

May 4, 2009

To:
California Energy Commission
Dockets Office, MS-4
Re: Docket No. # 09-IEP-1G
1516 Ninth Street
Sacramento, CA 95814-5512

DOCKET**09-IEP-1G**

DATE MAY 04 2009

RECD. MAY 04 2009

Subject: Public comment to 2009 Integrated Energy Policy Report - Biopower in California

This comment is in regards to the questions for public comment posted on http://www.energy.ca.gov/2009_energypolicy/documents/2009-04-21_workshop/2009-04-21_BIOMASS_WORKSHOP_QUESTIONS.PDF, as part of the Workshop held on April 21, 2009.

First, we would like to address the following question:

Biogas – Question 2. Do nitrogen oxide (NOx) emission requirements pose a hurdle to development of new biogas generation? What low-NOx technologies are available and how much do they cost? What can be done to expand the availability and utilization of low-NOx technologies for generating electricity from biogas?

We noticed the lack of mention to Homogeneous Charge Compression Ignition (HCCI) Engines as a potential low-NOx technology that may enable increased biomass utilization in California. Per technology summary attached, the technology has shown promise in field tests utilizing landfill gas. MEI urges policy makers to continue to fund research in the area of clean renewable power generation to help bring HCCI and other low-NOx technologies to the marketplace.

Our second comment addresses the general question of other barriers to implementation. One barrier to distributed generation is the excessive cost and duration for interconnection to the grid imposed by some utilities. We believe statewide guidelines to streamline the process would both reduce cost and time, and therefore facilitate the deployment of biogas based, and distributed power systems in general.

Makel Engineering, Inc.
1585 Marauder St., Chico CA
(530)895-2770
www.makelengineering.com

Attachment:

Homogeneous Charge Compression Ignition Engines: A Low Emissions Technology for Renewable Energy Production

Homogeneous Charge Compression Ignition Engines: A Low Emissions Technology for Renewable Energy Production

by Makel Engineering, Inc.
Chico, CA 95973

Technology Background

Homogeneous Charge Compression Ignition (HCCI) is a hybrid of the two well-known spark ignition and compression ignition engine concepts, which allows the use of fuels with very low energy content (such as biogas from anaerobic digestion of dairy waste, wastewater, or landfill gas) to achieve high thermal efficiency and low emissions. When contrasted with current spark ignited engine technology, NO_x emissions (a precursor to ozone formation) may be reduced as much as 20:1 in an engine operating in lean burn HCCI mode without requiring cost-prohibitive exhaust cleanup equipment.

Demonstration of Landfill Gas Operation

Makel Engineering, Inc. (MEI), a small RD&D Company located in Northern California, developed and demonstrated a low emissions generator system fueled by landfill gas. Funded by a California Energy Commission grant, the initial 30kW system demonstration was conducted at the 190 acre, Neal Road Landfill which serves the city of Chico and surrounding communities in Butte County. This project demonstrated the viability of converting conventional, off-the-shelf diesel engines to HCCI operation, enabling the use of landfill gas to generate power while achieving CARB 2007 standards. MEI is currently working on the scale up of the technology to larger generators in the several hundred kilowatt range and streamline the design to allow commercial production of HCCI based generators for renewable energy applications. Key results from this demonstration are illustrated in Figure 1.

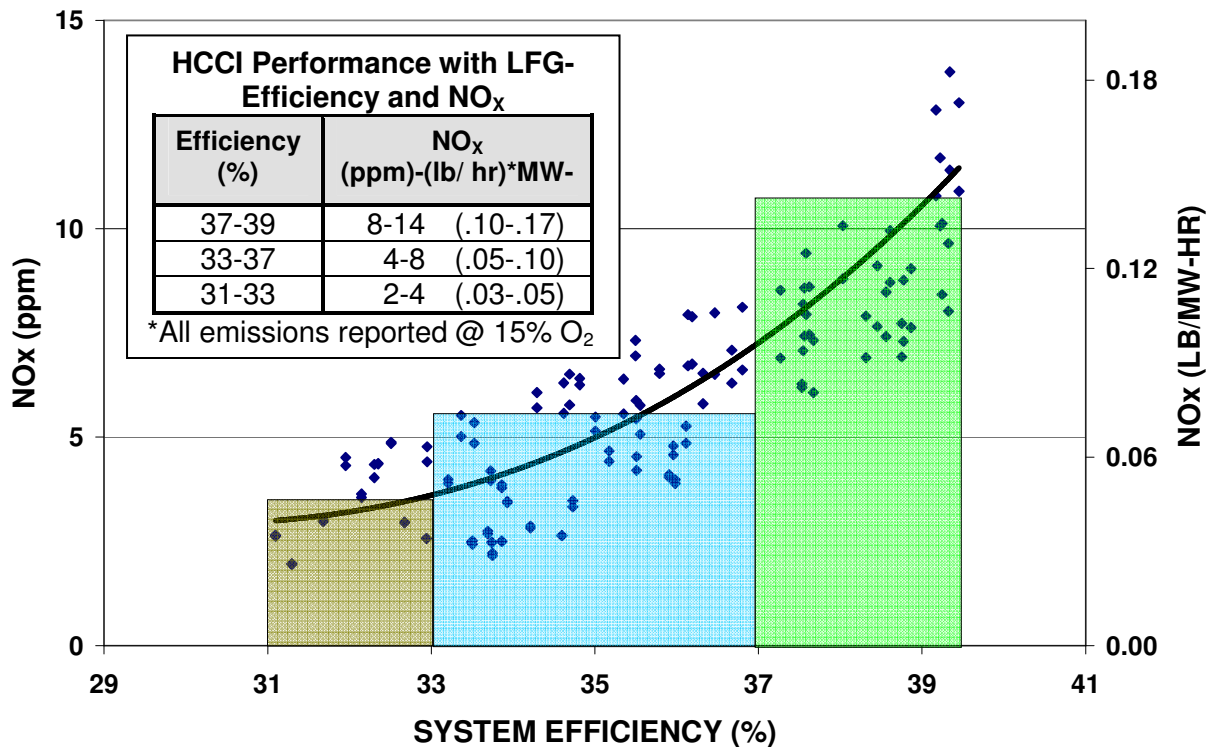


Figure 1 - NO_x Emissions & System Efficiency for LFG

Environmental and Economic Benefits

- Improving air quality
- Reducing operational costs of end user
- Offsetting the cost of electricity for municipalities and other end users
- Generation of additional renewable energy
- This technology can be adopted very quickly by a wide array of potential sites where sources of low BTU value feed stocks are present including: landfills, waste water treatment plants dairies, and biomass gasification plants

Publications

The findings from this work have been published at the following:

- Third Annual *Joint Forum on Biomass, Biofuels, and Bioproducts* of the California Biomass Collaborative. Details of the Forum can be found at the following website: http://biomass.ucdavis.edu/pages/forum/3rd/forum_program.html
- Third Annual *Advanced Stationary Reciprocating Engines Meeting* of U.S. DOE-ARES Program, and the CEC-ARICE Program. Details of this meeting can be found at the following website: <http://www.energetics.com/recips06/index.htm>
- *2006 Fall Technical Conference* of the Internal Combustion Engine Division (ICED) of ASME, ASME paper number ICEF2005-1578. Details of this conference can be found at the following website: <http://www.asmeconferences.org/ICEF06/TechnicalProgramOverview.cfm>

The Need for Public Policy Action

HCCI technology helps to support the stretch goals outlined by policymakers in two ways:

- Increased thermal conversion efficiency
- Low emissions