Legacy of Energy and Climate Leadership

• Procurement of over 800 MW of renewable energy and energy efficiency resources
• Establishment of the award-winning Connecticut Green Bank
• Creation of the first-in-the-nation statewide microgrid program to build local resiliency
• Award-winning energy efficiency initiatives
• The establishment of the Governor’s Council on Climate Change
Connecticut is on track to achieve the requirement of 10% GHG emission reduction from 1990 levels by 2020. To meet the requirement of 80% reduction by 2050, an interim 2030 reduction target of 45% is needed to drive continuous progress in decarbonizing thermal energy, the electric grid, and transportation system. This was the target recommended by the Governor’s Council on Climate Change in January, 2018.
Connecticut is feeling the effects of climate change, from changes to Long Island Sound fisheries, to increases in severe weather events.

The Connecticut Institute for Resilience and Climate Adaptation (CIRCA) at the University of Connecticut recommends that the state plan for 50 centimeters of sea level rise (SLR) by 2050.
Over **90 percent** of Connecticut’s GHG emissions are related to energy usage.

The 2018 CES sets forth bold but achievable steps to meet GHG reduction goals, while containing costs to ratepayers.

The CES, along with the work of CIRCA and the GC3, form the foundation for two Governor’s proposals this session, one focused on *planning and resiliency*, and the other focused on *Connecticut’s energy future*. 
Comprehensive Energy Strategies 1-4

1. Ensure sustainable and equitable funding for energy efficiency.

2. Advance market transformation of the energy efficiency industry.

3. Grow and sustain renewable and zero-carbon generation in the state and region.

4. Expand deployment of all cost-effective distributed generation (“behind the meter”) in a sustainable manner.
5. Continue to improve *grid reliability and resiliency* through state and regional efforts.

6. Reduce transportation greenhouse gas emissions by accelerating the adoption of *low- and zero-emission vehicles* and strengthening alternative-fueling infrastructure.

7. Increase *mobility, connectivity, and accessibility* by advancing smart-growth, mixed-use transit-oriented development, and innovative transportation partnerships.

8. Modernize the grid.
Ensure sustainable and equitable funding for energy efficiency

- Implement sustainable funding for energy efficiency
- Find equitable solutions for oil and propane conservation
- Reduce the energy burden of low-income households
- Address health and safety barriers to further unlock efficiency and create healthier homes
- Catalyze the competitiveness of Connecticut’s businesses with increased energy productivity
Advance Market Transformation of the Energy Efficiency Industry

- Integrate energy efficiency with real estate market forces.
- Develop a sustainable workforce to meet industry demand
- Standardize efficiency with energy performance codes, standards, and certifications
- Transition to cleaner thermal fuels and technologies
Context: How We Currently Heat our Homes

**Connecticut**
- Natural Gas, 34%
- Fuel Oil, 43%
- Electricity, 16%
- LPG, 4%
- Other, 3%

**United States**
- Natural Gas, 48%
- Electricity, 38%
- Fuel Oil, 5%
- LPG, 5%
- Other, 4%

*Source: U.S. Census Bureau. 2016.*
Grow and sustain renewable and zero-carbon generation

- Increase the Renewable Portfolio Standard to 40% by 2030
- Use existing procurement authority for regional nuclear and hydropower resources
- Continue procuring grid scale renewables based on needs determined in the Integrated Resources Plan in a cost-effective and environmentally-sustainable manner
- Phase down biomass and landfill gas RECs in Connecticut’s Class I RPS
Declining Cost of Clean Energy Programs, Behind the Meter and Grid Side (nominal dollars, 2012-2016)

*Average cost for RSIP was levelized over 20 years for Purchased Residential PV systems and not leased systems.*
Expand cost-effective distributed generation

Net Metering

SHREC

LREC/ZREC

Virtual Net Metering
Increase Access, Reduce Costs

- Grandfather existing distributed generation systems
- Determine total authorized utility spending for all distributed generation tariffs
- Designate consumer categories within the spending cap
- Hold semi-annual competitive solicitations for Low and Zero Emission Tariff categories
- Integrate a statewide shared clean energy program into the new LREC/ZREC auctions
- Enhance transparency of voluntary renewable energy products
- Establish renewable generation rates for residential customers
Improve Grid Reliability and Resiliency

- Support ISO NE improving regional winter natural gas generation fuel security and reliability

- Continue to deploy community **microgrids** to support statewide resiliency goals in strategic locations and support the Energy Assurance Plan.

