

# Connecticut Electric Sector Procurement Plan 2010 Plan Report

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on behalf of the CEAB

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## *What we want to accomplish today*

- Overview of the Connecticut Procurement Planning Process
  - Statutory Framework
  - History of CEAB and EDC implementation
- CEAB's 2010 Plan Recommendations and Results
- Briefing on Follow-on Activities



## **Legislative Actions to Re-establish State Planning**

### **2003: An Act Concerning Long Term Planning for Energy Facilities (PA 03-140)**

- Reconstituted the CEAB
- Energy Planning Features
- Established RFP Process for Alternatives

### **2005: An Act Concerning Energy Independence (PA 05-01)**

- Mitigate "Federally Mandated Congestion Charges"
- Established Capacity Contract Authority at the DPUC

### **2007: An Act Concerning Electricity and Energy Efficiency (PA 07-242)**

- Annual Procurement Planning Process
- Electric Distribution Company (EDCs) prepare the plan
- CEAB reviews/modifies
- DPUC Long-Term Contracting Authority

## **PA-07-242 Annual Procurement Planning Process**

### **Electric Distribution Companies Assessment:**

- The energy and capacity requirements of customers for the 3, 5, & 10 years,
- The manner of how best to eliminate growth in electric demand,
- How best to level electric demand in the state ,
- The impact of current and projected environmental standards,
- Energy security & economic risks associated with potential energy resources, and
- The estimated lifetime cost and availability of potential energy resources.

**CEAB** - shall review and approve or review, modify and approve the proposed procurement plan

**DPUC** - shall review and approve or review, modify and approve the proposed procurement plan

## Summary of Annual Planning Actions to Date

### 2008 Plan

EDC: Good analytical start, but missing key elements

CEAB: Significant Supplemental Work on Key Issues

DPUC: extensive hearings and examination of the Plans

### 2009 Plan

Short cycle due to time taken on 2008 Plan

Focus on Collaboration and Improved Foundations for 2010 Plan

### 2010 Plan

EDCs Extended Assessment - Strong Analytical Foundation Jan 2010

CEAB's Plan Addressed Integration and State Energy Policy Apr 2010

DPUC Order on Review of the EDC and CEAB Plans Sept 2010

## CEAB's 2010 Planning Process: Key Dates

November 2009	CEAB led Stakeholder Workshops
January 1, 2010	EDCs Plan filed
January 25, 2010	CEAB received Written Public Comments
February 11, 2010	CEAB Public Hearing on EDCs IRP
February 2010 Workshops	Two Additional Stakeholder Workshops
April 27, 2010 Plan for	CEAB Issues the 2010 Comprehensive the Procurement of Energy Resources

## **CEAB's Stakeholder Input Workshops**

November 2, 2009	DPUC-hosted Transmission Workshop
November 5, 2009	Repowering Workshop
November 5, 2009	Renewable Energy Workshop
November 9, 2009	Energy Security Workshop
November 19, 2009	Environmental Policy Workshop
November 19, 2009	Natural Gas Workshop
November 23, 2009	Demand-Side Management Workshop
December 7, 2009	Nuclear Workshop
February 19, 2010	Transmission Workshop
February 25, 2010	Combined Heat and Power Workshop

Materials from all workshops are posted on the CEAB website

<http://www.ctenergy.org/2010ProcurementPlan.html>

## **CEAB's 2010 Plan Report**

- CEAB Plan - 500+ Page Report with:
  - Executive Summary
  - Description of the Planning Process
  - Description of the Analysis and Results
  - 13 Technical papers on Drivers, Options, and Implementation
- Relies on EDC's IRP submitted January 2010
- Relies on Stakeholder Input from Workshops and Hearings

All 2010 Plan documents are posted on the CEAB website

<http://www.ctenergy.org/2010ProcurementPlan.html>

## **Looking Back: Challenges of the Past Decade**

### **Reliability Was a Significant Issue**

- Southwest Connecticut Reliability
- Congestion costs , GAP RFP, RMR Agreements
- Federally Mandated Congestion Charges
- Connecticut was "behind" in addressing reliability

### **Competitive Market Formation was a Significant Issue**

- ISO Locational Market Pricing
- ISO Capacity Market
- ISO Locational Forward Reserve Market
- Connecticut retail open access

## **Looking Back: Accomplishments**

### **Key Reliability Issues Have Been Addressed**

- Southwest Connecticut Transmission is Complete; GSRP underway
- Commitments for 1,500 MW of New Generation
- Congestion Costs Have Subsided
- Connecticut has "caught up" to its reliability challenges
- ISO-NE Planning Processes Have Progressed

### **Competitive Market Formation**

- ISO Energy and Capacity Markets are maturing
- Demand Response has become an established resource
- Connecticut retail activity is active for large customers, procurement systems for customers on standard service

