

DOCKETED

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Document Title:	Innovative Solutions to Convert California's Residual Forest Biomass Resources into Renewable Natural Gas
Description:	N/A
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Organization:	Evan Hughes
Submitter Role:	Applicant
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*Comment Received From: Evan Hughes
Submitted On: 8/24/2018
Docket Number: 19-ERDD-01*

Innovative Solutions to Convert California's Residual Forest Biomass Resources into Renewable Natural Gas

COMMENTS ON DRAFT SOLICITATION ON DEMONSTRATING INNOVATIVE SOLUTIONS TO CONVERT CALIFORNIA'S RESIDUAL FOREST BIOMASS RESOURCES INTO RENEWABLE NATURAL GAS

INTRODUCTION

Evan Hughes, Ph.D., as an independent consultant is considering a proposed project that will address the CEC's intention to include pilot demonstration of a hybrid system which combines gasification with unconventional methods (e.g., dry fermentation, water electrolysis) to demonstrate an innovative biomass to RNG pathway. The unconventional method involves wet processing of dry biomass (forest residues) to produce RNG via the APADICS technology of Bountiful Applied Research Corporation (BARC) of Bountiful UT. APADICS is a hybrid of conventional pulping technology--but one which includes an innovative lignin separation step via the El Shall process licensed to BARC with anaerobic digestion (AD) to make the high-methane content biogas stream which is made into renewable natural gas (RNG) to be used in the transportation sector as renewable CNG (R-CNG) for vehicle fuel, especially for trucks and including trucks that haul forest residue biomass. We would site the project, as proposed as a requirement, in the service territory of a California natural gas investor-owned utility.

COMMENTS

Evan Hughes and BARC have comments in reply to two of the six questions posed in the announcement.

Question 1: Are the technical targets for the pilot demonstration clear and reasonable? Should they be narrowed further? If not, why not? Please identify the specific targets that should be changed and the recommended change. We think the size given in Table 1, 50-100 scf/minute RNG output, is too large for the funding of \$750,000 to \$2M range of the expected awards.

Question 5: Are the correct technologies being focused on (conversion, cleanup, and upgrading systems)? Are there components that offer more opportunity for cost reduction? We think that the focus on components implied here is too narrow. In our proposal we would show how it is the system as a whole that enables the meeting of the cost target, specifically it is the integrated system with two major byproducts--lignin and cellulose, in our case--that enable the RNG to meet the cost target when deployed at commercial scale.

Additional submitted attachment is included below.

DOCKETED Docket Number: 19-ERDD-01 Project

Title: Research Idea Exchange

TN #: 224589

Document Title: Evan Hughes Comments

Description:

Comments on Draft Solicitation on Demonstrating Innovative Solutions to Convert California's Residual Forest Biomass Resources into Renewable Natural Gas

Filer: Evan Hughes

Organization: Evan Hughes, Ph.D., Consultant, Biomass Energy and Geothermal Energy

Submitter Role: Public Submission

Date: 8/24/2018 (submitted at approximately 3pm PDT)

Docketed Date: 8/24/2018

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COMMENTS ON DRAFT SOLICITATION ON DEMONSTRATING INNOVATIVE SOLUTIONS TO CONVERT CALIFORNIA'S RESIDUAL FOREST BIOMASS RESOURCES INTO RENEWABLE NATURAL GAS

INTRODUCTION

Evan Hughes, Ph.D., as an independent consultant is considering a proposed project that will address the CEC's intention to include pilot demonstration of "a hybrid system which combines gasification with unconventional methods (e.g., dry fermentation, water electrolysis) to demonstrate an innovative biomass to RNG pathway." The unconventional method involves wet processing of dry biomass (forest residues) to produce RNG via the "APADICS" technology of Bountiful Applied Research Corporation (BARC) of Bountiful UT. APADICS is a hybrid of conventional pulping technology --but one which includes an innovative lignin separation step via the El Shall process licensed to BARC --with anaerobic digestion (AD) to make the high-methane content "biogas" stream which is made into renewable "natural gas" (RNG) to be used in the transportation sector as renewable CNG (R-CNG) for vehicle fuel, especially for trucks and including trucks that haul forest residue biomass. We would site the project, as proposed as a requirement, in the service territory of a California natural gas investor-owned utility.

Comments: Evan Hughes and BARC have comments --below in **bold**--in reply to two of the six questions posed in the announcement.

Question 1: "Are the technical targets for the pilot demonstration clear and reasonable? Should they be narrowed further? If not, why not? Please identify the specific targets that should be changed and the recommended change." **We think the size given in Table 1, 50-100 scf/minute RNG output, is too large for the funding of \$750,000 to \$2M range of the expected awards.**

Question 5: “Are the correct technologies being focused on (conversion, cleanup, and upgrading systems)? Are there components that offer more opportunity for cost reduction?” **We think that the focus on “components” implied here is too narrow. In our proposal we would show how it is the system as a whole that enables the meeting of the cost target, specifically it is the integrated system with two major “byproducts” — lignin and cellulose, in our case — that enable the RNG to meet the cost target when deployed at commercial scale.**

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Comments should be submitted by 5:00 p.m. on Friday, August 24, 2018. The Energy Commission encourages comments through the Energy Commission’s docket system to Docket # 19-ERDD-01 (Research Idea Exchange). Please include your name and the name of the organization you represent. Comments should be in a downloadable, searchable format such as Microsoft® Word (.doc) or Adobe® Acrobat® (.pdf). Please include the title of the Request for Comments: Demonstrating Innovative Solutions to Convert California’s Forest Biomass Resources into Renewable Natural Gas in the subject line.

