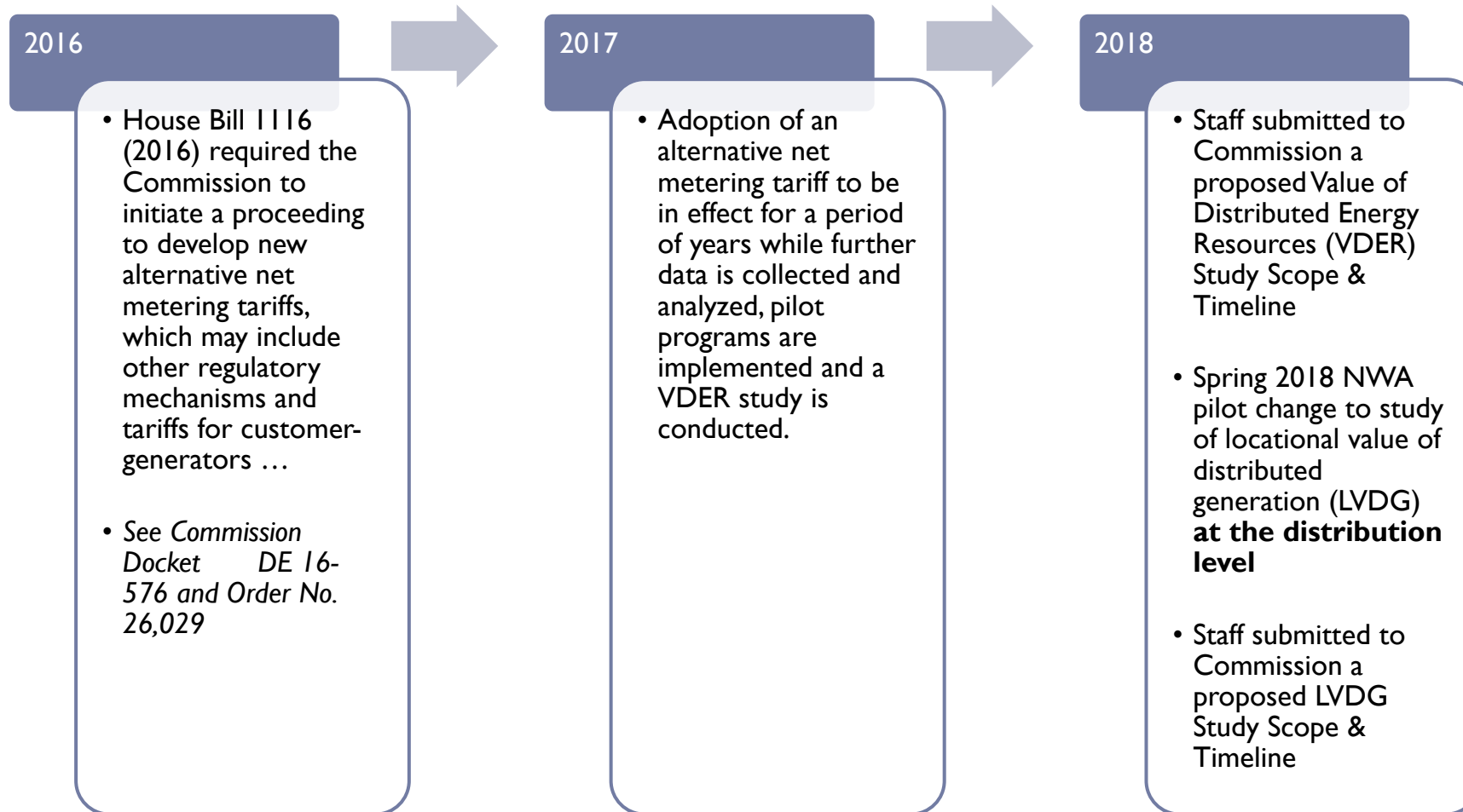




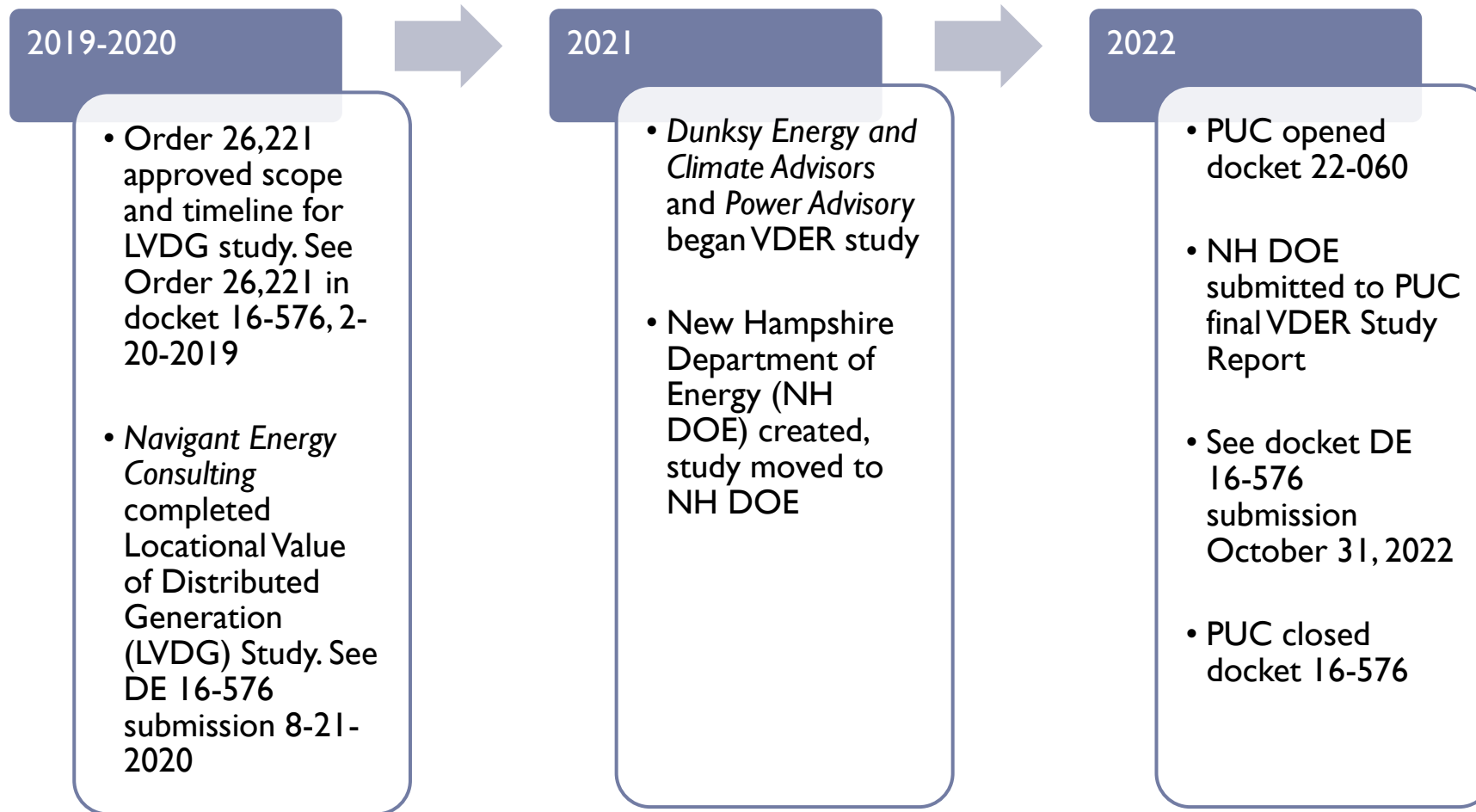
# New Hampshire VDER Study

DOE Summary Presentation to EESE Board

# New Hampshire VDER Study History and Context



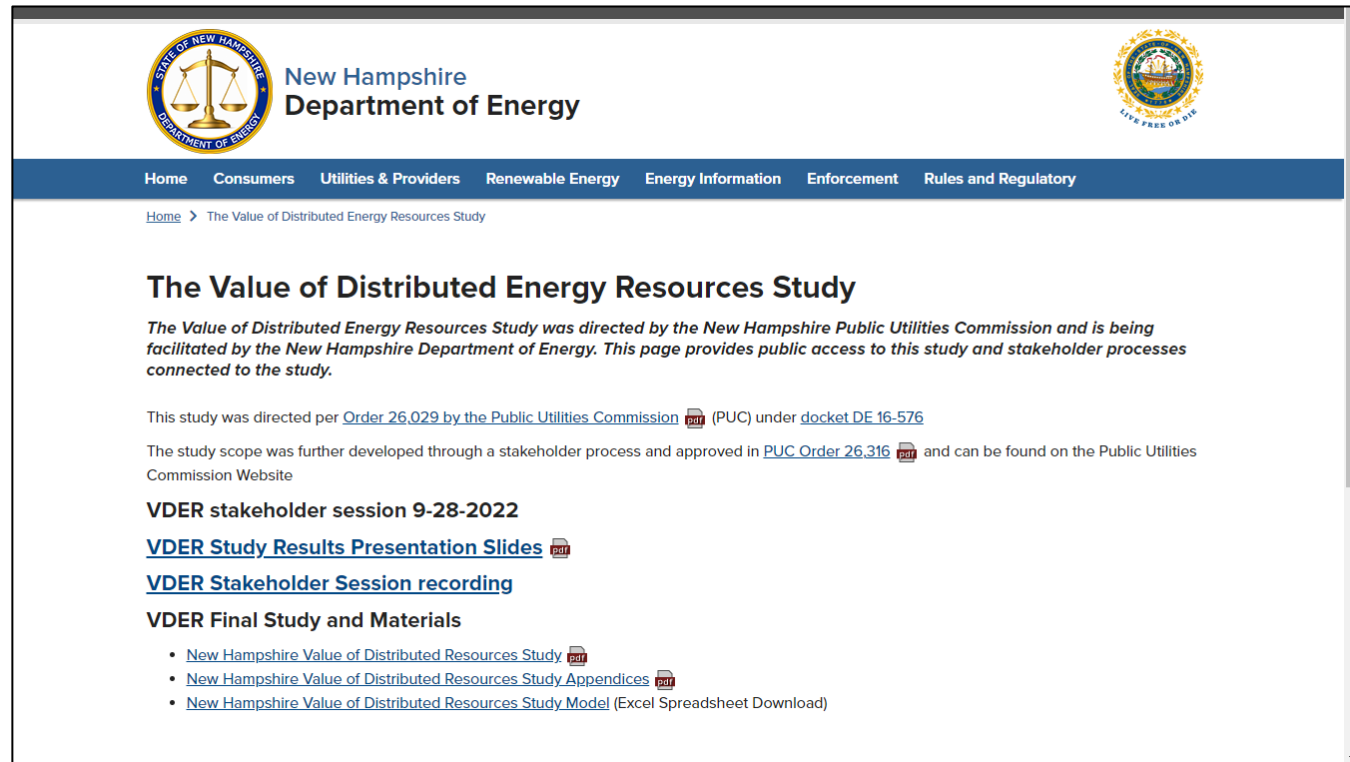
# New Hampshire VDER Study History and Context





# NH VDER Resources and Information

**Report, consultant presentation of results and model available online in the net metering section of the NH Department of Energy Website**

▶ [The Value of Distributed Energy Resources Study | NH Department of Energy](#)



The screenshot shows the website for the New Hampshire Department of Energy. The header includes the state seal and the text "New Hampshire Department of Energy". A navigation bar contains links for Home, Consumers, Utilities & Providers, Renewable Energy, Energy Information, Enforcement, and Rules and Regulatory. The main content area features the title "The Value of Distributed Energy Resources Study" and a paragraph stating that the study was directed by the New Hampshire Public Utilities Commission and is being facilitated by the New Hampshire Department of Energy. Below this, there are links to the study's public access page and stakeholder processes. Further down, there are links to the study's direction by the Public Utilities Commission (PUC) under docket DE 16-576, the study's development through a stakeholder process and approval in PUC Order 26.316, and the study's availability on the PUC website. The page also lists "VDER stakeholder session 9-28-2022" and provides links to "VDER Study Results Presentation Slides" and "VDER Stakeholder Session recording". Finally, there is a section for "VDER Final Study and Materials" with links to the study, appendices, and a model spreadsheet download.


