



The Road to 100%  
**Renewable Electricity**

2030



# Public Workshop #1

## Agenda for July 9, 2020

Remarks from Commissioner Ucci

Project Team Introductions

Presentation Part 1

Break ( $\approx$  10:20 – 10:30)

Remarks from Governor Raimondo

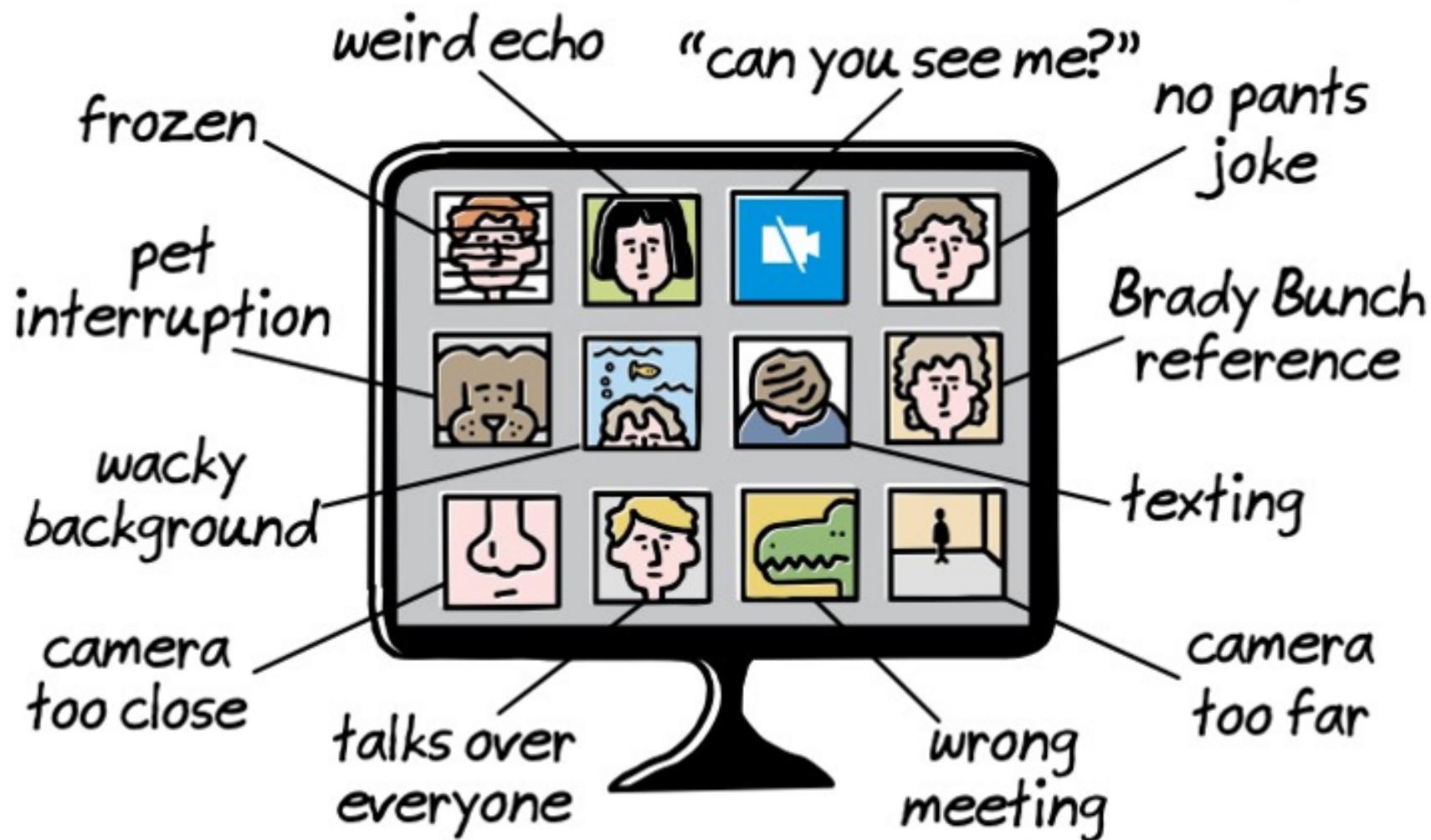
Presentation Part 2

Q&A

# every virtual meeting

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# A Few Logistics...

By default, all attendees will be placed on mute.

If you have any questions, please ask through the Q&A button at the bottom of your screen. Attendees by phone can press \*9 to raise/lower their hand.

You can see all the questions that have been asked – please give a “thumbs up” if you want to ask a similar question!

If we do not get to your question/comment in the webinar, please email: [energy.resources@energy.ri.gov](mailto:energy.resources@energy.ri.gov)



The Road to 100%

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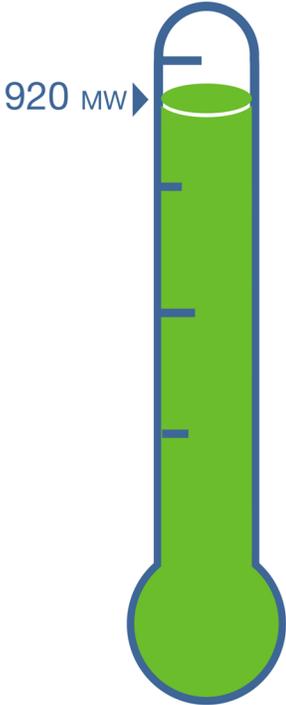
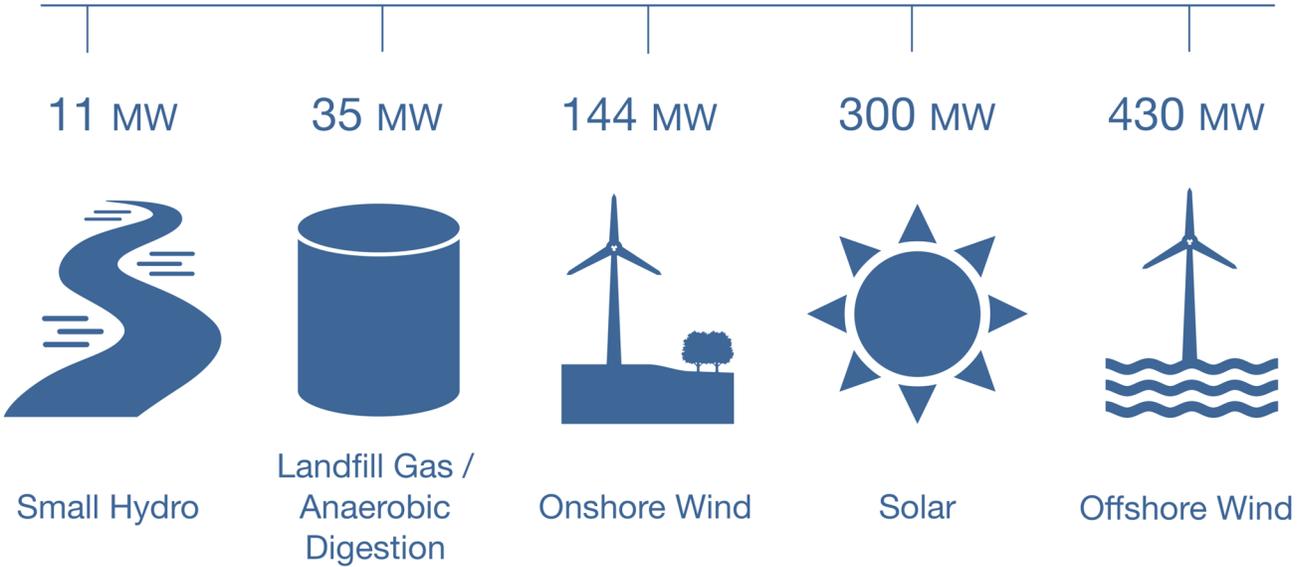
**Commissioner  
Nicholas Ucci**

