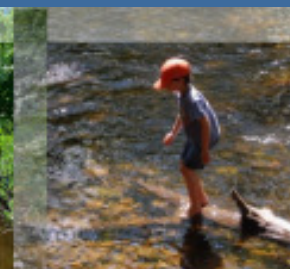
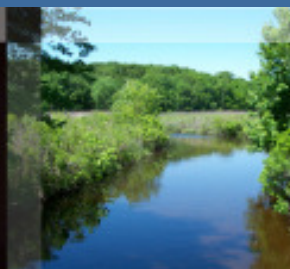
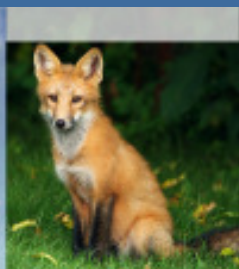




Connecticut Department of Energy and Environmental Protection



Connecticut Department of
**ENERGY &
ENVIRONMENTAL
PROTECTION**

Connecticut Power and Energy Society

March 23, 2017

Tracy Babbidge, Bureau Chief
Connecticut Department of Energy & Environmental Protection



Connecticut Department of Energy and Environmental Protection

2017 Comprehensive Energy Strategy

2017
Comprehensive Energy Strategy
for Connecticut

PREPARED BY
The Connecticut Department of Energy
and Environmental Protection



MARCH-APRIL 2017

Coming really, really soon



Connecticut Department of Energy and Environmental Protection

CT Department of Energy and Environmental Protection

DEEP was established on July 1, 2011 with the consolidation of the Department of Environmental Protection, the Department of Public Utility Control, and energy policy staff from other areas of state government.

Energy Branch

- PURA
- Energy & Technology Policy

Environmental Quality Branch

- Air Management
- Materials Management and Compliance Assurance
- Water Protection and Land Use

Environmental Conservation Branch

- Natural Resources
- Outdoor Recreation

Office of the Commissioner

- Adjudications
- Legal Counsel
- Central Services



Connecticut Department of Energy and Environmental Protection

Energy Policy Bureau

Office of Energy Supply & Infrastructure

- Focuses on energy supply-side issues including electricity, natural gas, renewables and associated infrastructure (ie. transmission, natural gas pipelines, distribution networks)

Office of Energy Demand

- Focuses on energy efficiency programs including, federal weatherization, utility sponsored investments, and the state's "Lead by Example" programs.

Office of Climate Change and Innovation

- Focuses on the state's climate change programs including oversight of the Governor's Council on Climate Change, the Regional Greenhouse Gas Initiative (RGGI), compliance with the Global Warming Solutions Act (GWSA), emerging energy technologies and energy information.



Connecticut Department of Energy and Environmental Protection

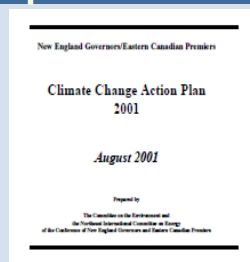
Connecticut's Policy Framework

CT signs *NEG/ECP 2001 Climate Change Action Plan*

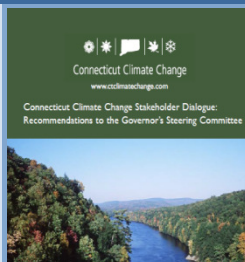
GSC finalizes *CT Climate Change Action Plan*

2007 Public Act 07-242 – Energy Efficiency and Expansion of the Renewable Portfolio Standard

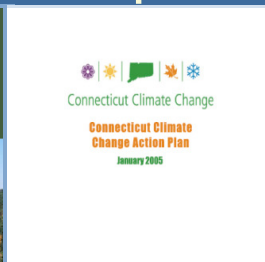
Executive Order 46 on Climate Change Creates the GC3



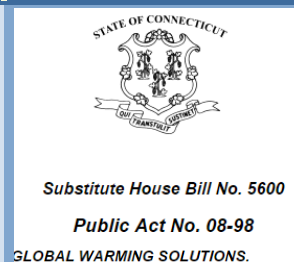
2001



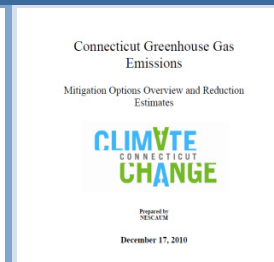
2004



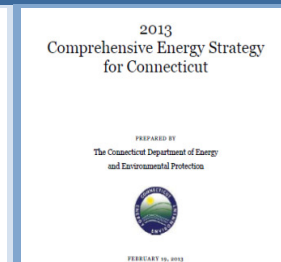
2005



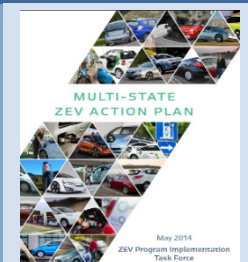
2008



2010



2013



2014

CT's implementation of 1990 Amendments to Federal CAA continues

An Act Concerning Climate Change (Public Act 04-252) sets GHG goals that align with NEG/ECP regional goals

CT Global Warming Solutions Act (Public Act 08-98) reaffirms commitment to GHG targets for 2020 and 2050

ZEV MOU

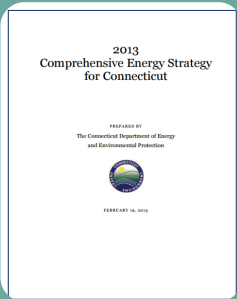
2013 Comprehensive Energy Strategy

Regional Greenhouse Gas Initiative

International ZEV Alliance

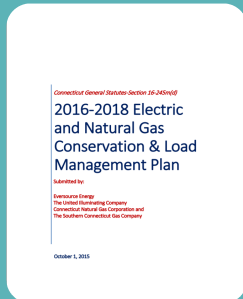
CT's implementation of The RPS continues

Energy Plans



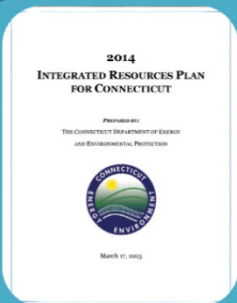
Comprehensive Energy Strategy

The Department of Energy and Environmental Protection (DEEP) developed the first-ever Comprehensive Energy Strategy for the State of Connecticut – an assessment and Strategy for all residential, commercial, and industrial energy issues, including energy efficiency, industry, electricity, natural gas, and transportation.



