2020 New Hampshire Energy Summit

Rules of the Road

- Questions will be addressed at the end of each of the three segments.

- Submit a question via the “Q&A” feature in the black toolbar located at the top or bottom of your screen.

- Only questions submitted via Q&A will be read by our host for the panelists to address.

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www.nepga.org

Decarbonizing New England

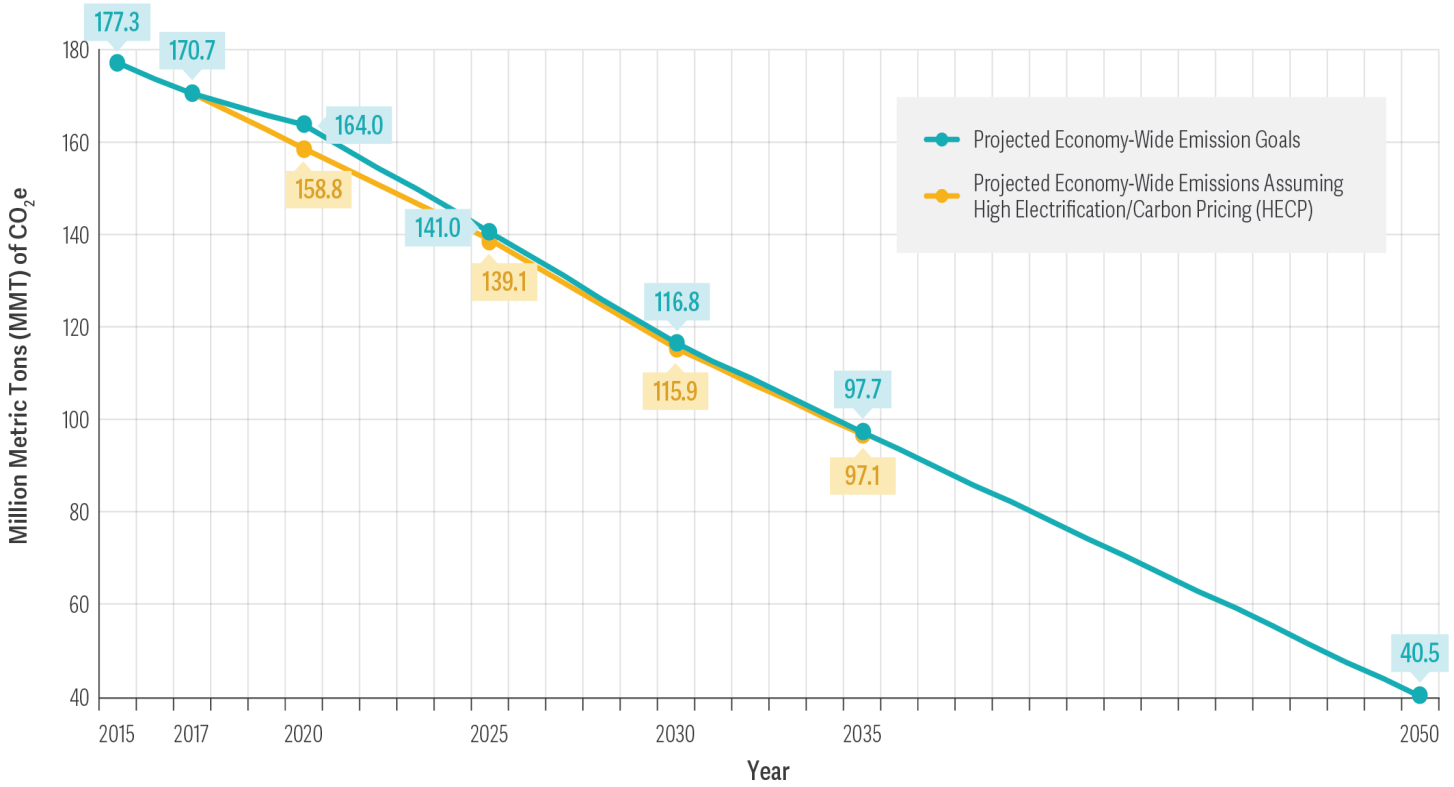
How Electricity Can Enable Our Future

New Hampshire Energy Summit

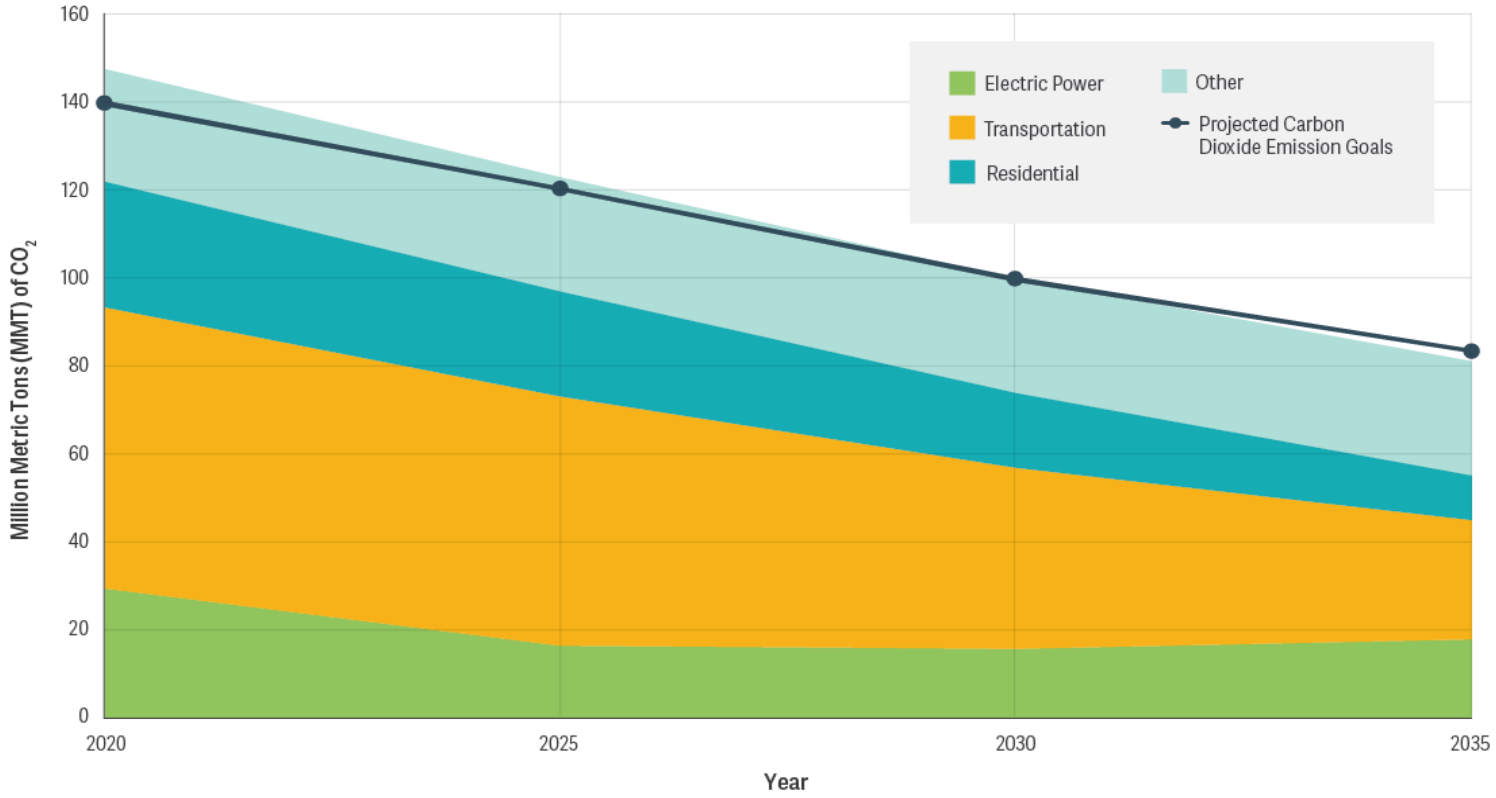
Dan Dolan

September 29, 2020

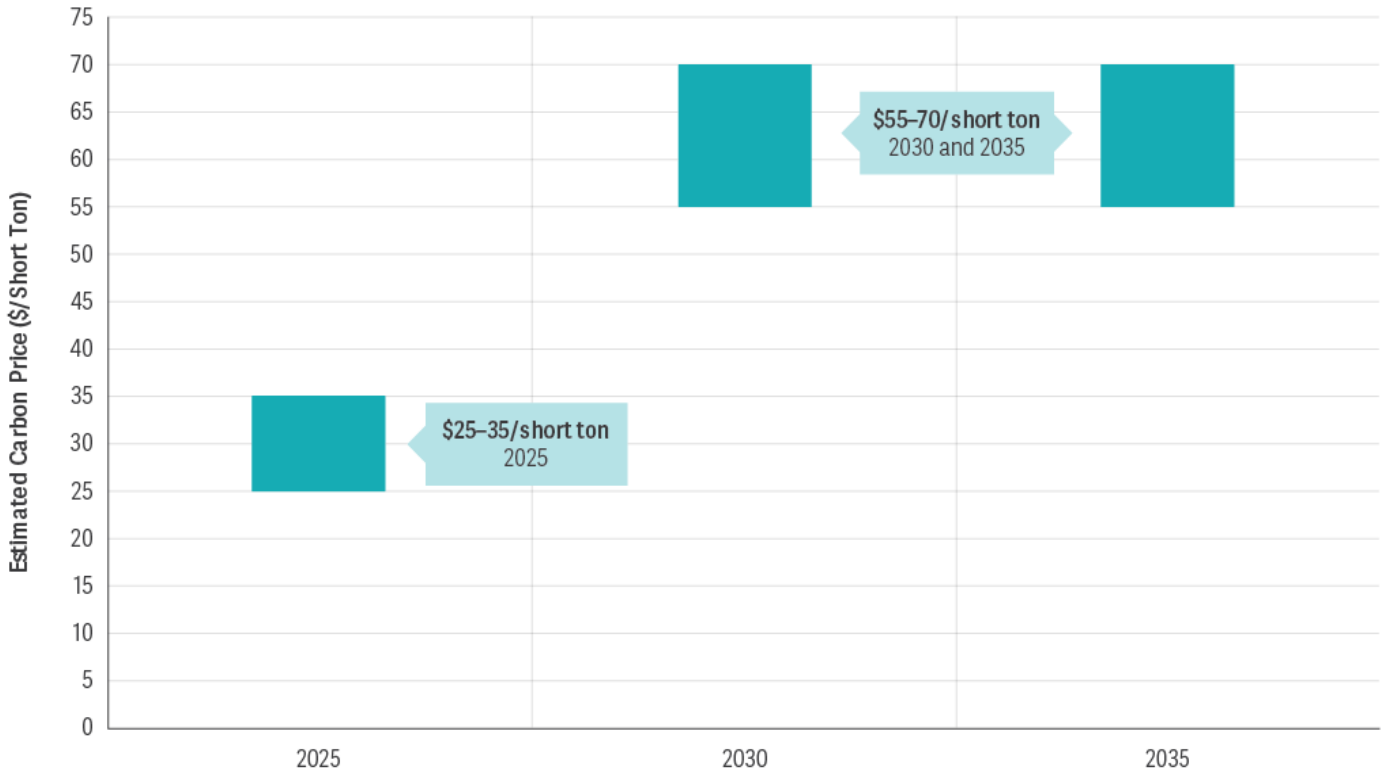
New England CO_2 emissions goals & a pathway to get there

