MURTHA CULLINA
ATTORNEYS AT LAW

BRUCE L. MCDERMOTT
203.772.7787 DIRECT TELEPHONE
860.240.5723 DIRECT FACSIMILE
BMCDERMOTT@MURTHALAW.COM

October 17, 2018

Mr. Robert Stein
Chairman
The Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

Re: PETITION 1350 - EIP Investment LLC Petition for a Declaratory Ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the Proposed Construction, Maintenance and Operation of a 19.98-megawatt Combined Heat and Power Fuel Cell Facility and Associated Equipment to be Located Within Building 107 on the Corner of Curtis Street and the Pan Am Southern, LLC Railroad Tracks at the Stanley Black & Decker Campus, 480 Myrtle Street, New Britain, Connecticut

Dear Chairman Stein:

Enclosed please find the original and fifteen (15) copies of EIP Investment LLC's responses to the Siting Council's First Set of Interrogatories dated October 5, 2018 in connection with the above-referenced petition. Responses to Interrogatories 11 and 36 will be filed separately.

Please feel free to contact me with any questions concerning this submittal at (203) 772-7787.

Very truly yours,

Bruce L. McDermott

Enclosures

Murtha Cullina LLP
265 Church Street
New Haven, CT 06510
T 203.772.7700
F 203.772.7723

Interrogatory CSC-1-1

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-1: Did EIP Investment LLC (EIP or Petitioner) provide notice of the Petition to the following Connecticut State Agencies: Department of Consumer Protection, Department of Construction Services, and Connecticut Department of Labor? If no, please provide notice to such state agencies and indicate the date of mailing.

A-CSC-1-1: Notices to the three agencies were mailed on October 15, 2018.

Interrogatory CSC-1-2

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick
Page 1 of 1

Q-CSC-2-2: Figure 1 of the Petition references a 44 megawatt (MW) Data Center. Is that a projected 44 MW load as a result of the data center and/or future generating project? If it includes a future generating project, please indicate the fuel type, type of generation (e.g. fuel cell) and projected MW.

A-CSC-2-2: The 44MW referenced is in regard to the data center load and will be powered by hydrogen. EIP has contemplated that it will be using Connecticut-based Doosan fuel cells in the power generation.

Interrogatory CSC-1-3

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-3: Figure 1 of the Petition depicts an "Existing Sub-station with 69-kV Grid Feed Microgrid Controls." Is this the Burritt Street Substation referenced on page 8 of the Petition? Figure 1 also depicts a "New Sub-Station Site." Is it correct to say that the new substation is not required for the proposed 19.98 MW fuel cell project?

A-CSC-1-3: Yes, the Burritt Street Substation is the substation identified. A new substation is not required.

Interrogatory CSC-1-4

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-4: Figure 1 of the Petition also depicts a “Proposed Rooftop Solar Installation.” Is this a future project and unrelated to the proposed 19.98 MW fuel cell project? If yes, what is the projected MW of that project?

A-CSC-1-4: Part of the overall goals of the project is to introduce as much Class I renewable energy to the campus as possible within the regulatory and statutory limits. The “Proposed Rooftop Solar Installation” is a future phase of the project, unrelated to the 19.98MW fuel cell project. The projected size of the solar project would be approximately 3-5MW.

Interrogatory CSC-1-5

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-5: Figure 1 of the Petition also depicts a “Cogen/Chillers Site.” Is this also a future project and unrelated to the proposed 19.98 MW fuel cell project? If yes, what is the projected MW of that project?

A-CSC-1-5: Yes. This refers to the proposed location of the 44MW of additional generation and associated mechanicals of the data center and is unrelated to the 19.98 MW project.

Interrogatory CSC-1-6

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-6: Page 1 of the Petition references a “96 kV electrical interconnection.” Was this a typo and 69 kV was intended? Explain.

A-CSC-1-6: Yes, it is a “69kV” electrical interconnection.

Interrogatory CSC-1-7

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-7: Page 8 of the Petition notes that, "The energy from the fuel cells will be transformed from 480V to 13.8kV in 9 locations within Building 100." Does this mean that nine transformers will be installed inside the building? Explain.

A-CSC-1-7: Yes. There will be nine transformers inside the building that will take the 480v power and step it up to 13.8kV. The power will then be transmitted through newly installed cable into existing conduits (below grade) to the Burritt Street Substation where it will be stepped up to 69kV.

