Response to the IESO's White Paper on OPTIONS TO ENHANCE DER PARTICIPATION

December 10, 2020

TABLE OF CONTENTS

WHAT IS SENSORSUITE?

SensorSuite® Inc. ("SS") is a **complete energy intelligence platform** for facility owners and managers. SS's Energy Cloud Ecosystem ("ECE") delivers **high resolution** and **real time data** enabling their **customers** to make **better informed decisions** while extracting **more value** out of their electricity, gas and water assets.

ECE can be leveraged to **aggregate** and **co-ordinate DERs**.

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OUR COMPLETE ENERGY INTELLIGENCE PLATFORM

84
MURBs IN IESO AREA

103
MURBs ACROSS CANADA

1Billion
DATA POINTS PER YEAR ACROSS 16+ PARAMETERS

MULTI-UNIT RESIDENTIAL BUILDING (MURB)

13MW
CONTROLLABLE IN IESO AREA

VOLTAGE, CURRENT, USE, DEMAND, POWER FACTOR, OUTSIDE TEMP

EXTRACTING > VALUE FROM

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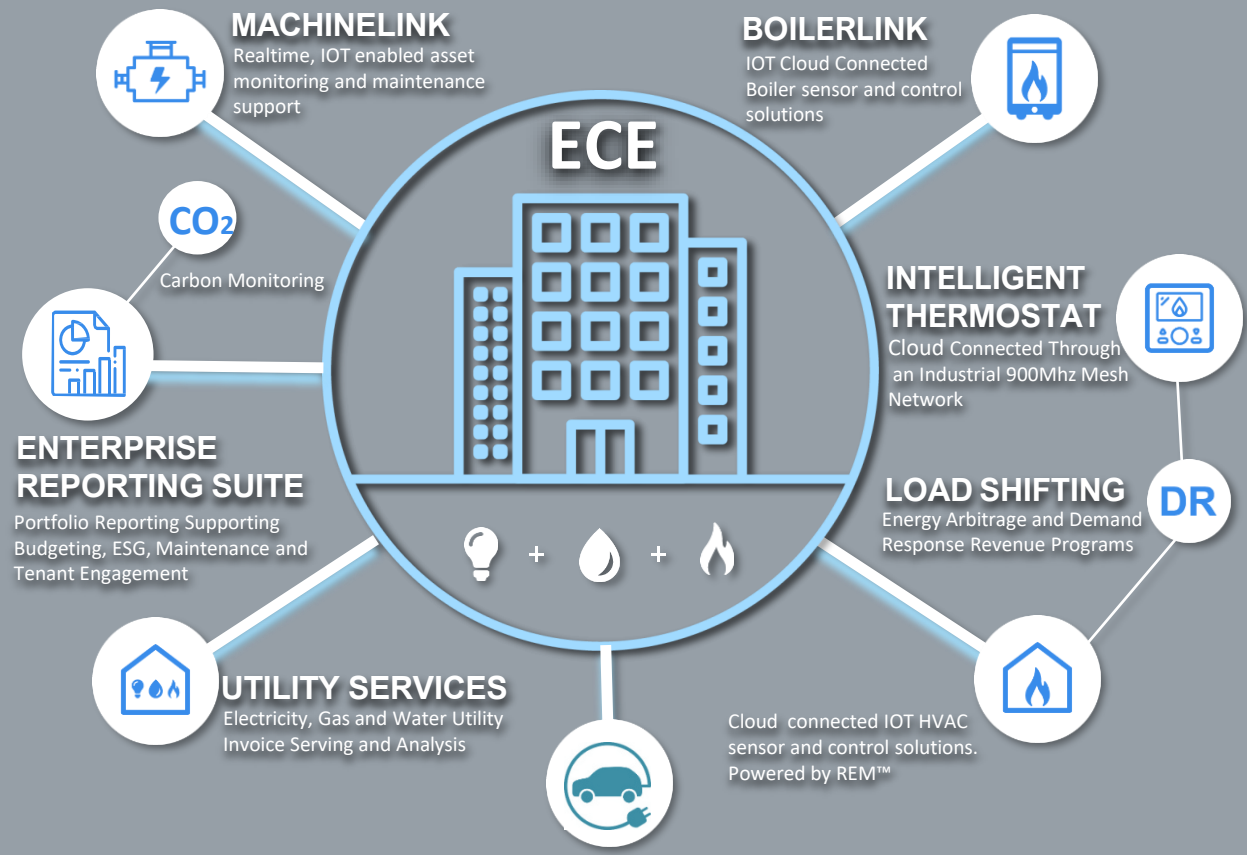
ENERGY CLOUD ECOSYSTEM



Coming End Q4 2020:

