

Rhode Island GHG Emissions Reduction Study

*Meeting No. 1
Providence, RI*

December 15, 2015

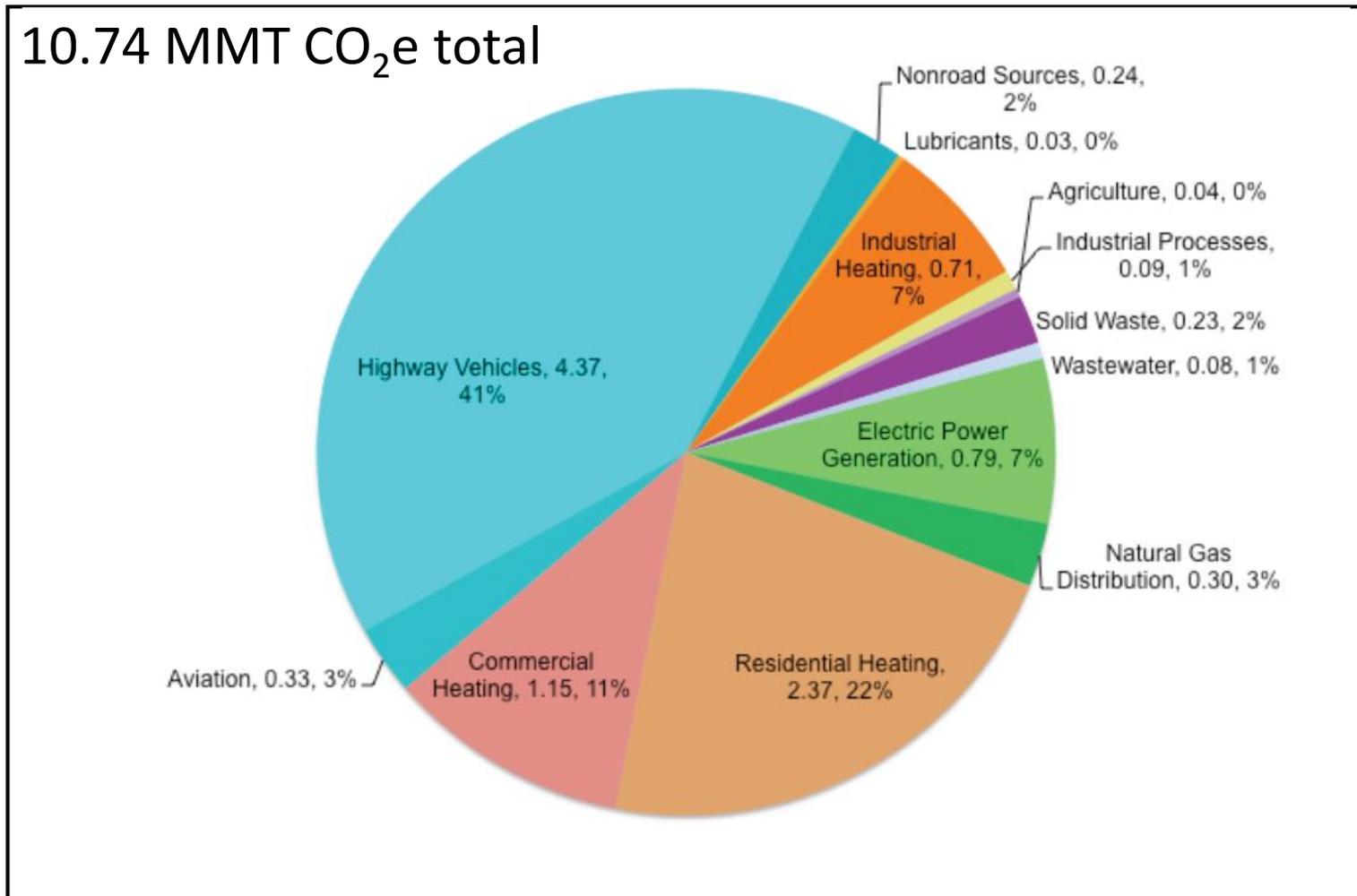
Overview of Today's Meeting

1. GHG study context
 - Resilient Rhode Island Act of 2014
 - RI GHG emissions
 - GHG planning elsewhere
2. Project team and approach
 - Team structure
 - Tasks
 - The tool being used - LEAP system
3. Task 1 – Define technology pathways and policy sets
 - Examples of pathways
 - Stakeholder input
4. Public comment
5. Next steps

