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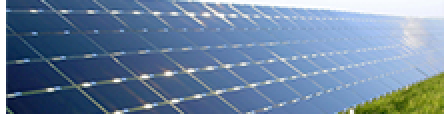

# Invenergy Clear River Energy Center

January 12, 2016
Preliminary Hearing
Energy Facility Siting Board
Docket Number
SB-2015-06

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Invenergy

# Invenergy Corporate Overview

- Invenergy is *innovation* in *energy*. Deeply experienced and entrepreneurial in our core, we provide power generation and storage solutions to address the energy challenges facing our communities and our customers. We believe in clean, sustainable energy.

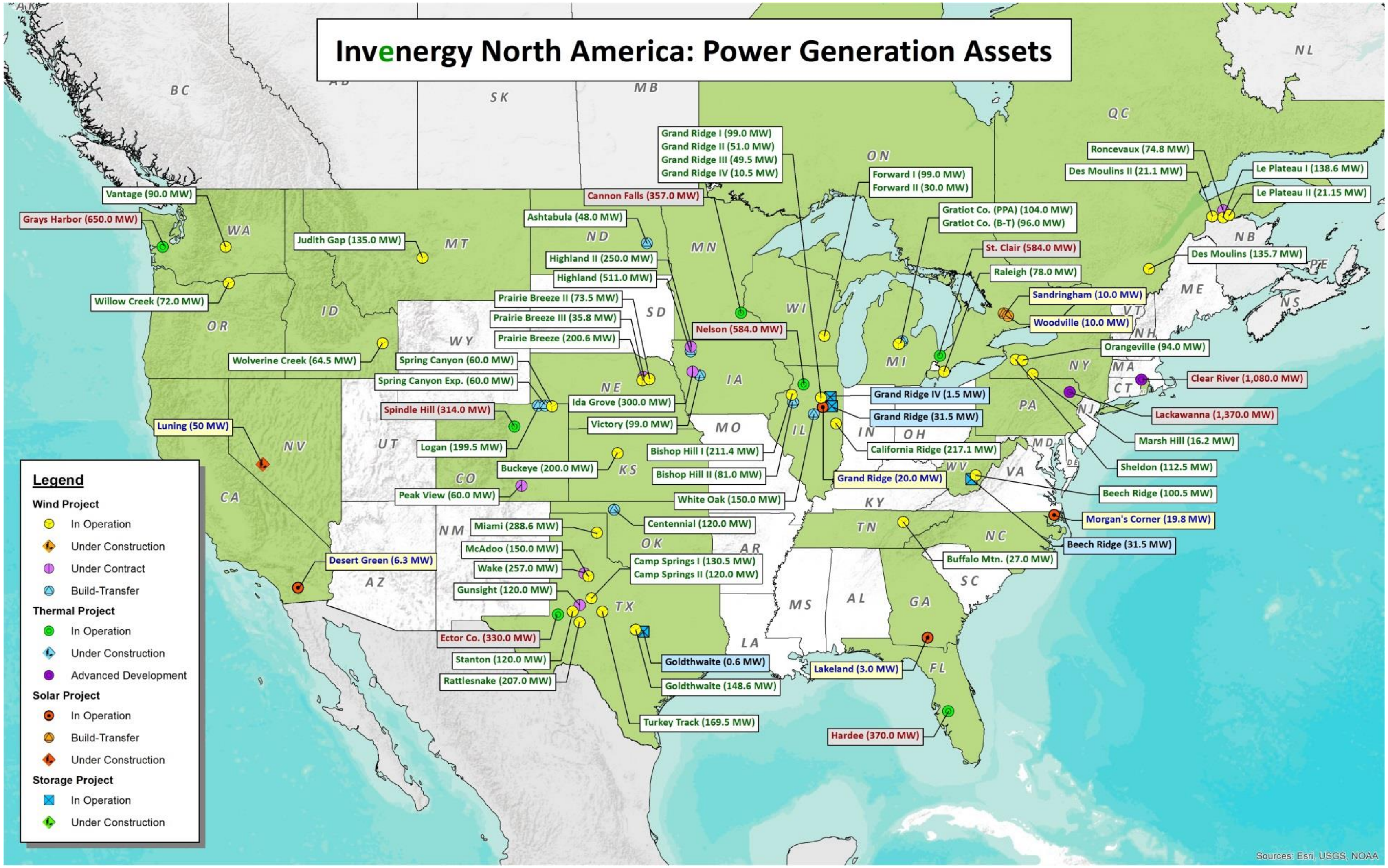
- We develop. We build. We own. We operate.

- We have over 10,000 MW of assets that includes projects that are under construction, under contract, or build-transfer.

- Invenergy is the largest independent wind power company in North America (4th overall).

- Invenergy is the largest operator of energy storage systems in the U.S. (Winner of the 2015 ESNA Innovation Award for Centralized Storage.)

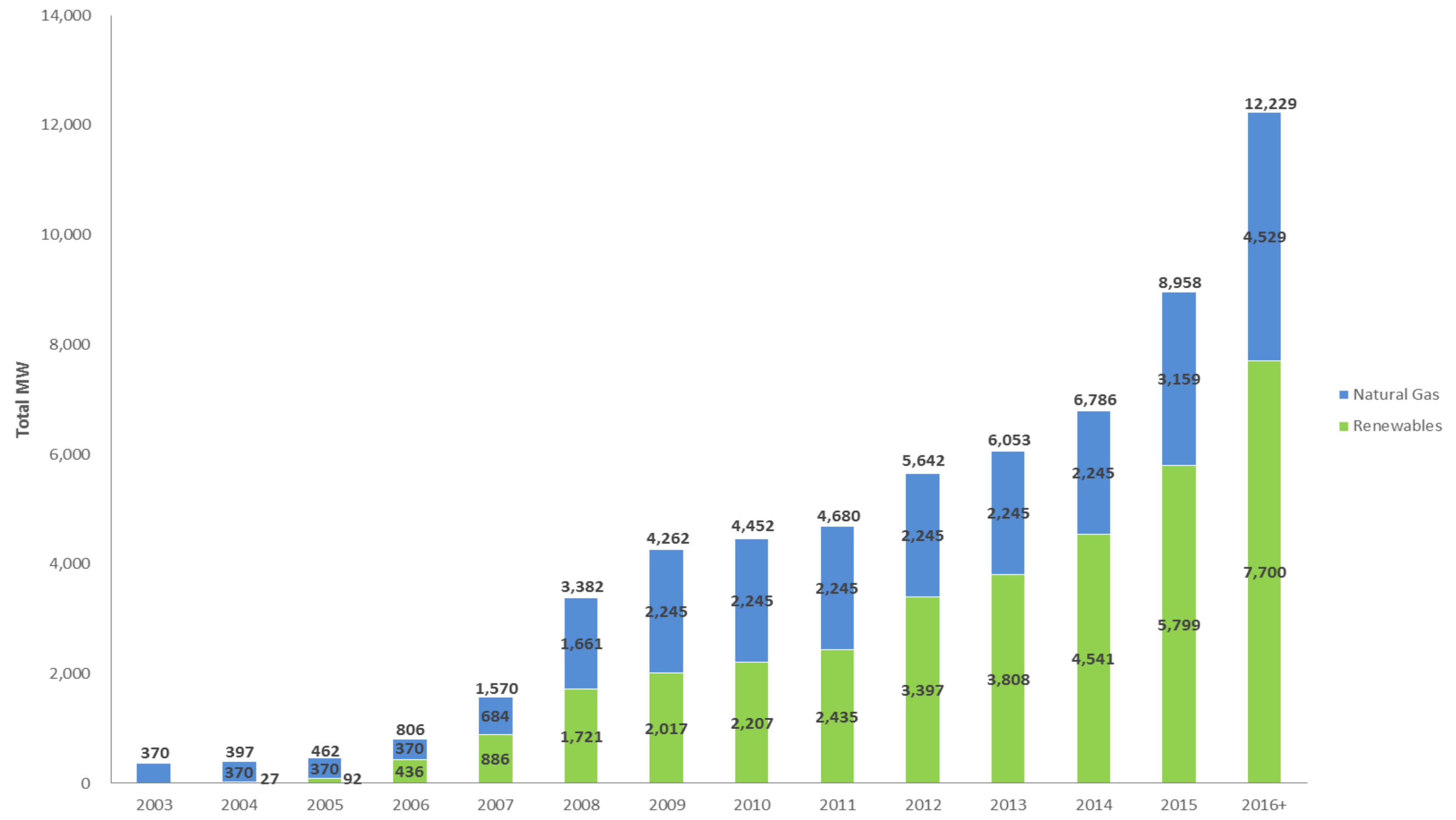
# Invenergy has developed over 10,000 MW of utility-scale projects globally; our <u>North American</u> portfolio exceeds 9,500 MW




