STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED REBUTTAL TESTIMONY OF GEORGE BACON

(September 1, 2017)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF GEORGE BACON, ESS GROUP, INC.

I. INTRODUCTION

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

A. My name is George Bacon. I am Senior Project Manager for Energy and Industrial Services at ESS Group, Inc. ("ESS"), located at 10 Hemingway Drive, Riverside, RI 02915, although my office is in ESS' Waltham, Massachusetts office.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC" or "the Project" or "the Facility").

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. To rebut claims made by witnesses for the Town of Burrillville ("Town") regarding CREC's environmental impacts related to the revised Water Supply Plan ("Water Supply Plan") filed with the Board on January 11, 2017, specifically whether a local water supplier should be considered for supplying water to the Facility by pipeline and whether it is necessary to identify, at this time, the contractor to be selected to provide for trucking and off-site treatment and wastewater disposal from the Facility. My rebuttal testimony also comments on the Rhode

Island Department of Environmental Management's ("RIDEM's") Supplemental Advisory Opinion dated August 15, 2017 regarding wastewater disposal and whether Invenergy has provided sufficient information and data to support RIDEM's ability to develop a Supplemental Advisory Opinion on the disposal of wastewater from the Facility. My rebuttal testimony further demonstrates that implementation of the Water Supply Plan dated January 11, 2017 will not cause unacceptable harm to the environment.

Q. HOW HAVE YOU STRUCTURED YOUR TESTIMONY?

A. I have structured my testimony in three (3) parts, based on the areas of my expertise, the testimony by two of the Town's witnesses and my review of RIDEM's Supplemental Advisory Opinion dated August 15, 2017. The three (3) sections are: (i) Water Supply Plan; (ii) Wastewater Disposal and (iii) RIDEM's Supplemental Advisory Opinion.

I. <u>WATER SUPPLY PLAN</u>

Q. THE TOWN'S WITNESS, MR. THOMAS HEVNER, STATES THAT BECAUSE INVENERGY REDUCED PROCESS WATER DEMAND FOR THE PROJECT BY CHANGING THE FACILITY FROM A WATER-COOLED TO AN AIR-COOLED FACILITY, THAT WATER FROM A LOCAL WATER SUPPLIER COULD BE PIPED TO THE SITE AND THAT A PIPELINE IS THE PREFERABLE METHOD TO DELIVER PROCESS WATER TO THE PROPOSED FACILITY. DO YOU HAVE A RESPONSE?

A. Mr. Hevner's testimony incorrectly describes and mischaracterizes the CREC proposal in a couple of ways. First, on page 1, line 17 of his testimony, Mr. Hevner incorrectly states "Since the proposed CREC [F]acility was changed from a water-cooled to an air-cooled facility …." The CREC Facility has never been proposed as a water-cooled facility. The CREC Facility was and continues to be proposed as a dry-cooled facility in order to minimize water use and wastewater generation. In the original EFSB Application filed October 29, 2015, the description of the proposed CREC Facility included the following, on page 2, second paragraph: "Each unit

will utilize air-cooled condensers (ACC) to limit water usage and wastewater discharge." Since the original EFSB Application, a reduction in water use by CREC has been achieved by changing the method of demineralized water production and the recycling of wastewater within the Facility.

Second, Mr. Hevner also states on page 8 that, with the reduced process water demand of the CREC Project, "local water suppliers may have adequate capacity to provide water to CREC." Mr. Hevner suggests that a local water supply (from these water suppliers) could therefore be piped to the Facility, eliminating the purported adverse impacts of trucking water. Mr. Hevner's testimony fails to recognize Invenergy's willingness and effort to secure local water supplies. Invenergy, in its response to the Town's Data Request No. 22-36, stated that if a local water supplier was willing to commit to supplying water to the Project, Invenergy would be interested in working with that local water supplier. It is also my understanding that Invenergy has had discussions with, among others, the Pascoag Utility District and the Harrisville Utility District to solicit interest in supplying water to the Project. To date, no local water supplier has been willing to supply water to the CREC Project. As a result, a water pipeline as an alternative to trucking water to the Facility is not feasible without the cooperation and willingness of the local water suppliers to work out an agreement.

Finally, Mr. Hevner, in his testimony on page 8, acknowledges that the Water Supply Agreement with the Town of Johnston, "appears to be adequate to supply the water needs for the CREC. The Johnston water is supplied by the Providence Water Supply Board, a dependable source of water."

II. WASTEWATER DISPOSAL

Q. ANOTHER TOWN WITNESS, MR. JAMES JACKSON, EXPRESSES CONCERN THAT THE WASTEWATER PLAN DOES NOT IDENTIFY WHAT FIRM WILL

PROVIDE THE TRUCKING SERVICES AND WASTEWATER TREATMENT FOR THE FACILITY. PLEASE EXPLAIN WHY INVENERGY HAS YET TO IDENTIFY SUCH A COMPANY?

A. As provided in Invenergy's Response to Data Request No. 4-1 from the RIDEM, dated June 19, 2017, Invenergy has not yet executed an agreement with any facility to treat and dispose of process wastewater. Invenergy stated that an agreement for trucking and treatment of CREC wastewater will be evaluated before the operational phase of the Facility and that there are numerous entities that can provide this service, such as Clean Harbors, Tradebe and Mass Tank Disposal. Invenergy further stated that preliminary research based on discussions with licensed entities reveals that the quality of wastewater to be discharged from CREC Facility is well within the permissible limits that these contractors will be able to receive for treatment and disposal.

To further support that wastewater from the CREC Facility will be able to be disposed of by trucking by licensed contractors and received, treated and discharged by Publicly Owned Treatment Works ("POTWs") please see Invenergy's Responses to RIDEM's Data Request Nos. 4-2, 4-3 and 4-4.

In Invenergy's Response to Data Request No. 4-2 dated June 19, 2017, Invenergy provided RIDEM with the analysis used to establish the projected wastewater composition for the CREC Facility. Data Response to No. 4-2 provided a mass balance table, tied to the Facility's Water Balances, WMB-01 Sheets 1-4 Rev N3, that identified the average daily composition and flow for each process wastewater source within the Facility and the expected composition of the combined process wastewater that would be hauled away by licensed contractors for treatment and disposal. Invenergy's Response to Data Request No. 4-2 also addressed RIDEM's Data Request 4-3 by providing a list of all of the waste streams within the CREC Facility impacting the wastewater composition.

In its Data Request No. 4-4, RIDEM asked Invenergy to, "Identify all specific USEPA effluent pretreatment discharge standards in 40 CFR 423 that are applicable to the Project. For any EPA requirement that was not determined to be applicable include a detailed reason why." Invenergy's Response to this Data Request, dated June 19, 2017, provides the requested analysis. Invenergy's Response includes a review of USEPA effluent pretreatment standards identified in 40 CFR 423, and specifically 40 CFR 423.17 which is applicable to new steam electric power generating facilities (inclusive of gas and/or distillate oil fired combined cycle electric generating facilities such as CREC) discharging wastewater to POTWs after June 7, 2013. Invenergy's Response further provides detailed reasons why each of the USEPA pretreatment standards identified in CFR 423.17, applicable to wastewater discharges to a POTW, would be met by wastewater generated by the CREC Facility without additional pretreatment. In developing the discharge effluent standards identified in CFR 423.17, USEPA identified specific chemical processes, associated process wastewaters and associated chemical constituents present in process wastewaters generated by some steam electric generating facilities, which if discharged to POTWs, would impact the operation of these treatment facilities. As addressed in Invenergy's Response to Data Request No. 4-4, in each case the specific chemical processes, process wastewaters and associated chemical constituents of concern by USEPA do not exist in the CREC Facility or the chemicals of concern will not be present in wastewater generated by the CREC Facility because of the nature of the fuels being used by the CREC Facility and because of the plan to use dry-cooling systems to reject heat from the Facility. The majority of the processes of concern identified by USEPA in CFR 423.17 are those associated with steam electric generating facilities that utilize coal and/or heavy oil as fuels and generate process

wastewaters that are high in various chemical constituents of concern if discharged to a POTW, none of which are present in the CREC Facility.

To address the question of whether the pretreatment standards apply to wastewater hauled by trucks to a POTW, I refer to CFR 403.1(b)(1), which states that pretreatment standards apply to discharges to POTWs whether the wastewaters are indirectly discharged into or transported by truck or rail or otherwise introduced into POTWs. CFR 403.1(b)(1) describes the objectives of the pretreatment standards as follows:

> *(a) To prevent the introduction of pollutants into POTWs which will interfere with the operation of a POTW, including interference with its use or disposal of municipal sludge;*
> *(b) To prevent the introduction of pollutants into POTWs which will pass through the treatment works or otherwise be incompatible with such works; and*
> *(c) To improve opportunities to recycle and reclaim municipal and industrial wastewaters and sludges.*

From the analysis provided by Invenergy's Response to RIDEM's Data Request No. 4-4, Invenergy will be able to dispose of process wastewater from the CREC Facility by contracting with licensed contractors, already providing services throughout New England, to haul process wastewaters from the Facility to any POTW operating within the State of Rhode Island or the region for treatment and disposal. Although some POTWs may have additional pretreatment standards that apply to that specific facility, if these additional pretreatment standards were common to most POTWs, and if wastewaters from new steam electric generating facilities (inclusive of gas/oil fired combined cycle generating facilities) were expected to have the specific chemical constituents identified by these additional pretreatment standards, then USEPA would have included these additional pretreatment standards in the development of 40 CFR 423.17. As a result, it is my opinion that CREC Facility wastewater to be hauled by trucks for treatment and disposal at POTWs will meet the pretreatment requirements identified in 40 CFR

423.17. Once the CREC Facility has been placed into operation, any wastewater being hauled for off-site disposal will be chemically characterized to confirm that the composition of the wastewater meets all the requirements of the licensed contractor for treatment and discharge at the specific POTWs receiving CREC Facility wastewater.

Q. BASED ON YOUR EXPERIENCE AND EXPERTISE, CAN CREC'S ENVIRONMENTAL IMPACTS REGARDING WASTEWATER BE ANALYZED WITHOUT SUCH A COMPANY BEING IDENTIFIED?

A. Yes. Based on my experience, the environmental impacts from CREC's transportation of wastewater by truck and the receipt, treatment and discharge of CREC wastewater at existing POTWs can be assessed without identifying the specific licensed contractor that will be employed to transport these wastewaters or the specific POTW that will receive these wastewaters for treatment and disposal. The potential impacts to POTWs from process wastewaters generated by steam electric generating facilities have already been identified and assessed by USEPA and the standards generated by USEPA are intended to be protective of the operation of all POTW facilities and their discharge permits. The fact that Invenergy can provide this assessment without the necessity of identifying, at this time, which specific contractor will haul CREC Facility wastewater for treatment and disposal is demonstrated by the fact that USEPA was able to develop the CFR 423.17 pretreatment standards applicable to a wide range of steam electric generating facilities and operating POTWs without need of identifying each specific electric generating facility or which specific POTW would receive the wastewaters from future steam electric generating facilities. It is important to recognize that USEPA 40 CFR 423 did not designate low volume wastewaters such as those to be generated by the CREC Facility as hazardous or toxic classifications.

III. <u>RIDEM SUPPLEMENTAL ADVISORY OPINION</u>

Q. HAVE YOU REVIEWED RIDEM'S SUPPLEMENTAL ADVISORY OPINION?

A. Yes.

Q. DO YOU HAVE AN OPINION REGARDING ITS CONCLUSIONS?

A. Yes. I have read RIDEM's Supplemental Advisory Opinion ("Advisory Opinion") dated August 15, 2017, and I will comment on the section titled "Revised Water Supply Plan" on pages 16 and 17 of that Advisory Opinion, and specifically RIDEM's statements that it cannot identify the type of permit to be issued to the Facility, cannot opine on impacts associated with the disposal of wastewater from the Facility until a receiving facility has been identified, and cannot identify the appropriateness of the treatment facility to receive and treated process wastewater from the Facility.

In Invenergy's Responses to RIDEM's Data Request Nos. 4-2, 4-3 and 4-4, dated June 19, 2017, Invenergy provided RIDEM with the projected flow rates and composition of process wastewater from the CREC Facility based on use of a water supply from the Town of Johnston. This response, in the form of a mass balance table, identified all process wastewater sources within the CREC Facility, provided the expected composition and volume of each wastewater source and provided the expected wastewater composition for the final wastewater to be trucked from the CREC Facility. In Response No. 4-4, Invenergy also provided RIDEM with an analysis of USEPA pretreatment regulations for new steam electric generating facilities discharging to POTWs providing detailed reasons why process wastewater from the CREC Facility is expected to meet all the pretreatment discharge criteria developed by USEPA for discharges to POTWs by any steam electric generating facility including a facility of a design as that of the CREC Facility.

It is my opinion that sufficient information has been provided to RIDEM to allow RIDEM to provide the EFSB with an advisory opinion (qualified as required) as to the following: whether Invenergy's process wastewater disposal plan to use licensed wastewater disposal trucking contractors to haul process wastewater to existing licensed POTWs for treatment and disposal, results in any unreasonable impacts; whether the process wastewater projection provided for the CREC Facility is consistent with similar process wastewater generated from other combined cycle power plants already operating in Rhode Island, some of which currently discharge to a POTW; and in the opinion of RIDEM, whether any discharge permit would be required by the CREC Facility if all process wastewater needing disposal is hauled by licensed contractors already doing business in Rhode Island if these wastewaters are delivered to existing POTWs for treatment and disposal as allowed under CFR 423.17.

It is reasonable, and Invenergy agrees, that RIDEM will, upon commencement of operations by CREC, review the CREC Facility wastewater characterization and final plan for transport, treatment and disposal of process wastewater from the CREC Facility to a specific POTW or POTWs or any other wastewater disposal facility to ensure that the wastewater disposal plan is consistent with all required regulations and standards before the process wastewater disposal plan is implemented. Before any process wastewaters can be trucked from the CREC Facility and delivered to any POTW, for treatment and disposal in the future, those wastewaters will be fully characterized, to the extent required by the receiving POTW, to confirm that the wastewaters can in fact be received and treated by that POTW.

It is also reasonable, however, that RIDEM should be able to provide an advisory opinion (qualified as required) to the EFSB to help the EFSB determine whether the process wastewater disposal plan for the CREC Facility wastewaters is an acceptable plan if those process

wastewaters are characterized, hauled by a licensed contractor and received by an existing POTW operating in the State of Rhode Island for treatment and disposal.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes, it does. That said, I may offer additional testimony in response to the Rhode Island Department of Health's Supplemental Advisory Opinion, if necessary.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED REBUTTAL TESTIMONY OF BRANDON BLANCHARD

(September 1, 2017)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF BRANDON BLANCHARD OF PARE CORPORATION

I. INTRODUCTION

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

A. My name is Brandon Blanchard. I am a Managing Engineer at Pare Corporation ("Pare"), located at 8 Blackstone Valley Place in Lincoln, Rhode Island.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC").

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. The purpose of my testimony is to update the Board regarding modifications made to CREC's on-site wastewater treatment system ("OWTS") permit application, which was filed with the Board on March 10, 2017 and is pending with the Rhode Island Department of Environmental Management ("RIDEM") for it to issue a recommendation to the EFSB, as it is my current understanding that the EFSB will make the final determination to approve or deny Invenergy's OWTS permit.

Q. SINCE YOUR PRE-FILED DIRECT TESTIMONY HAS BEEN FILED, HAVE ANY MODIFICATIONS BEEN MADE TO CREC'S OWTS PERMIT APPLICATION?

A. Yes.

Q. WHY?

A. The wetland edge in the vicinity of the proposed OWTS was modified. Specifically, the wetland edge identified by others was modified such that its 50-foot buffer encroaches within the location originally proposed for the bottomless sand filter component of the OWTS.

Q. PLEASE EXPLAIN THE MODIFICATIONS.

A. The bottomless sand filter is proposed to be relocated to maintain a 50-foot setback from onsite freshwater wetlands. This requires that additional soil evaluations be performed to locate an appropriate alternate location for the bottomless sand filter. Soil evaluations are being scheduled with RIDEM, and the design will be modified once these additional soil evaluations are completed.

Q. PLEASE EXPLAIN WHAT IMPACT THE MODIFICATIONS WILL HAVE ON THE PERMIT APPLICATION PROCESS?

A. A revised OWTS New Construction permit application package will be submitted to RIDEM in order for it to render a recommendation to the Board, depicting a new location for the proposed bottomless sand filter. The dimensions and overall size of the bottomless sand filter may also change, based on the soil conditions identified at its new location through the upcoming soil evaluation process. Additional design modifications associated with this change, such as revised piping and a new pump design, will also be incorporated into the revised permit application package. It is anticipated that the revised permit application package will be submitted to RIDEM in September 2017, but that the overall design basis will remain largely

unchanged. The design flow rate, type of advanced treatment, and type of disposal field (i.e., bottomless sand filter) are expected to remain essentially the same.

II. ADVISORY OPINIONS

Q. HAVE YOU REVIEWED RIDEM'S SUPPLEMENTAL ADVISORY OPINION?

A. Yes.

Q. DO YOU HAVE AN OPINION REGARDING ITS DISCUSSION OF THE OWTS PERMIT?

A. Yes. RIDEM states that it has reviewed Invenergy's on-site wastewater treatment system permit application in accordance with the normal regulatory practice and procedure and will provide the EFSB with a recommendation on the acceptability of the proposed system. (Page 14) RIDEM also states that if it finds that Invenergy has complied with the requirements of the applicable regulations, a permit will be issued. (Page 14) The OWTS permit application is being prepared in conformance with RIDEM's OWTS Regulations, and it is anticipated that the final, updated permit application will receive RIDEM's approval and that a recommendation for approval will be provided to the EFSB.

Q. HAVE YOU REVIEWED THE TOWN OF BURRILLVILLE BUILDING INSPECTOR'S SUPPLEMENTAL ADVISORY OPINION?

A. Yes.

Q. ON PAGE 4, THE BUILDING INSPECTOR STATES THAT THE BOARD WILL REQUIRE THE OWTS PERMIT PRIOR TO ANY BUILDING PERMIT BEING ISSUED. DO YOU HAVE A RESPONSE?

A. It is understood that a building permit is not typically issued until an OWTS permit is issued by RIDEM. A revised OWTS permit application will be submitted to RIDEM for their review, once additional soil evaluations are performed and design modifications are completed. Additional soil evaluations are required to determine the size and location of the proposed

bottomless sand filter. These soil evaluations are being performed to support design modifications that will be made to comply with RIDEM's OWTS Regulations. It is anticipated that the additional soil evaluations will be performed in mid-September 2017. The revised OWTS permit will meet RIDEM's requirements to the greatest extent possible. Accordingly, if the EFSB is satisfied with RIDEM's recommendation that Invenergy has satisfied the requirements for its OWTS permit to issue, it is my understanding that the EFSB will incorporate that determination into its final decision. This should also fulfill the requirement for an OWTS Permit to be issued before a building permit can be issued.

III. CONCLUSIONS

Q. DO YOU HAVE AN OPINION, TO A REASONABLE DEGREE OF CERTAINTY, REGARDING WHETHER CREC'S ONSITE WASTEWATER TREATMENT SYSTEM PERMIT APPLICATION, AS MODIFIED, WILL BE CONSISTENT WITH THE REQUIREMENTS FOR RIDEM PERMIT APPLICATIONS?

A. The design modifications and revised permit application will be prepared in accordance with RIDEM OWTS requirements to the greatest extent possible. It is anticipated that the design basis will remain largely unchanged and that the revised permit application will meet RIDEM requirements.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

PRE-FILED REBUTTAL TESTIMONY OF MAUREEN CHLEBEK

(September 1, 2017)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF MAUREEN CHLEBEK, MCMAHON ASSOCIATES

I. INTRODUCTION

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

A. My name is Maureen Chlebek. I am an Associate and General Manager at McMahon Associates ("McMahon"), located at 14 Breakneck Hill Road, Lincoln, Rhode Island 02865.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC" or "Facility").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. To rebut claims made by witnesses for the Town of Burrillville ("Town") regarding CREC's traffic impacts. My rebuttal testimony below further demonstrates that CREC will not produce significant adverse effects on the quality of the state's roads and bridges and thereby not cause unacceptable harm to the traffic safety environment.

II. TRAFFIC ANALYSIS

Q. THE TOWN'S WITNESSES, MR. THOMAS HEVNER AND MR. JAMES COOGAN, EXPRESS CONCERN REGARDING TRAFFIC DURING OIL-FIRED EVENTS. IN FACT, MR. HEVNER STATES THAT AN EVALUATION SHOULD BE CONDUCTED. (PAGE 9) HAS MCMAHON CONDUCTED AN EVALUATION INTO THE TRAFFIC CONDITIONS DURING AN OIL-FIRED EVENT?

A. Yes, as also discussed previously in my direct testimony and in Appendix E of the revised Water Supply Plan filed with the Board on January 11, 2017, McMahon accounted for the truck trips generated during an oil-fired event, which amounted to 22 trucks per day. The analysis assumes approximately 13 water trucks (2 for normal operation and 11 for water replenishment), 7 oil trucks, and 2 additional trucks consisting of either 1 aqueous ammonia truck, 1 wastewater truck or 1 mobile demineralizer trailer. The number of days per year that CREC would expect this level of truck traffic is highly dependent on the number of hours and the time of year of any oil-fired operation. Invenergy estimates that there will be few oil fired events per year and for every event that lasts longer than approximately 3 days it will take approximately 30 days to replenish the oil and water tanks at this level of traffic. Generally speaking, Invenergy would expect the truck traffic to be spread out over the daytime hours as both the water and oil trucks will be making round trip deliveries from the origin of their respective supplies. Invenergy would expect six truck trips during the peak AM and PM hours.[1] Six (6) trips during the peak hour is less than previously assumed as part of the initial Traffic Impact Study, dated May 2016 ("Traffic Impact Study").

The limited truck traffic involved in the Water Supply Plan will not adversely impact traffic operations of the surrounding street network. In my professional opinion, the roads will not experience significant additional deterioration or congestion due to the transport of water to the site.

Q. MR. COOGAN STATES THAT DURING THE CONSTRUCTION PERIOD, THE VOLUMES WILL CAUSE ADVERSE IMPACTS WITH REGARD TO TRAFFIC QUEUES AND DELAYS ON CHURCH AND MAIN STREET. (PAGE 5) DO YOU HAVE A RESPONSE?

A. As detailed in the Traffic Impact Study, the trip generation estimates for the construction

[1] As noted in the Traffic Impact Study, the peak AM hour is between 7:00AM and 8:00AM and the peak PM hour is between 3:15PM and 4:15PM. *See* Traffic Impact Study, dated May 2016, at page 7.

phases were very conservative. For example, the employee shift change is expected to occur between 5:00 PM and 6:00 PM. The construction truck trips are expected to occur between 8:00 AM and 3:00 PM. Realistically, these two trip types will never occur together, and the majority of these trips will never occur during the weekday afternoon peak hour. For purposes of providing a conservative traffic study, however, we assumed that all employee shift traffic and 25% of the daily truck trips will occur during the weekday afternoon peak hour.

Furthermore, the construction analysis represents the highest or "most intense" of the four construction phases. Under this conservative trip generation estimate for the construction condition, the AM peak hour traffic operations maintained the existing traffic levels of service ("LOS") at the intersection of Church Street and Main Street, with minor increases in delay. During the PM peak hour, the southbound approach of Church Street/Main Street is expected to decrease from LOS "C" to "F" with increased delays. Intersection LOS is a measure of driver delay under a given set of roadway and traffic conditions and ranges from LOS A (with little or no delay) to LOS F (Long delays). The criteria for intersection LOS is contained in Appendix G of the Traffic Impact Study. Appendix G is part of the Appendix to the Traffic Impact Study and was filed with the Board on August 2, 2016 as a supplement to Invenergy's Response to the EFSB's Data Request, No. 1-1.

At the request of the Town, McMahon Associates was asked to evaluate the construction condition for the PM peak hour without applying the conservative assumptions. *See* Invenergy's Responses to the Town's 13th Set of Data Requests. If we were to analyze the weekday afternoon peak hour from 3:15PM to 4:15PM with what is projected to occur based on client information, we would have a minimal number of concrete trucks delivering during the FNTP phase between

3:15 PM and 4:00 PM, when construction ends each day, and a negligible impact on peak hour traffic.

Since the construction employee trips are the highest volume of traffic added to the network and shifts are expected to change between 5:00 and 6:00 PM, it is expected that this time period will be affected. If the employee trips were added to this time period, it is expected that the southbound left turn movement would operate at LOS E and under capacity, indicating that although the southbound left turn movement will experience long delays, there still will be adequate gaps in the main street traffic to allow motorists to complete the southbound left turn maneuver. All other movements at this intersection are expected to operate at LOS B or better.

This analysis demonstrates that the construction-related traffic added to this intersection can be accommodated within the capacity of the intersection. Throughout the day, including the AM peak hour, the southbound approach will operate at LOS C or better. The added delay to the southbound approach of this intersection will be temporary, occurring only during the PM peak hour of the heaviest construction phase. Under the final operation condition, the southbound approach will operate at LOS C in the PM peak hour, matching the current and future no-build operations.

Q. MR. COOGAN ALSO RECOMMENDS INVENERGY UTILIZE THE EXISTING ALGONQUIN ACCESS ROAD TO REDUCE THE NUMBER OF TRAFFIC CONFLICT POINTS ON WALLUM LAKE ROAD. (PAGE 7) DO YOU HAVE A RESPONSE?

A. In Invenergy's response to the RIDEM's Data Request No. 3-13, Invenergy explained that the Algonquin Road is owned by Spectra, and Spectra indicated that it will not allow Invenergy to use the road during construction or operation. Invenergy attached, as Exhibit 4, a letter from Spectra denying Invenergy's request. Accordingly, it is my understanding that using the Spectra Energy/Algonquin access road is not legally or physically possible.

Furthermore, as indicated in the Traffic Impact Study, the intersection of Wallum Lake Road at the Site Driveway is projected to operate at good level of service (LOS B or better) with minimal delay to motorists under both the Construction condition and the Final Operation condition. Mr. Coogan concurred that this intersection will operate well in his statement, stating: "Existing traffic volumes on Wallum Lake Road are low enough so that this construction traffic turning onto and off of Wallum Lake Road will cause minimal delays for existing traffic." (Page 6) When asked if the proposed site driveway will affect the operations of the driveway leading to the adjacent Algonquin facility, Mr. Coogan indicated that it would not. (Pages 6-7)

Q. WOULD INVENERGY'S USE OF THE EXISTING ALGONQUIN ACCESS ROAD REDUCE THE NUMBER OF TRAFFIC CONFLICT POINTS ON WALLUM LAKE ROAD?

A. Both the Algonquin driveway and the proposed driveway to CREC are T-intersections, with the driveway approach forming the minor street northbound approach at its intersection with Wallum Lake Road. At each of these two intersections, there are four vehicular conflict points: the westbound left turn from Route 100 into the site, the eastbound right turn from Route 100 into the site, and the northbound left and right turns exiting the site onto Route 100. If the two driveways were to be combined to have a common access point from Wallum Lake Road, then the total number of conflicts would reduce from eight to four. The traffic volumes on Wallum Lake Road are low and the projected site traffic can turn into and out of the proposed site with minimal delay (LOS B or better) and without reducing the LOS on Wallum Lake Road. This is supported by both the capacity analysis results cited in the Traffic Impact Study and by the testimony of Mr. Coogan

Q. MR. COOGAN ALSO ANALYZES CERTAIN INTERSECTIONS, STATING THAT CONSTRUCTION TRAFFIC WILL HAVE AN IMPACT ON TRAFFIC AT THE PASCOAG MAIN STREET AND CHURCH STREET INTERSECTION. (PAGE 7) DID YOU ANALYZE THIS INTERSECTION?

A. Yes, this intersection was analyzed in the Traffic Impact Study and further analyzed in an additional report, entitled "Invenergy Clear River Energy Center – Intersection Review – Church Street at Main Street, Pascoag, RI," dated August 2016, attached to my Pre-Filed Direct Testimony as Exhibit MC-2, and in responses to the Town of Burrillville's 13th set of Data Requests.

Q. DID YOU MAKE ANY FINDINGS? IF SO, PLEASE EXPLAIN.

A. As demonstrated in the reports above, the impact of the construction traffic at the Pascoag Main Street and Church Street intersection will result in some incremental delay to the Church Street southbound approach. Throughout the majority of the day, this intersection will operate at LOS C or better. In the PM peak hour of the heaviest construction stage, the delay on one approach at this intersection is expected to reach LOS E with a volume to capacity ratio of less than one, indicating that the intersection will have available capacity to handle the added traffic. Note that all other approaches at this intersection still operate at LOS B or better during the peak hours during the construction phases. In the Final Operation condition when the plant is built and operating, the traffic operations of the southbound approach will be comparable to current existing conditions.

Q. MR. COOGAN ALSO CITES TO A MEMORANDUM FROM THE BURRILLVILLE CHIEF OF POLICE EXPRESSING CONCERNS REGARDING LARGE TRUCKS TURNING AND FOLLOWING THE ROAD ALIGNMENTS. (PAGE 9) ARE THESE CONCERNS TYPICAL FOR ALL LARGE TRUCKS?

A. Yes. These concerns would apply to all large trucks as well as school buses using the intersection. These concerns relate to pre-existing conditions as trucks and school buses are currently using these roadways under the current existing geometric conditions. Route 100 falls under RIDOT jurisdiction, and it has no truck restrictions.

Q. HOW WOULD THESE TYPES OF CONCERNS TYPCIALLY BE HANDLED?

A. The concerns cited in the letter from the Burrillville Police Chief involve commercial motor vehicle ("CMV") size and weight and the manner of turning at intersections by CMVs. The size and weight of the CMVs falls under federal regulation. RIDOT has a permitting process for CMVs that exceed the federal regulation criteria.

In regard to the manner of turning at intersections by CMVs, if it is feasible to improve the roadway geometry to address the truck turning issues, then that could be considered. Based on the overall low traffic volumes and stopped condition for Church Street southbound, the minor truck traffic increases expected during operation of the Facility would result in insignificant changes in operation of the intersection over existing conditions. RIDOT's Supplemental Advisory Opinion, dated August 15, 2017, supports this conclusion. RIDOT has provided Design comments from engineer Anita Marshall in review of the Physical Alteration Permit Application for the CREC. The last comment states, "The Traffic Analysis and Traffic Impact Study submitted by McMahon Associates indicate that the truck traffic already makes up a significant proportion of the traffic on Main St (9%), Church St (9%), and Wallum Lake Rd (10%) in Burrillville. The additional trips associated with Facility operations would not represent a noticeable increase in truck traffic. However, the traffic reports do indicate a significant increase in traffic <u>during construction</u> at the South Main Street / Main Street intersection in Pascoag in the AM and PM commuter peak periods. A detail officer should be assigned to direct traffic at that intersection during peak periods while the site is under construction." As suggested by RIDOT, it is advisable to station a detail officer at the intersection during the PM peak period to address the increased truck traffic. This is reasonable at the onset of the heaviest construction stage, and potentially throughout that stage, should the police details prove necessary.

Q. MR. COOGAN ALSO TAKES ISSUE WITH THE ASSIGNMENT OF TRIPS TO THE ROAD NETWORK, ARGUING THAT IT APPEARS INCONSISTENT. (PAGE 11) DO YOU HAVE A RESPONSE?

A. For construction phase employee trips, McMahon applied the same trip distribution assumptions as were applied for the Final Operation stage employee trips as demonstrated in the Traffic Projection Model ("TPM") tables located in the Traffic Impact Study Appendix (pages 129-130). As shown in the TPM, 90% of vehicle trips are entering/exiting the site from the east, 40% of which are also shown traveling through the two study area intersections in Pascoag. An additional 40% of vehicle trips are expected to originate from Route 7/Route 107 to the east and travel to the proposed site to the north of the study area intersections rather than through the two Pascoag Main Street study area intersections. The path of these trips enters into the study area street network from the north at the proposed site driveway. Similarly, 10% of trips are expected to utilize Jackson Schoolhouse Road to access the proposed site, and also enter the study area street network north of the site at the site driveway.

ADVISORY OPINIONS

Q. HAVE YOU REVIEWED RIDOT'S SUPPLEMENTAL ADVISORY OPINION?

A. Yes.

Q. DO YOU HAVE AN OPINION ON RIDOT'S SUPPLEMENTAL ADVISORY OPINION?

A. I agree with RIDOT's opinion that the proposed water supply plan will not negatively impact state highways and roads and that project mitigation as it relates to traffic control, pavement resurfacing and traffic detail will be addressed accordingly under the physical alteration permit process.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED REBUTTAL TESTIMONY OF MICHAEL FEINBLATT

(September 1, 2017)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF MICHAEL FEINBLATT, ESS GROUP, INC.

I. INTRODUCTION

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

A. My name is Michael Feinblatt. I am a Vice President and Practice Leader for Energy and Industrial Services at ESS Group, Inc. ("ESS"), located at 10 Hemingway Drive, Riverside, RI 02915.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC" or "Facility" or "Project").

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. To rebut claims made by witnesses for the Town of Burrillville ("Town") regarding CREC's environmental impacts related to air emissions, oil storage and usage, ammonia usage and responding to public health concerns, as well as address the Rhode Island Department of Environmental Management's ("RIDEM's") Supplemental Advisory Opinion. My rebuttal testimony further demonstrates that CREC will conform to applicable laws and regulations to so as to protect the public health and that the Project will not cause unacceptable harm to the environment.

Q. HOW HAVE YOU STRUCTURED YOUR TESTIMONY?

A. I have structured my testimony in five (5) parts, to address the primary critiques of my pre-filed testimony by the Town's witnesses, as well as respond to certain supplemental advisory opinions. The five (5) sections are: (i) air emissions; (ii) oil storage and usage; (iii) ammonia storage; (iv) environmental impact study; and (v) supplemental advisory opinions.

II. AIR

REPORTS

Q. HAVE YOU REVIEWED THE PRE-FILED DIRECT TESTIMONY OF THE TOWN'S WITNESS, MR. ERIC EPNER?

A. Yes.

Q. OVERALL, DOES HIS OPINION ACCURATELY CHARACTERIZE THE EMISSIONS DATA PREPARED BY YOU AND ESS GROUP, INC.?

A. No. While he accurately lists the potential annual emissions of pollutants from the Facility and details the possible acute and chronic health effects of each pollutant, he fails to recognize that the maximum predicted off-site concentrations of each of these pollutants resulting from the operation of the Facility will be below the air quality standards established by the U.S. Environmental Protection Agency ("EPA") and RIDEM to protect public health and the environment.