**2020  
Qtr. 1**

# Rhode Island Clean Energy Portfolio

**1,000 MW**  
by end of 2020

## 920 Megawatts





State of Rhode Island and Providence Plantations

Gina M. Raimondo  
Governor

EXECUTIVE ORDER

20-01

January 17, 2020

ADVANCING A 100% RENEWABLE ENERGY FUTURE  
FOR RHODE ISLAND BY 2030

WHEREAS, Rhode Island and the world face significant environmental, economic, energy, and public health challenges from the impacts of climate change; and

WHEREAS, Rhode Island is committed to mitigating economy-wide greenhouse gas emissions and their effect on climate change, while spurring new and innovative opportunities for investment and job growth throughout the state's clean energy economy; and

WHEREAS, Rhode Island's clean energy sector has seen a 74% increase in jobs since 2014, demonstrating that protecting against climate change and strengthening our economy are complementary goals; and

WHEREAS, the Resilient Rhode Island Act establishes targets for Rhode Island to reduce greenhouse gas emissions to 10% below 1990 levels by 2020, to 45% below 1990 levels by 2035, and to 80% below 1990 levels by 2050; and

WHEREAS, the Rhode Island Executive Climate Change Coordinating Council (EC4), in its December 2016 Greenhouse Gas Emissions Reduction Plan, made clear that a business-as-usual approach to reducing economy-wide greenhouse gases is insufficient to meet Resilient Rhode Island Act emission reduction targets; and

2020 JAN 17 AM 10:52  
SECRETARY OF STATE  
PUBLIC INFORMATION  
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## Executive Order 20-1

### Goal

Meet 100% of the state's electricity demand with renewable energy resources by 2030.

### Process

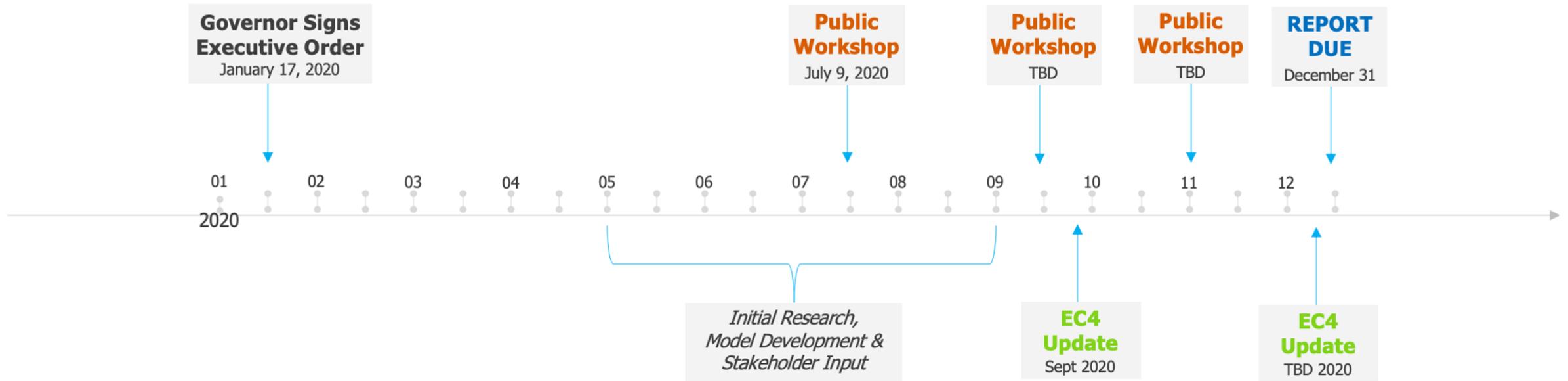
OER shall conduct economic & energy market analysis, and develop viable policy & programmatic pathways.

### Results

Implementable action plan by December 31, 2020.

# Project Timeline

Report due by December 31, 2020



Please note that all 2020 dates are subject to change.



# 100% x '30 Webpage

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[www.energy.ri.gov/100percent](http://www.energy.ri.gov/100percent)

Workshop materials will be posted here.



# Public Comment

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[Energy.Resources@energy.ri.gov](mailto:Energy.Resources@energy.ri.gov)

A close-up photograph of several interlocking metal gears. The gears are made of a dark, possibly steel, material and are arranged in a way that shows their teeth meshing together. The lighting is dramatic, with strong highlights on the edges of the teeth and deep shadows in the recesses, creating a sense of mechanical complexity and precision. The background is dark and out of focus.

# State Project Team

## **RI Office of Energy Resources**

Nicholas Ucci, Commissioner

Carrie Gill, Ph.D.

Becca Trietch

Shauna Beland

Chris Kearns

Yasmin Yacoby

## **Division of Public Utilities and Carriers**

Linda George, Administrator

Joel Munoz

John Bell

## **Public Utilities Commission**

Ronald Gerwatowski, Chairman

## **Department of Environmental Management**

Terry Gray, Associate Director

# Rhode Island's 2030 Goal: 100% Renewable Energy

FIRST PUBLIC WORKSHOP – VIA WEBINAR

PRESENTED BY

Dean Murphy

Jurgen Weiss

Michael Hagerty

PREPARED FOR

Rhode Island

Office of Energy Resources

JULY 9, 2020

THE **Brattle** GROUP



# Webinar Logistics

- **By default, everyone but the panelists will be muted**
- **If you have a substantive question, ask via the Q&A button at the bottom of your webinar screen**
  - ▶ You can see all the questions that have been asked – give a thumbs up if you want to ask a similar question
  - ▶ If you are connected only by phone, press \*9 to be recognized and allowed to speak during Q&A (please identify yourself by name and organization)
- **For technical questions about webinar logistics, send a chat to Ellen Paal (host)**
  - ▶ Any logistical question you can't figure out through the webinar: email [ellen.paal@brattle.com](mailto:ellen.paal@brattle.com)
- **We'll have a 10-minute break at ~10:20**

# Agenda

- **Introductions and Background**
  - ▶ Executive Order 20-01
  - ▶ The Importance of Decarbonizing Electricity
  - ▶ Electricity System Basics
- **Guiding Principles and Stakeholder Comments**
- **Q&A Period; 10-minute Break**
- **Remarks by The Honorable Governor Gina M. Raimondo**
- **The 100% Goal: Defining and Measuring It**
  - ▶ What does 100% mean?
  - ▶ “The Gap” – How much additional Renewable Energy is needed?
- **Next Steps and Project Timeline**
- **Poll and Final Q&A**

# Introductions and Background

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# Project Team

## Rhode Island State Agencies

Office of Energy Resources

Division of Public Utilities and Carriers

Public Utilities Commission

Department of Environmental Management

## Consulting Team

THE **Brattle** GROUP

An economic and energy consulting firm with 11 offices in North America, Europe and Australia, with over 50 partners and 500 employees. Team most recently completed Heating Sector Transformation Strategy for RI as well as New England 80by50 report.



