



Connecticut Department of Energy and Environmental Protection



Connecticut Department of
**ENERGY &
ENVIRONMENTAL
PROTECTION**

GC3 Meeting

January 19, 2018
1:30 — 3:30 p.m.



Agenda

1:30

Welcome & Announcements
Commissioner Rob Klee, GC3 Chair

1:35

Review & meeting objectives
Keri Enright-Kato, DEEP

1:45

Scenario update
Jason Rudokas, NESCAUM

1:55

Updated REMI analysis of combined buildings,
transportation and electric sector scenarios
Stan McMillen, REMI Consultant

2:15

Discuss mid-term GHG reduction target and policies
Facilitated by Commissioner Rob Klee, GC3 Chair

3:00

Public comments

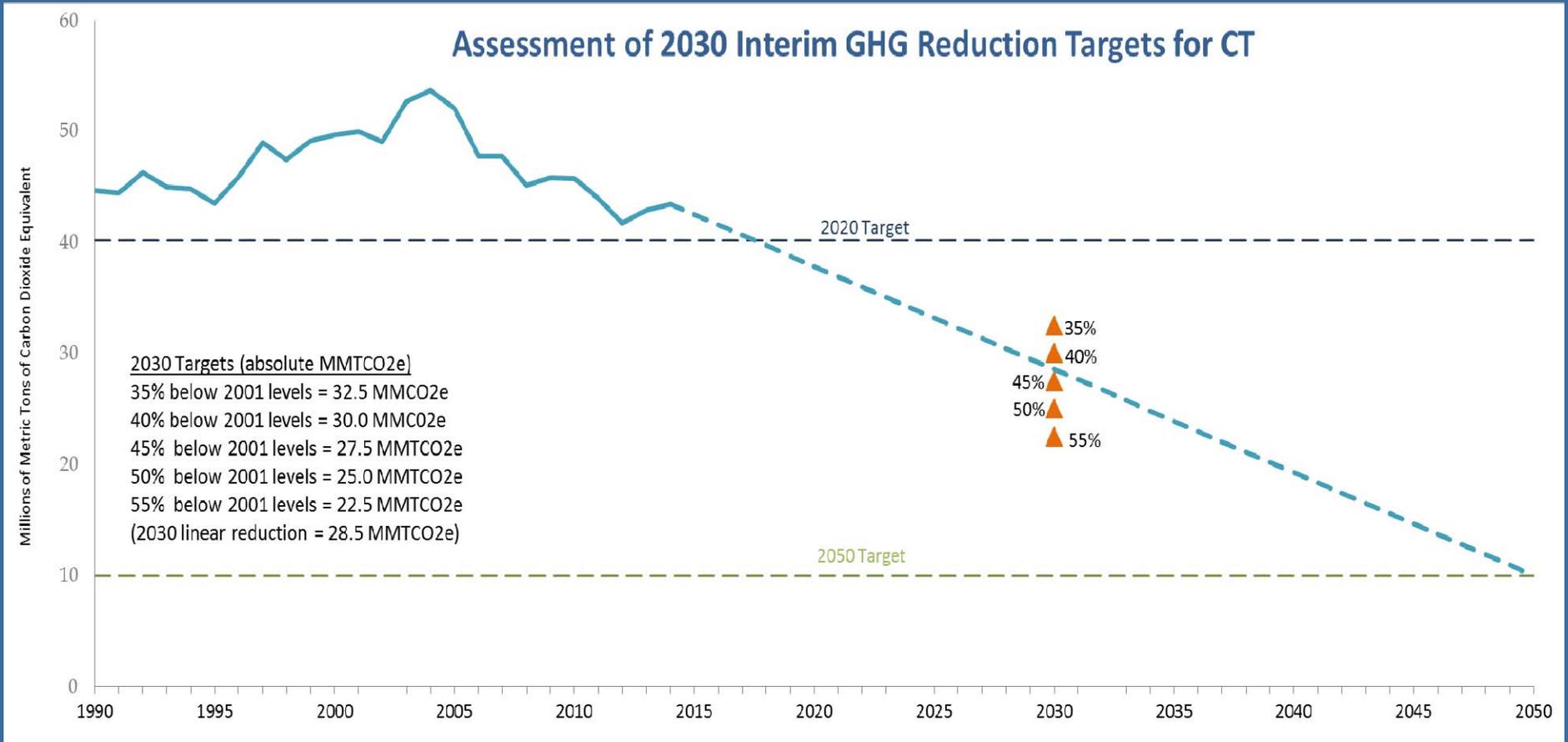


Review

- Scenario sensitivities:
 - Electric sector zero carbon content 60%, 70%, 80%
 - As zero carbon generation increases, back off renewable thermal technology penetration more than clean transportation
 - As zero carbon generation increases, back off renewable thermal penetration and clean transportation equally
- REMI Analysis
 - Much of projected economic and job growth tied to building sector (EE & RTT deployment)
 - Analysis optimistically assumes private investments lead to technology deployments with a few exceptions (CHEAPR rebate extended 5 years and federal incentives).
- Requested next steps
 - Review 45% reduction scenario and update REMI analysis
 - Provide overview of potential policy options
- Meeting objectives for today
 - Finalize mid-term target recommendation
 - Begin discussion of menu of policies



CORRECTION: Assessment of 2030 Interim GHG Reduction Targets for CT



Comparative Analysis of Mid-term Targets

State	Baseline Year	Baseline total emissions (MMTCO ₂ e)	Midterm Target Year	Midterm Target %	CAGR* reduction to meet mid-term target from 2014 baseline	CAGR reduction/increase from baseline to 2014
New York	1990	235,840,000	2030	40%	-2.66%	-0.3%
Rhode Island	1990	12,480,000	2035	45%	-2.47%	-0.4%
Vermont	1990	8,110,000	2028	50%	-4.36%	+0.1%