 New Hampshire  
Department of Energy 


Home Consumers Utilities & Providers Renewable Energy Energy Information Enforcement Rules and Regulatory

[Home](#) > The Value of Distributed Energy Resources Study


## The Value of Distributed Energy Resources Study

*The Value of Distributed Energy Resources Study was directed by the New Hampshire Public Utilities Commission and is being facilitated by the New Hampshire Department of Energy. This page provides public access to this study and stakeholder processes connected to the study.*

This study was directed per [Order 26.029 by the Public Utilities Commission](#)  (PUC) under [docket DE 16-576](#)



The study scope was further developed through a stakeholder process and approved in [PUC Order 26.316](#)  and can be found on the Public Utilities Commission Website

**VDER stakeholder session 9-28-2022**

[VDER Study Results Presentation Slides](#) 

[VDER Stakeholder Session recording](#)

**VDER Final Study and Materials**

- [New Hampshire Value of Distributed Resources Study](#) 
- [New Hampshire Value of Distributed Resources Study Appendices](#) 
- [New Hampshire Value of Distributed Resources Study Model](#) (Excel Spreadsheet Download)

## Objectives of the VDER Study:

1. Estimate hourly avoided costs attributable to net-metered distributed generation (DG) using test criteria methodologies from standard energy efficiency benefit-cost analysis where appropriate.
2. Analyze rate and bill impacts to estimate the direction and magnitude of the impacts of DG deployment on all ratepayers and any potential cost-shifting between customers with and without DG.
3. Provide data and analysis to inform future net metering rate design and tariff development.

