STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: Docket No. SB 2015-06
Invenergy Thermal Development LLC's
Proposal for Clear River Energy Center

PRE-FILED REBUTTAL TESTIMONY OF J. TIMMONS ROBERTS

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Q: Are you the same Timmons Roberts that provided pre-filed testimony in this case earlier?

A: Yes, I am.

Q: Are you familiar with the Pre-Filed Direct Testimony of Ellen G. Cool, an expert witness retained by the Rhode Island Office of Energy Resources (OER)?

A: Yes, I am.

Q: So you are aware of the fact that Dr. Cool disagrees with you in several salient respects?

A: Yes, I am.

Q: Are there matters in Dr. Cool's Testimony that you would like to respond to?

A: Yes, there are five matters that I would like to address: (a) consumption- versus production-based accounting for carbon emissions; (b) Rhode Island's ability to meet the Resilient Rhode Island Act emission-reduction targets; (c) the availability of mitigation tools to help Rhode Island achieve emissions reductions; (d) stranded costs; and (e) the degree to which Invenergy would be in direct competition with new renewables. I also include a closing statement at the end of this testimony.

Consumption vs. Production-Based Carbon Accounting

Q: Please identify the first matter in Dr. Cool's testimony that you would like to address, and tell us where in her testimony that issue is discussed.

A: The first issue I would like to address is the appropriate method to account for carbon emissions. As you know, in my previous testimony, I testified that building the proposed

Invenergy power plant would make it impossible for Rhode Island to meet its short-, medium-, and long-term carbon-emission-reduction goals under the Resilient Rhode Island Act. (Timmons Roberts Direct Testimony, page 14, lines 1-18; page 22, lines 4-6.) However, Dr. Cool testifies "that operation of [the proposed Invenergy plant] would contribute to lowering CO2 emissions" in Rhode Island. In addition, Dr. Cool endorses the OER Advisory Opinion that offers the same inaccurate conclusion. (Cool Testimony, page 10, lines 15-20.) Dr. Cool acknowledges that she bases her opinion in this regard "on a consumption accounting basis." (Cool Testimony, page 10, line 16.) This issue is extremely important in the decision over whether the Invenergy plant is compatible with Rhode Island meeting its carbon-emission-reduction goals.

Q: What is the alternative to the consumption-based accounting method that OER and Dr. Cool endorse?

A: The alternative to consumption-based accounting is production-based accounting for carbon emissions. I discussed production-based accounting in my Direct Testimony, at page 19, line 6 – page 21, line 12.

Q: What is the difference between consumption-based and production-based accounting for carbon?

A: In the electricity sector, there is a crucial difference. The six New England states have a single, unitary electricity grid. Rhode Island demand accounts for only about 6% of New England's aggregate electricity load. Therefore, if you use consumption-based accounting, and you build a fossil fuel power plant here in Rhode Island, by means of an accounting trick, you account for 94% of the carbon emissions against other states' goals; that is, these emissions are

considered as being from "out of state" and those emissions then disappear from our ledgers. In contrast, when you use production-based accounting, you have to account for the carbon emissions produced or created here in Rhode Island. I believe that production-based accounting is the correct method to use.

Q: Why do you believe the production-based accounting method is more appropriate in this case?

A: There are multiple reasons why the consumption-based accounting method for carbon emissions is completely inappropriate to use in considering a permit application for the siting of a specific fossil-fuel power plant.

First, as I discussed in my previous testimony (Direct Testimony, page 7, line 7 – page 8, line 9), I was closely involved, together with other collaborators in the state Senate and the previous Administration, in drafting the Resilient Rhode Island Act. Later, when the bill was being debated, I appeared in the General Assembly to testify in favor of passage. Speaking for myself, and the other drafters, I can state most emphatically that what we drafted and what we supported was meant to utilize a strict production-based method of accounting. It is my understanding that production-based accounting was the only carbon-accounting method that had ever been used in the state up to the time that the Resilient Rhode Island Act was enacted.

Q: Are you aware of the fact that, in interpreting the Resilient Rhode Island Act the Governor's Executive Climate Change Coordinating Council (EC4) considered this question and decided to adopt the consumption-based method of accounting?

A: Yes, I certainly am. That decision was made against the strongly expressed advice of some of us on the EC4's own expert panel, and in repeated public comment in meetings of the group charged with overseeing public input on the study, and against the strong and united opinion of the entire Rhode Island environmental community.

Moreover, that decision was published in a report in December 2016, well over a year after the Invenergy application was filed here in the EFSB. The EC4 is composed of state agency heads--Governor Raimondo's employees and appointees. The EC4, consisting as it does of gubernatorial employees and appointees, was acutely aware of the political implications for Invenergy when it made this choice.

Q: Is there another reason why you favor production-based accounting for carbon emissions in this proceeding instead of consumption-based accounting?

A: Yes. The most important reason that the production-based method of accounting for carbon emissions is correct and consumption-based accounting, at least as it has been used in the context of the Invenergy plant, is wrong is plain, simple common sense. A simple thought experiment will demonstrate why consumption-based accounting is completely nonsensical in this context.

As I mentioned above, we have a six-state electricity grid in New England, and Rhode Island demand accounts for only 6% of its (New England's) total load. Now imagine that every New England state had statute just like the Resilient Rhode Island Act, so every New England state had laws that called for reducing in-state carbon emissions by 20% by 2020, 45% by 2035, and 80% by 2050 (all from 1990 levels). If you use consumption-based accounting (as OER mistakenly does), then Rhode Island could build a retrograde coal-fired power plant in

downtown Providence without violating the law calling for carbon-emission reductions, because – by this neat little accounting trick – 94% of the plant's emissions would "count" towards emissions of states outside of Rhode Island. Sure, the state's power-sector emissions might increase, but the extent of that increase would be so miniscule as a result of consumption-based accounting that we could still achieve the Resilient Rhode Island Act's goals even while burning dirty, carbon-intensive coal in downtown Providence.

