

Bidirectional EV Working Group

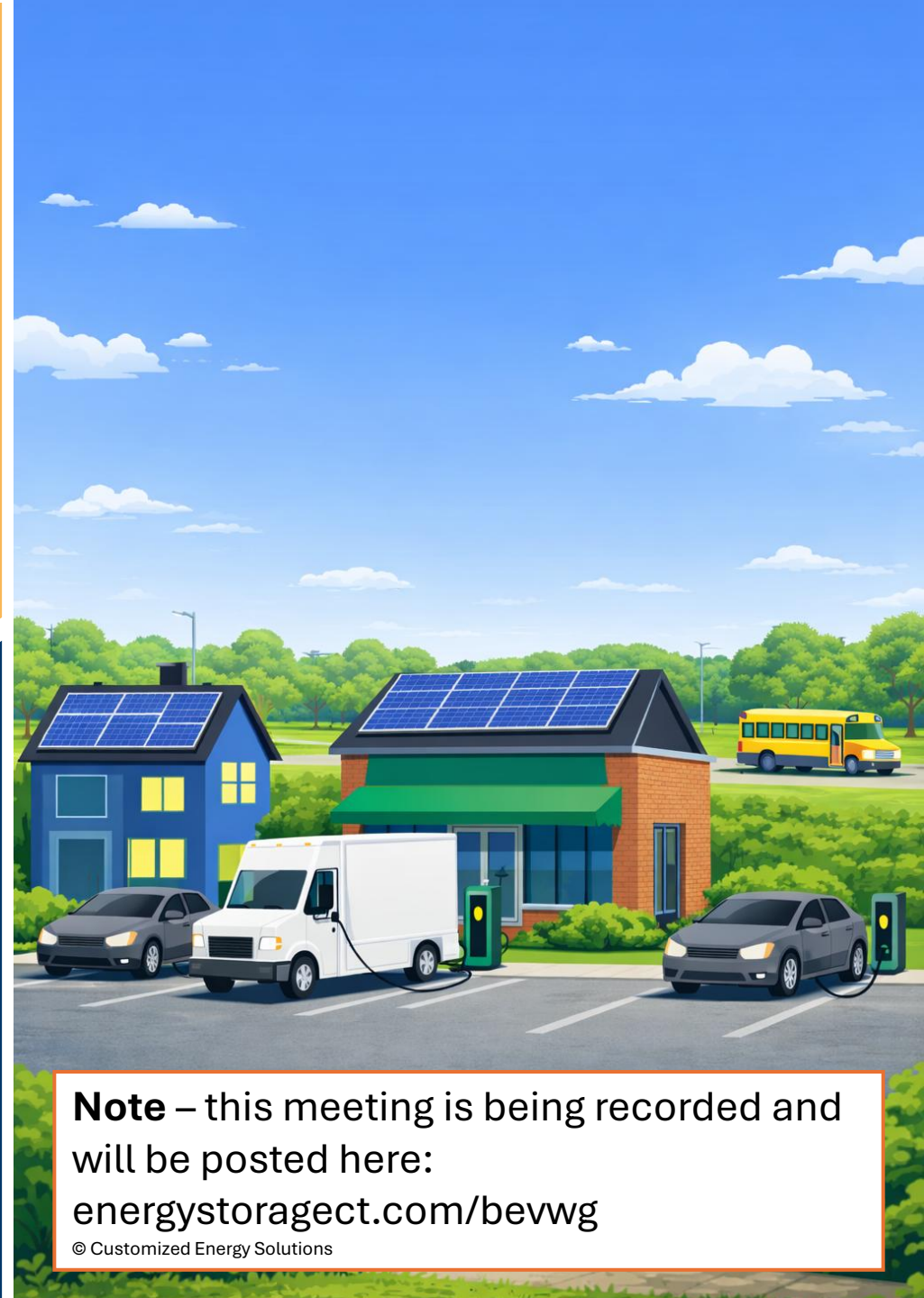
Meeting #5: Incentives



EVERSOURCE



May 29, 2026



Note – this meeting is being recorded and will be posted here:

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Agenda

1. Welcome & Overview
2. Current ESS Incentives and BCA Methodology
3. Bidirectional EV Cost Drivers
4. Potential Incentive Structures
5. Illustrative Examples and Incentive Values
6. Wrap-Up & Next Steps

Logistics

- ▶ For clarifying comments and questions, please use hand raise function.
- ▶ There will be discussion periods during each section.

