



January 28, 2020

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# VERMONT PUBLIC SERVICE DEPARTMENT

RATE DESIGN INITIATIVE / DISTRIBUTED ENERGY RESOURCES STUDY  
STAKEHOLDER ENGAGEMENT MEETING

**NewGen**  
Strategies & Solutions

# RATE DESIGN OBJECTIVE

## ADVANCED RATE DESIGN



*The way in which customer interact with the electric grid and utilities is changing.....*



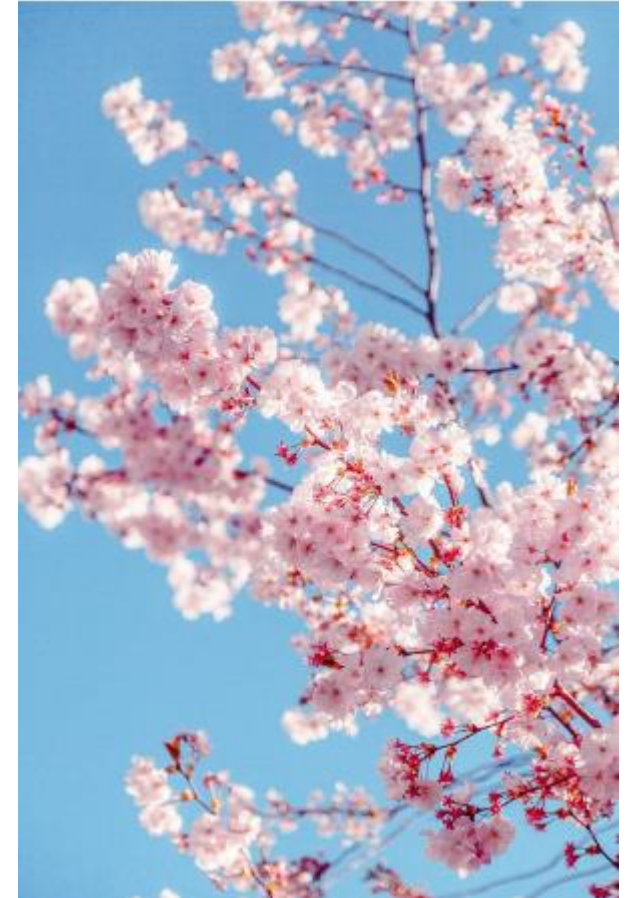
Use utility **price signals, incentives, and other inducements** to **leverage technology and new business models** in order to better advance utility goals for **cost containment, renewables integration, and environmental performance** consistent with sector goals

# ANTICIPATED OUTCOMES

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- Better load factors
- More responsive and managed loads (e.g., flexible loads)
- Maintaining, reducing average system costs/rates/bills
- Better integration of renewables
- New business models for sector
- Improving environmental outcomes