Of course, because of the very same accounting trick, Vermont could build a new coal-fired power plant also – because over 90% of the carbon emissions produced in Vermont would be accounted for out of state.

So, too, New Hampshire. New Hampshire could build a new coal-fired power plant in downtown Concord and, by OER's flawed logic, still claim to be reducing in-state carbon emissions.

Add those three new coal-fired power plants and New England's carbon emissions would surely rise. But each separate state would be able to claim – nonsensically, of course – that it can meet its own emission-reduction goals because its carbon emissions should really be "accounted for" in another state.

More important, consumption-based accounting is dangerous to use in the way that Dr. Cool uses it here. Climate change is an emergency. Using consumption-based accounting provides an excuse to avoid responding to the emergency in the ways that we need to respond. When the Resilient Rhode Island Act was being considered in the legislature, the understanding of the environmental community was that our emissions in 2012 were about 12 percent *above* the

1990 baseline used by the Act, or at least level with 1990 emissions. Thus achieving a 10 percent emissions reduction by 2020 (from the 1990 level) would have required a 22 percent net reduction (from the 2012 level). As I'll show below, it at least meant a 10 percent emissions reduction, since 2010 emissions in Rhode Island were almost exactly the same as 1990 emissions in the state. Instead, the adoption of this shift in accounting to the improper use of "consumption-based" rules, Rhode Islanders learned in the 2016 EC4 report that *we had already easily met* our 2020 target, without lifting a finger. I believe that in adopting this approach our state agencies are not respecting the clear intent of the General Assembly that passed the Act and the Governor who signed it into law (Lincoln Chafee).

Q: Has this controversy between consumption-based accounting and production-based accounting ever been tested in the courts?

A: Yes, it has. The one case that I am aware of is Kaine v. Massachusetts Department of Environmental Protection, 474 Massachusetts 278 (2016). That case was brought under the Massachusetts Global Warming Solutions Act, which calls for legally enforceable carbon-emission reductions. In Kaine, the Massachusetts Department of Environmental Protection argued, exactly as OER does in this case, in favor of consumption-based accounting. Conservation Law Foundation, representing the plaintiffs, argued for production-based accounting. The Supreme Judicial Court of Massachusetts sided with CLF and the plaintiffs.

Kaine is the only case that I am aware of in which the difference between production-based and consumption based accounting for reducing carbon emissions has actually been litigated.

Q: Does the phrase "consumption-based accounting for carbon emissions" have a specific meaning in the academic literature pertaining to climate change?

A: Yes, it does. In fact, I am a principal author of several recently-published, peer-reviewed articles on climate change that address this issue, including one in the leading interdisciplinary journal *Nature Climate Change* ("National emissions pathways and human development: correcting for carbon embodied in trade." Julia Steinberger, J. Timmons Roberts, Glen Peters, and Giovanni Baiocchi. *Nature: Climate Change* 2 (2), 81-85. 2012). As this article and others make clear, "consumption-based accounting" is a term of art in climate-change science. It refers to accounting for *all life-cycle emissions caused by consumption* within a country, state, city or institution. For example, when one looks at the climate consequences of substituting corn-based ethanol for gasoline, one needs to look not merely at automobile tailpipe emissions but also the emissions from the diesel tractors that tilled the fields to grow the corn, the emissions created by fertilizers and pesticide production and transport, and, if appropriate, even the emissions due to the loss of a potential carbon sink as a result of cutting down a forest to create corn fields. The state of Oregon and several other localities around the country are pioneering methods to do legitimate consumption-based accounting. The homepage for Oregon's effort is http://www.oregon.gov/deq/mm/Pages/Consumption-based-GHG.aspx. This is a crucial effort for honest policy going forward.

The Oregon Department of Environmental Quality (DEQ) describes the difference between different methods for accounting for carbon emissions:

> DEQ utilizes two types of greenhouse gas inventories: the in-boundary inventory and the consumption-based inventory. The inventories utilize different accounting methods and each encompasses a unique scope of emissions, with some overlap…The consumption-based emissions inventory supplements the in-boundary inventory by estimating the emissions – both in-state and elsewhere – associated with consumption by Oregon residents, businesses and governments. More than half of these consumption-based emissions occur in other states or nations and are not included in the in-boundary inventory. Together these inventories tell a more complete story of how Oregon contributes to climate change and, by extension, opportunities to reduce emissions.

This quote shows that *true consumption-based emissions accounting can double a state's responsibility for global warming*. There is important variation by state, but this is generally true for the United States as well, since we have shifted strongly to a service economy, and rely on developing countries for energy- and emissions-intensive stages of the production process. Rhode Island's relatively good performance on energy efficiency and emissions of greenhouse gases is in quite a large part due to this same shift in our economy away from manufacturing to services.

The irony then is that I am a strong endorser of utilizing such a consumption-based model to account for carbon emissions, as the term is properly used in the academic literature. Here, although I respect my colleagues in the Office of Energy Resources and want to support their efforts to green the economy of Rhode Island, OER is essentially using an accounting trick to pretend that building a large, new, long-lived fossil-fuel power plant in Rhode Island will actually result in Rhode Island being able to meet its targets under the Resilient Rhode Island Act. That is preposterous, and I think the selective use of consumption-based accounting is

plainly disingenuous and against the intent of our legislature and the previous Governor who signed this Act into law.

Rhode Island's Ability to Meet the Resilient Rhode Island Targets

Q: What is the second issue you want to address?

