

# Response to Sierra Club Data Requests Set Two: Data Request No. 109

Amended Application for Certification  
for  
**HYDROGEN ENERGY CALIFORNIA**  
(08-AFC-8A)  
Kern County, California

Prepared for:  
**Hydrogen Energy California LLC**



Submitted to:



**California Energy  
Commission**



**U.S Department  
of Energy**

California Energy Commission

**DOCKETED  
08-AFC-8A**

TN # 68967  
DEC. 21 2012

Prepared by:



**December 2012**



## DATA REQUEST

- 109. The AFC indicates that the VOC emitted with the CO<sub>2</sub> vent gas stream (concentration 40 ppm) is “MeOH”, which is the commonly used abbreviation for methanol (AFC, Appx. E-3, p. 10). Methanol is both a VOC and HAP. The AFC estimates VOC emissions from the CO<sub>2</sub> vent gas at 11 lb/hour and 2.8 ton/year (as CH<sub>4</sub>, i.e., methane) (Ibid). However, the AFC fails to estimate emissions of methanol from the CO<sub>2</sub> vent for purposes of determining HAP emissions from the Project (see AFC, Appx. M, p. 1). Based on the AFC’s estimates for VOC emissions (as CH<sub>4</sub>), HAP emissions from the CO<sub>2</sub> vent can be estimated at 5.6 ton/year (as MeOH).<sup>4</sup> This increases the estimate of total methanol emissions from the Project from 7.09 tons/year to 12.69 tons/year, which exceeds the 10 ton/year major source threshold for emissions of single HAPs pursuant to 40 CFR §63.41 (defining a major source as a facility that will emit 10 tons annually of any HAP or 25 tons annually of any combination of HAPs.)**
- a. Please revise estimates for HAP emissions from the Project to account for methanol contained in the CO<sub>2</sub> vent gas.**
  - b. Please revise the health risk assessment for the Project to account for emissions of methanol contained in the CO<sub>2</sub> vent gas.**
  - c. Please provide a case-by-case maximum achievable control technology (“MACT”) analysis pursuant to 40 CFR Part 63, Subpart B for the Project’s emissions of HAPs.**

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<sup>4</sup> (2.8 tons VOC as CH<sub>4</sub>/year) × (methanol = CH<sub>3</sub>OH: 32 lb/lb-mol) / (methane = CH<sub>4</sub>: 16 lb/lb-mol) = 5.6 tons VOC as CH<sub>3</sub>OH/year.

## RESPONSE

- a. Methanol is used by the Rectisol process to capture and remove carbon dioxide (CO<sub>2</sub>) from synthetic gas to produce clean hydrogen-rich gas. Captured CO<sub>2</sub> is compressed and transported offsite for enhanced oil recovery and sequestration, and provisions are included for venting CO<sub>2</sub> for short periods of time in the event of unplanned equipment outages. A small amount of methanol remains in the CO<sub>2</sub> vent gas, and a wash system is in place to further reduce the potential for methanol emissions when venting occurs. The Rectisol process licensor, Linde, anticipates that the typical methanol content in the vented CO<sub>2</sub> stream will be 18 to 20 parts per million (ppm), as shown in Attachment 109-1. The annual emission estimate is based on the typical methanol content of 20 ppm and the expected annual quantity of CO<sub>2</sub> that would be vented, which will range from 70 to 100 percent of vent flow capacity. Emissions of methanol in the vented CO<sub>2</sub> gas are presented below in Attachment 109-2. This does not change the emissions of other pollutants from the CO<sub>2</sub> vent previously presented in the Amended Application for Certification (AFC).

Hydrogen Energy California (HECA) proposes a methanol emission limit from the CO<sub>2</sub> vent gas of 2.4 tons/year. HECA will manage annual CO<sub>2</sub> venting to meet the proposed emission limits for this source. HECA will measure the actual methanol concentration in the vent stream for each venting occurrence, along with flow rate. Based on the actual average annual methanol concentration and annual emission quantity to date, HECA will reduce the venting rate and/or duration as necessary to comply with annual emission limits. The CO<sub>2</sub> vent will be a highly instrumented and closely monitored system because venting affects the low greenhouse gas basis associated with all products produced.

The only other source of methanol emissions is the fugitives associated primarily with the Rectisol process, which are estimated to be 7.4 tons/year. Therefore, the total Project methanol emissions are 9.8 tons/year, which is less than the threshold for a single hazardous air pollutant (HAP), and HECA is not a major source of HAPs.

