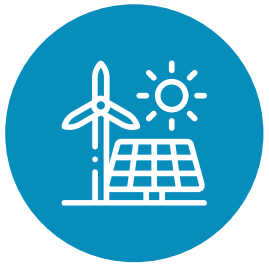
STATE OF RHODE ISLAND
OFFICE OF ENERGY RESOURCES

Rhode Island's Clean Energy Future

Nicholas Ucci
Commissioner

Mission statement



The Rhode Island Office of Energy Resources' (OER) mission is to lead the state toward a **clean, affordable, reliable**, and **equitable** energy future.

OER develops policies and programs that respond to the state's evolving energy needs, while advancing **environmental sustainability**, **energy security**, and a vibrant **clean energy economy**.

OER is committed to working with public- and private-sector stakeholders to ensure that all Rhode Islanders have access to cost-effective, resilient, and sustainable energy solutions.

2014 Resilient Rhode Island Act GHG Emissions Reduction Targets

10% BELOW 1990 LEVELS BY **2020**

45% BELOW 1990 LEVELS BY **2035**

80% BELOW 1990 LEVELS BY **2050**

Quick Facts

1990-2016
Rhode Island Greenhouse Gas (GHG) Emissions Inventory

Gross GHG Emissions by Economic Sector in 2016

Transportation	Electricity Consumption	Residential Heating	Industry	Commercial Heating	Waste	Natural Gas Distribution	Agriculture
35.7%	25.7%	16.7%	10.3%	7.8%	1.8%	1.4%	<1%

2016 Gross GHG Emissions

11.02 million metric tons of CO_2e

RI Greenhouse Gas Emissions 1990 v. 2016

SECTOR	CHANGE IN MMTCO2E	PERCENT CHANGE	TREND
Transportation	-1.03	-20.7%	↓
Electricity Consumption	0.02	0.7%	↑
Residential Heating	-0.53	-22.4%	↓
Industrial Heating & Processes	0.33	40.7%	↑
Commercial Heating	-0.29	-25.2%	↓
Other	-0.26	-40.0%	↓
Total	-1.46	-11.7%	↓

1990 - 2016 Change

Statewide Net GHG Reductions (1990-2016)

11.7%

DEM Photo: Arcadia Wildlife Management Area

Clean Energy Accomplishments

Electric Sector Decarbonization

- **1,000 MW by 2020**
  - Represents ten-fold increase since 2016
  - As of 3Q 2020, state's portfolio = 933 MW

- **100% Renewables by 2030**
  - Executive Order 20-01 set first-in-nation goal
  - Comprehensive report on technical analysis and policy pathways complete.

- **Regional Greenhouse Gas Initiative (RGGI)**

- **Carbon Pricing Study**

- **Solar Opportunities Study**

Offshore Wind

- **Block Island Wind Farm**
  - First in North America
  - Operational in December 2016

- Selection of **400 MW Revolution Wind** project
  - 800+ construction jobs
  - $40 million port investment
  - Represents ≈ 24% of est. 2030 demand

- **RFP for up to 600 MW of new offshore wind resources** now under development
  - Represents ≈36% of est. 2030 demand

Energy Efficiency

- Rhode Island remains among the top states in the nation for energy efficiency innovation.
- Accounts for 6 out of 10 clean energy jobs (pre-COVID)
- $605M in total benefits achieved in 2019
- 1M metric tons of GHGs reduced in 2019.

