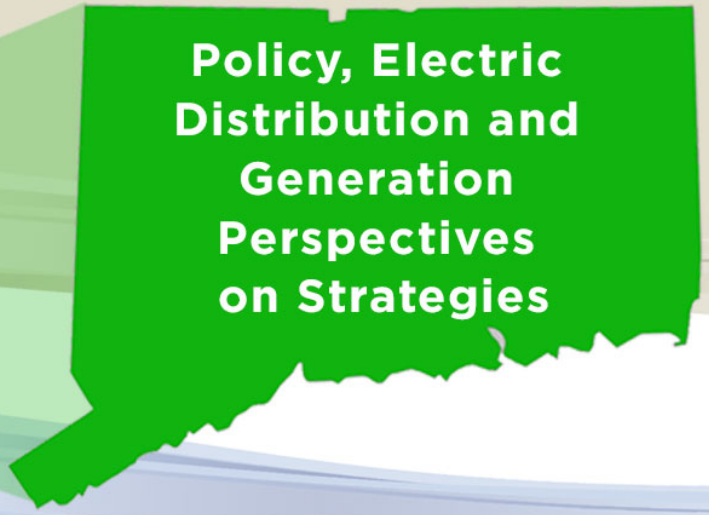
Addressing Connecticut's Climate Change Goals



WEDNESDAY, NOVEMBER 9

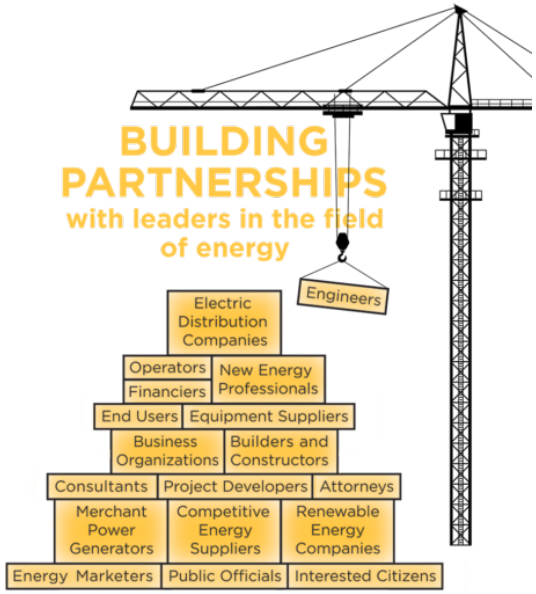
CPES
Connecticut Power and Energy Society

CPES Meeting

November 9, 2016

Building Partners

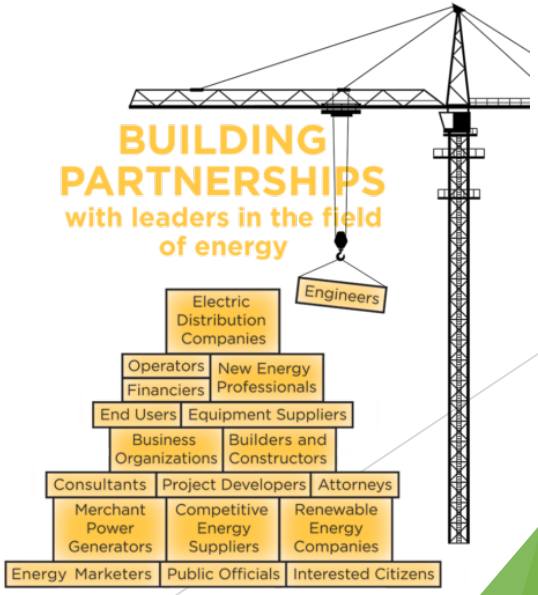
- Platinum Partners:
  - Robinson + Cole
  - Starion Energy
- Silver Partners:
  - Portland Natural Gas Transmission System
  - DePino, Nunez & Biggs



CPES
Connecticut Power and Energy Society

Building Partners

- Individual Members:
  - John Athas, Daymark Energy Advisors
  - Kent McCord, Solect Energy
  - Sabin Rossi, Fairbanks Energy Services
  - M. Anne Peters, Carmody Torrance Sandak & Hennessey, LLP
  - Pamela Elkow, Carmody Torrance Sandak & Hennessey, LLP



New Energy Professionals

- Welcome First Time Attendees
  - Benjamin Davis, Concentric Energy Advisors
  - Bruce Douglas, Natural Systems Utilities
  - Steve Horn, Dominion Resources
  - Alec Lawson, Primacy
  - Kent McCord, Solect Energy
  - Sayen Moray, ERS

New Energy Professionals

CPES
Connecticut Power and Energy Society

Upcoming Events

Tuesday, Dec 13, 2016

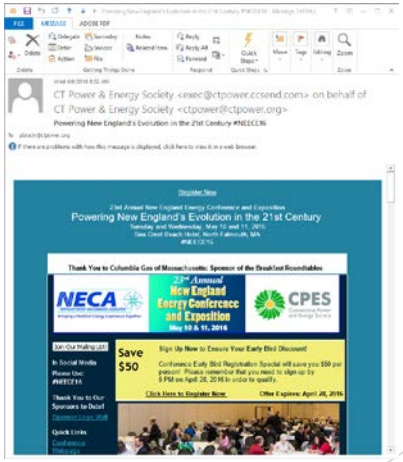
Holiday Party, The Society Room, Hartford

Wednesday, Jan 11, 2017

Legislative Preview, Courtyard Marriott, Cromwell

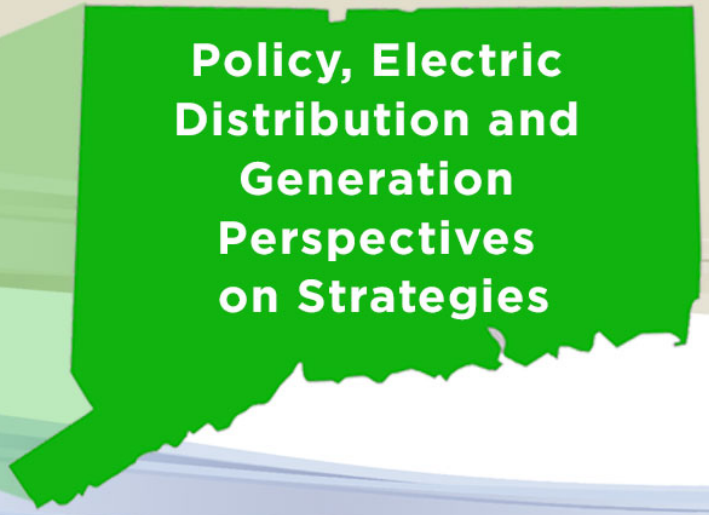
CPES
Connecticut Power and Energy Society