Q. LET'S START WITH HIS STATEMENTS REGARDING THE AIR PERMIT APPLICATION. ON PAGE 4 OF HIS TESTIMONY, MR. EPNER STATES THAT PREVIOUS CONCERNS HE RAISED DURING THE PLANNING BOARD HEARINGS HAVE NOT BEEN ADDRESSED. DO YOU HAVE A RESPONSE?

A. Each of the previous concerns raised by Mr. Epner during the Planning Board Hearings were addressed in the subsequent Air Permit Application Addendum and the Multisource Modeling Addendum. Notably, Mr. Epner states in his testimony that all previous issues and

questions were not fully addressed, but does not identify any specific previous issue or question which have not been fully addressed.

Q. NEXT, ON PAGES 5-6, MR. EPNER DISCUSSES THE MULTISOURCE MODELLING ADDENDUM AND STATES THAT BECAUSE IT "RELIES WHOLLY ON CONDITIONS DESCRIBED IN A MAJOR SOURCE AIR PERMIT MODIFICATION APPLICATION SUBMITTED [BY SPECTRA] FOR THE ADJACENT ALGONQUIN COMPRESSOR STATION," IT IS IMPROPER TO RELY ON THOSE MODELING RESULTS. DO YOU AGREE? IF NOT, PLEASE EXPLAIN.

A. Both RIDEM and I disagree with Mr. Epner. The October 18, 2016 CREC Multisource Modeling Addendum included multisource modeling conducted for CREC based on the Algonquin Compressor Station ("ACS") configuration proposed in its September 22, 2016 Minor Source Permit Application. The Chief of RIDEM's Office of Air Resources informed Invenergy in a meeting at RIDEM on December 8, 2016 that the issuance of the CREC Major Source Permit was contingent on the issuance of the Minor Source Permit for the proposed ACS modification because the multisource modeling submitted for CREC was based on the proposed future ACS configuration. As stated in Invenergy's Response to the Town's Data Request No. 28-7, RIDEM's EFSB Status Update, dated June 13, 2017, stated that the CREC Major Source Air Permit is contingent upon the issuance of a permit for the proposed modifications to the ACS, which is currently under review. It further stated that within thirty (30) days of the issuance of the permit for the ACS, RIDEM anticipates rendering a preliminary decision on the CREC permit.

Q. REGARDING THE HEALTH RISK ASSESSMENT ("HRA") REPORT, ON PAGE 7 OF HIS TESTIMONY, MR. EPNER STATES THAT THE REVISED HRA FIGURE 6 INDICATES SIGNIFICANTLY FEWER MAXIMALLY IMPACTED RECEPTORS BUT DOES NOT ALLEGEDLY PROVIDE THE METHODOLOGY OR BASIS FOR THIS REDUCTION. DO YOU HAVE A RESPONSE?

A. As stated in Invenergy's Response to the Town's Data Request No. 28-4, the version of Figure 6 that was included in the original HRA Report identified the maximally impacted receptor

of each receptor type (school, place of worship, etc.) within the study area. The revised version of Figure 6 that was included in the MSPAA identified the maximally impacted receptor for each exposure pathway (inhalation, crops, drinking water, etc.) evaluated within the study area to be more consistent with RIDEM's definition of the "Most Exposed Individual." There are fewer maximally impacted receptors shown on the revised version of Figure 6 because there are a fewer number of exposure pathways than there are receptor types. Regardless, the health risk analysis was conducted at all of the receptor sensitive locations shown on Figure 5 of the HRA for both the original HRA Report and for the MSPAA, so the revision to Figure 6 is immaterial to the scope of or the results of the analysis.

Q. MR. EPNER ALSO REQUESTS CLARIFICATION AS TO WHAT THE LAST COLUMN IN REVISED TABLE 1 REPRESENTS. (PAGE 7) WHAT DOES "N.GAS W/DB" MEAN?

A. As stated in Invenergy's Response to the Town's Data Request No. 28-5, in the Major Source Permit Application, the potential emissions were conservatively calculated assuming that all turbine operating hours firing natural gas included the potential emissions from duct burner firing. On Page 2 of the MSPAA, Invenergy proposed to limit HRSG duct burner usage to the total natural gas usage equivalent of 6,100 hours per year per turbine at the duct burner's maximum firing rate. Thus, in the revised version of Table 1 presented in the MSPAA, the potential emissions from the turbines firing natural gas while firing the duct burners ("N.Gas w/DB") for 6,100 hours per year per turbine was calculated separately from the potential emissions from the turbines while firing natural gas without firing the duct burners ("N.Gas") for 2,150 hours per year per turbine. There was no need to separate these columns in the prior versions of Table 1 because it was previously conservatively assumed that the duct burners were being fired during all turbine

operating hours (i.e. 8,760 hours per year) while firing natural gas because no limit on duct burner firing was proposed.

EMISSION CREDITS

Q. MR. EPNER ALSO DISCUSSES EMISSION REDUCTION CREDITS ("ERCs") AND, ON PAGE 8 OF HIS PRE-FILED TESTIMONY, STATES THAT ERCs OFFER NO BENEFIT AT ALL TO THE LOCAL AIR QUALITY IN RHODE ISLAND. DO YOU AGREE?

A. Both RIDEM and I disagree with Mr. Epner. RIDEM Air Pollution Control Regulation No. 9, Section 9.4.2(d)(5)b, requires that emission offsets be obtained from sources in other nonattainment areas, provided that emissions from the other areas contribute to a violation of the National Ambient Air Quality Standards ("NAAQS") in the nonattainment area in which the source is located. In a letter dated July 22, 2015, RIDEM stated that there is sufficient evidence to show that NOx emissions in New York contribute to ozone levels in Rhode Island. The source of the proposed CREC ERCs is located in Saratoga Springs, New York, which is approximately 120 miles (200 kilometers) northwest of the Project site. Rhode Island is a downwind state from New York. Numerous studies conducted over the last 15-20 years have shown that the regional transport of ozone and its precursors occurs over many hundreds of kilometers in the eastern United States. By reducing the emissions of ozone precursors in an upwind state which contributes to local air quality in Rhode Island by an amount which exceeds the potential emissions of these pollutants from the CREC, the ERCs proposed for the CREC Project clearly provide a benefit to local air quality in Rhode Island.

EMISSIONS ANALYSIS

Q. MR. EPNER ALSO PROVIDED THE ALLEGED POTENTIAL ANNUAL EMISSIONS FROM CERTAIN POLLUTANTS. (PAGE 9) DO YOU HAVE ANY CONCERNS WITH HIS NUMBERS AND ANALYSIS?

A. Yes. He fails to recognize that the maximum predicted off-site concentrations of each of these pollutants resulting from the operation of the Facility will be below the air quality standards established by the EPA and RIDEM to protect public health and the environment. The purpose of these standards, which are established based on rigorous research and epidemiological testing, is to ensure that the ground level concentrations of these pollutants remain below the concentrations at which these possible acute and chronic health effects are experienced.

Q. MR. EPNER CONCLUDES THAT THE POLLUTANTS WILL HAVE BOTH ACUTE AND CHRONIC NEGATIVE HEALTH EFFECTS ON ANIMALS AND HUMANS. (PAGES 10-11) DO YOU HAVE A RESPONSE?

A. Again, the fact that the maximum predicted off-site concentrations of each of these pollutants resulting from the operation of the Facility will be below the air quality standards established by the EPA and RIDEM to protect public health and the environment, will ensure that the ground level concentrations of these pollutants remain below the concentrations at which possible acute and chronic health effects will occur.

Q. DID YOU ANALYZE THE REVISED WATER SUPPLY PLAN, FILED WITH THE BOARD ON JANUARY 11, 2017, AS IT RELATES TO YOUR EMISSIONS ANALYSIS?

A. Yes.

Q. ON PAGES 11-12 OF MR. EPNER'S TESTIMONY, HE COMMENTS ON THE INCREASED TRUCK EMISSIONS AND ADVERSE IMPACT THEY COULD HAVE. DO YOU HAVE A RESPONSE?

A. As stated in Invenergy's Responses to the Town's Data Request No. 22-45, any ambient air quality impacts resulting from truck emissions both during the Project construction and operating periods would be temporary and transient in nature. Because truck emissions are released at a relatively low velocity and elevation, they do not disperse far from their source. Thus, the areas primarily impacted will be along the roadways themselves and in those areas closest to

the roadways to be used. Any people or wildlife who do spend extended time in those areas are already experiencing temporary air quality impacts from existing vehicular traffic on those roadways and may experience only minor increases in those impacts for very short periods of time as a result of the truck traffic associated with the Project. This conclusion was also supported in the testimony of Ms. Ellen Cool on behalf of the Office of Energy Resources ("OER").

Q. ON PAGE 12 OF HIS TESTIMONY, MR. EPNER STATES THAT CREC WILL MAKE IT "VIRTUALLY IMPOSSIBLE" FOR RHODE ISLAND TO COMPLY WITH THE RESILIENT RHODE ISLAND ACT. DO YOU AGREE? PLEASE EXPLAIN.

A. I disagree. As stated in the testimony of Ms. Cool on behalf of OER, the Greenhouse Gas ("GHG") Plan issued by the Executive Climate Change Coordinating Council ("EC4") in December 2016 identified ten major mitigation options available to Rhode Island to meet its economy-wide GHG reduction targets. Except for preservation of the nuclear units, each of these mitigation options can be implemented through policy tools that are available to Rhode Island. The implementation of these tools by Rhode Island and the other states in the region will increase the percentage of energy sold in Rhode Island derived from clean energy resources over time, which will enable Rhode Island to comply with the Act. As stated by Ms. Cool, CREC's operation would contribute to lowering GHG emissions in the near term until a decreased demand for fossil-fuel generation leads to its output being replaced by lower and zero carbon emitting resources in the long term.

Q. ALSO ON PAGE 12, MR. EPNER CRITICIZES YOUR CONCLUSION AND STATES THAT THERE IS NOT ENOUGH INFORMATION FOR YOU TO CLAIM THAT CREC WILL REDUCE REGIONAL AIR EMISSIONS. DO YOU HAVE A RESPONSE? PLEASE EXPLAIN.

A. In my opinion, there is sufficient information available to make this conclusion. The updated forecast model run by PA Consulting Group, Inc. ("PA") for the Project, based on updated

electricity and fuel market data, predicted that CREC would lead to an annual average CO2 emissions reduction of 0.95% for the New England and New York Region. The assumptions of the model were affirmed by Ms. Cool in testimony submitted on behalf of the OER. As stated in her testimony, the updated model indicates that the operation of CREC still results in decreases in CO2 emissions. The results of the forecast model are consistent with my understanding of the regional energy market, in which the most efficient generating units operate more frequently than the less efficient, higher emitting units because they are more cost effective. Consequently, CREC will produce the same amount of power as a less efficient unit which has higher emissions when it operates, thus leading to an overall decrease in regional emissions resulting from CREC's operation.

Q. AFTER REVIEWING MR. EPNER'S TESTIMONY AS IT RELATES TO EMISSIONS, DOES YOUR PREVIOUS OPINION THAT CREC'S AIR EMISSIONS WILL CONFORM TO APPLICABLE LAWS AND REGULATIONS SO AS TO PROTECT PUBLIC HEALTH AND NOT CAUSE UNACCEPTABLE HARM TO THE ENVIRONMENT CHANGE?

A. No. The RIDEM Air Pollution Control Regulations have been established to protect the air quality in Rhode Island and maintain air quality at levels which are protective of public health and the environment. A Major Source Permit cannot be issued unless the applicant has demonstrated full compliance with the RIDEM Air Pollution Control Regulations, including compliance with the NAAQS and the RIDEM Acceptable Ambient Levels ("AALs") for air toxic emissions. The CREC will fully comply with the RIDEM Air Pollution Control Regulations, NAAQS, and AALs, as demonstrated in the Major Source Permit Application and the associated addenda. As such, the Project will conform to applicable laws and regulations so as to protect public health and not cause unacceptable harm to the environment.

As stated on Page 13 of RIDEM's Supplemental Advisory Opinion, dated August 15, 2017, "'DEM is charged with determining whether projects and activities present an acceptable harm to the environment through the various permits, licenses, and reviews authorized by the Rhode Island General laws and the associated rules and regulations promulgated thereunder. Projects and activities determined to be compliant with the thresholds and standards set for acceptability in those various rules and regulations, in the context of harm to the environment, are approved, often through the issuance of permits. Conversely, projects and activities that have an unacceptable level of harm to the environment either result in denial of permits and approvals for the proposed project or activity, or enforcement actions to stop and mitigate the harm for conditions not considered under an application before DEM.' Consequently, whether the Facility presents an unacceptable harm to the environment largely turns on whether it meets the standards for the various permits and approvals necessary for compliance with the applicable rules, regulations and statutes that the DEM is tasked with enforcing."

As it relates to emissions, if the CREC Project, which has demonstrated that it meets the relevant standards, is issued a Major Source Permit by RIDEM, it will have been determined by RIDEM that the Project will not cause unacceptable harm to air quality.

Q. ON PAGE 17 OF HISTESTIMONY, THE TOWN COUNCIL PRESIDENT STATES THAT IT IS HIS "BELIEF THAT, DESPITE THE EPA'S ASSURANCES THAT THERE CAN BE 'SAFE' LEVELS OF TOXIC AIR EMISSIONS FROM CREC, GOVERNMENTAL STANDARDS ARE NOT A GUARANTEE THAT SUCH EMISSIONS WILL NOT CAUSE HARM . . . TO THE ENVIRONMENT, TO THE RESIDENTS OF THIS TOWN AND TO THE STATE." DO YOU HAVE A RESPONSE?

A. Yes. The EPA has established the NAAQS to provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children and the elderly, as well as to protect against decreased visibility and damage to animals, crops, vegetation and

buildings. The Clean Air Act requires periodic review of the science upon which the standards are based and the standards themselves. The periodic review of the NAAQS include the preparation of an integrated review plan, the completion of an integrated science assessment, a risk/exposure assessment and a policy assessment. The scientific review during the development of these documents is thorough and extensive. Draft versions of all documents are reviewed by the Clean Air Scientific Advisory Committee, an independent scientific panel, and the public has an opportunity to comment on them. This lengthy, rigorous review process ensures that the NAAQS are conservative enough to fully protect public health and the environment. RIDEM has established AALs to protect the public against the potential acute and chronic effects which can be associated with air toxic emissions. The Office of Air Resources ("OAR") is required to reevaluate Regulation No. 22 once every two years. That review includes an evaluation of any changes in a published health benchmark for any of the listed substances and whether any substances should be added to the list based on a change in published health benchmark information. The conservative nature of these health-based air quality standards and the rigorous scientific processes involved in establishing them ensures that ground level concentrations which are below the standards will not cause harm to the public or the environment.

III. OIL

Q. REGARDING CREC'S OIL USAGE, THE TOWN'S WITNESS, MR. THOMAS HEVNER STATES, ON PAGES 4 AND 20, THAT A SPILL PREVENTION CONTAINMENT AND COUNTERMEASURE ("SPCC") PLAN MUST BE IMPLEMENTED. HAS INVENERGY AGREED TO IMPLEMENT THE SPCC PLAN?

A. Yes. As stated in my Pre-Filed Direct Testimony, an SPCC Plan will be prepared, and all Facility personnel involved with the storage and transfer of ultra-low sulfur diesel ("ULSD") will be properly trained to implement the SPCC Plan and all associated emergency procedures.

Q. MR. HEVNER ALSO SUGGESTS, ON PAGES 18 AND 20, THAT AN EVALUATION FOR THE IMPLEMENTATION OF A FACILITY RESPONSE PLAN ("FRP") SHOULD ALSO BE UNDERTAKEN IF THE PROJECT ADVANCES. FIRST, WHAT IS A FRP?

A. Facilities that could reasonably be expected to cause substantial harm to the environment by discharging oil into or on navigable waters are required to prepare and submit a Facility Response Plan ("FRP") to the EPA. A facility may pose substantial harm according to the FRP rule if it has a total oil storage capacity greater than or equal to 1 million gallons and (a) does not have sufficient secondary containment for each aboveground storage area, or (b) is located at a distance such that a discharge from the facility could cause "injury" to fish, wildlife, and sensitive environments, or (c) is located at a distance such that a discharge from the facility would shut down a public drinking water intake, or (d) has had, within the past five years, a reportable discharge greater than or equal to 10,000 gallons. The FRP must include an emergency response action plan, an analysis of potential spill hazards, a description of discharge procedures and equipment, and an implementation plan for response, containment and disposal.

Q. IS INVENERGY WILLING TO IMPLEMENT A FRP?

A. Although oil is not being transported over water, Invenergy is willing to implement an FRP to prevent any adverse impacts to fish, wildlife and sensitive environments in the unlikely event of a release from the aboveground oil storage tank.

IV. AMMONIA

Q. REGARDING AMMONIA, ON PAGES 18-19 OF MR. HEVNER'S TESTIMONY, HE RECOMMENDED THAT INVENERGY EVALUATE THE POTENTIAL RISK OF A CHEMICAL ACCIDENT UNDER THE RISK MANAGEMENT PLAN ("RMP") REQUIREMENTS. MR. HEVNER ASSERTS THAT INVENERGY SHOULD CONDUCT A "FULL RMP", NOT JUST AN "RMP-LIKE" ANALYSIS. PLEASE RESPOND.

A. As discussed in my Pre-Filed Direct Testimony, although CREC is not subject the Risk Management Program, an analysis of the worst-case accidental release scenario was previously completed to assess the potential consequences in the extremely unlikely event of a release of the 19% aqueous ammonia into the containment area. It appears that Mr. Hevner may not have reviewed my Pre-Filed Direct Testimony, because not only does this analysis appear to be completely ignored, but he also re-stated comments made by the Rhode Island Department of Health ("RIDOH") of which my Pre-Filed Direct Testimony specifically responded to and refuted. (Pages 21-25)

In the August 9, 2016 response to the RIDOH Advisory Opinion, Invenergy proposed to conduct a facility-wide RMP-like hazard analysis, including the ammonia, hydrogen tubes, and fuel oil storage and delivery systems, the storage and transport of hazardous waste, and the transport and use of natural gas at the Facility. The term "RMP-like" used in this response was not intended to mean that Invenergy was proposing a less rigorous analysis than what would be required under the RMP Regulations, only that the RMP Regulations do not apply to the Facility.

Q. YOU MENTIONED THAT MR. HEVNER'S DIRECT TESTIMONY IGNORES YOUR RESPONSE TO COMMENTS FROM RIDOH. ON PAGES 16-17 AND 19 OF HIS TESTIMONY, MR. HEVNER STATES THAT THE ALOHA MODEL INPUTS SHOULD BE UPDATED TO SATISFY RIDOH. DID YOU DO THIS?

A. Yes. As stated in my Pre-Filed Direct Testimony, the ALOHA analysis was updated to address concerns raised in RIDOH's original advisory opinion. Specifically, in its September 12, 2016 Advisory Opinion, RIDOH recommended that the ALOHA model be run using Stability Class F and at an ambient temperature of 85°F to be more conservative.

Subsequent to the issuance of the RIDOH Supplemental Advisory Opinion, the storage volume of the CREC ammonia storage tank has been reduced from 40,000 to 27,000 gallons. CREC has proposed to employ passive evaporative controls to mitigate the consequences of an

accidental release of ammonia from its on-site storage tank. The passive control system will consist of industrial-grade plastic balls placed in the bottom of the containment area surrounding the storage tank. In the event of an accidental release of aqueous ammonia into the containment area, the liquid would pass between the balls and spread out on the concrete base. The floating balls will reduce the area available for volatilization to approximately one-tenth of the total surface area of the liquid. The balls will also block the wind, greatly reducing the wind speed at the surface of the liquid, further reducing the rate of volatilization.

CREC is also now proposing to use a misting system within the ammonia storage tank containment area to reduce the concentration of any aqueous ammonia within the containment area by 33% in the event of a release.

The results of the revised ALOHA modeling analysis, based on the reduced storage volume and the proposed control systems and using the modeling inputs recommended by the RIDOH, are shown graphically on the figure attached to Invenergy's Responses to RIDOH's 1st Set of Data Responses as Exhibit D. As shown on the figure, even under the most stable wind conditions (Stability Class F), the impact areas are all within the CREC and Spectra property lines, within areas not accessible to the public.

V. ENVIRONMENTAL IMPACT STUDY ("EIS")

Q. HAVE YOU REVIEWED THE TESTIMONY OF MR. THOMAS HEVNER?

A. Yes.

Q. HE DISCUSSES A PREVIOUS EIS CONDUCTED ON THE SITE AND BASICALLY OPINES THAT THE EIS DETERMINED THAT THE BUCKHILL SITE WAS NOT COMPATABLE WITH A POWER PLANT. DO YOU HAVE A RESPONSE?

A. As stated in my Pre-Filed Direct testimony, the CREC will require an Individual Permit from the U.S. Army Corps of Engineers ("USACE") for its proposed wetland impacts. The

USACE is responsible for preparing an Environmental Assessment ("EA") to determine whether an EIS will be required for the Project. If required, the preparation of the EIS would be the responsibility of the USACE.

Federal regulation 40 CFR 325 Appendix B, sets forth implementing procedures for the USACE regulatory program. In cases where the specific activity requiring an USACE permit is merely one component of a larger project, the district engineer is required to establish the scope of the NEPA document (EA or EIS) to address the specific activity requiring an USACE permit and those portions of the entire project over which the district engineer has control and responsibility to warrant Federal review. The district engineer is considered to have control and responsibility for portions of the project beyond USACE jurisdiction only in cases where the environmental consequences of the larger project are essentially products of the USACE permit action.

The EFSB Application and the numerous environmental permit applications which have been be filed for CREC fully detail the environmental impacts of the Project and collectively include all of the elements which would be required for an EIS. The USACE did not notify Invenergy in any of the pre-application meetings that an EIS would be required for the Project. For the USACE to require an EIS for the Project, the district engineer would need to conclude that the environmental consequences of the Project have not been properly considered through the EFSB and other environmental permitting processes. If required, the scope of such an EIS would be limited to the aspects of the Project for which the USACE has control and responsibility.

The EFSB Rules of Practice and Procedure require a study of the alternatives to the proposed Facility, including sites, together with the reasons for the applicant's rejection of such alternatives. The alternatives analysis is not intended to determine whether the proposed site is

suitable, but rather to explain why the site selected is the best alternative of the sites considered, and why the other sites considered were not chosen.

On Page W-12 of the Ocean State Power Project Final Environmental Impact Statement ("OSP EIS"), Volume II, the U.S. Fish and Wildlife Service stated that the Buck Hill Road site was not carried forward as a recommended site by the Federal Energy Regulatory Commission ("FERC") because of environmental limitations and should have been eliminated from consideration because of those constraints and its proximity to sensitive receptors. The Buck Hill Road site considered in the alternatives analysis for the OSP EIS is the same site now being proposed for the CREC.

In its response to this comment (FA3-6), FERC stated "There are many reasons why some sites are ranked lower or eliminated and others considered. A power plant may be inconsistent and incompatible with the recreation activities available at a park near a site, yet the site can still remain environmentally acceptable; however, it may not be the best available site. Distances to sensitive receptors cannot be considered as fatal flaws, but will assist in rating sites." It is clear from this comment that FERC did not consider the environmental limitations associated with the Buck Hill Road site (or any site) to be fatal flaws. Rather, they were considerations to be used to determine which of the sites considered in the alternatives analysis for the project was the preferred alternative. In the end, the current site of OSP was chosen as the preferred alternative for the project, based on all of the considerations of the alternatives analysis that were available at that time, not because the Buck Hill Road site had a fatal flaw.

Similarly, in its analysis of potential sites for the CREC, Invenergy considered many factors, including environmental constraints and distance to sensitive receptors and concluded that the site selected was the preferred alternative for the Project. Because the site was not considered

as the preferred alternative for one power plant project nearly thirty years ago does not eliminate the potential for it to be considered as the preferred alternative for a very different power plant project nearly thirty years later.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes, it does. That said, I may offer additional testimony in response to the RIDOH's Supplemental Advisory Opinion, if necessary.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

PRE-FILED REBUTTAL TESTIMONY OF MICHAEL HANKARD

(September 1, 2017)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF MICHAEL HANKARD, HANKARD ENVIRONMENTAL, INC.

I. INTRODUCTION

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

A. My name is Michael Hankard. I am the owner and President of Hankard Environmental, Inc., an acoustical consulting firm, located at 211 East Verona Avenue, Verona, Wisconsin 53593.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC" or "Project" or "Facility").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. To address and respond to statements made by the Town's witness, Mr. David M. Hessler, regarding noise. My rebuttal testimony demonstrates that CREC will conform to applicable laws and regulations and will thereby not cause unacceptable harm to the environment or the public health.

Q. HAVE YOU REVIEWED THE TESTIMONY OF MR. HESSLER?

A. Yes.

Q. WHAT PORTIONS OF HIS TESTIMONY ARE RELEVANT TO YOUR REBUTTAL?

A. Mr. Hessler's testimony acknowledges that Invenergy has committed to take every reasonable step to ensure that the noise from CREC will meet the Town's "demanding" nighttime Ordinance noise limit of 43 dBA at the nearest residences "at all times and during all normal operating modes, including start-up and shutdown, when noise from this particular type of plant can easily be dramatically louder than during steady-state operation." (Page 4) He also describes the types of equipment CREC will use to make sure it meets the Town's noise ordinance limit. He further states that "during all normal modes of operation, noise from the facility is expected to be reasonably low in the community." (Page 5)

Although he does not state that CREC will be "inaudible," which Invenergy has never claimed, his opinion is similar to mine in that he determined that the "sound emissions are likely to be at a level that is normally regarded as benign and acceptable in most rural communities, even when the pre-existing environmental sound level is extremely low and offers no significant masking." (Page 5)

He concludes by recommending that the EFSB should require, as a condition of any permit, extensive field testing to ensure compliance with the Town's noise ordinance. He also opines that the EFSB should, as an explicit condition of the CREC permit, penalize noise violations with fines, cease and desist orders, and possible revocation of the operating license. Finally, he opines that Invenergy should post a performance bond or financial assurance to ensure the noise conditions are satisfied and to compensate Town residents who are affected.

Q. DO YOU BELIEVE THAT EXTENSIVE FIELD TESTING AND/OR A PERFORMANCE BOND IS NECESSARY TO ENSURE THE NOISE CONDITIONS ARE SATISFIED?

A. I believe that extensive field testing should be required as part of the EFSB permit, as is almost always the case on projects such as this. This testing should be made an explicit part of the

contract signed by CREC and the Engineer, Procure, and Construct ("EPC") contractor ultimately hired to build the Project. It is typical for a noise test protocol to be drafted and agreed upon prior to testing. The testing is typically conducted by agents of the EPC contractor, but can be witnessed by or supplemented by agents of the owner, the Town, and/or the financing entity. In the event that the testing shows a violation, the contractor is typically allowed a certain reasonable amount of time to cure the issue and then noise levels are re-tested until compliance is demonstrated. Given that noise compliance and noise testing will likely be conditions of the ESFB permit and given that those permit conditions will be made conditions of the EPC contract, I do not believe a performance bond is necessary.

Q. DO YOU BELIEVE THAT THE EFSB SHOULD MAKE FINES, CEASE AND DESIST ORDERS, OR PERMIT REVOCATION CONDITIONS OF THE PERMIT IN THE EVENT OF NOISE VIOLATIONS?

A. No, unless these actions are specified to be taken only after the EPC contractor (or the owner of the Project once the Facility becomes operational) is given reasonable time to resolve noise issues. My experience conducting compliance noise tests is twofold. I have conducted tests at the outset of operations, and there are at times that certain pieces of equipment need additional noise reduction. I have found contractors very motivated to fix any problems in a timely fashion, because project timelines come with financial incentives and penalties. I have also conducted tests for projects that have been operating for months or years, but a noise complaint was received. If the Facility were to be found out of compliance, again I feel that the owner should be given a reasonable amount of time to fix the issues. I could only see the EFSB issuing fines, cease and desist orders, or revoking the permit in the case of blatant disregard for noise on the part of the contractor or owner, significant and unexplained delays in resolving noise problems or repeated noise issues due to neglect of equipment.

Q. DO YOU BELIEVE THAT INVENERGY SHOULD POST FINANCIAL ASSURANCE FOR THE PURPOSE OF COMPENSATING TOWN RESIDENTS AFFECTED BY NOISE?

A. No. The need for the CREC to meet the 43 dBA limit during normal operations, start-up and shut-down will be a permit requirement based on the Town's Noise Ordinance, and Invenergy will (and has) agreed to this being a compliance condition in the EFSB's final decision. Additionally, as this requirement will be included in the EPC construction contract as a limit that must be achieved, and the ability of the Project to meet this limit will be required to be demonstrated by testing, it is unnecessary for Invenergy to post financial assurance.

Q. DID MR. HESSLER'S TESTIMONY ALSO ADDRESS LOW FREQUENCY NOISE?

A. Yes. Similar to my Pre-Filed Direct Testimony, his testimony indicates that he does not anticipate any adverse community noise impacts specifically from low frequency noise from CREC. (Page 7)

Q. MR. HESSLER'S TESTIMONY DISCUSSES NOISE DURING CONSTRUCTION AND EMERGENCIES. HE STATES THAT SOME FAIRLY SIGNIFICANT NOISE CAN BE EXPECTED, THAT STATE OF THE ART TEMPORARY SILENCERS DURING THESE TIMES SHOULD BE USED, AND THAT INVENERGY SHOULD TAKE ALL REASONABLE ACTIONS TO REDUCE CONSTRUCTION NOISE. (PAGES 7-8) DO YOU AGREE?

A. I agree that the release of steam at the conclusion of construction for the purposes of cleaning pipes is loud if not mitigated and that the EPC contractor should be required to obtain the best commercially available silencer. In my opinion, it is unreasonable to require "state of the art" controls, as that could be interpreted to mean not only what is commercially available, but something experimental, only available overseas, etc. Not that I believe Mr. Hessler was suggesting as much, but it is important to avoid ambiguity and unreasonable or unattainable requirements on this matter.

Mr. Hessler states that "all reasonable actions" should be taken to reduce noise impacts during construction. (Page 1) I would be more specific, as "reasonable" can mean different things to different people. First, it should be noted that the noise study conducted for the CREC and included in the Application showed that predicted construction noise levels at nearby residences are within the range of existing daytime noise levels and therefore will not be intrusive. Second, the Town noise ordinance says in its exemptions section that noise from permitted construction "can occur" (is not limited to any level) from 7am to 6pm, but is prohibited on Sunday. Thus, it does come down to the contractor acting reasonably. My definition of this would be to require that the contractor (1) use properly maintained equipment, particularly with respect to mufflers; (2) establish a line of communication with residents to keep them apprised of upcoming activities and to respond to complaints; and (3) make construction noise and its minimization something that the on-site project managers are aware of and have the authority to control to a reasonable degree.

Q. MR. HESSLER STATES THAT START-UP LASTS FROM 40 TO 120 MINUTES. (PAGE 4) DO YOU AGREE?

A. No. Start-up of the CREC, at least in terms of how much time the additional noise resulting from steam by-pass during start-up is concerned, is much shorter than the overall time to start the unit up and achieve full load and is more in the order of 10 to 30 minutes depending upon the start-up conditions. *See* Michael Theriault Acoustics, Inc., "Transient Operation Noise Level Evaluation for the Clear River Energy Center," dated March 2016, filed with the Board on August 2, 2016 as Exhibit 1 to Invenergy's Supplemental Response to EFSB Data Request No. 1-1. Additionally, as Mark Wiitanen notes on page 3 of his rebuttal testimony, "Start-up of the CREC, at least in terms of how much time the additional noise resulting from steam by-pass during start-up is produced, is 10 to 45 minutes." Regardless, the noise analysis I performed assumes the

bypass valves operating at their full flow. The noise abatement measures will limit the start-up noise to 43 dBA at the nearest residence.

Q. DOES THAT CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes. However, I may have additional rebuttal testimony after reviewing the Rhode Island Department of Health's recently issued Supplemental Advisory Opinion.

INVENERGY THERMAL PRE-FILED REBUTTAL TESTIMONY
STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED REBUTTAL TESTIMONY OF RYAN HARDY

(September 1, 2017)

LIST OF EXHIBITS

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF RYAN HARDY, PA CONSULTING GROUP, INC.

I. INTRODUCTION

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

A. Ryan Hardy, Member of PA Consulting Group, Inc.'s ("PA") Management Group, located at 10 Canal Park, Cambridge, Massachusetts.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("CREC" or "Facility" or "Project").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. To rebut claims made by witnesses for the Town of Burrillville ("Town") regarding need, cost-justification and anticipated ratepayer savings for CREC, as well as to rebut claims made by witnesses for the Conservation Law Foundation ("CLF"). This rebuttal testimony serves to demonstrate that my previous analysis regarding need, cost-justification, and anticipated ratepayer savings is reasonable, and that the Rhode Island Public Utilities Commission's ("RI PUC's") Advisory Opinion still remains valid.

I. RESPONSE TO TOWN OF BURRILLVILLE'S WITNESS GLENN WALKER'S SUPPLEMENTAL PRE-FILED TESTIMONY AND CONSERVATION LAW FOUNDATION'S WITNESS ROBERT G FAGAN'S PRE-FILED TESTIMONY

CONNECTICUT SITING COUNCIL DECISION

Q. IN THE SUPPLEMENTAL PRE-FILED DIRECT TESTIMONY OF MR. GLENN WALKER, HE SUMMARIZES AN AUGUST 17, 2016, CONNECTICUT SITING COUNCIL DECISION AND ASSERTS THAT THE DECISION EXEMPLIFIES THAT CREC IS NOT NEEDED. DO YOU AGREE?

A. No, I disagree with Mr. Walker. The Connecticut Siting Council's Decision was for NTE Connecticut, LLC's proposed Killingly Energy Center, a 550 MW dual-fuel combined cycle power project, which has not yet cleared an FCA and is proposed to be located within a different ISO-NE zone than CREC. The Connecticut Siting Council's decision took a narrow view of reliability need, and indicated that if a resource has not cleared an auction. it is not needed in the market. However, the Siting Council acknowledged that the "*need, for a facility is a function of time*" and that Killingly Energy Center may be needed in the future. As such, the Siting Council dismissed the application without prejudice, which implies the Council may reconsider if Killingly Energy Center clears a future capacity auction.