A: Dr. Cool states: "Importantly, the data demonstrate that Rhode Island is on track to achieve the 2020 emissions reduction target [from the Resilient Rhode Island Act], due to the success of current GHG reduction policies and programs. (Cool Testimony, page 24, lines 4-6.) Dr. Cool's Figure 2, also on page 24, purports to show just how far below 1990 carbon-emission levels we already are today, in 2017, and that the state is on track to meet the 20% reduction level by 2020.

Q: What is wrong with that?

A: It is inaccurate. In fact, it is inaccurate for Rhode Island, and for the United States, and for the entire world.

I will focus on Rhode Island. For our state, Dr. Cool's Figure 2 was copied directly from the bottom of page 9 of the December 2016 "Rhode Island Greenhouse Gas Emissions Reduction Plan" commissioned by the EC4. As I suggested above, and much as it pains me to say this, the work of the EC4, a body of executive branch agency heads, cannot help but sometimes be politically influenced.

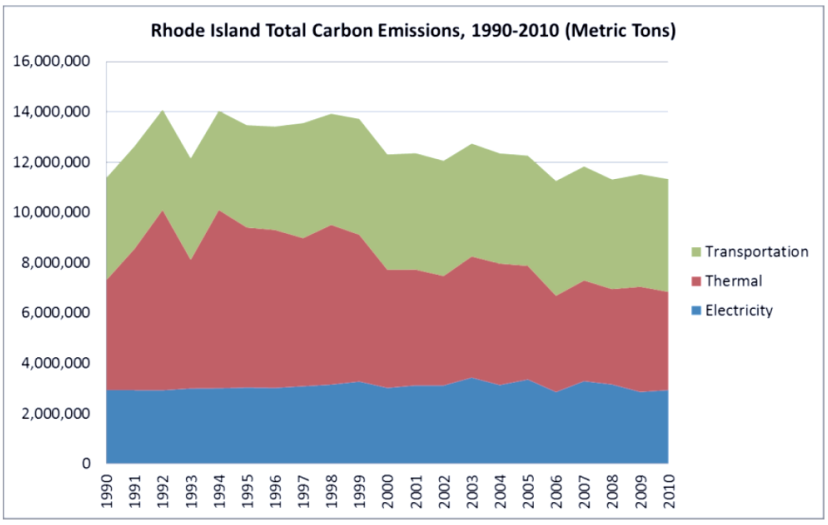
More importantly, Dr. Cool's Figure 2 is directly contradicted by the recently published energy section of the state's own Guide Plan report called *Energy 2035*, released in October 2015. Drafts of that report were the basis for the environmental movement's agreeing with the

short-term targets in the Resilient Rhode Island Act. *Energy 2035* can be found here: http://www.planning.ri.gov/documents/LU/energy/energy15.pdf.

That Rhode Island governmental publication plainly shows that Rhode Island's carbon emissions are the same today as they were in 1990, and are not on track to achieve a 10% reduction over 1990 levels by 2020. For example, on page 20 (pdf page 31) it states that "Economy-wide carbon dioxide emissions rose during the 1990s, primarily driven by thermal-sector energy consumption. Today, however, emissions have returned to approximately 1990 levels, after a steady decline in the past decade." On Page 23 (pdf page 34) the report argues that: "Carbon dioxide emissions from Rhode Island electric consumption can be measured as a reflection of the contributions from in-state generation plus electricity imports, or simply by pro-rating the state's electric consumption by the New England system mix. Carbon dioxide emissions measured using the latter method show that emissions grew slightly during the 1990s, but currently are similar to levels seen 20 years ago." On Page 54 n.34 (pdf page 65): "Rhode Island's economy-wide GHG emissions today are very similar to levels in 1990. In 2010, emissions totaled 11,330,473 tons; 1990 emissions were 11,378,895 tons." On Page 153 n.290 (pdf page 164): "GHG reduction targets are often given relative to a 1990 baseline. Rhode Island's economy-wide GHG emissions today are very similar to levels in 1990. In 2010, emissions totaled 11,330,473 tons; 1990 emissions were 11,378,895 tons." And on page 155 (pdf page 166), *Energy 2035* directly contradicts the claims in the 2016 GHG report and those made by OER in its testimony in support of the Invenergy plant: "Rhode Island has approximately six years left to meet the 2020 target of reducing carbon emissions by 10 percent below 1990 levels,

as reflected in the NEG/ECP commitment, the 2002 Greenhouse Gas Action Plan, and the 2014 Resilient Rhode Island Act. As of 2013, Rhode Island is at 1990 levels only, according to the Energy 2035 modeling. This means that a reduction of nearly 2 percent per year is required to meet the 2020 goal."

