

CALIFORNIA ENERGY COMMISSION

1516 NINTH STREET
SACRAMENTO, CA 95814-5512
www.energy.ca.gov



January 27, 2014

California Energy Commission

DOCKETED**12-EPIC-01**

TN 72525

FEB 11 2014

To: Researchers and Other Interested Parties: QUESTIONNAIRE for 2015-2017 Triennial Investment Plan for the Electric Program Investment Charge

Questionnaire for applied research and development, technology demonstration and deployment, and market facilitation

The Electric Program Investment Charge (EPIC) provides electric public interest investments in applied research and development, technology demonstration and deployment, and market facilitation for clean energy technologies in accordance with California Public Utilities Commission's May 31, 2012, Phase 2 Decision 12-05-037, as modified.¹ The California Energy Commission, Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E), and Southern California Edison Company (SCE), as the four administrators of the program, submitted coordinated investment plans to the CPUC for consideration on November 1, 2012. In November, 2013, CPUC Decision 13-11-025 modified and approved the first triennial investment plans of each program administrator. The portion of the EPIC Program administered by the Energy Commission will provide funding for applied research and development, technology demonstration and deployment, and market facilitation for clean energy technologies and approaches for the benefit of ratepayers of PG&E, SDG&E, and SCE.

Energy Commission staff is implementing its first EPIC investment plan, as modified and approved by the CPUC.² Competitive solicitations for initiatives in the first EPIC investment plan will be published soon. A schedule of upcoming EPIC funding opportunities and feedback opportunities for the Energy Commission's first EPIC investment plan is available online at www.energy.ca.gov/research/epic/.

The CPUC EPIC schedule calls for EPIC administrators, including the Energy Commission, to submit a proposed second EPIC investment plan by May 1, 2014.³ To meet this schedule, Energy Commission staff is now developing the second triennial investment plan for EPIC funds collected in 2015-17. The plan must be approved by the CPUC. Staff estimates the plan may include \$340 million for applied research and development, technology deployment and demonstration, and market facilitation. As part of this information gathering process for the second EPIC investment plan, the Energy Commission seeks ideas from interested parties on proposed initiatives in the topic areas of the electricity system "Value Chain," specifically grid operations/market design, generation, transmission, distribution, and demand-side management. The Energy Commission's second EPIC investment plan will build upon and follow the initiative format of the first triennial EPIC investment plan located at: www.energy.ca.gov/research/epic/documents/final_documents_submitted_to_CPUC/2012-11-01_EPIC_Application_to_CPUC.pdf as modified and approved by the CPUC in Decision 13-11-025, <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M081/K773/81773445.PDF>.

¹ http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF

² Energy Commission, October 2013, The Electric Program Investment Charge: Proposed 2012-14 Triennial Investment Plan, in Application of the California Energy Commission for Approval of Electric Program Investment Charge Proposed 2012 through 2014 Triennial Investment Plan, Attachment 1, http://www.energy.ca.gov/research/epic/documents/final_documents_submitted_to_CPUC/2012-11-01_EPIC_Application_to_CPUC.pdf, as modified and approved by the CPUC in Decision 13-11-025, <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M081/K773/81773445.PDF>.

³ CPUC Decision 12-05-037, Phase 2 Decision Establishing Purposes and Governance for Electric Program Investment Charge and Establishing Funding Collections for 2013-2020, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF, page 31. CPUC Decision 13-04-030 modified Decision 12-05-037.

This is only a Request for Information; please do not submit proposals for funding.

Initiative ideas received, in response to this request, will be considered by Energy Commission staff in developing the second EPIC investment plan for funds collected in 2015-2017.

If you have applied research, development, technology demonstration, deployment or market facilitation ideas, please complete the attached initiative template. This template asks you to discuss your idea, identify why this research is appropriate for public funding, and include the issues/barriers that are impeding full market adoption of the clean energy technology/strategy addressed. Proposed initiatives will be compiled and posted on the Energy Commission website at: www.energy.ca.gov/research/epic/.