In contrast, the RI PUC's Advisory Opinion took a multifaceted approach to determining the reliability need for the CREC, which is outlined in the four subheadings within the "Need" section of its Advisory Opinion. The four findings of reliability need by the RI PUC are (i) that CREC Unit 1 cleared an FCA, (ii) that there is a significant amount of capacity at risk for retirement in ISO-NE, (iii) that Rhode Island is an import constrained zone as identified by ISO-NE; and (iv) that resources above the Net Installed Capacity Requirement are needed. In other words, the Connecticut Siting Council's narrow decision related to Killingly Energy Center failing to clear an auction does not invalidate the determination for need within the RI PUC's Advisory Opinion for the full CREC facility on any of these four pillars of need.

Q. ARE THERE OTHER CONCERNS OF MR. WALKER'S TESTIMONY YOU WANT TO ADDRESS?

A. Yes. Mr. Walker ignores critical aspects of the Connecticut Siting Decision that are relevant to the determination of need for CREC. For example, Mr. Walker, and Mr. Fagan for that matter, argue that even if a facility has a capacity supply obligation ("CSO") within ISO-NE, it still may still not be needed for reliability. The Connecticut's Siting Council's decision on Killing Energy Center finds otherwise. The Council, at page 5 states:

> *"it is possible to have more resources clear in a given FCA than NICR….However, ISO-NE, in its filing of the auction results with the Federal Energy Regulatory Commission (FERC), does not specifically indicate which of the resources that cleared the auction specifically add up to NICR and which resources are considered the 'surplus' resources, over and above the NICR. Thus the Council cannot 'break apart' auction results and arbitrarily designate certain cleared capacity resources at 'NICR' resources and others as 'surplus' resources. The Council must view all of the cleared resources as a 'package' required for New England resource adequacy necessary for the electric reliability of the New England region and necessary for the electric reliability of the State" [**Emphasis in the original**]*

In highlighting the Connecticut's Siting Council decision, Mr. Walker chooses to ignore the Connecticut's Siting Council's findings that clearly state that resources that have cleared an auction and have a CSO are part of the package of resources needed for reliability within ISO-NE and that this package cannot be broken apart. CREC's Unit 1 has cleared an FCA, and has a seven year capacity obligation to meet electric reliability needs in New England. In other words, according to the Connecticut Siting Council decision, CREC is part of the package of capacity necessary to meet New England and Rhode Island reliability needs.

RESPONSE TO CRITICISM OF YOUR PRE-FILED TESTIMONY

Q. ON PAGES 19-23 OF MR. WALKER'S SUPPLEMENTAL TESTIMONY HE CRITICIZES YOUR RESPONSE TO HIS PRE-FILED TESTIMONY AND SAYS YOU MISREPRESENTED HIS TESTIMONY. DO YOU HAVE A RESPONSE?

A. I do not believe I misrepresented his testimony. In fact, his supplemental testimony further reinforces the fact that I did not misrepresent his original testimony. Mr. Walker's first example in his supplemental testimony of my "misrepresentation" relates to the ISO-NE's 2015 Regional

Energy Outlook's assessment on the units that are at-risk for retirement in New England. In Mr. Walker's Pre-Filed testimony he stated that in ISO-NE's 2015 Regional Energy Outlook "*most of the units at risk for retirement appear to have retired prior to FCA 11*" (Walker Page 7). He reinforced his view in his supplemental testimony stating that "*most of the units identified by ISO-NE exited the market in CCPs prior to 2020/2021*." (Page 19)

These statements by Mr. Walker about capacity ISO-NE has determined to be at-risk for retirement are demonstrably false, and my characterization of this fact is not a misrepresentation of what Mr. Walker stated. The 2015 Regional Energy Outlook[1] identifies 6,000 MW of coal and oil capacity at risk for retirement. These units include Yarmouth, Newington, Schiller, Merrimack, West Springfield, Mystic, Canal, Montville, New Haven, Middletown and Bridgeport Harbor Unit 3. None of these facilities have retired or are expected to retire prior to the 2020/2021 CCP, as Mr. Walker claims. Bridgeport Harbor Unit 3 is expected to retire in the 2021/2022 CPP. Therefore, the statement at page 7 of his supplemental testimony that "*most of the units at risk for retirement appear to have retired prior to FCA 11*" is false. These units are still at risk for retirement and represent a material reliability risk for New England.

Also, on page 22 of the 2015 Regional Energy Outlook, ISO-NE outlines that there is 3,500 MW of capacity slated to retire by 2018 and an additional 6,000 MW of capacity at risk of retiring by 2020. In other words, nearly 10,000 MW in total. This is fully consistent with the RI PUC's finding that CREC is needed to address the substantial amount of capacity that is at risk for retirement and is also largely consistent with the ISO-NE's 2017 Regional Energy Outlook view of retirements and capacity at-risk for retirement. In 2016, the RI PUC explicitly stated in its Advisory Opinion that "*[b]ased on the fact that ISO-NE has identified as a challenge to reliability*

[1] https://www.iso-ne.com/static-assets/documents/2015/02/2015_reo.pdf

the approximately 10,000 MW of retirements and 'at-risk' for closing of non-gas fossil fuel fired generation in New England, the entire CREC facility is needed for continued reliability in the region." (Page 10) The ISO-NE 2017 Regional Energy Outlook's view of retirements and at risk for retirements is that there are 4,200 MW of capacity slated for retirement though 2020, that there is 5,500 MW at-risk for retirement, and that "*uncertainty surrounds the future of 3,300 MW from the region's remaining nuclear plants.*"[2] (Pages 27 and 28) This totals 13,000 MW in potential retirements in ISO-NE.

RI PUC'S ADVISORY OPINION

Q. BASED ON YOUR REVIEW OF MR. WALKER AND MR. FAGAN'S TESTIMONY, DO YOU THINK THE RI PUC'S ADVISORY OPINION AND ITS CONCLUSIONS NEED TO BE REVISED?

A. No. I have seen no new evidence that invalidates any of the RI PUC's Advisory Opinion findings. The full CREC is still needed within the ISO-NE region.

Q. IN MR. FAGAN'S TESTIMONY, PAGES 28-35, HE CRITIQUES THE RI PUC'S ADVISORY OPINION AND THE TESTIMONY OF THE OFFICE OF ENERGY RESOURCES THAT WAS PROVIDED TO THE RI PUC. MR. FAGAN STATES THAT ALLEGED "NEW EVIDENCE" REGARDING AT RISK FACILITIES SHOULD ALTER THE RI PUC'S CONCLUSION. DO YOU AGREE?

A. No, I disagree with Mr. Fagan. None of the "new" evidence Mr. Fagan provides contradicts the RI PUC's four major findings on reliability need: (1) CREC Unit 1 cleared an FCA, (2) there is a significant amount of capacity at-risk for retirement, (3) Rhode Island is within an import constrained zone; and (4) capacity above the NICR is needed. While I believe that these four findings remain accurate, even if one of these foundational pillars of the RI PUC's determination was invalidated, there would still be a demonstrated reliability need for the CREC facility based on the remaining pillars.

[2] https://www.iso-ne.com/static-assets/documents/2017/02/2017_reo.pdf

Q. DO YOU THINK THERE ARE OTHER NEEDS FOR CREC BEYOND THE RELIABILITY NEEDS IDENTIFIED IN THE RI PUC'S ADVISORY OPINION?

A. Yes. I believe there are several other critical reliability needs for CREC. For example, ISO-NE President & CEO Gordon van Welie stated on January 30, 2017 in his *State of the Grid: 2017*[3] report that in order to integrate renewable resources "*the region needs fast-responding, flexible capacity resources that are not constrained in their operation*" and that "*non-gas resources are needed*" to help maintain reliability. (Pages 36 and 18 respectively) CREC, as a highly-flexible dual-fuel power generation facility, fills both of these system needs. I discussed these other reliability needs further in Section III of my Pre-Filed Direct Testimony.

CREC HAS CLEARED THE FCA AND RETAINS A CAPACITY SUPPLY OBLIGATION

Q. DOES CREC HAVE A CAPACITY SUPPLY OBLIGATION?

A. Yes. CREC Unit 1 cleared FCA 10 and received a seven year obligation to provide capacity to ISO-NE to help maintain reliability, indicating that the Facility is needed to maintain reliability in New England.

Q. ON PAGE 9, MR. WALKER STATES THAT BECAUSE INVENERGY SOLD UNIT 1'S CSO FOR 2019-2020, CREC IS NOT NEEDED. DO YOU AGREE? PLEASE EXPLAIN.

A. No, I disagree with Mr. Walker. As I describe above and within my Pre-Filed Direct Testimony, determination of need is broader than just securing a CSO. Capacity that clears a FCA is by definition a very strong indication of need, but there are a number of other factors that must be considered. The fact that Invenergy elected to sell CREC Unit 1's CSO for 2019-2020 neither negates the broader need for CREC nor the fact that CREC Unit 1 has a seven year obligation to provide capacity to ISO-NE.

[3] https://www.iso-ne.com/static-assets/documents/2017/01/20170130_stateofgrid2017_remarks_pr.pdf

The development of a new power plant is a complicated process. ISO-NE understands that the timing associated with construction—including securing the appropriate regulatory approvals—can be uncertain. Due to this challenge, ISO-NE allows new resources that have secured a CSO through the FCA to defer the rights and obligations of that CSO to allow for additional time for a resource to come online. While Invenergy elected to sell its CSO versus defer its obligation for a year, the principal behind this deferment is the same and the underlying capacity that CREC will provide is still needed in the market. In other words, CREC is still needed for reliability and has an obligation to provide that capacity.

Q. MR. FAGAN'S PRE-FILED TESTIMONY ALSO DISCUSSES THE RESULTS OF THE FCA 11. HE STATES THAT THE AUCTION CLEARED A SURPLUS OF 1,760 MW ABOVE THE NET INSTALLED CAPACITY REQUIREMENT ("NICR") FOR NEW ENGLAND (PAGE 7). THEREFORE, MR FAGAN OPINES THAT THIS INDICATED A LACK OF NEED FOR CREC. DO YOU AGREE?

A. No. I disagree. The NICR is the minimum, not the maximum, amount of capacity needed to meet ISO-NE's reliability target. However, meeting the NICR is only one component of need within the FCM. ISO-NE's FCM is designed to determine need not just in terms of meeting the absolute minimum amount of capacity needed to maintain reliability, but also to maximize the overall economic value to the ratepayer. ISO-NE calls this maximization of value, maximizing social surplus.

When the marginal supply offers in the auction do not perfectly correspond with the NICR, the FCA process evaluates every possible combination of supply offers in the auction to maximize social surplus. Ultimately, ISO-NE selects the most optimal economic solution that meets or exceeds the NICR. Removing a resource that is part of the most optimal economic solution by definition creates a less optimal economic outcome for the ratepayer and greater risk that the needed resources and value will not be delivered to the ratepayer. In other words, all cleared

capacity in an FCA is needed by ISO-NE in order to maximize the value for the ratepayer in meeting its reliability target.

In its Advisory Opinion before the Board, the RI PUC agrees with this assessment, stating plainly that "*Resources acquired above the Net Installed Capacity Requirement are needed*." (Page 12) Moreover, the Connecticut Siting Council's recent decision on the Killingly Energy Center, which Mr. Walker highlights, determined that one cannot "*cannot 'break apart' auction results and arbitrarily designate certain cleared capacity resources as 'NICR' resources and others as 'surplus' resources*" and that one must "*view all of the cleared resources as a 'package' required for New England resource adequacy necessary for the electric reliability of the New England*." (Page 5)

CREC Unit 1 cleared 485 MW in the FCA and has a seven year obligation to provide capacity, and is therefore part of the package needed for reliability in New England during this time period. Mr. Fagan's attempt to break apart the auctions results and cherry pick which resources are needed and which resources are not needed is fundamentally antithetical to ISO-NE's market structure.

Q. MR. WALKER'S SUPPLEMENTAL TESTIMONY, ON PAGES 6-7, STATES THAT YOUR PRE-FILED DIRECT TESTIMONY STATED THAT UNIT 2 WAS NOT NEEDED BY THE ISO-NE BECAUSE IT HAS FAILED TO OBTAIN A CSO. DO YOU AGREE WITH HIS CHARACTERIZATION OF YOUR TESTIMONY?

A. Absolutely not. Mr. Walker is grossly mischaracterizing my testimony. As I explicitly stated in my Pre-Filed Direct Teestimony, "*capacity that clears an FCA is by definition a very strong indication of need. It is undisputed that approximately half of CREC's capacity cleared FCA 10, which indicates that this capacity is needed to maintain reliability in ISO-NE.*" However, I also explicitly stated within my Pre-Filed Direct Testimony that "*there are several forms of need within ISO-NE and Rhode Island specifically*" and that the full CREC facility is needed. (Page 11)

Note that the RI PUC in its Advisory Opinion agrees that there are a number of factors determining need for the full CREC facility stating, which I discuss further above and in Section III of my Pre-Filed Direct Testimony.

RETIREMENTS CONTINUE TO PRESENT A MATERIAL RELIABILITY RISK

Q. MR. WALKER, ON PAGE 20, CLAIMS THAT YOUR VIEW OF RETIREMENTS IS SIMILAR TO HIS. IS THIS TRUE?

A. No. Mr. Walker is again misconstruing my testimony. I explicitly state in my Pre-Filed Direct Testimony that "*there is a significant amount of capacity at risk for retirement*," and that "[*d]ue to the relatively small size of ISO-NE's market, relatively small changes in supply can have a material impact on capacity prices*." (Page 16) It is my view that there is significant uncertainty related to retirements, which is why the analysis within my Pre-Filed testimony presents a range of potential retirement scenarios and calculates the impacts of those ranges.

Mr. Walker and I have similar views on the very low end of my range of retirements. The assumption on the low end of my range is that no additional retirements of existing units occur beyond those that have already been announced with firm retirement dates. This is an extremely conservative view and does not assume the retirement of any of the 5,500 MW capacity at-risk for retirement that ISO-NE identifies in the 2017 Regional Energy Outlook, nor the 1,280 MW of static delist bids submitted in FCA 11 that did not exit the market, nor the possibility for 1,044 MW of Public Service of New Hampshire 6 ("PSNH") units to retire if Eversource Energy is ultimately unable to sell them.

Q. MR. WALKER ALSO DISCUSSES RETIREMENTS IN ISO-NE AND STATES THAT HE DOES NOT ANTICIPATE ANY SIGNIFICANT UNIT RETIREMENTS DUE TO CAPACITY PRICES. DO YOU AGREE?

A. No, I disagree with Mr. Walker. Power generation facilities, which have useful lives that span decades, do not make retirement decisions based on a single year of cleared capacity prices.

In other words, a power generation facility may be willing to accept lower capacity prices in a single year (or few years), if the owner of the facility has a reasonable expectation that prices may rise in the future. As I demonstrated in my Pre-Filed Direct Testimony, very small changes in retirements can have a material impact on capacity prices within ISO-NE due to the relatively small market size.

My analysis of what is at-risk relies on ISO-NE's view of what is at-risk for retirement. In determining what capacity is at-risk for retirement, ISO-NE has a more transparent view of the ongoing costs of existing generators than the speculation Mr. Walker offers. In the 2017 Regional Energy Outlook, pages 27 and 28, ISO-NE has determined that there is 5,500 MW of capacity at-risk for retirement. Again, this is largely the same capacity that was determined to be at-risk in the 2015 Regional Energy Outlook, when capacity prices were clearing at materially higher levels. If ISO-NE determined that these facilities were at-risk for retirement at a time when capacity prices were higher than the most recent cleared auction (FCA 11), simple logic would dictate that Mr. Walker's view of low capacity prices in perpetuity would increase the likelihood that these at-risk facilities will retire.

This straightforward logic is reinforced by a June 13, 2017 letter (i.e. after FCA 11) that Dominion Energy sent to ISO-NE in order to explore Dominion Energy's options for potentially retiring the 2,000 MW nuclear Millstone Power Station located in Connecticut due to "*economic reasons.*" The letter is attached as **Exhibit RH Rebuttal-1**. Note that this 2,000 MW facility was not considered at-risk in ISO-NE's 2017 Regional Energy Outlook, yet Dominion Energy is signaling the potential for it to retire due to economic reasons.

Q. MR. FAGAN ALSO DISCUSSES RETIREMENTS IN HIS PRE-FILED TESTIMONY. SPECIFICALLY, ON PAGES 11-17, HE DESCRIBES HIS "AT-RISK" ANALYSIS TO SUPPORT HIS OPINION THAT CREC IS NOT NEEDED. DO YOU AGREE WITH HIS ANALYSIS?

A. No. Mr. Fagan's retirement analysis largely centers on the idea that not all of the 5,500 MW of capacity that ISO-NE has identified as at-risk will retire at once. He uses ISO-NE assumptions (i.e. inputs) in ISO-NE's 2016 Economic Studies to argue that ISO-NE thinks that only 2,611 MW of at-risk capacity is likely to retire by 2025. While this is the wrong way to interpret this ISO-NE study—as the 2,611 MW is an input assumption in the model and not an output of economic modeling study that he cites—one can still use Mr. Fagan's logic as a reference point for why CREC is needed.

No party in this proceeding has argued that the 5,500 MW of capacity that ISO-NE has identified as at-risk would likely retire at once. While it is certainly possible, I agree with Mr. Fagan that such a scenario is unlikely to occur. However, as I demonstrated in my Pre-Filed Direct Testimony, very small changes in the amount of at-risk retirements can have a major impact on reliability and capacity cost to Rhode Island ratepayers. The fact that ISO-NE identifies 5,500 MW of capacity at-risk for retirement is simply an indication that there is a considerable amount of capacity at-risk to retire.

I analyzed three at-risk retirement scenarios in my Pre-Filed Testimony: 500 MW, 1,044 MW, and 1,500 MW above the amount of capacity that has already announced its retirements. In the 500 MW at-risk retirement scenario, the potential increase in capacity pricing if CREC did not enter the market would be $2.08/kw-mo. With CREC in the market, this would translate to $61 million in incremental Rhode Island ratepayer savings in FCA 12 alone (in other words the savings for only one year; there would be savings beyond FCA 12). In the 1,044 MW at-risk scenario, the potential increase in capacity pricing if CREC did not enter the market would be $2.82/kw-mo. With CREC in the market, this would translate to $80 million in incremental Rhode Island ratepayer savings in FCA 12 alone. In the 1,500 MW at-risk scenario, the potential increase in

pricing if CREC did not enter the market would be $3.50/kw-mo. With CREC in the market, this would translate to $96 million in incremental Rhode Island ratepayer savings in FCA 12 alone.

In summary, with just 500 MW of at-risk retirements in FCA 12, there would be material ratepayer savings for Rhode Island ratepayers due to CREC entering the market. My 500 MW at-risk scenario represents less than 20% of the capacity that Mr. Fagan cites from ISO-NE's 2016 Economic Studies and less than 10% of the capacity that ISO-NE has identified as at-risk for retirement in the 2017 Regional Energy Outlook. The fact that the full 5,500 MW will not retire at once is irrelevant to the need for CREC, particularly since Rhode Island ratepayers would face major impacts with just 500 MW of at-risk capacity retiring.

Q. CAN YOU PROVIDE ACTUAL EXAMPLES ON HOW SUCH CAPACITY PRICE CHANGES CAN IMPACT RHODE ISLAND CUSTOMERS?

A. Yes. On August 21, 2017, the RI PUC voted to approve National Grid's (i.e. Narragansett Electric Company) proposed 53% electric rate increase to Rhode Island residential customers. National Grid stated before the PUC that this increase in electric rates "*is due to higher capacity costs*" in FCA 8 and FCA 9 and that these higher capacity costs were a result of retirements and Rhode Island being part of an import constrained zone that had "*insufficient new and existing resources to provide the capacity needed in this zone*."[4] Note that these capacity costs are directly passed through to National Grid's customers and that National Grid is not earning any profit on this rate increase.

CREC entered the market in FCA 10, which helped Rhode Island clear at materially lower capacity prices than FCA 9.

Q. DO YOU THINK THE AT-RISK FACILITIES INDICATE THE CREC IS NEEDED?

[4] http://www.ripuc.org/eventsactions/docket/4605-NGrid-DR-PUC1(8-10-17).pdf, Pages 1 & 6.

A. Yes. In my opinion, ISO-NE's at-risk capacity indicates that CREC is needed for both reliability and to help provide Rhode Island ratepayers with affordable capacity, which is consistent with the RI PUC's Advisory Opinion that "*the entire CREC facility is needed for continued reliability in the region*" due to retiring and at-risk capacity. (Page 10)

RHODE ISLAND REMAINS WITHIN AN IMPORT CONSTRAINED ZONE

Q. ON PAGE 8 OF HIS TESTIMONY, MR. FAGAN STATES THAT THERE WERE NO BINDING TRANSMISSION CONSTRAINTS BETWEEN THE NORTHERN NEW ENGLAND AND SOUTHEAST NEW ENGLAND ("SENE") CAPACITY ZONES. HE STATED THAT THIS SHOWS THAT CREC IS NOT NEEDED FOR SYSTEM RELIABILITY. DO YOU AGREE?

A. No, I disagree with his assessment. ISO-NE has determined that the SENE capacity zone is import constrained. Import constrained zones are determined when there is insufficient surplus of existing qualified capacity above the zone's Transmission Security Analysis requirement to allow for the loss of the zone's largest power generation unit. The addition of new cleared capacity in SENE—including CREC Unit 1—have helped prevent the zone from having a binding constraint. Binding, in this context, refers to when the potential flow of electricity on the transmission interface reaches its limit. Moreover, the fact that a zone does not bind in a capacity auction does not mean that the zone is no longer import constrained. In fact, ISO-NE has determined that SENE is still an import constrained zone for FCA 12.[5] This signals that ISO-NE believes that the zone is still at risk for not procuring the resources needed.

The RI PUC agrees with this assessment stating in its Advisory Opinion, on page 12, that:

> *"arguing that the lack of price separation signals a lack of need in the zone is contrary to the ISO-NE determination that the SENE is still an import constrained zone. It is the job of ISO-NE to make these determinations under the FERC approved process….Where imports of energy will be needed even with the addition of CREC, it can only benefit the region and the State of Rhode Island consumers to have CREC located within the SENE zone. Therefore, CREC is needed within the SENE zone."*

[5] https://www.iso-ne.com/static-assets/documents/2017/05/a5-fca-12-zone-formation-pspc.pdf

Mr. Fagan's assertion that SENE is no longer an import constrained zone is not supported by ISO-NE's most recent assessment that SENE remains import constrained for FCA 12.

FUTURE AUCTIONS

Q. ON PAGE 12, MR. WALKER STATES THAT THE 2017 CELT REPORT, COMPARED WITH THE 2015 CELT REPORT, DEMONSTRATES THAT THE FORECAST OF NET SUMMER PEAK LOAD IS LOWER IN 2017 THAN IN 2015, MAKING IT UNLIKELY THAT CREC UNIT 2 WILL CLEAR IN THE NEXT FCAS. DO YOU AGREE?

A. No, I disagree with Mr. Walker. First, Mr. Walker is making a qualitative assessment on the likelihood of CREC clearing in future auctions. He has not conducted a detailed quantitative analysis of all relevant factors to determine if CREC will clear in future auctions. While the summer peak load forecast in the 2017 CELT report is lower than the forecast from the 2015 CELT report, Mr. Walker has not quantitatively demonstrated that peak demand forecasts will continue on this downward trend. More importantly, Mr. Walker is only considering one variable to make an assessment of what will clear subsequent auctions. As I have previously discussed, the FCM is designed to determine need not just in terms of meeting the absolute minimum amount of capacity needed to maintain reliability, but also to maximize the overall economic value to the ratepayer.

One of the key factors that Mr. Walker ignores is that generator bids are not static from auction to auction—the price at which a resource is willing to withdraw from the capacity auction matters and this can change from auction to auction. Future expectations of costs, as well as future revenue projections, can shift from year-to-year driven by market factors (e.g. changes to fuel cost expectations) as well as factors inside-the-fence at a given facility (e.g. changes to maintenance costs driven by an unexpected outage). Additionally, a generator may alter its assumption of risk from year-to-year, impacting the price at which a generator may be willing to exit the auction. For example, as a new combined cycle early in its development cycle may have a significant risk

premium associated with uncertainties surrounding permitting and construction. As the project moves forward and certainty of costs increases, the same project may have a lower risk premium and be willing to enter the market at a lower price. In other words, a change to the demand forecast is just one part of the overall equation, and one must look at the entire system, including expected changes to supply.

Q. ON PAGE 16, MR. WALKER STATES THAT THERE ARE OTHER ALTERNATIVES TO CREC BEING PROPOSED IN THE MARKET THAT CAN PROVIDE FAST START, RAMPING, AND FLEXIBILITY CHARACTERISTICS. DO YOU AGREE?

A. No, I disagree with Mr. Walker. Specifically, Mr. Walker cites the Bridgeport Harbor 6 project and Canal 3 project as examples of other proposed generators that could provide the same fast start, ramping, and flexibility characteristics as an alternative CREC. Both facilities cleared FCA 10—along with CREC Unit 1—indicating that all three facilities are within the same package of resources needed to maintain reliability within New England. In other words, these three facilities are complementary resources and not direct substitutes for one another.

However, even if these resources were not complementary, Mr. Walker's assertion ignores the reality that CREC will likely operate at a higher efficiency than Canal 3, indicating that ISO-NE would typically dispatch CREC over this less efficient resources to meet fast start, ramping, and flexibility needs. Canal 3 will use natural gas combustion turbine technology, not combined cycle, which typically requires approximately 50% more fuel to generate one kWh of electricity than CREC. Lastly, Canal 3 remains in relatively early development and is owned by GenOn, a subsidiary of NRG Energy that recently filed for Chapter 11 bankruptcy in June 2017.

Q. MR. FAGAN'S PRE-FILED TESTIMONY ALSO RELIES HEAVILY ON THE 2017 CELT REPORT. HE OPINES THAT THIS REPORT SHOWS THAT THE CONCLUSIONS IN HIS TESTIMONY BEFORE THE RI PUC WERE CORRECT (PAGE 17). DO YOU AGREE?

A. No, I disagree with this assessment by Mr. Fagan. The underlying premise of Mr. Fagan's conclusion are misguided. Mr. Fagan—similar to Mr. Walker—is making a qualitative assessment on the need for CREC based on the likelihood of future ISO-NE peak load forecasts trending negative without performing any type of detailed, quantitative analysis. Mr. Fagan continues to ignore the fact that the FCM is designed to determine need not just in terms of meeting the absolute minimum amount of capacity needed to maintain reliability, but also to maximize the overall economic value to the ratepayer. I have conducted this detailed quantitative analysis in my Pre-Filed Direct Testimony, and my analysis indicates that CREC is needed.

Q. MR. FAGAN GOES ON TO STATE, ON PAGE 18, THAT "ACCOUNTING FOR INCREASED ENERGY EFFICIENCY RESOURCE TRAJECTORIES, AND ACCOUNTING FOR INCREASES IN BEHIND-THE-METER SOLAR PV RESOURCE TRAJECTORIES, HAS LED TO A REDUCTION IN RELIABILTIY NEED THAT EXCEEDS THE CAPACITY SUPPLY OBLIGATION HELD BY INVENERGY FOR THE FIRST UNIT FOR THE YEAR 2019." DO YOU AGREE?

A. No. Mr. Fagan is again trying to break apart the package of capacity that has secured a CSO and is arbitrarily trying to designate certain cleared recourse as necessary and other as unnecessary. As I have described above, ISO-NE, the RI PUC, and the Connecticut Siting Council have all determined that all cleared resources through an FCA are necessary to maintain reliability and that picking and choosing between already cleared resources is antithetical to the ISO-NE market structure.

Q. SHOULD THESE ARGUMENTS IMPACT THE RI PUC'S PREVIOUS ADVISORY OPINION?

A. No. The RI PUC determined that the full CREC facility is needed due to (i) CREC Unit 1 clearing an FCA, (ii) that there is a significant amount of capacity at risk for retirement in ISO-NE, (iii) that Rhode Island is an import constrained zone as identified by ISO-NE, and (iv) that

resources above the Net Installed Capacity Requirement are needed. Mr. Walker and Mr. Fagan's assertions about the 2017 CELT report do not override these four pillars.

HIGHLY SPECULATIVE ASSERTIONS

Q. IN MR. FAGAN'S TESTIMONY, ON PAGE 27, HE NOTES THAT NEW UPDATED DATA ON THE INCREASING LEVELS OF SOLAR PV SHOW THAT CREC IS NOT NEEDED. DO YOU AGREE THAT ASSESSMENT?

A. No, I disagree with Mr. Fagan. Added levels of solar, or wind for that matter, will not obviate the need for new dispatchable capacity. In other words, CREC will still be needed when the sun is not shining or the wind is not blowing. As a flexible and efficient generator, CREC will help support the integration of solar generation on the ISO-NE grid by providing an effective resource to balance solar generation's variable and intermittent nature. ISO-NE has recognized this system need stating in the ISO-NE's 2017 Regional Energy Outlook that New England's "*generation fleet will need to include fast, flexible power plants ready to jump in and balance the variable output from wind and solar resources; these will likely be natural gas-fired generators…because of their ability to turn on and off quickly*." (Page 18)

Q. MR. WALKER ALSO SUMMARIZES RECENT RFPS FOR RENEWABLE ENERGY THAT HAVE BEEN PLACED IN THE MARKET. DID YOU TAKE THIS INTO ACCOUNT IN YOUR NEED ANALYSIS?

A. Yes. As indicated on page 4 of my Pre-Filed Direct Testimony, my analysis takes into account the results of the Connecticut and New England Clean Energy RFPs. Additionally, my analysis assumes that renewable energy will continue to be built within New England to meet renewable portfolio standard targets.

Q. DO YOU AGREE WITH MR. WALKER'S SUMMARY OF THE IMPACTS THE MASSACHUSETTS CLEAN ENERGY RFPS WILL HAVE ON THE ENERGY MARKET IN NEW ENGLAND?

A. No, I do not. On page 13 of his supplemental testimony, Mr. Walker implies that procuring the renewable capacity targeted within the ongoing Massachusetts RFPs for new renewable generation, including off-shore wind, are an absolute certainty. This is not the case. The actual Massachusetts RFP for renewable generation states, on page 3, that "*that the DPU shall consider both the potential costs and benefits of such contracts and shall approve a contract only upon a finding that it is a cost effective mechanism for procuring low cost clean energy on a long-term basis*."[6] Similar language is found in the Massachusetts off-shore wind RFP, which states on page 13 that "*proposals must be cost effective for ratepayers*."[7] This is a key requirement that must not be overlooked. Unlike CREC, where the cost and financial risks of the Facility are entirely borne by Invenergy, the burden of costs and financial risk of the renewable generation targeted within these RFPs will be borne entirely by the Massachusetts ratepayer. Outside of new renewable projects needed to meet renewable portfolio standards (which are included in my analysis), there will be a limit to additional new renewable projects that are cost effective in ISO-NE.

Q. CAN YOU EXPLAIN WHY YOU BELIEVE THERE ARE LIMITED COST EFFECTIVE NEW RENEWABLE PROJECTS IN ISO-NE?

A. Recent experience within the ISO-NE market demonstrates that most renewable resources are not currently cost-effective compared with other alternatives. ISO-NE's FCA determines the most optimal economic solution of resources needed to meet reliability. Similar to CREC, renewable resources are able to participate in the FCA.

Typically, new resources that bid into the auction are subject to the Minimum Price Offer Rule ("MOPR") that governs the lowest price that a new resource is able to bid into the market.

[6] https://macleanenergy.files.wordpress.com/2016/12/83d-rfp-and-appendices-final_june-12-2017-conforming-changes-clean.pdf

[7] https://macleanenergy.files.wordpress.com/2017/02/section-83c-request-for-proposals-for-long-term-contracts-for-offshore-wind-energy-projects-june-29-2017.pdf

However, renewable resources currently have an important exemption where the first 200 MW of renewable resources bid into each FCA are exempt from this rule. As discussed by Division of Public Utilities Commission witness Seth Parker in his pre-filed testimony before the RI PUC, this exemption allows new renewable resources to be "*virtually guaranteed to c1ear*." (Page 46) However, only 73 MW of new solar and wind resources cleared in FCA 10, which is 127 MW below the 200 MW MOPR exemption threshold. Similarly, in FCA 11, only 11 MW of new solar and wind resources cleared, which is 189 MW below the 200 MW MOPR exemption threshold.

The fact that new renewable projects are virtually guaranteed to clear the FCA but are not clearing demonstrates that there is a lack of cost effective renewable resource alternatives currently within the New England market. It is my assessment that Massachusetts will not burden its ratepayers with excess costs above what is necessary to meet its renewable portfolio standard, which I take into account in my analysis.

Q. SO, ARE YOU SAYING THAT THE CREC PROJECT WILL PROVIDE POWER TO CONSUMERS AT A LOWER COST AS COMPARED TO THE OTHER RENEWABLE GENERATION PROJECTS DISCUSSED BY MR. WALKER AND MR. FAGAN?

A. Yes. The outcomes of recent FCA 10 and 11, as I describe above, demonstrate that there is a lack of cost effective renewable alternatives to CREC currently available to the market.

Q. BOTH MR. WALKER AND MR. FAGAN DISCUSS RHODE ISLAND AND OTHER NEW ENGLAND STATES' INCENTIVE PROGRAMS FOR RENEWABLE ENERGY. HAVE YOU TAKEN THESE TYPES OF PROGRAMS INTO ACCOUNT WHEN YOU CONDUCTED YOUR ANALYSIS?

A. Yes. These programs are encapsulated within the 2017 CELT Report, which I have taken under consideration within my analysis. Moreover, it is important to recognize that, similar to the Massachusetts Clean Energy RFPs, whenever new capacity is brought into the market under these

incentives programs, cost is being borne by ratepayers of the state with the incentive program. In contrast, the cost to develop and operate CREC is borne by Invenergy and not the ratepayer.