Conservation & Load Management Plan

Every three years, Connecticut's utilities develop and implement an energy efficiency investment plan for the CT Energy Efficiency Fund (CEEF). The CEEF is funded by various sources, including customer contributions, the Regional Greenhouse Gas Initiative (RGGI) and the ISO New England Forward Capacity Market. The CT Energy Efficiency Board (EEB) advises and assists the utilities in the development of the plan. DEEP then reviews and approves or modifies the CEEF's plans and budgets in order to achieve cost-effective energy savings across the state.



Integrated Resource Plan

The [Integrated Resource Plan](#) is a biannual assessment of Connecticut's future electricity needs, and a plan to meet those needs through a mix of generation and energy efficiency.



Connecticut Department of Energy and Environmental Protection

2008 Global Warming Solutions Act

Public Act No. 08-98

Reaffirmation of GHG reduction targets

- 10% below 1990 levels by 2020
- 80% below 2001 levels by 2050

Climate Action Planning

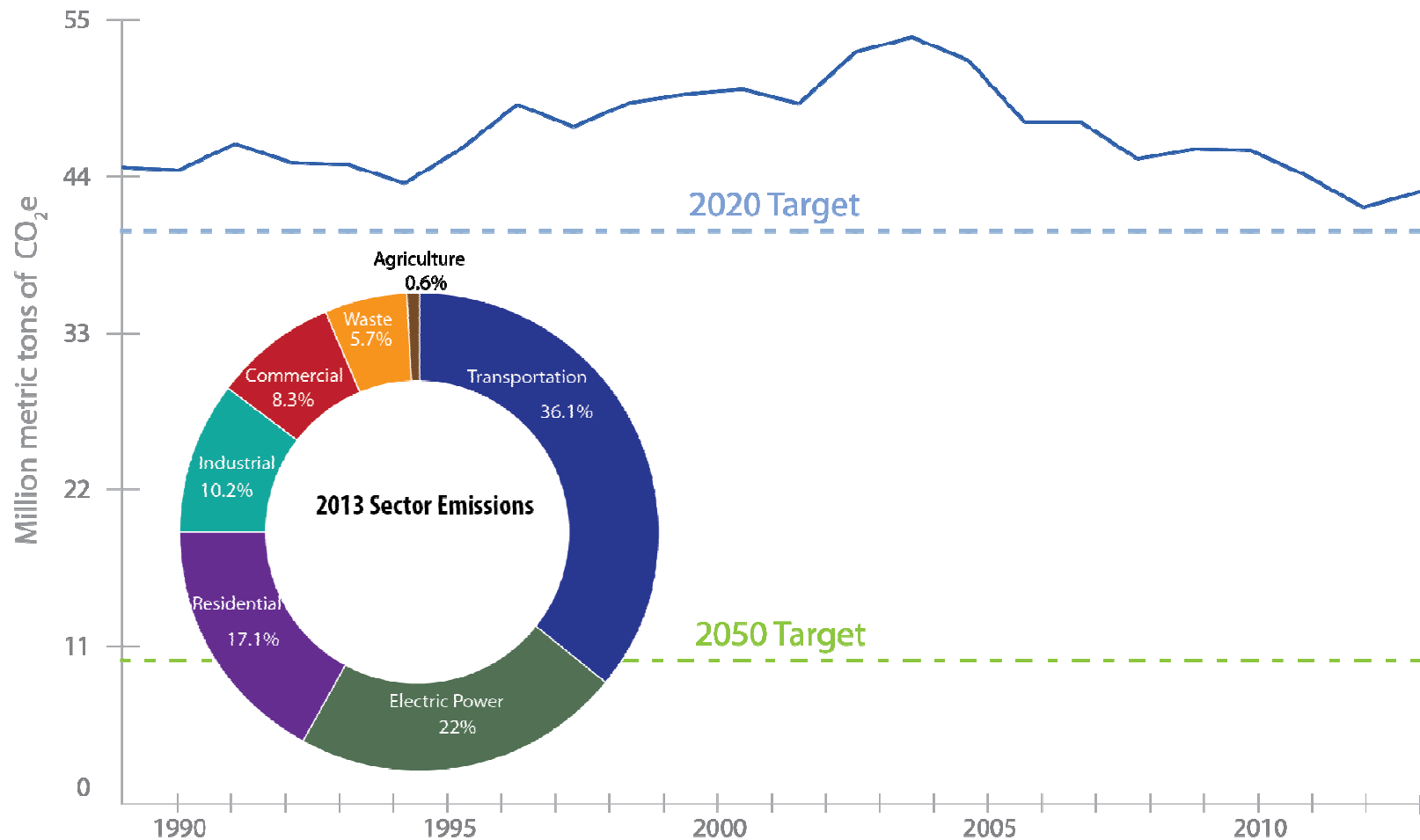
- Framework for monitoring and reporting progress to meet mandated targets
- Framework for engaging stakeholders

Regional Greenhouse Gas Emissions Initiative

- Implement CT's participation in **RGGI**, nation's first market-based regulatory program to reduce GHG emissions

Progress: CT Greenhouse Gas Emissions

Connecticut Statewide Greenhouse Gas Emissions 1990-2013



Energy Planning Priorities

- ✓ Advance Tailored Energy Efficiency Solutions to Achieve Cost Savings for All Consumers
- ✓ Continue to drive down program costs
- ✓ Support grid modernization initiatives
- ✓ Continued focus on resiliency initiatives including microgrids and energy security
- ✓ Continue progress towards 2020 greenhouse gas reduction goal (GHG) provide a foundation for achieving transformational 2050 GHG reduction goal.



Comprehensive Energy Strategy

Electricity

- Strategically and cost-effectively advance deployment of clean energy to meet Connecticut's policy goals. Continue to encourage competitive procurement models.