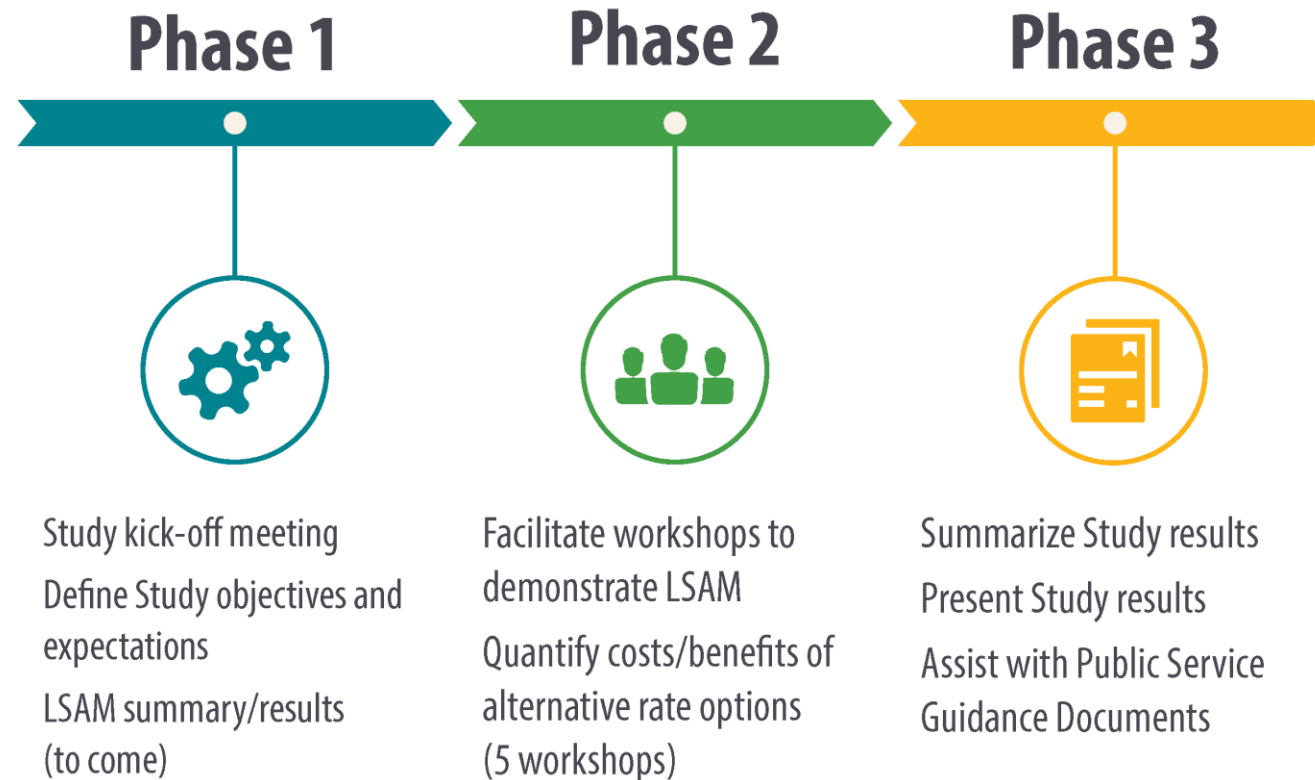
*What is the cost of continuing “business as usual”?*



# STUDY TIMEFRAME

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- September 15, 2019 – May 29, 2020



# FUTURE STAKEHOLDER ENGAGEMENT EVENTS

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- Event #2 (January 2020)
  - More hands-on, analytical
  - Evaluate rate options, impacts, benefits
- Event #3 (March 2020)
  - More hands-on, analytical
  - Evaluate rate options, impacts, benefits
  - Incorporate feedback
- Event #4 (April 2020)
  - Synthesis of the analytics
  - Discuss key insights / outcomes
- Event #5 (May 2020)
  - Summary of results
  - Accomplishment of Study objectives
  - Next steps

# STAKEHOLDER WORKSHOPS

## GENERAL INSIGHTS

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- State of rates in Vermont:
  - Actively pursuing more innovative rate options
  - Active in EV rate options
  - High PV penetration and growing behind the meter storage
- Customers in Vermont are becoming more interested in being “part of the solution” – value in participating
- Regional Network Service (RNS) savings associated with DER may be temporal and misrepresented by some in the market
- *Concerns associated with grid, especially distribution network with higher penetration of solar and EVs.*

# OPPORTUNITIES AND CHALLENGES

## Opportunities

- Customer value realized as “part of the solution”
- Electrification (Evs and Home)
- Renewables/storage offerings
- Increasing market participants (3<sup>rd</sup> parties)
- Awareness high, follow through lacking

## Challenges

- CIS / Billing systems lagging
- Increasing complexity, administrative needs
- Equity
- More flexible loads
- Data management
- Generating interest with limited bill savings

## DESIRED OUTCOMES AND KPI FEEDBACK

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- Compare and benchmark to baselines (status quo)
- Maximize flexible loads
- Evaluate / consider total energy burden
- GHG emissions may increase on electric system but aggregate may decline
- KPIs:
  - Power supply costs | Load factor | GHG | Average system costs | *Total energy costs / Resilience*