II. OFFICE OF ENERGY RESOURCES EFSB TESTIMONY

Q. HAVE YOU REVIEWED THE PRE-FILED EFSB TESTIMONY OF OER'S WITNESS, DR. ELLEN G. COOL?

A. Yes.

Q. ONE OF THE AREAS DR. COOL ANALYZES WAS CREC'S GREENHOUSE GAS ("GHG") EMISSIONS. PLEASE SUMMARIZE HER FINDINGS.

A. Dr. Cool found that CREC would reduce annual average GHG emissions for the New England and New York regions by 0.95% during the first five years of operations (2020-2024), which equals approximately 644,000 short tons of avoided carbon dioxide emissions per year, relative to CREC not entering service. (Page 6) Dr. Cool also stated that "*it is reasonable to expect that CREC will continue to contribute to regional CO2 emissions reductions beyond 2024, relative to a future without CREC*," finding that "*CREC would be one of the most efficient gas-fired resources in the region*" and that "*it will continue to displace energy from less efficient and higher emitting fossil-fired resources*." (Page 8)

Q. DO YOU AGREE WITH HER FINDINGS?

A. Yes, I agree with her findings.

Q. ONE OF THE AREAS DR. COOL DISCUSSES WAS THE IMPACT OF THE CHANGE TO REGIONAL GREENHOUSE GAS INITIATIVE ("RGGI") CO2 ALLOWANCE PRICING FORECAST ON OER'S ADVISORY OPINION. DO YOU AGREE WITH HER FINDINGS?

A. Yes, I agree with her findings. Dr. Cool noted that in the draft 2017 policy scenario overview, "*[t]he range of the new RGGI forecast scenarios…result in overall price trajectories that are generally lower than the forecast range illustrated in…OER's Advisory Opinion*." (Page 16, Lines 18-20). However, Dr. Cool also noted that "*PA's updated allowance price forecast*

remains at or below the lowest of the RGGI scenario forecasts," and that "*using a low forecast conservatively estimates the output of the Facility and the system-wide CO2 emission reductions*." (Page 17) Therefore, Dr. Cool's findings regarding the updated RGGI forecast scenarios did not lead to a change in the findings of OER's Advisory Opinion.

Q. DR. COOL ALSO DISAGREES WITH PROFESSOR ROBERT'S PREVIOUS ASSERTION THAT CREC WOULD LIKELY RUN ON BACKUP ULSD DURING SUMMER HEAT WAVES AND COMPOUND THE GHG EMISSIONS IMPACTS. WHAT IS YOUR OPINION ON THIS ISSUE?

A. I completely agree with Dr. Cool's assessment. CREC will have dual fuel capability, allowing it to switch to burning ULSD instead of natural gas in the event of constraints on the natural gas pipeline system. These constraints on the gas pipeline system typically occur during the cold winter months, when the gas pipeline system in New England operates closer to full capacity to serve both residential and commercial heating demand. Despite typically experiencing higher electricity peak demand during the summer months than during the winter months, natural gas demand for heating purposes in the summer is low, so natural gas-fired and dual fueled generators like CREC do not compete for fuel supply, and there is generally adequate pipeline capacity to serve these generators needs. Additionally, Invenergy has stated that it plans to secure firm gas transportation service for at least a portion of its fuel requirements, indicating that it would be less likely to experience complete natural gas supply curtailment that would force it to switch to burning ULSD than generators with interruptible service arrangements.

Q. DR. COOL ALSO OPINES THAT CREC WOULD NOT HINDER OR IMPAIR RHODE ISLAND'S ABILITY TO IMPLEMENT THE GHG PLAN ISSUED BY EC4 IN DECEMBER OF 2016. DO YOU AGREE?

A. Yes, I agree with her opinion. Dr. Cool noted that the GHG Plan issued by EC4 showed that, "*current emissions are significantly below the 1990 baseline*" and that "*Rhode Island is on track to achieve the 2020 emissions reduction target, due to the success of current GHG reduction*

policies and programs." (Page 24) Furthermore, Dr. Cool verified that CREC would decrease average annual GHG emissions by approximately 0.95%, or 644,000 short tons. Therefore, CREC will not hinder Rhode Island's ability to implement the GHG Plan, and in fact will contribute to meeting the 2020 emissions reduction target.

Q. LASTLY, DR. COOL OPINES THAT CREC WOULD NOT HINDER OR IMPAIR RHODE ISLAND'S ABILITY TO IMPLEMENT THE GHG MITIGATION OPTIONS PROPOSED BY THE GHG PLAN. DO YOU AGREE?

A. Yes, I agree with her opinion. As Dr. Cool describes in her testimony, the GHG mitigation options presented in the GHG Plan that pertain to electricity can be implemented through state- or regional-level policy tools, regardless of CREC's existence or operations and that these policy measures "*will continue to increase the percentage of energy sold in Rhode Island that is derived from clean energy resources*." (Page 27) On the other hand, CREC's operations and GHG emissions will be determined by price signals in the ISO-NE wholesale energy and ancillary services markets, and as the amount of energy generated by clean energy resources increases, "*the demand for energy from incumbent fossil-fired resources including CREC will diminish, regardless of how much fossil-fueled capacity remains in the region's fleet*." (Page 27, Lines 12-13). Therefore, the existence of CREC on the system and its wholesale market-driven operations and emissions will not prevent policy-driven investments in other clean energy resources. As I explained in Section II of my Pre-Filed Direct Testimony, the existence of CREC will enhance and support the development of more renewable energy resources.

III. <u>ECONOMY AND JOBS</u>

Q. HAVE YOU REVIEWED THE TESTIMONY OF MR. RALPH GENTILE AND MR. MARC VATTER ON BEHALF OF THE RIBCTC?

A. Yes, I have reviewed their testimony.

Q. ON PAGE 8 OF THEIR TESTIMONY, THEY STATE THAT THEIR ANALYSIS SUPPORTS YOUR AND MR. EDINALDO TEBALDI'S TESTIMONY (AS ADOPTED BY MASON SMITH) IN TERMS OF JOB CREATION. ADDITIONALLY, THEY STATE THAT THEIR ANALYSIS SUGGESTS SLIGHTLY HIGHER NUMBERS OF ONSITE CONSTRUCTION JOBS. DO YOU HAVE A RESPONSE?

A. Yes. The testimony of Ralph Gentile, Ph.D., and Marc Vatter, Ph.D. states that the projected economic impacts detailed in both my testimony and Edinaldo Tebaldi's testimony (as adopted by Mason Smith) are not only reasonable, but conservative in regards to direct jobs projected to be created during the construction period. Such confirmation is significant in that Mr. Gentile and Mr. Vatter performed an independent analysis using distinct methods and data sources, as detailed in their testimony (Page 1).

Q. IS THERE ANYTHING ELSE REGARDING MR. GENTILE'S AND MR. VATTER'S TESTIMONY THAT YOU WOULD LIKE TO NOTE?

A. In addition to confirming the reasonableness of our economic impact projections, Mr. Gentile and Mr. Vatter make two important points in their testimony, among many, regarding CREC's anticipated benefit to Rhode Island. First, they note that the timing of CREC's construction will coincide well with the projected availability of skilled workers in Rhode Island. Specifically, they state that CREC's construction "*could lend stability to the construction trades in Rhode Island over the years 2018-2020*" (Page 9). Second, they note that even if the market in Rhode Island for skilled workers (e.g., construction laborers, electricians, etc.) becomes tight, those who decide to move from one job to work on the construction of CREC are likely to realize higher wages and benefits by doing so (Page 11). I agree with their analysis.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

EXHIBIT RH REBUTTAL - 1

Thomas P. Wohlfarth
Senior Vice President - Regulatory Affairs

120 Tredegar Street, Richmond, VA 23219
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Dominion Energy®

June 13, 2017

Mr. Vamsi Chadalavada
Chief Operating Officer
ISO New England Inc
One Sullivan Road
Holyoke, MA 01040-2841

Dear Mr. Chadalavada,

I am writing today to alert you that Dominion Energy is performing a strategic assessment of our Millstone Power Station. Given that Millstone is the largest generating resource in New England; we want to keep you apprised as we work through this process.

As you are well aware, nuclear power plants in deregulated markets require the same sustained capital and operating investments as nuclear power plants in regulated states. However, it is becoming increasingly apparent nationwide that deregulated energy markets are not conducive to these sustained investments.

This is particularly true in cases when carbon-free nuclear energy is not eligible for the substantial clean energy procurements being conducted at the state level, as is currently the case here in New England and in Millstone's home state of Connecticut. As you know, Millstone accounts for the equivalent of more than half of Connecticut's electricity production and virtually all of its carbon-free electricity.

We will continue to vigorously pursue legislative options for equitable treatment for nuclear power in Connecticut's clean energy procurement process. However, due diligence for our shareholders requires we undertake this strategic review. In completing this review, a key variable will be our continuing obligations as a generator in the New England ISO. As a routine part of such a review, we will factor these obligations in as part of our larger assessment of our path forward in Connecticut.

Accordingly, I would like to confirm Dominion Energy's understanding of the options available to any generator that may choose, for economic reasons, to exit

the market in New England. Our understanding is that a generator that has a capacity supply obligation has the option to transfer such obligation via a commercial transaction or alternatively pay a financial penalty in order to exit the market prior to their obligation ending.

Please confirm this at your convenience. And thank you for your timely attention to this request.

Sincerely,

Thomas P. Wohlfarth

Thomas P. Wohlfarth
Senior Vice President, Regulatory Affairs

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED REBUTTAL TESTIMONY OF JEFFREY HERSHBERGER

(September 1, 2017)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF JEFFREY HERSHBERGER, ESS GROUP, INC.

I. INTRODUCTION

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

A. My name is Jeffrey Hershberger. I am a Professional Geologist for Environmental Geosciences and Engineering at ESS Group, Inc. ("ESS"), located at 10 Hemingway Drive, Riverside, RI 02915, although my office is in ESS' Waltham, Massachusetts office.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC" or "the Project" or "the Facility").

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. To rebut testimony by Mr. Hevner, for the Town of Burrillville ("Town"), regarding CREC's environmental impacts related to the revised Water Supply Plan ("Water Supply Plan") filed with the Board on January 11, 2017, specifically that the potential to use an on-site source of water supply to provide the process water for the Facility should be explored. My rebuttal testimony also addresses the Supplemental Advisory Opinion from the Rhode Island Department

of Environmental Management ("RIDEM"). My rebuttal testimony further demonstrates that the water usage will not cause unacceptable harm to the environment.

Q. HOW HAVE YOU STRUCTURED YOUR TESTIMONY?

A. I have structured my testimony in two (2) parts, based on the areas of my expertise and the primary critiques of my Pre-Filed Direct Testimony by Mr. Hevner, filed with the Board on August 7, 2017. The first section discusses and responds to statements from Mr. Hevner regarding water usage, and the second section discusses RIDEM's Supplemental Advisory Opinion, which was filed with the Board on August 15, 2017.

II. WATER USAGE

Q. THE TOWN'S WITNESS, MR. HEVNER, STATES THAT SUBSURFACE CONDITIONS SHOULD BE EVALUATED TO PROVIDE BOTH PROCESS AND POTABLE WATER TO THE FACILITY FROM AN ON-SITE SOURCE. HAS THIS BEEN EVALUATED?

A. Yes. As noted in the previously submitted Water Supply Plan, because of the many concerns expressed by the Town over the use of local water supplies and the use of water from a previously contaminated Pascoag Utility District ("PUD") groundwater well for process water for the CREC, an alternative non-local water source has been identified. Water use from an on-site or nearby water source, beyond the minimal amount of water needed to satisfy the potable water demand of the Facility during operation, was evaluated to determine if adequate yield could be reliably obtained and, if so, would there be any impact to the available water resources within the local area and the Clear River watershed.

The Project site is located within an upland area in northwestern Rhode Island. The area consists primarily of glacial till overlying bedrock. Limited alluvium is also present and is associated with the small streams in the site area. Isolated areas of wetland-related soils are also present in the site area. Any sustainable water supply in this type of setting would need to be

obtained from the crystalline bedrock. The bedrock in the site area is classified as part of the Esmond Igneous Suite, in particular augen granite gneiss (Zeag; defined as gneiss with alkali-feldspar porphyroclasts, typically massive but with strong penetrative foliation and lineation) (Bedrock Geologic Map of Rhode Island, Hermes, et., al, 1994). Actual primary porosity of this type of bedrock is almost non-existent and water availability is directly related to the development of secondary porosity features, such as fractures, faults and joints, the locations of which are unknown and their potential long term yield is very uncertain, even if a test well was installed and pumped for the purpose of evaluating its sustainable, long term yield. Simply stated, due to the uncertainty in the nature of the fracturing of the underlying bedrock and in its long-term sustainable yield, reliance on on-site wells is not considered a reliable option for supplying process water to the Facility.

Additionally, use of an on-site water source to supply process water for the Facility would also result in competition between the proposed Facility and the local water suppliers, and other local water users, for the limited water available within the Clear River watershed. As noted in the Burrillville Code of Ordinances, Aquifer Zoning (Section 30-202), the Clear River Basin is an important component of the groundwater resources of the town.

Q. ARE THERE OTHER CONSIDERATIONS CONCERNING ON-SITE WATER SUPPLY FROM THE BEDROCK?

A. Yes. There are also other significant considerations regarding the potential use of an on-site water source to supply process water for the Facility. A bedrock water system of this type, located in an upland area and a significant distance from any substantial surface water bodies, would be susceptible to diminished yield during periods of drought. A bedrock well source would also likely have significantly higher total dissolved solids ("TDS") and potentially

higher concentrations of silica that would result in higher water treatment costs for the Facility compared to the current water source (Providence Water – surface water).

Numerous studies have been performed within New England related to the potential yields from bedrock wells since a significant percentage of households obtain their water supply from private wells completed within similar types of crystalline bedrock. The United States Geological Survey ("USGS") stated that the median well yields for bedrock wells completed in this type of setting (crystalline igneous and/or metamorphic bedrock types) in Massachusetts is 7 gallons per minute ("gpm") (Hansen and Simcox, 1993). The Maine Geological Survey states that the median yield of bedrock wells in Maine is 3 to 6 gpm (Maine Geological Survey, 2012). The Vermont Geological Survey and Vermont Department of Environmental Conservation ("VTDEC") state that the median yield of bedrock wells in Vermont is 6 gpm (Vermont Geological Survey/VTDEC, 2010). The New Hampshire Department of Environmental Services ("NHDES") states that the median yield of bedrock wells in New Hampshire is 6.5 gpm (NHDES, 2010). These median yields are more than adequate for residential water use and are also adequate for the potable water use planned for the Facility during operation. However, for the proposed operation of the CREC, more water would be needed on a regular basis and, in particular, to support oil-firing operations or operation of the evaporative coolers during the summer months. It may be possible to install multiple wells on the Project site to try to increase the overall water yield, however, potential interferences between multiple wells (e.g., wells pumping water from the same fractures or interconnected fractures) could reduce the overall yield of the individual wells and/or the combined well system.

A bedrock well yield of approximately 6 gpm is equivalent to a daily well yield of approximately 7,200 gallons per day (gpd; assuming the well is pumped for approximately 20

hours per day to allow for well recharge and to account for periodic well maintenance and downtime). Per the Water Supply Plan, with both combustion turbines firing natural gas under a full-load normal condition (other than summer) will be approximately 15,840 gallons per day ("gpd"), and during full-load summer condition firing natural gas (approximately 3 months of year) will be approximately 18,720 gpd. Based on a median well yield (approximately 7,200 gpd) and a full-load normal water demand of 15,840 to a summer water demand of 18,720 gpd a total of 3 on site process water wells would be required to meet the normal water demands of the Facility.

The above evaluation only addresses the normal operating water demand of the Facility, but the water supply also must address the seasonal peak water demands related to oil firing, when required, and the use of the evaporative coolers during the summer months.

Based on the information provided in the Water Supply Plan, these peak seasonal water demands could range from approximately 37,120 to 55,520 gpd (variable use of the evaporative coolers typically 4 to 6 hours per day and 8 hours per day at times at an hourly water use rate of 4,600 gallons per hour of evaporative cooling) to as much as 104,000 gpd (post oil firing event requiring the refilling of the water storage tanks under the extended refilling scenario requiring, as noted in the Water Supply Plan, a total of 11 water trucks per day to refill the water tanks plus 2 additional trucks to satisfy the normal operating water supply requirement of the Facility). Based on the median bedrock well yield of 7,200 gpd, 15 on-site wells (which do not interfere with each other) would be needed to address the peak seasonal water demand.

In my opinion, given known site conditions, including the uncertainty in the nature of the fracturing of the bedrock underlying the site and the upland setting of the site, a wellfield including as many as 15 independent wells (wells not interfering with the production of other

wells within the field) would be difficult to locate on the site without significant potential for interference between pumping wells, which would reduce the sustainable yield of certain wells. In my professional opinion, it would be unlikely that the bedrock beneath the site would support a well system to reliably meet the Project water demands over the long term, including the water demand to operate the evaporative coolers and to refill the storage tanks following an oil-fired event. It would also be difficult to assess the long-term sustainability of any water well system on the site based on the performance of short-term testing. Bedrock well systems are especially susceptible to the effects of lower groundwater elevations during periods of drought conditions.

Q. ARE THERE OTHER CONCERNS WITH AN ON-SITE WELLFIELD?

A. Yes. Another concern regarding the use of an on-site wellfield to meet the water supply requirements of the Facility is the potential for impacts to on-site and, in some cases, off-site wetland areas or water resources. The 67-acre Project site has considerable wetland areas. The layout of the Facility has been developed to minimize wetland impacts. Pumping water from the underlying bedrock may have un-intended impacts on surface water and/or wetland areas as a result of fracturing and fissures within the bedrock that may extend to the surface or draw recharge from the property or surrounding areas.

Development of an on-site water supply well network will also require access to the well locations for both initial well installations and associated testing and long term access for maintenance of the wells/equipment. The initial step in the process of evaluating the potential for an on-site well system to meet the Project water demands would be the performance of a fracture trace analysis. The fracture trace analysis uses established criteria for identifying linear features on the land surface using aerial photography that are possibly related to the fractures in the underlying bedrock. The goal of the fracture trace analysis is to increase the potential for

encountering fractures and/or zones in the bedrock that may yield larger quantities of water to wells. Therefore, these potential drilling locations are dictated by the underlying geology and not reasonable access to the property. These preferred drilling locations are also often associated with surface hydrology (e.g., wetlands, streams, etc.) as these are frequently locations of groundwater discharge from fractures in the underlying bedrock.

Access to the well locations will require establishment of permanent, gravel-based, access roads requiring extensive clearing of forested areas to support construction of these access roads. Large air-rotary drilling rigs would be used to conduct the well drilling, along with any support trucks (e.g, rig tender carrying the well pipe and other equipment), and these type of rigs require access roads. As noted above, drilling locations would typically be established using some type of lineament or fracture trace analysis resulting in preferred drilling locations that are not always readily accessible. It is clear that the amount of clearing for the well installation and testing to even initially determine if this approach might be feasibly would be extensive. Given the total number of wells required and the requirements for permanent access roads to maintain well pumps and associated piping, impacts to wetland areas and further forest clearing would likely be extensive. Even a program focusing on the development of a well network to support just the typical daily process water demand for the Facility (up to 18,720 gpd) would likely result in the need for extensive clearing, road building and potentially, wetland impacts. This approach would also still require trucking of water to the Facility to provide additional process water to support use of the evaporative coolers during the summer months and/or tank refilling after an oil-fired event.

Q. GIVEN YOUR ANALYSIS, WHAT IS YOUR CONCLUSION WITH REGARD TO THE TOWN'S SUGGESTION TO FURTHER EVALUATE SUBSURFACE CONDITIONS FOR PURPOSES OF ON-SITE WELLS?

A. The development of an on-site wellfield consisting of as many as 15 independent wells to reliably meet the normal and peak seasonal water requirements of the Facility is not considered a viable alternative, given the well-recognized variable and often limited yield of bedrock wells in New England, the projected number of bedrock wells that would be required to meet the water supply requirements of the Facility, the known geology and topography of the site, the likelihood of diminished well yields as a result of potential interferences between numerous bedrock wells, the potential susceptibility of bedrock wells in similar upland locations to low yields during periods of drought, the potential for impacts to on-site and potentially off-site wetland areas, and the extensive additional clearing of forest areas required to support access roads to the well locations. Use of groundwater from an on-site well system would also result in less water being available within the Clear River watershed for the other public water suppliers and other existing and potential future water users in the watershed.

III. SUPPLEMENTAL ADVISORY OPINION

RIDEM

Q. HAVE YOU REVIEWED RIDEM'S SUPPLEMENTAL ADVISORY OPINION?

A. Yes.

Q. DOES RIDEM HAVE AN OPINION REGARDING THE WATER BEING SUPPLIED FROM THE TOWN OF JOHNSTON?

A. Yes, RIDEM states that "there are no impacts associated with water withdrawal" from the Town of Johnston. (Page 16)

Q. IS THERE ANYTHING ELSE IN THE RIDEM SUPPLEMENTAL ADVISORY OPINION THAT YOU WOULD LIKE TO ADDRESS?

A. Yes, the RIDEM Supplemental Advisory Opinion is consistent with the content of the Water Supply Plan. I also agree with RIDEM's statement that no new permits from any of RIDEM's Surface Water Protection Programs would be required.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes, it does.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

PRE-FILED REBUTTAL TESTIMONY OF TREVOR HOLLINS

(September 1, 2017)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF TREVOR HOLLINS OF HDR, INC.

I. INTRODUCTION

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

A. My name is Trevor Hollins. I am a Lighting Design Manager, at HDR Architecture, Inc. ("HDR"), located at 8404 Indian Hills Drive, Omaha, NE. 68114.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC").

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. My rebuttal testimony responds to the Rhode Island Department of Environmental Management's ("RIDEM") Supplemental Advisory Opinion, filed with the Board on August 15, 2017, regarding lighting. My rebuttal testimony also responds to the Rhode Island Department of Health's ("RIDOH") Supplemental Advisory Opinion, filed with the Board on August 28, 2017, regarding lighting.

Q. HAVE YOU REVIEWED RIDEM'S SUPPLEMENTAL ADVISORY OPINION?

A. Yes.

Q. ON PAGE 6 OF ITS ADVISORY OPINION, RIDEM DISCUSSES THREE STRATEGIES IDENTIFIED IN YOUR PRE-FILED TESTIMONY: LOWERING OF ILLUMNATION INTENSITY, CONTROLLING DIRECTION OF EMITTED ILLUMINATION AND MINIMIZING THE SPECTRUM OF LIGHT. DO YOU HAVE AN OPINION REGARDING THIS PART OF RIDEM'S OPINION?

A. RIDEM correctly identified that the three specified lighting strategies (lowering of illumination intensity, controlling direction of emitted illumination, and minimizing the spectrum) have the "potential to greatly reduce the amount of light pollution emitted by the Facility." (Page 6)

Q. DO YOU HAVE A RESPONSE TO RIDEM'S STATEMENT THAT UNTIL A LIGHTING DESIGN PLAN IS PRODUCED WHICH DETAILS EXACTLY WHERE, WHEN, AND HOW THE PROPOSED MEASURES WILL BE IMPLEMENTED, AND WHAT IF ANY AREAS THE APPLICANT DEEMS CANNOT SAFELY USE THE STRATEGIES DISCUSSED, IT IS IMPOSSIBLE TO JUDGE THE EFFICACY OF THESE MEASURES?

A. In making this statement, RIDEM references Invenergy's Response to RIDEM's Data Request No. 3-21 filed with the Board on August 4, 2016. Since then, Invenergy has prepared a lighting plan, a lighting technical memorandum and a nighttime visual assessment prepared by their engineers and consultants as a supplementary Data Response to RIDEM's Data Request Nos. 3-21, 3-22 and 3-57 filed with the Board on June 19, 2017. The lighting plan and lighting technical memorandum included the three specified lighting strategies of lowering illumination intensity, controlling direction of emitted illumination, and minimizing the spectrum so as to reduce and control to the extent practicable the amount of light pollution emitted by the facility. It appears that RIDEM may not have reviewed those documents prior to filing their Supplemental Advisory Opinion. It is my opinion that a review of this additional information would allow RIDEM to conclude that the lighting impacts to the community and wildlife will be minimized.

Q. HAVE YOU REVIEWED RIDOH'S SUPPLEMENTAL ADVISORY OPINION, FILED WITH THE BOARD ON AUGUST 28, 2017?

A. Yes.

Q. ON PAGE 11, IT STATES: "THE APPLICATION DID NOT INCLUDE SUFFICIENT INFORMATION FOR THE EVALUATION OF IMPACTS OF POTENTIAL NIGHTTIME LIGHTING OF THE FACILITY. SUCH IMPACTS SHOULD BE EVALUATED WHEN THAT INFORMATION IS AVAILABLE." DO YOU HAVE A RESPONSE?

A. Yes. On June 19, 2017, Invenergy filed the following three lighting informational documents with the Board as exhibits to its Supplemental Responses to RIDEM's 3rd Set of Data Requests:

- Lighting Plans, prepared by HDR, Inc., dated March 2, 2017, revised April 21, 2017;
- Lighting Technical Memorandum, of which I prepared, dated April 19, 2017; and
- Nighttime Visual Assessment Report, entitled "Clear River Energy Center Visual Simulations – EDR Project No. 16110," prepared by Environmental Design & Research, dated January 9, 2017.

All three documents provide information sufficient for the RIDOH and the Board to evaluate the impact of potential nighttime lighting of the Project.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED REBUTTAL TESTIMONY OF CHAD JACOBS

(September 1, 2017)

LIST OF EXHIBITS

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF CHAD JACOBS, HDR, INC.

I. INTRODUCTION

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

A. My name is Chad Jacobs. I am a Project Manager at HDR, Inc. ("HDR"), located at 11 Stanwix St. Pittsburgh, PA. 15222

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC" or "the Project").

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. To rebut claims made by witnesses for the Town of Burrillville ("Town") regarding CREC's stormwater impact filed with the EFSB on August 7, 2017. My rebuttal testimony further demonstrates that Invenergy's stormwater management plans and soil erosion and sediment control plans will be in conformance with applicable laws and regulations and will thereby not cause unacceptable harm to the environment.

Q. HOW HAVE YOU STRUCTURED YOUR TESTIMONY?

A. I have structured my testimony based on the areas of my expertise, stormwater and soil erosion and sediment control, and the primary critiques of my pre-filed testimony by the Town's witnesses. I will also respond to relevant sections of the supplemental advisory opinions.

II. STORMWATER ANALYSIS

Q. THE TOWN'S WITNESS, MR. ANTHONY JAMES ZEMBA, STATES THAT INVENERGY HAS NOT PROVIDED INFORMATION IDENTIFYING HOW CREC WILL ADDRESS STORMWATER DISCHARGE. DO YOU AGREE? IF NOT, PLEASE EXPLAIN WHAT INFORMATION INVENERGY HAS PROVIDED REGARDING CREC'S STORMWATER DISCHARGE.

A. I do not agree with Mr. Zemba's statement. Specifically, as discussed in my Pre-Filed Direct Testimony, Invenergy developed final designs for the Erosion and Sediment Control Plan, the Operation and Maintenance ("O&M") Plan and a Final Stormwater Management Plan, which were submitted to RIDEM on April 26, 2017 for review and approval as part of a comprehensive freshwater wetlands alteration permit. The designs meet the design criteria and guidance as outlined in the Soil Erosion and Sediment Control Handbook and the Rhode Island Stormwater Management Control Manual. These plans were also filed with the Board on May 16, 2017 as part of Invenergy's Application to Alter Freshwater Wetlands and were submitted to the Building Inspector on June 9, 2017.

Q. MR. ZEMBA ALSO STATES THAT CREC WILL INCREASE THE IMPERVIOUS SURFACE AREA RESULTING IN INCREASED STORMWATER RUN-OFF FROM CREC. HAS INVENERGY ACCOUNTED FOR THIS IN ITS STORMWATER MANAGEMENT PLAN? IF YES, PLEASE DESCRIBE.

A. The stormwater collection and treatment system was designed in accordance with the Rhode Island Stormwater Design and Installation Standards Manual 2015 Edition. This manual establishes design criteria and guidance for the management and control of stormwater runoff for the State of Rhode Island. The increase in stormwater runoff and pollutant loading has been mitigated using standard recommended best management practices. The end result is the proposed

stormwater runoff is at or less than the original runoff rate and meets RIDEM's water quality guidelines for stormwater treatment volume.

Q. ANOTHER TOWN WITNESS, MR. JAMES A. JACKSON, ALSO ADDRESSES STORMWATER AND NOTED THAT THE STORMWATER PLAN INDICATED AN INCREASE TO POLLUTANTS IN THE STORMWATER. DO YOU HAVE A RESPONSE?

A. The CREC has proposed the use of standard RIDEM best management practices; dry infiltration swales and a gravel wet vegetated treatment system with forebay to reduce the overall pollutant loading to the watershed. *See* the Pollution Calculations Summary Tables attached for details, attached as **Exhibit CJ Rebuttal - 1**.

III. SUPPLEMENTAL ADVISORY OPINION

Q. HAVE YOU REVIEWED THE BUILDING INSPECTOR'S SUPPLEMENTAL ADVISORY OPINION?

A. Yes.

Q. THE BUILDING INSPECTOR RAISES THE ISSUE OF HOW THE SITE CONTRACTOR WILL BE ABLE TO MOVE AROUND THE SITE TO UTILIZE BOTH AREAS DUE TO WETLAND CONSTRAINTS. (PAGE 2) DO YOU HAVE A RESPONSE?

A. The main access road which is currently an existing dirt road into the site will be the main travel way between upland areas. In those wetland areas that must be traversed the use of timber mat bridging will be utilized. Bridging of wetlands is an accepted common practice for development adjacent to or crossing sensitive areas.

Q. THE BUILDING INSPECTOR ALSO QUESTIONS THE DIRECTIONS GIVEN AS TO HOW THE PROJECT WILL PROGRESS. (PAGE 2) DO YOU HAVE A RESPONSE?

A. The Project has been broken into four main phases of construction as shown on the Soil Erosion and Sedimentation Control Plan, pages 01C905 through 01C921. The phases show a

gradual change of the site grading, stormwater controls and erosion and sediment controls work that should be completed prior to moving onto the next phase of work.

Q. THE BUILDING INSPECTOR ALSO REQUESTS THAT CREC UTILIZE THE ALREADY EXISTING ACCESS ROAD. (PAGE 2) DO YOU HAVE A RESPONSE?

A. In Invenergy's response to RIDEM's Data Request, No. 3-13, Invenergy explained that the Algonquin access road is owned by Spectra, and Spectra indicated that it will not allow Invenergy to use the road during construction or operation. Invenergy attached, as Exhibit 4, a letter from Spectra denying Invenergy's request. Accordingly, it is my understanding that using the Spectra Energy/Algonquin access road is not possible.

Q. THE BUILDING INSPECTOR ALSO NOTES THAT UNDER THE TOWN'S SOIL EROSION AND SEDIMENT CONTROL ORDINANCE, AN APPLICANT MUST SUBMIT A SOIL EROSION AND SEDIMENT CONTROL PLAN THAT MEETS THE REQUIREMENTS OF THE ORDINANCE. (PAGE 4) CAN YOU EXPLAIN, IN DETAIL, HOW CREC'S SOIL EROSION AND SEDIMENT CONTROL PLAN MEETS THE REQUIREMENTS OF THE ORDINANCE.

A. Invenergy's submittal to RIDEM for permit review, that was also provided to the Building Inspector on June 9, 2017, includes a detailed stormwater management plan which includes a written narrative, drawings and supporting calculations prepared under the direction of a registered Rhode Island professional engineer. The phased soil erosion and sediment control plan clearly shows the necessary detail reflecting changes in existing and proposed contours, drainage features and aquatic resources. The location of erosion and sediment control BMPs have been shown on the drawings and installation details provided in the plan set. All of this in in compliance with Rhode Island Soil Erosion and Sediment Control Handbook 2014 edition.

In order to show that the stormwater management plan complies with the Town's Code of Ordinances, I will respond to each pertinent section in Article II, entitled "Soil Erosion and Sediment Control."

Section 12-64(b), states:

> The erosion and sediment control plan shall include sufficient information about the proposed activities and land parcels to form a clear basis for discussion and review and to ensure compliance with all applicable requirements of this article. The plan shall be consistent with the data collection, data analysis, and plan preparation guidelines in the current "Rhode Island Soil Erosion and Sediment Control Handbook," prepared by the U.S. Department of Agriculture, Soil Conservation Service, state department of environmental management, state conservation committee and at a minimum, shall contain: (1) A narrative describing the proposed land disturbing activity and the soil erosion and sediment control measures and stormwater management measures to be installed to control erosion that could result from the proposed activity. Supporting documentation, such as a drainage area, existing site, and soil maps shall be provided as required by the building official as his designee.

Drawings 01C900 thru 01C921 detail limits of disturbance, a sequence of construction and phased construction plans for the Project. These drawings also depict locations for erosion and sediment control BMPs used on the Project. In addition to the plans, there are construction installation details for the selected BMPs used for the Project. These plans have been developed in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook.

Section 12-64(b)(2) states:

> Construction drawings illustrating in detail existing and proposed contours, drainage features, and vegetation; limits of clearing and grading, the location of soil erosion and sediment control and stormwater management measures, detail drawings of measures; stock piles and borrow areas; sequence and staging of land disturbing activities; and other such information needed for construction.

Drawings 01C900 thru 01C921clearly indicate the existing condition of the site and the phased approach that will be taken during construction to achieve the proposed condition. These plans have been developed in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook.

Section 12-65, states "The contents of the erosion and sediment control plan shall clearly demonstrate how the principles outlined in this section have been met in the design and are to be accomplished by the proposed development project." Subsection 1 provides that "The site selected shall show due regard for natural drainage characteristics and topography." To ensure that Invenergy's stormwater management plan complies with this section of the Code, where possible, natural drainage features such as the existing creeks and wetlands have been protected as indicated on the drawings. In those areas where potential impact could occur, cross culverts and other means of address site drainage have been installed.

Next, subsection 2 provides that "To the extent possible, steep slopes shall be avoided." Steep slopes have been avoided for this Project. Similarly, subsection 3 provides that "The grades of slopes created shall be minimized." Here, the graded slopes have been minimized. In some areas the Project uses retaining walls to further minimize impacts to existing grade and aquatic resources.

Subsection 4 states:

> Post development runoff rates should not exceed predevelopment rates, consistent with other stormwater requirements, which may be in effect. Any increase in storm runoff shall be retained and recharged as close as feasible to its place of origin by means of detention ponds or basins, seepage areas, subsurface drains, porous paving, or similar technique.

Here, post development runoff rates are less than the existing condition. Please see calculations provided in the Stormwater Management Plan dated March 2017 for further details.

Subsection 5 states: "Original boundaries, alignment, and slope of watercourses within the project locus shall be preserved to the greatest extent feasible." In Invenergy's stormwater management plan, the current phasing of construction and proposed layout have preserved watercourses to the greatest extent possible. Please see Invenergy's Stormwater Management plans for more details.