Buildings

- Focuses on deploying energy efficiency investments to achieve weatherization goal of 80% of all residential units by 2050, customized solutions, deeper measures, advancing codes and standards.

Transportation

- Strategic emphasis on decarbonizing transportation –federal emission standards ZEV MOU, EV deployment and regulatory framework, improving connectivity/mobility and reducing vehicle miles traveled.



Connecticut Department of Energy and Environmental Protection

Average Regional Electric Rates

Average Price of Electricity to Ultimate Customers by End-Use Sector-All Sectors (c/Kilowatthour)

Connecticut	16.73
New England	15.85
National Average	10.07

Table 5.6.A. Average Price of Electricity to Ultimate Customers by End-Use Sector,
by State, December 2016 and 2015 (Cents per Kilowatthour)



Connecticut Department of Energy and Environmental Protection

2016 Three State RFP

- 56 proposals for received for some 6,200 MW of clean energy generation

Number of Generation & Storage Bids, by Location

	Wind	Hydro	Solar	Fuel Cell	Storage
Total MW	3,260	1,810	720	60	50
CT	-	-	6 (180 MW)	1 (60 MW)	-
MA	-	-	3 (90 MW)	-	-
ME	10 (1770 MW)	-	3 (250 MW)	-	2 (50 MW)
NH	1 (30 MW)	-	1 (50 MW)	-	-
NY	8 (1460 MW)	1 (320 MW)		-	-
RI	-	-	6 (150 MW)	-	-
Canada	-	2 (1490 MW)		-	-



Connecticut Department of Energy and Environmental Protection

2016 Small Scale RFP

- 103 proposals for received for some 1,160 MW of clean energy generation

	Wind (MW)	Hydro (MW)	Solar (MW)	Fuel Cell (MW)	Storage (MW)	AD (MW)	EE (MW)
Total MW	80	2	715	200	120	10	5
CT	10 (25)	-	49 (480)	12 (2000)	13 (90)	2 (5)	2 (5)
MA	2 (20)	-	1 (15)	-	-	-	-
ME	1 (15)	-	1 (20)	-	1 (2)	1 (2)	-
NH	-	-	2 (40)	-	1 (25)	-	-
NY	-	-	2 (40)	-	-	-	-
RI	-	-	2 (20)	-	-	-	-
VT	2 (20)	-	6 (100)	-	1 (4)	-	-
Canada	-	1 (2)	-	-	-	-	-



Connecticut Department of Energy and Environmental Protection

Project Selections: Small Scale RFP

DEEP selected a total of 25 projects (wind, solar and energy efficiency) to move forward with contract negotiations.

Project	Megawatts
Total Capacity Wind and Solar Projects	402 MW
Energy Efficiency	
	34 MW
Total Capacity	368 MW



RFP Requirements and Non-Price Scoring Criteria

- **Utility-Scale Competitive Renewable Energy Procurements**
 - EDCs required to enter into long-term PPAs through a competitive bidding process.
- **RFP Scoring Criteria**
 - 75% Price
 - 25% criteria outlined in Public Act 15-107
- **Siting Requirements**
 - Three State RFP
 - Small Scale RFP
- There are a lot of factors that need to be accounted for in non-price evaluation.
- Ability to differentiate between projects complicated by diversity of projects eligible to bid which include gas capacity and transmission.
- With only 25 points to consider, difficult to weigh any given factor.