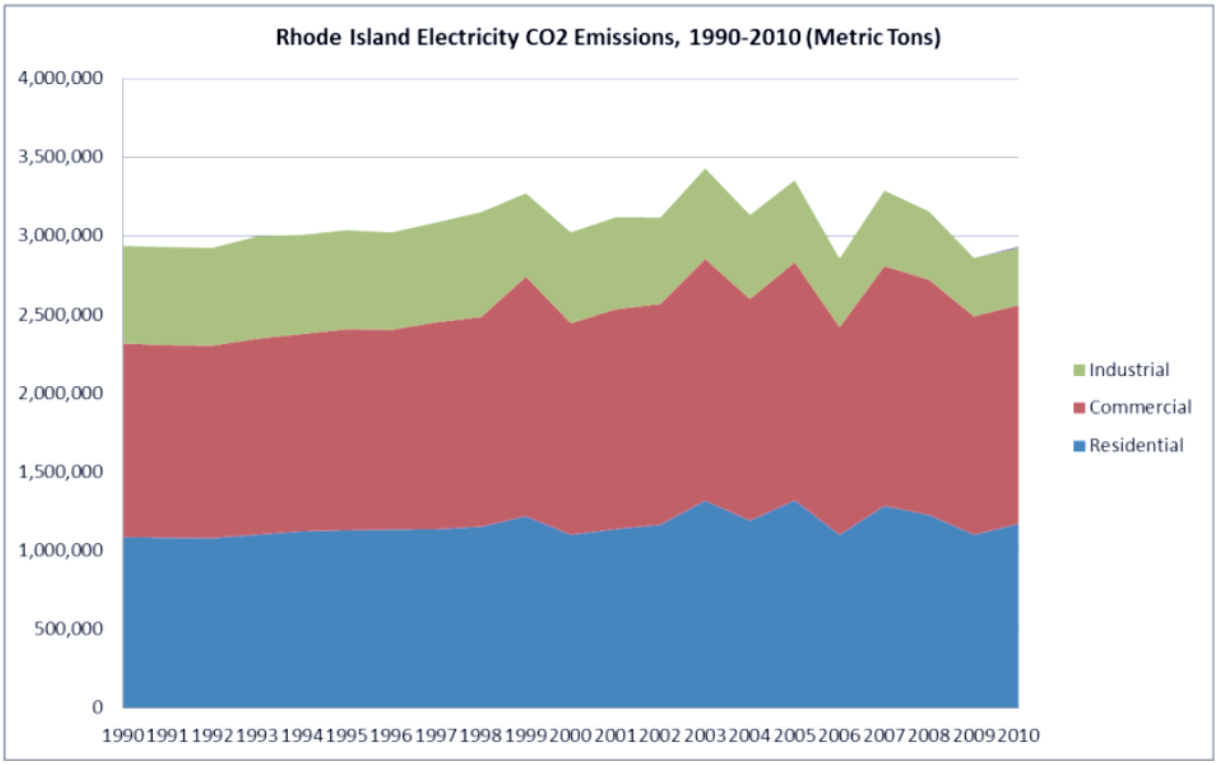
Two figures from *Energy 2035* confirm these facts about Rhode Island's carbon emissions using the state's own accounting methods. The first is total emissions in our state: http://www.energy.ri.gov/policies-programs/ri-energy-laws/state-energy-plan.php



Source: EIA SEDS, EIA-923

Figure 9. Rhode Island whole energy system consumption, expenditure, and carbon dioxide emissions profile.

The second is just emissions from electricity use over the same period, and comes from page 24 of *Energy 2035*:



And please remember that the Resilient Rhode Island Act set greenhouse gas emissions reduction targets for the entire state economy, not just for the electricity sector and not just CO2 emissions. The point here is that the EC4's 2016 GHG Plan disingenuously switched accounting methods, making it appear the state has nothing further to do to reach its 2020 target. And by "switched accounting methods," I mean *switched accounting methods* from the method that had previously been used by the State of Rhode Island. This is an outlandish switch.

Q: To what extent is it important or meaningful if Rhode Island does not achieve its 2020 carbon-emission-reduction targets for 2020 as set forth in the Resilient Rhode Island Act?

A: Failing to meet those targets would be a very, very important failure for our state, potentially setting off a chain reaction of failure to do what we must, and what we promised we would do. I

explained one important reason why this is true in my earlier testimony: Even if we start immediately, meeting the carbon-emission-reduction goals in the Resilient Rhode Island Act will be very challenging; and the longer we wait to make a serious start, the harder it will be. (Direct Testimony, page 13, lines 15-21.) In addition, I stand by what I say above: our only existing policy on greenhouse gas emissions must not be undermined by an accounting trick and the failure of courage by our state agencies.

But there is an additional very important reason as well. The recent science shows that the carbon-emission-reduction *targets set forth in the Resilient Rhode Island Act are far from being stringent enough* to prevent catastrophic climate change.

The Resilient Rhode Island Act targets were based on those agreed by the New England Governors and Eastern Canadian Premiers (NEG-ECP) much earlier, in a resolution adopted on August 28, 2001, which called for reductions of greenhouse gases to 1990 levels by 2010, at least 10% below 1990 levels by 2020, 35-45% below 1990 levels by 2030, and a 75-85% reduction of 2001 levels by 2050 (http://www.cap-cpma.ca/data/Signed%2039-1En.pdf). Those targets were in turn based on science from 1997-2000. In the intervening two decades, the scientific community has generated hundreds of studies about the likely trajectories of warming with the volume of carbon emissions we are putting into the atmosphere, and thousands of articles on the likely impacts on our ecosystems and the agricultural and other systems the sustain our civilization. These are summarized most broadly in the assessment reports compiled by the Intergovernmental Panel on Climate Change (the IPCC), which show that impacts for regions like Sub-Saharan Africa and small island developing states will be devastating if we let

temperatures rise 1.5 degrees Celsius (or more) above those in pre-industrial times, let alone the 2 degrees Celsius that is the common "guard rail" in summaries of the science for policy-makers. The 2010-2013 "Structured Expert Dialogue" under the United Nations Framework Convention on Climate Change pointed out that a temperature rise of 2 degrees Celsius would be dangerous, and that limiting temperature rise to no more than 1.5 degrees Celsius should be strived for, and that language was enshrined in the 2015 Paris Agreement, signed by nearly every country on Earth (except Syria and Nicaragua), including the United States (for details on that process, see Petra Tschakert, "1.5°C or 2°C: a conduit's view from the science-policy interface at COP20 in Lima, Peru" Climate Change Responses (2015) 2:3 available at https://climatechangeresponses.biomedcentral.com/track/pdf/10.1186/s40665-015-0010-z?site=climatechangeresponses.biomedcentral.com).