Regarding drainage, subsection 6 states: "In general, drainage shall be directed away from structures intended for human occupancy, municipal or utility use, or similar structures." Subsection 7 states: "All drainage provisions shall be of such a design and capacity so as to adequately handle stormwater runoff, including runoff from tributary upstream areas, which may be outside the locus of the project." Additionally, subjection 8 states: "Drainage facilities shall be installed as early as feasible during construction, prior to site clearance, if possible." For this Project, drainage onsite and offsite has been directed away from existing structures. The structural and non-structural BMPs have been designed in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook. The phasing of the construction activities illustrates the correct sequence of construction to minimize disturbance and control erosion and sediment runoff.

Subsection 9 discusses fill location and states that "Fill location adjacent to watercourses shall be suitably protected from erosion by means of rip-rap, gabions, retaining walls, vegetative stabilization, or similar measures." The current design of the Project has minimized fill adjacent to watercourses. In those areas where fill does occur, the necessary erosion and sediment control devices have been used.

The next subsections in the Code discuss vegetation. Subsection 10 states: "Temporary vegetation and/or mulching shall be used to protect bare areas and stockpiles from erosion during construction; the smallest areas feasible shall be exposed at any one time; disturbed areas shall be protected during the nongrowing months, November through March." Subsection 11 states: "Permanent vegetation shall be placed immediately following fine grading." Subsection 12 states: Trees and other existing vegetation shall be retained whenever feasible; the area within the dripline shall be fenced or roped off to protect trees from construction equipment. Further, subsection 13 states: "All areas damaged during construction shall be resodded, reseeded, or otherwise restored.

Monitoring and maintenance schedules, where required, shall be predetermined." The Project conforms with each of these subsections. The Project's sequence of construction utilizes a phased approach in order to minimize the amount of land disturbed at one time. Both temporary and permanent seeding has been specified as a means of stabilizing disturbed areas upon completion of work in that area. The current plan clearly denotes the limits of disturbance for the Project. It also shows those areas that shall be preserved/protected such as aquatic resources. Similarly, the March 2017 Stormwater Management Plan included notes discussing what would be done to areas that were damaged during construction, depicting that Invenergy will resod, reseed or restore and that Invenergy will implement a monitoring and maintenance schedule.

Invenergy's Soil Erosion and Sediment Control Plan complies with each of the Town Ordinance sections quoted in my testimony.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

EXHIBIT CJ REBUTTAL - 1

Invenergy – Rhode Island - Clear River Energy
Pollution Calculations Summary Tables

Pollution Calculations for Main Site (2P & 3P)			
Pollutant	**Pre-Development**	**Post with out BMP Net Increase**	**Post with BMP Net Increase**
TSS (lbs TN/year)	477.3	19,242.7	5,123.4
TP (lbs TN/year)	1.0	40.1	13.1
TN(lbs TN/year)	16.3	328.8	187.4
Bacteria (#col/100ml/year)	2,807.5	391,592.8	124,918.1

Pollution Calculations for Dry Swale (15R & 29R)			
Pollutant	**Pre-Development**	**Post with out BMP Net Increase**	**Post with BMP Net Increase**
TSS (lbs TN/year)	33.4	1,320.3	132.0
TP (lbs TN/year)	0.1	2.2	1.5
TN(lbs TN/year)	1.1	19.6	8.8
Bacteria (#col/100ml/year)	196.5	15,146.0	4,543.8

Pollution Calculations for Dry Swale (18R & 20R)			
Pollutant	**Pre-Development**	**Post with out BMP Net Increase**	**Post with BMP Net Increase**
TSS (lbs TN/year)	21.4	866.8	86.7
TP (lbs TN/year)	0.0	1.4	1.0
TN(lbs TN/year)	0.7	12.9	5.8
Bacteria (#col/100ml/year)	125.6	9,940.5	2,982.2

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED REBUTTAL TESTIMONY OF RICHARD LIPSITZ

(September 1, 2017)

LIST OF EXHIBITS

RL REBUTTAL - 1	"Invenergy Administrative Subdivision," for the Rhode Island Energy Facility Siting Board review purposes, prepared by Waterman Engineering Company

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCTION THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF RICHARD S. LIPSITZ, WATERMAN ENGINEERING CO.

I. INTRODUCTION

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

A. Richard S. Lipsitz, Professional Land Surveyor and president of Waterman Engineering Company, located at 46 Sutton Avenue, East Providence, Rhode Island 02914.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC" or "the Project").

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. My rebuttal testimony responds to the Town of Burrillville ("Town") Building Inspector's Supplemental Advisory Opinion, filed with the Board on August 15, 2017.

Q. HAVE YOU REVIEWED THE BUILDING INSPECTOR'S SUPPLMENTAL ADVISORY OPINION?

A. Yes.

Q. ON PAGE 3, THE BUILDING INSPECTOR STATES THAT IT IS HIS OPINION THAT INVENERGY HAS NOT SUBMITTED A SATISFACTORY PLAN WHICH MEETS THE MINIMUM REQUIREMENTS NECESSARY TO VET A PROJECT. DO YOU HAVE A RESPONSE?

A. Yes. The boundary survey and plan completed of the entire Algonquin property, the initial draft Administrative Subdivision of the parcel Invenergy will acquire, the revised draft Administrative Subdivision plan of substantially the same parcel and the final Administrative Subdivision Plan completed early this summer are sufficient to define the property that the CREC will be constructed on. When the initial draft plan was developed in November 2015, we met with Tom Kravitz, the Burrillville Town Planner at that time, to discuss the parcel to eventually be acquired by Invenergy. It was determined that the Administrative Subdivision was the correct procedure (as confirmed by Ray Goff, the current Planner in his memo dated 8/10/2017). It was also discussed and agreed that the formal filing of the Administrative Subdivision Plan & Application should occur after all approvals for the CREC were obtained. Doing otherwise would be premature and could create a lot that would need to go through the Planning process again, should modifications to the lot be necessary as determined by the permit reviewing agencies, such as Rhode Island Department of Environmental Management ("RIDEM") and the EFSB. This initial draft Administrative Subdivision plan accurately depicted the parcel to be acquired and its relationship to the remaining Algonquin property. This plan was presented to the Town's Planning and Zoning Boards at a master plan meeting in June 2016 and at various public hearings since the Project was first proposed, including the Town's Planning Board and Zoning Board advisory process. This parcel information was also shared with and used by the other members of the design team for their various tasks of the site design and permitting.

The initial draft Administrative Subdivision has been revised on two occasions during the design and review process to date. The "Invenergy Administrative Subdivision" was filed with the Board in response to the Town's Data Request, No. 28-2, mailed to the Building Inspector on July 19, 2017 and is attached as **Exhibit RL Rebuttal - 1**. Minor changes to the proposed

southerly property line were made to remove the small portion of the Invenergy parcel from the A-80 overlay district. Also, the Administrative Subdivision Plan was finalized and a metes and bounds description was prepared, per the request of the Building Inspector in a previous memo / opinion. I would reiterate that the Invenergy parcel, apart from the minor revision regarding the A-80 land, has remained the same since our initial meetings with Mr. Kravitz and the Town Planning and Zoning Boards. The Building Inspector's Supplemental Advisory Opinion completely ignores the previously filed site plans showing the same Invenergy parcel.

Q. THE BUILDING INSPECTOR ALSO TAKES ISSUE WITH THE PLAN'S REPRESENTATION THAT CREC IS NOT WITHIN THE A-80. (PAGE 10) DO YOU HAVE A RESPONSE?

A. Yes. To use the Building Inspector's own words, I find his statements "tantamount to a blatant misrepresentation" regarding the parcel upon which CREC will be constructed. Invenergy is proposing to acquire a 67.065-acre parcel from Algonquin. The Building Inspector indicated in his opinion that it is a "new" parcel, yet it has been depicted on accurate survey plans as directed by the previous Town Planner for almost two years, and on the plans prepared for the design and permitting of this Project by the other members of Invenergy's professional team. Plans showing this very same parcel were previously submitted to multiple entities, including RIDEM, United States Army Corps of Engineers, Rhode Island Department of Transportation and others, all of whom appear to have no difficulty understanding the parcel's location.

The Building Inspector states that since the Invenergy parcel has not been approved by the Planner through the Administrative Subdivision process, that the CREC is being built on Algonquin land and the A-80 overlay district is within that land. The CREC is proposed to be built on the Invenergy parcel, a 67.065-acre portion of the entire 753.809-acre Algonquin property, which will be subdivided and conveyed once the approvals for the CREC are obtained. This parcel

is not within the A-80 overlay district, as shown on the Town of Burrillville GIS (Geographic Information System) as I have previously testified. Because this parcel is not within the A-80 overlay district (according to the Town's GIS system), it is not necessary to engage in further hydrogeologic analysis per the Town Ordinance reference in the supplemental opinion.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

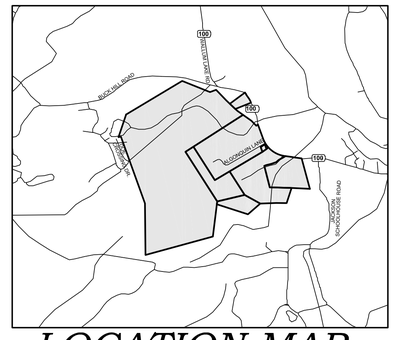
EXHIBIT RL REBUTTAL - 1

INVENERGY ADMINISTRATIVE SUBDIVISION

A.P. 120, LOT 7, A.P. 135, LOT 2
A.P. 137, LOTS 1, 2, 3, 21 AND
A.P. 153, LOTS 1 & 2

WALLUM LAKE ROAD (R.I. ROUTE 100)
BURRILLVILLE, RHODE ISLAND
JUNE 13, 2017
REV: 7/11/2017

INDEX SHEET:



LOCATION MAP

ENERGY FACILITIES SITING BOARD REVIEW SET
NOT FOR RECORDING

PREPARED FOR:

INVENERGY LLC
ONE SOUTH WACKER DRIVE, SUITE 1900
CHICAGO, ILLINOIS 60606

Waterman
ENGINEERING COMPANY
Engineers & Surveyors - Est. 1894

46 Sutton Avenue
East Providence, RI
Phone: (401) - 438 - 5775
Fax: (401) - 438 - 5773
www.watermanengineering.net

PLAN REFERENCES

1. REFERENCE IS MADE TO THE FOLLOWING MAPS AND PLANS OF RECORD;

A.) R.I. HIGHWAY PLAT No.'s 111, 498, 605 & 922 & R.I.D.O.T. FIELD BOOKS 2071 & 2072 REGARDING WALLUM LAKE ROAD.

B.) PLAN ENTITLED "FINAL PLAN MINOR SUBDIVISION FOR BRIAN LANGFORD PLAT 118, LOT 2 BURRILLVILLE, RHODE ISLAND FEBRUARY, 2005 SCALE: 1 INCH EQUALS 200 FEET REVISED: APRIL 24, 2006 BY MARC N. NYBERG ASSOCIATES, INC." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND.

C.) PLAN ENTITLED "PLAN ENTITLED "EXISTING CONDITIONS PLAN BURRILLVILLE 1 DUKE ENERGY ALGONQUIN LANE BURRILLVILLE, RHODE ISLAND PROJECT NO: 2313.001 7/18/01 REVISED: 8/30/01 & 12/13/01 BY GEISSER ENGINEERING CORPORATION."

D.) PLAN ENTITLED "PLAN OF LAND SHOWING A.P. 118, LOT 2 PREPARED FOR: JEANNE LANGFORD BUCK HILL ROAD BURRILLVILLE, RHODE ISLAND DATE: JUNE 15, 2001 REVISED: 7-11-01 BY MARC N. NYBERG ASSOCIATES, INC." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 25, PAGE 17.

E.) PLAN ENTITLED "PLAN OF LAND IN BURRILLVILLE FOR FRANK JARVIS SCALE: 1" = 200' REVISED: 2-20-89 BY JAMES F. LEMBO REGISTERED PROFESSIONAL ENGINEER." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE IN PLAT BOOK 19, PAGE 42.

F.) PLAN ENTITLED "PLAN OF DIVISION OF LAND BURRILLVILLE, RHODE ISLAND PREPARED FOR ARTHUR CIMINI & NICHOLAS VELTRI BY N. VELTRI SURVEY, INC. SCALE: 1" = 30' DATE: MAR. 88." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 18, PAGE 41.

G.) PLAN ENTITLED "DIVISION OF LAND OWNED BY KATHERINE FRANCIS DRAWN BY THE WALTER COMPANY DANIEL R. GAUTHIER REGISTERED LAND SURVEYOR FEBRUARY, 1979 SCALE: 1" = 40'," WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 11, PAGE 22.

H.) PLAN ENTITLED "PLAN OF LAND OF REMAINING AREA OWNED BY MILTON H. LETENDRE BURRILLVILLE, RHODE ISLAND APRIL, 1978 SCALE: 1 INCH EQUALS 100 FEET BY ROBERT C. COURNOYER, REGISTERED LAND SURVEYOR." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 10, PAGE 38.

I.) PLAN ENTITLED "DIVISION OF LAND OWNED BY DELLA SANFORD TO BE ACQUIRED BY TAURUS REALTY, INC. BURRILLVILLE, RHODE ISLAND FEBRUARY, 1978 SCALE: 1 INCH EQUALS 50 FEET BY ROBERT C. COURNOYER, REGISTERED LAND SURVEYOR." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 10, PAGES 36 & 37.

J.) PLAN ENTITLED "PLAN OF LAND OWNED BY DELLA C. (McGUINNESS) SANFORD BURRILLVILLE, RHODE ISLAND SEPTEMBER, 1977 SCALE: 1 INCH EQUALS 100 FEET BY ROBERT C. COURNOYER, REGISTERED LAND SURVEYOR." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 10, PAGE 54.

K.) PLAN ENTITLED "PLAN SHOWING LAND IN BURRILLVILLE, RHODE ISLAND TO BE CONVEYED TO THE NARRAGANSETT ELECTRIC COMPANY BY MILTON H. LETENDRE ET UX SCALE: 1" = 200' DATE: OCTOBER 12, 1977." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 10, PAGE 24.

L.) PLAN ENTITLED "PLAN SHOWING LAND IN BURRILLVILLE, RHODE ISLAND TO BE CONVEYED TO THE NARRAGANSETT ELECTRIC COMPANY BY ELZA E. SALETNIK ET AL SCALE: 1" = 200' DATE: APRIL 27, 1977." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 9, PAGE 55.

M.) PLAN ENTITLED "PLAN SHOWING EASEMENT ACROSS LAND IN BURRILLVILLE, RHODE ISLAND TO BE CONVEYED TO THE NARRAGANSETT ELECTRIC COMPANY BY ALGONQUIN GAS TRANSMISSION COMPANY SCALE: 1" = 200' DATE: OCTOBER 1, 1974." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 10, PAGE 10.

N.) UNRECORDED PLAN ENTITLED "COMPRESSOR STATION SITE BURRILLVILLE, R.I. SCALE: 1" = 200' DATE: 11/24/70 DWG. NO: L-5421 ALGONQUIN GAS TRANSMISSION COMPANY BOSTON MASSACHUSETTS REVISED: 6-7-77 COMPILED FROM DEEDS OF RECORD AND FROM A.G.T. CO. OFFICE PLANS."

O.) PLAN ENTITLED "PLAND SHOWING LAND TO BE ACQUIRED BY ALGONQUIN GAS TRANS. CO. BURRILLVILLE, R.I. SCALE: 1" = 400' DATE: 2-9-61." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN VOLUME 63, PAGE 95.

P.) UNRECORDED PLAN ENTITLED "MAP OF LAND IN THE TOWN OF BURRILLVILLE, RHODE ISLAND OWNED BY SMITH ANGELL HEIRS AND HAZEL R. HOPKINS SURVYED FROM THE DEPARTMENT OF FISH AND GAME OF THE STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS APRIL, 1959 BY WILLARD B. HALL - REGISTERED LAND SURVEYOR."

Q.) PLAN ENTITLED "LAND IN BURRILLVILLE, R.I. OWNED BY RAYMOND J. KING ETUX. SURVEYED FOR SALE SCALE: 1 IN. = 60 FT. AUGUST, 1956 BY WILLARD B. HALL - REG. LAND SURVEYOR." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 3, PAGE 11.

R.) PLAN ENTITLED "SEVERAL PARCELS OF LAND IN BURRILLVILLE, RHODE ISLAND ALL PARCELS ARE NORTH ORIENTATED SCALE FOR ALL PARCELS 1 IN. = 60 FT. BY WILLARD B. HALL - REG. LAND SURVEYOR." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 3, PAGE 3.

S.) PLAN ENTITLED "REPLAT OF LOTS 178, 179, 180, 181, 182, 183, 184, 185, 186, 219, 220, 221, 222, 253, 254, 255, 256, 257, 258, 259 & 260 ROUND LAKE CITY SECTION #3 OWNED BY RESORT BUILDING & DEVELOPMENT CORP. IN BURRILLVILLE, RHODE ISLAND BY WILLARD B. HALL, REGISTERED LAND SURVEYOR SEPTEMBER, 1954 SCALE: 1 IN. = 80 FT. REPLATTED AUGUST, 1955." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 2, PAGE 234.

T.) PLAN ENTITLED "ROUND LAKE CITY SECTION #3 OWNED BY RESORT BUILDING & DEVELOPMENT CORP. IN BURRILLVILLE, RHODE ISLAND BY WILLARD B. HALL, REGISTERED LAND SURVEYOR SEPTEMBER, 1954 SCALE: 1 IN. = 80 FT." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 2, PAGE 228.

U.) PLAN ENTITLED "ROUND LAKE CITY SECTION #2 OWNED BY RESORT BUILDING & DEVELOPMENT CORP. IN BURRILLVILLE, RHODE ISLAND BY WILLARD B. HALL, REGISTERED LAND SURVEYOR AUGUST, 1954 SCALE: 1 IN. = 80 FT." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 2, PAGE 225.

V.) PLAN ENTITLED "ROUND LAKE CITY SECTION #1 OWNED BY RESORT BUILDING & DEVELOPMENT CORP. IN BURRILLVILLE, RHODE ISLAND BY WILLARD B. HALL, REGISTERED LAND SURVEYOR JUNE, 1954 SCALE: 1 IN. = 80 FT." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND.

W.) PLAN ENTITLED "MAP OF LAND IN BURRILLVILLE OWNED BY WILLIAM COONEY MAR. 1954 BY WILLARD B. HALL, REGISTERED LAND SURVEYOR." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 2, PAGE 219.

X.) PLAN ENTITLED "MAP OF LAND IN BURRILLVILLE, R.I. OWNED BY WILLIAM COONEY SURVEYED FOR SALE TO ABEL DACARLO MAR., 1954 SCALE: 1 IN. = 100 FT. BY WILLARD B. HALL, REGISTERED LAND SURVEYOR." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 2, PAGE 216.

Y.) PLAN ENTITLED "MAP OF LAND IN BURRILLVILLE, R.I. OWNED BY LOUISSE CUNNINGHAM SURVEYED FOR TRANSFER TO LAWRENCE J. CUNNINGHAM SCALE: 1 IN = 40 FT. SEPTEMBER, 1952 BY WILLARD B. HALL, REGISTERED LAND SURVEYOR." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, R.I. IN PLAT BOOK 2, PAGE 202.

Z.) PLAN ENTITLED "MAP OF LAND IN BURRILLVILLE, R.I. OWNED BY LOUISE A. CUNNINGHAM TO BE SOLD TO ALFRED J. CHRISTIAN JUNE, 1949 SCALE: 1 IN. = 40 FT. BY WILLARD B. HALL, REGISTERED LAND SURVEYOR." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, R.I. IN PLAT BOOK 2, PAGE 159.

AA.) PLAN ENTITLED "MAP OF LAND IN THE TOWN OF BURRILLVILLE OWNED BY CHARLES LETENDRE, SURVEYED FOR TRANFER TO LEONARD LETENDRE APRIL 29, 1949, SCALE: 1 IN. = 60' BY WILLARD B. HALL, REGISTERED LAND SURVEYOR." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 2, PAGE 146.

BB.) PLAN ENTITLED "MAP OF LAND IN THE TOWN OF BURRILLVILLE, R.I. OWNED BY PALMER GREEN, SURVEYED FOR SALE OCT., 1946 SCALE: 1 IN. = 10 RODS = 165 FT. BY WILLARD BY HALL, REGISTERED LAND SURVEYOR." WHICH IS RECORDED WITH THE LAND EVIDENCE RECORDS AT THE TOWN OF BURRILLVILLE, RHODE ISLAND IN PLAT BOOK 2, PAGE 132.

CC.) UNRECORDED PLAN ENTITLED "U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE H.H. BENNETT - CHIEF EAST GREENWICH, R.I. SURVEY OF LAND PURCHASED PROJECT LI-RI-38-1 SITE 3 BURRILLVILLE & GLOCESTER TWP'S, PROVIDENCE CO., R.I. SUBMITTED R.B. OGDEN DATE: 10-1-40."

GENERAL NOTES

1. REFERENCE IS MADE TO THE FOLLOWING TOWN OF BURRILLVILLE LAND EVIDENCE RECORDS REGARDING RECORDED TITLE TO THE PREMISES SURVEYED;

A.) A.P. 135, LOT 2 & A.P. 120, LOT 7 ~ ALGONQUIN GAS TRANSMISSION COMPANY ~ VOLUME 98, PAGE 274

B.) A.P. 137, LOT 1 & A.P. 137, LOT 21 ~ ALGONQUIN GAS TRANSMISSION COMPANY ~ VOLUME 63, PAGES 93 & 94

C.) A.P. 137, LOT 2 ~ ALGONQUIN GAS TRANSMISSION COMPANY ~ VOLUME 71, PAGE 150

D.) A.P. 137, LOT 3 ~ ALGONQUIN GAS TRANSMISSION COMPANY ~ VOLUME 71, PAGE 215

E.) A.P. 153, LOT 1 ~ ALGONQUIN GAS TRANSMISSION COMPANY ~ VOLUME 63, PAGE 205

F.) A.P. 153, LOT 2 ~ ALGONQUIN GAS TRANSMISSION COMPANY ~ VOLUME 63, PAGE 235

2. THESE PREMISES MAY BE SUBJECT TO THE FOLLOWING EASEMENTS, RIGHTS OF WAY OR AGREEMENTS OF RECORD;

A.) EASEMENT GRANTED TO THE NARRAGANSETT ELECTRIC COMPANY AS DESCRIBED IN VOLUME 87, PAGE 137 & DELINEATED ON PLAN REF. 1(M).

B.) AGREEMENT BETWEEN DRANS (A.P. 102, LOT 19) & BUCK HILL FOREST, INC. (A.P. 135, LOT 2) REGARDING THE USE & LOCATION OF THE EXISTING "WILSON TRAIL" AS DESCRIBED IN VOLUME 90, PAGE 640.

3. PARCEL 2 IS SITUATED IN AN 'F-5 ZONE' (FARMING / RESIDENTIAL DISTRICT).

DIMENSIONAL REQUIREMENTS	F-5 ZONE
MIN. LOT AREA	= 5 ACRES
MIN. FRONTAGE/WIDTH	= 450 FT.
MIN. S/B FRONT YARD	= 40 FT.
MIN. S/B REAR YARD	= 40 FT.
MIN. S/B SIDE YARD	= 15 FT.
MAX. STRUCTURE HEIGHT	= 50 FT.
MAX. BUILDING COVERAGE	= 20%

NOTE - ZONING INFORMATION IS FROM CURRENT ZONING AND MAY NOT REFLECT THE CONDITIONS AT THE TIME OF CONSTRUCTION OR ANY VARIANCES GRANTED.

4. PORTIONS OF THESE PREMISES ARE SITUATED IN A ZONE 'A' (AREAS OF 1% ANNUAL CHANCE FLOOD - NO BASE FLOOD ELEVATIONS DETERMINED) AND ZONE 'X' (AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN) AS DESIGNATED ON THE "NATIONAL FLOOD INSURANCE PROGRAM, FIRM FLOOD INSURANCE RATE MAP PROVIDENCE COUNTY, RHODE ISLAND (ALL JURISDICTIONS) PANEL(S) 110 & 130 OF 451 TOWN OF BURRILLVILLE MAP NUMBER(S) 44007C0130G & 44007C0110G EFFECTIVE DATE(S): MARCH 2, 2009. FEDERAL EMERGENCY MANAGEMENT AGENCY".

5. ANY UTILITIES SHOWN ON THIS PLAN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING PLANS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UTILITIES SHOWN COMPRISE ALL SUCH OR ABANDONED. THE SURVEYOR DOES NOT WARRANT THAT THE UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM ALL AVAILABLE INFORMATION. (PLEASE CONTACT DIG SAFE 72 HOURS PRIOR TO CONSTRUCTION AT PHONE NO. 1-888-DIG-SAFE AND/OR ALL LOCAL UTILITY COMPANIES.)

6. REFERENCE IS MADE TO R.I.D.O.T. FIELD BOOK #2071 & #2072 REGARDING THE LAYOUT & GEOMETRY OF WALLUM LAKE ROAD AS SHOWN ON R.I. HIGHWAY PLAT No. 922. SOME DISCREPENCIES WERE FOUND DURING THE COURSE OF THIS SURVEY. THE LAYOUT FOR WALLUM LAKE ROAD WAS REPRODUCED USING THE MONUMENTATION FOUND AS SHOWN , R.I. HIGHWAY PLAT No. 922 & THE FIELD NOTES REFERENCED.

7. MULTIPLE INCONSISTENCIES EXIST WITHIN THE LAND EVIDENCE RECORDS ALONG THE SOUTHERLY BOUNDARY OF THE SUBJECT PARCEL (MAINLY THE BOUNDARY DIVIDING THE SUBJECT PROPERTY WITH LAND OF THE STATE OF RHODE ISLAND (CASIMIR-PULASKI MEMORIAL STATE FOREST). THIS BOUNDARY WAS REPRODUCED FROM THE BEST AVAILALBE INFORMATION AND OCCUPATION FOUND. VERY LITTLE MONUMENTATION AND/OR OCCUPATION COULD BE FOUND ALONG THIS BOUNDARY LINE.

8. PLANIMETRICS FOR ONSITE IMPROVEMENTS TAKEN FROM AERIAL MAPPING COMPILED JULY 23, 2015 BY EASTERN TOPOGRAPHICS P.O. BOX 970 495 CENTER STREET (RT. 28) WOLFEBORO, NEW HAMPSHIRE 03894 FROM AERIAL PHOTOGRAPHS EXPOSED APRIL 25 & APRIL 29, 2015. GROUND CONTROL BY WATERMAN ENGINEERING CO. ALL BUILDING LINES SHOWN REPRESENT ROOF LINES AS SEEN IN THE AERIAL PHOTOGRAPHY. LOCATIONS OF TRAILS & OFFSITE IMPROVEMENTS TAKEN FROM AERIAL MAPPING PROVIDED BY THE TOWN OF BURRILLVILLE. LOCATION OF STREAMS & WATER COURSES COMPILED FROM AERIAL MAPPING & R.I.G.I.S. DATA AND ARE SHOWN ONLY FOR GENERAL REFERENCE PURPOSES.

9. THE PARCELS INCLUDED IN THIS SUBDIVISION ARE CURRENTLY DESIGNATED AS A.P. 120, LOT 7, A.P. 135, LOT 2, A.P. 137, LOTS 1, 2, 3 & 21 & A.P. 153, LOTS 1 & 2 IN THE TOWN OF BURRILVILLE TAX RECORDS.

10. EXISTING NUMBER OF LOTS: 8
PROPOSED NUMBER OF LOTS: 3

11. "PARCEL 2" OF THIS SUBDIVISION IS BASED UPON A CLASS I SURVEY PERFORMED IN 2017. "PARCEL 1" & "PARCEL 3" OF THIS SUBDIVISION ARE A CLASS IV SURVEY IN 2017, HOWEVER, ARE BASED UPON A CLASS I SURVEY CONDUCTED BY WATERMAN ENGINEERING COMPANY IN 2015. AN UPDATED CLASS I SURVEY OF "PARCEL 1" & "PARCEL 3" WAS NOT CONDUCTED BY WATERMAN ENGINEERING COMPANY IN 2017. (SEE CERTIFICATION)

12. THE PURPOSE OF THIS SUBDIVISION IS TO RECOFIGURE THE LOT LINES TO CREATE THREE PARCELS AS SHOWN.

13. FINAL PROPERTY MONUMENTATION TO BE SET AFTER CONSTRUCTION & DEVELOPMENT OF "PARCEL 2".

SCHEDULE B - PART II TITLE EXCEPTIONS

THESE PREMISES MAY BE SUBJECT TO THE FOLLOWING EASEMENTS, RIGHTS OF WAY OR AGREEMENTS OF RECORD AS REFERENCED IN SCHEDULE B, PART II OF STEWART TITLE GUARANTY COMPANY'S COMMITMENT FOR TITLE INSURANCE FILE No.: 1500030458, EFFECTIVE DATE: FEBRUARY 11, 2015 AT 8:00 A.M. REGARDING THE SUBJECT PROPERTY. AN UPDATED TITLE COMMITMENT WAS NOT PROVIDED IN 2017 AS PART OF THIS SUBDIVISION;

3.) 100' BUILDING SETBACK FROM WALLUM LAKE ROAD & PIPELINE EASEMENT AS DESCRIBED IN VOLUME 63, PAGE 93.

POSSIBLE RESERVATION OF 30' RIGHT OF WAY AND RIGHTS TO IMPROVE "WOODS ROAD" BY PHILIP G. HARRIS IN VOLUME 63, PAGE 205.

4.) 300' WIDE EASEMENT GRANTED TO BLACKSTONE VALLEY ELECTRIC COMPANY AS DESCRIBED IN VOLUME 71, PAGE 170 (CORRECTS EASEMENT AS DESCRIBED IN VOLUME 71, PAGE 77)

5.) 50' WIDE RIGHT OF WAY, AGREEMENTS, 40' SETBACK RESTRICTION & USE RESTRICTIONS AS DESCRIBED IN VOLUME 62, PAGE 69 (AS TO A.P. 137, LOT 1)

50' WIDE RIGHT OF WAY, 100' SETBACK & RELEASE OF RESTRICTIONS AS DESCRIBED IN VOLUME 63, PAGE 94

9.) 30' WIDE EASEMENT GRANTED TO PASCOAG FIRE DISTRICT AS DESCRIBED IN VOLUME 63, PAGE 313

10.) 8' WIDE UTILITY EASEMENT GRANTED TO VERIZON NEW ENGLAND, INC. AS DESCRIBED IN VOLUME 269, PAGE 1198

11.) EASEMENT GRANTED TO VERIZON NEW ENGLAND, INC. AS DESCRIBED IN VOLUME 272, PAGE 1092

12.) POSSIBLE RIGHT OF WAY IN FAVOR OF PHILIP G. HARRIS AS DESCRIBED IN VOLUME 63, PAGE 235

13. MEMORANDUM OF OPTION AND LAND LEASE BETWEEN ALGONQUIN GAS TRANSMISSION COMPANY & SBA PROPERTIES, INC. AS DESCRIBED IN VOLUME 248, PAGE 618 (AS TO A.P. 135, LOT 2 & A.P. 120, LOT 7)

14.) MEMORANDUM OF ANTENNA SITE AGREEMENT BETWEEN SBA PROPERTIES, INC. & SPRINT SPECTRUM, L.P. AS DESCRIBED IN VOLUME 249, PAGE 1098

15.) MEMORANDUM OF LAND LEASE BETWEEN ALGONQUIN GAS TRANSMISSION COMPANY AND SBA PROPERTIES, INC. AS DESCRIBED IN VOLUME 249, PAGE 712

16.) MEMORANDUM OF SITE LEASE BETWEEN SBA PROPERTIES, INC. & AT&T WIRELESS PCS, LLC AS DESCRIBED IN VOLUME 255, PAGE 903

18.) MEMORANDUM OF ANTENNA SITE AGREEMENT BETWEEN SBA PROPERTIES, INC. & CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS AS DESCRIBED IN VOLUME 609, PAGE 4

ENERGY FACILITIES SITING BOARD REVIEW SET
NOT FOR RECORDING

** SIGNATURES MUST BE IN BLUE INK TO CONSTITUTE AN ORIGINAL PLAN

CERTIFICATION

THIS SURVEY HAS BEEN CONDUCTED AND THE PLAN HAS BEEN PREPARED TO SECTION 9 OF THE RULES AND REGULATIONS ADOPTED BY THE RHODE ISLAND STATE BOARD OF REGISTRATION FOR PROFESSIONAL LAND SURVEYORS ON JANUARY 1, 2016, AS FOLLOWS:

TYPE OF BOUNDARY SURVEY:
COMPREHENSIVE BOUNDARY SURVEY

MEASUREMENT / ACCURACY SPECIFICATION:
I ("PARCEL 2")
IV ("PARCEL 1" & "PARCEL 3")
(SEE NOTE #11)

OTHER TYPE OF SURVEY:
DATA ACCUMULATION SURVEY — III
TOPOGRAPHIC SURVEY — N/A

THE PURPOSE FOR CONDUCTING THIS SURVEY AND FOR THE PREPARATION OF THE PLAN IS AS FOLLOWS:
ADMINISTRATIVE SUBDIVISION TO RECONFIGURE THE LOTS AS SHOWN TO ASSIST WITH THE FUTURE DEVELOPMENT OF "PARCEL 2".

BY: _____ 1837 7/11/2017
RICHARD S. LIPSITZ, P.L.S. — REG. NO. — DATE
WATERMAN ENGINEERING COMPANY (COA No. LS.000A483)

RICHARD S. LIPSITZ
STATE OF RHODE ISLAND
No. 1837
PROFESSIONAL LAND SURVEYOR

NO.	DATE	REVISION	CHECKED BY
1	7/11/2017	NOTES REVISED	RSL

NOTES & REFERENCES
INVENERGY ADMINISTRATIVE SUBDIVISION
A.P. 120, LOT 7, A.P. 135, LOT 2,
A.P. 137, LOTS 1, 2, 3 & 21 AND A.P. 153, LOTS 1 & 2
WALLUM LAKE ROAD (R.I. ROUTE 100) ~ BURRILLVILLE, R.I.