Non-Price Evaluation Factors

Viability

GHG

Emissions

Consistent with CES and IRP

Economic development benefits in CT

Capacity

Reliability

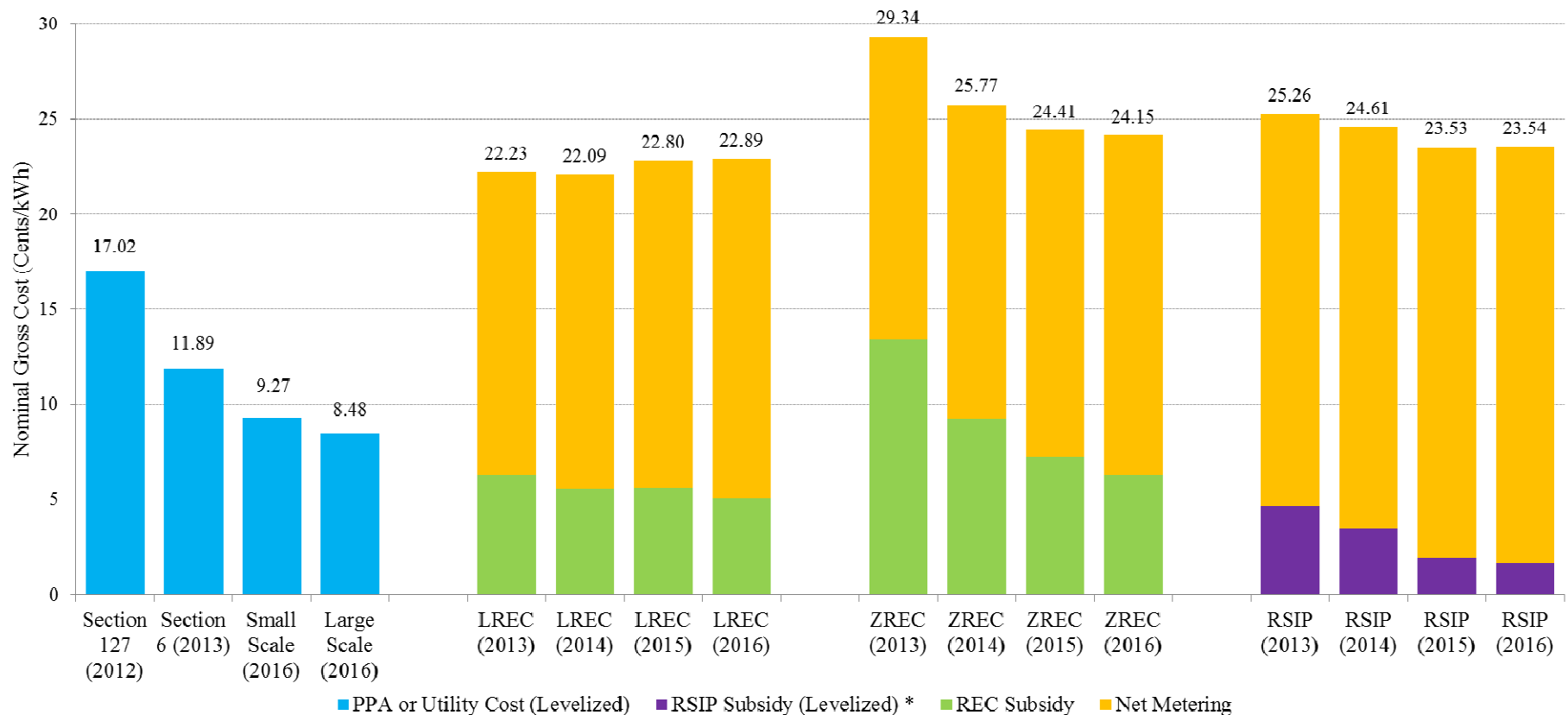
Diversity

Price Risk



Connecticut Department of Energy and Environmental Protection

Cost of Clean Energy Programs

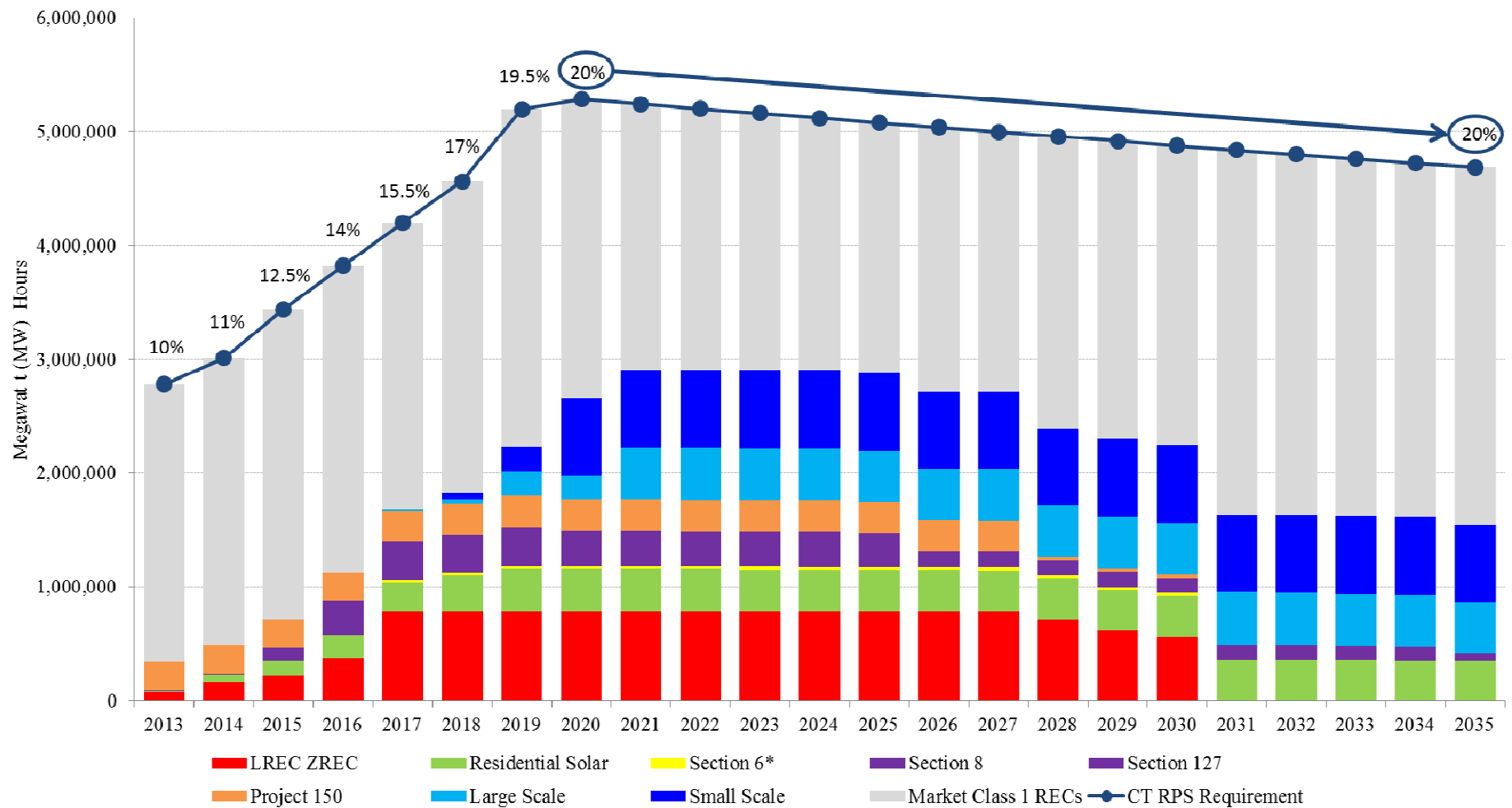


* Average cost for RSIP was levelized over 20 years for Purchased Residential PV systems and not leased systems.



