

MEMORANDUM

To: Liz Stone, Danny Musher

From: Paul Miller, NESCAUM

Date: January 8, 2016

Re: *Electricity generation vs. consumption GHG accounting approaches*

Issue Statement

In assessing Rhode Island's greenhouse gas (GHG) mitigation scenarios to achieve the state's ultimate goal of an 80% reduction in GHG emissions from 1990 levels by 2050, there are two options in accounting for GHG emissions from the electric power sector. The first option is to account for all GHG emissions emitted by fossil fuel electricity generation occurring within the state (generation-based). The second option is to account for GHG emissions associated with electricity used within the state (consumption-based). Neither method is a "full life cycle" approach, in that both approaches are based on GHG emissions emitted by combustion of the fuel used to generate electricity (wherever it may occur), but not in the production of the fuel being used (*e.g.*, methane leakage in a gas production field). This memorandum presents an overview of the two GHG accounting approaches, strengths and drawbacks of each approach, and places these in the regional context of what neighboring states and the broader region are pursuing.

I. Alternative methods for electricity GHG accounting in Rhode Island

A. Generation-based

Generation-based accounting of GHG emissions from the electricity sector is the summation of GHGs emitted directly from the combustion of fuels at power plants within Rhode Island's borders (*i.e.*, "at the stack" emissions). For fossil fuel combustion, the GHG emissions are mainly carbon dioxide (CO₂), but methane (CH₄) and nitrous oxide (N₂O) may also be co-emitted. Total emissions are expressed as "carbon dioxide equivalent" (CO₂e) that account for the global warming potential of the non-CO₂ GHGs, but CO₂ comprises the vast majority of fossil fuel combustion GHGs.

B. Consumption-based

Consumption-based accounting of GHG emissions from the electricity sector tabulates GHG emissions associated with electricity used within Rhode Island, regardless of where the generation sources are located that provide the electricity used in Rhode Island.

II. Strengths and drawbacks of each approach

A. Generation-based

Strengths: Generation-based accounting is the traditional emissions inventory approach and is straightforward to do. It is a relatively simple tabulation of GHG emissions occurring at the stack of power plants located in the state, which is already currently reported annually by the

largest sources to the U.S. EPA's Greenhouse Gas Reporting Program.¹ For smaller sources, standard emission factors based on fuel consumed and type of combustion source can be used to estimate GHG emissions.

Drawbacks: Electricity in Rhode Island is provided through a regional transmission grid operated by ISO-New England, so GHG emissions from electricity use within Rhode Island are a reflection of the generation sources across (as well as outside of) the ISO-New England grid, and not solely attributable to generation sources within the state. Because of the regional nature of the grid, a generation-based approach would not account for "leakage" where fossil fuel generation could shift out-of-state, and the electricity imported back into Rhode Island. It may also not fully capture GHG emission reductions achieved through in-state energy efficiency programs, or give appropriate credit for electricity obtained from renewable energy sources located out-of-state.

B. Consumption-based

Strengths: A consumption-based approach for electricity is a more direct accounting of actual GHG emissions associated with electricity use within Rhode Island and more realistically comports with how electricity is generated and distributed across a regional, multi-state grid.

A consumption-based GHG approach can be a more informative metric for purposes of state-level policymaking because many (though not all) policy instruments available to states have more influence on electricity demand, i.e., consumption. For example, energy efficiency and demand-side management programs are state-level policies that influence consumption by in-state consumers and businesses. In contrast, most policies which influence the type, location, and scale of generation (e.g., air quality standards, interstate transmission, reliability requirements) are federal or regional policies. Even renewable energy policies, which are state-based, are effectively implemented at a regional level (market for RECs is New England-wide).

The consumption-based approach also highlights where states need to coordinate and collaborate on policymaking, is more consistent with approaches of neighboring states, and will allow for more regionally consistent and accurate accounting for GHG emissions and emission reductions.

Drawbacks: To the extent Rhode Island is becoming a net exporter of electricity to other states, a consumption-based approach could be viewed as failing to count GHG increases within the state associated with electricity generation for out-of-state sale.