INVENERGY LLC
ONE SOUTH WACKER DRIVE, SUITE 1900
CHICAGO, ILLINOIS 60606

PROJECT NO: 15-015
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DRAWN BY: BJT
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FILENAME: 15-015_AS1
1 of 6 SHTS
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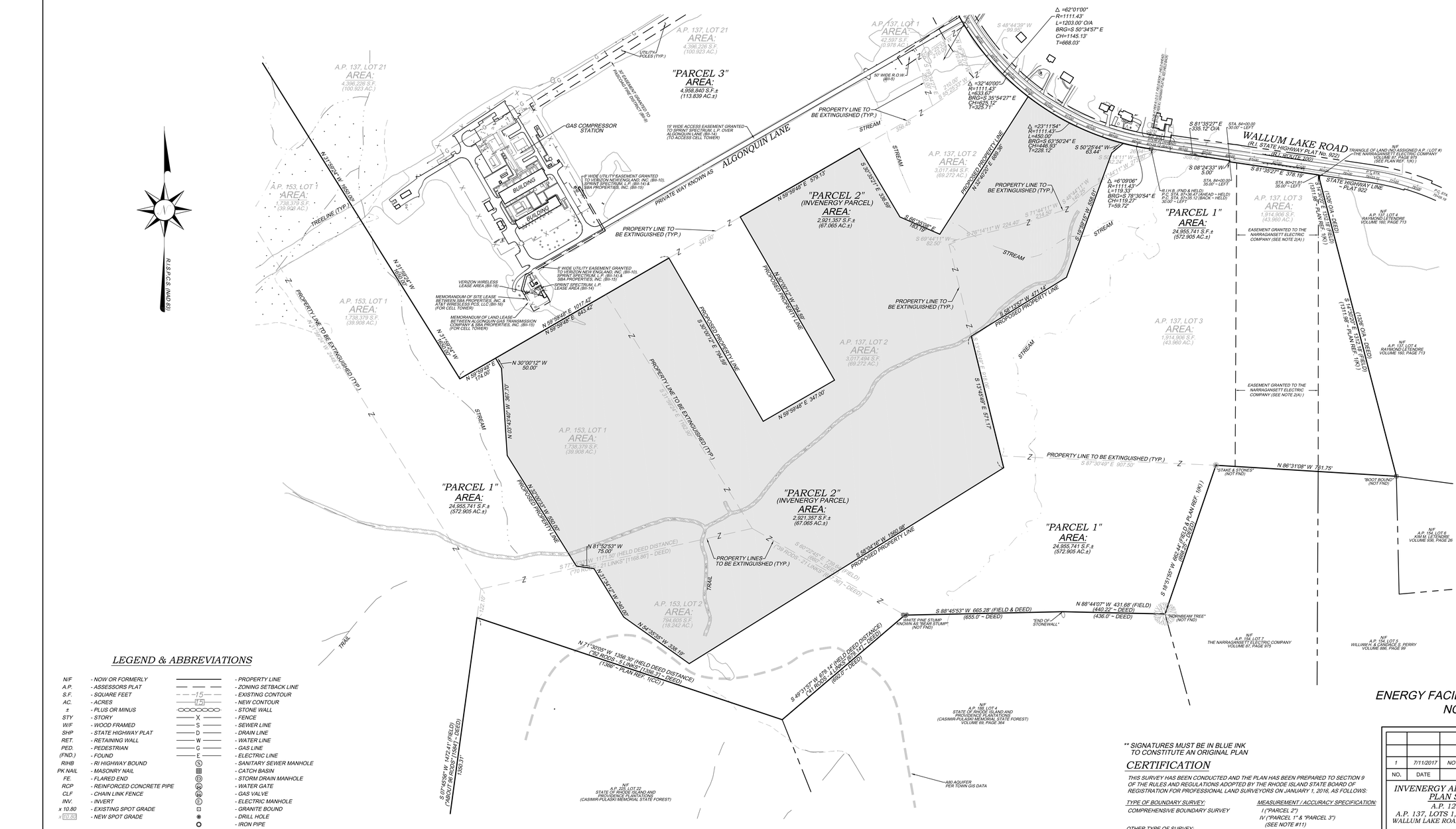

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GRAPHIC SCALE

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(in feet)

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(SEE NOTE #11)

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BY: _____ 1837 7/11/2017

RICHARD S. LIPSITZ, P.L.S. — REG. NO. — DATE

WATERMAN ENGINEERING COMPANY (COA No. LS.000A483)

RICHARD S. LIPSITZ
STATE OF RHODE ISLAND
No. 1837
PROFESSIONAL LAND SURVEYOR

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INVENERGY ADMINISTRATIVE SUBDIVISION PLAN SHOWING "PARCEL 2"
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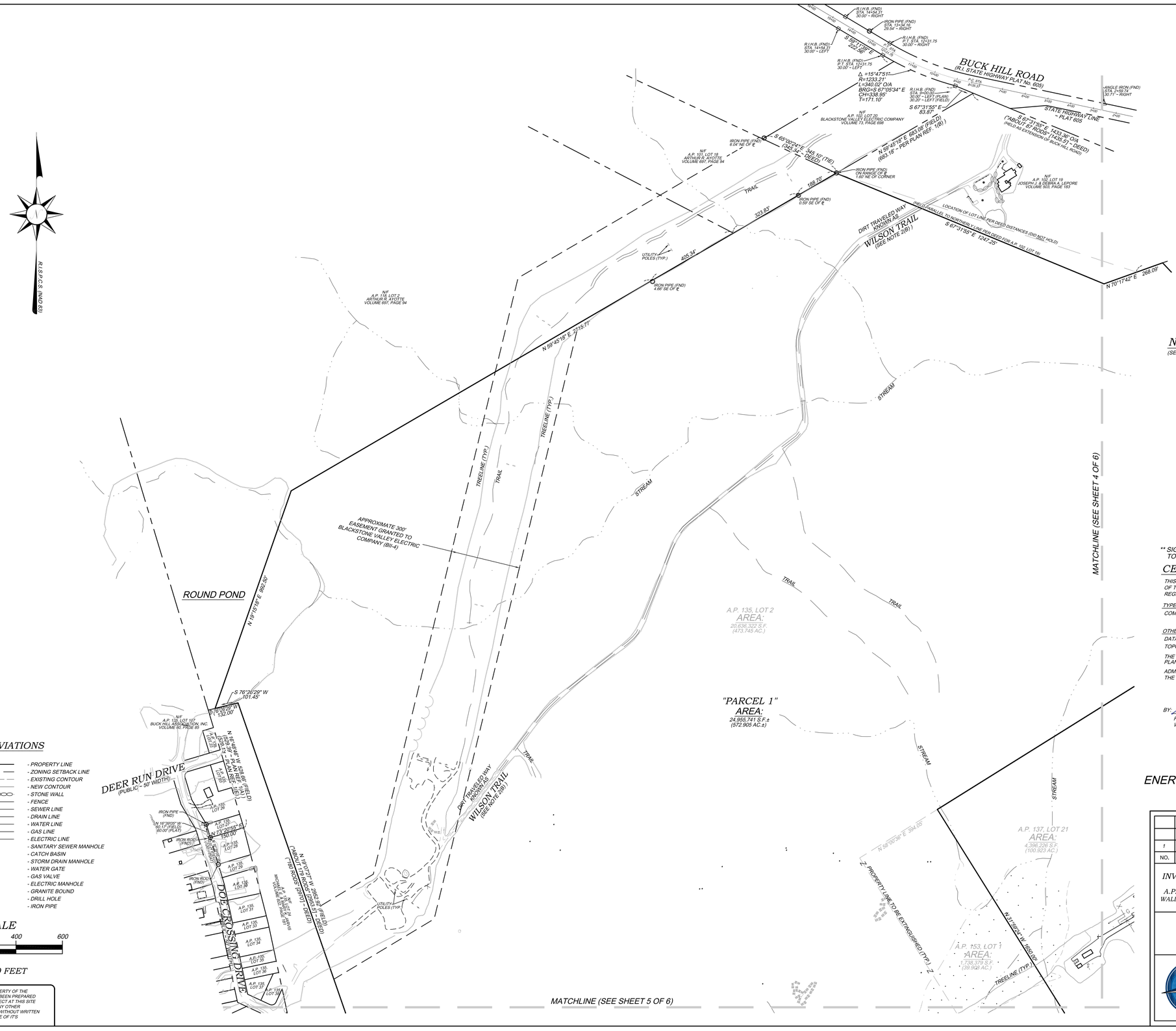

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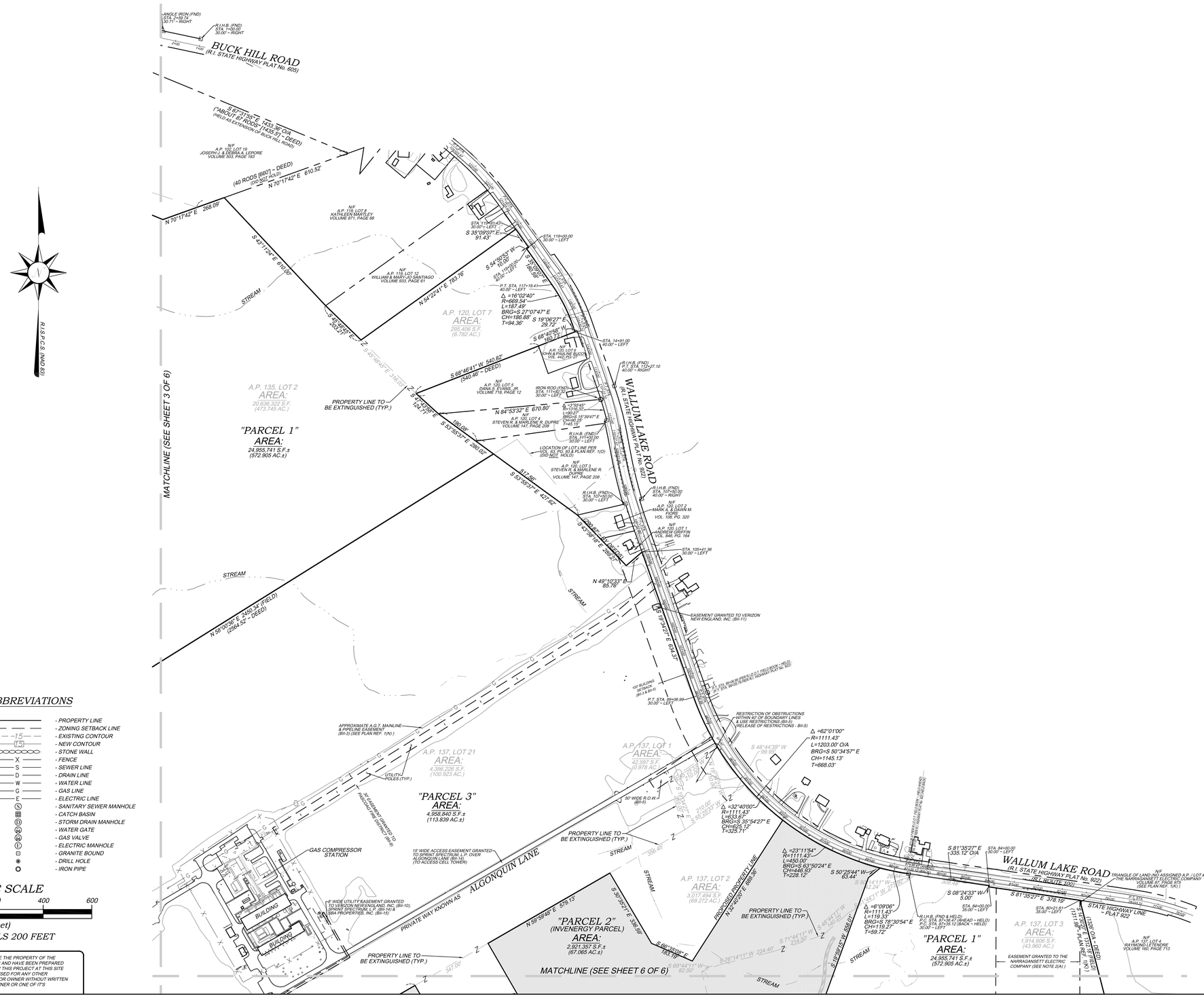

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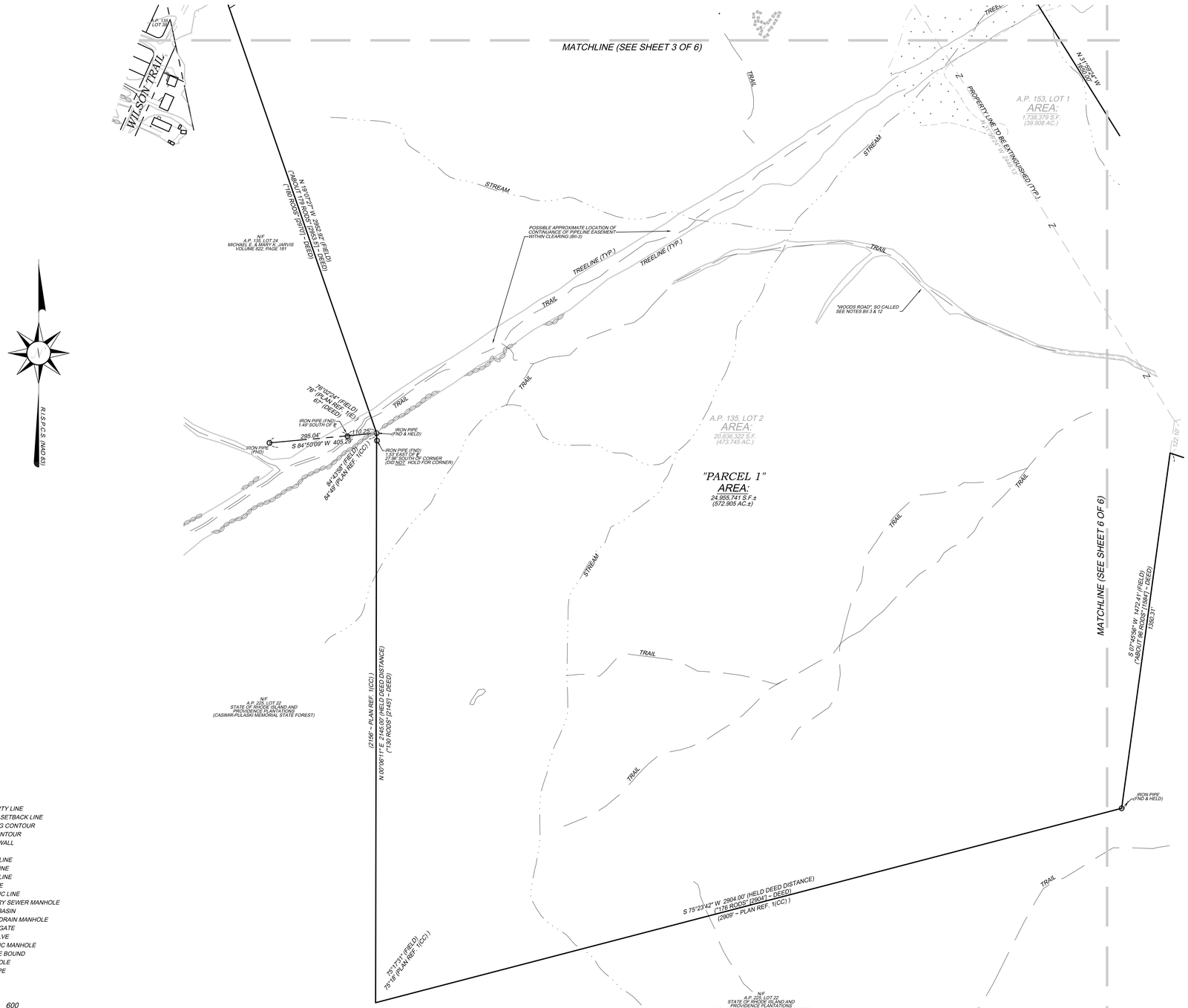

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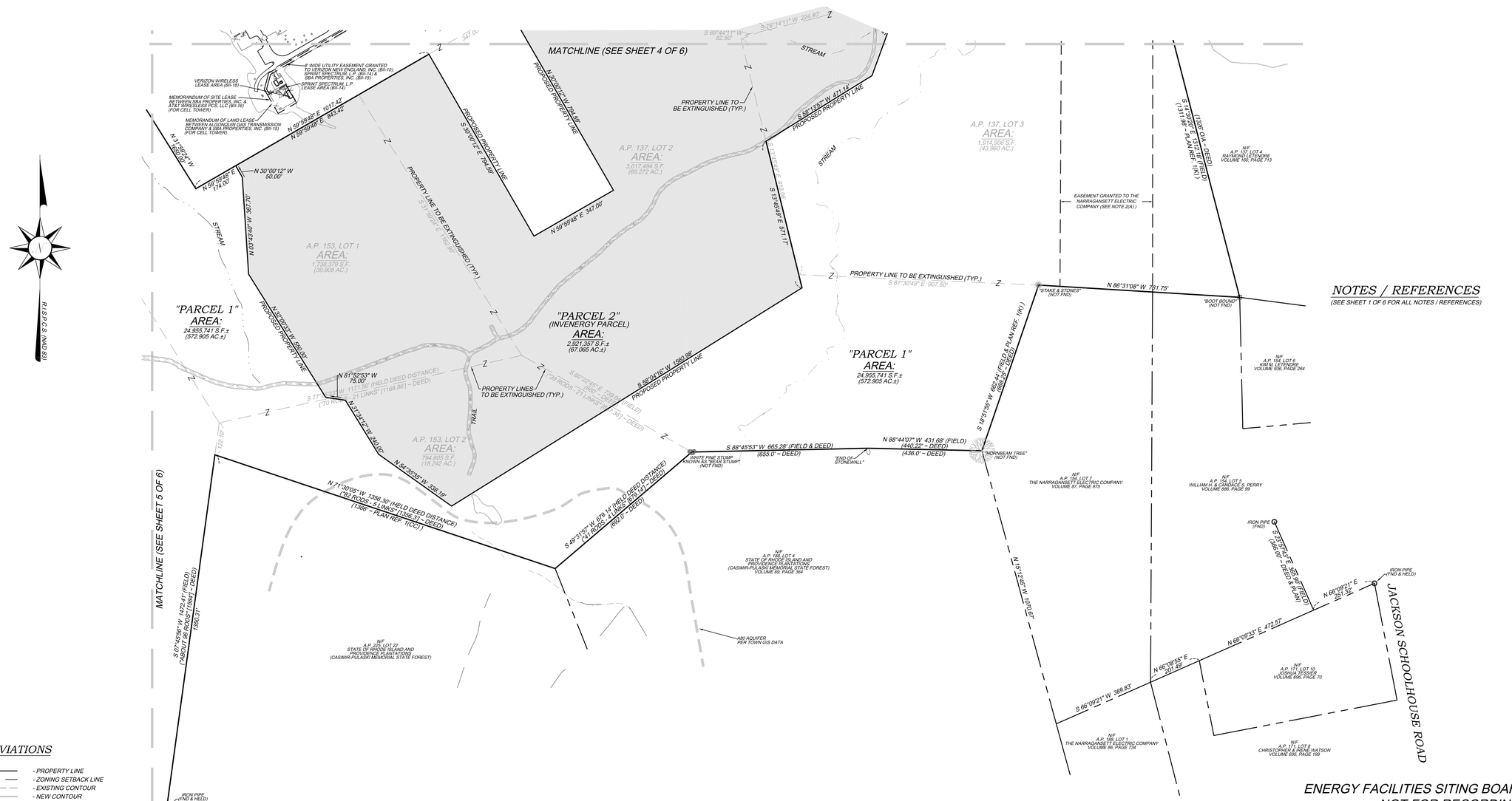

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STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

PRE-FILED REBUTTAL TESTIMONY OF MICHAEL MAROUS

(September 1, 2017)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCTION THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF MICHAEL S. MAROUS, MAROUS AND COMPANY

I. INTRODUCTION

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

A. Michael S. MaRous, president and owner of MaRous and Company, located at 300 S. Northwest Highway, No. 204, Park Ridge, Illinois 60068.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("CREC").

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESITMONY?

A. To rebut claims made by the Town's witness regarding property values surrounding CREC. My rebuttal testimony below further demonstrates that CREC will not negatively impact the property values in the neighborhood where CREC is to be located or to residential properties in the general vicinity.

Q. HAVE YOU REVIEWED THE TESTIMONY OF JOHN F. PACHECO, III?

A. Yes.

Q. ON PAGE 10 OF HIS TESTIMONY, MR. PACHECO DISCUSSES THE TOWN TAX ASSESSOR'S ADVISORY OPINION. HAVE YOU REVIEWED THE TOWN TAX ASSESSOR'S ADVISORY OPINION?

A. Yes.

Q. MR. PACHECO STATES THAT THE TOWN'S TAX ASSESSOR CONCLUDED THAT THE NEGATIVE IMPACT ON PROPERTY VALUES COULD BE IN THE 3% TO 7% RANGE. DO YOU HAVE A RESPONSE?

A. Mr. Pacheco relies on a market impact analysis conducted by Glen C. Walker, ASA. However, Mr. Walker's report found no empirical data to support the contention raised by "The Effect of Power Plants on Local Housing Values and Rents" by Lucas W. Davis, and revised May 2010 (the "Davis Study"), that properties within two (2) miles of power plants suffered a three (3) to seven (7) percent decreases in housing values and rents.

Q. ARE YOU FAMILIAR WITH THE DAVIS STUDY, CITED IN MR. WALKER'S REPORT?

A. Yes. Indeed, I have a few issues with this study.

Q. PLEASE EXPLAIN THE ISSUES YOU HAVE WITH THIS STUDY?

A. Although the Davis Study concludes that a three (3) to seven (7) percent decrease in housing values and rents within two (2) miles of plants was found, it also states that: "Overall, however, the analysis suggests that the total local impact from power plant openings during the 1990s was relatively small...." (Page 19)

Additionally, there are multiple problems with how the Davis Study was developed. The first problem is that the methodology employed for the study uses census "microdata" and develops a "hedonic" multiple regression analysis ("MRA"). When one uses a MRA, he or she must also run the study with the assumption that there is no impact on value. Here, the study was not run with the assumption that there is no impact on value. Without a base-line value, one can neither determine diminution nor increase in value.

Second, the Davis Study does not consider whether or not the environmental quality of the air surrounding the area where the power plant is proposed was already degraded because of the

proximity to other industrial uses. Similarly, the Davis Study does not factor in any changes in technology that could be used to reduce or eliminate environmental issues. Third, the Davis Study assumes that people prefer to be at a distance from power plants without providing any support for this assumption. Fourth, the Davis Study does not differentiate the neighborhoods by proximity to the power plant or by proximity to other potential sources of value diminution, such as waste transfer stations. Fifth, the Davis Study does not analyze the economic situations of the neighborhoods prior to the development of the power plant. Sixth, the Davis Study includes coal-fired plants, and the conclusions are out of date due to changes in technology. Seventh, the specific situation of the proposed Project, which incorporates significant buffering, incorporates significant setbacks and utilizes state-of-the-art technology, is not analyzed by the Davis Study. Finally, the census "microdata" utilized by the Davis Study was, essentially, a survey of homeowners' own opinions regarding their own property values and not empirical or expert data. Accordingly, for all these reasons, the Davis Study conclusions are of questionable validity.

Q. ALSO, DID MR. WALKER'S ADVISORY OPINION SUPPORT YOUR FINDINGS?

A. Yes. Mr. Walker's Advisory Opinion, which was filed with the Board on August 9, 2017, supported the findings of my analysis that there is no long-term impact on property values resulting from proximity to a gas-fired power plant. (Page 46) He also agreed with my conclusion that any impact from high voltage tension lines is mitigated by the existence of the lines already in the area. (Page 20)

Q. MR. PACHECO ALSO STATES THAT THE TOWN'S TAX ASSESSOR CONCLUDED THAT RESIDENTIAL PROPERTIES DIRECTLY ACROSS THE STREET FROM THE PROPOSED FACILITY'S ENTRANCE WOULD LIKELY EXPERIENCE LOWER MARKETABILITY AND POTENTIAL IMPACT TO THEIR MARKET VALUES DURING THE CONSTRUCTION PHASE. DO YOU HAVE A RESPONSE?

A. Yes. The Tax Assessor's Advisory Opinion does opine that there will likely be an impact during the construction phase due to the increased traffic levels and the disruptive nature of the construction in general. However, there is no empirical data to support this opinion, and the Tax Assessor appears to base his opinion on his presumption and the Davis study, which, as discussed above, presents a number of problems.

Although I have not studied this specific issue for gas-fired power plants, disruption is typical for major construction projects, especially for properties located on a state highway. This is mitigated by the fact that there is a set completion date. Further mitigation results from the distance of the construction from the properties in question. It is my opinion, however, that the potential for this type of negative impact would be covered by the Property Value Guarantee Agreement (submitted to the EFSB as a joint filing by both the Town and Invenergy on November 21, 2016), and that neighbors would be protected in this way.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED REBUTTAL TESTIMONY OF EDWARD PIMENTEL

(September 1, 2017)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF EDWARD PIMENTEL, PIMENTEL CONSULTING, INC.

I. INTRODUCTION

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

A. My name is Edward Pimentel. I am the President of Pimentel Consulting, Inc., located at 26 Avon Road, Cranston, RI 02905.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC" or "Facility" or "Project").

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. My rebuttal testimony reconfirms that my previous analysis is both accurate and reasonable. My rebuttal testimony below responds to the Town of Burrillville ("Town") Building Inspector's Supplemental Advisory Opinion, as well as the Statewide Planning Program's Supplemental Advisory Opinion, both filed with the Board on August 15, 2017.

II. TOWN BUILDING INSPECTOR'S SUPPLEMENTAL ADVISORY OPINION

Q. HAVE YOU REVIEWED THE BUILDING INSPECTOR'S SUPPLEMENTAL ADVISORY OPINON?

A. Yes.

Q. THE BUILDING INSPECTOR DISCUSSES THE PROCESS OF AN ADMINISTRATIVE SUBDIVISION AND REQUESTS THAT INVENERGY COMPLY WITH THE SUBDIVISION REQUIREMENTS OF THE BURRILLVILLE SUBDIVISION REGULATIONS. (PAGE 7) TO THE BEST OF YOUR KNOWLEDGE, WOULD INVENERGY COMPLY WITH THOSE REQUIREMENTS?

A. Yes. I am well aware that a separate and distinct lot, to be accomplished by the merging and reconfiguring of several existing lots, is to be achieved by means of an Administrative Subdivision. I am also well aware of the Land Development Project procedural nature of the proposed CREC development. The only unique aspect of the subject development proposal is affording approval authority to the EFSB and rendering the local Planning and Zoning Boards advisory. Otherwise, the development process to-date has proceeded in a similar regulatory fashion. It is preposterous to assert, much less demand, that a lot be first physically created, prior to engaging in the procedural review process necessary to realize its eventual intended development purpose. I can professionally attest to the fact that, in my experience, all 'developments' that have also entailed an Administrative Subdivision, have been conditionally approved based on the physical boundaries being altered as authorized upon receipt of final project approval. It makes no rational sense to create a lot at the outset, without first achieving all requisite approvals for the final intended use. If a boundary alteration was required for any reason, as may be necessary when proceeding through the more vigorous later stages of plan review, the development could very well be caught in a perpetual review loop, forever incurring unnecessary time and expense. This very development is prime evidence of this possibility, having effected some minor boundary alteration since the initial review, to realize better Zoning Ordinance compliance.

The fact that the subject development is a major land development project, it is "vested" at the Master-Plan Stage of Review, well prior to necessitating detailed engineering and any requisite

external permit approvals. And yet, it is my professional opinion that throughout the review process, albeit in an advisory capacity, the Building Inspector is requesting that a much higher and unlawful standard be imposed. The degree to which the CREC development has been thoroughly and minutely analyzed, would be more-so akin to Final Stage - well after all engineering detail and requisite external approvals have been garnered; clearly, well after the development has minimally achieved Master Plan "vested" standing.

Q. THE BUILDING INSPECTOR ALSO STILL CONTENDS THAT A USE VARIANCE IS NECESSARY, CONTENDING THAT INVENERGY HAS NOT ESTABLISHED THAT CREC WILL NOT BE BUILT IN THE A-80 OVERLAY ZONE. DO YOU HAVE A RESPONSE?

A. The basis by which a Zoning Official can properly determine the permissibility or prohibitive nature of a specified land use, is dependent upon the explicit quality of material(s) available detailing the imposed zoning designation(s). The underlying, or primary zoning district, is typically specified on a zoning map, detailing individualized zoning on a lot-by-lot basis. In certain instances, the zoning ordinance also details zoning designation in written form on a plat / lot basis. The same may also hold true in regard to specialized zoning, such as an overlay district. Without such precise instruments, rendering an appropriate zoning determination is difficult, if not virtually impossible. The primary source detailing the A-80 Overlay District boundary delineation is the "Aquifer Overlay Map of the Town of Burrillville," referenced by the Building Inspector in his Supplemental Advisory Opinion, hereinafter referred to as "Overlay Map." It is the same map used by the CREC's expert in realizing a development that will be entirely situated outside the A-80 Overlay District. Richard Lipsitz, a Rhode Island registered and licensed surveyor, has not only conducted field measurements, resulting in preparation of a Class I Survey Site Plan, but scientifically concluded after overlaying the Overlay Map upon the entire Spectra property, that no portion of the CREC lot will be situated within the A-80 Overlay District.

Once again, I must emphasize the fact that no lot is established at the outset of a development proposal. All aspects of the development, including lot creation, are conditional on achieving final approval. In the subject instance, a lot that has no A-80 Overlay District encumbrances can, and will be, eventually established such that the applicable regulations are moot, and there is no need for a use variance.

Additionally, neither I, nor any of the CREC's experts, especially the land surveyor, have ever argued that the imposed boundary delineation on the Spectra property is in error. We explicitly contend that the eventual CREC development lot will be configured such that it does not encroach into the A-80 Overlay District. Section 30-202(b)(3) "Aquifer Zoning - Appeal of Designation," explicitly states that, "***Where the bounds of the aquifer zones are in doubt or in dispute, as delineated by the overlay map****, the burden of proof and all associated expenses shall be borne by the owners of the land in question to show where said aquifer zones are properly located*." As discussed above, Invenergy does not question the integrity of the Overlay Map, and in fact, used that map to ensure that CREC would not encroach on the A-80. Because Invenergy does not question the Overlay Map and used the Overlay Map to ensure CREC is not within the A-80, the bounds of the aquifer zone are not in doubt or in dispute. Therefore, the obligation to prove otherwise, as referenced in the Building Inspector's Supplemental Advisory Opinion, is not applicable.

Q. THE BUILDING INSPECTOR ALSO STILL CONTENDS THAT A USE VARIANCE IS NECESSARY BECAUSE HE CLAIMS THAT CREC IS TWO ELECTRIC GENERATING FACILITIES, NOT ONE. DO YOU HAVE A RESPONSE?

A. I have previously, and continue to confirm, that the CREC development entails a singular electric generating facility, as further evidenced by Invenergy's pursuit of a singular operating license. A zoning ordinance absolute is the mandatory literal interpretation of the language

contained therein, especially in regard to the definitional language of the various land uses. I concur with the Building Inspector's assertion that a single-family dwelling is not only drastically dissimilar to a multi-family dwelling, but can be limited to a single facility on an individualized lot. The reason for this agreement is based upon the explicit definition of the respective land uses and the parameters / constraints imposed pursuant to said definitions. The respective definitions are provided for in Section 30-3 "Definitions," of the Town of Burrillville Zoning Ordinance:

> Dwelling, Single-Family - "*Means a structure containing one dwelling unit or household and no other principal use*."
>
> Dwelling, Multifamily - "*Means a residential building designed for or occupied by three households or more, with the number of families in residence not to exceed the number of dwelling units provided*."

The parameters / constraints imposed pursuant to both definitions clearly limit the respective land use to a singular "structure" or "residential building." The respective definitions are literally clear in what constitutes an individualized "single" or "multi-family" entity. What is most perplexing is the Building Inspector's usage of such clear and concise language in the context of a singular "Electric Generating Facility." To reiterate, definitional language must be interpreted literally, regardless of how elaborate or vague the language may be. An "Electric Generating Facility" is defined in the following manner pursuant to Section 30-3 of the Ordinance:

> **Electric Generating Facility - "Means any generating facility designed to generate electric energy in excess of 180 megawatts ('MW') annually."**

The Building Inspector is improperly attempting to expand upon the preceding definition of "Electric Generating Facility" by including the descriptive nature of the operation provided by the Applicant. Although the nature of the Facility and operation may be accurate, it neither contradicts nor precludes said land use from being permitted by special use permit in the F-5 Zoning District. The definitional language may be somewhat limiting, but it is clear that it references a "facility",

and not any singular operational feature, as implied by the Building Inspector in his supplemental advisory opinion. The Building Inspector has purposely singled out those specified components of the Facility and operation that were non-singular in nature, such as continuously referencing the "two-units" or "both-units". Regardless, the definition of an Electric Generating Facility imposes a singular parameter / constraint, namely that the facility must "*generate electric energy in excess of 180 megawatts*." Therefore, the facility can be comprised as it sees fit to be operationally functional. I should also point out that the existing Ocean State Power ("OSP") generating facility is comprised of two power trains that were built at separate times (one following the other) and contains four combustion turbines and two steam turbines. Were the intent to limit the facility, additional parameters / constraints would have been included in the definition. There was clear intent to broaden, and not restrict, what constitutes an Electric Generating "Facility". The manner of interpretation employed by the Building Inspector is not only incorrect, having exceeded the literal limits of what otherwise constitutes an "Electric Generating Facility" in the Burrillville Zoning Ordinance, but is also quite problematic considering the resulting implications where such broad interpretations are well beyond actual definitional language permitted. For example, a solar farm would necessitate an actual count, or minimally a range, of panels employed, otherwise anything beyond a single panel could be deemed inappropriate. Similarly, the Block Island wind farm is considered a singular wind farm, not five separate wind farms because there are five separate wind turbines.

Q. BECAUSE CREC IS AN ELECTRIC GENERATING FACILITY UNDER THE TERMS OF THE ZONING ORDINANCE, IS A USE VARIANCE NEEDED?

A. No. A special use permit is required under the Table of Use, F-5 District, but not a use variance.

Q. DO YOU HAVE ANY OTHER COMMENTS REGARDING THE BUILDING INSPECTOR'S ADVISORY OPINION?

A. I stand by my professional opinion that the CREC Development is permitted by special use permit in the F-5 District, otherwise deemed a "conditionally permitted" land use in accordance with Rhode Island case law, and thus permitted as a matter-of-right, subject to reasonable conditions of approval, if necessary.

