Electrification
Technical Conference

February 1, 2022

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Agenda

Presentation (9:30 – 10:30)	
(i) Background	CA-1, CA-15, IC-1(c)
(ii) Overview of Customer Electrification Portfolio	CA-5, CA-6, CA-7, CA-11, IC-3(a)
(iii) Detailed Description of Cost-Benefit Assessments	CA-2, CA-3, CA-4, CA-8, CA-9, CA-10, CA-12, IC-4
(iv) Marginal Costs	IC-1(a), IC-1(b), IC-2(a), IC-2(b)
(v) Approaches to Cost Recovery	As directed by the Board
(vi) CDM Program Delivery	CA-13, CA-14, IC-3(b)
Q&A – Panel Format (10:30 – 12:30)*	

Background

Context

System Dynamics

- ~3 TWh of surplus energy
- Capacity constraints

Cost Dynamics

- Non-firm exports: ~3.5 ¢/kWh
- Domestic rate: 13.5 ¢/kWh

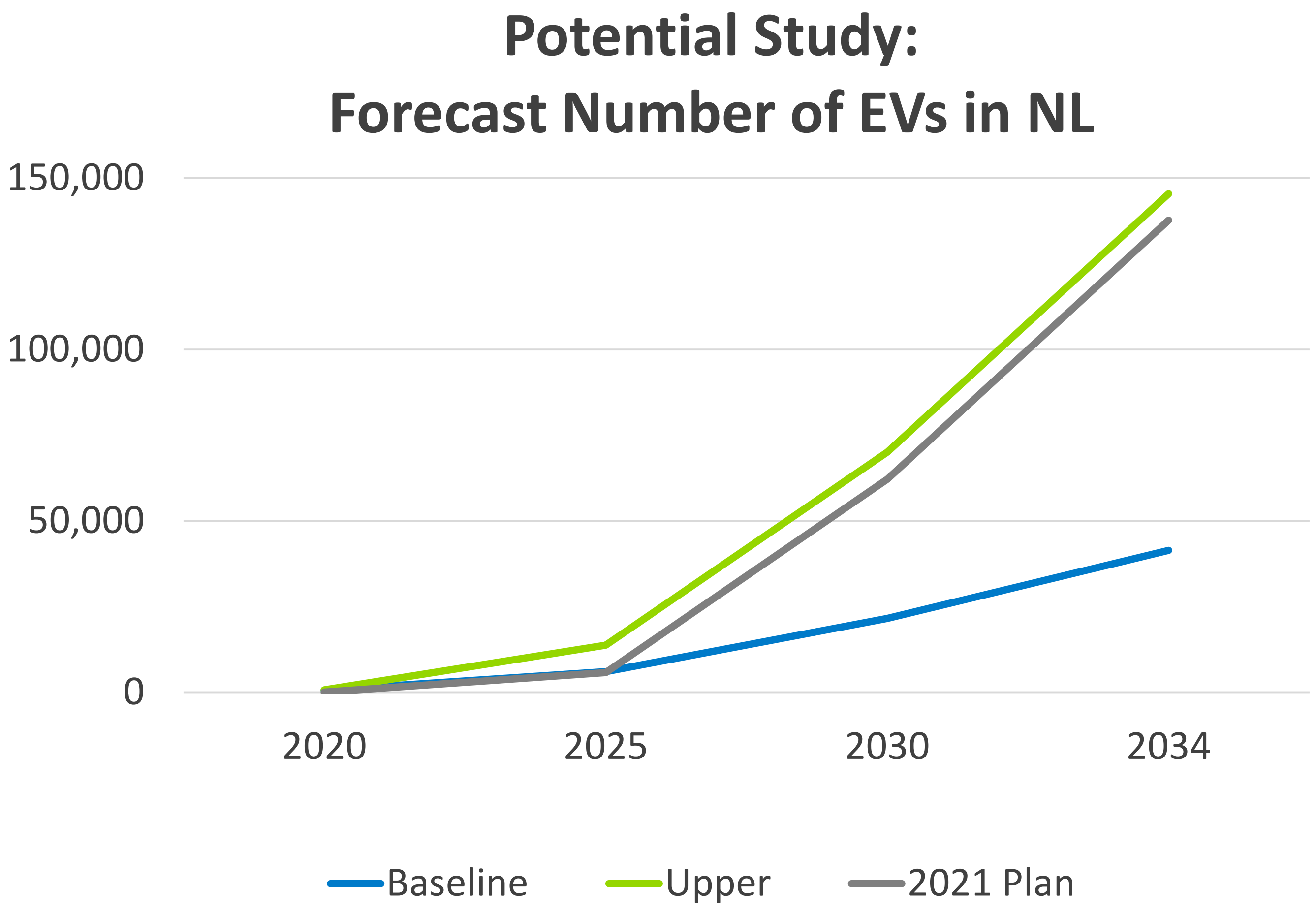
Reference on Rate Mitigation

"… maximizing domestic load through electrification, improving energy efficiency and using demand response to reduce peak and allow for increased export sales leads to the best outcomes for customers."

- Board of Commissioners of Public Utilities, *Rate Mitigation Options and Impacts, Muskrat Falls Project – Final Report,* February 7, 2020, page iii.