**PA 07-242 established Connecticut IRP process**

## ***Looking Ahead: Challenges of the Coming Decade***

### **Reliability Remains Important, Not Acute**

- Outlook for Surplus in Installed Generation
- Need for NEEWS is reduced

### **Environmental Requirements Are Key**

- Ozone Non-Attainment, Green House Gas Emissions, Water Issues

### **Renewable Energy Requirements Are Significant**

- CT and NE RPS Requirements call for ~3,700 MW of new projects

### **Energy Security and Independence Issues are Key**

- Gas Dependency; Reliance on Imports; Aging CT Generation Fleet

### **High and Rising Costs of Electricity Must Be Mitigated**

- Reliability, Environment, RPS all put upward pressure on cost

## ***Framework for the 2010 Plan***

### **Planning to Address Broader "Needs"**

- Reliability, Environment, Cost, Security
- Vision of the Long Term informing actions for the next decade

### **Integrated Assessments To Seek Best Solutions**

- Address Current Needs and Set-up for Long Term

### **Be Proactive to Address Needs on A Timely Basis**

- Procurement and Planning

### **Clear Near-Term Action Plan with Milestones and Signposts**

- Will require actions by several energy entities in Connecticut

## CEAB's Goals for the 2010 Plan

To derive the Procurement Plan required in the legislation, integrated resources planning must be conducted. The EDCs have now filed three 10-year Integrated Resource Plans.

### CEAB has taken on the challenge of Putting the "I" in IRP:

1. Focus on near-term and long-term procurement and planning
2. Expanding the Framework to 2030
3. Expanded information on 15 Key Issue Areas
4. Expanded Collaboration and Stakeholder Input
5. Expanded integration analysis to address reliability, environment, cost and security goals in a portfolio approach
6. Focus on addressing how the State organizations can facilitate Resource Procurement and future planning processes

## 2010 Integrated Resource Planning Components

Key Objectives (Needs)	Key Drivers	Resource Options
<ul style="list-style-type: none"> <li>• Maintain Reliability</li> <li>• Manage Costs</li> <li>• Meet Environmental Requirements</li> <li>• Secure Supplies</li> </ul>	<ul style="list-style-type: none"> <li>• Natural Gas Supply</li> <li>• Renewable Policy</li> <li>• Carbon Policy</li> <li>• NOx Emissions</li> <li>• Resource Finance</li> <li>• Load &amp; Demographics</li> </ul>	<ul style="list-style-type: none"> <li>• DSM</li> <li>• Renewables</li> <li>• CHP</li> <li>• Repowering</li> <li>• Transmission</li> <li>• Imports</li> <li>• Evolving Technologies</li> <li>• Nuclear</li> </ul>

### **Reliability: Current Ample Supply, Retirement Risks**

- Regional RPS compliance and aggressive DSM keeps region in capacity surplus for the decade, subject to retirement risks
- During the next decade, under a CO<sub>2</sub> cap and trade regime, operating cost of the regions 2200 MW of coal units in the region (560 MW in CT) come under economic pressure for retirement.
- Much or all aging steam based capacity in NE, (coal, oil and natural gas) over the next decade is at risk for retirement (more than 8,000 MW)
  - environmental compliance costs, economic obsolescence, or CO<sub>2</sub> regulations.
  - This would lead to a need of 5,800MW of new capacity in New England.
  - With NEEWS, CT OK. Without NEEWS, up to 2,000MW of that capacity needed in Connecticut.

### **Resource Options – Repowering** *Retirement of Aging Fossil Generation*

#### *Repowering: Aging Steam Oil / Gas and Coal Units In CT*

<b>Unit Name</b>	<b>Fuel</b>	<b>Capacity (MW)</b>
Montville 5	Oil/Gas	81
Middletown 3	Oil/Gas	236
Middletown 2	Oil/Gas	117
Norwalk Harbor 1	Oil	168
Norwalk Harbor 2	Oil	162
Montville 6	Oil	407
Middletown 4	Oil	400
Bridgeport Harbor 2	Oil	130
New Haven Harbor	Oil/Potential Gas	461
Bridgeport Harbor 3	Coal	372
AES Thames	Coal	181
<b>Total</b>		<b>2,715</b>

