BUILDING A SUSTAINABLE ENERGY FUTURE FOR A WARMING WORLD

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Center for Energy and Environmental Policy
University of Delaware
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Climbing Conventional Energy Prices: U.S.


Center for Energy and Environmental Policy
Climbing Conventional Energy Prices: U.S. East Coast Urban Corridor

Mid-Atlantic Energy Price Increases

Needed 2050 GHG Emission Reductions Below 1990 Levels to Stabilize Atmospheric Concentrations at Current Levels *

Carbon dioxide  > 60%
Methane 8 - 20%
Nitrous oxide 70 - 80%
CFC 11 70 - 75%
CFC 12 75 - 85%
HCFC 22 40 - 50%

* 30% reduction needed by 2030.
Source: IPCC Second & Third Assessment Reports

Center for Energy and Environmental Policy
U.S. CO₂ Emissions by Sector
(Million Metric Tons of Carbon)

Source: Ed Mazria of Mazria Odems Dzurec
June 28, 2007
State of Delaware (pop. 850,000)
Bill creates 1st Sustainable Energy Utility in the US

Delaware creates a new utility with $30 million in bond authority, $20 million from carbon auction proceeds, and $5-10 million from the sale of renewable energy certificates to enable citizens and businesses to choose energy conservation, efficiency & renewables as their 1st option.

July 15, 2008
District of Columbia (pop. 580,000)
Landmark Energy Bill Passes

The “Clean and Affordable Energy Act” was unanimously passed on July 15, 2008 by the District of Columbia to establish the nation’s capitol “as one of the leading cities tackling climate change.” The District’s sustainable utility proposal is based on successful models in Delaware, Vermont, Oregon, and New Jersey.
Delaware Sustainable Energy Utility

Legislation Goals & Board Recommended Targets

- Reduce conventional energy consumption by 30% for Participants by 2020 (assumed 2020 participation rate = 33%)
- Invest in 300 MW of Renewables installed onsite (by 2020)
- Double yearly Low- & Moderate Income Weatherization rate by 2012 under the SEU’s Affordable Energy Program
- Create Green Communities Program to assist school districts, local governments and public university and health care facilities to ‘go green’ (annual investments to total $2-4 million)
**U.S. Cost per kWh Saved versus kWh Supplied**

<table>
<thead>
<tr>
<th>State</th>
<th>Cost per kWh Saved</th>
<th>Retail Price of Electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>CT</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>MA</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>NJ</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>NY</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>VT</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Delaware Sustainable Energy Utility Task Force (2007)
California Electricity Consumption
(Annual Electricity Sales in kWh per person)


Center for Energy and Environmental Policy
Next Generation Policies to Increase Vehicle Fuel Economy

HYBRID ELECTRIC VEHICLES // BUS RAPID TRANSIT

* Assumes bus occupancy rate of 22.5 passengers per trip segment. Data sources: DOE & EPA, 2008

<table>
<thead>
<tr>
<th>Estimated Fuel Economy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U.S. conventional 4 cylinder car</strong></td>
</tr>
<tr>
<td><strong>25 mpg</strong> [10.6 km/l]</td>
</tr>
<tr>
<td><strong>U.S. conventional 6 cylinder car</strong></td>
</tr>
<tr>
<td><strong>20 mpg</strong> [8.5 km/l]</td>
</tr>
<tr>
<td><strong>Toyota Prius or Honda Civic Hybrid (4 cyl)</strong></td>
</tr>
<tr>
<td><strong>45 mpg</strong> [19.1 km/l]</td>
</tr>
<tr>
<td><strong>Bus Rapid Transit</strong></td>
</tr>
<tr>
<td><strong>80 mpg</strong> [35.0 km/l]*</td>
</tr>
</tbody>
</table>

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Increased Corporate Average Fuel Economy Standards

(Source: Hwang, 2006; UCS, 2008)

Center for Energy and Environmental Policy
Raising the Necessary Capital

From a risk/return standpoint, Energy Efficiency investments pose a remarkable opportunity

Comparative Risk / Return of Typical Investments

31 states and Wash DC have passed legislation
8 states with pending legislation
29 states have completed Climate Change Action Plans
http://yosemite.epa.gov/oar/globalwarming.nsf/content/ActionsStateActionPlans.html

Sources: CEEP Survey, 2007; DSIRE, 2007; UCS, 2007
Renewable Energy Credits (RECs)
Markets for Sustainable Energy

Figure 1

Wholesale REC Prices by Resource Type

$/MWh

Source: National Renewable Energy Laboratory

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Energy Efficiency can Help Spur the Economy

Forward thinking officials have the opportunity to promote significant expansion of their “green economy”

- Energy efficiency programs stimulate meaningful investment and create important jobs:
  - Green Collar Jobs – “blue collar work force opportunities created by firms, organizations, and policies whose mission is to improve environmental quality”
  - White Collar Jobs – Research, development, engineering and design of energy efficient technology
  - These jobs require on-site presence and are therefore more resistant to foreign outsourcing than traditional blue-collar manufacturing jobs
Energy Efficiency Investments Benefit the “Local” Economy

Energy Efficiency is responsible for the creation of thousands of jobs

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>$39</td>
<td>316,000</td>
</tr>
<tr>
<td>Commercial</td>
<td>$51</td>
<td>302,000</td>
</tr>
<tr>
<td>Appliances &amp; Electronics</td>
<td>$88</td>
<td>372,000</td>
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<tr>
<td>Industrial</td>
<td>$75</td>
<td>351,000</td>
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<tr>
<td>Transportation</td>
<td>$33</td>
<td>151,000</td>
</tr>
<tr>
<td>Utilities</td>
<td>$15.7</td>
<td>139,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$301</strong></td>
<td><strong>1,630,000</strong></td>
</tr>
</tbody>
</table>

Delaware Sustainable Energy Utility

CO₂ Emissions to Increase 30% w/o Policy Action

- New CO₂ from Increased Conventional Energy Use (compared to 2005)
- Avoided CO₂ by SEU Actions (EE + RE) & CO₂ Offsets created by DE Offshore Wind Project
- Effect of SEU E-E & EC Programs and Utility Demand Response Programs
- Effect of SEU Renewables Program
- Effect of Delaware Offshore Wind Project

* Delaware’s 2005 CO₂ Emissions = ~17.8 million short tons
Sustainable Energy Utility

Website: http://www.seu-de.org/

See also feature article in IEEE Spectrum:
http://www.spectrum.ieee.org/may08/6216

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