Dean Murphy



Jurgen Weiss



Mike Hagerty

# Governor Raimondo's Executive Order 20-01

- **Advancing a 100% Renewable Electricity Future for Rhode Island by 2030**
  - ▶ Executive Order: *"...meet one hundred percent (100%) of the state's electricity demand with renewable energy resources by 2030."*
  - ▶ Leverage market competition to reduce ratepayer cost and energy price volatility
  - ▶ Create economic development opportunities
  - ▶ Action plan due December 31, 2020
- **Primary focus: Achieving 100% renewable electricity by 2030**
  - ▶ Yet "100x30" is but one step toward the longer-term, economy-wide "80x50" goal: 80% reduction in greenhouse gas emissions by 2050
  - ▶ The 100x30 renewable electricity effort must support the larger goal

# Rhode Island's Existing Renewable Electricity Supply

## Existing RI Renewable Energy Programs

Renewable Energy Program	2019 Capacity	2019 Production
Renewable Energy Growth	70 MW of solar	90 GWh
Long-Term Contracting Standard	180 MW of various technologies (including wind, solar, small hydro, and LFG)	650 GWh
Net Metering/ Virtual Net Metering	160 MW of solar	190 GWh
<b>Total</b>	<b>410 MW</b>	<b>930 GWh</b> (13% of 7,250 GWh 2019 load)

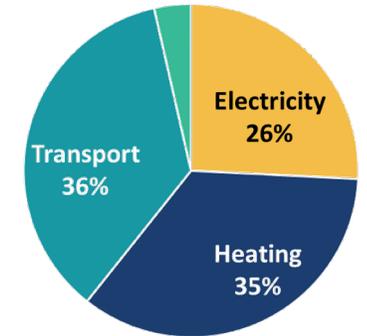
Sources: National Grid filings with DPUC.

- **Renewable energy production from resources supported by RI programs was 13% of RI electricity use in 2019**
  - ▶ Rising to ~52% in 2024 with Revolution Wind online (+25%) and new renewables from existing programs (+14%)
- **Existing RI renewable energy programs:**
  - ▶ **Renewable Energy Standard**
    - Sets a requirement for purchasing renewable energy credits (RECs) to cover a % of metered load (plus losses): 16% in 2020; +1.5%/year
    - Market for RECs incentivizes renewable generation
    - RECs provide short-term incentive (a few years), but long-term commitment can be more effective
  - ▶ **Programs to increase renewable energy production**
    - Programs are complementary to RES, not additional
    - RE Growth, Long Term Contracts, Net Metering (incl. virtual)
- **RI also requires utilities to submit plans for implementing energy efficiency programs that decrease electricity use**

# The importance of decarbonizing electricity

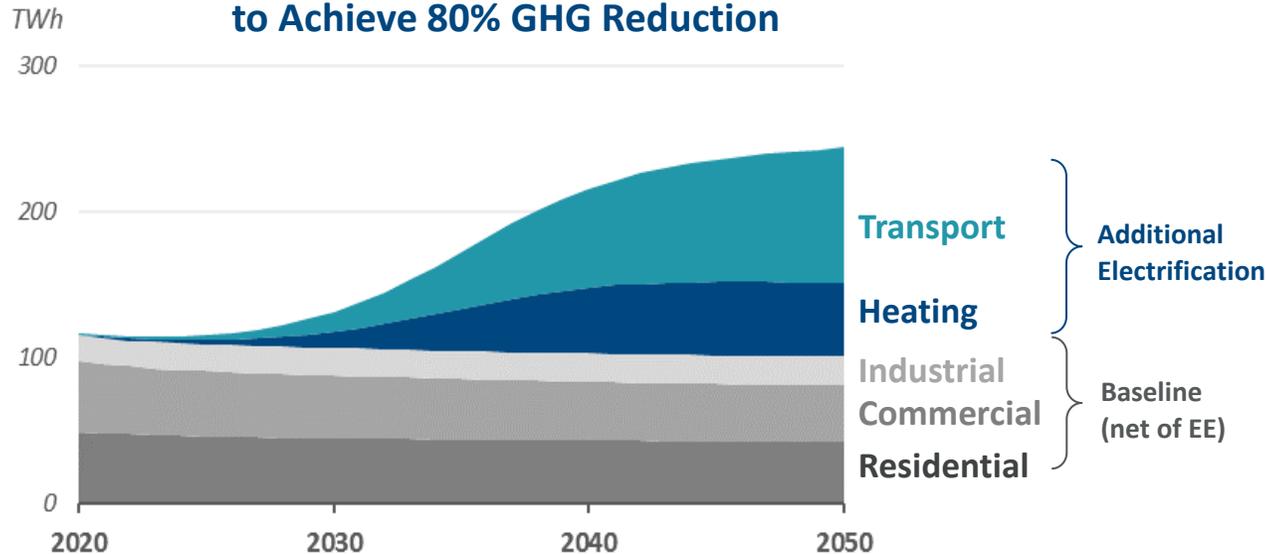
- **Electricity generation currently emits 26% of Rhode Island's GHGs**
  - ▶ Rhode Island is a (small) part of the ISO New England grid, which is still largely gas-fired
- **Electrification is a primary pathway for decarbonizing other sectors, such as transportation and heating**
  - ▶ Electrifying most transportation & heating in New England would roughly double load by 2050

Rhode Island GHG Emissions



Source: 2016 Rhode Island Greenhouse Gas Emissions Inventory, October 2019.

New England 2020-2050 Projected Load to Achieve 80% GHG Reduction

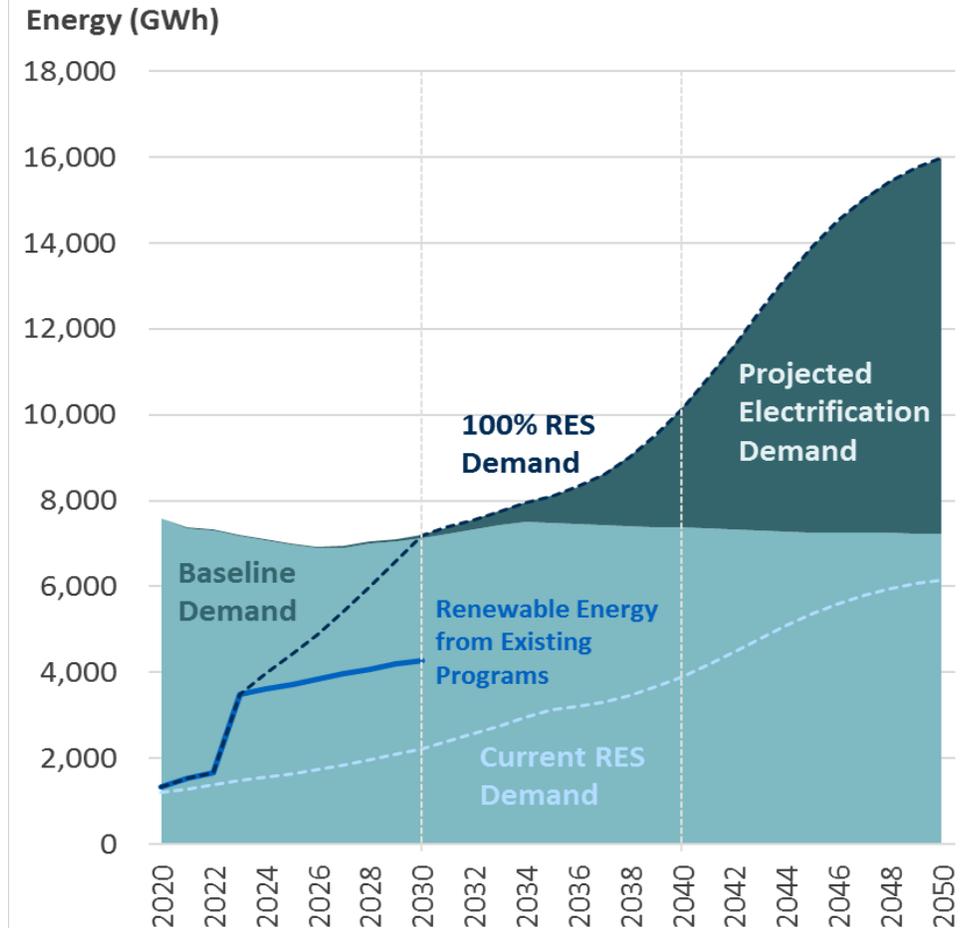


- ▶ Recent RI Heat Sector Transformation report: electrification via heat pumps is a key decarbonization pathway that should be pursued aggressively
- ▶ Electrifying transportation would require even more electricity than electrified heat

