VERSION NOTES

- Changes to the version presented May 25, 2017 are marked with **CHANGES TO SLIDE 6/15**

Slide #(s)	Description of change(s)
45	Added a provision within the Industrial Conservation Initiative regulation related to CDM program participation

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VERSION NOTES

- Changes to the version presented April 27, 2017 are marked with **CHANGES TO SLIDE 5/18**

Slide #(s)	Description of change(s)
8	Non-energy benefits no longer a current state summary
15 – 17 38 – 40	Extended FIT and mFIT to both 2011-2014 and 2015-2020, changed the label from Conservation Behaviour to Behavioural Conservation; Changed the label from Conservation Behaviour to Behavioural Conservation and extended the shading to consider programs like summer savings and pledge; CHP to “<20 MW”
18 – 20 42 – 44	Updated columns to clearly reflect which policy objectives are evolving, updated indication that a technology/approach aligns with policy objectives to reflect varying degrees of alignment, removed pilots and research and development as a line item
21, 68	Updated to reflect discussions on fuel switching
23, 25 64, 66	Removed pilots and research and development as a line item, added solar PV-storage as a line item, other minor updates based on discussions during Advisory Group meeting
45	Added a provision within the Industrial Conservation Initiative regulation related to CDM program participation

- New slides are marked with **NEW SLIDE 5/18**

Slide #(s)	Description of change(s)
12, 13, 14	Moved into executive summary from main body of the report
74, 75	Appendix added with ACEEE Scorecard rankings used to determine which U.S. utilities to focus on in the jurisdictional review

CONSERVATION FRAMEWORK MID-TERM REVIEW

DEFINITION OF CDM

APRIL 27, 2017

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SECTION 1: EXECUTIVE SUMMARY

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II. Introduction and Methodology

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TOPIC 2: DEFINITION OF CDM

Policy Context – 2013 Long-Term Energy Plan (LTEP) & Conservation First Framework/Industrial Accelerator Program Ministerial Directions

LTEP refers simply to "Conservation" as a broad term. The current landscape of demand response (DR) initiatives was laid out in the 2013 LTEP which charged the former-IESO with evolving current programs and integrating DR into the grid:

- "Ontario is aiming to use DR to meet 10% of peak demand by 2025, equivalent to approximately 2,400 MW under forecast conditions. To encourage further development of DR in Ontario, the IESO will evolve existing programs and introduce new initiatives. […] The IESO, as the system operator, is in the best position to enable these large consumers to provide DR to the grid in a manner that puts DR on par with comparable generation options."

2014 Ministerial Directions to OPA (now IESO) for Conservation First Framework and Industrial Accelerator Program provide the following definition of CDM:

- *Conservation First Framework*
  - "The OPA shall consider CDM to be inclusive of activities aimed at reducing electricity consumption and reducing the draw from the electricity grid, such as geothermal heating and cooling, solar heating and small scale (i.e. <10MW) behind the meter customer generation. However, CDM should be considered to exclude those activities and programs related to a Distributor's investment in new infrastructure or replacement of existing infrastructure, any measures a Distributor uses to maximize the efficiency of its new or existing infrastructure, activities promoted through a different program or initiative undertaken by the Government of Ontario or the OPA, such as the OPA Feed-in Tariff (FIT) Program and micro-FIT Program and activities related to the price of electricity or general economic activity."
- *Industrial Accelerator Program*
  - "The OPA shall consider CDM to be inclusive of activities aimed at reducing electricity consumption and reducing draw from the electricity grid, including behind the meter customer generation."

Dec. 2016 Ministerial Direction to IESO

- "The final FIT application period will be held in 2016. The IESO shall cease accepting applications under the FIT program by December 31, 2016 and any unallocated procurement target at the end of the procurement process will remain unallocated."

CHANGES TO SLIDE 5/18

MID-TERM REVIEW

Navigant was engaged by the IESO to complete the mid-term review for the Conservation First Framework and Industrial Accelerator Program. Issues were identified by the IESO and grouped into eight major topics that will guide the Framework Review through four key activities outlined below. This report communicates the current state of **Definition of CDM**.

Current State Summaries		Market Research	Opportunities	Final Study Report
Topics	**Report Date**	**Current State Summaries:**	**Objectives:**	Research, analysis, market research inform potential modifications	Consolidation of findings, feedback, and identification of issues and opportunities. Methodologies and approach clearly discussed
Customer and market engagement and satisfaction	March 16	Summarize the current state of each theme (e.g., existing operations, policies, progress, decisions, etc.) and are used as a basis for market research	• To confirm and enhance content of the current state summaries • To gather insights into future framework improvements design, and delivery	Cost-benefit and gap analysis to scope opportunities	Out of Scope: • New mass market research • 2011-14 framework in-depth analysis • New program design • LDC Mid-term incentive • Evaluation Measurement &Verification protocols • Codes and Standards
Definition of CDM	April 20			Consolidated list of short-term (within 1 year), medium-term (before 2020), and long-term (post 2020) opportunities for prioritization by the IESO	
Collaboration	April 20				
Governance & operations	May 18				
Planning integration	June 15				
Climate change	July 13				
Budgets, targets, cost effectiveness	August 17		May to August	September/October	November to February

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FOCUS AREAS AND KEY QUESTIONS

This report will analyze available information and begin to explore the issues and opportunities of the key questions and focus areas listed below pertaining to the **Definition of CDM** topic.

Key Questions

- How has the definition of CDM changed over time in Ontario?
- Is the current definition appropriate to achieve the policy objectives of the framework and to align with Ontario's broader GHG reduction goals?
- How does the definition of CDM in Ontario align with the definition of CDM/DSM in other jurisdictions?

Focus Areas

I. Conservation First Framework:
- Defining CDM

II. Industrial Accelerator Program:
- Defining CDM

Note: the definition of CDM topic crosses other topics. Some examples include:	
Topic 1: Customer and market engagement and satisfaction	How does the inclusion or exclusion of certain technologies impact customer engagement with the framework?
Topic 5: Planning integration	How does the definition of CDM interact with system planning? How are planning and CDM goals impacted by technologies that are included or excluded?
Topic 7: Climate change	Do the technologies included support climate change goals?
Topic 8: Budgets, targets, cost effectiveness	What is the impact of adding or removing technologies on the ability to cost-effectively reach targets?

REPORT ORGANIZATION

This report will be organized by the sections outlined in the table below. The sections are designed to address one or more of the focus areas identified.

Section	Description	Focus Area
Segmentation and Definitions	Review the segmentation of the technologies investigated and define each technology and the benefits it typically brings to customers and system operators.	• Defining CDM
CDM in Ontario	Description of the technologies currently included in the definition of CDM and those that are excluded. Review of the evolution of the definition of CDM in Ontario and policies that impact the definition and adoption of CDM.	• Defining CDM
Jurisdictional Scan	Description and justification of the jurisdictions considered in the review. High-level review of the selected jurisdictions from a broader policy perspective. Matrix of technologies and methods by jurisdiction followed by observations and key findings.	• Defining CDM

TECHNOLOGIES AND APPROACHES ASSESSED

- Demand side management (DSM) is an umbrella term that typically refers to energy efficiency and demand response
- This review will investigate all major DSM activities and also includes distributed energy resources (DER) given the increasing importance of distributed energy resources and the fact that much of this activity happens behind the meter
- For the purpose of this report, each technology and approach assessed was mapped to a category for ease of review

Category	Category Description	Technology/Approach	
Energy Efficiency	Technology or approaches that result in less energy to perform the same function.	• Resource acquisition • Market transformation • Behavioural	• Performance-based funding • Voltage reduction • Pilots/Research & Development
Demand Response	Technology or approaches that enable energy shifting or reduction during certain times.	• Direct load control • Demand Response capacity	• Time-of-use pricing • Critical peak pricing
Distributed Energy Resources	Behind-the-meter or distribution-connected generation or storage resources that supply all or part of a customer's electricity use.	• Solar Photovoltaic (PV) • Solar PV-storage • Storage • Combined Heat & Power	• Electric Vehicles • Microgrids • Pilots/Research & Development

NEW SLIDE 5/18

ENERGY EFFICIENCY DEFINITIONS

- The following table outlines the definition of each energy efficiency technology and approach investigated including some examples of each

Technology/Approach	Description	Examples
Resource acquisition	Programs that promote products and practices used by energy consumers that drive investments in the short-term; includes fuel switching actions such as electricity to solar/geothermal heating	Retrofit program, small business lighting program, coupon program
Market transformation	Programs that create lasting change in market behavior by removing identified barriers or exploiting opportunities to accelerate the adoption of energy efficiency measures	Voluntary standards, new approaches to building management
Behavioural	Programs focused on behavioral transformation of energy use of end consumers	Social benchmarking, home energy reports
Performance-based funding	Performance-based incentive payment calculated via use of whole-building advanced metering infrastructure (AMI) and associated analytics	ESCO model whereby project is financed and developed by the ESCO and payment is per unit of saving
EE Pilots/Research & Development	Trial initiatives to test new approaches and strategies for delivering energy efficiency to customers	IESO Pay for Performance for multi-site customers, building optimization
Voltage reduction	Reduction of energy consumption resulting from a reduction of feeder voltage/voltage optimization	Voltage optimization through reactive power compensation, ground wire loss reduction

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NEW SLIDE 5/18

DEMAND RESPONSE DEFINITIONS

- The following table outlines the definition of each demand response technology and approach investigated including some examples of each

Technology/Approach	Description	Examples
Direct load control	Programs focused on automatically shifting customer load in response to signals from the system operator or aggregator	Ontario's *peaksaver*PLUS program
Demand Response Capacity	Programs focused on customers shifting load in response to signals from the system operator or aggregator	Ontario's former Demand Response programs (DR1, DR2)
Time-of-use pricing	Programs that modify customer-facing pricing into pricing tiers based on the time of day (and/or season)	Ontario's time-of-use pricing regime
Critical peak pricing	Programs that align the highest system peaks with customer-facing pricing	Critical peak pricing, critical peak rebates

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NEW SLIDE 5/18

CUSTOMER DISTRIBUTED ENERGY RESOURCE DEFINITIONS

- The following table outlines the definition of each distributed energy resource technology and approach investigated for the customer type including some examples of each