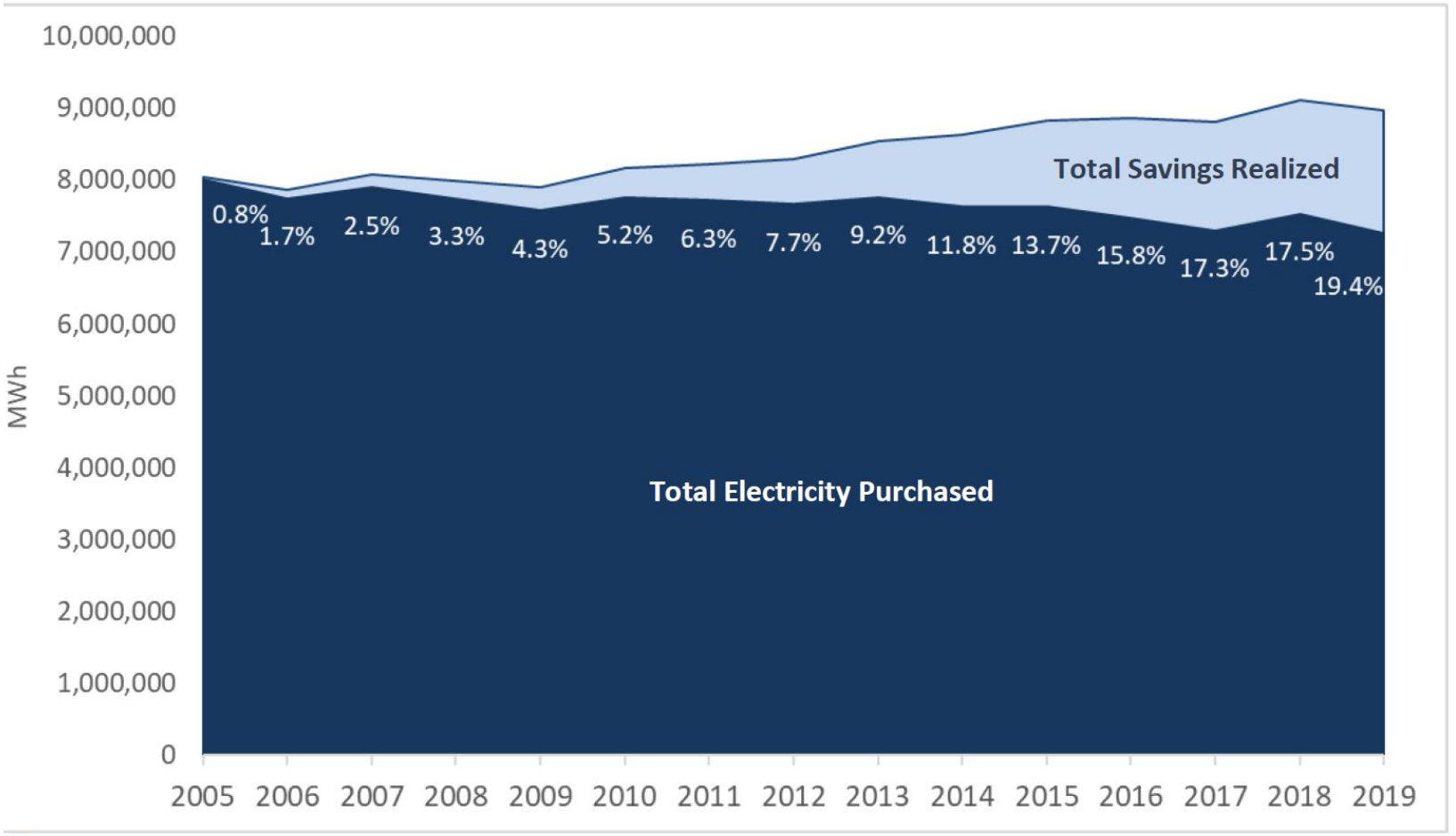
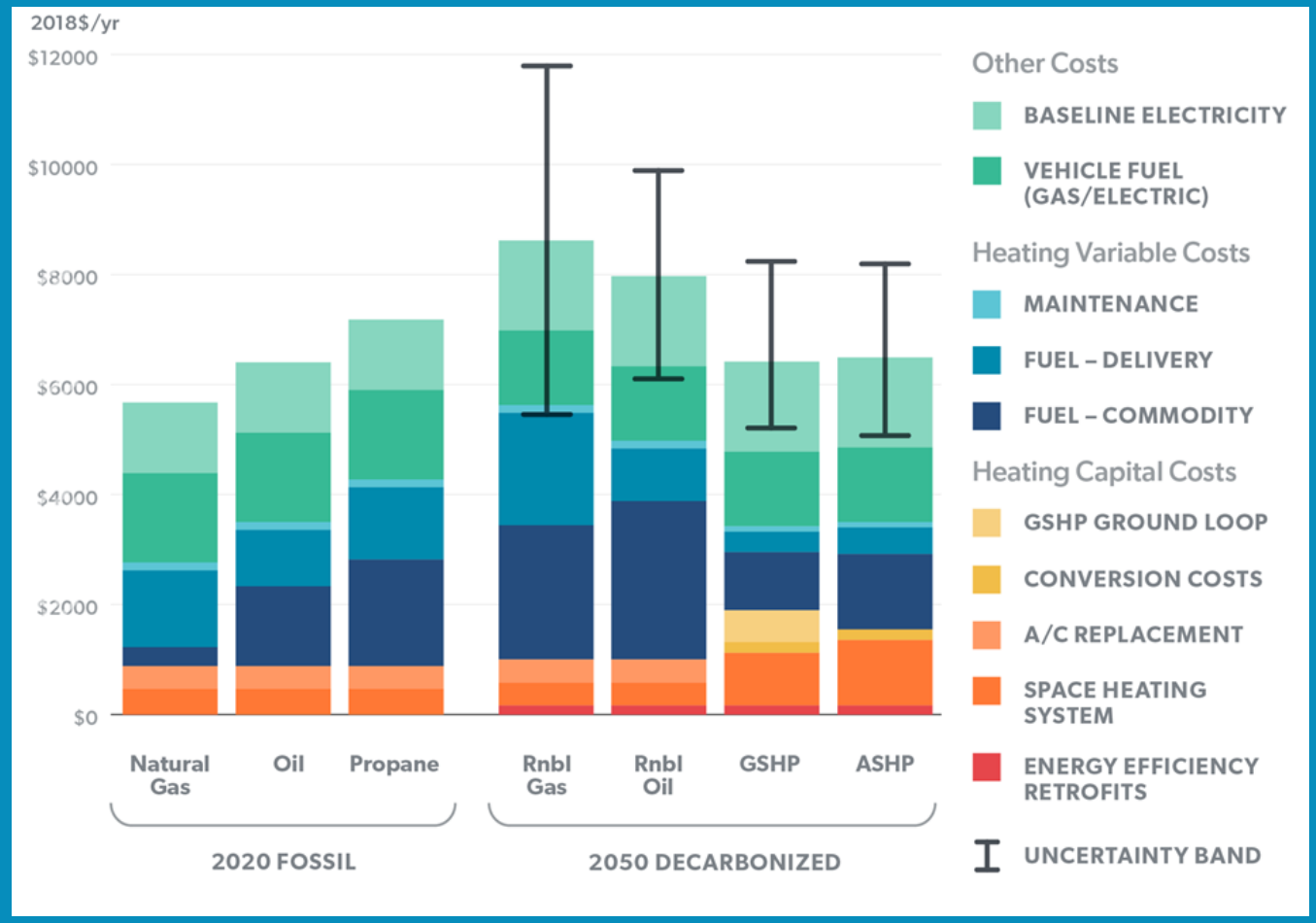


Figure 1. Cumulative Impact of Efficiency Investments on RI Electric Supply Requirements (2005-2019). Percentages represent the percent of load that cumulative electric savings since 2005 are covering.