## NEWGEN'S LOAD SHAPE ANALYSIS MODEL (LSAM)

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- Dynamic model designed to facilitate strategic decision-making
  - Forward-looking model supporting short-, medium-, and long-term planning
- Integrates rate design, financial planning, and resource planning

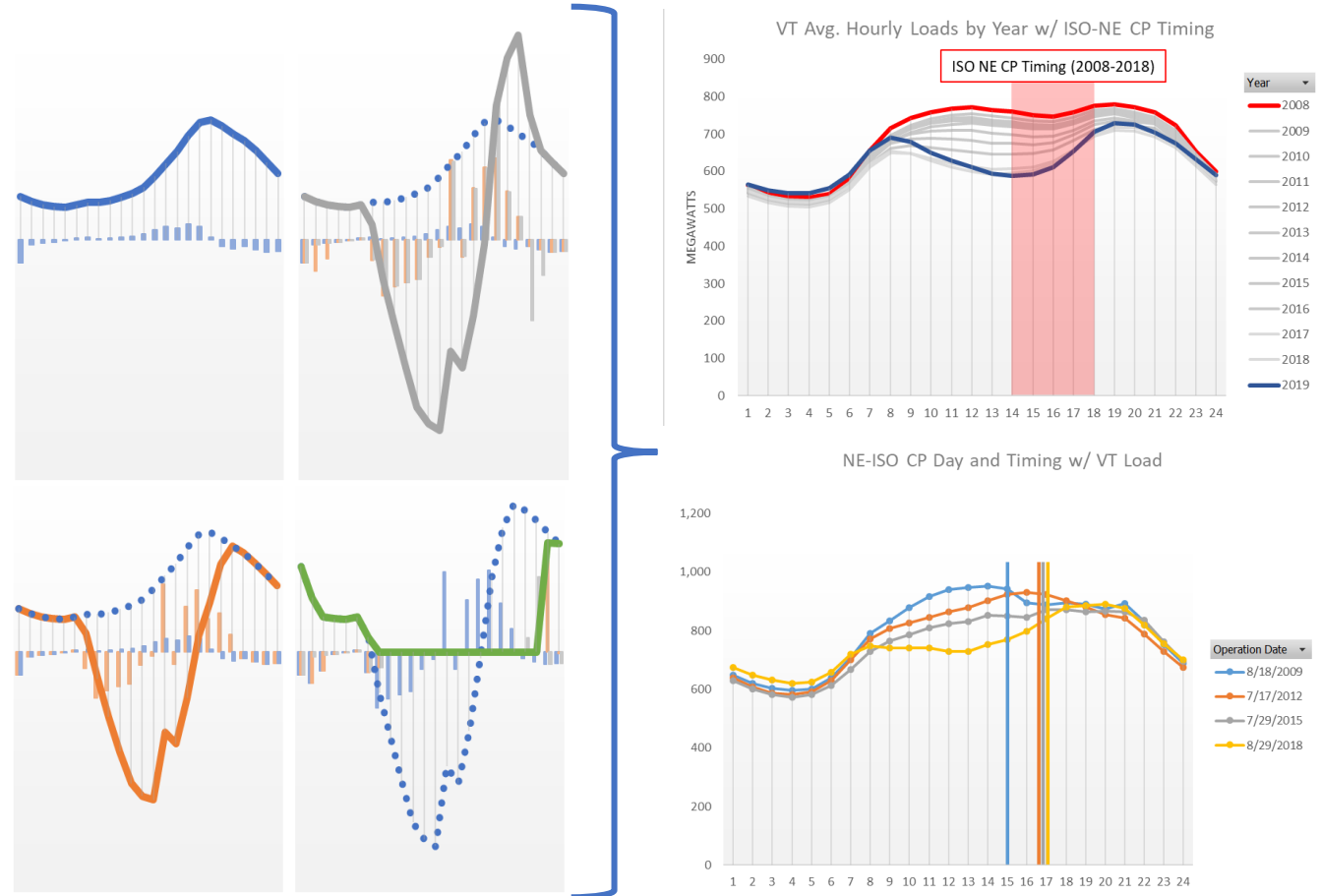
## LSAM'S ROLE IN THIS STUDY

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- LSAM allows study stakeholders to evaluate the impacts of new and innovative rate designs on
  - DER adoption
  - Load shapes and forecasts
  - Power supply costs
  - Revenue recovery and financial performance of the electric utility
- LSAM also allows for instantaneous evaluation of numerous scenarios and sensitivities