Technology/Approach	Description	Examples
Solar PV	Solar PV cited on customer premise, delivered via a utility or 3rd party partner	Micro feed-in-tariff programs
Solar PV-storage	Combination of solar PV and storage technologies into a customer-sited nanogrid	Alectra's (former PowerStream) POWER.HOUSE
Storage	Utility incentives designed to accelerate adoption of storage technology. Programs may enable the utility to utilize stored power during peak events	TESLA Powerwall
Combined Heat and Power	Also called co-generation is behind-the-meter generation that involves the production of both electricity and useful thermal energy in an integrated system[1]	Natural gas powered CHP for hospitals, waste energy recovery for pulp and paper facilities
Electric Vehicles	Plug-in electric vehicles as they relate to the ability to shift and manage customer load or use as storage	Electric vehicle charging rates, direct load control devices on charging
Microgrids	Programs or pilots that promote microgrids (combination of storage technology and generation resources). Can consider resiliency/islanding in response to physical or economic conditions	Customer-sited microgrids (solar PV, storage, combined heat and power)
Pilots/Research & Development	Trial initiatives to test new approaches and strategies for delivering distributed energy resources to the grid	Smart grid fund intelligent electric vehicle charging stations

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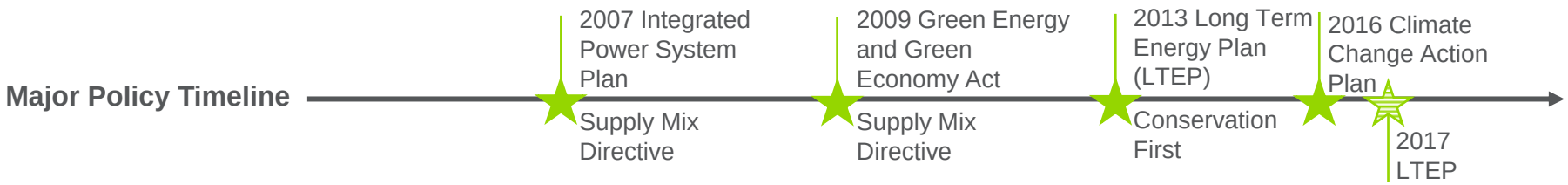
1 Adapted from ACEEE and US DOE

CHANGES TO SLIDE 5/18

EVOLUTION OF THE DEFINITION OF CDM IN ONTARIO – LONG TERM VIEW

- The definition of CDM is set by guiding policies which specify overarching, long-term CDM goals/targets at the provincial level, these goals/targets have historically included a broad range of CDM activities



	2005-2007	2008-2010	2011-2014	2015-2020
Guiding policy	• 15 specific directives	• Integrated Power System Plan • Supply Mix Directive	• Green Energy and Green Economy Act • Supply Mix Directive	• Long Term Energy Plan • Conservation First
Long term goals/targets	N/A	3,600 **MW** by 2025	7,100 **MW** and 28 **TWh** by 2030	30 **TWh** by 2032

Definition of CDM	2005-2007	2008-2010	2011-2014	2015-2020
Energy Efficiency				
Behavioural Conservation				
Fuel Switching*				
Self/Co Generation	*< 10 MW*	*< 10 MW*	*< 10 MW Excl. FIT and mFIT*	
Demand Management				
Natural Conservation				

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* When established, Fuel Switching referred to a transition from electricity to natural gas resulting in a reduction in electricity use

CHANGES TO SLIDE 5/18

EVOLUTION OF THE DEFINITION OF CDM IN ONTARIO – SHORT TERM VIEW (DX)

- The definition of CDM for the purposes of short-term targets is set by specific directives, these targets have historically included a subset of CDM activities that are included in long term goals/targets
- The table below outlines the targets for distribution connected (Dx) customers programs over time and the activities both included in the definition of CDM and supported through programs

	2005-2007	2008-2010	2011-2014	2015-2020
Primary target responsibility	Former OPA (IESO)	Former OPA (IESO)	LDCs	LDCs
Short term goals/targets	1,350 **MW**	Additional 1,350 **MW**	1,330 **MW** and 6,000 **GWh** between 2011 and 2014	7 **TWh** by 2020

Definition of CDM		2005-2007	2008-2010	2011-2014	2015-2020
Energy Efficiency	Other programs				
	LDC programs*				
	IESO programs				
Behavioural Conservation					
Fuel Switching					
Self/Co Generation	Renewables	*<500 kW*			*<10 MW*
	CHP**	<10 MW			*<10 MW*
Demand Management					
Natural Conservation					

**Included LDC third tranche programs*

***Combined Heat and Power projects were approved on a case-by-case basis and were considered eligible in 2013*

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CHANGES TO SLIDE 5/18

EVOLUTION OF THE DEFINITION OF CDM IN ONTARIO – SHORT TERM VIEW (TX)

- The definition of CDM for the purposes of short-term targets is set by specific directives, these targets have historically included a subset of CDM activities that are included in long term goals/targets
- The table below outlines the targets for transmission connected (Tx) customers programs over time and the activities both included in the definition of CDM and supported through programs

	2005-2007	2008-2010	2011-2014	2015-2020
Primary target responsibility	N/A	N/A	Former OPA (IESO)	IESO
Short term goals/targets	N/A**	N/A**	300 MW by June 2015	1.7 TWh by 2020

Definition of CDM		2005-2007	2008-2010	2011-2014	2015-2020
Energy Efficiency	Other programs				
	LDC programs				
	IESO programs				
Behavioural Conservation					
Fuel Switching					
Self/Co Generation	Renewables				*<20 MW*
	CHP*				*<20 MW*
Demand Management					
Natural Conservation					

**Combined Heat and Power were approved on a case-by-case basis and were and were considered eligible in 2013*

***Note: Tx connected customers were eligible and participated in certain demand response programs*

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CHANGES TO SLIDE 5/18

ELIGIBILITY AND ALIGNMENT WITH POLICY OBJECTIVES

- The following table outlines whether a particular technology or approach is currently eligible to be considered CDM within Conservation First Framework and Industrial Accelerator Program per Directions and which policy objectives the technology or approach aligns with; note: pilots/research and development are not included

Technology/ Approach	Eligible as CDM?	Policy Objectives						
		Initial					Evolving	
		Integration with Regional Planning	Customer Choice	Peak Reduction	Innovation	Market Transformation	Greenhouse gas reductions	Energy Affordability
Resource acquisition	Y	○	●	◑			●	●
Market transformation*	Y	○	●	○		●	●	●
Behavioural	Y	○	●	◑	●	●	●	●
Performance-based funding	Y	○	●	◑	●	●	●	●

Alignment: ● **High** ◑ **Moderate** ○ **Low**

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* Recall: Market Transformation refers to programs that create lasting change in market behavior by removing identified barriers or exploiting opportunities to accelerate the adoption of energy efficiency measures

NEW SLIDE 5/18

ELIGIBILITY AND ALIGNMENT WITH POLICY OBJECTIVES

- The following table outlines whether a particular technology or approach is currently eligible to be considered CDM within Conservation First Framework and Industrial Accelerator Program per Directions and which policy objectives the technology or approach aligns with; note: pilots/research and development are not included

Technology/ Approach	Eligible as CDM?	Policy Objectives						
		Initial					Evolving	
		Integration with Regional Planning	Customer Choice	Peak Reduction	Innovation	Market Transformation	Greenhouse gas reductions	Energy Affordability
Direct load control	N	○	○	●			●	○
Demand Response Capacity	N	●	◑	●			●	◑
Time-of-use pricing	N		◑	●		●	●	◑
Critical peak pricing	N	●	◑	●			●	◑

Alignment: ● **High** ◑ **Moderate** ○ **Low**

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ELIGIBILITY AND ALIGNMENT WITH POLICY OBJECTIVES

- The following table outlines whether a particular technology or approach is currently eligible to be considered CDM within Conservation First Framework and Industrial Accelerator Program per Directions and which policy objectives the technology or approach aligns with; note: pilots/research and development are not included

Technology/ Approach	Eligible as CDM?	Policy Objectives						
		Initial					Evolving	
		Integration with Regional Planning	Customer Choice	Peak Reduction	Innovation	Market Transformation	Greenhouse gas reductions	Energy Affordability
Voltage reduction	N	●		◑	●			
Solar PV	Y[1]	●	●	●	●		●	●
Solar PV-storage	N	●	●	●	●		●	●
Storage	N	●	●	●	●		●	●
Combined Heat and Power	Y	●	●	●			○	●
Electric Vehicles	N	●	●		●		●	
Microgrids	N	●	●	●	●		◑	●

Alignment: ● **High** ◑ **Moderate** ○ **Low**

1: small scale (i.e. <10MW) and not promoted through a different program or initiative undertaken by the Government of Ontario or the OPA, such as the OPA Feed-in Tariff (FIT) Program and micro-FIT Program

CHANGES TO SLIDE 5/18

PRELIMINARY OBSERVATIONS

How has the definition of CDM changed over time in Ontario?

- Targets have shifted from province-wide peak demand to LDC-level energy targets driven by larger policy goals which, in turn, lead to government directives
- In the past (pre-2008), progress included savings funded outside of IESO (then OPA) CDM programs (Renewable Energy Standard Offer Programs, Enwave, third tranche funding for LDCs)
- Combined Heat and Power was formally added to be considered as progress to targets
- Savings from time-of-use was previously included
- The context of fuel switching has changed over time as the needs of the bulk electricity system have changed – in 2006 fuel switching was moving from, for example, electricity to natural gas which reduces peak electric capacity; more recently, fuel switching can mean switching to electricity from natural gas which reduces greenhouse gas emissions

- The definition of CDM that is counted towards targets has changed over time and targets have shifted from broad, province-wide energy and demand reduction targets to localized, LDC energy targets

Is the current definition appropriate to achieve the policy objectives of the framework and to align with Ontario's broader GHG reduction goals?