Objectives

- Ensure understanding of current incentive structure, benefit-cost analysis (BCA), and the relationship between the two
- Develop shared understanding of incremental cost drivers of bidirectional EVs (incremental to non-bidirectional EVs)
- Discuss potential incentive structures and rates

Additional Information

- ▶ The WG Charter, meeting notes, slides, presentations and other resources are accessible at: <https://energystorage.ct.com/bevwg/>



Current ESS Incentives and BCA Methodology



- Enrollment incentives – paid upon project completion/DERMS enrollment
 - Based on installed capacity (kWh)
 - No performance obligations
- Performance incentives – paid based on average kW discharged across all event hours
 - No penalties for non-performance; simply not paid
- Note: current incentive structure (referred to as “Construct 5”), differs substantially from original incentive structure (“Legacy”)
 - The Legacy incentive structure had higher upfront incentives and lower performance incentives
 - PURA directed the switch to Construct 5 in its Docket No. 25-08-05 Final Decision
 - PURA cited relatively low Passive Dispatch performance (resulting in incentive clawbacks) as a primary rationale for the switch to Construct 5

Construct 5 – Enrollment Incentives

Customer Category	Enrollment Incentive Rate*
Residential (Non-Grid Edge)	\$30/kWh
Residential (Grid Edge)	\$130/kWh
Commercial (Non-Priority)	N/A
Commercial (Priority)	\$10/kWh

*Enrollment incentives are defined based on rated energy capacity (kWh)

Construct 5 – Performance Incentives

Customer Class	Years 1 – 5	Years 6 – 10
Small or Medium C&I	\$325/kW	\$175/kW
Large C&I	\$275/kW	\$175/kW
Standard Residential	\$300/kW	
Underserved Residential*	\$450/kW	
Low-Income Residential*	\$550/kW	

- Priority Customers include:
 - Small Businesses
 - Critical Facilities
 - Customers Replacing Fossil Fuel Generators
 - Grid Edge customers
- Grid Edge designation based on reliability criteria

- Benefit Cost Analysis (BCA) is used to evaluate the performance of the program and inform incentive levels
- Conducted from numerous perspectives, each of which has its own included set of costs and benefits and discount rate (see table)
- Primary tests discussed in PURA dockets:
 - Participant Cost Test (PCT):** used to evaluate customer economics; while not based on full financial analysis, a strong indicator of whether compensation levels will be sufficient to make at least some projects viable. *Benchmark: PCT of 1 or greater suggests project viability*
 - Ratepayer Impact Measure (RIM):** used to assess costs of program to ratepayers, excluding most non-monetizable values (such as emissions). *Benchmark: RIM of 1.4 or greater*
 - RIM-CT:** similar to the RIM, but excludes certain values that accrue to other ISO-NE customers (e.g., capacity DRIPE)

