

August 4, 2016

Via Email and Federal Express

Thomas Kravitz, Planner
Burrillville Town Hall
144 Harrisville Main Street
Harrisville, RI 02830

Re: Clear River Energy Center Master Plan Application for Major Land Development
Plat 120, Lot 7; Plat 135, Lot 2; Plat 137, Lots 1, 2, 3 and 21; Plat 153, Lots 1 and 2

Dear Mr. Kravitz:

We are in receipt of the written public comments, submitted at the July 11, 2016 Burrillville Planning Board Meeting and forwarded to this office by you. The Town Solicitor and Attorney for the Planning Board have given Invenergy Thermal Development LLC ("Invenergy") an opportunity to respond to the written public comments.

The written public comments reflect numerous subject matter areas which Invenergy has addressed through responses to the Town of Burrillville's ("Town") Data Requests filed with the Energy Facility Siting Board ("EFSB"), and through testimony, reports and/or studies of Invenergy's consultants. Those subject areas are: Air; Ammonia; Noise; Planning; Traffic; Stormwater; Wetlands and Water.

First, Invenergy responded to thirteen sets of data requests issued by the Town in the EFSB Proceeding (Docket No. SB-2015-06), comprising over 190 individual requests, and as recent as yesterday, the Town issued additional data requests.

Second, Invenergy presented the testimony of five consultants: Maureen Chlebek, McMahon Associates (Traffic); Michael Feinblatt, ESS Group, Inc. (Air, Stormwater and Wetlands); Michael Hankard, Hankard Environmental, Inc. (Noise); Edward Pimentel, Pimentel Consulting, Inc. (Planning); and Robert Smith, McMahon Associates (Road Conditions). The Town also presented the testimony of its consultants. *See* Transcripts from the Burrillville Planning Board Hearings, dated June 20, 2016 and July 11, 2016.

Finally, Invenergy and the Town's consultants submitted reports and/or studies to the Burrillville Planning Board addressing each of the eight (8) following areas: Air; Ammonia; Noise; Planning; Traffic; Stormwater; Wetlands and Water.

ADLER POLLOCK & SHEEHAN P.C.

Thomas Kravitz, Planner

August 4, 2016

Page 2

Accordingly, Invenergy refers to the previously established record to address the public comments related to those areas:

NOISE:

- Invenergy's Responses to the **Town's 1st Set of Data Requests, Nos. 1-1 – 1-14;** Invenergy's Responses to the **Town's 2nd Set of Data Requests, Nos. 2-1, 2-4 – 2-6;** Invenergy's Responses to the **Town's 4th Set of Data Requests, Nos. 4-1, 4-30, 4-37 & 4-41;** Invenergy's Responses to the **Town's 6th Set of Data Requests, No. 6-8;**
- Michael Theriault Acoustics, Inc., "*Noise Level Evaluation for the Clear River Energy Center,*" October 2015;
- Michael Theriault Acoustics, Inc., "*Transient Operation Noise Level Evaluation for the Clear River Energy Center,*" March 2016;
- Hessler Associates, Inc., "*Invenergy Clear River Energy Center Facility Noise and Community Noise Impacts,*" May 26, 2016; and
- Hessler Associates, Inc., "*Invenergy Clear River Energy Center, Additional Comments on Facility Noise Issues,*" July 12, 2016.

TRAFFIC:

- Invenergy's Responses to the **Town's 1st Set of Data Requests, No. 1-15;** Invenergy's Responses to the **Town's 4th Set of Data Requests, No. 4-3;** Invenergy's Responses to the **Town's 5th Set of Data Requests, No. 5-5;** Invenergy's Responses to the **Town's 6th Set of Data Requests, Nos. 6-1 – 6-6;** Invenergy's Responses to the **Town's 13th Set of Data Requests, Nos. 13-1 – 13-13;**
- McMahon Associates, "*Traffic Impact Study for the Clear River Energy,*" May 2016;
- CDR Maguire, "*Clear River Energy Center Traffic Impact Study Review,*" June 16, 2016; and
- McMahon Associates, "*Clear River Energy Center, Burrillville, RI, Traffic Comment Responses,*" July 29, 2016 (a copy is attached).

AIR:

- Invenergy's Responses to the **Town's 1st Set of Data Requests, No. 1-18;** Invenergy's Responses to the **Town's 4th Set of Data Requests, Nos. 4-44 – 4-46;** Invenergy's Responses to the **Town's 5th Set of Data Requests, No. 5-12;** Invenergy's Responses to the **Town's 6th Set of Data Requests, Nos. 6-13 & 6-14;** Invenergy's Responses to the **Town's 7th Set of Data Requests, Nos. 7-3, 7-5 – 7-29, 7-32, 7-33, 7-35 – 7-39;** Invenergy's Responses to the **Town's 11th Set of Data Requests, Nos. 11-1 & 11-2;**

Thomas Kravitz, Planner

August 4, 2016

Page 3

- ESS Group, Inc., “*Air Dispersion Modeling Report – Clear River Energy Center—Burrillville, Rhode Island*,” October 30, 2015; and
- Fuss & O’Neill, “*Clear River Energy Center Air Quality Application Review*,” June 17, 2016.

PLANNING:

- Pimentel Consulting, Inc., “*Executive Summary*,” June 2016.

AMMONIA:

- Invenergy’s Response to the **Town’s Data Request, No. 4-7**; Invenergy’s Response to the **Town’s Data Request, No. 11-3**; and
- CDR Maguire, “*Clear River Energy Center Ammonia Storage Review*,” June 15, 2016;

STORMWATER/WETLANDS:

- Invenergy’s Response to the **Town’s 3rd Set of Data Requests, No. 3-2**; Invenergy’s Response to the **Town’s 4th Set of Data Requests, Nos. 4-10, 4-14, 4-29, 4-35**; Invenergy’s Response to the **Town’s 8th Set of Data Requests, Nos. 8-11 – 8-15**; and
- CDR Maguire, “*Clear River Energy Center Master Plan Drawing Package Review*,” June 16, 2016.

WATER:

- Invenergy’s Response to the **Town’s 1st Set of Data Requests, No. 1-17**; Invenergy’s Responses to the **Town’s 4th Set of Data Requests, Nos. 4-12 – 4-23**; Invenergy’s Response to the **Town’s 5th Set of Data Requests, Nos. 5-2 – 5-4, 5-9, 5-16 – 5-19**; Invenergy’s Response to the **Town’s 6th Set of Data Requests, Nos. 6-9 – 6-11**; Invenergy’s Responses to the **Town’s 8th Set of Data Requests, Nos. 8-1 & 8-2**; Invenergy’s Responses to the **Town’s 11th Set, all responses**; and
- *Invenergy will present the testimony of Dr. William Alhert at the Hearing on August 15, 2015 to address other concerns regarding water issues discussed in the written public comment.*

Thomas Kravitz, Planner
August 4, 2016
Page 4

Many of the written public comments have been responded to in those data requests, expert testimony and expert reports. For clarity's sake, Invenergy will respond only to the comments not sufficiently addressed in data responses, testimony and/or expert reports.

1. Response to Public Comment Concerns Regarding Buck Hill Line of Site:

According to the viewshed analysis conducted, which is described in detail in Section 6.12.3 of Invenergy's EFSB Application, Clear River Energy Center ("CREC") will not be visible from the Buck Hill Management Area, which is just north of Buck Hill Road, near the Connecticut border. (Figure 6.12-2, Visual Resource Points, is attached.)

2. Response to Public Comment Concerns Regarding National Grid Transmission Line:

Invenergy has forwarded Mr. Kevin Frenette's information (375 Collins Taft Rd, Burrillville, RI 02830) to National Grid.

3. Response to Public Comment Concerns Regarding Alternative Routes:

See McMahon Associates, "*Clear River Energy Center, Burrillville, RI, Traffic Comment Responses*," July 29, 2016 (a copy is attached).

4. Response to Written Public Comment Concerns Regarding Resilient Rhode Island Act and Citation to Testimony of Conservation Law Foundation ("CLF") Consultant J. Timmons Roberts:

See the Office of Energy Resources August 21, 2016 Power Point Presentation; Invenergy's Pre-Filed Direct Testimony of Ryan Hardy, filed with the Public Utilities Commission on April 22, 2016 and filed with the EFSB on July 20, 2016, proprietary information redacted.

5. Response to Written Public Comment Concerns Regarding Alternative Sources of Water:

Invenergy submits that it is presently investigating alternative and additional water supply options and will supplement.

Thomas Kravitz, Planner
August 4, 2016
Page 5

6. Response to Written Public Comment Concerns Regarding Wildlife Impact:

According to ESS Group, Inc., having reviewed the Rhode Island Natural History Survey ("RINHS") database, no known occurrences or records of rare plant/animals are documented within the project area.

However, according to ESS Group, Inc.'s review of the Rhode Island Wildlife Action Plan ("RIWAP"), the rare and area sensitive species that have been identified (e.g. Canada Warbler, Northern Water Thrush, Eastern Box Turtle) may be impacted from the clearing of forest and other vegetation within the project impact area. The nature and potential extent of these impacts will be assessed in detail in the wetlands applications to be submitted for the project to the U.S. Army Core of Engineer ("USACE") and the Rhode Island Department of Environmental Management ("RIDEM"). CREC has been designed to minimize impact to forested habitat areas. Invenergy will work with USACE and RIDEM to identify mitigation measures to further minimize the impacts of the project to rare and sensitive species both during construction and during operation.

Thank you for the opportunity to address these items. Invenergy believes it has addressed the items raised in the written public comment. If it has not, please advise me immediately.

Sincerely,



ELIZABETH McDONOUGH NOONAN
enoonan@apslaw.com

Enclosures

cc: John Niland, P.E. (*e-mail only, with enclosures*)
Alan M. Shoer, Esq. (*e-mail only, with enclosures*)
Richard R. Beretta, Esq. (*e-mail only, with enclosures*)
Oleg Nikolyszyn, Town Solicitor (*e-mail only, with enclosures*)
Michael McElroy, Esq. (*e-mail only, with enclosures*)

PRINCIPALS

Joseph W. McMahon, P.E.
Joseph J. DeSantis, P.E., PTOE
John S. DePalma
William T. Steffens
Casey A. Moore, P.E.
Gary R. McNaughton, P.E., PTOE

ASSOCIATES

John J. Mitchell, P.E.
Christopher J. Williams, P.E.
R. Trent Ebersole, P.E.
Matthew M. Kozsuch, P.E.
Maureen Chlebek, P.E., PTOE
Dean A. Carr, P.E.

MEMORANDUM

TO: Beth Noonan

FROM: Maureen Chlebek, P.E., PTOE

DATE: July 29, 2016

RE: Clean River Energy Center
Burrillville, RI
Traffic Comment Responses

McMahon Associates has prepared this memorandum to provide responses to traffic related comments made at the Burrillville meetings in June and July of 2016.

Comment 1. Crash Comment: "Has the non-intersection crash history along Route 100 been investigated?"

Response 1: Crash data was collected from the Burrillville town line on South Main Street to the proposed site on Wallum Lake Road for all study area roadways following the truck route. Additional analysis was performed to determine the number of crashes on the study area roadway segments. Intersections at the study area intersections are not included in this summation. A detailed summer of crashes along the truck route roadway segments is attached. When considering the number of crashes on the roadways, consider that the data covered a three-year period from 2013-2016 and that the roadway lengths vary.

Comment 2: ADT Comment: Please provide estimates of the daily trip generation.

Response 2: Under future build conditions when the power plant is fully occupied and operating, an expected 60 additional trips (30 vehicles in, 30 vehicles out) are expected daily, including trips for 25 power plant employees and various delivery vehicles during the day. The existing ADT and ADT with the addition of the proposed power plant is compared below.

	Existing ADT	Existing Build ADT	% Increase
South Main Street	4950	5000	1%
Pascoag Main Street	6500	6550	1%
Church Street	3650	3700	2%

As shown in the table, the project is expected to create a minor increase in traffic overall in comparison to the average daily traffic.

Comment 3. Alternative Truck Route Comment: "Have you explored alternative truck routes to the site?"

Response 1: Alternative truck routes have been explored and evaluated. See attached report on alternative truck routes. The results indicate that the alternative truck routes would not be viewed as advantageous for construction vehicles originating in the Providence metro area. This is mainly due to the additional distance of 10+ miles, and also that the roadways do not appear to present an overall upgrade in terms of their ability to handle larger vehicles when compared to the originally assumed route.

Crash Summary

	<u>Wallum Lake</u>	<u>Church Street</u>	<u>High Street</u>	<u>South Main Street</u>
	<u>Road</u>			
Segment Length (miles)	5	0.8	0.09	2.2
Years Reported	1/1/2013- 12/31/2015	5/10/2013- 5/10/2016	5/10/2013- 5/10/2016	5/10/2013- 5/10/2016
Type				
Angle	0	2	2	14
Head-on	1	0	0	0
Rear-end	1	1	0	9
Read to Side	0	1	0	0
Sideswipe	1	1	3	4
Animal	0	0	0	5
Rear to Rear	0	0	1	0
Single Vehicle	18	6	3	13
Unknown	<u>0</u>	<u>3</u>	<u>2</u>	<u>2</u>
Total	21	14	11	47
Severity				
Property Damage	16	11	10	37
Personal Injury	5	3	1	10
Fatality	0	0	0	0
Other	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	21	14	11	47
Weather				
Clear	16	10	5	33
Cloudy	0	3	5	6
Rain	1	1	0	2
Snow	2	0	1	5
Blowing snow	1	0	0	0
Ice	0	0	0	0
Sleet	1	0	0	1
Fog	0	0	0	0
Unknown	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	21	14	11	47
Time				
7:00 AM to 9:00 AM	2	2	3	5
9:00 AM to 4:00 PM	9	7	8	19
4:00 PM to 6:00 PM	1	2	0	6
6:00 PM to 7:00 AM	<u>2</u>	<u>3</u>	<u>0</u>	<u>17</u>
Total	21	14	11	47

Source: Town of Burrillville Police

INVENERGY CLEAR RIVER ENERGY CENTER



ALTERNATE TRUCK ROUTES

Prepared by



McMahon Associates
55 Dorrance Street, Suite 403
Providence, RI 02903

Based on feedback received at the Burrillville Planning Board meetings of June 20 and July 11, 2016, we have investigated alternate truck routes that may potentially be utilized by construction vehicles accessing the site. Our initial traffic studies assumed that the majority of vehicles would originate in the Providence metro area, and therefore travel I-295 to US 44 to RI Route 100. The originally assumed truck route is shown as Route A in the attached diagram. Route 44 is a designated US route and is on the National Highway System, and Route 100 for most of its length has wide shoulders and good sight distance, suitable for larger vehicles. This is also the most direct route, measuring approximately 16 miles from I-295 to the site, passing through the village of Chepachet in Glocester (A-1). Only a small section of roughly one mile through the village of Pascoag has reduced roadway width, and a tight curve at the intersection of Pascoag Main Street and Church Street (A-2).



