# RHODE ISLAND DEPARTMENT OF HEALTH



# **Energy Facility Siting Board Supplemental Advisory Opinion:**

Clear River Energy Center

August 28, 2017

# 1.0 SUBMISSION OVERVIEW

The Rhode Island Energy Facility Siting Board (EFSB) issued a "Notice of Designation to the Rhode Island Department of Health to Render an Advisory Opinion," on the Proposed Invenergy Clear River Energy Center (CREC) on March 10, 2016. The Rhode Island Department of Health (RIDOH) submitted an Advisory Opinion to the EFSB in response to that request in September 2016 following a public hearing and comment period on that Opinion.

On April 13, 2017, the EFSB issued a "Notice of Designation to the Rhode Island Department of Health to Render a Supplemental Advisory Opinion" to address "the potential health impacts associated with Invenergy's new water supply plan." On June 8, 2017, RIDOH submitted "The Rhode Island Department of Health's First Set of Data Requests" to the EFSB, which requested that the applicant supply updated information about electric and magnetic fields, noise and the delivery and storage of hazardous and flammable substances. The applicant responded to that request in a letter to the EFSB dated June 22, 2017. That letter, with attachments, was received by RIDOH on July 24, 2017. RIDOH reviewed those responses and other material in the EFSB docket and prepared this Supplemental Advisory Opinion prepared in response to the April 2017 Notice.

# 2.0 CONTENT OUTLINE

The 2016 RIDOH Advisory Opinion was structured to address a set of health issues that may be associated with the proposed CREC facility, based on a review of the EFSB Preliminary Decision and Order and other publicly available documentation. That document was structured as follows:

- Introduction;
- Electromagnetic Fields;
- Noise;
- Drinking Water Quality;
- Air Pollution and Asthma;
- Emergency Response and Prevention;
- Climate Change and Health;
- Other Health Considerations; and
- Summary of Conclusions.

This Supplemental Advisory Opinion is similarly structured, but, since it is designed to supplement, not replace, the original Opinion, focuses on issues that potentially impacted by proposed changes in the configuration or operation of the proposed facility or by additional information obtained subsequent to the submittal of the original Opinion.

### 3.0 CONTACT INFORMATION

For additional information related to this Advisory Opinion, please address all correspondence to:

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# 4.0 INTRODUCTION

The Introduction section of the original Opinion discusses RIDOH's lead priorities, strategies and population health goals, as well as the World Health Organization's definition of health as a state of complete physical, mental, and social well-being in order to provide context for the more specific discussions in the document. The context information has not changed since the submittal of the original Opinion.

# 5.0 ISSUE 1: Electromagnetic Fields

In response to the RIDOH data request for more information about electric and magnetic fields, the applicant supplied a letter dated December 28, 2016 from Exponent. In that letter, Exponent updated the analysis of transmission line electromagnetic field impacts in the original CREC EFSB application. Differences between the original and updated analysis and documentation include the following:

- New Right of way (ROW) The updated documentation acknowledges that "a 0.8 mile 345-kV interconnection transmission line will be constructed on a new ROW between the switchyard within the CREC facility and the existing 345-kV ROW." The remaining six miles of transmission lines will be sited within an existing ROW. The previous document stated that all transmission lines associated with the facility would be sited on an existing ROW. According to the current documentation, the new ROW "will be contained wholly within 67 acres of land that will be purchased from the Spectra Energy Algonquin Compressor Station site."
- The updated documentation clarifies the widths of the ROWs. The new ROW (designated in the updated analysis as XS-1) would be 250 feet wide, the southern section of the existing ROW (XS-2 in the updated documentation) is 300 feet wide, and the remaining ROW (XS-3) is 500 feet wide.
- Updated estimates of transmission line loadings were provided.
- The maximum predicted magnetic and electric field levels predicted in the original and updated analyses are as follows:

	Maximum Magnetic Field (mG)		Maximum Electric Field (kV/m)	
Location	Original Analysis	Updated Analysis	Original Analysis	Updated Analysis
On ROW	366	372	7.7	7.6
Edge of ROW	79	84	1.5	1.7
100 feet from edge of ROW	19	17	0.14	0.2

Note that the maximum impacts at the edge of and 100 feet from the ROW in the updated analysis are associated with the new ROW, because the ROW is narrower in that area.