Primary Costs and Benefits, by Test Perspective

Category	Benefit/Cost Stream	PACT	CTET	PCT	SCT	TRC	RIM	RIM-CT
Utility Benefits - Peak Savings	Avoided Generation Capacity	Benefit	Benefit	-	Benefit	Benefit	Benefit	Benefit
	Avoided T&D Capacity	Benefit	Benefit	-	Benefit	Benefit	Benefit	Benefit
	Reliability	Benefit	Benefit	-	Benefit	Benefit	Benefit	Benefit
Utility Benefits - Energy Savings	DRIPE Capacity Impacts	Benefit	Benefit	-	Benefit	Benefit	Benefit	Benefit*
	Avoided Energy	Benefit	Benefit	-	Benefit	Benefit	Benefit	Benefit
	DRIPE Energy Impacts	Benefit	Benefit	-	Benefit	Benefit	Benefit	Benefit*
Societal Benefits - GHG Savings	Cross-DRIPE Impacts	Benefit	Benefit	-	Benefit	Benefit	Benefit	Benefit*
	Non-Embedded Emissions	-	Benefit	-	Benefit	-	-	-
Program Administrative Costs	Program Administration	Cost	Cost	-	Cost	Cost	Cost	Cost
Participant Bill Savings	Participant Bill Savings	-	-	Benefit	-	-	Cost	Cost
Incentives	Program Incentives	Cost	Cost	Benefit	-	-	Cost	Cost
	Performance Incentive Aggregator Fee ¹	-	-	Cost	-	-	-	-
ESS Technology Costs	Participant Incremental DER Costs	-	-	Cost	Cost	Cost	-	-
Avoided Backup Generator	Net Avoided Backup Generator	-	-	Benefit	-	-	-	-

“DRIPE” = Demand Reduction Induced Price Effect, or impact on clearing price of reducing demand or increasing supply