Interrogatory CSC-1-8

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-8: Page 9 notes that, “The Project will also entail various interconnection work required by a completed interconnection study.” Has it been confirmed that Burritt Street Substation can handle the proposed nearly 20 MW of new generation to be interconnected, or is that still being evaluated?

A-CSC-1-8: Yes it has been confirmed that the substation can handle the new generation.

Interrogatory CSC-1-9

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-9: Page 8 of the Petition notes that the existing feeders would be replaced with four 13.8-kV feeders. Would this utilize existing conduits, and would the entire feeder path be underground to reach Burritt Street Substation? Would the entire feeder path be located within the Stanley Black and Decker campus?

A-CSC-1-9: Yes, the existing conduits will be utilized. The feeder path will be below grade until it reaches the Burritt Street Substation. The entire feeder path will occur on the Stanley Black and Decker Campus.

Interrogatory CSC-1-10

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-10: Page 8 of the Petition notes that a new 13.8-kV/69-kV transformer would be installed at Burritt Street Substation and connected to the existing 69-kV busbar.

a) How many megavolt-ampere (MVA) would the new transformer be?

b) Provide a drawing depicting the location of the transformer and interconnection to the busbar.

c) Would the substation fenceline need to be modified?

d) Would the transformer have or require containment measures to protect against leakage of insulating oil?

e) Would magnetic field levels be materially affected at the subject property lines? If yes, would it still be expected to be below the International Commission on Non-Ionizing Radiation Protection (ICNIRP) 2,000 mG limit?

A-CSC-1-10:

a) The new transformer will be 25 MVA.

b) It will be in the Burritt Substation. There is an online diagram but no formal layout drawing yet.

c) The substation fence line does not need to be modified as space is available within the existing footprint of the substation. See attachment CSC-1-10-1.

d) The transformer will have containment measures as required by applicable law. Currently, biodegradable insulating oil is contemplated.

e) No study performed yet but based on the changes contemplated no change in the magnetic fields are expected.

Petition No. 1350
Exhibit CSC-1-10-1

TWO PRIVATELY OWNED TRANSMISSION VOLTAGE FEEDS TO ON SITE SUBSTATION

ON-SITE PRIVATELY OWNED SUBSATION 25 MW CAPACITY 2012 EST 50 MW W/UPGRADE

A7 AERIAL OF SUBSTATION
Scale: 1" = 20 ft

No.	Date	Issue Notes
3	2013.08.26	ADDED AERIAL VIEW
2	2012.11.12	FOR GENERAL INFORMATION, ADJUSTED
1	2012.11.06	FOR GENERAL INFORMATION

Date 00/00/00
Revision -
Project File Name OZSiteOfLiities.vwx
Plot Date 00/00/00
Drawing Code jd
Designed By -
Drawn By mkw
Checked By -
Reviewed By jd
Submitted By jd
Project Manager JOHN DERHAM

Design Firm
THUNDERBIRDCHP LLC
PO BOX 808
FARMINGTON CT 06034

Consultant
- - -

Project Title
PROJECT OZ
CONFIDENTIAL

Drawing Title
SUBSTATION 416
@ ~218 FT
w/ PHOTOS

Scale
AS NOTED

Drawing No.
Y-080
of
Total Sheets

Interrogatory CSC-1-12

Q-CSC-1-12: How would the fuel cell units be delivered to the site, e.g. by truck or rail?

A-CSC-1-12: The fuel cell units will be delivered by truck.

Interrogatory CSC-1-13

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-13: If the proposed facility is approved, approximately when would construction commence and when is it expected to be completed and operational? What are the expected typical work hours and days of the week that construction would occur?

A-CSC-1-13: Construction is contemplated to begin in the 1st quarter of 2019, and will be commissioned and powered no later than the 2nd quarter 2020. EIP expects to be working 7am–5pm on normal days with critical shut downs carried out as needed and appropriately scheduled with potential stakeholders and impacted persons being done off hours as needed. EIP expects to work a limited number of Saturdays.

Interrogatory CSC-1-14

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-14: Since all of the fuel cells would be located indoors, how would the fuel cell exhaust be handled? Would there be multiple stacks exiting the building? How tall a height would such stacks reach relative to the building height? The Buildings will have the exhaust consolidated and exhaust through the roof without any high stacks.

A-CSC-1-14: The buildings will have the exhaust consolidated and vented through ridge vents on the roof. These vents will not be higher than any existing building surrounding the project.

