Reducing CT's Greenhouse Gases 80% by 2050
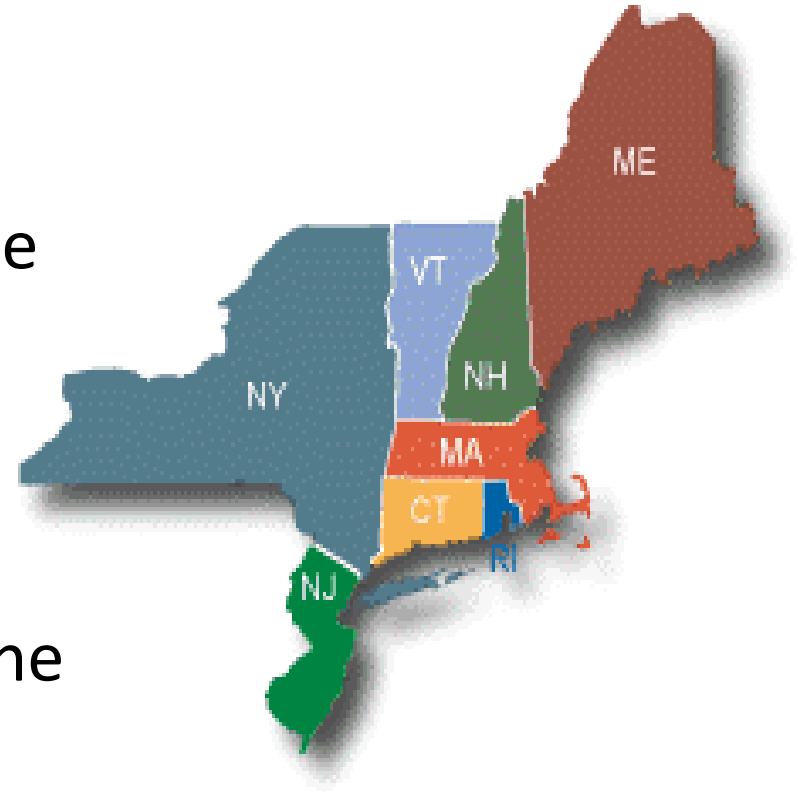## Overview of Analytical Approach

Paul J. Miller
Northeast States for Coordinated
Air Use Management

The Northeast States for Coordinated Air Use Management (NESCAUM)

- NESCAUM founded in 1967
- Multi-state association of state air agencies in:

  ME, NH, VT, MA, RI, CT,

  NY & NJ

- The NESCAUM directors are the 8 state air agency chiefs

Support for CT Climate Planning

- "Long-range Energy Alternatives Planning" (LEAP) framework

- Applying LEAP for CT
    1. Set up a reference line with LEAP
    2. Identify technologies and measures to put into LEAP
    3. Combine into scenarios
    4. Do scenario analysis in LEAP
    5. Provide results to CT

- Results to inform CT policy decisions

Long-range Energy Alternatives Planning system

- A comprehensive decision support tool for simulating different energy systems

- Developed at Stockholm Environment Institute

- 27,000 users in 190 countries

- LEAP being used in RI & MA greenhouse gas (GHG) planning efforts

Role of LEAP Modeling in Emissions Reduction Study

- Provide an integrated, statewide model of energy demand, energy supply, and GHG emissions

- Quantify impacts of technical and behavioral GHG reduction measures

  - Emissions

  - Energy

  - Social costs and benefits

- Evaluate a range of scenarios – in particular, pathways to CT GWSA targets

- Support analysis of mitigation policies

1. The Reference Line

What is a Reference Line?

In LEAP, it's a simulated projection of CT's GHG emissions across the years from the burning of fossil fuels used for:

- electricity generation
- transportation
- heating & cooling in homes and business
- industrial processes.

Other greenhouse gas sources (e.g., agriculture) can be added separately.