Heating Sector Transformation

Governor Raimondo's Executive Order 19-06 (7/8/19) launched the HST Initiative to advance development of a cleaner, more affordable and reliable heating future.



Average Consumer Energy Wallet: 2020 vs. 2050

Clean Transportation

- **Transportation & Climate Initiative Program (TCI-P)**
  - At least a 26% reduction in carbon emissions from transportation from 2022 to 2032
  - Anticipated to generate around $20 million annually for Rhode Island

- **Electrifying State Bus Fleet**
  - www.ripta.com/projects/electric-bus/

- **EV Charging Station Expansion**

- **Mobility Innovation WG Report (January 2021)**
  - climatechange.ri.gov/state-actions/mobility-innovation.php

Lead by Example – E.O. 15-17

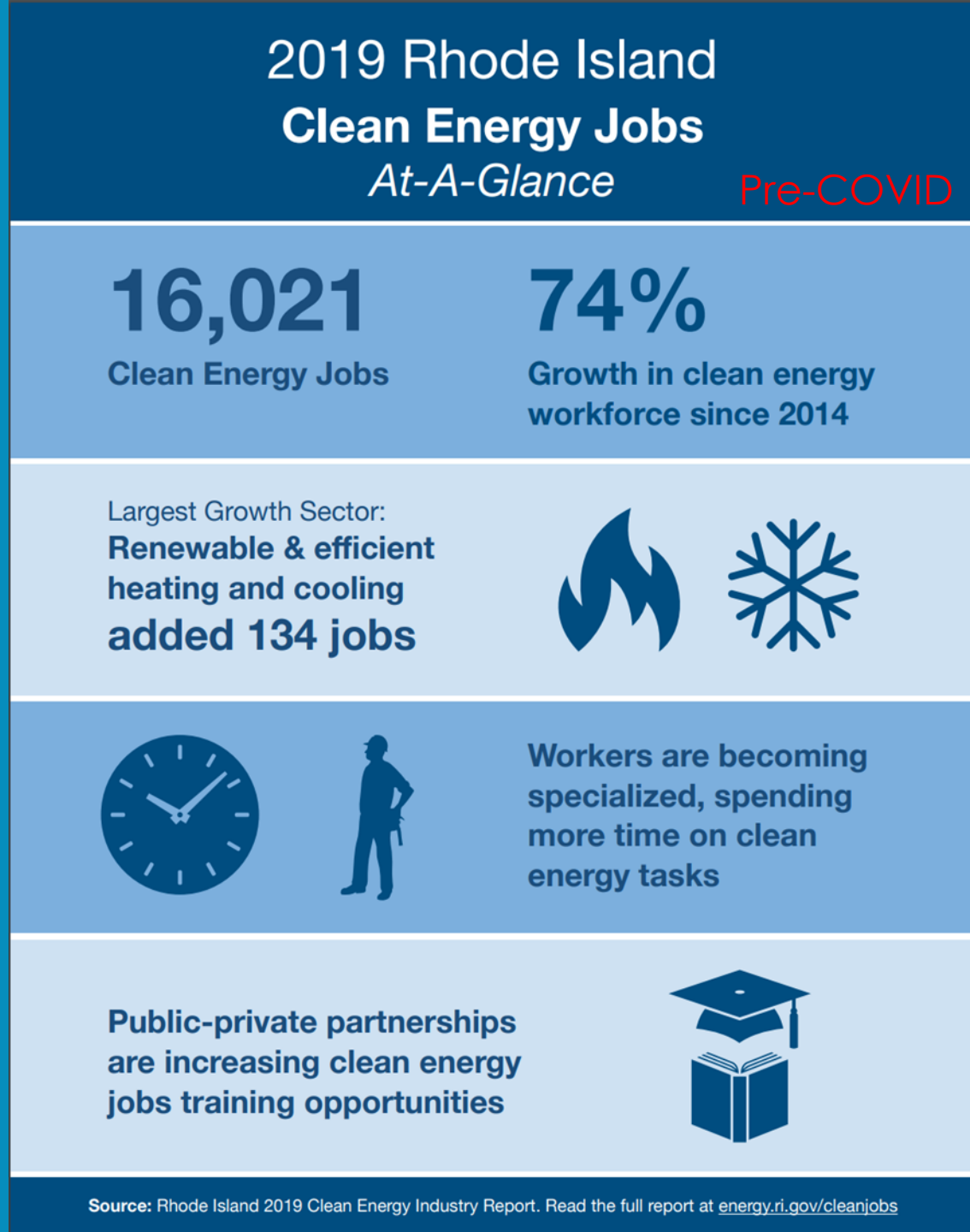
OER's LBE Program has spurred hundreds of clean energy projects across state facilities, centralized utility billing, and conducted competitive supply procurements saving millions in electric and gas utility costs for State Government agencies.