Communications



CPES
Connecticut Power and Energy Society

Addressing Connecticut's Climate Change Goals



WEDNESDAY, NOVEMBER 9

Connecticut Department of Energy and Environmental Protection

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

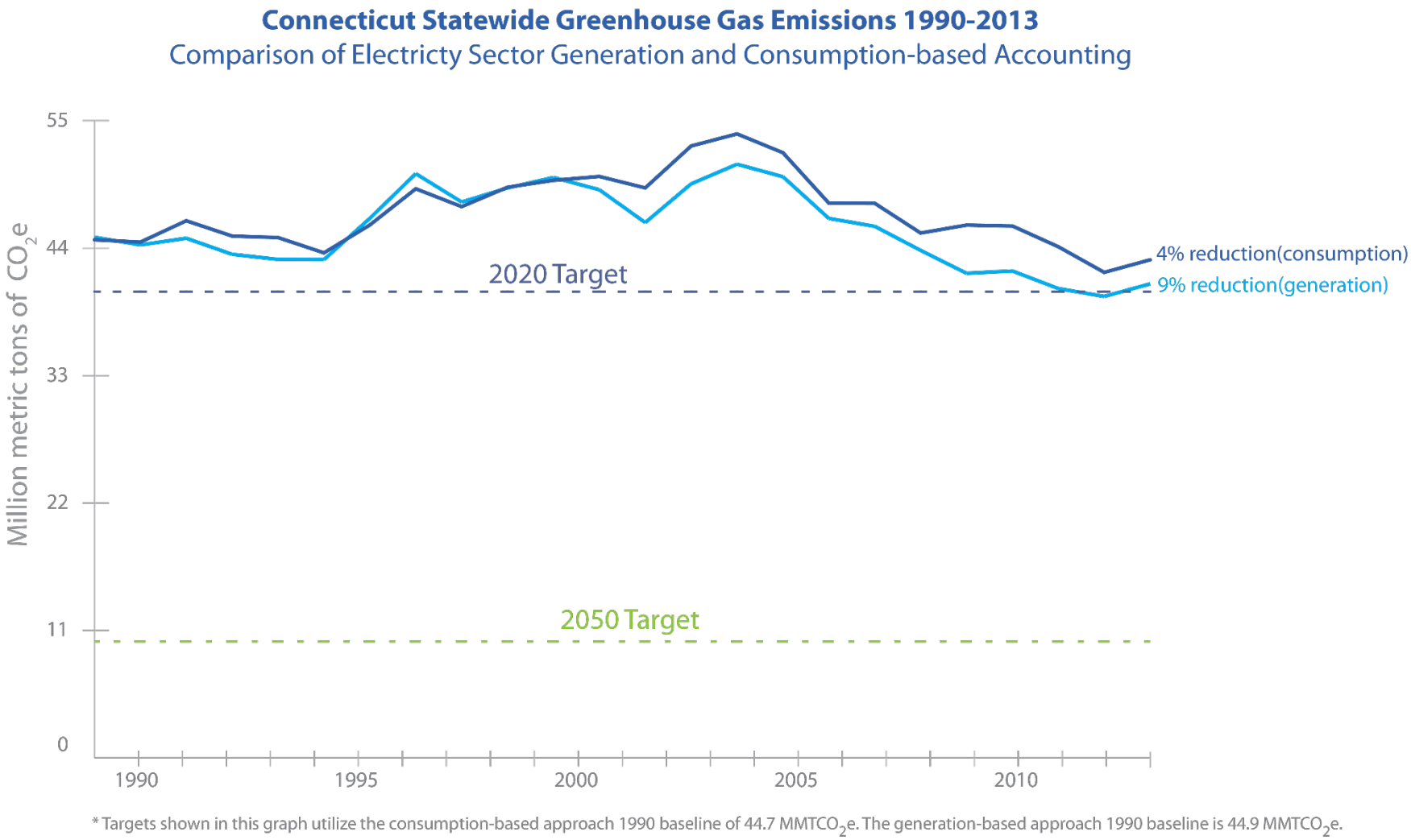
2008 Global Warming Solutions Act

Public Act No. 08-98

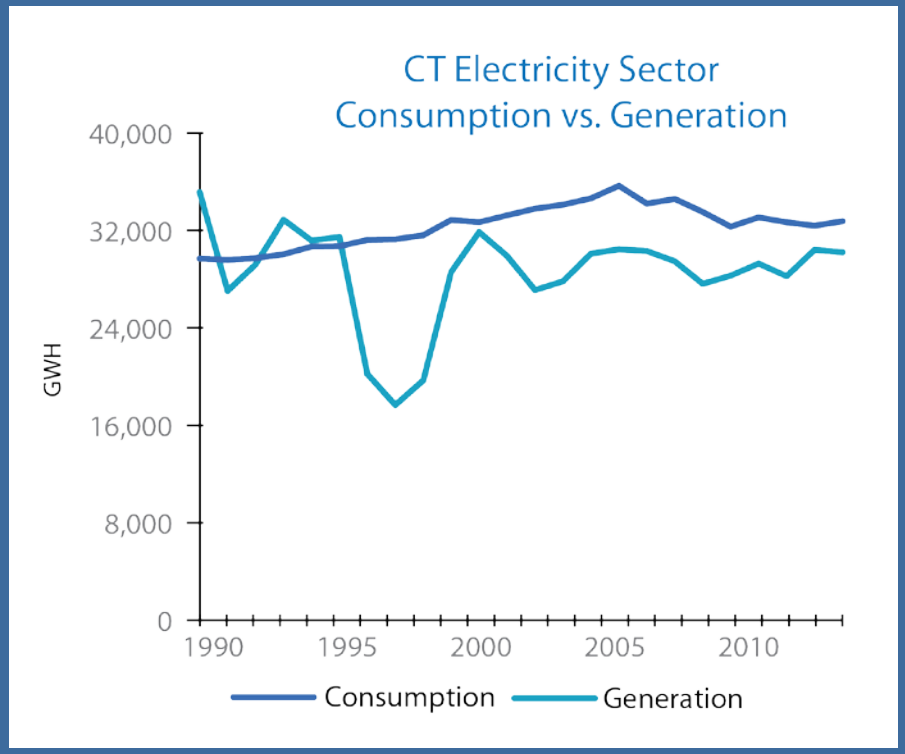
Requires the state to meet economy-wide greenhouse gas emission reductions equal to:

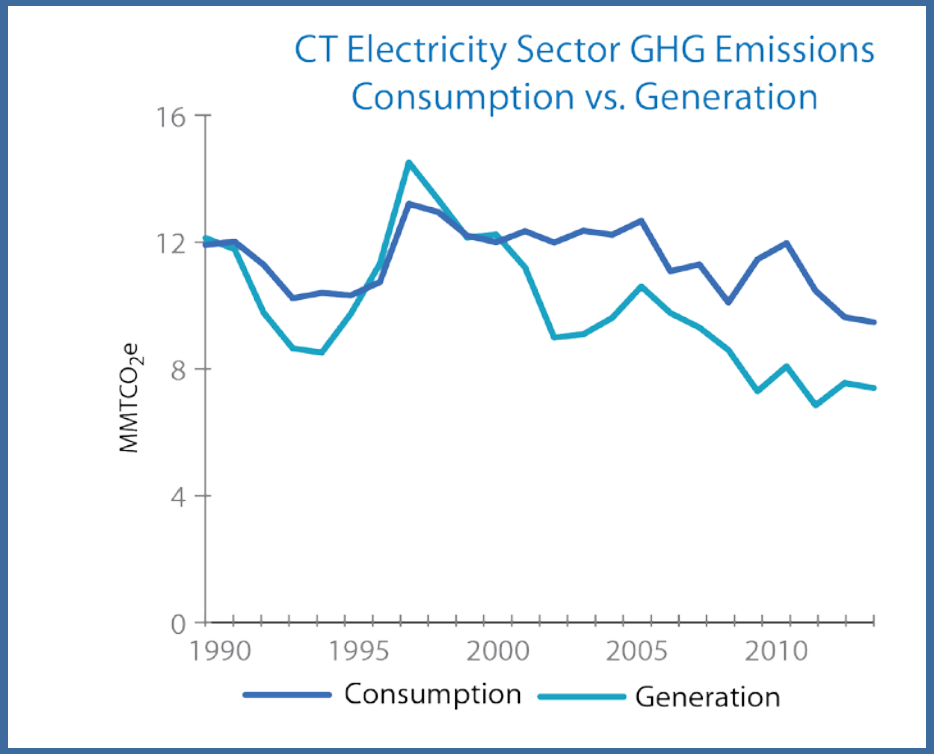
- 10% below 1990 levels by January 1, 2020
- 80% below 2001 levels by January 1, 2050.

Economy-wide emissions 1990-2013



Electricity Sector: Consumption vs. Generation Accounting

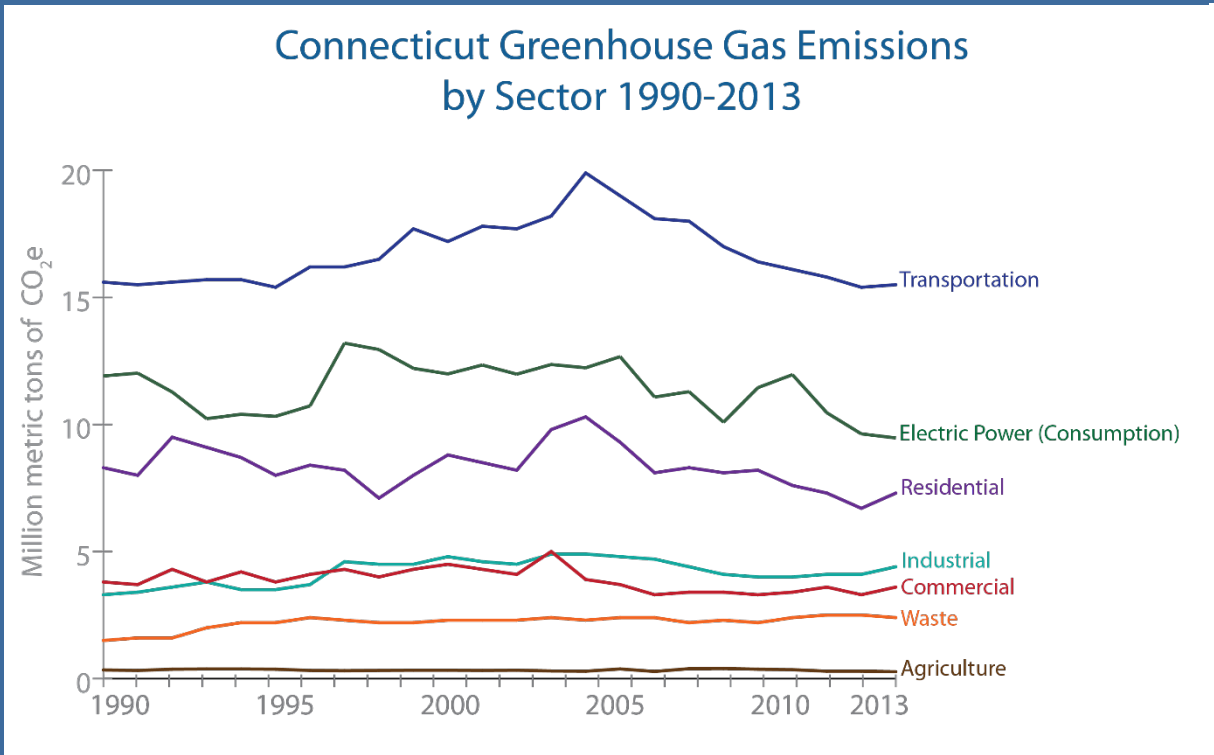


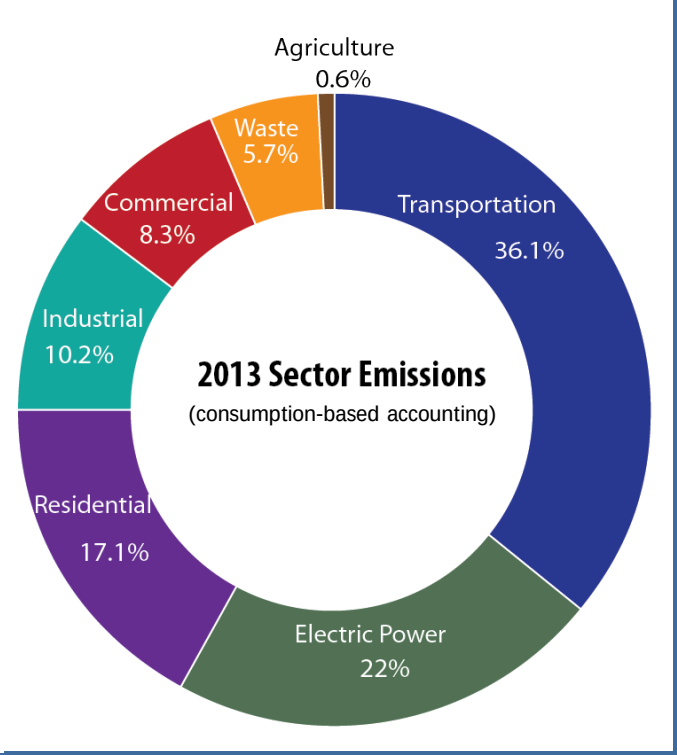


The generation-based approach indicates lower carbon emissions than the consumption-based approach, reflecting the fact that power plants operating within Connecticut have a "cleaner" generation mix than the region as a whole.