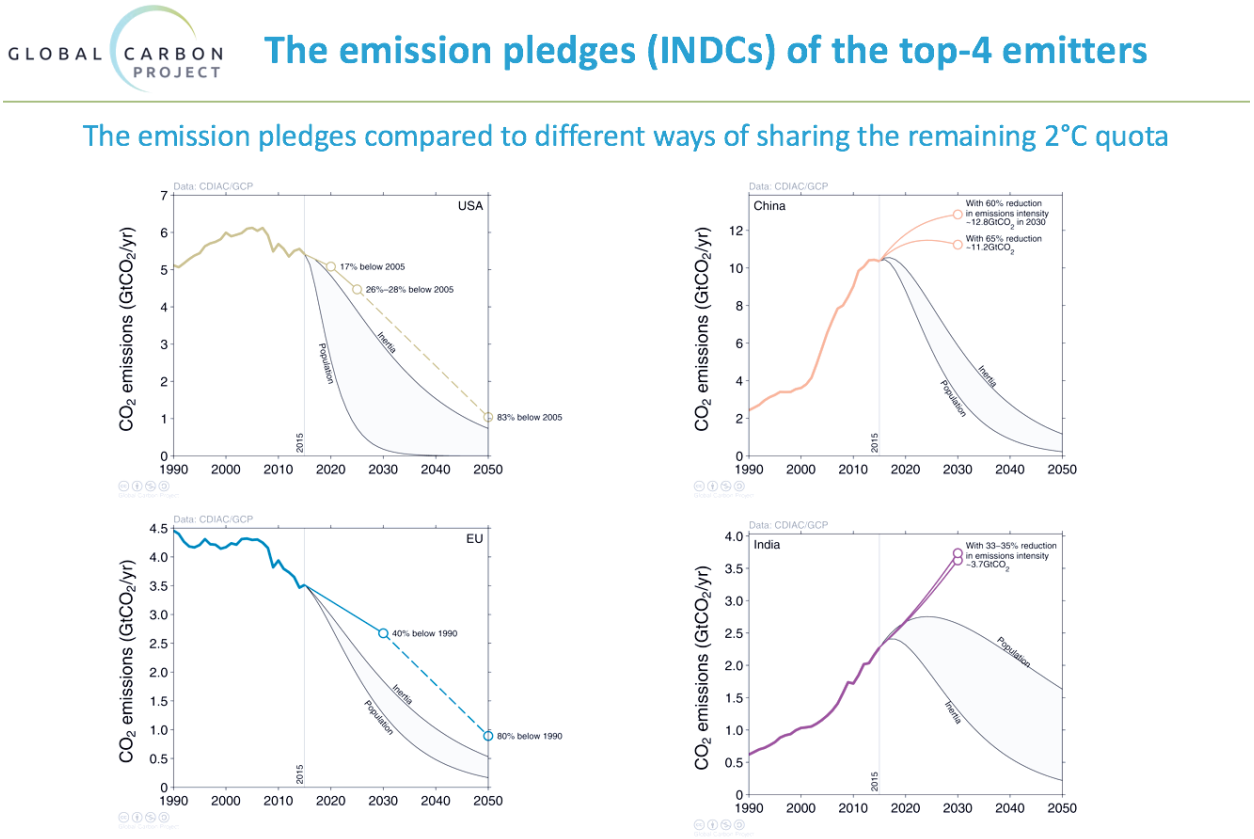
In my judgment of this wide literature, the most useful approach to understand the trajectory of climate change and avoid its worst impacts is that of the "carbon budget," which takes the total amount that can be emitted to keep temperature rise to under 2 or 1.5 degrees Celsius. The most widely stated standard for the total global carbon budget comes from a study published in *Nature* by Malte Meinchausen et al. in 2009 (cited over 1,800 times since publication), which calculated that "Limiting cumulative CO_2 emissions over 2000–50 to 1,000 Gt CO_2 yields a 25% probability of warming exceeding 2 °C—and a limit of 1,440 Gt CO_2 yields a 50% probability—given a representative estimate of the distribution of climate system properties." (https://www.nature.com/nature/journal/v458/n7242/full/nature08017.html) Nearly no one would get on an airplane with a fifty-fifty chance of crashing, and to live with just

a fifty-fifty chance of avoiding "dangerous climate change" associated with going beyond 2 degrees should be unacceptable to all of us, and most experts have utilized the lower number, saying we have a total global budget of 1000 gigatons. (Arguably it should be far lower.) The Global Carbon Budget project has studied and published clear information about the implications of the disappearing chance of staying in the safe range of emissions, and I would be honored to explain the implications of this crucial work if the Board would like (see http://www.globalcarbonproject.org/index.htm).

There is a rich literature discussing how to apportion that carbon budget among nations, and what principles should be utilized to do so. Dr. Glen Peters of the Norwegian climate research center CICERO has been a leader in this area. Dr. Peters is a core member of the Global Carbon Project Team, and a 2016 article by Dr. Peters reviews possible ways to calculate global carbon budgets in the top journal in the field (Peters, Glen P. "The 'best available science' to inform 1.5 [deg] C policy choices." *Nature Climate Change* 6.7 (2016): 646-649).

In a recent article I co-authored in the respected journal *Global Environmental Change*, my co-authors and I argued that the key to ambitious and sustainable climate policy was agreeing and acting upon strong principles of equity, so that countries believe they have been fairly treated in the process and the decision reached. That is, like individuals, countries are willing to do what they consider to be their "fair share," if other players are also doing their fair share. One useful analysis was conducted by Dr. Peters, cited above. In that analysis, Dr. Peters determines that if we are to stay to our "fair share," without resorting to unproven and expensive "negative emissions technologies," the United States and other wealthy nations would have to reach net

zero net emissions by about 2035. In my professional opinion, and as a father who would like to leave a livable planet to my two children, I believe this is the only responsible basis for our action as a nation, as a state, and as individuals. It is important to recognize that this means not just an earlier date but a higher rate of emissions reductions. The reductions needed for the top emitters, including the U.S., are shown in the figure below, and equity-based approaches are shown with the "population" curve.