A-1: Putnam Pike (Main St.) at Money Hill Rd



A-2: Pascoag Main St at Church St

The Planning board questioned if there were alternate routes that construction vehicles might utilize and suggested investigation of RI/MA Route 146 to MA Route 16 and RI/MA Route 96 (Route B). We have investigated the feasibility of this suggested route and note the following. Also starting measurement from I-295, this route is significantly longer than the original assumed truck route, totaling 28.5 miles. Route 146 in Rhode Island and Massachusetts is primarily freeway, covering approximately 13 miles of the alternate route, and truck traffic can easily be accommodated on this roadway. Route 16 is of variable width, some areas having wide shoulders, others having little or no shoulder. It travels through the village of East Douglas and the Town Common of Douglas. East Douglas has a small commercial area with shops on each side of the road, and numerous crosswalks (similar to Route 107 in Harrisville). Douglas Town Common is more rural/historical. There are two noteworthy intersections along this piece of Route 16. First, is the intersection of Davis Street and NE Main Street (B-1). This intersection is under partial stop control with a flashing beacon. Route 16 (Davis Street) comes in at a sharp skew with to NE Main Street which has the right-of-way in the westbound direction. Sight distance is somewhat limited at this intersection. Second, is the intersection of SW Main Street and South Street (Route 96) (B-2).



B-1: Davis Street at NE Main Street

South Street intersects SW Main at a skewed angle, and sight distance is limited here as well, particularly looking west from the South Street northbound approach. From this intersection, Route 96 heads south back into Rhode Island, is somewhat narrow at first, but with wider shoulders toward the southern end. Unfortunately, there are no suitable east-west cross connections to the site on Route 100, so construction vehicles would need to proceed all the way to Hill Road (B-3), and then use Route 107 to Route 100 north. This would require vehicles to pass through the village of Pascoag, including the Church Street section.

As an alternate to this suggested route, we also investigated a slight variation (Route C). Instead of turning south onto Route 96 in Douglas, MA, continuing west on SW Main Street for just over one mile, it intersects with Wallum Lake Road (Route 100). This leads directly to the proposed site, and is about 3 miles shorter than the suggested alternate route (totaling 25.5 miles). Similar to Route 96, Route 100 is narrow at first in Massachusetts, but widens upon entering Rhode Island. There is a sharp, stop controlled portion at its intersection with East Wallum Lake Road (C-1). Immediately following that curve is a section of somewhat steep grade (C-2). Since this route comes in from the north, it does not travel the section of Route 100 through the village of Pascoag.



B-2: South St at SW Main St



B-3: Round Top Rd at Hill Rd



C-1: Wallum Lake Rd at E Wallum Lake Rd

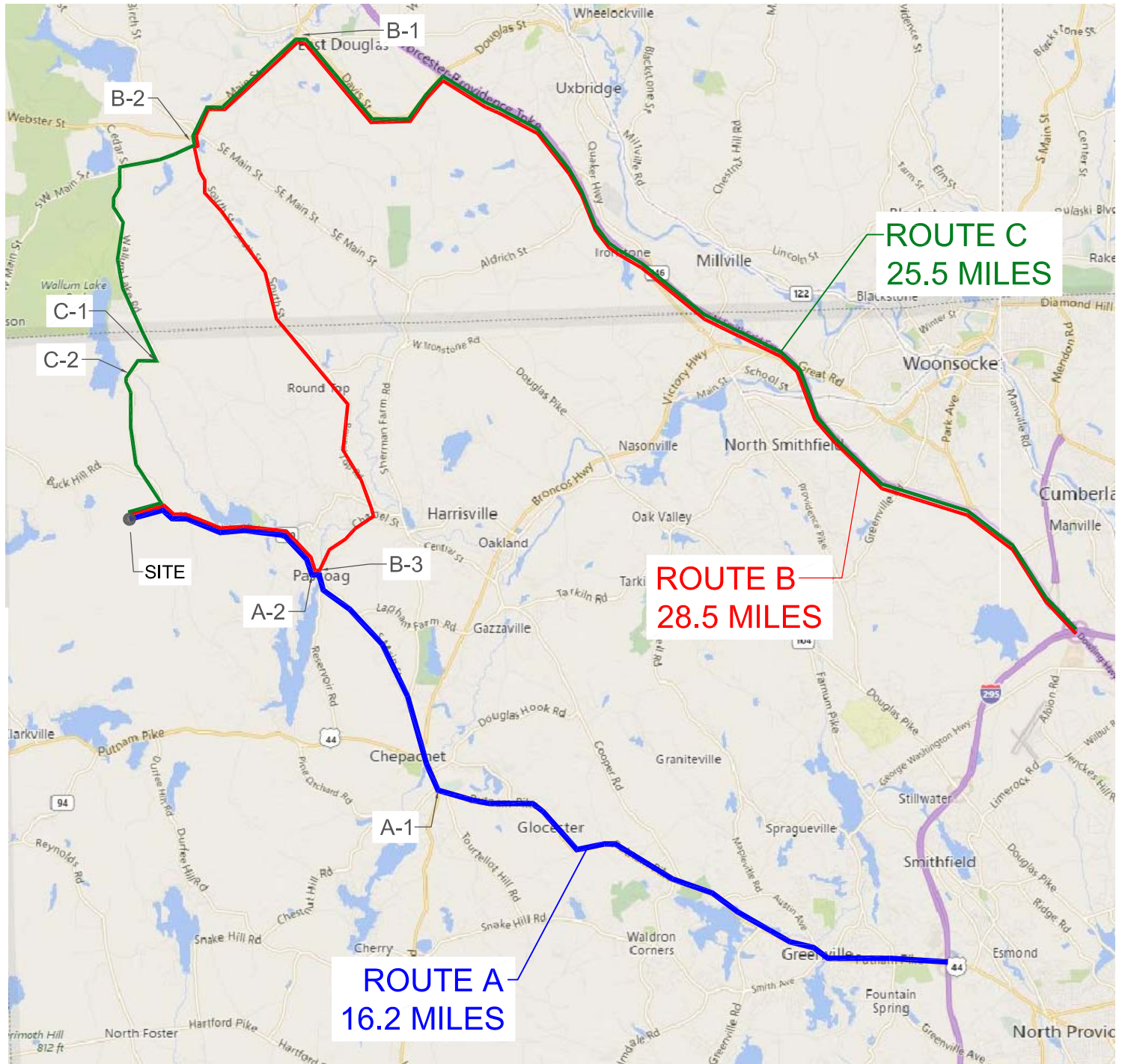


C-2: Wallum Lake Rd

In summary, upon review of the two noted alternate truck routes, we do not feel that they would provide a route that would be viewed as advantageous for construction vehicles originating in the Providence metro area. This is mainly due to the additional distance of 10+ miles, and also that the roadways do not appear to present an overall upgrade in terms of their ability to handle larger vehicles when compared to the originally assumed route. For the majority of construction vehicles accessing the proposed site from the Providence metro area, we feel they would most likely utilize the originally assumed route noted above. However, for any construction vehicles for which trips may originate in the Worcester area, the suggested route (with the variation noted above) may present a considerably shorter trip. At this time it is difficult to project what percentage of construction vehicles may originate in the Worcester area. While this percentage is assumed to be small, any use of this alternate would potentially reduce the overall truck traffic currently projected to utilize Route 100 through Pascoag.

ALTERNATE TRUCK ROUTES

BURRILLVILLE, RI



REDACTED

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS ENERGY FACILITY SITING BOARD

**IN RE: INVENERGY THERMAL DEVELOPMENT LLC :
APPLICATION TO CONSTRUCT AND :
OPERATE THE CLEAR RIVER ENERGY : SB-2015-06
CENTER, BURRILLVILLE, RHODE ISLAND :**

PRE FILED TESTIMONY OF

RYAN HARDY

1 1.1 INTRODUCTION

2 Q. PLEASE STATE YOUR NAME, BUSINESS TITLE AND BUSINESS ADDRESS.

3 A. My name is Ryan Hardy, and my business address is 10 Canal Park, Cambridge,
4 Massachusetts.

5 Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

6 A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC
7 (“Invenergy”), in support of their application for a license from the Rhode Island (“R.I.”) Energy
8 Facilities Siting Board (“EFSB” or the “Board”) to construct the Clear River Energy Center
9 project in Burrillville, Rhode Island (“Clear River Energy Center” or “Clean River”).

10 Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND
11 PROFESSIONAL EXPERIENCE.

12 A. I am employed by PA Consulting Group, Inc. (“PA”), and I am a Member of PA’s
13 Management Group. A detailed description of my educational background and professional
14 experience is included as **Exhibit RH-1**.

15 Q. WHAT IS PA CONSULTING GROUP?

1 A. PA is a global consulting, technology and innovation firm. We are an independent firm
2 employing approximately 2,500 people from offices across the Americas, Europe, the Nordics,
3 the Gulf and Asia Pacific. We work across eight industries including energy and utilities,
4 consumer and manufacturing, defense and security, financial services, government, healthcare,
5 life sciences, transport, travel and logistics.

6 **Q. CAN YOU PLEASE DESCRIBE PA CONSULTING GROUP’S EXPERIENCE**
7 **WITH POWER MARKETS?**

8 A. PA’s energy economics advisors are experts across the entire energy value chain, from
9 fuels through to power. Our energy economics advisors have refined our approach to analyzing
10 North American power markets over the last 15 years.

11 Over this time period, we have developed a robust, well-developed, and industry-tested
12 fundamental power market modeling process, including our proprietary stochastic dispatch
13 optimization, capacity compensation, environmental, renewable, and valuation models along
14 with the use of production cost, transmission, and natural gas models that are operated by PA’s
15 subject matter experts and populated with PA proprietary data.

16 In the last five years alone, we have supported the development, buy-side, sell-side, and
17 financing processes for over 225 GW of power generation in North America and nearly 20 GW
18 in New England specifically.

19 **Q. PLEASE DESCRIBE YOUR EXPERIENCE PROVIDING TESTIMONY TO**
20 **REGULATORY COMMISSIONS, BOARDS, AGENCIES OR AS AN EXPERT**
21 **WITNESS.**

22 A. I have conducted several appraisals of power plants (approximately 5 GW) under the
23 Uniform Standards of Professional Appraisal Practice (“USPAP”) appraisal standards in a

litigation context. I have also submitted testimony to Federal Energy Regulatory Commission (“FERC”) related to the financial parameters supporting the PJM ISO's capacity auction construct. More information related to my professional experience is included as **Exhibit RH-1**.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. On October 29, 2015, Invenergy filed its application with the R.I. EFSB to construct a 850-1,000 megawatt (“MW”) combined cycle dual fueled generation facility (“Facility”) called the Clear River Energy Center project, and to be located in Burrillville, R.I., as described in more detail in the application. In accordance with the Preliminary Order of the EFSB, the Board requested an advisory opinion from the Rhode Island Public Utilities Commission (“PUC”) as to (1) the need for the proposed Facility; (2) whether it is cost-justified to the consumer consistent with the object of ensuring that the construction and operation of the Facility will be accomplished in compliance with all the requirements of the laws, rules and regulations; and (3) whether cost effective efficiency and conservation opportunities provide an appropriate alternative to the proposed Facility.

My testimony will be with regard to (1) the need for Clear River Energy Center and (2) the cost-justification of the facility, which the PUC will be focusing on in its Advisory Opinion.

Q. PLEASE IDENTIFY THE SPECIFIC SECTIONS OF THE APPLICATION FOR WHICH YOU ARE SPONSORING TESTIMONY IN THIS PROCEEDING.

A. My analysis supports the following sections of the application:

- Section 7.0 titled “Assessment of Need,” pages 115-121; Supplement to the Application: Three reports; and
- Section 10.0 titled “Study of Alternatives,” pages 124-129.

Q. PLEASE PROVIDE AN OVERVIEW OF YOUR TESTIMONY.

1 A. My testimony addresses five topics:

- 2 • The need for the Clear River Energy Center.
- 3 • PA’s modeling methodology with regard to the Clear River Energy Center analysis
- 4 performed.
- 5 • The ratepayer impacts of the Clear River Energy Center.
- 6 • The emissions impacts of the Clear River Energy Center.
- 7 • The broader economic impacts of the Clear River Energy Center.

8 **Q. PLEASE PROVIDE A SUMMARY OF YOUR ASSESSMENT OF THE NEED**
9 **FOR CLEAR RIVER.**

10 A. My analysis indicates that Clear River Energy Center is needed to cost-effectively
11 maintain reliability in ISO-NE and to support the introduction of more renewable energy projects
12 into the ISO-NE region. I base this conclusion on both the results of ISO-NE’s most recent
13 capacity auction, other information from ISO-NE, and my modeling of subsequent auctions.

14 **Q. WHAT IS YOUR UNDERSTANDING OF THE STANDARD USED BY THE PUC**
15 **TO REVIEW THE NEED FOR THE CLEAR RIVER PROJECT?**

16 A. My understanding is that the PUC will apply a liberalized standard to determine the need for
17 the project, given that wholesale generation of electricity is a competitive industry where the risk
18 of success for such projects and the risks associated with the cost of construction are placed not
19 on ratepayers, but on private investors. I believe the PUC explained this view in its Advisory
20 Opinion in the Indeck-North Smithfield project (Docket No. 3094). In the Indeck Advisory
21 Opinion, the PUC pointed out that, in its most recent three advisory opinions (Indeck, Tiverton
22 Power, Hope Energy) the PUC concluded that as a result of the Utility Restructuring Act of 1996
23 (“URA”) the URA has “effectively repealed by implication the much older need assessment

1 provision of the” Energy Facilities Siting Act, thereby relaxing the standard of review required
2 by the PUC. In the Indeck Advisory Opinion, the PUC concluded that “as a result of the new era
3 of competition, the need for generating plants is determined by the free market, and therefore, the
4 PUC’s determination of “need” is limited to whether the proposed electric supply is necessary to
5 meet demand.”¹ As I will explain further below, the Clear River Energy Center is necessary to
6 meet demand in the ISO-NE market.

7 **Q. PLEASE PROVIDE A SUMMARY OF YOUR ASSESSMENT OF CLEAR RIVER**
8 **ENERGY CENTER’S IMPACT ON RATEPAYERS.**

9 A. From 2019-2022, and based upon the most recent information to account for the results
10 of the Forward Capacity Auction (“FCA”) 10 auction, the presence of Clear River Energy Center
11 is projected to save Rhode Island ratepayers approximately \$210 million.