- There are several technologies and approaches currently not included in the definition of CDM that have both customer and system benefits and align with one or more of the Government's policy objectives
- Interactions with other policies must also be taking into consideration (e.g., net metering, industrial conservation initiative)

- All technologies and approaches align with some policy objectives, but not all align with GHG reduction goals
- Interaction with other policies should be considered
- Fuel switching must be considered in the context of broader climate objectives, for example, electrification implies an increase in electricity use, however, could there be a role for CDM to ensure electrification is as efficient as possible

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JURISDICTIONS REVIEWED

- IESO is unique among system operators in its role with CDM programs that go beyond energy efficiency activities (e.g., long-term system planning, demand response, regional planning, procurement)
- As it pertains specifically to CDM activities, Navigant selected six jurisdictions that are among the most mature and progressive worldwide

Canada	**Nova Scotia British Colombia**	• Nova Scotia and BC Hydro have historically had the highest DSM spending per customer in Canada
USA	**California Massachusetts Vermont New York**	• California, Massachusetts, and Vermont placed 1st, 2nd, and 3rd respectively in the ACEEE (American Council for an Energy-Efficient Economy) *2016 Energy Efficiency Scorecard* • New York placed 5th on the scorecard, but is a meaningful addition as it is one of the most progressive jurisdictions with respect to expanding investment in DER • All of these jurisdictions have diverse and mature program portfolios and a high level of energy savings achievement (as a % of sales)
Not Selected	**Europe PJM Australia**	• Certain jurisdictions in Europe, such as Germany, are leaders in CDM activities, however they are generally poor comparables to North American jurisdictions • EE in Europe is generally defined more broadly as inclusive of transportation and all fuel types. In addition, the lead delivery and reporting agents are typically governmental bodies, with a priority focus on building codes and appliance standards, as opposed to measure level incentives • PJM Interconnection does not oversee DSM or DER programming or investment. • Australia did not rank highly on the ACEEE international scorecard

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CHANGES TO SLIDE 5/18

TYPICAL FUNDING SCHEMES - CONTEXT

- Each technology and approach was assessed against three funding categories listed below. In addition, the assessment specified whether the technology or approach is fully funded or if the funding is uncertain (e.g., pilot programs, changing funding mechanisms, or retiring funding mechanisms

Funding Category	Description	
DSM	Funding is primarily sourced from an energy efficiency/demand-side management plan that is typically regulator approved. Plans generally cover 1-3 years. Costs are typically recovered as an operating expense included in tariffs, but may also be recovered via a special charge (e.g., Vermont). Funding relates to electricity DSM only.	**DSM**
Other Ratepayer	"Other ratepayer" is used to represent funding that is not approved as part of a DSM budget, but rather is separately approved as part of a different filing request or operating budget. 'Separate filings' may include e.g. required smart grid plans or grid modernization plans. Costs are typically recovered as an operating expense included in tariffs, but may also be recovered via a special charge (e.g., California).	**OR**
Other Funding (Including typically a mix of public/taxpayer, non-utility, and ratepayer)	Particularly for new Distributed Energy Resource (DER) investments, there may be special public funding used by a utility partner that is leading the investment. For instance, BC Hydro's Field, BC grid storage project was developed with support from the Canada Clean Energy Fund, or cap and trade revenues in California. This category indicates that funding for existing or newly planned activities has been sourced from what may be a combination of 'other public' and varying levels of ratepayer funds. Funding support may also be derived from non-utility revenue streams that are linked to specific DER initiatives (e.g. digital platform advertising).	**OF**

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CHANGES TO SLIDE 5/18

ENERGY EFFICIENCY – TYPICAL FUNDING SCHEMES

- Customer EE programs are typically funded as part of DSM regulatory plans
- Voltage reduction is funded outside of DSM budgets, and is generally viewed by utility commissions as a prudent operational enhancement and not a DSM activity

Predominant Funding Source	Indicator
DSM	**DSM**
Other Ratepayer	**OR**
Other (e.g., taxpayer)	**OF**

EE Activity	Ontario	British Columbia	Nova Scotia	Massa-chusetts	California	Vermont	New York
Resource acquisition	**DSM**	**DSM**	**DSM**	**DSM**	**DSM**	**DSM**	**DSM**
Market transformation	**DSM**	**DSM**	**DSM**	**DSM**	**DSM**	**DSM**	**DSM**
Behavioural	**DSM**	**DSM**	**DSM**	**DSM**	**DSM**	**DSM**	**DSM**
Performance-based funding	**DSM**	-	-	**DSM**	**DSM**	-	**DSM**
Voltage reduction	**OF, OR**	**OR**	**OR**	**OR**	**OR**	**OR**	**OR**

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DEMAND RESPONSE – TYPICAL FUNDING SCHEMES

- Direct Load Control is typically a DSM activity, bundled as part of e.g. a 'Smart A/C' program, however it can also separately be introduced as a smart grid initiative outside of DSM plans and proceedings
- Most jurisdictions offer Time-of-use and Critical Peak Pricing tariffs (Yes indicates that a pricing program is available to customers either on a mandatory or voluntary basis)

Predominant Funding Source	Indicator
DSM	**DSM**
Other Ratepayer	**OR**
Other (e.g., taxpayer)	**OF**

DR Activity	Ontario	British Columbia	Nova Scotia	Massa-chusetts	California	Vermont	New York
Direct load control	**OR**	**DSM ^**	**DSM ***	**DSM**	**DSM**	-	**DSM**
Demand Response Capacity	**OR**	**DSM**	-	**OR, DSM**	**OR, DSM**	**OR, DSM**	**OR, DSM**
Time of Use Rates	**YES**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**
Critical Peak Pricing	**YES[T]**	**NO**	**YES****	**YES**	**YES**	**YES**	**YES**

^ New pilot activity in 2015 using 103 homes and 4 businesses focused on residential hot water.
** This has been piloted in collaboration with Nova Scotia Power and New Brunswick Power, and is also offered by the Berwick Electric Commission in Berwick, NS. (http://www.nrcan.gc.ca/energy/funding/current-funding-programs/cef/4975)*
*** Nova Scotia Power offers 'one-part real time pricing' and interruptible tariffs for very large customers that are categorically similar to CPP.*
[T] Ontario has a program allowing large customers with certain NAICS codes and peak demand greater than 500 kW to offset peak during the top 5 hours of the year and pay lower rates. In addition, there are CPP pricing pilots underway for residential customers.

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CHANGES TO SLIDE 5/18

DISTRIBUTED ENERGY RESOURCES – TYPICAL FUNDING SCHEMES

- Combined Heat and Power may fall under either DSM or as part of broader initiatives that include state or provincial funding
- Electric Vehicle incentives directly to customers are uncommon, these incentives are more generally captured in the form of purchase rebates and charging infrastructure initiatives

Predominant Funding Source	Indicator
DSM	DSM
Other Ratepayer	OR
Other (e.g., taxpayer)	OF

DER Activity	Ontario	British Columbia	Nova Scotia	Massa-chusetts	California	Vermont	New York
Solar PV	OR	-	-	OF	OR, OF	-	OF
Solar PV-storage	^	-	-	OF	OR	OF	OF
Storage	OR	-	%	#	OR	OR	OR
Combined Heat and Power	DSM	OR	OF *	DSM	OF	DSM	OF
Electric Vehicles (EVs)	OF	-	-	-	OF **	-	-
Microgrids	OF	-	-	-	OF	-	OF

^ Alectra (former PowerStream) Ontario is running a solar PV storage pilot.
** As part of the Nova Scotia Community Feed in Tariff Program (COMFIT), administered by the Nova Scotia DOE but no longer accepting applications. https://energy.novascotia.ca/renewables/programs-and-projects/comfit*
*** Southern California Edison, for example, offers a special metered EV rates.*
 # Massachusetts is currently developing an energy storage target, 2020 mandates expected to be set in July 2017.
% Very small pilot project http://www.nspower.ca/en/home/newsroom/news-releases/clean-energy-project.aspx

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PRELIMINARY OBSERVATIONS

How does the definition of CDM in Ontario align with the definition of CDM/DSM in other jurisdictions?

- IESO is unique among system operators given its oversight of DSM activities conducted by constituent LDCs
- In other jurisdictions (not Ontario), DSM plans and the funding allocated to them, focus primarily on energy efficiency and demand response programs, although CHP may be included as well as pilot/R&D budgets
- In other jurisdictions (not Ontario), DR investments are typically part of DSM plans, including e.g. direct load control programs, smart appliance programs, and behavioural programs
- DER investments are supported most commonly by a combination of ratepayer (operating expense, specific/required funding request*, or surcharge) and public (e.g. provincial/state/federal) clean energy grants and funds, as well as non-utility revenue streams and operational cost savings. *E.g. requirements to develop and submit 'smart grid' or 'grid modernization'
- In most other jurisdictions, Voltage reduction (VR) is funded outside of DSM budgets, and is generally viewed by regulators as a prudent operational enhancement and not a DSM activity. In Massachusetts VR has been funded as part of 'grid modernization', and in California, where many utilities have been actively pursuing voltage reduction for decades, voltage reduction studies to find additional incremental savings have been part of smart grid pilot initiatives. Navigant is aware, however, of jurisdictions/utilities that have included CVR in DSM budgets (e.g. PECO in Pennsylvania)
- Generally, DSM includes the technologies included under "customer energy efficiency" and "dispatchable demand response" (as defined in this report)
- DER and smart grid investments are typically funded outside of DSM
- The treatment of both combined heat and power and voltage reduction varies across jurisdiction

NEXT STEPS

Based on the preliminary assessment of the current state of definition of CDM, the following areas will be considered in the market research phase:

- Understand the interactions between this report and other current state summaries (e.g., collaboration, climate change, planning integration, budgets and targets)
- Consider policy interactions during market research phase (e.g., net metering and Industrial Conservation Initiative) and the impact on adoption of different technologies and approaches
- Where a technology/approach should be funded is not a simple policy question and there are many considerations, for example:
  - Scale (cross with topic 3 - collaboration):
    - DERs are promoted in many jurisdictions through both government and private funding which may require scale to successfully promote adoption
    - Demand response can be funded both locally and through the IESO with different objectives. The structure of the jurisdiction and local vs. system needs have a large impact on how the funding/program administration is structured
    - Cost/benefit equity (alignment between those who fund a resource and those benefit from a resource on a time and geographic scale)
  - Market/System (cross with topic 5 - planning integration):
    - The degree to which (1) the resource is needed (e.g., renewable integration and the need for balancing resources); and (2) the market can support the ability to earn revenues (e.g., capacity costs and reserve margins, ancillary services markets, technology to provide automated demand response, dynamic pricing (rate structures)
  - Policy goals (cross with climate change + planning integration):
    - Is grid modernization a goal and/or promoted elsewhere?
    - What is the role of the regulator?