Minnesota	2005	150,000,000	2025	30%	-2.43%	+0.6%
California	1990	431,000,000	2030	40%	-3.29%	+0.1%
Connecticut	2001	50,065,141	2030	40%	-3.14%	-1.1%
Connecticut	2001	50,065,141	2030	45%	-3.66%	
Connecticut	2001	50,065,141	2030	50%	-4.24%	

*Compound Annual Growth Rate (CAGR)



Scenario Update

Jason Rudokas, NESCAUM



Overview of Mitigation Scenarios

- This presentation documents the proposed input assumptions and mitigation wedges for mid-term target scenarios of 40% and 45% below 2001 levels by 2030.
- This data presented here was used as input for the REMI macroeconomic modeling
- Informed by GC3 guidance, the following set of slides outline the input assumptions for three sectors:

Electric Sector

- Electric energy efficiency
- Renewable and carbon free energy generation

Buildings Sector

- Thermal energy efficiency
- Renewable thermal

Transportation Sector

- EV deployment
- Heavy-duty electrification/alternative fuels
- Passenger and freight rail electrification
- Short haul trucks electrification/alternative fuels
- VMT reductions



Electric Power Generation Mix in 2030 for 40% and 45% Mid-Term Reduction Targets

	40% Mid-Term Target	45% Mid-Term Target
Zero Carbon Generation	64%	66%
Fossil Fuel Generation	36%	34%

- Generation mix represents CT's portion of the regional electric grid.
- Renewables are defined as CT Class I resources
- Electricity prices in LEAP have been updated to align with the CES rate analysis



Residential & Commercial Renewable Thermal*

Residential RT	2020	2030
40% below 2001 levels by 2030		
% of Thermal Load	10%	22%
45% below 2001 levels by 2030		
% of Thermal Load	11%	26%
Commercial RT**	2020	2030
40% below 2001 levels by 2030		
% of Heated Sq. ft.	7%	14%
45% below 2001 levels by 2030		
% of Heated Sq. ft.	9%	20%

Current RTT penetration for residential single-family homes is approximately 1.5-2.5% and commercial % is unknown at this time.

*Renewable thermal refers to air and ground source heat pumps.