12 **Q. PLEASE PROVIDE A SUMMARY OF YOUR ASSESSMENT OF CLEAR**
13 **RIVER’S IMPACT ON EMISSIONS.**

14 A. My analysis indicates that the addition of Clear River Energy Center will lead to an
15 annual average reduction of 1,037,000 short tons for CO₂, 2,399 short tons for NO_x and 2,984
16 short tons for SO₂ in the New England and New York region over the 2019-2022 timeframe.
17 This equates to annual emission reductions of 1.01% for CO₂, 3.12% for NO_x and 3.35% for
18 SO₂. With regard to reductions in greenhouse gases, these reductions will support the goals of
19 the state and regional efforts to mitigate climate change, including the Regional Greenhouse Gas
20 Initiative (“RGGI”) and the more recent Resilient Rhode Island Act. These goals also support the
21 U.S. Environmental Protection Agency’s (“EPA”) Clean Power Plan (“CPP”) efforts, and by

¹ *In RE: Indeck-North Smithfield L.L.C. Need Assessment To Construct A Gas Fired Power Generation Facility*,
Docket No. 3094 (9/6/2000) at pp 6-8.

1 supporting the increased development of renewable energy resources these goals also support the
2 State’s Energy Policy (“Energy 2035”). I understand these issues will be taken up by the Office
3 of Energy Resources and Statewide Planning, in the context of their specific requests for
4 Advisory Opinions to the EFSB.

5 **Q. PLEASE PROVIDE A SUMMARY OF YOUR BROADER ASSESSMENT OF**
6 **CLEAR RIVER’S ECONOMIC IMPACTS.**

7 A. The addition of Clear River Energy Center will have several positive impacts to the
8 Rhode Island economy.

9 **Rhode Island jobs.** From 2017-2021, which includes the most intense two years of construction
10 and the first years of operation, Clear River will support the creation of just under 800 full-time
11 jobs per year. The construction and operation of Clear River alone – i.e., not including the
12 electricity cost savings to the customer – will create an average of more than 660 full-time jobs
13 per year from 2017-2019 and 145 full-time jobs per year from 2020 to 2034 in Rhode Island.

14 **Rhode Island earnings.** From 2017-2021, Clear River will support the creation of
15 approximately \$360 million in earnings to Rhode Island workers, or more than \$70 million per
16 year. Earnings to Rhode Island employees as a result of Clear River Energy Center will total
17 more than \$550 million from 2016-2034.²

18 **Rhode Island economic output.** From 2017-2021, the total economic impact on Rhode Island is
19 projected to be \$700 million, or approximately \$140 million per year. The overall impact of
20 Clear River Energy Center on the Rhode Island economy will total more than \$1.2 billion from
21 2016-2034, or an average of \$65 million annually.

² The analysis assumes 30 months of construction and a June 2019 commercial online date. As a result, there is one month of construction assumed in 2016 – the small 2016 benefits are excluded from most economic impact considerations, but are included in the analysis period totals (2016-2034).

1.2 ASSESSMENT OF THE NEED FOR CLEAR RIVER ENERGY CENTER

Q. CAN YOU PLEASE PROVIDE AN OVERVIEW OF THE ISO-NE MARKET?

A. ISO-NE is an independent, non-profit Regional Transmission Organization (“RTO”)

serving Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont.

Among other items, ISO-NE is tasked with system planning, operating the power system, and

administering the region’s FERC approved wholesale energy, ancillary and capacity markets for

members operating within these states.

Members of ISO-NE, such as Rhode Island load-serving entities, rely upon the ISO-NE Forward

Capacity Market (“FCM”) capacity procurement mechanism developed by ISO-NE stakeholders

and approved by FERC, in which ISO-NE seeks to procure sufficient capacity, on a both a

system-wide and localized basis, three-years in advance of a Delivery Year³ (“DY”) in order to

meet projected peak demand *plus* minimum target reserve margins.

I have prepared a more detailed overview of ISO-NE in the Clear River Energy Center

Application in Section 7.1 titled “Standards for Determining Need for the Proposed Facility,”

pages 115-116.

Q. CAN YOU PLEASE PROVIDE AN OVERVIEW OF THE ISO-NE CAPACITY MARKET?

A. ISO-NE’s FCM capacity procurement mechanism is utilized by ISO-NE market

participants as a means to ensure that the ISO-NE power system has sufficient resources to

reliably meet the future demand for electricity. Under the FCM, FCAs are utilized as a market-

based approach to determine both system-wide and localized needs for both existing and new

generation capacity through a competitive auction process designed to select the portfolio of

³ Within ISO-NE, a Delivery Year runs from June 1 through May 31 of the following year.

existing and new resources needed for system-wide and local reliability with the greatest social surplus.⁴ In other words, resources that clear an FCA maximize social surplus in order to meet both system-wide and local reliability needs and are by definition needed by ISO-NE.

I have prepared a more detailed overview of ISO-NE's FCM in the Clear River Energy Center Application in Section 7.1.2 titled "7.1.2 ISO-NE FCM Overview and Objectives," pages 115-116.

Q. DID YOU CONDUCT A FORECAST OF THE RESULTS OF FCA 10 PRIOR TO THE AUCTION FOR CLEAR RIVER ENERGY CENTER?

A. Yes.

Q. WHAT WERE THE RESULTS OF YOUR ANALYSIS?

A. Utilizing PA's proprietary FCM Simulation Model, PA forecasted the need for [REDACTED] MW of incremental capacity in FCA 10 with a system-wide clearing price of [REDACTED]. Of that total, PA projected that approximately [REDACTED] MW would be combined cycle generation in the form of Clear River Energy Center.

I have prepared a more detailed overview of this analysis in Clear River Energy Center's Application in Section 7 titled "PA's FCM Simulation Methodology and Results," pages 117-118, and in the Memorandum on Capacity Prices included as **Exhibit RH-2**.

Q. WHAT WERE THE ACTUAL RESULTS OF FCA 10?

A. On February 8, 2016, FCA 10 concluded with 1,459 MW of new generation clearing the auction with a system-wide clearing price of \$7.03/kW-mo. The new cleared capacity generation was primarily comprised of three facilities:

⁴ Social surplus, sometimes called social welfare, is the sum of consumer and supplier surplus, which is maximized when demand equals supply.

- 1 • 485 MW of Invenergy’s Clear River Energy Center;
- 2 • PSEG’s 484 MW Bridgeport Harbor 6 combined cycle generation facility proposed to be
- 3 located in Bridgeport, Connecticut; and
- 4 • NRG’s 333 MW Canal 3 peaking facility proposed to be located in Sandwich,
- 5 Massachusetts.

6 **Q. HOW DID THE ACTUAL RESULTS OF FCA 10 COMPARE WITH YOUR**
7 **ORIGINAL FORECAST?**

8 A. PA’s projections were very close to the actual results PA forecasted:

- 9 • A clearing price in the auction of [REDACTED]. The actual clearing price was \$7.03/kW-
- 10 mo. This is less than a [REDACTED]% difference;
- 11 • That approximately [REDACTED] MW of total generation would clear FCA 10. This compares
- 12 with the approximately 35,567 MW of total generation that actually cleared the auction.
- 13 This is less than a [REDACTED]% difference; and
- 14 • That approximately [REDACTED] MW of new combined cycle generation would clear FCA 10.
- 15 This compares with 969 MW of new combined cycle generation that actually cleared
- 16 FCA 10. This is an approximately [REDACTED]% difference.

17 **Q. HAVE YOU UPDATED YOUR ANALYSIS FOR FCA 11?**

18 A. Yes.

19 **Q. WHAT ARE YOUR FORECASTED RESULTS FOR FCA 11?**

20 A. PA forecasts that an additional [REDACTED] MW of combined cycle capacity—the incremental
21 capacity at Clear River Energy Center— will clear FCA 11 at a price of [REDACTED].

22 My approach is summarized in the Memorandum on Capacity Prices included as **Exhibit RH-2**.

23 The analytical methodology is identical to the one I utilized to project FCA 10 clearing prices.

**Q. IS IT YOUR ASSESSMENT THAT CLEAR RIVER ENERGY CENTER IS
NEEDED FOR RELIABILITY IN THE ISO-NE MARKET?**

A. Yes. Capacity that clears an FCA is by definition needed. Approximately half of Clear River Energy Center's capacity cleared FCA 10, which indicates that this capacity is needed to maintain reliability in ISO-NE. Additionally, based on my analysis for FCA 11, the full capacity of Clear River Energy Center will be needed starting in the 2020/21 delivery year and beyond.

**Q. IS IT YOUR ASSESSMENT THAT THE CLEAR RIVER ENERGY CENTER
WOULD HELP SUPPORT THE FURTHER DEVELOPMENT OF RENEWABLE
ENERGY RESOURCES IN THE ISO-NE REGION, INCLUDING RHODE ISLAND?**

A. Yes. Flexible and efficient generation, such as Clear River Energy Center, broadly helps ensure reliability is maintained in a least-cost and efficient manner. However, flexible generation is also critically important in markets with the expansion of variable and intermittent renewable energy, such as wind and solar. For example, wind generation's intermittent and at times unpredictable nature (e.g., wind ramp-down events where wind stops blowing suddenly) requires flexible generation that can ramp up quickly to respond to changes in wind generation in order to maintain reliability. The same is true for other variable non-dispatchable generation such as solar. ISO-NE has recognized this system need. In the ISO's 2016 State of the Grid report, ISO-NE states that "growing levels of variable generation will require a fleet of flexible resources to successfully integrate." As a new highly flexible resource, Clear River Energy Center will help ISO-NE be able to more reliably integrate renewable resources across the New England footprint, including in Rhode Island.

1.3 MODELING APPROACH

1 **Q. CAN YOU PLEASE DESCRIBE PA’S ENERGY MARKET MODELING**
2 **METHODOLOGY?**

3 A. PA has a robust, well-developed, and industry-tested fundamental modeling process,
4 including its proprietary stochastic dispatch optimization, capacity compensation, environmental,
5 renewable, and valuation models along with the use of production cost, transmission, and natural
6 gas models that are operated by PA’s subject matter experts and populated with PA proprietary
7 data.

8 PA utilizes AURORA^{xmp5} for its production cost modeling in order to dispatch generation units
9 to minimize total system cost, and PA analyzes both fixed and future capital costs required to
10 meet electric demand and ensure system reliability. The latter analysis results in a projection of
11 incremental compensation required to maintain reliability, which existing generation should be
12 measured against. PA’s proprietary environmental optimization model integrates the natural gas-
13 power-coal sectors, as well as the coal generator capital expenditure versus coal selection and
14 resulting emission price, paradigms. PA also utilizes its proprietary stochastic model to assess
15 specific generator operations and economics relative to the electric system and under power
16 purchase agreements, as necessary, as well as to assess financial hedges and fuel transportation
17 rights.

18 I have prepared a more detailed overview in the Memorandum on Clear River included as
19 **Exhibit RH-3** in the section titled “Modeling methodology overview,” Pages 1-2.

20 **Q. WHAT ARE THE KEY ASSUMPTIONS THAT PA USED IN ITS MODELING?**

21 A. PA views power markets within the context of six key value drivers (i.e., major
22 assumptions) that are directly integrated into PA’s fundamental market modeling process. These

⁵ EPIS, Inc.

1 key drivers include market structure, fuels (e.g., natural gas, coal, and fuel oil), environmental
2 regulations, supply and demand, cost of new entry, and transmission. PA's specific assumptions
3 are available in the Memorandum on Clear River included as **Exhibit RH-3**.

4 **Q. WHAT GEOGRAPHIC AREA DID PA CONSIDER IN ITS UNDERLYING**
5 **ANALYSIS AND MODELING?**

6 A. PA modeled the entire Eastern Interconnect, focusing in on the ISO-NE and New York
7 ISO ("NYISO") regions.

8 **Q. WHY DID PA SELECT TO REPORT THIS GEOGRAPHIC REGION INSTEAD**
9 **OF RHODE ISLAND ONLY?**

10 A. Rhode Island is part of the broader ISO-NE market, which is an integrated electric system that
11 centrally dispatches electricity across the New England region (i.e., across ISO-NE). Due to this
12 integrated nature, it would be inappropriate to report the impacts of Clear River Energy Center
13 on just Rhode Island specifically. PA also considered NYISO due to New York being party to
14 the RGGI, and the high degree of interconnectivity (approximately 2 GW of transfer capability)
15 between ISO-NE and NYISO.

16 **Q. DOES REPORTING THESE GEOGRAPHIES AMOUNT TO CHERRY**
17 **PICKING?**

18 A. Absolutely not. This is the most appropriate way to represent the electricity system and
19 impacts on greenhouse gas emissions. The ISO-NE and NYISO footprints have a high degree of
20 interconnectivity and seams agreements that help to facilitate the participation of a resource in
21 either market's wholesale energy and capacity markets. For example, on December 16, 2015,
22 ISO-NE and NYISO went live on a new interregional market system to streamline energy
23 exchanges between the two ISOs by utilizing Coordinated Transaction Scheduling ("CTS")

1 which enables the more efficient use of interregional transmission lines and, therefore, better
2 access to the lowest-cost source of power between the two regions. In other words, it is incorrect
3 to look at the operation of ISO-NE as an “island” from an electricity market perspective, and one
4 needs to consider surrounding impacts (including emissions impacts).

5 **1.4 Ratepayer impact**

6 **Q. WILL CLEAR RIVER ENERGY CENTER LOWER WHOLESALE POWER**
7 **COSTS TO RHODE ISLAND RATEPAYERS?**

8 A. Yes, absolutely. From 2019-2022, the presence of Clear River Energy Center is projected
9 to save Rhode Island ratepayers approximately \$210 million.

10 **Q. HOW WERE THE \$210 MILLION IN SAVINGS TO THE RHODE ISLAND**
11 **RATEPAYER CALCULATED? HOW DID THE SAVINGS BREAK DOWN BETWEEN**
12 **CAPACITY AND ENERGY COST SAVINGS?**

13 A. Cost savings to the ratepayer will accrue primarily through wholesale capacity and
14 energy markets. The \$210 million represents the difference in total capacity and energy costs to
15 Rhode Island-only load resulting from the Clear River Energy Center capacity addition, as
16 measured by comparing cost results from capacity and energy modeling cases (a) with Clear
17 River Energy Center coming online in two stages: 2019 (485 MW) and 2020 (an additional 485
18 MW); and (b) without Clear River Energy Center.

19 With Clear River Energy Center:

- 20 • Capacity cost savings to Rhode Island ratepayers were calculated to be \$170 million from
21 2019-2022, or \$42 million annually on average.
- 22 • Energy cost savings to Rhode Island ratepayers were calculated to be \$41 million for
23 2019-2022, or nearly \$10 million annually.

**Q. WHY WILL CLEAR RIVER ENERGY CENTER RESULT IN CAPACITY
MARKET SAVINGS TO THE RHODE ISLAND RATEPAYER?**

A. As stated, ISO-NE's FCM capacity procurement mechanism is utilized by ISO-NE market participants as a means to ensure that the ISO-NE power system has sufficient resources to reliably meet the future demand for electricity. Resources that clear an FCA are the resources that maximize social surplus in order to meet both system-wide and local reliability needs. Stated simply, as supply gets tighter (i.e., reserve margins decline), capacity prices will increase, all else being equal. When new generation capacity enters the market it increases the reserve margin, which, all else equal, results in lower capacity prices, thereby saving ratepayers money. Additional information regarding these FCM dynamics is included in **Exhibit RH-2**.