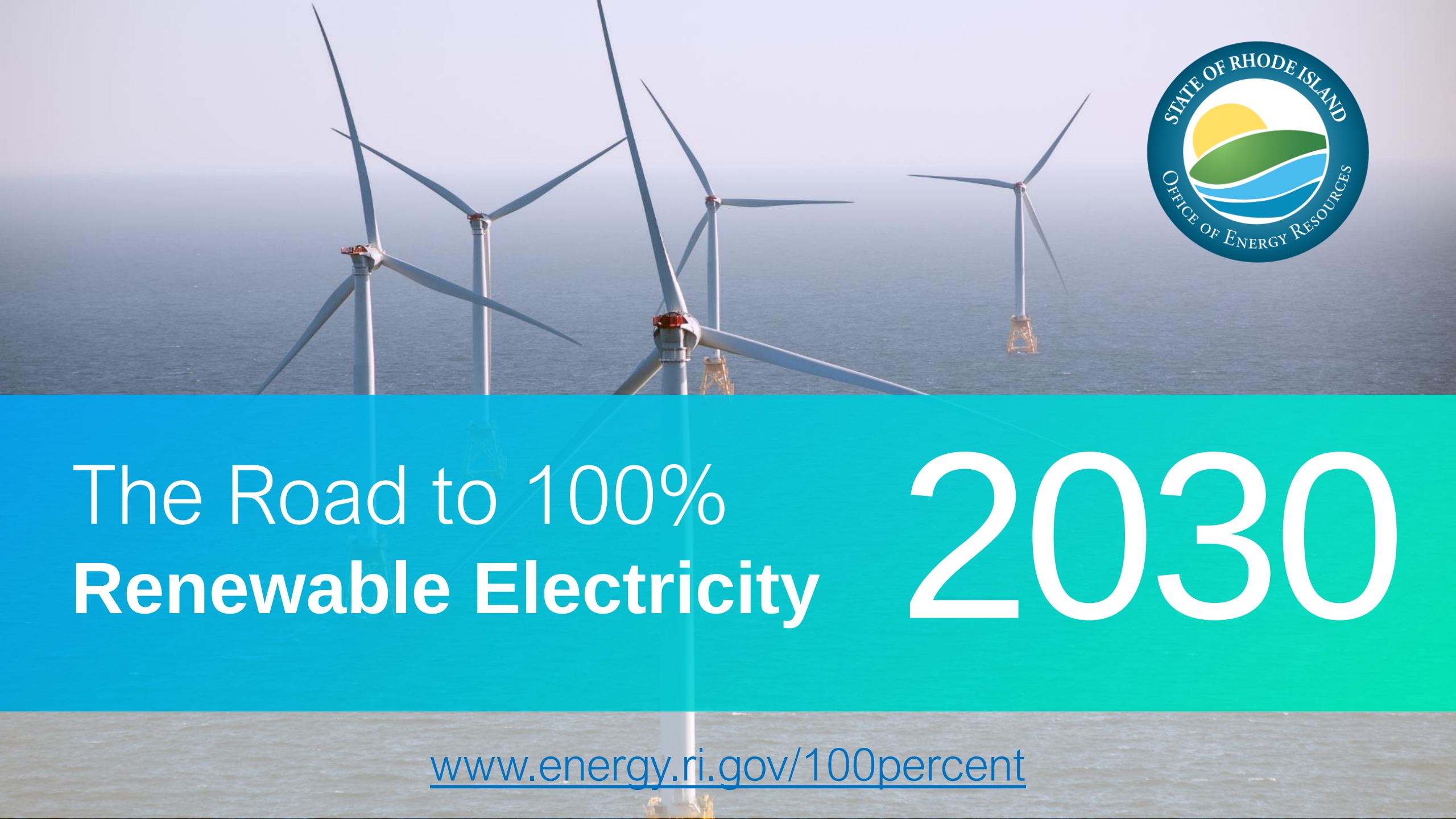
- **COMPLETE**: Reduce energy consumption of at least 10% below FY14 levels by the end of FY19
  - ≈ -13% between CY14 and CY19
- **COMPLETE**: Procurement of 100% of State government electricity consumption from renewables by 2025
  - 100% renewable effective October 2020
- **COMPLETE**: Establishment of voluntary stretch code
  - Commercial & Residential
- **NOW UNDERWAY**: State fleet min. 25% of new light-duty purchases/leases will be zero-emission by 2025

Clean Energy Jobs

Clean energy occupations are a source of sustainable-wage employment for Rhode Island residents and high unemployment communities.

- Entry-level clean energy jobs can provide a premium compared to corresponding statewide medians.
- For entry-level workers – young adults and those with lower educational attainment – clean energy vocational trades present job opportunities.
- **Clean Energy Internship Program**
  - Joint initiative by OER and Rhode Island Commerce
  - Year-round during Spring, Summer & Fall semesters
  - Supported by local renewable & ee companies





The Road to 100% **Renewable Electricity** 2030

www.energy.ri.gov/100percent

Putting the pieces together…

There are four integrated components of the 100% Renewable by 2030 effort:

Foundational principles, developed by the project team to align with the Governor's executive order and informed by stakeholders.

Technical analysis, informed by principles and stakeholder input, illuminated the costs and benefits of hypothetical resource portfolios.

Stakeholder input, informed the foundational principles, analytical inputs and assumptions, and shaped policy recommendations – thank you!