# The importance of decarbonizing electricity (cont'd)

- RI's initial challenge is to reach 100% renewable energy by 2030
  - ▶ This will require adding about **360 GWh per year** on average from 2020 to 2030, beyond what existing renewable programs may add
- **After 2030, electricity use is projected to rise as electrification helps economy-wide decarbonization**
- **RI must therefore continue to add renewable energy to stay at 100% beyond 2030**
  - ▶ This will require adding about **440 GWh per year** on average from 2030 to 2050
  - ▶ With other states also moving away from fossil fuels, the power system becomes less flexible, more intermittent

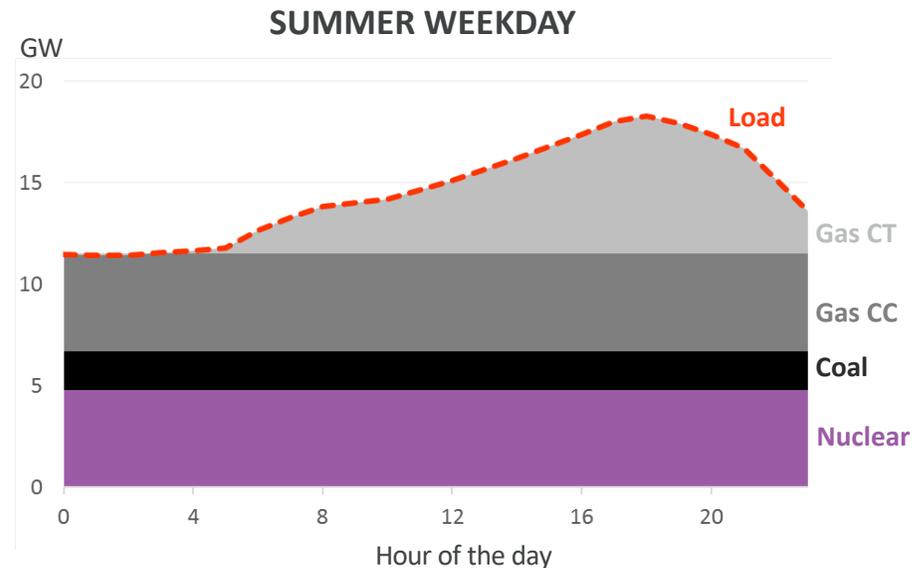
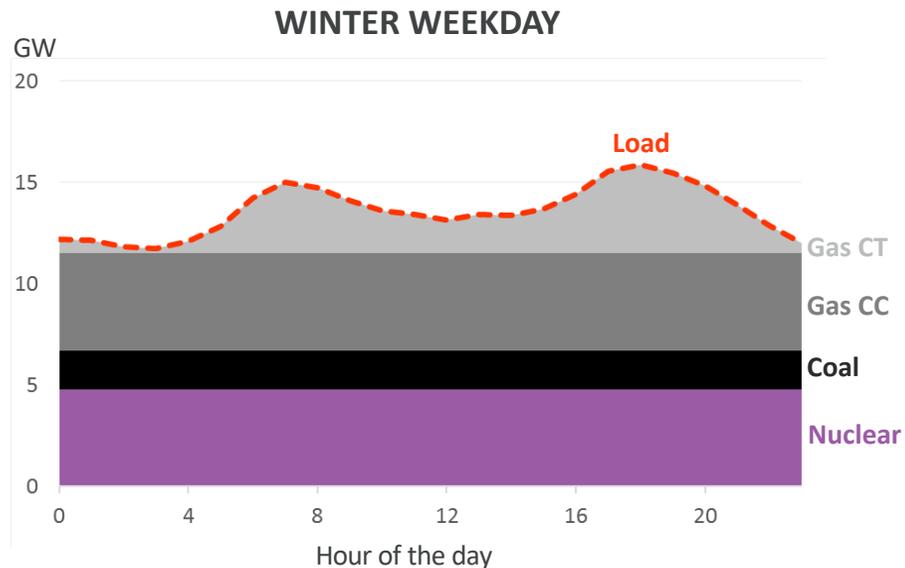
Rhode Island 2020-2050 Projection



# Electricity System Basics – Fossil Resources

- **Electricity consumption (load) varies** with time of day, season, weather, etc.
- Electricity is not easily stored; **it must be generated as it is consumed**, minute by minute
- Traditionally, **power plants (mostly fossil) are turned on and off as necessary to follow changing electric load** in real time (lowest incremental cost first, to minimize total cost)

ILLUSTRATIVE HOURLY LOAD AND GENERATION PROFILES FOR NEW ENGLAND



**Energy** is electricity actually produced to meet demand (load)

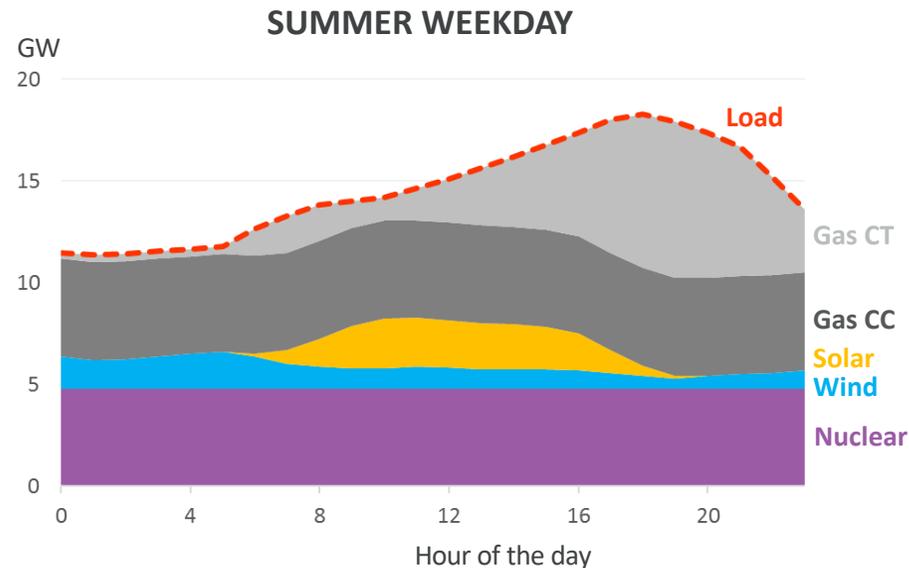
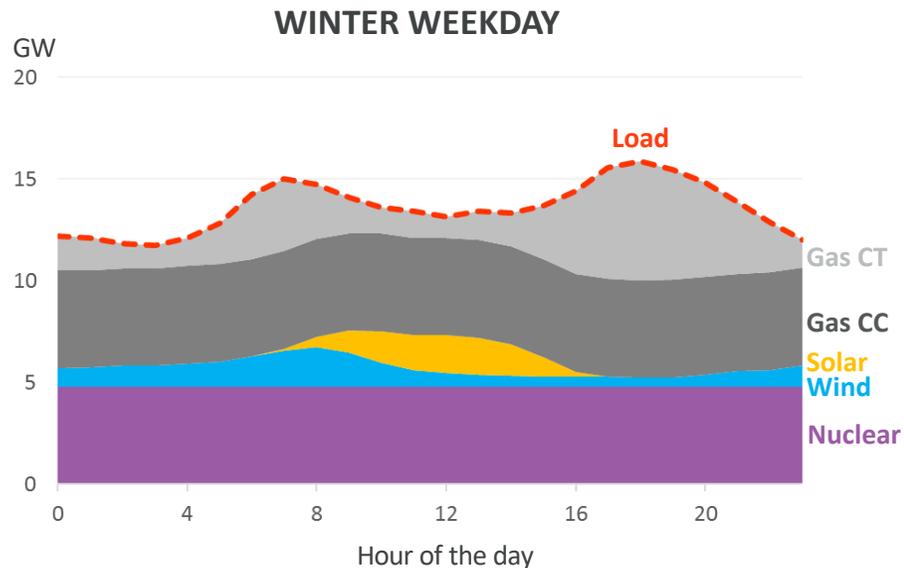
**Capacity** is the ability to produce energy on demand (to meet peak load)