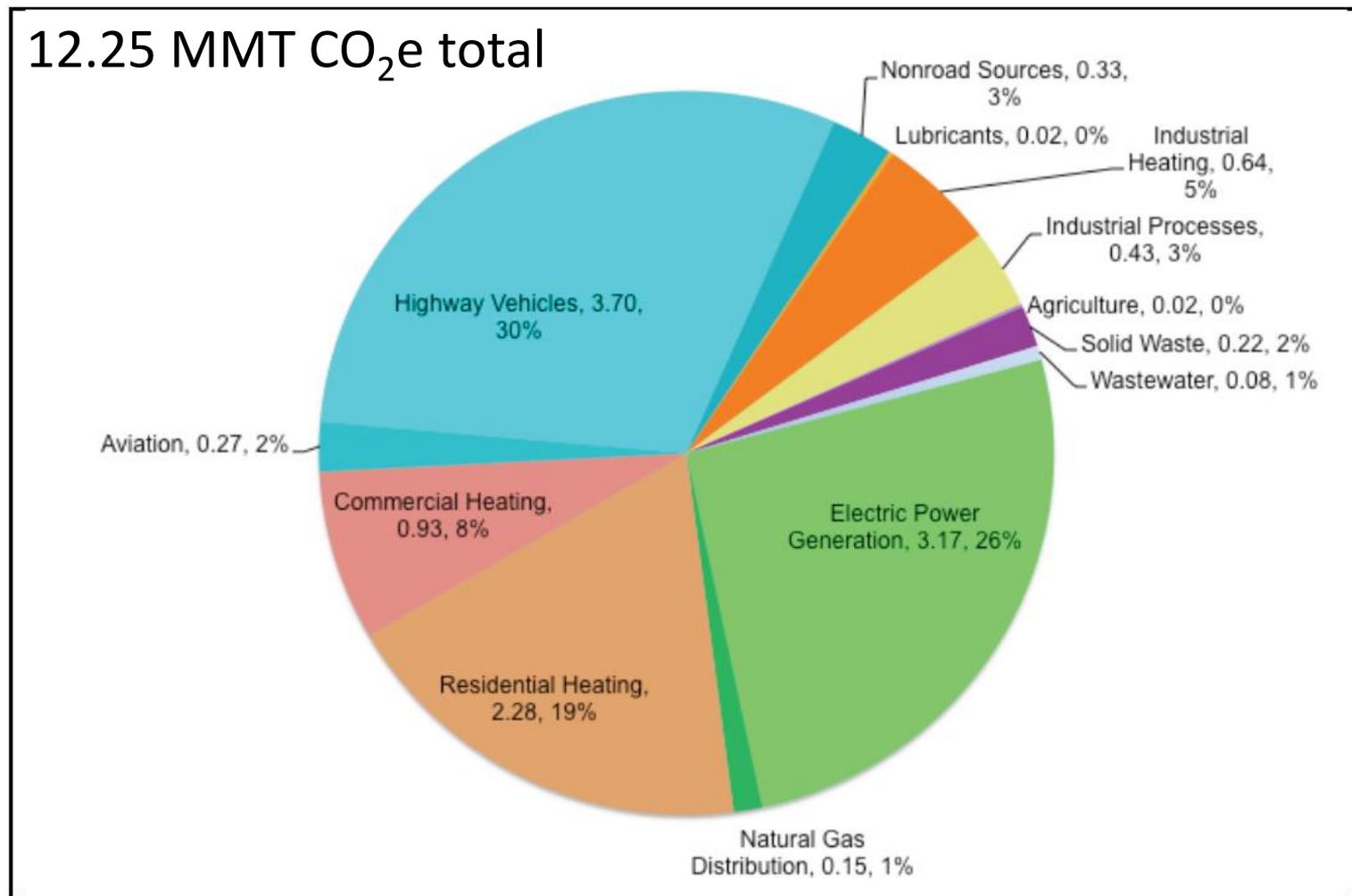
Resilient Rhode Island Act of 2014

- Charges the Executive Climate Change Coordinating Council (EC4) with developing a GHG emissions reduction plan by December 31, 2016
- Plan to include strategies, programs and actions to meet following GHG reduction goals:
 - 10% below 1990 levels by 2020
 - 45% below 1990 levels by 2035
 - 80% below 1990 levels by 2050
- NESCAUM-led project team to provide consultant support to EC4 in preparing the plan