As of December 1, 2015; includes projects that are under construction, under contract, or build-transfer and in advanced development

# Our track record of developing clean energy projects extends over a decade

## Cumulative Capacity (MW)




As of December 1, 2015; includes projects that are under construction, under contract, or build-transfer

# Few companies can match Invenergy's breadth in clean energy technology experience

# We have developed 64 wind projects, totaling almost 7,700 MW

- **Contracted 8 wind projects in 2015**
- **Invenergy ranked #2 in terms of new U.S. wind capacity installed in 2014**
- In 2014, Invenergy built wind projects globally totaling 726 MW in:
  - Colorado (2)
  - Nebraska (1)
  - New York (2)
  - Texas (1)
  - Quebec (2)
  - Poland (1)
- Invenergy has built and transferred part of its wind portfolio to key customers and continues to operate about 3,700 MW
- At the end of 2014, Invenergy ranked #5 in terms of U.S. wind power owned by capacity

**2014 - 2015 Highlights**

- H1 2015: Contracted over 1,100 MW of wind projects
- 2014: Developed and built 726 MW of wind projects

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# We have developed seven solar projects, totaling over 119 MW

- Luning, 50 MW, is contracted to Liberty Utilities under a build-transfer agreement
- Morgans Corner, 20 MW, is contracted to Dominion under a build-transfer agreement
- In 2012, Invenergy completed the largest PV project in Illinois (20 MW) adjacent to the Company’s 210 MW Grand Ridge Wind facility
- Invenergy actively pursuing solar projects, throughout the U.S. including in locations in Rhode Island

| Project | Location | COD | Size |
|---|---|---|---|
| Luning | Nevada | 2016 | 50 MW |
| Morgans Corner | North Carolina | 2016 | 19.8 MW |
| Desert Green | California | 2014 | 6.5 MW |
| Lakeland | Georgia | 2013 | 3 MW |
| Sandringham | Ontario | 2013 | 10 MW |
| Woodville | Ontario | 2013 | 10 MW |
| Grand Ridge | Illinois | 2012 | 20 MW |
| | | Total: | 119.1 MW |

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# Invenergy's energy storage portfolio includes 68 MW of projects in operation or construction

- As we enter a new era of electricity usage and distribution, energy storage promises to help transform the grid toward more flexibility and adaptability

- Invenergy is at the cutting edge of innovative storage technology, and we work with our customers to develop solutions to best meet their needs
- Since 2013, Invenergy completed four energy storage projects; We just finished construction of a 31.5 MW project in WV
- An additional 110 MWs are in advanced development for market areas with a high concentration of intermittent generation

## PJM Energy Storage Projects

- Our projects provide **dynamic regulation service (DREG)** to PJM
  - 31.5 MW Beech Ridge (WV)
  - 31.5 MW Grand Ridge (IL)
  - 1.5 MW Grand Ridge Pilot (IL)

## Goldthwaite Storage

- Three GE 2.5MW – 120 meter rotor turbines with 300kW/600kWh GE Durathon batteries
- Utilizes existing inverter to maximize generator output
- Three applications: Ramp Control, Predictable Power, Frequency Regulation

# Invenergy's operates over 3,100 MW of natural gas-fired plants

- Natural gas is the fuel of choice for Invenergy's thermal power facilities, which use the most efficient technologies available to minimize environmental impact
- Invenergy operates seven natural-gas power plants in the U.S. and Canada
- The company has recently completed the 584 MW Nelson combined cycle plant in Illinois and the 330 MW Ector County peaker in Texas


| Project | Type | Location | COD | Size of Facility |
|---|---|---|---|---|
| Hardee | Combined Cycle | Florida | Acquired 2003 | 370 MW |
| Spindle Hill | Peaker | Colorado | 2007 | 314 MW |
| Grays Harbor | Combined Cycle | Washington | 2008 | 620 MW |
| Cannon Falls | Peaker | Minnesota | 2008 | 357 MW |
| St. Clair | Combined Cycle | Ontario | 2009 | 584 MW |
| Nelson | Combined Cycle | Illinois | 2015 | 584 MW |
| Ector County | Peaker | Texas | 2015 | 330 MW |
| | | | Total: | 3,159 MW |

# We are a consistent project finance leader

- Since 2001, Invenergy has raised over $15 billion to support our operating and construction portfolio of over 9,000 MW. In 2014, Invenergy raised over $1.7 billion
- Invenergy works with banks, institutional investors and other financial partners depending on the type of asset and nature of the transaction
- In 2012 and 2013, Invenergy was awarded the Project Finance Borrower of the Year award by *Power Finance & Risk*

**Power Finance & Risk** The weekly issue from Power Intelligence www.powerintelligence.com

*10th Annual Power Finance Deals & Firms Awards*

**THE WINNERS**

*The industry has spoken. We revamped the format of our awards and expanded the category slate this year. In place of editorially selected awards, each category was directly adjudicated by borrowers, investors, bankers and advisors active in the Americas in an online poll in April and May.*

*Here is this year's roster of excellence:*

**Project Finance Borrower Of The Year**
**INVENERGY**

*The voters' voice:*

"Simply for the breadth of their expertise and the fact that they completed so many financings in 2012"

"The breadth of borrowings among solar, natural gas and wind among U.S. and non-U.S. projects and investors is difficult to match"

"Flawless execution and internal and external team coordination and an ability to anticipate issues and develop strategies to address for quick resolution"

**Michael Polsky,**
*President and CEO of Invenergy*

# Complete In-House Capabilities

## Project Development

- Strategic Siting
- Permitting
- Interconnection

## Marketing & Finance

- PPAs, Tolls, Hedges
- REC Derivatives
- Extensive Project Finance Experience

## Engineering & Construction

- In-House Design
- Construction Management

## Operations

- Projects Operated:
  - 39 Wind
  - 5 Thermal
  - 4 Solar
  - 2 Storage

**Focused Execution Leads to Superior Results, Lower Costs, and Satisfied Customers**

# Invenergy operates all of our wind, solar and thermal generation in North America

- The fleet-wide availability of our wind portfolio is 96.6% since COD[(1) (2)] – among the best in the industry
- We do not outsource O&M which leads to significantly higher turbine performance rate
- Invenergy operates its fleet from the downtown Chicago Control Center (ICC) or directly from its power plants. The ICC is staffed 24 x 7

- Invenergy's in-house engineers constantly monitor and optimize the performance of our fleet
- Our power schedulers, operations engineers, and asset managers collaborate closely and share knowledge

(1) Weighted average for the portfolio from inception through February 28, 2015.
(2) Includes all effects of turbine, transformer, substation or other mechanical unavailability including during initial shake out period

# Clear River Energy Center (CREC) Overview

- Clear River Energy Center (CREC) overview
  - Project Description
  - Benefits Overview

# Clear River Energy Center Overview

- Clear River Energy Center (“CREC”)
- Approximately $700 Million investment
- Combined Cycle Advanced Technology:
  - Two single shaft “H” Class combined cycle units with output up to 1,000 MW
  - Air cooled condensers require minimal water
  - Dual fuel capability
- June 1, 2019 Commercial Operation date
  - 30 Month Construction Schedule
- Remote Site with proper zoning
  - Site control through land purchase option agreement
  - Location has on site high voltage power lines (345kV, NE ISO Queue #489) and interstate high pressure gas
  - Proper Zoning
  - Excellent buffer to surrounding area

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# CREC – Design Basis

- General Information
  - Two 1x1 Single Shaft power blocks. Technology will be GE 7HA.02, based “Power Islands”. Net plant output will be nominally 1000MW
  - Combustion turbines will be dual fuel with two one million gallon fuel oil storage tanks on site
  - Will employ dry cooling with Air Cooled Condensers (ACCs)
    - Minimal water consumption
  - Will employ supplemental power production with “Duct Firing” using natural gas. Supplemental output will range from 25-50MW per train
  - Water supply from Pascoag Utility District
  - Discharge to Burrillville POTW (no pre-treatment required)
  - Local gas and electric interconnections, no new Rights of Way (ROW) required
  - Project will meet local broad band noise limits of 43dBA at nearest residence (~2,000ft to the East of the project on Wallum Lake Road)