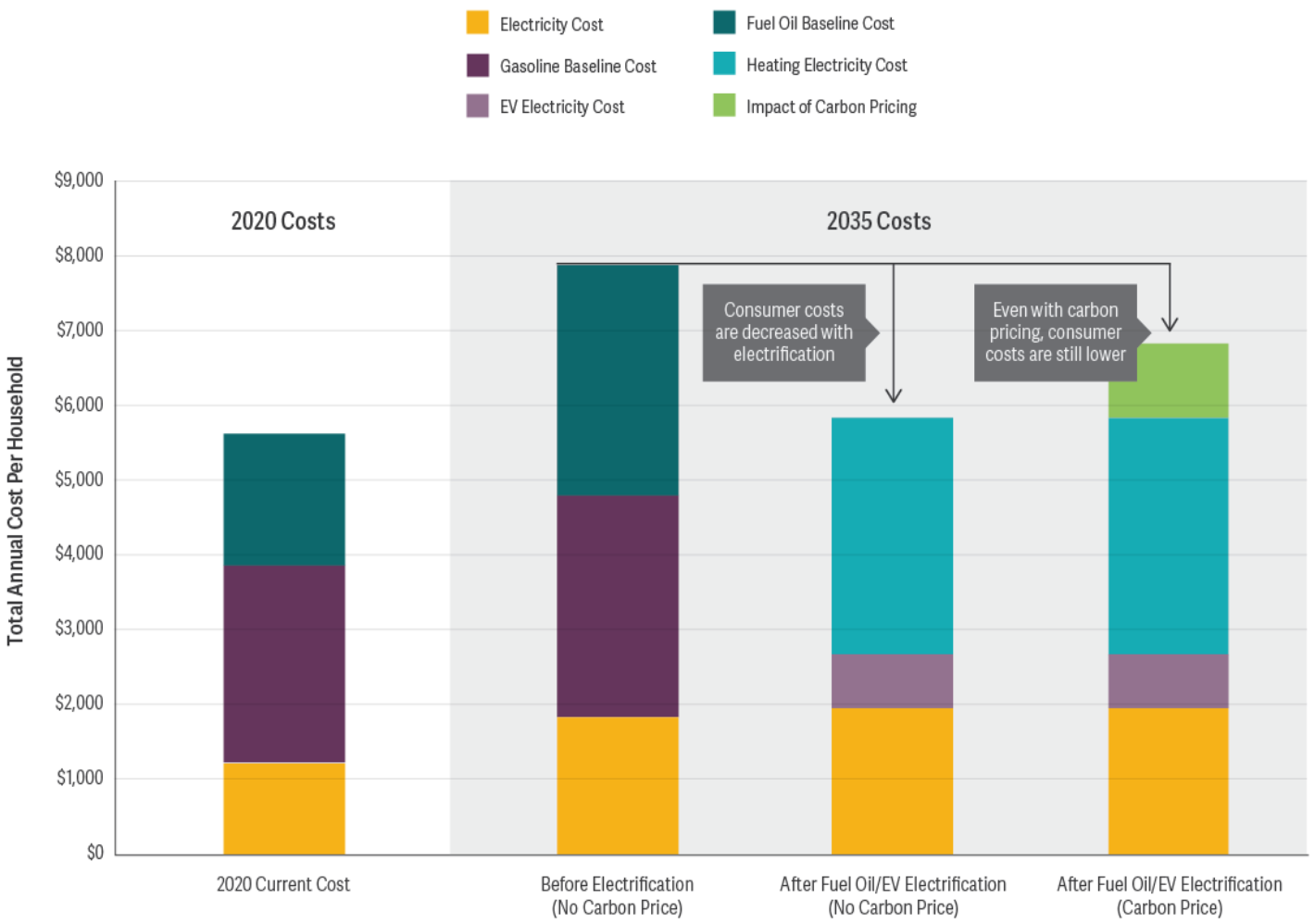


Economic sector emissions profiles with high electrification/CO_2 price

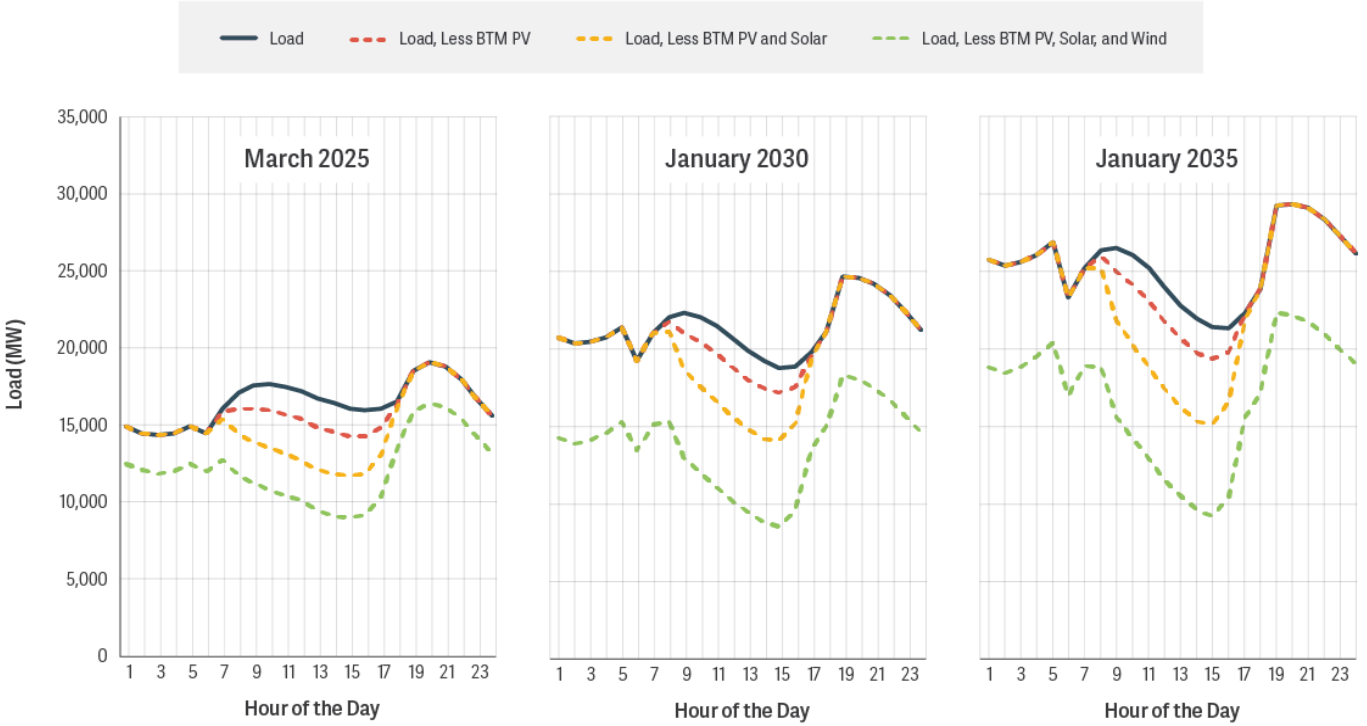


New England CO_2 prices sufficient to meet state emissions requirements



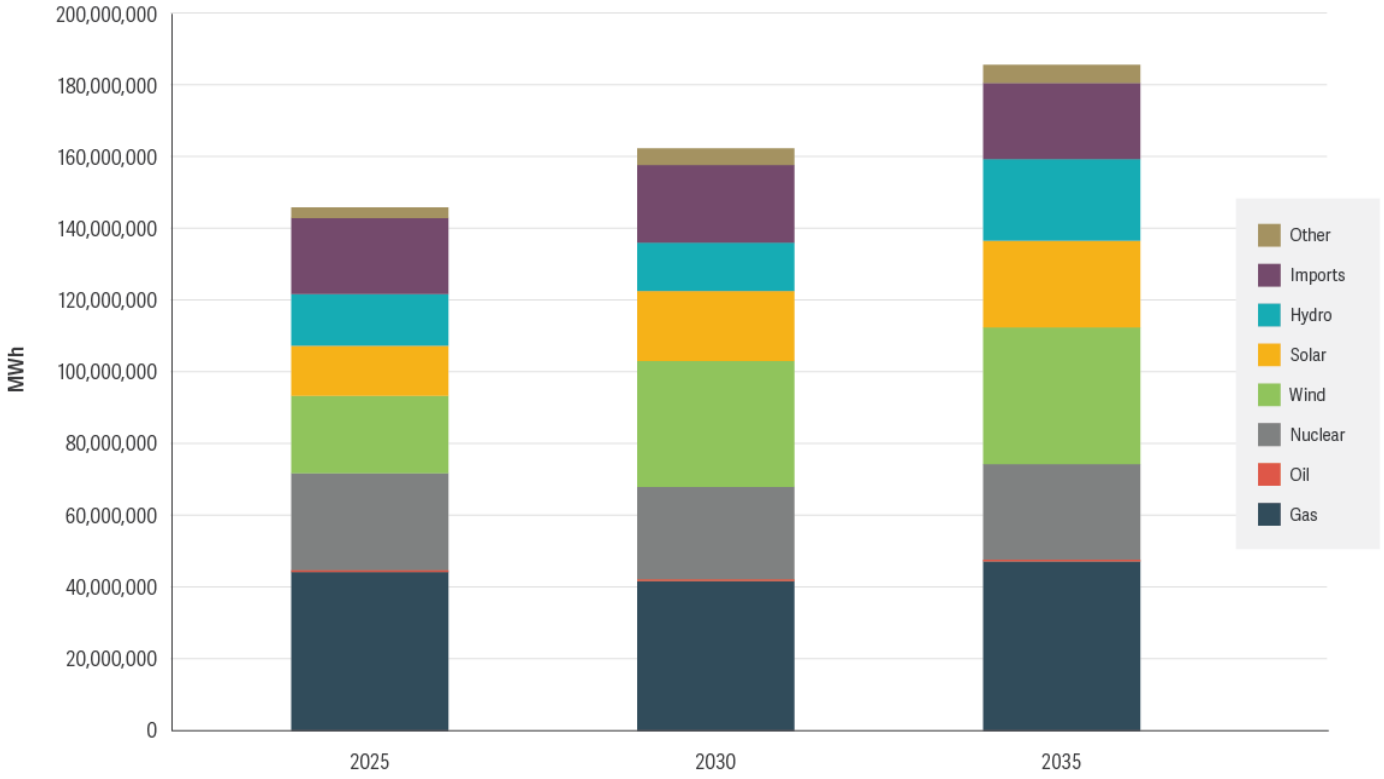

Electricity Cost
Gasoline Baseline Cost
EV Electricity Cost
Fuel Oil Baseline Cost
Heating Electricity Cost
Impact of Carbon Pricing
Total Annual Cost Per Household
$9,000
$8,000
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