1990 RI GHG Emissions by Sector (MMT CO₂e)



2010 RI GHG Emissions by Sector (MMT CO₂e)



GHG Planning Elsewhere

- Neighboring states:
 - Massachusetts – 80% below 1990 emissions by 2050
 - Connecticut – 75%-85% below 2001 emissions by 2050
- New England/Eastern Canada
 - NEG/ECP 2030 GHG “marker range” of 35%-45% below 1990 emissions
- California - 40% below 1990 emissions by 2030; 80% below by 2050



Project Team and Approach

Project Team



Pamela M. Sherrill Planning LLC

Approach: Summary of Tasks

Task 1: Define Technology Pathways and Policy Sets

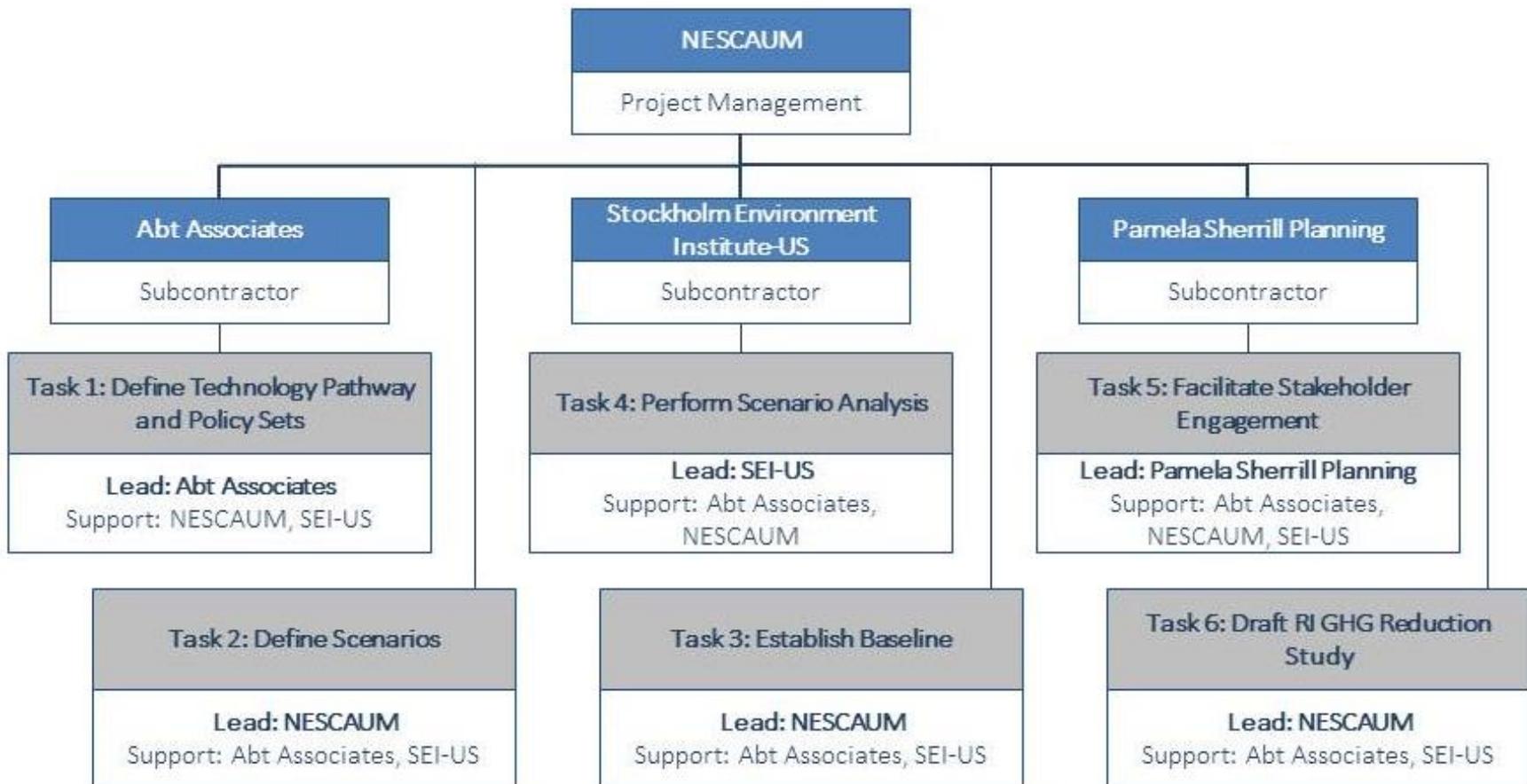
Tasks 2 & 3: Develop Reference Case & Defining Scenarios (3-5 in total)

