Governor's Council on Climate Change (GC3)
MEETING MINUTES

Meeting Date: August 9, 2017
Meeting Time: 1:30 — 3:30 p.m.
Meeting Location: CT DEEP,
Gina McCarthy Auditorium,
79 Elm Street, 5th Floor, Hartford

ATTENDANCE

Council Member	Title	Organization	Present
Melody Currey	Commissioner	Department of Administrative Services	N
Katie Dykes	Chairperson	Public Utilities Regulatory Authority	Y
David Elder on behalf of Commissioner James Redeker	Supervising Transportation	Department of Transportation	Y
Garrett Eucalitto	Undersec. For Trans. Policy & Planning	Office of Policy and Management	N
T.J. Hanson	Product Director	Thule, Inc.	N
John Humphries	Organizer	CT Round Table for Climate & Jobs	Y (phone)
Rob Klee (chair)	Commissioner	Department of Energy & Environmental Protection	Y
David Kooris	Director of Rebuild by De-sign and National Disaster Resilience	Department of Housing	Y
Matt Macunas on behalf of Bryan Garcia	President and Chief Executive Officer	Connecticut Green Bank	Y
James O'Donnell	Executive Director	Connecticut Institute for Resilience and Climate Adaptation	Y
David Robinson	General Counsel	The Hartford	Y
Catherine Smith	Commissioner	Department of Economic & Community Development	Y
Lynn Stoddard	Director	Institute for Sustainable Energy	N
Don Strait	Director	Connecticut Fund for the Environment	Y
Katharine Wade	Commissioner	Connecticut Department of Insurance	N

Associated Staff	Title	Organization	Present
Tracy Babbidge	Chief	Bureau of Energy & Technology Policy, DEEP	Y
Keri Enright-Kato	Director	DEEP Office of Climate Change, Technology & Research	Y
Stanley McMillen	Consultant		Y
Paul Miller	Deputy Director & Chief Scientist	Northeast States for Coordinated Air Use Management	Y
Jason Rudokas	Policy Analyst	Northeast States for Coordinated Air Use Management	Y
Mary Sotos	Deputy Commissioner	Bureau of Energy & Technology Policy, DEEP	Y
Jeff Howard		Bureau of Energy & Technology	Y

		Policy, DEEP	

AGENDA & NOTES

Welcome and Announcements
Rob Klee

Overview of CT Comprehensive Energy Strategy (CES)
Mary Sotos, Deputy Commissioner of Energy

- Overview of CES policy objectives
- Chapters: Electric Power, Buildings, Transportation
- CES recognizes that in order to meet the GWSA targets we must develop policies and programs that decarbonize each sector. The goals and strategies in the draft CES put the state on a path to reduce emissions at the lowest possible cost to CT residents and businesses (e.g., increase Class I renewables and carbon free resources, target peak demand reductions, procure energy efficiency as a resource, and deploy zero-emission vehicles).
- Public comment period from mid-August to mid-September– seeking comments at scheduled meetings and in written form.
- Council comments on CES: job creation, economic benefits, regionalization, grid modernization, transportation strategies and funding, GHG mitigation.

Review and discuss mitigation wedges and scenarios
Mitigation wedges and scenarios presented by Jason Rudokas, NESCAUM
Discussion facilitated by Rob Klee, Commissioner, CT DEEP

- Request and suggestion to develop a decision making process at the next GC3 meeting. DEEP staff will propose a process at the next meeting.
- Based on the feedback the GC3 has provided over the past several meetings, NESCAUM developed two "riverbank" mid-term target scenarios of 35% and 55% below 2001 levels by 2030.
- GC3 should determine if additional pathways to 2050 should be evaluated, including any sector-specific variations that the council may want to consider. Some of the proposed measures may have more flexibility than others — adjustments or tweaks to the scenarios that focus on near-term implementation or feasibility is something to consider.
- Today's discussion will tee us up to discuss considerations for a mid-term target recommendation at our next meeting in September.
- Three primary means for emissions reductions reside within the Electric, Buildings, and Transportation sectors.