### ***Environmental: Strategies to Reduce Emissions***

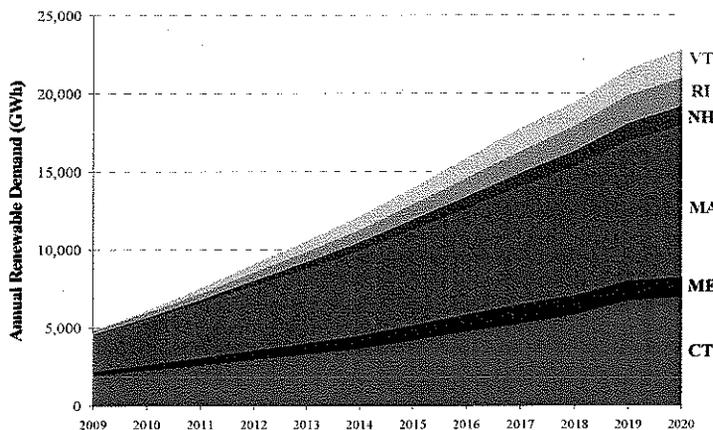
- Addition of DSM would be a key tool to reduce CT emissions
  - A-ACE 2: 5% reduction in CT NO<sub>x</sub>, up to 25% of CT CO<sub>2</sub>.
- Connecticut CO<sub>2</sub> and NO<sub>x</sub> emissions , especially on HEDD, do not benefit from an in-state RPS case (w/ fuel cells)
  - Carbon and NO<sub>x</sub> annual emissions both increase a bit
- CO<sub>2</sub> regulation significantly reduces coal output (kWh, CO<sub>2</sub>, NO<sub>x</sub>)
- Retirement of Connecticut coal units would reduce NO<sub>x</sub> emissions on HEDD, possibly as much as 10%
- Addition of 1000 MW nuclear has largest impact on reducing emissions in the long term (post 2020)

### ***Cost: Pressures from RPS, Transmission, Environment***

- By 2020, ~ \$13 Billion of capital investment needed in the region to provide the new renewable to meet regional RPS (w/o trans).
  - On pro rata basis, investment for CT's RPS ~ \$4.5B, with most invested out of state.
  - CT RPS in-state only - ~ \$4B capital in state, plus fuel in fuel cells (overall, more costly than regional solution)
  - Per ISO-NE study, added T costs could be \$10 Billion
- Added DSM can reduce RPS costs
  - RPS defined as % of CT kWh consumption

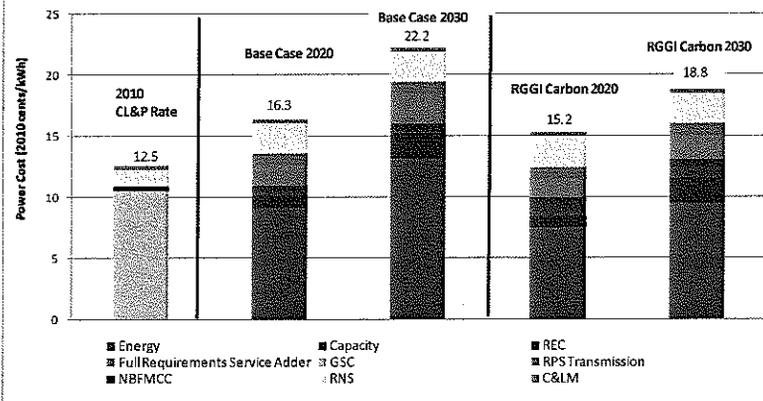
## Key Cost Drivers – Renewable Policy Increasing Renewable Energy Requirements

New England Class I Renewable Demand to 2020



## Power Cost Implications – Base Case

Current CL&P Rate v. Future Base Case and  
RGGI Carbon Power Costs



## ***Energy Security: Risks on Location and Mix***

- New Resources are needed to make substantial improvements in energy security for Connecticut as measured by;
  - Amount of In-state Generating and Demand Response Capacity
  - Geographic concentration of capacity resources
  - Amount of Import and Exports to and from Connecticut
  - Degree of In-state and regional generation dependence fossil fuels
  - Overall efficiency measures of the Regional and Connecticut generation fleet as utilized.
- High retirements case could accelerate CT reliance on region

## ***Recommendation: Energy Efficiency***

- **Analysis Shows Significant EE Benefits:**
  - Lower Cost Resource, lower than renewable or conventional
  - Potential for Reduced Supply, Transmission
  - Positive impacts on CT environment and jobs
- **Financing Is the Key Issue**
  - Ratepayer funding approach: Equity issues; State Budget issues
  - Market Barriers to much of the cost-effective EE potential
- **Recommend a Refocusing with Goal of All Cost Effective EE**
  - Refocus ratepayer funding measures, leverage
  - Expand Alternative Financing Programs
  - Review Appliance and Build Codes and Standards

### **Recommendation: RPS Policy Review**

- **Significant Renewable Resources Need to meet RPS:**
  - Analysis shows the resource potential is regional
  - Limited Renewable Resources in-State
  - Cost of Resources and Transmission could be significant
- **Managing Cost Impact on Rates is Key Issue**
  - Regional Compliance Strategies include transmission costs
  - Local Strategies rely on higher cost Fuel Cells and Solar
- **Recommend a Formal Review of the RPS Policy set in 2000**
  - Assure that the policy is aligned with current goals
  - Stakeholder Process for input on the RPS Objectives
  - Results to be brought to the Legislature

