

VERSION NOTES

- Changes to the version presented August 24, 2017 based on Advisory Group feedback are described below

Slide #	Advisory Group Feedback	Action
15, 54	Further modification to the slides to more appropriately reflect Combined Heat and Power.	Slides updated to reflect Advisory Group comments

- Changes to the version presented September 7, 2017 based on public webinar feedback are described below

Slide #	Advisory Group Feedback	Action
54	Metrics for SCGT and CCGT were reversed to accurately captured the difference in emissions.	Slides updated to reflect Public Webinar comments

- All slide changes are marked with **CHANGES TO SLIDE**

VERSION NOTES

- Changes to the version presented July 20, 2017 based on IESO feedback are described below

Slide #	Description of Change
29, 30	-Updated metrics to align with IESO avoided GHG reporting practices and corrected errors found from data transfer into PowerPoint -GHG avoided/MW metric removed because this metric is not readily available in an accurate format

- Changes to the version presented July 20, 2017 based on Advisory Group feedback are described below

Slide #	Advisory Group Feedback	Action
45, 36, 10	Slides reference Ontario Planning Outlook Scenario B. This should be changed upon release of the 2017 Long Term Energy Plan.	Slides updated to reflect Advisory Group comments
14	Slide should be identified as a "snapshot" that reflects the information available at the time, and the slide should also incorporate the fact that there are federal incentives.	Slides updated to reflect Advisory Group comments
7, 12, 82	Discussion question 2 should be changed from asking if the current structure is "conductive" to "optimized" to support Ontario's climate change policy objectives.	Slides updated to reflect Advisory Group comments
15, 54	A caveat will be added to slide 13, where it will be stated that: if Combined Heat and Power offsets grid-electricity, it would be considered higher-emitting. However, if Combined Heat and Power offsets other less-efficient generating types, then it coincides with climate strategy.	Slides updated to reflect Advisory Group comments

- All slide changes are marked with **CHANGES TO SLIDE**

CONSERVATION FRAMEWORK MID-TERM REVIEW

CLIMATE CHANGE

JULY 20, 2017

NAVIGANT

DISCLAIMER

This report was prepared by Navigant Consulting Ltd. (Navigant) for the Independent Electricity System Operator. The work presented in this report represents Navigant's professional judgment based on the information available at the time this report was prepared. Navigant is not responsible for the reader's use of, or reliance upon, the report, nor any decisions based on the report. **NAVIGANT MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESSED OR IMPLIED.** Readers of the report are advised that they assume all liabilities incurred by them, or third parties, as a result of their reliance on the report, or the data, information, findings and opinions contained in the report.

TABLE OF CONTENTS

1. Discussion Slides.....	4
2. Introduction.....	21
I. Policy Context	
II. Introduction and Methodology	
III. Climate Change Snapshot	
3. Current State	29
I. Ontario	
II. Jurisdictional Review	
4. Summary Observations and Next Steps.....	79
Appendix A: Glossary.....	83

DISCUSSION SLIDES

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 **Climate Change** topic.

Key Questions

- What do Ontario's current climate policy and plans mean for the Conservation First Framework and the Industrial Accelerator Program?
- Is the current structure of CFF and IAP optimized to support Ontario's climate change policy objectives? Why or Why not?
- Should CDM targets, budgets, and/or structure be adjusted in light of the Climate Change Action Plan (CCAP) and broader climate policy? If so, how?
- Should other aspects of the CFF and IAP be adjusted in light of Ontario's climate change policy objectives? If so, how?
- What are the implications for customers with the introduction of CCAP?

Focus Areas

I. Conservation First Framework:

- Aligning with Climate Change Action Plan (CCAP), greenhouse gas (GHG) reduction target to complement energy targets
- Effect of CCAP on Conservation First Framework budgets, targets, programs
- Impact of Cap & Trade on Conservation First Framework programs and customers
- Energy Efficiency/DSM (right use, right time, right cost)
- Impact on environmental attributes

II. Industrial Accelerator Program:

- Impact on environmental attributes
- EE/DSM (right use, right time, right cost)
- Impact of Cap & Trade on program participation
- Aligning with CCAP, GHG target to complement energy targets

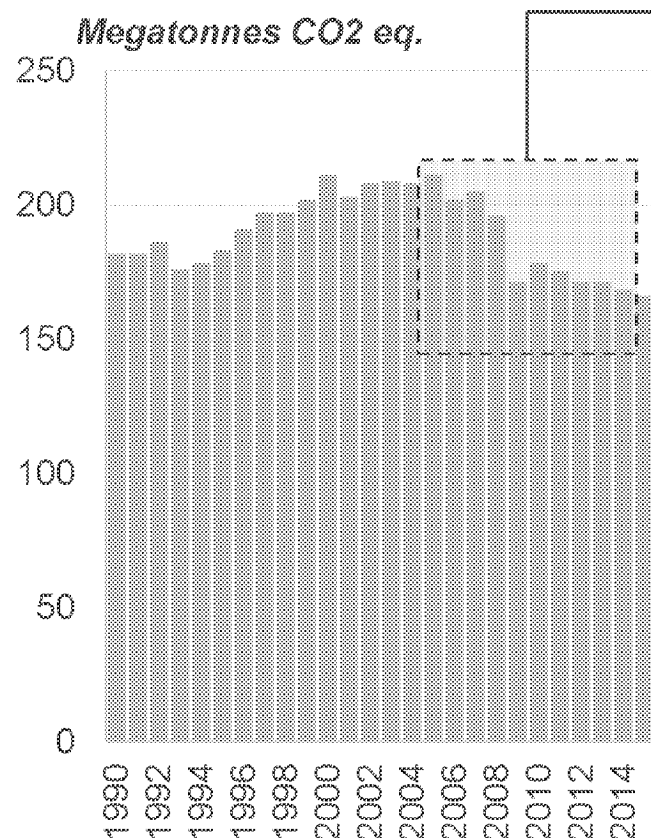
WHAT DO ONTARIO'S CURRENT CLIMATE POLICY AND PLANS MEAN FOR THE CONSERVATION FIRST FRAMEWORK AND THE INDUSTRIAL ACCELERATOR PROGRAM?

ONTARIO'S GHG EMISSIONS: THE BIG PICTURE

Ontario's Climate Change Strategy (Nov-2015) committed to a GHG emissions reduction goal of 80% (1990 levels) by 2050

- Previously, the Government committed to a 6% reduction (1990 levels) by 2014
- 2014 goals were achieved largely due to the phase out of coal and economic recession

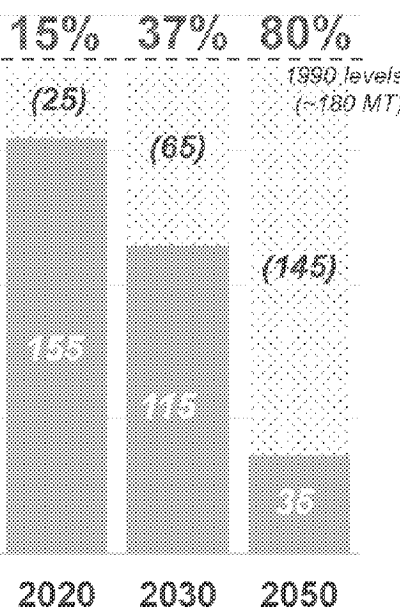
Ontario GHG Emissions (1990 – 2015)



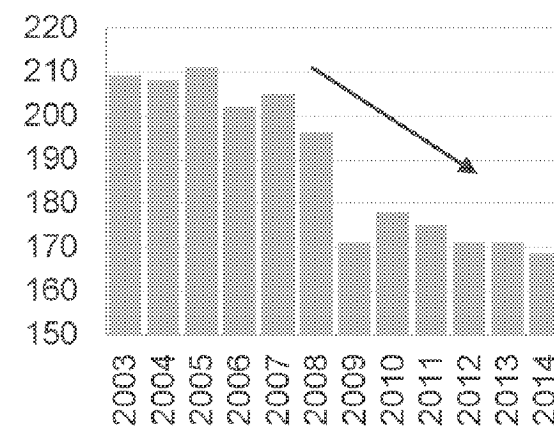
Climate Change Strategy

GHG reductions goals:

- 15% reduction by 2020
- 37% reduction by 2030
- 80% reduction by 2050

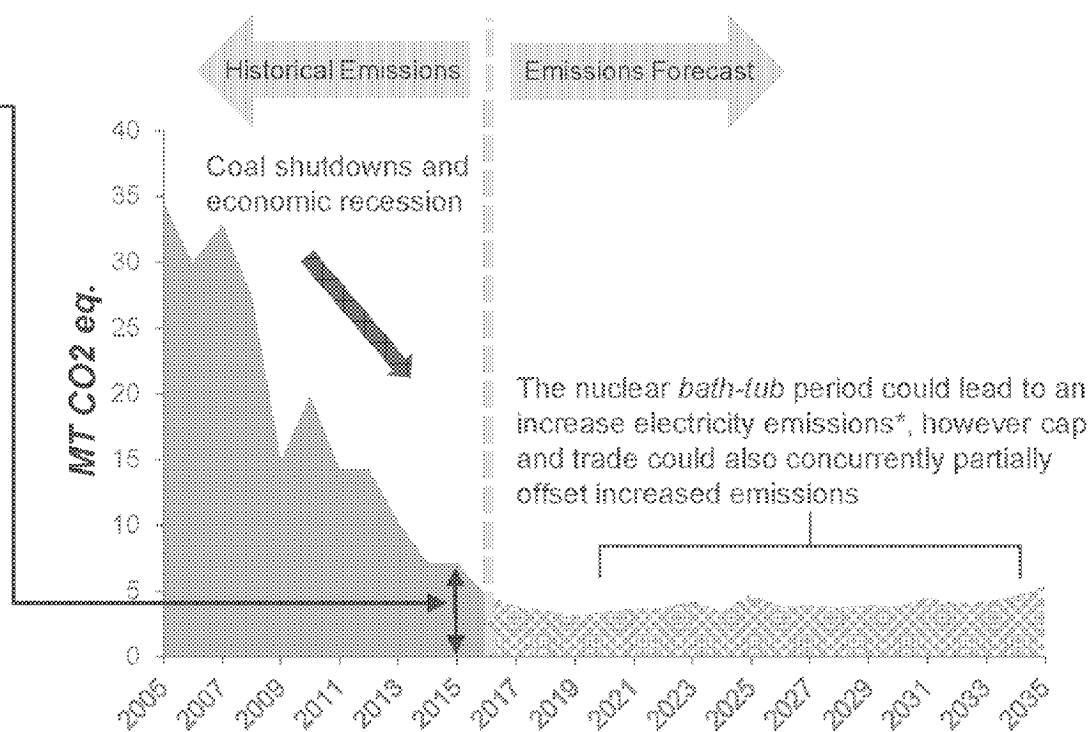
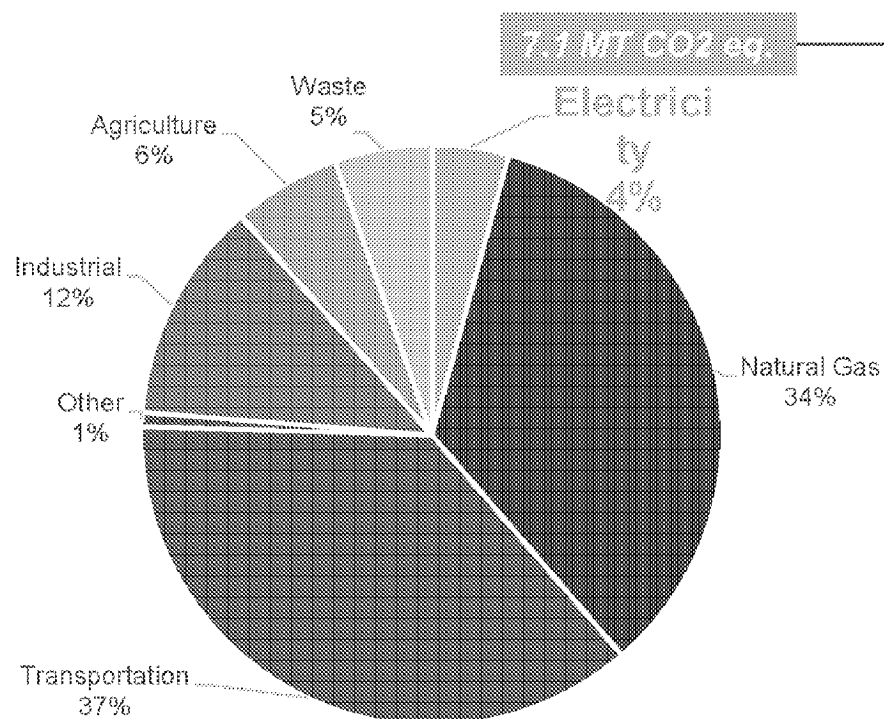


- Ontario emissions peaked in 2005 at 211 MT CO₂ eq.
- The shut-down of 7,600 MW of coal power plants contributed significantly to the drastic decline in GHG emissions from 2005 to 2014



GHG EMISSIONS FROM ONTARIO'S ELECTRICITY SECTOR

- Ontario's CCAP does not explicitly define goals for emissions reductions (or energy savings) from the CFF or IAP
- Electricity sector emissions have decreased significantly over the past decade and represent a small fraction of Ontario emissions, however electricity savings through CFF and IAP can still deliver emissions savings*
 - Eliminating all electricity emissions (~5 MT) would only contribute 8% and 3% to the 2030 / 2050 targets, respectively

2015 Ontario GHG Emissions (166 MT CO₂ eq.)

Source: OPO Module 6

Note: Forecast includes impact from cap and trade

*According to the Ontario Planning Outlook Scenario B. Values to be updated upon release of the 2017 Long Term Energy Plan.

IMPACT FROM PROVINCIAL AND FEDERAL CLIMATE CHANGE POLICIES

- While there are no explicit goals or targets imposed on the CFF or IAP, Ontario's CCAP and the Federal Government's "Carbon Strategy" introduce new initiatives, programs, and investments
- These actions may impact the delivery of CFF and IAP in a number of ways, including potential:
 - **Overlap** with existing programs and across agencies (LDCs, IESO, OEB);
 - **Competition** for sources of funding and budgets (energy efficiency, behind-the-meter generation, energy literacy, etc.);
 - **Misalignment** between government agencies regarding evaluation of cost-effectiveness, incentives, EM&V activities

Climate Change Action Plan

- Establishing a **green bank** to help homeowners and businesses secure financing for green projects
- Improving the energy efficiency of residential, commercial and industrial **buildings**
- Empowering communities to adopt green **land-use planning** policies and increasing funding opportunities
- Collaborating with **Indigenous communities** to upgrade off-grid infrastructure and reduce emissions
- Etc.

Climate
Change
Action
Plan

Ontario's
Climate
Change
Strategy

Federal
Carbon
Strategy

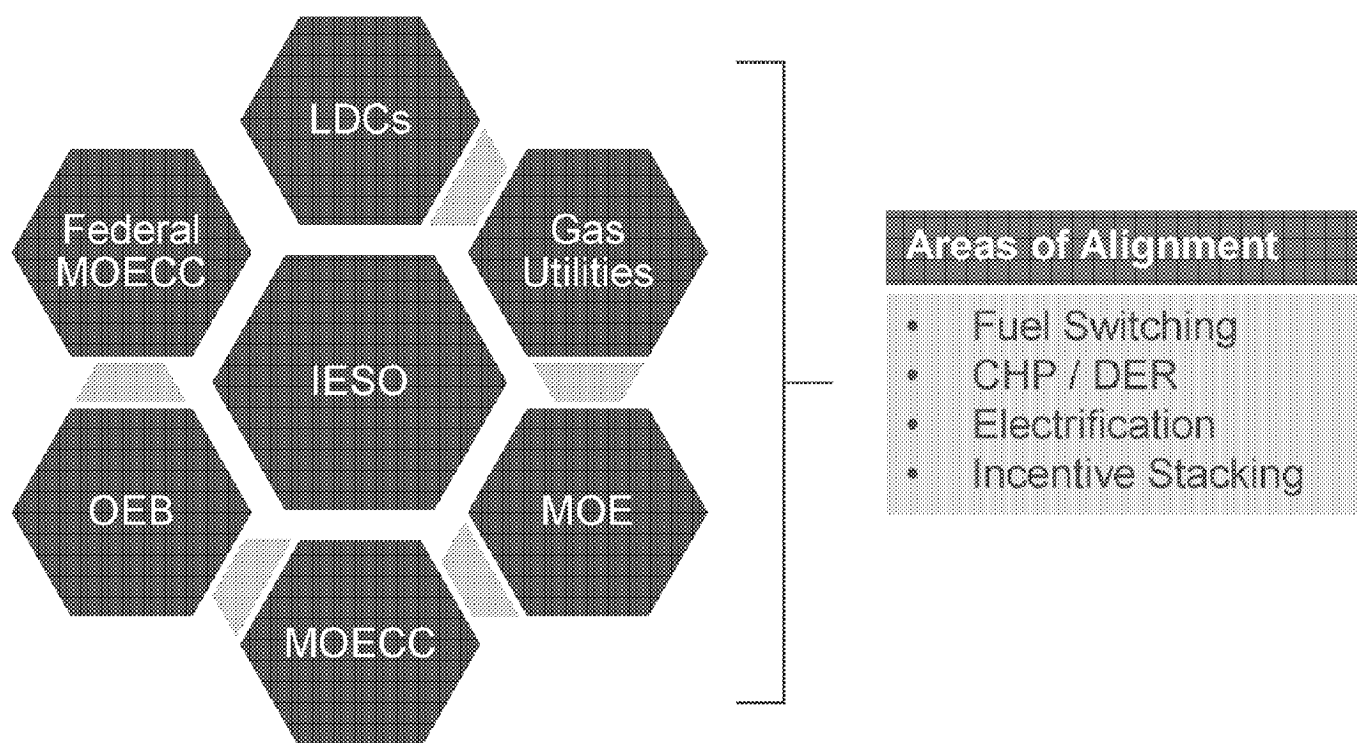
Pan-Canadian Framework on Clean Growth and Climate Change

- Funding various **low-carbon initiatives** at the federal level, such as deploying green transportation, supporting clean technology R&D, and reforming building codes to tighten energy efficiency standards and incorporate climate resilience
- Creating a \$35-billion **Canada Infrastructure Bank** to collaborate at the provincial and municipal levels to fund large infrastructure projects
- Etc.

IS THE CURRENT
STRUCTURE OF CFF AND
IAP OPTIMIZED TO
SUPPORT ONTARIO'S
CLIMATE CHANGE POLICY
OBJECTIVES? WHY OR
WHY NOT?

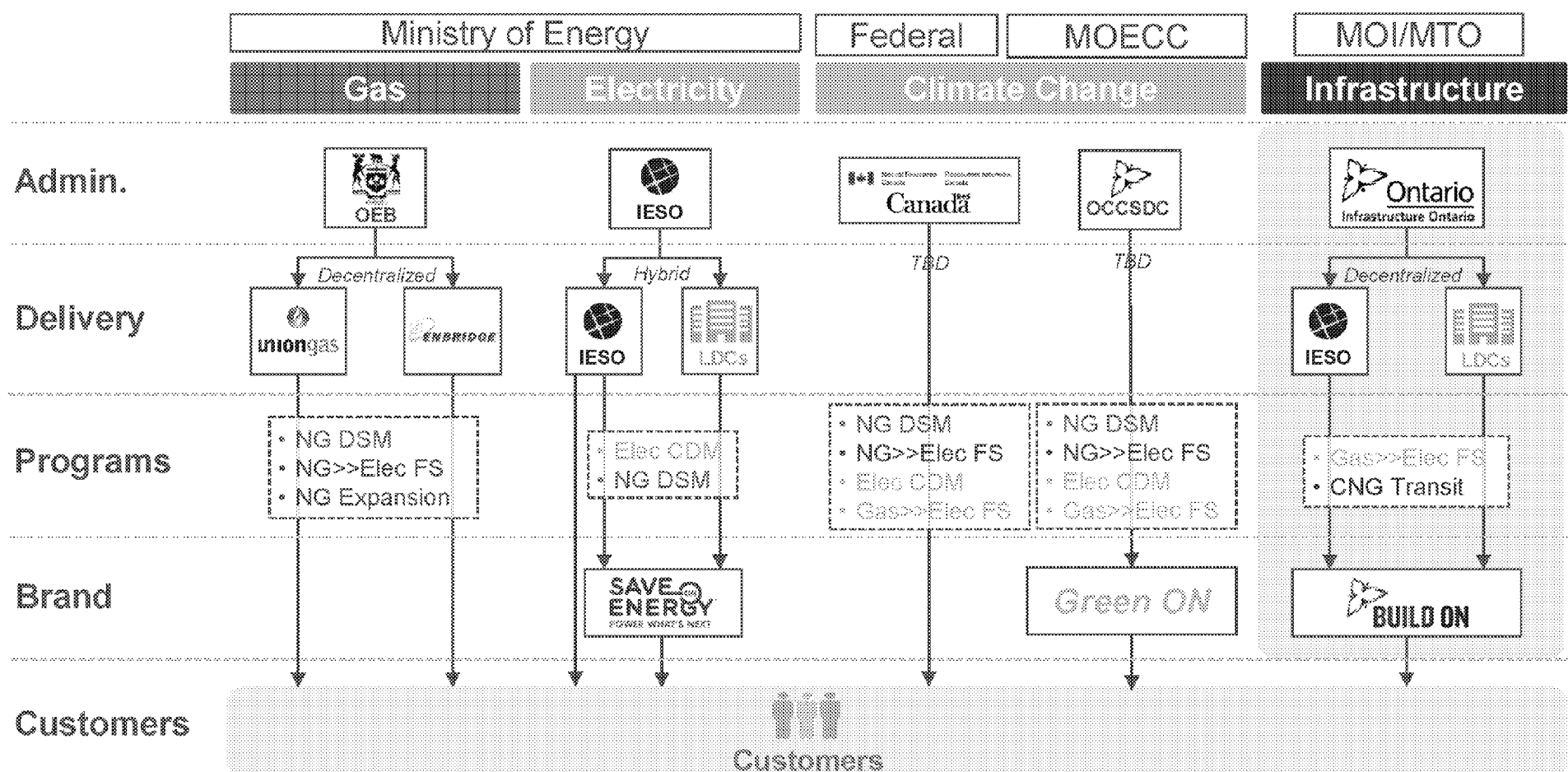
IMPACT ACROSS PROVINCIAL AND FEDERAL AGENCIES

- The introduction of new initiatives and programs from Ontario's CCAP and the Federal Carbon Strategy will require sector stakeholders to identify opportunities of alignment across a number of areas – such as fuel switching, electrification, etc. – in order to address potential:
 - **Overlap** in programs
 - **Competition** for funding sources
 - **Misalignment** across agencies