# LSAM MODEL INPUTS: FORECASTING DERS, OTHER ELECTRIFICATION TECHNOLOGIES, AND POLICY IMPACTS

- PV
  - How much and by when?
- EV
  - How many, by when, charged where, at what voltage, and at what time?
- Other Electrification Tech
  - How much, by when, and at what impact?
- Storage
  - How much, by when, and how will it be charged/discharged?



# LSAM INPUTS AND OUTPUTS

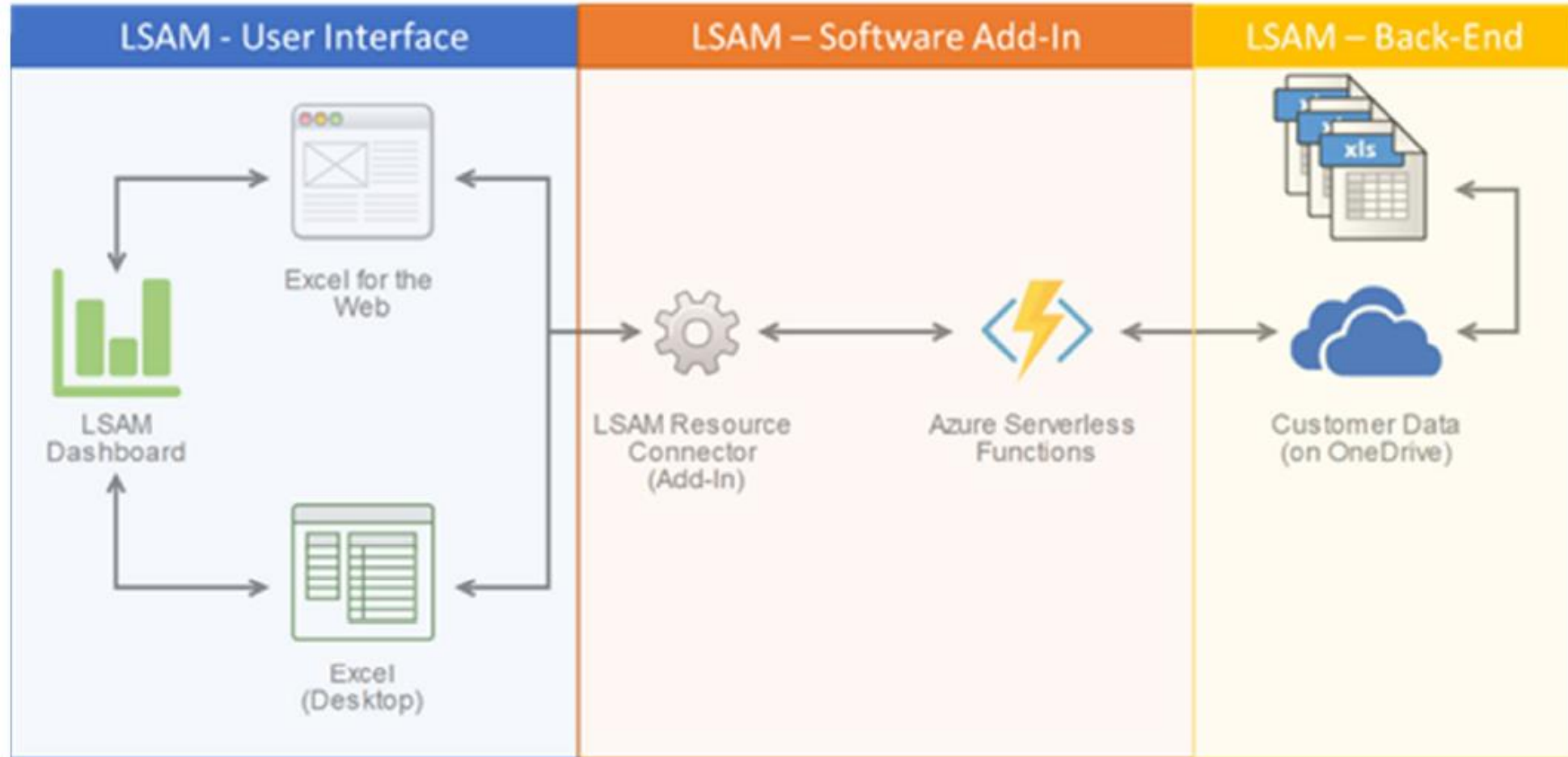