Q. IN THE EVENT THAT THE BOARD DOES NOT AGREE WITH YOUR INTERPRETATION OF WHAT PERMITS AND/OR VARIANCES ARE NEEDED, IS INVENERGY REQUESTING ANY WAIVERS?

A. Yes. It is my understanding that if the Board does not agree with my interpretation of the Burrillville Zoning Ordinance, Invenergy will request that the Board grant whatever waivers the Board deems necessary pursuant to EFSB Rule 1.13(c)(1)(iii). In the Town's response to the EFSB's Data Request, No. 1-1, the Building Inspector contends that Invenergy will need four (4) use variances, a dimensional variance for the height of certain structures, and a waiver for the octave band limits. Although Invenergy—and I—are of the opinion that CREC needs only a special use permit, height variances and waiver from the octave band limitations, if the Board disagrees, Invenergy requests the Board issue waivers from the zoning relief identified in the Town's response to EFSB Data Request No. 1-1, so that CREC can be built.

III. STATEWIDE PLANNING PROGRAM'S SUPPLEMENTAL ADVISORY OPINION

Q. HAVE YOU READ THE STATEWIDE PLANNING PROGRAM'S SUPPLEMENTAL ADVISORY OPINION?

A. Yes.

Q. DO YOU HAVE AN OPINION REGARDING ITS CONTENTS?

A. Yes. The opinions proffered by the Rhode Island Statewide Planning Program's Supplemental Advisory Opinion are on point with every pertinent siting guideline. I reiterate that

my extensive analysis of the CREC Development included a thorough assessment for "consistency" purposes, with all local and pertinent state regulatory documents.

Q. IN YOUR PROFESSIONAL CAPACITY, DO YOU HAVE AN OPINION, TO A REASONABLE DEGREE OF CERTAINTY, WHETHER CREC COMPLIES WITH THE STATE GUIDE PLAN?

A. Yes. I agree with the conclusions proffered in the Statewide Planning Program's original Advisory Opinion and Supplemental Advisory Opinion that CREC complies with the State Guide Plan.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED REBUTTAL TESTIMONY OF JIM RIORDAN

(September 1, 2017)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF JAMES RIORDAN

I. INTRODUCTION

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

A. My name is Jim Riordan. I am a Project Manager for the Water Program at Weston & Sampson, Inc., located at 100 Foxborough Boulevard, Foxborough, MA, 02035.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC" or "the Facility").

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. To rebut claims made by witnesses for the Town of Burrillville ("Town"), filed with the EFSB on August 7, 2017, regarding CREC's stormwater impact. My rebuttal testimony further demonstrates and confirms that Invenergy's stormwater management plans and soil erosion and sediment control plans will be in conformance with applicable state and local laws and regulations and will thereby not cause unacceptable harm to the environment.

Q. HOW HAVE YOU STRUCTURED YOUR TESTIMONY?

A. I have structured my testimony based on the areas of my expertise and the primary critiques of my Pre-Filed Direct Testimony by the Town's witnesses. I will also respond to relevant sections

of the Rhode Island Department of Environmental Management's ("RIDEM") Supplemental Advisory Opinion.

II. STORMWATER ANALYSIS

Q. THE TOWN'S WITNESS, MR. ANTHONY JAMES ZEMBA, STATES THAT INVENERGY HAS NOT PROVIDED INFORMATION IDENTIFYING HOW CREC WILL ADDRESS STORMWATER DISCHARGE. DO YOU AGREE? IF NOT, PLEASE EXPLAIN THE INFORMATION INVENERGY HAS PROVIDED REGARDING CREC'S STORMWATER DISCHARGE.

A. I do not agree with Mr. Zemba's statement. Specifically, as discussed in my Pre-Filed Direct Testimony and in the testimony of Chad Jacobs, Invenergy developed final designs for the Erosion and Sediment Control Plan, the Operation and Maintenance ("O&M") Plan and a Final Stormwater Management Plan, which were submitted to RIDEM for review and approval as part of a comprehensive Freshwater Wetlands Alteration Permit. The designs meet the design criteria and guidance as outlined in the Soil Erosion and Sediment Control Handbook and the RI Stormwater Management Control Manual. These plans were also filed with the Board on May 16, 2017 as part of Invenergy's Application to Alter Freshwater Wetlands and were submitted to the Building Inspector on June 9, 2017.

Q. MR. ZEMBA ALSO CLAIMS THAT INVENERGY HAS NOT ADDRESSED STORMWATER DISCHARGE ADVERSE IMPACTS TO BIODIVERSITY. (PAGE 1) DO YOU HAVE A RESPONSE?

A. The *Rhode Island Stormwater Design and Installation Standards Manual* ("RISDISM") sets the standards for stormwater management in Rhode Island. As noted in chapter 3 of RISDISM:

> All of the minimum standards contribute to protecting the water and habitat quality of receiving waters from the negative impacts of stormwater runoff…In general, when a project's stormwater management system is designed, installed, and maintained in accordance with the requirements of this manual, its runoff impacts will be presumed to be in compliance with applicable state regulatory standards and requirements. (RIDEM, 2015, p. 3-1)

Invenergy designed the CREC facility and the associated stormwater best management practices ("BMPs") to be in compliance with RISDISM. CREC is, therefore, protective against the potential adverse impacts of stormwater discharge to biodiversity.

Q. MR. ZEMBA ALSO IMPLIES THAT INVENERGY SHOULD TREAT STORMWATER RUNOFF. (PAGE 9) DO YOU HAVE A RESPONSE?

A. RISDISM, which is the Rhode Island standard for stormwater management, requires that stormwater quality and quantities from new impervious surfaces be managed with BMPs. The CREC Application proposes to do this. In fact, the design plan proposes BMPs that exceed the requirements of the RISDISM management standards by proposing control of greater stormwater volumes than required.

Q. MR. ZEMBA ALSO STATES THAT CREC WILL INCREASE THE IMPERVIOUS SURFACE AREA RESULTING IN INCREASED STORMWATER RUN-OFF FROM CREC. HAS INVENERGY ACCOUNTED FOR THIS IN ITS STORMWATER MANAGEMENT PLAN? IF YES, PLEASE DESCRIBE.

A. In its existing condition, the area is primarily wooded. The proposed Facility includes new impervious surface of 18 acres out of 67 total acres. This increase is accounted for in the CREC stormwater management plan. Rhode Island standards for stormwater management require that stormwater quality and quantities from new impervious surfaces be managed with BMPs. The CREC Application proposes to do this. In fact, the design plan proposes BMPs that exceed the requirements of the management standards by proposing control of greater stormwater volumes than required.

Q. ANOTHER TOWN WITNESS, MR. JAMES A. JACKSON, ALSO ADDRESSES STORMWATER AND NOTES THAT THE STORMWATER PLAN INDICATES AN INCREASE TO POLLUTANTS IN THE STORMWATER. DO YOU HAVE A RESPONSE?

A. The Stormwater Management Plan for the proposed CREC Facility includes BMPs for control of pollutants pursuant to the Rhode Island stormwater standards. RISDISM, which sets

stormwater standards in Rhode Island, requires that BMPs manage pollutants to the maximum extent practicable ("MEP"). Rhode Island's MEP standard is to use BMPs from RISDISM to treat the first inch of runoff from new impervious surface. This treatment-design volume is referred to as the water quality volume ("WQV"). As previously stated, the proposed BMPs exceed this MEP standard and, therefore, the Rhode Island stormwater quality standards. The CREC proposal is to treat approximately 109 percent of WQV.

Q. HAVE YOU REVIEWED RIDEM'S SUPPLEMENTAL ADVISORY OPINION?

A. Yes.

Q. DO YOU HAVE AN OPINION REGARDING ITS DISCUSSION OF THE STORMWATER PERMIT?

A. Not at this point, as RIDEM has yet to conduct a review or opine on the RIPDES Stormwater Construction General Permit ("CGP") application. RIDEM states that the wetlands permit will address the CGP "if and when the permit to alter wetlands is issued." (Page 18) RIDEM goes on to say that such permit issuance "will include authorization to discharger under the RIPDES General Permit and will include approval of the construction of proposed stormwater management practices" and means that stormwater BMP design would be considered acceptable under the Rhode Island Stormwater Design and Installation Standards Manual.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes. However, I may respond to the Rhode Island Department of Health's Supplemental Advisory Opinion, if relevant to my area of expertise.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED REBUTTAL TESTIMONY OF JASON RINGLER

(September 1, 2017)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF JASON R. RINGLER, ESS GROUP, INC.

I. INTRODUCTION

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

A. My name is Jason R. Ringler. I am a Senior Scientist for Ecological Science and Environmental Permitting Services at ESS Group, Inc. ("ESS"), located at 10 Hemingway Drive, Riverside, RI 02915.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC" or "the Project").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. To rebut claims made by witnesses for the Town of Burrillville ("Town") regarding wetlands and biodiversity filed with the EFSB on August 7, 2017. In particular, my rebuttal testimony reconfirms that my previous analysis of CREC's environmental impacts was both accurate and reasonable. My rebuttal testimony further demonstrates Invenergy's avoidance, minimization and mitigation efforts and CREC's consistency with the Rhode Island Department of Environmental Management's ("RIDEM") Rules and Regulations governing freshwater wetlands.

Q. HOW HAVE YOU STRUCTURED YOUR TESTIMONY?

A. I have structured my testimony in two (2) parts, based on the primary critiques of my pre-filed testimony by the Town's witnesses. The two (2) sections are: (i) wetlands; and (ii) biodiversity/habitat. I will also respond to relevant sections of the supplemental advisory opinions.

II. WETLANDS ANALYSIS

Q. THE TOWN'S WITNESSES, MR. ANTHONY JAMES ZEMBA AND MR. JAMES A JACKSON, STATE THAT THERE WILL BE SIGNIFICANT IMPACTS TO WETLANDS DUE TO THE FACILITY'S CONSTRUCTION, ACCESS ROAD CONSTRUCTION AND TEMPORARY LAYDOWN AREA. DO YOU AGREE?

A. No. In my opinion, the impacts to freshwater wetlands will not be significant. The Project has been designed to minimize both temporary and permanent disturbance of wetlands. Temporary disturbances associated with access to construction staging areas has been kept to a minimum by avoidance and minimization measures wherever possible. In addition, temporarily disturbed areas will be revegetated with endemic species. The details concerning the impact to wetlands are explained in Section 6 of the Application, the wetlands addendum and the Freshwater Wetlands Permit application filed with RIDEM for the Project.

As discussed below in more detail, RIDEM states in its Supplemental Advisory Opinion ". . . based on the information currently available to [RI]DEM it appears that it is possible for the Applicant to meet its regulatory burden" for each of the six programs, which includes freshwater wetlands. (Page 14) The issuance of environmental permits, according to RIDEM, would serve as "a formal declaration that the proposed facility has met the standards and criteria for acceptable harm to the environment as established in State and federal laws and regulations." (Page 15). Therefore, significant impacts to wetlands are not expected, assuming the requisite environmental permits are issued.

Q. MR. ZEMBA AND MR. JACKSON RECOMMEND THAT INVENERGY REVISE THE SITE LAYOUT TO REDUCE DIRECT AND INDIRECT IMPACTS TO

WETLANDS. HAS INVENERGY ALREADY REVISED THE SITE LAYOUT TO REDUCE IMPACTS TO WETLANDS?

A. Yes.

Q. PLEASE EXPLAIN IN DETAIL THE EFFORTS INVENERGY HAS TAKEN TO MINIMIZE IMPACTING WETLANDS ON THE PROPOSED CREC SITE.

A. Invenergy has designed this Project so as to minimize impacts to wetlands and wildlife habitat as much as reasonably possible, to provide for greatest possible amount of protection of existing habitat.

Specifically, the design proposes improvements of the existing Wood Road to serve as the Facility roadway to avoid wetland and habitat impacts that would otherwise occur due to the development of an entirely new road crossing through wetlands. The design includes retaining walls that will considerably reduce its overall width and impacts by reducing the total width of the roadway infrastructure. In addition, the design proposes six natural bottom, box-type culverts to allow unimpeded flow of water, aquatic habitat connectivity, and access for wildlife movement under the proposed roadway. Each culvert will have a minimum height of approximately four feet and a minimum width of nine feet. The culvert conveying the tributary to Iron Mine Brook, as well as Wildlife Crossing #5 (closest to the CREC Facility) will have a minimum height of approximately six feet and a minimum width of twelve feet.

The provisions for a natural bottom culvert will accommodate a naturalized stream channel within the culvert while the retaining walls along the length of the roadway will effectively guide wildlife to the proposed natural bottom, three-sided box. Each culvert crossing will include two grate openings to promote light within the interior of the culvert. For large wildlife (i.e. white-tailed deer) that may be discouraged from utilizing the culvert crossings, an at-grade ramp is

proposed along the midpoint of the roadway. These measures were designed and located per specific guidance provided by RIDEM Wetlands staff.

During construction, several measures will be implemented to minimize impacts to the environment. These include the use of the existing woods road, installation of soil erosion and sediment controls, supervision and inspection of construction activities within resource areas by an environmental monitor and minimization of impacted areas. The environmental monitor will oversee construction activities including the installation and maintenance of soil erosion and sediment controls, on a routine basis to ensure compliance with all federal, state, and local permit commitments.

Time of year restrictions to avoid tree clearing during the June-July timeframe is also proposed. Following the completion of construction, restoration efforts, including final grading and installation of permanent soil erosion control devices, and restoration of temporarily impacted areas, will be completed.

Finally, a Compensatory Wetland Mitigation Plan following the New England District Compensatory Mitigation Guidance in cooperation with resource agencies will be developed. Invenergy intends to work with RIDEM and the United States Army Corps of Engineers ("USACE") to determine which potentially available parcel(s) appear best suited to offset project-related wetland and other impacts. It is anticipated that the Compensatory Wetland Mitigation Plan will include a description of Project impacts, objectives, mitigation site selection procedures, site protection information, and monitoring standards in addition to all required graphics and information. It is anticipated that the final mitigation package will primarily consist of land preservation and possibly some restoration should a viable project be identified.

Q. MR. ZEMBA AND MR. JACKSON ALSO RECOMMEND THAT CREC SHARE AN ACCESS ROAD WITH SPECTRA ENERGY/ALGONQUIN. TO YOUR KNOWLEDGE, IS THAT POSSIBLE?

A. In Invenergy's response to the RIDEM's Data Request No. 3-13, Invenergy explained that the Algonquin Road is owned by Spectra, and Spectra indicated that it will not allow Invenergy to use the road during construction or operation. Invenergy attached, as Exhibit 4, a letter from Spectra denying Invenergy's request. Accordingly, it is my understanding that using the Spectra Energy/Algonquin access road is not possible. I believe other Invenergy witnesses can speak to this access road question.

Q. HAVE YOU REVIEWED RIDEM'S SUPPLEMENTAL ADVISORY OPINION?

A. Yes.

Q. DO YOU HAVE AN OPINION REGARDING ITS DISCUSSION OF THE FRESHWATER WETLANDS PERMIT APPLICATION?

A. Yes. According to RIDEM's August 15, 2017 Supplemental Advisory Opinion, the alteration of freshwater wetlands are subject to federal and State environmental laws, regulations and standards which establish if an environmental impact is acceptable. According to the Supplemental Advisory Opinion, RIDEM personnel with knowledge and expertise of wetlands have conducted substantial, but not yet complete, reviews of the permit Freshwater Wetland Application. Notwithstanding the June 19, 2017 RIDEM letter requesting additional information associated with the Freshwater Wetland Application and the fact that the review processes have not yet been completed with final decisions rendered, RIDEM states in its opinion, "based on the information currently available to [RI]DEM it appears that it is possible for the Applicant to meet its regulatory burden" for each of the six programs, which includes freshwater wetlands. (Page 14) I am confident Invenergy will be able to satisfy the regulatory burden of responding to comments and deficiencies. Once completed and the requisite environmental permits are issued, RIDEM

stated in its Supplemental Advisory Opinion that it will serve as "a formal declaration that the proposed facility has met the standards and criteria for acceptable harm to the environment as established in State and federal laws and regulations." (Page 15)

III. HABITAT ANALYSIS

Q. THE TOWN'S WITNESS, MR. ZEMBA, ALSO COMMENTS ON INVENERGY'S BIODIVERSITY ANALYSIS, STATING THAT INVENERGY HAS NOT SUFFICIENTLY AND ACCURATELY CHARACTERIZED THE BIODIVERSITY ON THE SITE. DO YOU AGREE?

A. No. First, Mr. Zemba states that "[c]ertain taxa are under-represented by the data presented." (Page 4) It would appear Mr. Zemba has not reviewed the August 2, 2017 Biological Inventory Report - Clear River Energy Center. If he had done so, Mr. Zemba would know that: "[a]dditional forest interior species or bird species of conservation concern (BCC)" were observed; "additional herpetofauna" was observed; and "a number of mammal species" were documented onsite. ESS performed or supervised numerous studies and the species found were detailed in Invenergy's EFSB Application, Invenergy's Application to Alter Freshwater Wetlands and Biological Inventory Report, previously filed with the Board.

The biological scope of the inventory included terrestrial vertebrates (birds, mammals, amphibians, reptiles), targeted invertebrates (primarily lepidopterans [butterflies, moths, and skippers], odonates [dragonflies and damselflies], and stream benthic macroinvertebrates), and vascular plants. Thirteen (13) distinct field survey programs were conducted as part of this biological inventory, in addition to a bat acoustic survey conducted by ESS in 2015.

Q. MR. ZEMBA ALSO STATES THAT THERE IS NO DISCUSSION ABOUT PLANT SPECIES OF CONSERVATION CONCERN. DO YOU AGREE WITH THAT STATEMENT?

A. As discussed, it would appear Mr. Zemba has not reviewed the August 2, 2017 Biological Inventory Report - Clear River Energy Center. If he had done so, Mr. Zemba would note vascular

plant surveys were conducted in the study area on the following dates in 2017 (n=2): May 24 and July 3. The May survey resulted in the detection of 125 vascular plant species, and 40 additional species were detected during the July survey, for a total of 165 vascular plants detected in the study area. Of these, ten species are classified by the Rhode Island Invasive Species Council ("RIISC") as invasive species in Rhode Island, and one is classified as a potentially invasive species (RIISC 2001[1]). In addition to the 165 plant species detected in the study area during the plant surveys, an additional 22 species were detected incidentally in the study area. The report states few painted trilliums (*Trillium undulatum*), a state-listed species, were found in this area adjacent to the existing woods road.

Q. REGARDING FRAGMENTATION AND WILDLIFE, RIDEM STATES THAT ALTHOUGH INVENERGY HAS PROVIDED RIDEM WITH ADDITIONAL INFORMATION, THAT INFORMATION DOES NOT PROVIDE IT WITH ENOUGH DETAIL TO DISCUSS THE NATURE OF FISH AND WILDLIFE IMPACTS AND RENDER AN OPINION. DO YOU HAVE A RESPONSE?

A. Yes. In response to comments from RIDEM in its original 2016 Advisory Opinion, an inventory of the flora and fauna in the study area was proposed in early 2017. The goal of this inventory was to provide a comprehensive assessment of the faunal and floral communities present. Invenergy sought input from RIDEM on numerous occasions, starting in early March 2017 when the site-specific flora and fauna survey protocols were provided to RIDEM. RIDEM tendered a letter on June 13, 2017; however, this input was received well after the survey had been underway for an extended period of time. While RIDEM's response was received after most survey programs had been initiated, the methodologies used during this biological inventory largely conformed to the recommendations that RIDEM summarized in its June 13, 2017 letter.

[1] Rhode Island Invasive Species Council. 2001. Rhode Island List of Invasive Plant Species. Accessed online at: http://rinhs.org/wp-content/uploads/2011/10/RIISC_2001list_wlogos.pdf

In the Biological Inventory Report, the specific field survey methodologies and the seasonal timing of the surveys were chosen to attempt to maximize the number of animal and plant species documented at the site.

As noted by RIDEM in its Supplemental Advisory Opinion, proposed alterations of upland areas are not subject to regulation "and no standards for acceptable impacts are established in State or federal environmental law." (Page 15) Irrespective of the seasonality or number of years a biological inventory may be completed on-site, in the absence of such standards "[RI]DEM is unable to render an opinion on whether these proposed impacts are acceptable or not." (Page 15)

Q. ON PAGE 11 OF RIDEM'S SUPPLEMENTAL ADVISORY OPINION, IT STATES "GIVEN THE WEIGHT OF THIS THREAT IN AN ALREADY FRAGMENTED LANDSCAPE, THE BEST COURSE OF ACTION IS TO AVOID FURTHER FRAGMENTATION TO THE GREATEST EXTENT PRACTICABLE, TO FOCUS CONSERVATION ON THE BEST AND LEAST IMPAIRED BLOCKS OF HABITAT, AND TO FOCUS RESTORATION EFFORTS ON RESTORING CONNECTIVITY OF INTACT HABITATS RATHER THAN TO CONTINUE TO FRAGMENT LANDSCAPES AND LOOK FOR MITIGATION ELSEWHERE." DO YOU HAVE A RESPONSE?

A. Yes. A great deal of planning has been undertaken by Invenergy to avoid and minimize impacts to onsite jurisdictional wetlands as well as limit clearing to the extent practicable to accommodate the Facility. Approximately 35 acres will be cleared for the power plant site and access road, which in my opinion will not have a significant impact on fragmentation.

As previously noted, the design proposes six natural bottom, box-type culverts to allow unimpeded flow of water, aquatic habitat connectivity and access for wildlife movement under the proposed roadway. The provisions for a natural bottom culvert will accommodate a naturalized stream channel within the culvert while the retaining walls along the length of the roadway will effectively guide wildlife to the proposed natural bottom. In addition, time of year restrictions to avoid tree clearing during the June-July timeframe is proposed. Following the completion of

construction, restoration efforts, including final grading and installation of permanent soil erosion control devices, and restoration of temporarily impacted areas, will be completed. Temporarily cleared forest areas will be planted with native tree and shrub species and the Project proponent will commit to a ten-year monitoring and management plan for both wetland and upland restoration activities.

Q. IN YOUR OPINION, HAS INVENERGY CONDUCTED A COMPREHENSIVE ASSESSMENT OF CREC'S BIODIVERSITY IMPACTS?

A. Yes. As previously noted, the specific field survey methodologies and the seasonal timing of the surveys were chosen to attempt to maximize the number of animal and plant species documented at the site and largely conformed to the recommendations that RIDEM summarized in its June 13, 2017 letter. While a multiyear, multi seasonal inventory may provide a more refined list of species, it would not change the fact that the local site (67 acres) habitat is currently used by a variety of bird, mammal, reptile and amphibian species or that the Project site is located on private property within a semi-contiguous forest patch that is greater than 500 acres.

Q. YOU HAVE MENTIONED THE AUGUST 2, 2017 BIOLOGICAL INVENTORY REPORT, WHICH WAS FINALIZED AFTER YOU FILED YOUR PRE-FILED DIRECT TESTIMONY. DOES THIS REPORT CHANGE YOUR PREVIOUS OPINION REGARDING CREC'S IMPACT ON BIODIVERSITY?

A. No. The Biological Inventory affirms that the proposed Project would result in the loss of habitat currently used by a variety of bird, mammal, reptile, and amphibian species. However, existing breaks in flow or connectivity already exist near where Buck Hill and Wallum Lake Roads intersect and Unfragmented Forest Blocks (500 acres or more) and Unfragmented Forest Blocks (250 acres to 500 acres) exist north and west of the proposed Project area; therefore, the Project would not create a barrier for wildlife species across the landscape. As previously noted, the proposed CREC site is located on private property within a semi-contiguous forest patch

greater than 500 acres (as designated in the 2015 Rhode Island WAP). The current design avoids and minimizes impacts to onsite jurisdictional wetlands as well as limits clearing to the extent practicable while still proposing to build on the privately-owned land. The Biological Inventory can be used to supplement the proposed mitigation in direct coordination with regulatory agencies.

Q. RIDEM'S SUPPLEMENTAL OPINION CONTAINS SEVERAL REFERENCES TO ITS REVIEW OF THE WORK ANTICIPATED TO CONSTRUCT THE TRANSMISSION LINE RIGHT OF WAY ON NATIONAL GRID PROPERTY. DO YOU HAVE A RESPONSE?

A. I understand that the Board will be reviewing the environmental impacts of the transmission line ROW construction in the separate EFSB Docket No. SB-2017-01. For the work involving National Grid's ROW, I refer the Board to the detailed Environmental Report filed in that proceeding. Invenergy plans to address all of RIDEM's wetlands concerns within the context of its pending Wetlands Aplication with RIDEM, which will also include plans for impact mitigation for the transmission project.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED REBUTTAL TESTIMONY OF MASON SMITH

(September 1, 2017)

SUMMARY

Mason Smith is a Managing Consultant at PA Consulting Group, Inc. and worked closely with Edinaldo Tebaldi regarding Clear River Energy Center's ("CREC's") economic impact analysis in support of the application. Mr. Smith adopts the Pre-Filed Direct Testimony of Mr. Tebaldi and his conclusions that CREC will have a significant positive impact on Rhode Island's employment, earnings and economic output, enhancing the socioeconomic fabric of the state.

LIST OF EXHIBITS

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF MASON SMITH

I. INTRODUCTION

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

A. Mason Smith, Managing Consultant at PA Consulting Group, Inc. ("PA"), located at 10 Canal Park, Cambridge, Massachusetts.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC").

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I am a Managing Consultant employed by PA. I have more than eleven (11) years of experience providing energy market advisory services in support of strategic planning, generation asset financings, and regulatory proceedings on behalf of utilities, independent power producers, energy investors, and other market participants. I have led economic impact analyses focused on generation investments, transmission investments, and power purchase agreement considerations. I have a Master of Business Administration (Finance and Strategy) and a Master of Environmental Management (Policy, Economics, and Law) from Yale University. A detailed description of my

educational background and experience is in my CV, which is attached as **Exhibit MS Rebuttal-1**.

Q. PLEASE DESCRIBE YOUR EXPERIENCE PROVIDING TESTIMONY TO REGULATORY COMMISSIONS, BOARDS AND AGENCIES OR AS AN EXPERT.

A. I served as an expert witness and submitted exhibits analyzing economic impacts associated with the Killingly Energy Center to the Connecticut Siting Council in Docket No. 470. I also led the analysis of the adequacy of renewable energy generation sources to meet Rhode Island's 2011 renewable energy standard in support of the expert testimony of Ronald Norman submitted to the Rhode Island Public Utilities Commission in Docket No. 4050.

Q. PLEASE DESCRIBE YOUR EXPERIENCE WITH ECONOMIC IMPACT ANALYSIS FOCUSED ON THE STATE OF RHODE ISLAND.

A. I led the input-output analysis of the economic impacts associated with the construction and operation of CREC and worked with Edinaldo Tebaldi to draft the Economic Benefits section of the EFSB Application.

Q. PLEASE IDENTIFY THE SECTIONS OF THE EFSB APPLICATION THAT YOU ASSISTED WITH AND CAN SPEAK ABOUT.

A. Section 5.1 (Economic Benefits), as supplemented with updated analysis.

Q. IN COMPLETING THIS ECONOMIC ANALYSIS, DID YOU COLLABORATE WITH ANY OTHER EXPERTS ON THE TOPIC? IF SO, WHO?

A. Yes. I collaborated with Edinaldo Tebaldi and Ryan Hardy, also of PA.

Q. PLEASE DESCRIBE YOUR ROLE IN THE ANALYSIS.

A. I collaborated with Edinaldo Tebaldi in developing the analytical approach and in collecting and reviewing the appropriate input assumptions on CREC. I also led the analysis of the economic impacts using National Renewable Energy Lab's Jobs and Economic Development Impact ("JEDI") model and IMPLAN model, and contributed to the drafting of Section 5.1

(Economic Benefits) of the EFSB Application and of Edinaldo Tebaldi's Pre-Filed Direct Testimony.

Q. PLEASE EXPLAIN WHY YOU ARE SUBMITTING REBUTTAL TESTIMONY.

A. Edinaldo Tebaldi is in the process of an employment change. He will be relocating to another state and taking on a role that will involve significant international travel obligations. As a result, he will not be able to provide testimony before the EFSB.

Q. DO YOU ADOPT MR. TEBALDI'S PRE-FILED DIRECT TESTIMONY?

A. Yes. I adopt the entirety of Mr. Tebaldi's Pre-Filed Direct Testimony, including his conclusion that CREC will have a significant positive impact on Rhode Island's employment, earning and economic impact, enhancing the socioeconomic fabric of the state. As noted above, I led the input-output analysis and helped develop Mr. Tebaldi's testimony and Section 5.1 of the EFSB Application.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. My rebuttal testimony reconfirms that my and Mr. Tebaldi's previous analysis of CREC's positive economic impact is both accurate and reasonable. My rebuttal testimony will respond to the testimony of the Rhode Island Building and Construction Trades Council's ("RIBCTC's") witnesses and respond to the supplemental advisory opinion of Statewide Planning Program. My rebuttal testimony further demonstrates that CREC will have a significant positive impact on Rhode Island's employment, earnings, and economic output and will enhance the socioeconomic fabric of the state.

Q. HAVE YOU REVIEWED THE PRE-FILED DIRECT TESTIMONY OF THE RIBCTC'S WITNESSES, MR. RALPH GENTILE AND MR. MARC VATTER?

A. Yes.

Q. DO YOU HAVE AN OPINION REGARDING THEIR ECONOMIC ANALYSIS?

A. The testimony of Mr. Gentile and Mr. Vatter relies on their data and experience through the Construction Labor Market Analyzer ("CLMA") to provide insight into the demand for skilled construction trades from construction projects – data and experience which they used in this case to examine the employment impacts of CREC. Their analysis supports PA's job creation projections and notes that CREC will create highly skilled jobs that will result in "substantial wage premia for these workers." (Page 10) Importantly, they also note that CREC's construction timeline, which is scheduled to be most intense later in 2018 through 2020, will bring stability to Rhode Island's construction trades during those years.

SUPPLEMENTAL ADVISORY OPINION ANALYSIS
RHODE ISLAND STATEWIDE PLANNING PROGRAM

Q. HAVE YOU REVIEWED THE RHODE ISLAND STATEWIDE PLANNING PROGRAM'S SUPPLEMENTAL ADVISORY OPINION?

A. Yes, I have reviewed the Supplemental Advisory Opinion that was submitted by the Statewide Planning Program to the Board on August 15, 2017.

Q. DO YOU HAVE AN OPINION REGARDING THE STATEWIDE PLANNING PROGRAM'S ANALYSIS OF CREC'S ECONOMIC IMPACT?

A. Yes. I find the evaluation conducted by Statewide Planning Program ("the Program") to be an appropriate review of our estimates with respect to the impact of CREC on the Rhode Island economy and note their support for our conclusions throughout. The Program enlisted the assistance of the Department of Administration's Office of Management and Budget ("OMB") to evaluate the economic impact estimates for the construction and operation of CREC. OMB analyzed employment, earnings, and economic output resulting from the construction and operation of CREC. In each case, the Program summarizes OMB's findings relative to Invenergy's and concludes, "Based on this, the Program deems Invenergy's estimate to be

reasonable, and consistent with a finding of positive economic impact." (Page 8) Among the findings from the analysis performed by the Program and OMB:

- OMB's analysis using RIMS II multipliers from the Bureau of Economic Analysis found CREC to result in positive economic benefits to Rhode Island, and also returned higher conclusions with respect to direct jobs and total economic output resulting from the CREC construction phase than my JEDI analysis found;
- OMB's review of the operations phase conclusions resulting from the operation of CREC found Invenergy's estimate of direct employees at CREC and earnings from CREC to be reasonable; and
- OMB's analysis using JEDI to test various cost and in-state versus out-of-state assumptions found the impact of CREC on employment, earnings, and economic output "remains uniformly positive" (Page 5); and
- OMB estimated the revenue from taxes and other revenues to Rhode Island State departments to be nearly $70 million from 2018-2036.

Q. THE PROGRAM'S SUPPLEMENTAL ADVISORY OPINION NOTED THAT THE AVERAGE EARNINGS PER CREC FULL-TIME EMPLOYEE ("FTE") APPEARED HIGH. CAN YOU COMMENT ON THIS?

A. Yes. In the construction period, the direct earning totals divided by the direct FTE results in a number of greater than $170,000 per FTE, which the Program notes is higher than the annual 2016 pay of $87,000 indicated for utility system construction workers in Rhode Island per the Federal Bureau of Labor Statistics. The Program offers two reasons for this differential, and I agree with both. First, construction of power plants like CREC generally require highly skilled employees who, as a result, earn higher wages. Second, earnings provided by JEDI do include assumed benefits on top of wages which represent "employee health benefits, workers

compensation, disability insurance, and social security, among others." After accounting for these two considerations, I believe the $170,000 per FTE to be reasonable.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

EXHIBIT MS REBUTTAL - 1

Mason Smith — Managing Consultant

Mason has more than 10 years of experience as a consultant involved in generation and transmission asset valuation and power market analysis, with a focus on policy and economics. Mason has delivered comprehensive reports on U.S. and international power markets, with a focusing on economic and regulatory drivers and their impacts on power generation and transmission assets. Mason has led input-output analyses to assess the economic impact associated with generation facilities and has evaluated the cost and benefits associated with investments in a range of energy assets and programs. Mason has an MBA and a Master of Environmental Management from Yale University.

Primary expertise	Related experience	Qualifications	Client list
• Electricity market economics • Economic impact analysis	• Generation planning • Financial analysis	• MBA, Finance and Strategy, Yale University • Master of Environmental Mgmt, Policy, Economics, & Law Track with Energy Focus, Yale University	• Power producers and developers • Electric utilities

Primary expertise

Electricity market economics – Working on behalf of utilities, generation owners, and prospective transmission developers, Mason has analyzed electricity rate impacts and plant gross margin impacts associated with proposed investments, potential policy developments, and major infrastructure changes, among others.

Economic impact analysis – Mason has led input-output analyses to analyze the economic impact associated with generation and transmission facilities and has evaluated the costs and benefits associated with investments in a range of energy assets and programs.

Key client achievements

Transmission Developer – Mason led the evaluation of the economic development benefits associated with the construction of a proposed HVDC transmission line in New England as well as the impacts associated with savings to natural gas and electricity customers. PA employed input-output models including IMPLAN to estimate the in-state jobs, income, and economic output resulting from the facility's construction and operation.