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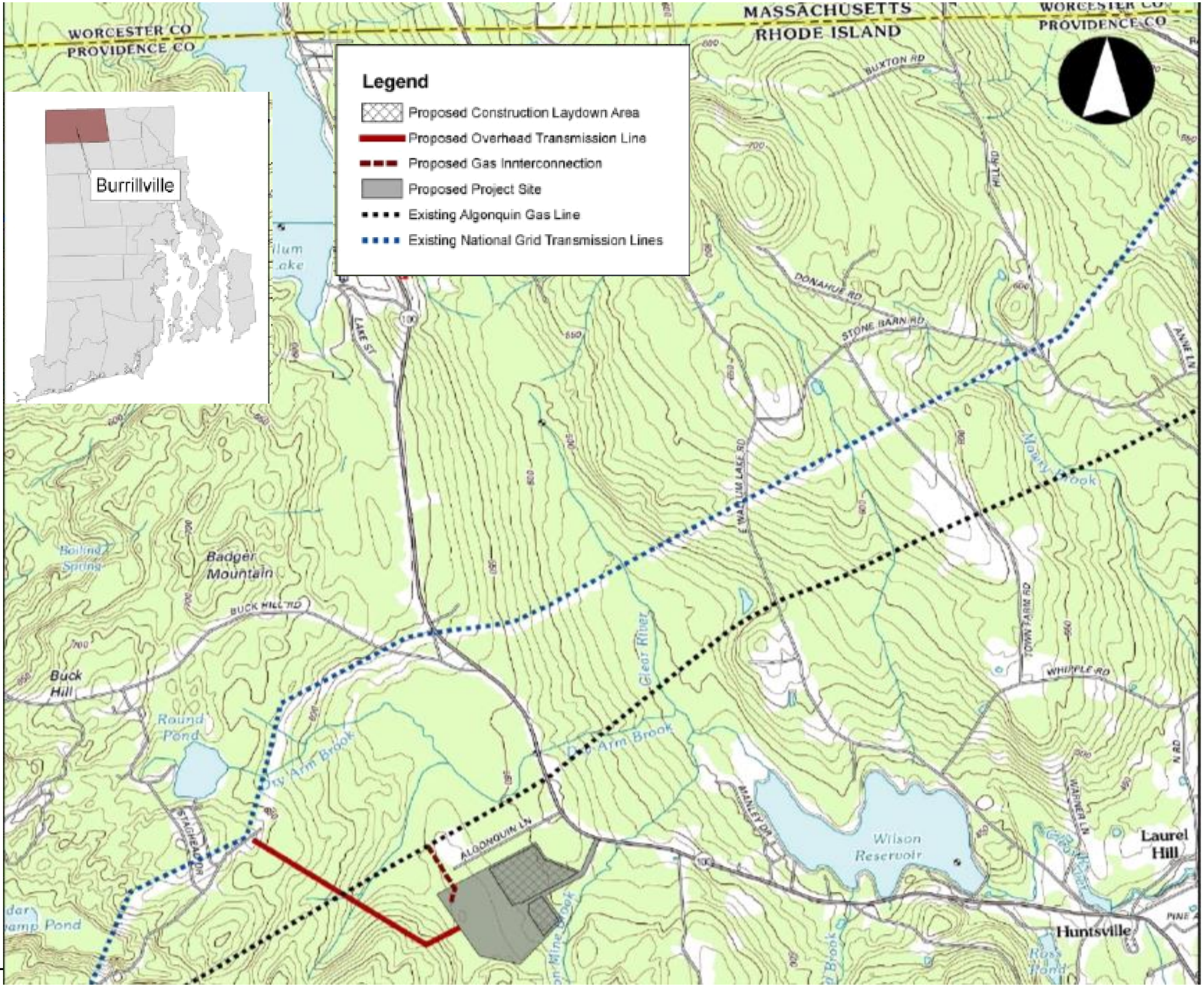
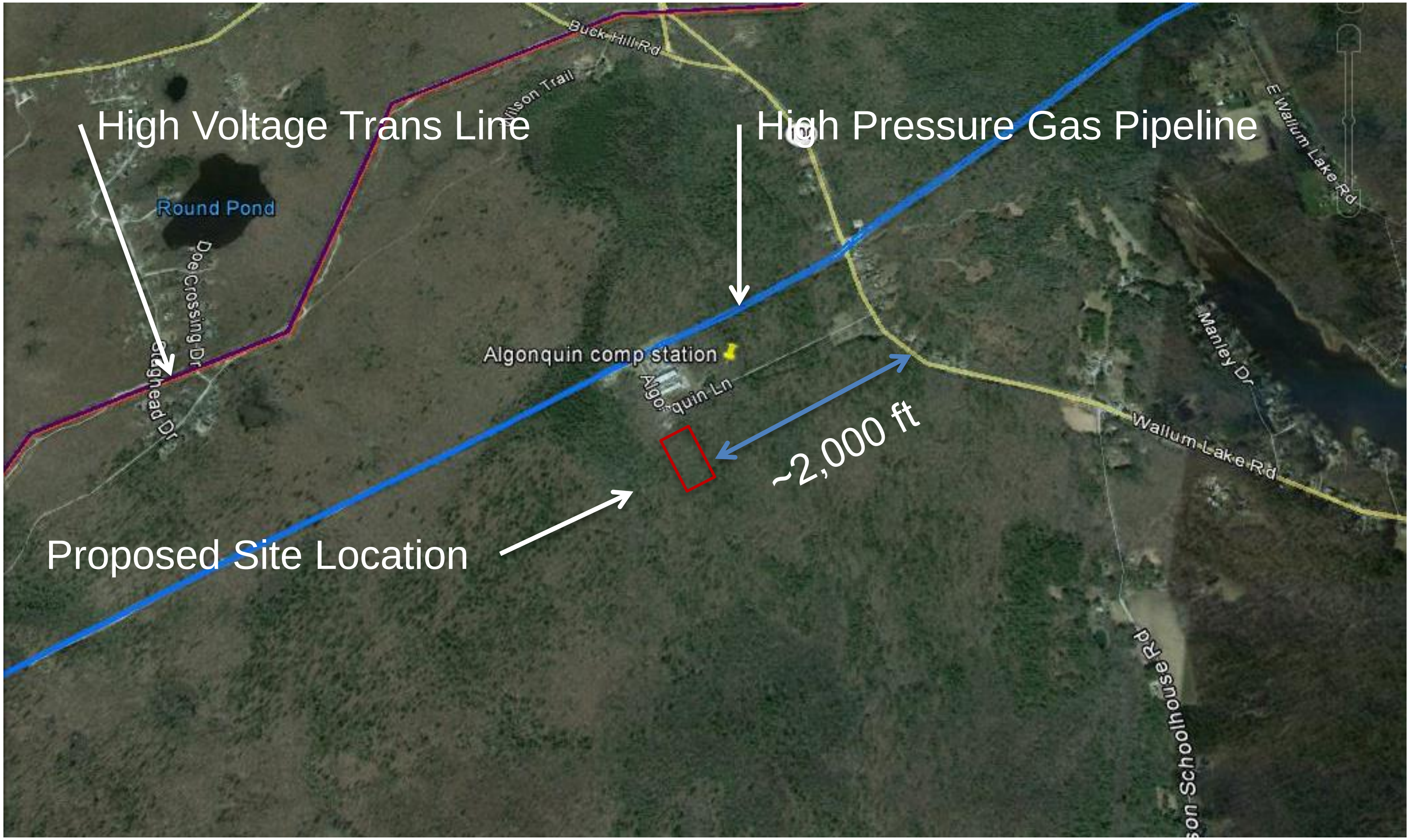

Legend
Proposed Construction Laydown Area
Proposed Overhead Transmission Line
Proposed Gas Innterconnection
Proposed Project Site
Existing Algonquin Gas Line
Existing National Grid Transmission Lines
Burrillville
MASSACHUSETTS
RHODE ISLAND
WORCESTER CO
PROVIDENCE CO
Badger Mountain
Buck Hill
Round Pond
Wilson Reservoir
Laurel Hill
Huntsville
Clear River
Dry Arm Brook
ALGONQUIN LN
BUCK HILL RD
STONE BARN RD
DONAHUE RD
BUXTON RD
WHIPPLE RD
TOWN FARM RD
E WALLUM LAKE RD
LAKE ST