**Percentages represent the % of heated floor space provided by heat pumps.



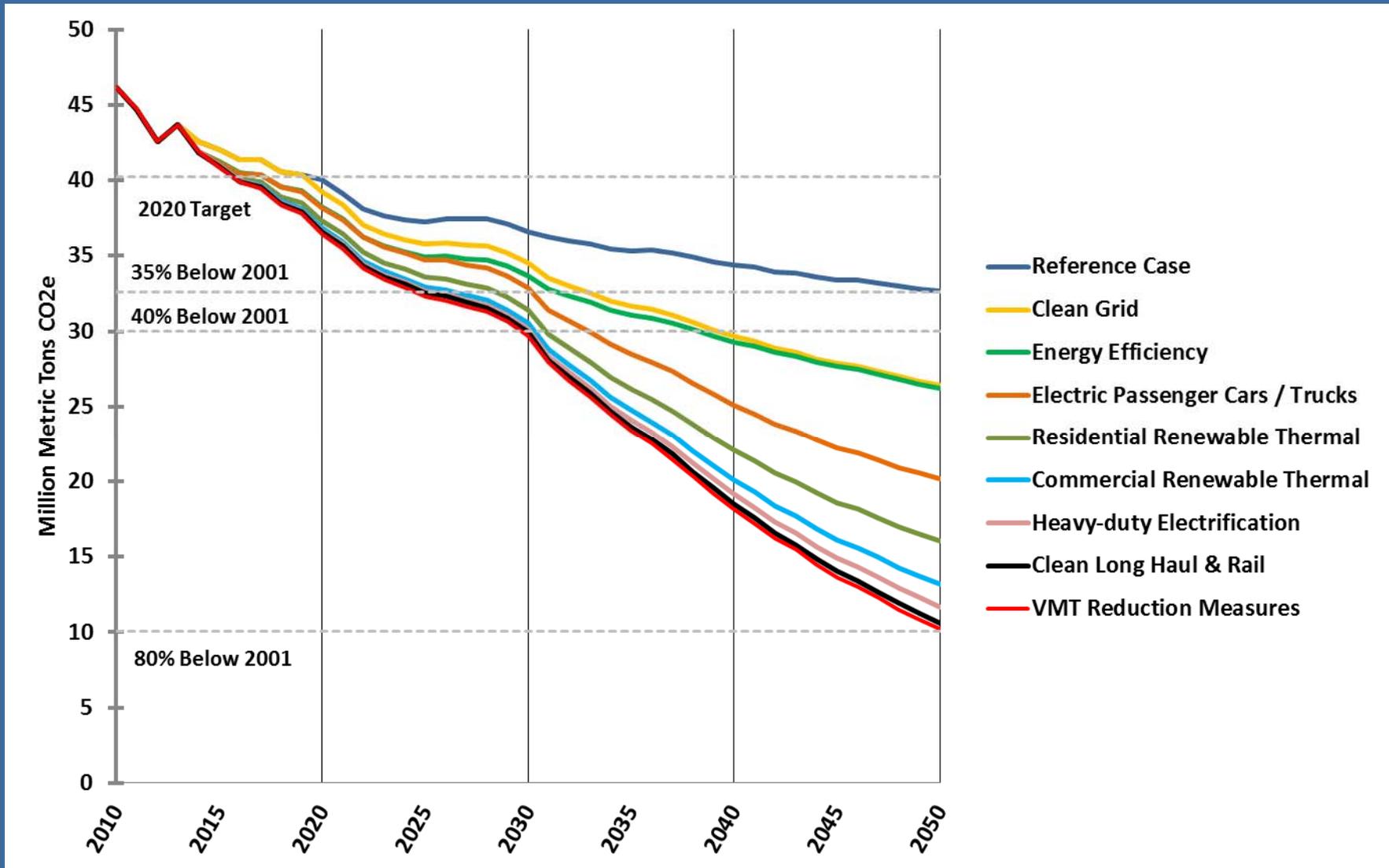
Electrification of Passenger Vehicles

	2020	2030
40% below 2001 levels by 2030		
# of EVs	28,000	400,000
% of Fleet	1%	16%
% of Sales	2%	50%
45% below 2001 levels by 2030		
# of EVs	40,000	500,000
% of Fleet	2%	20%
% of Sales	3%	56%

