Efficiency Standards and the Power System: Benefits for Vermont

Senate Natural Resources and Energy Committee
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New England Demand Response Initiative

- **Unprecedented Broad Sponsorship:** ISO-NE, NECPUC, NESCAUM, NYISO, DOE, EPA, FERC
  - State + Regional + Federal agencies
  - Utility + Environmental regulators
  - Direct support and participation by FERC

- **Broad, Regional Stakeholder Participation:**
  - More than 30 stakeholder groups, including 3 ISOs, 6 state PUCs, utilities and DR providers, DOE, EPA, state air directors, market participants, state energy offices, and advocates

- **Expert consulting team** provided Framing Papers, technical support – great library of resources

- **38 Major recommendations**, almost all by consensus of all stakeholders
Selected NEDRI recommendations—Energy Efficiency

- **EE-1:** Ratepayer support for EE should be maintained, and potentially increased “to capture all cost-effective energy efficiency”

- **EE-3:** New England states should adopt common model appliance/equipment standards for ten specific products – could displace 25% of load growth to 2020

- **EE-4:** Update building codes and improve their implementation across the region – could displace 10% of load growth to 2020;

- **EE-6:** Create a regional coordinating council for EE program design, cooperation, and assessment.
Gas Prices Up to Stay

Natural Gas Futures Price ($/MMBtu)

Source: NYMEX
Figure 4. Electricity generation by fuel, 1970-2025 (billion kilowatthours)
Coal’s Resurgence in Electric Power Generation

Proposed New Plants

100 Plants
63 GW
$73 Billion

Equivalent Power for 63 Million Homes

Undecided
4.2 GW
$3.9 B

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LEGEND
Capacity (GW)
Investment (B - Billion $)
Proposed Plants

OCES 09/03/2004
Why efficiency? A regulator’s view

- New power plants & fuel *more expensive*
- Rapid load growth causes *reliability* problems
- Generation is a major source of *pollution*
- *Productivity* is the engine of growth – becoming more efficient improves the economy
- Lots of low-cost efficiency is *available*
- *Key point: the power system includes generation, wires, AND end use consumption*
Efficiency is cheaper

NE-ISO Average Monthly Price

**Delivered Cost of Wholesale Power**
- Wholesale Spot Market Price
- Efficiency Vermont, Contract Commitment

Efficiency Savings:
- 1 cent/KWh (Jan 2002), more than 6 cents/KWh (Mar 2003).
- Currently 3.6 cents/KWh

- [Image of graph showing trends in power costs and efficiency savings over time.]
The Public Value of Efficiency

Demand Curve

Price

Assumed Demand

Supply Curve

Shaded area is savings to wholesale market

P1

P2

Q2

Q1

Quantity
Efficiency lowers peak loads, improves reliability

Combined Commercial Cooling and Lighting Loadshape
Baseline and Load Management Compared to Energy Efficiency

![Graph showing energy usage over hours, with Load Management, Baseline, and Efficient comparisons.](image-url)
Efficiency lowers pollution costs

- No single industry has a larger environmental "footprint" than the electric industry
- In America, the electric industry contributes
  - 67% of the SOx emissions
  - 28% of the NOx emissions
  - 36% of the CO2 emissions
  - 33% of the mercury emissions
- but only 2.5% of the gross national product
The Large Efficiency Reservoir

- DOE “Five Labs” Study (1997)
  - Cost-effective DSM potential is 15% of total load by the end of this decade

- ACEEE studies, summer 2000:
  - At least 64,000 MW available cost-effectively by 2010 from just three programs:
    - Residential AC upgrades & repairs
    - Commercial HVAC equipment and tuneups
    - Commercial lighting design and upgrades

- California, Summer 2001: 12% reduction
  - “Crash” effort, many programs

- New England 2003: EE and LM can meet 80% of load growth over next 15 years
What if the NEDRI Recommendations were implemented actively?

One post-NEDRI estimate:

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ISO-NE Peak Demand Forecast (MW)</td>
<td>26,258</td>
<td>29,768</td>
</tr>
<tr>
<td>Energy Efficiency Total</td>
<td>500</td>
<td>2,450</td>
</tr>
<tr>
<td>Building Codes</td>
<td>0</td>
<td>700</td>
</tr>
<tr>
<td>Appliance Standards</td>
<td>500</td>
<td>1,750</td>
</tr>
<tr>
<td>Enhanced SBC Funding</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Short-Term DR Total</td>
<td>220-440</td>
<td>440-1,100</td>
</tr>
<tr>
<td>Emergency Programs</td>
<td>200-400</td>
<td>400-900</td>
</tr>
<tr>
<td>Market Programs</td>
<td>20-40</td>
<td>40-200</td>
</tr>
<tr>
<td>Load as Contingency Reserve</td>
<td>10-25</td>
<td>60-300</td>
</tr>
<tr>
<td>Dynamic Pricing</td>
<td>50-200</td>
<td>200-750</td>
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</table>

- Thus: Energy efficiency could offset 30-50% of incremental load growth
- And: DR and Pricing could provide an additional ~300 – 1800 MW of resources

Source: Lawrence Berkeley National Lab estimates (C. Goldman and G. Barbose), based on 2003 NEDRI Report after adoption, thus not reviewed or endorsed by NEDRI participants.
Efficiency benefits grow over time (California example)
Projected New England Regional Electric Demand
With and Without New/Updated Efficiency Standards

MW's

Forecast
Forecast with Standards
Efficiency as a power system resource

- **Generation Benefits:**
  - Both capacity and energy savings
  - Lowers fuel supply and fuel costs
  - Reduces required reserves
  - Avoids pollution costs

- **Transmission & Distribution Benefits:**
  - Defers new T & D upgrades
  - Reduces line losses
  - Improves reliability

- **Financial Benefits:**
  - Lowers total power system costs
  - Lowers customer bills
  - Mitigates or avoids expensive price spikes
Utilities have many fixed costs, and rates often exceed marginal production costs:

Extra sales are profitable to utility

In Vermont: each saved kWh can save customer $.10, but cut $.04 from utility profits

Efficiency programs cutting sales by 5% can cut profits by 23%

Needed: rate policies to make efficiency profitable to utilities
For more information…

New England Demand Response Initiative

web link at www.raponline.org

Posted: NEDRI Report and Recommendations; Framing Papers and Memos on Demand Response and policy options;

“Efficient Reliability: The Critical Role of Demand-Side Resources in Power Systems and Markets”

(R. Cowart, NARUC June 2001)

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