The consumption-based approach reflects significant historical and ongoing change in the mix of fuels used to generate electricity in New England. It also has the potential to better align Connecticut's GHG inventory with actions the state has taken and can take to reduce emissions by investing in energy efficiency within our borders, and increasing generation of electricity from renewable energy sources both within the state and regionally through policies such as the Renewable Portfolio Standard and long-term contracting.

Sector Emissions Over Time





Connecticut's largest reduction has occurred in the electric power sector — a 20.5 percent reduction under consumption-based accounting and a 39 percent reduction under generation based accounting.

The transportation sector continues to be the single largest source of emissions in the state, contributing 36 percent, principally from the use of fossil fuels in passenger cars and light-duty trucks.

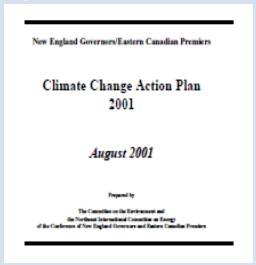
Connecticut's Policy Framework

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

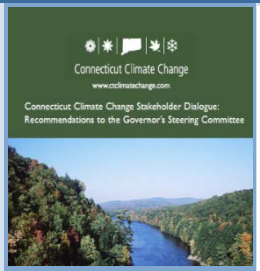
GSC finalizes *CT Climate Change Action Plan*

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

Executive Order 46 on Climate Change Creates the GC3

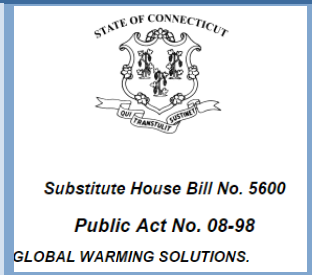


2001

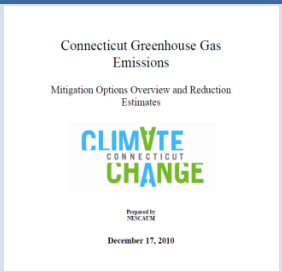


2004

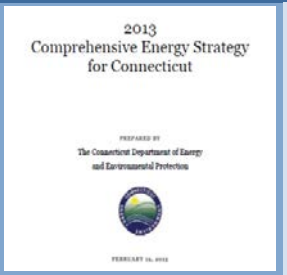
2005



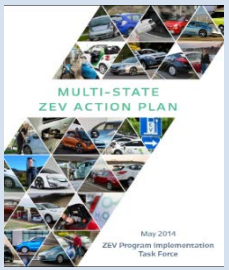
2008



2010



2013



2014

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

CT 's implementation of 1990 Amendments to Federal CAA continues

2013 Comprehensive Energy Strategy

Regional Greenhouse Gas Initiative

International ZEV Alliance

CT 's implementation of The RPS continues

Comprehensive Energy Strategy(CES)

Guiding Principles

Cheaper, Cleaner, More Reliable and Sustainable… for Communities and Customers

The 2016 CES covers the same topics as the 2013 CES but recognizes buildings as critical elements of an integrated energy infrastructure.

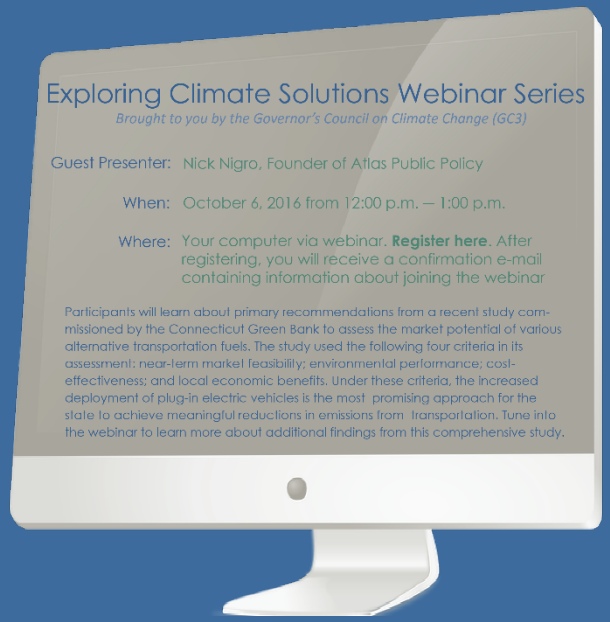
2013 CES Chapters	2016 CES Sectors
Electricity	Electricity
Energy Efficiency	Buildings and Processes
Industry	
Natural Gas	
Transportation	Transportation

Governor's Council on Climate Change

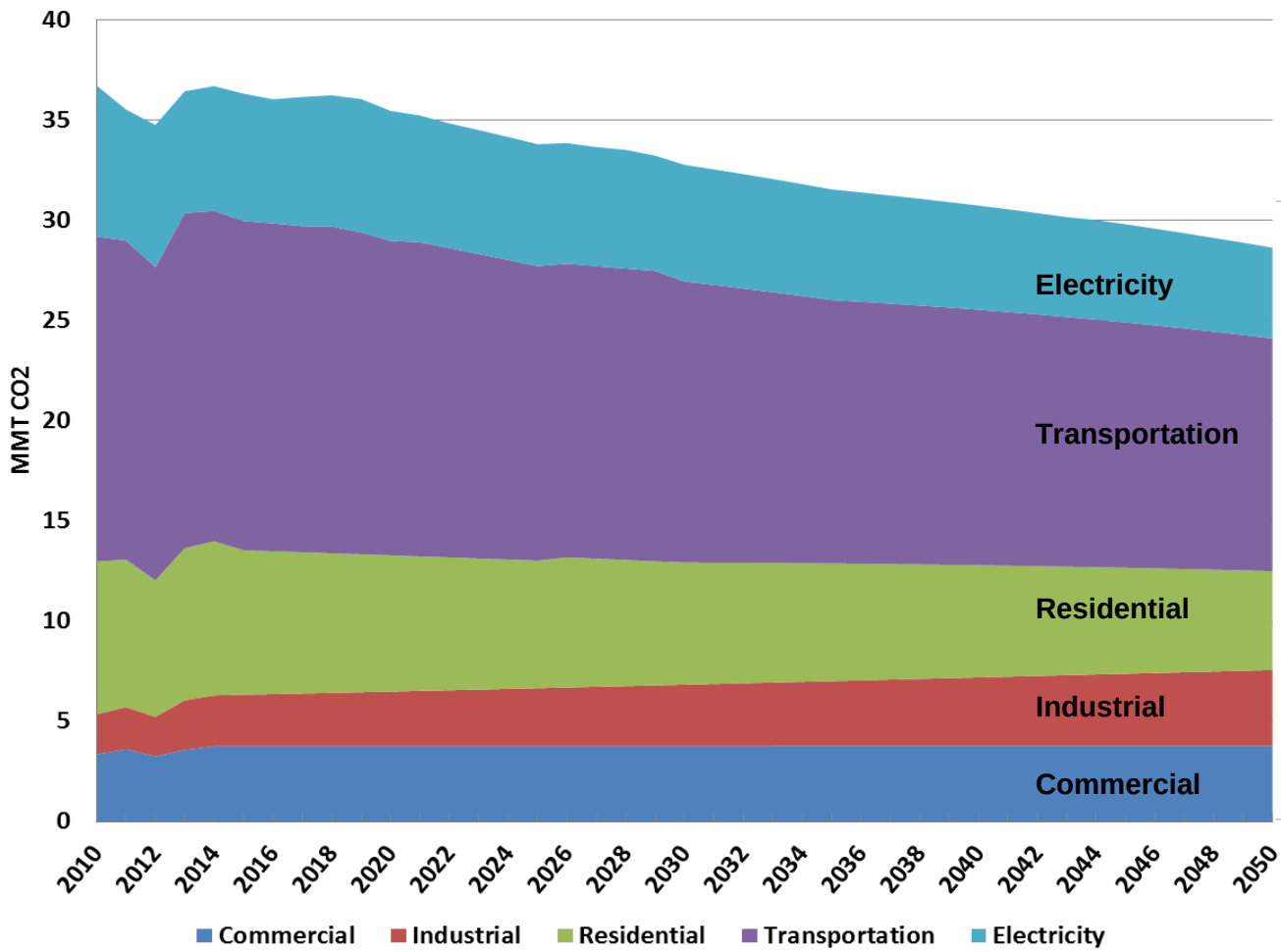
www.ct.gov/deep/GC3

The Council is to examine the effectiveness of existing policies and regulations designed to reduce greenhouse gas emissions and identify new strategies to meet the state's greenhouse gas emissions reduction target of 80% below 2001 levels by 2050.

It will do so, in part, by developing **interim statewide greenhouse gas reduction targets** for years between 2020 and 2050 and by identifying short- and long-term statewide strategies to achieve the necessary reductions.