The International Commission on Non-Ionizing Radiation Protection (ICNIRP), an international agency recognized by the World Health Organization, recommends that the general public's exposure be limited to 2,000 mG for magnetic fields and 5 kV/m for electric fields. The predicted maximum electric field on the ROW is higher than that recommendation, but public access to that area is limited. Since predicted levels of magnetic and electric fields outside the ROWs are substantially lower than the ICNIRP recommendations, RIDOH continues to support the conclusion in the original Opinion, that the health impacts of electric and magnetic fields from transmission lines associated with the facility are minimal.

### 6.0 ISSUE 2: Noise

In response to the RIDOH data request, the applicant supplied a memo dated June 21, 2017 from Hankard Environmental, on behalf of CREC, with the subject "Supplemental information Regarding Noise Questions Raised by RIDOH." That memo refutes some of the assertions in the September 2016 RIDOH Opinion and reports the result of updated noise modeling.

The CREC memo argues that average nighttime noise level impacts will be lower than those predicted by the model, due to variations in operations at the facility and in atmospheric conditions. The memo also states that the additional turbine at the Algonquin Station, which had been permitted and installed but was not yet operational at the time of the earlier analysis, would not increase noise impacts from the Algonquin facility, and thus the lack of consideration of that equipment in their earlier analysis did not result in an underestimation of total noise levels in the area. Based on those arguments, CREC disagreed with RIDOH's assertion in the original Opinion that total noise levels in the vicinity of the proposed facility are likely to exceed World Health Organization guidelines for nighttime noise.

RIDOH agrees that, due to variations in operations and atmospheric conditions, noise impacts associated with the facility will also vary from day to day. However, as discussed in the original Opinion, current noise levels at some locations around the facility are already elevated, even without the addition of new sources. The CREC noise survey measured noise levels at receptor M1, which is near residences, which were in the moderate annoyance range for daytime exposures and which exceeded the threshold for sleep disturbance sat night. The Algonquin compressor station was the primary existing noise source of both day and nighttime noise noted at that location.

Those measurements were substantiated by the testimony of residents living near that receptor, which was received during the public review of the original Opinion document. One neighbor reported that "we are unable to sleep or enjoy the peace and quiet of our home. Another neighbor testified that:

My husband is a one-hundred percent disabled Vietnam Veteran and his health and survival relies on him getting good quality sleep, not to mention reduced stress levels. As a result of the continued noise and vibration his sleep pattern is negatively impacted and his stress level as a result has increased to a point where his cardiologist has told me not to have him get stressed over this situation. That is easier said than done when faced with the noise and vibration problem on a daily basis.

The updated CREC analysis listed modeled modified noise impacts for baseload and start-up operations at the five receptors identified in the original analysis; those impacts are approximately 1 dBA lower than

those reported in the earlier analysis. According to the CREC total response, this reduction is "due to additional noise mitigation measures being added to the design of the CREC since the application." RIDOH supports the applicant's efforts to reduce noise generation in the facility design. However, as several commenters noted during the earlier public process, the ability of those measures to meet noise reduction goals in practice have not yet been proven.

In view of the concerns discussed above, RIDOH continues to strongly recommends that the EFSB establish clear noise limitations and require the CREC facility, if constructed, to work in conjunction with Algonquin to ensure that neighborhood noise impacts are minimized to the fullest extent possible.

# 7.0 ISSUE 3: Drinking Water Quality

The change in the proposed process water source from a previously contaminated Pascoag Utility District (PUD) groundwater well to trucked water from the Town of Johnston municipal water supply renders RIDOH's previous comments on process water supply moot.

However, trucked water cannot provide drinking water for the facility and a separate, approved source must be developed for on-site human consumption. Should the power plant use well water on-premises for human use and consumption, and their offices serve more than 25 persons more than 60 days out of the year, then the plant must obtain a public water system license through RIDOH's Center for Drinking Water Quality.

Concern remains regarding the protection of sourcewater for nearby wells and water systems, including private wells and Wallum Lake, the source serving Zambarano Hospital. Effort should be made to protect these and all other sourcewaters from contamination through each phase of the project, including construction and operations.