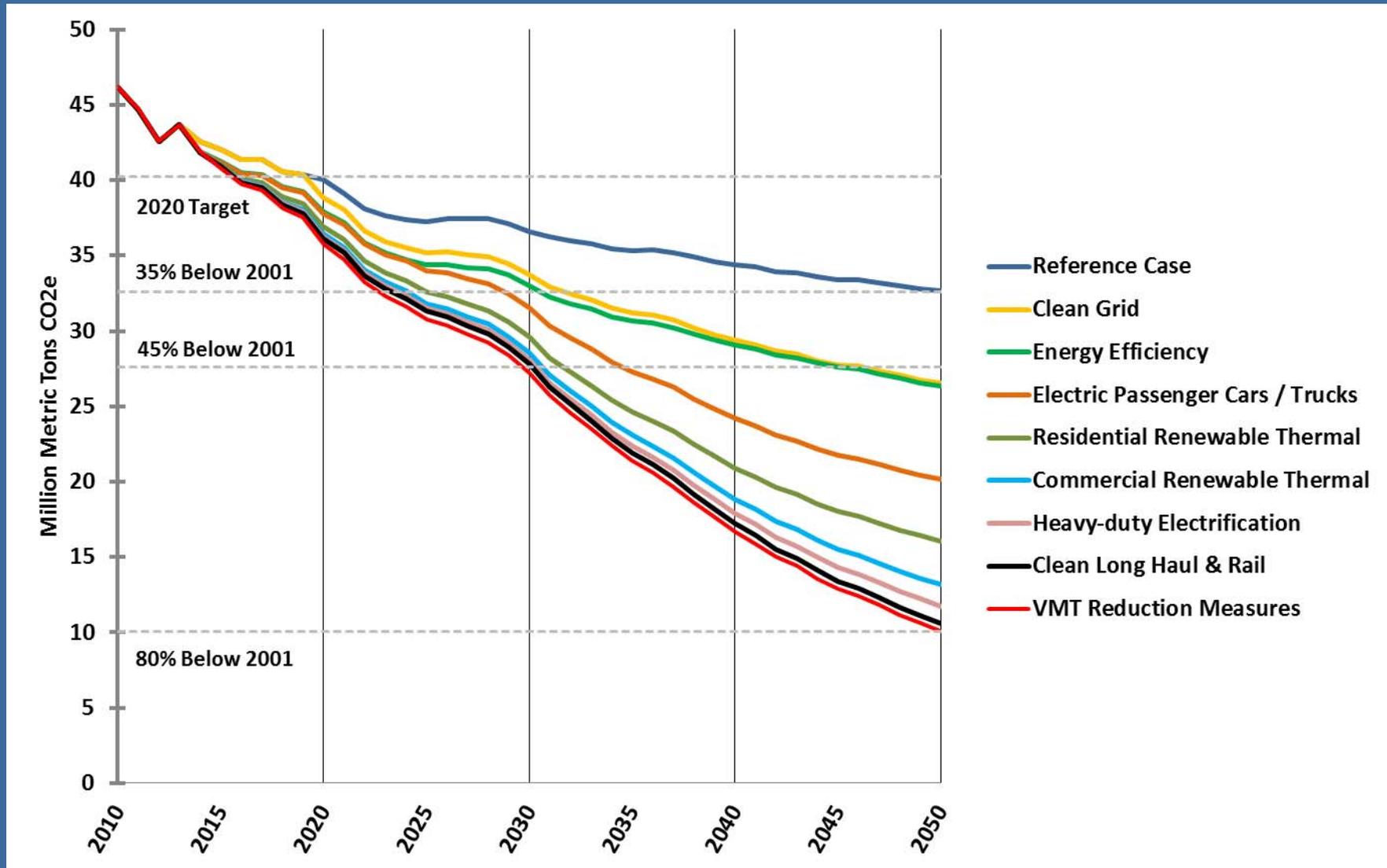
- In each scenario EV sales are ~ 100% by 2050
- # and % of EVs are rounded
- % of sales refers to annual sales
- # of EVs currently are approximately 5,500



40% Reduction Target Mitigation Wedges



45% Reduction Target Mitigation Wedges



Updated REMI analysis of combined buildings,
transportation and electric sector scenarios
Stan McMillen, REMI Consultant



Combined Sector REMI Output

Combined Sector Economic & Fiscal Impact (2020 – 2030)

Economic or Fiscal Variable	40% Midterm Target	45% Midterm Target
	<u>Average</u> Level & % Change	<u>Average</u> Level & % Change
Total Employment (Jobs)	12,600 0.52%	19,220 0.8%
State GDP (millions current \$)	\$1,720 0.45%	\$2,906 0.75 %
State Revenue (millions current \$)	\$65 0.22%	\$122 0.42%
State Expenditure (millions current \$)	\$62 0.24%	\$109 0.42%



Transportation Sector REMI Output

Transportation Sector Economic & Fiscal Impact (2020 – 2030)

Economic or Fiscal Variable	40% Midterm Target	45% Midterm Target
	<u>Average Level & % Change</u>	<u>Average Level & % Change</u>
Total Employment (Jobs)	1,300 0.05%	1,880 0.08%
State GDP (millions current \$)	\$378 0.08%	\$545 0.13 %
State Revenue (millions current \$)	\$20 0.06%	\$28 0.09%
State Expenditure (millions current \$)	-\$17 -0.06%	-\$22 -0.08%