Q: You say the reductions needed for top-emitting countries are shown in the figure above. Would you please further explain that figure?

A: This slide from the 2016 Global Carbon Budget report, a major output of the Global Carbon Budget Project mentioned above. It shows the respective reductions in emissions needed by key nations from now until 2050. The "Inertia" pathways shown in the figures (the higher curved lines of emissions reductions through 2050) do not include equity considerations in calculating required trajectories we must take; the "Population" line (the lower curve for the United States) shows that giving each person on Earth a right to an equal share of the carbon budget requires much faster reductions in the U.S. and the EU, and even in China. (India is the opposite case, since its emissions are so low compared to its population. Note especially that in the case of the United States the "83 percent below 2005" level in 2050 (the straight, dashed, top line in the top left figure) is very far from what's required under either approach, but especially the "population" curve, which goes to nearly zero by the late 2020s. I include this figure to show just how out of date the targets in the Resilient Rhode Island Act are; how they do not adequately address the problem.

I have two more bases for making the conclusion that the Resilient Rhode Island Act is not adequate to the problem we face. In 2014, Price Waterhouse Cooper conducted an analysis of the rate of emissions reductions that would be needed to keep the world below 2 degrees Celsius of warming (http://www.pwc.co.uk/assets/pdf/low-carbon-economy-index-2014.pdf) . Their calculation was that globally we would need 6 percent reductions year upon year upon year. Note that this is to stay under 2 degrees of warming, not the 1.5 degrees Celsius that was agreed as an aspirational target in Paris in 2015.

Most recently, Christian Holz and colleagues published a paper that tested the impact of utilizing either looser or more stringent principles of equity in deciding what would be the "fair share" of the global carbon budget that each country should be able to spend, and how much time they would have left at current levels of emissions before they would have surpassed their budget. By stringent equity principles, they mean that countries who created the mess of climate change and who have the resources to clean it up should have to do so. For example, carbon dioxide molecules stay in the atmosphere for 100 years on average, and warming began in earnest about 1850. Therefore our national "responsibility" could most stringently be applied to all our emissions since that date. Looser equity criteria would use 1950, arbitrarily, or 1990, the baseline date for the Kyoto Protocol targets and most efforts such as Rhode Island's targets. These choices of baseline years make a difference on how much of our national carbon budget we have already spent, and as a result, how much we have left to spend and thus how quickly we have to stop spending any more.

Besides responsibility, the other principle used in nearly all international agreements on climate is "capability," which means that since wealthier countries have more resources to support clean-up efforts, and because they already have in place electrical energy and cooking, heating and cooling energy (which hundreds of millions of poor people around the world still lack), they have greater ability to act on climate change with sharper reductions. These two principles (responsibility for the harm and capability of ameliorating the harm) have been the bedrock of international agreements of many sorts for decades.

The Holz et al. study (cited above) calculates that with strong equity principles, in order to keep temperature change to under 1.5º C, we need to achieve zero net emissions in the United States by 2021. With weaker equity principles, we would need to achieve zero emissions in the United States by 2029. This is something of a shocker, and may appear unrealistic. Some authors argue that a "wartime mobilization" toward renewable energy could achieve these goals: a look at the complete transformation of the U.S. economy during just four years of World War II might support that point. Worrying about pragmatic politics, many authors assume that while doing our best to rapidly decarbonize here, the U.S. would have to "buy pollution permits" from developing countries, or in other ways support their rapidly reducing emissions (Holz, Christian, Sivan Kartha, and Tom Athanasiou. "Fairly sharing 1.5: national fair shares of a 1.5° C-compliant global mitigation effort." *International Environmental Agreements: Politics, Law and Economics*: 1-18.). Regardless, we have to get off fossil fuels in the next 15 years if we want a livable planet.

Q: In what way is this discussion relevant to the permitting issue that is now before the EFSB?

A: This discussion of climate change and the need to rapidly decrease carbon emissions should be the central, determining factor in the EFSB's decision, and should lead the EFSB to deny a permit to Invenergy for its proposed fossil-fuel power plant. Not only is Rhode Island not on track to meet its modest 2020 short-term carbon-reduction target under the Resilient Rhode Island Act, but that statute is itself outdated in light of recent climate science that shows we need to get our emissions to net zero in the next 10-18 years.

The EFSB must consider whether the Invenergy plant would cause unacceptable harm to the environment. Climate change is fundamentally an environmental calamity, and permitting a new major source of greenhouse gas emissions such as the Invenergy plant against the backdrop I have just described would cause unacceptable harm to the environment.

Additionally, Section 8 of the Resilient Rhode Island Act expressly empowers this EFSB to account for climate change and Rhode Island's public policy to reduce carbon emissions. Section 8 states, in full:

> Consideration of the impacts of climate change shall be deemed to be within the powers and duties of all state departments. agencies, commissions, councils and instrumentalities, including quasi-public agencies, and each shall be deemed to have and to exercise among its purposes in the exercise of its existing authority, the purposes set forth in this chapter pertaining to climate change mitigation, adaption and resilience in so far as climate change affects the mission, duties, responsibilities, projects or programs of the entity.

If given a permit by the EFSB, Invenergy can and will contribute to the climate change disaster, and EFSB is empowered and required by this section to act to prevent that terrible result by denying a permit to Invenergy.

