

Testimony before RI Office of Energy Resources Public  
Workshop Regarding the Climate Change Impacts of the  
proposed Burrillville Power Plant

Peter Nightingale  
nigh@pobox.com

July 24, 2016

From Mary Christina Wood, *Nature's Trust* (pp. 74-75):

While the public may assume agencies implement regulations in a formulaic, objective fashion requiring very little judgment, in fact agency behavior can be highly politicized and even corrupt. A host of scientific and technical presumptions flow into permit and other approval decisions, and the agencies commonly invoke their vast discretion to choose assumptions that ease the burden on politically powerful permit applicants.

Ignoring all the other problems of fracking and focusing on global warming only, the trouble with the fracked-gas policy is that methane is a much more powerful greenhouse gas than carbon dioxide.

Methane decays in the atmosphere in about a decade. To estimate the impact of a gas policy on global warming, one converts the gas to a carbon dioxide equivalent with the same effect on global warming. The conversion factor is called the global warming potential (GWP).

For making small scale, real-life decisions one smears out the effect over a time horizon of 20 or a 100 years. For the 20 year horizon the rounded GWP conversion factor is roughly 90 and for a 100 years it is 30. These are the numbers from the latest IPCC report. (See Table 8.7 second line from the top on page 71—

[https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5\\_Chapter08\\_FINAL.pdf](https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf)

EPA uses the 100 year horizon and a conversion factor of 20, which is 20 years out of date. (See <https://www.law.cornell.edu/cfr/text/40/part-98/subpart-A/appendix-TableA-1>

In the long run (200 or 300 years) methane is irrelevant. The problem is that it's likely that within the couple of decades we might reach tipping points at which the climate will undergo irreversible changes. It seems that we are already beyond some of these:

1. Collapse of the West Antarctic Ice Sheet is under way—  
<https://www.sciencedaily.com/releases/2014/05/140515090934.htm>
2. There are indications that the AMOC (Atlantic Meridional Overturning Circulation) is collapsing—  
<http://www.climatecentral.org/news/climate-change-jamming-critical-heat-conveyor-18810>  
If that happens, the weather patterns in the North Atlantic will change dramatically.
3. Extensive regions of the the Arctic, the “weather kitchen of the globe,” have warmed up by more than 3°C (5.4°F)—[http://www.arctic.noaa.gov/reportcard/exec\\_summary.htm](http://www.arctic.noaa.gov/reportcard/exec_summary.htm)

In other words, use of the 100 year horizon is irresponsible; the decadal time scale is what we should be using.

When one uses the decadal time scale:

The conclusion stands that both shale gas and conventional natural gas have a larger GHG [greenhouse gas footprint] than do coal or oil, for any possible use of natural gas and particularly for the primary uses of residential and commercial heating.

This is from the abstract of this paper by Robert Howarth—<http://tinyurl.com/meth-bridge>

By the time the benefits of the *Clean Power Plan* show up, 50-80 years from now, as the plots on the next pages show, we'll all be dead and the climate will be ruined.

The quote from *Nature's Trust* at the top of this testimony fits perfectly with the OER presentation. The bar graph presented on page 21 of this document <http://tinyurl.com/gmgushz> is a demonstration of how this works. The disclaimer at the bottom

of the graph reads: “Note: Does *not* consider full life-cycle GHG emissions.” This makes the information presented totally irrelevant for global warming. The situation is even worse than the wrong estimates of the global warming potential used by the EPA. What OER creates here here Kahneman refers to as the *illusion of validity*.

