<table>
<thead>
<tr>
<th><strong>Docket Number:</strong></th>
<th>17-IEPR-04</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Title:</strong></td>
<td>Natural Gas Outlook</td>
</tr>
<tr>
<td><strong>TN #:</strong></td>
<td>221394</td>
</tr>
<tr>
<td><strong>Document Title:</strong></td>
<td>Presentation - Scope of the 2017 Natural Gas Market Trends and Outlook Report</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Presentation by Jennifer Campagna of CEC</td>
</tr>
<tr>
<td><strong>Filer:</strong></td>
<td>Raquel Kravitz</td>
</tr>
<tr>
<td><strong>Organization:</strong></td>
<td>California Energy Commission</td>
</tr>
<tr>
<td><strong>Submitter Role:</strong></td>
<td>Commission Staff</td>
</tr>
<tr>
<td><strong>Submission Date:</strong></td>
<td>10/5/2017 1:34:09 PM</td>
</tr>
<tr>
<td><strong>Docketed Date:</strong></td>
<td>10/5/2017</td>
</tr>
</tbody>
</table>
Scope of the 2017 Natural Gas Market Trends and Outlook Report

California Energy Commission

October 9, 2017

Jennifer Campagna
Leon D. Brathwaite
Supply Analysis Office
Energy Assessments Division
Background

Natural Gas Market Trends and Outlook Report

- Produced every two years as part of the California Energy Commission’s Integrated Energy Policy Report (IEPR)

- Reports are required by statute:
  - Section 25302 of the California Public Resources Code requires that the IEPR contains an overview of major energy trends and issues facing the state
  - Section 25303 of the California Public Resources Code requires the Energy Commission to conduct natural gas (and electricity) forecasting and assessment activities in support of the IEPR
Natural Gas Demand

- U.S. historical demand
  - Significant increase in power generation NG demand since 2008
  - Some growth in industrial sector
  - Residential and commercial flat

- California historical demand
  - Clean energy policies (i.e., RPS) impact on natural gas demand
  - Flattening of natural gas demand in all sectors

- California demand forecast
  - Residential, commercial, industrial - done by Demand Analysis Office
  - WECC power plants - done by PLEXOS (another presentation)

- Growing exports to Mexico and LNG
Natural Gas Sources and Production

- Production and reserves in the U.S. are rising
  - U.S. - largest natural gas producer in world (2016)
  - Gas production over 77,000 MMcf/day (2016)
  - Proved reserves at 300 Tcf (2015)

- Shale natural gas is the main driver
  - 60% of U.S. dry gas production originates from shale
  - Environmental concerns regarding disposal of wastewater and emissions

- LNG imports to the United States are declining
Daily Natural Gas Production from Shale (U.S.)

Source: U.S. EIA
Natural Gas Infrastructure

- Natural Gas Infrastructure
  - U.S. natural gas system
    - 318,000 miles of interstate and intrastate pipelines; over 2.2 million miles of gas distribution lines
    - Development of NG resources in Northeast & other regions has led to the construction of additional pipeline capacity
  - California natural gas system
    - 12.89 Bcf/day delivery capacity of interstate pipelines; in-state receipt capacity of 9 Bcf/day
    - Peak demand of 11.157 Bcf can be a challenge for the system
  - Long-term role of storage in California
    - Aliso Canyon, Los Medanos, Pleasant Creek
    - Declining natural gas use
  - U.S./California Infrastructure Safety Issues
    - San Bruno explosion, Aliso Canyon gas leak
    - Aging infrastructure
Natural Gas Prices and Supply Outlook

- NAMGas model
- Three IEPR common cases
  - High Demand
  - Mid Demand
  - Low Demand

- NAMGas presentation will discuss projections for:
  - Natural gas hub prices
  - U.S. demand
  - U.S. production
California Energy Commission

Natural Gas Issues

- Gas-Electric Coordination
- Impact of Increased Renewables
- Switching from Coal to Natural Gas Generation, especially in eastern U.S.
- California’s Unique Issues
  ✓ State’s position at the end of several major interstate pipeline systems
- The Changing Market in Mexico
  ✓ Mexico’s Increasing Demand for Natural Gas
  ✓ United States Exports to Mexico
- LNG Exports from the United States
  ✓ Market changes – U.S. positioned to become net exporter
  ✓ U.S. could become third largest LNG producer for export by 2020
Methane Emissions from the Natural Gas System

- Leakage can occur throughout NG system
- Methane emissions
  - 10 percent of total GHG emissions in California
- Estimating methane emissions
  - Bottom-up or Top-down
- Multiple studies (e.g. EDF)
- State and Federal Greenhouse Gas Inventories
- California efforts (e.g. legislation, research funding)
- Tracking in-state and out-of-state emissions (Senate Bill 839)
  - Working with CARB
  - Progress report completed September 2017
Comments and Questions?

Jennifer Campagna, Jennifer.Campagna@energy.ca.gov, 916-654-4710

Leon Brathwaite, leon.brathwaite@energy.ca.gov, 916-654-4771