**Q. WHY WILL CLEAR RIVER ENERGY CENTER RESULT IN ENERGY
MARKET SAVINGS TO THE RHODE ISLAND RATEPAYER?**

A. Clear River Energy Center will be a very efficient combined cycle facility. It will generate low-cost energy that will displace higher cost generation, including output from coal-, oil-, and less efficient natural gas-fired facilities (a list that would include almost all existing natural gas-fired generation in New England). Stated simply, Clear River Energy Center will reduce system energy costs and save ratepayers money, and we know from my analysis that the energy cost savings to Rhode Island ratepayers will be significant.

**Q. HOW WERE THE SAVINGS IN RHODE ISLAND CAPACITY MARKET
COSTS CALCULATED?**

A. Capacity costs to Rhode Island-only load are allocated by ISO-NE based on the capacity auction clearing price and Rhode Island's share of the system-wide peak demand. PA calculated Rhode Island's share of the system-wide peak demand by multiplying Rhode Island's annual

1 peak demand, in megawatts, by 1 + the actual realized reserve margin, to account for the excess
2 capacity that ISO-NE procures in the FCM in order to ensure peak demand is met even if outages
3 occur.

4 To calculate any capacity cost savings under ISO-NE's capacity cost allocation methodology,
5 PA started by comparing the annual projected FCM Rest of Pool ("ROP") clearing prices from
6 the "With Clear River Energy Center" and "Without Clear River Energy Center" scenarios for
7 auctions starting with FCA 10 (the 2019/2020 delivery year). The difference in clearing prices
8 between the two scenarios in each delivery year was then multiplied by Rhode Island's share of
9 the system-wide peak demand to determine the savings to Rhode Island-only load as a result of
10 Clear River Energy Center.

11 **Q. HOW WERE THE SAVINGS IN RHODE ISLAND ENERGY MARKET COSTS**
12 **CALCULATED?**

13 A. The energy cost to Rhode Island-only load for each case was calculated using projected
14 Rhode Island-area energy prices from PA's fundamental production cost analysis (utilizing the
15 AURORA^{xmp} software and PA's underlying market assumptions) for the "With Clear River
16 Energy Center" and "Without Clear River Energy Center" modeling cases.

17 **Q. DID THE ANALYSIS CONDUCTED BY PA CONSIDER ALL RELEVANT**
18 **COMPLIANCE COSTS ASSOCIATED WITH EMISSIONS PROGRAMS INCLUDING**
19 **RGGI, CLIMATE CHANGE (RESILIENT RHODE ISLAND ACT) AND OTHER**
20 **EMISSIONS PROGRAMS?**

21 A. Yes, PA's analysis included all compliance costs associated with existing emissions
22 programs, for both Clear River and all other generating facilities located within the geographic
23 footprint analyzed by PA. For example, PA's analysis includes compliance costs for the RGGI

1 program, and compliance costs associated with the EPA’s Cross State Air Pollution Rule
2 (“CSAPR”) for SO₂ and NO_x emissions.⁶ Given that there are no explicit compliance programs
3 related to the Resilient Rhode Island Act that have been proposed and/or promulgated, PA has
4 not included any specific compliance costs associated with this law.

5 **1.5 Environmental Impacts**

6 **Q. DID YOU CALCULATE THE EMISSIONS IMPACTS OF CLEAR RIVER**
7 **ENERGY CENTER?**

8 A. Yes.

9 **Q. WHAT METHODOLOGY DID YOU USE?**

10 A. I used the same methodology previously described to calculate energy prices.

11 **Q. BASED ON THIS APPROACH, DO YOU FORECAST A DECLINE IN**
12 **EMISSIONS FOR THE NEW ENGLAND AND NEW YORK FOOTPRINT?**

13 A. Yes. Annual average emissions reductions from 2019-2022, due to the addition of Clear
14 River Energy Center, are projected to be on average 1,037,000 short tons for CO₂, 2,399 short
15 tons for NO_x and 2,984 short tons for SO₂. This equates to annual emission reductions of 1.01%
16 for CO₂, 3.12% for NO_x and 3.35% for SO₂ for this region.

17 **Q. EXCLUDING NEW YORK, DO YOU FORECAST A DECLINE IN EMISSIONS**
18 **FOR JUST THE ISO-NE REGION?**

19 A. Yes. Annual emissions reductions from 2019-2022, due to the addition of Clear River
20 Energy Center, are projected to be 135,000 short tons for CO₂, 1,441 short tons for NO_x and

⁶ Note that the CSAPR program does not directly impact the ISO-NE footprint (or generators located therein) due to the fact that the rule’s coverage area does not extend north of New York.

1 2,208 short tons for SO₂. This equates to annual emission reductions of 0.25% for CO₂, 4.84%
2 for NO_x and 5.40% for SO₂.

3 **Q. DO YOU FORECAST A DECLINE IN EMISSIONS FOR THE ENTIRETY OF**
4 **THE REGIONAL GREENHOUSE GAS INITIATIVE FOOTPRINT?**

5 A. Yes. Annual emissions reductions from 2019-2022, due to the addition of Clear River
6 Energy Center, are projected to be 1,014,000 short tons for CO₂, 2,359 short tons for NO_x and
7 2,936 short tons for SO₂. This equates to annual emission reductions of 0.84% for CO₂, 2.64%
8 for NO_x and 2.83% for SO₂.

9 **Q. HOW DOES THE ADDITION OF A HIGHLY EFFICIENT NATURAL GAS**
10 **COMBINED CYCLE FACILITY LOWER ENVIRONMENTAL EMISSIONS?**

11 A. The net system-wide decrease is largely driven by highly efficient natural gas-fired
12 combined cycle generators, such as Clear River Energy Center, requiring less fuel per unit of
13 energy generated than less efficient competing generators. This results in both emissions and
14 economic advantages relative to existing generators. As such, Clear River Energy Center will
15 displace less efficient (and less environmentally-friendly) resources that are currently dispatched
16 on the power system.

17 **Q. WHAT IS RGGI?**

18 A. RGGI is the first market-based regulatory program in the United States explicitly directed
19 at reducing greenhouse gas emissions from the power sector. It is a cooperative cap-and-trade
20 program among Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New
21 York, Rhode Island and Vermont. RGGI recognizes that greenhouse gas emissions are a global
22 issue, and not a localized emissions issue.

23 **Q. IS RHODE ISLAND PARTY TO RGGI?**

1 A. Yes. Rhode Island was a leader by participating in the initial negotiations that informed
2 the original memorandum of understanding that formed RGGI in 2005, and officially signed on
3 to RGGI with the General Assembly's passage and Governor's signature of The Implementation
4 of the Regional Greenhouse Gas Initiative Act of 2007.

5 **Q. DOES THE IMPLEMENTATION OF RHODE ISLAND'S REGIONAL**
6 **GREENHOUSE GAS INITIATIVE ACT REQUIRE RHODE ISLAND'S**
7 **PARTICIPATION IN RGGI?**

8 A. Yes.

9 **Q. WHAT IS THE LEGISLATIVE INTENT OF THE IMPLEMENTATION OF THE**
10 **REGIONAL GREENHOUSE GAS INITIATIVE ACT?**

11 A. According to the Legislative Findings under § 23-82-2 of the Act, "Rhode Island's
12 implementation of the Regional Greenhouse Gas Initiative, (hereinafter referred to as "RGGI"),
13 should be managed to maximize the state's contribution to lowering carbon emissions while
14 minimizing impacts on electric system reliability and costs to Rhode Island power consumers
15 over the long term." Additionally, the legislative findings include that "it is the intent of the
16 General Assembly in enacting this chapter that the state of Rhode Island shall fulfill the mutual
17 understandings and commitments of the regional greenhouse gas initiative so that the state may
18 fully participate in that initiative and all sales or auctions and other proceedings as may be
19 established under that initiative."

20 **Q. DOES THE ADDITION OF CLEAR RIVER ENERGY CENTER HELP RHODE**
21 **ISLAND LOWER REGIONAL CARBON EMISSIONS WHILE MINIMIZING**
22 **IMPACTS ON ELECTRIC SYSTEM RELIABILITY?**

1 A. Yes. As I demonstrated above, the addition of Clear River Energy Center is necessary for
2 system reliability, and will also help lower regional carbon emissions.

3 **Q. WILL THE ADDITION OF CLEAR RIVER ENERGY CENTER NEGATIVELY**
4 **IMPACT THE ABILITY OF RHODE ISLAND OR NEW ENGLAND TO MEET**
5 **BINDING CO2 EMISSION REDUCTION TARGETS?**

6 A. No. As a participant in the RGGI, all thermal generators greater than 25 MW located
7 within Rhode Island are subject to RGGI program CO₂ emissions caps. As such, the addition of
8 Clear River Energy Center will not impact the overall emissions reduction goals of RGGI given
9 its emissions are also accounted for under the RGGI cap. Moreover, given the likelihood that the
10 addition of Clear River Energy Center will actually lead to an overall decrease in regional CO₂
11 emissions given the high efficiency of the unit (see previous section), it may lead to an overall
12 less costly compliance trajectory for the region under the RGGI program. In other words, the
13 addition of Clear River Energy Center could help save Rhode Island ratepayers costs associated
14 with the state's participation in the RGGI program.

15 In addition, as a new unit, Clear River Energy Center may not be subject to the EPA's recently
16 finalized CPP, which addresses CO₂ emissions from existing thermal resources. However, the
17 final version of the CPP does allow states to address leakage of CO₂ emissions under the rule
18 through inclusion of new sources via a concept called new source complements. If a state
19 chooses to include new resources in a State Implementation Plan ("SIP") for the CPP, the state
20 emissions budget is credited with additional allowances to cover incremental future demand
21 growth that would be presumably served by new sources. The EPA's calculations to derive the
22 emissions associated with incremental demand growth served by new sources assume a CO₂
23 emissions rate from these sources of 1,030 lbs/MWh. This is notably much higher than the

1 expected emissions rate of Clear River which would be around 760 lbs/MWh. The result is that
2 even if Clear River is included in the yet-to-be-developed SIP for Rhode Island, it potentially
3 produces fewer emissions than would be added to the state budget from its inclusion in the rules.
4 It is my opinion that the likely pathway for CPP compliance in the New England states,
5 including Rhode Island, is a regional approach through the continuation of the RGGI program
6 which currently includes new resources under its emissions caps. It is likely that this program
7 will continue to include new resources as a compliance approach, and the inclusion of a low-
8 CO₂-emitting and highly efficient resource such as Clear River would actually help the region to
9 meet CO₂ caps under the CPP and drive down compliance costs for ratepayers in New England,
10 including those in Rhode Island.⁷

11 **Q. DOES THE CONSTRUCTION AND OPERATION OF CLEAR RIVER ENERGY**
12 **CENTER RUN COUNTER TO OBJECTIVES LAID OUT IN THE RESILIENT RHODE**
13 **ISLAND ACT?**

14 A. Absolutely not. The Resilient Rhode Island Act was enacted to help reduce overall *global*
15 emissions regarding the *global* issue of climate change. In particular, as described by
16 Conservation Law Foundation’s witness J. Timmons Roberts’ pre-filed testimony before the
17 EFSB on Page 10 Line 18, the carbon-emission-reduction goals in the Resilient Rhode Island
18 Act are based on an overarching goal to see the “reduction of *worldwide* carbon emissions by
19 80% below 1990 levels by 2050 [emphasis added].” This is the target set by the Resilient Rhode
20 Island Act at R.I. Gen. Laws § 42-6-2.2.

21 Moreover, the Resilient Rhode Island Act states that among the goals of the Rhode Island
22 Executive Climate Change Coordinating Council is to “work with other New England states to

⁷ Current regulations contemplate a final version or draft of the SIP to be submitted no later than September 2016.

1 explore areas of mutual interest to achieve common goals” (R.I. Gen. Laws § 42-6-2.2(a)(8)).

2 The common goal here is regional CO₂ reduction, in support of the overarching goal of
3 *worldwide* carbon emissions reductions, and Clear River Energy Center advances that objective
4 as noted in my prior responses with regard to the RGGI program.

5 While the Rhode Island Executive Climate Change Coordinating Council has not issued its
6 strategic planning document, a planning document issued by the Massachusetts Secretary of the
7 Executive Office of Energy and Environmental Affairs in compliance with a similar law, the
8 Massachusetts Global Warming Solutions Act, concluded that new natural gas generation can
9 comport with targeted reductions to “act as a bridge to a clean energy future” (Climate Change
10 Plan at 39). Professor Roberts identifies the Massachusetts Global Warming Solutions Act as a
11 similar law to the Resilient Rhode Island Act, and, within the context of this law, the
12 Massachusetts EFSB determined that a natural gas-fired combined cycle development project
13 similar to Clear River Energy Center (the Footprint Power Salem Harbor Station) is consistent
14 with the Massachusetts Global Warming Solutions Act. The Massachusetts EFSB concluded that
15 “*New England* fossil fuel units displaced by Footprint in the foreseeable future would yield GHG
16 [(greenhouse gas)] and criteria pollutant emission reductions on a net basis under any plausible
17 modeling scenario [emphasis added].”⁸ This recognition by the Massachusetts EFSB of the
18 regional nature of carbon emissions efforts as compatible with the Commonwealth’s Global
19 Warming Solutions Act to help meet global greenhouse emission goals further supports my
20 opinion that the Clear River Energy Center’s regional benefits in carbon reductions, by

⁸ In *RE: Footprint Power Salem Harbor Development LP For Approval to Construct a Bulk Generating Facility in the City of Salem, Massachusetts*, EFSB 12-2 (Final Decision 10/10/2013) at pp 27-32 (emphasis added).

1 displacing more polluting generation resources, is in complete support of the goals and targets
2 set by the Resilient Rhode Island Act.

3 Moreover, with the most recent natural gas generation project approved (in 2013) by the
4 Connecticut Siting Board (the Towantic project), the Connecticut EFSB did not even consider
5 the project for compliance with the Conn. Global Warming Act, which Professor Roberts also
6 identifies as a similar law to the Resilient Rhode Island Act.

7 In any event, Professor Roberts explained (at page 21) that “he performed no analysis on the
8 overall effect on carbon emissions for that seven state area . . .” I did that regional analysis, as I
9 describe above, and this regional approach is consistent with the regional goals that are set forth
10 in RGGI and the Resilient Rhode Island Act, and are compatible with the regional nature of the
11 electric generation market managed by the ISO-NE.

12 Even if one was to take the view that the legislative intent of the Resilient Rhode Island Act is to
13 directly reduce CO₂ emissions within the state, a significant component of CO₂ emissions
14 triggered by Rhode Island ratepayers would be missed by stopping an analysis at the State’s
15 border given Rhode Island’s electricity load is served by power imported from other portions of
16 ISO-NE (much of which is carbon emitting fossil power). Within a CO₂ accounting context, such
17 a point of view would result in emissions “leakage” – in other words, not properly accounting for
18 the impacts of emissions “outside” of a specified region even though emissions in that area
19 “outside” of the specified region are impacted by activities “inside” the specified region. This is
20 not a unique issue. For example, within California’s state CO₂ cap-and-trade program (AB 32),
21 electricity that is imported into the state is “taxed” based on the CO₂ intensity of the imported
22 generation – given the high degree to which the state relies on power imports to meet in-state
23 electricity needs.