### **Recommendation: Single State Planning Entity**

- **CEAB concludes that the status quo is insufficient:**
  - Integration of the Electric Sector is lacking (G, T, EE)
  - Electric Planning is intertwined with Environment, Transportation, Natural Gas, and Land Use planning.
  - A comprehensive “energy” policy and plan is needed
- **This issue has been studied by CEAB, CASE, and PRI**
- **CEAB Recommends Consideration In 2011 Session**
  - Key functions: Comprehensive Energy Planning and CEAB’s ISO Coordination role
  - CEAB has no staff or budget for these functions currently
- **NOTE: This Plan pre-dated the 2010 Energy Bill vetoed by Gov. Rell**

### **Recommendation: ISO-NE Coordination**

- **Stronger Coordination needed with ISO-NE, NESCOE and other regional entities affecting Connecticut electric costs:**
  - NEEWS Projects has made clear that Active Involvement by CT in ISO-NE Planning is needed
  - CEAB lack staff and technical resources to carry out its Statutory Role
- **CEAB Proposed Actions and Recommendations:**
  - CEAB is pursuing an executive director to engage in this effort
  - Added CEAB engagement in the ISO-NE Planning Process
  - Coordination with DPUC and OPM on NESCOE/NE Governor's activities

### **Recommendation: Transmission Planning and Non-Transmission Alternatives**

- **CEAB-DPUC Proactive Planning and RFP Process to fully and timely consider alternatives to Transmission Projects:**
  - Greater Springfield RFP shows limitations of CEAB's Reactive RFPs
  - Consensus: Planning must begin sooner and tie into ISO-NE Process
  - Utilities currently lack incentives to examine NTAs
- **CEAB Proposed Actions and Recommendations:**
  - CEAB employ Proactive RFPs & tie into DPUC IRP Authority
  - Coordinate NTA RFPs more directly with ISO-NE
  - Review Statutory Authority to Couple RFPs with IRP

### **Recommendation: Hartford Area Transmission Planning and Alternatives**

- **Apply New Planning Approach to the Greater Hartford Area Assessment:**
  - This is the next Reliability Need Area in CT, under study by ISO-NE
  - 1, 200 MW load area
- **CEAB Proposed Actions and Recommendations:**
  - Engage Technical Consultants to Implement the Proactive Approach
  - Engage in the ISO-NE Needs Assessment Process
  - Develop an Integrated Approach to Assessing and Soliciting Alternatives to the need (e.g., EE & DR, CHP, generation)

### **Recommendation: Combined Heat & Power and District Energy Development**

- **CHP and DE may offer long-term potential:**
  - Potential Advantages include efficiency, environmental, and decentralized systems
  - Best if planned as part of other land use decisions (a la Denmark)
- **CEAB Proposed Actions and Recommendations:**
  - Explore actions to preserve existing CHP installations
  - Further study on the role that CHP/DE systems could play in development in CT

## **Recommendation: Natural Gas-Fired Generation**

- **Analysis of CT Existing Generation Fleet shows:**
  - Over 3,000 MW of fossil-fired generation fleet could retire by 2020
  - Some cost & environmental pressures could accelerate this
  - Need for replacement is not immediate, but contingent
  - Many of these sites offer “repowering” options for new gas gen.
- **CEAB Proposed Actions and Recommendations:**
  - Need to begin planning for timely, orderly retirements
  - DPUC may need to conduct procurement process to replace, including complex considerations of repowering options
  - Monitor market conditions and environmental factors that could trigger need to act

## **Recommendation: Nuclear Generation**

- **Nuclear Options Should be Considered in a L-T GHG Planning:**
  - National Effort to Develop new nuclear units and address waste issues
  - New Technologies may address safety, cost, size issues
  - Need to consider all low-carbon options for 2030+
  - Lead time issue require that study begin soon
- **CEAB Proposed Actions and Recommendations:**
  - Initiate a nuclear options study with CASE to address key issues

## ***DPUC Decision***

- **Energy Efficiency**
  - Taking Steps to expand through alternative approaches
  - No increase in ratepayer funding for programs
- **Greater Hartford NTA**
  - Will work with CEAB on this process
- **Repowering**
  - Opening a proceeding to design RFP for options, if needed

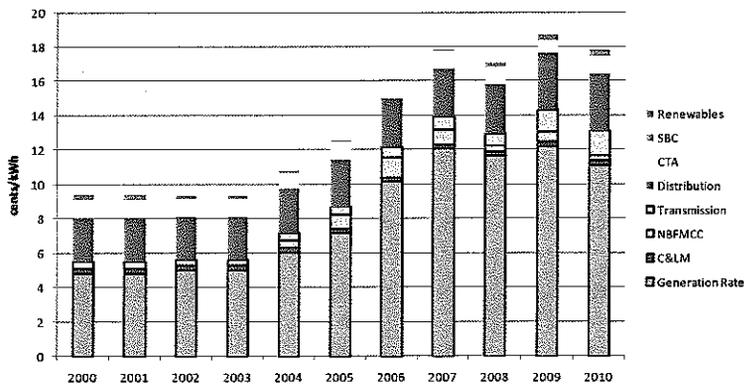
## ***CEAB Actions to Implement the 2010 Plan***