CURRENT SNAPSHOT OF ONTARIO'S CLIMATE CHANGE LANDSCAPE

- Customers have a multitude of programs available that support similar objectives



Acronym List: NG (natural gas); Gas (gasoline); DSM (Demand Side Management); FS (Fuel Switching); CDM (Conservation and Demand Management); CNG (Compressed Natural Gas); Elec (Electricity); MOECC (Ministry of Environment and Climate Change); MOI (Ministry of Infrastructure); MTO (Ministry of Transportation); OCCSDC (Ontario Climate Change Solutions Deployment Corporation)

FUEL SWITCHING AND CHP / DER

- **Fuel switching** refers to the replacement of a particular source of energy with a lower carbon-emitting alternative (e.g., gas to electricity, or propane/oil/wood to gas/electricity)
- **CHP projects** qualify for incentives under either the IESO's CFF or IAP, however, **renewable projects** do not currently qualify for CFF funding. FIT/microFIT provides funding for renewables, however microFIT will transition to a "net metering" scheme

Areas of Alignment	
1 Fuel Switching	• Cooperation across electric/gas utilities to track GHG emissions reductions through any fuel-switching combinations, in addition to the delivery of dual-impact measures • A standardized approach for estimating GHG savings for fuel-switching programs involving gas, propane, wood, or fuel oil equipment • Extended role of DSM to promote adoption of equipment that exceeds codes and standards – which may in turn merit higher incentives for adoption
2 CHP / DER	• Funding for CHP is at odds with Ontario's climate change strategy when it increases overall emissions at the site and source • Funding for CHP coincides with climate strategy when CHP offsets other higher emitting systems • Increased focus on renewables through CCAP and decreased funding for microFIT (with transition to net-metering) projects present an opportunity for establishing renewables incentives and/or renewable energy credits (REC)

ELECTRIFICATION AND INCENTIVE STACKING

- **Electrification:** The transportation sector accounts for 37% of CO2 emissions in Ontario. Efficient and smart electrification and vehicle charging can lead to significant GHG emissions reductions
- **Incentive stacking:** Dual-impact measures deliver both electricity and natural gas savings, and as a result are eligible for electricity and gas incentives. Incentive stacking would also enable these measures to potential claim “emissions” incentives

3 Electrification

Areas of Alignment

- CCAP requirements for *EV-ready homes* may facilitate adoption of “smart” charging
- Incentivizing “smart” charging at home and public infrastructure through incentives (in addition to TOU/CPP or free charging) may deliver GT&D and GHG savings
- Tracking GHG emission savings from EV adoption will require a standard calculation and establishing a *baseline* level of emissions (which may vary based on the *baseline* vehicle)

4 Incentive Stacking

- Incentive stacking may require a customer or LDC to apply for incentives to three separate agencies – the IESO (or LDCs) for electricity, the OEB (or gas utilities) for gas, and a third agency for emissions
- A single and common process for EE incentives may simplify the evaluation of measures and facilitate adoption

- SHOULD CDM TARGETS, BUDGETS, AND/OR STRUCTURE BE ADJUSTED IN LIGHT OF THE CLIMATE CHANGE ACTION PLAN (CCAP) AND BROADER CLIMATE POLICY? IF SO, HOW?
- SHOULD OTHER ASPECTS OF THE CFF AND IAP BE ADJUSTED IN LIGHT OF ONTARIO'S CLIMATE CHANGE POLICY OBJECTIVES? IF SO, HOW?

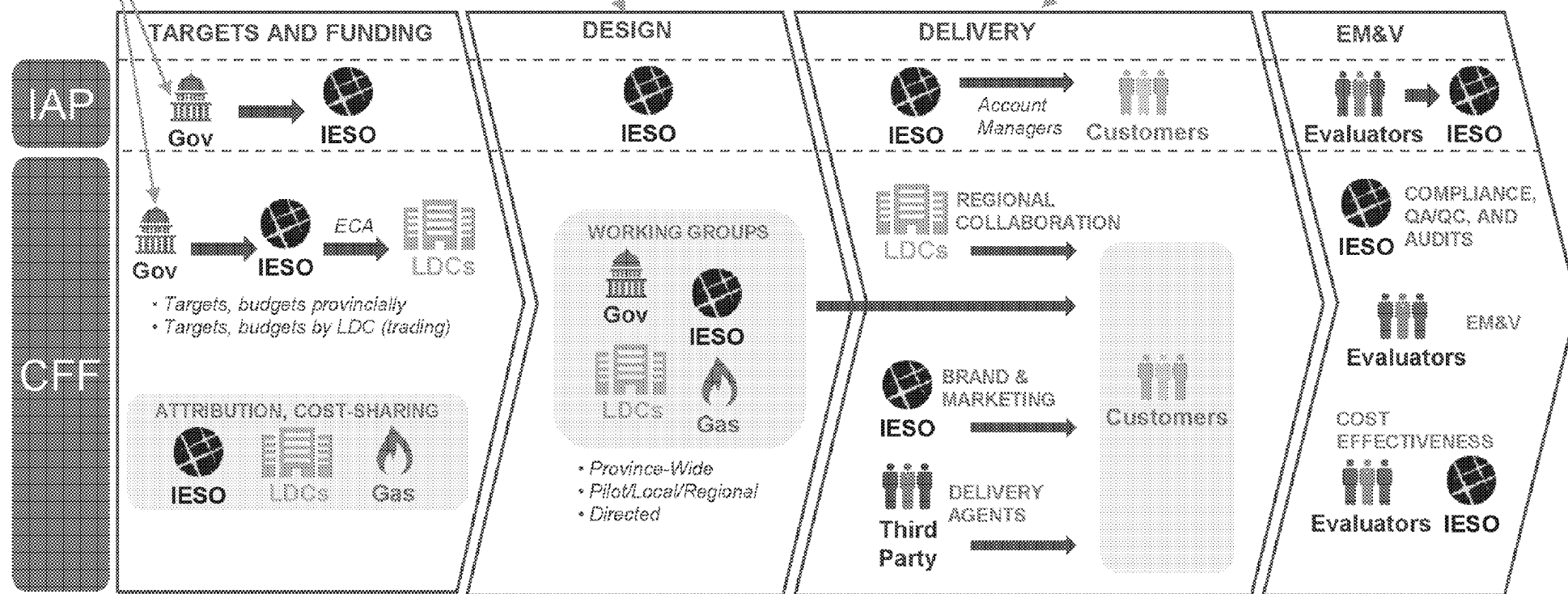
MAP OF ONTARIO'S CURRENT CDM LANDSCAPE

- The complexities of the design, delivery, and other aspects of the CFF and IAP are illustrated below.
- The relationships and roles of the different entities involved directly – or indirectly – in various aspects of the CFF and IAP are also illustrated

Government direction sets several criteria associated with CPP/IAP (e.g., targets, stakeholder roles [IESO, LDCs], coverage, spending)

Program design, roles, responsibilities are split between IESO and LDCs depending on whether a program is provincial, local, regional, pilot, or directed.

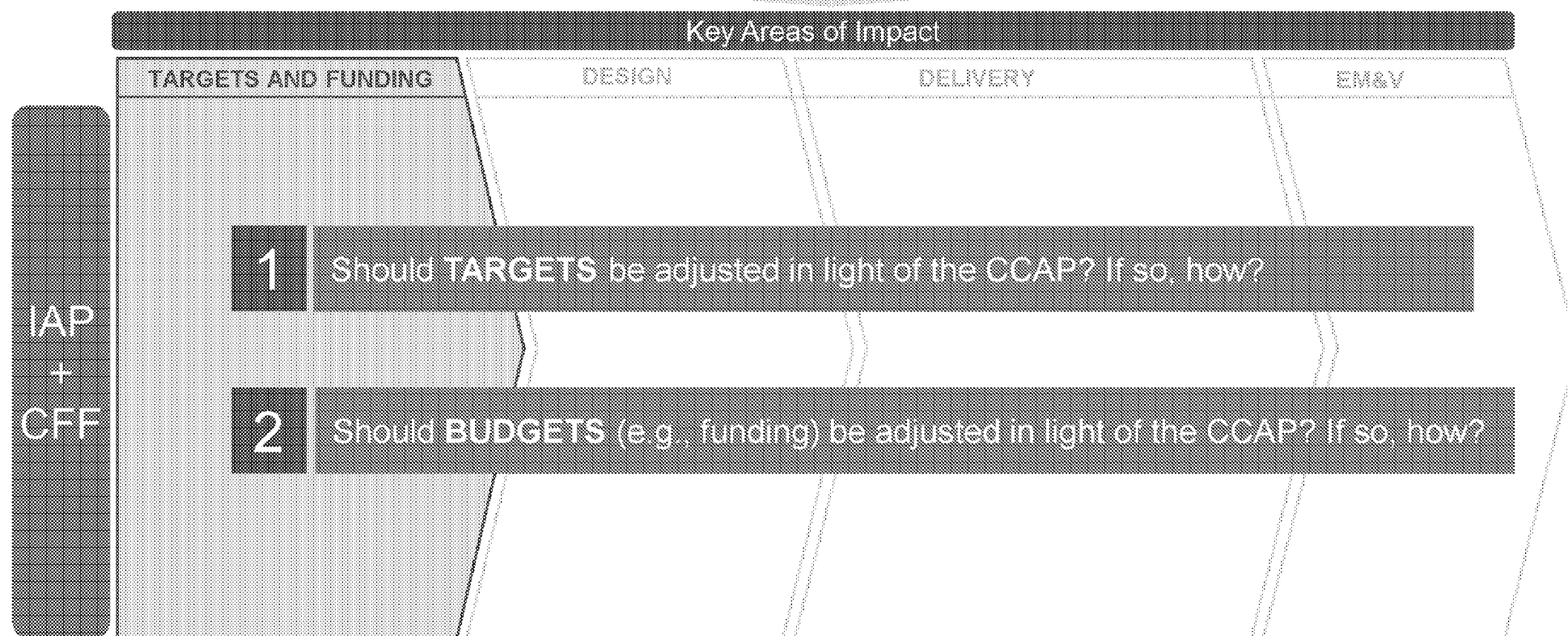
Program delivery is primarily undertaken by LDCs with some centrally-delivered programs and support from the IESO



IMPACT ON TARGETS AND BUDGETS

- Climate policy will be an impactful part of Ontario's future: the CCAP outlines funding that overlaps with electricity and natural gas programs which will impact and transform the current CFF/IAP framework and process

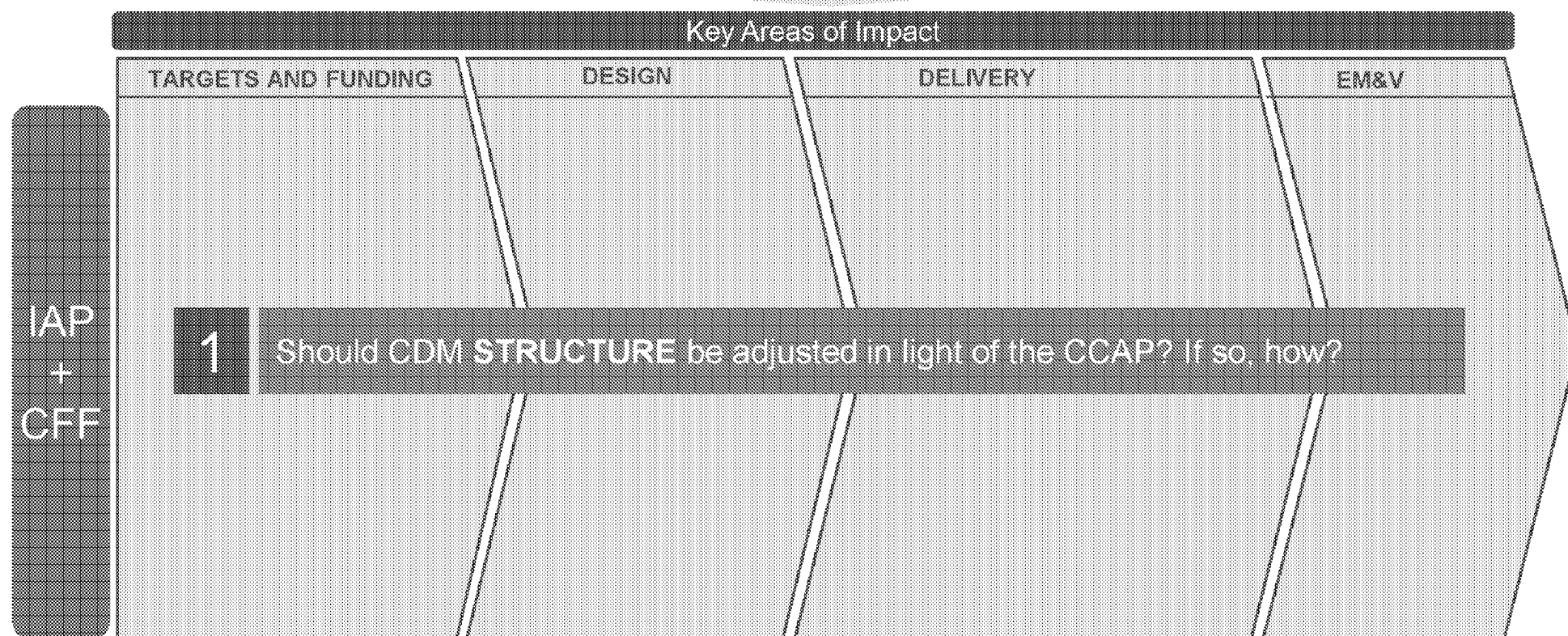
The current roles and relationships of stakeholders will evolve...



IMPACT ON TARGETS AND BUDGETS

- Climate policy will be an impactful part of Ontario's future: the CCAP outlines funding that overlaps with electricity and natural gas programs which will impact and transform the current CFF/IAP framework and process

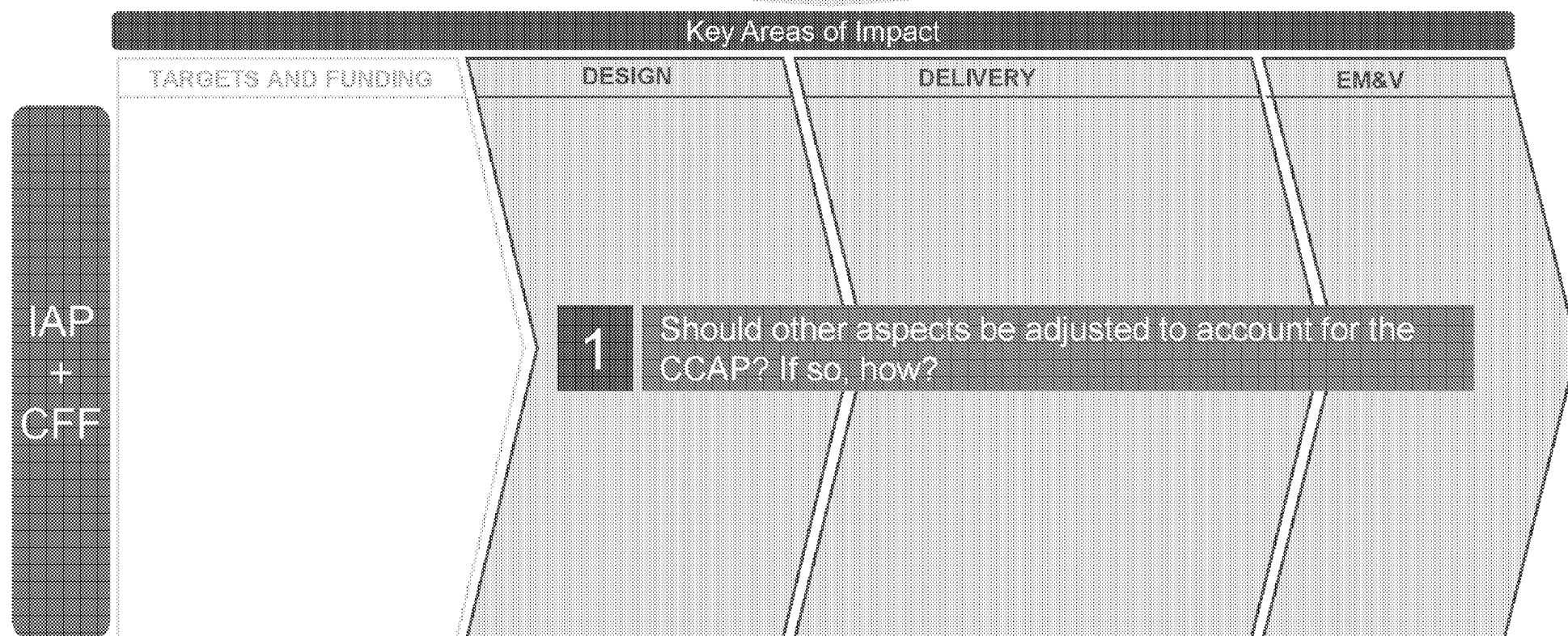
The current roles and relationships of stakeholders will evolve...



IMPACT ON DESIGN, DELIVERY, AND EM&V PRACTICES

- Climate policy will be an impactful part of Ontario's future: the CCAP outlines funding that overlaps with electricity and natural gas programs which will impact and transform the current CFF/IAP framework and process

The current roles and relationships of stakeholders will evolve...



WHAT ARE THE IMPLICATIONS FOR CUSTOMERS WITH THE INTRODUCTION OF CCAP?

SECTION 2: INTRODUCTION

- I. Policy Context
- II. Introduction and Methodology
- III. Climate Change Scorecard & Snapshot

TOPIC 7: CLIMATE CHANGE

**Policy Context – 2013 Long-Term Energy Plan & Conservation First Framework/Industrial Accelerator Program
Ministerial Directions & MOECC Plans and Regulations**

LTEP 2013 refers to climate change in the following statement regarding coal generation and the addition of renewables to the supply mix:

- “To date, Ontario has more than 18,500 MW of renewable energy online or announced, which includes more than 9,000 MW of hydroelectric capacity and more than 9,500 MW of solar, wind and bioenergy capacity. This is remarkable progress, and Ontario is proud of the role renewable energy is playing in the supply mix. This investment in clean, renewable energy sources is helping Ontario reduce its reliance on fossil fuels. The coal phase-out is the single largest climate change initiative in North America, reducing greenhouse gas emissions and air pollution.”
- “Ontario will phase in wind, solar and bioenergy over a longer period than contemplated in the 2010 LTEP, with 10,700 MW online by 2021.”

Directions regarding the Conservation First Framework and the Industrial Accelerator Program for the period of 2015-2020 reference the need to incent measures that deliver system value and promote conservation at peak times – the greatest opportunity for GHG reductions in ON is during peak times when natural gas generators are producing electricity.

The Ministry of the Environment and Climate Change's Climate Change Action Plan, Ontario's Cap and Trade program and the introduction of the Regulation under Development for the Ontario Climate Change Solutions Deployment Corporation should also be considered when assessing the policy considerations for Climate Change as it relates to CDM in ON

See next slide for further detail.

TOPIC 7: CLIMATE CHANGE (CONT)

**Policy Context – 2013 Long-Term Energy Plan & Conservation First Framework/Industrial Accelerator Program
Ministerial Directions & MOECC Plans and Regulations****MOECC's Climate Change Action Plan:**

- Total estimated Greenhouse Gas Reduction by 2020: 9,832,000 Tonnes
- New government greenhouse gas pollution target will be 37% below 2006 levels by 2030

Summary of actions related to current CDM policy and framework in ON:

- Establishing a green bank that would help homeowners and businesses access and finance energy-efficient technologies to reduce greenhouse gas pollution from buildings.
- Creating a cleaner transportation system by addressing greenhouse gas pollution from cars on the road today, by increasing the availability of zero-emission vehicles on the road tomorrow, by deploying cleaner trucks, and making transit more available.
- Halting the ongoing rise in building-related emissions by giving Ontarians more choices, incentives and tools to make the right energy choice for their homes and businesses, by providing better information about energy use by buildings and homes, and by making new buildings increasingly energy efficient over time.
- Making Ontario one of the easiest and most affordable jurisdictions in North America for homeowners and businesses to install or retrofit clean-energy systems like solar, battery storage, advanced insulation and heat pumps, while helping to protect and support low-income households, vulnerable communities and many renters from the cost impacts of carbon pricing.
- Supporting a carbon market that drives the lowest cost greenhouse gas emission reductions. Actions in this plan, supported by cap and trade proceeds, will help business and industry make investments that reduce greenhouse gas pollution. This will help save energy costs, improve productivity and global competitiveness, and protect and create jobs.
- Working in partnership with First Nations and Métis communities to address climate change, with actions guided by Traditional Ecological Knowledge, and helping to build capacity in these communities to participate in the economic opportunities that may arise from the actions.
- Building on progress, leading by example and acting on opportunities to make government operations carbon neutral. Ontario will achieve this by reducing greenhouse gas pollution across our facilities, operations and procurement.

TOPIC 7: CLIMATE CHANGE (CONT)

**Policy Context – 2013 Long-Term Energy Plan & Conservation First Framework/Industrial Accelerator Program
Ministerial Directions & MOECC Plans and Regulations**
Ontario's Cap and Trade program began on January 1st, 2017:

- The cap limits how many tonnes of greenhouse gas pollution businesses and institutions can emit. The cap drops each year to encourage lower emissions. Companies can trade (buy or sell) allowances. For example, if a company emits more greenhouse gas emissions than permitted by the cap, it could buy credits in order to comply. Credits would be available for purchase from a company that reduced its greenhouse gas emissions and have surplus credits.
- Cap and trade is projected to generate about \$1.9 billion per year in proceeds. By law, every dollar collected through cap and trade must be invested – in a transparent way – back into projects that reduce greenhouse gas pollution, such as: public transit, electric vehicle incentives, social housing retrofits.
- Ontario has already committed \$325 million to the [Green Investment Fund](#) for projects that will fight climate change, grow the economy and create jobs. These investments are part of our plan to secure a healthy, clean and prosperous low-carbon future.
- Mandatory participants: an electricity importer, a facility or natural gas distributor that emits 25,000 tonnes or more of greenhouse gas emissions per year, a fuel supplier that sells more than 200 litres of fuel per year
- Voluntary participants: Participation in the cap and trade program isn't mandatory for facilities that generates more than 10,000 but less than 25,000 tonnes of greenhouse gas emissions per year.
- Market participants: Companies without emissions to report are still eligible to participate in the auction as a market participant. Market participants can include individuals, not-for-profit organizations and companies without compliance obligations.