Regardless of the source of water for the plant, maintaining the quality of existing drinking water supplies, both public and private, remains a priority.

## 8.0 ISSUE 4: Air Pollution and Asthma

RIDOH has not received additional information that would change its assessment of potential air pollution and asthma impacts associated with the proposed facility since the original Opinion was submitted. Emissions from the two water delivery trucks per day proposed in the applicant's January 11, 2017 Water Supply Plan are unlikely to significantly compromise air quality in the area, assuming that the trucks observe the anti-idling restrictions in RIDEM's Air Pollution Control Regulation No. 45, as well as any applicable RIDOT limitations.

As discussed in the original Opinion, RIDOH plans to review the Health Risk Assessment submitted to RIDEM, as well as RIDEM's air pollution control permit evaluation and, if indicated, will supply comments on those documents during RIDEM's public comment period. RIDOH continues to recommend that, if the CREC is to be built, all possible steps be taken to reduce harmful emissions and mitigate the health impacts of emissions, with special consideration of individuals with asthma or

otherwise impaired respiratory health. RIDOH is available to collaborate with state partners to help ensure that steps are identified and implemented effectively to prevent and mitigate such health impacts.

# 9.0 ISSUE 5: Emergency Response and Prevention

The original Opinion provided recommendations concerning planning for, mitigation of and response to potential emergency releases and catastrophic events involving materials at or in transit to or from the proposed CREC facility. RIDOH's June data request asked CREC for the following updates on this issue:

- Information about any changes in the facility proposal that affect the amount or concentration of ammonia that will be stored, the number or location of storage tanks, delivery methods or the planned safety measures. In addition, if the ALOHA model has been run again, please supply RIDOH with the documentation of the inputs for that model run.
- Information about any changes to plans for delivery and storage of compressed hydrogen, fuel oil, and other hazardous or flammable substances at the facility.

CREC's responded to the data request and to the comments and recommendations concerning emergency response and prevention in the RIDOH Opinion with a memo from the ESS Group dated April 20, 2017. Those issues are discussed further below.

#### Ammonia

• RIDOH's original Opinion stated that the applicant had not provided documentation to support its statement that the EPA's ammonia concentration threshold of 20% for requiring a Risk Management Plan (RMP) was set at that level "because it does not consider aqueous ammonia stored at a concentration less than 20% to pose a public health risk upon release". Note that CREC proposes to store aqueous ammonia with a concentration of 19%.

CREC replied that the omission of ammonia at concentrations lower than 20% from EPA's "List of Regulated Toxic Substances and Threshold Quantities for Accidental Release Prevention" "indicates that there is insufficient health and environmental effects or exposure data available to conclude that ammonia at a concentration of less than 20% is known to cause or may be reasonably anticipated to cause death, injury, or serious adverse effects to human health or the environment."

Since the above cited list was developed in a regulatory process that balanced a variety of factors in addition to risk, RIDOH does not agree that aqueous ammonia in any concentration less than 20% (e.g. 19%) is free from the potential to cause health or environmental consequences if released. Therefore, RIDOH continues to believe in the importance of implementing measures to mitigate any such consequences.

RIDOH's Opinion stated that Invenergy should establish clear, written procedures for the periodic
inspection, testing and maintenance of the integrity of the containment area and the functionality of
passive controls, sensors, etc. The applicant replied that "Invenergy will develop and implement an
Operations and Maintenance (O&M) plan for the facility ammonia containment and control systems
following their final design and prior to storing any ammonia on-site to ensure that these systems

function as designed should an accidental ammonia release occur." RIDOH agrees with that strategy if it is successfully implemented.

- RIDOH's Opinion states that Invenergy should establish clear, written emergency procedures. The
  applicant's response states that "Invenergy will develop and implement an Emergency Response Plan
  (ERP) for the facility following its final design and prior to storing any ammonia on-site that
  identifies the staff who will be responsible for implementing emergency response should an
  accidental ammonia release occur and the appropriate training to be provided for those staff. RIDOH
  agrees with that strategy if it is successfully implemented.
- In the Opinion, RIDOH stated that some of the inputs used to model potential offsite consequences from an ammonia release did not represent worst case conditions and commented that Invenergy should conduct a worst-case off-site consequence analysis for ammonia storage using more conservative assumptions.