**Study timeframe:** 15-year period (2021-2035)



## Establish Avoided Cost Value Stack

- Technology neutral
- Hourly 8760 data
- For each study year



## Calculate Value Achieved by DG Systems

- DG system production profiles
- Overlaid on avoided cost value stack



## Rate & Bill Impact Assessment

- Impact of DG deployment on NH ratepayers
- Considering two DG compensation scenarios



**Study Adders:** High Load Growth assessment  
Market Resource Value assessment

# Value Stack Results

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- Methodology Summary
- Key Results



1. Establish Tech  
Neutral Value  
Stack

2. Develop  
Representative  
DG System  
Output Profiles

3. Combine to  
Assess DER  
Value

4. Test  
Sensitivities



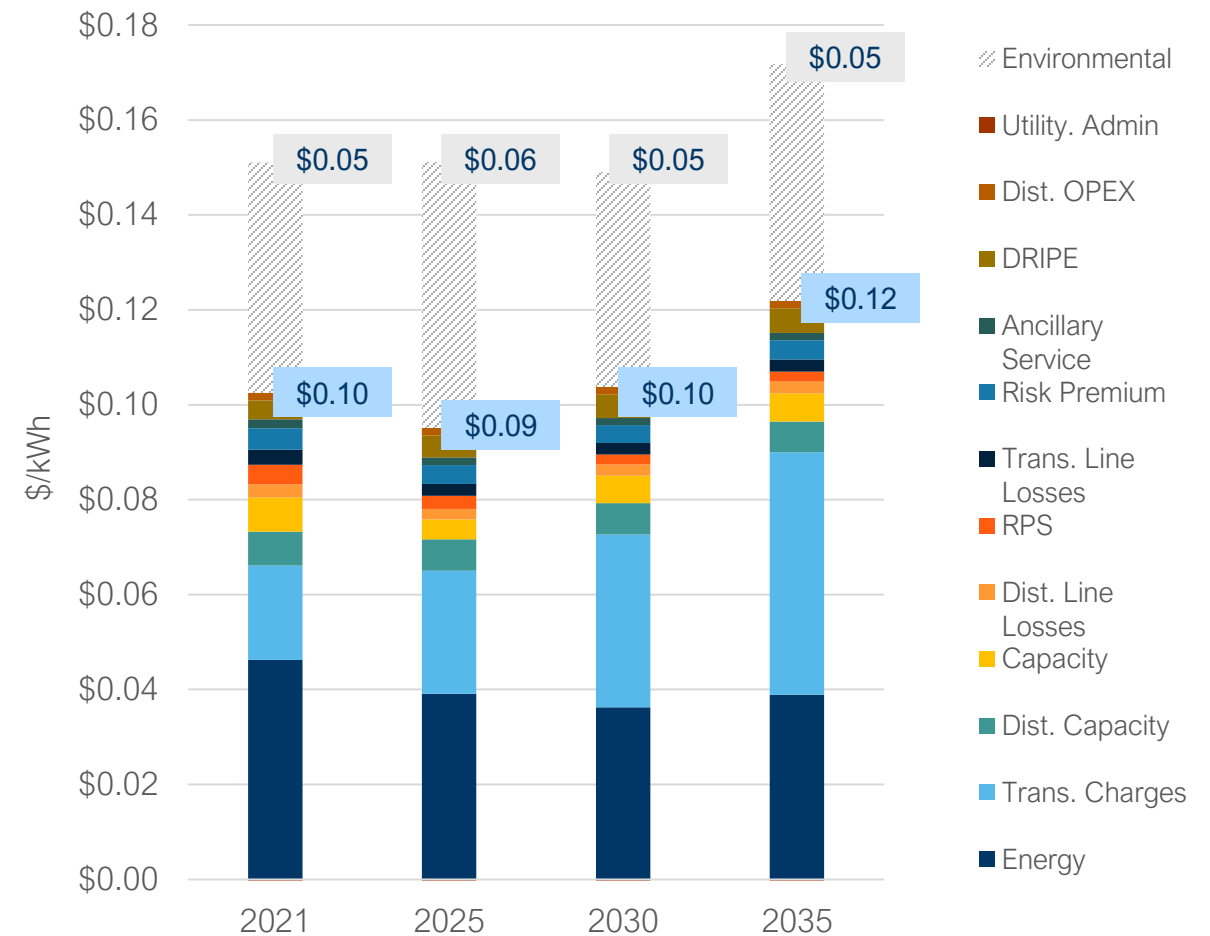
# Technology Neutral Value Stack

The technology neutral value stack quantifies the **total avoided cost value during each hour** of the study period

These **hourly values can be averaged across each study year** to generate average annual avoided costs (*graph to the right*)

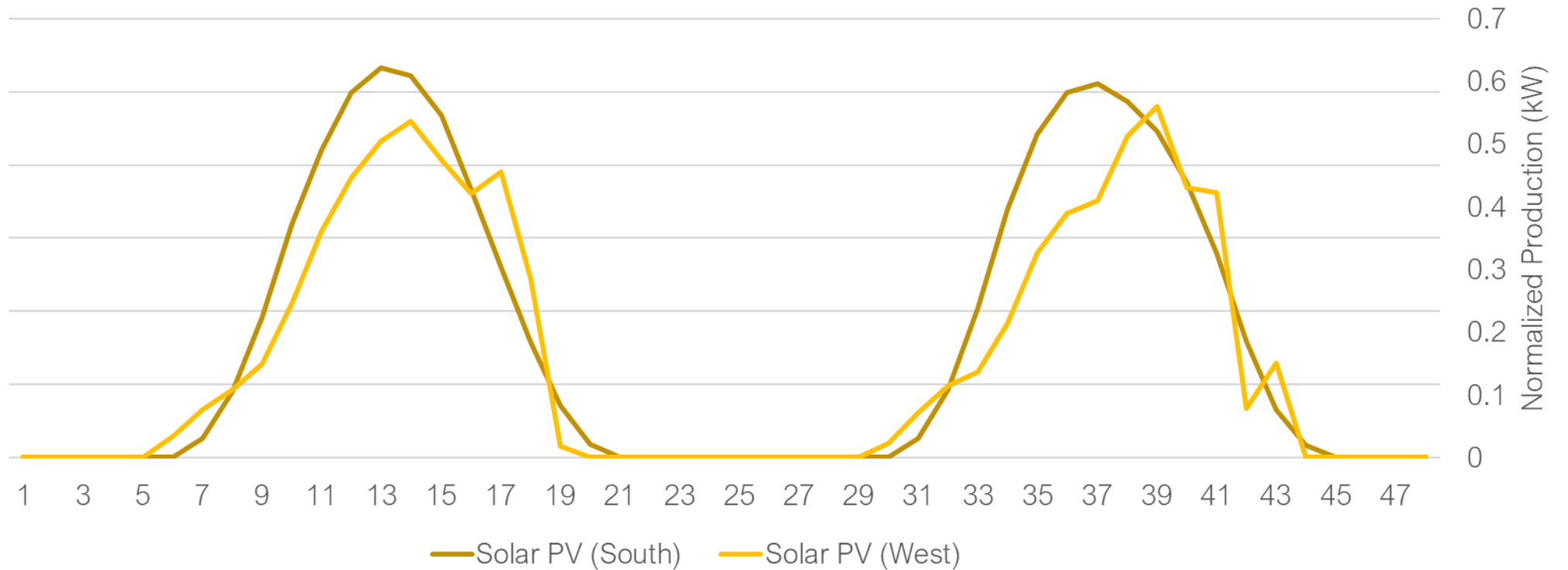
- There is **considerable variation from hour-to-hour** within a given year
- The **average annual value achieved by a DER may be higher or lower** depending on the specific hours when it reduces loads