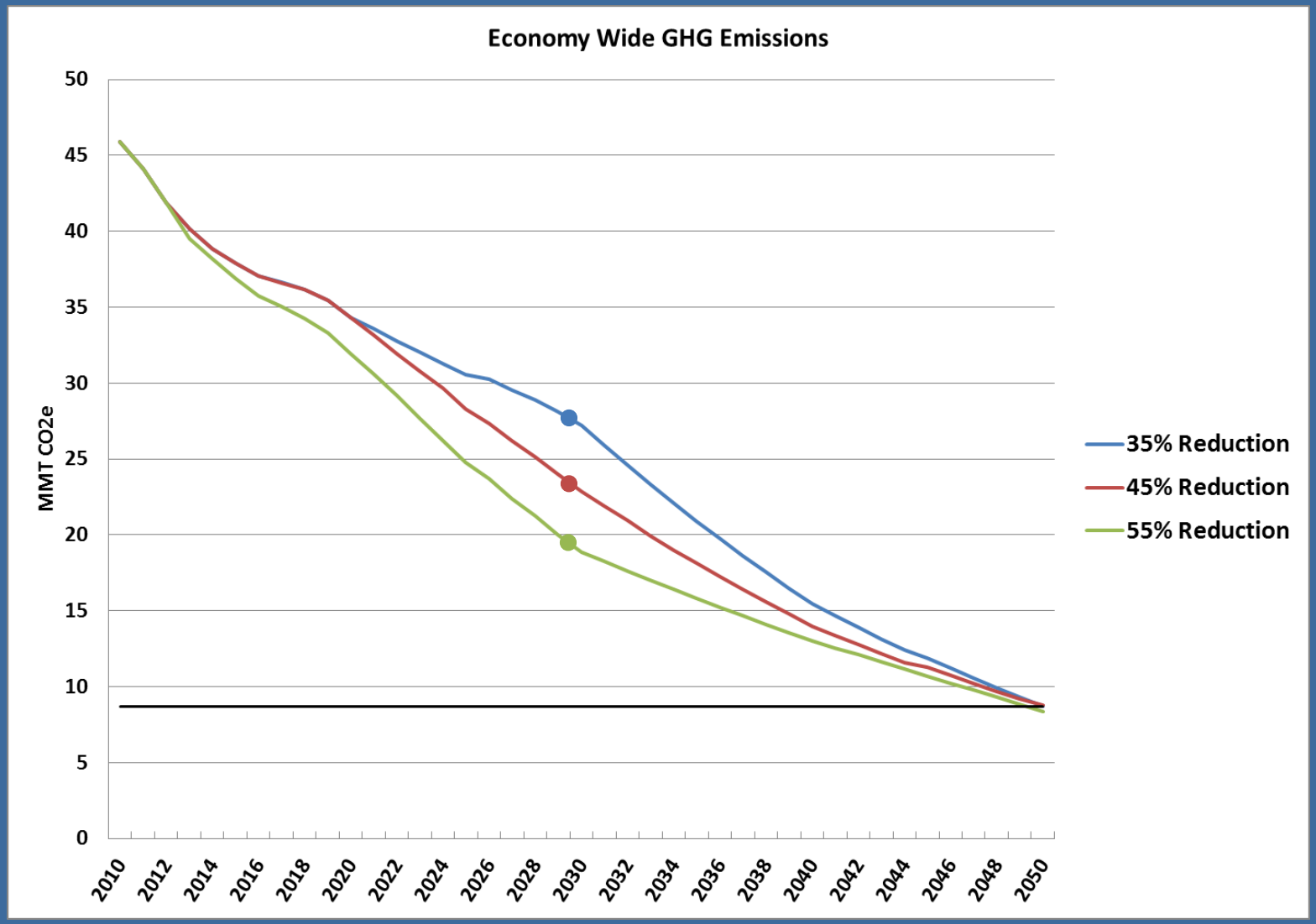


Connecticut Reference Case Projections by Sector



	2050 GHG Share	2010-2050 Avg. Annual Growth
Electricity	16%	-1.3%
Transportation	41%	-0.8%
Residential	17%	-1.1%
Industrial	13%	1.6%
Commercial	13%	0.3%

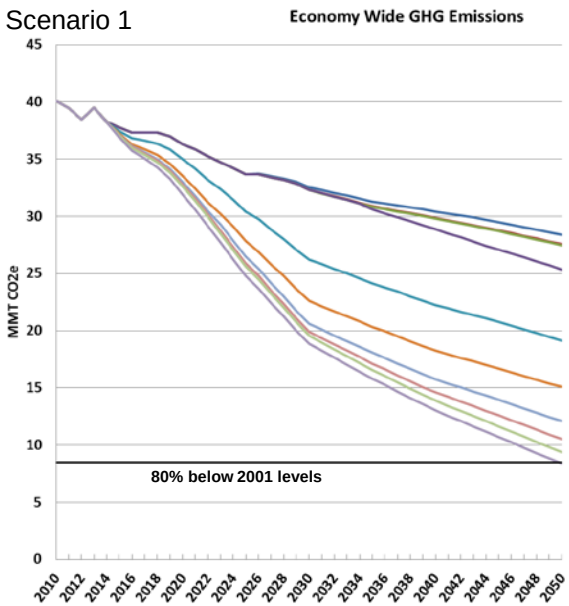
Evaluation of three alternative interim 2030 targets



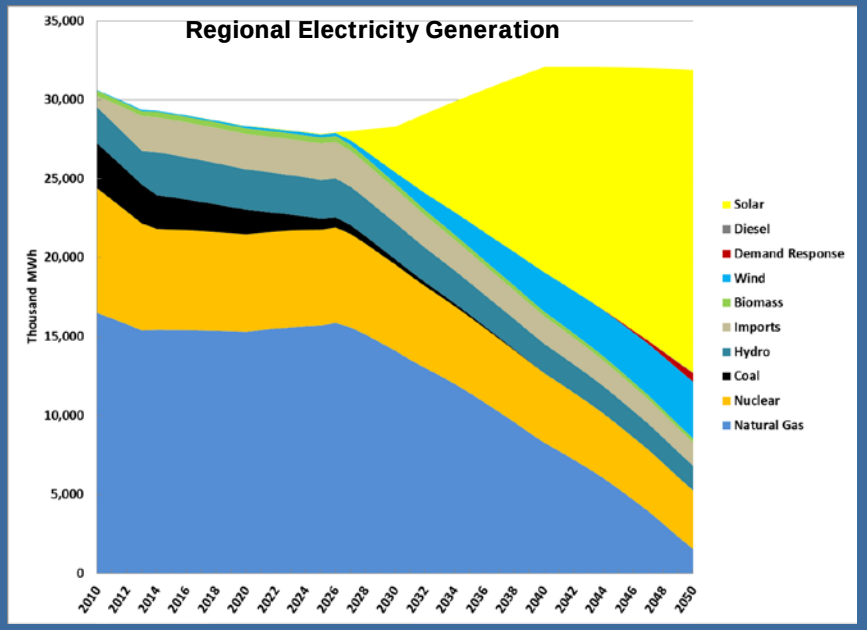
8 MMT difference in 2030 between 35 and 55 percent scenarios

Hypothetical Emission Reduction Scenarios

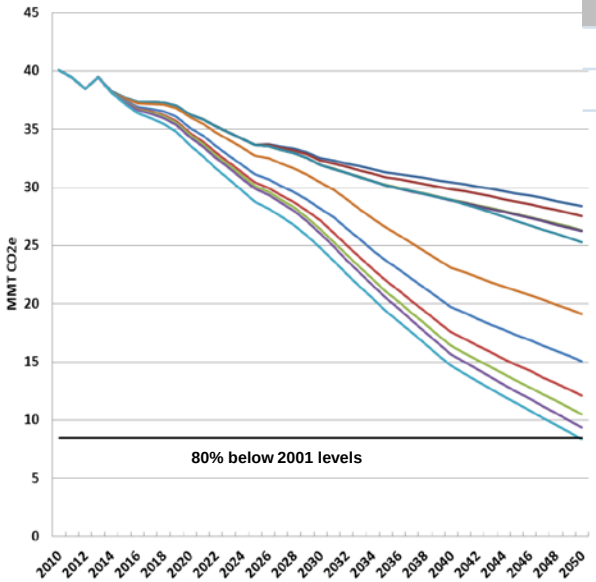
Scenario 1



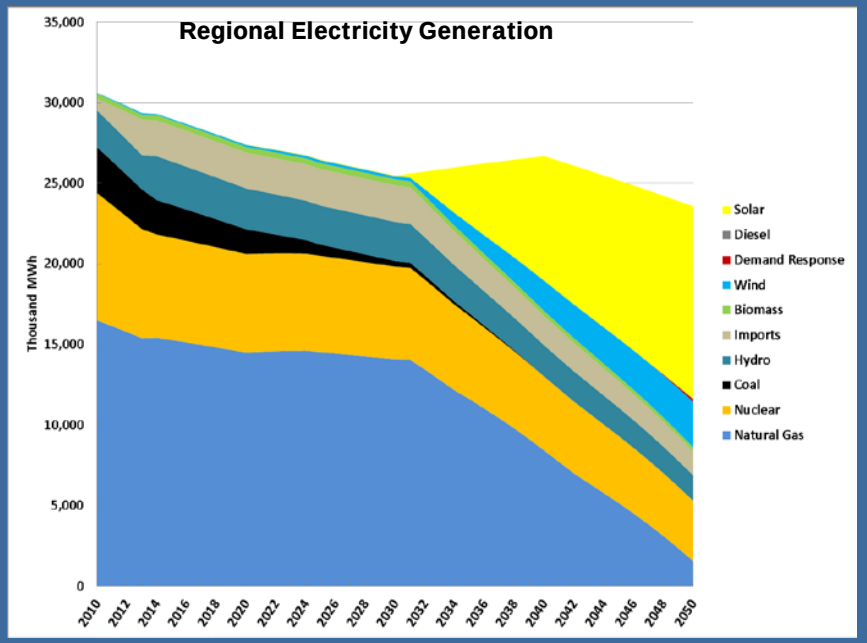
Year	% Reduction
2030	40%
2040	65%
2050	80%