- **BAS Integration (BACnet/Modbus)**
- **Variable Frequency Drives (VFD's)**

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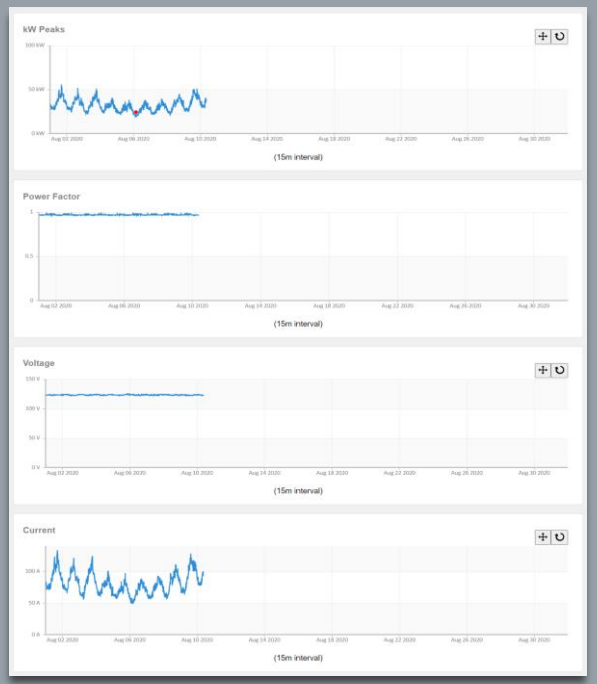
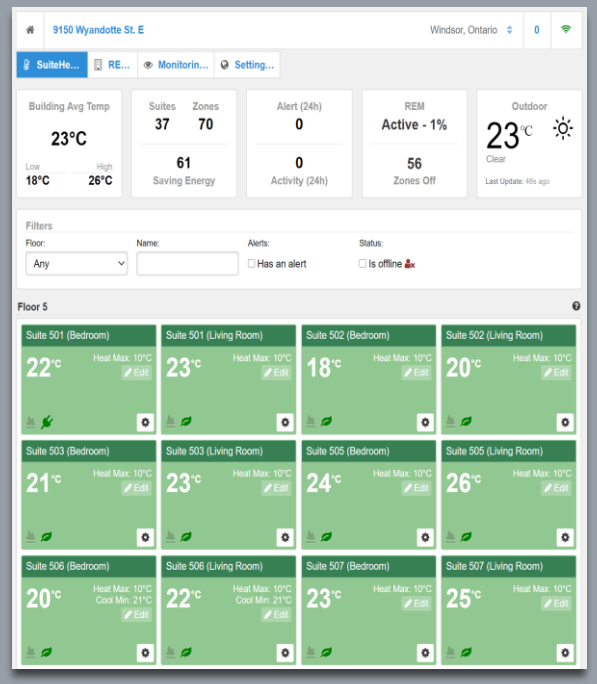
ENHANCED VISUALIZATION TOOLS

Asset Level



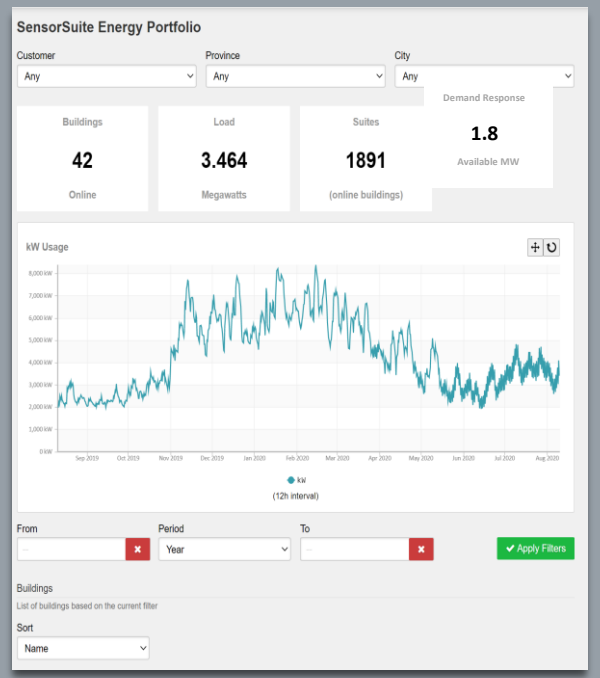
Cloud based, asset level monitoring and control tools for electric, gas and water assets

Building Level



Real time optimisation of electric heating circuits to improve comfort and eliminate needless waste of energy

Enterprise Level



Aggregation from asset level to building level to create a virtual, interactive and energy efficient grid resource

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- SS thanks and appreciates the efforts of the IESO in promoting deployment and operations of DERs.
- IESO's foresight to develop a market ecosystem that not only facilitates DER off-take, but also increases market competition, creates customer choice, and addresses climate goals is praiseworthy.
- SS is ready and able to bridge the data gap with exiting customer assets, and to help the IESO/LDC leverage energy resources to advance the DERs market.
- SS is providing key points in the following slides and is providing greater technical detail in the appendix.