Description of Ontario Climate Change Solutions Deployment Corporation: "The corporation's activities would focus on reducing market barriers to deployment of low-carbon technologies, including through improved access to information, incentives, and strategic use of financial de-risking tools to encourage greater private sector investment, emphasizing fuel-switching, energy storage and deep energy"

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 is the current state summary for the **Climate Change** topic.

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
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 topic reports - To gather insights into future framework improvements, design, and delivery	Cost-benefit and gap analysis to scope opportunities	Methodologies and approach clearly discussed
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	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
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

REPORT ORGANIZATION

This report is 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
Ontario Context	Review of provincial and federal climate change policy and efforts (Ontario's CCAP, cap and trade, federal carbon strategy, etc.). Review of the metrics typically used in a assessment of GHG emissions reductions (peak / off-peak emissions factors) and metrics used to express the benefits of CDM. Review of potential areas of alignment between climate change and CDM, including fuel switching (FS), CHP/DER, and electric vehicles (EVs).	Conservation First Framework: • Effect of CCAP on Conservation First Framework budgets, targets, programs • Impact of Cap & Trade on Conservation First Framework programs and customers Conservation First Framework and Industrial Accelerator Program: • Impact on environmental attributes • EE/DSM (right use, right time, right cost) • Impact of Cap & Trade on program participation • Aligning with Climate Change Action Plan (CCAP), greenhouse gas (GHG) reduction target to complement energy targets
Jurisdictional Scan	Overview of approaches used to incorporate and align climate change policy with CDM (DSM) policy in other jurisdictions. High-level summary of past and on-going work in these jurisdictions in the context of climate change/GHG reductions and in relation to CDM, FS, CHP/DER, and EVs, and review of associated emission factors and metrics for evaluation of CDM.	Conservation First Framework and Industrial Accelerator Program: • Aligning with Climate Change Action Plan (CCAP), greenhouse gas (GHG) reduction target to complement energy targets • EE/DSM (right use, right time, right cost)

CONSERVATION FIRST FRAMEWORK SNAPSHOT

AREA	METRIC	DESCRIPTION	RESULT	INSIGHT
GHG metrics	GHG reduction per MWh saved (tonnes GHG avoided/MWh)	Avoided tonnes GHG calculated by IESO for 2015 verified results divided by the net verified energy savings achieved in 2015	0.089	- Avoided GHG is calculated net of any increases in GHG emissions due to natural gas CHP projects 2015 CFF spending does not include legacy framework, however, GHG avoided considers savings from legacy framework (savings achieved in 2015)
	\$ spent per GHG reductions (\$/tonnes GHG avoided)	The incentive plus non-incentive spending in 2015 divided by avoided tonnes GHG calculated by IESO for 2015 verified results	189	
CDM Plan Metrics	% of LDC CDM Plan allocated to natural gas behind the meter generation (BMG)	Planned target achievement (2020 energy savings) within LDC CDM Plans that specified BMG = "TRUE"	12%	Based on LDC CDM Planned amounts (not actual)

INDUSTRIAL ACCELERATOR PROGRAM SNAPSHOT

AREA	METRIC	DESCRIPTION	RESULT	INSIGHT
GHG metrics	GHG reduction per MWh saved (tonnes GHG avoided/MWh)	Avoided tonnes GHG calculated by IESO for 2015 verified results divided by the net verified energy savings achieved in 2015	0.039	- Avoided GHG is calculated net of any increases in GHG emissions due to natural gas CHP projects - Administrative costs are higher in 2015 for IAP (first year of the program) and are expected to level out as more projects come into service
	\$ spent per GHG reductions (\$/tonnes GHG avoided)	The incentive plus non-incentive spending in 2015 divided by avoided tonnes GHG calculated by IESO for 2015 verified results	2,815	
CDM Plan Metrics	% of achievement allocated to natural gas behind the meter generation (BMG)	Gross unverified first year energy savings for generation projects that have received a project incentive between 2012 and 2017	49%	8 projects with 4 implemented in 2016

SECTION 3: CURRENT STATE

- I. Ontario
- II. Jurisdictional Review

I. ONTARIO

OVERVIEW

Section	Ontario
Description	Review of provincial and federal climate change policy and efforts (Ontario's CCAP, cap and trade, federal carbon strategy, etc.). Review of the metrics typically used in a assessment of GHG emissions reductions (peak / off-peak emissions factors) and metrics used to express the benefits of CDM. Review of potential areas of alignment between climate change and CDM, including fuel switching (FS), CHP/DER, and electric vehicles (EVs).
Focus areas	Conservation First Framework: • Effect of CCAP on Conservation First Framework budgets, targets, programs • Impact of Cap & Trade on Conservation First Framework programs and customers Conservation First Framework and Industrial Accelerator Program: • Impact on environmental attributes • EE/DSM (right use, right time, right cost) • Impact of Cap & Trade on program participation • Aligning with Climate Change Action Plan (CCAP), greenhouse gas (GHG) reduction target to complement energy targets
Source(s)	IESO Data, National Inventory Report, Ministry of Environment and Climate Change, Environmental Commissioner of Ontario, Government of Ontario,

Summary:

- Ontario's Climate Change Strategy (Nov-2015) committed to a GHG emissions reduction goal of 80% (1990 levels) by 2050
- Eliminating all electricity emissions (~5 MT) would only contribute 8% and 3% to the 2030 / 2050 targets, respectively.
- Climate policy will be an impactful part of Ontario's future; the CCAP outlines funding that overlaps with electricity and natural gas programs which will impact and transform the current CFF/IAP framework and process
- Areas of overlap and impact include fuel switching, electrification, CHP and DER, and incentive stacking

I. ONTARIO

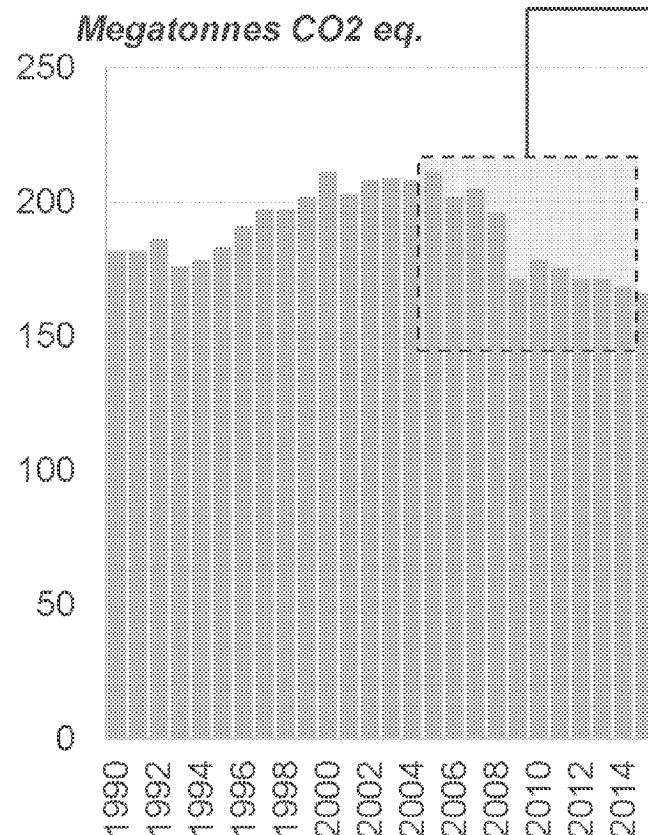
- Policies
- Metrics
- Potential Alignment

ONTARIO'S GHG EMISSIONS: THE BIG PICTURE

Ontario's Climate Change Strategy (Nov-2015) committed to a GHG emissions reduction goal of 80% (1990 levels) by 2050

- Previously, the Government committed to a 6% reduction (1990 levels) by 2014
- 2014 goals were achieved largely due to the phase out of coal and economic recession

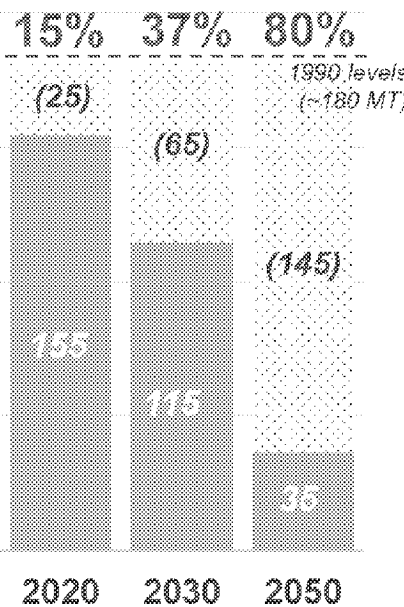
Ontario GHG Emissions (1990 – 2015)



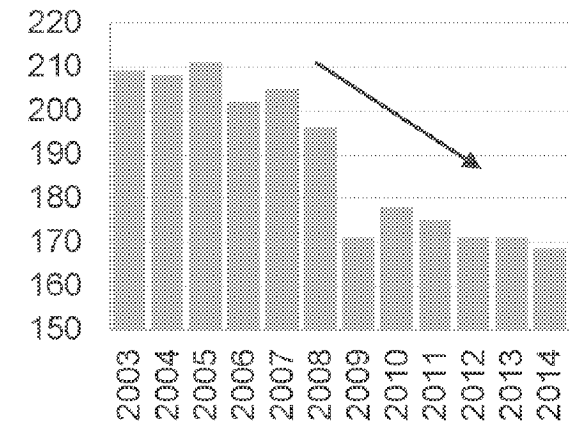
Climate Change Strategy

GHG reductions goals:

- 15% reduction by 2020
- 37% reduction by 2030
- 80% reduction by 2050

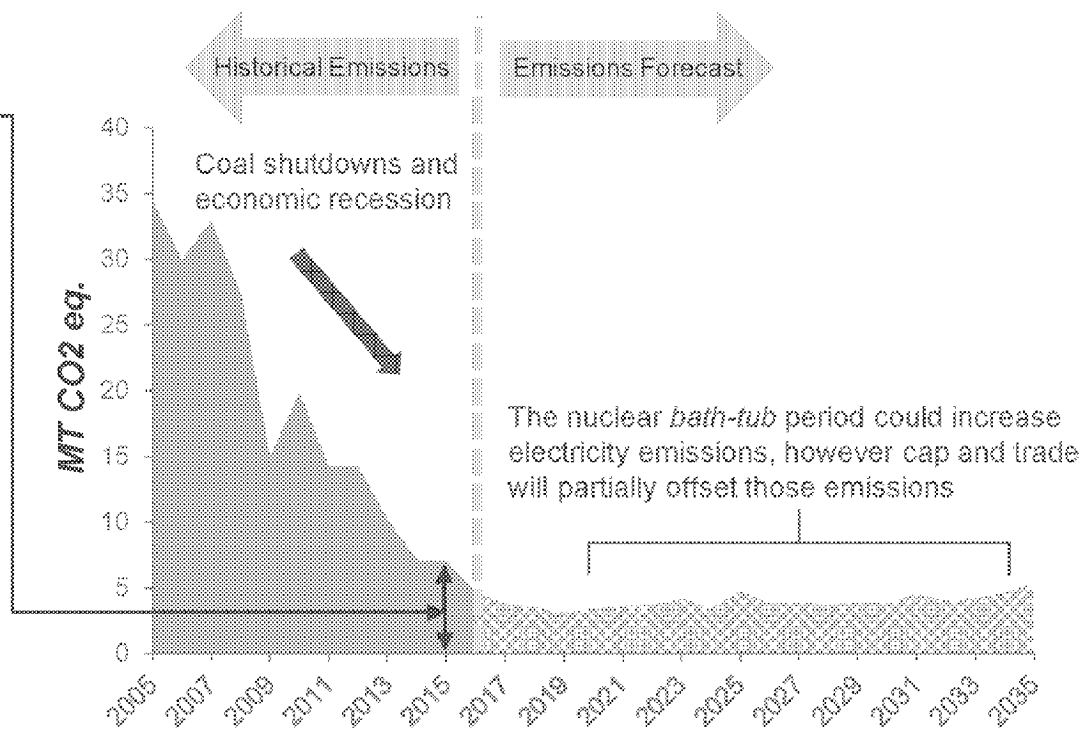
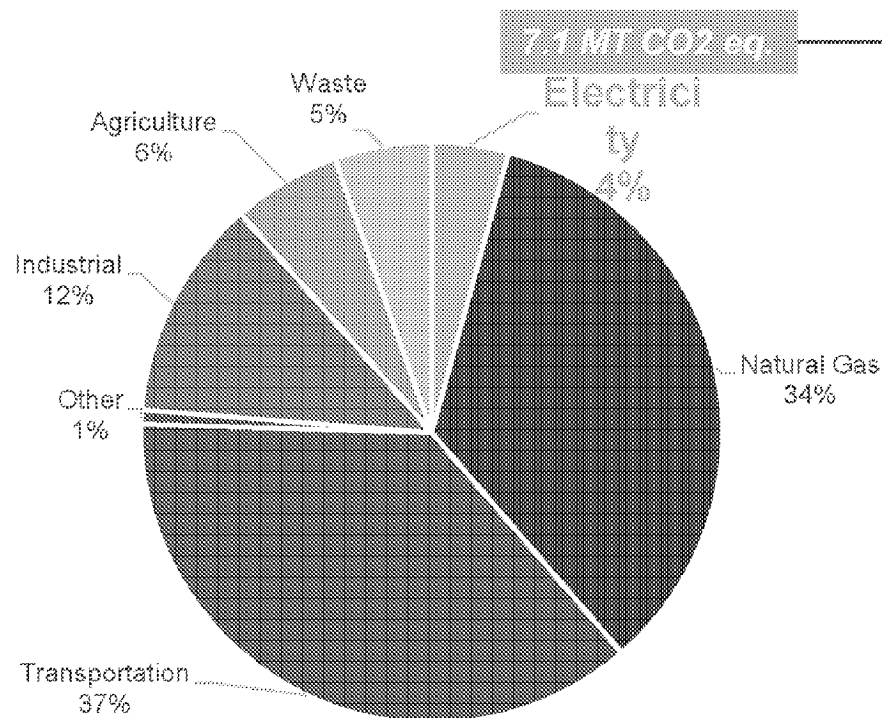


- Ontario emissions peaked in 2005 at 211 MT CO₂ eq.
- The shut-down of 7,600 MW of coal power plants contributed significantly to the drastic decline in GHG emissions from 2005 to 2014



GHG EMISSIONS FROM ONTARIO'S ELECTRICITY SECTOR

- In 2015, Ontario's GHG emissions were 166 MT CO₂ eq. – 4% were emissions from the electricity sector (~7 MT)
- Electricity sector emissions decreased approx. 80% from 2005 (~35 MT) to 2015 (~7 MT), largely due to coal retirements
- Moving forward, the changing supply mix is projected to increase electricity emissions compared to 2017 levels (i.e., decreased nuclear availability, and increased use of gas)
 - Eliminating all electricity emissions (~5 MT) would only contribute 8% and 3% to the 2030 / 2050 targets, respectively.

2015 Ontario GHG Emissions (166 MT CO₂ eq.)

Source: OPO Module 6

Note: Forecast includes impact from cap and trade

*According to the Ontario Planning Outlook Scenario B. Values to be updated upon release of the 2017 Long Term Energy Plan.

REVIEW OF RELEVANT CLIMATE CHANGE POLICIES

The following slides provide a high-level review of relevant provincial and federal climate change policy, programs, and initiatives which combined make up – and influence – Ontario's energy-sector approach to climate change:

1. Ontario's Climate Change Action Plan (CCAP)
2. Ontario's Cap and Trade program
3. Federal Carbon Strategy (*Pan-Canadian Framework on Clean Growth and Climate Change*)
4. Ontario's Carbon Price Forecast; and
5. Ontario's Gas DSM Framework



CLIMATE CHANGE ACTION PLAN (CCAP)

Climate
Change
Action
Plan

Ontario's five-year Climate Change Action Plan (2016–2020) is a wide-reaching policy framework designed to drive Ontario's transition to a low-carbon economy in pursuit of the province's emissions reduction goals (below 1990 levels) of 15% in 2020, 37% in 2030 and 80% in 2050. It makes use of various financial incentives, regulatory changes, infrastructure investments and research funding to develop and implement green technologies across the province.

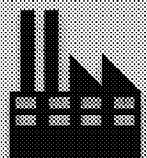
Key Characteristics

- Establishing a green bank to help homeowners and businesses secure financing for green projects
- Decreasing the carbon footprint of Ontario's transportation system
- Helping consumers better manage their energy usage
- Improving the energy efficiency of residential, commercial and industrial buildings
- Empowering communities to adopt green land-use planning policies and increasing funding opportunities
- Collaborating with Indigenous communities to upgrade off-grid infrastructure and reduce emissions
- Supporting R&D in low-carbon technology
- Reducing emissions across government operations
- Developing carbon storage in agricultural land and natural systems (e.g. forests, wetlands)

Impact on Ontario

- The average vehicle will be associated with lower GHG emissions as gasoline becomes cleaner, low-carbon fuels are promoted and the deployment of electric vehicles accelerates
- Residential and commercial buildings will be retrofitted to consume less energy with funding from the green bank and other programs
- Given new funding, more green technology innovation can be expected from the private sector
- The electricity sector makes up only 4% of Ontario GHG emissions (~7 MT CO₂e), so reductions from electricity savings would contribute marginally to provincial targets
- The CCAP does not provide a bottom-up breakdown that indicates the source of emissions reductions

CAP AND TRADE PROGRAM



Cap and Trade

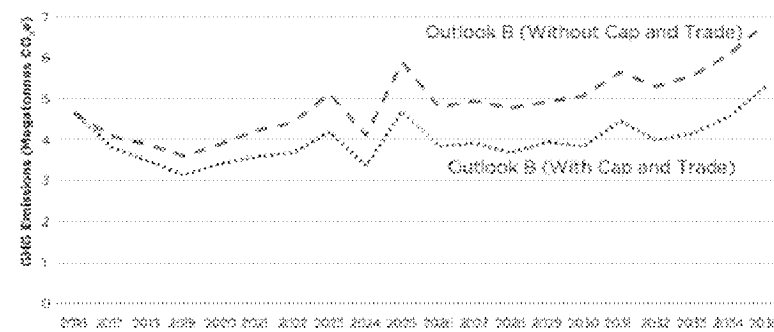
Established under the *Climate Change Mitigation and Low-carbon Economy Act, 2016*, Ontario's new cap and trade program came into effect on January 1, 2017. This program requires polluters to purchase an allowance for each tonne of CO₂ equivalent that they wish to emit each year, and enables businesses to trade these allowances amongst each other. The government sets a cap on the total number of allowances sold and lowers it each year, thus decreasing total pollution.

Key Characteristics

- Ontario is part of the Western Climate Initiative (WCI), which aims to connect cap and trade programs across North America, and intends to link its program to the California–Quebec carbon market
- Ontario's June-2017 auction had a settlement price of \$18.72 per tonne
- The emissions cap will decrease by 4% per year to 2020, considered an aggressive rate of decline
- Auction proceeds are projected to be \$1.8 billion in 2017-18, and \$1.4 billion annually thereafter
- Proceeds from the cap and trade program will be directed toward the green initiatives outlined in the *Climate Change Action Plan*
- Mid-size commercial and industrial customers will be protected from increasing energy costs with \$1-1.3 billion in subsidies from cap and trade proceeds

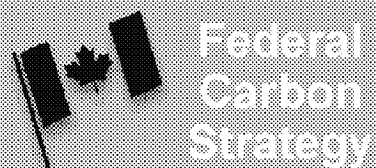
Impact on Ontario

- By 2017, gasoline prices are projected to increase by 4.3¢ per litre and home heating bills are expected to rise by an average of \$5 per month
- Gas-fired generation will become more expensive, slowing electricity sector GHG emissions growth
- The impact of cap and trade is estimated at ~1.5 MT by 2030. Based on the CCAP's 37% target reduction by 2030 (65 MT), cap and trade accounts for approx. 2% of the target reduction (1.5 / 65).



FEDERAL CARBON STRATEGY

PAN-CANADIAN FRAMEWORK ON CLEAN GROWTH AND CLIMATE CHANGE



Released in 2016, the Government of Canada's climate action strategy is composed of carbon pricing and other emissions-reduction measures, as well as infrastructure adaptation and investment in clean technology. It sets national emissions reduction targets but allows provinces to implement their own programs to meet these goals. It was developed in collaboration with provincial governments but has not yet been signed by Manitoba or Saskatchewan.