Connecticut Department of Energy and Environmental Protection

RPS Requirements (Thru 2035)



Connecticut Department of Energy and Environmental Protection

Connecticut's Microgrid Program

- Program is critical piece of larger resiliency strategy in the wake of severe storms
- Program provides enhanced safety and quality of life for residents in an outage situation
- Program fits in with Governor's larger vision for cheaper, cleaner, and more reliable energy future for Connecticut
- In line with "portfolio approach" that encourages deployment of distributed generation



Focus on Increasing Public Facility Resilience

- Severe weather events becoming new normal
- Threats facing the state become more multi-dimensional (weather, terrorism, cyber-attacks, etc.)
- Microgrids are a way to allow critical facilities to function even when all else fails



Connecticut Microgrid Program Milestones

Coming Soon in 2017 Grants to Include funding for generation



November 2015 Issue Round 3 grant awards for microgrid projects including funding for generation




July 2016 Town of Fairfield Microgrid Operational



October 2014 Issued 2 grant awards for microgrid projects totaling \$5 million



August 2015 University Of Hartford Microgrid Operational



July 2013 Issued 9 grant awards for microgrid projects totaling \$19 million

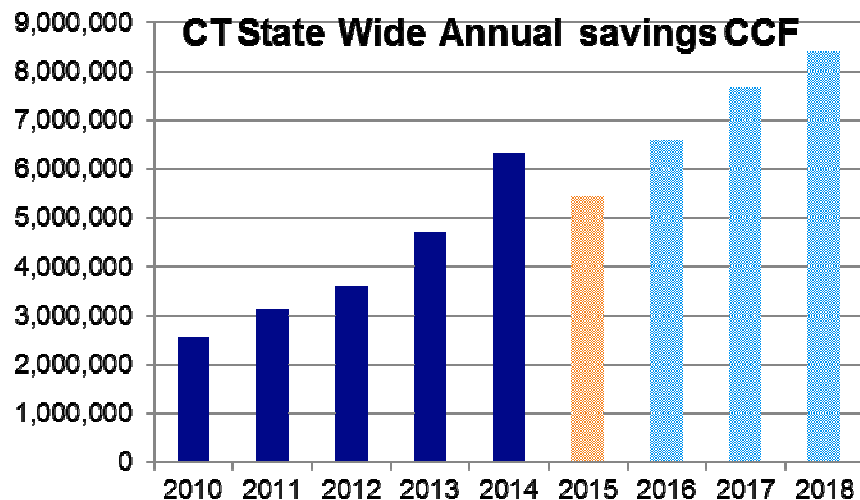
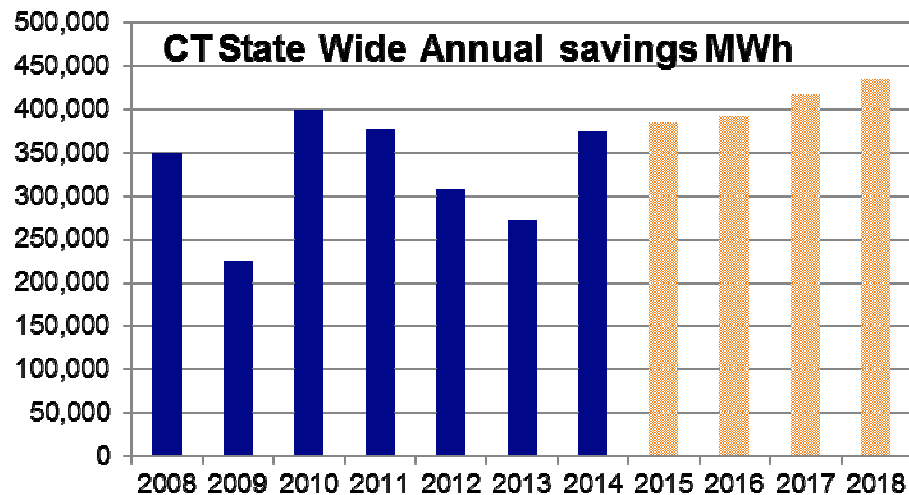


March 2014 Wesleyan University Microgrid Operational



Energy Savings Progress and Targets: 2016-2018

EnergizeCT.com



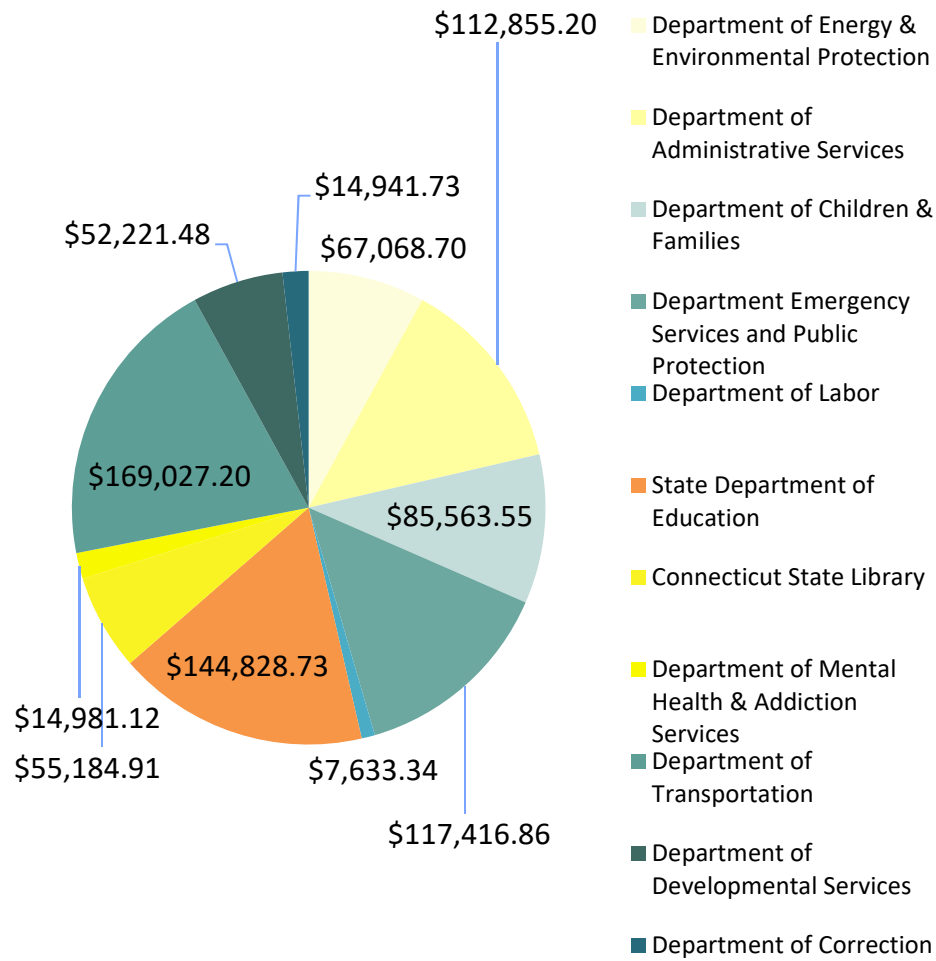
Highlights of 2016-2018 Targets:

- \$700M portfolio for customers
- 129k residential homes weatherized
- 9.7 M residential products distributed
- All 169 communities actively engaged
- 28k businesses more efficient
- Energy savings equivalent to the output of a 262 MW power plant

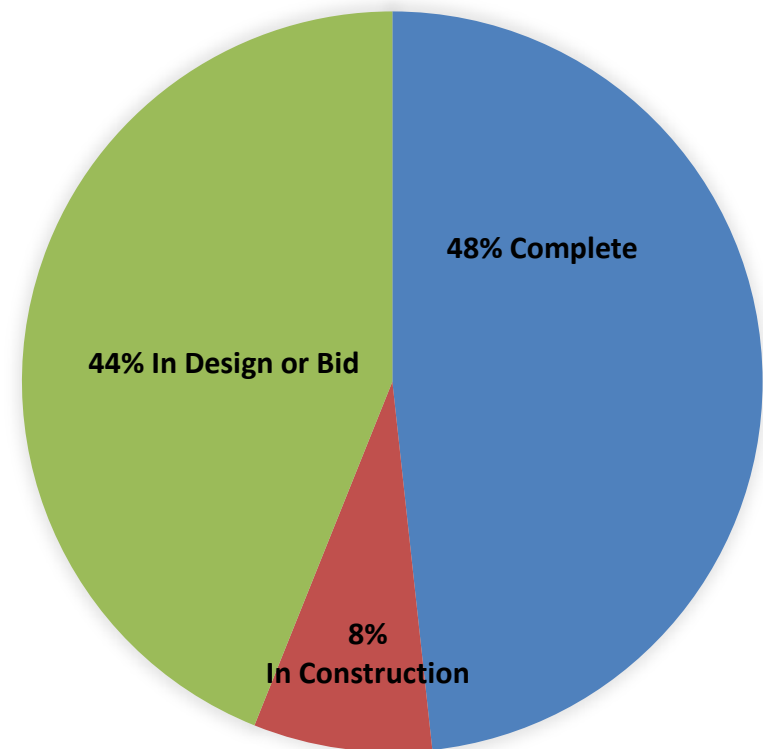
Information from 2016-2018 Conservation and Load Management Plan

Leading By Example: Progress Across Agencies

Small Projects at Several Agencies Saving Over \$800k Annually



Mid-Size Projects Completed and Underway To Save \$2.91M Annually



Leading By Example: Progress Ready to Scale Up

CT Valley Hospital, Middletown 2016 Guaranteed Energy Savings Performance Contract



- ✓ \$31.9M in guaranteed energy and maintenance savings
- ✓ 35% reduction in energy use
- ✓ Reduced GHG emissions of estim. 10,000 metric tons of CO₂
- ✓ 2 miles of new steam and condensate pipes
- ✓ 2.5 megawatt Cogen System
- ✓ Solar-Powered electric vehicle charging station



Connecticut Department of Energy and Environmental Protection

Transportation Best Practices

There are three primary means to reduce greenhouse gas emissions from the transportation sector:

- Reduce vehicle miles traveled
- Increase fuel economy; and
- Switch to fuels with lower life-cycle carbon content

Approach — There are various approaches to achieve a target, which range from voluntary efforts to mandatory actions:



Timing — Immediate vs. long-term impacts

Level of Authority — Local vs. state vs. federal

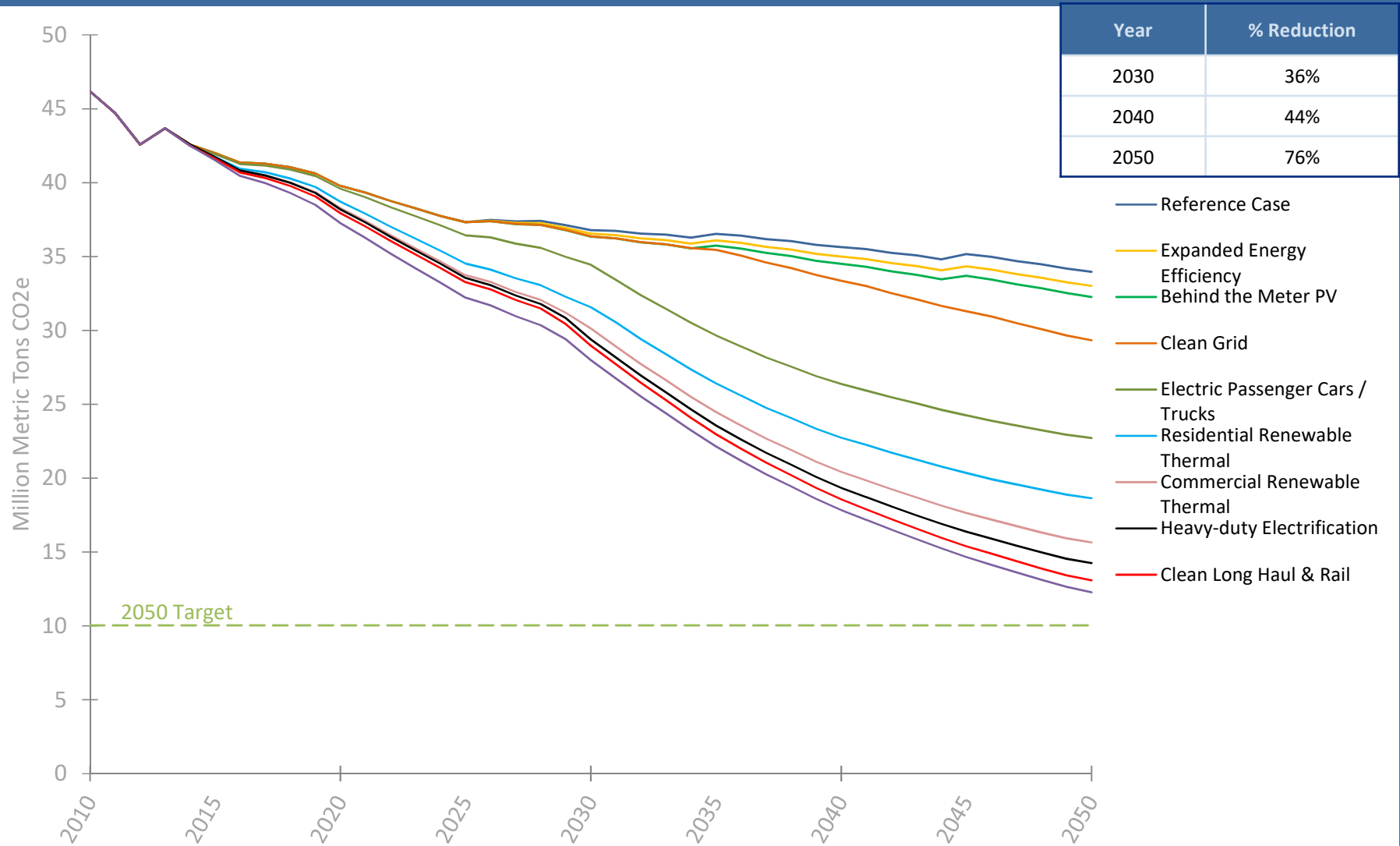
Effectiveness Factors — policy design/nuances and consumer responses