SENSORSUITE'S PERSPECTIVES

- SS believes that for the integration of DERs and its aggregation, it is imperative to move from traditional planning to an "Integrated Distribution Planning" process (Illustrated)
- There is a need to expand objectives to include clean energy and climate goals, market options, flexibility, consumer-centricity, etc.
- Proactively include prosumers and other stakeholders in the planning process via stakeholder consultations and other participatory options.
- Need to increase data visibility and advanced forecasting with more granular data.
- Include DER operators, planners, aggregators, as part of the planning process to help develop a conducive market ecosystem and achieve common goals. DERs should become a mainstream player in the long-term planning process.
- Bridge any information/planning gap between the G-T-D, system planner, and DER operators/aggregators.

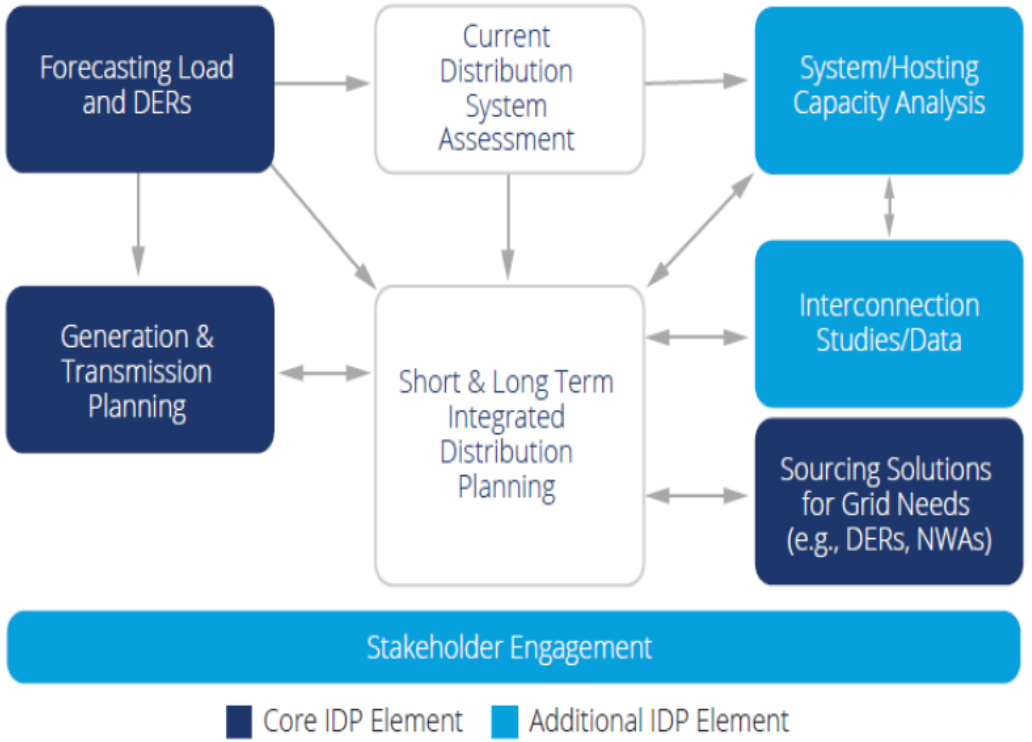
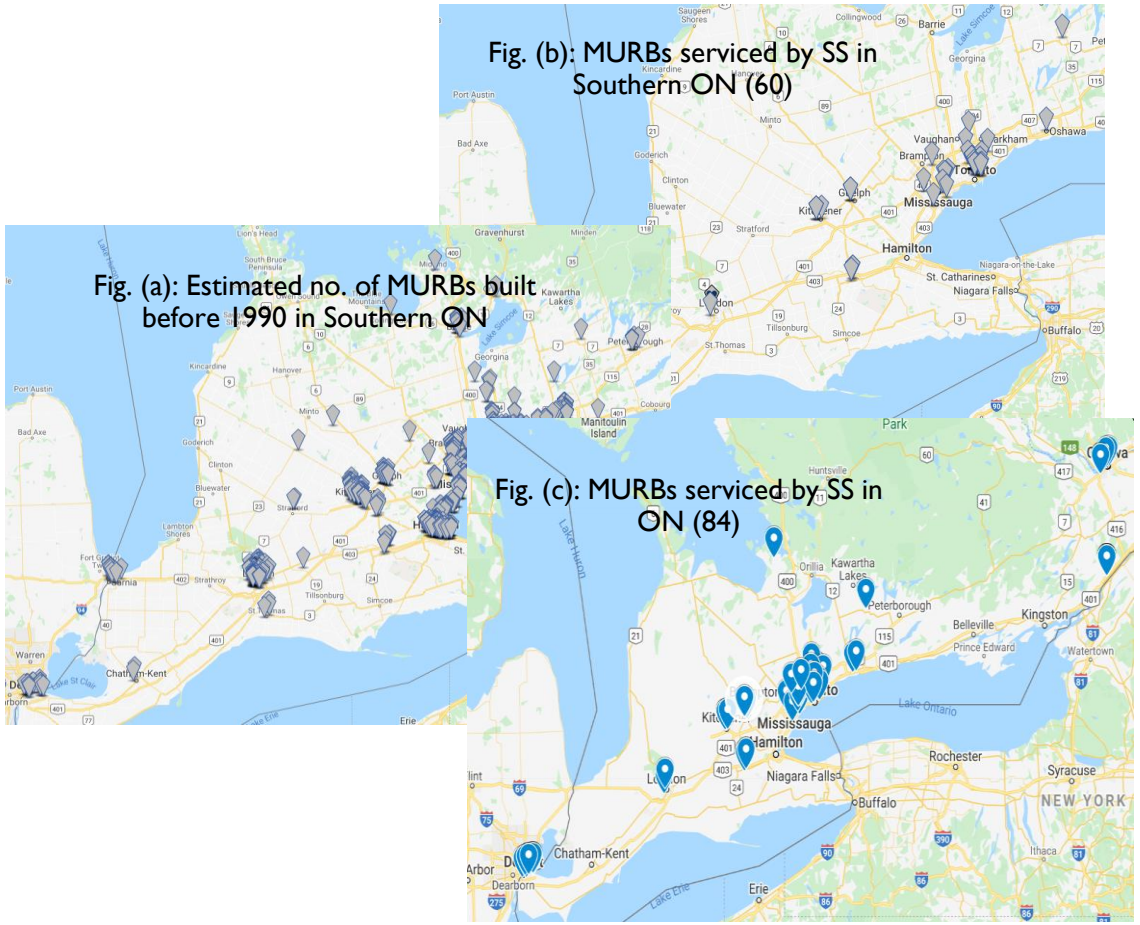