- **CASE - Nuclear Study**
- **Greater Hartford NTA Process**
- **RPS Policy Stakeholder Process**

## APPENDIX – Background Data and Illustrative Charts

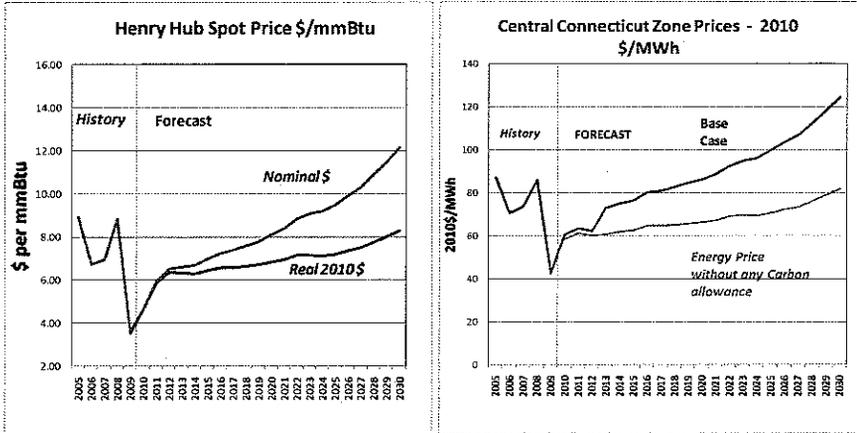
### Historical Connecticut Electric Rates

CT Light and Power's Historical Electric Rate in CT



**CTA (Competitive Transition Assessment)** – The component of electric utility retail customer bills assessed to allow utilities to recover Stranded Costs  
**SBC (Systems Benefits Charge)** – public policy costs such as generation decommissioning and displaced worker protection costs  
**NBFMCC (Non-Bypassable Federally Mandated Congestion Charges)**

## Natural Gas & Connecticut Market Energy Prices



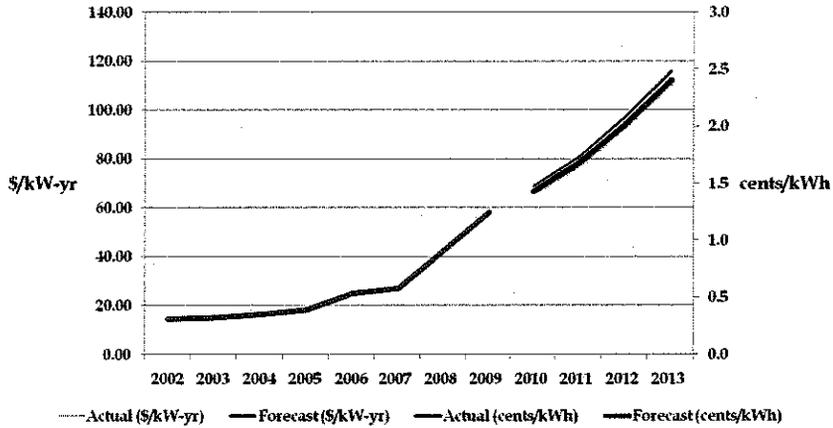
## Connecticut has the most aggressive RPS policy in the region

### New England RPS Targets to 2020

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>CT Class I</b>	7.0%	8.0%	9.0%	10.0%	11.0%	12.5%	14.0%	15.5%	17.0%	19.5%	20.0%
<b>ME Class I</b>	3.0%	4.0%	5.0%	6.0%	7.0%	8.0%	9.0%	10.0%	10.0%	10.0%	10.0%
<b>MA Class I</b>	5.0%	6.0%	7.0%	8.0%	9.0%	10.0%	11.0%	12.0%	13.0%	14.0%	15.0%
<b>NH Class I &amp; II</b>	1.0%	2.1%	3.2%	4.2%	5.3%	6.3%	7.3%	8.3%	9.3%	10.3%	11.3%
<b>RI</b>	2.5%	3.5%	4.5%	5.5%	6.5%	8.0%	9.5%	11.0%	12.5%	14.0%	14.0%