# Project Location Burrillville, RI



# Project Rendering

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# Project Schedule

| Activity | Date | Remarks |
|---|---|---|
| Identify market need, locate site, obtain site control | 1st -3rd QTR - 14 | Site Control obtained 3rd QTR, needed to file interconnect |
| File Interconnect with NE ISO | 4th QTR -14 | The application starts a process with the NE ISO under the Forward Capacity Auction (FCA) queue position #489 |
| Pre-App MTG with EFSB, RIDEM, Office of Energy | 1st QTR-15 | Initial meetings with State Agencies |
| File Air Permit App with RIDEM | June -15 | Initial meetings with RIDEM prior to application |
| File EFSB Application | Oct-15 | Deemed complete and Docketed Nov 16th 2015 |
| Obtain Project Permits | 2016 | |
| Commence Construction | 1st QTR 2017 | 30 month duration |
| Project Commercial Operation | June-2019 | |

# Project Benefits Overview

- Electric rate savings and increased reliability
  - By displacing older, inefficient plants, Clear River is projected to save ratepayers $280 million in cumulative savings between 2019 and 2022
- Jobs and Economic Benefits:
  - Approximately 350 Building Trade Unions construction jobs and 25 permanent skilled high paying jobs
  - Project construction labor costs approach $150 million
  - The project will contribute more than $3.5 million annually during operations to the local economy in employee salaries
  - For Burrillville, the project will generate millions of dollars annually in new tax revenue, which can be used to support schools, libraries, police and fire services
  - The project will invest in well treatment and system upgrades, which involve using water from Pascoag Utility District well that have been unusable since deemed contaminated in 2001
- Cleaner energy and healthier air: The project will enable the transition away from older, less-efficient, and polluting coal and oil plants, that will lower emissions of harmful pollutants in the region by the following average annual amounts including $CO_2$ and other GHG's **Net Effect: Reduced Emissions**
  - 1,019,000 tons of $CO_2$ removed from the air annually
  - 2,240 tons of $NO_x$ removed from the air annually
  - 2,762 tons of $SO_2$ removed from the air annually

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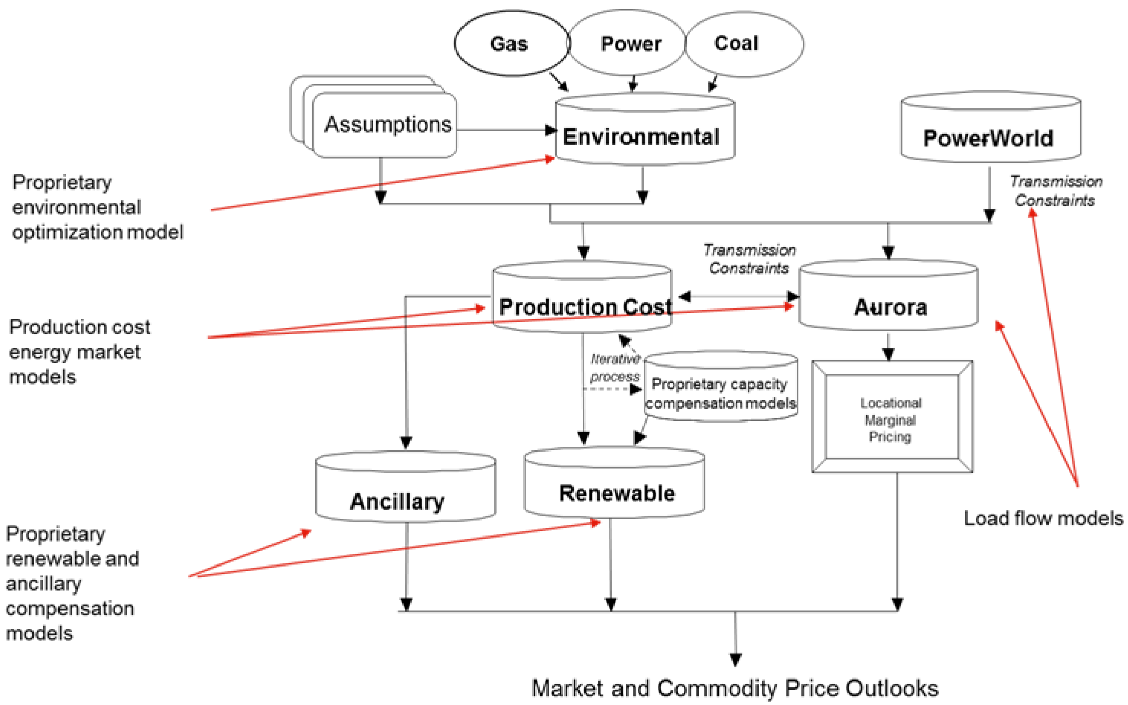
# Emissions impact of Clear River on ISO-NE and NYISO Market

- PA assessed the emissions impacts using its standard power market modeling process, which incorporates a suite of tools, including:
  - (1) AURORAxmp for its production cost modeling in order to project wholesale energy market prices;
  - (2) PA's proprietary environmental optimization model that integrates the natural gas-power-coal sector, as well as the coal generator capital expenditure versus coal selection and resulting emissions prices, paradigms;
  - (3) PA's proprietary stochastic model to assess specific generator operations and economics relative to the electric system; and
  - (4) PA's proprietary FCM Simulation Model
- Based on PA's market experience, PA evaluated both ISO-NE and NYISO given (1) the close proximity and degree of interconnect (including reciprocity agreements) between the markets; and (2) the fact that ISO-NE is typically downwind from NYISO emissions

## PA's Fundamental Modeling Process




CREC's addition will lower $CO_2$, NOx and $SO_2$ emissions by 1% to 4% per annum

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# Clear River's environmental benefits are largely realized by its ability to displace dirtier power resources

## Impact of Clear River on Total Emissions Reductions on ISO-NE/NYISO Footprint (% Change)

| | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|
| **$CO_2$ Emission Change** | -1% | -1% | -1% | -1% | -1% | -1% | -1% |
| **NOx Emission Change** | -2% | -3% | -3% | -2% | -3% | -2% | -3% |
| **$SO_2$ Emission Change** | -3% | -4% | -4% | -3% | -3% | -2% | -3% |

**The net system-wide decrease is driven by two major factors:**

1. As a highly efficient natural gas-fired combined cycle, **Clear River requires less fuel per MWh generated than its gas-fired peers**, resulting in economic and emissions advantages relative to existing gas-fired generators
   - As such, **Clear River will displace less efficient (and less environmentally-friendly) resources** that are currently dispatched on the power system
2. To comply with ISO-NE's Pay-for-Performance Initiative, **Clear River will secure firm natural gas transport service** for a portion of its natural gas needs
   - In order to comply with the Pay-for-Performance initiative, many natural gas generators are installing dual fuel capability. **Dual fuel facilities typically burn fuel oil** during periods of natural gas scarcity, **leading to overall more emissions** intensive footprints **than facilities that have secured firm natural gas** as a cleaner solution, **such as Clear River**

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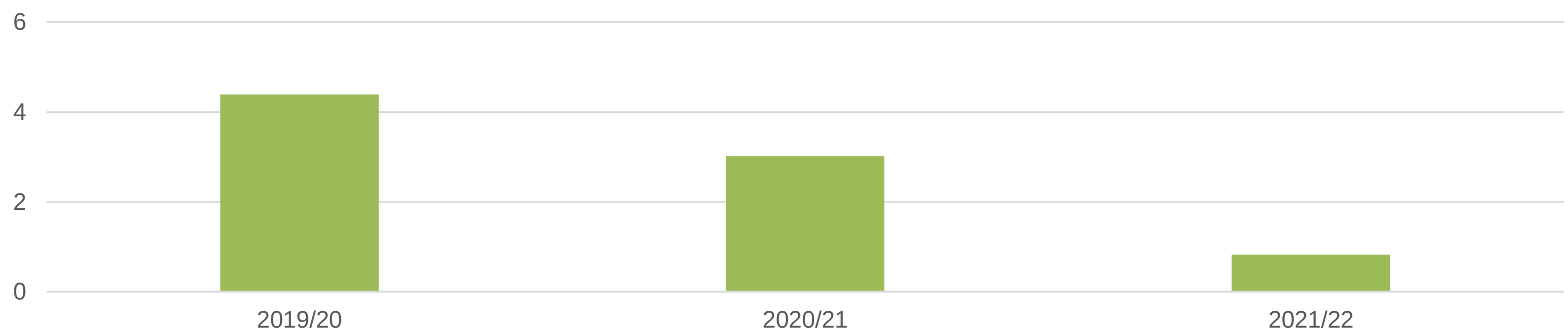
## CREC's economic impacts to Rhode Island ratepayers – $258 million in savings the first three years