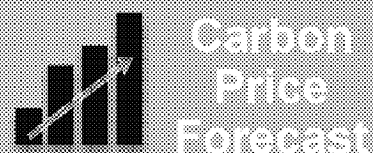
Key Characteristics

- Imposing a national carbon floor price of \$10 per tonne in 2018, rising gradually to \$50 per tonne in 2022, and allowing provinces to implement the price using carbon taxes or cap and trade programs
- Seeking to phase out coal power generation by 2030
- Funding various low-carbon initiatives at the federal level, such as deploying green transportation, supporting clean technology R&D, and reforming building codes to tighten energy efficiency standards and incorporate climate resilience
- Creating a \$35-billion Canada Infrastructure Bank to collaborate at the provincial and municipal levels to fund large infrastructure projects
- Establishing the \$2-billion Low Carbon Economy Fund to help provinces and territories fund emissions-reducing projects

Impact on Ontario

- Federal funding from the Low Carbon Economy fund will enable Ontario to increase investment in low-carbon technology
- Ontario and its municipalities will be able to sponsor transformative projects such as electricity grid interconnections and green transportation plans for support from the Canada Infrastructure Bank
- Ontario's emissions cap will be required to decrease at least as fast as the federal strategy mandates; however, this may still result in a carbon price below the national price floor
- Many of Ontario's climate policies as laid out in the *Climate Change Action Plan* (e.g. building codes and retrofits, low-carbon transportation) are mirrored in the federal strategy, keeping Ontario competitive with other provinces

OEB LONG-TERM CARBON PRICE FORECAST

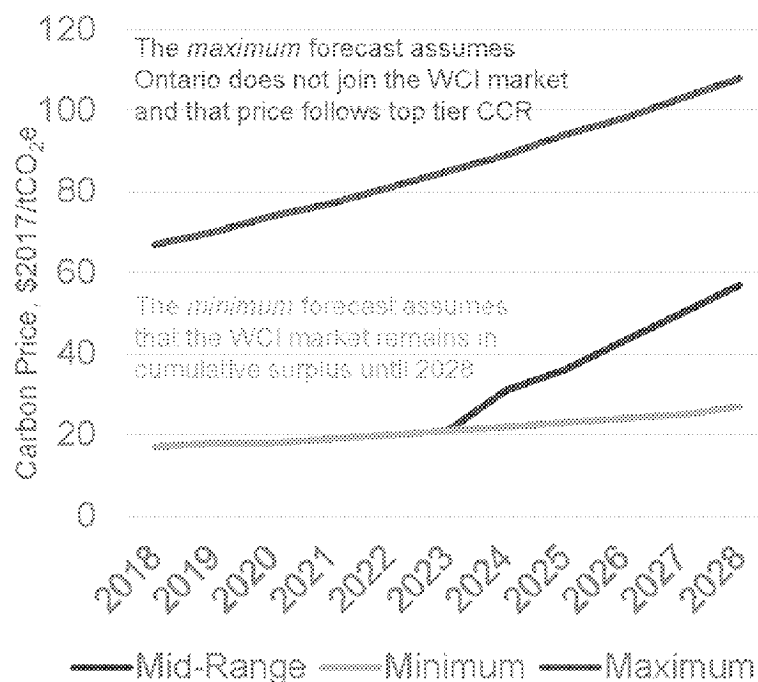


Commissioned by the OEB, the province's first Long-Term Carbon Price Forecast Report was issued in May 2017 and projects carbon prices from 2018 to 2028. Three carbon price forecasts were developed, incorporating varying assumptions regarding the success of the carbon market as well as policy decisions in Ontario and other WCI jurisdictions. The wide deviation between maximum and minimum forecasts demonstrates that the price of carbon is quite sensitive to these assumptions.

Key Characteristics

- The mid-range forecast assumes that Ontario will join the WCI market in 2018 and that no major policy changes will influence carbon prices
- Modest \$1/tonne annual increases are projected until 2023, when a shortage of carbon allowances is expected to develop in the joint WCI market, increasing prices more sharply
- The price of carbon is projected to increase from \$17/tonne in 2018 to \$57/tonne in 2028

Price Forecast



Impact on Ontario

- Carbon price increases will encourage green innovation to lower operating costs
- Higher fuel prices for heating and transportation will incentivize energy-efficiency measures and accelerate the transition to electric vehicles
- Carbon leakage: carbon-intensive businesses may opt to shift investment away from Ontario, a risk which can be mitigated by more widespread adoption of carbon pricing (e.g. *Pan-Canadian Framework*) as well as business-friendly climate policy

OEB NATURAL GAS DEMAND-SIDE MANAGEMENT FRAMEWORK



Gas DSM

Released in 2014 by the Ontario Energy Board (OEB), the *2015-2020 Natural Gas DSM Framework* provides guidance to gas utilities in the creation of their demand-side management (DSM) plans, with the aim of reducing natural gas consumption throughout Ontario. It provides a framework for such activities as targeting, budgeting, evaluating programs and calculating cost-effectiveness, as well as laying out a list of principles intended to guide DSM decision-making.

Key Characteristics

- Unlike in the electricity sector, natural gas utilities participate in DSM programs on a voluntary basis, so the OEB provides them with shareholder incentives and allows them to set their own savings targets
- The OEB urges utilities to maximize cost-effective efficiency measures that result in long-term savings
- Gas utilities are encouraged to coordinate and integrate their DSM efforts with electricity distributors' CDM initiatives to increase total energy savings and reduce program costs
- When planning future infrastructure projects, utilities must prove early on that DSM has been considered as an alternative
- The framework was developed before Ontario introduced its cap and trade legislation; as such, it does not consider the impact of carbon pricing

Impact on Ontario

- DSM programs could reduce annual Ontario natural gas consumption by between 4.5% and 7.1% in 2020 and by between 9% and 17.8% in 2030 (Source: OEB Natural Gas Conservation Potential Study)
- Residential, commercial and industrial consumption can all be reduced with DSM but the industrial sector has the highest potential savings
- Utilities can fund DSM programs with ratepayer dollars, thus increasing customers' energy costs
 - However, customers who participate in the programs should see their energy bills go down
 - Additionally, the OEB has introduced a cost-efficiency incentive to reward DSM programs that use the least amount of ratepayer dollars
- DSM programs enable many low-income consumers to undertake efficiency measures that would otherwise be out of reach

I. ONTARIO

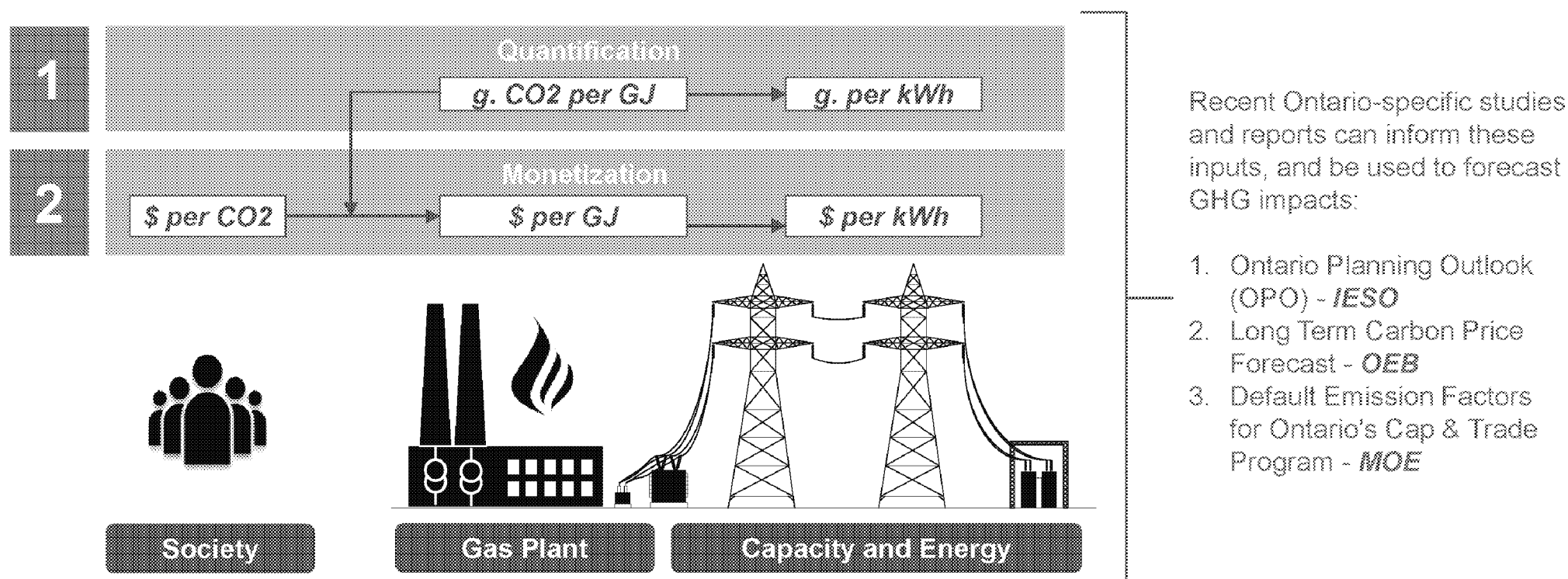
- Policies
- **Metrics**
- Potential Alignment

GHG EMISSIONS METRICS

Treatment of GHG emissions can be assessed based on three categories of benefits:

- Qualitative – *impacts that cannot be quantified or monetized and are treated qualitatively*
- Quantifiable – *impacts that can be tracked, measured, and reported; and*
- Monetizable – *quantifiable impacts that can also be monetized through pricing or avoided costs*

GHG emissions can be (1) quantified (based on the carbon intensity of generation resources) and (2) monetized (based on a societal price on carbon)



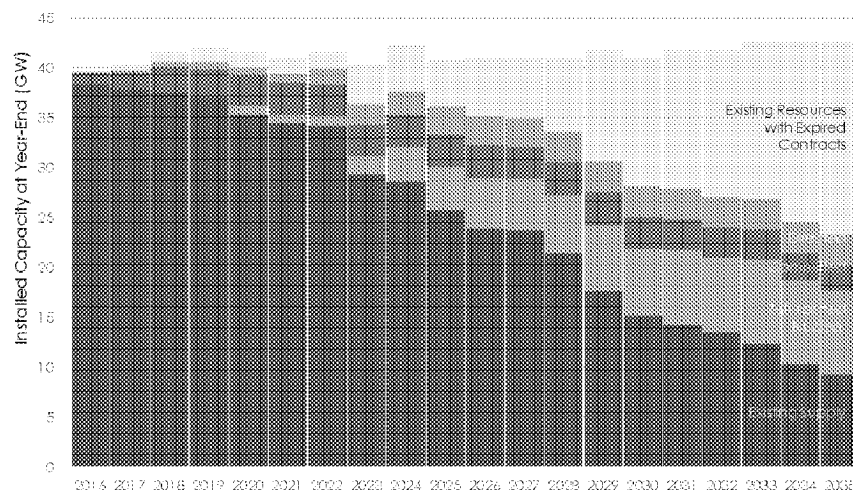
CHALLENGES ASSOCIATED WITH QUANTIFYING AND MONETIZING GHG (1)

Accurately quantifying and monetizing GHG emissions can be a challenge due to:

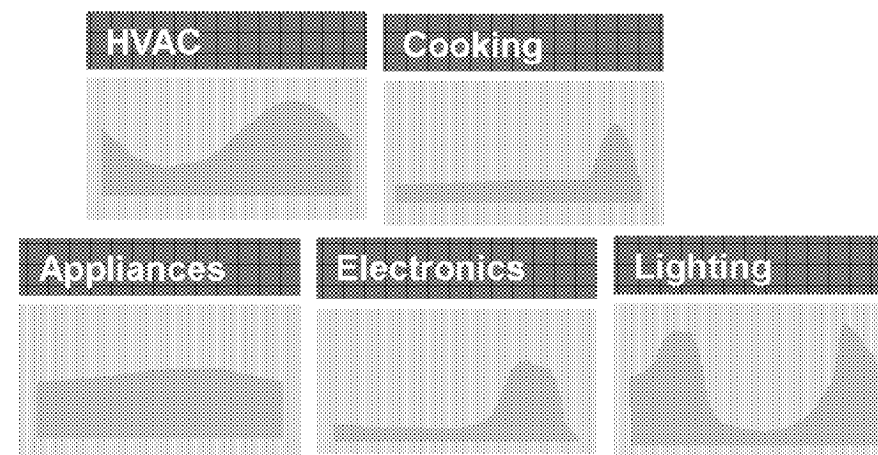
- The electricity supply mix changes with time;
- Current supply mix forecasts can only be so accurate;
- All gas peakers have different GHG/carbon intensities (e.g., SCGT vs. CCGT);
- All EE measures (and DR resources) follow different load-shapes; and
- Different load-shapes may or may not be coincident with GHG emitting resources

In 2016, IESO will be reporting avoided emissions using a method that considers the avoided emissions associated with the marginal resource and takes into account load shapes by end-use/equipment; IESO is currently undertaking this activity, avoided GHG emissions will be reported as part of the 2016 EM&V results

Ontario's Changing Supply Mix over Time



Illustrative Load Shapes by End-Use/Equipment



CHALLENGES ASSOCIATED WITH QUANTIFYING AND MONETIZING GHG (2)

Another consideration is that Ontario's emissions intensity is forecast to remain relatively low through 2036*

- Ontario's emissions intensity decreased drastically following the shut-down of coal plants (250 g/kWh to below 50 g/kWh)
- Emissions intensity decreased further from 2014/15 to 2016 due to decreased demand and decreased use of gas resources
- Emissions are expected to hit the lowest point in 2019 – prior to the beginning of refurbishment activities at Bruce

In the near term, the impact of energy efficiency on GHG emissions reductions will be limited because of low emissions intensity

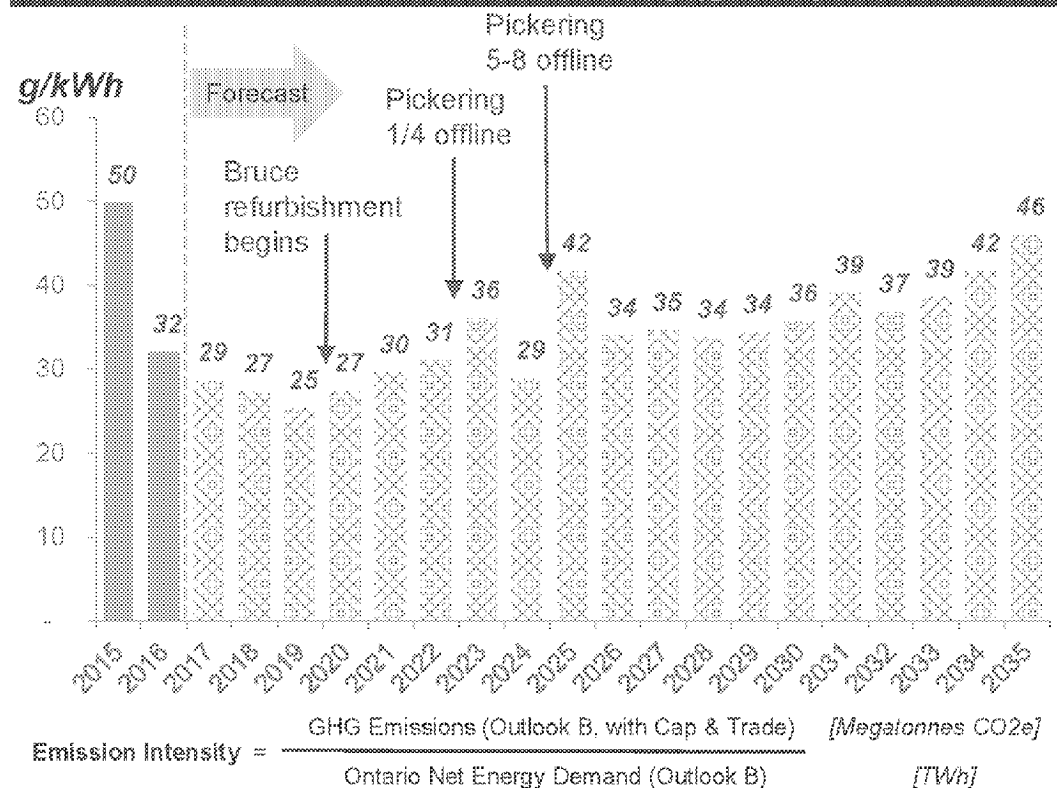
- In comparison, higher-emitting jurisdictions such as MISO and PJM can claim much higher GHG savings from energy efficiency

Emission Factors in Neighboring Jurisdictions

g/kWh	Off-Peak	On-Peak
ISO-NE	344	480
NYISO	352	510
PJM	812	605
MISO	965	789
Manitoba	0	0

Source: Ministry of Energy (2016). Proposed Default Emissions Factors for Ontario's Cap & Trade Program

Forecast of Ontario Emissions Intensity (g/kWh)



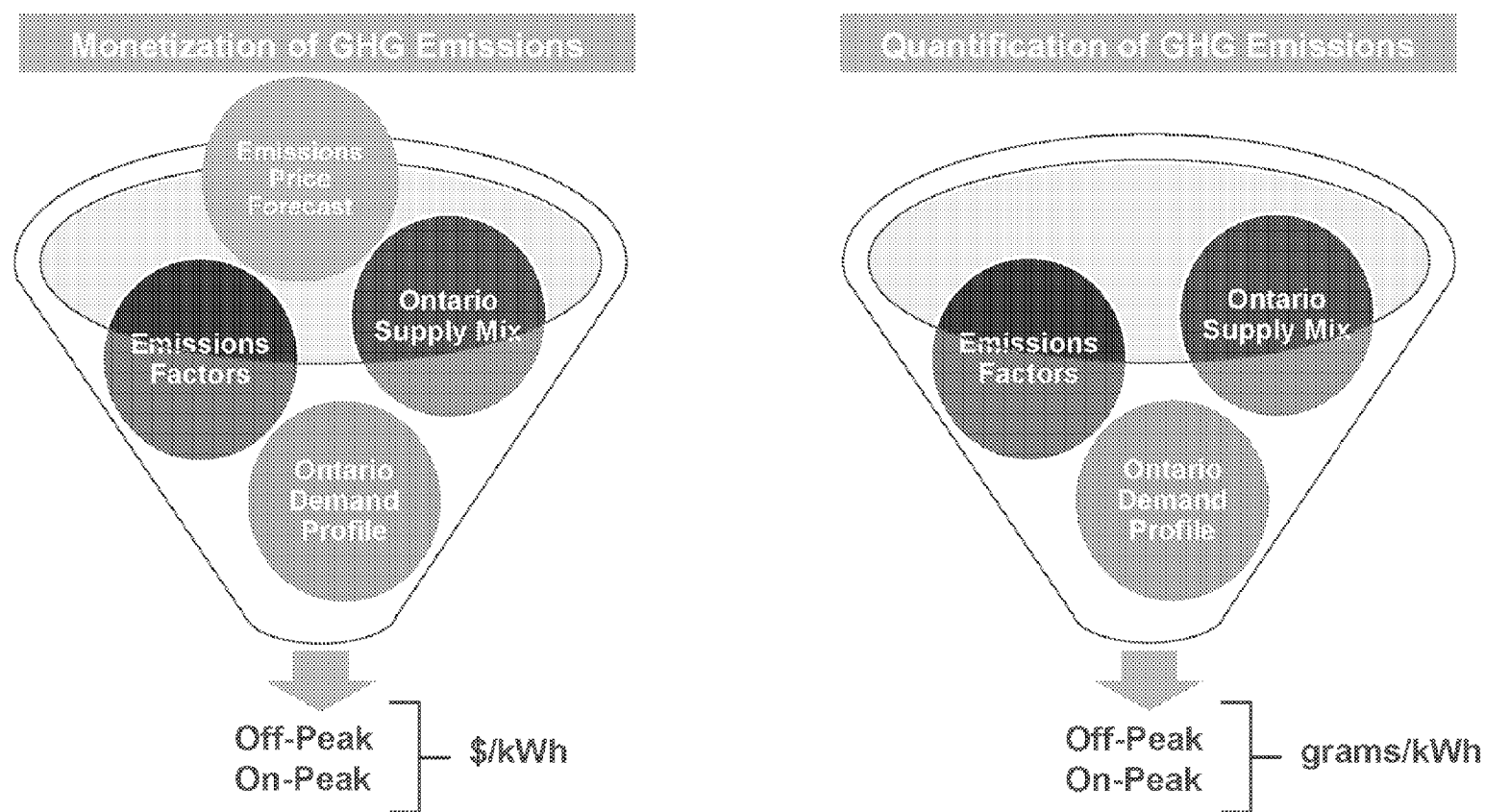
*According to the Ontario Planning Outlook Scenario B. Values to be updated upon release of the 2017 Long Term Energy Plan.