Dunsky Potential Study: Transportation

- Potential to more than triple number of EVs in NL by 2034

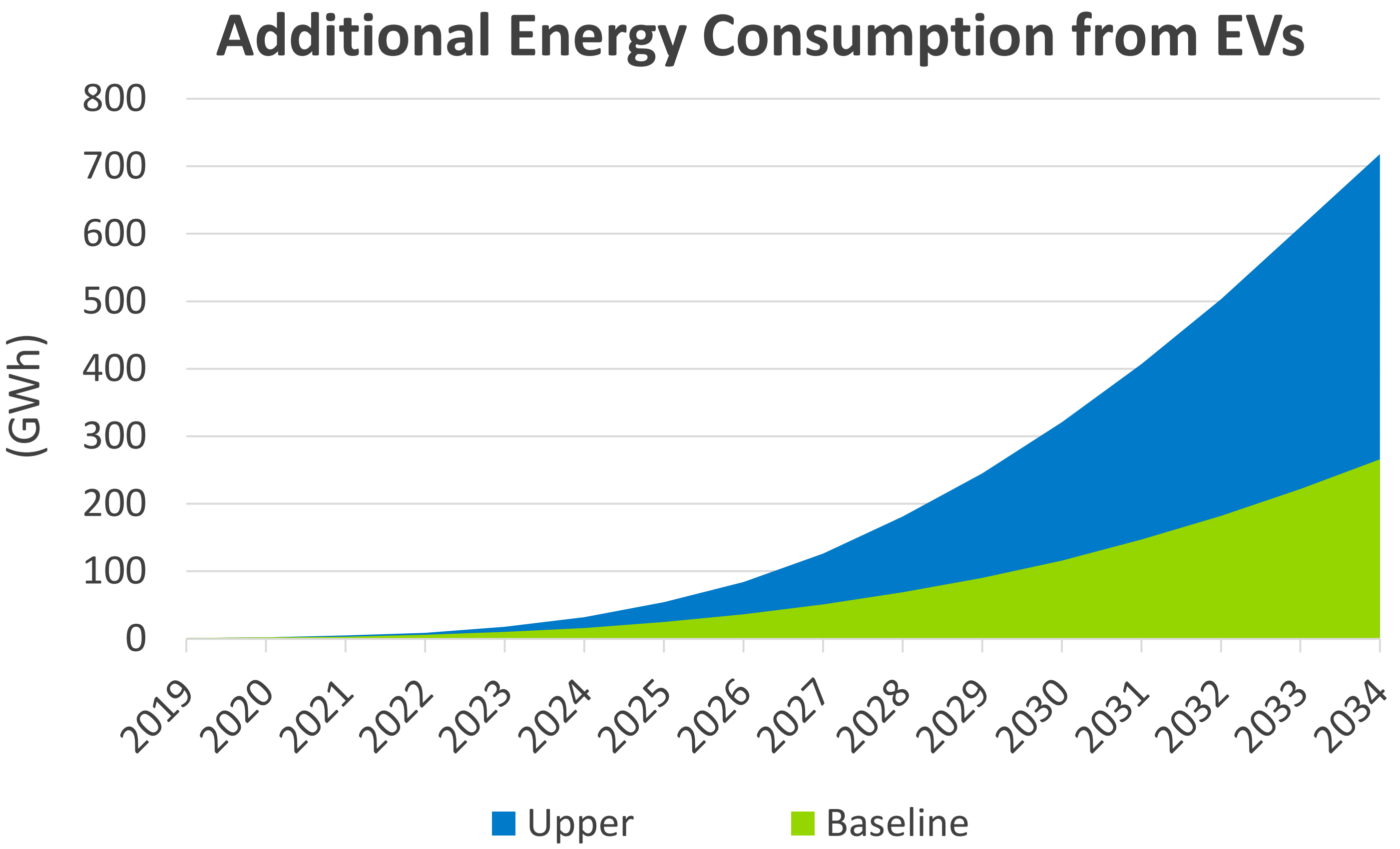


EV Adoption Lags Behind in NL

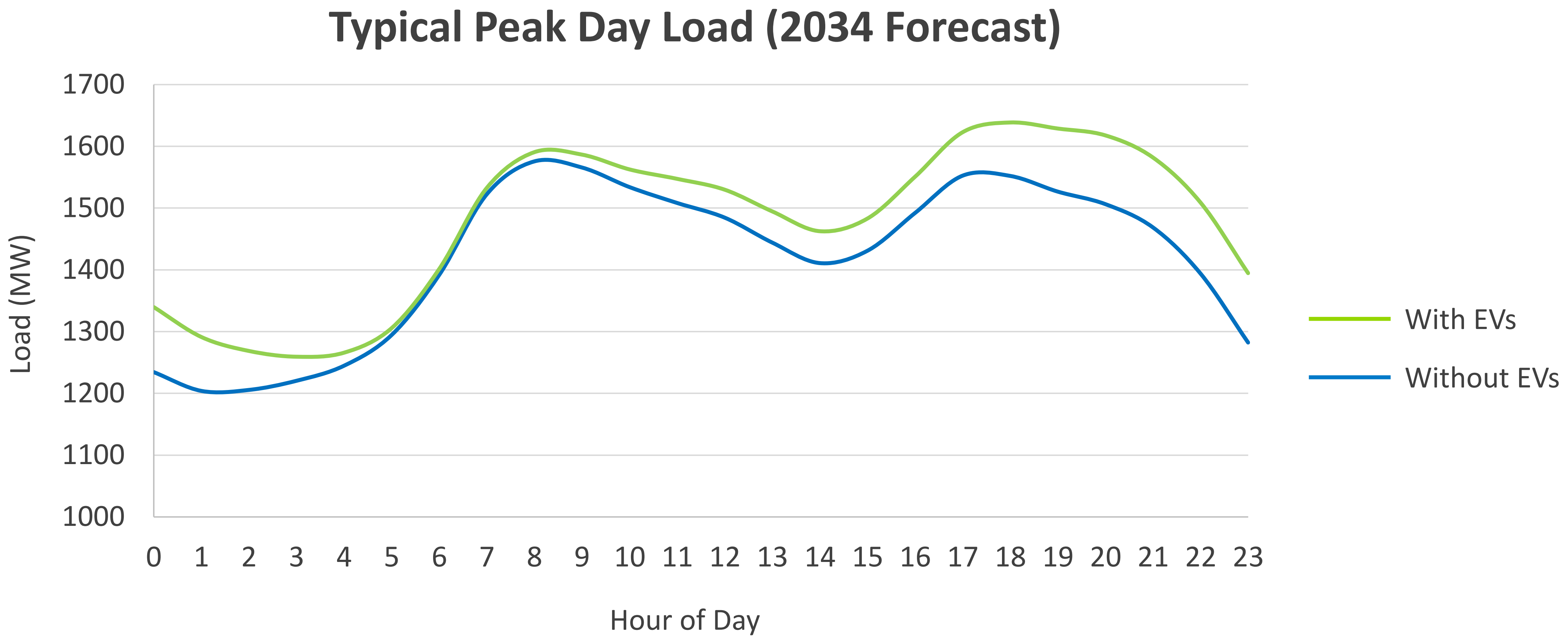
- **BC** – EVs 10% of annual vehicle sales
- **QC** – EVs 7% of annual vehicle sales
- **NL** – EVs <0.1% of annual vehicle sales