SECTION 2: CURRENT STATE OF AFFAIRS

I. Segmentation and Definitions
II. CDM in Ontario
III. Jurisdictional Scan

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I. SEGMENTATION AND DEFINITIONS

NAVIGANT

OVERVIEW

Section	Segmentation and Definitions
Description	Review the segmentation of the technologies investigated and define each technology and the benefits it typically brings to customers and system operators
Focus area	• Defining CDM
Source(s)	• Navigant expertise, IESO data, ACEEE, DOE

- 22 Technologies and approaches were selected by Navigant and IESO
- Technologies and approaches are segmented into three categories (energy efficiency, demand response, distributed energy resources) for the purposes of this report

TECHNOLOGIES AND APPROACHES ASSESSED

- Demand side management (DSM) is an umbrella term that typically refers to energy efficiency and demand response
- This review will investigate all major DSM activities and also includes distributed energy resources (DER) given the increasing importance of distributed energy resources and the fact that much of this activity happens behind the meter
- For the purpose of this report, each technology and approach assessed was mapped to a category for ease of review

Category	Category Description	Technology/Approach	
Energy Efficiency	Technology or approaches that result in less energy to perform the same function.	• Resource acquisition • Market transformation • Behavioural	• Performance-based funding • Voltage reduction • Pilots/Research & Development
Demand Response	Technology or approaches that enable energy shifting or reduction during certain times.	• Direct load control • Demand Response capacity	• Time-of-use pricing • Critical peak pricing • Pilots/Research & Development
Distributed Energy Resources	Behind-the-meter or distribution-connected generation or storage resources that supply all or part of a customer's electricity use.	• Solar Photovoltaic (PV) • Solar PV-storage • Storage • Combined Heat & Power	• Electric Vehicles • Microgrids • Pilots/Research & Development

ENERGY EFFICIENCY DEFINITIONS

- The following table outlines the definition of each energy efficiency technology and approach investigated including some examples of each

Technology/Approach	Description	Examples
Resource acquisition	Programs that promote products and practices used by energy consumers that drive investments in the short-term	Retrofit program, small business lighting program, coupon program
Market transformation	Programs that create lasting change in market behavior by removing identified barriers or exploiting opportunities to accelerate the adoption of energy efficiency measures	Voluntary standards, new approaches to building management
Behavioural	Programs focused on behavioral transformation of energy use of end consumers	Social benchmarking, home energy reports
Performance-based funding	Performance-based incentive payment calculated via use of whole-building advanced metering infrastructure (AMI) and associated analytics	ESCO model whereby project is financed and developed by the ESCO and payment is per unit of saving
Pilots/Research & Development	Trial initiatives to test new approaches and strategies for delivering energy efficiency to customers	IESO Pay for Performance for multi-site customers, building optimization
Pilots/Research & Development	Trial initiatives to test new approaches and strategies for delivering energy efficiency to the grid	Conservation Fund pilot for Conservation Voltage Reduction
Voltage reduction	Reduction of energy consumption resulting from a reduction of feeder voltage/voltage optimization	Voltage optimization through reactive power compensation, ground wire loss reduction

DEMAND RESPONSE DEFINITIONS

- The following table outlines the definition of each demand response technology and approach investigated including some examples of each

Technology/Approach	Description	Examples
Direct load control	Programs focused on automatically shifting customer load in response to signals from the system operator or aggregator	Ontario's *peaksaver*PLUS program
Demand Response Capacity	Programs focused on customers shifting load in response to signals from the system operator or aggregator	Ontario's former Demand Response programs (DR1, DR2)
Time-of-use pricing	Programs that modify customer-facing pricing into pricing tiers based on the time of day (and/or season)	Ontario's time-of-use pricing regime
Critical peak pricing	Programs that align the highest system peaks with customer-facing pricing	Critical peak pricing, critical peak rebates

CUSTOMER DISTRIBUTED ENERGY RESOURCE DEFINITIONS

- The following table outlines the definition of each distributed energy resource technology and approach investigated for the customer type including some examples of each

Technology/Approach	Description	Examples
Solar PV	Solar PV cited on customer premise, delivered via a utility or 3rd party partner	Micro feed-in-tariff programs
Solar PV-storage	Combination of solar PV and storage technologies into a customer-sited nanogrid	Alectra's (former PowerStream) POWER.HOUSE
Storage	Utility incentives designed to accelerate adoption of storage technology. Programs may enable the utility to utilize stored power during peak events	TESLA Powerwall
Combined Heat and Power	Also called co-generation is behind-the-meter generation that involves the production of both electricity and useful thermal energy in an integrated system[1]	Natural gas powered CHP for hospitals, waste energy recovery for pulp and paper facilities
Electric Vehicles	Plug-in electric vehicles as they relate to the ability to shift and manage customer load or use as storage	Electric vehicle charging rates, direct load control devices on charging
Microgrids	Programs or pilots that promote microgrids (combination of storage technology and generation resources). Can consider resiliency/islanding in response to physical or economic conditions	Customer-sited microgrids (solar PV, storage, combined heat and power)
Pilots/Research & Development	Trial initiatives to test new approaches and strategies for delivering distributed energy resources to the grid	Smart grid fund intelligent electric vehicle charging stations

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1 Adapted from ACEEE and US DOE

II. CDM IN ONTARIO

NAVIGANT

OVERVIEW

Section	CDM in Ontario
Description	Review of the evolution of the definition of CDM in Ontario and policies that impact the definition and adoption of CDM.
Focus area	• Defining CDM
Source(s)	• Government directives, Integrated Power System Plan, IESO website, Long Term Energy Plan

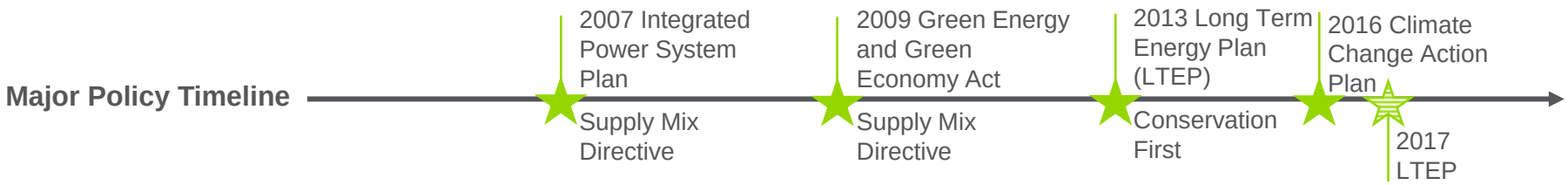
Summary:

- Targets have shifted from province-wide peak demand to LDC-level energy targets driven by larger policy goals which, in turn, lead to government directives
- In the past (pre-2008), progress included savings funded outside of IESO (formerly OPA) CDM programs (Renewable Energy Standard Offer Programs, Enwave, third tranche funding for LDCs)
- Combined Heat and Power was formally considered eligible as part of the Process and Systems program and could be considered as progress to targets in 2014
- Savings from time-of-use was previously included
- Technologies and approaches currently not included in the definition of CDM have both customer and system benefits and align with one or more policy objectives
- Interactions with other policies must also be taking into consideration (e.g., net metering, industrial conservation initiative)

CHANGES TO SLIDE 5/18

EVOLUTION OF THE DEFINITION OF CDM IN ONTARIO – LONG TERM VIEW

- The definition of CDM is set by guiding policies which specify overarching, long-term CDM goals/targets at the provincial level, these goals/targets have historically included a broad range of CDM activities



	2005-2007	2008-2010	2011-2014	2015-2020
Guiding policy	• 15 specific directives	• Integrated Power System Plan • Supply Mix Directive	• Green Energy and Green Economy Act • Supply Mix Directive	• Long Term Energy Plan • Conservation First
Long term goals/targets	N/A	3,600 **MW** by 2025	7,100 **MW** and 28 **TWh** by 2030	30 **TWh** by 2032

Definition of CDM	2005-2007	2008-2010	2011-2014	2015-2020
Energy Efficiency				
Behavioural Conservation				
Fuel Switching*				
Self/Co Generation	*< 10 MW*	*< 10 MW*	*< 10 MW Excl. FIT and mFIT*	
Demand Management				
Natural Conservation				

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* When established, Fuel Switching referred to a transition from electricity to natural gas resulting in a reduction in electricity use

CHANGES TO SLIDE 5/18

EVOLUTION OF THE DEFINITION OF CDM IN ONTARIO – SHORT TERM VIEW (DX)

- The definition of CDM for the purposes of short-term targets is set by specific directives, these targets have historically included a subset of CDM activities that are included in long term goals/targets
- The table below outlines the targets for distribution connected (Dx) customers programs over time and the activities both included in the definition of CDM and supported through programs

	2005-2007	2008-2010	2011-2014	2015-2020
Primary target responsibility	Former OPA (IESO)	Former OPA (IESO)	LDCs	LDCs
Short term goals/targets	1,350 **MW**	Additional 1,350 **MW**	1,330 **MW** and 6,000 **GWh** between 2011 and 2014	7 **TWh** by 2020

Definition of CDM		2005-2007	2008-2010	2011-2014	2015-2020
Energy Efficiency	Other programs				
	LDC programs*				
	IESO programs				
Behavioural Conservation					
Fuel Switching					
Self/Co Generation	Renewables	*<500 kW*			*<10 MW*
	CHP**	<10 MW			*<10 MW*
Demand Management					
Natural Conservation					

**Included LDC third tranche programs*

***Combined Heat and Power projects were approved on a case-by-case basis and were considered eligible in 2013*

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CHANGES TO SLIDE 5/18

EVOLUTION OF THE DEFINITION OF CDM IN ONTARIO – SHORT TERM VIEW (TX)

- The definition of CDM for the purposes of short-term targets is set by specific directives, these targets have historically included a subset of CDM activities that are included in long term goals/targets
- The table below outlines the targets for transmission connected (Tx) customers programs over time and the activities both included in the definition of CDM and supported through programs