How Reference Line is Used

- Serves as reasonable starting point for analyzing future GHG reductions

- Can be compared against historical emissions as a reality check on model set-up

- Provides initial sense of how high CT's GHG emissions are above its 80% reduction target
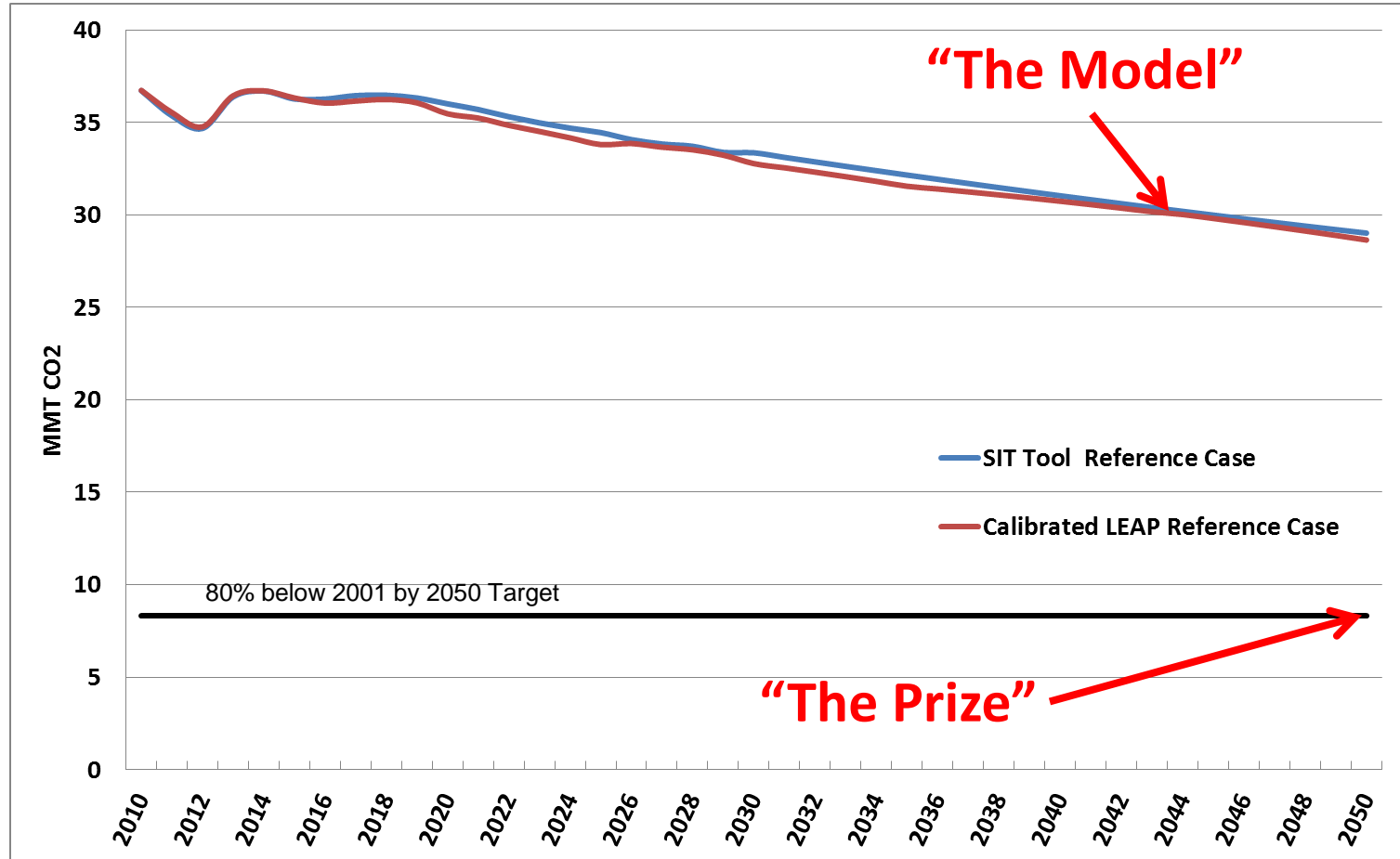
Words to Remember, Part 1

"All models are wrong, some are useful."