Task 4: Perform Scenario Analysis (LEAP system)

Task 5: Facilitate Stakeholder Engagement

Task 6: Draft RI GHG Reduction Study

Team Structure by Task



Timeline - Start date November 5

Key Milestones and Outcomes		Month												
		1	2	3	4	5	6	7	8	9	10	11	12	13
	Project kick-off meeting	■												
Task 1	Define technology pathways and policy sets		■	■										
Task 2	Define scenarios			■	■	■								
Task 3	Establish baseline			■	■	■								
Task 4	Perform scenario analysis					■	■	■	■	■	■	■		
Task 5	Facilitation of five (5) stakeholder meetings		■		■		■			■				■
	Attendance at four (4) EC4 or advisory board meetings													
Task 6	Draft study									■	■	■		
	Revise draft study												■	
	Final study with executive summary and appendices and final MS PowerPoint slide deck presentation													■

Timing for Input

- Stakeholder Meetings
 - 12/15/15: Task 1 Define Technologies and Policy Sets
 - Seeking your input today and through to next meeting
 - 2/23/16: Establish Task 3 Reference Case and get initial input into Task 2 Defining Scenarios
 - 4/6/16: Reach closure on Task 2 Defining Scenarios
 - 6/1/16: Present initial results of Task 4 Scenario Analysis
 - Additional meeting tbd



Task 1: Define Technologies and Policy Sets

***This is a focus for today, and will be
discussed in more depth later in
presentation***



Task 2: Defining Scenarios
&
Brief Introduction to LEAP



The Tool Being Used:
Long-range Energy Alternatives
Planning (LEAP) System

Developing Scenarios and Policies in LEAP

The screenshot shows the 'Manage Scenarios' window in LEAP. The left pane displays a tree view of 'Current Accounts' under 'TEM: Template'. The 'RES: Residential Package (A)' scenario is selected and highlighted in blue. The right pane shows the details for this scenario, including its abbreviation 'RES', inheritance settings, and a list of additional included scenarios.

Current Accounts

- TEM: Template
 - BAS: Baseline
 - MIT: Mitigation (A)
 - TRA: Transport Package (A)
 - RES: Residential Package (A)**
 - N: Non Energy Package (A)
 - COM: Commercial Package (A)
 - IN: Industry
 - AEO: Baseline AEO Extrapolated
 - T1: Electric Vehicles
 - T2: Smaller Cars
 - T3: Switch NE Air Travel to Rail
 - T4: Improve Transit Load Factors
 - T5: Increase Transit Service
 - T6: Electrify Commuter Rail
 - T7: Bus Electrification
 - T8: Biofuel Buses
 - T9: Biofuels for Aircraft
 - 2GR: Second Gen Biofuels

LEAP Background

- A comprehensive decision support tool for simulating different energy systems
- Developed at the Stockholm Environment Institute
- 27,000 users in 190 countries
- Early version of LEAP previously used in 2002 RI GHG Action Plan
- LEAP being used in CT & MA GHG planning efforts