Fig. Source: Smart Electric Power Alliance

ENABLING DER INTEGRATION REQUIRES A CHANGE IN BUSINESS MODELS

- With ~4% market penetration in Southern ON in the MURB space*, SS not only gathers rich datasets with millions of data points over multiple parameters, but also understands consumer driven change in the DER space.
- Urban consumers in high demand regions are already rallying for a change as the requests to set up EV charging infrastructure has increased significantly in the buildings SS services. SS's ability to help visualise DER at the system level in real time can be easily leveraged by the IESO/LDC to better understand consumer behaviour, and to test aggregation opportunities.
- SS is equipped to lead pilots, and associate with the IESO and/or the LDC under various options proposed in the white paper viz. multi-nodal aggregation, improving data telemetry and visualisations, peak management/peak shaving specially in the high density urban setting i.e. MURBs and helping develop standardised protocols and procedures, etc.

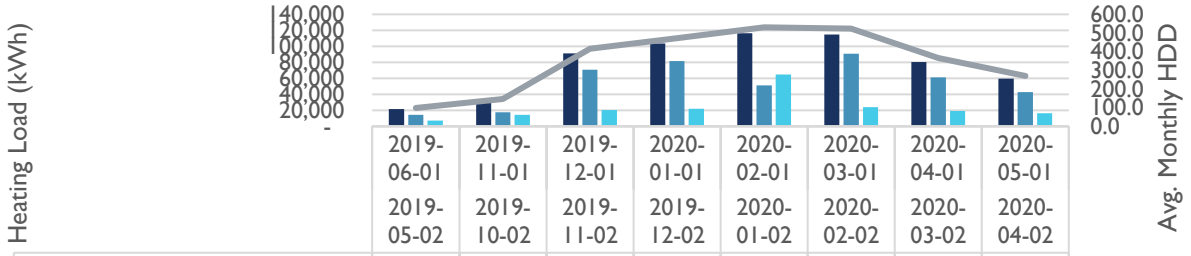


DELIVERING INSIGHTS INTO URBAN CONSUMER BEHAVIOUR

Note: *The geotag for MURBs in figures (a) & (b) is sourced from the buildings database available at www.costar.com. The actual numbers may vary for Fig (a)*
** MURBs with 100+ units*

- The REM (Responsive Energy Management) Tool is the SS energy efficiency optimization tool that combines data from external and internal sources and uses machine learning to optimize energy use of various connected equipment.
- The graph represents energy savings in one of the SS's serviced MURBs located in Ontario.
- The REM Tool created ~31% savings, in this one example.
- With the ability to aggregate SS's entire MURB portfolio at multi-nodal levels, and ready to go industry standard data telemetry, SS can facilitate IESO/LDC to develop a robust market ecosystem amidst ongoing disruption.