1 Finally, if one were to take such a “Rhode Island-only” point of view to its logical (and
2 extremely hypothetical) conclusion, analyzing Rhode Island as an electrical and emissions island
3 thereby necessitates a worldview that Rhode Island, in the future, will generate all of its energy
4 needs within the state. While I have not performed an analysis to better understand such a
5 hypothetical scenario, in this worldview, Rhode Island’s CO₂ emissions and ratepayer costs
6 would almost certainly go up given the need for more baseload and quick-start generation to be
7 constructed in the state (even if a portion of those in-state needs were eventually met with
8 renewable generation given the need to balance the intermittency of this generation).

9 **1.6 Economic Impact**

10 **Q. DID YOU ANALYZE THE ECONOMIC IMPACT OF CLEAR RIVER ENERGY**
11 **CENTER?**

12 A. Yes, PA was retained to evaluate the economic development impacts resulting from the
13 construction and ongoing operation of the Clear River Energy Center.

14 **Q. IN COMPLETING THIS ECONOMIC ANALYSIS, DID YOU COLLABORATE**
15 **WITH ANY RHODE ISLAND EXPERTS ON THE TOPIC? IF SO, WHO?**

16 A. Yes, PA collaborated with Professor Edinaldo Tebaldi. Dr. Tebaldi is an associate
17 professor of economics at Bryant University. He also serves as the Rhode Island forecast
18 manager for the New England Economic Partnership (“NEEP”). He is an applied econometrician
19 with research interests in economic growth, development and labor market outcomes. Dr.
20 Tebaldi has published several articles in refereed journals and co-authored a number of economic
21 impact assessment studies and reports analyzing economic conditions across New England
22 States.

Q. PLEASE DESCRIBE THE METHODOLOGY EMPLOYED TO ESTIMATE THE ECONOMIC IMPACTS?

A. To estimate the magnitude of the resulting economic impacts, the study uses input-output (“I-O”) analysis. I-O analysis accounts for inter-industry relationships within a city, state or expanded area, and employs the resulting economic activity multipliers to estimate how the local economy will be affected by a given investment (in this case, the construction and ongoing operation of the Clear River Energy Center facility).

Multiplier analysis is based on the notion of feedback through I-O linkages among firms and households who interact in regional markets. Firms buy and sell goods and services to other firms and pay wages to households. In turn, households buy goods from firms within the economic region. Thus, the economic impact of Clear River Energy Center spreads to other local businesses through direct purchases from them as well as from purchases of locally produced goods and services that are made using the income derived by the employment that has been created. Further impacts occur because of feedback effects – where other local firms require more labor and inputs to meet rising demand for their output, which has been stimulated by Clear River Energy Center’s construction and operation.

The economic impact of Clear River Energy Center’s construction and operation can be categorized as follows:

- Direct Effects – Jobs, income, output and fiscal benefits that are created directly by the construction and ongoing operations of Clear River Energy Center. The jobs (and other benefits) that are created may be short-term, as in the case of construction jobs, or long-term, such as the operations and maintenance positions that exist throughout the life of the generation facility.

- Indirect Effects – Jobs, income, output and fiscal benefits that are created throughout the supply chain and that are spawned by the direct investment to build and operate the facility. Indirect jobs include the jobs created to provide the materials, goods, and services required by the construction and operation of Clear River Energy Center, as well as the jobs created to provide the goods and services paid for with the wages from the direct jobs.

- Induced Effects – Jobs, earnings, output and fiscal benefits created by household spending of income earned either directly from Clear River Energy Center or indirectly from businesses that are impacted by Clear River Energy Center.

Q. WAS THE ANALYSIS COMPLETED USING ANY MODELS OR SOFTWARE DESIGNED FOR THIS TYPE OF ECONOMIC ANALYSIS?

A. Yes, the job creation, earnings and overall economic impact of Clear River Energy Center on Rhode Island were analyzed using project cost specifics and two I-O models: IMPLAN⁹ and the National Renewable Energy Lab’s Jobs and Economic Development Impact model (“JEDI”).

IMPLAN is an economic analysis tool that takes data from multiple government sources and employs an estimation method based on industry accounts or I-O Matrix that allows, using multipliers, to make estimations of how changes in income and spending impact the local economy. IMPLAN estimates are generated by interacting the direct economic impact of Clear River Energy Center with the Regional Input-Output Modeling System (RIMS II) multipliers for

⁹ IMPLAN Group LLC, IMPLAN System (data and software), 16905 Northcross Dr., Suite 120, Huntersville, NC 28078 www.IMPLAN.com.

Rhode Island. The United States Bureau of Economic Analysis (“BEA”) provides these multipliers.

The JEDI model estimates the economic impact of constructing and operating power generation plants at the state level. The JEDI model also uses an I-O methodology and relies on economic multipliers derived from IMPLAN. The JEDI model allows estimating of the economic impact of power generation investment in a state including local labor, services, materials, other components, fuel and other inputs. The model also allows adjusting the portion of project investment that occurs locally.

Q. WILL THE PROJECT HAVE A POSITIVE ECONOMIC IMPACT ON THE STATE OF RHODE ISLAND? WHAT IS THE SOURCE OF THESE ECONOMIC IMPACTS?

A. Yes. As is typical of generation facilities like Clear River Energy Center, the project will create a significant number of jobs and income for Rhode Island workers and will have a very positive impact on the Rhode Island economy. These economic development impacts will result from the following three areas:

1. Construction of the facility – Equipment, materials and labor employed during construction as well as state sales tax, permitting fees and other activities.
2. Ongoing operation of the facility – Fixed and variable costs associated with the materials and labor needed to operate the facility as well as annual property taxes.
3. Power market cost savings to Rhode Island ratepayers – The addition of new efficient generation capacity in Rhode Island will result in lower capacity and power prices, thereby driving significant savings to Rhode Island ratepayers. In addition to direct cost

1 savings, PA has evaluated the induced economic effects on the Rhode Island economy
2 associated with these electricity customer cost savings.

3 **Q. WHAT WAS THE SOURCE OF THE LABOR AND COST INPUTS?**

4 A. Cost and labor inputs related to the construction and ongoing operation of the facility
5 were provided by Invenenergy. Wholesale power markets savings – the reinjection of ratepayer
6 savings into the economy resulting in induced impacts to the Rhode Island economy – were
7 calculated using PA’s projected energy and capacity market prices.

8 **Q. WHAT ARE THE ESTIMATED ECONOMIC IMPACTS OF THE**
9 **CONSTRUCTION AND OPERATION OF THE CLEAR RIVER ENERGY CENTER ON**
10 **THE STATE OF RHODE ISLAND?**

11 A. The construction and ongoing operation of Clear River Energy Center will create
12 hundreds of jobs and drive well over \$1 billion in economic development in Rhode Island. The
13 direct economic impacts themselves will be significant, realized in the form of jobs, income,
14 output and benefits created directly by the construction and ongoing operations of Clear River
15 Energy Center. In addition, Clear River Energy Center will generate significant economic
16 activity in Rhode Island through I-O linkages among firms and households who are affected by
17 its construction and operations.

18 The construction of Clear River Energy Center is expected to generate 388 jobs in 2017 and 492
19 jobs in 2018. Ongoing facility operations will create an additional 25 onsite (direct) jobs and
20 approximately \$2 million in earnings annually from 2020 through 2034. Note that these figures
21 do not include the jobs and earnings associated with the contractors and service professionals
22 that will be involved in the regular operation and maintenance of the facility.

1 The total impact of Clear River Energy Center on the Rhode Island economy, including all
2 direct, indirect and induced economic activity, will be considerably larger. In summary, the job
3 creation, earnings and overall economic impact of the project on the state of Rhode Island are
4 projected as follows:

- 5 • Rhode Island jobs – From 2017-2021, which includes the most intense two years of
6 construction and the first years of operation, Clear River Energy Center will support the
7 creation of just under 800 full-time jobs per year. The construction and operation of Clear
8 River Energy Center alone – i.e., not including the electricity cost savings to the customer
9 – will create an average of more than 660 full-time jobs per year from 2017-2019 and 145
10 full-time jobs per year from 2020 to 2034 in Rhode Island.
- 11 • Rhode Island earnings – From 2017-2021, Clear River Energy Center will support the
12 creation of approximately \$360 million in earnings to Rhode Island workers, or more
13 than \$70 million per year. Earnings to Rhode Island employees as a result of Clear River
14 Energy Center will total more than \$550 million from 2016-2034.¹⁰
- 15 • Rhode Island economic output – From 2017-2021, the total economic impact on Rhode
16 Island is projected to be \$700 million, or approximately \$140 million per year. The
17 overall impact of Clear River Energy Center on the Rhode Island economy will total
18 more than \$1.2 billion from 2016-2034, or an average of \$65 million annually.

19 It is important to note that the most significant economic impacts will be realized in the early
20 years of the project: the construction of Clear River Energy Center will bring significant
21 investment and construction activity to Rhode Island from 2016 to 2019.

¹⁰ The analysis assumes 30 months of construction and a June 2019 commercial online date. As a result, there is one month of construction assumed in 2016 – the small 2016 benefits are excluded from most economic impact considerations, but are included in the analysis period totals (2016-2034).

Q. HAVE THE DESIGN SPECIFICATIONS AND CONSTRUCTION SCHEDULE ASSUMED CHANGED SINCE THE ECONOMIC ANALYSIS WAS COMPLETED?

A. Yes. The facility as currently planned is substantially very similar to the facility envisioned at the time of the economic analysis, but there have been changes to the planned capacity and the construction schedule, and subsequently to the total projected savings to Rhode Island ratepayers that warrant noting.

- Planned capacity – The economic impact analysis was completed assuming a 1,000 MW combined cycle facility, while the facility is now expected to be approximately 970 MW.
- Construction schedule – The economic impact analysis was completed assuming that the plant would be constructed in a single 30-month timeframe and commence commercial operation in June 2019. However, the plant is now expected to be built in two stages – 485 MW, in a 1x1x1 configuration, is projected to come online in June 2019, and an additional 485 MW will come online in June 2020, when the plant is expanded to a 2x2x2 configuration.
- Savings to ratepayer – The current economic impact analysis assumes that Clear River Energy Center results in \$284 million in savings to the Rhode Island ratepayer from 2019-2022, which represents approximately \$280 million in induced economic impacts for the state. Under the latest plant configuration, 2019-2022 savings are projected to be only \$210 million.

Q. HOW WOULD YOU EXPECT THE RESULTS TO BE IMPACTED, IF AT ALL?

A. We have not updated the economic impact analysis to account for these assumption adjustments. The impact of these changes on the projected economic impact of the facility would be determined by the collective impact of the three changes on the cost and level of

1 employment required to construct and operate the facility. Equipment and materials costs would
2 be expected to be slightly lower as a result of the reduced capacity, as would induce economic
3 effects as a result of the lower ratepayer cost savings projections, but the cost of construction
4 would be expected to increase somewhat with the plant being built and brought online in phases.
5 Collective economic impacts would likely decline slightly, but we would still expect the impact
6 of Clear River Energy Center on total economic output in Rhode Island to be well over \$1.0
7 billion from 2016-2034.

8 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

9 **A.** Yes, it does.

REDACTED

**RYAN HARDY
EXHIBITS**

EXHIBIT

RH-1

Ryan Hardy

Member of PA's Management Group



Ryan has over 15 years of experience in energy market advisory services to support strategic planning, generation asset financings, power company restructurings and reorganizations, and power and fuel contract litigation and negotiation support. Ryan has managed the valuation process for numerous asset transactions, including thermal (natural gas, coal), renewable (wind, solar, landfill gas, and biomass) capacity and utility scale battery storage. He has been a strategic advisor to both private equity and utility clients on acquisition strategies, and he is an expert on power market structures including capacity market constructs and their impact on asset values.

Primary expertise	Related experience	Qualifications
<ul style="list-style-type: none"> • Power market advisory services • Asset valuation • Financial restructuring and due diligence • Litigation support 	<ul style="list-style-type: none"> • Battery storage valuation • Landfill gas valuation • Formalized capacity market analysis 	<ul style="list-style-type: none"> • MBA with concentration in finance • Member of American Society of Appraisers • Certified Appraiser, Machinery and Technical Specialty

Primary expertise

Power Market Advisory Services – Ryan possesses extensive experience in wholesale energy markets as it relates to market price forecasting, portfolio valuation, due diligence, and contract analysis

Asset Valuation – Ryan has amassed extensive valuation experience with thermal and renewable asset types including coal, natural gas, hydro, geothermal, wind, solar, biomass, landfill gas, and battery storage

Financial Restructuring and Due Diligence – Ryan has led fundamental analysis and forecasting efforts for two of the largest restructuring efforts in the energy industry including valuation, budgeting, and power and fuel contract renegotiations

Litigation Support – Ryan has supported power and fuel contract dispute resolution through providing analysis and strategic guidance to regulatory bodies supporting stakeholders with capacity market development

Key client achievements

Served as project manager and trusted advisor to \$3 B hedge fund providing quarterly power market updates and serving as the analytic arm to this active participant in power market investments. Provided numerous case studies examining complex scenarios around transmission development, demand growth, renewable investment, and environmental legislation.

Retained by a major Southeast utility to provide market insights and articulate the investment climate of power markets outside of its native service territory as part of a corporate initiative to explore strategic asset acquisition opportunities. Analyzed seven power markets including an analysis of major market players, typical contract structures, market operations, and environmental regulations. In addition, PA evaluated the potential acquisition of a major wind developer and our presentation provided supporting materials for the company's board of directors to approve the acquisition of a 100 MW biomass power generating facility.

Served as the strategic advisor to a major Independent Power Producer seeking to develop over \$2 B in new power generation projects in New Jersey, Maryland, New York, and California, among others. I have worked closely with members of management to provide analysis and strategic support for both equity and debt-raising efforts, and I have presented market and asset analysis to potential investors, investment banks, and rating agencies resulting in the successful development of natural gas-fired combined cycle projects.

Retained to provide negotiation support for long-term power contracts, asset analytics and strategic support for

power plant acquisitions and financings. Key strategic support included detailed analysis of potential contract counterparties and in-depth analysis of cogeneration power facilities including optimization analysis around the provision of power (energy and capacity), steam, and ancillary services.

Retained as a strategic advisor by the management group of this IPP to help develop its growth strategy. In particular, I developed a process to evaluate diversification options to the IPP's current power generating portfolio, as a means to reduce overall portfolio risk. As part of this process, I conducted an independent review of the IPP's current power generating portfolio, performed an in-depth analysis of all U.S. power markets, identified areas for strategic growth, and ultimately highlighted specific generation technologies, markets, and specific assets that would complement the client's current portfolio, and presented multiple executive-level presentations for the client to formulate its growth platform.