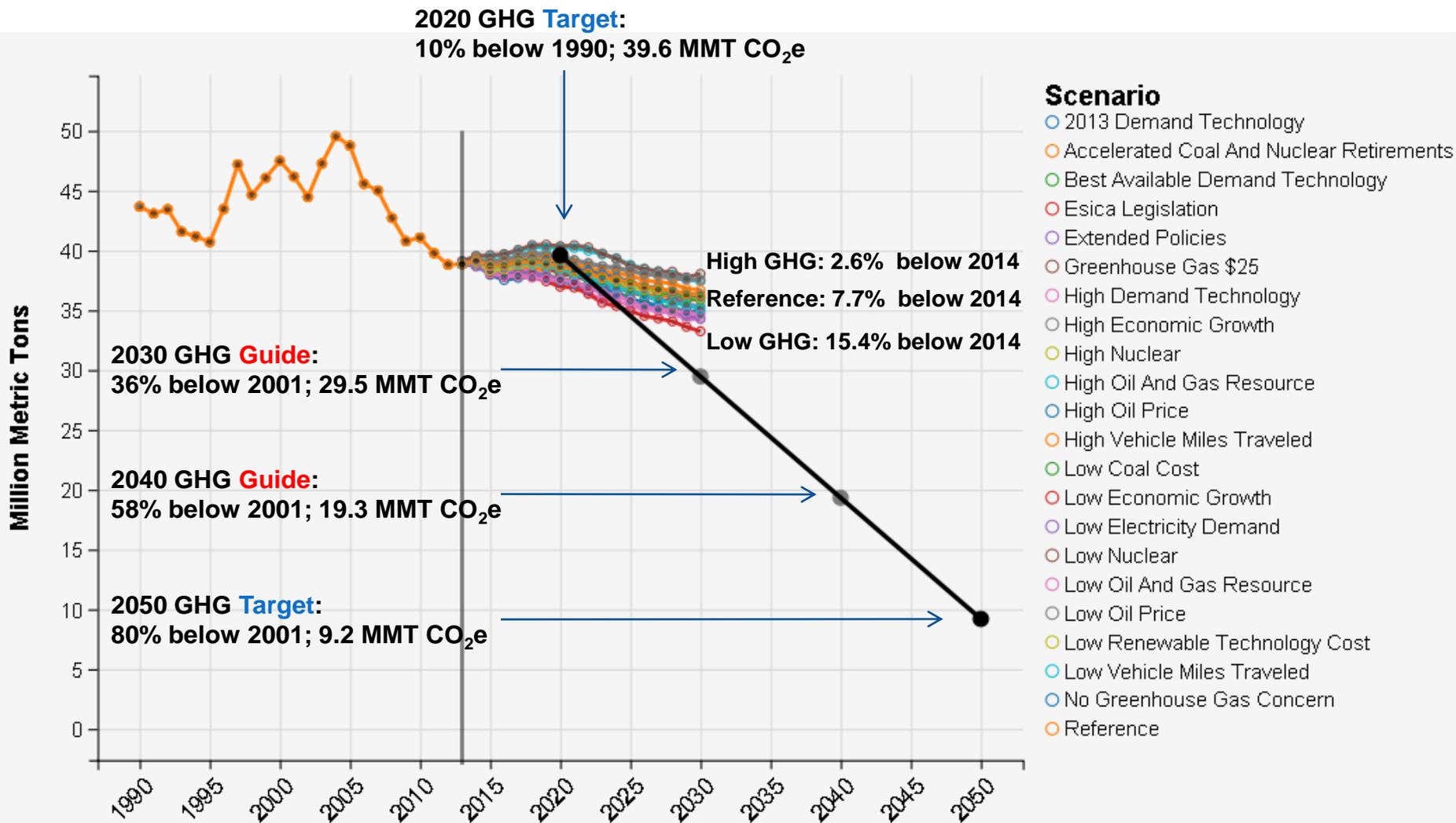
Some Key LEAP Features

- Bottom-up technology detail across energy sectors
- Multi-state modeling capability
- Vehicle fleet turnover in transportation sector
- Optimization for new generation in electric sector
- Emissions accounting for GHGs and criteria pollutants
- Benefit/cost analysis of policies and measures
- Transparent calculations and easy to connect with other tools such as macroeconomic models, spreadsheet models, etc.



Task 3: Develop Reference Case

Using AEO Reference Case with Bounding Scenarios: Example from CT





Task 4: Perform Scenario Analysis

Using LEAP to Examine Sensitivities and Various Scenarios





Encore on

Task 1: Define Technologies and Policy Sets

Task 1 – Define Technology Pathways & Policy Sets

- Purpose: ID potential technologies and policies to populate in LEAP framework relevant to RI
- Technology pathways and policy sets
 - Terminology
 - Identifying information resources

Terminology

- **Technology pathways** – Different demand- and supply-side energy resources, technologies, and practices that can help RI reduce GHGs over short- and long-term. Examples include:
 - Electrification of transportation
 - Energy efficiency
 - Renewables
 - Land use practices
 - Non-energy sector GHG sinks (e.g., forests)
 - And many others...
- **Policy sets** – Combinations of possible strategies and actions to elicit technology pathway outcomes. Examples include:
 - Economy-wide carbon tax or total energy standard
 - Individual technology/sector policies (e.g., electric vehicle sales incentives, renewable portfolio standards)

Key Energy and Non-Energy Transitions

Energy Transitions

- Efficiency and conservation across all energy use sectors (includes VMT, building energy use, vehicle efficiency, etc.)
- Fuel switching in transportation/buildings
- Decarbonize electricity
- Decarbonize fuels (gas/liquids)

Non-Energy Transitions

- Reduce GHG emissions (CO₂ and non-CO₂) in non-energy sectors (i.e., forestry and agriculture, waste, refrigerants, etc.)