- Ensure **coastal resiliency** of substations and other critical grid infrastructure to support DEEP’s flood management goals.
Current Consumption and Emissions Trends

Energy Consumption by Sector
- Electric Power, 39%
- Transportation, 28%
- Residential, 15%
- Commercial, 8%
- Industrial, 10%

GHG Emissions by Sector
- Transportation, 36%
- Electric Power, 22%
- Residential, 17%
- Commercial, 8%
- Industrial, 10%
- Agriculture, 1%
# EVs needed for a 45% GHG reduction by 2030

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td># of ZEVs</td>
<td>70,000</td>
<td>750,000</td>
<td>2,600,000</td>
</tr>
<tr>
<td>% of Fleet</td>
<td>3%</td>
<td>32%</td>
<td>95%</td>
</tr>
</tbody>
</table>

45% below 2001 by 2030

Note: numbers are approximate based on modeling assumptions
Develop an EV Roadmap, that includes a review of sustainable incentive funding models and, in collaboration with PURA, examines the appropriate regulatory framework for EV deployment in CT.

Increase EV uptake through consumer education and new fleet purchasing models.

Facilitate state and regional transportation planning that improves system efficiency and reduces vehicle miles traveled.
Modernize the Grid

- Initiate grid modernization proceedings
- Integrate efficiency, storage and renewables to manage peak demand
- Ensure interoperability of demand response communications between buildings and the grid
- Apply best practices from the federal Grid Modernization Lab Initiative
“We have to lower carbon emissions everywhere. We have to once again make Connecticut a national leader in green energy.”

-Governor Malloy, State of the State Address, Feb. 7., 2018

- 45% GHG Reduction by 2030
- 40% Class I RPS by 2030
- Science-based climate resiliency planning
- Cost effective distributed generation programs
- Commitment to Energy Efficiency and the CT Green Bank
**TABLE S1: Program and Ratepayer Costs (NPV) under Six Scenarios**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Business as Usual</th>
<th>BTM Cap at 2.5%</th>
<th>BTM Cap at 5%</th>
<th>$22.5 Million/Year</th>
<th>$30 Million/Year</th>
<th>$35 Million/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>Ongoing</td>
<td>Ongoing</td>
<td>Ongoing</td>
<td>20 Year Contracts</td>
<td>20 Year Contracts</td>
<td>20 Year Contracts</td>
</tr>
<tr>
<td>Program Cost (Millions)</td>
<td>$5,047</td>
<td>$1,549</td>
<td>$3,097</td>
<td>$1,964</td>
<td>$2,619</td>
<td>$3,055</td>
</tr>
<tr>
<td>Generation Value (Millions)</td>
<td>$3,322</td>
<td>$949</td>
<td>$1,897</td>
<td>$1,689</td>
<td>$2,252</td>
<td>$2,627</td>
</tr>
<tr>
<td>Net Direct Ratepayer Cost (Millions)</td>
<td>$1,725</td>
<td>$600</td>
<td>$1,200</td>
<td>$275</td>
<td>$367</td>
<td>$428</td>
</tr>
</tbody>
</table>
**TABLE S2: Estimated Cumulative Installed Capacity and Percent of Load under Six Scenarios (2021-2030)**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Business as Usual</th>
<th>BTM Cap at 2.5%</th>
<th>BTM Cap at 5%</th>
<th>$22.5 Million/Year</th>
<th>$30 Million/Year</th>
<th>$35 Million/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Solar (in MW)</td>
<td>315</td>
<td>157</td>
<td>315</td>
<td>261</td>
<td>348</td>
<td>406</td>
</tr>
<tr>
<td>C/I Solar (in MW)</td>
<td>794</td>
<td>157</td>
<td>315</td>
<td>311</td>
<td>415</td>
<td>485</td>
</tr>
<tr>
<td>C/I Fuel Cell (in MW)</td>
<td>85</td>
<td>25</td>
<td>50</td>
<td>61</td>
<td>81</td>
<td>95</td>
</tr>
<tr>
<td>Percent of Load in 2030</td>
<td>8.94%</td>
<td>2.53%</td>
<td>5.06%</td>
<td>5.22%</td>
<td>6.95%</td>
<td>8.11%</td>
</tr>
</tbody>
</table>
**TABLE S3:** Monthly Residential Bill Impact under Six Scenarios

<table>
<thead>
<tr>
<th>Year</th>
<th>Business as Usual</th>
<th>BTM Cap at 2.5%</th>
<th>BTM Cap at 5%</th>
<th>$22.5 Million/Year</th>
<th>$30 Million/Year</th>
<th>$35 Million/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021 (Nominal Dollars)</td>
<td>$0.53</td>
<td>$0.19</td>
<td>$0.38</td>
<td>$0.28</td>
<td>$0.37</td>
<td>$0.43</td>
</tr>
<tr>
<td>2025 (Nominal Dollars)</td>
<td>$2.38</td>
<td>$0.85</td>
<td>$1.70</td>
<td>$1.15</td>
<td>$1.53</td>
<td>$1.78</td>
</tr>
<tr>
<td>2030 (Nominal Dollars)</td>
<td>$5.01</td>
<td>$1.64</td>
<td>$3.29</td>
<td>$1.13</td>
<td>$1.51</td>
<td>$1.76</td>
</tr>
</tbody>
</table>