In this regard, Dr. Cool's discussion on page 6 of her testimony pertaining to Ryan Hardy's submission is especially important. On page 6, line 19, Dr. Cool refers to Invenergy's original application, claiming that if Invenergy were built, there could be an average annual reduction of 1.01% in CO2 emissions. On page 6, line 9, Dr. Cool refers to Ryan Hardy's updated analysis, suggesting a reduction of 0.95% in CO2 emissions.

I discuss above how Invenergy's and OER's figures are wrong because they used consumption-based accounting. However, even if Invenergy's and OER's figures were correct –

which they are not – that would be far, far smaller carbon reductions than what is required by current science to keep our planet livable. More importantly, the timeframe in which Invenergy would be reducing state emissions will be very short, before it will be raising our state emissions by competing primarily against new renewable resources and newly developed storage for renewable generation. Any way you do your accounting, a new fossil fuel power plant means a new source of greenhouse gas emissions that the planet cannot afford.

Other Mitigation Tools

Q: On page 26, lines 6-9, Dr. Cool states: "Regardless of the total capacity of the gas-fired fleet in Rhode Island or across the region, New England states have legislative and policy tools that promote the development of renewable resources to achieve state's GHG reduction and renewable energy goals." What is your response?

A: While Dr. Cool is correct that legislative and policy tools such as Renewable Portfolio Standards and other economic incentives for building new renewable generation capacity "promote the development of renewable resources" (Dr. Cool, page 26, line 8), those *existing laws and tools are nowhere near extensive or stringent enough to achieve the carbon-reduction goals required by currently existing science.*

To sum it up, I would say three specific things about Dr. Cool's statement just quoted.

First, as I indicated in my previously filed testimony, building the Invenergy plant in Rhode Island will make it impossible for Rhode Island to meet its short-, medium-, or long-term carbon-emission-reduction targets under the Resilient Rhode Island Act. (Direct Testimony, page 14, lines 1-18; page 22, lines 4-6.)

Second, even the goals set forth in the Resilient Rhode Island Act fall far short of what the current science tells us is needed to avert a climate disaster. And Dr. Cool is mistaken that the current "legislative and policy tools that promote the development of renewable resources" are sufficient to get us to our goals. It is also crucial that we stop now investing in new fossil-fuel infrastructure like Invenergy's proposed natural gas plant in Burrillville.

Third, that is why I believe that Dr. Cool is just wrong when she asserts (page 26, lines 12-14) that the development and operation of Invenergy would not "hinder Rhode Island's ability to implement the proposed mitigation options." This is not simply a technical issue, but also an economic and political one, as I will discuss in more detail later in this testimony.

Stranded Costs

Q: Dr. Roberts, on page 24 line 9 through page 25, line 5, Dr. Cool disagrees with your prior statement that "The plant will have to be used, or there will be huge stranded costs for the firm and the state." Dr. Cool rejects your statement by saying, at page 25, lines 3-5: "However, the risk of financial losses is borne entirely by Invenergy and its investors, and not by electric customers in Rhode Island or elsewhere in New England." What is your response?

A: Of course, I know that, in the narrowest and most literal sense, Dr. Cool is correct that Invenergy and its investors and lenders bear the most immediate risk of loss if the Invenergy plant is unremunerative. But I am a sociologist by training who studies political economy, and I was discussing the broader context. If Invenergy is permitted and built, there is going to be

enormous political pressure on all regulators (in Rhode Island and the rest of New England) to amortize and fully utilize that investment.

In the current American democratic system, private influence over regulatory decision-making and routine practice comes in several crucial forms. First, companies directly lobby regulatory agencies. They do this with letters, testimony, phone calls, office visits, and these efforts are often combined with targeted advertising to "influence the influencers." Just one body set up to make sure policy and agency practice support the fossil fuel industry is the American Petroleum Institute, whose 2015 tax forms show they had a budget of $241 million dollars, and some of that is spent lobbying the Rhode Island legislature and administration. Another crucial way that private industries influence policy is through financing political campaigns, with fundraisers for candidates and the establishment of Political Action Committees and "Super PACs." Billions of dollars have been spent by the fossil fuel industry to fight back against regulations designed to protect the Earth's climate, which regulations might cause the companies to not be able to drill, dig, ship, and burn their products. Another key means of influence has been their funding of think tanks that "sow uncertainty" about the reality of climate change and the viability of regulatory and incentive approaches being proposed. There is also the "revolving door," wherein fossil fuel using companies hire the very agency personnel and politicians that they were being regulated by. These lobbyists utilize their contacts from their previous positions inside administrative agencies and legislatures. This could be dismissed if it was hypothetical, and I would be happier if it were, but it very real and applies to the case before you, in several fundamental ways.

I am happy to provide references for a series of peer-reviewed studies documenting the efforts of the fossil fuel industries and utilities in opposing rapid action on climate change in the United States.

The Invenergy plant is expected to cost about a billion dollars. A billion dollars is a lot of money. If that money is spent, and the Invenergy plant is built, there will be tremendous public pressure and political pressure to use the plant for decades. Some of that will come in the form of influence-peddling that I just described. Some will come in 2027 and 2037 and 2047 and every year in between from workers and communities now dependent upon jobs and tax revenues from the aging Invenergy plant. We see the same thing occurring now with the two remaining old nuclear plants in New England: Seabrook, in New Hampshire; and Millstone, in Connecticut. Spending huge amounts of capital on long-lived infrastructure creates a powerful dynamic to use the infrastructure, lest the investment be "stranded." "Path dependency" is a well-known phenomenon where early decisions constrain and determine later ones.