- PA's methodology to analyze the rate impacts for Rhode Island customers compared two scenarios to determine the net impacts of Clear River on Rhode Island ratepayers
  - The first scenario projected total energy and capacity costs to Rhode Island without the addition of Clear River to the ISO-NE market; and
  - The second scenario projected total energy and capacity costs to Rhode Island with the addition of Clear River

**Projected FCM Capacity Price Savings w/ Clear River ($/kW-mo)[1]**




- In the first three years of operation (2019-2021), market projections indicate that Clear River would save Rhode Island ratepayers $258 million in capacity and energy costs, or more than $86 million annually
  - The additional Clear River capacity is projected to result in capacity cost savings of nearly $212 million in this timeframe, with energy cost savings of approximately $46 million as Clear River displaces less efficient generation resources
  - Thereafter, Rhode Island ratepayers would continue to realize approximately $23 million in energy cost savings per year, with capacity cost impacts determined by the types of new development capacity that enter the ISO-NE market to maintain reliability after Clear River's market entry

[1] After the first three years PA does not project a material difference in capacity prices between the two cases.

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# Renewable Support

- Renewables are intermittent and variable
- The NE ISO* recognizes the variable nature of these resources and ”*Wind and solar resources will eventually help achieve federal and state environmental goals. Paradoxically, the operating characteristics of these renewable will increase reliance on fossil-fuel-fired natural gas generators, due to:*
  - *Wind and solar resources can have rapid and sizeable swings in electricity output due to wind speed, time of day, cloud cover, haze, and temperature changes (which is why they are called variable or intermittent resources)*
  - *These resources have a limited ability to serve peak load. Wind speeds can be at their lowest levels in the summer, while extreme cold and ice can also hinder output. Widespread use of solar power, meanwhile, will likely shift peak net load to later in the afternoon, just as output diminishes with the setting sun*
- *To balance the variable output from wind and solar resources, the power system must hold <u>more</u> fast-start capacity in reserve. The types of units that can come on line quickly are typically natural gas combined cycle and combustion turbine generators”*
  - As more renewables are brought on line more fast start/flexible units are needed to support them

*The ISO NE 2015 Regional Electricity Outlook

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# ISO NE Capacity Market Overview

- Need for New Resources

# 2015 Regional System Plan

- ISO-NE published RSP15 on Nov 5, identifying the electricity needs from 2015 through 2024 and plans to meet the needs
- 10-year growth rate for net demand is 0.6% per year for the summer peak and 0% for the annual use of electric energy
- The net Installed Capacity Requirement is expected to grow from 33,391 MW in 2015 to 36,000 MW in 2024
- A market resource alternatives study identified a need for 1,540 MW of resources in the SEMA/RI zone

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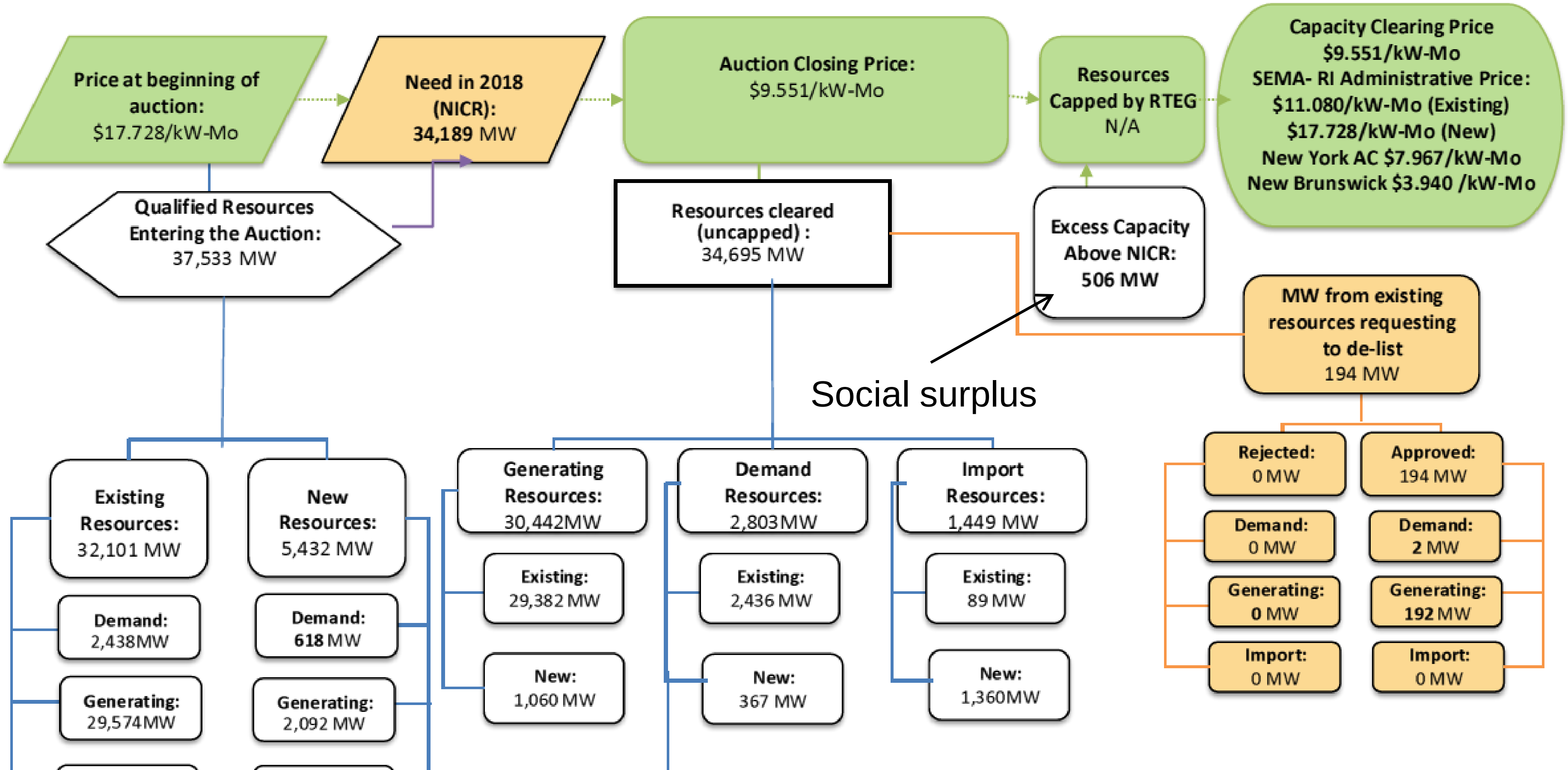
# Need for New Capacity

ISO New England FCA10 FERC Nov 5, 2015 Filing:

- Southeastern New England (SENE: NEMA Boston and SEMA-RI zones) is an import constrained zone, where local resources and transmission import capability may not be enough to reliably serve local demand
- 34,151 MW of Net Installed Capacity Required (NICR)
- 33,411 MW of Existing Capacity Resources (ECR) are qualified
- 1,468 MW new capacity resources needed (NICR – ECR + Approved Retirements)
- 147 new capacity resources, totaling 6,720 MW, are competing to satisfy the need for new capacity resources in FCA10
- FCA10 is a Descending Clock Auction and will occur on Feb 8, 2016 in discrete rounds
- The ISO – NE has the ability to award more capacity than what may be needed if there is additional benefit