	2005-2007	2008-2010	2011-2014	2015-2020
Primary target responsibility	N/A	N/A	Former OPA (IESO)	IESO
Short term goals/targets	N/A**	N/A**	300 MW by June 2015	1.7 TWh by 2020

Definition of CDM		2005-2007	2008-2010	2011-2014	2015-2020
Energy Efficiency	Other programs				
	LDC programs				
	IESO programs				
Behavioural Conservation					
Fuel Switching					
Self/Co Generation	Renewables				*<20 MW*
	CHP*				*<20 MW*
Demand Management					
Natural Conservation					

**Combined Heat and Power were approved on a case-by-case basis and were and were considered eligible in 2013*

***Note: Tx connected customers were eligible and participated in certain demand response programs*

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CURRENT DEFINITION OF CDM

- The current definition of CDM (considered towards targets) is defined by government Directive

Conservation First Framework	Industrial Accelerator Program

• Inclusive of activities aimed at reducing electricity consumption and reducing the draw from the electricity grid; for example:
  • geothermal heating and cooling
  • solar heating
  • small scale (i.e. <10MW) behind the meter customer generation
• CDM should be considered to exclude those activities and programs related to:
  • a Distributor's investment in new infrastructure or replacement of existing infrastructure
  • any measures a Distributor uses to maximize the efficiency of its new or existing infrastructure
  • activities promoted through a different program or initiative undertaken by the Government of Ontario or the OPA, such as the OPA Feed-in Tariff (FIT) Program and micro-FIT Program
  • activities related to the price of electricity or general economic activity
	• Inclusive of activities aimed at reducing electricity consumption and reducing draw from the electricity grid, including behind the meter customer generation

CHANGES TO SLIDE 5/18

ELIGIBILITY AND ALIGNMENT WITH POLICY OBJECTIVES

- The following table outlines whether a particular technology or approach is currently eligible to be considered CDM within Conservation First Framework and Industrial Accelerator Program per Directions and which policy objectives the technology or approach aligns with; note: pilots/research and development are not included

Technology/ Approach	Eligible as CDM?	Policy Objectives						
		Initial					Evolving	
		Integration with Regional Planning	Customer Choice	Peak Reduction	Innovation	Market Transformation	Greenhouse gas reductions	Energy Affordability
Resource acquisition	Y	○	●	◑			●	●
Market transformation	Y	○	●	○		●	●	●
Behavioural	Y	○	●	◑	●	●	●	●
Performance-based funding	Y	○	●	◑	●	●	●	●
Pilots/Research & Development	Y		●		●	●	●	●

Alignment: ● **High** ◑ **Moderate** ○ **Low**

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CHANGES TO SLIDE 5/18

ELIGIBILITY AND ALIGNMENT WITH POLICY OBJECTIVES

- The following table outlines whether a particular technology or approach is currently eligible to be considered CDM within Conservation First Framework and Industrial Accelerator Program per Directions and which policy objectives the technology or approach aligns with; note: pilots/research and development are not included

Technology/ Approach	Eligible as CDM?	Policy Objectives						
		Initial					Evolving	
		Integration with Regional Planning	Customer Choice	Peak Reduction	Innovation	Market Transformation	Greenhouse gas reductions	Energy Affordability
Direct load control	N	○	○	●			●	○
Demand Response Capacity	N	●	◑	●			●	◑
Time-of-use pricing	N		◑	●		●	●	◑
Critical peak pricing	N	●	◑	●			●	◑

Alignment: ● **High** ◑ **Moderate** ○ **Low**

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CHANGES TO SLIDE 5/18

ELIGIBILITY AND ALIGNMENT WITH POLICY OBJECTIVES

- The following table outlines whether a particular technology or approach is currently eligible to be considered CDM within Conservation First Framework and Industrial Accelerator Program per Directions and which policy objectives the technology or approach aligns with; note: pilots/research and development are not included

Technology/ Approach	Eligible as CDM?	Policy Objectives						
		Initial					Evolving	
		Integration with Regional Planning	Customer Choice	Peak Reduction	Innovation	Market Transformation	Greenhouse gas reductions	Energy Affordability
Voltage reduction	N	●		●	●			
Solar PV	Y[1]	●	●	●	●		●	●
Solar PV-storage	N	●	●	●	●		●	●
Storage	N	●	●	●	●		●	●
Combined Heat and Power	Y	●	●	●			○	●
Electric Vehicles	N	●	●		●		●	
Microgrids	N	●	●	●	●		◑	●

Alignment: ● **High** ◑ **Moderate** ○ **Low**

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1: small scale (i.e. <10MW) and not promoted through a different program or initiative undertaken by the Government of Ontario or the OPA, such as the OPA Feed-in Tariff (FIT) Program and micro-FIT Program

CHANGES TO SLIDE 6/15

THERE ARE SIGNIFICANT POLICIES IN PLACE THAT CAN INFLUENCE AND/OR CONFLICT WITH CURRENT PROGRAMS

- The following policies can improve the economics for certain technologies, in particular for distributed energy resources
- These policies and programs can also influence a customer's participation in energy efficiency programs

Policies/Programs	Description
Net Metering	Credit for electricity customers when excess renewable generation is exported to the grid. Net metering regulation was recently passed in Ontario allowing customers with renewable generation to sell excess energy back to the grid at retail electricity rates. Customers receive a "net" bill. Improves the business case for customer sited solar PV and storage resources. Phase II of the regulation is anticipated to include a positon on virtual net metering enabling behind-the-meter resources to be aggregated to provide, for example, ancillary services to the grid.
Industrial Conservation Initiative	Customers who are eligible to participate pay a global adjustment (GA) charge based on their percentage contribution to the top five peak Ontario demand hours over a 12 month base period. Recent announcement to reduce eligibility to customers with >500 kW of peak demand. Improves the business case for customer sited storage, combined heat and power, and microgrids which can help the customer reduce their load during potential critical peak hours. Regulation (O.Reg 429/04) allows customers to maintain their eligibility if participation in the Conservation First Framework, Industrial Accelerator, or Ontario Climate Change Solutions Deployment Corporation programs or Demand Response pilots or auctions results in a decrease in their peak demand below the eligibility threshold.
Industrial Electricity Incentive	Eligible customers that are accepted into the program can receive reduced electricity rates. Can reduce the case (increased payback periods) for customer sited energy efficiency and distributed energy resources.

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III. JURISDICTIONAL SCAN

NAVIGANT

OVERVIEW

Section	Jurisdictional Scan
Description	Description of the technologies and methods considered in the review. High-level review of the selected jurisdictions. Matrix of technologies and methods by jurisdiction followed by observations and key findings.
Focus area	• Defining CDM
Source(s)	• Desk research including utility filed plan review, docket searches, and utility websites.

Summary:

- IESO is unique among system operators given its oversight of DSM activities conducted by constituent LDCs
- DSM plans, and the funding allocated to them, focus primarily on energy efficiency and demand response programs, although CHP may be included as well as pilot/R&D budgets
- DR investments are typically part of DSM plans, including e.g. direct load control programs, smart appliance programs, and behavioural programs
- DER investments are supported most commonly by a combination of ratepayer (operating expense, specific/required funding request*, or surcharge) and public (e.g. provincial/state/federal) clean energy grants and funds, as well as non-utility revenue streams and operational cost savings
  - *E.g. requirements to develop and submit ‘smart grid’ or ‘grid modernization’ plans
- Voltage reduction is funded by reviewed jurisdictions outside of DSM budgets, and is generally viewed by regulators as a prudent operational enhancement and not a DSM activity
  - In Massachusetts it has been funded as part of ‘grid modernization’, and in California, where many utilities have been actively pursuing voltage reduction for decades, voltage reduction studies to find additional incremental savings have been part of smart grid pilot initiatives. Navigant is aware, however, of jurisdictions/utilities that have included CVR in DSM budgets, such as PECO in Pennsylvania

JURISDICTIONS REVIEWED

- IESO is unique among system operators in its role with CDM programs that go beyond energy efficiency activities (e.g., long-term system planning, demand response, regional planning, procurement)
- As it pertains specifically to CDM activities, Navigant selected six jurisdictions that are among the most mature and progressive worldwide

Canada	**Nova Scotia British Colombia**	• Nova Scotia and BC Hydro have historically had the highest DSM spending per customer in Canada
USA	**California Massachusetts Vermont New York**	• California, Massachusetts, and Vermont placed 1st, 2nd, and 3rd respectively in the ACEEE (American Council for an Energy-Efficient Economy) *2016 Energy Efficiency Scorecard* • New York placed 5th on the scorecard, but is a meaningful addition as it is one of the most progressive jurisdictions with respect to expanding investment in DER • All of these jurisdictions have diverse and mature program portfolios and a high level of energy savings achievement (as a % of sales)
Not Selected	**Europe PJM Australia**	• Certain jurisdictions in Europe, such as Germany, are leaders in CDM activities, however they are generally poor comparables to North American jurisdictions • EE in Europe is generally defined more broadly as inclusive of transportation and all fuel types. In addition, the lead delivery and reporting agents are typically governmental bodies, with a priority focus on building codes and appliance standards, as opposed to measure level incentives • PJM Interconnection does not oversee DSM or DER programming or investment. • Australia did not rank highly on the ACEEE international scorecard

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JURISDICTIONS – QUANTITATIVE COMPARISON

2015 Averages	Ontario (Average)	British Columbia (BC Hydro)	Nova Scotia (NS Power)	Massachusetts (All Utilities)	California (All Utilities)	Vermont (All Utilities)	New York (All Utilities)
C&I Rate ($/kWh)*	$0.125	$0.09	$0.12	$0.09	$0.13	$0.13	$0.08
Res Rate ($/kWh)*	$0.165	$0.11	$0.16	$0.16	$0.17	$0.17	$0.16
Res Customer Count (All Utilities in Jurisdiction) Millions	4.5	1.7	0.5	3.4	13.7	0.3	8.4
C&I Customer Count (All Utilities in Jurisdiction) Millions	0.49	0.2		0.56	1.9	0.05	1.4
Peak (GW)	21	11.5	2.4	16.9	64.9	0.8	38.3

US jurisdictions are presented in 2015 $USD, Canadian in 2015 $CAD. US States are summed into an all utility average, Province of British Columbia represents 2014 BC Hydro Annual Report Data, Province of Nova Scotia represents data from nspower.ca. US utilities represent a weighted average across respective jurisdictions.
US data Source: EIA Form 861, FERC Form 1.