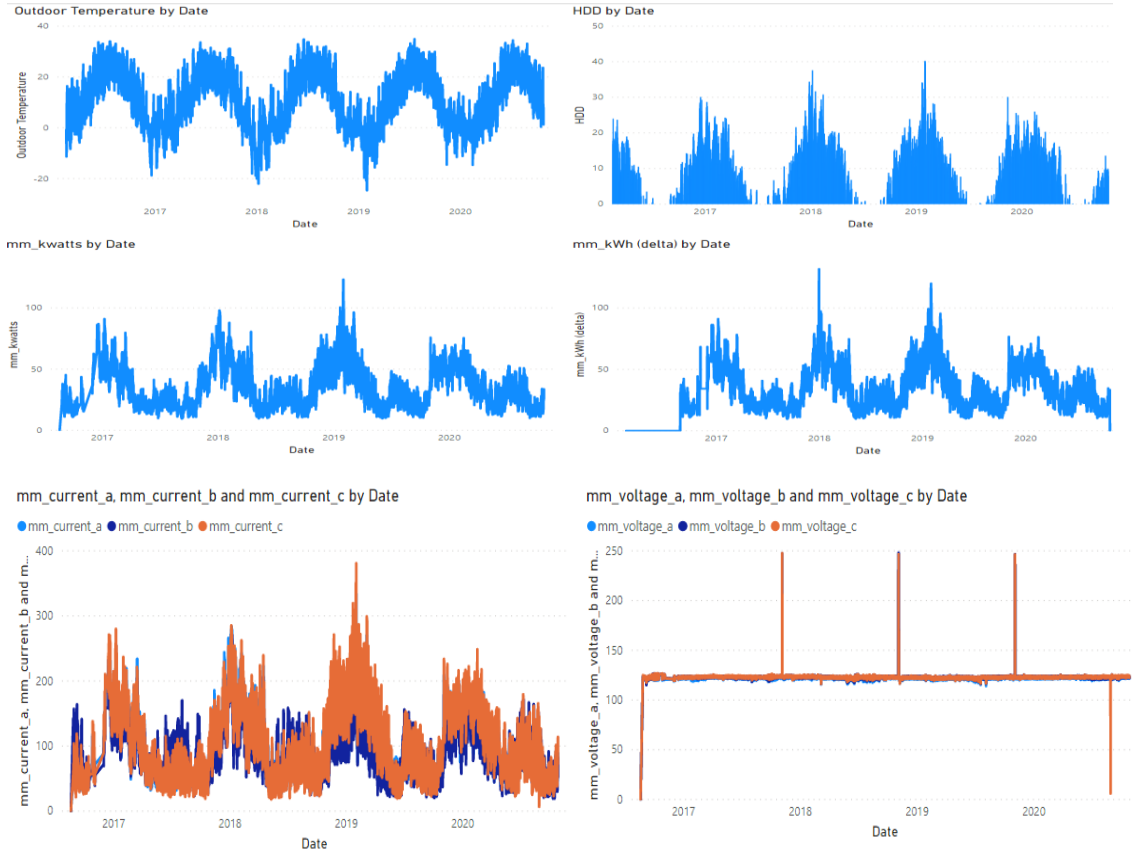
Parameters	Particulars
REM Control Period	May'19 to Apr'20
Heating Load Savings	30.48% (189,152 kWh)
Total Consumption	11.70 kWh/sq.ft.
Predicted HL	7.56 kWh/sq.ft.
Actual HL	5.26 kWh/sq.ft.
HL Savings	2.51 kWh/sq.ft.



	2019-06-01 2019-05-02	2019-11-01 2019-10-02	2019-12-01 2019-11-02	2020-01-01 2019-12-02	2020-02-01 2020-01-02	2020-03-01 2020-02-02	2020-04-01 2020-03-02	2020-05-01 2020-04-02
Predicted HL (kWh)	21,890	32,192	91,328	103,784	116,376	114,996	80,519	59,531
HL with SS	14,709	17,705	70,704	81,741	51,387	90,795	61,359	43,065
HL Savings Realised	7,181	14,487	20,624	22,044	64,990	24,201	19,160	16,466
Heating degree-days 15.5°C - min/max (°C-d)	99.7	146.6	415.9	472.6	530.0	523.7	366.7	271.1