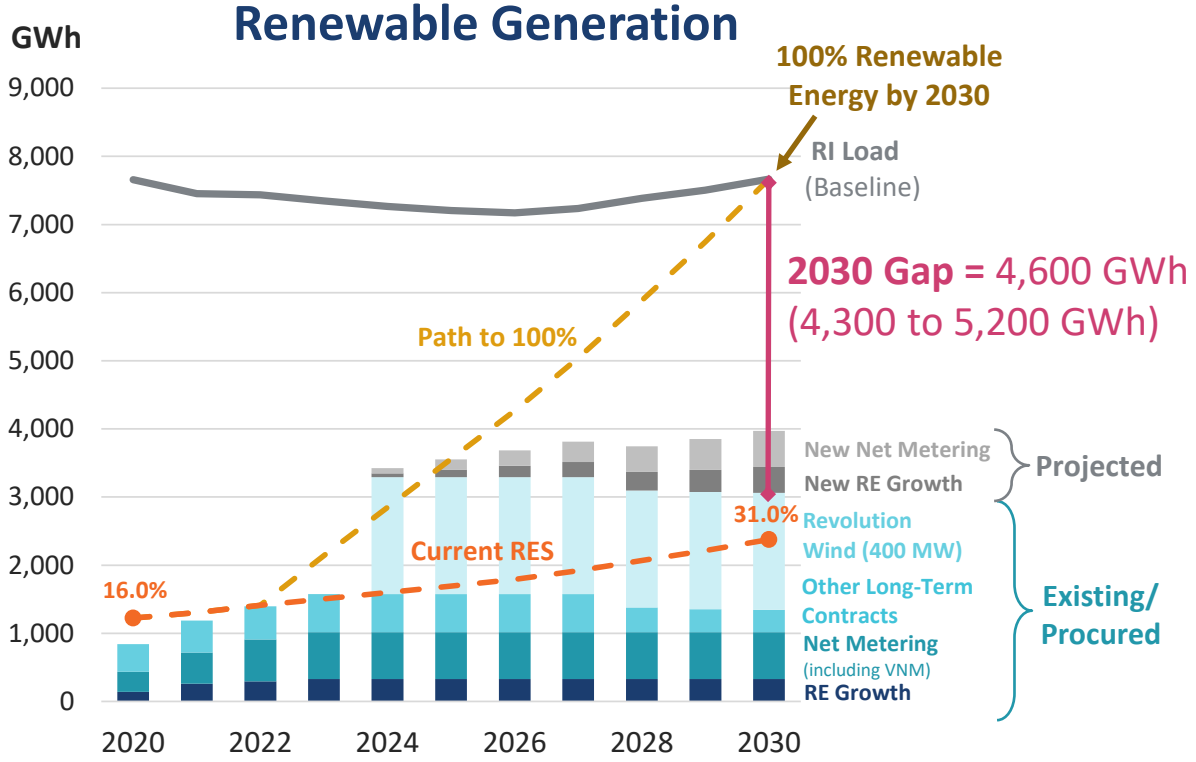
Policy and programmatic recommendations, developed to satisfy the goals of the Executive Order in a manner consistent with the principles, technical analysis, and stakeholder input.

Renewable Energy Generation to Meet 100% in 2030

Rhode Island must increase its RES, and accelerate new renewables to achieve 100% by 2030

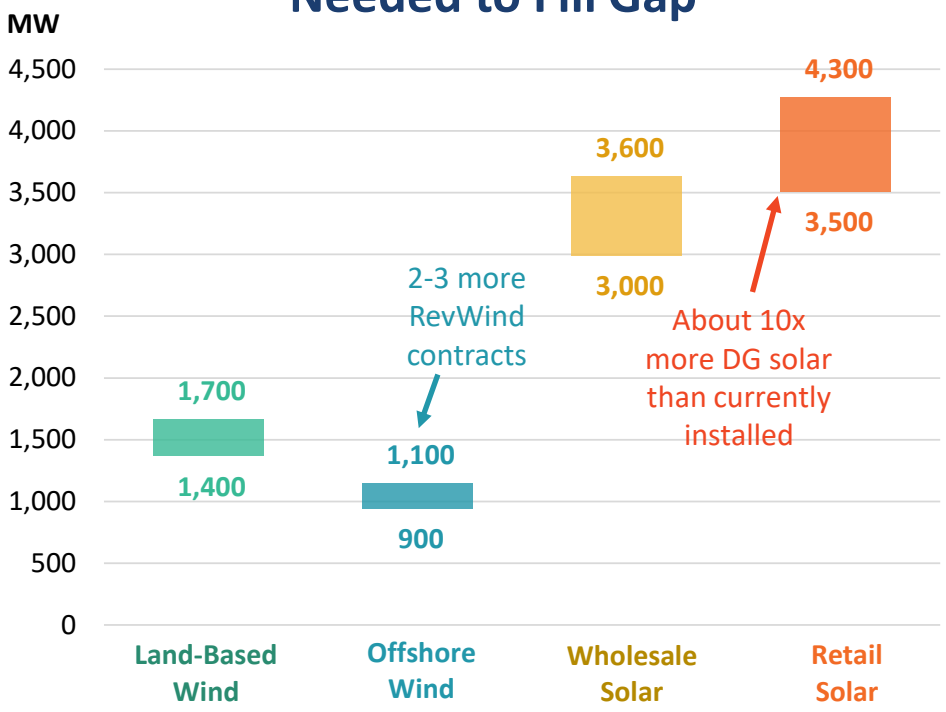
- Gap is slightly higher at 4,600 GWh (was 4,400 GWh), now accounting for the end of some existing contracts

Rhode Island Energy Demand and Renewable Generation



Note: Load is grossed up to account for BTM PV that produces RECs.

Single-Technology Capacities Needed to Fill Gap



Project Insights

- While there is significant uncertainty in the future costs of renewable energy resources, utility-scale resources (solar, offshore wind, and land-based wind) have similar cost ranges. Distributed resources have significantly higher costs.