Figure 5-1. Overall Program BCA

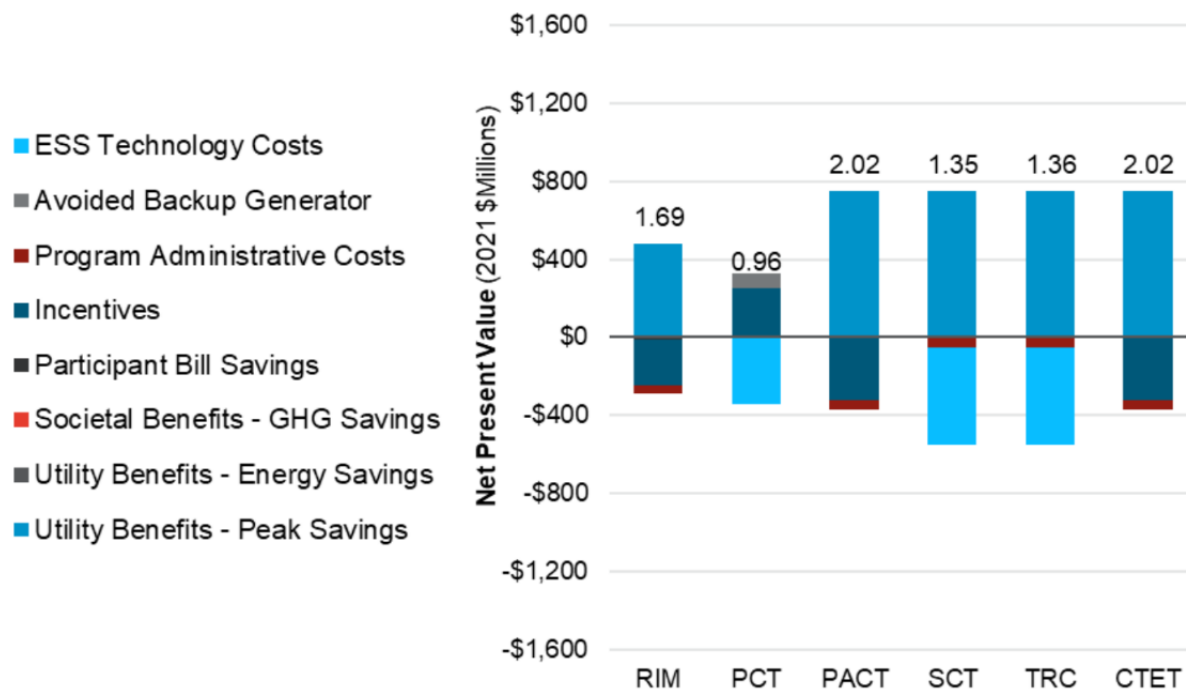


Figure 5-3. Residential Program BCA

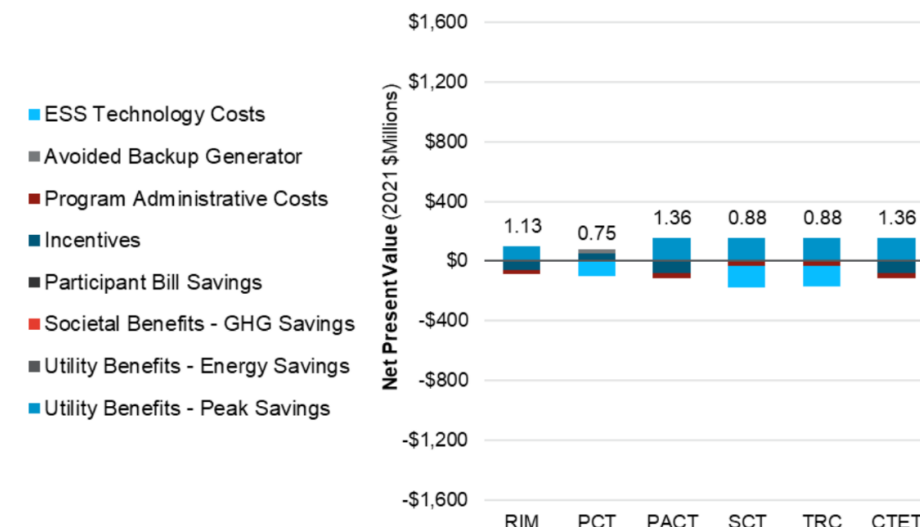
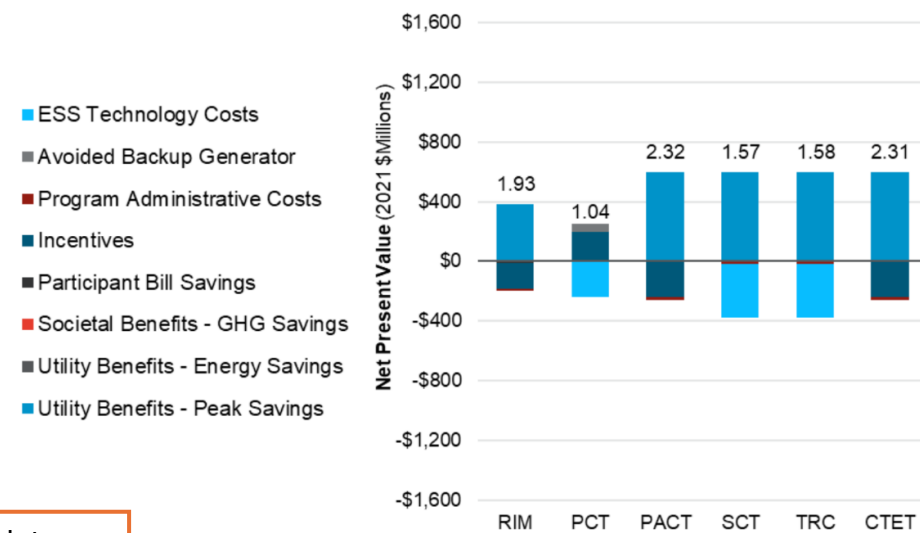


Figure 5-4. C&I Program BCA



- As of Year 5 Report, overall program achieved RIM above 1.4 benchmark, and PCR just below 1 benchmark
- C&I BCA generally more attractive due to lower compensation/incentive rates
- Significant residential activity, despite PCT below 1: suggests additional value drivers/customer motivation

Above from Year 5 EM&V Report; 10/16/2025 Update



Bidirectional EV Cost Drivers

For the Participant Cost Test (PCT)

- Cost methodology for stationary storage:
 - Consider *full cost of system*
 - Rationale: the primary use of stationary storage is to provide economic value, much of which is derived from the ESS program
- Cost methodology for bidirectional EVs:
 - Consider *incremental cost* associated with moving from non-V2G-capable EV to V2G-capable
 - Rationale:
 - EVs are primarily a mode of transportation; discharge for ESS is a peripheral use as opposed to primary rationale for purchasing an EV
 - Other programs (e.g., Managed Charging) may already seek to claim benefits associated with purchase and use of EV over internal combustion engine alternative
 - Benefits in ESS is based on discharge during Active Events – incremental cost (V2G capability) aligned with provided benefit (Active Discharge)
- *Logic above also applies to Total Resource Cost and Societal Cost Test*