EV Energy Sales Potential

- Energy sales potential from EVs could exceed 700 GWh annually by 2034

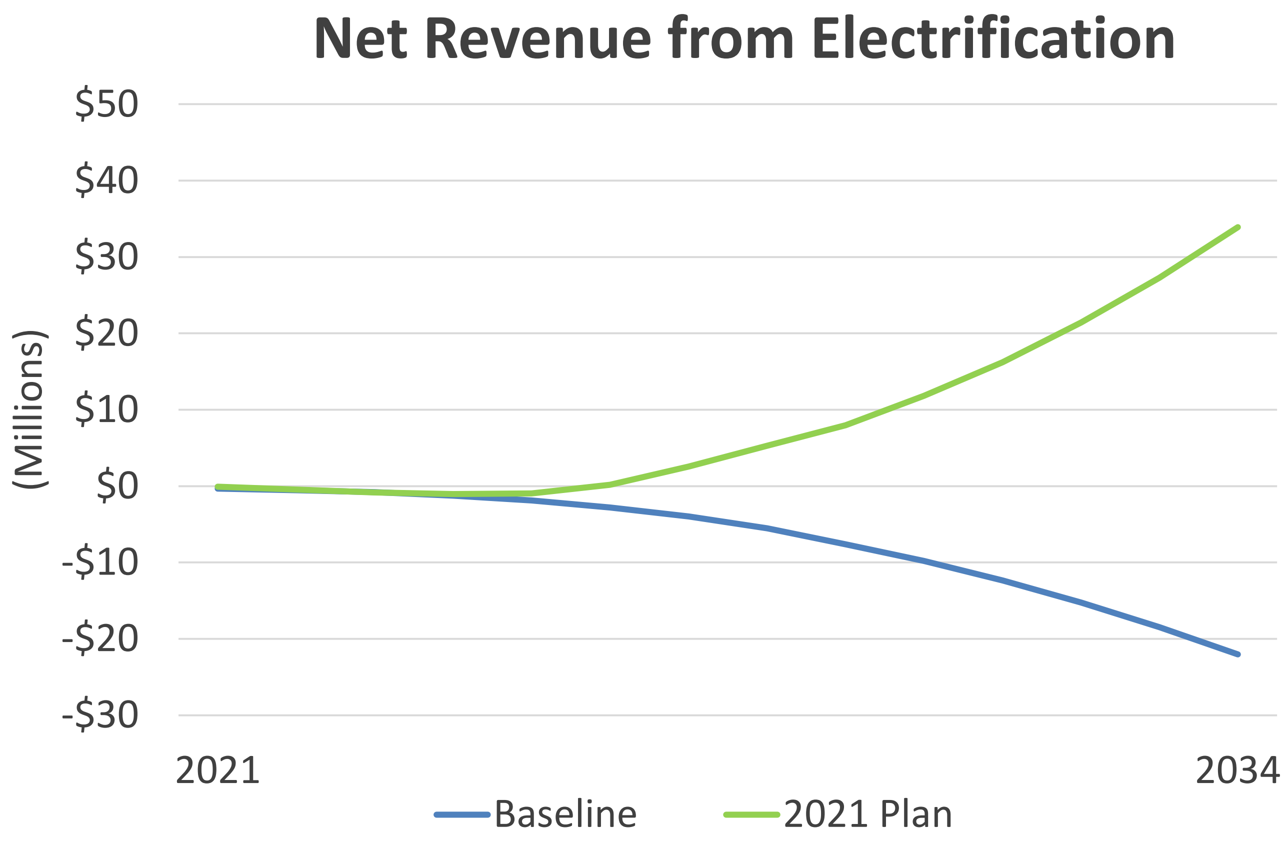


EV Impact on System Load



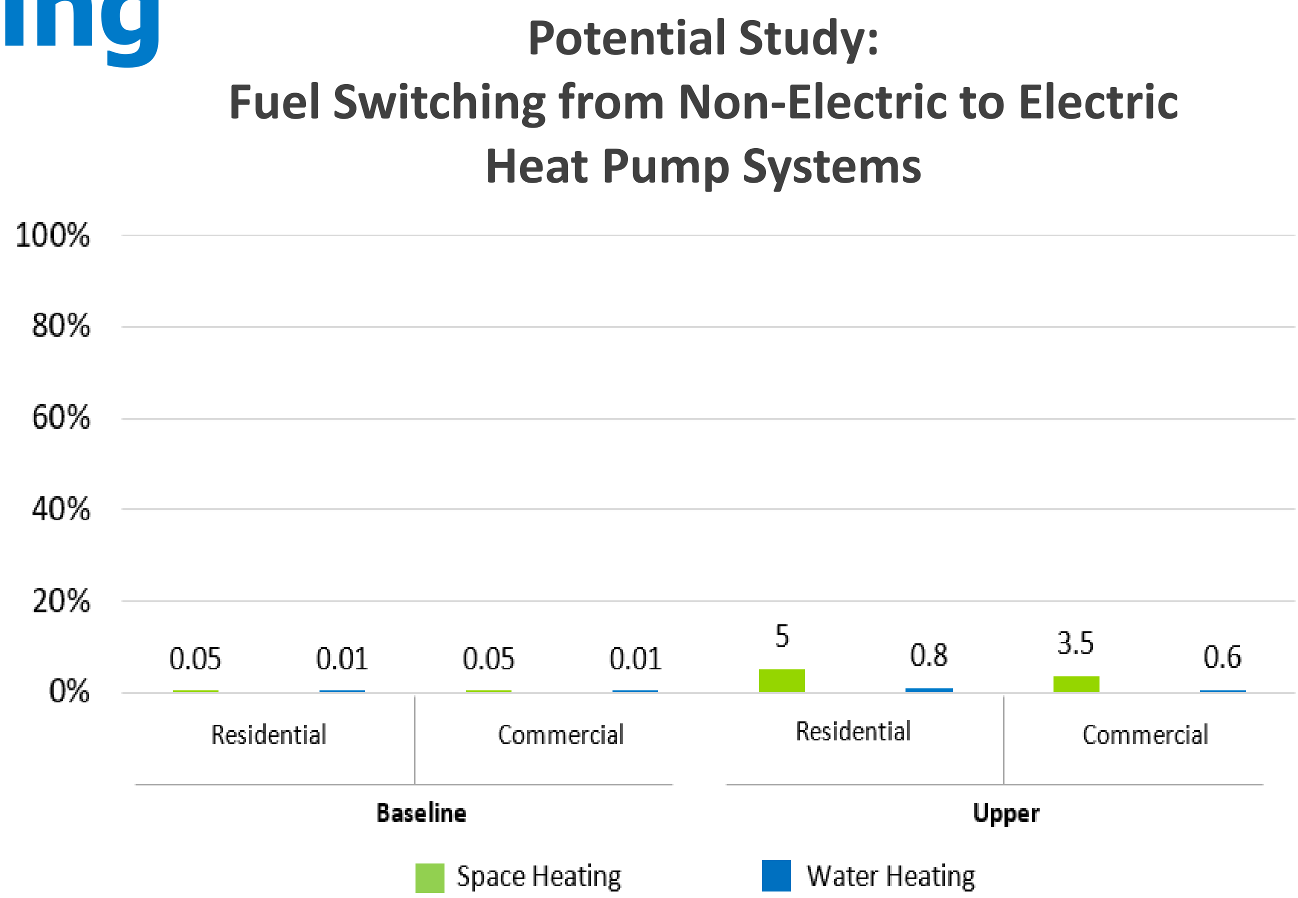
Rate Mitigation

- 2021 Plan will provide 0.5 ¢/kWh rate mitigating benefit by 2034
- Unmanaged EV charging results in negative NPV of $22 million
- Managed EV charging with no programs to increase adoption reduces potential benefit by 60%



Dunsky Potential Study:
Space & Water Heating

- Limited potential due to unfavorable customer economics
- Large incentive insufficient to reduce barrier to adoption