Interrogatory CSC-1-15

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-15: Would outdoor cooling modules be required to reject any waste heat that is not utilized inside the building? If yes, how many would be required, and where would they be located?

A-CSC-1-15: The Project is designed to utilize all the low grade and high grade heat. The high grade heat (240 degrees Fahrenheit) is proposed to be run through an organic rankin cycle engine (ORC) to generate additional electricity for parasitic load requirements. The low grade heat from the fuel cell units will be combined with the low grade heat exiting from the ORCs to provide energy to a heating and cooling loop. Outdoor cooling modules will be installed as a back-up to this system. Current design anticipates three cooling modules will be located adjacent to the Industrial 107 building, as is typical.

Interrogatory CSC-1-16

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-16: Would the proposed fuel cell provide baseload or backup power (or both) for Stanley Black and Decker? What percentage of the facility's power would the proposed fuel cell facility provide? Would any surplus power be sold to the grid?

A-CSC-1-16: The DEEP RFP process results in a PPA contract with the EDC's that require 100 percent of the power is committed to the grid with a. In its current design and configuration in a major upstream outage, and with the consent of Eversouce Energy and UI, the power could be deployed to Stanley Black and Decker through Eversource-owned assets until such time grid power was restored.

Interrogatory CSC-1-17

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-17: Would the proposed fuel cell shut down in the event of a power outage? If so, does it have “black start” capability and the ability to automatically restart? Or would the facility continue operating during a power outage and provide seamless uninterruptable power to Stanley Black and Decker?

A-CSC-1-17: The fuel cells would not shut down, but would “idle” and not provide power until such a time when the utility required it. The system is designed to “idle” and does have “blackstart” capability. The fuel cell facility is capable of providing Stanley Black and Decker (a designated “critical commercial facility”) with seamless uninterruptable power in the event of a power outage, however, this will require the consent and approval of UI and Eversource.

Interrogatory CSC-1-18

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-18: Provide a specifications sheet for the PureCell Model 400 fuel cell. This fuel cell has two operating modes: Power Mode at 460 kW and Eco Mode at 440 kW. Which modes would the fuel cell units operate at? Is the proposed 19.98 MW the approximate power output at the point of interconnection? Does it take into account estimated losses?

A-CSC-1-18: See attachment CSC-1-18-1. It is anticipated that the individual units will run in both modes over the lifetime of the units in order to optimize facility output. 19.8MW is the anticipated maximum output at the point of interconnection and this output does take into account the minimal anticipated line and transformer losses. As proposed, the heating loop and system parasitic loads will be supplied by the OCR units.

PureCell® Model 400

PURECELL SYSTEM BENEFITS

Energy Security

Proven PAFC fuel cell technology that is setting durability records

Energy Productivity

Increased efficiency and continuous on-site generation reduces energy costs

Energy Responsibility

Ultra-low emissions equals sustainability

PURECELL SYSTEM COMPETITIVE ADVANTAGES

Long Life

Industry leading 10-year cell stack life assures high availability and low service cost

Modular & Scalable

Solutions for multi-megawatt applications to meet growing energy demand

Experience

Most knowledgeable and experienced team in the industry

High Efficiency

Up to 90% total CHP Efficiency

Grid-Independence

Proven performance delivering power when the utility grid fails

Load Following

Capable of dispatching power to match building needs

Small Footprint

Highest power density among clean generation technologies

Flexible Siting

Indoor, outdoor, rooftop, multi-unit

RATED POWER OUTPUT: 460KW, 480VAC, 50/60HZ

Characteristic	Units	Operating Mode	
		Power 460kW	Eco 440kW
Electric Power Output[1]	kW/kVA	460/532	440/518
Electrical Efficiency	%, LHV	43%	45%
Peak Overall Efficiency	%, LHV	90%	90%
Gas Consumption[1]	MMBtu/h, HHV (kW)	4.09 (1,200)	3.77 (1,104)
Gas Consumption[1,2]	SCFH (Nm^3/h)	3,995 (107)	3,674 (98.4)
High Grade Heat Output @ up to 250°F[1]	MMBtu/h (kW)	0.72 (212)	0.55 (162)
Low Grade Heat Output @ up to 140°F[1]	MMBtu/h (kW)	1.03 (301)	1.00 (292)

FUEL

Supply ..... Natural Gas
Inlet Pressure ..... 10 to 14 in. water (2.5 - 3.5 mbar)