Served as project manager for PA's engagement with a start-up firm to provide independent market analysis and insight in support of the client's development of utility scale battery storage technology. PA provided a detailed description of U.S. power markets and analyzed the potential for the technology to earn energy, capacity, and ancillary services margins as both a standalone project and in conjunction with wind generation. PA utilized a proprietary storage dispatch model to evaluate the technology and forecast returns and net present value under various market scenarios. PA worked with the client to develop a presentation for use in discussions with potential partners such as utilities and wind developers.

Additional experience

From 2009-2010, Mr. Hardy assisted with the development of a coalition to develop a green bank at the federal level to fund renewables, transmission and distribution. The Coalition was formed in order to advocate and support an entity funded by the government that would provide financing opportunities for clean energy technologies. Ryan's work with the Coalition involved driving initiatives such as analysis and presentations used in discussions with members of Congress and other stakeholders, hosting and speaking at stakeholder conferences and meeting with Congressmen about the Green Bank and its goals. Through its work, the Coalition facilitated the inclusion of the Clean Energy Deployment Administration (CEDA)/Green Bank in the Waxman Markey bill that passed in the House of Representatives, which encompasses many of the goals of the Coalition.

In 2008, Ryan supported a private equity firm in performing a valuation on a portfolio of landfill gas generating assets in the state of New York. PA's valuation of the portfolio was conducted in support of a potential acquisition and included analysis related to energy, capacity, and renewable energy credit (REC) markets. PA also conducted an analysis of the contracts in the landfill gas portfolio, which included landfill gas procurement, REC contracts, and forward capacity contracts. In addition to providing a forecast of plant cash flows, PA submitted a market expert report to the client outlining the Northeast power markets and the portfolio's ability to sell into both the New York and New England markets. The explanation of risk factors and projected cash flows for the portfolio allowed the client to determine a suitable price under which they would complete the transaction.

In 2007, Ryan managed the auction process for the sale of the client's 50 MW peaking facility in ERCOT. Drafted information memorandum and acted as lead arranger in the two-stage auction resulting in the successful sale of the power plant.

Over several years, Ryan led the fundamental valuation effort for Calpine's U.S. generating portfolio consisting of natural gas combined cycles, combustion turbines, cogen facilities, and geothermal plants. Conducted claims analysis for power and steam contracts for various facilities, and contributed to the company's plan for reorganization.

Performed litigation analysis involving the alleged violation of EPA regulations. Project work included interpreting results of the IPP's independent production cost modeling and recreating forecasts using PA's applications. Results of this analysis were incorporated into expert testimony. Due diligence was performed on all company documentation and depositions regarding the violations. Additional analysis was done to prepare rebuttal of opposing side's testimony.

EXHIBIT

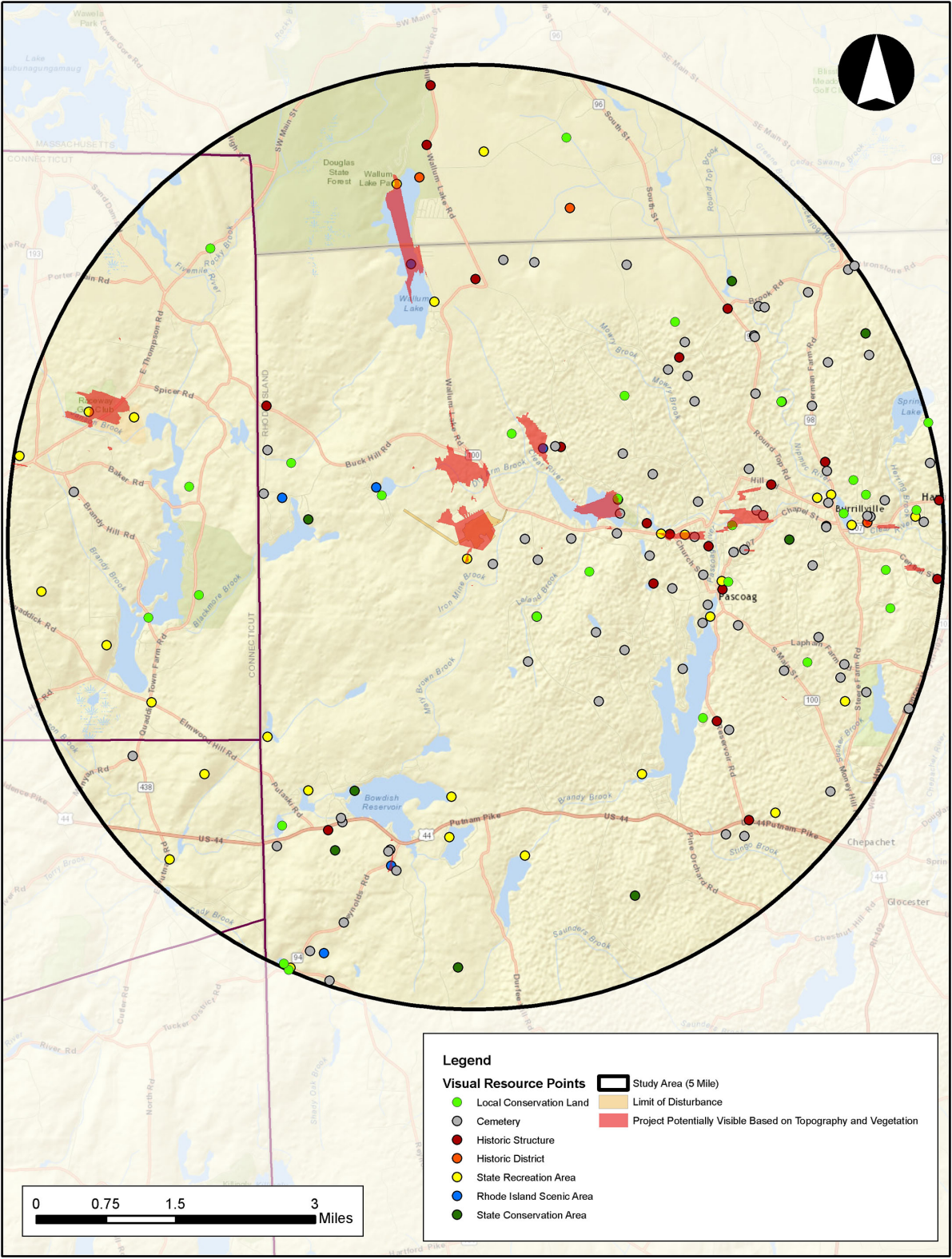
RH-2

(REDACTED)

EXHIBIT

RH-3

(REDACTED)



Legend

Visual Resource Points

- Local Conservation Land
- Cemetery
- Historic Structure
- Historic District
- State Recreation Area
- Rhode Island Scenic Area
- State Conservation Area
- Study Area (5 Mile)
- Limit of Disturbance
- Project Potentially Visible Based on Topography and Vegetation

0 0.75 1.5 3 Miles

Office of Energy Resources EFSB-2015-06 Advisory Opinion

Public Workshop and Comment Opportunity

*Center for Biotechnology & Life Sciences
Ryan Family Auditorium, Room 100
University of Rhode Island (Kingston Campus)*

*July 21, 2016
10:00 AM – 1:00 PM*



STATE OF RHODE ISLAND

**OFFICE OF
ENERGY RESOURCES**

Public Comment

There will be an opportunity for public comment at the end of today's workshop.

If you would like to deliver public comment, please use the sign-up sheets located at the front or rear of the room.

OER also encourages the submission of written comments. Comment may be submitted through August 1st at: DOA.publiccomment@energy.ri.gov

Workshop Overview

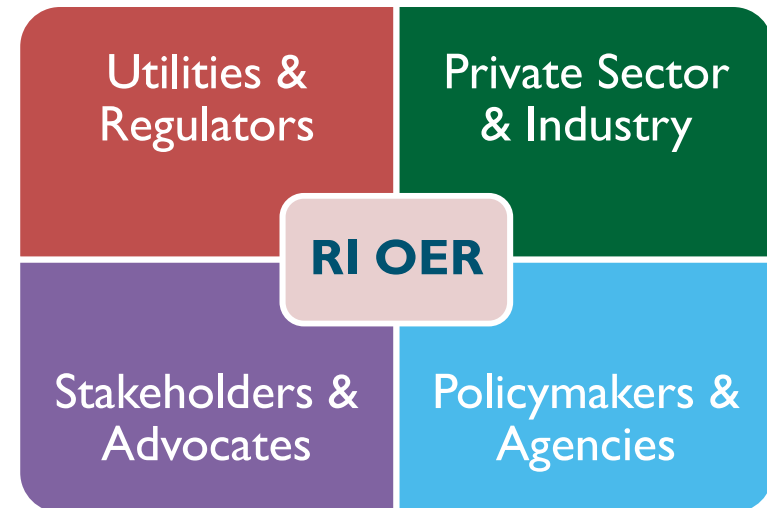
- **Welcome and Introductions**
- **Purpose of Workshop**
- **Background on Proposed Facility & OER Advisory**
- **Technical Presentation on GHG Analysis**
- **DEM's Air Pollution Control Permit Process**
- **Public Comment**

Office of Energy Resources

Leading Rhode Island to a secure, cost-effective, and sustainable energy future.



OER is the lead state agency on energy policy and programmatic matters



OER works closely with diverse partners to advance Rhode Island as a national leader in the clean energy economy

Workshop Purpose

- Provide the public with an overview of OER's approach to developing its advisory opinion to the Energy Facility Siting Board
- Provide administrative updates by OER & DEM
- Provide a forum for Public Comment relative to GHG emission-related issues and OER's advisory opinion

Today's workshop will be transcribed and posted on OER's website: www.energy.ri.gov

Background on Proposed Facility and OER Advisory Opinion



STATE OF RHODE ISLAND

**OFFICE OF
ENERGY RESOURCES**

Clear River Energy Center

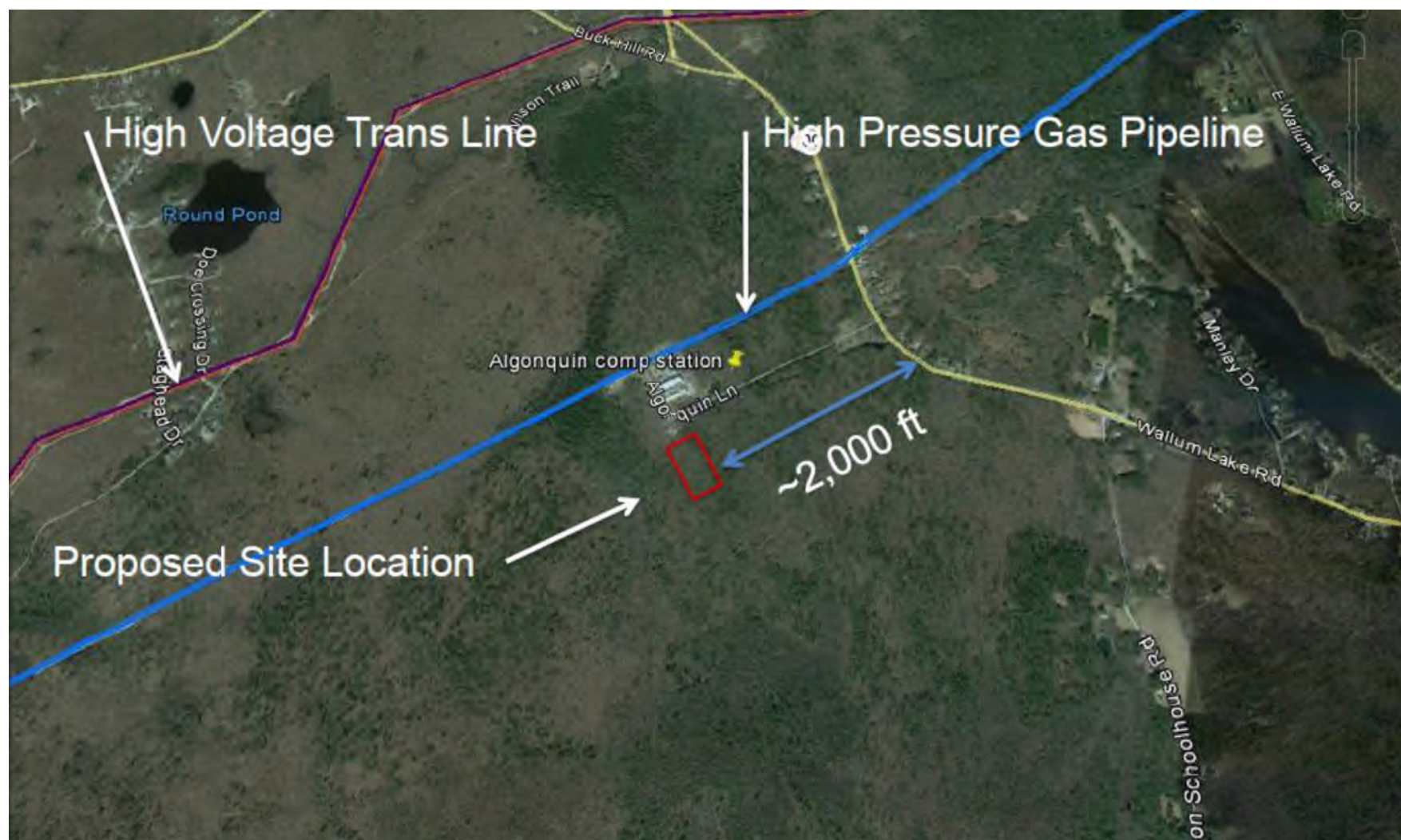
- **≈ 1,000 MW combined cycle power plant, consisting of two generation units:**
 - Primarily fueled with natural gas
 - Ultra-low sulfur diesel as backup fuel when gas not available, stored in 2 on-site tanks, each 1 million gallons
- **36-month construction schedule**
- **Commercial Operation**
 - June 1, 2019 in-service date for Unit 1
 - June 1, 2020 in-service date for Unit 2

Clear River Energy Center

CREC Project Rendering



Project Location in Burrillville



EFSB Advisory Opinions

- The Energy Facility Siting Board (EFSB) has requested Advisory Opinions from twelve (12) local and state agencies on various components of the Clear River Energy Center proposal:

EFSB-2015-06 Advisory Agencies	
Public Utilities Commission	Burrillville Planning Board
Department of Environmental Mgmt.	Burrillville Zoning Board of Review
Department of Health	Burrillville Building Inspector
Department of Transportation	Burrillville Tax Assessor
Statewide Planning Program	Pascoag Utility District
Office of Energy Resources	Historical Preservation & Heritage Comm.