In its reply, the applicant stated that, subsequent to the submittal of RIDOH's Opinion, several changes were made to the planned ammonia storage to further mitigate potential accidental release consequences, including a reduction in the volume of the ammonia storage tank from 40,000 to 27,000 gallons. Also, in addition to the passive evaporate controls previously proposed, "CREC is also now proposing to utilize 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 applicant then re-ran the ALOHA model using "the reduced storage volume and the proposed control systems and using the modeling inputs recommended by the RIDOH." The results of that modeling, which show that, "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," are reassuring to RIDOH.

- RIDOH's Opinion commented that appropriate planning should be implemented for a release with off-site consequences. The applicant replied that "Invenergy will develop and implement a Risk Management Plan (RMP) equivalent plan for the facility following its final design and prior to storing any ammonia on-site that includes safety procedures for potentially impacted sensitive receptors, such as residences, schools, and health care facilities should an accidental ammonia release occur." RIDOH strongly supports the development of such a plan if it is appropriately developed.
- RIDOH commented that planning activities should include an evaluation of impacts of a fire involving the ammonia tank and that Invenergy should coordinate with local emergency responders. The applicant replied that the "ERP and RMP for the facility which will be developed and implemented following its final design and prior to storing any ammonia on-site will include an evaluation of impacts of a fire involving the ammonia tank, including the emergency response procedures to be implemented should such an event occur." The applicant also states that those plans "will include a plan for coordination with local emergency responders, including the nearest hazardous materials response team" and "(t)his coordination will include providing local emergency responders with the quantities and locations of all chemicals stored on-site, transport routes and procedures, and the results of the worst-case off-site consequence analyses completed for the facility." RIDOH strongly supports those strategies if they are successfully implemented.

### Other Hazardous or Flammable Materials

The applicant's reply to the data request states that "(t)here has been only one change for the plans for the delivery and storage of compressed hydrogen, fuel oil and other hazardous or flammable substances at the facility. The fuel oil storage tank design has been modified from two one million gallon storage tanks to a single two million gallon tank and the tank location has changed which relocated the tank to an area closer to the Clear River Energy Center facility and further away from wetlands." The memo attached to the data request response addresses other comments and recommendations in RIDOH's Opinion regarding storage, use and transport or hazardous or flammable materials as follows:

- RIDOH commented that Invenergy should establish clear, written procedures for the periodic
  inspection, testing and maintenance of all equipment, controls, sensors, etc. related to the storage
  and use of hydrogen at the facility. The applicant replied that "Invenergy will develop and
  implement an O&M plan for the facility hydrogen storage and handling systems following their
  final design and prior to storing any hydrogen on-site to ensure that these systems function
  appropriately and as designed." RIDOH concurs with that strategy if it is successfully
  implemented.
- RIDOH commented that staff that are involved with the storage, transfer and use of hydrogen should be provided with appropriate training. The applicant responded that "Invenergy will develop and implement an ERP for the facility following its final design and prior to storing any hydrogen on-site that identifies the staff who will be involved with the storage, transfer, and use of hydrogen and the appropriate training to be provided for those staff. The training, which will include emergency response training and periodic refresher training, will be designed ensure the safe operation and maintenance of the hydrogen storage and handling systems." RIDOH concurs with that strategy if it is successfully implemented.
- RIDOH commented that Invenergy should coordinate with local emergency responders concerning compressed hydrogen delivery, handling and storage. The applicant responded that the "ERP for the facility which will be developed and implemented following its final design and prior to storing any hydrogen on-site will include a plan for coordination with local emergency responders, including the nearest hazardous materials response team. This coordination will include providing local emergency responders with the quantities and locations of the hydrogen to be stored on-site, transport routes and procedures, with a focus on planning for any potential impacts on sensitive receptors that could occur in the unlikely event of an incident involving hydrogen on-site or during transport." RIDOH concurs with that strategy if it is successfully implemented.
- RIDOH commented that all potential hazards should be evaluated in a facility-wide RMP-like hazard analysis. The applicant replied that "Invenergy will develop and implement an RMP equivalent plan for the facility following its final design and prior to storing any hazardous materials on-site that includes an evaluation of all potential hazards, including any potential hazards associated with the use, storage and transport of ammonia, hydrogen, fuel oil, natural gas, and any hazardous waste that may be generated at the facility." RIDOH concurs with this strategy if it is successfully implemented.
- RIDOH commented that all staff that may be involved in emergency response should be identified and provided with appropriate training and that Invenergy should coordinate with local emergency responders. The applicant responded that "Invenergy will develop and implement an ERP for the facility following its final design and prior to storing any hazardous materials on-site

