

**Governor's Council on Climate Change (GC3)
Analysis, Data, and Metrics Working Group
MEETING MINUTES**

Meeting Date: October 14, 2015

Meeting Time: 2:30 p.m. —4:30 p.m.

Meeting Location:
DEEP Bureau of Energy & Technology Policy
10 Franklin Square, New Britain, CT

ATTENDANCE

Working Group Members	Title	Organization	Present
Catherine Smith	Commissioner	Department of Economic & Community Development	N
James O'Donnell	Executive Director	CT Institute for Resilience & Climate Adaptation (CIRCA)	Y
John Humphries	Organizer	CT Roundtable on Climate and Jobs	Y
Don Strait	Director	Connecticut Fund for the Environment	Y
Robert Klee	Commissioner	Department of Energy & Environmental Protection (DEEP)	Y
Lynn Stoddard	Director	Institute for Sustainable Energy	N
Arthur House	Chairperson	Public Utilities Regulatory Authority (PURA)	Y
Tom Maziarz on behalf of James Redeker	Bureau Chief of Policy and Planning	Department of Transportation	Y

AGENDA & NOTES

Associated Staff	Title	Organization	Present
Keri Enright-Kato	Director	DEEP Office of Climate Change, Technology & Research	Y
Jeff Howard	Environmental Analyst	DEEP Office of Climate Change, Technology & Research	Y
Katie Dykes	Deputy Commissioner	DEEP	Y
Tracy Babbidge	Bureau Chief	DEEP Bureau of Energy & Technology Policy	Y
Arthur Marin	Executive Director	NESCAUM	Y
Paul Miller	Deputy Director & Chief Scientist	NESCAUM	Y
Jason Rudokas	Climate Policy Analyst	NESCAUM	Y

Welcome and review of meeting agenda

Rob Klee, ADM Working Group co-Chair

- Introductory remarks and review of the agenda
 - Review and discuss proposed reference case
 - Review and discuss data on in-state electricity consumption
 - Demonstration of Long-range Energy Alternatives Planning (LEAP) tool
 - Review and discuss Exploratory Report proposed framework
 - Public comments
- Review of administrative procedures — Signing in for this meeting, accessing ADM materials on www.ct.gov/deep/gc3, making oral comments today, submitting written comments, signing up for GC3 e-mail distribution list, intent to post audio recording on the web page.
- Public comments will be heard during the final portion of agenda.

Review and discuss proposed reference case

Paul Miller and Jason Rudokas, NESCAUM

- Discussed the 2014 Annual Energy Outlook (AEO) Reference Case that was developed by the Energy Information Administration (EIA). They project a reference case for New England, which NESCAUM downsizes to make CT specific and then looks at different sensitivities that the EPA would also look at.
- Slide 6 shows the various AEO sensitivities for projected emissions based on future energy consumption scenarios. Recommendation is to go with the middle range of the spread – 7.7% below 2014.
- The reference case is what is used to make sure the model is reasonably realistic.
- Grey dots are what emissions would be relevant to 2001 if emission reductions followed a linear reduction trend (reference line).

Questions and discussion:

- Is the model starting in 2020 or 2015? The slope would change dramatically depending on where you put your starting point.
 - The first year of the model will be 2014, at what pace we bend the curve down will be something we need to determine.
- Is it correct to interpret the model, as applying a sort of one change in terms of the economy – they're all independent changes?
 - Yes, they're linearized sensitivities. A single individualized sensitivity, as far as a reference line goes, does not move things too much.
 - It's a gauge as what to predict 5-10 years out.
 - Every year AEO's projection changes based on new inputs/information – their projections are rarely right once actualized
 - The middle AEO projection reduces GHG emissions by 7.7%; this reference line is what we would use to compare with steeper emissions reduction curves that will achieve the 2050 goal.

Review and discuss data on in-state electricity generation versus in state electricity consumption

Jason Rudokas, NESCAUM

- How do we account for GHGs from electricity consumption? How much electricity do the commercial, residential, industrial, and all other loads consume? Do we want to look at GHGs associated with that consumption or just look at generation from in-state power plants? The differences between consumption and generation shapes whether or not your state is an importer or exporter of electricity.
- CT has switched from being a net importer to a net exporter over the past couple of years. NESCAUM examined how big of an effect this has both historically and into the future based on AEO projections.
- Slide 8 is a comparison of generation and consumption – actual and predicted.
- The data is EIA historical in-state generation data until 2014; the rest is AEO's regional prediction for generation and consumption.
- Based on historical actuals and future projections, there is only a small difference between generation and consumption.
- NESCAUM proposes using the consumption based approach to align with the CT Integrated Resource Plan and for regional consistency.