Overview of Customer Electrification Portfolio

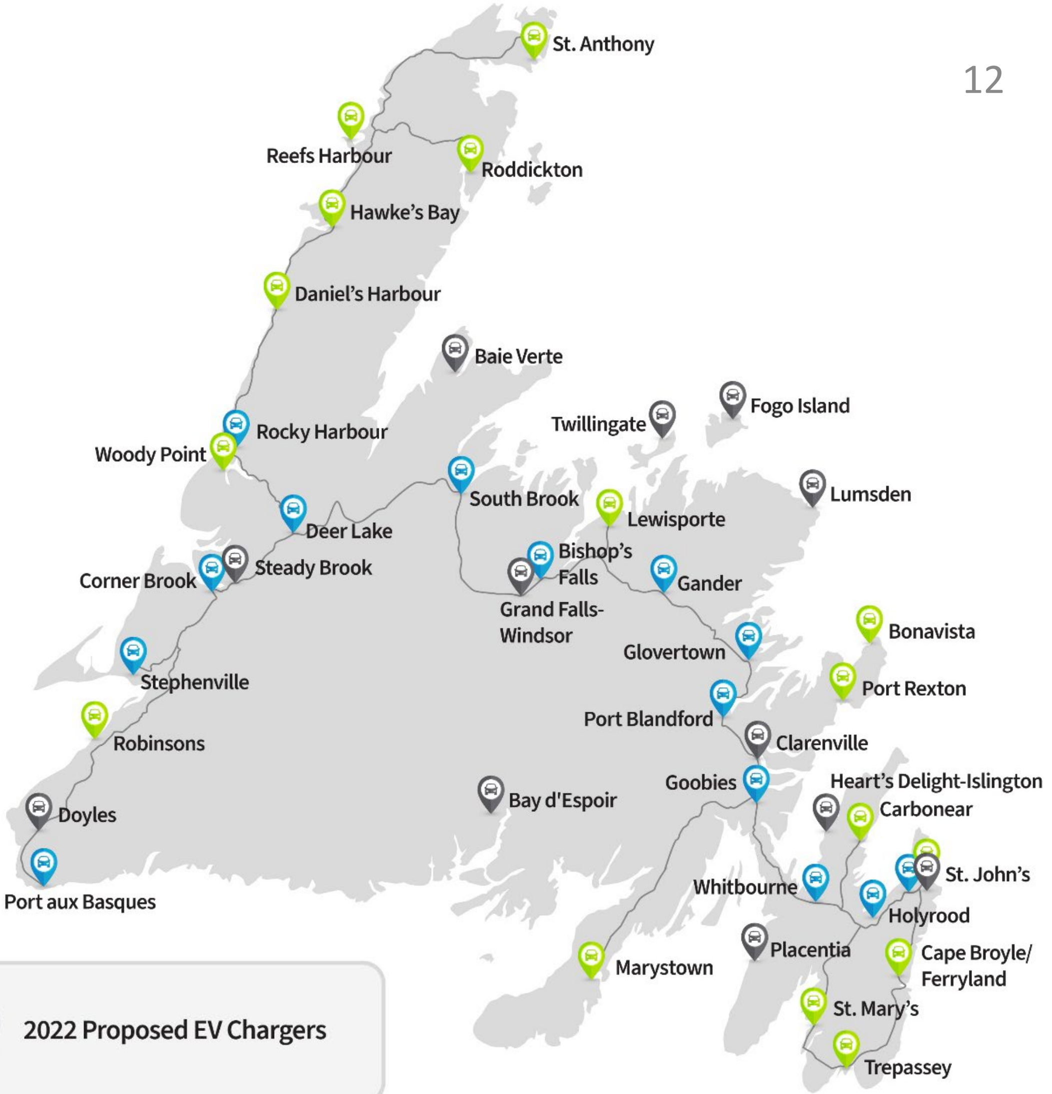
Barriers to EV Adoption

- **32%** of NL residents ranked cost as a primary barrier
- **24%** of NL residents ranked availability of public charging as a primary barrier

- **Incremental cost of EV $19,000 in 2021**
- **Lack of access to public fast charging in NL**

Infrastructure Investments:
EV Charging Network

- Achieve minimum geographic coverage necessary to travel across province
- 42 charging stations on the island by year-end 2022 (plus 3 in Labrador)