Here are some guidelines for completing the template:

1. The information contained in your initiative should be no more than three pages.
2. Complete one template per initiative. Multiple templates may be submitted, one for each separate initiative.
3. All proposed initiatives must advance science or technology and offer a reasonable probability of providing benefits to California Electric Investor Owned utilities (IOU) ratepayers and must meet the following criteria:
 - a. Focus on energy efficiency and demand-side management, generation, transmission and distribution, grid operation and market design issues.
 - b. Support state energy policy.
 - c. Consider opportunities for collaboration and co-funding with other entities.

Please e-mail suggested initiatives in a downloadable, searchable format such as Microsoft® Word (.doc) or Acrobat® (.pdf) by February 13, 2014. Please include the docket number 12-EPIC-01 and indicate "EPIC second investment plan" in the subject line. Send the completed initiative questionnaire to:

docket@energy.ca.gov and include in the CC line: Prab.Sethi@energy.ca.gov

A public workshop is scheduled in February, 2014 to focus on market facilitation. A draft second investment plan will be released in March, 2014 and a public workshop will be conducted to receive comments on the draft second investment plan.

Sincerely,

Laurie ten Hope
Deputy Director
Energy Research and Development Division



(This is a Request for Information only - Complete Pages 1 and 2 for each initiative)

Title of Proposed Initiative: Waste-Fired Distributed Generation Using “Air Curtain” FireBox® and Organic Rankine Cycle Technology

Investment Areas (Check one or more) – For definitions, see *First Triennial Investment Plan*, page 12:

- Applied Research and Development
 Technology Demonstration and Deployment
 Market Facilitation

Electricity System Value Chain (Check only one): See CPUC Decision 12-05-037, Ordering Paragraph 12.a. http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF.

- Grid operations/market design
 Generation
 Transmission
 Distribution
 Demand-side management

Issues and Barriers:

Full commercial implementation of this technology is being hampered by a lack of working units in commercial settings. In part this is a consequence of non-recurring costs that must be borne by the user as the developer does not have sufficient capital to absorb these costs. Additionally, any new generation incorporating innovative combustion technology for use in California must address a host of emissions/AQMD requirements.

To the extent that the combustion process has been EPA-approved for burning whole logs and wood waste only, the combustion process and products associated with burning agricultural waste (vines, grape skins and solids) needs to be characterized by empirical testing.

Initiative Description and Purpose:

Combining the technology’s EPA-approved combustion system with an air cooled ORC power system provides an economic solution for solid waste disposal and distributed power generation simultaneously. Presently, small (100kW-class) distributed power systems are virtually all fossil fuel-fired, and biomass-fired power systems are typically offered in the multi-MW range that require expensive fuel preparation (chipping, pelletizing, etc.).

It is estimated that the funding level required to complete these objectives will be in the range of \$300K to \$800K, depending on extent of scope.

Stakeholders:

This initiative is supported by the developer of the technology, Air Burners Inc., and the following California stakeholders, including but not limited to;

- California agriculture, state-wide
- CA Department of Forestry (CDF)
- CA Parks and Recreation

- Cal Fire

Background and the State-of-the-Art:

Currently, Air Burners Inc. (ABI) designs, manufactures and sells combustion equipment, (the FireBox), as a stand-alone solid waste (wood logs, wood waste, forest and agricultural waste) disposal system.

The operating principles of the Firebox's "air curtain" technology are described in the ABI website, www.airburners.com and shown in Figure 1 below. The purpose of the air curtain is to stall or slow down the smoke particles on their way out of the FireBox. This subjects the particles to the highest temperatures in the FireBox causing them to reignite, further reducing their size to acceptable limits. The net result is very clean combustion with opacities under 10% using EPA Method 9. This compares with opacities of 80-100% in open burning.

There are approximately 1000 of these units operational worldwide. Additionally, ABI has completed the design, construction and successful operation of a 50kW power system consisting of a Firebox, heat pipe heat exchanger and ORC in its manufacturing facility. The system is propane-fired to replicate biomass firing. This unit has demonstrated the feasibility of Firebox heat acquisition by the heat pipe heat exchanger, transfer of this heat into the ORC evaporator and conversion of this heat into electric power.

