Towards a Low Carbon, Consumer Friendly and Lower Cost Energy Future: Three Themes

I. Emission Trends Are Falling in the Power Sector: We Need to Keep Going and Apply Low Carbon Electricity to Transportation and Building Technologies

II. Technology Advancements, Cost Reductions, Economic Gain, Greater Consumer Control and Emissions Reductions are Aligning:
   ➢ Envisioning a Consumer Friendly, Community Oriented and Low Carbon Energy Future

III. To Get There, We Need to Undo Outdated Approaches and Realign Incentives, Revenue and Fairly Value Diverse Energy Resources
Actual 2015 emissions of 83.2m tons fell 6% below the current cap, and 16% below projections.
Boston After Sandy Storm Surge

Image from WGBH, based on a Boston Harbor Association report depicting the impacts of 7.5-foot storm surge (similar to what parts of New York City experienced during Sandy).
Pathway to Deep GHG Reductions: Electrification Using Low Carbon Generation

Full Electrification Illustration

Current emissions from all gasoline vehicles and fossil fuel heated buildings

If all gasoline vehicles and buildings shift to electricity: 50% GHG Reduction

Further GHG reductions from increased renewable electricity: up to 80% reduction

% Renewables
- Current RPS (16-19%) by 2030
- 50%
- 75%
EnergyVision

Electrify Buildings and Transportation  Modernize the Grid  Clean Electric Supply  Maximize Energy Efficiency

Low Carbon Power + New Electric Technologies = Pathway to Deep GHG Reductions
Maximize Energy Efficiency
Impact of Efficiency on Overall Load Forecast

Efficiency Reduces Power Grid Costs

New England Demand Forecast

Energy efficiency investments have deferred $416 Million of transmission investment in Vermont and New Hampshire

Source: ISO-NE Data.
State Trends:
Cost-effective EE is meeting ~13% of regional electric consumption

Source: Acadia CLEAN Center. Analysis using Electric Efficiency Data for CT, MA, ME, NH, RI, VT from Electric Efficiency Program Administrator Annual Reports, Plans and State Efficiency Database.
Electrification: Buildings

Emissions from Heating Sources

- **Oil**: 18,000 lbs
- **Propane**: 14,000 lbs
- **Natural Gas**: 10,000 lbs
- **Electric Heat Pump**
  - **Current Mix**: 8,000 lbs
  - **50% Renewables**: 6,000 lbs
  - **75% Renewables**: 4,000 lbs

Green color variation for Heat Pump emissions represents the amount of renewables in the regional electric generation mix.
Electrification: Transportation

Emissions from Vehicles

- Current Mix
- 50% Renewables
- 75% Renewables
- Nissan Leaf
- Current Mix
- 50% Renewables
- 75% Renewables
- Chevy Volt
- Medium Sedan

Emissions from Gasoline
Emissions from Electricity


Advancing the Clean Energy Future  www.acadiacenter.org
Modernize the Grid: Adapt from One Way to Two Way

Power Flows One Way; Dollars Flow the Other

Power and Dollars Flow Two Ways
Empowering the Modern Energy Consumer

- Consumer control
- New opportunities
- Embrace innovation
- Remove barriers to new technologies
- Protect consumers
- Fair rates
Community EnergyVision

• Opportunities for communities to take control of their energy future
  • Community solar
  • Leveraging residents’ buying power for clean energy resources
  • Geographically targeted energy efficiency
  • Strategic use of storage, electric vehicles, distributed generation
• Economic, regulatory, legal, information, barriers

Self-Reliance / Local Control / Consumer Oriented / Improving Neighborhoods / Cleaner Air
Community Energy Future
State Trends:
Pilots deploying local energy resources as substitutes for T&D infrastructure

Nantucket NWA Pilot

Vermont Act 61
Maine Boothbay Pilot
RI System Reliability Procurement
LIPA TX Deferral Proposals

Incremental Load Relief by Technology

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• **Align utility incentives and earnings and grid planning** with consumer and environmental goals and technology advancements.

• **Level the playing field for customer-side resources** to ensure that the best options for the environment and consumers are selected.