EMISSIONS[3,4]

NOx ..... 0.02 lbs/MWh (0.009 kg/MWh)
CO ..... 0.01 lbs/MWh (0.005 kg/MWh)
VOC ..... 0.01 lbs/MWh (0.005 kg/MWh)
SO_2 ..... Negligible
Particulate Matter ..... Negligible
CO_2[1] (electric only) ..... 998 lbs/MWh (454 kg/MWh)
(with High-Grade heat recovery) ..... 815 lbs/MWh[5] (371 kg/MWh)
(with full heat recovery) ..... 485 lbs/MWh[5] (220 kg/MWh)

OTHER

Ambient Operating Temp ..... -20°F to 104°F (-29°C to 40°C)
Relative Humidity ..... 0 to 100%
Sound Level ..... <65 dBA @ 33 ft. (10m)
Water Consumption ..... None (up to 86°F (30°C) Ambient Temp.)
Water Discharge ..... None (Normal Operating Conditions)

CODES AND STANDARDS

ANSI/CSA FC1-2014: Stationary Fuel Cell Power Systems
UL1741-2010: Inverters for Use With Distributed Energy Resources

NOTES

1. Average performance during 1st year of operation.
2. Based on natural gas higher heating value of 1025 Btu/SCF (40.4 MJ/Nm3)
3. Emissions based on 440 kW operation.
4. Fuel cells are exempt from air permitting in many U.S. states.
5. Includes CO_2 emissions savings due to reduced on-site boiler gas consumption

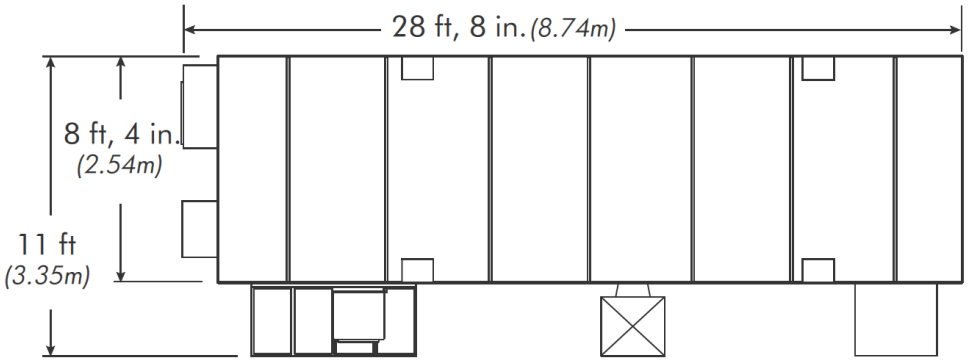
Doosan Fuel Cell America, Inc.
Corporate Headquarters
195 Governor's Highway
South Windsor, CT 06074
860.727.2253
www.doosanfuelcell.com