## FORECAST INPUTS

- PV
  - Econometric adoption forecast
  - Rates + policy + installed costs
- EV
  - Adoption: Base and High Cases
  - Charging: Travel data for Northeast
- Electrification (CCHP, Elec. H2O)
  - Input % of Residential Customers
- Flex Load / Energy Storage
  - Input MW and duration (Workshop 3)

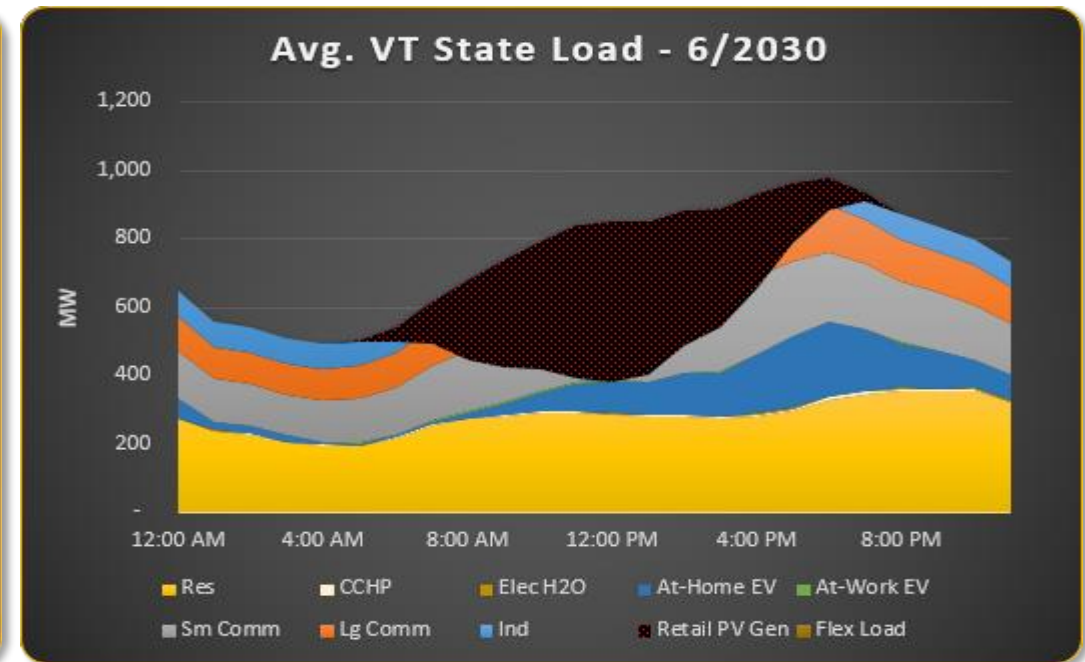
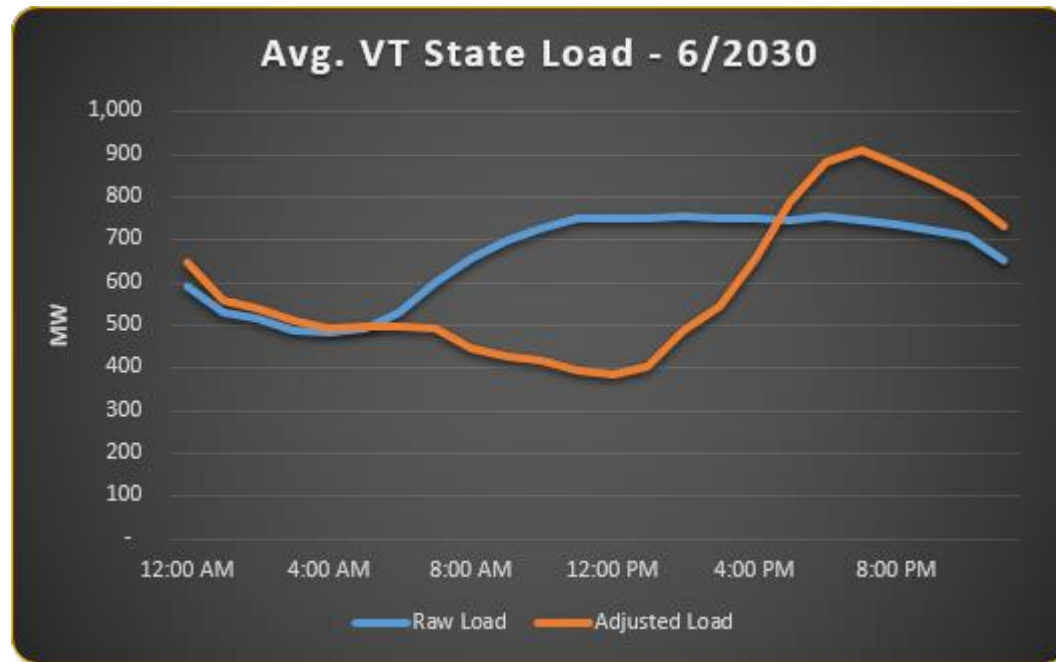
## OUTPUTS (Pre and Post Inputs)