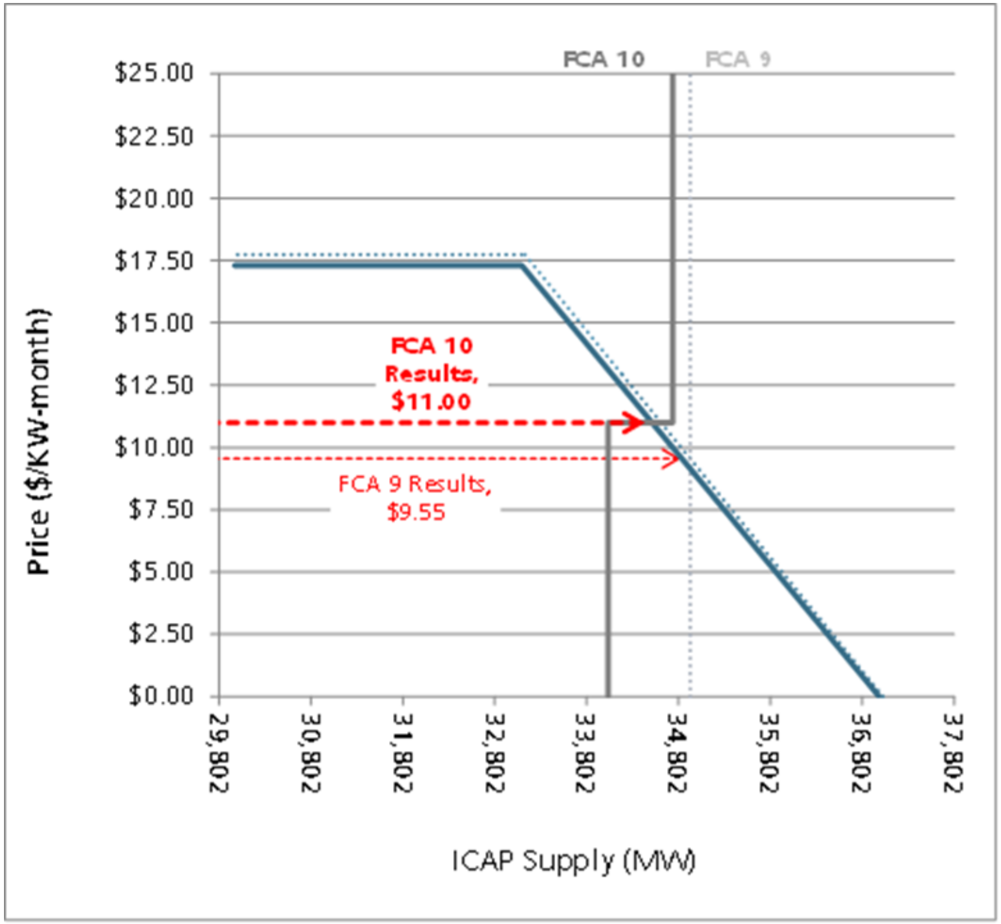
# FCA 9 Results




| | |
|---|---|
| On Peak | 1,752 MW |
| Seasonal Peak | 404 MW |
| Real Time | 510 MW |
| Real Time EG | 137 MW |

# FCA 10 Outlook Example

- SEMA/RI last year's 2018/19 FCA 9 zone clearing Prices
  - New Resources at $17.728/kW-mo
  - Existing Resources at $11.08/kW-mo
- UBS expects New Resources to clear at about $11.00/kW-mo in FCA10
- If a new 1,000 MW asset is available for lower costs, the line could cross farther to the right at ~$10/kW-mo
- New entries offered at or below the market clearing price are the only resources that will clear in the auction



# Interconnections Overview

- Clear River Energy Center Interconnection overview
  - Water Supply
  - Waste Water
  - Electric
  - Natural Gas

# CREC – Interconnections

- Water
  - Supplied from Pascoag Utility District groundwater well 3A
  - Well 3A will be reactivated and a treatment system will be installed by CREC
  - Well water supply to the facility via dedicated water line
- Waste Water
  - Waste water discharge to the local sewer
  - New force main to local sewer will be installed
- Electrical Interconnection
  - 345kV line run to National Grid’s Sherman Road Substation
- Natural Gas
  - Gas will be delivered from the adjacent Spectra Energy compressor station

# CREC – Water Use

- CREC's water use varies seasonally and with type of fuel used. Natural gas will be used exclusively except for rare winter days when ultra low sulfur distillate (ULSD) oil may be required
- Annual average daily water use at 0.1 MGD
- Average daily summer water use (Jul-Sept) expected at 0.22 MGD
- Winter maximum daily water use with ULSD at 0.9 MGD

| Operating Season and Fuel | Water Use | Wastewater Generated | Consumptive Evaporative Loss |
|---|---|---|---|
| **Summer**<br>*Firing Natural Gas* | 224,640 gpd | 89,280 gpd | 135,360 gpd |
| **Annual Average**<br>*Firing Natural Gas* | 102,240 gpd | 69,120 gpd | 33,120 gpd |
| **Winter**<br>*Both CT Firing Gas* | 102,240 gpd | 69,120 gpd | 33,120 gpd |
| **Winter**<br>*One CT Firing Gas other CT Firing Oil* | 924,489 gpd | 200,160 gpd | 724,329 gpd |

*gpd - gallons per day*

# CREC Water Supply

- Project will obtain water from Pascoag Utility District (PUD)
- Project will utilize dry cooling to conserve water use;
  - Average daily use is 71 GPM, peak use (on oil) is 642 GPM
- Project's full water requirements for both the natural gas and oil firing can be met from PUD's well 3A which has approximately 700 GPM capacity
- PUD's well 3A was previously shut down due to contamination by a leak from a local gasoline station
- As a result of contamination of well 3A, Department of Health issued a Consent Order on January 15, 2002, prohibiting PUD from using water from well 3A for drinking water supply and only allows its use "for remediation of the contamination" as directed by the Director of Health the Department of Environmental Management, Water Resources or other appropriate State Official(s)

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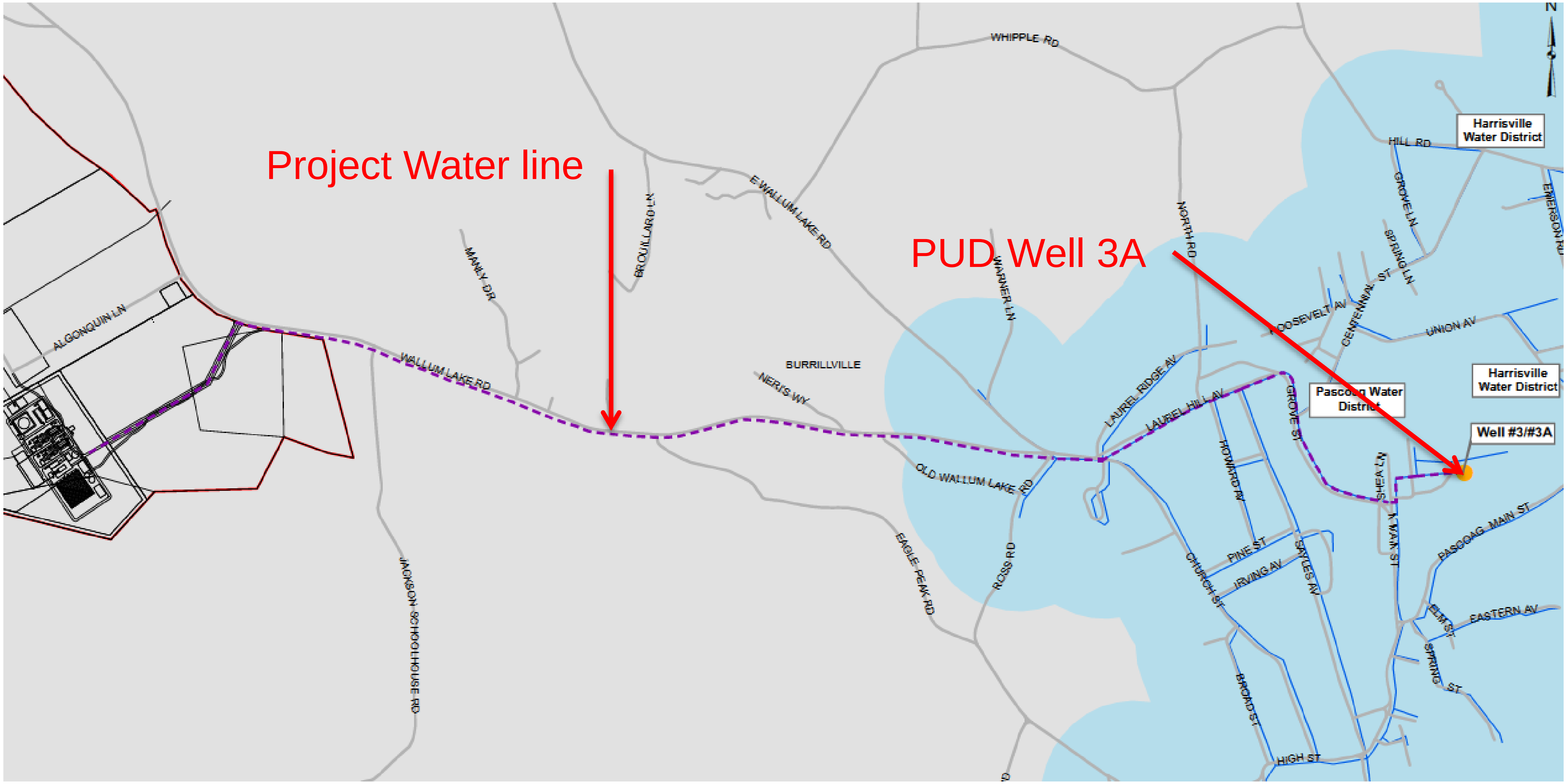
# CREC Water Supply