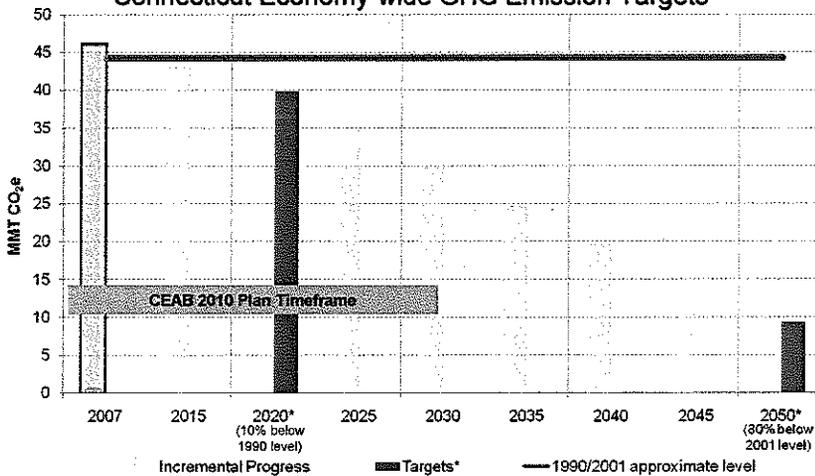
## Regional Transmission Service Costs

**\$9 Billion investment in Transmission 2002 - 2013**



## 2008 Global Warming Solutions Act

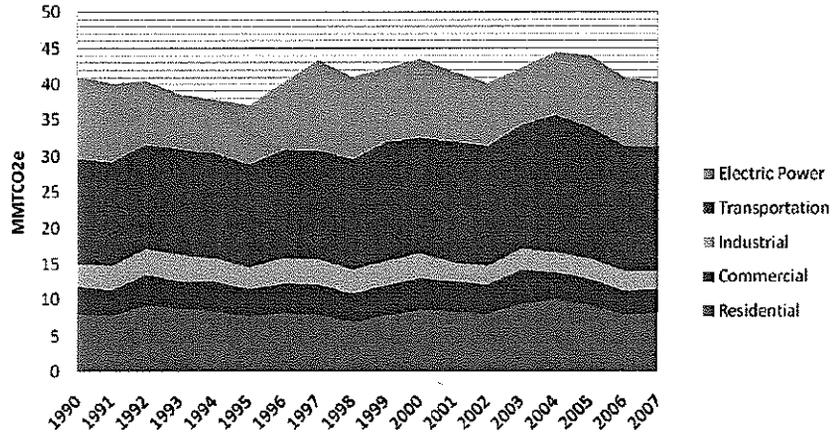
**Connecticut Economy-wide GHG Emission Targets\***



\* Targets are legislatively mandated for Connecticut (PA 08-98)

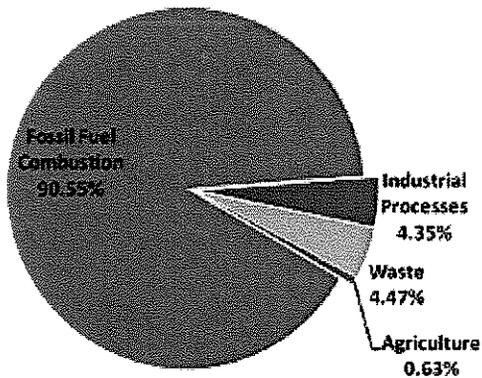
**Key Objectives – Environmental Requirements**  
 Historical CT CO<sub>2</sub> Emissions

Connecticut Fossil fuel Combustion CO<sub>2</sub> by Sector  
 1990 - 2007



**Key Objectives – Environmental Requirements**  
 CT CO<sub>2</sub> Emissions by Source

Connecticut GHG Emissions by Source  
 2006



## Key Objectives – Secure Supplies

### Energy Security: Potential for Gas Disruption

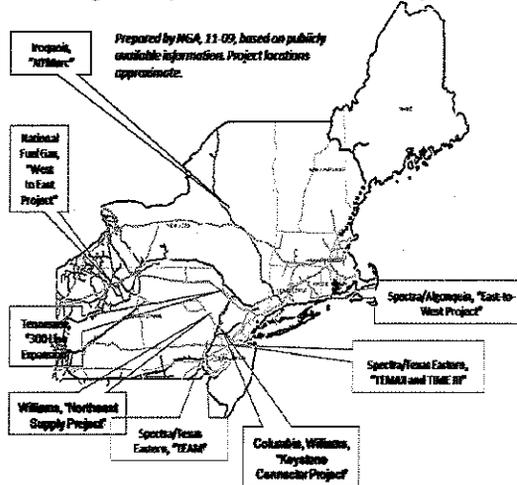
#### EDCs IRP Plan - 2020

- Simulated the loss of natural gas supply or equivalent 2000 MW with no reliability shortfalls

#### CEAB Resource Plan - 2030

- Examine if certain resource configurations create or reduce vulnerabilities
  - Distributed Generation
  - Renewable local fuels
  - More transmission interconnections
  - More Natural Gas usage for generation
  - DSM

#### Existing & Proposed Northeast Gas Pipelines:

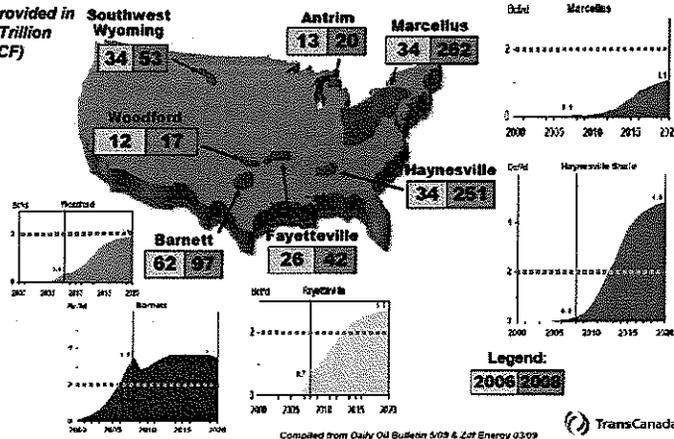


## Key Drivers - Natural Gas Supply

### Profound Changes – Shale Revolution

#### Shale Gas Resource Estimates

\* Note: data provided in the map is in Trillion Cubic Feet (TCF)