2020 Costs
2035 Costs
Consumer costs are decreased with electrification
Even with carbon pricing, consumer costs are still lower
2020 Current Cost
Before Electrification (No Carbon Price)
After Fuel Oil/EV Electrification (No Carbon Price)
After Fuel Oil/EV Electrification (Carbon Price)

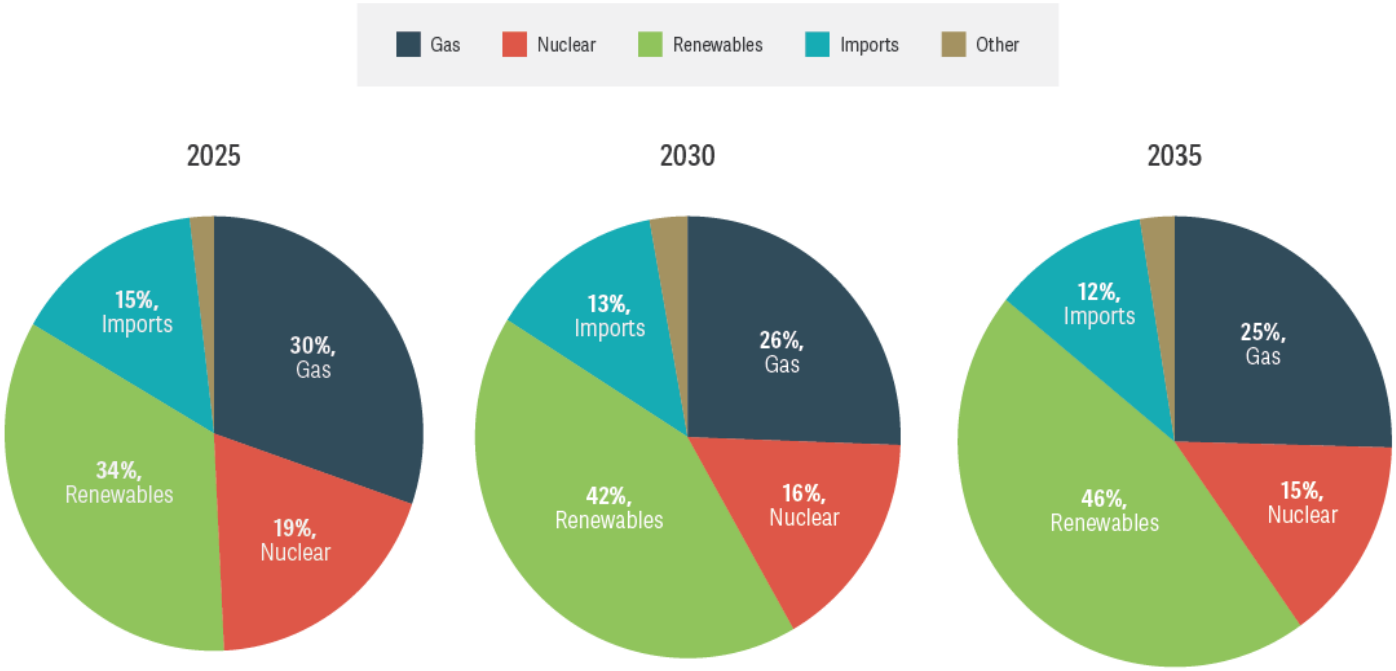
Electric ramp rates with high electrification in transportation and heating



Note:
[1] The reported months are those in which the maximum ramp-up net of renewables occurs.