Building Sector REMI Output

Building Sector Economic & Fiscal Impact (2020 – 2030)

Economic or Fiscal Variable	40% Midterm Target	45% Midterm Target
	<u>Average Level & % Change</u>	<u>Average Level & % Change</u>
Total Employment (Jobs)	14,700 0.6%	21,000 0.9%
State GDP (millions current \$)	\$1,974 0.5%	\$2,950 0.8%
State Revenue (millions current \$)	\$110 0.4%	\$65 0.23%
State Expenditure (millions current \$)	\$62 0.24%	\$62 0.24%



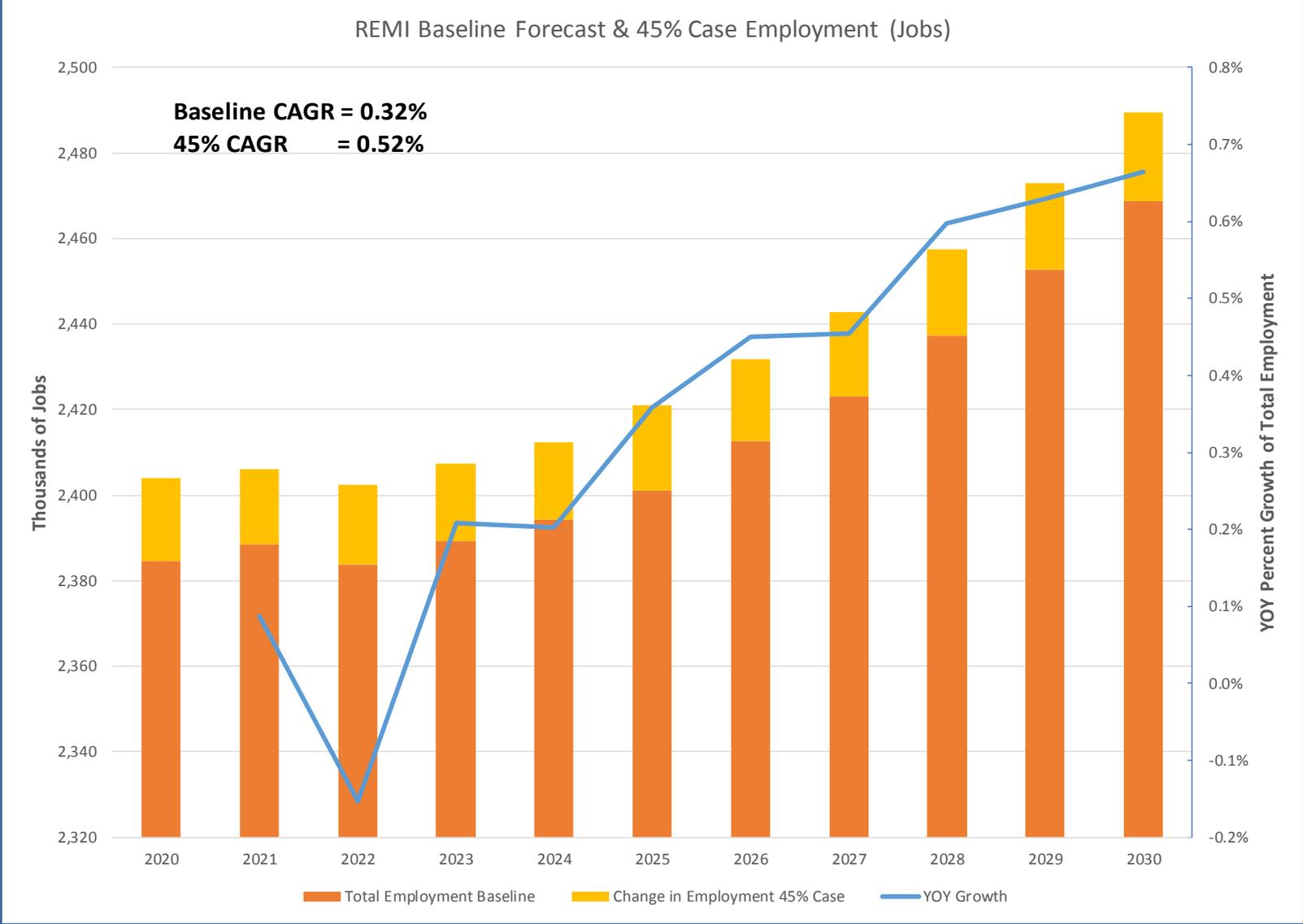
Electricity Sector REMI Output

Electricity Sector Economic & Fiscal Impact (2020 – 2030)