The impact of **environmental externalities is shown in grey**

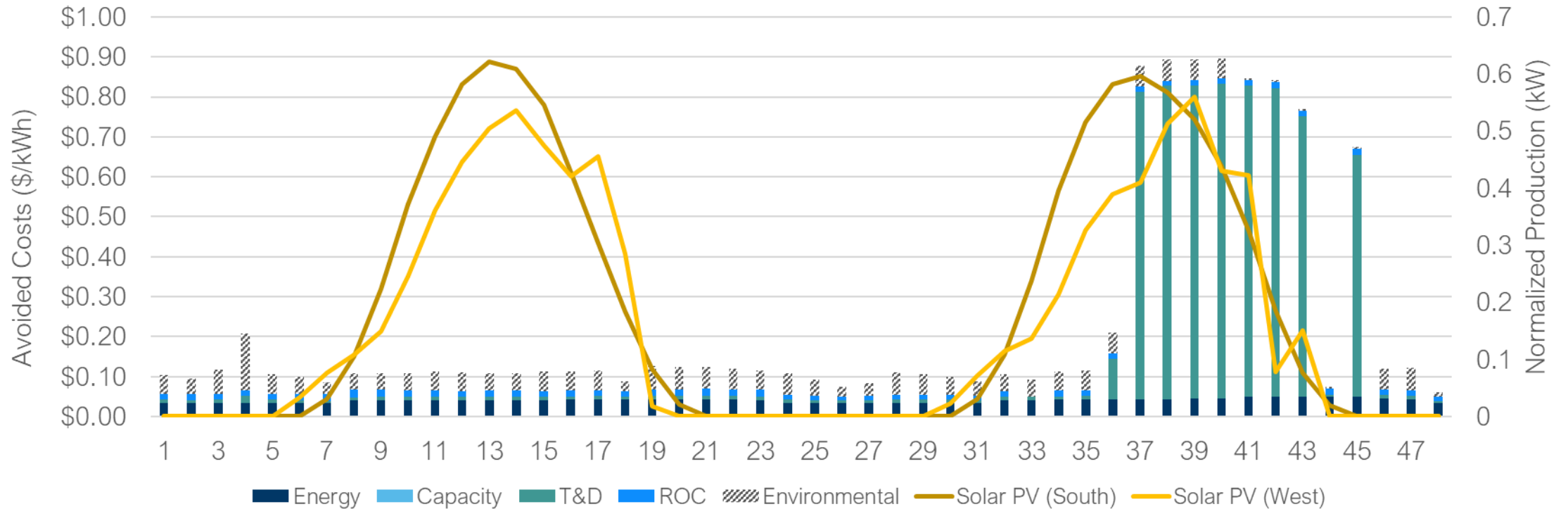


Note: All values are in \$2021

# Methodology Summary



# Methodology Summary



ROC = Rest of (Value Stack) Components

# Value Achieved by DG Systems

Value **decreases over time** for all types of **solar-only systems**

- This is primarily a result of decreasing energy avoided costs

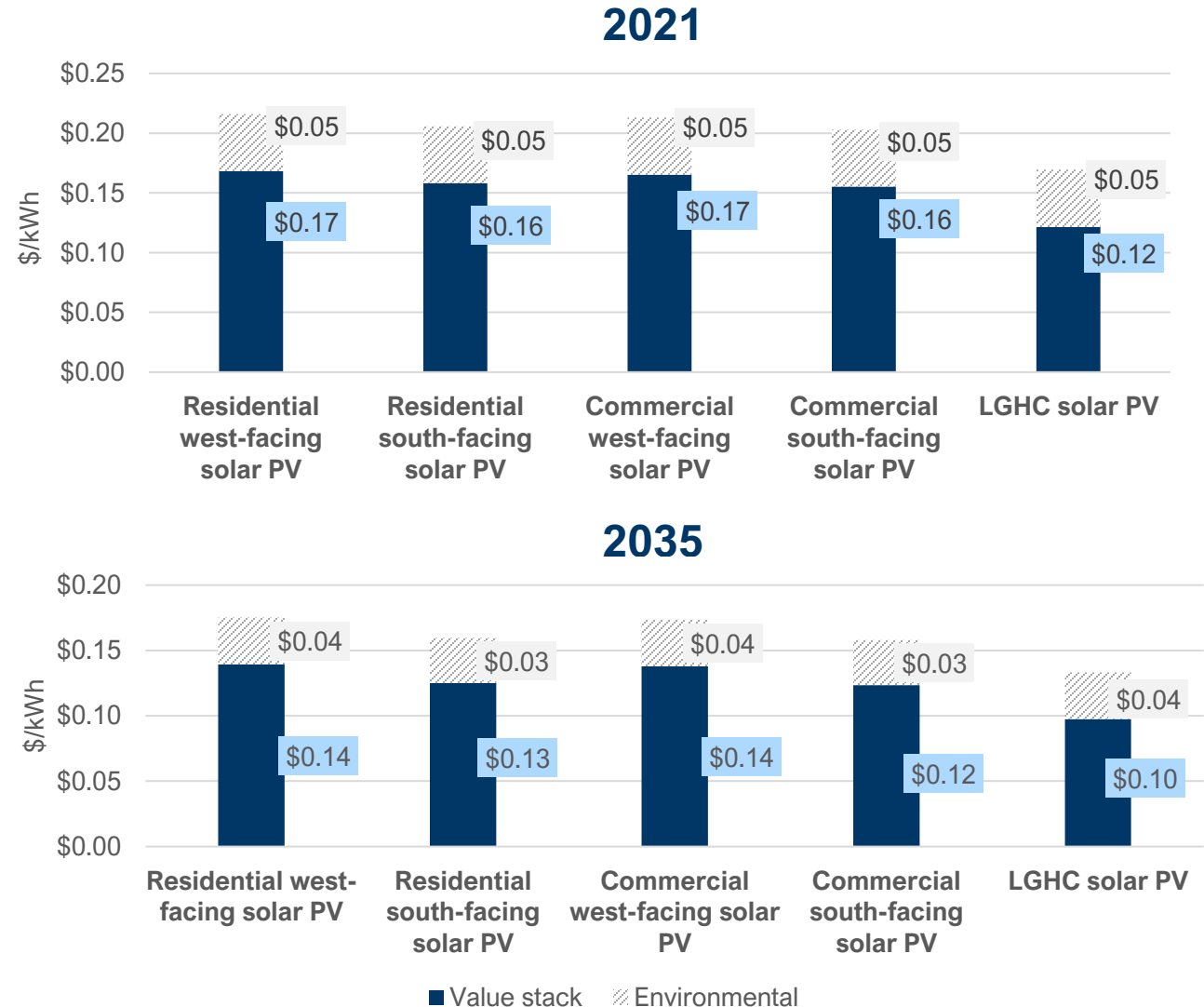
For a given segment, **west-facing systems** generate **6-10% more avoided cost value**

- **Deployment of these systems is expected to be limited** – customers currently incentivized to maximize volumetric production through south-facing installations

**Commercial systems achieve less total value** than residential systems

- Primarily due to **reduced line loss** and **reduced RPS** avoided cost value (due to lower % of energy assumed to be consumed BTM)