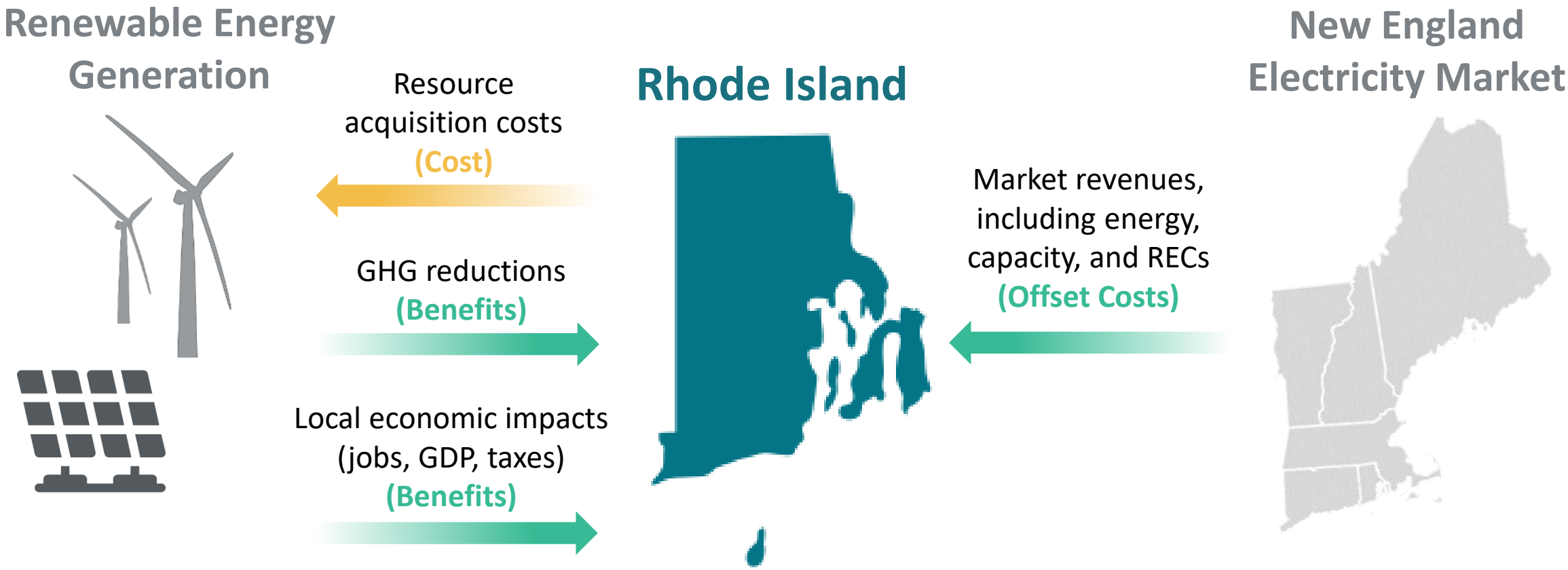
- Regional dynamics - including market design and transmission planning – will affect local costs but also create opportunities.

- Different renewable resource portfolios will cause different (and as yet unknown) investment needs in the distribution and transmission grid, and may require integrated planning to optimize outcomes.

- To achieve and maintain 100% renewable electricity beyond 2030, policy, programmatic and technical (e.g. storage) solutions may need to evolve as regional penetration of clean energy resources accelerates and increasingly-challenging grid impacts emerge.

- Achievement of our clean energy future requires ratepayers to support investment to drive long-term energy, economic, and environmental benefits through charges on their bills.

Analyzing Renewable Costs and Benefits to Rhode Island



Net Cost to RI Ratepayers = Resource Acquisition Costs - Market Revenues

Economic Impacts: Local Development, GDP, Jobs

Other factors: Equity, Land Use, Additionality of GHG Abatement

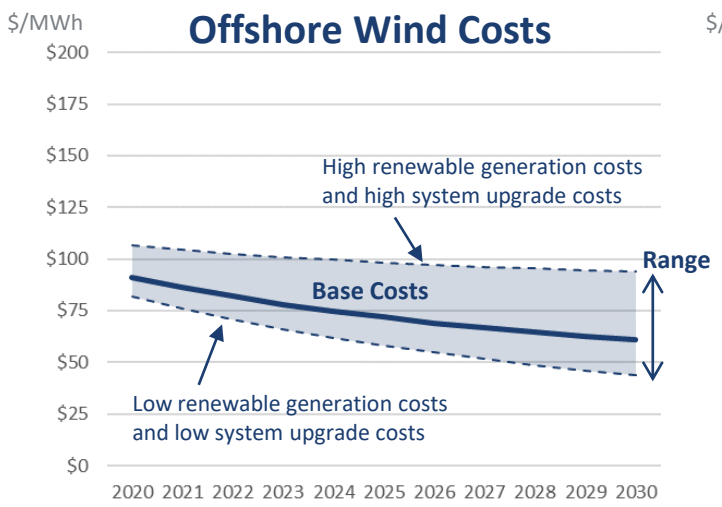
Resource Acquisition Cost Projections

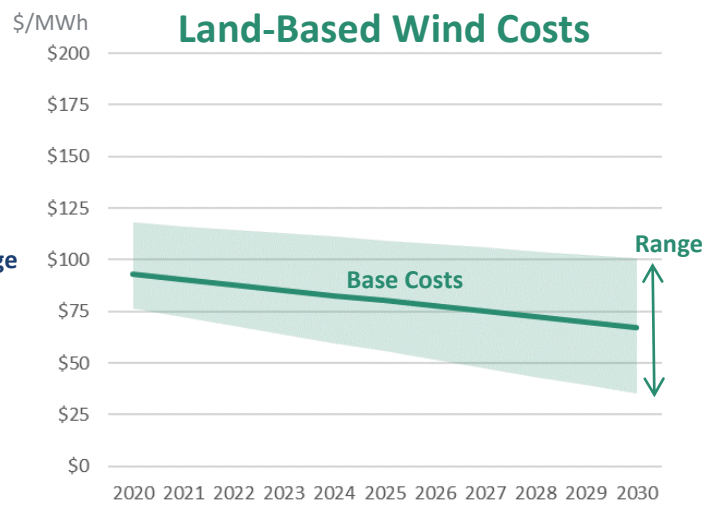
We received input from renewable developers to consider a broader range of future renewable generation costs

