacement was first introduced, approximately 250 consumers automatically qualified as Class A with 12-month average peak demands greater than 5MW; in 2015 the scheme was opened for consumers with demand greater than 3MW, entitling a further 1500 consumers for participation
- Since 2017, with lowering of the average demand threshold to 500 kW, over 2,500 consumers with a combined demand of over 3,000 MW are eligible for GA Cost reduction through demand curtailment
- As an increasing number of consumers curtail demand during 'Projected ON Peaks' – therefore reducing ON grid demand for short periods – the actual peak for the day may be recorded at a time prior or later than the 'Projected ON Peak'.

b) Load curtailment for longer duration to account for unpredictability of peaks and settlement disparity

Hour Ending	15	16	17	18	19	20	21	22	23
LOW RISK									Can mitigate peak projection and AQEW settlement disparities
MEDIUM RISK								May mitigate either peak projection or AQEW settlement disparities	
HIGH RISK							May mitigate neither peak projection nor AQEW settlement disparities		

Source: Represented using IESO Global Adjustment data, Accessed Dec 2017

- A low-risk GA displacement strategy would therefore require running of on-site generation equipment for longer periods of the day as made feasible by continuous cycle gas engines

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c) Additional revenue streams from running against retail electricity prices

- When the cost of electricity purchased from the grid is higher than the cost of running the on-site generating equipment.
- Continuous duty on-site generation for GA displacement can also be programed to automatically run behind-the-meter when the cost of generation is less than the estimated real-time retail price of electricity at the site
- This represents an additional savings stream for consumers using continuous duty gas engines – a flexibility that is not afforded by battery systems (with limited discharge) and standby gas engines (not configured to run on demand)

d) Preparedness for GA regime change

- The GA Cost regime, in its current form, is expected to continue for the foreseeable future. However, if the market does indeed change, and GA costs can no longer be reduced though demand curtailment, the continuous duty gas engine represents a compelling hedge against future electricity costs. This caps the consumer's electricity cost to the cost of running the engine which at today's costs of natural gas and O&M is not more than 8 ct/kWh; whilst utilization of engine heat recovery can offer further savings.

Benefits of Continuous Duty Gas Engine for GA Displacement

	CONTINUOUS DUTY GAS ENGINES FROM EPS-AB	BATTERY SOLUTIONS	STANDBY GAS ENGINES	STANDBY DIESEL ENGINES
On-site generation for brief periods (<2 Hrs) to catch ON peaks -> High risk strategy requiring precise peak prediction	√	√	√	√
Generation for extended periods to hedge against AQEW variation and "peak shifting" due to simultaneous curtailment by consumers	√	x	√	√
Deliver full rated power for the life of the project	√	x	√	√
Ability to provide electricity during a prolonged power outage	√	x	√	√
Option for continuous operation if GA regime changes	√	x	x	x
Option to integrate engine heat recovery for additional savings in the future	√	x	x	x
Low cost of running ($/kWh) in continuous duty operation	√	x	x	x
Behind the meter generation (with automated dispatching) when retail electricity price exceeds cost of generation	√	x	x	x

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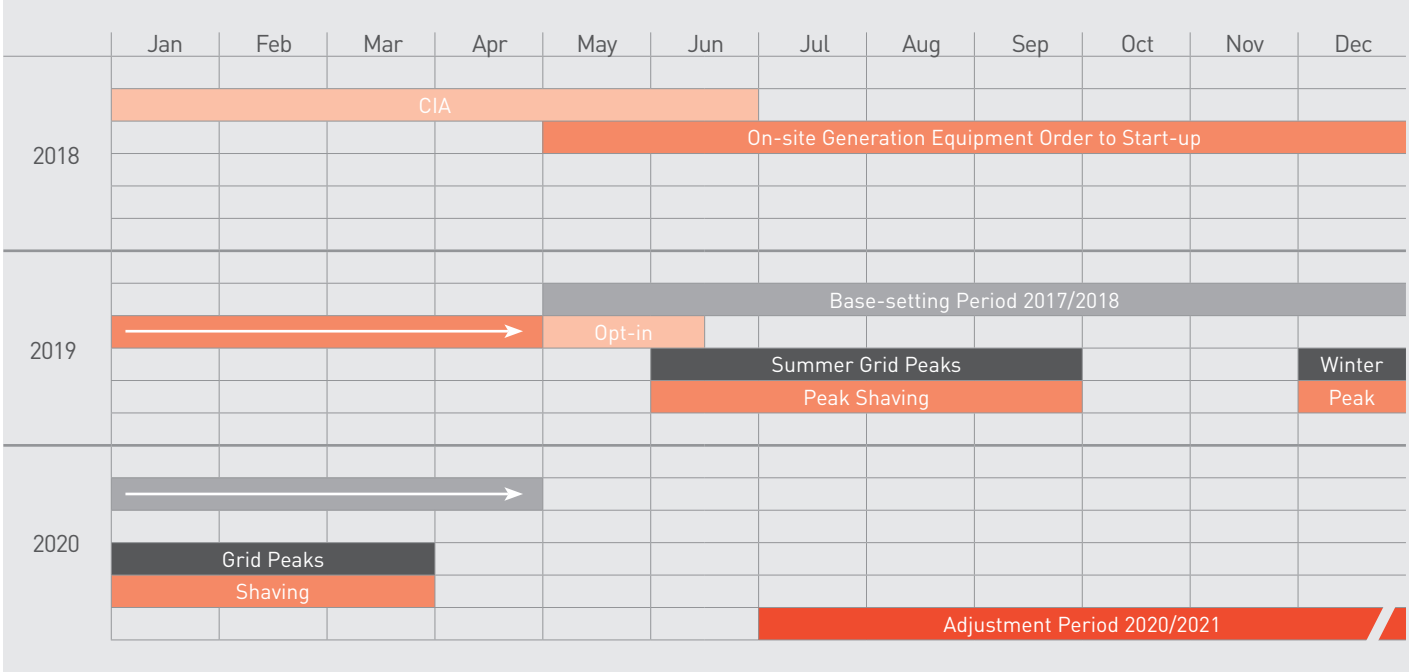
Next steps and Implementation Timelines

- Contact globaladjustment@gruppoab.com for further information.
- Engage EPS AB for no-obligation feasibility studies on potential GA savings, system sizing and financing options.
- Engage EPS AB for Connection Impact Assessment studies required for the LDC go-ahead for on-site generation.



Definitions:

CIA - Connection Impact Assessment; a mandatory study assessing the project's impact on the distribution grid; managed entirely by EPS-AB

Opt in – Customers eligible for GA are required to opt into the program by informing the Local Distribution Company (LDC) or the Independent Electrical System Operator (IESO) (automatic eligibility for customers with peak demand →5MW)

Base-setting Period – Measurement timeframe during which a customer's peak demand during the main Ontario grid peaks is recorded

Adjustment Period – Billing timeframe during which GA costs are charged to the customer proportionate to its peak demand recorded in the preceding Base-setting Period

3.3 MW EPS AB Energy Canada's "GA Buster", currently operating 5-10 hours during projected peak days to ensure GA avoidance and cost savings

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