Petition No. 1350
Exhibit CSC-1-18-1

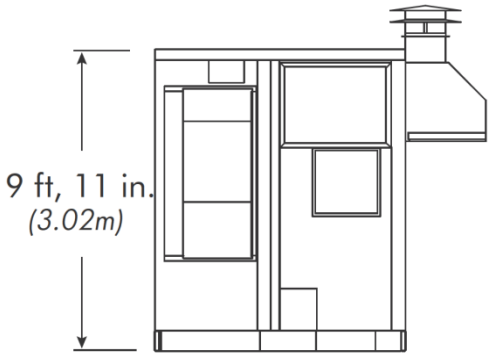
PureCell® Model 400

SYSTEM DIMENSIONS

Power Module

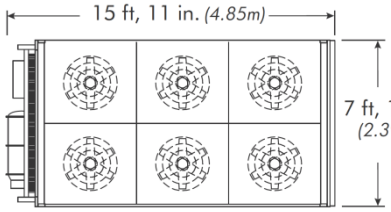


Top View

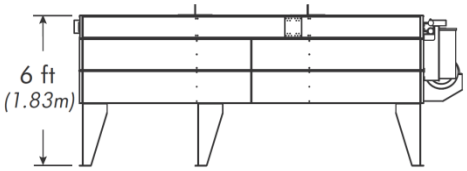


Side View

Cooling Module



Top View



Side View

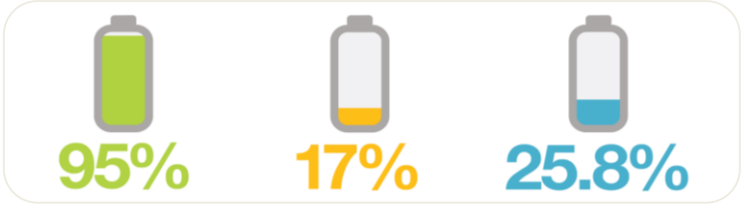
PHYSICAL SPECIFICATIONS

	Power Module	Cooling Module
Length	28′ 11″ (8.74m)	15′ 11″ (4.85m)
Width	8′ 4″ (2.54m)	7′ 10″ (2.39m)
Height	9′ 11″ (3.02m)	6′ 0″ (1.83m)
Weight	57,000 lb (27,216 kg)	3,190lb (1,447 kg)

PURECELL ADVANTAGE

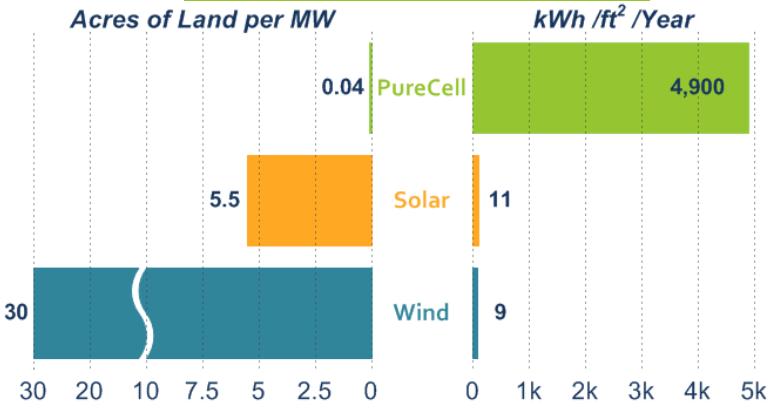
OFFSET 3x MORE CO_2

CAPACITY FACTOR



CO_2 OFFSET

USE LESS LAND



Doosan Fuel Cell America, Inc.
Corporate Headquarters
195 Governor's Highway
South Windsor, CT 06074
860.727.2253
www.doosanfuelcell.com

Interrogatory CSC-1-19

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-19: Would any waste heat from the fuel cell facility be used for the building/campus internal use such as to provide or supplement domestic heating and/or hot water? Would the waste heat also provide on-site cooling/air conditioning as well?

A-CSC-1-19: Yes, to both questions. EIP has contemplated in its design that it will be utilizing waste heat to displace gas fire burners and air conditioning, thereby reducing CO_2, EIP will also be deploying state-of-the-art Connecticut made generators, which utilize the waste heat in the production of electricity that EIP intends to use for building, operational, and parasitic loads**.**

Interrogatory CSC-1-20

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-20: What is the operational life of the facility? Does the fuel cell media have to be changed? If so, at what intervals?

A-CSC-1-20: The contracted useful life of the facility is 20 years. The stacks have to be rebuilt every 10 years. Because there are 45 units there will be no impact on the power output during maintenance or stack rebuild. The facility will run all day, every day, for 20 years.

Interrogatory CSC-1-21

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-21: Page 8 of the Petition notes that, “The Project will use natural gas from a utility pipeline distribution system for its fuel supply.” Has EIP consulted with the natural gas utility regarding the adequacy of the existing pipeline to serve the fuel cell facility or whether upgrades would be required to the pipeline?

A-CSC-1-21: EIP has had extensive conversations with the gas utility and also has a direct connection to the main gas transmission line. Both are achievable and the systems are more than adequate to support the loads.

Interrogatory CSC-1-22

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-22: Does the amount of phosphoric acid in the fuel cell comply with the applicable state and federal regulations?

A-CSC-1-22: Yes.

Interrogatory CSC-1-23

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-23: Please provide an Emergency Response Plan for the proposed facility in accordance with Public Act 11 101, An Act Adopting Certain Safety Recommendations of the Thomas Commission.

A-CSC-1-23: The Project's Emergency Response Plan is being prepared and will be filed with the Council upon its completion.

Interrogatory CSC-1-24

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-24: Please identify media to be used for pipe cleaning procedures at the proposed facility in accordance with Public Act 11-101, An Act Adopting Certain Safety Recommendations of the Thomas Commission.

A-CSC-1-24: Natural gas supply system includes an automated redundant nitrogen purge system.