Environmental externalities **increase value by 26-40%**



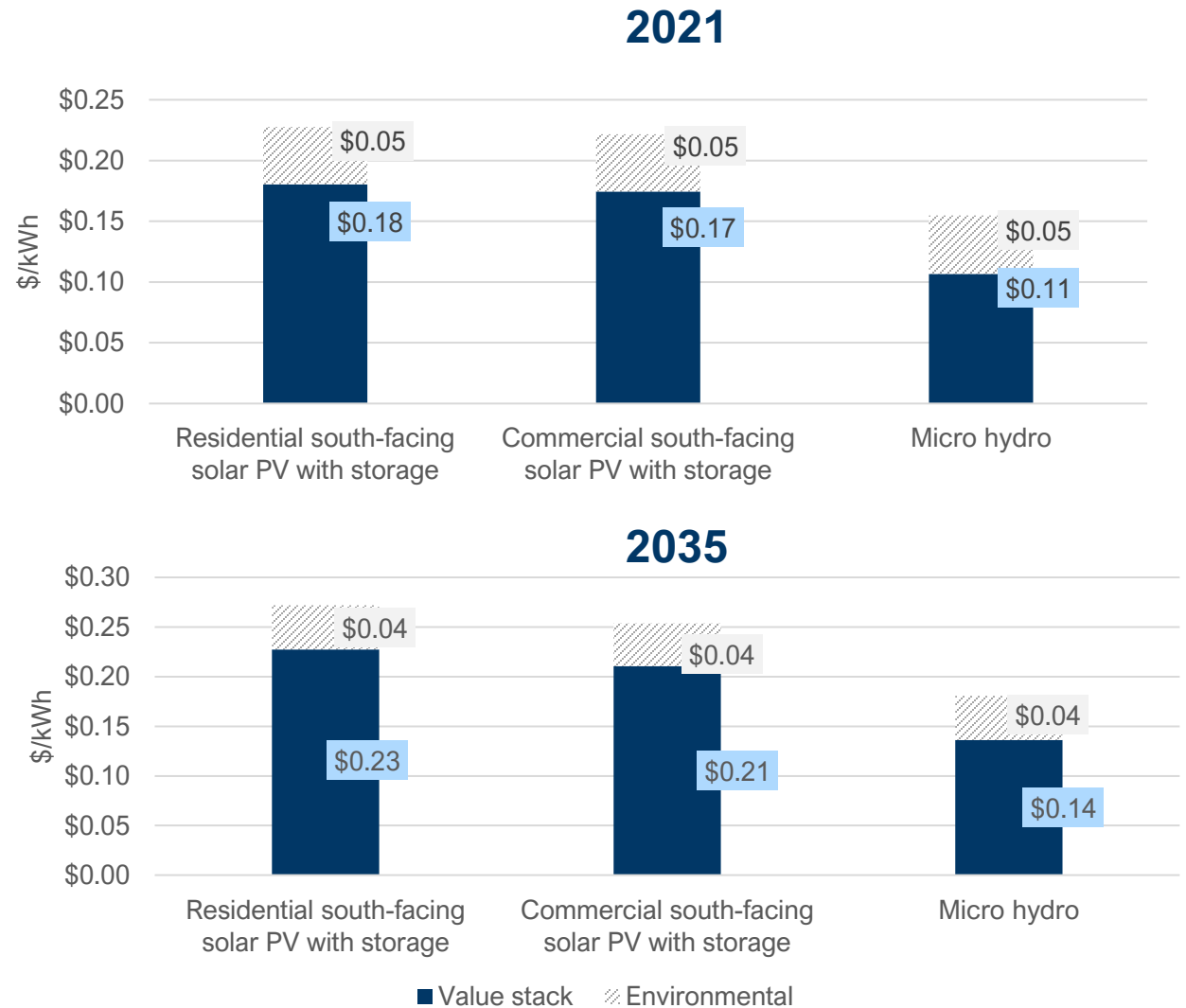
Note: All values are in \$2021

# Value Achieved by DG Systems

Value increases over time for **solar paired with storage** and **micro-hydro systems**

- These systems **achieve greater transmission avoided costs**
- **Increased transmission avoided costs over the study period** drive increased value over the study period

Environmental externalities **increase value by 20-45%**



Note: All values are in \$2021



Sensitivity	Description	Impact
<b>High Load Growth Scenario</b>	Assess impacts of high load growth (e.g., due to transportation and building electrification)	<ul style="list-style-type: none"> <li>Higher loads drive <b>0% to 5% higher values</b> than the baseline value stack, <b>varying by year and DG system type</b></li> </ul>
<b>Market Resource Value Scenario</b>	Assess impacts of DERs participating as aggregated, passive resources in the ISO-NE markets	<ul style="list-style-type: none"> <li>From a utility system perspective, under current market rules, all DG systems provide <b>1% to 11% greater value by reducing load than by participating as aggregated resources</b> in the market, with the <b>exception of micro hydro</b>. Micro hydro facilities are able to consistently generate during the summer and winter reliability periods, <b>increasing their value</b> in the capacity market by <b>2% to 4%</b>.</li> </ul>

- In New Hampshire, DERs are forecasted to achieve a total average annual net avoided cost value of **\$0.11 to \$0.18 per kWh energy produced in 2021** and **\$0.10 to \$0.23 per kWh produced in 2035**, varying by DER system type, and excluding environmental externalities
- West-facing systems provide **5-10% greater avoided cost value**; however, customer-generators in New Hampshire are currently incentivized to maximize solar production by installing south-facing systems.
- **Net-metered DERs are expected to provide some additional value beyond what is shown here**, notably for those value stack criteria addressed qualitatively in this study: transmission capacity (for non-pool transmission facilities), transmission and distribution system upgrades, distribution grid support services, and resiliency. Additional research and data collection might support quantifiable valuation of these criteria in the future.
- The results that are presented show annual averages for representative years, however values within a year vary – sometimes significantly – by hour. **Storage can target load reductions such that they occur during periods of higher avoided cost value.**



# Rate & Bill Impacts Assessment Results

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- Overview and Methodology
- Results and Key Considerations



- **Step 1:** Estimate load under a hypothetical no-DG scenario and under the forecasted future DG deployment in NH
- **Step 2:** Assess the rate impacts of DG using the following framework:

$$Rates_{Post\ DG} = Rates_{Pre\ DG} + \frac{(Lost\ Revenues - Avoided\ Costs) + (Admin\ Costs + Export\ Bill\ Credits)}{Load_{Post-DG}}$$