For Other Tests (e.g., Ratepayer Impact Measure or RIM)

- Question of incremental technology cost irrelevant, as primary costs are incentive costs
- This is the same as for stationary storage

Implications

- Assumed project costs do not directly affect PCT, as PCT costs are primarily incentives
- However, incentive costs may be adjusted to try to achieve PCT near 1
- Goal: find incentive level that results in PCT approaching 1 while ensuring a RIM of at least 1.4

Upfront Costs

- Incremental EVSE cost → bidirectional EVSE often come with a substantial incremental cost
- Interconnection cost → higher interconnection cost or interconnection cost when there otherwise would have been no interconnection cost
- Incremental labor (incl. project management for greater complexity)
- Other (e.g., other equipment, monitoring, etc.)

**Significant
Impact**

Charging Costs

- Increased cycling increases net kWh consumed
- TOU implications can increase or decrease impact
- Assume no impact on demand charges

**Likely Modest
Impact**

Impact on Battery

- Increased cycling could affect warranty, increase degradation
- For perspective, an electric school bus will likely cycle well over 100 full equivalent cycles annually; assuming 25% of 200 nameplate kWh discharged per event and participation in 20 events per season, this would be equivalent to about 5 cycles

**Likely Minimal
Impact**

- Very limited data on incremental costs – one relevant source (from NREL), dates from 2017
- One Working Group participant provided incremental cost estimates for MHD
- Other values based on review of general literature, comparing comparable models with and without V2G capability, etc.
- Note – interconnection and “other” categories have greatest uncertainty
 - Interconnection uncertainty is consistent with stationary storage – driven by specific location and size of resource
 - “Other” might include costs for SCADA, other hardware; unclear how often this will be applicable

Illustrative Cost Ranges

Category – All Costs Incremental to One-Way EVSE	Residential – Light Duty	Commercial – MHD (Level 2 Charger)	Notes
EVSE	\$5,000-\$6,000	\$10,000-\$15,000	Per port cost
Interconnection	\$500	\$1,000-\$50,000	Per project?
Labor	\$500	\$5,000	Per project?
Other	\$0	\$5,000-\$50,000	Varies

Discussion:

- What other cost data is available?
- Are there other participant costs that should be considered?



Potential Incentive Structures

- Most common (and history in ESS program):
 - Upfront incentive w/ performance obligation
 - Upfront/enrollment incentive w/ no obligation
 - Performance incentive
- Other potential approaches:
 - Fixed annual payments w/ minimum participation requirements
 - Incentive for vehicle being plugged in during designated hours
 - Others?
- Consider differentiation between residential, commercial fleet, and commercial MHD

Challenge with upfront incentive: What should payment be based on?

- Current upfront incentives are per kWh of installed capacity
- There is significant uncertainty and variation in expected bidirectional EV performance:
 - How many events will they participate in?
 - How much of total kWh discharged during events?
- Given this uncertainty, is an upfront incentive appropriate? If so, how could this uncertainty be addressed?

Discussion:

- What incentive design most effective at driving desired outcomes (e.g., bidirectional EVSE and discharging energy during peak events), balancing project economics and ratepayer impacts?
- How might this differ by customer type?
- Role of aggregators/flexibility in how incentives are ultimately paid to customers?



Illustrative Examples

- As previously noted, limited data on incremental costs and on expected performance
- Assumptions shown are *intended to be illustrative*, given limited data
- Table to right on a per charging port/EV basis
- Incentive levels shown in subsequent slides based on current Construct 5 incentive levels
- For upfront incentive, based on EV kWh assumed to be discharged during events
 - For example, using residential assumptions to right, 100 kWh nameplate * 25% discharged during events = 25 kWh
 - Challenge: without some sort of performance obligation, how would one establish the value used to discount nameplate if this approach was taken?