Electric resource mix to meet emissions trajectory & supported by CO_2





Notes:

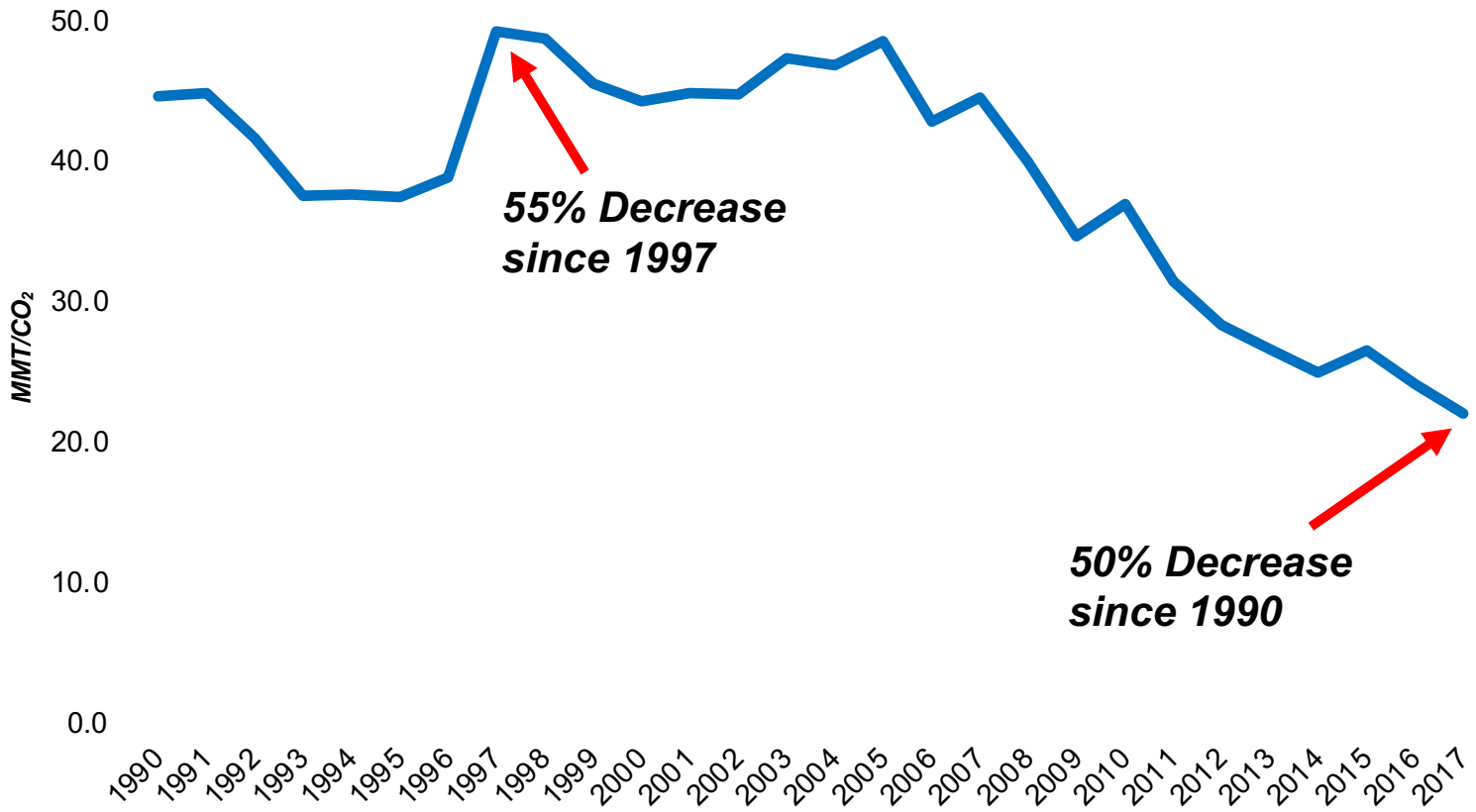
[1] Renewables includes hydro, wind, and solar generation.

[2] Oil generation makes up less than 0.001% of all annual generation and is not included in these charts.

[3] Imports = Imports between ISO-NE and HQ, independent of the New England Clean Energy Connect contract and imports/exports between ISO-NE and NYISO and NB. The NECEC contract appears in the Hydro category; Other = Landfill gas, biomass, refuse. Solar includes both utility-scale and behind-the-meter.

[4] The HECP scenario assumes 25% (2025), 50% (2030), and 75% (2035) of residential homes currently heating with gas, oil, or propane switch to electric heating and 25% (2025), 60% (2030), and 90% (2035) of consumers driving light-duty vehicles switch to electric vehicles. It also assumes additional EE (25% increase over assumed 2035 EE) and adds additional storage and zero-emission resources needed to accommodate increased electrification and maintain New England's progress towards meeting its carbon reduction standard. Finally, it adds a $25/short ton price on carbon in 2025, $65/short ton in 2030, and $70/short ton in 2035.

New England power plant CO_2 emissions



Source: http://www.eia.gov/environment/emissions/state/, released October 23, 2019

www.NEPGA.org

@NEPowerGen

Sen Martha Fuller Clark

Chair
Senate Energy
Committee

Sen Jeb Bradley,
Ranking Member
Senate Energy
Committee

A State Energy Update

Congressman Chris Pappas

Member of the House Transportation & Infrastructure Committee

2020 New Hampshire Energy Summit

NH Senator David Watters

Carrie Hitt, Executive Director, National Offshore Wind Research and Development

Matthew Mailloux, Energy Advisor, Governor's Office of Strategic Initiatives

Offshore Wind: NH Taking Steps Forward in 2020 and Beyond

Commission to Study Offshore Wind and Port Development

Presented by: Senator Watters

Development of a new offshore wind development industry is in the beginning stages of expanding to northern New England. It should be a goal of the state of New Hampshire to maximize the economic benefit that will come to New Hampshire as a result of this new industry.

Purpose of Bill (HB1245)

- To investigate in parallel with BOEM study economic development opportunities for NH in the following categories:
  - Supply chain needs
  - Port capabilities
  - Workforce development
  - Energy procurement, transmission, and storage
  - Fisheries and marine environment
- To ensure the success of offshore wind in the Gulf of Maine
- May consider if contracts with developers and utilities can deliver lower costs to rate payers

Commission Members

- Two members of Senate, one from each party
  1. ***Senator David Watters***
  2. ***Senator Jeb Bradley***
- *Four members of the House of Representatives*
  1. *House Environment & Agriculture:* ***Rep. Jane Beaulieu***
  2. *Fish and Game & Marine Resources:* ***Rep. Kathryn Harvey***
  3. *Science, Technology & Energy:* ***Rep. Peter Somssich***
  4. ***Rep. Renny Cushing***
- *Office of Strategic Initiatives:* ***Matthew Mailloux***
- *Business & Economic Affairs:* ***Taylor Caswell (Mark LaLiberte – alternate)***
- *Dept. of Environmental Services:* ***Ted Diers (Steven Couture – alternate)***
- *Public Utilities Commission:* ***Dianne Martin***
- *Fish & Game Dept.:* ***Cheri Patterson***

Commission Members (cont.)

- *Consumer Advocate:* ***Donald Kreis***
- *Pease Development Authority:*
- *Clean Energy NH:* ***Michael Behrmann***
- *President of University of New Hampshire:* ***Diane Foster***
- *Community College System of NH:* ***Sean Clancy***
- *2 members representing NH Commercial Fishing Community:*
    1. ***Jim Titone***
- *Business & Industry Assoc. of NH:* ***Tony Giunta***
- *2 members representing Labor, IBEW, & AFL-CIO:* ***Joe Casey & Glenn Brackett***
- *NH Electric Transmission Utility:* ***Vandan Divatia***
- *Rockingham Regional Planning Commission:* ***Tim Roache***
- *Strafford Regional Planning Commission:* ***Jennifer Czysz***

Commission Duties

- Commission shall consider and make recommendations on the following topics:
  1. Opportunities to establish a supply chain supporting development of offshore wind facilities
  2. Assess capabilities of Portsmouth harbor to become a regional hub both on and offshore to attract developers in the industry
  3. Evaluate potential workforce and workforce housing and transportation needs, and NH's ability to provide workforce educational opportunities, training, development, recruitment, housing, and transportation to meet those needs and benefits of utilizing NH workforce to the fullest extent possible
  4. Potential locations to interconnect offshore wind facilities to onshore transmission grid and advisability of an independent transmission solicitation process
  5. Opportunities for contracts and solicitations with offshore wind developers to ensure full development of projects at lowest cost to rate payers

Commission Duties (cont.)

- Commission shall consider and make recommendations on the following topics:
  6. Opportunities for research partnerships with UNH and CCSNH on workforce development, technology, and environmental issues
  7. Opportunities in coordination with congressional delegation and Dept. of Navy for use of facilities at Portsmouth Naval Shipyard
  8. Appropriate accommodations and protections for fisheries and marine habitat
  9. Coordinate with partner states on marine surveys and studies, meta-ocean data, and transmission studies
  10. Energy procurement requirements and schedules for public utilities
  11. Role of energy storage in transmission or energy procurement

Duties of the Office of Offshore Wind Industry Development

Support the work of NH members of Intergovernmental Renewable Energy Task Force and BOEM

Assist in developing and implementing offshore wind development strategies including:

- -Assessment of port facilities
- -Economic impact analyses
- -Supply chain analyses
- -Outcome and performance measurements

Collaborate with key state agencies and partners on development initiatives

Office of Offshore Wind Industry Development Duties (cont.)