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g., synthesis gas) as well as cleaning and upgrading systems that further refine intermediate products into RNG. Projects must perform a pilot-scale demonstration of the proposed technology pathway and should meet technical targets specified in Table 1.

Table 1: Technical Targets for the Pilot Demonstration

Parameter Target Gas Quality: 3 Of suitable quality to meet natural gas standards in California Investor Owned Utility (IOU) Territory including: Heat Content: 990 – 1150 British Thermal Units per Standard Cubic Feet (BTU/scf) Total Sulfur: <12.6 parts per million (ppm) Scale of Pilot Demonstration: 50-100 scf/min RNG output (2.97-5.94 mmBTU/hr)

Length of Pilot Demonstration: 500 hours total runtime (including 16 hours of continuous, steady state operation)

Emissions: Complies with local air district standards

Maturity: TRL 3 to 6 at project initiation, TRL 6 or greater by project conclusion

Projects must also provide analysis showing that when commercially mature, the proposed technology pathway can achieve the technical and cost targets specified in Table 2.

Table 2: Technical and Cost Targets for a Commercially-Mature System

Parameter Target Levelized Cost of Methane \$12-21/mmBTU Payback 10 yr System Lifetime 15 yr

In addition to the technical and cost targets above, proposed projects must:

☑ Perform the 500-hour pilot demonstration in natural gas IOU territory. ☑ Demonstrate a whole system approach from biomass feedstock to high quality RNG. Projects that focus on only one component (e.g., gas cleanup) are not eligible for funding. ☑ Sample and analyze the RNG produced to verify high quality consistent with natural gas standards. ☑ Include a techno-economic analysis for a full-scale facility as part of the proposed project. Include in the analysis the programs and incentives that would be leveraged to improve economics. ☑ Adhere to the following feedstock requirements:

- o All test and demonstration activities must be performed using woody biomass feedstocks (e.g., forest slash, orchard prunings, green waste) as fuel. Feedstock may be processed (e.g., ground, chipped, or pelletized) or unprocessed.
- o All feedstock used for test and demonstration activities must be waste biomass only – not purpose-grown energy crops.
- o At least half of all feedstock used for test and demonstration activities must be forest waste biomass.
- o Proposed projects must identify the feedstock strategy including where feedstock will be sourced and what types of feedstock will be used. Proposed projects are also encouraged to:

☑ Discuss the proposed technology's potential to displace open burning of biomass and contribute to decreased wildfire risk. ☑ Leverage generation of value-added co-products, such as bioproducts or biofuels, in addition to RNG.

☑ Use the RNG produced in an end-use application such as heating, electricity generation, or transportation fuel. Possible projects funded include:

☑ A gasification to methanation process which uses innovative components and/or methods to significantly reduce capital and operating costs compared to conventional systems.

☑ A hybrid system which combines gasification with unconventional methods (e.g., dry fermentation, water electrolysis) to demonstrate an innovative biomass to RNG pathway.

Questions

Energy Commission staff is seeking input from interested stakeholders on the above excerpts from the draft GFO.

1. Are the technical targets for the pilot demonstration clear and reasonable? Should they be narrowed further? If not, why not? Please identify the specific targets that should be changed and the recommended change.
2. Are the target cost and technical specifications for a commercially-mature system clear and reasonable? Should they be narrowed further? If not, why not? Please identify the specific targets that should be changed and the recommended change.
3. Will a technology that achieves these targets have the characteristics required for a commercially-viable woody biomass to RNG system? What targets are missing that would help improve commercial viability?
4. Are the feedstock requirements clear and reasonable?

5. Are the correct technologies being focused on (conversion, cleanup, and upgrading systems)? Are there components that offer more opportunity for cost reduction?

6. What is the best way to evaluate the levelized cost of methane presented by proposed projects? Would requiring a technical overview of the pathway, assumptions used, and economic estimates be sufficient?

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DOCKETED Docket Number: 19-ERDD-01 Project Title: Research Idea Exchange

TN #: 224589 Document Title: Taylor Biomass Energy Comments

Description:

Comments on Draft Solicitation on Demonstrating Innovative Solutions to Convert California's Residual Forest Biomass Resources into Renewable Natural Gas Filer: Kevin Uy

Organization: Taylor Biomass Energy, LLC Submitter Role: Public Submission Date: 8/24/2018 12:02:41 PM

Docketed Date: 8/24/2018

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COMMENTS ON DRAFT SOLICITATION ON DEMONSTRATING INNOVATIVE SOLUTIONS TO CONVERT CALIFORNIA'S RESIDUAL FOREST BIOMASS RESOURCES INTO RENEWABLE NATURAL GAS

August 24, 2018 RE: Docket No: 19-ERDD-01

INTRODUCTION

Recovery of valuable products from waste forestry biomass resources provides a means to significantly impact both forest management and greenhouse gas reduction. However, as pointed out in the draft solicitation, the location of these potential resources provides a significant challenge to the economic recovery of energy products from the resources