Scenario 2

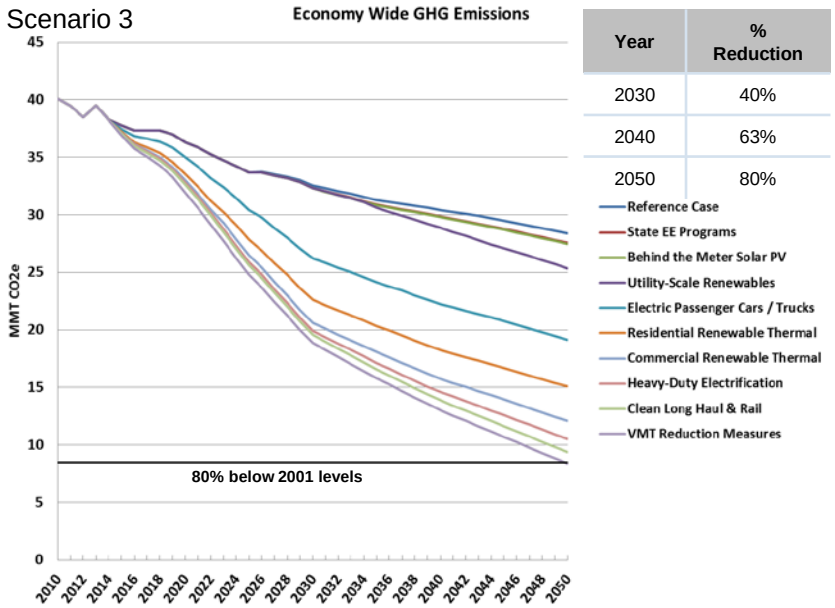


Year	% Reduction
2030	40%
2040	65%
2050	80%

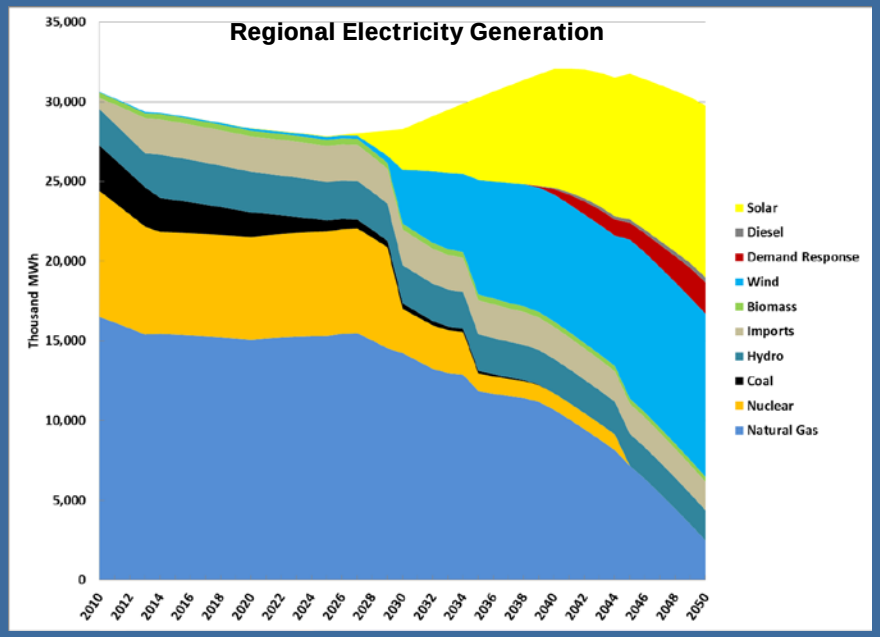


Hypothetical Emission Reduction Scenarios

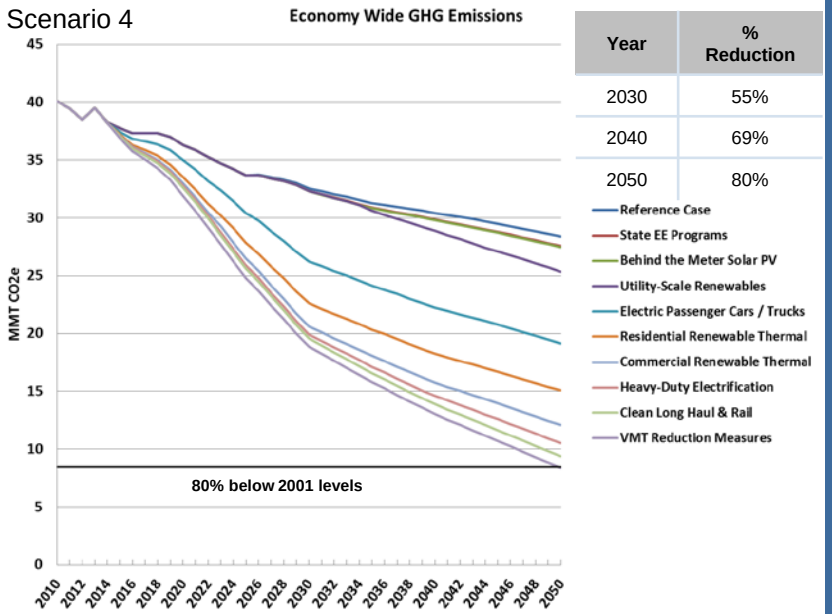
Scenario 3



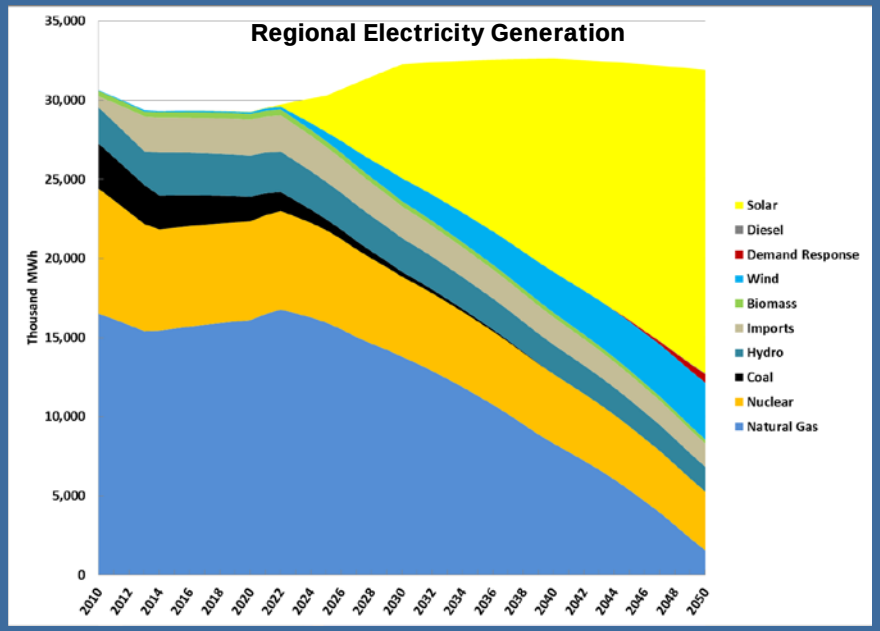
Year	% Reduction
2030	40%
2040	63%
2050	80%



Scenario 4

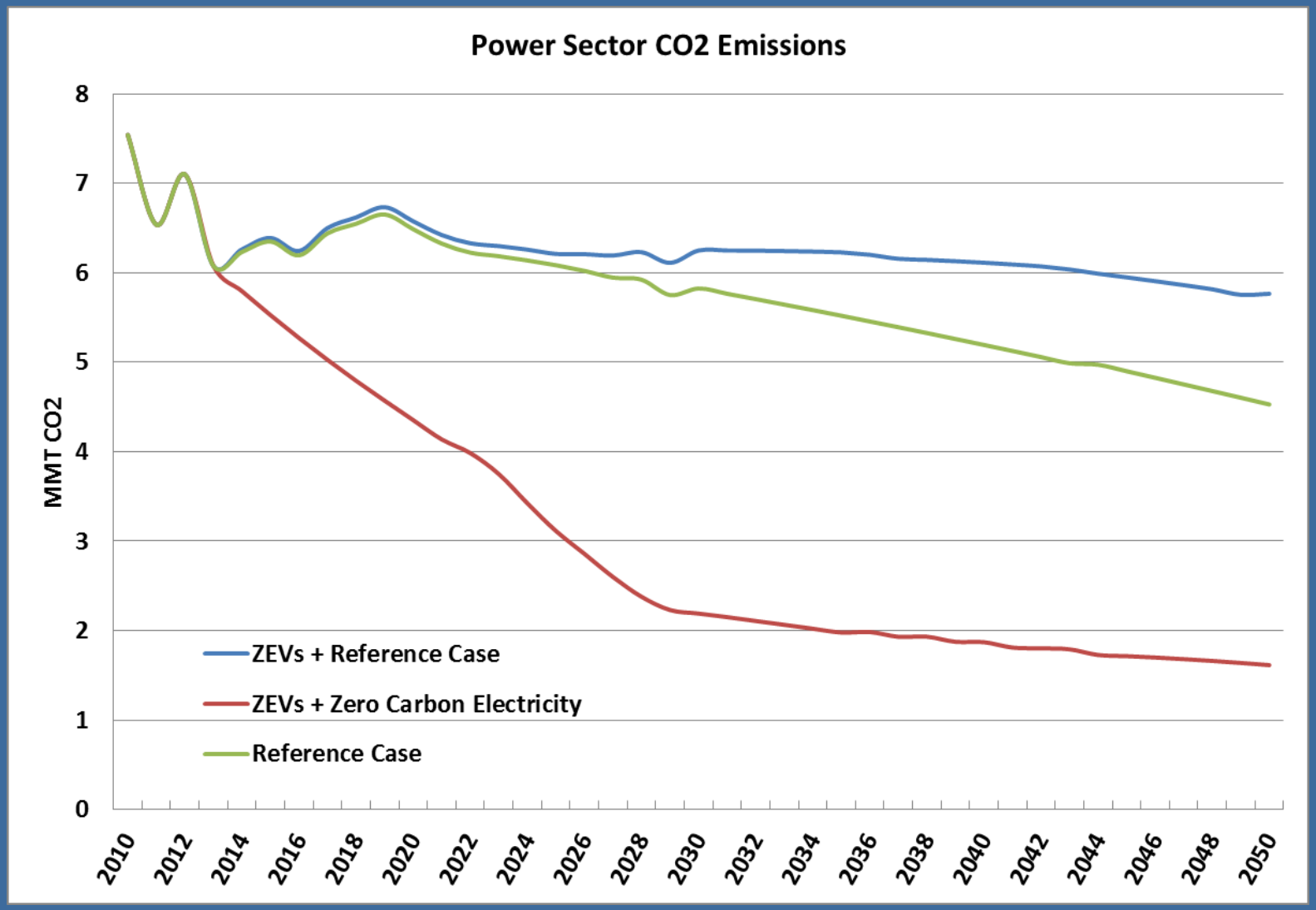


Year	% Reduction
2030	55%
2040	69%
2050	80%



Hypothetical Zero Emission Vehicle Scenario

Power Sector CO_2 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

GC3 Process Timeline: 2016-2017

Task	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Refine and finalize GHG reduction scenarios in LEAP.							
Economic Analysis of Scenarios (REMI).							
Review and discuss midterm target(s) and policy options for achieving GHG reduction targets.							
Develop a policy narrative around GHG mitigation scenarios.							