DELIVERING INSIGHTS INTO URBAN CONSUMER BEHAVIOUR

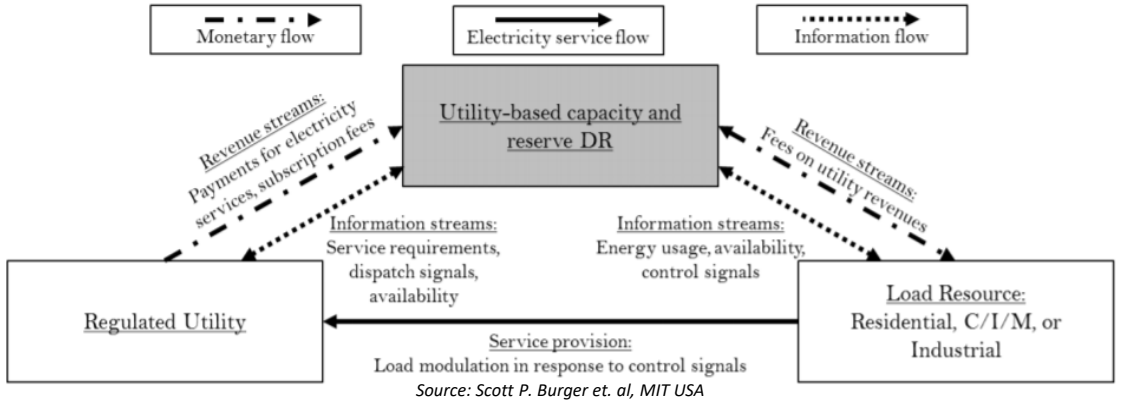
- SS captures real-time operational data such as temperature, phase wise voltage and current profile, power demand, energy consumption, etc., and SS can develop forecasts and insights that can drive business decisions.
- The system is paid for by using efficiency gains by customers and has additional value by supporting grid optimization and resiliency, requiring minimal incentives (double advantage of supporting grid optimization and resiliency, with minimized incentives).



EVIDENCE-BASED DATA DRIVES DER ADOPTION

- The white paper under section 2.5, Potential to Aggregate Under Existing Market Rules envisages the need to develop new business models to promote DERs.
- To facilitate DER adoption, maintain grid reliability, and facilitate financial transactions, it is imperative to consider the options of developing utility facilitated business models.
- SS opines that as more grid interactive DERs (both generation and load side) interconnect with the grid, these LDC facilitated business models shall help develop a strong market ecosystem. Under such models, the utility only acts as a facilitator to prospective DER providers/aggregators and will help them to understand the needs and nuances from the grid reliability, data visibility, and safety perspective.

Figure 6: Generic utility-based demand response business model structure



Source: Scott P. Burger et. al, MIT USA

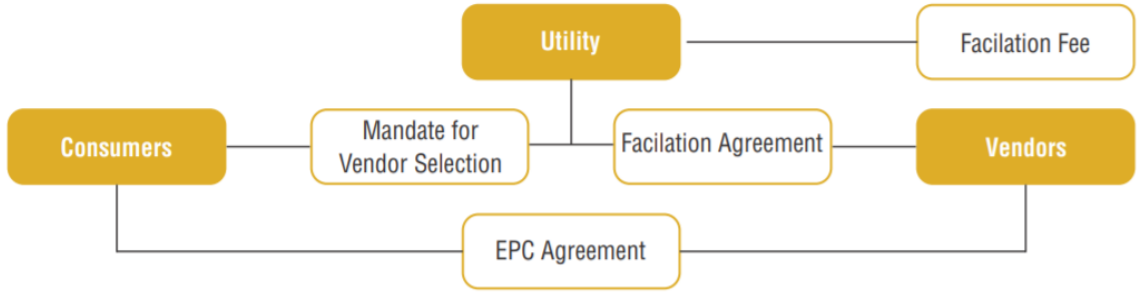


Figure 2 - Schematic of Anchored Procurement

Source: PACE-D TA Program Analysis

Source: Ronnie Khanna et. al, USAID PACE-TA Program, India

LDC AS A FACILITATOR

Note: *The schematics of the business models presented above are indicative. There is a need to understand ON's market requirements, DER technology, stakeholders, and financials, etc. to develop tailored business models.*

Sr. No.	Proposed option in the white paper	Support of Considerations
1.	Business Models	SS can leverage its experience and can work with the IESO/LDC to develop innovative business models which can help DER aggregators in the province. These business models can also explore the possibilities and issues around mixed aggregation.
2.	Option 1(b) Reducing the Minimum Size Threshold –Phased Approach	A phased approach should be supported with a year-on-year reduction strategy/target considering all of the possible DER technologies including energy storage and hydrogen.
3.	Option 2 Clarifying Existing Aggregation Rules and Processes	Based on SS's market experience, it is suggested that the IESO shall undertake stakeholder consultations with various DER players, operators, aggregators, and the LDCs, to formulate a robust and holistic set of rules and processes catering to market vision and requirements. SS's market insights, data
4.	Option 3(b) Modifying Aggregation Boundaries: Multi-Nodal Aggregations	SS's existing DR portfolio is equipped to support the multi-nodal aggregation pilot and is therefore ready to commence immediately (in terms of technology and data telemetry). The outcome of this pilot will help the IESO to develop a holistic multi-nodal aggregation plan and will also contribute to the IESO's real-time visibility projects.