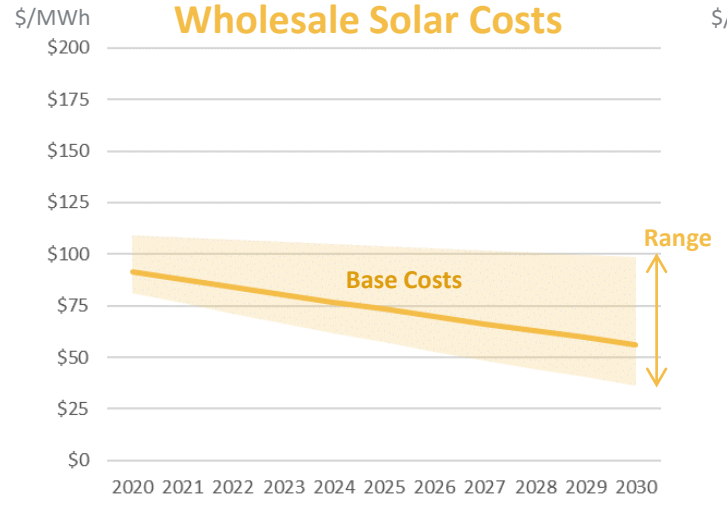
We updated renewable cost projections to reflect greater long-term cost uncertainty

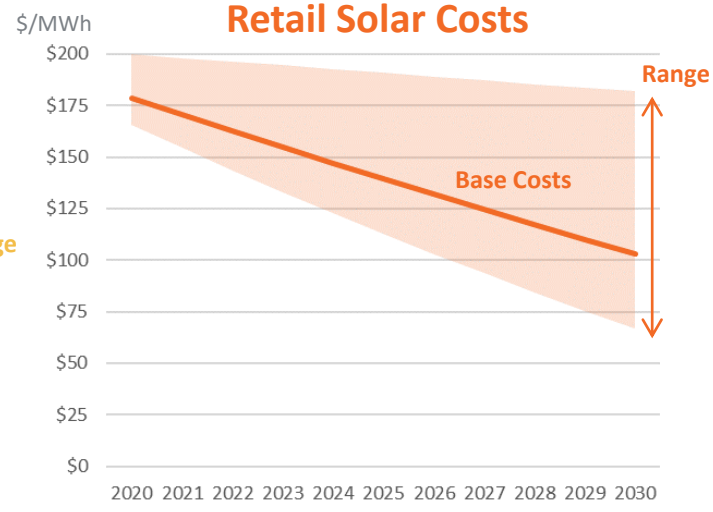
- *Renewable Generation Costs*: Increased cost range based on NREL's 2020 ATB, including "conservative" case with limited cost declines
- *System Upgrade Costs*: Increased cost range based on best available market data on system capacity and upgrade costs for each resource type

Net impact is an increase in Base Costs of $6-10/MWh and High Costs of $25-40/MWh









Notes: All monetary values in 2020 dollars. Total resource costs account PTC and ITC phaseout, maintaining 10% ITC for solar through 2030.

Capacity Market Revenues for Renewables

In addition to energy market revenues, renewables may also receive capacity market revenues that will reduce net ratepayer costs

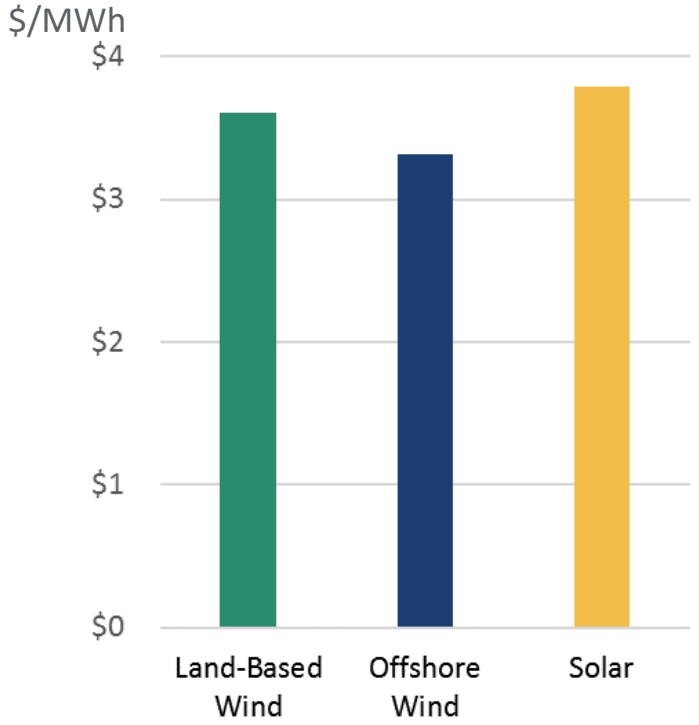
- Renewable capacity supported by state programs can enter the ISO-NE Forward Capacity Market through recently introduced substitution auctions
- But, only 54 MW of renewable capacity have cleared due to limited participation and low primary auction prices ($2/kW-mo)

We included future capacity market revenues in our analysis, reducing the net ratepayer costs of renewable generation

- Assume $4.5/kW-mo, based on average price in 5 most recent auctions
- Rely on ISO-NE's 2020 ORTP study for renewable qualified capacity
- Discount capacity revenues by 50% to account for decline in qualified capacity and potential for limited capacity to clear in future years

Analyze range from $0/MWh (don't clear the substitution auction) to about $14/MWh (based on ISO-NE Net CONE of $8.7/kW-mo)

Base Capacity Market Revenues



Sources and Notes: Assumed average capacity price over past 5 auctions of $4.50/kW-mo; qualified capacity based on draft 2020 ISO-NE ORTP study; assumed capacity factor of 35% for land-based wind, 45% for offshore wind, and 16% for solar. Monetary values in 2020 dollars.