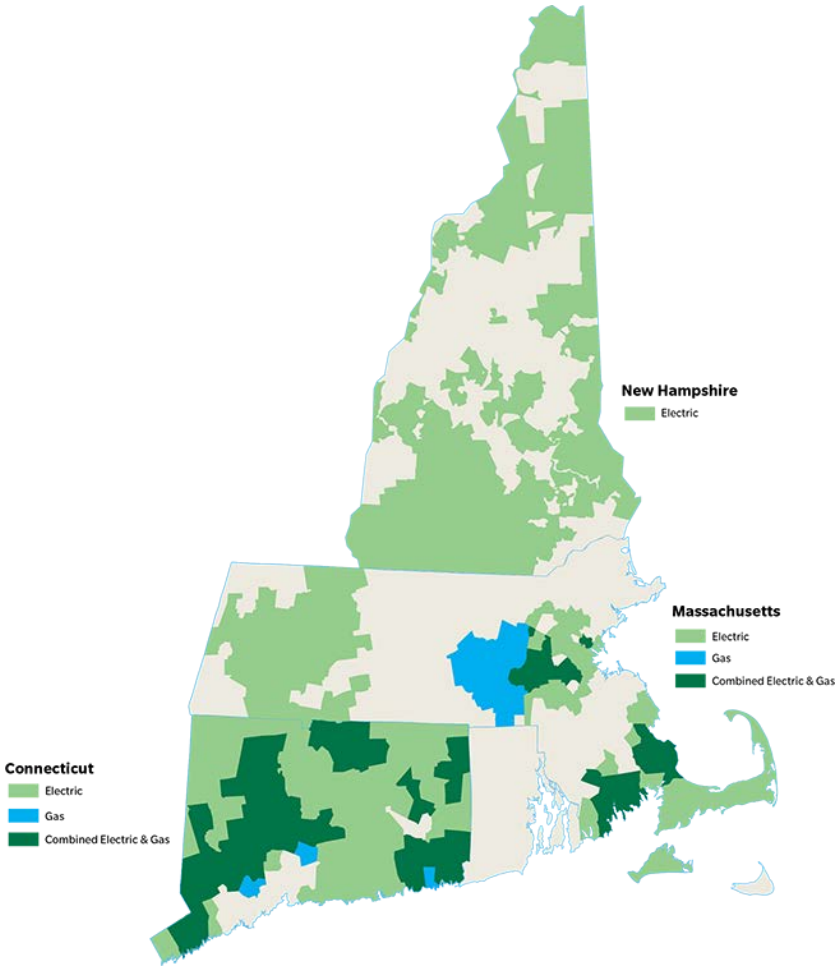
Upcoming Meetings:

GC3 Meeting November 14, 2016 3:00 – 5:00 PM
GC3 Meeting December 15, 2016 1:30 – 3:30 PM

Thank You!

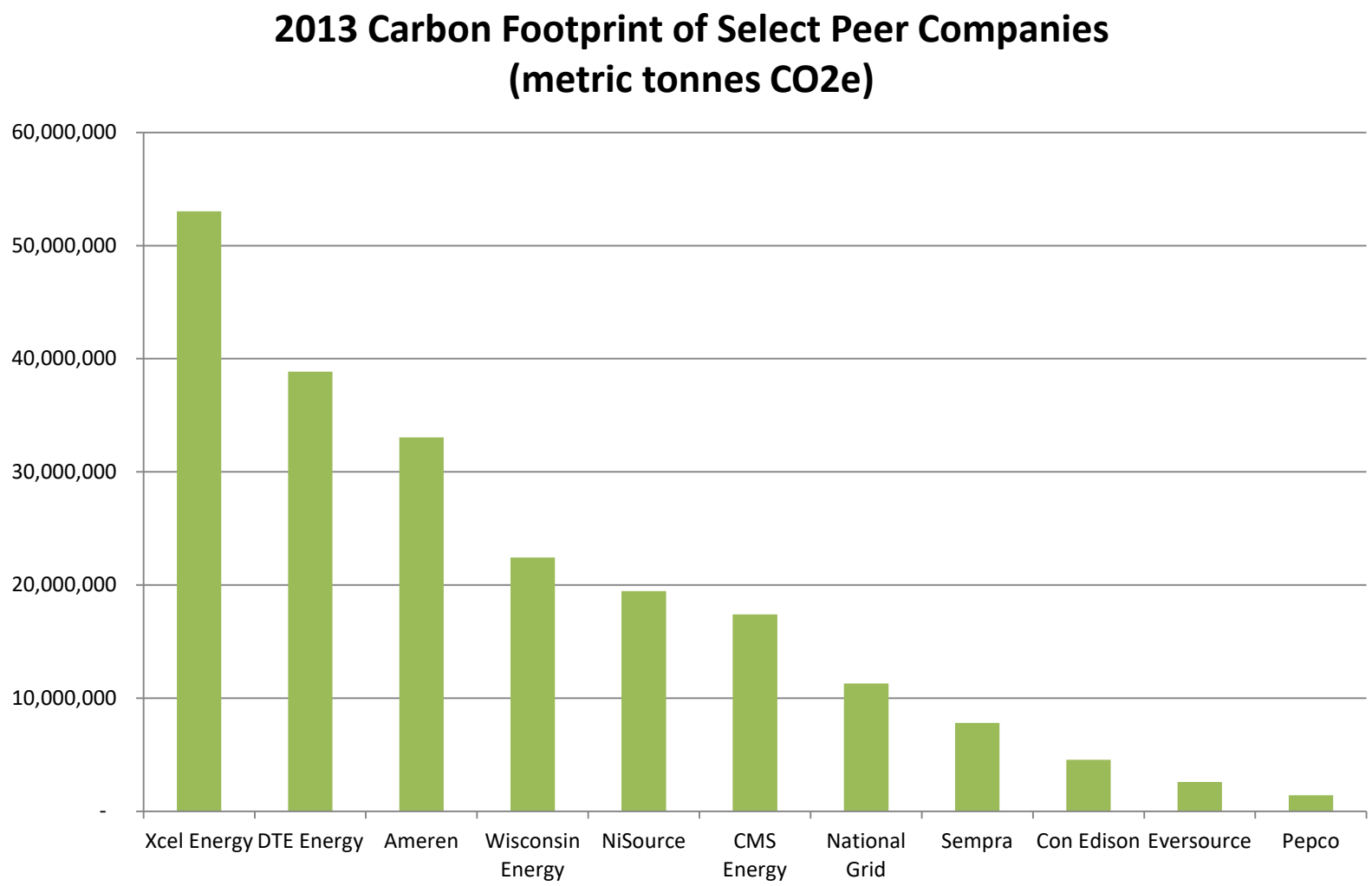
Keri Enright-Kato
Director of Climate Change,
Technology & Research, CT DEEP
Keri.Enright-kato@ct.gov

Utility Perspective



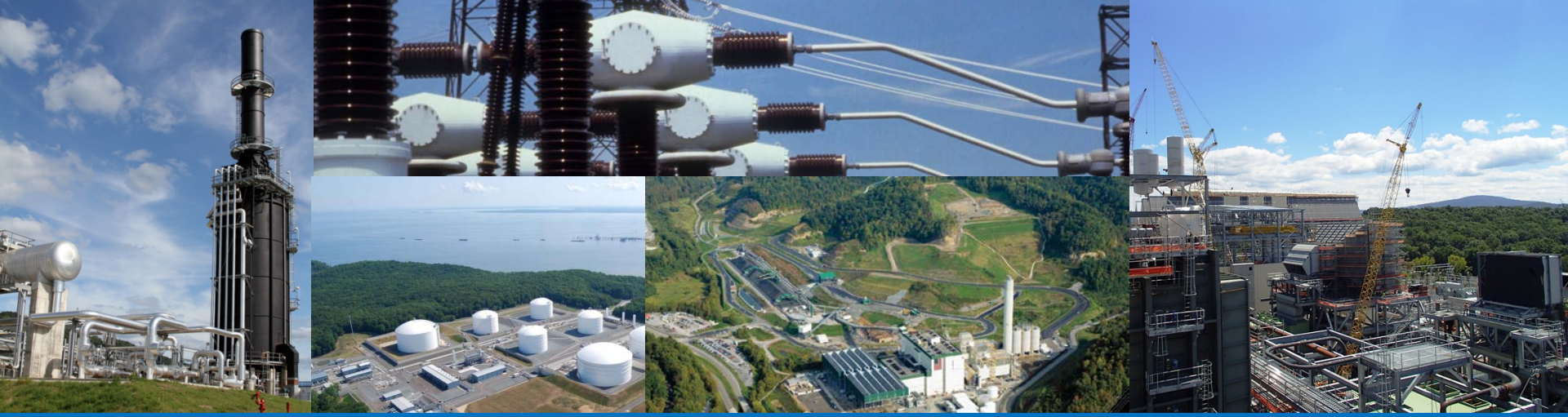
Tracy A. Gionfriddo, Eversource Energy

Eversource Has Smaller Footprint Than Most Peers



Corporate Focus on Reducing Regional Emissions Intensity

- Renewable energy
- Energy efficiency
- Natural gas heating
- Alternative fueled vehicles
- Adaptation and resiliency