Not surprisingly, this is exactly the method Invenergy uses to pretend that its proposed plant reduces greenhouse gas emissions as it does on page 15 of this presentation—

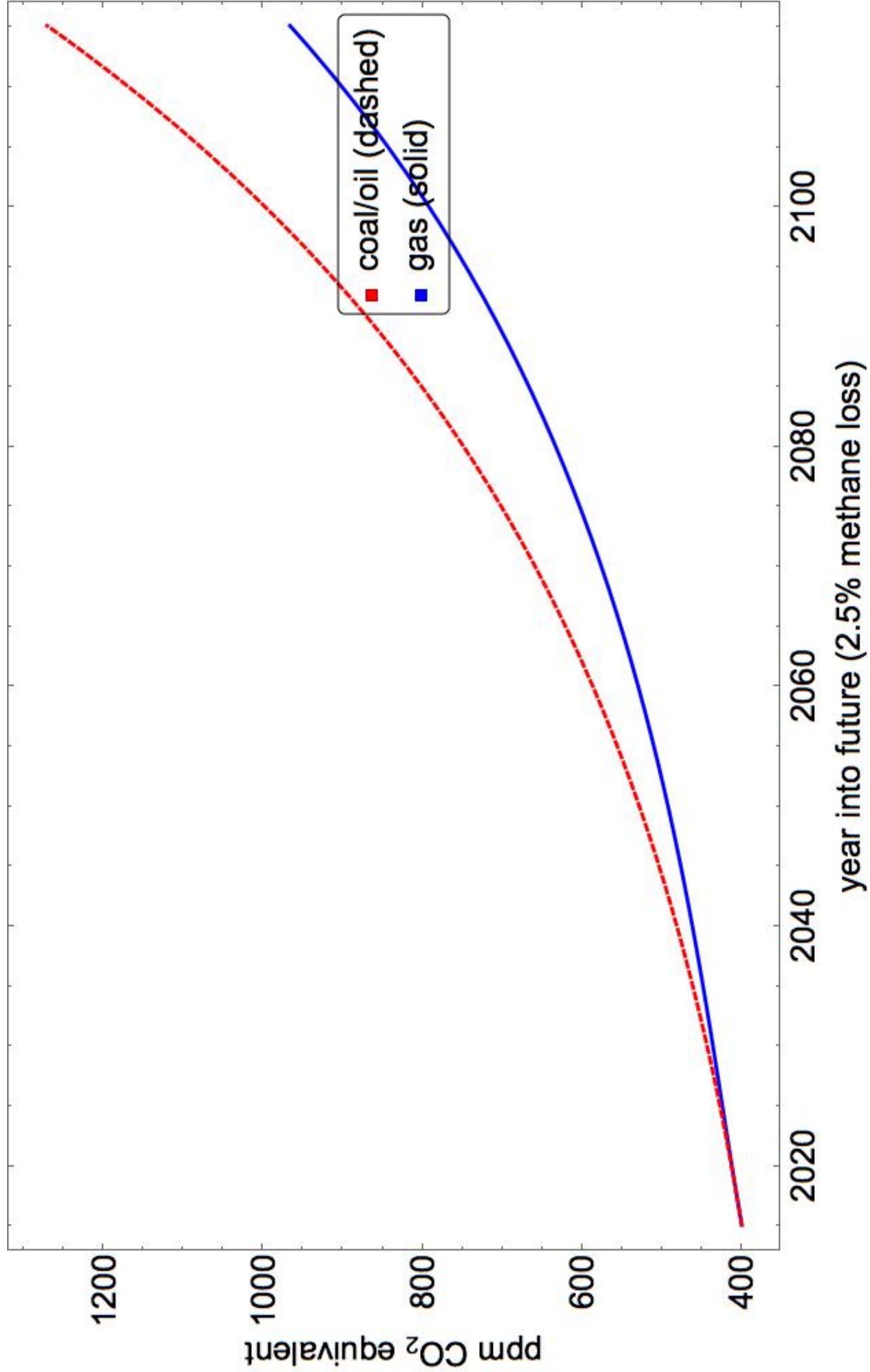
<http://tinyurl.com/h32xjy9>

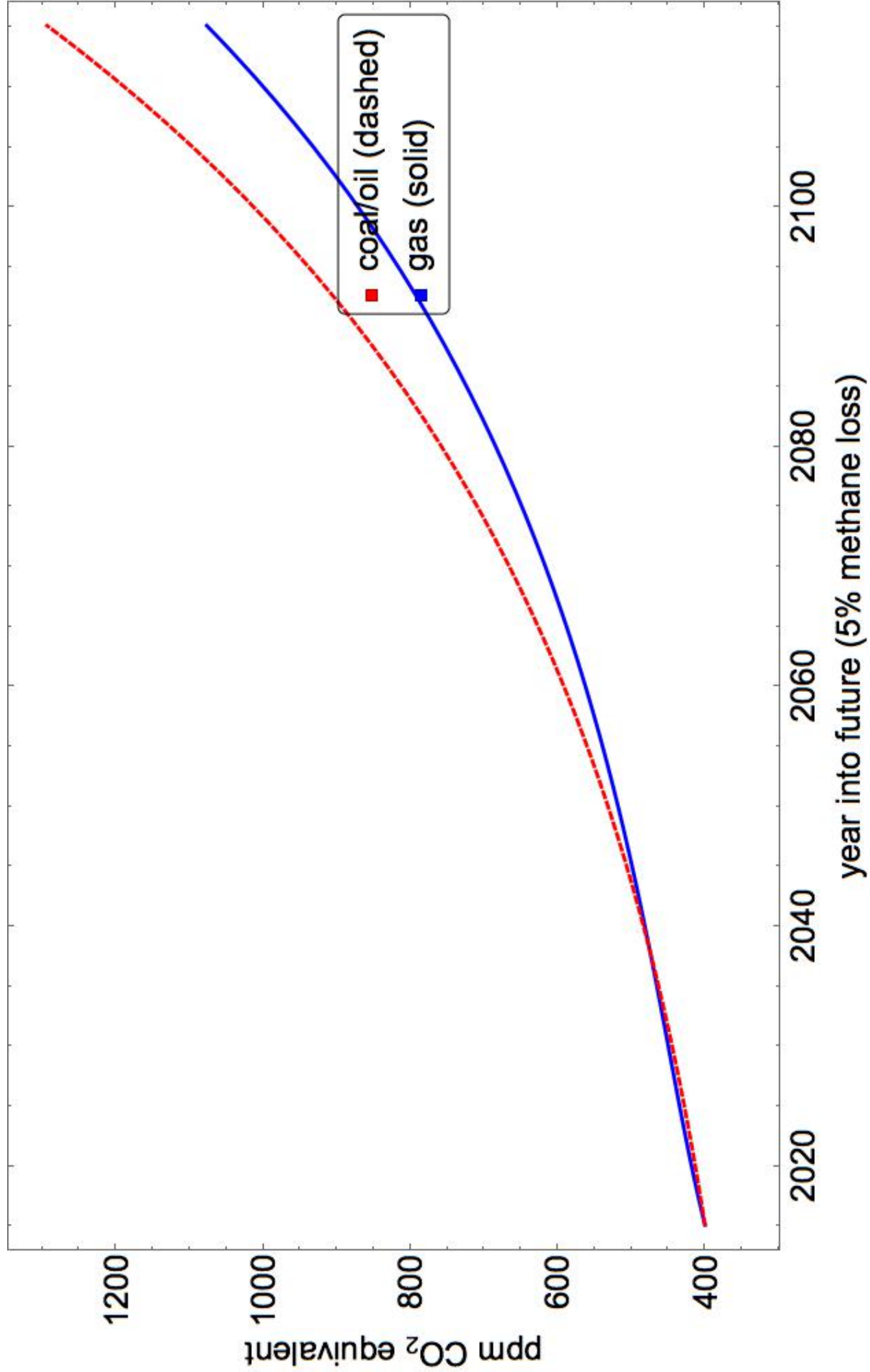
The only difference is that Invenergy fails to include a disclaimer.