- No investments expected beyond 2025



Existing EV Chargers | 2021 Approved EV Chargers | 2022 Proposed EV Chargers

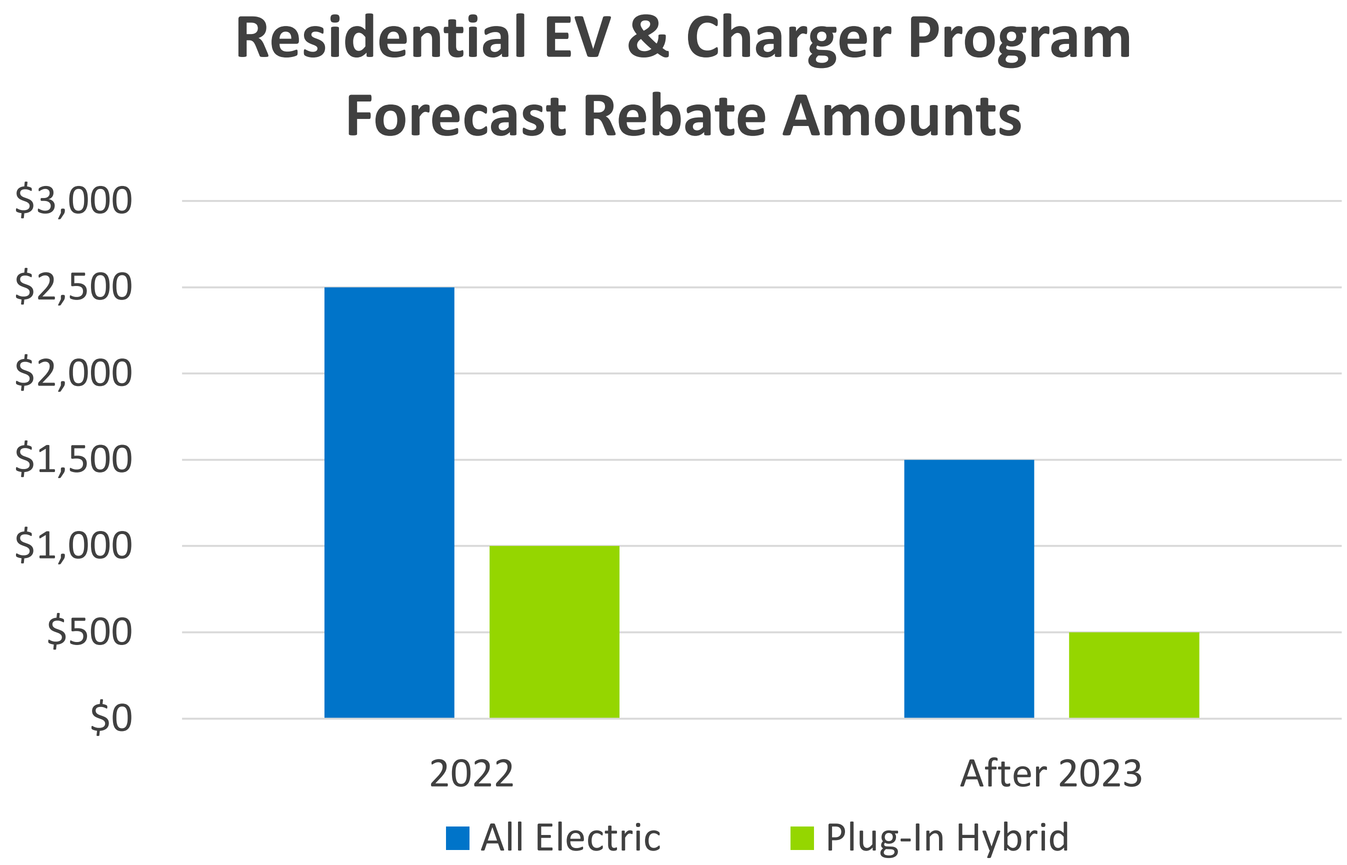
Rebate Programs

- Increase EV adoption by 16-32% over short term
- Charger rebates essential to load management

Program	Initial Rebate Amount
Residential EV & Charger Program	• Up to $2,500 for EV • $500 for “smart” charger
Commercial EV & Charger Program	• Up to $2,500 for EV • Up to $3,000 for “smart” charger
Custom Electrification Program	• Individualized rebates for commercial customers (e.g. electric forklift)