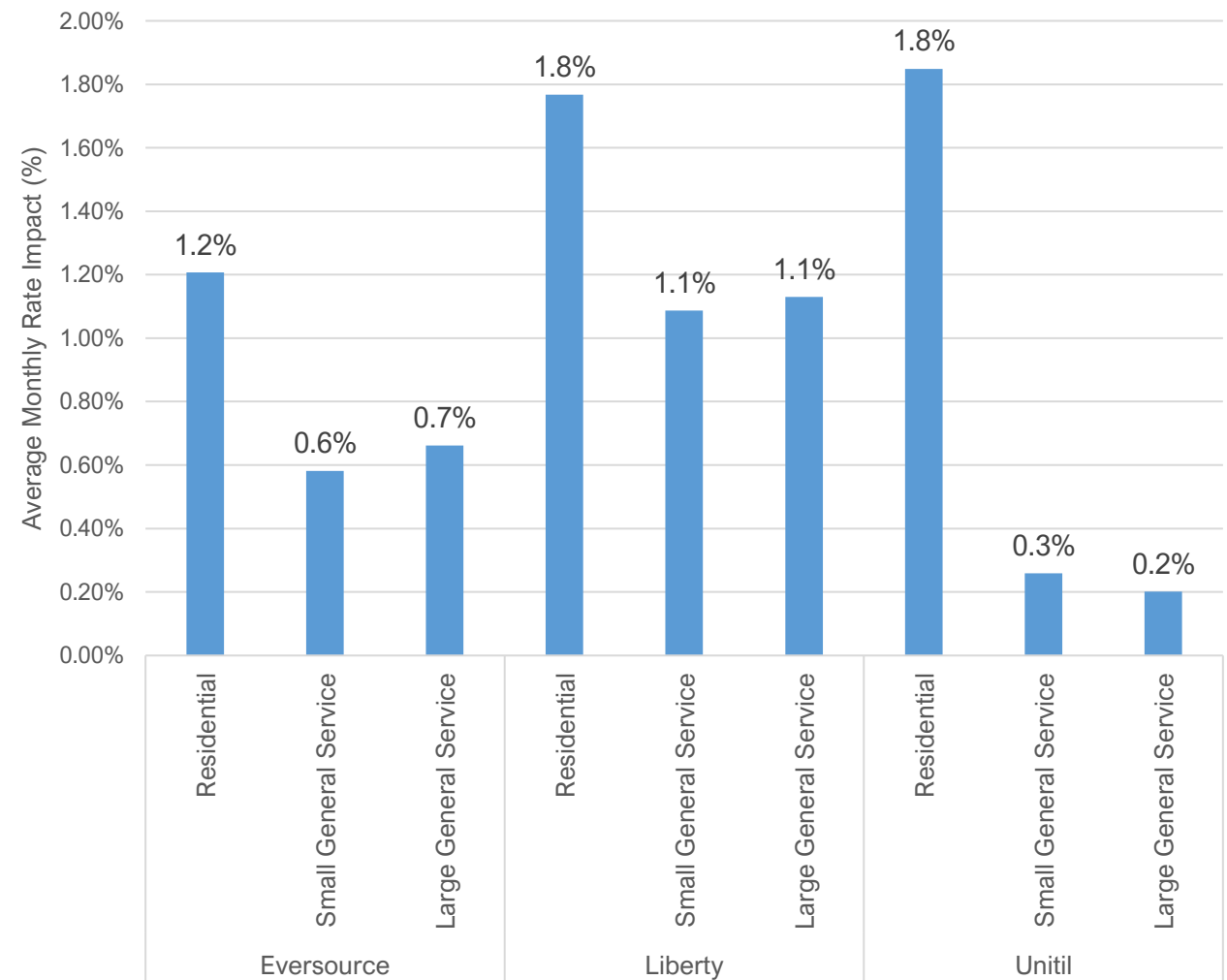
- **Step 3:** Estimate bills pre- and post-DG for each customer group

# NEM: Rate Impacts

Over the study period (2021-2035), the forecasted DG adoption is expected to result in slight rate increases relative to a no-DG scenario.

- **Residential** customers are expected to experience a statewide average monthly increase of 1.3% in residential rates across the utilities
- **Small General Service** customers are expected to experience a statewide average monthly rate increase of 0.57%
- **Large General Service** customers are expected to experience a statewide average monthly rate increase of 0.63%.

Average Monthly Rate Impact for Average Utility Customer (2021-2035)



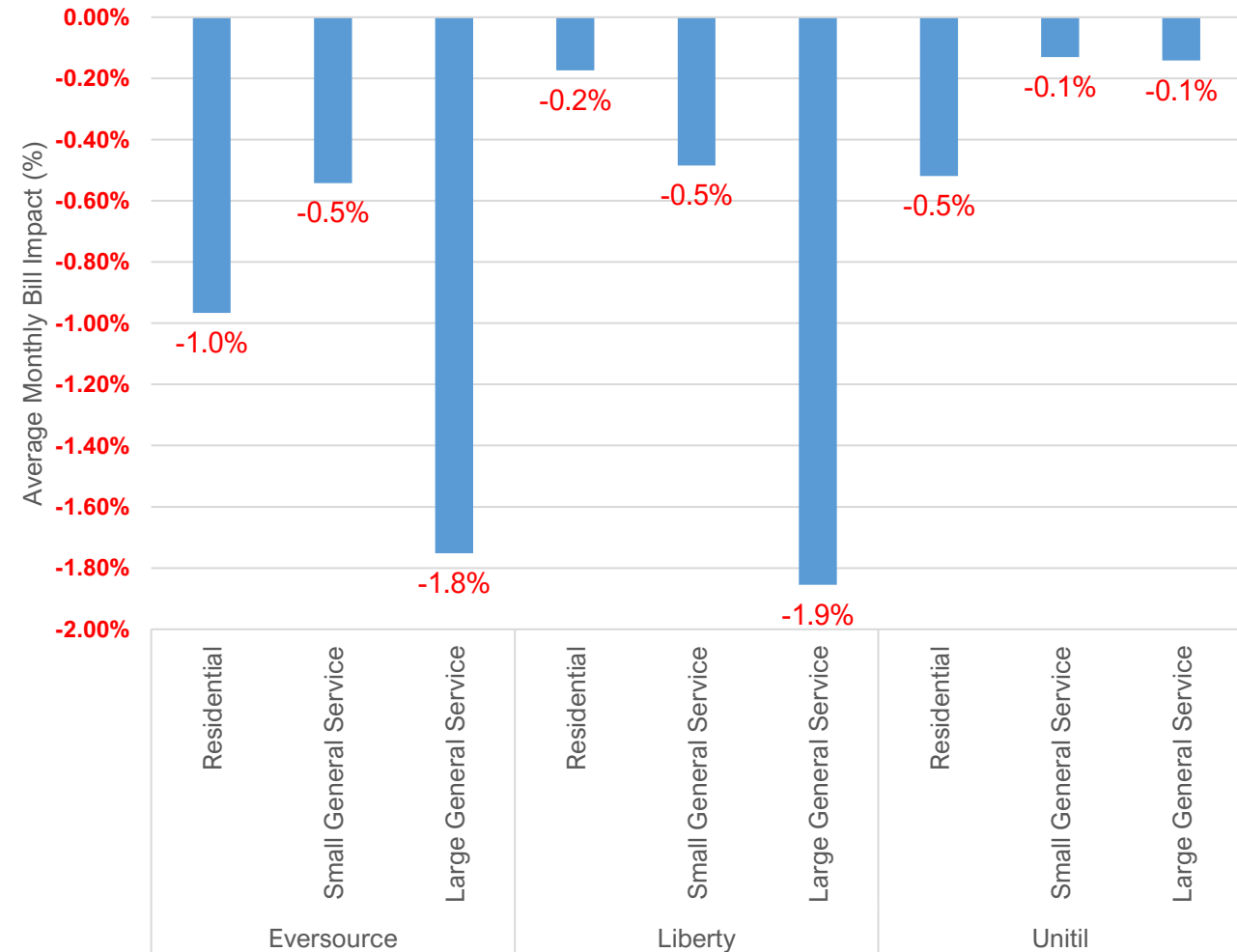
Based on a weighted average of utility customers across the three utilities Eversource (80%), Liberty (7%) and Unitil (12%).