- b. The health risk assessment will not be revised to reflect the methanol emissions from the CO<sub>2</sub> vent stream, because methanol has very high acute and chronic Risk Exposure Levels; therefore, this small increase in this pollutant is not expected to increase the health risks.
- c. A maximum achievable control technology (MACT) analysis is not required based on the responses to Data Request 109 (a) and (b). Although not required, HECA believes that the HAP emission controls already provided and described in the Amended AFC are equivalent to MACT.

**Attachment 109-1**  
**Linde Expected Methanol Emissions**



**Fw: LE-FLR-E-0196 / Expected methanol content in CO 2 vent stream**  
**Michael Kang** to: John Ruud

12/12/2012 07:23 AM

History: This message has been replied to.

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FYI

----- Forwarded by Michael Kang/AV/FD/FluorCorp on 12/12/2012 07:27 AM -----

From: KERN.COUNTY-2.PROCESS@LINDE-LE.COM  
To: michael.kang@fluor.com  
Cc: william.becktel@fluor.com, gary.bryan@fluor.com, mark.guerard@fluor.com  
Date: 12/11/2012 11:29 PM  
Subject: LE-FLR-E-0196 / Expected methanol content in CO2 vent stream

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Dear Michael,

Herewith Linde confirms, that the expected methanol content in the vented CO2 stream downstream the water wash column is 18 to 20 ppmv.

Best Regards

Ulvi



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**Attachment 109-2**  
**CO<sub>2</sub> Vent Emission Estimates**

**Intermittent CO<sub>2</sub> Vent****Emissions Summary**

Hydrogen Energy California, LLC  
 Hydrogen Energy California (HECA) Project

20-Dec-2012

**Operating Parameters**

Maximum Hours of Operation = 504 hr/yr  
 Maximum Hourly Flow = 761,400 lb/hr  
 Maximum Hourly Flow = 17,584 lbmol/hr  
 Average flow capacity for year = 85% of maximum (varies between 70% - 100%)  
 Annual Flow @ 85% capacity = 163,092 ton/yr  
 = 7,533,112 lbmol/yr

Molecular weight  
 Methanol 32 lb/lbmol

**CO<sub>2</sub> Vent Emissions @ Average Annual Flow (85% of Maximum)**

Compound	Short-term Emission Factor (ppm)	Long-term Emission Factor (ppm)	Hourly (lb/hr)	Annual (lb/yr)	Annual (ton/yr)
Methanol	40	20	2.25E+01	4.83E+03	2.4

**Notes:**

1) Vent gas methanol concentrations are based on process licensor data. The methanol concentration is expected to be 18-20 ppm, but could be as high as 40 ppm associated short-term operational conditions such as transient impacts on the wash column.

2) Annual emission rates are based on 504 hours per year of venting at 85% flow rate.



**BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT  
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1516 NINTH STREET, SACRAMENTO, CA 95814  
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***AMENDED APPLICATION FOR CERTIFICATION FOR THE  
HYDROGEN ENERGY CALIFORNIA PROJECT***

**Docket No. 08-AFC-08A  
(Revised 11/20/12)**

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DECLARATION OF SERVICE

I, Dale Shileikis, declare that on December 21, 2012, I served and filed a copy of the attached Response to Sierra Club Data Requests Set Two: Data Request No. 109, dated December, 2012. This document is accompanied by the most recent Proof of Service list, located on the web page for this project at: [http://www.energy.ca.gov/sitingcases/hydrogen\\_energy/index.html](http://www.energy.ca.gov/sitingcases/hydrogen_energy/index.html)

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**AND**

For filing with the Docket Unit at the Energy Commission:

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1516 Ninth Street, MS-4  
Sacramento, CA 95814-5512  
[docket@energy.ca.gov](mailto:docket@energy.ca.gov)

*OR, if filing a Petition for Reconsideration of Decision or Order pursuant to Title 20, § 1720:*

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California Energy Commission  
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I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

  
\_\_\_\_\_

<sup>1</sup> This Proof of Service form is not appropriate for the use when filing a document with the Chief Counsel under Title 20, sections 1231 (Complaint and Request for Investigation) or 2506 (Petition for Inspection or Copying of Confidential Records). The Public Advisor can answer any questions related to filing under these sections.