Words to Remember, Part 2

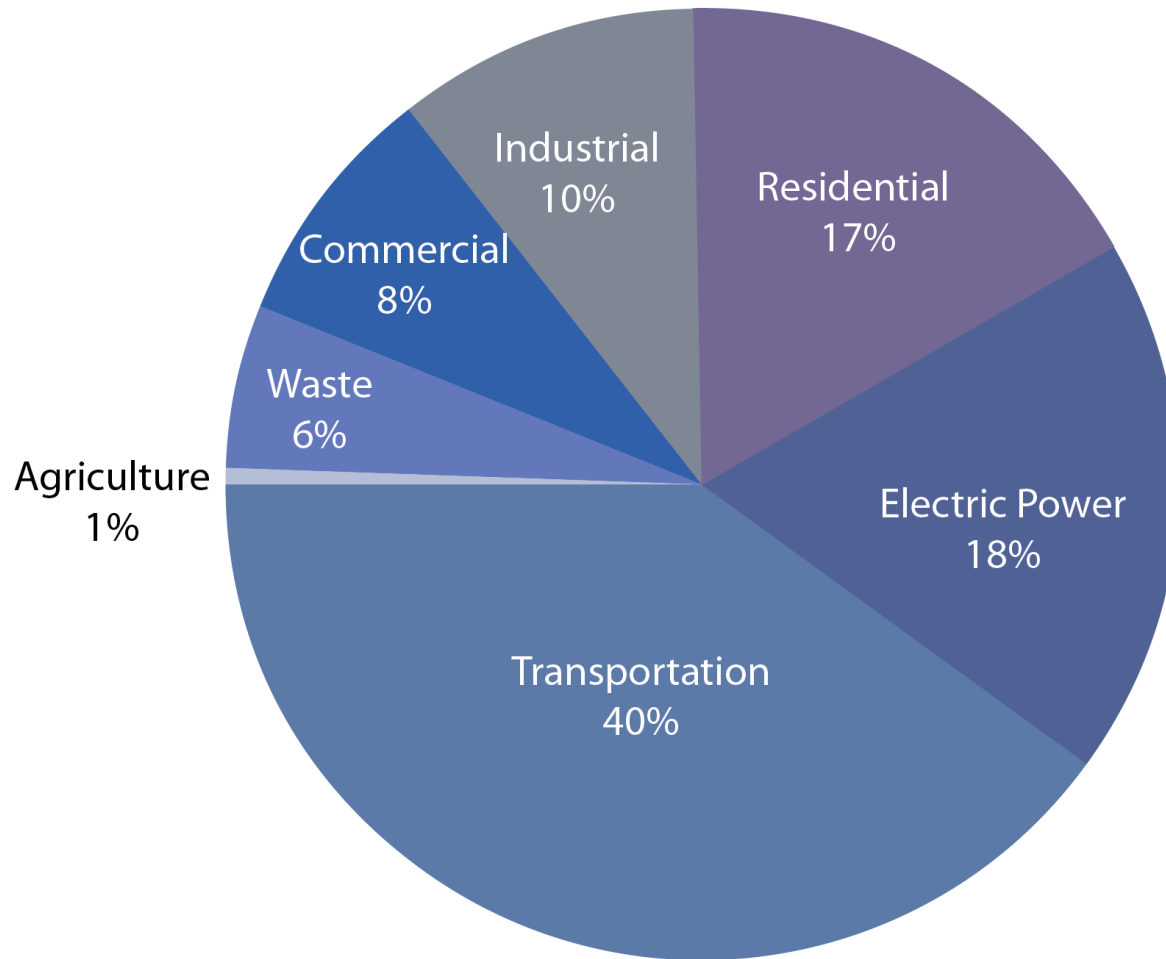"All models are wrong, some are useful."
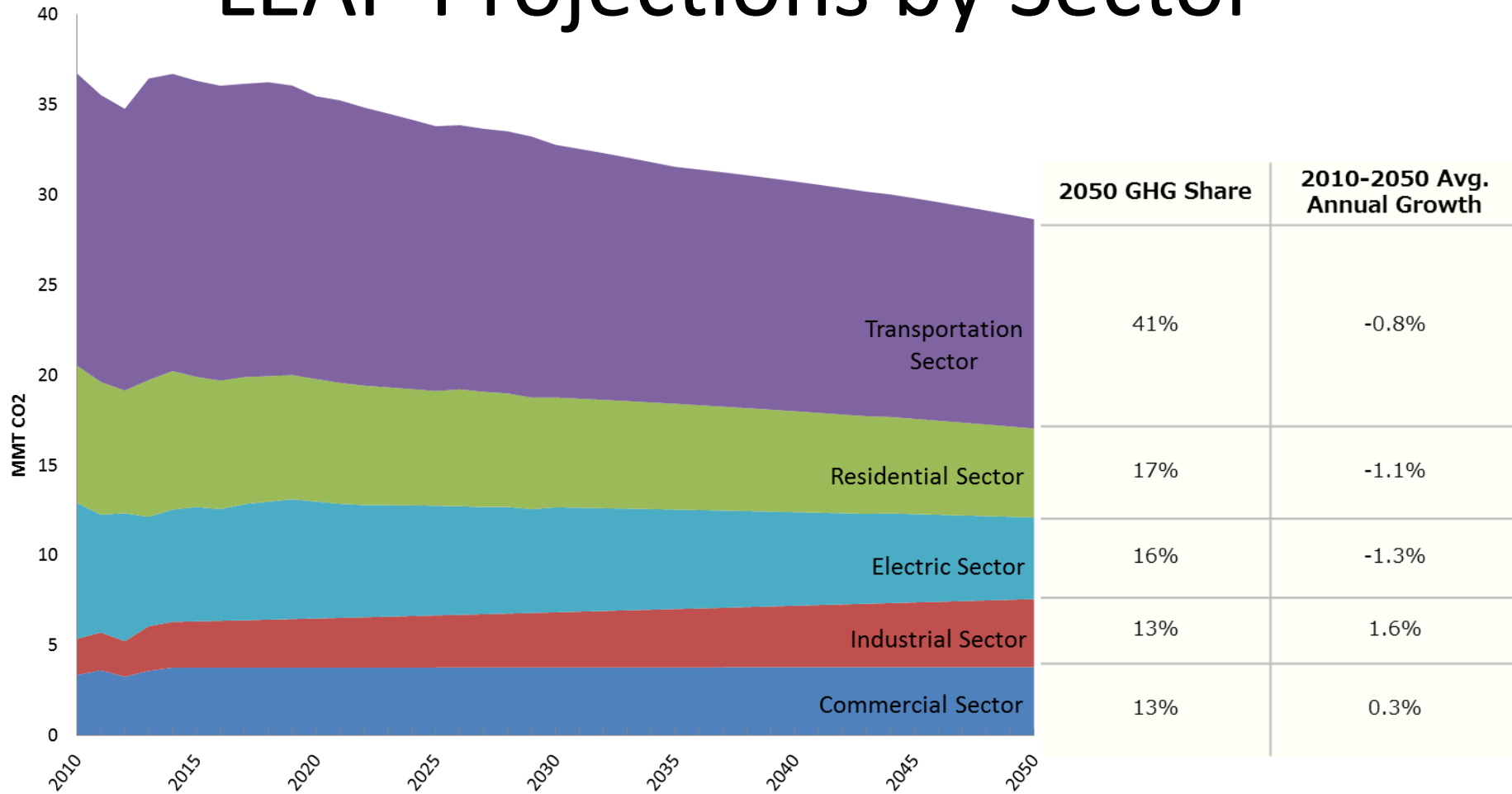
Keep your eyes on the prize.