Electric Sector Technology Penetration Rates and Assumptions

Renewables & Zero Carbon Electricity:

- Input assumptions for reference case include:

  - Reference case based on 2017 EIA Annual Energy Outlook(AEO) forecast for New England.
  - AEO projections scaled to CT electric load using 2017 ISO-NE Capacity, Energy, Loads, and Transmission Report (CELT).
  - Assumes regional nuclear electricity generation facilities do not retire prior to license expiration.

- Reference Case: 22% renewables in 2030 (51% carbon free), 28% renewables in 2050 (49% carbon free).
- 35% Midterm Target: 30% renewables in 2030 (62% carbon free), 63% renewables in 2050 (84% carbon free). 2030 Renewable percentage is consistent with CES RPS proposal.
- 55% Midterm Target: 39% renewables in 2030 (71% carbon free), 62% renewables in 2050 (82% carbon free)
- Council discussion:
  - Note the zero carbon penetration (60-70%) versus renewable energy percentage (30-40%). This demonstrates that zero carbon includes resources such as large hydro and nuclear.
  - Future of nuclear power assumes Millstone does not retire prior to its license expiration in 2035 and 2045.
  - Seabrook nuclear retires in 2050 thus it's important to note that in 2051 carbon emissions will increase without a strategy to replace this zero-carbon resource with other zero-carbon resources.
  - Maintaining low emissions in the future requires effective long-term strategies for zero-carbon replacement when nuclear power retires.

Electric energy efficiency scenarios:

- Energy efficiency inputs include data from public performance reports on CT energy dashboard. Measures assume to have a 12 year life. Savings per dollar invested assumes equipment increasingly efficient but also increasingly costly, and overall effectiveness of efficiency investment decreases. This approach uses a methodology similar to the one used by ISO-NE in the 2017 energy efficiency forecast.
- Reference case: Program spending remains at average 2014-2016 levels through 2050. When maximum cumulative savings are achieved based on a 12-year measure life, existing EE measures are replaced or maintained at an equivalent level. E.g. LED replaced with an LED.
- 35% Midterm Target: Program spending remains at average 2014-2016 levels through 2050. When maximum cumulative savings are achieved based on a 12-year measure life, EE measures are replaced by more efficient, higher-cost measures. E.g. LED replaced with a more efficient LED or other more efficient technology.
- 55% Midterm Target: Program spending is increased to remain a constant share of CT GDP through 2050. When maximum cumulative savings are achieved based on a 12-year measure life, EE measures are replaced by more efficient, higher-cost measures
- Council discussion:

- Adjusted energy efficiency scenarios based on feedback received.
- The assumption of decreasing effectiveness of efficiency dollars — can't we assume costs of the technology will come down or efficiency will increase for the same cost? It is difficult to know for sure what future costs might be or what technologies will increase efficiency, but we could model a scenario that makes assumptions around this.
- How much money is "spending is increased to remain a constant share of CT GCP through 2050?" — $380 million dollars compared to current average spend of $140-150 million per year.
- Important factors to consider are the limitation of technologies and increasing costs for efficiency gains and market adoption. E.g. a 7 watt light bulb doesn't have a lot more capacity for improved efficiency. However, other technologies that improve the use of that light bulb, such as building automation, could add additional efficiencies.
- Give and take between regulation and market adoption of more efficient technologies.
- Curves in the scenarios represent annual saving of cumulative investments.
- Energy efficiency in future years is also less impactful in reducing emissions because of the increasingly cleaner grid. Energy efficiency may be important for economic reasons, but it does not help to reduce emissions of a grid if the grid is already zero carbon.

Buildings Sector Technology Penetration Rates and Assumptions

- Thermal Energy Efficiency – same methodology used for electric energy efficiency, though measure life is assumed to be 15 years, not 12.
- Reference case: Program spending remains at average 2014- 2016 levels through 2050. When maximum cumulative savings are achieved based on a 15-year measure life, existing measures are replaced or maintained at an equivalent level
- 35% Midterm Target: Program spending remains at average 2014-2016 levels through 2050. When maximum cumulative savings are achieved based on a 15-year measure life, measures are replaced by more efficient, higher-cost measures.
- 55% Midterm Target: Program spending is increased to remain a constant share of CT GDP through 2050. When maximum cumulative savings are achieved based on a 15 year measure life, EE measures are replaced by more efficient, higher-cost measures.
- Renewable thermal deployment (ground and air-source heat pumps)
- Council discussion:
  - Current renewable thermal penetration is about 2%
  - Timing of early effects of interventions (e.g., 2020) leading to 35% and 55% targets — can this be achieved? It may be different in reality. 2020 penetration rates could be lower meaning that a steeper curve to 2030 would be required.