that identifies the staff who will be involved with emergency response and the appropriate training to be provided for those staff, including all planned emergency response drills."

Further, the applicant states that "the ERP and RMP for the facility which will be developed and implemented following its final design and prior to storing any hazardous materials on-site will include a plan for coordination with local emergency responders, including the nearest hazardous materials response team. This coordination will include providing local emergency responders with the quantities and locations of all hazardous materials stored on-site, transport routes and procedures, and the results of any hazard analyses completed for the facility. The ERP and RMP will include special consideration to potential impacts on sensitive receptors, including residences, schools, workplaces, medical facilities, and other places people congregate. Invenergy will provide emergency responders in any towns which could be impacted in the unlikely event of an incident at or during transport to the facility with any additional equipment that they may need to respond to such an event, upon request." RIDOH concurs with these strategies if they are successfully implemented.

In RIDOH's opinion, implementation of the strategies identified in the applicant's April 20, 2017 memo, as discussed above, along with the mitigation measures specified in the EFSB CREC application, would provide appropriate protections for minimizing the risk of accidental releases or incidents involving hazardous or flammable materials at or in transit to or from the proposed CREC facility.

# 10.0 ISSUE 6: Climate Change and Health

RIDOH continues to have grave concerns about climate change as a current and future health threat in Rhode Island and other locations and notes that vulnerable populations are already facing risks due to warming temperatures, impaired air quality, increased length and severity of pollen seasons, increasing severity of storms, flooding, drought, and the rising of sea levels. Health risks in Rhode Island associated with climate change include threats to housing and safety; heat-related morbidity and mortality; the introduction of infectious diseases and infectious disease vectors formerly confined to more southern latitudes; increase in symptoms of allergy, asthma and other respiratory disease, and threats to the food and fresh water supply. As with many public health risks, people with limited means, people with compromised health and other susceptible populations, including the elderly, children and outside workers, are particularly vulnerable to those threats.

The December 2016 EC4's "Rhode Island Greenhouse Gas Emissions Reduction Plan" concludes that "(a)n 80% GHG reduction by 2050 [the long-term target specified in the 2014 Resilient Rhode Island Act] would likely require a near-zero carbon grid coupled with significant electrification of residential/commercial space heating and on-road vehicles." In the De-Commissioning section of the EFSB CREC application, the applicant states that "(t)he Facility life expectancy is greater than 20 years and if market conditions are favorable the units could continue to operate for 30 or perhaps 40 years." If Rhode Island is to meet the commitments in the Resilient Rhode Island Act, it is essential that the State begin the move from fossil fuel energy generation as soon as possible.

RIDOH is also concerned that, while the burning of natural gas causes far less exposure to harmful air pollutant emissions than the burning of coal for those living near power plants, hydraulic fracking, the source of the natural gas for the proposed facility, has significant negative impacts on neighbors of fracking facilities. Just as the State's energy supply cannot be considered in a vacuum, RIDOH strongly

believes that it is important to evaluate the impacts of energy choices and plans on the larger community, including those living near fuel production facilities, fuel pipelines and power plants, as well as all of those affected by climate change, including vulnerable populations.

In view of these concerns, RIDOH supports the State's efforts to develop alternative, renewable energy sources and urges the State to move away from fossil fuel combustion as quickly as possible. Climate change is a local and global challenge, but it is also an opportunity for positive change. It provides us a challenge to change the way we have done things in the past, to ultimately live healthier and happier lives. It is imperative that action be taken individually and collectively to mitigate climate change--- for the health and well-being of our communities and of the world community.