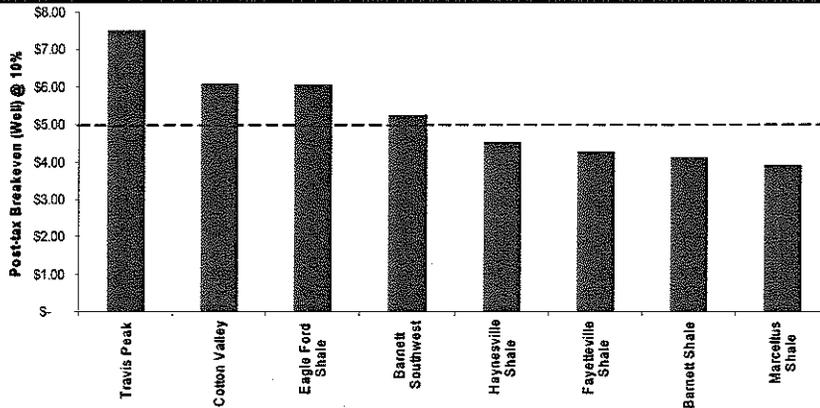


## Key Drivers - Natural Gas Supply

### Profound Changes – Shale Revolution

Estimate for Development Wells in Four L48 Shale Plays Break Even at Prices Below \$5.00/MMBtu, With Some at \$4 (Or Even Below)

Shale Gas Play Development Economics (Real 2009\$)

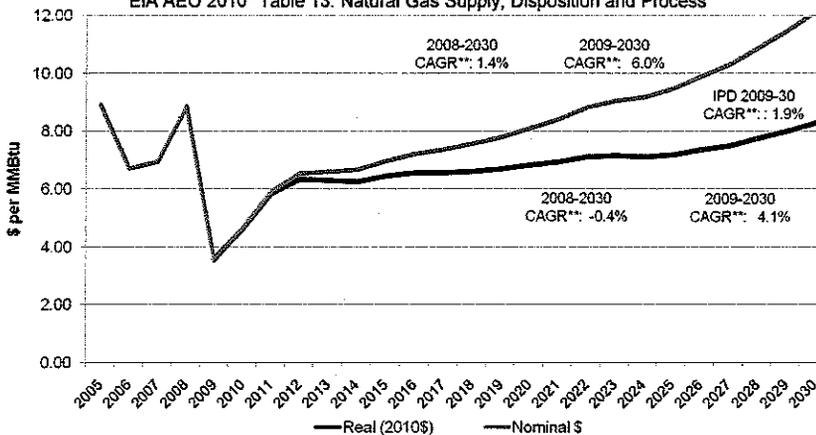


## Key Drivers - Natural Gas Supply

### Moderating Natural Gas Prices

#### Henry Hub Spot Price \$/MMBtu

EIA AEO 2010\* Table 13. Natural Gas Supply, Disposition and Process



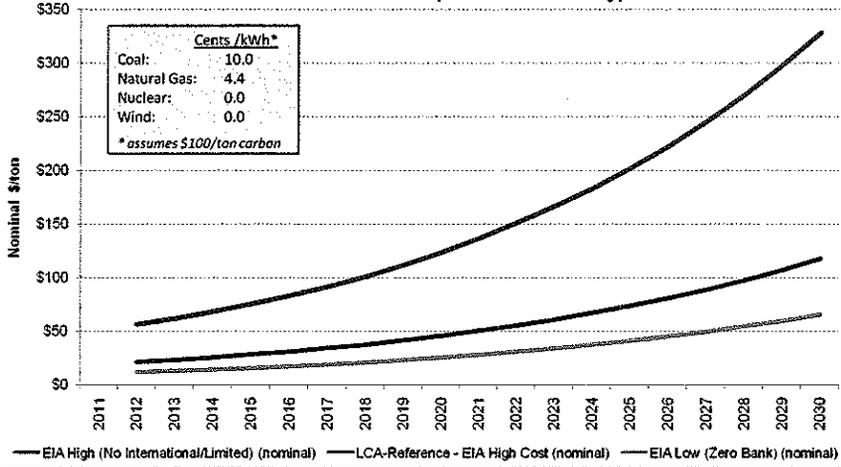
\* Data is from November 18, 2009

\*\* Compound Annual Growth Rate (CAGR)