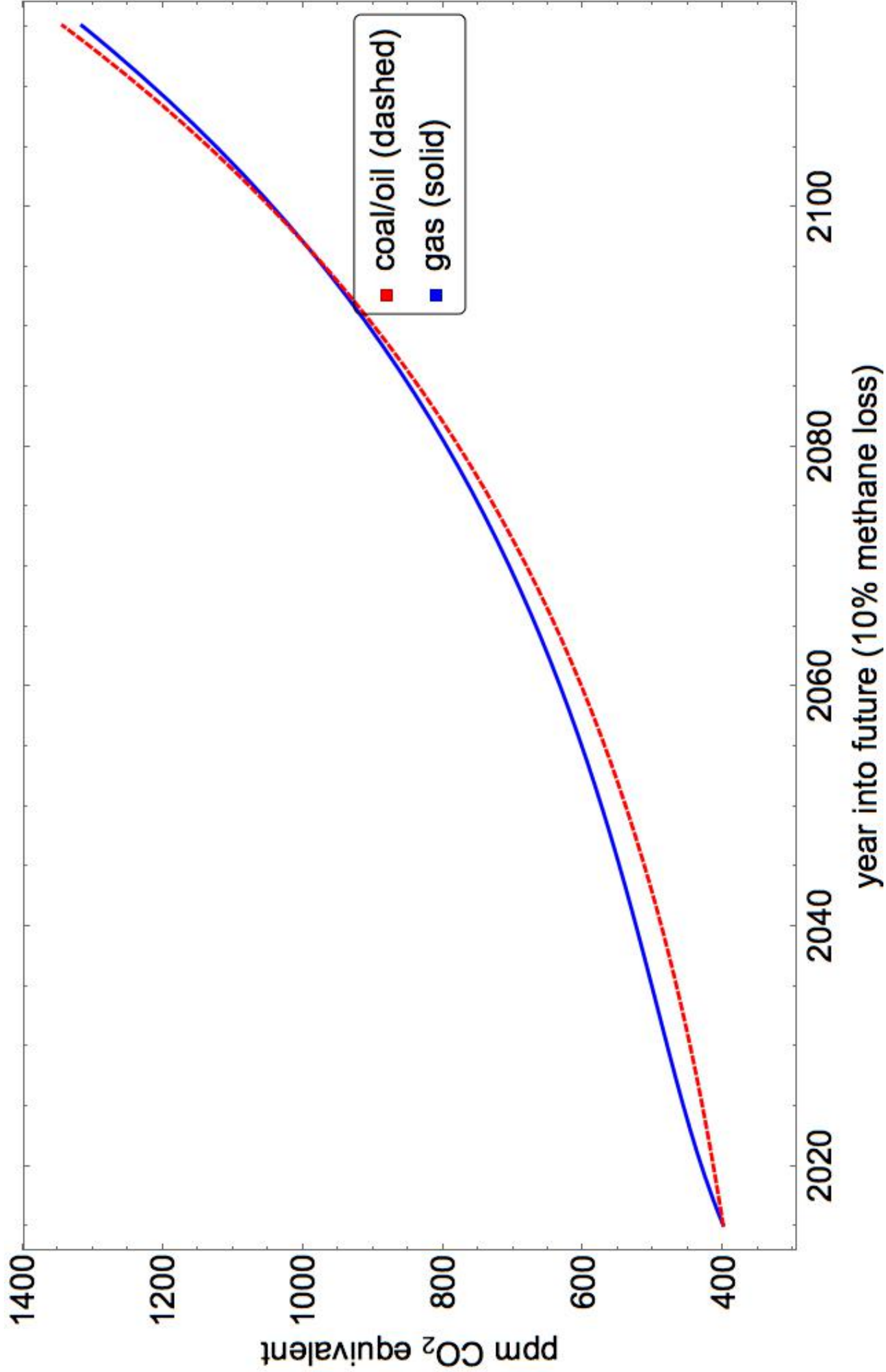
The next three pages contain some plots illustrating the impact of escaping methane. We look at the hypothetical, “ideal” implementation of the *Clean Power Plan*: the effect of switching power generation from only coal and oil completely to natural gas today assuming that energy consumption keeps growing according the pattern it has followed over the last 250 year, increasing by 2.2% per year.

There are three plots corresponding to 2.5%, 5% and 10% methane escaping unburned. Howarth’s latest estimate is that 12% is escapes—

[https://www.dovepress.com/articles.php?article\\_id=24085](https://www.dovepress.com/articles.php?article_id=24085)







See in particular Question 13 of the following document. It raises a fundamental question about the studies that are done to model the impact of the proposed power plan. Once again, we have a process that creates merely the illusion of validity. We are still waiting for answers to the questions raised in this letter.