ESTABLISHING GHG EMISSIONS METRICS

Given the complexities of adequately measuring GHG emissions, it's appropriate to apply simplifying assumptions to determine off-peak and on-peak parameters:

- Currently, the CDM Cost-Effectiveness Tool uses off-peak, mid-peak, and on-peak avoided energy costs
- Consistent with current practice, emissions factors could also be established for off-peak and on-peak periods

IESO is currently undertaking this activity, avoided GHG emissions will be reported as part of the 2016 EM&V results

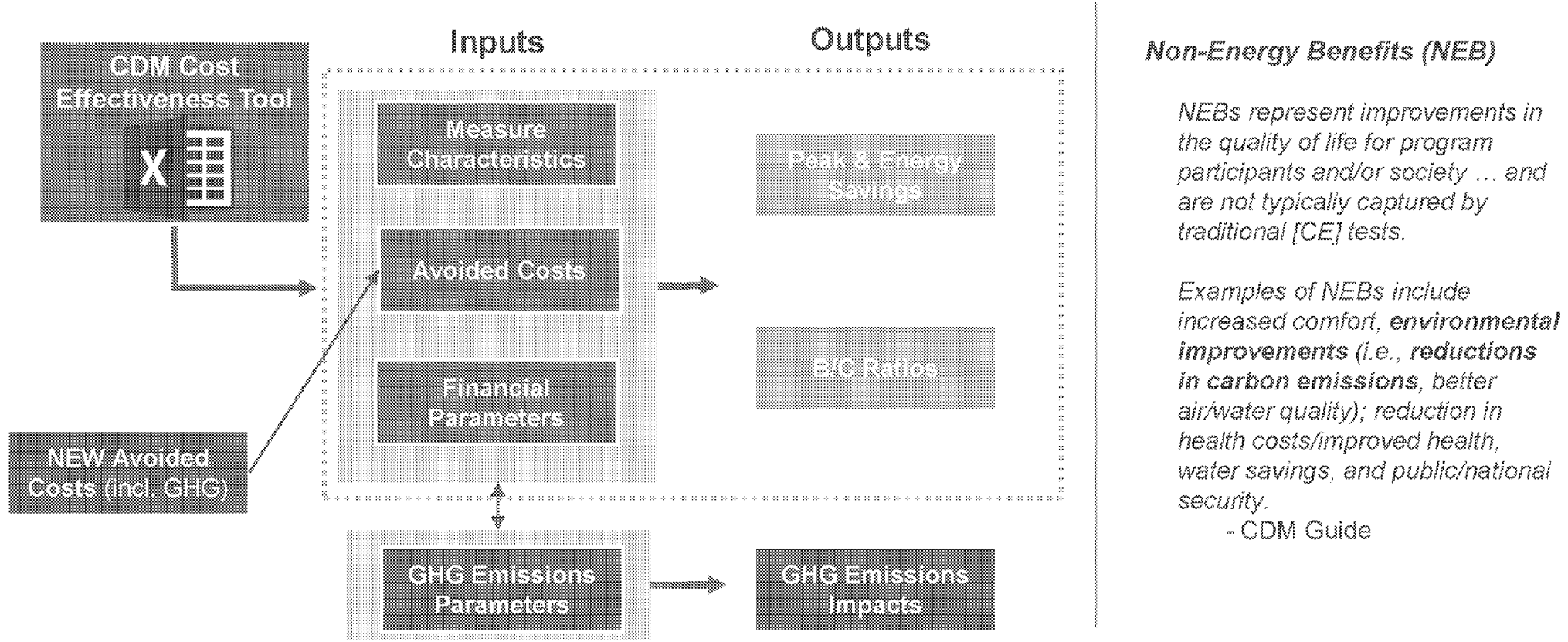


INCORPORATING GHG EMISSIONS METRICS

Quantifying and monetizing GHG emissions may require changes to existing tools – such as the CDM Cost-Effectiveness Tool – to incorporate carbon prices and emissions factors

- The current approach for incorporating emission is through Non-Energy Benefits (NEBs). However, with the cap and trade program, emissions are *internalized* across the energy sector
- GHG emissions are no longer “externalities”

IESO is currently undertaking this activity, avoided GHG emissions will be reported as part of the 2016 EM&V results



I. ONTARIO

- Policies
- Metrics
- **Potential Alignment**

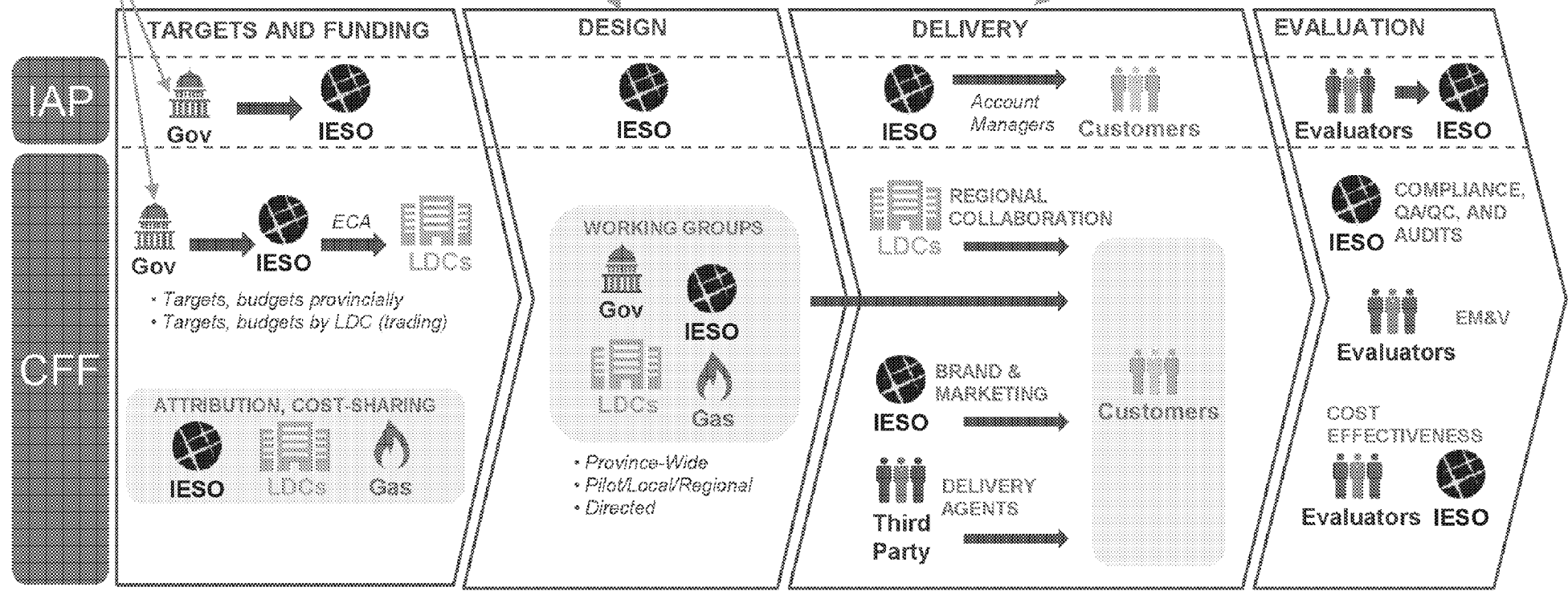
MAP OF ONTARIO'S CURRENT CDM LANDSCAPE

- The complexities of the design, delivery, and other aspects of the CFF and IAP are illustrated below.
- The relationships and roles of the different entities involved directly – or indirectly – in various aspects of the CFF and IAP are also illustrated

Government direction sets several criteria associated with CPP/IAP (e.g., targets, stakeholder roles [IESO, LDCs], coverage, spending)

Program design, roles, responsibilities are split between IESO and LDCs depending on whether a program is provincial, local, regional, pilot, or directed.

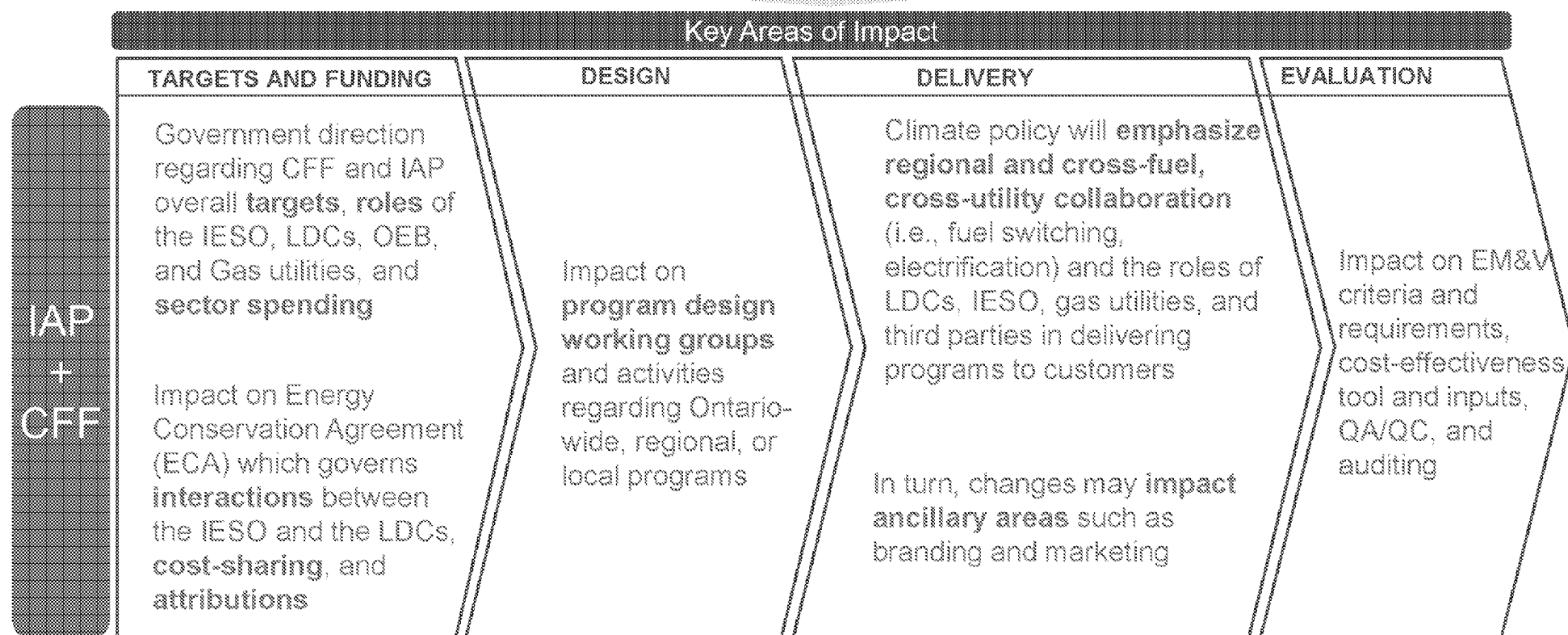
Program delivery is primarily undertaken by LDCs with some centrally-delivered programs and support from the IESO



CHANGING DSM ROLES, PROGRAM DESIGN PROCESS, AND DELIVERY

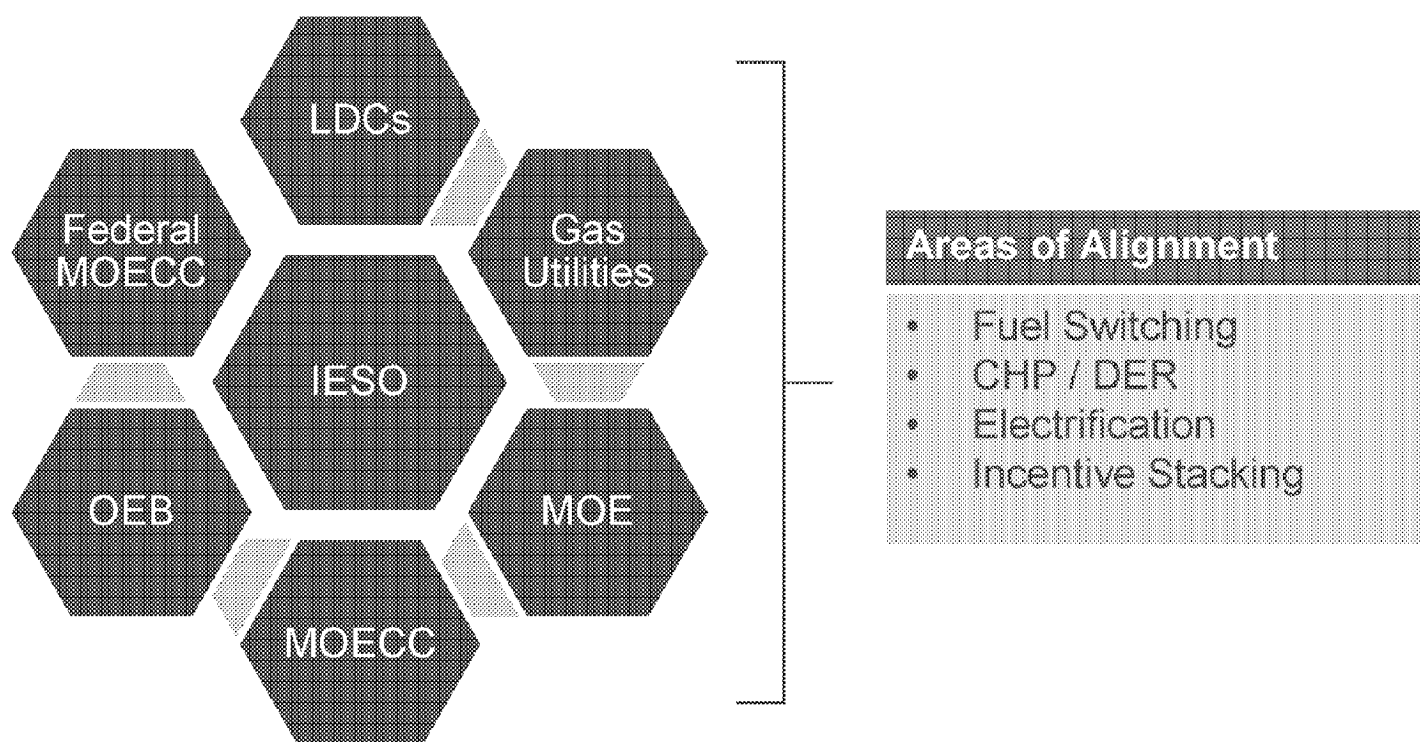
- Climate policy will be an impactful part of Ontario's future: the CCAP outlines funding that overlaps with electricity and natural gas programs which will impact and transform the current CFF/IAP framework and process

The current roles and relationships of stakeholders will evolve...



IMPACT ACROSS PROVINCIAL AND FEDERAL AGENCIES

- The introduction of new initiatives and programs from Ontario's CCAP and the Federal Carbon Strategy may require sector stakeholders to identify opportunities of alignment across a number of areas – such as fuel switching, electrification, etc. – in order to address potential:
 - **Overlap** in programs
 - **Competition** for funding sources
 - **Misalignment** across agencies



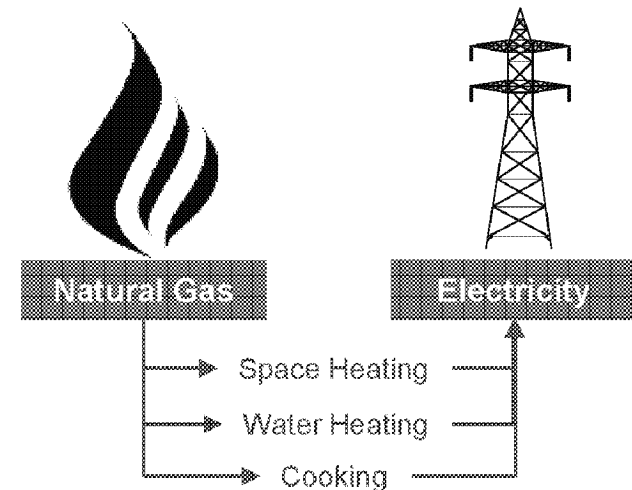
FUEL SWITCHING

- **Fuel switching** refers to the replacement of a particular source of energy with a lower carbon-emitting alternative – for example:
 - Gas to Electricity; or
 - Propane / Oil / Wood to Gas / Electricity

CCAP actions related to Fuel Switching

- Boost low-carbon technology in homes - *B&H 4.1*
- Help retire older wood stoves - *B&H 4.22*
- Set lower-carbon standards for new buildings - *B&H 5*
- Establish low-carbon content for natural gas - *B&H 6.1*

B&H = Building & Homes



Considerations

- Reductions in GHG emissions arise from **most fuel-switching combinations** (e.g., X to Y)
- **Codes and standards** for building envelope, and electric or gas equipment can contribute to GHG reductions
- **Natural gas will remain cost-effective alternative** to electricity in areas with natural gas access (particularly for space and water heating purposes)

Areas of Alignment

- **Cooperation across electric/gas utilities** to track GHG emissions reductions through any fuel-switching combinations, in addition to the delivery of dual-impacts measures
- A **standardized approach for estimating GHG savings** for fuel-switching programs involving gas, propane, wood, or fuel oil equipment
- Extended role of DSM to promote adoption of equipment that **exceeds codes and standards** – which may in turn merit higher incentives for adoption

CHP AND OTHER DER

- **Combined Heat and Power (CHP)** systems use a natural gas engine or turbine to generate electricity. Waste heat is captured and used for other purposes.
- **CHP projects qualify for incentives under either the IESO's CFF or IAP.** Renewables projects do not qualify for CFF funding or IAP. FIT/microFIT provides funding for renewables, however microFIT will transition to a "net metering" scheme.
- The CCAP did not specify any actions related to CHP systems.

CCAP actions related to Renewables

- Support hospitals, universities and colleges (renewables) – *B&H2.2*
- Boost low-carbon technology in homes – *B&H4.1*

B&H = Building & Homes

Considerations

- Ontario's electricity emissions intensity is well below levels from any gas resources
- In other jurisdictions, CHP may be a less carbon-intensive alternative, however, in Ontario **CHP is more carbon-intensive than current supply mix**
- The *BMG Potential Study* evaluated various CHP adoption scenarios based on various funding levels and impact of cap & trade. Results showed little impact on CHP potential
- **Funding for renewables projects will decrease** with the shift from microFIT to net-metering
- **Funding for CHP is at odds with Ontario's climate change strategy** when it increases overall emissions at the site and source
- **Funding for CHP coincides with climate strategy** when CHP offsets other higher emitting systems
- **Increased focus on renewables through CCAP and decreased funding for microFIT projects** present an opportunity for establishing renewables incentives and/or renewable energy credits (REC)

Emission Factors by Resource

	g/kWh	vs. ON
ON (2016)	32	-
Renewables	0	-32
CHP	254	+222
CCGT	346	+314
SCGT	510	+478
Diesel	723	+691

Areas of Alignment

ELECTRIC VEHICLES

- The transportation sector accounts for 37% of CO₂ emissions in Ontario (61 MT of CO₂ eq.), of which 75% are related to road transportation; this includes gasoline vehicles, trucks, and motorcycles (46 MT)
- An average passenger vehicle emits 4.7 tonnes of CO₂ (equivalent to 156 MWh of EE at an emission factor of 30 g/kWh)

CCAP actions related to Electric Vehicles

- Free overnight electric vehicle charging - T2.2
- Ensure charging infrastructure is widely available – T2.5
- Require electric vehicle charging in surface lots – LUP1.1.1
- Electric-vehicle-ready homes (New homes) – T2.5.2

T = Transportation, LUP = Land-Use Planning

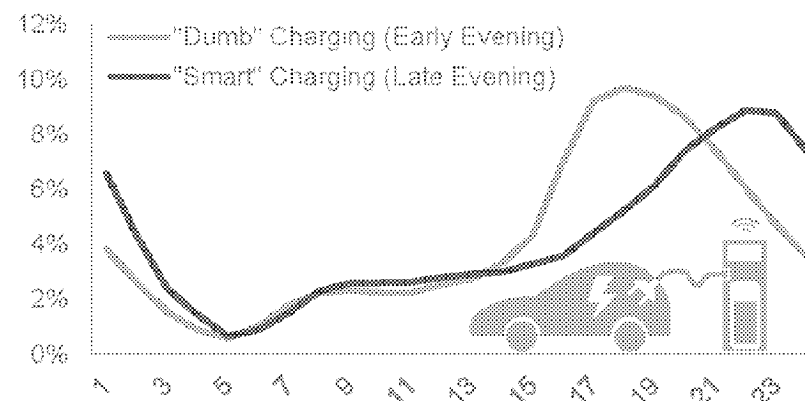
Considerations

- **EV adoption does not deliver electricity savings**, however, time-distribution of charging may induce lower system peaks
- **“Smart” charging:** On-peak charging may increase utilization of gas peakers and GHG emissions, while off-peak charging is unlikely to increase GHG emissions
- **System peaks are unlikely to change** with near-term EV adoption, however EVs can be > 3 to 5 times the peak load of an average detached home (5-10 kW vs. 2 kW)

Areas of Alignment

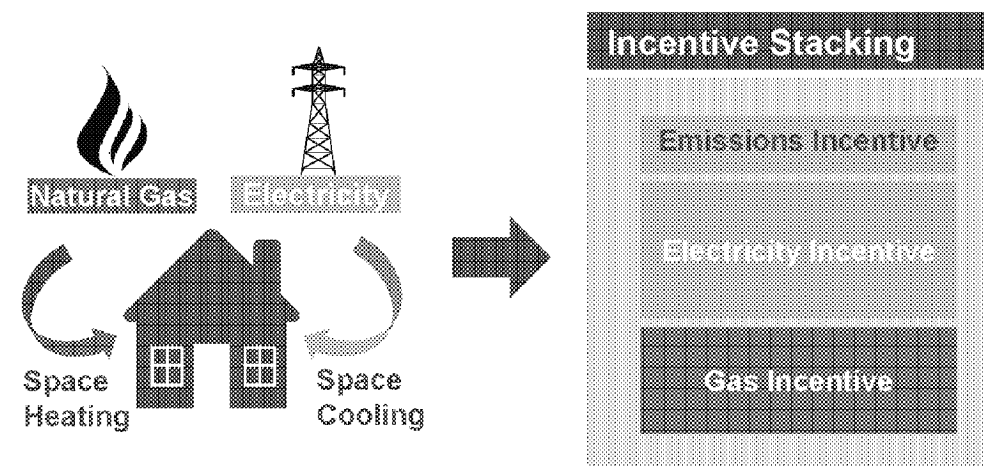
- CCAP requirements for *EV-ready homes* may facilitate adoption of “smart” charging
- Incentivizing “smart” charging at home and public infrastructure through incentives (in addition to TOU/CPP or free charging) may deliver GT&D and GHG savings
- Tracking GHG emission savings from EV adoption will require a standard calculation and establishing a baseline level of emissions (which may vary)

Illustrative Smart vs. Dumb Charging



INCENTIVE STACKING

- **Dual-impact measures** – such as home energy report (HER) or smart thermostats – deliver both electricity and natural gas savings
- This dual impact nature means that these measures are eligible for incentives for both electricity and gas savings
- **Incentives for GHG emissions reductions** may also be applicable so that measures may benefit from “incentive stacking” (i.e., electricity + gas + GHG)