SENSORSUITE SUPPORTS WHITE PAPER RECOMMENDATIONS

Sr. No.	Proposed option in the white paper	Support of Considerations
5.	Option 4(b) Modifying Aggregation Compositions: Mixed DR Contributors	The white paper highlights inherent challenges around such a scheme (e.g. visibility of the resources' response to dispatch instructions, granularity of metering to settle the aggregation, measurement & verification of the aggregations' response). However, mixed DR aggregation balances multiple demand uncertainties as well due to different consumption and end use patterns across consumer segments. SS's can provide the IESO/LDC, in real-time, multiple data points such as energy consumption, demand, voltage, current, weather, to name a few, using its proprietary tools deployed at various load-controlled residential premises.
6.	Option 6(a) Permitting Alternative Telemetry Sources: Device-Level Data	SS captures millions of data points at the residential facilities under its control. It can provide real time data, over a high speed and secure connection, at a scan rate, latency, and accuracy at par or better than specified for dispatchable loads (>= 1 MVA & <20 MVA) under Table 9. Therefore, perfectly positioned to facilitate the IESO's vision for a pilot through the Grid Innovation Fund (GIF). As mentioned previously, this pilot may also be bundled with the multi-nodal aggregation to study and understand multiple impacts. This will help test real-world performance, M&V requirements, assess cybersecurity concerns, open avenues for alternative telemetry and enhance competition.
7.	Data Aggregator	As highlighted earlier, SS, as an energy IOT company, is collecting and managing energy data. It's experience commensurate with the IESO's requirements as a data aggregator. SS's understanding of data collection and telemetry may be leveraged by the IESO/LDC to help facilitate multiple DER programs.

SENSORSUITE SUPPORTS WHITE PAPER RECOMMENDATIONS

RECAP KEY POINTS

- LDCs needs a change in Business Model to be more ubiquitous to enable DERs.
- Granular data points drive energy savings for urban customers.
- Aggregated urban customer data is critical to optimization for MURBs.
- Customer-paid-for energy savings systems best support DER adoption.
- LDC is a facilitator between market participants, customers and prosumers.

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APPENDIX

OPTION 1(B) REDUCING THE MINIMUM SIZE THRESHOLD –PHASED APPROACH

- A phased approach should be supported by definite year-on-year reduction strategy/targets considering all of the possible DER technologies, including energy storage and hydrogen.
- A year-on-year reduction target provides prospective DER providers/aggregators, nearing their contract end, the ability to strategize their participation in the envisaged DER market. This will not only increase competition within the IESO administered market (IAMs), but can also impact rates.
- Under section 3.1. it is stated that:
  - "…
    - *While lowering the minimum-size threshold is the most direct pathway to enhancing DER participation in the IAMs, system operators responding to FERC Order 841 pointed out that other barriers identified during the FERC proceeding would also need to be addressed to achieve this objective [11]. These include the high costs of adhering to telemetry requirements, the complexities of co-ordination between ISOs and distribution utilities, and the requirements to upgrade ISO/RTO dispatch systems and software – all of which can impede the participation of DERs in wholesale markets."*
- SS has already put in place adequate data telemetry equipment under its residential buildings' portfolio and is collecting real-time data to facilitate its customers. Therefore, SS can leverage its rich data-set and run a pilot with the IESO/LDC and the results may then be used to develop a future program. This will also help the IESO/LDC understand the additional cost burden, and other underlying complexities.

OPTION 2 CLARIFYING EXISTING AGGREGATION RULES AND PROCESSES

- As the paper highlights, the existing market rules and processes were developed at a time before the modern-day DER became mainstream.
- SS believes that given the variety of DER options available in today's market, there is a need to develop a dedicated set of aggregation rules and processes tailored to meet ensued market requirements.
- These rules and processes, may also include the data telemetry requirements, various technical/operational/safety standards that align with the system's requirements and are risk averse. Such clarity helps the DER provider/operator to participate in a non-discriminatory market.
- Based on SS's market experience, it is suggested that the IESO shall undertake stakeholder consultations with various DER players, operators, aggregators, and the LDCs, to formulate a robust and holistic set of rules and processes catering to market vision and requirements.