Evaluating Rebate Amounts

- Rebate amounts adjusted over time based on market factors and industry trends



Research:
EV Demand Response Pilot

Objectives:	• *Assess demand response measures to determine ability to shift peak loads, customer acceptance and cost-effectiveness*				
Timeframe:	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Total Vehicles:	0	75	125	125	0
Cost (000s):	$0	$573	$316	$258	$0

- Installation of AMI meters is not required for EV load management

Research:

Custom Fleet Pilot

Objectives:	• *Understand unique barriers to electrification of medium- and heavy-duty vehicles and buses* • *Encourage off-peak charging*				
Timeframe:	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Total Vehicles:	2	3	5	7	0
Cost (000s):	$295	$605	$857	$1,038	$0

Detailed Description of Cost-Benefit Assessments

Objectives of Assessments

Modified Total Resource Cost (mTRC) Test

- Determines whether benefits to participating customers are greater than costs to customer and the utility

Net Present Value (NPV) Analysis

- Determines whether total electrification portfolio is least cost for ratepayers overall

North American Practice for Evaluating Electrification

Cost assessments for electrification programs are designed to meet the specific policy goals of each jurisdiction

mTRC Test Inputs

Example:
Residential EV & Charger Program

TOTAL BENEFITS*	$67.3 million
Maintenance Savings	$2,974,030
Fuel Savings	$64,356,963

÷

TOTAL COSTS*	$34.8 million
Electricity Supply Costs	$8,045,129
Equipment Costs	$25,082,543
Program Admin. Costs	$1,697,873

= 1.9

*Costs and benefits calculated on NPV basis over 15 years.

mTRC Test Results

- Benefits for participating customers double the costs
- Sensitivity analyses confirm cost-effectiveness of programs

Program	mTRC
Residential EV & Charger Program	1.9
Commercial EV & Charger Program	2.2
Custom Electrification Program	2.1
Total Portfolio	**2.0**

NPV Analysis Inputs

	Investment		Pro Forma Revenue Requirement Impacts					
	Capital Costs	Program Costs	Incremental Revenues	Incremental System Costs	Capital Cost Recovery	Program Cost Recovery	Net Revenues	Cumulative NPV
	A	B	C	D	E	F	G	H
2021	1,538	1,336	49	32	115	35	(133)	(126)
2022	1,530	3,014	283	183	340	278	(519)	(589)
2023	460	3,944	772	447	477	746	(899)	(1,348)
2024	460	4,494	1,676	953	530	1,328	(1,135)	(2,253)
2025	311	4,385	3,414	1,927	570	1,954	(1,037)	(3,035)
2026	0	1,074	7,399	4,248	571	2,456	123	(2,947)
2027	0	1,706	13,142	7,563	548	2,544	2,487	(1,272)
2028	0	2,364	20,604	12,155	525	2,721	5,202	2,039
2029	0	2,980	29,583	18,175	502	2,987	7,919	6,803
2030	0	3,651	40,373	24,813	480	3,333	11,747	13,481
2031	0	4,334	52,825	32,481	382	3,765	16,197	22,184
2032	0	5,061	67,050	41,259	214	4,151	21,425	33,063
2033	0	5,788	82,948	51,091	107	4,467	27,284	46,157
2034	0	6,613	101,001	62,258	56	4,792	33,894	61,529

NPV Analysis Results

Net Benefit by 2034:

Net Revenue Impact	÷	Projected Energy Sales	=	Rate Mitigation Benefit
$33.9 million		6,527 GWh		0.5 ¢/kWh

Rate Mitigation Benefit	x	Average Annual Energy Usage	=	Average Annual Bill Savings
0.5 ¢/kWh		17,412 kWh		$100/year

Marginal Costs

Marginal Cost - Background

- Marginal cost reflects the cost of serving increased load requirements (i.e. the cost of serving the next kWh)
- Comprised of the marginal cost of Generation, Transmission, and Distribution
- Current framework for estimating the marginal costs for the Island Interconnected System (IIS) established through filings in 2016 and 2018
    - Study updated by CA Energy in 2021

Marginal Cost - Generation

- Bulk of costs for IIS are related to marginal cost of generation

- Marginal cost of generation has two components:
  - ***Energy*** – based on the value of excess energy in export markets
  - ***Capacity*** – based on internal cost of building capacity to satisfy reliability requirements

- Significantly higher in winter vs. non-winter as marginal costs are primarily driven by peak loads
  - Reflects limited capacity available to serve additional loads during winter