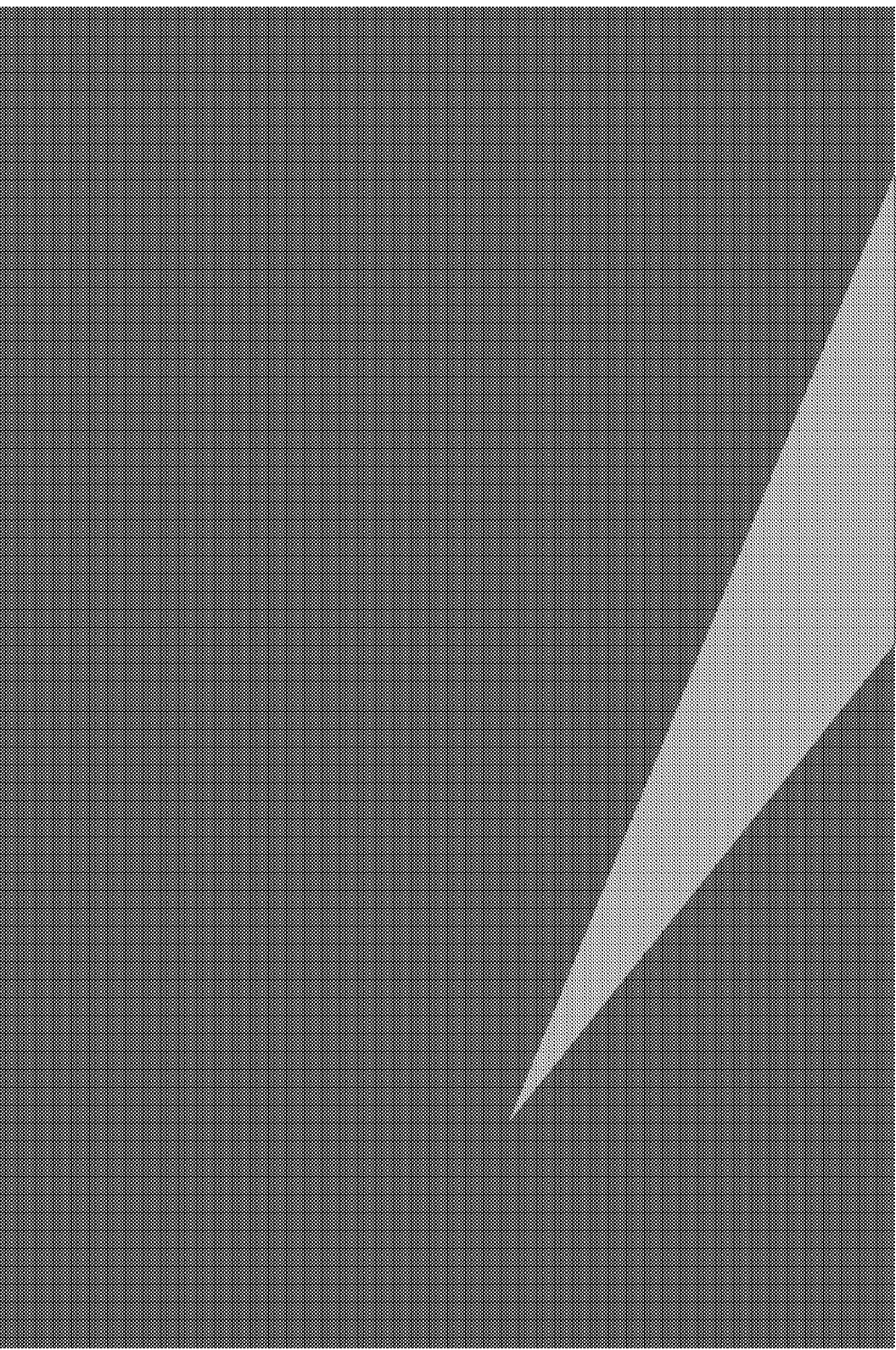


Considerations

- **Dual impact energy efficiency measures** reduce GHG emissions through electricity savings and natural gas savings
- Incentive stacking may require a customer or an LDC (on behalf of customers) to apply for incentives to **three separate agencies** – the IESO (for electricity), the OEB (for gas), and a third agency for GHG emissions

Areas of Alignment

- A **common approach** for quantifying and monetizing GHG reductions from electricity and gas savings may facilitate tracking and reporting of GHG emissions
- A **single and common process** for EE incentives may simplify the evaluation of measures and facilitate adoption



II. JURISDICTIONAL REVIEW

OVERVIEW

Section	Jurisdictional Review
Description	Overview of approaches used to incorporate and align climate change policy with CDM (DSM) policy in other jurisdictions. High-level summary of past and on-going work in these jurisdictions in the context of climate change/GHG reductions and in relation to CDM, FS, CHP/DER, and EVs, and review of associated emission factors and metrics for evaluation of CDM.
Focus area	Conservation First Framework and Industrial Accelerator Program • Aligning with Climate Change Action Plan (CCAP), greenhouse gas (GHG) reduction target to complement energy targets • EE/DSM (right use, right time, right cost)
Source(s)	Local Navigant expertise, World Bank, Nokia website, California Air Resource Board,

Summary:

- Climate policy can take the form of various initiatives at the national, provincial, community and customer levels
- Carbon pricing can interact with other climate policies in three different ways: complementary, overlapping or countervailing
- The jurisdictions studied feature various overlapping policies which demonstrate a soft alignment between carbon pricing initiatives, energy efficiency programs and other climate policies
- Some jurisdictions partake in multi-jurisdictional emissions trading schemes (e.g. RGGI; EU ETS; WCI, Inc.)
- Major policy categories include investment in clean technology and renewable energy, building retrofits, transportation electrification, waste management and low-income programs
- The jurisdictions studied have set specific emissions reduction and energy efficiency targets, and operate similar energy efficiency programs, albeit administering and funding them in differing ways

REVIEW OF RELEVANT CLIMATE CHANGE POLICIES

In Ontario, the climate change strategy within the energy sector is guided by the province's CCAP and cap-and-trade program, and implemented through the electricity and gas DSM frameworks.

- There are, however, **alternative approaches** and strategies in dealing with climate change.
- The focus of this section is on these alternatives.

This section is divided into two subsections:

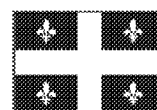
1. Policy Approaches – this subsection provides an overview of climate change policy approaches from three different perspectives:

- National-level;
- Community-level; and
- Customer-level.

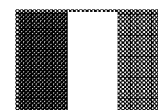
2. Jurisdictional Scan – this subsection provides an overview of five different jurisdictions, their climate change policies, and how these jurisdictions have developed alignment with broader policy and focus areas including transportation, renewables, energy efficiency and public housing, among others.



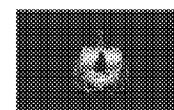
California



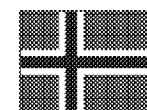
Quebec



France



Vermont



Norway

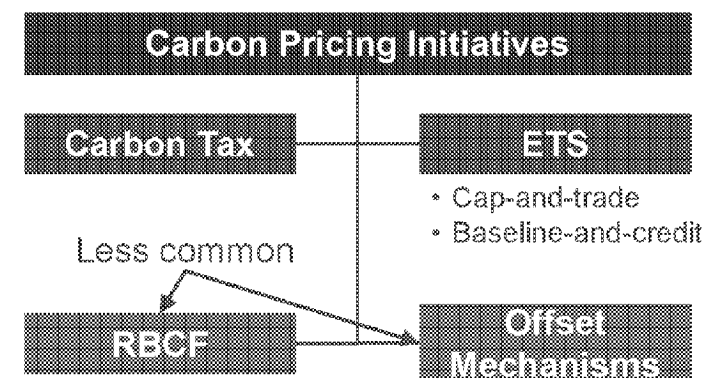
II. JURISDICTIONAL REVIEW

- Policy Approaches
- Jurisdictional Scan

II. JURISDICTIONAL REVIEW >> POLICY APPROACHES

NATIONAL/PROVINCIAL/STATE-LEVEL CLIMATE CHANGE POLICY APPROACHES

- As part of the **Paris Agreement**, countries made **voluntary GHG reduction commitments** to keep the global average temperature increase below 2°C. Among a wide array of policies and programs, carbon pricing initiatives will play an increasingly important role to implement those commitments.
- The World Bank defines **carbon pricing initiatives** as "...[any] initiative that explicitly puts a price on a unit of CO₂e, including ETSs – both cap-and-trade and baseline-and-credit – systems, carbon taxes, offset mechanisms and RBCF"



Carbon Initiative	Definition
Carbon Tax	A tax that explicitly states a price on carbon or that uses a metric directly based on carbon (that is, price per tCO ₂ e).
Emissions Trading Scheme (ETS)	A system where emitters can trade their emission units to meet their compliance obligations. The two main types of ETSs are cap-and-trade and baseline-and-credit. • Cap-and-trade – Cap-and-trade schemes set a desired maximum ceiling for emissions (or cap) and let the market determine the price for keeping emissions within that cap. • Baseline-and-credit – A mechanism where emission reductions achieved relative to a baseline can be credited and used for compliance purpose.
Results-Based Climate Finance (RBCF)	Funding approach where payments are made after pre-defined outputs or outcomes related to managing climate change, such as emission reductions, are delivered and verified.
Offset Mechanisms	An offset designates the emission reductions from project-based activities that can be used to meet compliance or corporate citizenship objectives vis-à-vis GHG mitigation.

COMMUNITY- AND CUSTOMER-LEVEL CLIMATE CHANGE APPROACHES

- In addition to National-level climate change strategies, community-level and customer-level climate change approaches are also widespread:
 - **Community-level:** Community-level approaches to climate change are generally focused on the development of *municipal energy plans*, which focus primarily on climate strategy through urban planning projects (e.g., district heating, transportation hubs, bicycle lanes, EV-charging, etc.)
 - **Customer-level:** The development of *sustainability plans* had been the traditional approach to establish climate change strategies by C&I customers. *Science-based targets* has emerged as a more innovative and robust approach for two reasons: (1) a sector-specific approach to climate change, and (2) compatibility with the 2°C Paris Agreement target.

Customer-Level: Science Based Targets

- Science-based targets is a unique, sector-specific methodology to set climate change targets for commercial and industrial customers.
- This approach looks at sector-specific decarbonization pathways that are compatible with the 2°C Paris Agreement target, however rather than applying a generic, sector-agnostic approach it defines the target based on the nature of a facility's operations.

Example:

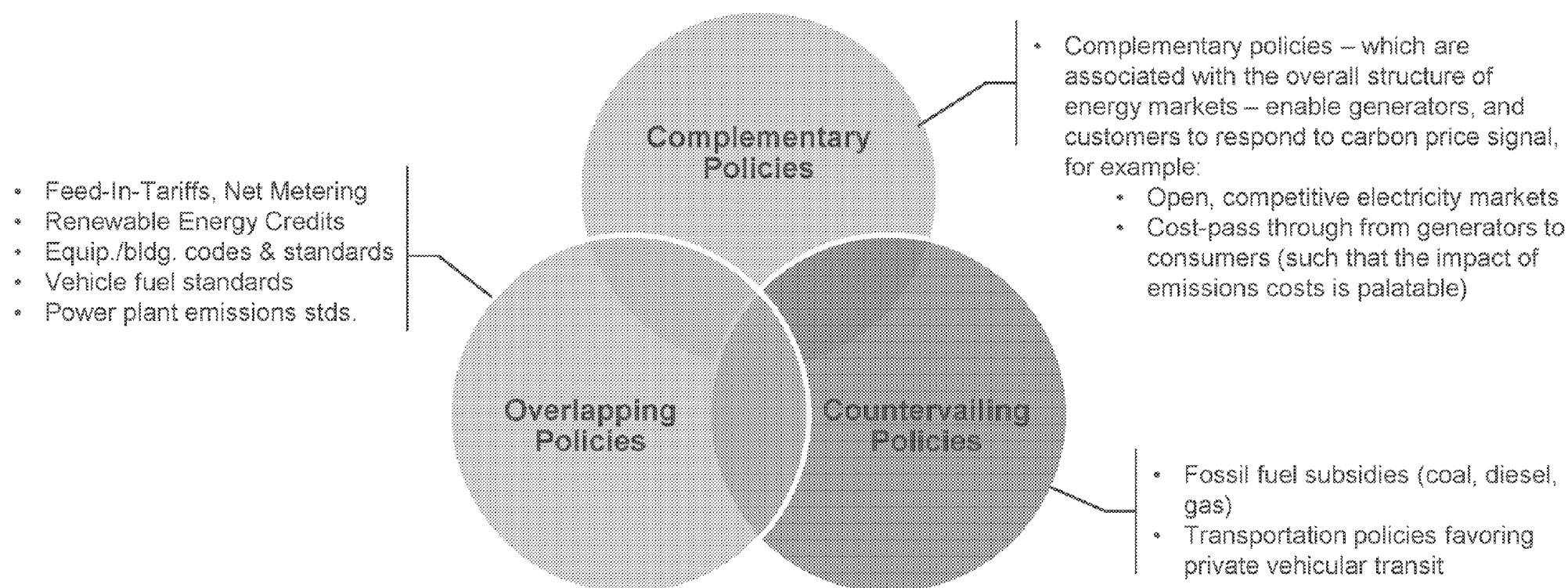
Nokia, the telecom giant, adopted the science-based target approach to establish GHG emissions and emissions intensity targets for 2017 through 2030.



ALIGNMENT OF CLIMATE CHANGE POLICY WITH BROADER POLICIES

Aligning carbon pricing initiatives with the broader policy landscape requires an integrated approach to policy making

- The World Bank (2016) defines three types of interaction between carbon pricing initiatives and existing policies:
 1. **Complementary** policies – policies combined with carbon pricing to enhance the overall performance
 2. **Overlapping** policies – which operate in parallel to and independently of carbon pricing initiatives; and
 3. **Countervailing** policies – which are directly or indirectly at odds with climate policy

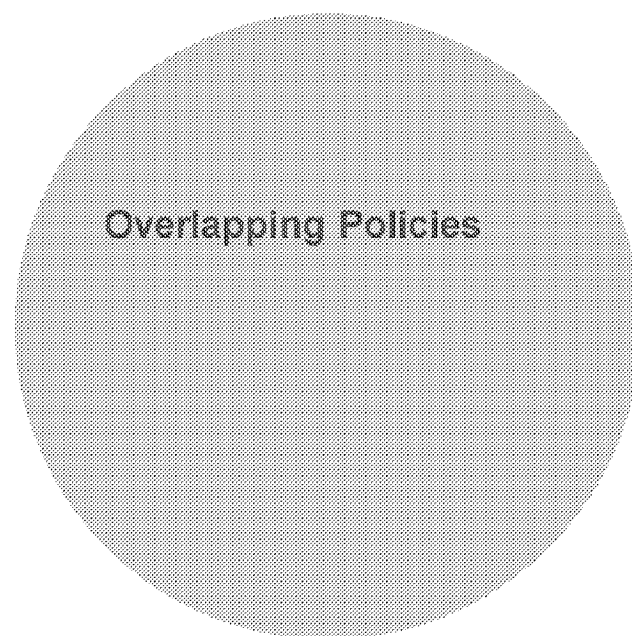


OVERLAPPING POLICIES

Overlapping policies are the focus of the jurisdictional scan.

- While all jurisdictions share common themes in terms of climate policies, emissions targets, and focus areas, unique features and characteristics are found in each jurisdiction.
- A key characteristic of “overlapping policies” is that **full and perfect** alignment between climate policies and broader policies is **not explicitly defined**.
 - While all of these jurisdictions have specific targets for CO2 reductions, renewables, and – in some cases – energy efficiency, the relationship between them are *soft* in nature and not prescriptive in terms of implementation.

“...a combination of policies which incorporate other policy instruments alongside a carbon price will be more effective at reducing emissions than a carbon price acting in isolation...”



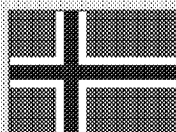
II. JURISDICTIONAL REVIEW

- Policy Approaches
- **Jurisdictional Scan**

KEY OVERLAPPING POLICIES ACROSS JURISDICTIONS

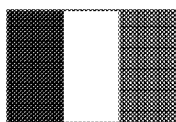
The jurisdictions studied share a focus on reducing GHG emissions through carbon pricing programs while investing proceeds into overlapping energy efficiency initiatives

Clean Technology & Renewable Energy



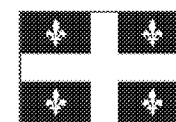
Norway's government has partnered with private-sector investors to establish the Technology Centre Mongstad, the world's largest facility for testing and improving CO₂ capture technology.

Building Retrofits



The French government provides consumers with up to €16,000 in tax credits as well as interest-free loans to finance energy-efficiency retrofits in residential buildings.

Transportation Electrification



Quebec offers a rebate of up to \$8,000 on electric vehicle purchases, as well as grants for the deployment of charging stations, all of which is financed by cap and trade revenues from the Green Fund.

Low-Income Programs



In 2016 the government of Vermont piloted a net-zero low-income housing development that employs solar panels and smart energy storage solutions, reducing peak demand on the local electricity grid.

Waste Management



California's recycling and waste management agency, CalRecycle, received \$30 million in cap and trade revenue in 2014-15 to provide grants and loans for the development of new recycling infrastructure.



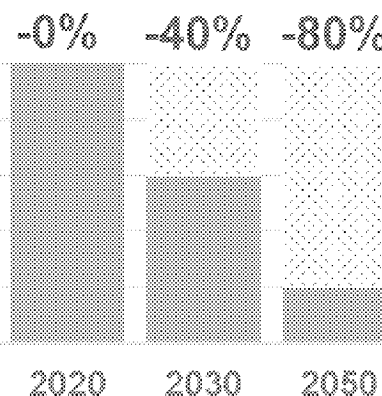
CALIFORNIA – OVERVIEW

California, the world's sixth-largest economy, has already begun to feel the effects of climate change. With some of the most aggressive emissions reduction and renewable energy procurement goals in the United States, California has emerged as a national leader in climate policy.

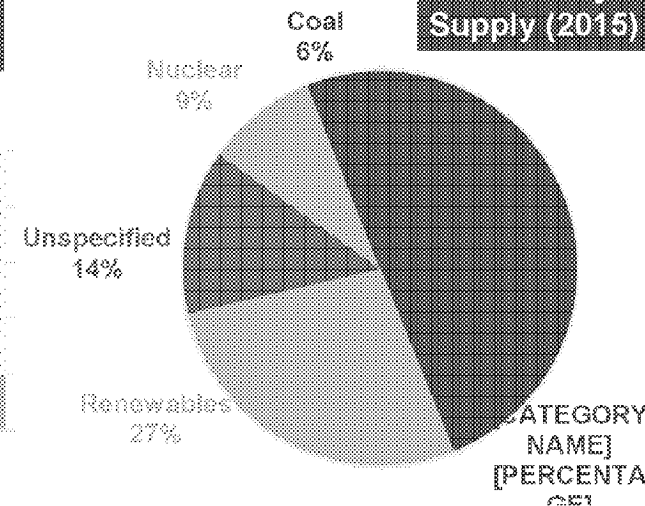
Policies

- Cap and trade system linked with Quebec (WCI, Inc. carbon market)
- Renewable portfolio standard requiring 50% renewable electricity procurement by 2030
- Improving gas and electric energy efficiency savings by requiring utilities to plan emissions reduction and clean energy deployment efforts
- Increasing energy efficiency savings in buildings by incentivizing retrofits and promoting cleaner heating fuels
- Setting high vehicle fuel-efficiency standards and incentivizing electric vehicle use
- Investing in natural carbon sequestration
- Reducing short-lived climate pollutants

Emissions Reduction Targets (below 1990 levels)



Electricity Supply (2015)



Actions

Cap and trade revenues are invested in projects that help increase energy efficiency:

- Renewable energy development in hydroelectric generation and low-carbon biofuels derived from agricultural waste
- Low-carbon public transit, passenger vehicle and freight technology
- Efficiency initiatives in hydroelectric generation and public buildings
- Power, heating and weatherization retrofits for low-income residents



CALIFORNIA – EE & CLIMATE POLICY

The California Air Resources Board (CARB) and California Public Utilities Commission manage the funding of energy efficiency (EE) measures in the state of California in a way that links the climate policy of cap & trade with DSM at the utility level, while the California Energy Commission implements other EE initiatives in the state. Given that programs are conceived and delivered by various entities, the EE system is somewhat decentralized.

Energy Efficiency Targets

Senate Bill 350

Establishes an intermediate GHG emissions reduction goal of 40% below 1990 levels by 2030 via EE and renewable energy targets:

- RPS requiring 50% renewable electricity procurement by 2030
- Double statewide EE savings in electricity and natural gas by 2030

Energy Efficiency Strategic Plan

California Public Utilities Commission's (CPUC) plan to maximize energy savings across the state

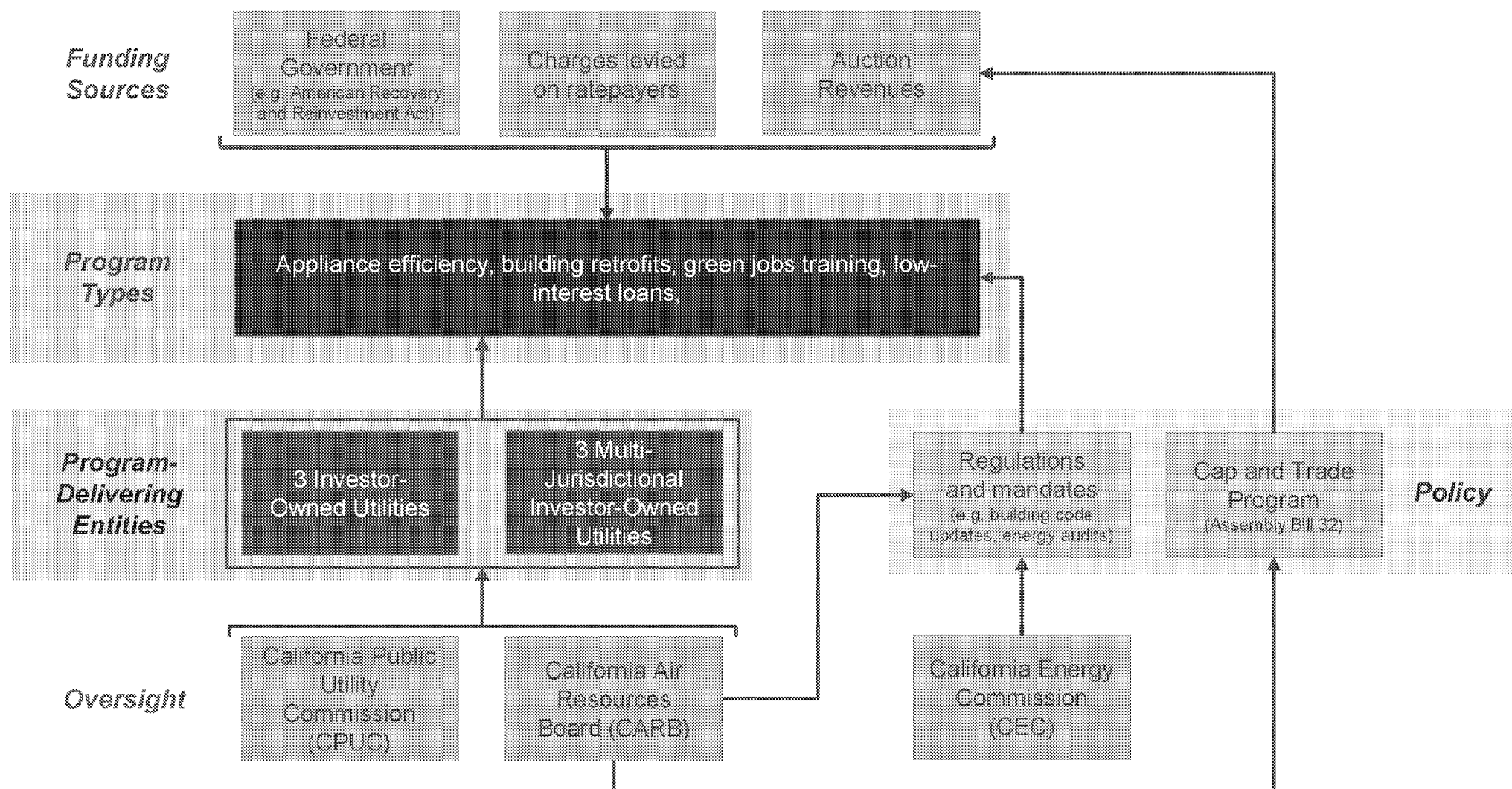
Energy Efficiency & Climate Policy

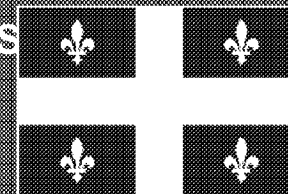
Interaction between utility DSM and cap and trade

- Every two years, utilities in California must incorporate cap and trade into their long-term (20 year) planning as part of their obligation to CARB's regulation whereby they must procure GHG allowances & offsets to meet their compliance obligations
- Past EE initiatives and renewable energy procurement are taken into account by CARB during annual allowance allocations per utility
- Utilities are allowed to set aside a portion of allowance revenues to fund EE and clean energy programs that have been approved by the CPUC
- Energy efficiency is considered a "complimentary and supplementary measure" to cap and trade, with "flexible market compliance features" to reach the required reductions in carbon emissions



CALIFORNIA – EE PROGRAM ORGANIZATION





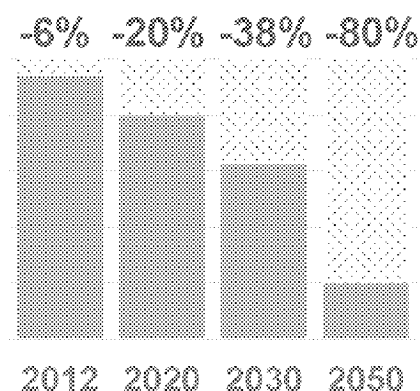
QUEBEC – OVERVIEW

Among Canadian provinces, Quebec has been a leader on climate change policy and renewable energy procurement. Its energy policy aims to reduce GHG emissions largely by electrifying the transportation sector. As the first province to implement a cap and trade program, it has served as a model for other provinces hoping to adopt similar strategies.