#### 11.0 ADDITIONAL HEALTH CONSIDERATIONS

Commenters on the original RIDOH Opinion identified several additional areas of potential health concern, including stress, mental health, light pollution and cancer, which were not discussed in the draft of this document. RIDOH has received no additional information related to these issues since the submittal of the Opinion, but continues to acknowledge that these issues are of concerns to neighbors of the proposed facility. In particular, RIDOH acknowledges the impact of stress associated with the siting of the proposed facility on nearby residents, in view of the previous water contamination issue and the influx of other large, community-changing facilities, and urges the EFSB to consider this issue in siting decisions.

# 12.0 SUMMARY OF CONLCUSIONS

RIDOH is strongly committed to its mission, which is "to protect and promote the health of Rhode Islanders" and which includes a vision of "safe and healthy lives in safe and healthy communities." As such, RIDOH advocates for including the consideration of health, defined by the WHO as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" in all decision-making about policy and programmatic issues.

RIDOH appreciates EFSB's request for RIDOH to supply an advisory opinion and supplementary advisory opinion on potential public health impacts associated with the CREC application and strongly recommends that health risks be critically considered in the evaluation of the application. The recommendations in the Summary of Conclusions of the original Opinion, modified to incorporate the updated information discussed in this document, are as follows:

• RIDOH continues to strongly recommend that the EFSB establish clear noise limitations and require the CREC facility, if constructed, to work in conjunction with Algonquin to ensure that neighborhood noise impacts are minimized to the fullest extent possible. If noise levels from operation of the facility, by itself or in conjunction with Algonquin, cause neighborhood disturbances, all available actions to mitigate those impacts should be pursued, including, but not be limited to, equipment and operational modifications, soundproofing of impacted residences and, if indicated, the purchase of properties subject to noise levels that cause serious annoyance and/or sleep disruption.

- Trucked water cannot provide drinking water for the facility and a separate, approved source must be developed for on-site human consumption. Should the power plant use well water on-premises for human use and consumption, and their offices serve more than 25 persons more than 60 days out of the year, then the plant must obtain a public water system license through RIDOH's Center for Drinking Water Quality. RIDOH also continues to be concerned about the protection of sourcewater for nearby wells and water systems, including private wells and Wallum Lake, the source serving Zambarano Hospital. Efforts should be made to protect these and all other sourcewaters from contamination through each phase of the project, including construction and operations. Regardless of the source of water for the plant, maintaining the quality of existing drinking water supplies, both public and private, remains a priority.
- RIDOH plans to comment on the CREC RIDEM air pollution permit, including the health risk
  assessment submitted in support of that application. RIDOH recommends that, if the CREC is to
  be built, all possible steps be taken to reduce harmful air emissions and mitigate the health
  impacts of emissions, with special consideration to individuals with asthma or otherwise impaired
  respiratory health.
- CREC has committed to strategies that respond to RIDOH's recommendations for mitigating the potential for and consequences of emergency releases and incidents. Those recommendations include specific measures related to the use, storage and transport of ammonia and hydrogen; planning, training and coordination efforts; and the recommendation that all potential hazards, including the potential for a breach of the oil tanks and a fire at the facility, be evaluated in a facility-wide RMP-like hazard analysis. If the facility is approved, it is essential that those plans and commitments be implemented in a timely manner and maintained throughout the life of the facility.
- RIDOH supports the Resilient Rhode Island Act's goals and encourages efforts aimed at
  maximizing carbon emission reductions and the development of alternative and renewable energy
  sources. Prioritization of alternative energy over fossil fuels, when at all possible, will help
  minimize the negative public health outcomes associated with climate change and to protect the
  environment and the natural systems on which we rely.
- RIDOH acknowledges the impact of increased stress associated with the proposed facility on
  nearby residents, especially in view of Burrillville's past experience with water contamination
  and the clustering of energy-related facilities in and near that rural town. RIDOH urges that this
  issue be considered in siting decisions.
- 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.

RIDOH appreciates the opportunity to submit this Supplemental Opinion. The Department strongly believes that all decisions related to sustainable economic development, health service delivery, or community health infrastructure building must be aligned with the needs of the affected communities. The above comments are supported by RIDOH's statewide goals, which focus on achieving health equity, improving integrated population health, and transforming communities.