Interrogatory CSC-1-25

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-25: Which National Fire Protection Association (NFPA) or other codes and standards apply to fuel cell construction, installation and/or modifications?

A-CSC-1-25: NFPA 853 is the national standard for the installation of Stationary Fuel Cell Power Systems and requires the preparation of a written Fire Prevention and Emergency Plan for fuel cell installations. The Fire Prevention and Emergency Plan is to be prepared in accordance with the requirements of Section 8.2 of NFPA 853 and is to include descriptions of fire prevention procedures, inspections, housekeeping practices, flammable material storage, control of ignition sources, procedures for fire protection equipment impairment, fire emergency plans and other information.

Interrogatory CSC-1-26

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-26: Provide the closest distance from the proposed fuel cell facility to the railroad tracks? How would the proposed fuel cell facility be protected from a train derailment?

A-CSC-1-26: The closest active line is approximately 55 feet from the active rail line to the closest connecting point to the fuel cell building. There are speed restrictions on the carriers on this line and EIP believes there is no risk of train derailment affecting the operations.

Interrogatory CSC-1-27

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-27: Where would the natural gas supply and gas meter be located (such to final confirmation from the utility company)? If the natural gas supply line to one or more of the fuel cells is accidentally severed in the case of a train derailment, would there be any safety features to automatically shut off the gas supply to all of the fuel cells?

A-CSC-1-27: The natural gas meter placement would be at the gas company's discretion. The existing house is over 100 feet away from the train line on the opposite side of the building. The entire system and each individual unit have redundant manual and automatic shout off features in the event of a pipe break. The feed gas to the units operates at 2 psi.

Interrogatory CSC-1-28

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-28: What is the distance and direction of the proposed facility to the nearest airport? Did the petitioner provide notification to the Federal Aviation Administration regarding the exhaust stacks as necessary/applicable?

A-CSC-1-28: The facility, as designed and constructed, will not have any appreciable increases in height that would affect airport operations or require notification of same.

Interrogatory CSC-1-29

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-29: Is it correct to say that the fuel cell facility would consume no water and discharge no water under normal conditions? Would there be some water consumption infrequently when the temperature is over 86F? Estimate the water consumption rate for the fuel cell facility under such conditions if known (and applicable).

A-CSC-1-29: In a typical design the units are closed loop and need augmentation of domestic water extremely infrequently. However, EIP's project will have virtually no water usage or discharge because EIP's design incorporates a cooling tower that can be used in instance where EIP's other means of heat dissipation are not keeping the appropriate design temperatures required for optimal operation. EIP would only, as a last resort, use a domestic water supply in the event of a catastrophic failure of the system's cooling towers. EIP expects the water consumption to be negligible. It will only be at system fill and makeup water. The minimal discharge will be de-ionized water in those rare instances in small quantities.

Interrogatory CSC-1-30

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-30: What is the distance and direction of the nearest residence from the proposed fuel cell facility?

A-CSC-1-30: The nearest residential facility is approximately 354 feet northerly from the structure. It has no sightline because a concrete framed six story building obstructs the sightline.

Interrogatory CSC-1-31

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-31: What is the municipal zoning of the host property? What surrounding land uses are adjacent to the host property?

A-CSC-1-31: The host property is zoned “I2” (General Industry). The surrounding adjacent land uses are primarily more I2, but also “A2” (Multi Family Houses), and “UI” (Urban Industrial).

Interrogatory CSC-1-32

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-32: Is it correct to say that the entire project is located in the Federal Emergency Management Agency (unshaded) Zone X, an area outside of both the 100-year and 500-year flood zones?

A-CSC-1-32: Yes.

Interrogatory CSC-1-33

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-33: Given that the project is largely indoors with only a small disturbance area at the Burritt Street Substation, is it correct to say that a DEEP General Permit is not required? Explain.

A-CSC-1-33: No DEEP General Stormwater Permit is required because less than one acre of property will be disturbed.

Interrogatory CSC-1-34

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-34: Natural gas has sulfur dioxide injected as an odorant. Please submit a desulfurization plan narrative for the proposed fuel cell facility containing the following information:

a) Chemical reaction overview concerning what substances are produced from the desulfurization process, as well as plans for their containment and transport;
b) How much solid sulfur oxide would result from the desulfurization process, and methods and locations for containment, transport, and disposal;
c) Whether any of these desulfurization substances are considered hazardous, and if so, plans for the containment, transport, and disposal of hazardous substances;
d) Anticipated method of disposal for any other desulfurization substances; and
e) Whether any gaseous substances resulting from desulfurization can be expected to vent from the fuel cells, as well as the applicable DEEP limits regarding discharge of these gasses.