Source: E3, California PATHWAYS, 2015

Electricity Generation

Sector	Changes in Technology and Consumer Preferences	Examples of Policies
Electricity Generation	Renewables (solar, wind, hydro, wave, geothermal)	<ul style="list-style-type: none"> • Renewable Portfolio Standard • Tax credits
	Demand management/optimization/energy efficiency	<ul style="list-style-type: none"> • Utility-run rebate programs • On-bill financing • Leveraging private financing • Workforce training and development • Tiered pricing/direct load control
	Energy infrastructure	<ul style="list-style-type: none"> • Cap-and-trade or cap-and-invest • Siting and permitting of new generation • Performance standards (emission or output-based)

Transportation and Land Use

Sector	Changes in Technology and Consumer Preferences	Example Policies
Transportation and Land Use (Forestry and Agriculture)	Smart Growth (reduce vehicle miles traveled)	<ul style="list-style-type: none"> • Transit-oriented development • Improved infrastructure for multi-modal travel ((bike, pedestrian) • Carbon or fuel taxes • Cluster zoning
	Vehicle efficiency	<ul style="list-style-type: none"> • Fuel economy standards • Trucking and freight strategy
	Zero emission vehicles	<ul style="list-style-type: none"> • Multi-state ZEV program
	Aviation/marine	<ul style="list-style-type: none"> • Caps on airport and seaport emissions
	Biofuels	<ul style="list-style-type: none"> • Low carbon fuel standard
	Forestry	<ul style="list-style-type: none"> • Improved forest management • Reforestation • Tree planting and retention incentives

Building Energy Use

Sector	Technology Changes and Consumer Preferences	Examples of Policies
Buildings and Facilities (heating/cooling and energy demand)	Energy efficiency	<ul style="list-style-type: none"> • Advanced building codes • Appliance and lighting standards • Combined heat & power incentives • Tax credits • Leveraging private financing • Building commissioning • Workforce training and development
	Thermal efficiency and renewables	<ul style="list-style-type: none"> • Residential thermal fuel incentives (e.g., solar, biomass) • Electrification incentives for heating/cooling (e.g., heat pumps) with renewables • Clean energy funding

Industry, Waste, and Other

Sector	Technology Changes and Consumer Preferences	Typical Policies
Industry, Waste, and Other Non-CO₂	<ul style="list-style-type: none">• Anaerobic digestion• Advanced waste-to-energy• Industry-specific or GHG-specific initiatives (e.g., SF₆, HCFCs)	<ul style="list-style-type: none">• Performance standards• Incentives for waste reduction• Education and outreach• Industrial process incentives

Examples of Information Resources

- Rhode Island State Energy Plan (2015)
- Rhode Island GHG Action Plan (2002)
- Comprehensive Energy Strategy for Connecticut (2013)
- CT DEEP: Taking Action on Climate Change Progress Report (2014)
- Massachusetts Clean Energy and Climate Plan for 2020 (2010)
- New York State Energy Plan (2015)
- Maryland Greenhouse Gas Reduction Act Plan (2013; 2015 progress report)
- DOE: SunShot Vision Study (2012)
- California: *First Update to the Climate Change Scoping Plan; Pursuant to AB 32* (2014)
- Summary of the California State Agencies' PATHWAYS Project (2015)
- Pathways to Deep Decarbonization (2014)
- AEE: Advanced Energy Technologies for Greenhouse Gas Reduction

Next steps

- Email initial comments on Task 1 info sources by 12/29 (sherrill6@cox.net)
- Team to send out draft list of technology-policy pathways by January 15 for 2nd round of comments
- Response from Technical Committee by January 29
- Revised list by next meeting (February 23) for initial discussion of Task 2 scenario development
- Will also discuss developing Task 3 reference case at February 23 meeting

Additional meeting comments

- Deadline for input on Task 1 “Define Technology Pathways and Policy Sets” by COB Tuesday, December 29
- Email to Pam Sherrill, meeting facilitator at sherrill6@cox.net
- Can also send technical questions to Paul Miller, NESCAUM, at pmiller@nescalum.org

Stakeholder Meeting #2

- February 23, 2016, 1 to 3 PM, Room 300, DEM
- GHG technical committee documents will be posted on Rhode Island project site:

<http://www.planning.ri.gov/statewideplanning/climate/meetings2.php>