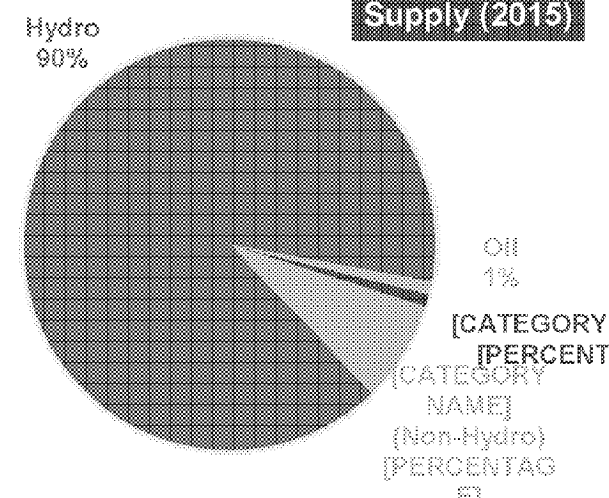
Key Policies

- Cap and trade system linked with California, with revenues directed toward a dedicated Green Fund
- Mandating Hydro-Québec to develop transportation electrification initiatives
 - Developing vehicle-to-grid and vehicle-to-home technology
 - Investing in battery storage R&D
 - Deploying a network of electric vehicle charging stations
- Advancing new renewable energy projects, including wind, biomass and geothermal
- Signing a climate agreement with Ontario and Mexico to advance the prospect of further expansion of the WCI, Inc. carbon market

Emissions Reduction Targets (below 1990 levels)

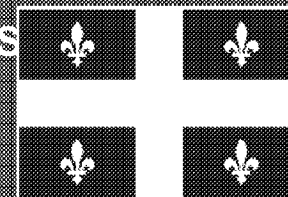


Electricity Supply (2015)



Actions

- With revenues from cap and trade, the government of Quebec promotes energy efficiency across the economy:
- Reducing fossil fuel consumption through energy efficiency improvements in buildings, industrial processes and vehicles
 - Supporting the development of renewable energy and investing in clean technology R&D
 - Funding programs that use organic waste to produce biofuels
 - Promoting electric vehicle use with financial incentives



QUEBEC – EE & CLIMATE POLICY

Despite Quebec's energy efficiency (EE) targets for 2030, a study conducted in 2016 by HEC Montreal found a lack of interdepartmental co-ordination among the many financial aid programs for EE in the province. The commercial transportation sector is the province's largest energy user and GHG emitter, yet it has been poorly served by EE funding.

Energy Efficiency Targets

2030 Energy Policy

- Apply EE measures to at least 5% of the total surface area of public buildings each year
- Reduce by 15% unit energy consumption in public buildings in relation to 2012
- Promote the installation of geothermal systems for heating and air conditioning in public buildings
- Reduce by 50% the unit energy consumption (L/100 km) of its light-duty vehicle fleet in relation to 2012

Hydro-Quebec

- Reduce electricity sales by 1/3 by 2020 through EE programs

Energy Efficiency & Climate Policy

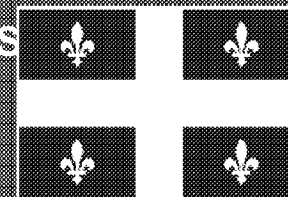
Cap-and-Trade Program

Revenue from this program enters the Green Fund, which makes possible the initiatives laid out in the 2013-2020 Climate Change Action Plan (CCAP)

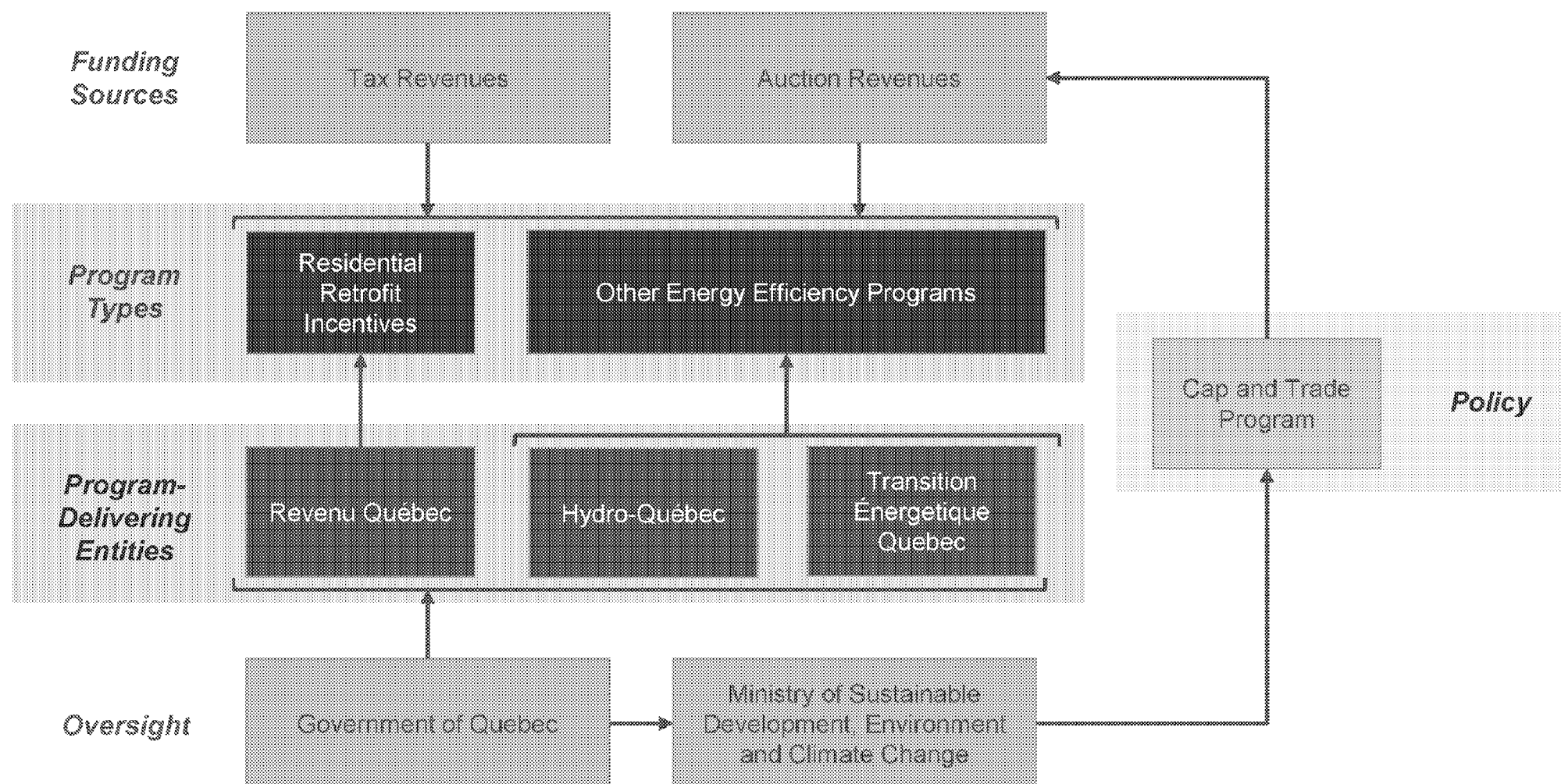
- Soft alignment, since cap and trade revenues are invested in projects that help increase EE: (public transit, transportation electrification, building retrofits, etc.)

2030 Energy Policy

Stated alignment between the policy's goals of transitioning to a low carbon economy and reducing energy consumption



QUEBEC – EE PROGRAM ORGANIZATION



REGIONAL GREENHOUSE GAS INITIATIVE (RGGI)

Established in 2009, RGGI is a market-based partnership between nine American states that aims to reduce CO₂ emissions from the power sector. It forms a cap and trade market for large fossil-fuel-fired power plants, with an emissions cap declining by 2.5% each year. Auction proceeds are spent at the discretion of each state, with the majority funding energy efficiency, renewable energy, and other consumer benefit programs aimed at spurring innovation in the clean energy economy.

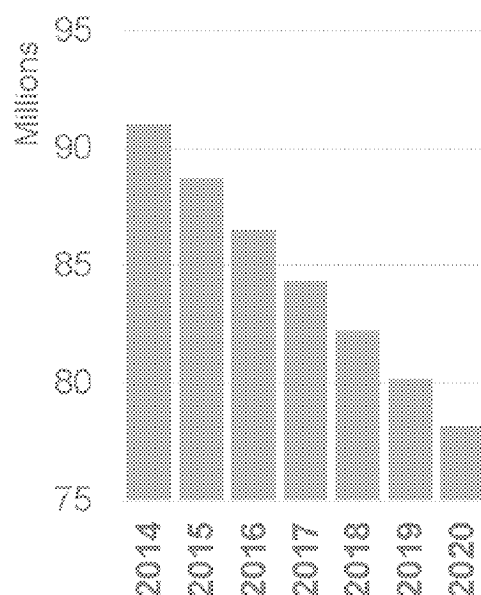
Participating States

- Connecticut
- Delaware
- Maine
- Maryland
- Massachusetts
- New Hampshire
- New York
- Rhode Island
- Vermont

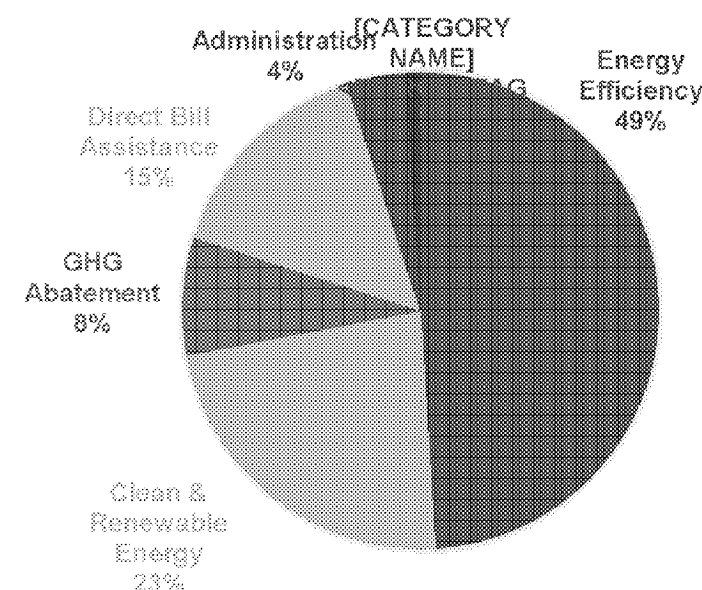
Facts on RGGI Investments (from 2008-2014)

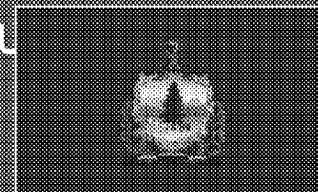
- Cumulative investments of \$1.37 billion
- Participation of 4.6 million households and 21,400 businesses
- Expected to return lifetime energy bill savings of \$4.7 billion to participants
- Projected lifetime savings of 20.6 million MWh of electricity and 76.1 million MMBtu of fossil fuels
- Since 2005, RGGI states have reduced power sector CO₂ pollution by 45%

Large-scale power sector emissions cap, region-wide (tonnes CO₂)



RGGI investments by category, 2014





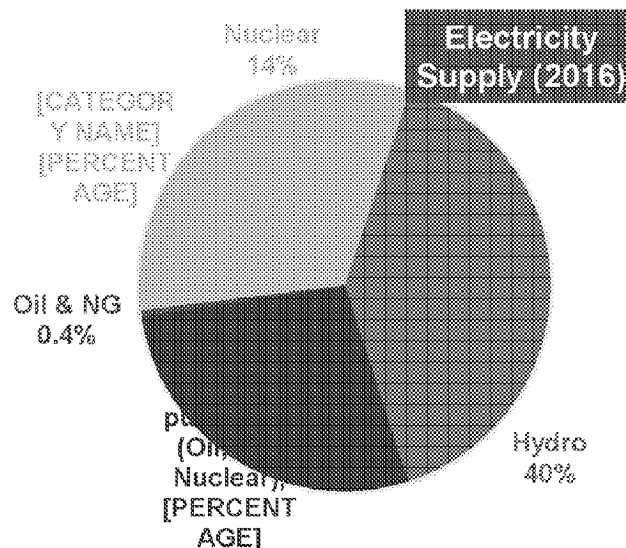
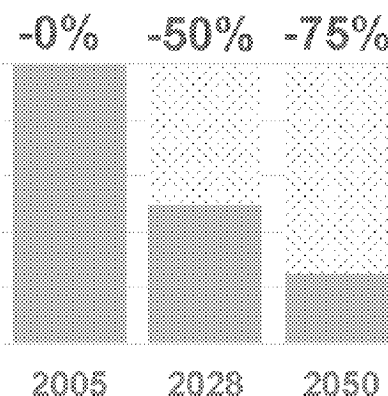
VERMONT – OVERVIEW

In 2000, Efficiency Vermont was established as the nation's first energy efficiency utility, tasked with promoting and facilitating energy efficiency across the state. As a result of this and other proactive policies, Vermont has been named the 3rd most energy-efficient state by the American Council for an Energy Efficient Economy (ACEEE).

Key Policies

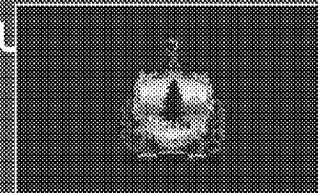
- Cap and trade for large power emitters operated through RGGI
- Renewable portfolio standard of 55% by 2017, increasing by 4% every three years until reaching 75% by 2032; also, target of 90% by 2050
- State utility Green Mountain Power
 - Sells renewable energy certificates, enabling them to lower customers' electricity costs
 - Provides customers with service rider options such as the Cow Power Program that finance its Renewable Development Fund
- The state has piloted net-zero low-income housing projects using solar panels and advanced battery storage solutions

Emissions Reduction Targets (below 1990 levels)



Actions

- Carbon allowance proceeds are invested mostly in programs managed by Efficiency Vermont, resulting in 14.5 million MWh of lifetime savings
- Accelerating adoption of LED lighting
 - Significantly improving the energy efficiency of snowmaking equipment at ski areas
 - Increasing the energy efficiency of homes, farms and schools
 - Generating over \$1.6 billion in lifetime savings on electric, heating and water costs



VERMONT – EE & CLIMATE POLICY

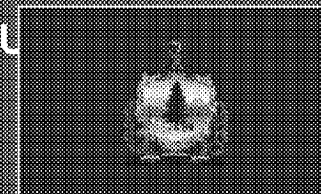
Vermont has legislated emissions reduction and energy efficiency targets, but the state lacks a coordinated strategic framework to maximize the efficiency of its climate policy execution. Instead of crafting a broad framework that both sets goals and lays out specific measures to help achieve them, Vermont often uses existing emissions reduction and energy efficiency activities to meet new targets.

Energy Efficiency Targets

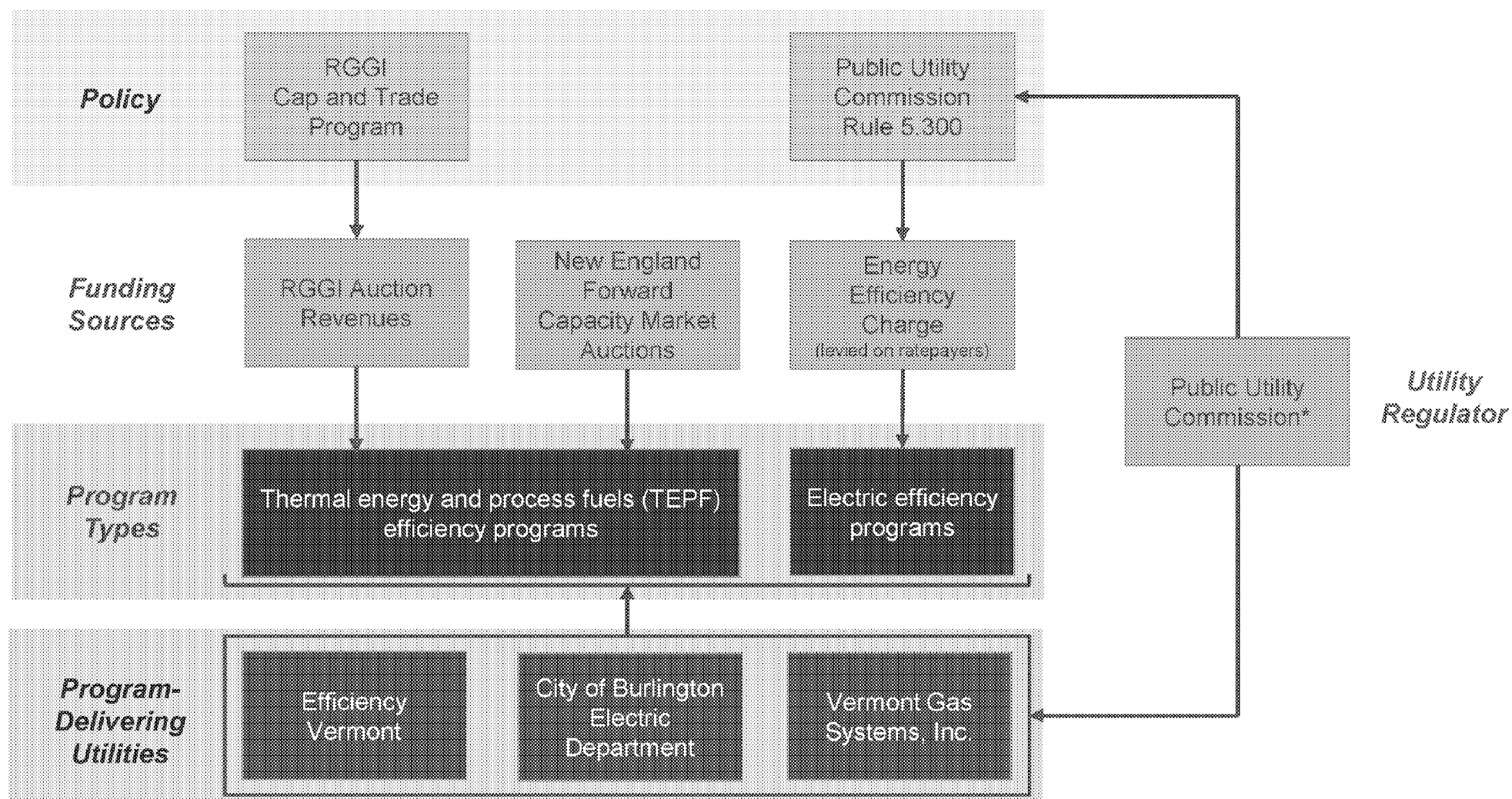
- Energy efficiency policy is introduced for the explicit purpose of reducing greenhouse gas emissions
- All new buildings to be “net-zero” by 2030
- By 2020, weatherizing 25% of the state’s homes to reduce their fuel needs and fuel bills by an average of 25%
- To reduce total fossil fuel consumption across all buildings by an additional 0.5% each year, up to 10% annually by 2025
- 30% of heating energy in buildings and industrial processes to come from renewables by 2035 (up from 20% currently)
 - Energy efficiency is explicitly mentioned as a component of this plan

Energy Efficiency & Climate Policy

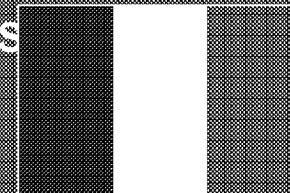
- **Efficiency Vermont’s plans are developed in alignment with Vermont’s *Energy Efficiency and Affordability Act* and Vermont’s *Comprehensive Energy Plan***
 - EE and climate policy being established jointly at the state government level
- Rather than being determined through state legislation, Efficiency Vermont’s quantifiable performance indicators are established with the Vermont Public Utility Commission, the independent board that regulates and oversees public utilities
- Efficiency Vermont views efficiency as a means to protect the environment by reducing power plant and heating emissions
- Among Efficiency Vermont’s 2016 action items is continuing to “develop and support policy instruments that can serve as useful tools for electricity and thermal energy savings through voluntary action or government adoption”



VERMONT – EE PROGRAM ORGANIZATION



* Formerly known as the Public Service Board



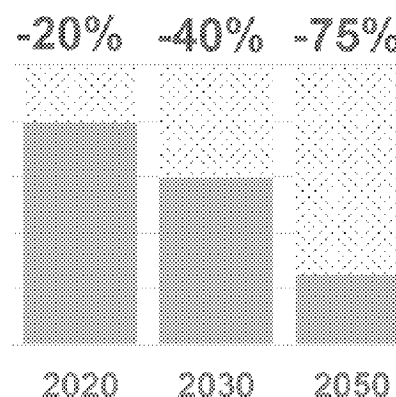
FRANCE – OVERVIEW

France is the world's second-largest producer of nuclear power, but much of its nuclear infrastructure is nearing retirement. Decreases in nuclear are expected to make way for the expansion of renewable energy. The French government has pursued an aggressive climate policy, with carbon pricing and energy efficiency measures expected to continue reducing emissions.