# NEM: Bill Impacts – Average Utility Customer

**Despite the forecasted electricity rate increase, monthly bills for the average utility customer across all utilities and rate classes are expected to decline on average over the study period**

- The average monthly declines range from **0.1% to 1.9%**
- **Largest reductions** observed for **Large General Service** customers in **Eversource's and Liberty's** service territories (**1.8% - 1.9%**, in average monthly bill decreases)
- **Eversource's residential customers** observe a **1.0% reduction** in average monthly bills
- **Minimal impacts** observed for **residential** customers in **Liberty's and Until's** territories as a **result of the low DG deployment** by customers in those customer sectors

**Average Monthly Bill Impact for Average Utility Customer (2021-2035)**

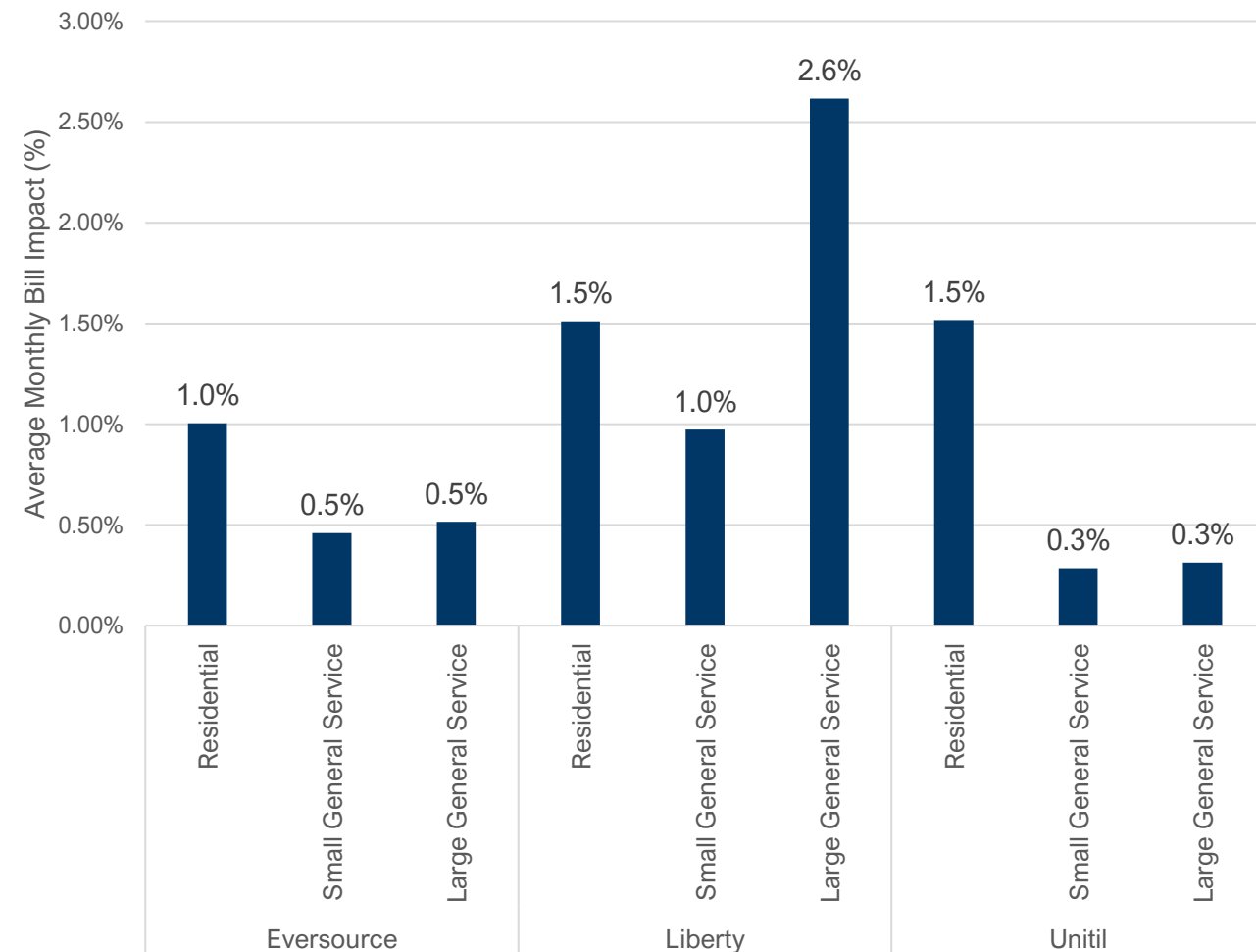


# NEM: Bill Impacts – Non-DG Customers

**The monthly bills for the Non-DG utility customers across all utilities and rate classes are expected to increase on average over the study period.\***

- The average monthly increases range from **1% to 1.5% for Residential**, **0.3% to 0.5% for Small General Service**, **0.3% to 2.6% for Large General Service**.
- **Largest increases** observed for **Large General Service** customers in **Liberty's** service territory.

**Average Monthly Bill Impact  
for Non-DG Utility Customer (2021-2035)**



\*when averaged across the entire study period; Liberty's Lg Gen Service bill impacts are related to its treatment of costs and demand charges.