Marginal Cost – 2021 Update

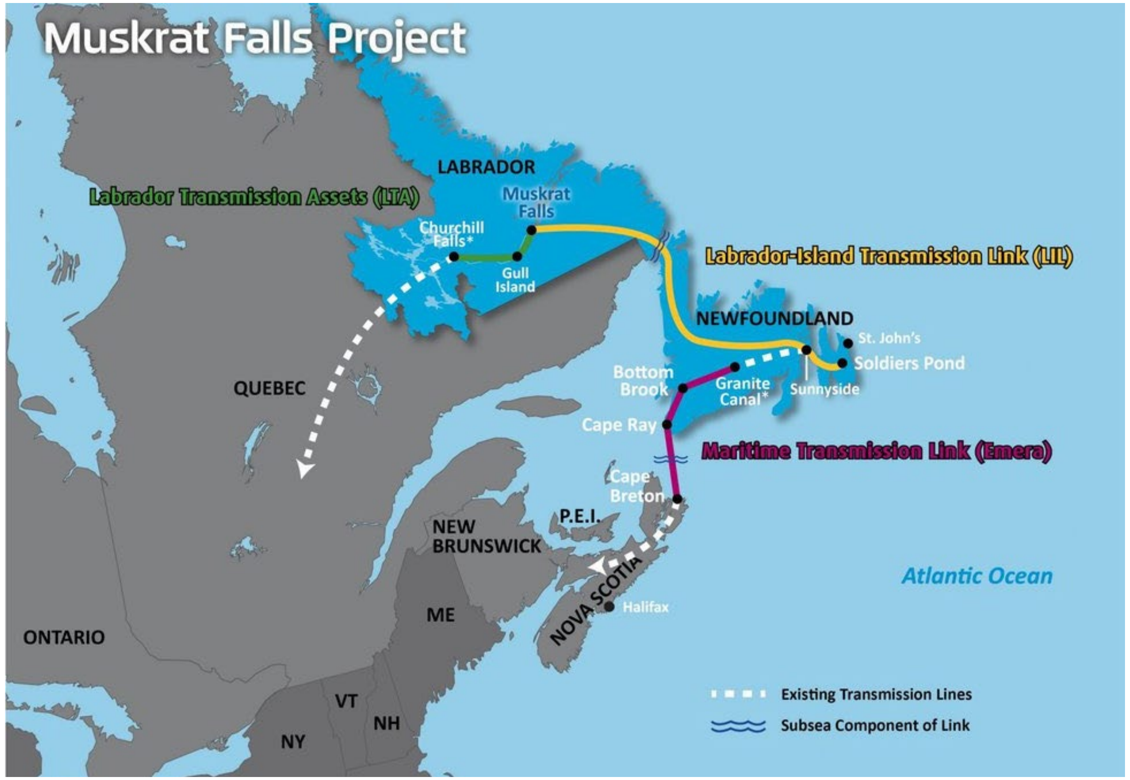
- Consistent shape to prior results with lower overall marginal costs
    - Results continue to show high value of winter capacity and energy relative to other time periods, resulting in higher winter marginal costs

- 2021 marginal costs continue to provide strong support for electrification and peak demand management

- Marginal cost will vary as system changes; this is consistent with marginal costing principles
    - e.g. Proceeding with a P90 peak demand forecast for planning will increase system marginal costs

Marginal Cost – Other Items

- 1¢ export vs. marginal cost of energy
  - Generation marginal cost of energy reflects tariffs and fees but not sunk costs (NEM fixed costs, HQT booking)
- There is no impact of deferred energy under MFPPA on marginal cost



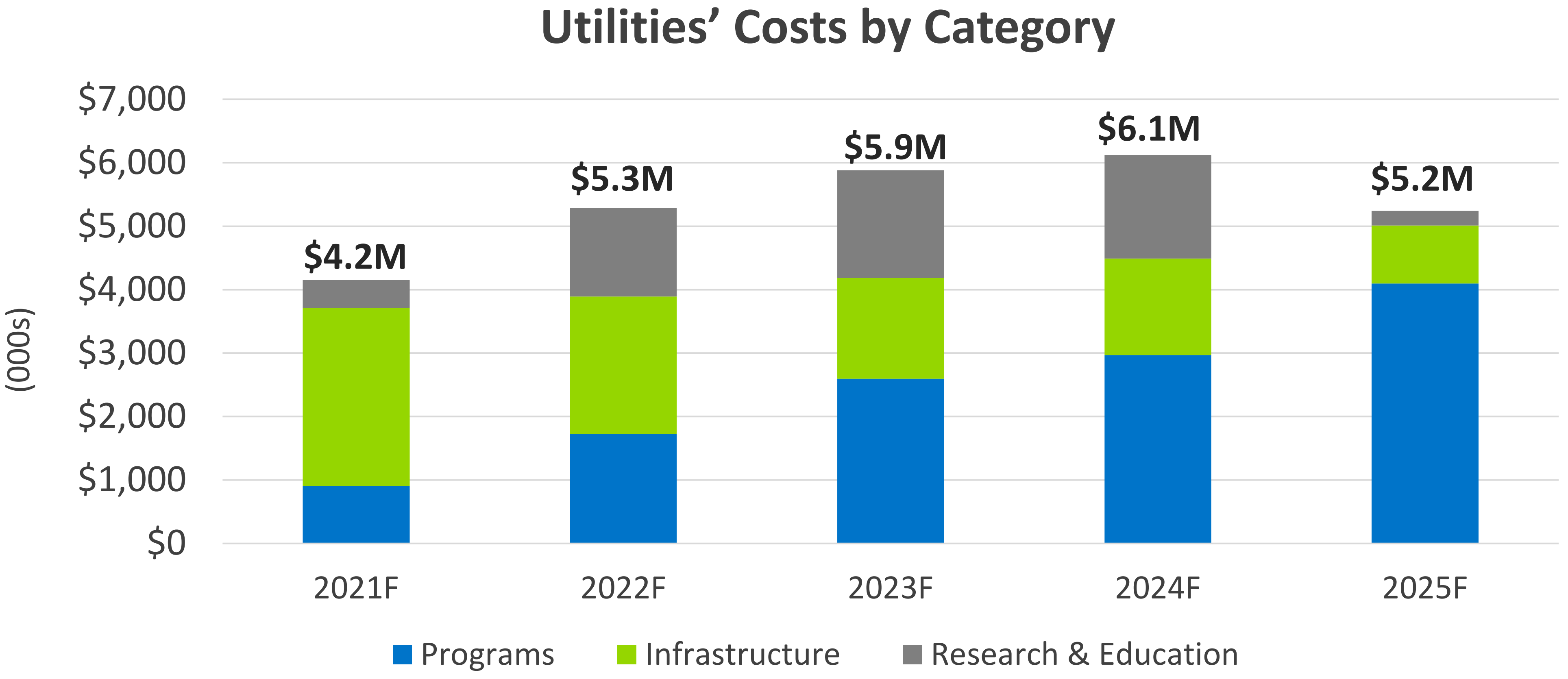
Marginal Cost – Other Items

- Potential Reliability and Resource Adequacy (RRA) impacts on marginal cost
  - Increasing system reliability requirements would increase Hydro's marginal cost of generation capacity