		Residential	Commercial
Project characteristics	EVSE kW	10	30
	EV kWh	100	200
	% of kWh discharged during events	25%	25%
	% of events	30%	75%
	% of charging off-peak	80%	80%
	Round-trip efficiency	85%	85%
Electric rates	\$/kWh - on peak	\$0.30	\$0.26
	\$/kWh - off-peak	\$0.20	\$0.17
Incremental Costs	EVSE	\$ 5,000	\$ 12,000
	Intercxn	\$ 500	\$ 2,000
	Labor	\$ 500	\$ 2,500
	Other	\$ -	\$ 5,000
	Total	\$ 6,000	\$ 21,500

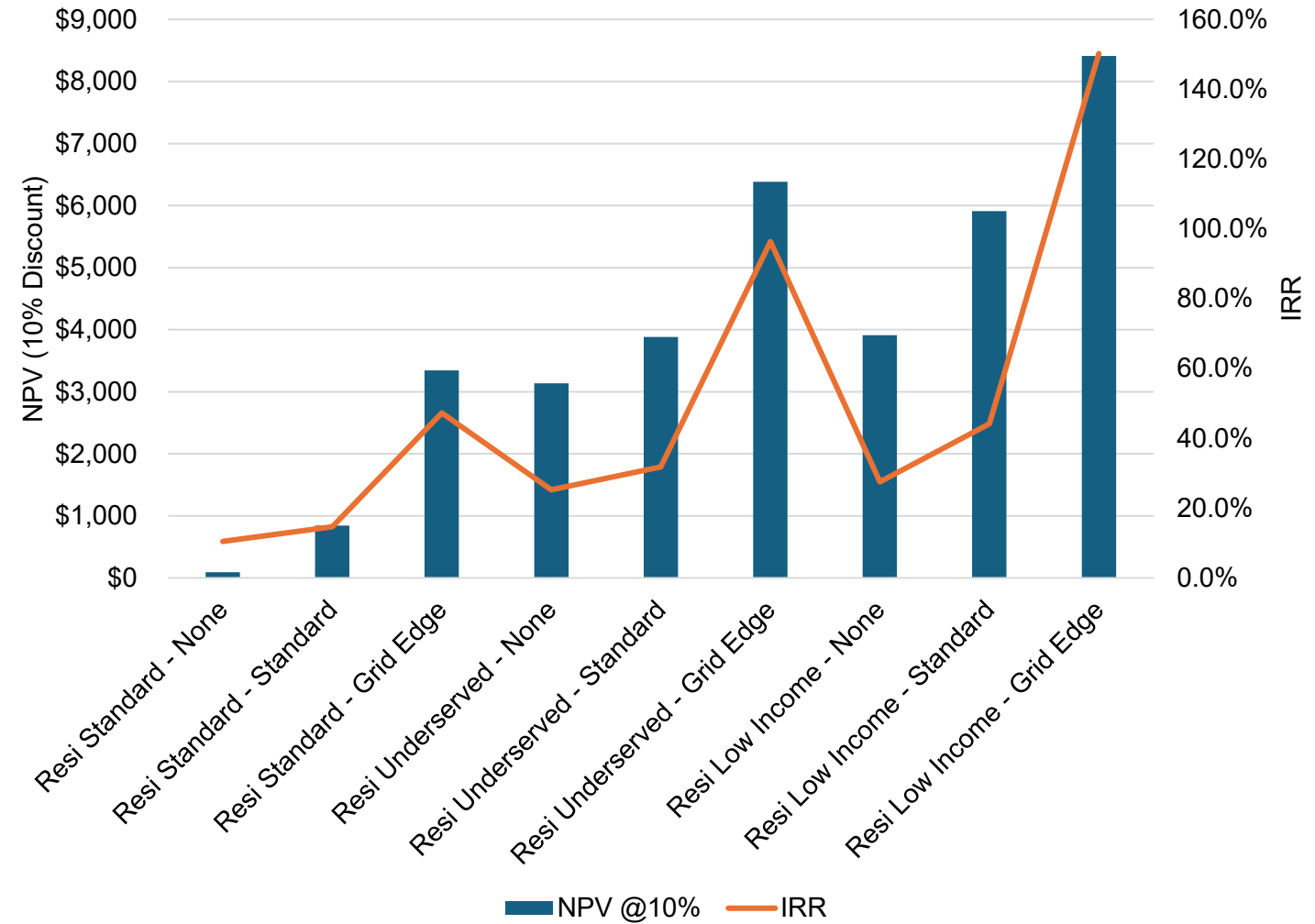
Other inputs		
PCT discount rate:		10%
Avg. event duration:		2.5
\$/kWh escalation rate:		2.50%
# of events:		30