- Pascoag Utility District (PUD) has been unable to use well 3A to remediate the ground water due to the high costs of the treatment system which consists of using activated carbon to remove the contamination
  - Granular Activated Carbon (GAC) is a typical and proven method of treatment
- CREC and PUD propose to use the well as a dedicated supply to meet CREC's industrial needs
- CREC's dedicated use will allow CREC to install a treatment system to remediate the ground water
  - In accordance with the Consent Order, CREC will not use the treated water for potable purposes
  - CREC will pay for installation of a dedicated water line from the well to the project site, so that the water will only be used by CREC
- Once the ground water for well 3A has been fully remediated, it may be used to supply drinking water to PUD customers
  - It is not known how long it will take to fully remediate the groundwater, the time frame is expected to take more than 20 years

# Project Water and Waste Water Lines



# Water Quality Treatment

- CREC will pay for the installation of a suitable treatment system to allow the groundwater to be used for make up to CREC's process
- CREC will pay Pascoag Utility District (PUD) to operate the treatment system to remove existing groundwater contamination
  - Treatment system consists of activated carbon consisting of serial carbon beds with influent/effluent monitoring employed to ensure target product quality at all times
- The system will be operated to maintain a target concentration of 40 ppb MTBE outlet from the first vessel. The water will then flow through the second vessel and the system will treat the water further to well below the 40 parts per billion EPA Drinking Water Advisory Level
  - The state and federal government advisory standards for MTBE are 20 – 40 ppb which are levels deemed to be protective of human health
  - This is EPA's Drinking Water Advisory Level although the treated water will be used exclusively for industrial purposes
- RIDEM's Groundwater Classification for PUD's well location is GAA4 which also sets a Groundwater Standard of 40 ppb for MTBE

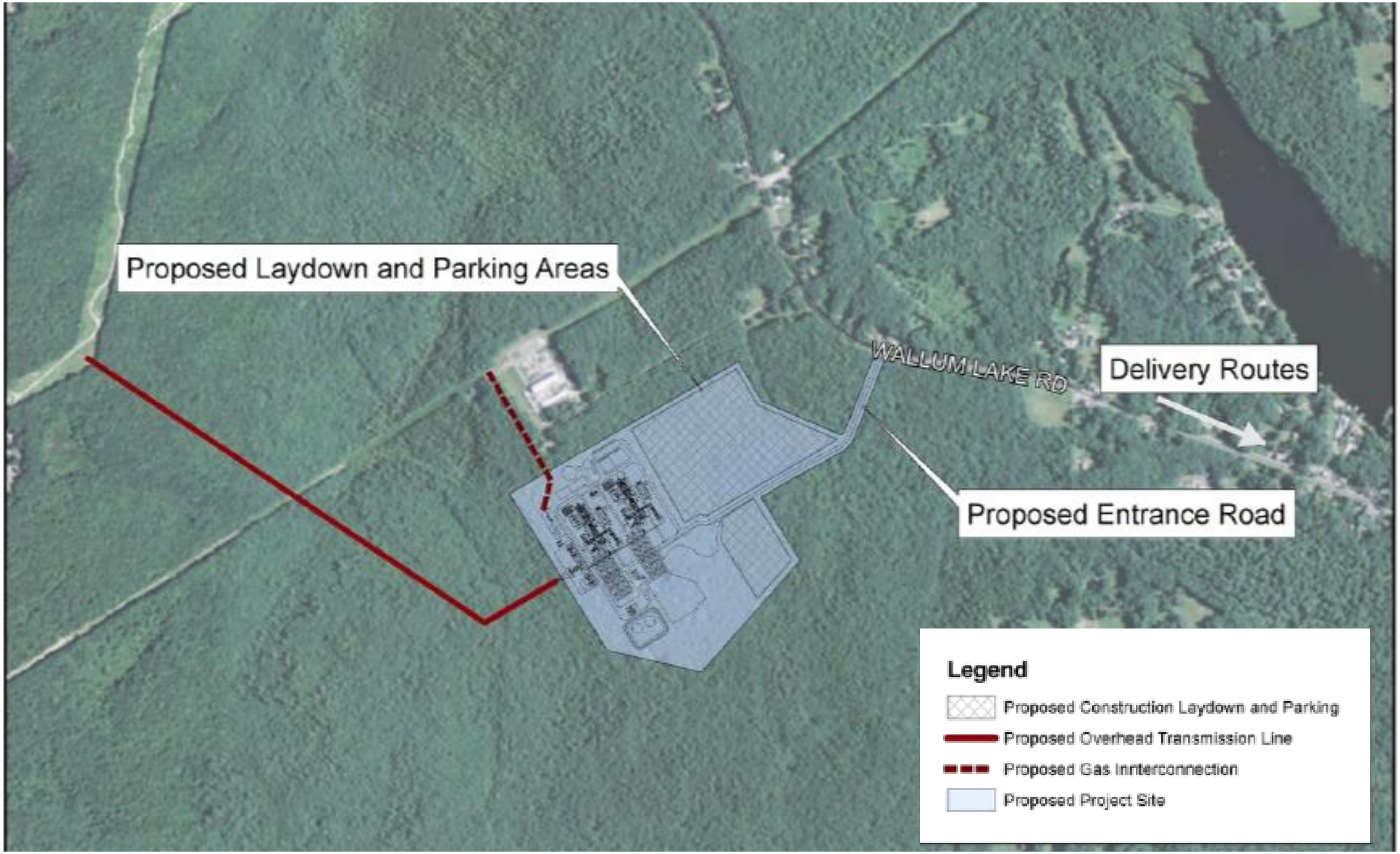
# Project Water Discharge

- Burrillville Sewer Commission (BSC) provided written support on 9/14/15 for the concept of connecting CREC into the Town’s Public Sanitary Sewer System and Waste Water Treatment Plant (WWTP)
- The BSC and its Engineer (James J. Geremia & Associates, Inc) are performing a review of their Wastewater Management Facilities Plan (Facilities Plan) to determine the feasibility of interconnecting CREC
  - Preliminary evaluation indicates there is sufficient capacity in the existing WWTP
- The Facilities Plan will require an evaluation that will be submitted to RIDEM requesting an Order of Approval by RIDEM to interconnect CREC into the sewer system
  - CREC will pay for all costs associated with interconnecting the CREC project into the sewer system and for BSC to modify its Facility Plan

# Electrical Interconnection

- Proposed Power Project would interconnect to the Sherman road substation:
  - 6 miles of new 345 kV line installed in an existing ROW that contains the 345 kV “341” line and “347” line
  - New  breaker in the Sherman Road substation
- Existing ROW crosses Spectra property approximately 1,800 ft from proposed site