NEW YORK – JURISDICTION OVERVIEW

- New York is a leading jurisdiction with respect to embracing and encouraging innovation in the energy marketplace via a large initiative known as 'Reforming the Energy Vision' (REV) spearheaded by Governor Andrew Cuomo
- This initiative has been developing for several years and supports development of DER pilots and a suite of major policy objectives including affordability, reduced GHG emissions, customer choice, job growth, and clean transit

- REV demo/pilot projects are typically proposed by 3rd parties and/or utilities, and are funded by a combination of non-utility revenue streams (varies by project, e.g. digital platform advertising), utility cost savings (e.g. reduction in DSM budget), and one-time and/or annual utility operational expenses

Key Players	Description of Role
NYSERDA (New York State Energy Research and Development Authority)	Promotes energy efficiency and the use of renewable energy sources. Partners with stakeholders to develop and invest to foster the conditions that: • Attract the private sector capital investment needed expand New York's clean energy economy • Overcome barriers to using clean energy at a large-scale in New York • Enable New York's communities and residents to benefit from energy efficiency and renewable energy
IOUs (Investor Owned Utilities)	7 privately owned utilities in New York
NYPA (New York Power Authority)	Public power authority, owns generation and transmission, only statewide electricity supplier, Promote energy efficiency and the development of clean energy technologies and electric vehicles
New York Public Utilities Commission (PUC)	Leads state policy implementation (largely shaped by the mission of REV) and regulates utility program administrators

NEW YORK – JURISDICTION OVERVIEW

- The table below outlines the agents involved in advancing each of the segmented categories of technologies and approaches, critical policies and recent developments are also outlined

EE	**Primary Administrator**	• IOUs, NYSERDA, and NYPA (public power authority). New York Public Utilities Commission (PUC) leads state policy implementation (largely shaped by the mission of REV) and regulates utility program administrators
	Critical Policy Drivers & Recent Developments	• Utility revenue decoupling permitted, utilities can also propose "earnings adjustment mechanisms" based on goal attainment • NY REV commission proceedings • Commission encourages utilities to move from a rebate-centric acquisition approach to one that more broadly focuses on market transformation • Increasing focus on innovation -- e.g. in 2016 ConEdison proposed a "Test and Learn" budget to "identify new measures, uses, and delivery mechanisms for existing offerings"
DR	**Primary Administrator**	• ~8 Utilities offer DR programs including ConEd, LIPA, National Grid, and NYPA. NYISO offers both reliability based and economic based DR payments. ~20 non-utility aggregators procure DR from customer groups
	Critical Policy Drivers & Recent Developments	• NY Public Utilities Commission has noted support and encouragement for DR & it is well aligned with REV policy goals • REV goals encouraging participation of 3rd party market participants • NYISO (New York System Operator) accepts DR capacity bids from qualified load resources
DER	**Primary Administrator**	• Third party technology and software providers, IOUs, NYSERDA, and NYPA
	Critical Policy Drivers & Recent Developments	• NY REV process is enabling and encouraging new market participants (typically funded by utilities) to develop and publically propose innovative DER pilot projects across a variety of customer segments • Virtual power plant aggregated solar PV and DR, community solar PV, and AMI-based customer information portals are example pilot projects • New York has very supportive net metering and interconnection policies

VERMONT – JURISDICTION OVERVIEW

- Vermont is a small jurisdiction in the Northeastern U.S. with clear policy goals to encourage innovation and energy efficiency
- The jurisdiction has been long supportive of load reduction and comprehensive efficiency programs

- Vermont was a pioneer in developing the 3rd party EE administration model, now Efficiency Vermont, funded by volumetric surcharges
- Energy efficiency resource standard goal is among the highest in North America at 2.5% savings as a percent of sales/year

Key Players	Description of Role
Efficiency Vermont (EVT)	3rd Party DSM Administrator operated by the Vermont Energy Investment Corporation (VEIC) Regulated by the Vermont Public Service Commission
Green Mountain Power (GMP)	Vermont's largest investor-owned electric utility. Recognized as an innovative utility with a strong commitment to DER (ran the first TESLA Powerwall pilot, now has a Powerwall program)
ISO-NE	New England grid operator, market administrator, and system planner Does not own infrastructure or deal with retail power

VERMONT – JURISDICTION OVERVIEW

- The table below outlines the agents involved in advancing each of the segmented categories of technologies and approaches, critical policies and recent developments are also outlined

EE	**Primary Administrator**	• Efficiency Vermont (EVT, 3rd Party Administrator), Burlington Electric, Vermont Gas • EVT delivers DSM solutions to the majority of the state's electric customers but does not manage or own T&D
	Critical Policy Drivers & Recent Developments	• Utility revenue decoupling permitted • Energy Efficiency Resource Standard (EERS) among the highest in North America at 2.5% of sales/year. This goal has become more difficult to reach cost effectively as programs have become increasingly mature • Supportive regulatory environment; Efficiency Vermont pioneered the 3rd party energy efficiency administrator role • Large catalog of energy efficiency measures and delivery strategies • Able to organize customer financing through a 3rd party financial institution. Long support for market transformation
DR	**Primary Administrator**	• Efficiency Vermont, Green Mountain Power (the states' largest electric utility), and Opower (now Oracle) have worked together to pilot retail-side DR initiatives
	Critical Policy Drivers & Recent Developments	• 2016 statewide comprehensive energy plan (developed by the Department of Public Service) encourages both the energy efficiency utility (Efficiency Vermont) and the distribution utilities to develop 'smart (variable) rates' informed by smart meters. Smart appliances are also encouraged • ISO-NE (New England system operator) accepts DR capacity bids from qualified load resources
DER	**Primary Administrator**	• Green Mountain Power and other municipal or cooperative utilities
	Critical Policy Drivers & Recent Developments	• 2016 statewide comprehensive energy plan (developed by the Department of Public Service) encourages the transition from centralized dispatch to greater volumes of distributed, local energy generation • The DPS encourages the PUC (primary regulator) to adjust its rules to encourage this policy goal over time • Vermont has very supportive net metering and interconnection policies

CALIFORNIA – JURISDICTION OVERVIEW

- California is a leading jurisdiction with a progressive policy environment that prioritizes GHG mitigation, innovation/customer choice, and long-run affordability

- California's Electric Program Investment Charge (EPIC) is a unique customer surcharge funded mechanism for California's top IOUs (Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E), and Southern California Edison Company (SCE)) to invest in a broad range of innovative technologies and programs spanning EE, DR, and DER. EPIC's policy goals include:
    - "*GHG emissions mitigation and adaptation in the electricity sector at the lowest possible cost, following the state's loading order for energy, low-emission vehicles/transportation, economic development, and efficient use of ratepayer monies*." (CA Energy Commission)

Key Players	Description of Role
PG&E, SCE, SDG&E	California's largest investor-owned utilities, heavily involved in DER and grid modernization
SMUD, LADWP	Large municipal utilities also heavily involved in DER and grid modernization
CAISO	California grid operator, market administrator, and system planner Does not own infrastructure or deal with retail power

CALIFORNIA – JURISDICTION OVERVIEW

- The table below outlines the agents involved in advancing each of the segmented categories of technologies and approaches, critical policies and recent developments are also outlined

EE	**Primary Administrator**	• EE is administered by electric utilities, including both large IOUs (such as PG&E, SDG&E, and SCE) and public power entities such as Los Angeles Department of Water and Power (LADWP) and Sacramento Municipal Utility District (SMUD) • Additionally, IOU funded EE is delivered by two Regional Energy Networks (REN), one in the SF bay area and one in Southern California
	Critical Policy Drivers & Recent Developments	• Utility revenue decoupling is permitted and required by the California Public Utilities Commission (CPUC). • Electric Program Investment Charge (EPIC) • PG&E's new pay for performance program marks a shift in EE resource acquisition program design, SCE is piloting a similar initiative. These developments are driven by new legislation that focuses on metered energy savings
DR	**Primary Administrator**	• Many utilities, including large municipals such as LADWP or SMUD, offer demand response programs and incentives. • 3rd party aggregators and large energy users may submit qualified capacity bids to CA ISO (CA system operator)
	Critical Policy Drivers & Recent Developments	• Due to high levels of renewable generation, peak demand is shifting to ~5-8pm and DR programs may evolve to seek evening reduction • Electric Program Investment Charge (EPIC) supports innovative programs
DER	**Primary Administrator**	• Many utilities, including large municipals such as LADWP or SMUD, are investing in DERs and also actively engaged with 3rd party providers to develop new initiatives
	Critical Policy Drivers & Recent Developments	• Electric Program Investment Charge (EPIC) • DER investment is widely supported and encouraged by the CPUC, which is requiring IOUs to file DER plans • Southern California Gas has implemented an opt-in distributed energy resources tariff (GO-DERS) to plan, design, procure, construct, own, operate, and maintain distributed energy equipment on customer premises • California has very supportive net metering and interconnection policies

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MASSACHUSETTS – JURISDICTION OVERVIEW

- Massachusetts utilities currently procure the highest relative amounts of energy efficiency of any jurisdiction in North America at ~2.5% savings as a percent of sales/year

- These targets are part of a longstanding commitment to efficiency and low long-run costs
- MA utilities have high avoided costs and high exposure to natural gas infrastructure limitations
- These factors enforce the business case for DSM, DR, and DER

Key Players	Description of Role
MASS Save	DSM services provider; initiative of Massachusetts electric and gas utilities, functions as a 'one-stop-shop' under a uniform brand to provide efficiency services to retail residential and commercial customers
IOUs	National Grid, Eversource, & Unitil are the primary IOUs. Responsible for developing grid modernization plans and DSM investment
ISO-NE	New England grid operator, market administrator, and system planner Does not own infrastructure or deal with retail power

MASSACHUSETTS – JURISDICTION OVERVIEW

- The table below outlines the agents involved in advancing each of the segmented categories of technologies and approaches, critical policies and recent developments are also outlined