Because currently-approved incentive levels used, projects could be assumed to have cost effectiveness comparable to current stationary storage

- Table shows various financial metrics for different assumptions on performance and upfront incentive levels
- With cost assumptions outlined in previous slide, all residential configurations have positive NPV and an IRR of at least 10%
- Highly sensitive to performance and cost assumptions
- Evaluated over 10 years of performance:
 - Will EVSE last this long?
 - Will customer have bidirectional EV at the site for that long?

Enrollment Incentives (\$/kWh)		Residential	
	Standard		\$30
	Grid Edge		\$130
Performance Incentives (\$/kW)	Residential Standard	Residential Underserved	Residential Low Income
	\$300	\$450	\$550

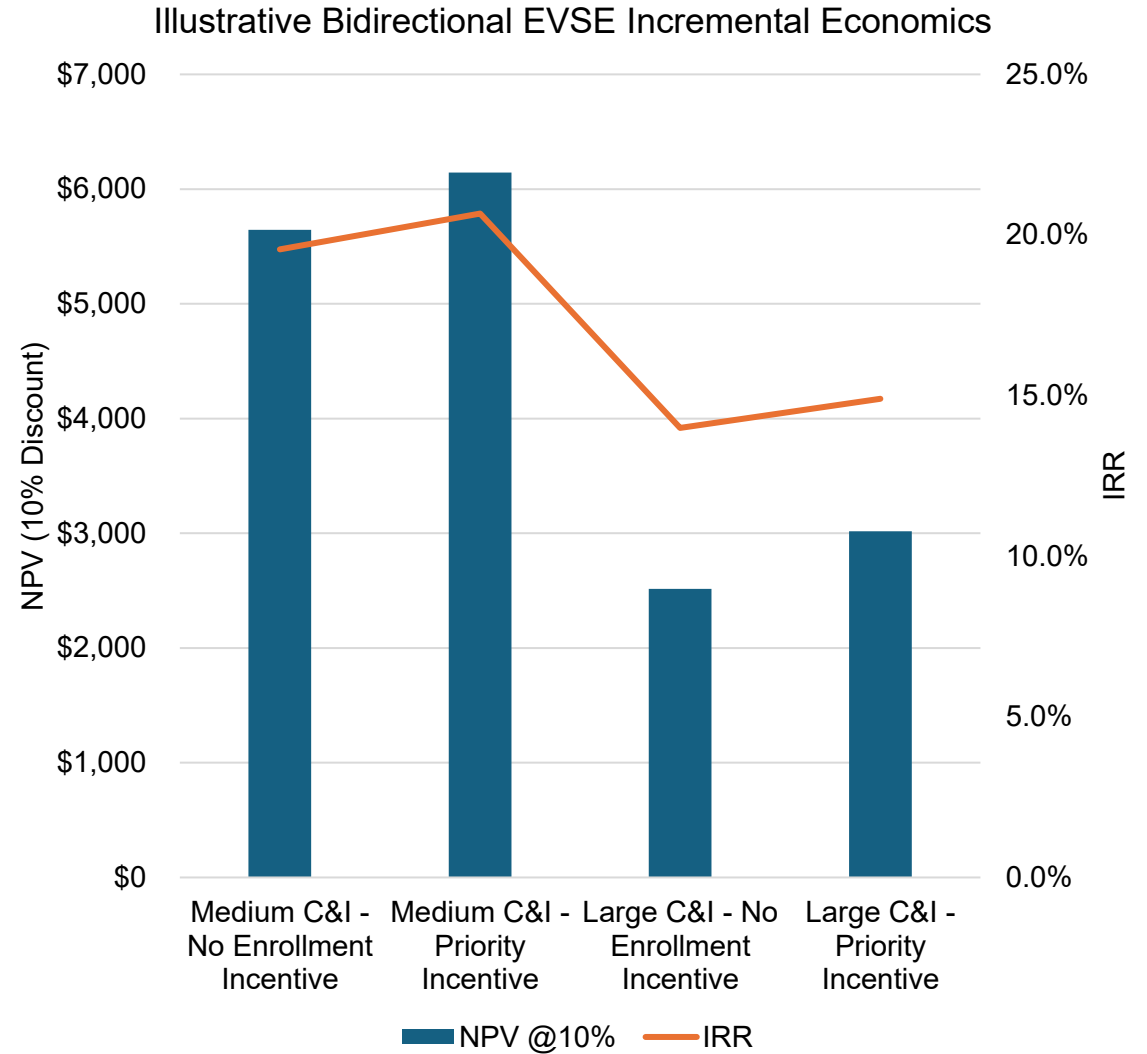
Illustrative Bidirectional EVSE Incremental Economics