**Both** are necessary for a cost-effective, reliable electric system

# Electricity System Basics – Grid in Transition

- Most **renewable energy sources generate based on the availability of wind or sun**
  - ▶ They cannot be “dispatched” by system operators to follow load
- But they **provide power at no (incremental) cost**, and are thus **dispatched first when available**
- For a time, **remaining fossil is still used to follow load** (though runs less overall)

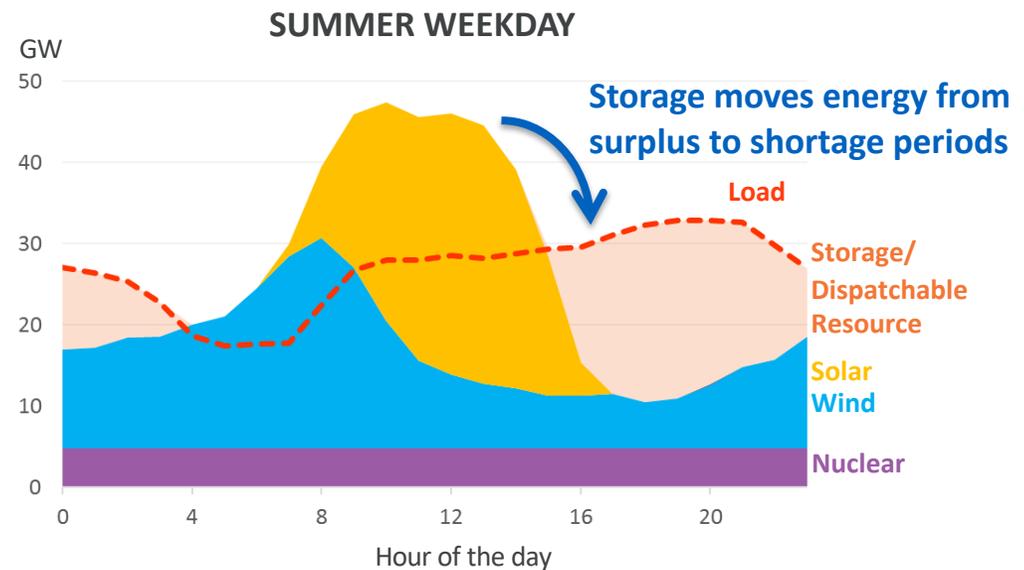
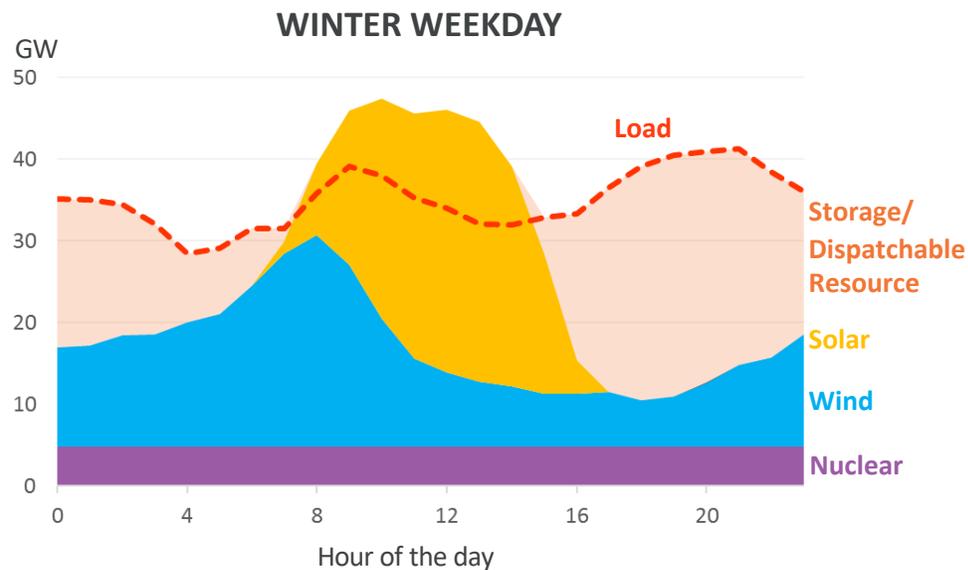
ILLUSTRATIVE HOURLY LOAD AND GENERATION PROFILES FOR NEW ENGLAND



# Electricity System Basics – Decarbonized Future

- The clean energy grid of the future will have **higher load and mostly renewable generation, reducing demand for generation from fossil power plants**
- It may have very **limited dispatchable generation**, and will need other ways to **match supply to load in real time**, including **energy storage (batteries, etc.)** or **flexible load**

ILLUSTRATIVE HOURLY LOAD AND GENERATION PROFILES FOR NEW ENGLAND



# 100% Renewable Rhode Island Project Scope

- **Engage with stakeholders** – throughout the process
- **Goal and Guiding Principles**
  - ▶ Clearly define the 100% renewable goal – 100% of what?
  - ▶ Principles (3 Themes): Decarbonization, Economic, and Implementation
- **Identify “the gap”** – additional renewables by 2030 to meet 100%
- **Identify mechanisms:** RES; expanded programs; competitive procurements; ...
- **Develop qualitative and quantitative tools** to evaluate proposed solutions
  - ▶ Cost; economic development; energy and environmental equity; land use; etc.
- **Identify effective mechanisms and technologies** to best meet 100% renewable goal
  - ▶ To match load, at reasonable cost, with positive economic impact, etc.
- **Report**

# Guiding Principles and Stakeholder Comments

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# Stakeholder Engagement is a Valuable Component of Developing the Action Plan

- As part of the recent Heat Sector Transformation effort, we spoke with small focus groups representing stakeholder constituencies to support/inform initial framing.
  - ▶ That process worked well in guiding the HST study
- In this 100% Renewable Electricity effort, we followed a similar process, holding several focus group sessions
  - ▶ Initial conversations helped raise key issues, scope stakeholder perspectives, and receive early feedback on initial direction
- Our work is strengthened by stakeholder engagement and input
  - ▶ Along with public workshops, additional comments are welcome by email at [energy.resources@energy.ri.gov](mailto:energy.resources@energy.ri.gov)
  - ▶ Presentation materials will be posted at [www.energy.ri.gov/100percent/](http://www.energy.ri.gov/100percent/)