EE	**Primary Administrator**	• A 3rd party entity, Mass Save, contracts with all electric utilities and leverages funding from a system benefit bill surcharge, ISO-NE forward capacity payments, and payments from participation in the Regional Greenhouse Gas Initiative (RGGI). Mass Save is designed to be a single, 'one stop shop' for customer EE services. • IOUs (including Eversource and National Grid) also offer their own EE/DR services in addition to Mass Save
	Critical Policy Drivers & Recent Developments	• Highest Energy Efficiency Resource Standards (EERS) in N. America, IOUs are currently required to achieve ~2.5% savings as percent of annual sales, National Grid has achieved as high as 3.1% (2014-2015 average) • Green Communities Act is the enabling legislation, includes prescriptive detail and strong policy support for EE/DR, focusing on "all cost effective and achievable"
DR	**Primary Administrator**	• National Grid and Eversource (IOUs) manage DR programs • ENERNOC, one of the largest DR aggregators is based in Boston • ISO-NE (New England system operator) accepts DR capacity bids from qualified load resources
	Critical Policy Drivers & Recent Developments	• Strong policy support (Green Communities Act) & available value from ISO-NE
DER	**Primary Administrator**	• Large IOUs, primarily National Grid and Eversource
	Critical Policy Drivers & Recent Developments	• Massachusetts has very supportive net metering and interconnection policies

NOVA SCOTIA – JURISDICTION OVERVIEW

- Efficiency Nova Scotia, the 3rd party DSM implementer for the province, implements a broad portfolio of DSM services across the province
- Nova Scotia has historically had among the highest levels of DSM spending per customer in Canada

- Nova Scotia Power, the province's T&D utility, has not seriously engaged in demand response activities with its customers, and the community feed-in-tariff program that has been successful in developing DER projects is not currently accepting additional applications

Key Players	Description of Role
Efficiency One	3rd Party DSM Administrator funded by Nova Scotia Power ratepayers
Nova Scotia Power	Nova Scotia's largest and primary utility. Owns generation, transmission, and distribution

NOVA SCOTIA – JURISDICTION OVERVIEW

- The table below outlines the agents involved in advancing each of the segmented categories of technologies and approaches, critical policies and recent developments are also outlined

EE	**Primary Administrator**	• Efficiency Nova Scotia (ENS, 3rd party administrator)
	Critical Policy Drivers & Recent Developments	• ENS most recent 2016-2018 DSM spending levels and continuation of pilot activities were challenged by a 2014 amendment to the Public Utilities Act to that place greater emphasis on short term affordability • ENS has a history of delivering a broad portfolio of programs and measures, and is a leader in energy efficiency in Canada • Nova Scotia Utility and Review Board (NSUARB – regulator) remains persuaded that energy efficiency is a public good
DR	**Primary Administrator**	• N/A
	Critical Policy Drivers	• N/A
DER	**Primary Administrator**	• Nova Scotia Power
	Critical Policy Drivers & Recent Developments	• Nova Scotia Community Feed-in Tariff (COMFIT) is part of Nova Scotia's effort to achieve 40% renewable by 2020 • COMFIT has developed ~150MW of community owned capacity, however the program is not currently accepting additional applications

BRITISH COLUMBIA – JURISDICTION OVERVIEW

- British Columbia set standards between '08-'11 to ensure all new capacity is clean or renewable and prioritizes cost effective DSM, however BC Hydro forecast an energy surplus in '12/'13, leading to a DSM moderation strategy that lowered spending by ~40% vs. planned over 2014-2016
- The jurisdiction overall remains supportive of innovative pilots and R&D, and released a climate leadership plan in 2016 that affirms its commitment to clean energy policies

Key Players	Description of Role
BC Hydro	Commercial Crown corporation owned by the Province of British Columbia, serves 95% of BC electric customers Owns generation, transmission, and distribution
Fortis BC	Largest IOU in BC, primarily a natural gas utility, owns natural gas *and* electric transmission and distribution
BC Ministry of Energy and Mines, BC Utilities Commission (BCUC)	Energy and Mines: BC Hydro regulator, BCUC: Fortis regulator

BRITISH COLUMBIA – JURISDICTION OVERVIEW

- The table below outlines the agents involved in advancing each of the segmented categories of technologies and approaches, critical policies and recent developments are also outlined

EE	**Primary Administrator**	• Utility administered: BC Hydro (Elec), Fortis BC Inc. (Elec), Fortis BC Energy Inc. (Gas)
	Critical Policy Drivers & Recent Developments	• BC Hydro is regulated by the BC Ministry of Energy and Mines, Fortis is regulated by the BC Utilities Commission. • Support for utility investment in innovative technologies and delivery methods as part of DSM plans • Fortis BC was asked by the regulator in 2015 to document actions taken to support innovative DSM after not including a specific funding request • BC Hydro and FortisBC offer a suite of traditional DSM rebates and programs • Navigant completed a Conservation Potential Review for all BC utilities in 2017 that indicated significant DSM potential. • Province is currently increasing efficiency standards for packaged boilers, gas fireplaces, air source heat pumps, and natural gas space and water heating equipment over the 2018-2020 period • BC Hydro has a long track record of implementing voltage reduction programs
DR	**Primary Administrator**	• Utility administered
	Critical Policy Drivers & Recent Developments	• BC Hydro is currently leading DR pilots including a residential hot water direct load control (DLC) program and voluntary commercial and industrial load curtailment
DER	**Primary Administrator**	• BC Hydro
	Critical Policy Drivers & Recent Developments	• Ongoing microgrid project in partnership with BC Institute of Technology • 2013 grid scale battery storage installation completed in partnership with the Canada Clean Energy Fund • BC Hydro has led installation of ‘dozens’ of electric vehicle charging stations in BC

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TYPICAL FUNDING SCHEMES - CONTEXT

Funding for energy efficiency, demand response, and distributed energy can come from a variety of outlets and strategies that vary by jurisdiction.

- Navigant reviewed the six selected jurisdictions across three categories:
  - Energy efficiency (EE)
  - Demand Response (DR)
  - Distributed Energy Resources (DER)
- Our research sought to identify the *primary* funding schemes used for reviewed EE/DR/DER activities
- The policy landscapes and technologies themselves are evolving along with a transforming energy sector
- Critically, funding schemes are developing constructs – particularly for DER the funding strategies and regulatory frameworks in use are evolving, or expected to evolve, for most jurisdictions
- For that reason, our results are indicative of the current state and direction
- Furthermore, particularly for some of the Canadian jurisdictions, many DER investments and DR strategies are new (or pilot) endeavours—it should be anticipated that funding strategies and/or program design may change
  - Our funding categories treat pilot programs in the same way as mature programs

TYPICAL FUNDING SCHEMES - CONTEXT

- Each technology and approach was assessed against three funding categories listed below
- In addition, the assessment specified whether the technology or approach is fully funded or if the funding is uncertain (e.g., pilot programs, changing funding mechanisms, or retiring funding mechanisms

Funding Category	Description	
DSM	Funding is primarily sourced from an energy efficiency/demand-side management plan that is typically regulator approved. Plans generally cover 1-3 years. Costs are typically recovered as an operating expense included in tariffs, but may also be recovered via a special charge (e.g. VT).	**DSM**
Other Ratepayer	"Other ratepayer" is used to represent funding that is not approved as part of a DSM budget, but rather is separately approved as part of a different filing request or operating budget. 'Separate filings' may include e.g. required smart grid plans or grid modernization plans. Costs are typically recovered as an operating expense included in tariffs, but may also be recovered via a special charge (e.g. CA).	**OR**
Other (Including typically a mix of public/taxpayer, non-utility, and ratepayer)	Particularly for new DER investments, there may be special public funding used by a utility partner that is leading the investment. For instance, BC Hydro's Field, BC grid storage project was developed with support from the Canada Clean Energy Fund. This category indicates that funding for existing or newly planned activities has been sourced from what may be a combination of 'other public' and varying levels of ratepayer funds. Funding support may also be derived from non-utility revenue streams that are linked to specific DER initiatives (e.g. digital platform advertising).	**OF**

CHANGES TO SLIDE 5/18

ENERGY EFFICIENCY – TYPICAL FUNDING SCHEMES

- Customer EE programs are typically funded as part of DSM regulatory plans
- Voltage reduction is primarily funded outside of DSM budgets in the jurisdictional review, and is generally viewed by utility commissions as a prudent operational enhancement and not a DSM activity

Predominant Funding Source	Indicator
DSM	DSM
Other Ratepayer	OR
Other (e.g., taxpayer)	OF

EE Activity	Ontario	British Columbia	Nova Scotia	Massa-chusetts	California	Vermont	New York
Resource acquisition	DSM	DSM	DSM	DSM	DSM	DSM	DSM
Market transformation	DSM	DSM	DSM	DSM	DSM	DSM	DSM
Behavioural	DSM	DSM	DSM	DSM	DSM	DSM	DSM
Performance-based funding	DSM	-	-	DSM	DSM	-	DSM
Voltage reduction	DSM, OF, OR[1]	OR	OR	OR	OR	OR	OR

[1] pilots have been funded through multiple sources (Conservation Fund, Smart Grid Fund, etc.)

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DEMAND RESPONSE – TYPICAL FUNDING SCHEMES

- Direct Load Control is typically a DSM activity, bundled as part of e.g. a 'Smart A/C' program, however it can also separately be introduced as a smart grid initiative outside of DSM plans and proceedings
- Most jurisdictions offer Time-of-use and Critical Peak Pricing tariffs (Yes indicates that a pricing program is available to customers either on a mandatory or voluntary basis)

Predominant Funding Source	Indicator
DSM	**DSM**
Other Ratepayer	**OR**
Other (e.g., taxpayer)	**OF**

DR Activity	Ontario	British Columbia	Nova Scotia	Massa-chusetts	California	Vermont	New York
Direct load control	**OR**	**DSM ^**	**DSM ***	**DSM**	**DSM**	-	**DSM**
Demand Response Capacity	**OR**	**DSM**	-	**OR, DSM**	**OR, DSM**	**OR, DSM**	**OR, DSM**
Time of Use Rates	**YES**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**
Critical Peak Pricing	**YES[T]**	**NO**	**YES****	**YES**	**YES**	**YES**	**YES**

^ New pilot activity in 2015 using 103 homes and 4 businesses focused on residential hot water.
** This has been piloted in collaboration with Nova Scotia Power and New Brunswick Power, and is also offered by the Berwick Electric Commission in Berwick, NS. (http://www.nrcan.gc.ca/energy/funding/current-funding-programs/cef/4975)*
*** Nova Scotia Power offers 'one-part real time pricing' and interruptible tariffs for very large customers that are categorically similar to CPP.*
[T] Ontario has a program allowing large customers with certain NAICS codes and peak demand greater than 500 kW to offset peak during the top 5 hours of the year and pay lower rates. In addition, there are CPP pricing pilots underway for residential customers.