- For adopted default assumptions, project economics appear relatively attractive
- Still, highly sensitive to performance and cost assumptions; for example, for large commercial with the \$10/kWh enrollment incentive:
 - Increasing cost by \$3,000 reduces IRR to 10%, NPV to effectively \$0
 - Reducing % of events participated in from 75% to 50% reduces NPV to negative \$5,000 and IRR to 1.8%

Enrollment Incentives (\$/kWh)	Commercial	
	Standard	\$0
	Priority Customer	\$10

Performance Incentives (\$/kW)	Small C&I	Medium C&I	Large C&I
		\$325	\$325





Wrap-Up & Next Steps



Meeting	Theme	Key Questions & Focus Areas
2	Bidirectional EV Technology Requirements by Vehicle Class	<ul style="list-style-type: none"> • Technical characteristics of bidirectional EVs by vehicle class; ESS participation readiness. • Vehicle, charger, and site-level requirements for bidirectional operation. • Integration of IES pilot early lessons. • Potential for phased inclusion of bidirectional EVs into ESS by vehicle class
3	Technical Integration of Bidirectional EVs into ESS	<ul style="list-style-type: none"> • How ESS technical requirements must adapt for bidirectional EVs; data, telemetry, and verification needs. • DERMS capabilities, constraints, and potential workarounds. • Privacy, cybersecurity, and data access considerations.
4	Cross-Program Participation	<ul style="list-style-type: none"> • Overlap between ESS Program and other state EV programs, particularly Managed Charging. • Distinguishing load reduction vs. energy discharge across programs. • Considerations across programs to avoid double-counting. • Identification of relevant tariffs (enabling and/or potential conflicts)
5	Bidirectional EV Incentives	<ul style="list-style-type: none"> • Appropriate incentive structure for bidirectional EV participation in ESS. • Upfront versus performance-based incentives. • Incentives tied to EVSE, vehicles, or integrated systems.
6	Draft Recommendations Review	<ul style="list-style-type: none"> • Present draft findings; identify consensus vs. minority views; confirm alignment with PURA's five directives. • Document consensus positions and non-consensus items. • Alignment with Interconnection Working Group recommendations.

Meeting	Topic	Date
1	Kickoff & Framing	Friday, March 6 th : 9:00-10:30AM ET
2	Bidirectional EV Technology Requirements by Vehicle Class	Tuesday, March 31 st : 9:00-10:30AM ET
3	Technical Integration of Bidirectional EVs into ESS	Thursday, April 16 th : 9:00-10:30AM ET
4	Cross-Program Participation	Thursday, May 7 th : 9:00-10:30AM ET
5	Bidirectional EV Incentives	Friday, May 29 th : 9:00-10:30AM ET
6	Draft Recommendations Review	Friday, June 12 th : 9:00-11:30AM ET