- Options to reduce marginal capacity cost
  - RRA process considers demand side and generation-based resource options; outcomes of RRA process reflected in marginal cost of capacity
  - Modelling indicates Bay d'Espoir Unit 8 is presently the least-cost option

Approaches to Cost Recovery

Electrification Portfolio Costs



Approaches to Cost Recovery

- NL Hydro - single deferral account for electrification and CDM costs
- Newfoundland Power - separate deferral accounts for electrification and CDM costs

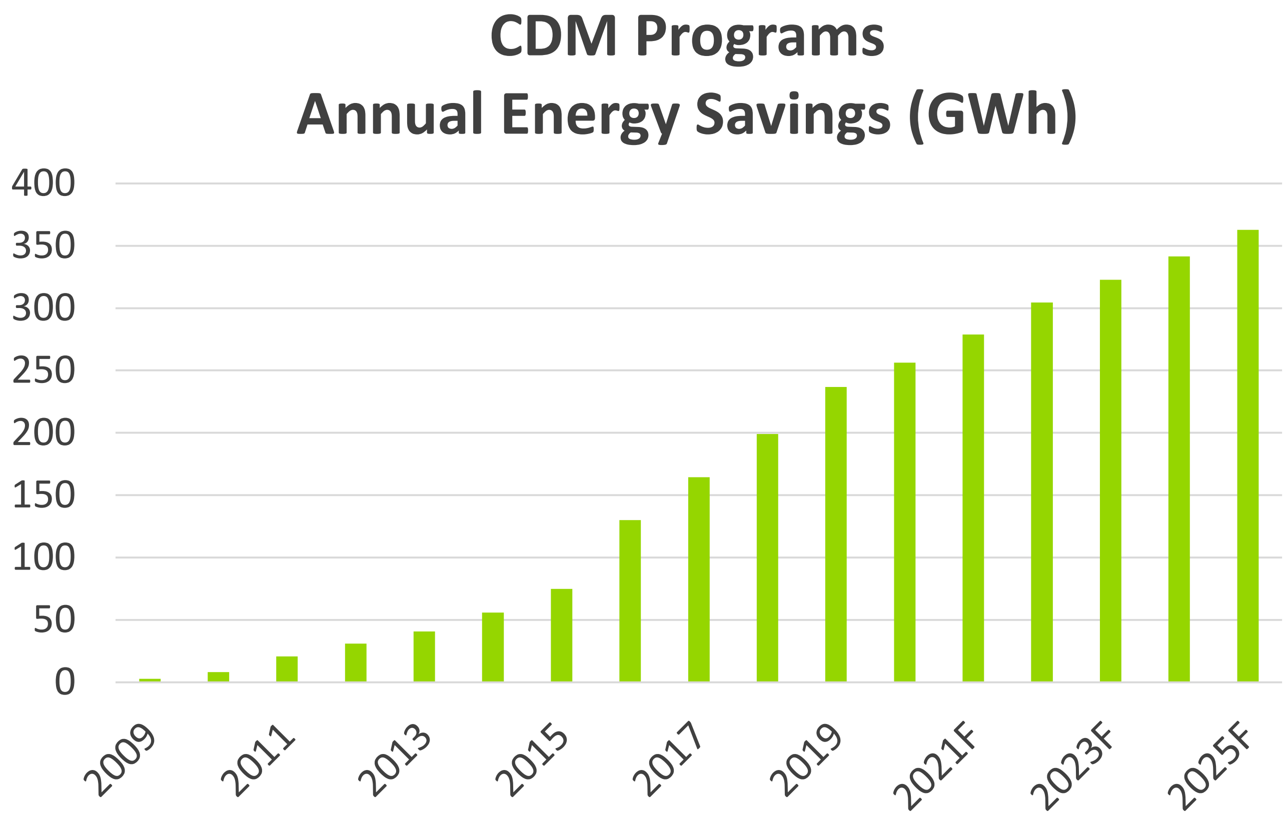
Comparison of Deferral Accounts		
Cost	**NLH**	**NP**
Program Costs	✓	✓
Research (Over $100,000)	✓	✓
Infrastructure (Capital and O&M)	✓	✓
Charging Station Revenues	✓	✓
Government Funding	✓	✓
General Expenses	-	-

CDM Program Delivery

Customer Benefits

By 2025:

- **1,610 GWh** total energy savings
- **82 MW** peak demand reduction
- **$255 million** lower system costs
- **$203 million** bill savings



Changes to Programs

- Adjustment of Business Efficiency Program (2021)
- Expansion of on-bill rebate for insulation (2022)
- New low-income program (2022)
- Conclusion of Instant Rebate Program (2022)

Third-Party Programs
Consistently monitor government-funded programs to maximize customer benefits and avoid duplication

Economic Evaluation

- Total Resource Cost ("TRC") test and Program Administrator Cost ("PAC") test approved in 2016
- Annual updates provided to Board
- Rate Impact Measure ("RIM") test not recommended for economic evaluation of CDM programs

CDM Program Evaluation Canadian Practice

Province	TRC	PAC	RIM
NL	✓	✓	-
NS	✓	-	-
PEI	-	✓	-
NB	-	✓	-
QC	✓	-	-
ON	✓	-	-
MB	-	✓	-
BC	✓	-	-

Assessment of TOU Rates

- Majority of demand management potential met through existing curtailment programs
- Benefit of TOU rates currently ½ of the cost
- TOU rates not expected to be cost-effective until after 2030 when EV load increases

TOU Rates Offer Modest Peak Demand Reduction at High Cost

- 21 MW reduction by 2024
- Cost of AMI deployment $85 million to $105 million

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