A-CSC-1-34: See attachment CSC-1-34-1.

PureCell Model 400 Fuel Processing System (FPS)

The FPS converts pipeline-quality natural gas into hydrogen reformate – a hydrogen-rich gas that is delivered to the anode side of the fuel cell stacks. This module includes a condenser to recover water generated in the fuel cell reaction by condensing water vapor from the process exhaust. This eliminates the need for makeup water under most operating conditions. The recovered water is used in the steam reformation process. The main components of the FPS include the following:

Hydro-Desulfurizer

The desulfurizer system removes sulfur used as an odorant in natural gas, which is a poison to the catalysts used in the fuel cell systems. Sulfur is converted to zinc-sulfide, a non-hazardous waste, within the desulfurizer and remains there until an overhaul is required, nominally after 10 years. This system will also remove small amounts of oxygen in the gas.

Steam Reformer

Steam (H_2O) generated in the cell stack cooling loop of the TMS is combined in the reformer with methane (CH_4) in the natural gas to generate a gas composed of hydrogen (H_2), carbon monoxide (CO), and carbon dioxide (CO_2).

$2CH_4 + 3H_2O = 7H_2 + CO + CO_2$ *Equation 1*

Integrated Low-Temperature Shift Converter

The integrated low-temperature shift converter (ILS) generates additional hydrogen through a water-gas reaction in which CO and water is converted to hydrogen and CO_2. The reduced CO content minimizes its adverse effect on fuel cell stack performance.

CO + H2O = H2 + CO2 *Equation 2*

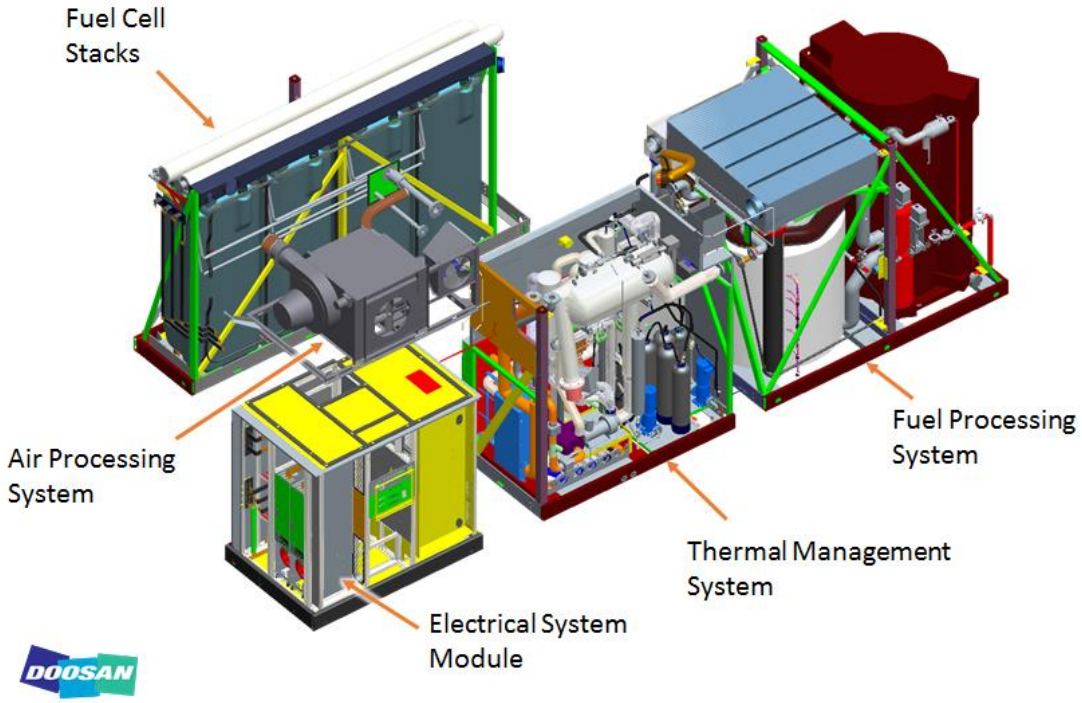


Figure 1. PureCell Model 400 Subsystems

Desulfurization Memorandum
PureCell® Model 400 Stationary Fuel Cell System

Date: 2017-01-05

Sulfur Background

Sulfur is present in pipeline natural gas. It is primarily used as an odorant so leaks can be detected. Unfortunately, sulfur is also a poison to fuel cell systems and exposure to sulfur will drastically reduce the life and efficiency of the fuel cell.