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OPTION 3(B) MODIFYING AGGREGATION BOUNDARIES: MULTI-NODAL AGGREGATIONS

- This is certainly a welcoming step as this has the potential to aggregate many potential DER assets/projects at multiple locations across the province. Additionally, this is also in line with the existing hourly demand response (HDR) program and dispatchable generation and load aggregation.
- SS opines that in order to implement this holistically, the LDCs may be advised/directed to identify and publish such aggregation nodes, like the NYISO's approach.
- Furthermore, urban (particularly residential and C&I) sub-load nodes may also be identified similar to CAISO's initiative. This will not only help envisage the possibility of future grid congestion, but also can also help deploy load-modifying demand response at such nodes. This will help LDCs defer investment in infrastructure augmentation by deploying peak-shaving and/or load modifying strategies at pain areas in the grid.
- Relatively smaller zones provide better visibility to the system operator and the LDCs alike. This also helps maintain grid reliability and safety in providing real-time services like operating reserves and energy. SS's existing DR portfolio is equipped to support the multi-nodal aggregation pilot and is therefore ready to commence immediately (in terms of technology and data telemetry). The outcome of this pilot will help the IESO to develop a holistic multi-nodal aggregation plan and will also contribute to the IESO's real-time visibility project.
- Additionally, it is imperative to state that such a proposal requires appropriate LDC's support.

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OPTION 4(B) MODIFYING AGGREGATION COMPOSITIONS: MIXED DR CONTRIBUTORS

- Allowing mixed DR contributors to participate in DER aggregation shall catapult Ontario's electricity sector to the forefront.
- The white paper highlights inherent challenges around such a scheme (Eg. visibility of the resources' response to dispatch instructions, granularity of metering to settle the aggregation, measurement & verification of the aggregations' response). However, mixed DR aggregation balances multiple demand uncertainties because of different generation, consumption and end use patterns across prosumer/consumer segments.
- The paper also points out that the residential smart meters are recorded once every hour, or at a 15-minute interval than the 5-minute interval required for dispatch.
- Historically, C&I consumers have better visibility at the system level due to higher demand. SS's has the ability to provide the IESO/LDC in real-time, various data points such as energy consumption, demand, voltage, current, weather, to name a few, using its proprietary tools deployed at various load-controlled residential premises.
- This alternative data telemetry, from almost all of the population centers of the province, will help the IESO test multiple options in a single pilot, namely, multi-nodal aggregation, mixed DR, and alternative telemetry with little to no additional cost implications on data collection and transmission.
- Learnings from this pilot will aid in improving M&V, aggregation, data telemetry requirements/standards, metering type, measurement intervals, dispatch model optimization, etc.

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OPTION 6(A) PERMITTING ALTERNATIVE TELEMETRY SOURCES: DEVICE-LEVEL DATA

- SS agrees with the IESO that in order to have greater system reliability and safeguard grid operations, and yet facilitate DER's growth, there needs to be appropriate data telemetry in place. Particularly (a) static data – DER type, location, capability; (b) operational data/telemetry providing real-time visibility; (c) revenue grade data to facilitate settlement.
- Given the technological advancements, there is a possibility that future DERs may have the ability to modify their output/consumption independent of the metrological conditions (energy storage, hydrogen, etc.)
- Thus, there needs to be put in place uniform and technology neutral data telemetry standards. Also, these protocols need to conform to the highest standards around data privacy, sharing, security, and control.
- SS is already capturing energy consumption, demand, weather, phase wise voltage and current, to name a few, at the residential facilities under its control. It can provide real time data, over a high speed and secure connection, at a scan rate, latency, and accuracy at par or better than specified for dispatchable loads (>= 1 MVA & <20 MVA) under Table 9. Therefore, perfectly positioned to facilitate IESO's vision for a pilot through the Grid Innovation Fund (GIF).
- As mentioned previously, this pilot may also be bundled with the multi-nodal aggregation to study and understand multiple impacts. This will help test real-world performance, M&V requirements, assess cybersecurity concerns, open avenues for alternative telemetry and enhance competition.

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OPTION 7(A) ENHANCING T-D INTEROPERABILITY: MODIFYING CONNECTION PROCESS FOR AGGREGATIONS

- As DERs primarily connect on the distribution side, it is imperative that LDCs have a say in the entire interconnection and approval process. This shall also be applicable for the DER aggregators. However, there needs to be a transparent and time bound interconnection process in place, tailored to meet the DER aggregation requirements.
- On November 26, 2020, the Ontario Energy Board (OEB) published Information and Template forms for Preliminary Consultation on DER Connections.
- SS opines that to develop a robust DER market ecosystem in the province, there needs to be IESO lead stakeholder consultations, with participation from the OEB and LDCs on developing standardized interconnection process for DER aggregation.

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