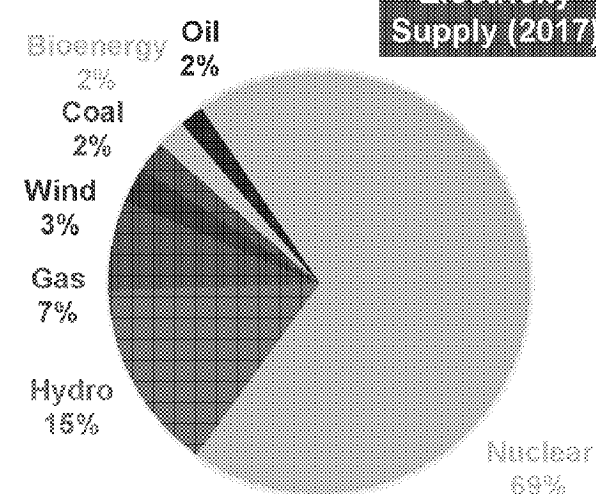
Key Policies

- Increasing the share of renewables to 32% of energy consumption and 40% of electricity generation by 2030
- Reducing the share of nuclear electricity generation to 50% by 2025
- Reducing energy consumption by 50% from 2012 to 2050
- Reducing landfill waste by 50% by 2025
- Participating in the EU Emissions Trading System (EU ETS), a pan-European cap and trade program
- Setting carbon pricing goals of €56 per tonne in 2020 and 100€ per tonne in 2030 for sectors not covered by the EU ETS

Emissions Reduction Targets (below 1990 levels)



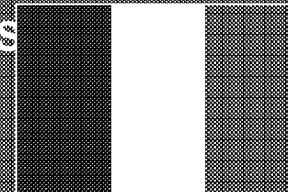
Electricity Supply (2017)



Alignment

Emissions reduction legislation is paired with measures to increase energy efficiency:

- Incentivizing home retrofits with tax credits and interest-free loans
- Tightening efficiency standards for new buildings
- Accelerating electric vehicle deployment among consumers and across the public service
- Installing 7 million electric vehicle charging points
- The EU ETS mandates that at least 50% of auction proceeds be spent on green initiatives



FRANCE – EE & CLIMATE POLICY

*A note on the European Union*

As part of the Paris Agreement, the European Union pledged to reduce GHG emissions by 40% from 1990 levels by 2030. It has set renewable procurement and energy efficiency targets but lacks an effective framework to integrate these targets with implementation plans for climate and energy efficiency policies.

France has set its own targets for increasing renewable procurement and decreasing energy consumption, while operating a host of programs aimed at increasing energy efficiency. However, experts have expressed concerns that EE targets for buildings – France's largest source of energy consumption – are unlikely to be met given existing program portfolios and funding levels.

Energy Efficiency Targets**EU Target**

- 30% improvement in energy efficiency by 2030 (EU-wide, countries to set individual targets)

National Energy Efficiency Action Plan

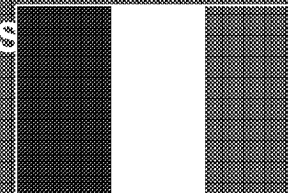
- Pursuant to EU directive mandating the establishment of an energy efficiency target
- Reducing final energy consumption to 131.4 Mtoe and primary energy consumption to 236.3 Mtoe

Energy Transition for Green Growth Act (2015)

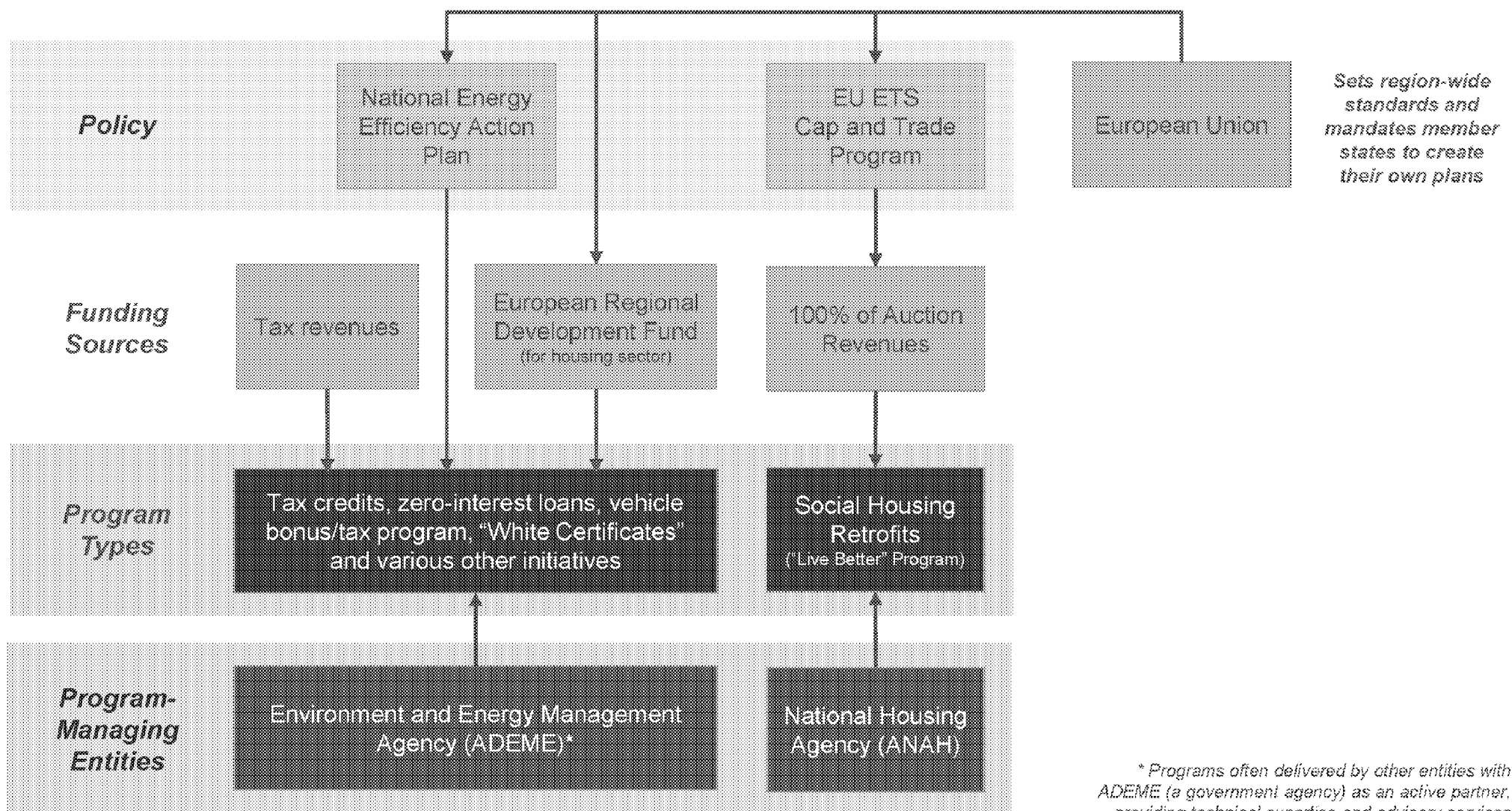
- Reducing energy consumption by 50% from 2012 to 2050

Energy Efficiency & Climate Policy

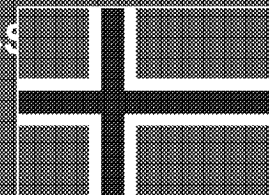
- The Environment and Energy Management Agency (ADEME) provides expertise, advisory services and financial assistance to support the implementation of projects spanning renewable procurement, air quality, waste management and energy efficiency; as such it serves as a bridge between the implementation of EE programs and climate policy.
 - For example, the ADEME awards tradable "White Certificates" to energy suppliers that meet government-mandated energy savings targets by implementing energy savings measures toward consumers in all sectors.
- Revenue from EU Emissions Trading System earmarked exclusively for energy efficiency retrofits of social housing



FRANCE – EE PROGRAM ORGANIZATION



* Programs often delivered by other entities with ADEME (a government agency) as an active partner, providing technical expertise and advisory services



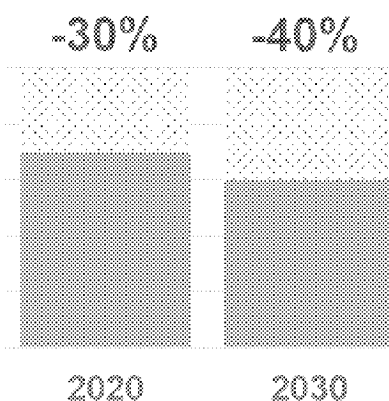
NORWAY

Despite its economy being heavily dependent on oil exports, Norway's government is committed to decarbonizing and improving energy efficiency across all sectors of the economy. In 2001 it established Enova, a state-run enterprise that provides financial support to sustainable energy production and energy efficiency initiatives through its Energy Fund, to help Norway transition to a more climate-friendly economy while strengthening energy supply security.

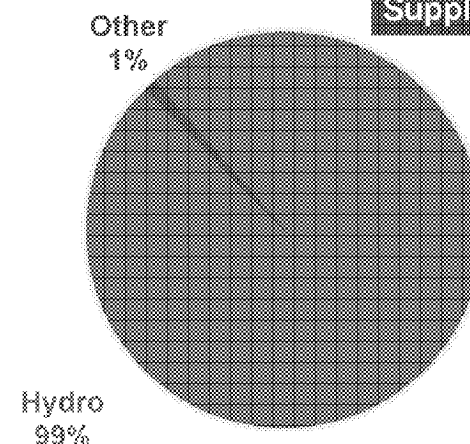
Key Policies

- Becoming a carbon-neutral society by 2030
- Incentivizing the purchase of electric vehicles, phasing out fossil fuel-powered cars by 2025
- Supporting the development of low-carbon energy technology
- Improving district heating technology
- Partnering with Sweden in the Norwegian-Swedish Electricity Certificate Market to develop new energy production based on renewable energy sources – goal: 28.4 TWh by the end of 2020
- Participating in the EU Emissions Trading System (EU ETS), a pan-European cap and trade program

Emissions Reduction Targets (below 1990 levels)



Electricity Supply (2017)



Alignment

Funding from the government as well as Enova's Energy Fund supports numerous energy-efficiency measures:

- Developing of new energy and climate technologies
- Reducing use of natural gas and oil for heating
- Increasing use of energy recovery & bioenergy
- Creating better-functioning markets for energy efficiency and climate-friendly solutions
- Promoting electric vehicle adoption by providing tax incentives and expanding charging infrastructure
- Increasing awareness of climate change issues and energy efficiency solutions

SECTION 4: SUMMARY OBSERVATIONS AND NEXT STEPS

PRELIMINARY OBSERVATIONS

What do Ontario's current climate policy and plans mean for the Conservation First Framework and the Industrial Accelerator Program?

Observations:

- Overlap with existing programs and across agencies (LDCs, IESO, OEB – gas utilities)
- Competition for sources of funding and budgets (energy efficiency, behind-the-meter generation, energy literacy, etc.)
- Misalignment between government agencies regarding evaluation of cost-effectiveness, incentives, EM&V activities
- At a minimum, there will be an increased need for collaboration and communication across entities, in particular with respect to the customer experience and communications

Next Steps:

- Understand barriers to collaboration and communication (expanding on the efforts associated with the collaboration current state summary)

Is the current structure of CFF and IAP optimized to support Ontario's climate change policy objectives? Why or Why not?

Observations:

- Strong areas of potential alignment could include: Fuel Switching, CHP / DER, Electrification, and Incentive Stacking
- Again, collaboration and communication across entities will be critical

Next Steps:

- Better understand the opportunities and what the roles of the various entities could be
- Discuss potential coordination with other entities to identify how the areas of alignment could be realized (e.g., OEB, gas utilities, government)

PRELIMINARY OBSERVATIONS

Should CDM targets, budgets, and/or structure be adjusted in light of the Climate Change Action Plan (CCAP) and broader climate policy? If so, how? Should other aspects of the CFF and IAP be adjusted in light of Ontario's climate change policy objectives? If so, how?

Observations:

- Incentive stacking and attribution will be key issues to tackle by various entities early on
- If metrics to be adjusted they would need to reflect variability in load profiles among technologies and approaches and Ontario's changing supply mix using a consistent, transparent methodology
- Ontario's electricity system intensity is lower than other jurisdictions and is a small percentage of total emissions in the province

Next Steps:

- Considerations of the feasibility and impact of modifying the structures within the Conservation First Framework and Industrial Accelerator Program
- Additional consideration of metrics to support integration/accounting of CCAP

What are the implications for customers with the introduction of CCAP?

Observations:

- Strong areas of potential alignment could include: Fuel Switching, CHP / DER, Electrification, and Incentive Stacking
- Again, collaboration and communication across entities will be critical

Next Steps:

- Through market research gauge customer interest in areas of alignment and other potential opportunities

NEXT STEPS

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

- Understand barriers to collaboration and communication (expanding on the efforts associated with the collaboration current state summary)
- Better understand the opportunities between CCAP and Conservation First Framework and Industrial Accelerator Program and what the roles of the various entities could be
- Discuss potential coordination with other entities to identify how the areas of alignment could be realized (e.g., OEB, gas utilities, government)
- Considerations of the feasibility and impact of modifying the structures within the Conservation First Framework and Industrial Accelerator Program
- Additional consideration of metrics to support integration/accounting of CCAP
- Through market research gauge customer interest in areas of alignment and other potential opportunities (e.g., Fuel Switching, CHP / DER, Electrification, and Incentive Stacking)
- Investigate how to feasibly align Conservation First Framework with climate policy for 2018-2020 and build the ability to stay nimble to prepare for 2020+

APPENDIX A: GLOSSARY

GLOSSARY

Term	Description
ACEEE	The American Council for an Energy-Efficient Economy; a nonprofit organization that aims to advance energy efficiency policies, programs, technologies, investments, and behaviors in order to help achieve greater economic prosperity, energy security, and environmental protection
ADEME	The Environment and Energy Management Agency of France; provides expertise, advisory services and financial assistance to support the implementation of projects spanning renewable procurement, air quality, waste management and energy efficiency
B/C Ratio, BCR	A benefit/cost ratio is the ratio of the benefits of a project or proposal, expressed in monetary terms, relative to its costs, also expressed in monetary terms
Baseline-and-credit	A mechanism in which emissions reductions achieved relative to a baseline can be credited and used for compliance purposes
BMG	Behind-the-meter generation; comes from a renewable energy system uniquely designed and built for a single building or facility to reduce the carbon footprint of the building by generating electricity from renewable sources
C&T	Cap and trade; a market-based system that sets a hard cap on greenhouse gas emissions while giving flexibility to businesses and industry in terms of how they meet their caps
CARB	The California Air Resources Board; a government agency responsible for maintaining healthy air quality in California. Operates the state's cap and trade program
Carbon intensity	The amount of carbon dioxide emitted per unit of energy consumed
Carbon tax	A tax that explicitly states a price on carbon or that uses a metric directly based on carbon (that is, price per tCO ₂ e)
CCAP	The Climate Change Action Plan; Ontario's five-year plan to fight climate change, reduce greenhouse gas pollution and transition to a low-carbon economy
CCGT	Combined-cycle gas turbine; a combined-cycle power plant uses both a gas and a steam turbine together to produce up to 50 percent more electricity from the same fuel than a traditional simple-cycle gas turbine
CEC	The California Energy Commission; California's primary energy policy and planning agency
CHP	Combined heat and power (also known as cogeneration); small to mid-sized natural gas generators that produce both steam (heat) and electricity
CO ₂ e / CO ₂ eq.	Carbon dioxide equivalent; a unit for measuring the carbon footprint of different greenhouse gases based on the global warming potential of each gas

GLOSSARY

Term	Description
CPP	Critical peak pricing; a form of demand response in which higher prices are charged to consumers during critical peak events
CPUC	The California Public Utilities Commission; a regulatory agency that regulates privately owned public utilities in the state of California, including electric power, telecommunications, natural gas and water companies.
Demand/ Load Profile	A graph of the variation in the electrical load versus time
DER	Distributed energy resources; distribution-connected resources that can be aggregated to meet demand. Could include distributed generation, storage and enabling technologies
ECA	Energy Conservation Agreement
Electrification	The process of powering by electricity and, in many contexts, the introduction of such power by changing over from an earlier power source
EM&V	Evaluation, measurement and verification; the collection of methods and processes used to assess the performance of energy efficiency activities so that planned results can be achieved with greater certainty and future activities can be more effective
Emission Factors	Measure of the average amount of a specific pollutant or material discharged into the atmosphere by a specific process, fuel, equipment, or source
ETS	An emission trading system is one in which emitters can trade their emission units to meet their compliance obligations. The two main types of ETSs are cap-and-trade and baseline-and-credit
EU ETS	European Union Emissions Trading System
EVs	Electric vehicles; vehicles propelled by an electric motor
FIT / microFIT	Feed-in-tariffs / micro feed-in-tariffs; payments to ordinary energy users for the renewable electricity they generate. In Ontario, the distinction is made between large and small renewable energy projects: those equal to or less than 10kW are subject to the micro feed-in-tariff rates
FS	Fuel switching; replaces inefficient fuels with cleaner and more economical alternatives
g/kWh	Grams per kWh, a unit measuring emissions per unit of electricity
Gas peakers	Used when there is a high peak in electricity demand
GHG	Greenhouse gas; an atmospheric gas responsible for the greenhouse effect

GLOSSARY

Term	Description
GJ	Gigajoule; a unit of energy
GT&D	Generation, transmission and distribution
ISO-NE	The Independent System Operator of New England, Inc.; an independent, non-profit Regional Transmission Organization, serving Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.
Load shape	Refers to the distribution of energy requirements over time
LTEP 2013	Ontario's Long-Term Energy Plan; a strategic plan developed by the Ministry of Energy to set the policy for Ontario's electricity system. The previous LTEP was released in 2013, with an update anticipated in 2017
MISO	Midcontinent Independent System Operator; provides open-access transmission service and monitors the high-voltage transmission system in the Midwest United States and Manitoba, Canada and a southern United States region which includes much of Arkansas, Mississippi, and Louisiana
Load shape	Refers to the distribution of energy requirements over time
MOE	The Ontario Ministry of Energy; tasked with developing the electricity generation, transmission and other energy-related facilities that power Ontario's economy
MOECC	The Ontario Ministry of Environment and Climate Change; tasked with protecting Ontario's land, air, and water and coordinating climate policy
MT	Metric tonne; a unit of weight
MW	Megawatt; a unit to measure electricity demand or supply
Net metering	A system in which renewable energy generators are connected to a public-utility power grid and surplus power is transferred onto the grid, allowing customers to offset the cost of power drawn from the utility
Net-zero building	A building which achieves zero net energy consumption by generating enough renewable energy to offset the total amount of energy it uses
NYISO	The New York Independent System Operator; monitors the reliability of the state's power system and coordinates the daily operations to distribute electricity supply
OEB	The Ontario Energy Board; Ontario's independent energy regulator, tasked with overseeing how energy companies operate to ensure the public interest is served

GLOSSARY

Term	Description
Offset mechanisms	An offset designates the emission reductions from project-based activities that can be used to meet compliance or corporate citizenship objectives vis-à-vis GHG mitigation
Paris Agreement	The Paris Agreement is an agreement within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with greenhouse gas emissions mitigation, adaptation and finance starting in the year 2020
PJM	PJM Interconnection, Inc. is a regional transmission organization that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia
QA/QC	Quality assurance / quality control; the combination of quality assurance, the process or set of processes used to measure and assure the quality of a product, and quality control, the process of ensuring products and services meet consumer expectations
R&D	Research and development; work directed toward the innovation, introduction, and improvement of products and processes
RBCF	Results-based climate finance; a funding approach where payments are made after pre-defined outputs or outcomes related to managing climate change, such as emission reductions, are delivered and verified
RE	Renewable energy; energy that is collected from renewable resources, which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat
REC	Renewable Energy Certificates, also known as Green tags, Renewable Energy Credits, Renewable Electricity Certificates, or Tradable Renewable Certificates; tradable, non-tangible energy commodities that represent proof that 1 megawatt-hour (MWh) of electricity was generated from an eligible renewable energy resource (renewable electricity) and was fed into the shared system of power lines which transport energy
RGGI	Regional Greenhouse Gas Initiative; a market-based partnership between nine American states that aims to reduce CO2 emissions from the power sector
RPS	Renewable portfolio standard; a regulatory mandate to increase production of energy from renewable sources such as wind, solar, biomass and other alternatives to fossil and nuclear electric generation
SCGT	Simple cycle gas turbine; a type of gas turbine most frequently used in the power generation, aviation (jet engine), and oil and gas industry (electricity generation and mechanical drives)
Supply Mix	Refers to the mix of energy sources of given electricity supply
WCI, Inc.	Western Climate Initiative, Inc.; a non-profit corporation formed to provide administrative and technical services to support the implementation of state and provincial greenhouse gas emissions trading programs.