Coordinate offshore wind industry economic development policy, including:

- Development of workforce
- Identification of and recruitment of offshore wind development employers
- Identification and recruitment of offshore wind supply chain employers
- Promotion of NH's benefits to the various components of the offshore wind industry
- Provide updates and guidance to the general court regarding policy and funding

National Offshore Wind Research and Development Consortium

September 29, 2020
NH Energy Summit
Present by: Carrie Hitt

NATIONAL OFFSHORE WIND
RESEARCH & DEVELOPMENT CONSORTIUM

National Offshore Wind R&D Consortium

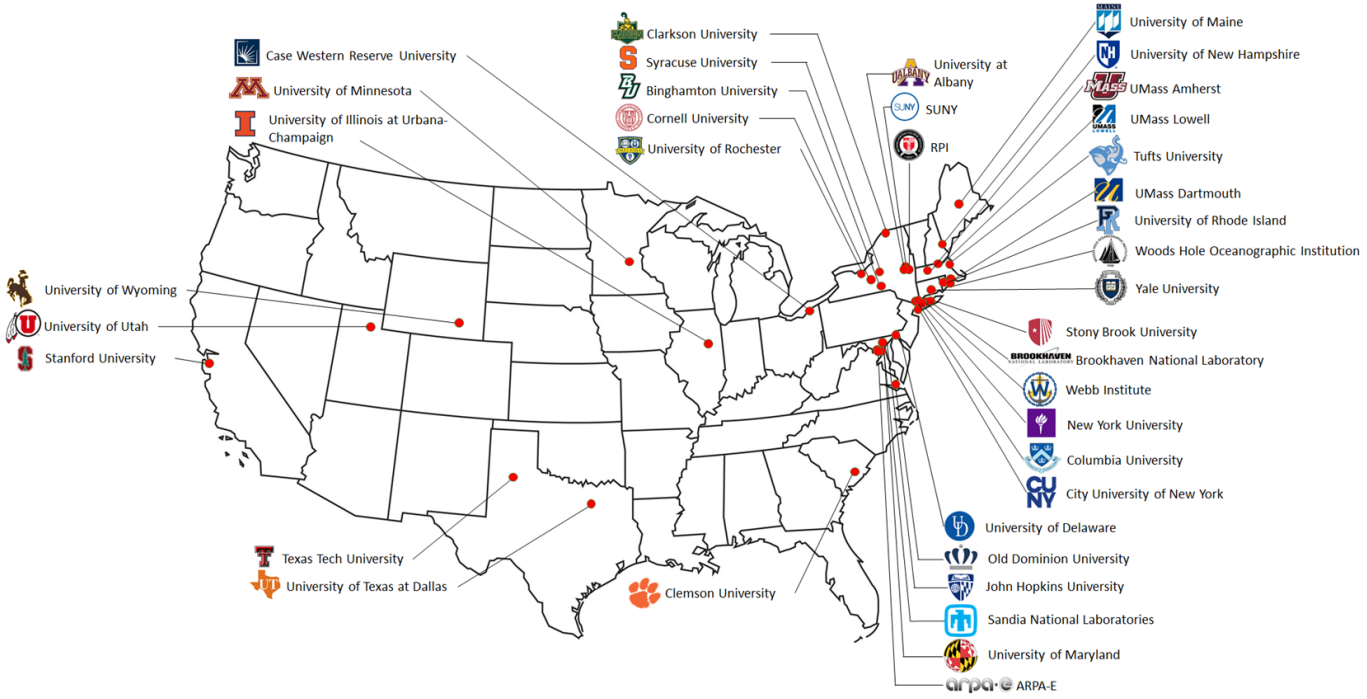
Goal: A nationally-focused, not-for-profit organization collaborating with industry on prioritized R&D activities to reduce levelized cost of energy (LCOE) of offshore wind in the U.S. and maximize other economic and social benefits

Desired Impacts:

- Innovations directly responsive to the technical and supply chain barriers faced by offshore wind project developers in the U.S.
- Build strong networks connecting technology innovators, investors, and industry
- Increase U.S. content and job opportunities

Consortium R&D Funding: @$41 M ($20.5 DOE funds, matched by NYSERDA) – plus state (MA, VA, MD) and member contributions

RDAG PARTICIPATION



Current R&D Awards = $17.6M

NYSERDA PON 4214

Pillar 1: Offshore Wind (OSW) Plant Technology Advancement	1.1: Array Performance and Control Optimization	Computational Control Co-design Approach for Offshore Wind Farm Optimization	Stony Brook University
		Impact of Low Level Jets on Atlantic Coast Offshore Wind Farm Performance	General Electric
		Reducing LCoE from Offshore Wind by Multiscale Wake Modeling	Cornell University
		Wind Farm Control and Layout Optimization for U.S. Offshore Wind Farms	NREL
	1.2: Cost-Reducing Turbine Support Structures for the U.S. Market	A Low-Cost Modular Concrete Support Structure and Heavy Left Vessel Alternative	RCAM Technologies
	1.3: Floating Structure Mooring Concepts for Shallow and Deep Waters	Demonstration of Shallow-Water Mooring Components for FOWTs (ShallowFloat)	Principle Power, Inc.
		Design and Certification of Taut-synthetic Moorings for Floating Wind Turbines	University of Maine
		Dual-Functional Tuned Inerter Damper for Enhanced Semi-Sub Offshore Wind Turbine	Virginia Tech
		Innovative Anchoring System for Floating Offshore Wind	Triton Systems, Inc.
		Innovative Deepwater Mooring Systems for Floating Wind Farms (DeepFarm)	Principle Power, Inc.
		Shared Mooring Systems for Deep-Water Floating Wind Farms	NREL
		Techno-Economic Mooring Configuration and Design for Floating Offshore Wind	UMass Amherst
	1.4: Power System Design and Innovation Challenge Statement	Development of Advanced Methods for Evaluating Grid Stability Impacts	NREL
Pillar 2: OSW Power Resource and Physical Site Characterization	2.1: Comprehensive Wind Resource Assessment	A Validated National Offshore Wind Resource Dataset with Uncertainty Quantification	NREL
	2.2: Development of a Metocean Reference Site	Development of a Metocean Reference Site near the MA & RI Wind Energy Areas	WHOI
Pillar 3: Installation, O&M and Supply Chain Solutions	3.2: Offshore Wind Digitization Through Advanced Analytics	Enabling Condition Based Maintenance for Offshore Wind	General Electric
		Physics Based Digital Twins for Optimal Asset Management	Tufts University
		Radar Based Wake Optimization of Offshore Wind Farms	General Electric
		Survival Modeling for Offshore Wind Prognostics	Tagup, Inc.
	3.3: Technology Solutions to Accelerate U.S. Supply Chain	20GW by 2035: Supply Chain Roadmap for Offshore Wind in the US	NREL

Offshore Wind Innovation Solicitation 1

- On August 4 NOWRDC released a solicitation for $9M in R&D projects that advance offshore wind in the U.S. (PON 4476)
- Open to companies, colleges/universities, and research institutions
- Types of proposals
  - Technical Feasibility Studies – Funding Limit $300,000
  - New Product, Systems, Service or Strategy Development – Funding Limit $800,000
  - Demonstration of Technologies, Systems or Services – Funding Limit $1,500,000
  - Multi-Phase Project spanning two or more of the above categories – Sum of Relevant Funding Limits
- Proposers are encouraged, but not required, to provide a projected cost share
- NOWRDC members Virginia, Maryland and Massachusetts have cost share programs available for projects benefiting those states
- Opportunity notice and related materials are posted here :https://nationaloffshorewind.org/solicitations/
- Innovate UK has a a limited funding available for UK collaboration

Challenge Areas

Challenge Area	Round 1 Enabling Large Scale Wind Turbines Due 21 September	Round 2 Support Structure Innovation; Supply Chain Development Due 19 October	Round 3 Electrical systems and Innovation; Mitigation of Use Conflicts Due 5 November
1	Enabling Fabrication and Installation of Future Foundations	Support Structure Solutions to Reduce Impact and Cost of Fixed and Floating Arrays (anchor and mooring designs)	Cable Innovation to Reduce Cable Failure, Electrical Losses and Costs
2	Port and Marine Systems Innovation to Support Onshore Logistics	U.S. Supply Chain Development Through Innovation	Innovation in Transmission Hardware Or Transmission Options to Reduce Interconnection Costs
3	Port Gaps Assessment and Strategies	Solutions to O&M Challenges	Innovation or Strategies to Mitigate Grid System Impacts
4	*Intentionally Blank*	Safety System Innovation	Technology Solutions to Mitigate Use Conflicts

All three Rounds of Challenge Areas are intended to close

NOWRDC Staff

Executive Director

Prior to joining the Consortium in September, 2019, **Carrie Cullen Hitt** served as President of New Hampshire Transmission Company, a regulated subsidiary of NextEra Energy Resources. She also held several positions in solar and battery storage market development at NextEra Energy Resources. From 2008-2014 Carrie was Senior Vice President of the Solar Energy Industries Association and President of the Solar Alliance. Carrie also served in several management positions market strategy and external affairs at Constellation Energy (now Exelon) from 2000-2008. She also held positions at the Harvard Electricity Policy Group and Green Mountain Energy Resources. Carrie began her career as an analyst for the Joint Energy Committee at the Massachusetts Legislature. She is a graduate of Clark University (BA) and Johns Hopkins University (MA).