- ISO-NE Costs
  - Energy and Capacity
- Renewable Compliance (RECs)
  - Scenarios for different RES policies
- Regional Network Transmission
  - Currently based on embedded transmission rate for VT + 12CP load
- Distribution capacity costs
- Retail energy sales (rate pressure)
- Carbon emissions and savings

# LSAM OVERVIEW – MODEL STRUCTURE



# LSAM EXAMPLE – 2030 FORECAST WITH LSAM DEFAULTS



- Continued solar adoption has led to low load during the day, and fewer retail energy sales
- Electric vehicles charged at-home charging has increased the evening peak

# LSAM EXAMPLE – 2030 FORECAST WITH LSAM DEFAULTS

Cost Component	Billing Determinants		Diversity	Forecast	Cost (\$000)		% Difference
	Raw Load	Adj. Load	Factor	Rate	Raw Load	Adj. Load	
RES %	1,113,645	1,335,644		\$6.16	\$6,859	\$8,226	19.9%
71.0%	6,305,120	6,371,387		\$48.96	\$308,703	\$311,947	1.1%
ISO-NE Capacity	4,476,635	4,523,684		\$9.18	\$41,095	\$41,527	1.1%
ISO-NE Energy	994,970	1,302,078		\$158.52	\$157,721	\$206,404	30.9%
RES Compliance Costs	1,225,700	1,521,981	80%	\$12.00	\$11,767	\$14,611	24.2%
RNS Capacity			Total Cost		\$526,145	\$582,715	10.8%
Distribution Capacity			Retail MWh		6,305,120	6,379,073	1.2%
			Avg. Rate		\$0.083	\$0.091	9.5%

- Capacity peaks (ISO-NE Capacity, RNS, and Distribution) have increased
- Retail energy sales have not increased at the same rate
  - PV has decreased retail sales, CCHP and EVs have increased retail sales
- Net result is modeled +9.5% rate pressure in addition to inflationary pressure and other cost changes