- Massachusetts uses a consumption-based approach and Rhode Island is also very interested in doing the same, which makes the accounting more regionally consistent.

Questions and discussion

- The blue line on the graph is emissions at the point of generation and the red line is implied emissions associated with end use electricity consumption.
- Are the life-cycle emissions of fuels captured in this?
 - No, it is all direct emissions. Life cycle emissions examine everything and are a huge undertaking; not something that can be considered under the current time frame and budget.
- Since a full-life cycle analysis (LCA) is not possible now, is there an in-between approach?
 - There are too many variables to develop an equivalency factor that would give you a reliable number or range. There a lot of studies out there looking at the LCA of Marcellus shale gas, photo-voltaics, wind turbines, etc. so you could take a qualitative approach looking at different fuel sources.
 - Since a full LCA of all fuels is not something we can take on now, we should use this analysis as a first rough cut of what it's going to take to get us to an 80% reduction.
 - The big question is the difference in the numbers between using a full LCA emissions or direct emissions. In the future, this is something we could look at. The timeline for the GC3 analysis makes a full LCA infeasible.
 - What about not using a full LCA across all sectors, but rather key sectors with challenges - specifically natural gas? We know that capacity already exceeds the 80% reduction in emissions. If you use the LCA numbers for natural gas versus direct emissions that could make a big difference.
 - Only using LCA in one sector skews the inventory. For instance, if you only do it for the electric sector, it will make your electric sector look much larger than the rest of the sectors which isn't necessarily the reality.
 - Shouldn't let the perfect be the enemy of the good, if a particular fuel or strategy looks much different using an LCA, then we need to consider it; methane leakage for example.
 - If there is uncertainty (methane leakage component) then those are measures you can put into the LEAP build up tool. With the tool, you can look at the impact of different factors on a sliding scale to capture these types of impacts.
- Regional accounting approach, Massachusetts methodology applied to Connecticut (slide 9)
- Massachusetts uses this approach every year to look at their greenhouse gas emissions. The approach was developed in order to comply with their Global Warming Solutions Act.
- Calculate net electricity imports/exports for all New England states and adjacent control zones (Canadian provinces) using generation and load data from ISO-NE
- Determine the fraction of New England and adjacent control zone electricity used in Massachusetts
- Use fraction to apportion electricity exports from all exporting regions to Massachusetts and convert to GHG emissions
- NESCAUM used this same approach when calculating Connecticut's consumption-based emissions.

Questions and discussion

- How does it account for long term contracts, such as our Maine Wind?

- You get partial credit for it in the Reference Case. The RPS is included in the AEO actuals and projections. The region as a whole gets credit for the RPS, not just CT. RPS's in all 6 states are averaged out across the region.
 - As a part of their accounting methodology, Massachusetts also tracks RECs in the NEPOOL GIS system in order to take full credit for their purchases of clean energy through contracts.
 - It's not the RECs that are being double counted, but when we add the environmental attributes (GHG emission), that's where things become unclear.
 - The point of the RPS is for a market transformation for renewable energy technologies.
- Slide 10 - Regional accounting approach applied to Connecticut for 2012
 - Connecticut was a marginal net importer in 2012, does not include RECs as they would add a negative component.
 - RECs become a mitigation measure; how to assign those environmental attributes to it would go into the sliding scale, assigning emissions to those RECs.

Questions and discussion

- 1 mWh = 1 REC regardless of which type of Class I technology produced it. For the purposes of carbon emissions, a biomass REC has a different carbon profile than a solar power REC. Using the regional accounting approach which is based on the Massachusetts model, looking at the amount of power sector emissions that are a part of the entire New England whole sale market in 2012, but only 25% of it due to CT being roughly 25% of the load and then adjust accordingly.
- Only takes the bulk New England production and then assigns it by consumption. Doesn't take into consideration things individual states do, such as policy matters in which the state is contracting for cleaner energy.
- Consumption based accounting is giving at least some credit to the things that Connecticut is doing, region wide, although it is not full credit yet.