Program Managers

Originally from Long Island, **Christine Hirt** received her Master's of Marine Policy from the University of Delaware where she studied perceptions of the Block Island Offshore Wind Project, the first offshore wind project in the United States. She supported the New Jersey Board of Public Utilities' offshore wind solicitation – the nation's largest single-state solicitation of offshore wind at the time – before heading to Washington D.C. to complete the Sea Grant Knauss Marine Policy Fellowship with the National Oceanic and Atmospheric Administration. Christine brings her experience and passion for marine policy, coastal management, and offshore wind to the Consortium, and looks forward to continuing to support this exciting industry. Christine can be reached at christine.hirt@nationaloffshorewind.org.

Juergen Pilot has a professional background in the on-shore wind industry and an educational background in Marine Engineering. A native of Bangor, Maine, Juergen attended Maine Maritime Academy, graduating with a B.S. in their Marine Systems Engineering program, and minoring in Naval Architecture and Mathematics. He obtained his EIT Certification in Mechanical Engineering in May of 2015. Juergen worked with onshore industry leader Nextera Energy's Wind Engineering & Construction program from 2015 to 2020, piloting their Leadership and Development program as well as completing rotations in Project Engineering, Project Estimating, Early-Stage Project Management, and Construction Project Management. He can be contacted at juergen@nationaloffshorewind.org.


November 9-12 Tech Conference Registration is open!
Thank you
www.nationaloffshorewind.org
Carrie.hitt@nationaloffshorewind.org
NATIONAL
OFFSHORE WIND
RESEARCH & DEVELOPMENT CONSORTIUM

Governor Sununu's Offshore Renewable Energy Task Force

Matt Mailloux

Energy Advisor at New Hampshire Office of Strategic Initiatives

https://www.boem.gov/renewable-energy/state-activities/new-hampshire-activities

2020 New Hampshire Energy Summit

Emerging NH Energy Initiatives: 5 Speaker “Speed Dating”

RESA
Retail Energy Supply Association

Time to Consider a Purchase of Receivables Program

NH Energy Summit

September 29, 2020

Dan Allegretti – Sigma Consultants
(on behalf of RESA)

POR – The Basics

What is a Purchase of Receivables program?

A purchase of receivables program (POR) is a mechanism for creating a risk pool, something like insurance, that allows competitive electric suppliers to syndicate the risk of non-payment (bad debt) across the entire pool of electric customers.

How does a Purchase of Receivables program work?

Under a POR the electric utility does the billing for the competitive electric suppliers. When the utility gets paid by the customer for electricity it remits payment to the supplier less a holdback for bad debt. That bad debt holdback is fixed in advance but is periodically adjusted on a going forward basis to match as closely as possible the actual cost of non-payments.

Are Purchase of Receivables programs generally limited to residential customers?

Yes. For business customers the use of credit reports and collateral requirements have not been an impediment to robust competition. Many business customers also take advantage of more complex products that are not supported by utility billing systems. POR programs are most valuable as a tool for advancing competition in the residential market.

POR – Benefits and Costs

What are the benefits of a Purchase of Receivables program?

First, a POR program enables suppliers to incorporate the known cost of non-payment into their prices. This eliminates the need for credit reports on individual customers, a cost savings that can be passed on to consumers. While suppliers could try to estimate the cost of non-payments across their own customer base, eliminating the uncertainty allows suppliers to offer better prices and facilitates market entry by new suppliers. In addition, a POR makes suppliers more willing to serve low income communities which may have higher default rates.

Who bears the cost of a Purchase of Receivables program?

Suppliers bear the cost of the program. The holdback rate is periodically reviewed and approved by the commission. If the utility has under-collected the actual cost of non-payment then a higher holdback rate is approved going forward and the money is applied against past and current non-collections until the next adjustment. If the utility has over-collected the rate is reduced until the next adjustment.

POR – Getting There from Here

Are Purchase of Receivables programs in place in other states?

Yes, many states with retail choice have adopted POR programs. Eversource currently administers POR programs for its customers in Massachusetts and Connecticut. States that have adopted POR have seen an increase in the number of suppliers and offers in the residential market following POR implementation.

What Will it Take for New Hampshire?

The implementation of a POR program will require the NHPUC to establish rules for utilities and suppliers to put a program in place. Periodically the NHPUC will need to review the discount rate applied by the utility and adjust it accordingly.

NH Emission Commission: A non-partisan ad hoc commission working toward identifying science-based emission reduction goals for New Hampshire

Presented by: Sheila Vargas
Government & Community Relations Manager
The Nature Conservancy

The Nature Conservancy
Protecting nature. Preserving life.

www.nhemissioncommission.com
@CurbNHEmissions

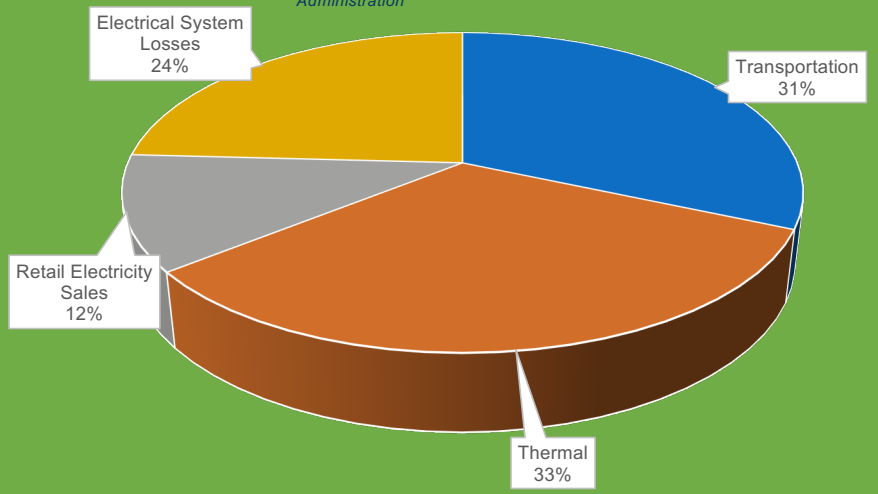
Decarbonizing NH's Thermal Energy Sector

Presented by: Huck Montgomery, Director of Government Affairs

- Imperative for climate action and decarbonization is indisputable
- Thermal energy (building & process heat) largest share of NH energy consumption
- GHG-intense fuels (petroleum) dominate NH's thermal energy sector (54.6%)
- Options for decarbonizing NH thermal energy:
  - Convert oil users to lower-emitting fuels
  - Expanded energy efficiency programs
  - Replace fossil fuels with renewables
    - Renewable Natural Gas
    - Green hydrogen
  - Strategic electrification
- No single solution is optimal for every end-use scenario

New Hampshire Energy Consumption (2018)

Source: US Energy Information Administration



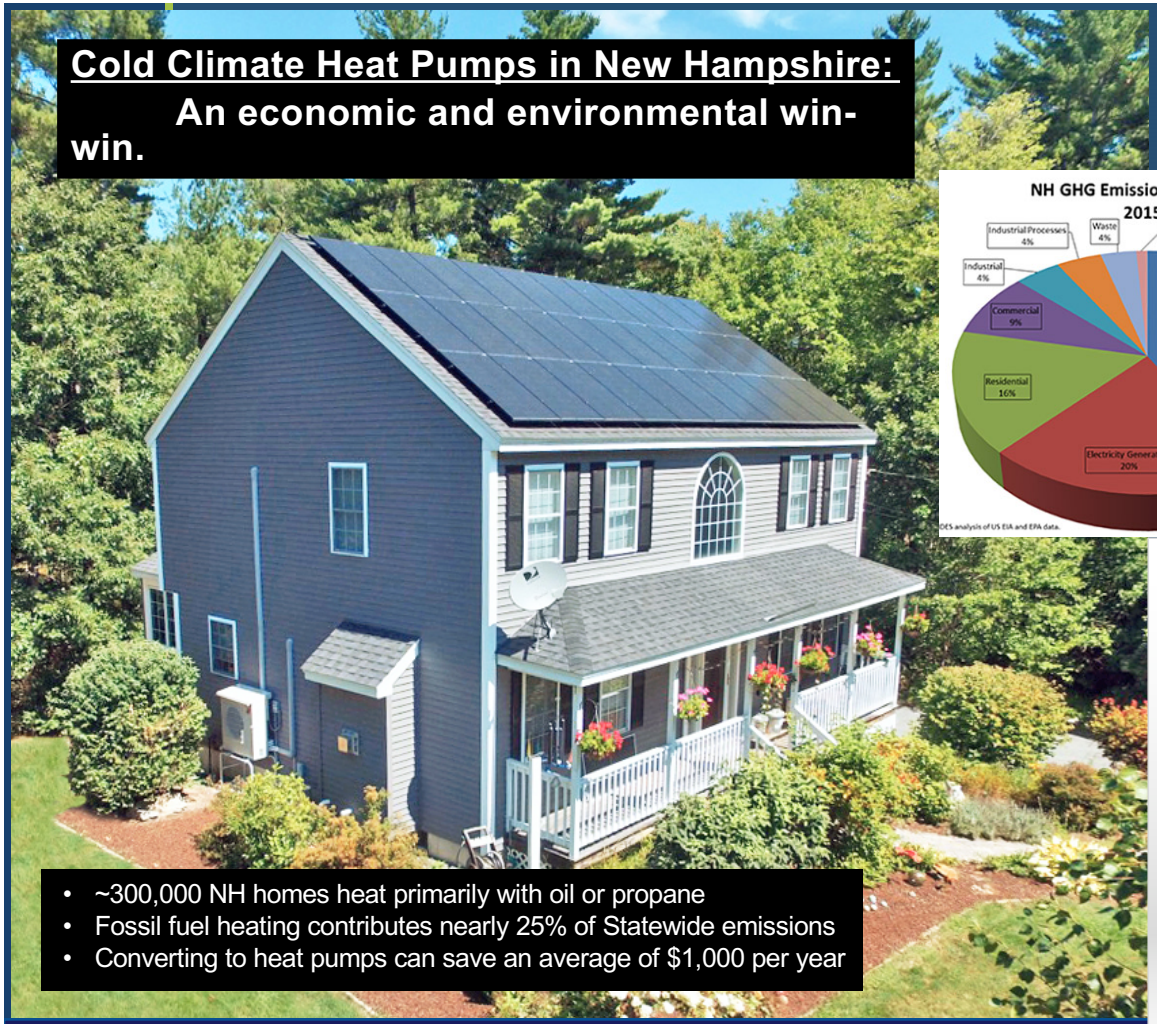
"More reliance on electricity reduces carbon emissions, but such "strategic electrification" is best targeted at fuel oil users in the first instance, especially those with no access to natural gas supply. Doing that won't hold back the deployment of renewable energy."