OER Advisory Opinion

- **EFSB tasked OER to collaborate with the RI Executive Climate Change Coordinating Council (EC4) and DEM to examine:**
 - The impacts of the Facility on anticipated greenhouse gas emissions...and the cumulative impact over the life of the project...
 - Whether the Facility will conform to the requirements and provisions of the Resilient Rhode Island Act...and state energy policies

EC4 & Resilient RI Act

- **EC4 established through Resilient RI Act (§42-6.2) with responsibility and oversight relating to assessing, integrating, and coordinating climate change efforts across state government**
- **The Act requires EC4 to develop a plan/strategies (by Dec 31, 2016) to meet the following GHG reductions:**
 - Ten percent (10%) below 1990 levels by 2020
 - Forty-five percent (45%) below 1990 levels by 2035
 - Eighty percent (80%) below 1990 levels by 2050

OER Advisory Opinion

- To support development of its advisory opinion, OER proposed to hold a Public Workshop and accept public comment:
 - EC4 endorsed this process at its May 11th meeting
 - OER will report back to EC4 in August
- OER contracted with Levitan & Associates to provide consultant services relative to its advisory opinion on potential GHG and state energy policy impacts
- OER has no permitting authority related to this project.

Upcoming Timelines

- OER Public Workshop on GHG Impacts on July 21
- OER reports to EC4 in August
- All Advisory Opinions due to EFSB on September 10
- EFSB Hearings throughout October – early-December
- EFSB Open Meeting (decisional) to follow hearings

Please note that the EFSB has not yet set a final procedural schedule beyond September 10. Dates are subject to change.

*Please visit EFSB website for more information:
www.ripuc.org/efsb/2015_SB_6.html*

Technical Presentation on GHG Analysis



STATE OF RHODE ISLAND
**OFFICE OF
ENERGY RESOURCES**

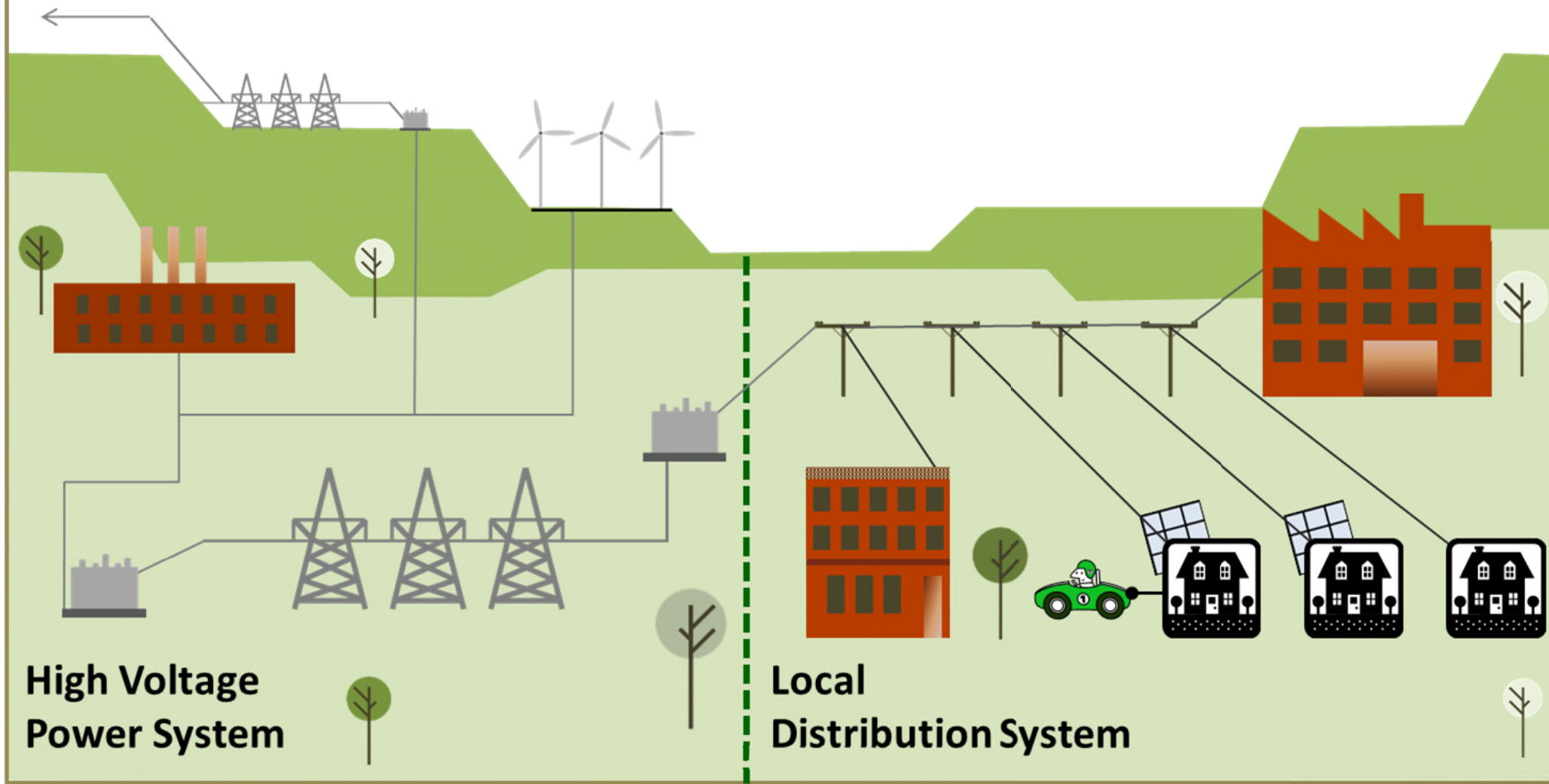
Framing the Issue

- Overview of the New England energy system
- Accounting for GHG emissions on a regional basis
- Current levels of GHG emissions and the state's long-term goals

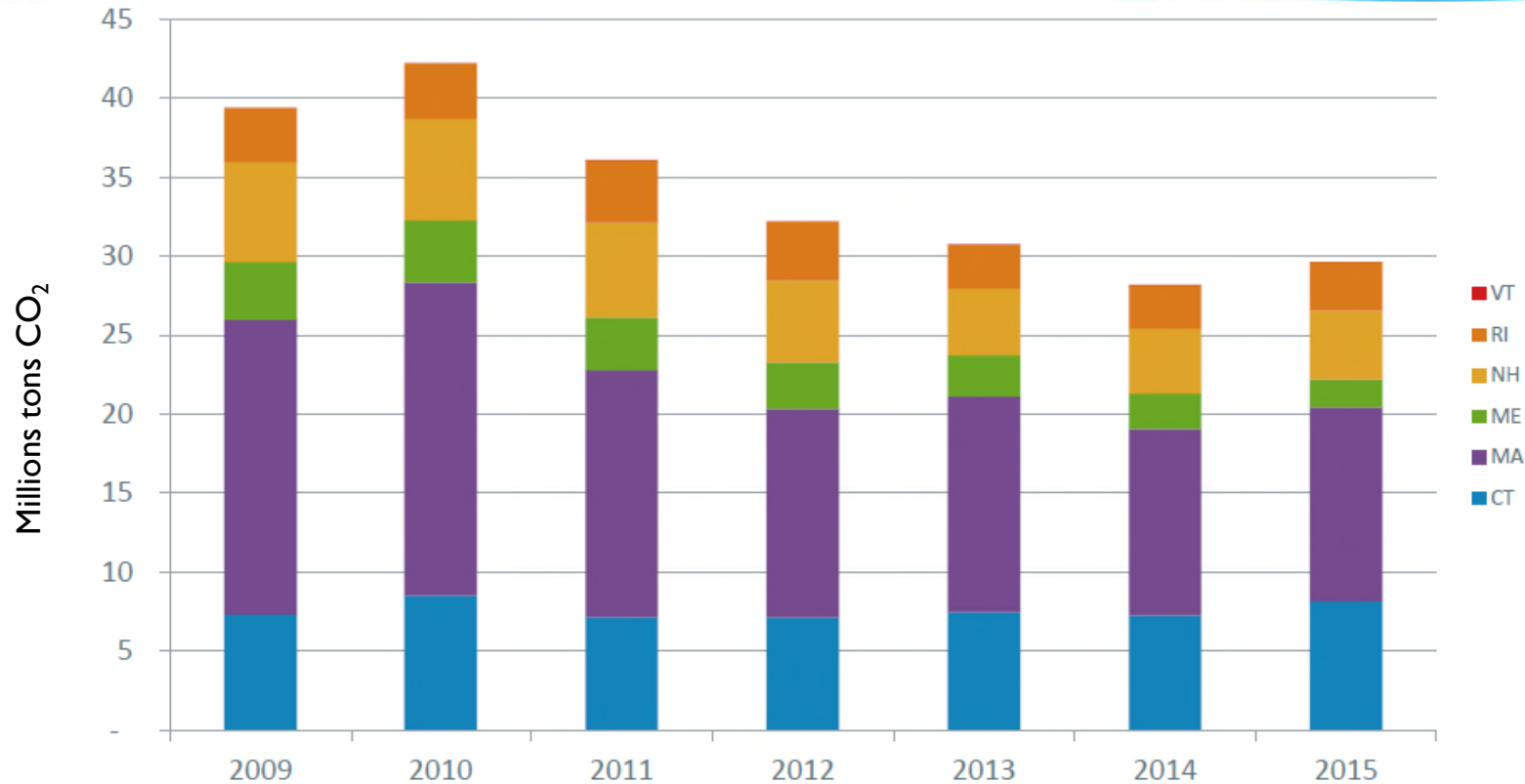
New England's Energy System

- **Regional electric power grid serves the six New England states**
 - \approx 350 power plants provide 31,000 MW of generating capacity
 - \approx 8,500 miles of high voltage transmission lines
- **Transmission lines and related equipment carry bulk power from generators to local distribution systems**
- **Local distribution systems deliver power to homes and businesses across New England**
- **Power plants and transmission system create a pooled, interconnected system to provide highly reliable electric service**