# Guiding Principles for 100% Renewable Goal

- With input from stakeholders, the project team developed several principles to help guide the implementation of the 100% Renewable Goal, and reviewed and refined these with stakeholders
  - ▶ These principles conflict in some circumstances
  - ▶ Tradeoffs between principles will be necessary
- These Guiding Principles are organized under three broad themes:
  1. Decarbonization Principles
  2. Economic Principles
  3. Policy Implementation Principles
  - ▶ These Principles will help guide the implementation of the 100% Renewable goal
    - E.g., types of renewable resources, or methods to acquire them
  - ▶ While these Principles reflect initial stakeholder comments, further insights are welcome

# A. Decarbonization Principles

## 1. Climate Leadership

- ▶ Set goals consistent with avoiding the worst implications of climate change
- ▶ Provide an example to states attempting to achieve similar targets

## 2. Power Sector Decarbonization

- ▶ GHG reductions should be “additional” – beyond what would occur otherwise
  - Making Alternative Compliance Payments (ACP) is not the same as new renewables
- ▶ Verifiable, e.g., with NEPOOL-GIS tracking
- ▶ Account for load met by behind-the-meter generation, as well as metered load

## 3. Facilitate Broader Decarbonization

- ▶ In other sectors (transportation, heating), and beyond Rhode Island
- ▶ Collaborate with regional partners to maximize GHG reductions

## B. Economic Principles

### 4. Cost Effective

- ▶ Lowest reasonable costs to consumers
  - Leverage market competition to reduce ratepayer costs and energy price volatility
  - Energy efficiency is foundational for reducing energy demand, GHGs, and costs
  - Maintain affordability of electricity for all Rhode Islanders
  - Consider cost impacts on all customers, particularly vulnerable customers
- ▶ Consider all costs
  - Renewable energy, balancing, T&D, siting and land use, etc.
  - Also consider costs beyond 2030

### 5. Energy and Environmental Equity

- ▶ Use the transition to 100% Renewable electricity to improve energy and environmental equity across all Rhode Island communities

### 6. Create economic development opportunities

- ▶ Foster opportunity in Rhode Island's clean energy economy

# C. Policy Implementation Principles

## 7. Robust and Sustainable Beyond 2030

- ▶ Continue to achieve 100% renewable to 2050 and beyond, at lowest reasonable cost
  - Flexible in response to growing electrification load, market and technological uncertainties and surprises
- ▶ 100x50 may be an even bigger challenge - NE grid is highly decarbonized only after 2030
  - Consider early adoption of “integration” resources (batteries, long-term storage, DR, etc.)

## 8. Consistent with RI’s Existing Renewable Energy Mechanisms

- ▶ Align with and leverage Rhode Island’s existing programs and laws
  - Renewable Energy Standard, RE Growth, Renewable Energy Fund, Energy Efficiency programs

## 9. Consistent with Other Rhode Island Priorities and Policies

- ▶ Responsible siting: balancing conflicting demands with open space, housing, etc.
- ▶ Social and economic policies: labor, housing, economic development, etc.
- ▶ Ensure continued power system reliability

# Stakeholder Sessions – Additional Key Points

- Guiding Principles: stakeholders generally agreed with draft Principles
  - ▶ There were some concerns about potential ratepayer cost of the 100% Goal
  - ▶ Agreement that Economic Development benefits should be considered
  - ▶ Principles should include energy and environmental equity considerations
- 100% Goal: general agreement with an energy-based approach like RES
  - ▶ Acquire renewable energy credits (RECs) equal to RI load (not peak, balancing, etc.)
  - ▶ Include load that is offset by behind-the-meter generation: solar (with RECs), BTM non-Renewables
    - Measurement could be an issue
  - ▶ What definition of renewables should be used? Expand beyond Class 1?
    - E.g., Canadian Hydro, existing Renewables, more Biomass, RECs from other regions (TX wind?), GHG Offsets?
    - Project team felt that such other options involve tradeoffs in the near to mid-term
    - Long term, through 2050, New England may need to consider other clean energy options

# Stakeholder Sessions – Additional Key Points (2)

- But Renewable Energy Standard (and the associated REC price) is not enough
  - ▶ Need other mechanisms (e.g., programs, procurements) or will pay ACP and not meet goal
- Cost is biggest concern for many stakeholders (unsurprisingly)
  - ▶ Consider how to protect vulnerable customers (low-income customers, vulnerable businesses) from impact
- Ensure 100% Goal aligns with other priorities
  - ▶ Land use is critical for open space and housing
  - ▶ Several expressed concern that 100% Goal shouldn't harm land use principles
  - ▶ Should also be consistent with social and economic policies, environmental equity

# Stakeholder Sessions – Additional Key Points (3)

- Logical conclusion seems to be “do mostly offshore wind”
  - ▶ Solar, onshore wind are costly and impact land use
  - ▶ Transmission is constrained from north
- Some interest in shutting down natural gas power plants in RI as part of 100% Goal
  - ▶ But Stakeholders (even strong environmental advocates) generally felt gas shutdown did not need to be part of this effort
- RECs have become single market across NE states – must account for other states to understand impact of changing RI’s Renewable Energy Standard
- Consider feasibility/practicality of implementing any proposed solution
  - ▶ E.g., are there enough installers to implement desired expansion?
  - ▶ Diversifying resources acquired may be valuable, to avoid implementation limits

# Stakeholder Feedback Invited

We are soliciting additional feedback and questions regarding the Principles

- Are important considerations missing from the Guiding Principles?
- Should any of the Principles be removed or substantively changed?

Questions about the background or electricity system basics just covered are also welcome

- Use the Q&A button from the webinar link,  
or \*9 if you are connected via phone

WE'RE MEETING TO  
TALK ABOUT COL-



WHAT'S "COL"?



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SHOULD WE WAIT?



YEAH, LET'S WAIT.



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-LABORATION.



TOM  
FISH  
BURNE

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Q & A



The Road to 100%

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**Break**

*Presentation will resume  
at 10:40 AM*



**The Road to 100%**

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**The Honorable Governor  
Gina M. Raimondo**

# The 100% Renewable Goal: Defining and Measuring It

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# What Does 100% Renewable Electricity Mean?

- **Interpret 100% in terms of energy production, similar to Renewable Energy Standard\***
  - ▶ Ensure there is sufficient renewable energy production to match RI's electricity consumption on an annual basis, accounting for line losses
  - ▶ Does account for behind-the-meter (BTM) generation that offsets load
    - BTM renewables that receive RECs (to avoid “double-counting” RECs)
    - BTM non-Renewable generation (load not otherwise metered)
  - ▶ Does not require 100% of RI generation capacity to be from renewable power plants or hour-by-hour balancing of renewable energy production with consumption
    - As the rest of the New England grid decarbonizes, these issues become more important, but not a major issue by 2030
    - Consider early efforts to address these issues nonetheless (e.g., with storage)
- **Define “renewable energy resources” based on existing Class 1 RES definition**
  - ▶ New (post-1997) Solar, Wind, eligible Biomass, small Hydro, etc.
    - Existing pre-1998 renewables are eligible only up to 2% of retail sales
  - ▶ Excludes nuclear, large hydro, offsets, etc.