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CHANGES TO SLIDE 5/18

DISTRIBUTED ENERGY RESOURCES – TYPICAL FUNDING SCHEMES

- Combined Heat and Power may fall under either DSM or as part of broader initiatives that include state or provincial funding
- Many DER pilots are occurring across all jurisdictions
- Electric Vehicle incentives directly to customers are uncommon, these incentives are more generally captured in the form of purchase rebates and charging infrastructure initiatives

Predominant Funding Source	Indicator
DSM	DSM
Other Ratepayer	OR
Other (e.g., taxpayer)	OF

DER Activity	Ontario	British Columbia	Nova Scotia	Massa-chusetts	California	Vermont	New York
Solar PV	OR	-	-	OF	OR, OF	-	OF
Solar PV-storage							
Storage	^	-	%	#	OR	OR	OR
Combined Heat and Power	DSM	OR	OF *	DSM	OF	DSM	OF
Electric Vehicles (EVs)	OF	-	-	-	OF **	-	-
Microgrids	OF	-	-	-	OF	-	OF

^ Alectra (former PowerStream) Ontario is running a solar PV storage pilot.
** As part of the Nova Scotia Community Feed in Tariff Program (COMFIT), administered by the Nova Scotia DOE but no longer accepting applications. https://energy.novascotia.ca/renewables/programs-and-projects/comfit*
*** Southern California Edison, for example, offers a special metered EV rates.*
 # Massachusetts is currently developing an energy storage target, 2020 mandates expected to be set in July 2017.
% Very small pilot project http://www.nspower.ca/en/home/newsroom/news-releases/clean-energy-project.aspx

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SECTION 4: SUMMARY OBSERVATIONS AND NEXT STEPS

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CHANGES TO SLIDE 5/18

PRELIMINARY OBSERVATIONS

How has the definition of CDM changed over time in Ontario?

- Targets have shifted from province-wide peak demand to LDC-level energy targets driven by larger policy goals which, in turn, lead to government directives
- In the past (pre-2008), progress included savings funded outside of IESO (then OPA) CDM programs (Renewable Energy Standard Offer Programs, Enwave, third tranche funding for LDCs)
- Combined Heat and Power was formally added to be considered as progress to targets
- Savings from time-of-use was previously included
- The context of fuel switching has changed over time as the needs of the bulk electricity system have changed – in 2006 fuel switching was moving from, for example, electricity to natural gas which reduces peak electric capacity; more recently, fuel switching can mean switching to electricity from natural gas which reduces greenhouse gas emissions

- The definition of CDM that is counted towards targets has changed over time and targets have shifted from broad, province-wide energy and demand reduction targets to localized, LDC energy targets

Is the current definition appropriate to achieve the policy objectives of the framework and to align with Ontario's broader GHG reduction goals?

- There are several technologies and approaches currently not included in the definition of CDM that have both customer and system benefits and align with one or more of the Government's policy objectives
- Interactions with other policies must also be taking into consideration (e.g., net metering, industrial conservation initiative)

- All technologies and approaches align with some policy objectives, but not all align with GHG reduction goals
- Interaction with other policies should be considered
- Fuel switching must be considered in the context of broader climate objectives, for example, electrification implies an increase in electricity use, however, could there be a role for CDM to ensure electrification is as efficient as possible

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PRELIMINARY OBSERVATIONS

How does the definition of CDM in Ontario align with the definition of CDM/DSM in other jurisdictions?

- IESO is unique among system operators given its oversight of DSM activities conducted by constituent LDCs
- In other jurisdictions (not Ontario), DSM plans and the funding allocated to them, focus primarily on energy efficiency and demand response programs, although CHP may be included as well as pilot/R&D budgets
- In other jurisdictions (not Ontario), DR investments are typically part of DSM plans, including e.g. direct load control programs, smart appliance programs, and behavioural programs
- DER investments are supported most commonly by a combination of ratepayer (operating expense, specific/required funding request*, or surcharge) and public (e.g. provincial/state/federal) clean energy grants and funds, as well as non-utility revenue streams and operational cost savings. *E.g. requirements to develop and submit 'smart grid' or 'grid modernization'
- In most other jurisdictions, Voltage reduction (VR) is funded outside of DSM budgets, and is generally viewed by regulators as a prudent operational enhancement and not a DSM activity. In Massachusetts VR has been funded as part of 'grid modernization', and in California, where many utilities have been actively pursuing voltage reduction for decades, voltage reduction studies to find additional incremental savings have been part of smart grid pilot initiatives. Navigant is aware, however, of jurisdictions/utilities that have included CVR in DSM budgets (e.g. PECO in Pennsylvania)
- Generally, DSM includes the technologies included under "customer energy efficiency" and "dispatchable demand response" (as defined in this report)
- DER and smart grid investments are typically funded outside of DSM
- The treatment of both combined heat and power and voltage reduction varies across jurisdiction

NEXT STEPS

Based on the preliminary assessment of the current state of definition of CDM, the following areas will be considered in the market research phase:

- Understand the interactions between this report and other current state summaries (e.g., collaboration, climate change, planning integration, budgets and targets)
- Consider policy interactions during market research phase (e.g., net metering and Industrial Conservation Initiative) and the impact on adoption of different technologies and approaches
- Where a technology/approach should be funded is not a simple policy question and there are many considerations, for example:
  - Scale (cross with topic 3 - collaboration):
    - DERs are promoted in many jurisdictions through both government and private funding which may require scale to successfully promote adoption
    - Demand response can be funded both locally and through the IESO with different objectives. The structure of the jurisdiction and local vs. system needs have a large impact on how the funding/program administration is structured
    - Cost/benefit equity (alignment between those who fund a resource and those benefit from a resource on a time and geographic scale)
  - Market/System (cross with topic 5 - planning integration):
    - The degree to which (1) the resource is needed (e.g., renewable integration and the need for balancing resources); and (2) the market can support the ability to earn revenues (e.g., capacity costs and reserve margins, ancillary services markets, technology to provide automated demand response, dynamic pricing (rate structures)
  - Policy goals (cross with climate change + planning integration):
    - Is grid modernization a goal and/or promoted elsewhere?
    - What is the role of the regulator?

APPENDIX A: GLOSSARY

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APPENDIX A:

GLOSSARY

Term	Description
DSM	Demand Side Management – an umbrella term that typically refers to energy efficiency and demand response
EE	Energy efficiency - Technology or approaches that result in less energy to perform the same function.
DR	Demand Response - Technology or approaches that enable energy shifting or reduction during certain times.
DER	Distributed Energy Resources - Behind-the-meter or distribution-connected generation or storage resources that supply all or part of a customer's electricity use
Dx	Distribution connected (connected to the distribution system)
Tx	Transmission connected (connected to the transmission system)
Resource acquisition	Programs that promote products and practices used by energy consumers that drive investments in the short-term.
Market transformation	Programs that create lasting change in market behavior by removing identified barriers or exploiting opportunities to accelerate the adoption of energy efficiency measures.
Behavioural	Programs focused on behavioral transformation of energy use of end consumers.
Performance-based funding	Performance-based incentive payment calculated via use of whole-building advanced metering infrastructure (AMI) and associated analytics.
R&D, pilots	Research and development, trial initiatives to test new approaches and strategies.

APPENDIX A:

GLOSSARY

Term	Description
Voltage reduction	Reduction of energy consumption resulting from a reduction of feeder voltage/voltage optimization.
Direct load control	Programs focused on automatically shifting customer load in response to signals from the system operator or aggregator.
Demand Response Capacity	Programs focused on customers shifting load in response to signals from the system operator or aggregator.
TOU	Time-of-use pricing, Programs that modify customer-facing pricing into pricing tiers based on the time of day (and/or season).
Critical peak pricing	Programs that align the highest system peaks with customer-facing pricing.
Solar PV	Solar photovoltaic (PV) cited on customer premise, delivered via a utility or 3rd party partner
Solar PV-storage	Combination of solar PV and storage technologies into a customer-sited nanogrid.
Storage	Utility incentives designed to accelerate adoption of storage technology. Programs may enable the utility to utilize stored power during peak events.
Combined Heat and Power	Also called co-generation is behind-the-meter generation that involves the production of both electricity and useful thermal energy in an integrated system.
Electric Vehicles	Plug-in electric vehicles as they relate to the ability to shift and manage customer load or use as storage.
Microgrids	Programs or pilots that promote microgrids (combination of storage technology and generation resources). Can consider resiliency/islanding in response to physical or economic conditions.

APPENDIX A: ACEEE SCORECARD

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ACEEE 2016 SCORECARD RANKING

Rank	State	Utility & public benefits programs & policies (20 pts.)	Trans-portation policies (10 pts.)	Building energy codes (7 pts.)	Combined heat & power (4 pts.)	State government initiatives (7 pts.)	Appliance efficiency standards (2 pts.)	**TOTAL SCORE (50 pts.)**	Change in rank from 2015	Change in score from 2015
1	California	15	10	7	4	7	2	**45**	1	1.5
1	Massachusetts	19.5	8.5	7	4	6	0	**45**	0	1
3	Vermont	19	7	7	2	5	0	**40**	0	0.5
4	Rhode Island	20	6	5	3.5	5	0	**39.5**	0	3
5	Connecticut	14.5	6.5	5.5	2.5	6	0.5	**35.5**	1	0
5	New York	10.5	8.5	7	3.5	6	0	**35.5**	4	3
7	Oregon	11.5	8	6.5	2.5	5.5	1	**35**	-3	-1.5
8	Washington	10.5	8	7	2.5	6.5	0	**34.5**	0	1
9	Maryland	9.5	6.5	6.5	4	5.5	0	**32**	-2	-3
10	Minnesota	12.5	4	6	2.5	6	0	**31**	0	0