"Natural gas, sold responsibly as a rate-regulated commodity, is compatible with bold climate action."

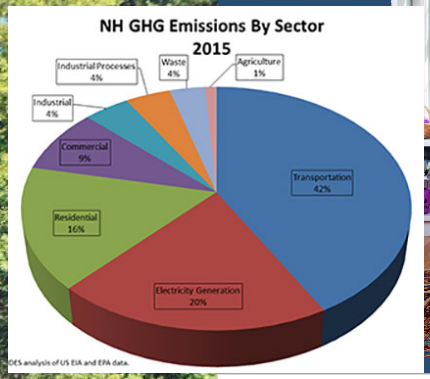
- D. Maurice Kreis, NH Consumer Advocate

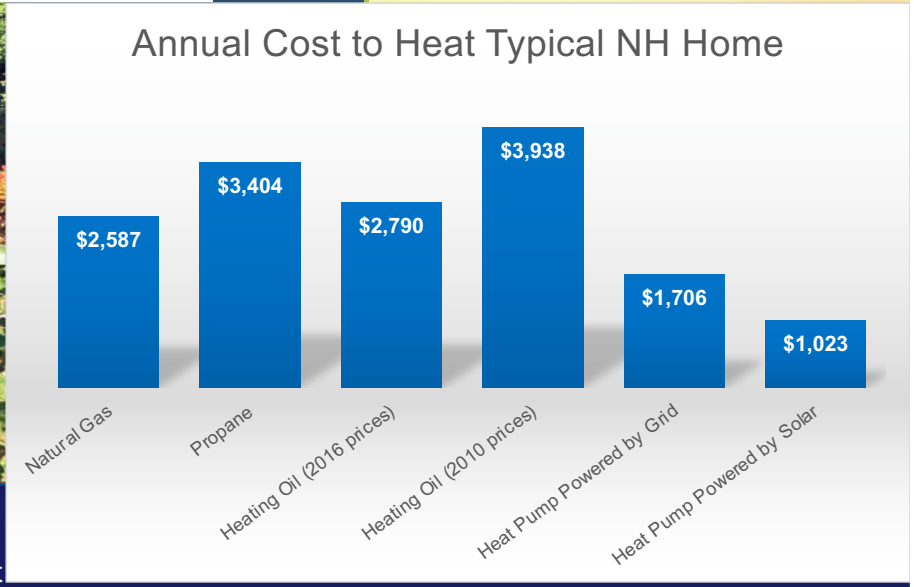
Cold Climate Heat Pumps in New Hampshire:

An economic and environmental win-win.



- ~300,000 NH homes heat primarily with oil or propane
- Fossil fuel heating contributes nearly 25% of Statewide emissions
- Converting to heat pumps can save an average of $1,000 per year





REVISION ENERGY

Presented by
Fortunat Mueller, President

KEY CAPTURE ENERGY

September 2020

Energy Storage

New Hampshire Energy Summit

Key Capture Energy identifies, develops, constructs and operates energy storage solutions to foster greater deployment of renewable energy, create a more stable electric grid, and provide value to all ratepayers.

KEY CAPTURE ENERGY

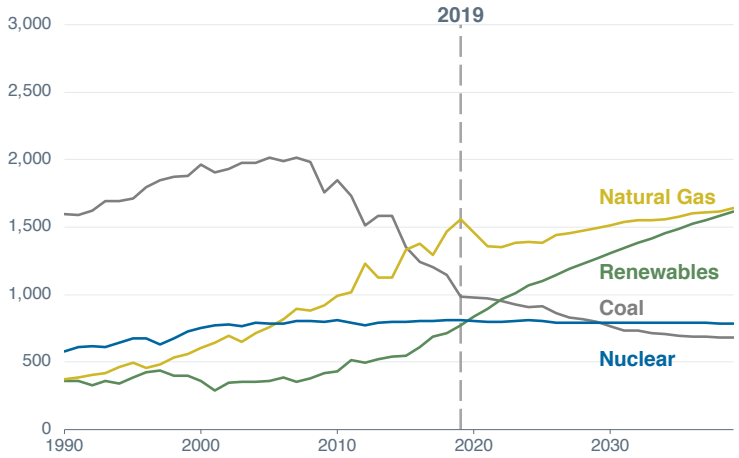
Key Capture Energy

- Founded in 2016 as a utility-scale energy storage company – engaged in development, procurement, construction, contracting, and operations
- Operating 20 MW project in New York, three 9.9 MW projects in Texas
- Constructing a distribution-deferral Non-Wires Alternative (NWA) project in New York State
- Beginning construction on 200 MW utility-scale storage in Texas
- Several projects in New England in development

U.S. Transition to Clean Energy Future

The electric grid is rapidly de-carbonizing

Electricity Generation by Fuel Type (TWh)



2019

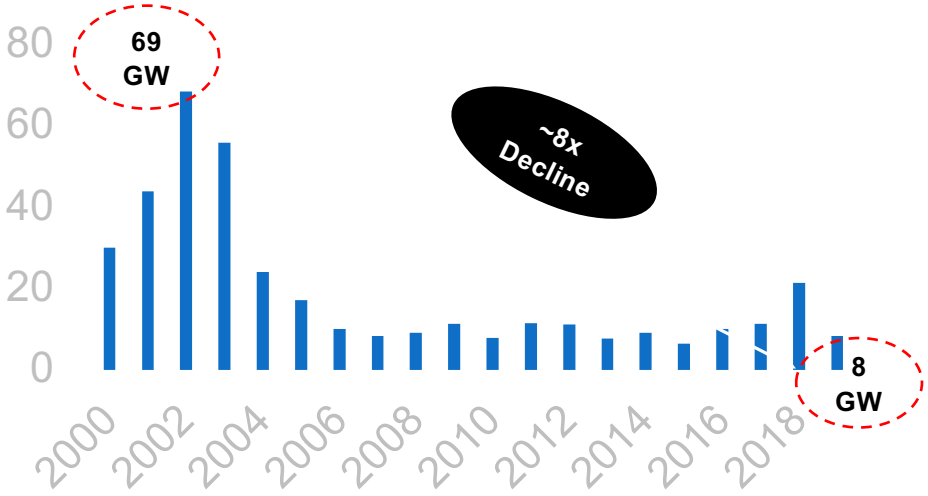
2030

- Electrification of the transportation and heating sectors
- Pace of clean energy growth has historically been underestimated

New Renewable Projects Replacing New Peakers

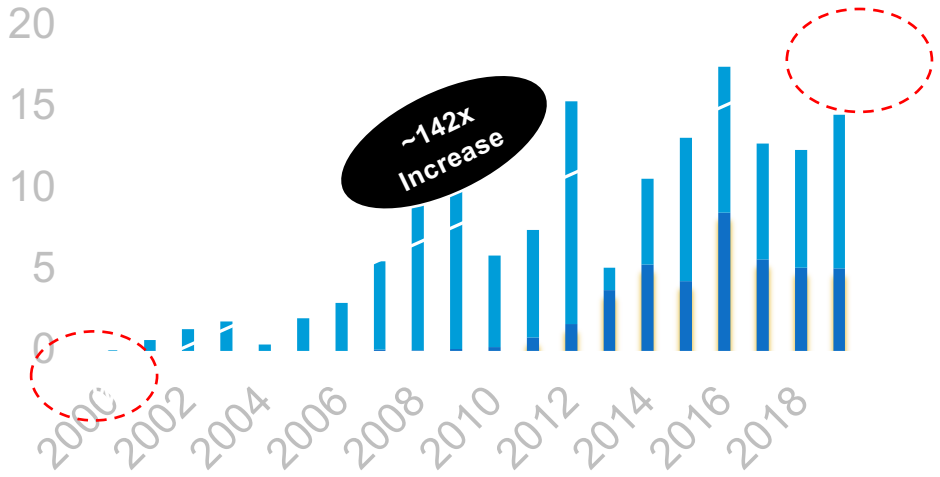
Instead of fast-responding natural gas generators, new US capacity is intermittent wind or solar