Ease of Implementation — political feasibility, equity, economic impacts, and co-benefits

Example strategies to reduce GHG emissions

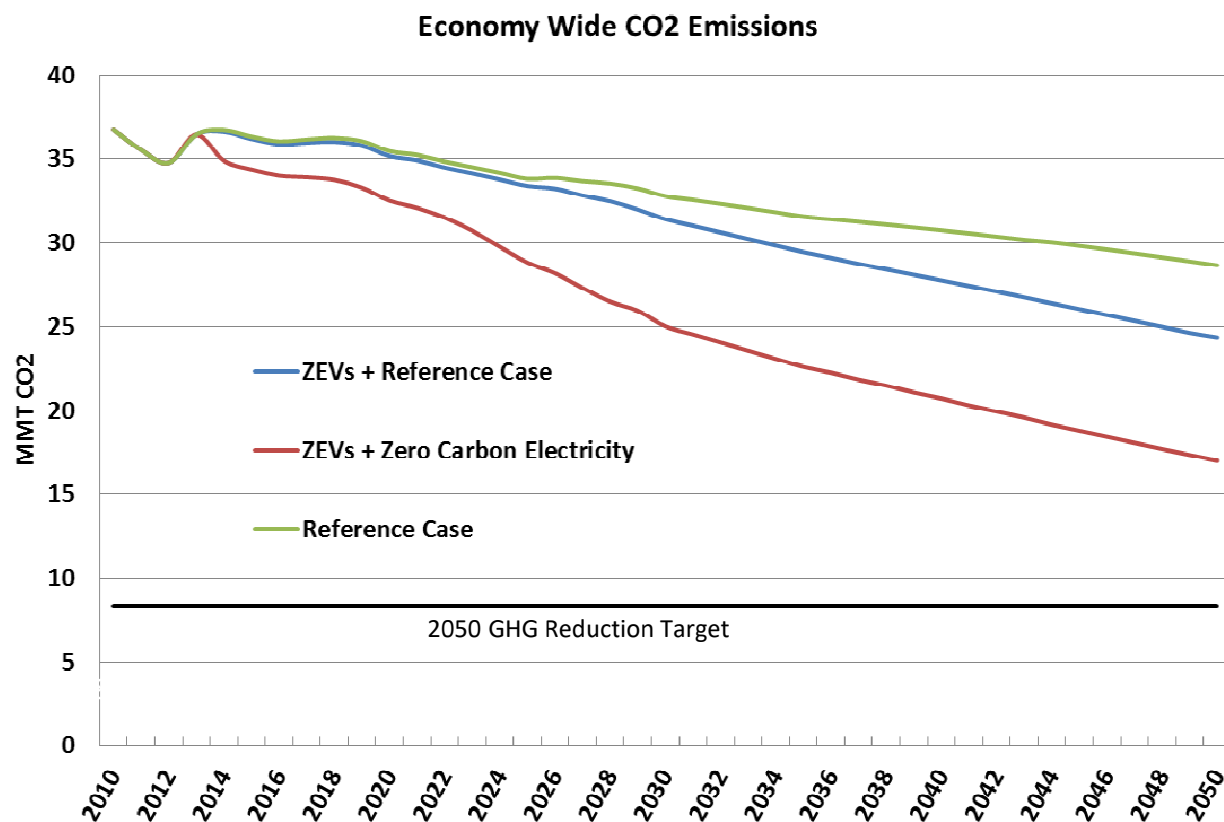
VMT Reductions	Fuel Economy	Fuel Switching to reduce carbon content
<p>Travel Pricing</p> <ul style="list-style-type: none"> • Road/congestion pricing • VMT fees • Fuel pricing <p>Provision for Alternative Modes:</p> <ul style="list-style-type: none"> • Transit investment • Bicycle support strategies • HOV lanes • Park-and-ride facilities <p>Parking Management:</p> <ul style="list-style-type: none"> • Parking pricing • Mandatory parking cash-out • Parking supply limits <p>Land Use Planning</p> <ul style="list-style-type: none"> • Increasing density, mix of uses, and transit-oriented development • Pedestrian environment improvements <p>Other VMT-reduction Measures:</p> <ul style="list-style-type: none"> • Telecommuting • Compressed work weeks • Restrictions on vehicle use 	<p>Improving Traffic Operations</p> <ul style="list-style-type: none"> • Traffic flow improvements • Speed limits • Driver education <p>Vehicle Technology Improvements:</p> <ul style="list-style-type: none"> • Mandates on new vehicle fuel economy (CAFÉ) • Research and development on fuel economy <p>Changing Vehicle Purchase/Retirement Decisions:</p> <ul style="list-style-type: none"> • Disseminate fuel economy information • Vehicle efficiency tax or feebates • Emission-based vehicle registration fees • Vehicle retirement/buyback programs 	<p>Alternative fuel vehicle (AFV) mandates</p> <p>Research and development on fuels and AFVs</p> <p>Carbon taxes or differential taxes for fuels</p>