Demonstration of Long-range Energy Alternatives Planning (LEAP) tool

Jason Rudokas, NESCAUM

- The LEAP tool requires a license, but is a nominal cost for government agencies and non-profits. DEEP staff will be trained on using the tool for future use.
- An example model put together for the demonstration; not a model of Connecticut's energy economy. The demonstration highlights key inputs and sensitivities, and how we would build scenarios from there.
- A description of the model is provided. The menu uses a tree structure and branches out from various categories. Some key assumptions that would be the "sliders" as mentioned earlier would include: income, population, gross domestic product, growth rate, etc. All would be Connecticut specific. Added sections include: EV penetration, wind increase, natural gas deployment.
- On the demand side there is household, industries, commercials, etc. but the model can be changed and it is possible to make further selections, such as residential household – urban or rural, and within that is refrigeration – efficient and inefficient models, etc.
- There is an analysis view (set up for reference case, data for the mitigation scenarios, etc.), the results view (look at various charts and can vary assumptions and sensitivities)
- Most important part is the summaries; shows key assumptions: population growth rate, wind increase, end year EV penetration (end year refers to end of 2050), end year natural

gas, etc. The sliders at the top of the program allow the user to see the results of certain changes.

- This is a demonstration of the versatility of the tool, but also how to calibrate it for future results. The reference case is what it is calibrated against, and the reference case must be built into the model.

Questions and discussion:

- All of the graphs assume a linear progression, how do we capture if we are, for example, looking at increasing mass transit? The emissions reductions resulting from today's investments may not become available until 15 years from now, how do we capture that in the model?
 - You need to calculate how much that will reduce carbon pollution and add it to the model. Not bound to use linear trends. The model wouldn't know that, so it would need to be plugged in to the model.
 - Advantage is to make a lot of simple assessments at a general level and then hone in on opportunities of promise and fine tune areas of interest.
- Is it possible to make multiple models with various end years? How do you capture those nuances?
 - Wouldn't need to set up a different model, but would need to set up the current model differently to accommodate what would be necessary. This model is just to show what the model is and to show how it can look at sensitivities on the fly and see how they interact with each other. Can easily respond to multiple scenarios.
 - The charts are not fixed and can be customized.
- Will this be able to do both economic and policy assumptions?
 - It is not an economic forecasting model. Entering data from power plants in the area, buildings, transportation, etc. and uses LEAP system wide cost calculation.
- Whose macro-economic calculations would you use? Federal, IRS...?
 - The REMI Model uses the Bureau of Economic Analysis as a main source for input data and the Commerce Department from Economic Affairs.
 - We will use the REMI model and calibrate it for Connecticut.
- Can it allocate costs in the model?
 - Yes.

Review and discuss Exploratory Report proposed framework

Jim O'Donnell, CIRCA

- The ADM report will include:
 - Activities to date
 - Discussion of analysis conducted (what, why, how)
 - Recommendations
- There are two more GC3 meetings left in 2015 - November 13 and December 16, and one more ADM meeting on December 3.
- Nov. 13: review Exploratory Report components, review LEAP modeling and visualization tool populated with Connecticut data
- Dec. 3: review and discuss preliminary strategy selections. Discuss and review interim target ranges.
- Dec. 16: recommend suite of strategies to be further analyzed in 2016. Review Exploratory Report draft.
- Any recommendations that the ADM wants to make for the GC3 will need to be discussed and decided on by December 16.

Questions/Comments about the Exploratory Report:

- Are we going to be positioned by December 16 to make the recommendations of strategies?
 - To some extent we are recommending what should be done in the next phase and what should be considered. We are talking about setting general parameters on where we should be looking.
 - It is a balancing act between how fast NESCAUM can generate things for us to look at and then for us to analyze.
 - Do not want to get in a situation where we get just enough information and then have to make policy recommendations.
 - This first phase, in 2015, is looking at what technology is needed and at what level of deployment.
 - In 2016 then we will determine what policies and incentives are needed to deploy the technology at the levels needed.
 - Working model by the end of 2015, but the policy scenarios will not be developed until 2016.
 - Based on this discussion, we need to push back the timeline to be able meet what has been outlined in the Exploratory Report deliverables.
- Can NESCAUM start feeding us examples of the types of questions that you need answered, for instance DOT information?
 - Yes NESCAUM will connect with DOT and others on questions and suggestions.
- In this initial report will we be setting a mid-term target?
 - This is still on the table and to be discussed by the group, but it all depends on level of information we receive during this NESCAUM preliminary analysis.
 - Setting a mid-term target should be based on information tied to other commitments and planning efforts.
 - A helpful step in NESCAUM's modeling would be to have the group develop a draft interim target or range.
 - As first step, establishing a range similar to the NEG/ECP reduction marker range of at least 35%-45% below 1990 levels by 2030 seems feasible and useful.
- In this Exploratory Report, will the GC3 be recommending some of the obvious strategies, a seize the moment approach, or are we taking a more cautious approach?
 - We would be jumping ahead of the process which would undermine the integrity of the process if the GC3 were to put policy recommendations forward before the full analysis were completed.
 - Yes, this is true, but it is a cautious approach.
 - It is critical to maintain the integrity of the process because Connecticut's success is not only achieving emission reductions but also its ability to lead by demonstration, ultimately creating a model that is scalable and exportable to other jurisdictions.

Public comments

Ray Albrecht, National Biodiesel Board:

(a) Thank you to NESCAUM for their wonderful work.

(b) Lifecycle analysis on renewable energy technology - every renewable energy technology will have non-renewable components, but as the energy becomes more available those penalties will start to evaporate. Plan to address outside issues along the way, but don't get hung up on those items.

(c) Natural gas is the elephant in the room. It's a dominant fuel and methane leakage should be put in the model. Could use a slide function to see the percent of leakage. Need to shoot for all renewable energy.

Joel Gordes, Environmental Energy Solutions:

(a) As one who was one of primary co-authors of 1990s climate change legislation, they didn't set goals or times. That being said, what the GC3 is doing is very ambitious. I would spend 80% on the first 5 years of goals, another 15% on the next 5 years of goals, and the last percent on anything past that. We don't do a very good job at looking at models and projections. Refers to an article about retro analysis that shows ISO-NE projections for energy and peak demand for various years. It shows huge over estimates in numbers. Economically the last black swan was the recession. Get ahold of Professor Shiller at Yale and see what he thinks about some of the projections.

(b) Jason talked about the RPS and hit it right on the head- market transformation is what it is for renewable energy. It is becoming a mitigation measure but we don't have emissions assigned.

(c) Wasn't the 2014 IRP late? Don't want to see all the good people in the room being forced to stay up till midnight and potentially make mistakes. Need to approach the legislature and say this is a big job, and trying to get everything out there in any meaningful form within the time frame is not fair.

Ben Martin, 350CT:

(a) Need to have the meeting at a time when the public can attend. Would be nice to have a meeting on a week night or weekend.

(b) It will be easier to accomplish the goal of 80% reduction that is written into the legislature if we shoot for 100%.

(c) When discussing the interim targets, we need to keep the long term targets in sight. We need to keep long term target in mind when making short term goals.

(d) The Union of Concerned Scientists had an article about natural gas and would like the GC3 to take a look at it.

Chris Phelps, Environment Connecticut:

Regarding the New England Governors and the Eastern Canadian Premiers, he believes it was an anticipated range that the region received as a whole. Keep in mind that some will be above that mark and some will be below. Use that context when thinking about interim targets. It is not implausible that CT might go above and as a result we should be more aggressive and make a deeper cut. The 80% mark comes from, "Do it or go home." Science says 80% is the minimum we need to achieve for the long term, but what do we need to do in the short term?

Diana McCarthy-Bercury, Eversource:

(a) Regarding the conversation about consumption versus generation and which one we will be used for greenhouse gas accounting, are we taking line loss into consideration for that?

(b) Renewable energy credits that we import for our Renewable Portfolio Standards – from the last meeting it was understood that we would be doing so from within state boundaries. This is something that we can't rely on, maybe in the future when looking at contracts we can write something in to the contract that explains who is responsible for the emissions.

(c) At a conference in Little Rock, there was a speaker from the EPA Emissions for Transportation who recommended to go online and check out tool kits and resources available for states, as well as literature on modeling.

(d) With respect to fugitive emissions from natural gas, keep fuel agnostic approach for all fuels. Line losses are included in the bar chart for Massachusetts and are applied to Connecticut.

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