Economic Impact Analysis: All-Offshore Wind Portfolio (Bookend)

To meet 100% Renewable with all Offshore Wind would require a series of projects

- Illustrated here as equal-size projects coming online each year, 2025-2030, with overlapping construction periods
  - Since OSW projects are quite large, an actual profile would be more "lumpy" – this pattern is illustrative

Construction periods overlap, 2022-2029

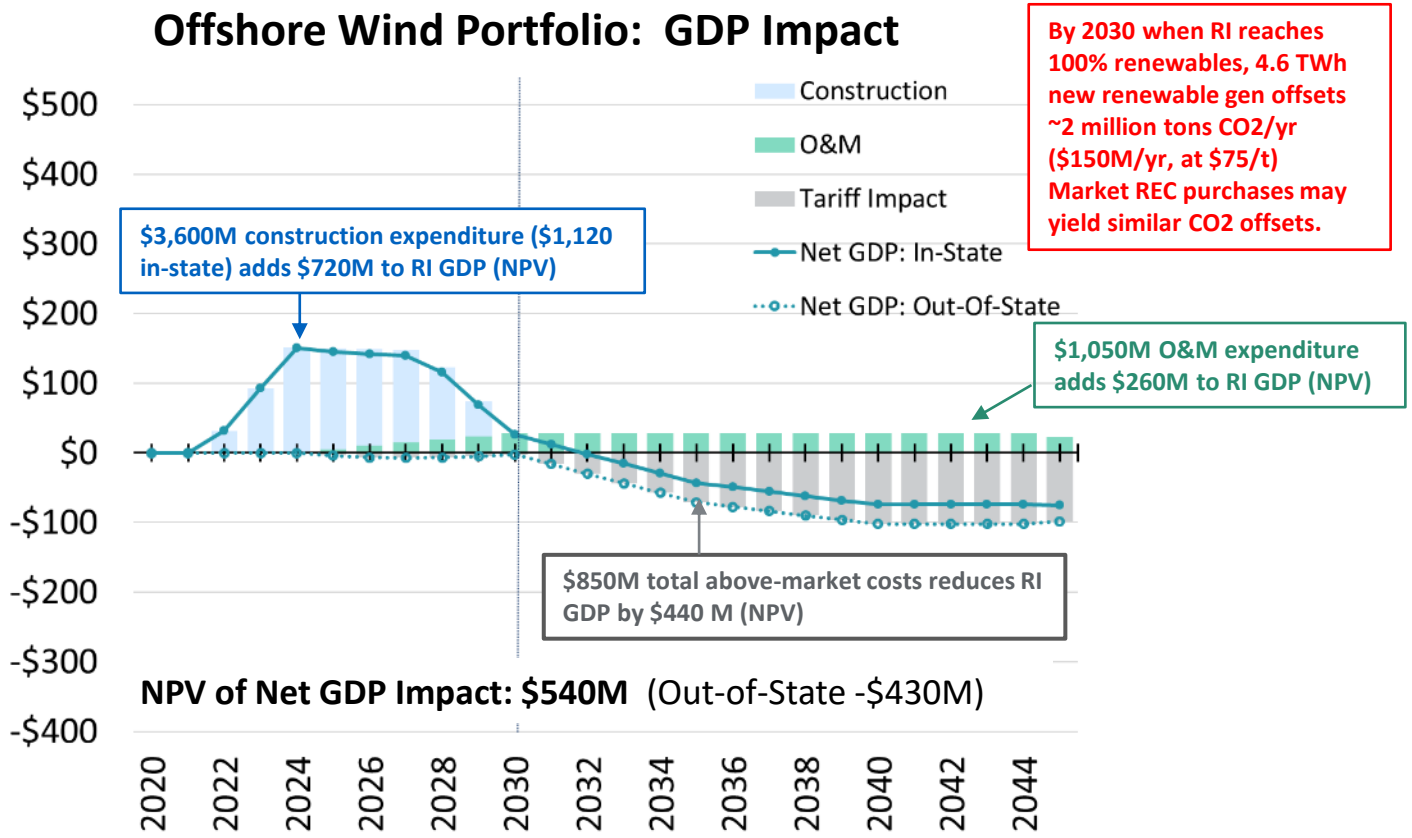
O&M and Tariff Impacts begin when first project comes online

- **Growing to 2030 as more come online**

Net impact initially positive, dominated by Construction

- **Tariff Impact may be positive or negative, vs purchasing RECs**

Out-of-state project assumes no in-state Construction, O&M benefits



Shows impacts only for resources online by 2030. The impact of additional renewable resources likely to be needed beyond 2030 is not included here.

Policy and Programmatic Recommendations

Study insights inform three categories of recommendations:

Policy

Recommendations for defining, achieving, and procuring 100% renewable electricity.

Planning & Enabling

Recommendations on ways to reduce risk, increase flexibility, and optimize renewable energy integration.

Equity

Recommendations on ways to foster equitable outcomes developed in partnership with frontline communities.

Thank You

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