# NEM: Bill Impacts – DG Customers

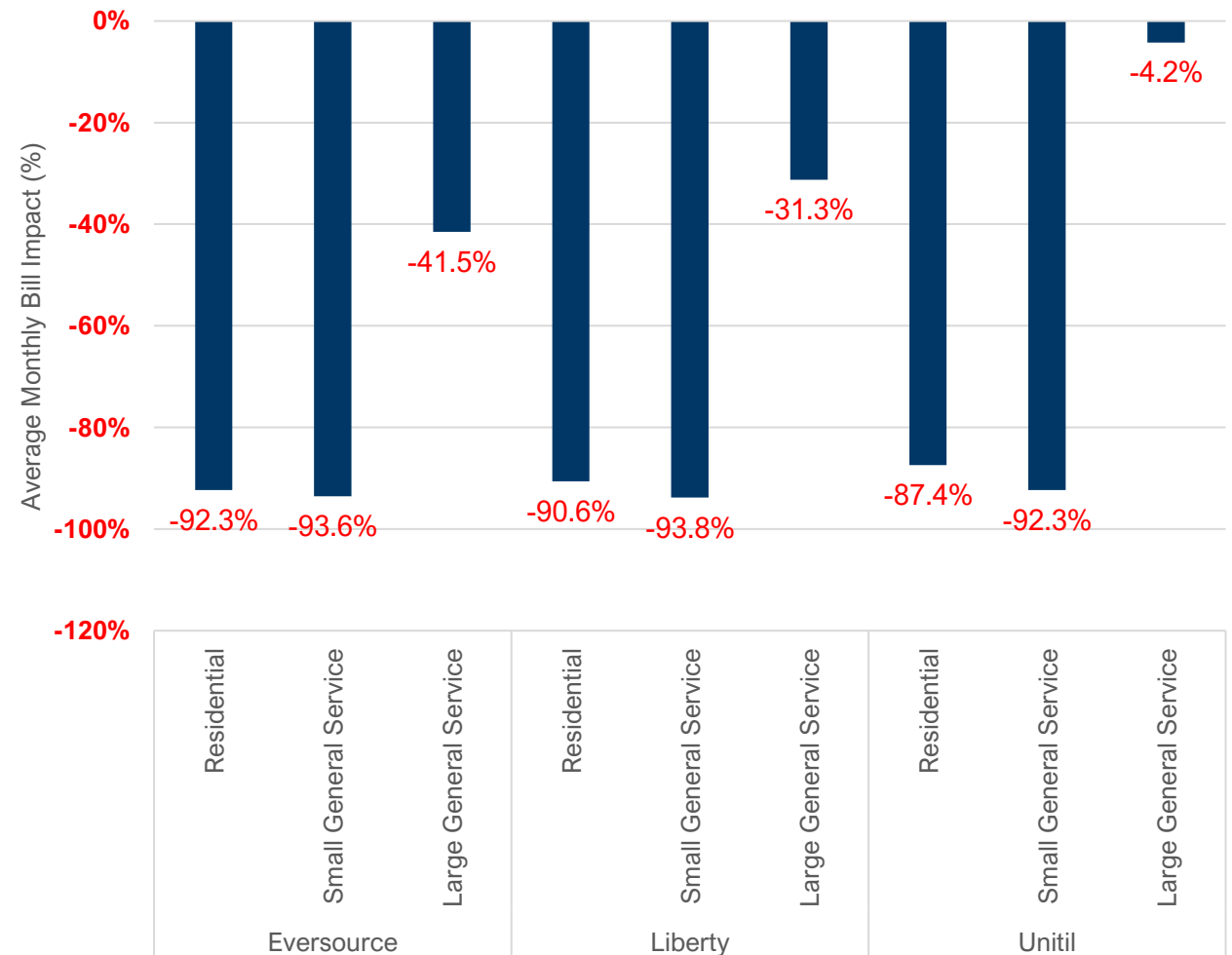
## DG customers will observe significant bill savings as a result of DG adoption.

**Residential Customers** across all the utilities will see from 87% to 92% average monthly bill savings from DG adoption over the study years.

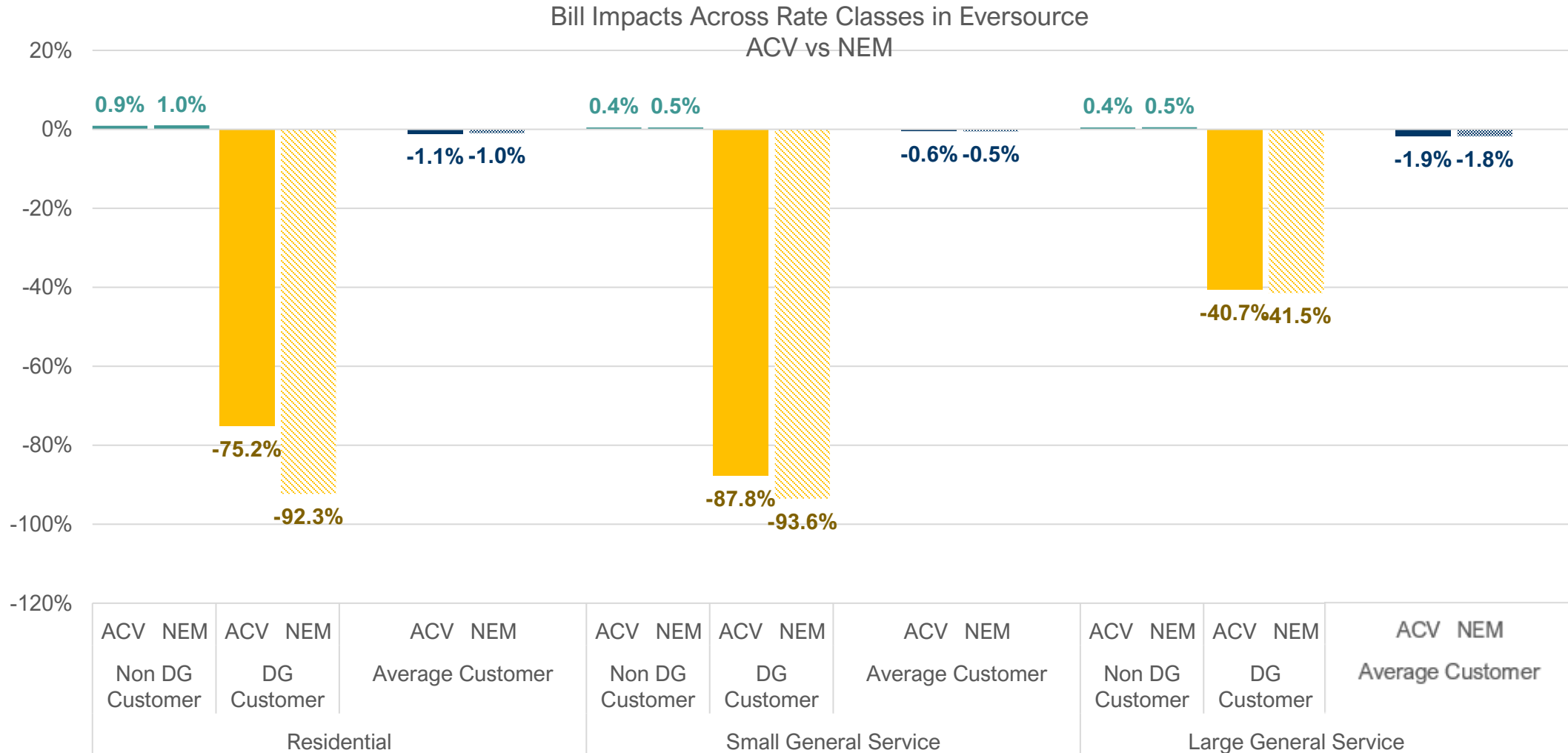
**Small Commercial Customers** across all the utilities will see about 93% average monthly bill savings from DG adoption over the study years.

**Large General Service Customers** across all the utilities will see from 4% to 40% average monthly bill savings from DG adoption over the study years, depending on their PV system size.

Average Monthly Bill Impact for DG Utility Customer (2021-2035)



# Bill Impact Across Rate Classes: Eversource



The analysis does not include the cost of installation

# Key Takeaways: Rate & Bill Impacts Analysis

- **All rate classes would be expected to see minimal rate increases** however the average utility customer would see a decrease in bills under both the NEM and ACV Tariff scenarios.
- For all utilities and all rate classes the average utility customer sees a decrease in average monthly bill amounts
- Monthly **bills would increase by a small percentage for non-DG customers** (1% to 1.5% for residential, 0.3% to 2.6% for commercial), but would **decrease by a large percentage for DG customers**
- **There are minimal differences between the RBI impacts under the NEM and ACV tariffs**, which are largely concentrated in rate classes with a higher proportion of DG exports.

# Next Steps

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- ▶ PUC Docket DE 22-060

Consideration of Changes to the Current Net Metering Tariff Structure, Including Compensation of Customer-Generators

- ▶ Pre-hearing conference January 5, 2022, 1:30pm

- ▶ Docket information available online at:

[New Hampshire Public Utilities Commission \(nh.gov\)](https://www.nh.gov)





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# Questions?