## Key Drivers – Carbon Policy

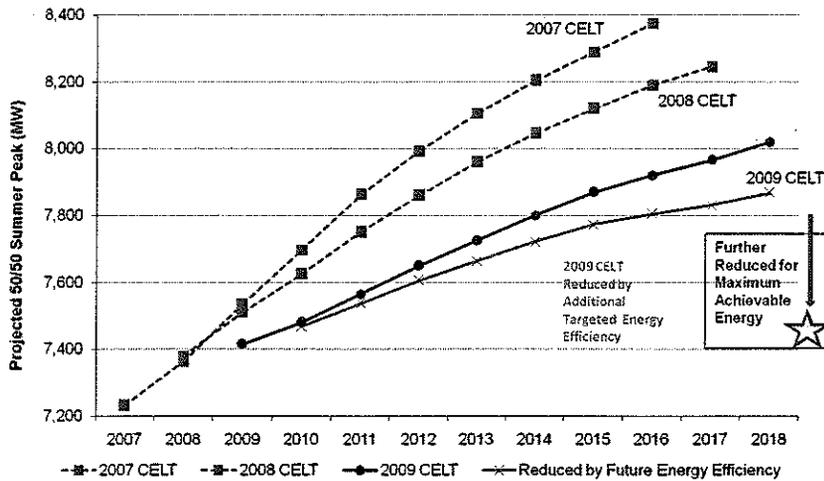
### Potential Costs for CO<sub>2</sub> Allowances

GHG Allowance Price Forecasts (Nominal)  
H.R. 2454 ACESA (Waxman-Markey)



## Resource Options – DSM

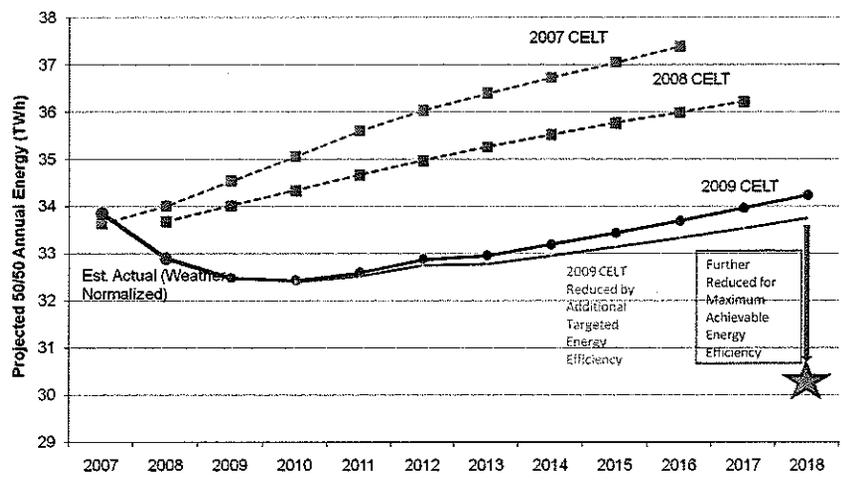
### Connecticut Peak Demand – The Potential to be Flat\*



\* These numbers do not include Demand Response (DR)

## Resource Options - DSM

*Connecticut Energy Requirements – The Potential to be Substantially Lower \**



\* These numbers do not include Demand Response (DR)

## Resource Options – Renewables

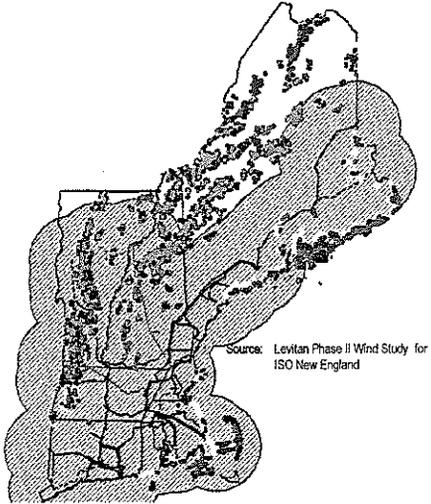
### Wind Resource Potential in New England

- Legend**
- Class 7: >8.8 (m/s) ●
  - Class 6: 8-8.8 (m/s) ●
  - Class 5: 7.5-8 (m/s) ●
  - Class 4: 7-7.5 (m/s) ●
  - Class 3: 6.4-7 (m/s) ●

- 40 Miles
- 230 kV
- 345 kV

**NE Total Wind Resource Potential:**  
9,433 MW

1 meter per second roughly 2.2 mph



Source: Levitan Phase II Wind Study for ISO New England

**Resource Options – Renewables**  
*ISO-NE Estimates for Added Transmission for Wind*

**Transmission for 5,500 MW of Wind**

- Potential transmission to connect 4,000 MW of offshore and 1,500 MW of near-shore onshore wind
- New transmission paths
  - New 345 kV line from Maine to Connecticut
  - New HVDC underwater cable from Maine to Boston
- Local loops to collect wind in Maine
- Preliminary cost estimate: \$6 billion