THE  
UNIVERSITY  
OF RHODE ISLAND

COLLEGE OF  
ARTS AND SCIENCES

DEPARTMENT OF PHYSICS

East Hall, 2 Lippitt Road, Kingston, RI 02881 USA    p: 401.874.2633    f: 401.874.2380    phys.uri.edu

March 20, 2016

Janet Coit, Director Rhode Island Department of Environmental Management  
235 Promenade Street  
Providence, RI 02908  
Nicole Alexander-Scott, Director Department of Health  
3 Capitol Hill  
Providence, RI 02908

Dear Directors Coit and Alexander-Scott:

I hereby request that you, pursuant to your obligations under Title 42, Chapter 42-17.1 Section 42-17.1 (14)(i)-(iii) and Title 23, Chapter 23-1, Section 23-1-1, provide answers to the following questions raised in this writing. Please let me know within the next couple of days whether you will honor this request and, if so, by when.<sup>1</sup>

### Introduction & background

This writing is in part a follow up of a meeting that Robert Malin and I, members of Fossil Free RI, had with Barbara Morin, Julia Gold, and Julian Drix had a couple of weeks ago at the Department of Health. We promised to follow up with more information; please find that attached.

Let me start with a short summary of some parts of that exchange.

First of all, there is a Compendium about the health effects of fracking, compressors stations etc. The compendium (<http://concernedhealthny.org/compendium>) was published by the Concerned Health Professionals of NY and was last updated in October of 2015. For your convenience, I bookmarked and highlighted several sections that are of particular interest for the various natural gas projects in Burrillville. With a little bit of luck, you should be able to find those sections, but not all PDF readers are compatible and this may not work as intended. Please let me know in that case. I'll be happy to provide a list of the pages I bookmarked.<sup>2</sup>

Please find also attached a plot of a scenario that that satisfies the National Ambient Air Quality

---

<sup>1</sup>I corrected minor typographical errors in this version;

<sup>2</sup>The compendium is not attached to this letter; please see my original email



Standards; see <http://www.epa.gov/criteria-air-pollutants/naaqs-table>. In spite of the fact that the standards are met, the plot shows the presence of levels of NO<sub>2</sub> that episodically exceed those standards by two orders of magnitude. The plot is a theoretical possibility that illustrates what is described in more detail in the attached by paper by Brown et al.<sup>3</sup>

In the present study we consider estimates of emissions from well pads, compressor stations and processing plants to gauge individuals possible exposures and the health risks those exposures pose. This is necessary because much of the publicly accessible emissions data has been collected to provide average exposures over a lengthy period of time and because the data collection is intended to document compliance with regional air quality standards.

Most of the questions in this writing are about the Air Dispersion Modeling Report - Clear River Energy Center - Burrillville, October 30, 2015, by ESS group. This report is part of the docket of the Energy Facility Siting Board ([http://www.ripuc.org/efsb/2015\\_SB.6.html](http://www.ripuc.org/efsb/2015_SB.6.html)) *Invenergy Response to CLF - First Set*: [http://www.ripuc.org/efsb/efsb/SB2015\\_05\\_DR1\\_R.pdf](http://www.ripuc.org/efsb/efsb/SB2015_05_DR1_R.pdf) A second data set submitted by Invenergy may raise further questions.

As you know, several segmented projects will be coming together in Burrillville:

1. Spectra Energy's Aim Project
2. Invenergy's Clear River Energy Center
3. Access Northeast, a project of Eversource Energy, National Grid and Spectra Energy: <http://accessnortheastenergy.com/News-and-Events/#events>
4. TransCanada's Ocean State Power Phase III, submitted to the Energy Facility Siting Board on December 1 of last year.

First of all, please note the date of the EES report: October 30, 2015. To the best of my knowledge, the expansion of the Algonquin compressor station had not yet been completed on that date. Obviously, no data are available yet to DEM about the environmental impact of the expanded compressor station. Nor will there be any such data for some time as the National Ambient Air Quality Standards requires three-year averages.

Consequently, the report cannot possibly provide the reliable multi-source modeling analysis requested, as the ESS report mentions, by RI DEM. Instead, the report stacks hypotheticals upon hypotheticals and the resulting lack of reliability puts public health at risk.