• **Maintain the best of what we have** – energy efficiency investments, moving to clean power, reliability – while evolving to a more modern energy system.
Modernize Outdated Rules as New Technologies
Change the Energy Landscape

Transmission Line Costs vs. Non-transmission Alternative

Cost Shared by States Costs Borne by One State

Transmission investment drivers:
follow the money: 11% v. 0-4%

VT, 4.1%
RI, 7%
ME, 8.4%
NH, 9.2%
CT, 25.7%
MA, 45.5%
Cost Allocation for Local Energy Resources

Maine Power Reliability Program: Economic Incentives Lead to More Costly Decisions

<table>
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<tr>
<th>Options</th>
<th>Project cost</th>
<th>Cost to Maine</th>
<th>Cost to Massachusetts</th>
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<tr>
<td>1) MPRP (regionally allocated)</td>
<td>$ 1.4 Billion</td>
<td>$ 118M (8.4% of $1.4B)</td>
<td>$ 637M (45.5% of $1.4B)</td>
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<td>2) Local Energy Resources</td>
<td>$ 800 Million</td>
<td>$ 800M (100% of $800M)</td>
<td>$ 0 Million (0% of $800M)</td>
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<td>3) If local energy resources had been regionally allocated</td>
<td>$ 800 Million</td>
<td>$ 67.2M (8.4% of $800M)</td>
<td>$364M (45.5% of $800M)</td>
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- Transmission: 11.74% ROE
- Distribution: 7-8% ROE
- Local energy resources: 0%

Regional expenditure on transmission for reliability continues to grow vs. state priorities for increasing energy efficiency, distributed energy resources, large-scale renewables.
Disconnect between Transmission System and State Priorities

Transmission Expenditure Index with 2000 = 100 (2009$)

Source: Acadia Center analysis of FERC Form 1, Plant in Service for 2000-2014;
Transmission System Trends:
Residential transmission rates are escalating dramatically

Source: Eversource tariffs for residential rates
Distribution Rates Rising  2002-2016

Monthly Delivery Charge for Eversource CT Customer @ 700 kWh per Month
How Consumers Pay for the Power They Use

Flat rates do not reflect underlying cost or value structures. Electric rates should allow us to make smart economic & energy decisions to save money and energy.
How Consumers Get Paid for the Power They Produce

Customers should pay the right value for staying connected to the grid and get paid the right value for the services they provide.

Value of Solar Generation

- Grid Value
- Societal Value

- Net Social Cost NOx
- Net Social Cost SO2
- Net Social Cost CO2
- Avoided NOx Compliance Costs
- Avoided CO2 Compliance Costs
- DRIPE - Capacity
- DRIPE - Energy
- Avoided Distribution Costs
- Avoided Transmission Costs
- Avoided Capacity Costs
- Avoided Energy Costs
Today’s Decisions Will Determine Our Energy Future

Potential Contributions of Energy Resource Alternatives

- 1.6 GW of Combined Heat & Power (1/4 of potential)
- All Cost Effective Gas Efficiency (1.2% of Sales)
- All Cost Effective Electric Efficiency (2.5% of Sales)
- RPS Expanded to 25% by 2025 (23.4% by 2020)
- 743 MW of Energy Storage (Proportional to CA)
- 1.2 GW of Electric Transmission

Proposed Additional Pipeline Capacity

Natural Gas Peak Day Impact (MMCF/Day)
Share of Regional GHG Budget Consumed by Natural Gas With Pipeline Additions

New England States Emissions from Natural Gas as Percentae of GHG Targets

- Natural Gas Emissions from Additional 1.3bcf (Northeast Energy Direct)
- Natural Gas Emissions from Additional 1.0bcf (Access Northeast)
- Natural Gas Emissions from Approved Expansions of .4bcf (AIM & TGP)
- Current Natural Gas Emissions

Sources: EIA SEDS, EPA SIT Tool, NEG/ECP 2001 Climate Change Action Plan
Continue to Improve ISO-NE Forecasts

Fully and fairly incorporating DER Will Impact Energy Infrastructure
Task Ahead to Embrace a Low Carbon Energy Future Involves Updating the Rules that Govern Energy System Revenues and Planning:

Is There a Win Win Result?

- Pro-consumer incentives for utilities
- Rates that help customers
- Make unequal cost sharing fair
- Adjust monopoly control
- Remove limits on customer generation
- Advancing community engagement
- Integrating community energy technologies
- Providing consumers with the information they deserve
- Only grant additional incentives for additional risk.
- ISO-NE should consider requiring guaranteed cost bids.
- Improve accuracy of project cost estimates to allow meaningful comparison.
- Don’t pay incentives on cost over-runs.