- Potential for sequencing of interventions across sectors. Consider great emphasis on certain technology penetration rates earlier and less on others later. E.g. more energy efficiency and less renewable thermal in early years.

Transportation Sector Technology Penetration Rates and Assumptions

ZEV deployment:

- 35% Midterm Target: 1% of fleet in 2020, 13% of fleet in 2030, 95% of fleet in 2050
- 55% Midterm Target: 3% of fleet in 2020, 32% of fleet in 2030, 95% of fleet in 2050
- Heavy-duty vehicle and rail electrification
- Light commercial trucks and transit buses electric
- School buses and refuse trucks
- Single-unit short-haul trucks
- Passenger and freight rail electric

VMT reductions

- 35% Midterm Target: 2% VMT reduction by 2050
- 55% Midterm Target: 4% VMT reduction by 2050
- VMTs increase but at a decreasing rate based on these 2050 scenarios.
- Council discussion:
  - Is there a qualitative assessment of the difficulty of each wedge? E.g. easier to implement a zero-carbon grid vs. renewable thermal deployment.
  - Consider looking at scenarios with a mid-term target between 35% and 55%.
  - Economic analysis of wedges is also important to consider.
  - How much can we count on technological advancement in near term vs. long-term? Technological advancement can change feasibility and policy can help drive technological advances and customer adoption.

Next steps:

- Analyze a 40 and 45% reduction by 2030 scenario.
- Variations in wedges (less of or more of certain measures/technologies).
- Variations in penetration rates of certain measures may be more expensive than others thus the Council would like to understand economic impact of choices.

Public comments

Ray Albrecht, National Biodiesel Board

- Need more emphasis on renewable fuels, especially in building heating. Electrification of heating needs to recognize ramification of adding electric load during peak winter demand. Consider European approach: heat pumps during "shoulder" periods and renewable fuels during peaks. Adding heat pump can roughly double annual household electric demand. Also need to emphasize short service life of heat pumps (typically 10 years, max. 15 years)

and commit to using funds most effectively. Winters are getting warmer, and we need to speed up our GHG emissions reductions.

Henry Link, EEC

- For clarity, use percentage reductions in GHG emissions rather than tonnage reductions.

Abi Rodriguez, Chispas CT

- Will there be subsidies for and education of low-income households?
- Need outreach to low-income communities.
- Will VW settlement fund be used to target VMT and other forms of GHG reduction?

Mike Morrissey

- Some CT towns are using propane school buses in the new school year.
- Yale adopting propane for shuttle buses.
- Propane, a low-carbon fuel, is making inroads.

Lee Granis, Greater New Haven Clean Cities

- Electric buses need to be incorporated in the GC3 analysis, as they are emerging quickly. Heavy-duty vehicles, on the other hand, will require attention to low-carbon fuels, because electric drive trains not sufficient for these.

Craig Peters, Capital Clean Cities of CT

- There are limits to electrification of transportation sector. Garbage trucks and other vehicles running on compressed natural gas are practical.
- GC3 needs to focus more broadly on alternative fuels.

George Rawitscher, Mansfield Climate Task Force

- National Climate Assessment is important and should not be suppressed by Trump administration.
- Also, "Living on Earth" recently referenced a commendable report on how a MA town is addressing flooding.
- Finally, need to change laws to allow sharing of PV-generated electricity.

David Chu, CEMA

- Dangerous to assume tech improvements – would undermine credibility of analysis.
- A recent analysis suggests 95% of New England roofs can support PV.

NOTE: *Slides are available on GC3 web page: www.ct.gov/deep/gc3*