\* Pascoag and Block Island (~1% of RI total) are exempted from current RES requirements

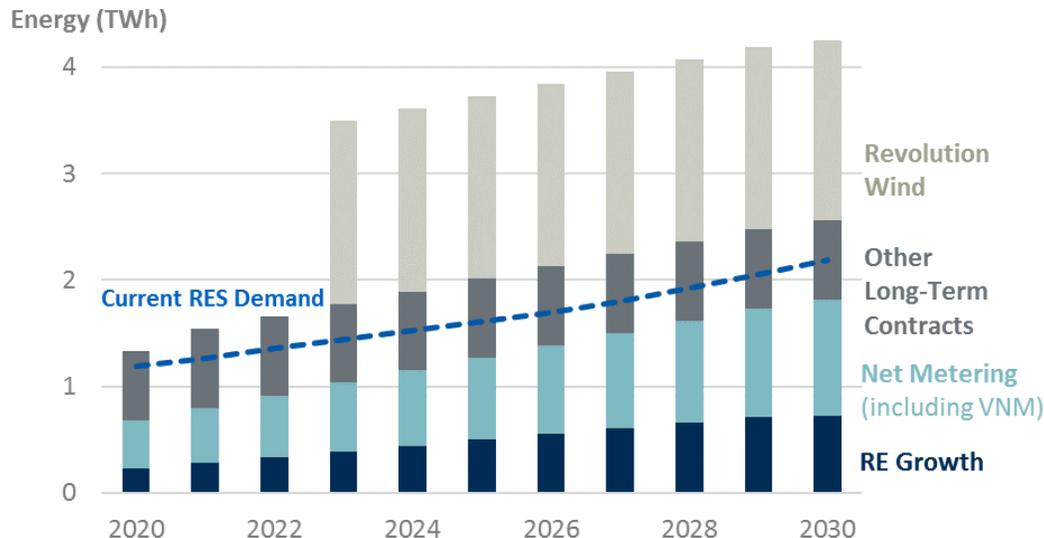
# Rhode Island will Need to Procure Additional Renewables to Meet 100% Renewable Electricity by 2030

## Renewable Energy Production

Projected to rise from 1,300 GWh in 2020 to 4,300 GWh in 2030

- Contracted resources, such as Revolution Wind, add nearly 1,800 GWh by 2030
- Distributed solar from RE Growth and Net Metering programs add 1,200 GWh by 2030

2020-2030 Renewable Energy Production

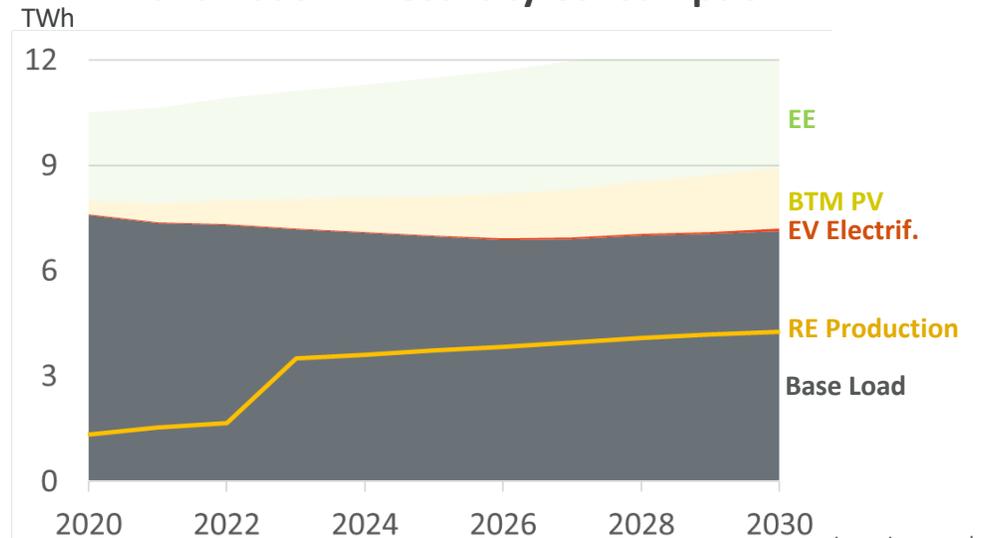


## Electricity Consumption

Projected to remain relatively flat through 2030 at about 7,200 GWh

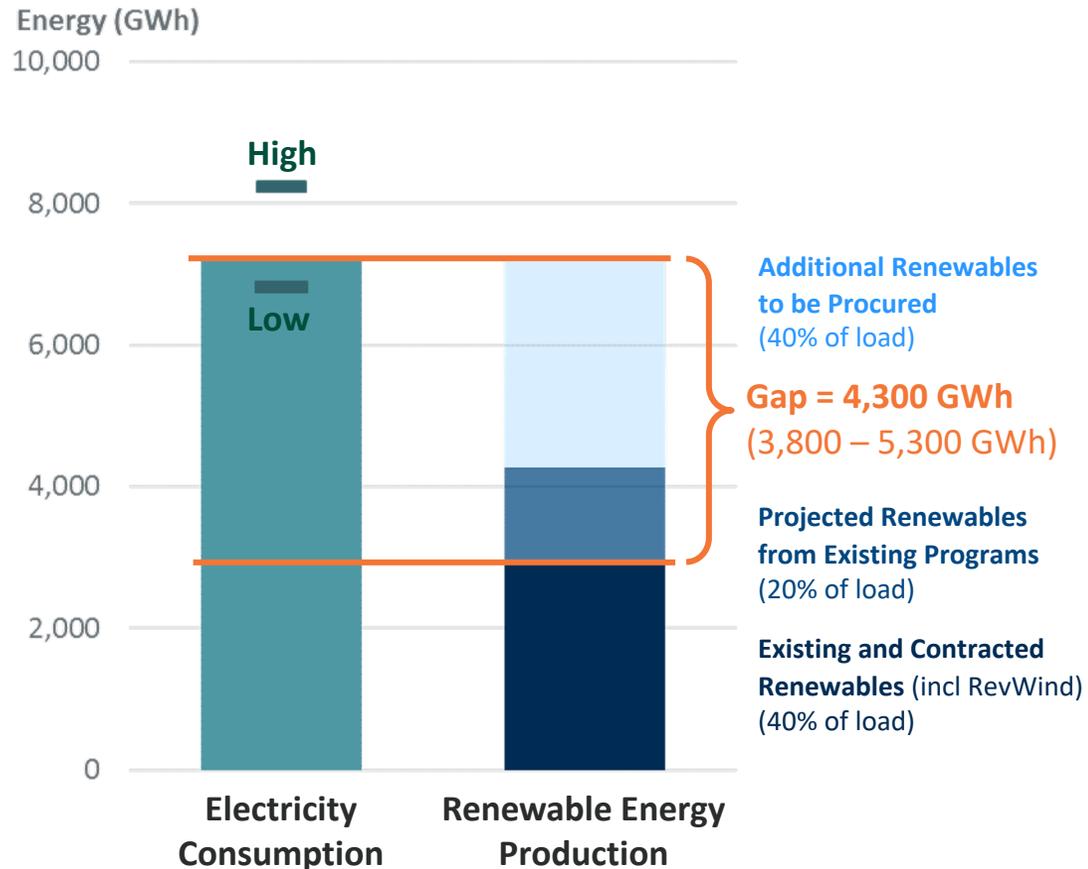
- May be 5% lower (about 6,800 GWh) with additional emphasis on EE...
- Or, 20% higher (about 8,200 GWh) with rising electrification by 2030

2020-2030 RI Electricity Consumption



# 2030 Load vs Renewable Generation

## Estimated 2030 Electricity Consumption and Renewable Energy Production



Additional renewables must be acquired, developed, procured, etc. to fill the remaining gap to meet 100% Renewables by 2030