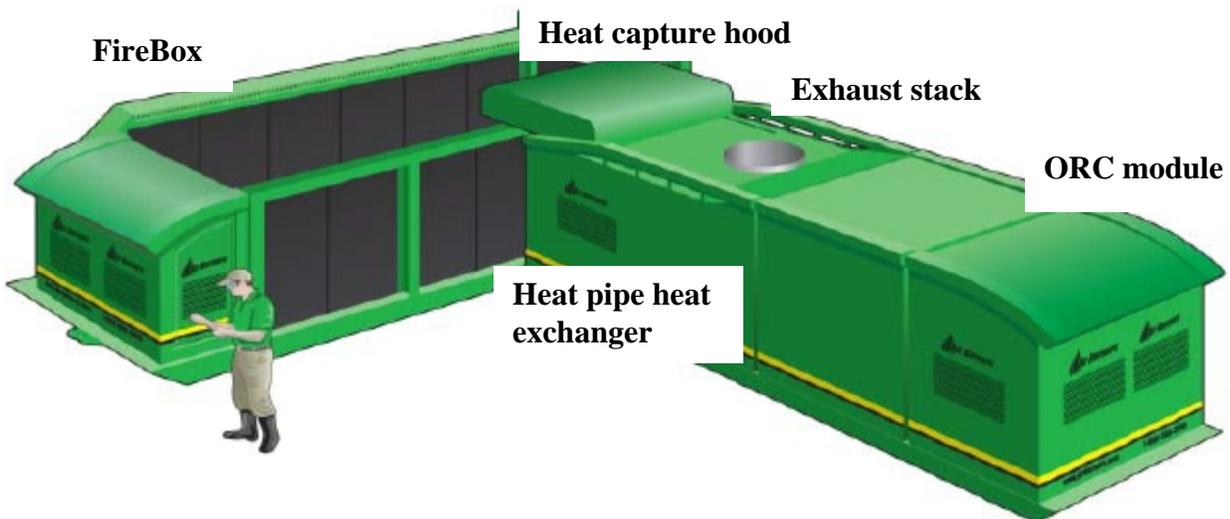
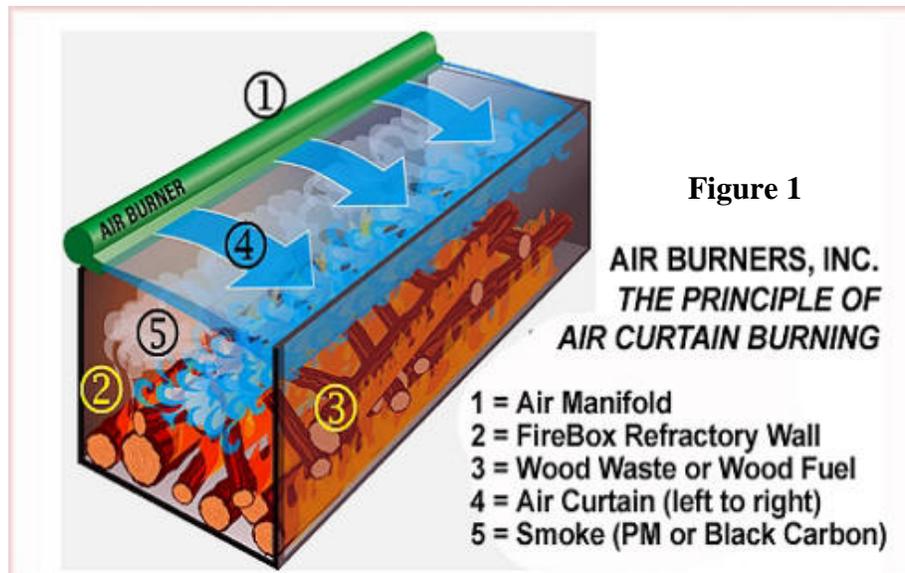


Figure 2- Biomass/ORC General Arrangement

A conceptual layout of the biomass/ORC system is shown in Figure 2 above.