Indeed, as the time line makes painfully clear, Burrillville may be subjected to a sequence of projects that exemplify impermissible segmentation as defined in item 46 on page 18 of this Federal Energy Regulatory Commission document <http://www.ferc.gov/CalendarFiles/20160128180805-CP14-96-001.pdf> Also see Request for Rehearing of Coalition of AIM Intervenors under CP14-96, [http://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=20150402-5290](http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20150402-5290)

Some of the questions in the list below are related to the episodic nature of the emissions mentioned above in the work of Brown et. al.

---

<sup>3</sup>Once again to save paper this paper is not attached but it can be found here <http://www.tandfonline.com/doi/full/10.1080/10934529.2015.992663>

## Average Moisture Conditions

The second paragraph of Section 2.0 of the ESS report states that the simulations were conducted at two typical temperature, namely 10F and 59F. Section 5.1 mentions that the simulations were run assuming average moisture conditions.

According to this EPA web site

(<http://www3.epa.gov/airquality/airtrends/2007/report/groundlevelozone.pdf>), ground-level ozone forms when emissions of nitrogen oxides (NOx) and volatile organic compounds (VOCs) react in the presence of sunlight. These ingredients come from motor vehicle exhaust, power plant and industrial emissions, gasoline vapors, chemical solvents, and some natural sources.

**Question 1:** How can a modeling done at average temperature and humidity conditions capture the true episodic impact of CERC and the other nearby pollution sources on public health? Temperature, humidity and sunlight fluctuate wildly in Rhode Island and, due to climate change, they are expected to vary even more fiercely during the lifetime of the proposed Clear River Energy Center.

### Effect of the 2015 build-out of the Algonquin Compressor Station

Table 15, NAAQS Compliance Determination, of the ESS's Air Dispersion Report on PDF page 45 contains the results of the simulations including the effect of the "Algonquin" Compressor Station up to 2014.

**Question 2:** How does the ESS modeling account for the AIM Project build-out of the compressor station that took place in 2015?

**Question 3:** Did the ESS modeling simultaneously simulate the four Rhode Island sources of pollution: Algonquin Station, Ocean State Power, RISE and CERC? If so, was the Algonquin compressor station characterized by its state before or after the 2015 AIM build-out? Due to the paucity of detail provided about the modeling, I cannot tell if it only simulated CERC while adding the other sources merely into the average background. Either way it seems that the simulation can only have been based on obsolete information that predates the 2015 build-out and ignores the fact that there also are out-of-state pollution sources.

**Question 4:** If the modeling did not simulate all four sources mentioned above simultaneously and in their post-AIM-build-out configuration, how did the modeling estimate the percentiles required to check that CERC will operate according to the National Ambient Air Quality Standards? (See *Reviewing National Ambient Air Quality Standards Scientific and Technical Information*, <http://www3.epa.gov/ttn/naaqs/criteria.html>)

How, in particular, did the simulations deal with the fact that it is mathematically impossible to obtain the required percentiles computed under those circumstances? For clarity let me add that this mathematical impossibility is the result of the fact that there are no addition laws that allow one to add averages to percentiles or percentiles to each other. Of course, some uncontrolled approximation might have been used to circumvent this problem. In that case, please supply the answer to question what approximation was used.

**Question 5:** If the modeling did simulate all four Rhode Island pollution sources simultaneously, please point us to the information that DEM supplied for the modeling, including start-up, shut-

downs, scheduled and unscheduled maintenance. Without this information it is impossible to ascertain even the feasibility of the modeling that presumably leads to the conclusion that the NAAQS standards are met upon construction of CERC.

Of particular concern in this context is the impact of coincidences such as a purge or blowdown of the Algonquin compressor station occurring during a startup-shutdown event of CERC? How was the impact of such coincidences obtained in the modeling used by ESS?

**Question 6:** One would assume that DEM has regulatory procedures in place to prevent the simultaneous occurrence of high-pollution episodes at the various sources and dangerous weather condition. Is this correct and, if so, what are those procedures?