Historical Natural Gas Additions (GW)



- Investment in natural gas in the U.S. has decreased from $100 billion in 2002 to under $6 billion in 2019

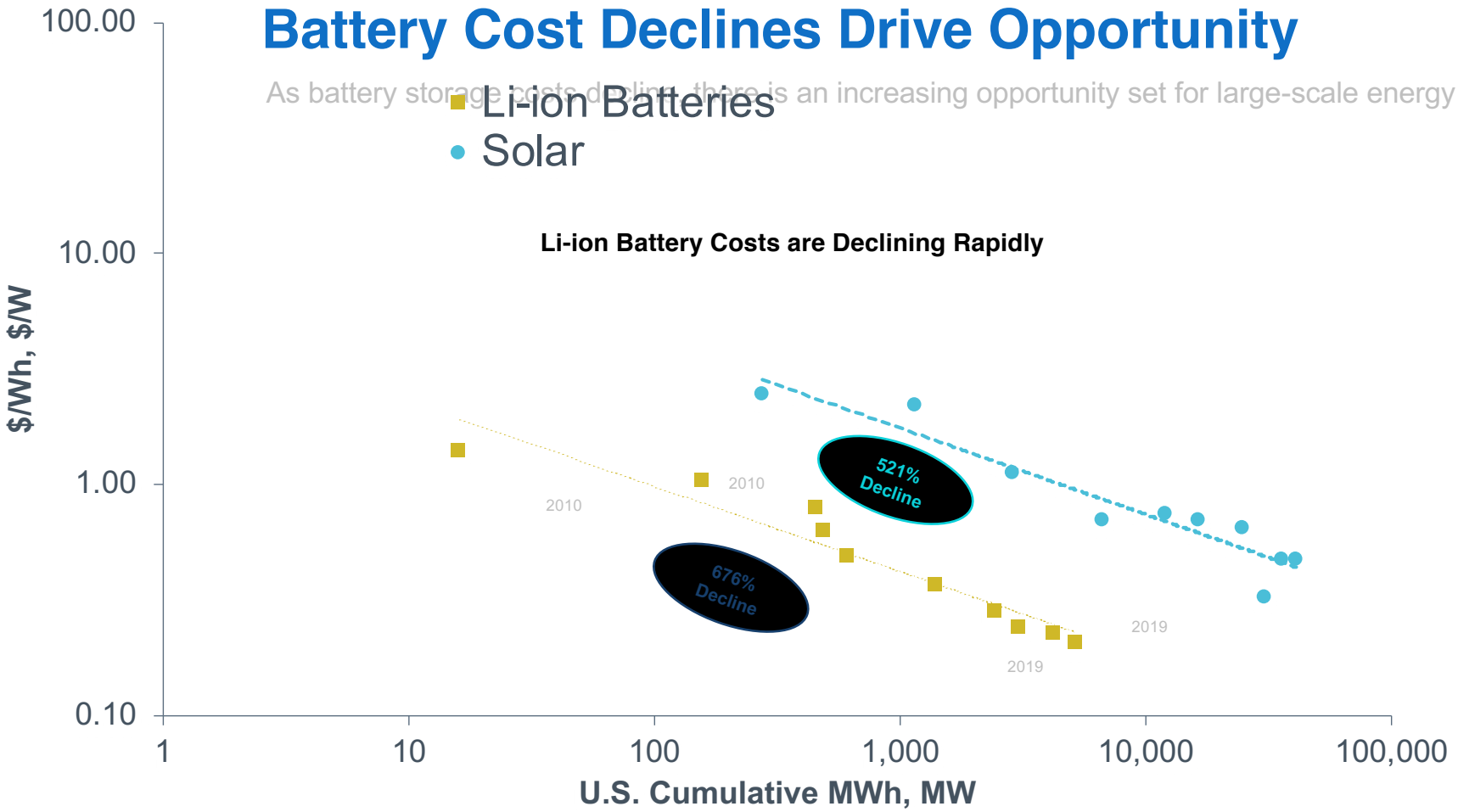
Wind and Solar Additions (GW)



- Annual wind & solar installed capital costs have increased from less than $1 billion in 2000 to over $23 billion by 2019

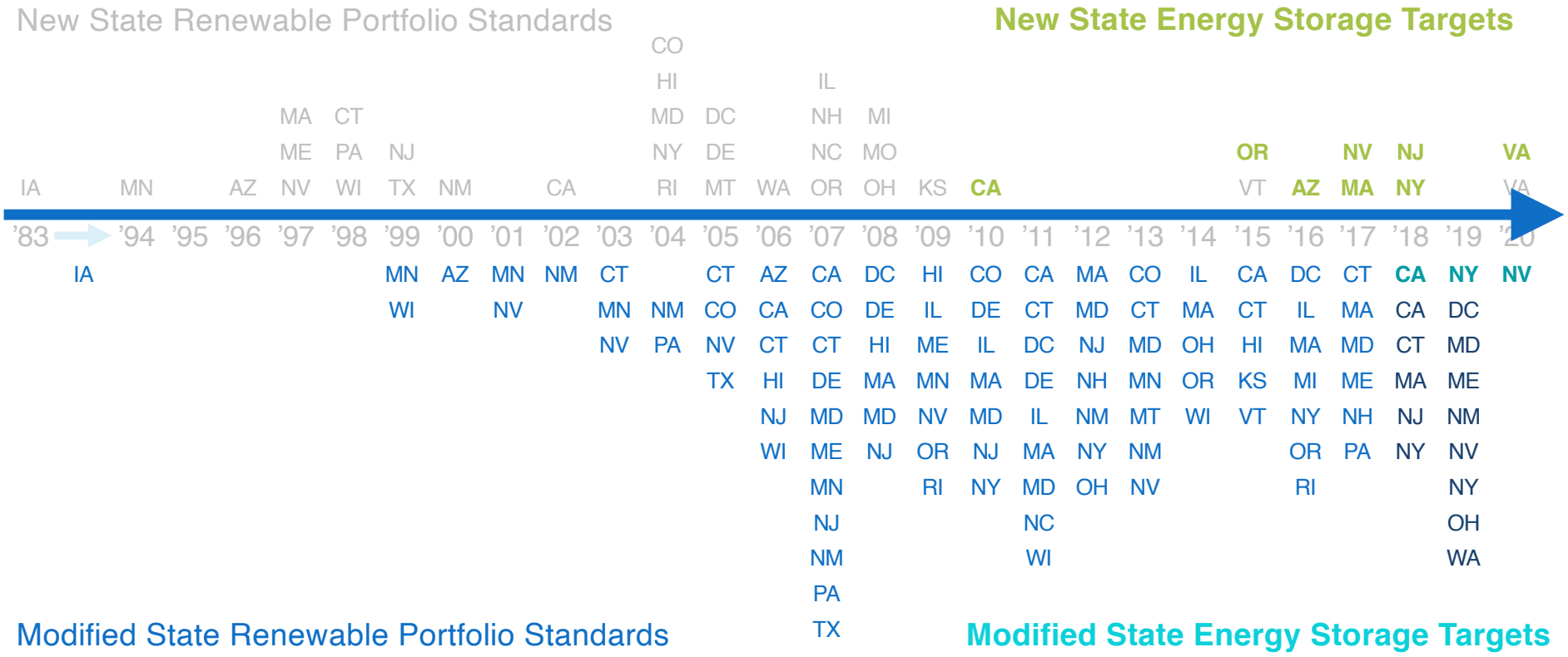
Battery Cost Declines Drive Opportunity

As battery storage costs decline, there is an increasing opportunity set for large-scale energy storage



Intersection of State Policy and Wholesale Markets

If wholesale market economics do not support new energy storage builds – state support will



Why do States Matter?

Battery development takes time.

Encouraging investment now will permit the technology to be available when we need it.

States can ensure a level playing field for batteries.

Rates and Regulation

Ensure that batteries receive fair electric rate treatment and can properly participate in markets and programs

Grid Access

Assure there are non-discriminatory rules for batteries to interconnect to the grid

Encourage Private Investment

Encourage new grid technology that can reduce costs at low risk to ratepayers.

Rachel Goldwasser
rachel.goldwasser@keycaptureenergy.com
www.keycaptureenergy.com

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