A photo of the 50kW experimental unit installed at ABI's facility is shown in Figure 3 below

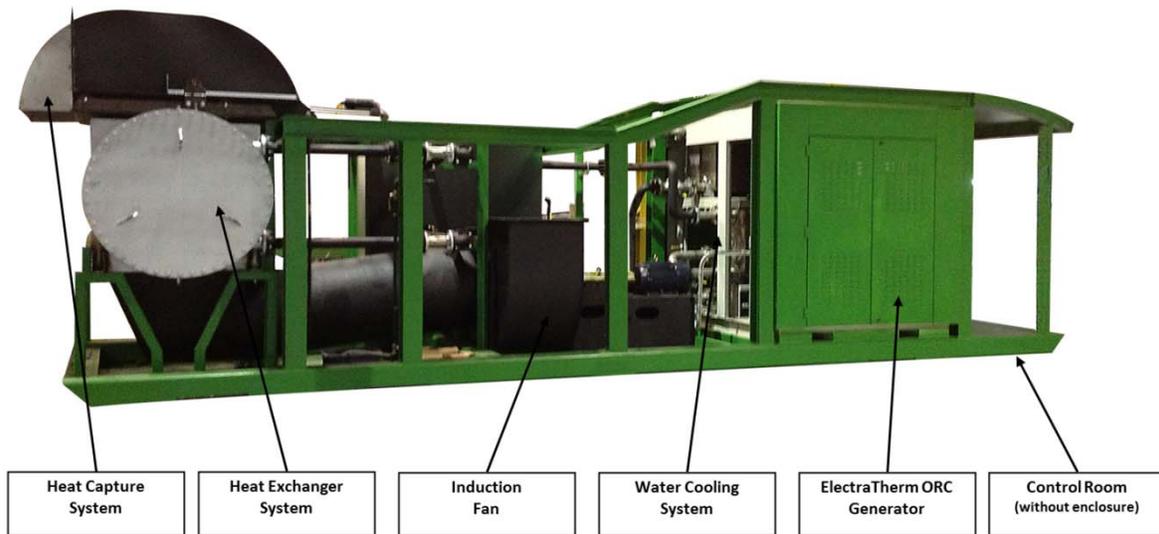


Figure 3- 50kW Experimental Biomass/ORC Power Unit at ABI's Facility

Justification:

The California IOU ratepayers will benefit by commercial development of this technology in several ways:

- It will provide a technical and economic solution, in a single unit, capable of solid waste disposal in various forms while generating revenue from the sale of power produced.
- California growers in the Central Valley, Department of Forestry, Parks and Rec, and Cal Fire have all expressed interest in applying this technology for their own particular applications/problems. The State of California owns several ABI FireBoxes and BurnBosses
- It will allow the California agriculture industry to dispose of Ag waste during “no burn” days by use of an EPA-approved combustion technology that also features rapid disposal (incineration) of solid waste and offsetting revenue generation, plus a significant reduction in Particulate Matter (PM). These discussions are already ongoing between ABI and San Joaquin valley growers.
- Similarly, there is great societal and economic benefit associated with disposal of wood waste for CDF, Parks and Rec and Cal Fire to improve safety and reduce forest fire incidents. The cost of waste disposal is significantly reduced by the power generated during the incineration process.
- ABI estimates that the installed capacity of these systems will be in the range of 20 to 100MWe throughout the state.
- Commercial installations of these units require operators to gather the fuel, remove the ash and monitor operation of the plant.
- Significantly less processing (chipping grinding trucking) and pollution than any other system.

Ratepayer Benefits (Check one or more):

- Promote greater reliability
- Potential energy and cost savings
- Increased safety
- Societal benefits
- Environmental benefits – Reduction of airborne emissions using FireBox air curtain
- GHG emissions mitigation/adaptation in the electricity sector at the lowest possible cost
- Low emission vehicles/transportation
- Waste reduction
- Economic development

Describe specific benefits (qualitative and quantitative) of the proposed initiative

Public Utilities Code Sections 740.1 and 8360:

This technology specifically addresses and supports the following objectives listed in 740.1;

- (1) Environmental improvement (reduction of Particulate Matter and non-biogenic CO₂)
- (2) Public and employee safety
- (3) Conservation by efficient resource use or by reducing or shifting system load,
- (4) Development of new resources and processes, particularly renewable resources and processes which further supply technologies.
- (5) Improve operating efficiency and reliability or otherwise reduce operating costs

This technology also conforms to and supports the following objective set forth in 8360:

- (c) Deployment and integration of cost-effective distributed resources and generation, including renewable resources.