**Question 7:** Are there any other sources of pollution in Massachusetts or Connecticut? If so, how were they accounted for in the modeling and in particular in the required NAASQ percentile estimates?

## Nonattainment in Providence County

**Question 8:** How did the ESS simulations take into account that the Final Environmental Impact Statement of the AIM Project lists Providence County as Moderate NA (nonattainment) for NO<sub>x</sub> and VOC and that purge and blowdown episodes of the Algonquin compressor station are listed in this context. Please see TABLE 4.11.1-3 (cont'd) Nonattainment and Maintenance Areas Within the Vicinity page 4-224 of (the first PDF of the list at the bottom of this web page:

<http://www.ferc.gov/industries/gas/enviro/eis/2015/01-23-15-eis.asp>)

Forgive me if I repeat myself, but clearly, the results in this AIM project table predate the 2015 build-out and Invenergy's CERC proposal, both of which will be contributing to making a bad situation worse. How does the ESS dispersion report account for this?

**Question 9:** Once again, how could the relevant estimates be made if, as is clear from the years mentioned in Table 15 of the ESS Air Dispersion Report, the impact of the 2015 AIM build-out is as yet to be determined? For clarity let me reiterate that the National Ambient Air Quality Standards require three-year averages, the accumulation of which could not have started before 2015.

**Question 10:** The third paragraph of page 4-228 of the FEIS of the AIM Project states: Although the facility has existing GHG potential emissions greater than 100,000 tpy [ton per year] of CO<sub>2</sub>e in Rhode Island, a major source of GHGs is not considered a major PSD [Prevention of Significant Deterioration] source if it is not also major for another PSD pollutant." Why does CERC, as major new source/modification at an existing source, not trigger a Nonattainment New Source Review? For more details see

<https://www.epa.gov/nsr/nonattainment-nsr-basic-information>

**Question 11:** The numbers in Table 15, NAAQS Compliance Determination, of the ESS Air Dispersion Report and those in TABLE 4.11.1-14 (con'd) on page 4-243 of the Final Environmental Impact Statement of the AIM Project appear to be inconsistent. To just give one example: according to Table 15, the one-hour number is 61.81% of the NAAQS impact, while the latter has 83.9%. There are two possibilities: (a) I am reading the table incorrectly, which is quite possible

because of the difference in nomenclature of the two tables and the absence of units in the ESS table; (b) CERC will be cleansing the atmosphere of NO<sub>2</sub>, which sounds too good to be true. How can the numbers in these tables be reconciled with the national standards?

## Noise Problems

**Question 12:** Pages 4-246 and 4-248 of the AIM Project's Final Environmental Impact Statement discuss noise problems of Algonquin compressor station, which in one area was rated as 57 decibels for its A-weighted sound pressure level even before the AIM Project. That is above the legal day-night limit of 55 dB.

What will DEM do to make sure that Spectra Energy/Algonquin will implement the remedies required by the Federal Energy Regulatory Commission? Will CERC push the noise pollution over the legal limit and if so by how much and what remedies will DEM and DOH require?

## Changing Climate Conditions

As is well-known, one of the major effects of climate change will be an increase in the variability of the weather. To be specific, Hansen and Sato have shown that: The summer bell curves for the United States and (North and Central) Europe are shifted more than one standard deviation (1), while the shift in the winter is only about half of a standard deviation. The shift in summer is enough to increase the frequency of summers warmer than from less than 1% to greater than 10%. (<http://iopscience.iop.org/article/10.1088/1748-9326/11/3/034009>)

The shift to which Hansen and Sato refer compares 2005–2015 data to the 1951–1980 period, which they use as their base. In other words, the more than ten-fold increase in weather extremes they describe have occurred in a period of 45 years is comparable to the expected life time of the power plant Invenergy is proposing.

**Question 13:** What is the meaning of simulations that ignore the fact that conditions are likely to change during the lifetime of CERC?

Respectfully submitted,



Peter Nightingale  
Professor of Physics  
email: [nightingale@uri.edu](mailto:nightingale@uri.edu)  
tel. 401.789.7649

encl: Plot of NO<sub>2</sub>: unhealthy in agreement with standards