III. Regional context: Considerations in choosing between a generation-based and consumption-based approach

In considering whether to take a generation-based or consumption-based approach to electricity sector GHG emissions, it is important to consider consistency of methods and goals with

¹ Facilities that emit 25,000 metric tons or more per year of GHGs are required to submit annual reports to EPA. Additional information available at: <http://www.epa.gov/ghgreporting/learn-about-greenhouse-gas-reporting-program-ghgrp>.

neighboring states and broader regional programs. As required by state law,² Massachusetts is already pursuing a consumption-based GHG accounting approach in its state GHG mitigation planning effort. Massachusetts currently imports a quarter of the power it uses, therefore counting only in-state generation would underestimate emissions from in-state electricity use. Connecticut appears likely to also pursue a consumption-based approach in order to be consistent with Massachusetts. Both these states also have similar 2050 80% GHG mitigation targets set by state law as in Rhode Island.

A harmonized regional approach among the three states, which collectively account for about 77% of annual electricity consumption in the ISO-New England territory,³ would avoid inconsistent accounting of GHG emissions. As a practical effect, a harmonized and consistent consumption-based approach among the three states would subject GHG emissions associated with cross-border electricity exports and imports to all three states' GHG mitigation requirements, which are virtually equivalent by 2050. On the other hand, if Rhode Island followed a generation-based approach, one outcome could be fossil-fuel generation being shifted to neighboring Connecticut and Massachusetts, with electricity imported back to Rhode Island. Neither Connecticut nor Massachusetts would count the emissions in their consumption-based approaches, and Rhode Island would not count the emissions with an in-state generation-based approach.

Rhode Island is also part of the Regional Greenhouse Gas Initiative (RGGI) that caps electricity sector GHG emissions from nine participating Mid-Atlantic and Northeast states. The RGGI program is also likely to serve as Rhode Island's compliance mechanism for the federal Clean Power Plan. While natural gas generation is leading to an increase in GHG emissions within Rhode Island, total GHG emissions among the participating RGGI states are decreasing as higher emitting coal- and oil-fired power plants reduce generation elsewhere in the RGGI region. To the extent the region is collectively constraining power plant GHG emissions over time and RGGI is amenable to becoming a federally-enforceable program, the state-specific location of a power plant is not a salient feature in achieving the regional GHG reduction requirements. In recognition of this, Rhode Island has recommended in its *Energy 2035: Rhode Island Energy Plan* that from a state emission perspective, policy makers should strongly consider in any separate carbon reduction efforts to use consumption-based emissions for the electricity sector.⁴

Finally, Rhode Island is part of the New England Governors/Eastern Canadian Premiers Resolution 39-1⁵ that sets a 2030 regional 35%-45% GHG reduction marker range below 1990

² Massachusetts Global Warming Solutions Act (GWSA) of 2008, Chap. 298. The GWSA provides that statewide GHG emissions shall include "total annual emissions of greenhouse gases in the commonwealth, including all emissions of greenhouse gases from the generation of electricity delivered to and consumed in the commonwealth ... whether the electricity is generated in the commonwealth or imported[.]" Note that in recent years, Massachusetts has imported about a quarter of its electricity from outside the state, which would include generation sources in Rhode Island.

³ ISO-New England, *Energy, Load, and Demand Reports, Net Energy and Peak Load by Source* (Dec. 9, 2015), available at <http://www.iso-ne.com/isoexpress/web/reports/load-and-demand/-/tree/net-ener-peak-load>.

⁴ Rhode Island Division of Planning, *Energy 2035: Rhode Island State Energy Plan*, State Guide Plan Element Report #50 (Oct. 8, 2015), p. 150.

⁵ Conference of New England Governors and Eastern Canadian Premiers, Resolution 39-1: Resolution Concerning Climate Change, 39th Annual Conference of New England Governors and Eastern Canadian Premiers, St. John's,

emissions on the way to a 2050 regional target of 75%-85% GHG reduction below 2001 levels. This resolution, signed in August 2015, sets a regional marker that is not state- or province-specific, which is consistent with the science of climate change. Emissions of GHGs contribute to a global problem, and the specific location of a GHG reduction is less relevant than achieving a collective reduction in GHG emissions, wherever they may occur. With Rhode Island part of this broader regional coalition having common GHG mitigation targets, and in recognition that GHGs have global impacts no matter where emitted, there can be greater opportunities for GHG reductions within a multi-jurisdictional effort that would be captured by an electricity consumption-based GHG accounting approach but not by a state-specific generation-based approach.

Newfoundland and Labrador, signed August 31, 2015, available at <http://www.coneg.org/Data/Sites/1/media/39-1-climate-change.pdf>.