Independent Power Producer – Mason led the evaluation of the cost savings to customers as well as the economic development benefits of the construction and operation of a proposed approximately 500 MW combined cycle generation facility in the New England power market. PA employed input-output models, including IMPLAN and the Jobs & Economic Development Impact (JEDI) model, to estimate the in-state jobs, income, and economic output resulting from the facility's construction and operation.

Municipal Utility – Mason helped a utility analyze the economic development considerations associated with utility power procurement. The utility was reviewing its procurement policy and retained PA to evaluate the relative benefits of contracting with local resources (to stimulate the local economy) versus selecting the lowest cost option (to minimize rates). Mason authored a white paper that evaluated the collective best interest of the utility's ratepayers, reviewed "buy local" provisions, considered the local economic development impacts associated with a range of investments (including thermal generation, wind, solar, and energy efficiency), provided an overview of common economic development multipliers, and reviewed Input-Output models such as JEDI and IMPLAN.

Transmission Developer – PA was engaged to evaluate the case for Wyoming wind generation in helping California more cost effectively and reliably meet its 50% renewable portfolio standard. Mason led an assessment of levelized costs, marginal curtailment rates, avoided overbuild costs, and installed transmission costs to facilitate a representative comparison of the true cost per unit of renewable energy required to meet California's RPS. The

team evaluated the benefits provided by the transmission line, as measured by the renewable energy cost savings facilitated by the introduction of the superior Wyoming wind resource to the RPS compliance portfolio, against the cost of building and maintaining the line needed to access it.

Additional experience

Hawaiian Electric - Mason has contributed to or led individual resource planning projects with Hawaiian Electric (HECO) and its subsidiaries Maui Electric (MECO) and Hawaiian Electric Light Company (HELCO) since 2009. In so doing, PA developed and tested multi-year resource plans which evaluated existing petroleum- and coal-fired thermal generation as well as a wide range of new generation options, including utility-scale renewables, battery storage, and a range of distributed energy resources (DERs). PA's analyses have leveraged hourly and sub-hourly production cost models to evaluate the technical and economic viability of existing and potential resources, project energy prices and environmental impacts under various scenarios, and determine the cost to the ratepayer.

Energy Market Authority of Singapore – In 2010 and 2014, PA was engaged by the EMA to identify the parameters used to set the Vesting Contract price for the Singapore power market. On both reviews, Mason led the effort to establish the financial parameters and determine the weighted average cost of capital (WACC) to be used in discounting projected cash flows for a hypothetical new generation development in Singapore.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED REBUTTAL TESTIMONY OF ROBERT SMITH

(September 1, 2017)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF ROBERT A. SMITH, MCMAHON ASSOCIATES

I. INTRODUCTION

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

A. My name is Robert A. Smith. I am a Senior Project Manager at McMahon Associates, located at 14 Breakneck Hill Road, Lincoln, RI 02865.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC").

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

A. To rebut claims made by witnesses for the Town of Burrillville ("Town") regarding CREC's road condition impacts, as well as discuss the Rhode Island Department of Transportation's ("RIDOT's") Supplemental Advisory Opinion. My rebuttal testimony further demonstrates that CREC will not produce significant adverse effects on the quality of the state's roads and bridges and thereby not cause unacceptable harm to the traffic safety environment.

Q. THE TOWN'S WITNESS, MR. JAMES W. COOGAN, DISCUSSES ROAD DAMAGE ON PAGE 6 OF HIS TESTIMONY. SPECIFICALLY, HE STATES THAT THE ADDITIONAL SITE-RELATED TRIPS OVER A THREE YEAR

PERIOD WILL CAUSE SOME PAVEMENT DETERIORATION. DO YOU HAVE A RESPONSE?

A. Some additional deterioration beyond what would normally be expected will likely be experienced, although it will be difficult to perceive in most locations. Only at particular intersections, most notably South Main Street northbound approaching Pascoag Main Street, where there is a downgrade approaching a stopped condition, one might notice deterioration such as rutting take place. A Roadway Assessment Report, was submitted as an appendix to the "Traffic Impact Study for the Clear River Energy Center – Wallum Lake Road (Route 100) Burrillville, Rhode Island," dated May 2016, and filed with the Board on August 2, 2016 as a supplement to Invenergy's Response to the EFSB's Data Request, No. 1-1. As noted in the Roadway Assessment Report, this rutting condition is already occurring (pre-construction) at that location.

Q. MR. COOGAN ALSO REQUESTS THAT INVENERGY'S COMMITMENT TO RESTORATION SHOULD BE DEFINED. IS THAT COMMON?

A. It would be difficult to define the level of restoration necessary until after construction is completed, and the level of any additional deterioration experienced is recorded and compared to the pre-construction Roadway Assessment. In my experience, a developer providing a defined pre-construction commitment to roadway restoration, based solely upon anticipated construction truck traffic to the proposed site, is unprecedented on State-maintained roads in Rhode Island.

Q. HAVE YOU REVIEWED RIDOT'S SUPPLEMENTAL ADVISORY OPINION?

A. Yes.

Q. DO YOU HAVE AN OPINION AS TO ITS FINDINGS REGARDING ROAD CONDITIONS?

A. I concur with RIDOT's supplemental advisory opinion dated August 15, 2017, stating that it is expected that Invenergy's proposed water supply plan will not significantly impact State highways and roads in a negative manner.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED REBUTTAL TESTIMONY OF MARK WIITANEN

(September 1, 2017)

LIST OF EXHIBITS

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND **DOCKET No. SB-2015-06**

INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED REBUTTAL TESTIMONY OF MARK WIITANEN OF HDR, INC.

I. INTRODUCTION

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

A. My name is Mark Wiitanen. I am a Senior Project Manager and Vice President, at HDR, Inc. ("HDR"), located at 5405 Data Court, Ann Arbor, MI 48108.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development, LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC" or "the Project" or "the Facility").

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. To rebut claims made by witnesses for the Town of Burrillville ("Town") regarding CREC's overall design. My rebuttal testimony reconfirms that my previous analysis is both accurate and reasonable.

II. PROJECT DETAILS

Q. IN YOUR PRE-FILED DIRECT TESTIMONY, YOU NOTED THAT CREC WILL BE THE CLEANEST MOST EFFICIENT NATURAL GAS PROJECT IN THE REGION. ONE OF THE TOWN'S WITNESSES, MR. ERIC EPNER, INDICATES IN HIS PRE-FILED TESTIMONY ON PAGES 12-13, THAT HE COULD NOT SUBSTANTIATE THAT STATEMENT BECAUSE HE BELIEVED

NO INFORMATION OR REFERENCES HAD BEEN PROVIDED. DO YOU HAVE A RESPONSE?

A. The CREC Project is based on the General Electric 7HA.02 combustion turbine which provides the highest efficiency across the range of ambient conditions of technology currently available in the combustion turbine market. This high efficiency unit was introduced in 2014 with the first units entering commercial operation in 2017. The advanced class combustion turbine technologies currently available in the United States include units manufactured by General Electric, Mitsubishi Hitachi Power Systems and Siemens Energy. The combined cycle efficiency of these three technologies at ISO Standard conditions are summarized below based on data published in the industry benchmarking resource Gas Turbine World 2017 Performance Specs included in **Exhibit MW Rebuttal - 1**.

GTW Combined Cycle Specs – Advanced Class Units (60 Hertz)
One-on-One Configuration (Unfired) ISO Conditions
Performance Summary Comparison

Manufacturer	Model	Net Output	Net Heat Rate (LHV)	Net Efficiency
General Electric	7HA.02	560,000 kW	5408 BTU/kWh	63.1%
Mitsubishi Hitachi	501JAC	540,000 kW	5408 BTU/kWh	63.1%
Siemens Energy	SCC5-8000H	460,000 kW	5611 BTU/kWh	61.0%

The average efficiency of the currently installed combined cycle plants within the New England ISO footprint is nominally 49%.

The high efficiency of the CREC GE 7HA.02 unit produces the lowest emission rates available for natural gas fuel bound constituents, such as CO_2. The CREC Project will also employ best available control technology for the control of nitrogen oxide ("NOx"), carbon monoxide ("CO") and volatile organic compound ("VOC") emissions through application of

selective catalyst reduction ("SCR") and oxidation catalyst in accordance with the New Source Review, Prevention of Significant Deterioration permitting process.

This selection also allows the Project to provide to RIDEM a guarantee from the manufacturer (GE) on the expected emissions from CREC. As a result of this selection, Invenergy modified its air permit application to reflect the selected manufacturer. Additionally, in response to questions and concerns raised during the public hearings, Invenergy has modified the air permit application to limit the number of days the Facility could run on fuel oil from 30 days per combustion turbine to 15 days.

Q. MR. EPNER ALSO QUESTIONES THE EFFICIENCY OF THE GE 7HA.02 COMBUSTION TURBINE. WHY IS THIS MODEL THE MOST EFFICIENT COMBUSTION TURBINE AVAILABLE ON THE MARKET TODAY?

A. As I said, the GE 7HA.02 combustion turbine is the most efficient combustion turbine available on the market today because the unit design achieves a nominal 63.1% combined cycle efficiency and employs technology to provide high efficiency across the load range. The high efficiency is provided through the application of advanced materials, including thermal barrier coatings on the airfoil and the use of single-crystal material in the hot gas path developed from the aerospace industry, supporting higher firing temperatures. This efficiency is available across a wide range of operating conditions through the application of variable inlet guide vane ("IGV") and three stages of variable stator vanes ("VSVs") to manage compressor operability during start-up, control compressor airflow during turndown, and facilitate response to variations in ambient temperature and load.

Q. HAVE YOU REVIEWED THE TESTIMONY OF MR. DAVID M. HESSLER?

A. Yes.

Q. ON PAGE 6 OF HIS TESTIMONY, MR. HESSLER STATES THAT INVENERGY SHOULD POST A PERFORMANCE BOND OR OTHER ACCEPTABLE FINANCIAL ASSURANCE FOR THE BENEFIT OF THE TOWN

TO ENSURE THAT NOISE CONDITIONS ARE SATISFIED. IS THIS TYPICAL?

A. No. It is not standard practice to post a performance bond or other financial assurance to ensure certain project conditions are satisfied.

Q. WHAT IS THE STANDARD PRACTICE?

A. The standard practice for compliance with local noise ordinances are as prescribed under the applicable community's administrative code. There are occasions where additional project specific criteria to address noise issues are developed under an approval process such as a special use permit. The project specific conditions typically address unique project application of the noise ordinance and/or define a resolution methodology.

Q. MR. HESSLER STATES THAT START-UP LASTS FROM 40 TO 120 MINUTES. DO YOU AGREE?

A. No. Start-up of the CREC, at least in terms of how much time the additional noise resulting from steam by-pass during start-up is produced, is 10 to 45 minutes. The predominant contributors to noise during start-up are the steam by-pass valves discharging to the air-cooled condenser. These steam bypass valves are subject to the rated flow and pressure steam conditions producing the worst case noise levels the analysis is based upon for only a portion of the overall plant start-up duration. The plant start-up duration will vary based on the equipment metal temperature, which is generalized in time-duration based definitions of hot, warm and cold starts, based on the preceding shutdown duration.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

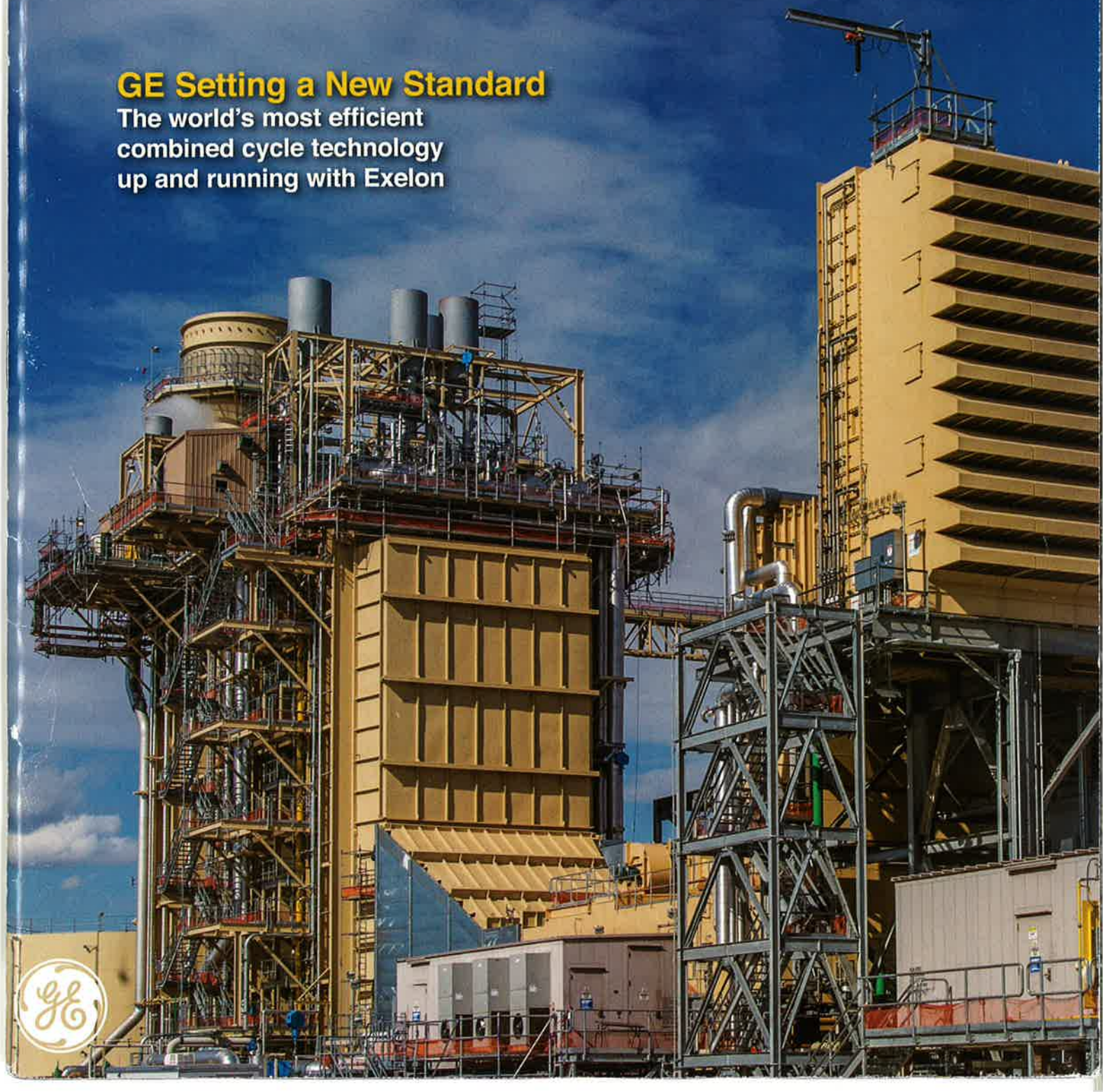
A. Yes.

EXHIBIT MW REBUTTAL - 1

Gas Turbine World

2017 Performance Specs

33rd Edition



Combined Cycle Performance Specs

Standard design performance ratings and adjustments for actual site and operating conditions

Conditions

Combined cycle design ratings apply to OEM reference plant performance at ISO conditions: 59°F ambient air (15°C) temperature, 14.7 psia (1.015 bar) sea level elevation and 60% relative humidity.

Standardized reference plants are typically designed around one or more gas turbines, multi-pressure reheat HRSGs without supplementary duct firing, no selective catalytic emissions reduction, no water or steam injection for power augmentation or emissions abatement.

Rules vary

Unlike the performance ratings for simple cycle gas turbines, which include engine design parameters such as pressure ratio, mass flow and exhaust temperature, there is no industry standard specifying the internal cycle design parameters for calculating combined cycle performance.

Plant performance specifications reported by different suppliers can be inconsistent or vague due to lack of design detail and differing scope of supply or boundary limits.

Depending on their business approach, some consider their combined cycle offering as consisting solely of the so-called "power block" or "power island".

Others consider the complete plant, which includes the combined cycle power block plus all BOP auxiliaries needed to operate the plant.

Net or gross?

This could lead to some ambiguity in defining "net performance" as tabulated here. Where the data refers to a full plant, "net" is defined as power output of the GT and ST generators, minus power consumed by the turbine-generator auxiliary packages and all of the plant's parasitic loads.

For combined cycle plants, parasitic power goes to operating system mechanical auxiliaries such as the boiler feedwater, condensate and cooling water circulating pumps, cooling fans, controls and other electrical auxiliaries (up to main step-up transformer), etc.

If performance ratings represent the power block only, "net" is defined as power output of the GT and ST generators less the parasitic power losses associated with only those systems that must operate the power block iso-

Adjusting ISO ratings to match site and operating conditions

Rule-of-thumb correction factors to estimate impact on combined cycle performance for non-standard site conditions and operating factors:

- **Ambient temp.** There is about a 2.5% reduction in ISO rated power output per 10°F rise in air temperature above 59°F and a corresponding increase in capacity with decreasing ambient temperatures below 59°F. Impact on heat rate (up and down, respectively) is about 0.5% per 10°F change in air temperature.

- **Site elevation.** For each 1000 ft. increase in site elevation above sea level, there is about a 3.5% reduction in ISO rated power output. Impact on heat rate is only about 0.2% per 1000 ft. increase in elevation.

- **Water temp.** For plants operating in hot climates there can be a 2% reduction in plant capacity and a corresponding 2% rise in heat rate if effective cooling water temperatures increase 25°F-30°F above assumed design temperature.

- **Plant age.** Over an extended 10-15 years of operation, plant capacity will deteriorate by approximately 3-5% from its as-new rating and heat rate will have increased by 3-5%, despite regular maintenance and plant overhauls.

- **Fouling.** Depending on operating environment and filtration, compressor fouling can cause gradual deterioration of up to 2% in plant capacity with 1.2% increase in heat rate. Can occur even with routine on-line compressor cleaning and typical 4,000-hr interval between off-line washing.

lated from the balance of the plant.

Both performance ratings are correct depending on definition of plant scope. OEMs that focus on complete turnkey plants are inclined to quote net plant performance. Those who primarily supply the GTs and STs, but do not specify balance of plant, quote net performance of the power block.

GTW combined cycle plant performance specifications provide a way to distinguish between the two groups by also listing gross GT and ST power output ratings. For performance specifications based on total plant performance, gross plant output (GT power plus ST power) should be around 2% higher than net plant power output rating.

The difference between a plant rated at 211 MW gross and 207 MW net indicates that 4 MW (~2%) is lost to operating the plant's auxiliary systems and the 207 MW remains as saleable power.

Less than 1% difference and the ratings are probably based on only the GT and ST generator power output. The difference between a gross rating of 213 MW and net rating of 212.5 MW would indicate 500 kW is lost to GT and ST auxiliary power consumption.

Correction factors

As with the simple cycle performance specs, there are real-world site factors for adjusting the GTW combined cycle ISO performance ratings (see editorial box) to allow for the effect of non-standard site conditions, and also the impact of in-service wear and tear.

Basically, they are tools for estimating the impact on performance of variation of cycle operating factors including ambient temperature and elevation, cooling-water temperature (on steam turbine power), deterioration in plant capacity with ageing and effect of compressor fouling on plant efficiency.

Condenser pressure

The steam condenser design and coolant (water or air) temperature can have a significant impact on combined cycle performance. Thermodynamically, the lower the heat sink temperature (and the closer the condenser saturation temperature can approach it), the higher the plant efficiency (lower heat rate).

The condenser temperature sets the condenser vacuum pressure and affects steam turbine power output. Lower condenser temperature means lower pressure and more steam turbine power, reducing plant heat rate (and vice versa).

There is no agreed-upon standard for coolant temperature nor for condenser design parameters (e.g. approach temperature difference) that apply when specifying combined cycle plant performance.

To fill that void, GTW asks the OEMs to specify the condenser pressure design ratings assumed in their performance calculations.

As shown in GTW's combined cycle ratings, the reported spread ranges from around 1.5 inch Hg for moderate design to a low of 1.0 inch Hg) for a more aggressive engineering approach.

Depending on condenser design, this range can reflect a substantial difference in assumed plant cooling water temperature.

Design tradeoff

For an apples-to-apples evaluation some adjustment to the data is necessary when extreme differences are noted.

An approximate rule-of-thumb: a decrease of 0.5 inch Hg (1.7 kPa) in condenser vacuum pressure results in about 0.5% increase in plant power output and a similar decrease in plant heat rate.

For plants with an air-cooled condenser and vacuum pressure 5 inch Hg or higher, plant output will decrease and heat rate increase by 3% or more from water-cooled plant ISO rating, depending on ambient air temperature and condenser design.

Other areas where inconsistencies in reported performance may arise by assumptions made in the selection of internal design parameters (such as HRSG approach temperature differences and pinch point) and in main throttle and reheat steam temperatures and pressures.

Losses over time

Plant capacity and heat rate deterioration is due mainly to degradation in gas turbine performance over time despite regular maintenance and plant overhauls.

Other areas subject to normal wear and tear or fouling that contribute to performance degradation include steam turbine flow surfaces and seals, heat transfer surfaces (particularly in the HRSG), cooling tower interiors (often due to algae growth), filters, piping, etc.

Typically, over 15 years (120,000 operating hours), capacity will have decreased by approximately 3% and heat rate will have increased by about 1.5%.

Caveat

In theory, the OEM ratings reported by the GTW performance specification are based on standard plant designs.

Actual quoted performance ratings in response to a bid request or competitive situation will invariably be different for several reasons.

When evaluating specific OEM ratings, you can expect that moderate versus aggressive design choices and cycle parameter assumptions will come into play. Sometimes adjustments will be needed to level the playing field.

Ultimately, when relying on published ratings for an actual project under development, it always pays to ask OEMs to confirm their ratings -- especially during final stages of comparative evaluation and choice of competitive units. ■

Model	Intro Year	Gross Plant Output (kW)	Net Plant Output (kW)	Net Heat Rate (Btu/kWh)	Net Plant Efficiency	Net Heat Rate (kJ/kWh)	Condenser Pressure	Gas Turbine Power (kW)	Steam Turbine Power (kW)	No. & Type Gas Turbine	Comments
GE Gas Power Systems (60 Hz) Aero (continued)											
LMS100	2015	138 938 kW	137 000 kW	6606 Btu	51.7%	6970 kJ	1.2 inch Hg	118 000 kW	20 924 kW	1 x LMS100	2P non reheat
LMS100	2015	278 890 kW	275 000 kW	6587 Btu	51.8%	6950 kJ	1.2 inch Hg	236 000 kW	42 861 kW	2 x LMS100	2P non reheat
GE Gas Power Systems (60 Hz) Frame											
7E.03	1977	144 170 kW	142 000 kW	6505 Btu	52.5%	6893 kJ	1.2 inch Hg	90 596 kW	53 574 kW	1 x 7E.03	2P non reheat
7E.03	1979	291 190 kW	287 000 kW	6439 Btu	53.0%	6793 kJ	1.2 inch Hg	181 192 kW	109 998 kW	2 x 7E.03	2P non reheat
7F.04	2009	309 470 kW	305 000 kW	5715 Btu	59.7%	6030 kJ	1.2 inch Hg	196 650 kW	112 820 kW	1 x 7F.04	3P reheat
7F.04	2009	623 090 kW	615 000 kW	5676 Btu	60.1%	5989 kJ	1.2 inch Hg	393 300 kW	229 790 kW	2 x 7F.04	3P reheat
7F.05	2009	381 100 kW	376 000 kW	5660 Btu	60.3%	5972 kJ	1.2 inch Hg	236 390 kW	144 710 kW	1 x 7F.05	3P reheat
7F.05	2009	765 800 kW	756 000 kW	5640 Btu	60.3%	5972 kJ	1.2 inch Hg	472 780 kW	293 020 kW	2 x 7F.05	3P reheat
7F.06	2016	401 400 kW	396 000 kW	5574 Btu	61.2%	5881 kJ	1.2 inch Hg	268 966 kW	132 434 kW	1 x 7F.06	3P reheat
7F.06	2016	806 380 kW	797 000 kW	5548 Btu	61.5%	5854 kJ	1.2 inch Hg	537 932 kW	268 448 kW	2 x 7F.06	3P reheat
7HA.01	2012	441 770 kW	436 000 kW	5497 Btu	62.1%	5799 kJ	1.2 inch Hg	292 872 kW	147 000 kW	1 x 7HA.01	3P reheat
7HA.01	2012	887 500 kW	877 000 kW	5466 Btu	62.4%	5767 kJ	1.2 inch Hg	585 744 kW	299 000 kW	2 x 7HA.01	3P reheat
7HA.02	2014	567 070 kW	560 000 kW	5408 Btu	63.1%	5706 kJ	1.2 inch Hg	375 071 kW	188 000 kW	1 x 7HA.02	3P reheat
7HA.02	2014	1 136 080 kW	1 122 000 kW	5398 Btu	63.2%	5695 kJ	1.2 inch Hg	750 142 kW	378 000 kW	2 x 7HA.02	3P reheat
IHI Power Systems (50/60 Hz)											
LM2500PE	1986	32 500 kW	31 790 kW	7093 Btu	48.1%	7484 kJ	****	22 230 kW	10 270 kW	1 x LM2500PE	
LM2500RB	2006	43 980 kW	43 120 kW	6497 Btu	52.5%	6855 kJ	****	31 430 kW	12 550 kW	1 x LM2500RB	
LM2500RC	2005	48 760 kW	47 780 kW	6818 Btu	50.0%	7193 kJ	****	34 660 kW	14 100 kW	1 x LM2500RB	
LM2500RD	2005	44 790 kW	43 900 kW	6533 Btu	52.2%	6893 kJ	****	31 350 kW	13 440 kW	1 x LM2500RB	
Note: All IHI ratings with inlet and exhaust losses											
IHI Power Systems (50 Hz)											
LM6000PC	1997	56 320 kW	55 250 kW	6687 Btu	51.0%	7055 kJ	****	42 900 kW	13 420 kW	1 x LM6000PC	
LM6000PC	1997	113 330 kW	111 130 kW	6649 Btu	51.3%	7015 kJ	****	85 800 kW	27 530 kW	2 x LM6000PC	
LM6000PC Sprint	1997	63 290 kW	62 120 kW	6655 Btu	51.3%	7021 kJ	****	48 430 kW	14 860 kW	1 x LM6000PC	
LM6000PC Sprint	1997	127 240 kW	124 820 kW	6623 Btu	51.5%	6988 kJ	****	96 860 kW	30 380 kW	2 x LM6000PC	
LM6000PF	1997	56 220 kW	55 180 kW	6402 Btu	53.3%	6754 kJ	****	42 260 kW	13 960 kW	1 x LM6000PF	
LM6000PF	1997	113 110 kW	110 970 kW	6366 Btu	53.6%	6717 kJ	****	84 520 kW	28 590 kW	2 x LM6000PF	
LM6000PF Sprint	1997	60 930 kW	59 830 kW	6474 Btu	52.7%	6830 kJ	****	46 460 kW	14 470 kW	1 x LM6000PF	
LM6000PF Sprint	1997	122 530 kW	120 220 kW	6443 Btu	53.0%	6798 kJ	****	92 920 kW	29 610 kW	2 x LM6000PF	

Model	Intro Year	Gross Plant Output (kW)	Net Plant Output (kW)	Net Heat Rate (Btu/kWh)	Net Plant Efficiency	Net Heat Rate (kJ/kWh)	Condenser Pressure	Gas Turbine Power (kW)	Steam Turbine Power (kW)	No. & Type Gas Turbine	Comments
Mitsubishi Hitachi Power Systems (50 Hz) (continued)											
MPCP1(M701G)	1997	499 500 kW	498 000 kW	5755 Btu	59.3%	6071 kJ	1.5 inch Hg	325 700 kW	172 300 kW	1 x M701G	
MPCP2(M701G)	1997	1 002 400 kW	999 400 kW	5735 Btu	59.5%	6051 kJ	1.5 inch Hg	651 400 kW	348 000 kW	2 x M701G	
MPCP1(M701J)	2014	703 200 kW	701 000 kW	5477 Btu	62.3%	5779 kJ	1.5 inch Hg	472 300 kW	228 700 kW	1 x M701J	
MPCP1(M701JAC)	2015	719 200 kW	717 000 kW	5408 Btu	63.1%	5706 kJ	1.5 inch Hg	487 000 kW	230 000 kW	1 x M701JAC	
Mitsubishi Hitachi Power Systems (60 Hz)											
MPCP1(H-100)	2010	150 000 kW	****	6193 Btu	55.1%	6534 kJ	1.2 inch Hg	102 500 kW	47 500 kW	1 x H-100	
MPCP2(H-100)	2010	305 700 kW	****	6083 Btu	56.1%	6418 kJ	1.2 inch Hg	205 000 kW	100 700 kW	2 x H-100	
MPCP1(M501)	1981	168 000 kW	167 400 kW	6635 Btu	51.4%	7000 kJ	1.5 inch Hg	112 100 kW	55 300 kW	1 x M501DA	
MPCP2(M501)	1981	337 300 kW	336 200 kW	6610 Btu	51.6%	6974 kJ	1.5 inch Hg	224 200 kW	112 000 kW	2 x M501DA	
MPCP3(M501)	1981	507 800 kW	506 200 kW	6585 Btu	51.8%	6947 kJ	1.5 inch Hg	336 300 kW	169 900 kW	3 x M501DA	
MPCP1(M501F)	1994	286 000 kW	285 100 kW	5976 Btu	57.1%	6305 kJ	1.5 inch Hg	182 700 kW	102 400 kW	1 x M501F	
MPCP2(M501F)	1994	574 000 kW	572 200 kW	5955 Btu	57.3%	6283 kJ	1.5 inch Hg	365 400 kW	206 800 kW	2 x M501F	
MPCP1(M501G)	1995	400 100 kW	398 900 kW	5843 Btu	58.4%	6165 kJ	1.5 inch Hg	264 400 kW	134 500 kW	1 x M501G	
MPCP2(M501G)	1995	803 000 kW	800 500 kW	5823 Btu	58.6%	6144 kJ	1.5 inch Hg	528 800 kW	271 700 kW	2 x M501G	
MPCP1(M501GAC)	2011	428 300 kW	427 000 kW	5640 Btu	60.5%	5951 kJ	1.5 inch Hg	280 800 kW	146 200 kW	1 x M501GAC	
MPCP2(M501GAC)	2011	858 600 kW	856 000 kW	5622 Btu	60.7%	5931 kJ	1.5 inch Hg	561 600 kW	294 400 kW	2 x M501GAC	
MPCP1(M501J)	2011	485 500 kW	484 000 kW	5504 Btu	62.0%	5807 kJ	1.5 inch Hg	326 200 kW	157 800 kW	1 x M501J	
MPCP2(M501J)	2011	974 000 kW	971 000 kW	5486 Btu	62.2%	5788 kJ	1.5 inch Hg	652 400 kW	318 600 kW	2 x M501J	
MPCP1(M501JAC)	2015	541 700 kW	540 000 kW	5408 Btu	63.1%	5706 kJ	1.5 inch Hg	365 100 kW	174 900 kW	1 x M501JAC	
MPCP2(M501JAC)	2015	1 086 300 kW	1 083 000 kW	5391 Btu	63.3%	5688 kJ	1.5 inch Hg	730 200 kW	352 800 kW	2 x M501JAC	
Note: All MHPS ratings on natural gas fuel, LHV at generator terminals, with inlet and exhaust losses											
PW Power Systems (50/60 Hz)											
FT8 SWIFTPAC 30	1990	42 100 kW	41 050 kW	6950 Btu	49.1%	7333 kJ	1.4 inch Hg	30 100 kW	12 000 kW	1 x FT8-3	
FT8 SWIFTPAC 60	1990	85 100 kW	83 100 kW	6878 Btu	49.6%	7257 kJ	1.4 inch Hg	60 500 kW	24 600 kW	2 x FT8-3	
FT4000 SWIFTPAC 60	2012	86 099 kW	84 608 kW	6868 Btu	49.7%	7247 kJ	1.5 inch Hg	69 347 kW	16 752 kW	1 x FT4000	
FT4000 SWIFTPAC 120	2012	173 271 kW	170 272 kW	6825 Btu	50.0%	7202 kJ	1.5 inch Hg	139 009 kW	34 262 kW	2 x FT4000	

Model	Intro Year	Gross Plant Output (kW)	Net Plant Output (kW)	Net Heat Rate (Btu/kWh)	Net Plant Efficiency	Net Heat Rate (kJ/kWh)	Condenser Pressure	Gas Turbine Power (kW)	Steam Turbine Power (kW)	No. & Type Gas Turbine	Comments
Siemens Energy (60 Hz)											
Industrial Trent 60 DLE	1998	****	66 400 kW	6374 Btu	53.5%	6725 kJ	1.5 inch Hg	51 674 kW	16 010 kW	1 x Trent 60	2P no reheat
Industrial Trent 60 DLE ISI	2010	****	77 500 kW	6376 Btu	53.5%	6727 kJ	1.5 inch Hg	60 200 kW	16 641 kW	1 x Trent 60	2P no reheat
Industrial Trent 60 WLE	2001	****	77 952 kW	6633 Btu	51.4%	6998 kJ	1.5 inch Hg	64 479 kW	18 291 kW	1 x Trent 60	2P unfired
Industrial Trent 60 WLE ISI	2011	****	80 300 kW	6723 Btu	50.7%	7093 kJ	1.5 inch Hg	64 036 kW	17 798 kW	1 x Trent 60	2P no reheat
SCC6-2000E 1X1	1989	****	174 000 kW	6533 Btu	52.2%	6893 kJ	****	117 000 kW	60 000 kW	1 x SGT6-2000E	
SCC6-2000E 2X1	1989	****	347 000 kW	6541 Btu	52.2%	6901 kJ	****	234 000 kW	119 000 kW	2 x SGT6-2000E	
SCC6-5000F 1X1	1989	****	370 000 kW	5863 Btu	58.2%	6186 kJ	****	250 000 kW	126 000 kW	1 x SGT6-5000F	3P reheat, 9 ppm NOx
SCC6-5000F 2X1	1989	****	746 000 kW	5813 Btu	58.7%	6133 kJ	****	500 000 kW	257 000 kW	2 x SGT6-5000F	3P reheat, 9 ppm NOx
SCC6-8000H 1S*	2010	****	460 000 kW	5611 Btu	61.0%	5920 kJ	****	****	****	1 x SGT6-8000H	3P reheat
SCC6-8000H 2X1	2010	****	930 000 kW	5602 Btu	61.0%	5910 kJ	****	620 000 kW	325 000 kW	2 x SGT6-8000H	3P reheat

*Siemens model 1S designates single shaft