Dominion®

CPES – Addressing Connecticut's Climate Change Goals

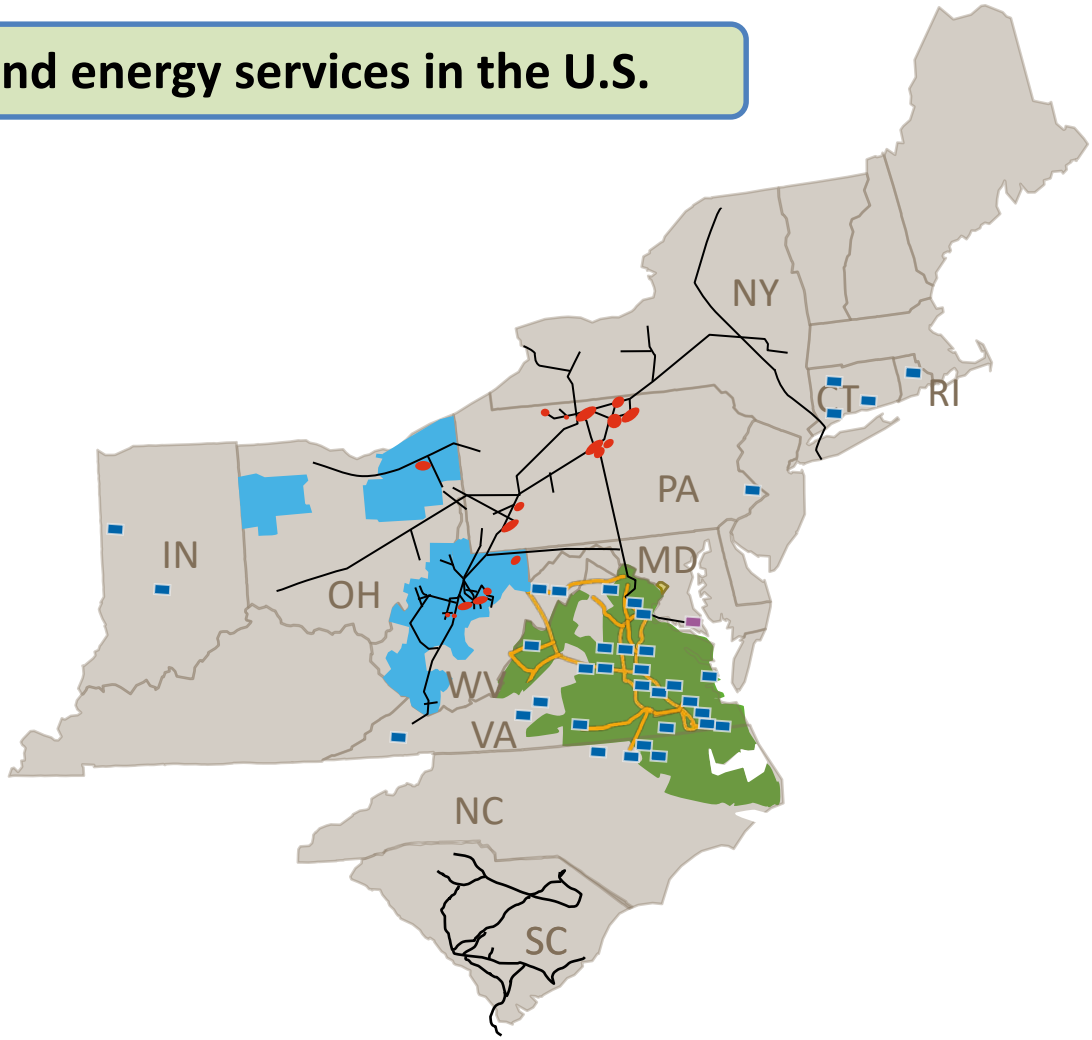
November 9, 2016

Dominion Profile

Power and Natural Gas Infrastructure

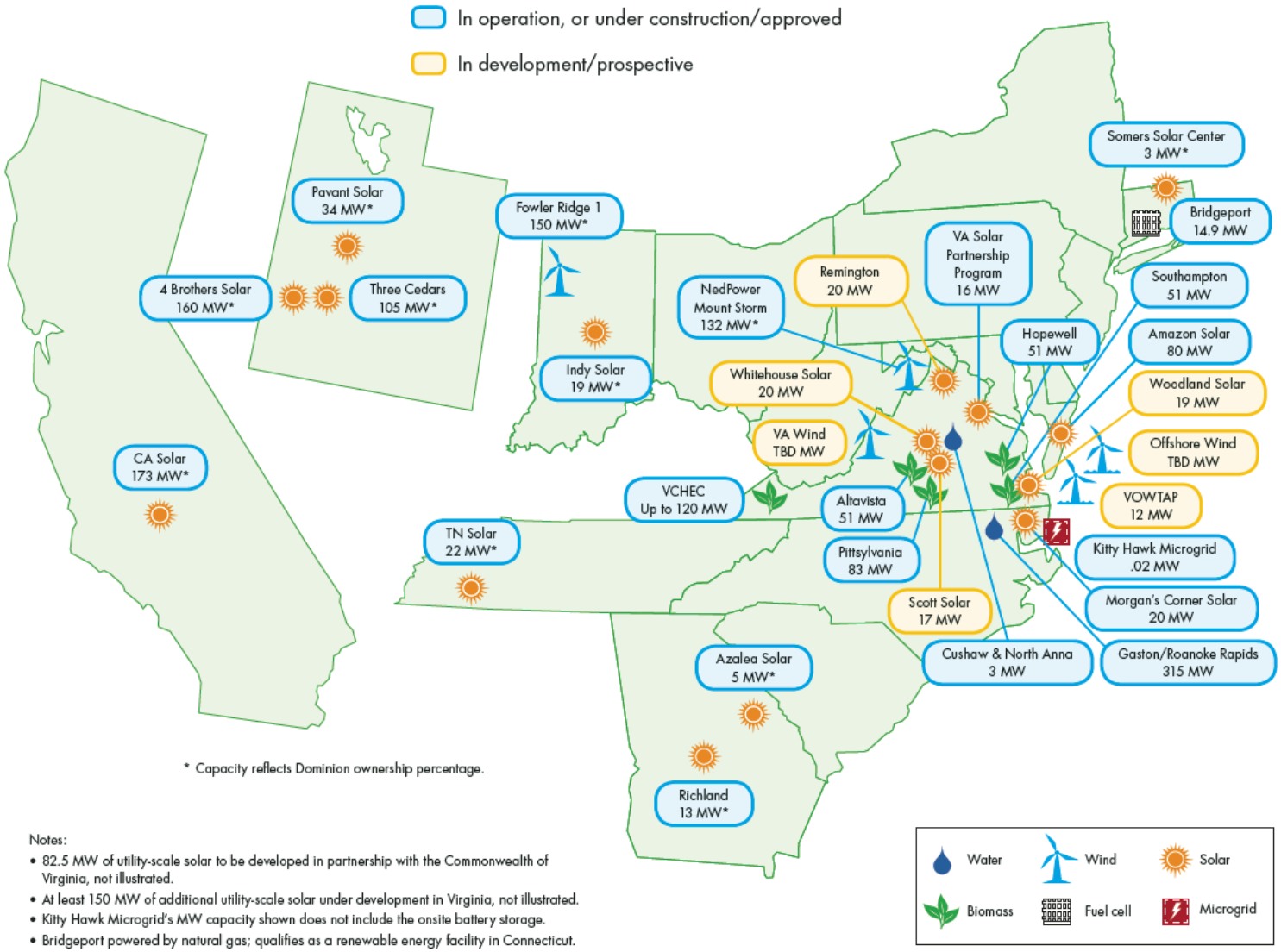
Leading provider of energy and energy services in the U.S.

- 25,700 MW of electric generation
- 6,500 miles of electric transmission
- 14,400 miles of natural gas transmission, gathering and storage pipeline
- 1 trillion cubic feet of natural gas storage operated
- Cove Point LNG Facility
- 2.5 million electric customers in VA and NC
- 2.3 million natural gas customers in OH & WV; and UT, WY, ID (not shown)
- 1.2 million non-regulated retail customers in 14 states (not shown)



Dominion Profile

Renewable Power Generation Portfolio

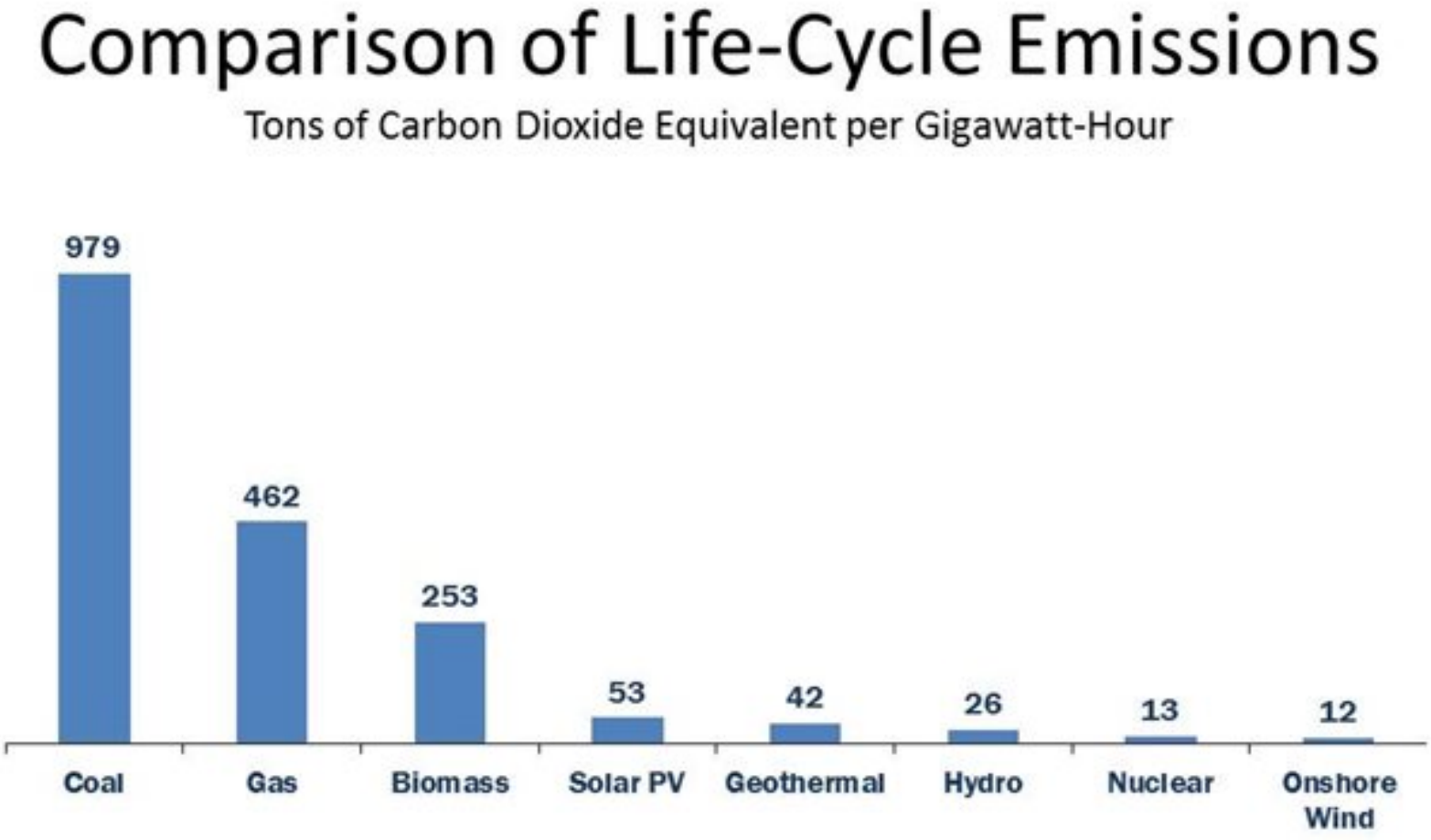


Notes:

- 82.5 MW of utility-scale solar to be developed in partnership with the Commonwealth of Virginia, not illustrated.
- At least 150 MW of additional utility-scale solar under development in Virginia, not illustrated.
- Kitty Hawk Microgrid's MW capacity shown does not include the onsite battery storage.
- Bridgeport powered by natural gas; qualifies as a renewable energy facility in Connecticut.

