<table>
<thead>
<tr>
<th><strong>Docket Number:</strong></th>
<th>19-IEPR-08</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Title:</strong></td>
<td>Natural Gas Assessment</td>
</tr>
<tr>
<td><strong>TN #:</strong></td>
<td>227779</td>
</tr>
<tr>
<td><strong>Document Title:</strong></td>
<td>Renewable Natural Gas - Biomethane and Hydrogen</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Presentation for April 22, 2019, IEPR workshop on Preliminary Natural Gas Price Forecast and Outlook</td>
</tr>
<tr>
<td><strong>Filer:</strong></td>
<td>Stephanie Bailey</td>
</tr>
<tr>
<td><strong>Organization:</strong></td>
<td>California Public Utilities Commission</td>
</tr>
<tr>
<td><strong>Submitter Role:</strong></td>
<td>Public Agency</td>
</tr>
<tr>
<td><strong>Submission Date:</strong></td>
<td>4/19/2019 11:37:36 AM</td>
</tr>
<tr>
<td><strong>Docketed Date:</strong></td>
<td>4/19/2019</td>
</tr>
</tbody>
</table>
Renewable Natural Gas: Biomethane & Hydrogen

CEC IEPR Workshop
April 22, 2019
Jonathan Bromson, Public Utilities Counsel IV
Jamie Ormond, Public Utilities Regulatory Analyst V
Terms

RENEWABLE NATURAL GAS/RENEWABLE GAS

BIOMETHANE

HYDROGEN

RENEWABLE METHANE
Legislation

- AB 1900 (Gatto 2012) – develop biomethane pipeline injection standards
- SB 1383 (Lara 2016) – develop at least 5 dairy biomethane pipeline interconnection projects; significantly increase the production and use of in-state biomethane in electric and transportation industries
- SB 840 (Budget 2016) – CCST deep dive into heating value & siloxane
- SB 2313 (Williams 2016) – extend the end-date for the interconnection incentive program
- SB 1440 (Hueso 2018) – determine cost effective renewable natural gas procurement
- AB 3187 (Grayson 2018) – work on renewable natural gas interconnection process
- SB 1369 (Skinner 2018) – consider hydrogen as energy storage
Goals / Expected Outcomes

- California imports about 95% of the fossil natural gas we use every day
  - Current California gas market impacted by infrastructure failures
- Any regulatory actions taken should help meet state emissions reduction goals. Moving towards a system that flows a decarbonized/zero-carbon gas product could:
  - Reduce system and end-use carbon emissions and reduced negative health impacts
  - Increase jobs
  - Enhance in-state system reliability
- Too early to tell how much RNG will be introduced into California supply
- Reducing waste gas from flaring directly into the atmosphere and instead putting it to beneficial use via pipeline injection for use in electric and transportation sectors moves state towards short-lived climate pollutant reduction goals. See ARB SLCP Reduction Strategy 2017
Dairy Pilots Update

- R. 17-06-015, 2018 Solicitation, Application evaluation process, Selection
- 6 pilot projects selected:
- Reviewing contracts for dairy biomethane pilot projects
- The 6 selected pilot projects comprise a little less than 6300 MMBtu/day of supply (about 2.36 Mcf/year), at a total installation cost of about $132 million and annual O&M costs of $1.4 million. Negligible impact on supply of natural gas currently, but a start.
Barriers / Issues
NOT under CPUC jurisdiction

• Market issues
  – CARB Low Carbon Fuel Standard (LCFS) credits
  – FedEPA Renewable Identification Numbers (RINs)
    • Pushing RNG towards transportation
    • What does the future hold?
Current CPUC Efforts – Ongoing

Barriers / Issues under CPUC jurisdiction

• Utility procurement pilots for use in CNG pumps
  – With LCFS and RIN credits, “in the money”

• Renewable natural gas pipeline interconnection tariff standardization

• SoCalGas voluntary opt-in RNG tariff, A.19-02-015
  – Core residential customers choose how much maximum $ per month amount for RNG purchase
  – Commercial / industrial customers chose $ amount or % of gas use

• Biomethane constituents of concern: update due July 2019

• Hydrogen injection standards and renewable gas procurement standards→
H₂@Scale: Linking Natural Gas, Electric and H₂ Grids
Hydrogen: Problem We’re Trying to Solve

-- We use a lot of natural gas! (high energy density, easy to store, cheap, dispatchable) But, it’s destroying the planet. What if it weren’t?
-- Let’s decarbonize the natural gas system, use a decarbonized gas form of fuel. (Retain advantages in a non-polluting, renewable form of gas.)
-- Mobile & Stationary Sources

When hydrogen is used as a power source, the only byproduct is water; no carbon dioxide is emitted.

Water is the only byproduct of power generation with hydrogen.

\[ H_2 + \frac{1}{2} O_2 + \text{Electricity} \rightarrow H_2O \]
Hydrogen issues under CPUC jurisdiction

• Production: via Electricity Rates
• Transportation: in pipeline system?
• Storage: in pipelines? in salt mines attached to pipelines? In blended gases?
  – Theory: seasonal time shifting of renewable electricity via storage in the pipeline system*
Barriers to US Hydrogen Proliferation

- Technology doubts/ lack of awareness & funding/ False assumptions
  - IHS Study -- EU and California – Leeds!
- Standard safety questions about hydrogen*
- Questions about cost → Electricity rates for hydrogen production
- Need to determine pipeline injection/safety/ blending standards (European studies are a start.)
  - Both topics fall within open proceedings
• R. 13-02-008: 18 parties have requested a phase or OIR on hydrogen transportation

• R. 18-12-006: investigate electric rates to produce hydrogen (...transportation fuel...)

• SB 1369 (Skinner 2018) hydrogen to be considered “storage.”
California Hydrogen Update

• AB 8, Perea 2013: $20 million annually for H2 refueling stations to support early FCEV market – AB 8 program is necessary until there are at least 100 publicly available hydrogen-fueling stations in operation in CA

• Governor Jerry Brown’s Exec Order B-48-18: 5 million ZEVs by 2030 ** FCEV + battery EV
  – Goal 200 hydrogen fueling stations by 2024
  – LCFS update to add Hydrogen Refueling Infrastructure credits for unused capacity for 15 years on top of LCFS credits for dispensing fuel

• By end of 2018, 39 hydrogen refueling stations (including 1 privately funded) are open to the public.*

• Another 26 stations are funded and in various stages of development