# Project Site



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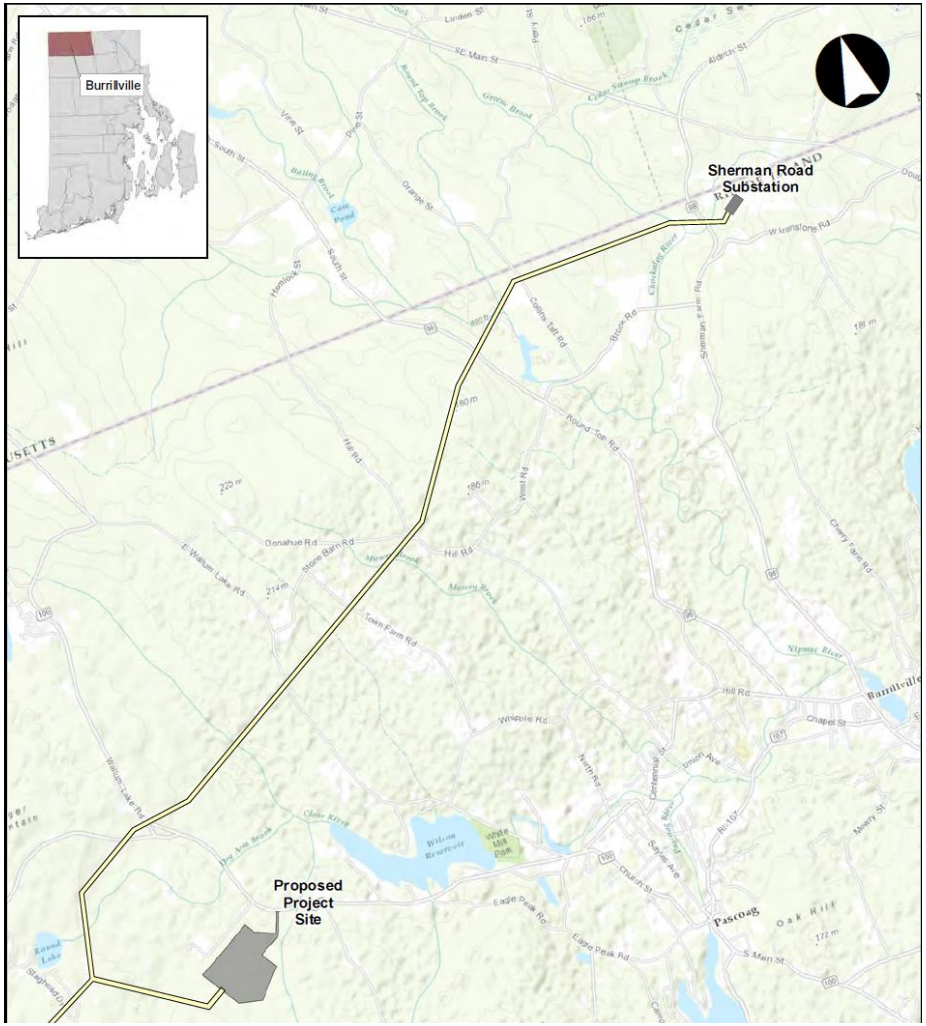
# Transmission Line



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# Gas Pipeline

- New gas pipeline lateral connections with Algonquin pipeline
  - Gas will be delivered from the discharge side of the neighboring Algonquin compression station
  - Gas lateral and meter station is approximately 500 feet long, all on Spectra or CREC property
- Project will pay for added expansion of gas pipeline necessary to meet project needs
- Project is situated at an ideal location requiring minimal upgrades
  - Memorandum of Understanding in place with Algonquin Pipeline for firm gas transportation


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# Permitting Overview

- Permitting Overview
  - Air Permit
  - Noise Controls

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# CREC – Permitting

- Permitting
  - Energy Facilities Siting Board (EFSB) Application
    - Docketed November 16, 2015
  - Environmental Permits
    - Air
      - MSP Application Submitted in June 2015
      - Air Quality Impact Analysis submitted in October 2015
    - RPDES Stormwater
      - Permit application to be filed be Q1 2016
    - Wetlands Impact Permit
      - Permit application to be filed Q1 2016
    - Water Permitting
      - Sewer connection approval expected mid 2016
      - Water supply approval expected  mid 2016
  - It is expected that all required permits issued by Q4 2016

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# Project Noise

- Noise produced during operation of the CREC must conform to levels approved by the Rhode Island Energy Facilities Siting Board
- Burrillville has a performance standard as established in their Code of Ordinances, which generally limits both broadband (A-weighted) and octave-band Facility noise levels at nearby residences to an equivalent level of 43 dBA
  - Burrillville's Code is not applicable in instances where "The facility generating the noise has been granted a permit or license by a federal and/or state agency and the authorization to operate within set noise limits"
- A three-dimensional, computer-generated acoustical model of both facility operation and construction was developed using SoundPLAN® 7.3 and industry-standard prediction methods to estimate noise levels at nearby receivers
- Achieving the broadband portion of the Burrillville code (43 dBA) was determined to be feasible with extensive controls,
  - This is the same limit that the EFSB approved for Ocean State Power,  the other Burrillville power plant
- The project will employ extensive noise controls, including placing the combustion turbines within buildings
- Furthermore, the maximum predicted CREC noise level of 43 dBA is lower than the limit that the Burrillville Compressor Station was required to meet under their FERC authorization

# Project Air Emissions

- The Project will displace older, less efficient, higher emitting generation due to its higher efficiency and lower cost
- Modeling conducted by PA Consulting shows that adding the Project to the grid **will result in an overall reduction of emissions** in the region by the following average annual amounts including CO2 and other GHG:
  - 1,019,000 tons of CO2 removed from the air annually
  - 2,240 tons of NOx removed from the air annually
  - 2,762 tons of SO2 removed from the air annually



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# Project Potential Emissions

| Criteria Pollutant | Potential Emissions (tons/year) |
|---|---|
| Nitrogen Oxides ($NO_x$) | 287 |
| Carbon Monoxide (CO) | 240 |
| Volatile Organic Compounds (VOC) | 88 |
| Carbon Dioxide ($CO_2$) | 3,616,592 |
| Sulfur Dioxide ($SO_2$) | 51 |
| Particulate Matter ($PM/PM_{10}/PM_{2.5}$) | 197 |

Notes

- Project potential emissions estimates are based on all project emission sources operating at maximum operating capacity for their maximum number of permitted hours per year
- All Project $NO_X$ and VOC emissions will be fully offset, as required by RIDEM Air Pollution Control Regulation Regulation No. 9
- Allowances will be purchased for the Project's combustion turbine $CO_2$ emissions, as required by RIDEM Air Pollution Control Regulation No. 46

# Major Source Air Permitting Process

- The rigorous Major Source air permitting process will ensure that air quality in the area surrounding the CREC Facility will be protected and will require the following:
  - Compliance with all applicable state and federal air pollution control regulations
  - Lowest Achievable Emission Rate (LAER) and offsets for all nonattainment pollutant emissions (NOx & VOC)
  - Best Available Control Technology (BACT) for all pollutant emissions
  - Compliance with the EPA's National Ambient Air Quality Standards (NAAQS) and RIDEM's Acceptable Ambient Levels (AALs)
- Process is administered by RIDEM and overseen by USEPA


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# BACT/LAER Determination

- The required BACT/LAER determination will ensure that state-of-the-art controls are used to reduce emissions and that the Project emission rates are the lowest achievable
- Top-down analysis assesses all feasible control technologies for each Project pollutant in order of effectiveness
- The most effective control technology identified for each pollutant must be used unless it can be demonstrated to be technically or economically infeasible for the Project
- Includes a nationwide review of all similar projects to determine the lowest emission rates that have been achieved in practice



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# Air Quality Impact Analysis

- The air dispersion modeling analysis completed for the Project demonstrates that compliance with the NAAQS and AALs will be maintained
- The Project will not cause an increase in the ambient air concentration of any pollutant which exceeds the allowable percentage of the available PSD increment for that pollutant
- Project impacts to soils and vegetation will be below the allowable screening levels.
- Project Health Risk Assessment demonstrates compliance with all applicable health-based guideline criteria


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# Wetlands and Stormwater Permitting Process

- Site wetlands have been delineated and are undergoing verification by RIDEM
    - A combined wetlands and stormwater permit application is being prepared for submittal to RIDEM
    - An individual permit (Section 404) is also being prepared for submittal to the Army Corps of Engineers
    - The application will detail how wetland mitigation will be implemented
- Stormwater management plan will be designed in accordance with the RIDEM Rhode Island Stormwater Design and Installation Standards Manual dated March 2015


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