- Beyond existing and contracted resources
- Load projection to include new electrification and load met by behind-the-meter (BTM) generation

The gap can be filled by:

- New renewables from continuing existing programs
- Expand or add renewable programs (e.g. RE Growth)
- Increased Renewable Energy Standard (RES)
  - Buy RECs – short-term or long-term
- Renewable procurements (e.g., offshore wind)
- Or additional energy efficiency, to reduce load

# Next Steps and Project Timeline

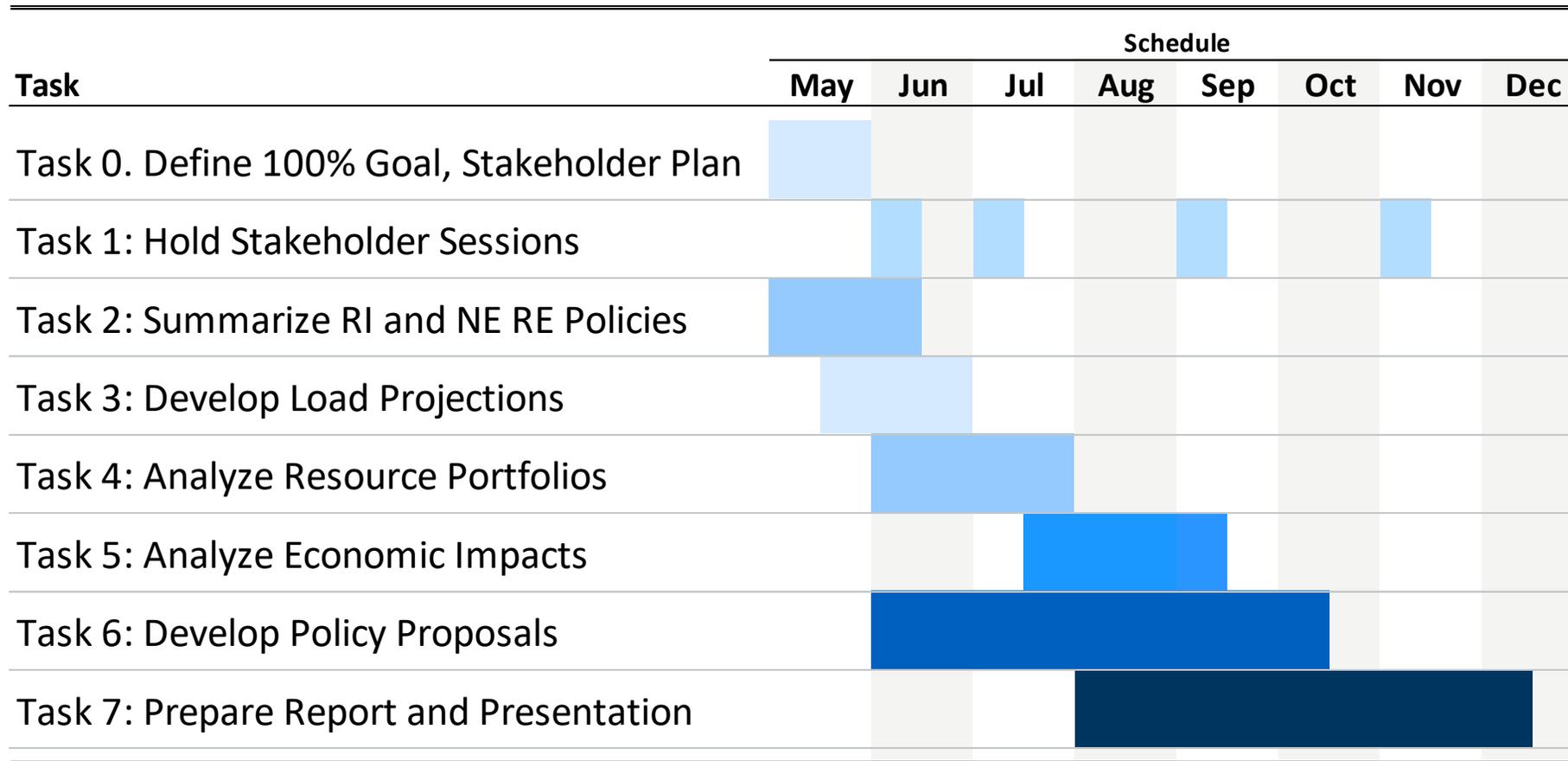
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# Next Steps

- **Solicit reactions and feedback from stakeholders on progress to date**
- **Define technology and strategy alternatives: e.g.,**
  - ▶ Buy short-term NEPOOL RECs
  - ▶ Technology choice: Offshore wind vs rooftop solar vs large-scale solar, etc.
  - ▶ Expand renewable energy programs (e.g., REGrowth)
  - ▶ Long-term procurements: offshore wind, solar, etc.
- **Evaluate strategies – qualitatively and quantitatively:**
  - ▶ Ratepayer cost (including all costs – generation, T&D, balancing, etc.)
  - ▶ Economic development benefits
  - ▶ Energy and environmental equity impacts
  - ▶ Land use impacts, etc.
- **Consider other factors:**
  - ▶ Longer-term factors re grid operations: Energy storage, clean peak, etc.
  - ▶ Implementation challenges (input appreciated)

# Project Timeline



Additional public stakeholder meetings are nominally planned for early September and early November, schedule TBD.

## Poll: Question 1

If the total cost difference between two alternative strategies is modest, would you prioritize:

- A) Achieving a lower cost impact on Rhode Island ratepayers, or
- B) Maximizing economic development benefits to Rhode Island?

(Choose A or B)

## Poll: Question 2

If existing, surplus New England (NEPOOL) RECs are less costly than procuring new renewable generation resources, would you prioritize:

- A) Relying more heavily on the REC market to lower overall costs to Rhode Island ratepayers, or
- B) Procuring additional renewable energy resources (and offsetting incremental GHGs), even at higher cost to Rhode Island ratepayers?

(Choose A or B)

## Further feedback is encouraged

We are soliciting feedback and questions regarding any of the materials presented today, or other issues

- Use the Q&A button from the webinar link, or \*9 if you are connected via phone

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-LABORATION.



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Q & A

# Glossary

**Decarbonize** reduce carbon emissions (greenhouse gases, or GHGs) by substituting non-fossil energy sources for electricity or in other sectors

**Energy** electric energy that is actually produced and delivered to end users

**Capacity** the ability to produce energy on demand, traditionally required to meet peak loads

**Heat Pump** reversible electric heating/cooling equipment that uses technology similar to an air conditioner; can heat in winter as well as cool in summer

**Renewable Energy Standard (RES)** RI 2004 legislation requires that renewable energy meet a minimum percentage of electric load, currently 16%, growing 1.5%/year; other NE states have similar RES

**Renewable Energy Credit (REC)** represents the renewable attribute of 1 MWh of renewable generation; RECs are tradeable, and used to meet the RES requirement

**Renewable Energy Growth Program** program to solicit and support smaller scale renewable projects in RI, primarily solar and wind

**Renewable Energy Fund** program of grants and loans for renewable energy technologies in RI; also direct funding for residential and commercial installations

**Competitive Procurement** Competitive process used to acquire long-term contracts for renewable energy (e.g., the 400 MW Revolution Wind offshore wind project)



# Post-Workshop Survey

We will email a survey link following the workshop – this survey will help us improve public participation in our workshops. All responses will be anonymous. Thanks in advance for your responses!





# Thank You

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We invite you to attend, contribute, and help shape pathways to a clean, reliable and affordable electricity future!



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