CT Reference Line

"Business as Usual" reference line: GHG 31% below 2001 by 2050

CT GHG Emissions by Sector, 2012

CT Reference Case
LEAP Projections by Sector

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

Y-axis: MMT CO2 (0 to 40)
X-axis: 2010, 2015, 2020, 2025, 2030, 2035, 2040, 2045, 2050

2. Technologies and Measures

Some Definitions

Technologies – machinery or equipment

- Zero Emission Vehicles, Ground Source Heat Pumps, High Efficiency Lighting

Measures – changes in business and consumer practices

- Reducing miles driven by vehicles, reducing electricity use through "Demand Response"

Scenarios – combinations of Technologies and Measures modeled in LEAP intended to achieve mid-and long-term GHG reduction targets

Scenarios do not prescribe what policies would be used to achieve the scenario combinations.

Examples Transportation Technologies

ZEV = Zero Emission Vehicles

Battery Electric Vehicles

Hydrogen Fuel Cell Vehicles

Examples Electricity Generation Technologies

Wind

Rooftop Solar

Examples of Residential/Commercial Technologies

Ground-source & air-source heat pumps for space heating & cooling

Examples of Measures

- "Smart Growth" practices to reduce vehicle miles travelled (VMT)
  - Increased density of new development, closer proximity to mass transit, mixed-use zoning
  - Infrastructure for multi-modal options, e.g., bicycles, walking
  - Increased telecommuting and ridesharing