Economic or Fiscal Variable	40% Midterm Target	45% Midterm Target
	<u>Average Level & % Change</u>	<u>Average Level & % Change</u>
Total Employment (Jobs)	-3,430 -0.14%	-3,690 -0.15%
State GDP (millions current \$)	-\$634 -0.16%	-\$588 -0.14 %
State Revenue (millions current \$)	-\$64 -0.22%	-\$69 -0.23%
State Expenditure (millions current \$)	-\$47 -0.17%	-\$70 -0.18%



Projected REMI Jobs 2020-2030



Key REMI Conclusions & Next Steps

Conclusions

- Economic and fiscal results are small fractions of the state economy and budget in each sector considered individually and combined...but not insignificant
- The buildings sector drives most of the economic and fiscal impact

Next Steps

- Complete economic and fiscal analysis report for consensus midterm scenarios
- Policy analysis?



Illustrative examples of approximate potential public incentives/private costs

- CHEAPR incentive for 5 more years to deploy 43,000* EVs
 - Average \$1,500 rebate per vehicle purchase = \$64 Million
- Build out of electric charging stations over 5 years
 - Level 2 station = cumulative \$50-70 Million
 - Level 3 station(fast charge) = cumulative \$4-7 Million
- Residential RTT incentive for 5 years to achieve 12.5% of thermal load
 - \$300 per household (current incentive) = \$51Million
 - \$1,000 per household = \$170 Million
 - \$2,000 per household = \$340 Million

*2030 EV deployment 400,000-500,000

**% of residential thermal load in 2030 between 22-26%



Discuss mid-term GHG reduction target and policies



Example Electric Sector Policies

Current Programs & Policies	Programs & Policies for Consideration
Federal tax incentive for RE	Clean Energy Standards
Regional Greenhouse Gas Initiative (RGGI)	GHG Emissions Reporting Program
Renewable Portfolio Standard (RPS)	Voluntary Purchases of Clean Energy
State Procurements for Grid-Scale Renewables	Grid Modernization Technology Deployment
Net Metering/Virtual Net Metering	
Low-Carbon and Zero-Carbon Renewable Energy Credits (LREC/ZREC)	
Residential Solar Investment Program (RSIP)	
Community Solar	



Transportation Sector Policies

Current Programs & Policies	Programs & Policies for Consideration
Federal tax incentive for ZEV purchase	Increased Taxes or Price Floors on Gasoline and Diesel
Federal Renewable Fuel Standard Program	Vehicle Miles Travel Tax
Federal Corporate Average Fuel Economy (CAFE) Standards	LEV/ZEV access to HOV Lanes, Free Parking, and Reduced Property Tax
International ZEV Alliance	Congestion Pricing/Tolls
ZEV Memorandum of Understanding	Lead by Example: A Standard for the State's Fleet for the Purchase of LEV/ZEVs
California LEV/ZEV Standards	Time-of-use Rate for EV Charging
Connecticut Hydrogen and Electric Automobile Purchase Rebate	Further Development of the Complete Streets Program and Multi-Mobility
Reduced Registration Fees for Electric Vehicles	Improve the Existing Car Sharing Service into LEV and ZEV
Auto Insurance Discounts	
Let's Go CT	
CTfastrak	
Complete Streets	
HOV lanes	



Building Sector Policies

Current Programs & Policies	Programs & Policies for Consideration
Federal Building Benchmarking Programs	Replace Electric Resistance Heaters with Efficient Heat Pump Technologies
Energy Efficiency Improvements - Financed Through Incentives from CT Energy Efficiency Fund and CT Green Bank	Establish a Residential Property Assessed Clean Energy Program
Commercial Property Assessed Clean Energy Program	Expansion of Building Energy Use Benchmarking Program to Municipalities and Private Sector
Lead by Example: Building Energy Use Benchmarking Program	Update State Building Code based on 2016 California Green Building Standards Code and 2018 International Energy Conservation Code & Triennial Updates Hereafter
State Building Code Based on 2012 International Code Council Standards	



Economy-wide Approaches

Currently there are no federal or state comprehensive policies that aim to reduce greenhouse gas emissions across all sectors. Two such policies that are worth considering, and are implemented in other jurisdiction in include:

- Carbon tax
- Cap-and-trade/invest



Public Comments