Life-Cycle Emissions

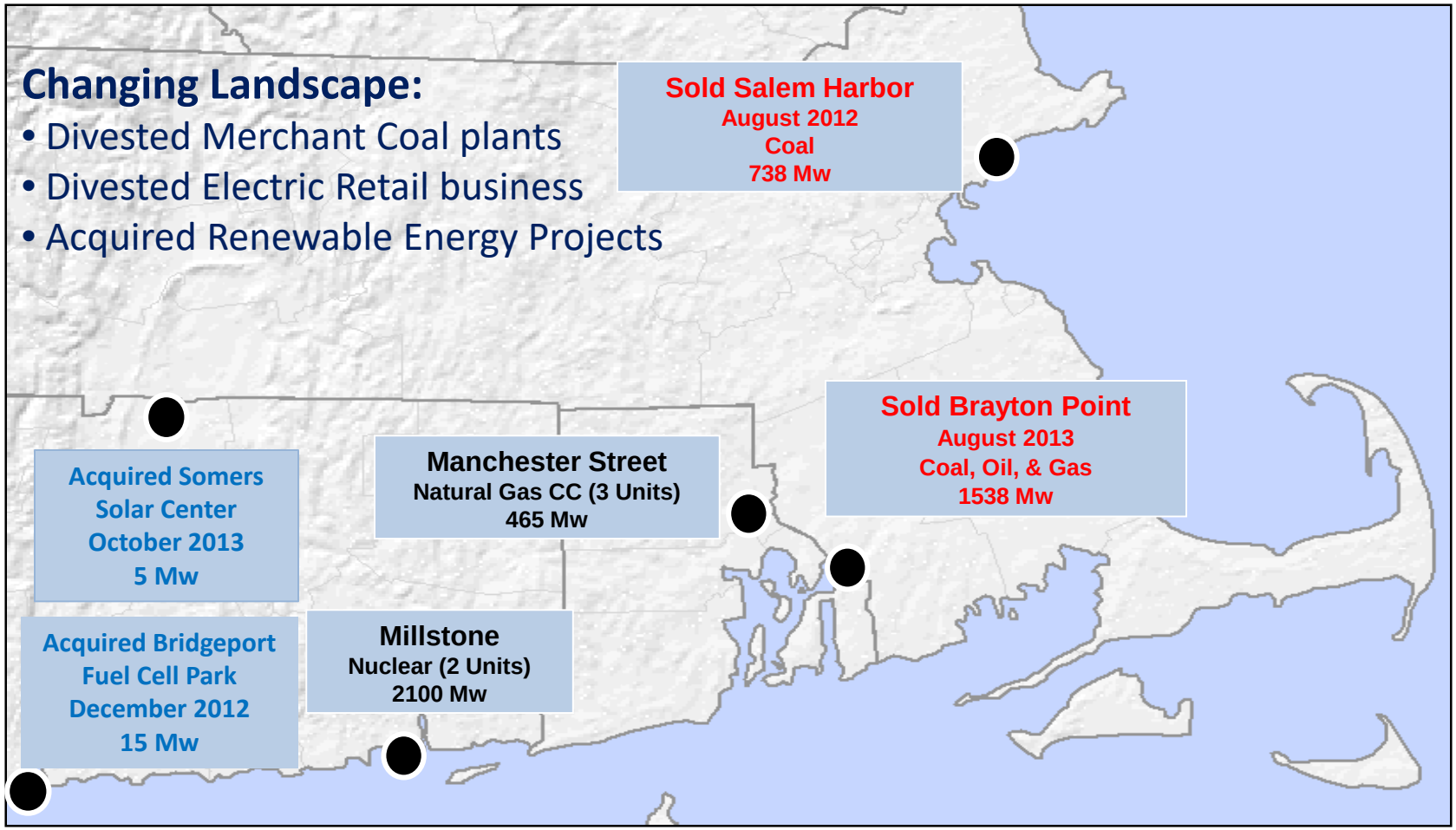
Various Electricity Resources



Source: Annex III. Technology-Specific cost and performance parameters. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Edenhofer, O., et.al., Cambridge University Press, 2014. The numbers shown are the median of studies examined by the IPCC in grams CO2e per kWh and are converted to tons CO2e per GWh.

Dominion Profile in New England

Changing Landscape the last few years – Dominion microcosm of region



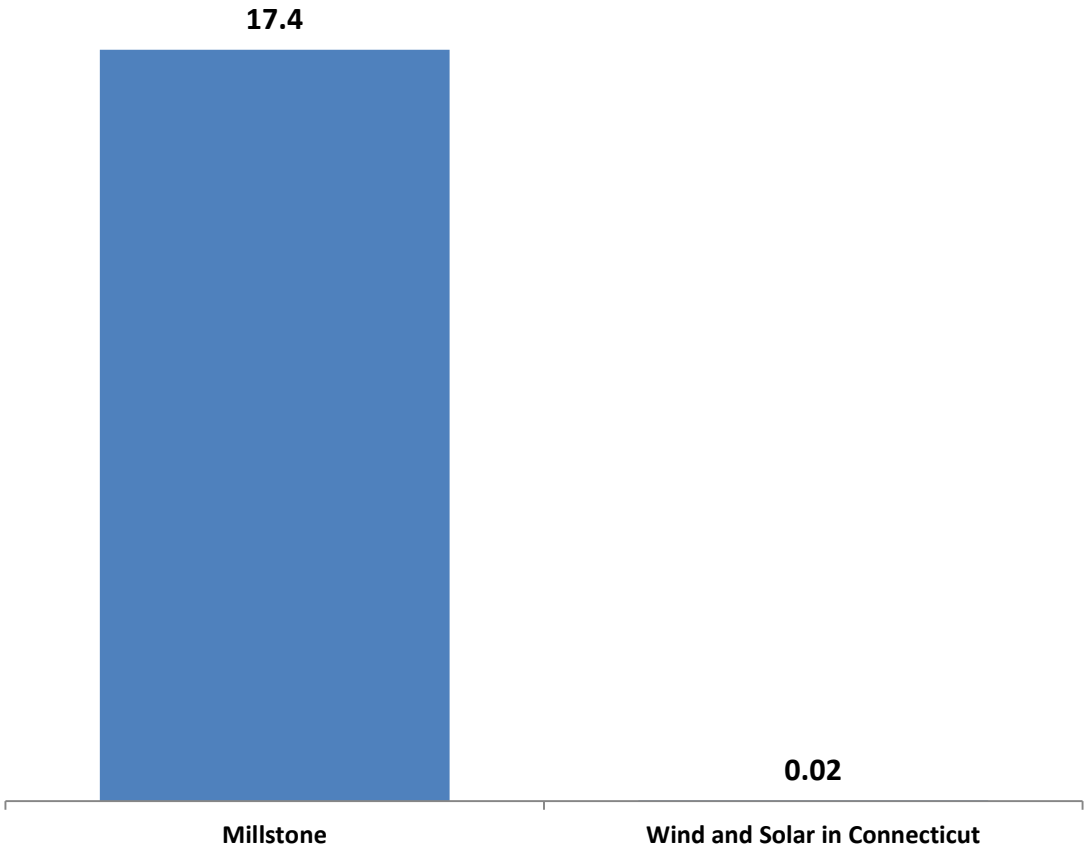
Dominion Millstone Power Station

Largest Generating Facility in Connecticut and New England:

- **Safe, reliable, carbon-free, base load power**
- **2,111 MWs; ~17million MWhs annually**
- **Typically produces the equivalent of 55-60 percent of Connecticut's power needs and 10-15 percent of New England's**
- **More than $1.2B capital investment in safety and efficiency since 2001**

Carbon-free Sources of Electricity

Billions of kilowatt-hours



Source: Energy Information Administration, 2015.

Market Pressures

For Existing Nuclear Resources

- **Prolific supply of low-cost shale gas**
- **Low growth (in some cases, no growth) in electricity demand**
- **State and federal incentives for other resources**
- **Market design issues**
  - Failure of markets to recognize valuable attributes
  - Price suppression in energy markets

Market Pressures Realized

Recent Premature Retirements of Nuclear Plant Based on Economics

"Dominion says Kewaunee nuclear plant will shut down for good" – *Milwaukee Journal-Sentinel October 22, 2012*

"Entergy announces plans to close Vermont Yankee" – *WCAX.com August 27, 2013*

"Entergy to close FitzPatrick nuclear plant in Oswego County" – *Syracuse Post-Standard November 2, 2015*

Market Pressures Realized

Recent Premature Retirements of Nuclear Plants Based on Economics

"Exelon Shutting Two Nuclear Plants After Legislation Fails " – *Bloomberg June 2, 2016*

"'Simply an economic decision': OPPD to close Fort Calhoun nuclear plant by end of 2016" – *Omaha World Herald June 17, 2016*

"PG&E to close Diablo Canyon, California's last nuclear power plant" – *Los Angeles Times June 21, 2016*

Conclusion/Contact

- **Conclusion: Existing nuclear is critical for Connecticut to achieve its carbon goals. Will policies align acknowledging that?**

- **Contact information:**
  - Kevin Hennessy
    Director, State Policy – New England
    Dominion Resources, Inc.
    860-444-5656 (office)
    860-912-5124 (mobile)
    Kevin.R.Hennessy@dom.com