Hypothetical Emission Reduction Scenario



Hypothetical Zero Emission Vehicle Scenario

Regional Electric Grid BAU vs. Decarbonized Electric Grid



Reference Case:

- On average 55% fossil fuel electricity generation 2030
- 2050 (AEO extrapolation)

ZEVs + Reference Case:

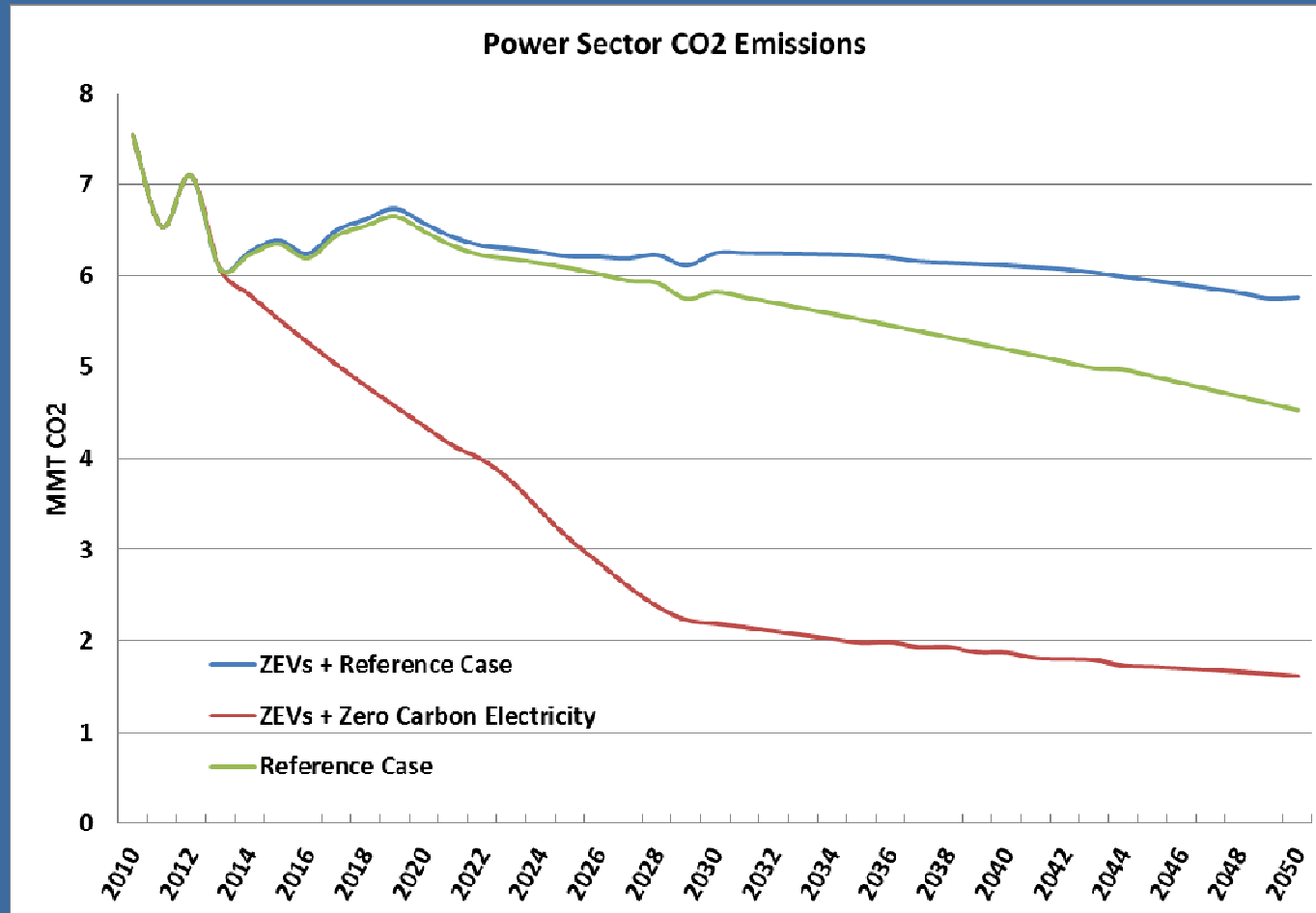
- 70% of passenger cars and trucks electric by 2050
- Reference Case electricity generation

ZEVs + Zero Carbon Electricity:

- 70% of passenger cars and trucks electric by 2050
- 80% zero carbon electricity by 2050

Hypothetical Zero Emission Vehicle Scenario

Electric Power Sector CO₂ Emissions



Electricity demand is 22% higher by 2050 in the ZEV scenarios

The grid mix has a large impact on the efficacy of vehicle electrification

CES Informational Meetings

Information Meetings Held:

- Demand Resources, October 27, 2016
- Renewable Thermal Technologies, November 3, 2016
- Grid Modernization, December 6th , 2016
- Siting of Renewable Energy, January 10, 2017
- Energy Efficiency in State Buildings, February 15, 2017
- Shared Clean Energy, February 14, 2017

Additional sessions

- Electric Vehicles, April 2017
- Procurement Process: Review, April 2017



CES Public Process

- March-April 2017-Release draft CES
- Technical meeting to answer stakeholder questions
- Public hearings to hear stakeholder comments
- 60 day written comment period
 - PURA required to comment on natural gas and impact to electric rates
- Submit final CES to Energy & Technology Committee