Types of sulfur found in natural gas vary from region to region. Some common examples are:

- Hydrogen Sulfide (H_2S)
- Tetrahydrothiophene (THT)
- Mercaptain – (MCP) - Broad family of sulfur molecules characterized by a sulfur atom attached to a hydrocarbon molecule or chain

The majority of it the odorants are organic with the exception of hydrogen sulfide. Standard pipeline natural gas contains up to 6 parts per million by volume (ppmv) sulfur on average with spikes as high as 30 ppmv possible. In order to successfully maintain operation of the fuel cell for a period of 10 years, the sulfur levels must be reduced to less than 0.02 ppmv, or a 99.7% removal rate. An additional benefit of this is that it removes sulfur dioxide from the emissions of the fuel cell power plant.

Sulfur Removal Techniques

Sulfur removal can be broken down into two main techniques, physical capture and reactive capture.

Physical capture involves using porous media such as activated carbon or molecular sieves to capture and concentrate the odorant before it enters the fuel cell. Doosan elected not to pursue this path due to several factors, including:

- The process concentrates the odorant and turned it into hazardous waste
- The concentrated odorant is highly toxic and requires specially trained personnel to handle the waste
- Would result in more service being required at customer sites to maintain the system

Reactive capture is the method used by Doosan to remove sulfur. It involves chemically reacting the odorant over a catalyst bed in order to separate the sulfur molecule. Once the sulfur molecule is separated from the odorant, the remaining odorant is destroyed in another catalyst bed. The sulfur molecule is then captured and converted to a compound called Zinc Sulfide.

$$* S + H_2 \leftrightarrow H_2S + * \qquad \textit{Equation 4}$$

$$H_2S + ZnO_{(s)} \leftrightarrow ZnS_{(s)} + H_2O \qquad \textit{Equation 5}$$

Note: * represents the non-sulfur odorant components

Doosan's system has been sized such that it will run for the 10 year service life of the unit and not need to be changed out. When the unit is removed from service, the decommissioning or refurbishment of the unit will be carried out by trained personnel and a company specializing in removal of the waste Zinc Sulfide will recover the spent material. Zinc sulfide has some commercial value, so that company will either process it and sell it or split it into Zinc and Sulfur and sell them separately.

Respectfully,
Jesse Hayes, Director, Product Management, Doosan Fuel Cell
195 Governors Highway
South Windsor, CT 06074
Jesse.hayes@doosan.com
(860) 560-3309

Interrogatory CSC-1-35

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick

Q-CSC-1-35: Is methane (CH4) broken down to zero in the reforming process? Is there some small amount of CH4 emissions that would still occur? Yes there is a small amount of methane emissions that will still occur, however the goal is to utilize a proprietary process, which would eliminate the methane emissions entirety.

A-CSC-1-35: Yes there is a small amount of methane emissions that will still occur, however the goal is to utilize a proprietary process, which would eliminate the methane emissions entirety.

Interrogatory CSC-1-37

EIP Investment, LLC
Petition No. 1350

Witness: Mark Wick
Page 1 of 1

Q-CSC-1-37: Page 6 of the Petition notes reductions in various greenhouse gasses in tons. For example, the carbon dioxide reduction is 762 tons. Page 11 of the Petition notes a net reduction of 2,330 tons of carbon dioxide annually due to the fuel cell power generation offsetting grid power. Please explain or reconcile the 2,330 tons versus the 762 tons. Is one annual and one is for a different time period?

A-CSC-1-37: In EIP's RFP response, it identified that there are a number of approaches to calculating the potential CO_2 reductions. Based on United States EPA eGrid database (eGrid2012), using fossil-fueled generation in New England as a basis for comparison, the emissions from the fuel cells in the project when compared with the New England fossil-fuel generation would result in a reduction of 2,330 tons of CO_2 annually. In our analysis of our CHP system using the JEDI model from NREL, the estimate for CO_2 reduction was 763 lbs per year when compared with Connecticut grid emissions. Connecticut has significantly lower CO_2 grid emissions than New England or the United States—largely a result of nearly half of the State's electrical load being served by the Millstone nuclear plant.