3. Combine into scenarios

4. Do analysis in LEAP

Hypothetical Scenario Analysis

Economy Wide CO2 Emissions
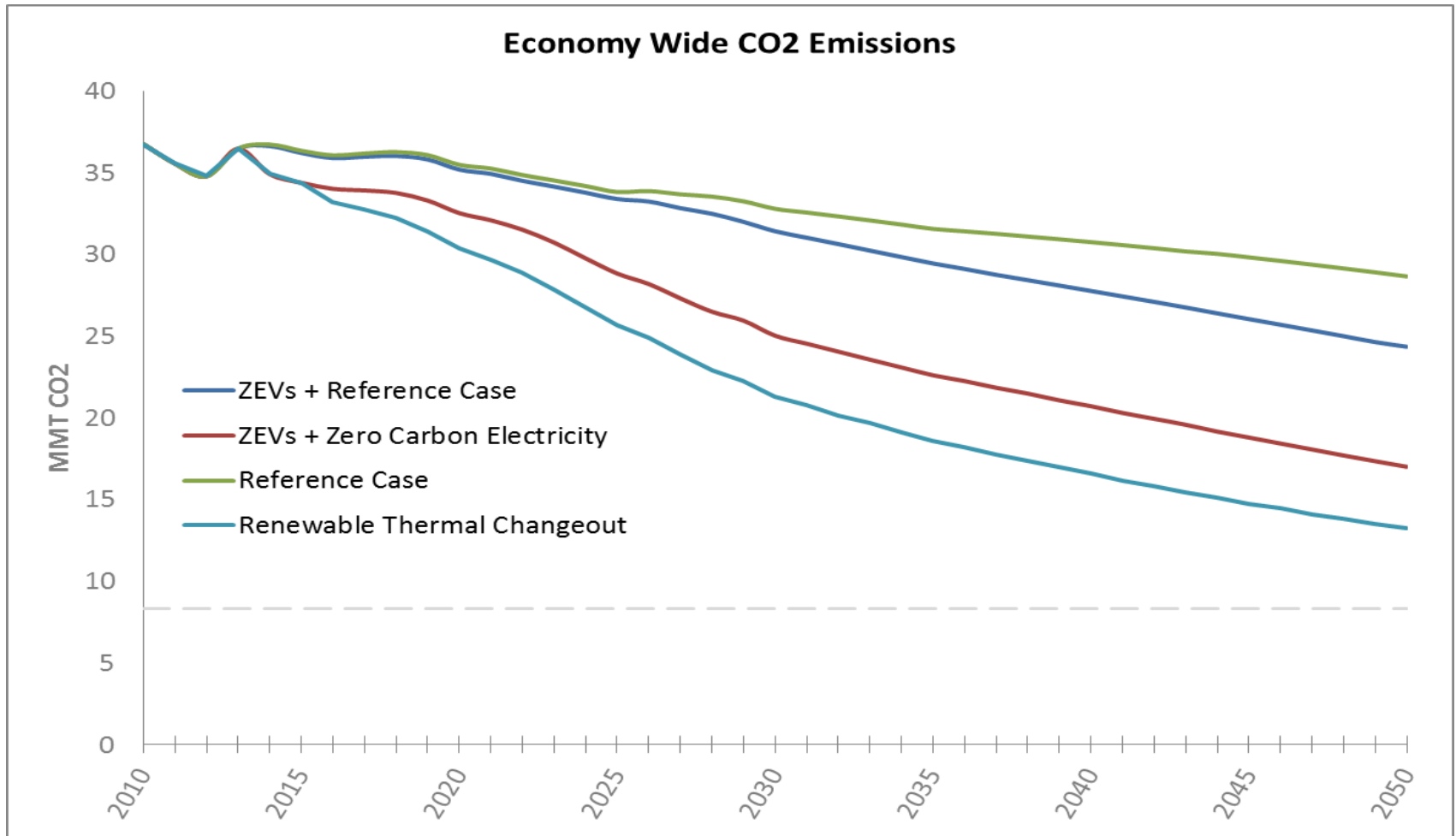
5. Provide Results to CT

Results to Inform CT's Policy Recommendations

Examples:

- Carbon tax
- Carbon dioxide cap & trade (e.g., RGGI)
- Renewable portfolio standards
- Incentives and subsidies, e.g.,
  - EV purchase rebates
  - Energy efficiency investments

Current status and next steps

- Reference line about done
- Putting in technologies & measures
- Getting input from CT on scenario combinations March-May
- Perform scenario analysis May-July
- Provide results to CT DEEP July-August
- CT develops policy recommendations July-Oct

Thank you

Questions?