**Interconnections
to NY, Quebec,
New Brunswick**

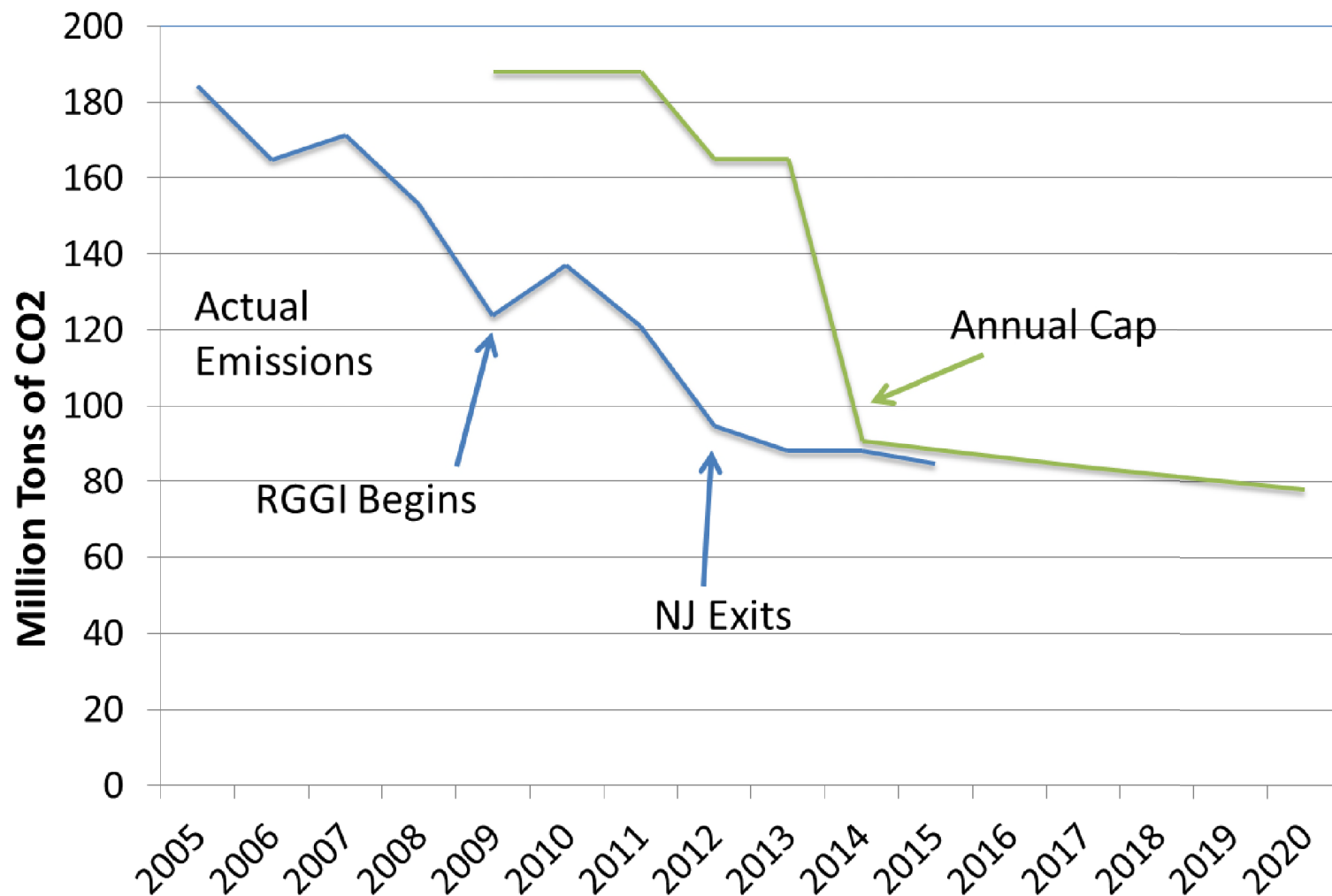


Regional Emissions



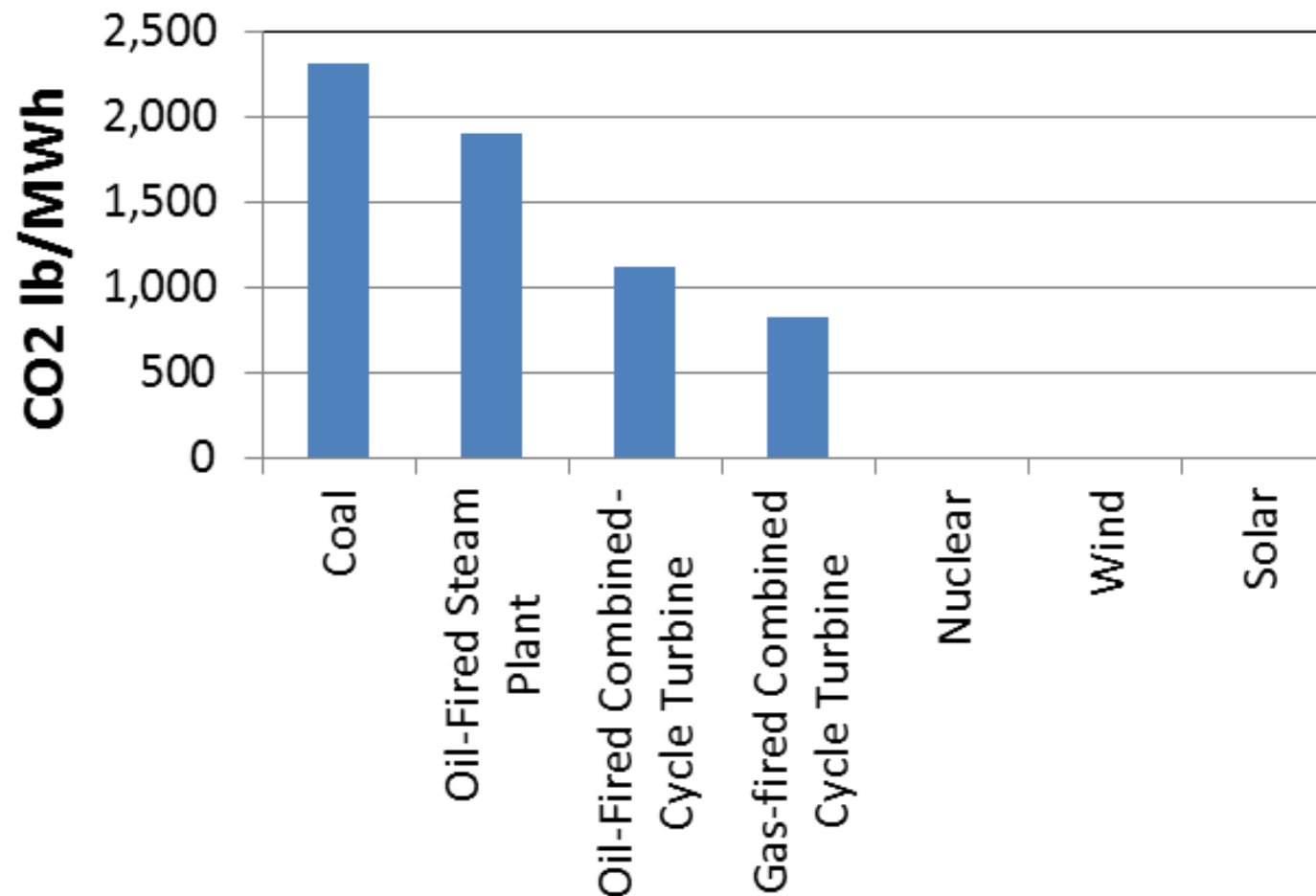
- ISO-NE monitors, but does not manage, regional emissions of GHG from power plants
- 9 Northeast states cooperate to reduce GHG's from the power sector through the Regional Greenhouse Gas Initiative (RGGI)

RGGI Annual CO₂ Cap



ME
NH
VT
MA
RI
CT
NY
MD
DE
DC

Typical Plant Emissions



Electric Sector GHG Accounting

- Two options for measuring GHG's in the electric sector:
 - “Generation-Based” Accounting
Emissions from in-state power plants
 - “Consumption-Based” Accounting
Emissions associated with electricity used in-state
- New England has a regional electric grid, so the two values are not always the same

Consumption-Based Approach

- **OER will apply consumption-based approach**
 - Consistent with EC4 decision in May 2016
 - More realistic representation of regional nature of electric grid, including cross-border transfers
 - Aligns with State policies that incentivize energy efficiency, preference for renewable energy
 - State does not control dispatch of generating resources (other than enforcing certain permit limits)
 - Some renewable resources under contract with RI utilities are located out-of-state
 - Consistent with approaches in MA and CT
 - Consistent with design of Regional Greenhouse Gas Initiative (RGGI)

Assignment #1

What will be the impact of CREC on GHG Emissions resulting from the proposed facility, and cumulative impact over life of project?

Invenergy and PA Consulting Assertions

“The project will enable the transition away from older, less-efficient, and polluting coal and oil plants, which will lower emissions of CO₂ by removing 1,019,000 tons of CO₂ from the air annually”

Table 5.2-1

Project Impact on Total Emissions Reductions on ISO-NE/NYISO Footprint
% Change

	2019	2020	2021	2022	2023	2024	2025
CO ₂ Emission Change	-1%	-1%	-1%	-1%	-1%	-1%	-1%
NO _x Emission Change	-2%	-3%	-3%	-2%	-3%	-2%	-3%
SO ₂ Emission Change	-3%	-4%	-4%	-3%	-3%	-2%	-3%

Key Questions

- How did PA Consulting arrive at these conclusions?
- What models or tools were used to analyze the regional electric system?
- What assumptions were used to analyze and forecast operation of CREC and its emissions?
- What assumptions were used to model the region's electric system?
- Are the assumptions reasonable?

Sources of Data and Information

- **Invenergy's Application (DPU Docket #4509)**
 - PA Consultants' analysis of operation and emissions
 - Written testimony filed by intervenors
- **Information requests to Applicant**
- **ISO New England, NYISO**
 - System resource and markets databases to validate model parameters

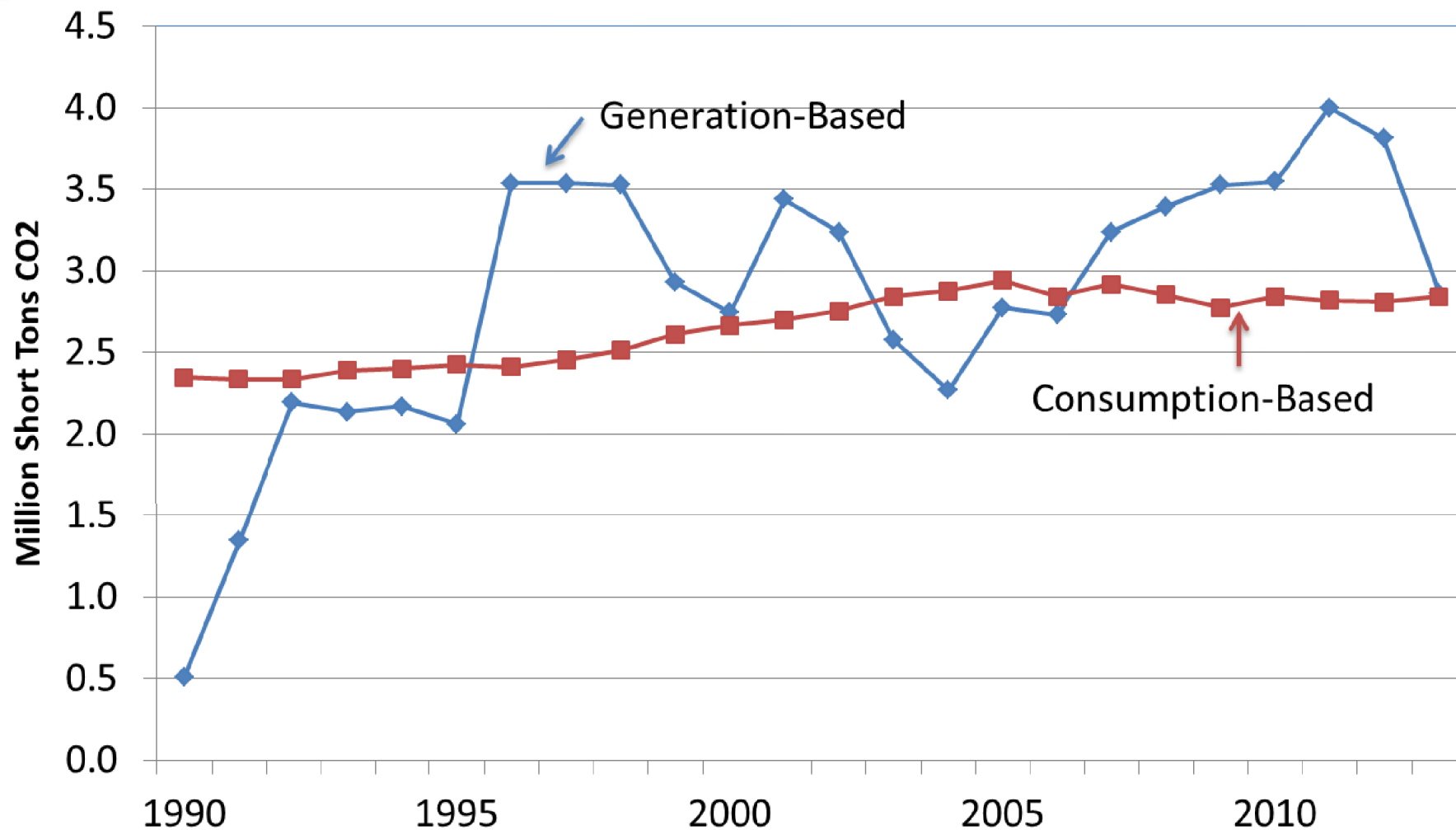
Assignment #2

**Examine consistency with
State Energy Laws and Policies**

Resilient Rhode Island Act

- R.I. Gen. Laws §§ 42-6.2-1 to 42-6.2-8
- Charges EC4 with developing *economy-wide* plan to meet GHG reduction targets
 - Reductions relative to 1990 baseline
 - 10% by 2020
 - 45% by 2035
 - 80% by 2050
- Plan due by end of 2016
 - NESCAUM under contract to develop GHG Study

RI GHG Emissions from Electric Power Sector



Consumption-based Accounting

Table 1-1
2013 and 2014 New England System Emissions (ktons)
and Emission Rates (lb/MWh)

Annual System Emissions						
	2013 Emissions (kTons)	2014 Emissions (kTons)	Total Emissions % Change	2013 Emission Rate (lb/MWh)	2014 Emission Rate (lb/MWh)	Emission Rate % Change
NO _x	20.32	20.49	0.8	0.36	0.38	5.6
SO ₂	18.04	11.68	-35.3	0.32	0.22	-31.3
CO ₂	40,901	39,317	-3.9	730	726	-0.5

- EC4 will use more detailed calculations based on Rhode Island's share of regional generation by technology type and associated emission factors

Source: ISO-NE 2014 Emissions Report

RI Energy Laws and Policies

- **Related to Energy Efficiency:**
 - Least Cost Procurement (2006)
 - Revenue Decoupling (2010)
- **Related to Renewable Energy Resources:**
 - Renewable Energy Standard (2004)
 - Long Term Contracting Standard for Renewable Energy (2009)
 - Distributed Generation Standard Contracts Program (2011)
 - Net Metering (2011)
 - Renewable Energy Growth Program (2014)
 - Affordable Clean Energy Security Act (2014)
- **Related to GHG reductions**
 - Regional Greenhouse Gas Initiative Act (2007)
 - Biodiesel Heating Oil Act (2013)

Key Questions

- How will potential CO₂ savings due to CREC help Rhode Island meet its GHG reduction targets?
- How will operation of CREC affect operation of other fossil-fired plants in the State and region?
- Will development of CREC affect the viability of less efficient fossil-fired plants?
- Will development of CREC affect expansion of renewable resources in the State and region?
- Will development of CREC affect the ability of the State to implement energy efficiency?
- Will CREC contribute to the goals of RGGI and other carbon-reduction laws and policies?

Data Sources

- **Narragansett Electric Co.**
 - Contracts with renewable resources
 - Energy Efficiency programs and incentives
- **ISO-NE**
 - System operations and fuel mix
- **RI DEM**
 - Air permits for CREC and other plants
 - GHG inventories
- **U.S. Energy Information Administration**
 - Energy sales by sector
 - GHG emissions by sector
- **U.S. EPA – power plant emissions database**
- **RGGI**
 - Allowance auction results
- **Public Comment will also be considered**

DEM's Air Pollution Control Permit Process

Public Workshop

Rhode Island Office of Energy Resources

July 21, 2016



RHODE ISLAND DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT

Background

- The Air Pollution Control Permit process is a permitting function under the delegated authority of the Clean Air Act and therefore DEM is the permitting authority under the Energy Facility Siting Act, not the Energy Facility Siting Board. (§42-98-7(a)(3))
- The Air Pollution Control Permit required for the Clear River Energy Center is called a major source permit and is required before construction of the source begins.
- The requirements that must be satisfied to obtain a major source permit are contained in DEM's Air Pollution Control Regulation No. 9, Sections 9.4 and 9.5



Major elements of the application/review.

- Control technology review: Purpose is to determine that the Source incorporates the best available control techniques for the air pollutants emitted.
- Air Quality Impact Analysis: This analysis combines an assessment of existing air quality and predictions, using air dispersion modeling, of the impacts of the proposed source and nearby sources. The purpose is to show that emissions from the proposed source will not cause or contribute to violation of air quality standards.



Major elements of the application/review.

- Health risk assessment: The purpose is to calculate risks associated with exposures to pollutants via multiple pathways (not just inhalation of air pollutants) and the cumulative health impact of exposures to multiple pollutants.



Status of permit application

- The application was determined to be administratively complete as of March 29, 2016.
- Administratively complete means that the application contains all of the required elements and in sufficient detail for DEM to begin the review process.



Expected timeline for review

- DEM is in the early stages of its review of the application and expects to complete the review in December 2016.
- The permit process does include the opportunity for public comment and a public hearing. It is expected that the public comment/public hearing aspect of the process will occur in February/March 2017.
- A final determination to issue or deny the permit is expected in May 2017.



Questions?

Douglas McVay
Chief, Office of Air Resources
Department of Environmental Management
401-222-2808, x-7011
doug.mcvay@dem.ri.gov



Public Comment



STATE OF RHODE ISLAND
**OFFICE OF
ENERGY RESOURCES**

Written Public Comment

- Electronic submittals are encouraged, and will be accepted until 4:00 PM, Monday, August 1, 2016 at:
DOA.publiccomment@energy.ri.gov

- Comments may also be mailed to:

Attn: Advisory Opinion Public Comment

RI Office of Energy Resources

One Capitol Hill, 4th Floor

Providence, Rhode Island 02908

Public Comment

- Speakers should limit their comments to GHG-related issues relative to OER's advisory opinion, as discussed during today's presentation
- **Please note:**
 - *OER has no permitting authority related to the proposed facility*
 - *OER will not be accepting sworn testimony*
 - *OER will not be cross-examining members of the public, but may opt to respond to comments and/or ask clarifying questions*

Public Comment

- Today's meeting is being transcribed. To assist the stenographer, *please speak in a clear voice.*
- When called upon, *please state your name and where you reside.*
- To enable each member of the public to contribute their comments, *each participant will be given three (3) minutes to speak.*
 - *If you require more time, you may submit your full comments to OER by email or through U.S. Mail.*

Thank you for your participation and courtesy.

Written Public Comment

- Electronic submittals are encouraged, and will be accepted until 4:00 PM, Monday, August 1, 2016 at:
DOA.publiccomment@energy.ri.gov

- Comments may also be mailed to:

Attn: Advisory Opinion Public Comment

RI Office of Energy Resources

One Capitol Hill, 4th Floor

Providence, Rhode Island 02908

Thank you for attending today's Public Workshop

www.energy.ri.gov



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ENERGY RESOURCES**