Direct Competition With Renewables

Q: On page 25, lines 6 through the top of page 26, Dr. Cool asserts that you are wrong that "Having a surplus of natural gas-fired electricity here in the state will decrease the incentive to make competing long-term investments that will be needed for new renewables." Specifically, Dr. Cool asserts, "Gas-fired generation plants and renewable resources are not directly competing investments." What is your response?

A: As natural gas prices have come down in recent years, more and more electricity generation in New England is gas-fired. In 2000, only 15% of electricity generation in New England was

gas-fired; today that figure is 49%. In part, this is a good thing, because gas has replaced what appear to be higher-emitting resources like coal and fuel oil. But there is an important down side here, too. With the increase of fracking to obtain gas (and the concomitant rise of wellhead methane emissions and leaks in transport and delivery, documented by Cornell, Harvard and MIT universities), cheap gas has become the dominant fuel in New England for generating electricity. And that is therefore an important factor that slows down the rate at which new renewables can penetrate the New England market: competition with cheap natural gas.

Concluding Remarks

Q: Do you have anything you want to add?

A: Yes. I'd like to say that I am not merely a scholar who has spent 25 years researching climate change and how we, as a species, are going to address climate change. I am also a human being and parent. We are already seeing the impacts of climate change in patterns predicted by scientists years ago, and those impacts are coming sooner than expected. Global concentrations of carbon dioxide have quickly surpassed 400 parts per million, when the safe level was was widely believed by scientists to be 350 ppm. Actual atmospheric concentrations and emissions are each year at the high end of the scenarios laid out by previous modelers and IPCC reports. The ocean has been absorbing massive amounts of carbon we've emitted, but it appears that "sink" may be filling up and the rate of absorption could drop quickly. The impacts are worsening, and could potentially destabilize our civilization. We face a dystopian future where the rich can pay to secure a safe place with safe food and water, but the poor are relegated to the places outside the levees, outside the gated communities, outside the nations protected by

border walls from economic, political and climate change migrants. And this future is not purely hypothetical – there are already people who have been forced to leave not only their homes but their home nations as a result of climate impacts occurring now, people who have nowhere to go. In short, if we do not quickly stop nearly all burning of fossil fuels, we face a grim, fortress world. The rich will probably survive, but the psychic toll up and down the stratification system will be devastating.

This dystopia is not the world I want to pass on to my children. At ages 14 and 22, they will be 47 and 55 in 2050, the year when impacts are projected to include devastating sea level rise and increasingly intense heat waves, droughts and floods in Rhode Island. That's about my age. My children love Rhode Island as much as I do, and I want them to be able to live and prosper here. We stand at a crossroads, and we as the generation in charge for a few more years need to act with courage and the foresight of protecting the next generation. And the one coming after that. Your considerations need to include them, and those in the shanties built on stilts at sea level in the world's slums and small islands as well, if we are going to solve this most existential crisis.

I would ask you to take to heart the recent statement by our own state Department of Health, which in its section on climate change in its Supplemental Advisory Opinion of August 28, 2017 on the Invenergy facility argued that building the facility would be incompatible with protecting the health and safety of Rhode Islanders, and with the current public policy of our state, the Resilient Rhode Island Act. That statement was the best summary of what's at stake

with this issue that I have ever read by a government agency, at any level. I will end my testimony with an excerpt of the DOH Supplemental Advisory Opinion:

> RIDOH continues to have grave concerns about climate change as a current and future health threat in Rhode Island and other locations and notes that vulnerable populations are already facing risks due to warming temperatures, impaired air quality, increased length and severity of pollen seasons, increasing severity of storms, flooding, drought, and the rising of sea levels. Health risks in Rhode Island associated with climate change include threats to housing and safety; heat-related morbidity and mortality; the introduction of infectious diseases and infectious disease vectors formerly confined to more southern latitudes; increase in symptoms of allergy, asthma and other respiratory disease, and threats to the food and fresh water supply. As with many public health risks, people with limited means, people with compromised health and other susceptible populations, including the elderly, children and outside workers, are particularly vulnerable to those threats.
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> The December 2016 EC4's "Rhode Island Greenhouse Gas Emissions Reduction Plan" concludes that "(a)n 80% GHG reduction by 2050 [the long-term target specified in the 2014 Resilient Rhode Island Act] would likely require a near-zero carbon grid coupled with significant electrification of residential/commercial space heating and on-road vehicles." In the De-Commissioning section of the EFSB CREC application, the applicant states that "(t)he Facility life expectancy is greater than 20 years and if market conditions are favorable the units could continue to operate for 30 or perhaps 40 years." If Rhode Island is to meet the commitments in the Resilient Rhode Island Act, it is essential that the State begin the move from fossil fuel energy generation as soon as possible.
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> RIDOH is also concerned that, while the burning of natural gas causes far less exposure to harmful air pollutant emissions than the burning of coal for those living near power plants, hydraulic fracking, the source of the natural gas for the proposed facility, has significant negative impacts on neighbors of fracking facilities. Just as the State's energy supply cannot be considered in a vacuum, RIDOH strongly believes that it is important to evaluate the impacts of energy choices and plans on the larger community, including those living near fuel production facilities, fuel pipelines and power plants, as well as all of those affected by climate change, including vulnerable populations.
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> In view of these concerns, RIDOH supports the State's efforts to develop alternative, renewable energy sources and urges the State to move away from fossil fuel combustion as quickly as possible. Climate change is a local and global challenge, but it is also an opportunity for positive change. It provides us a challenge to change the way we have done things in the past, to ultimately live healthier and happier lives. It is imperative that action be taken individually and

collectively to mitigate climate change--- for the health and well-being of our communities and of the world community.

I deeply appreciate your time and attention, the hard choice you face, and your courage.