California Energy Commission

California’s Natural Gas Needs and Supply

Prevention First 2008
An Onshore and Offshore Pollution Prevention Symposium & Technology Exhibition
September 9-10, 2008

Randy Roesser, Energy Specialist
California Energy Commission
rroesser@energy.state.ca.us
Topics of Presentation

• 2007 *Integrated Energy Policy Report*

• Natural Gas Role in Climate Change Era

• Natural Gas Supply, Demand & Prices

• Natural Gas Uncertainties

• The Energy Commission has the responsibility to conduct assessments and forecasts of energy industry supply, production, transportation, delivery and distribution, demand, and prices (SB 1389, Bowen & Sher, Ch. 568, 2002)

• The Energy Commission uses these assessments and forecasts from the various energy sectors to develop state energy policies that:
  – enhance the state's economy
  – protect public health and safety
  – ensure energy reliability
  – protect the environment
  – conserve resources
Energy Policy
To Meet Growing Energy Demand

The state’s Integrated Energy Policy Report and Energy Action Plan defined and adopted a “loading order” to meet California’s growing electricity needs.

(1) energy efficiency and demand response

(2) renewable energy and distributed generation

(3) clean fossil-fueled generation and infrastructure improvements
The Role of Natural Gas In Climate Change Era

• “...natural gas is the fossil fuel of choice and will likely play an even more important role in California’s energy future, despite policy makers’ emphasis on efficiency and renewables.” (2007 IEPR, page 167)

• “Even with uncertainties of domestic supplies and prices, California most likely will continue to build new natural gas power plants for years to come.” (2007 IEPR, page 168)

• “Natural gas is and will remain the major fuel in California’s supply portfolio and must be used prudently as a complementary strategy to reduce greenhouse gas emissions.” (2007 IEPR, page 186)
NATURAL GAS

SUPPLY
California Energy Supply Mix

- **Petroleum**: 46.0%
- **Natural Gas**: 29.5%
- **Renewables**: 9.0%
- **Coal**: 8.0%
- **Nuclear Hydro**: 5.0% (2.5%)

*California Energy Commission Staff, 2007*
California Sources of Natural Gas

- 13.5% In-State
- 23.5% Canada
- 40% Southwest
- 23% Rockies

California Energy Commission Staff, 2007
Major Production Basins Serving Western US, Canada and California

California Energy Commission Staff, 2007
Future Natural Gas Pipelines
Rockies To West Coast

- **Ruby Pipeline**: 680 mile, 1.2 bcf/d capacity line from Opal, Wyoming to Malin, Oregon. In-service date: early 2011

- **Kern River**: 0.2 to 1.0 bcf/d expansion of existing 1,650 mile 1.7 bcf/d pipeline from Wyoming to Southern California. In-service date: late 2010

- **Sunstone Pipeline**: 585 mile, 1.2 bcf/d capacity line from Opal, Wyoming to Stanfield, Oregon. In-service date: late 2011
Proposed West Coast LNG Facilities

Location and Capacity of Proposed LNG Terminals in California, Oregon, Washington, Western Canada and Baja-Mexico

- **Kitimat, British Columbia**
  - Kitimat LNG Facility
  - Galveston LNG, LLC
  - 0.61-1.0 Bcf/d

- **Clatskanie, Oregon**
  - Portwestward LNG Facility
  - Portwestward LNG, LLC
  - 0.7-1.25 Bcf/d

- **Astoria, Oregon**
  - Oregon LNG
  - Funding Partners
  - 1.0-1.5 Bcf/d

- **Bradwood, Oregon**
  - Bradwood Lending
  - Northern Star Natural Gas
  - 1.0-1.3 Bcf/d

- **Coes Bay, Oregon**
  - Jordan Cove Energy Project
  - Fort Chicago Energy Partners L.P.
  - 1.0 Bcf/d

- **Offshore, California**
  - Clearwater Port
  - Clearwater Port LLC (Northern Star Natural Gas)
  - 1.2-1.4 Bcf/d

- **Offshore, Southern California**
  - OceanWay Secure Energy Project
  - Woodside Natural Gas (Woodside Energy)
  - 0.4 Bcf/d - Later phases could increase capacity to 0.9 Bcf/d

- **Ensenada, Baja California**
  - Energia Costa Azul
  - Sempra & Pacific LNG Consortium/Shell Group
  - 1.0 Bcf/d

- **Texada Island, Canada**
  - Texada Island LNG
  - WestPac LNG Corp.
  - 0.5 Bcf/d

- **Vancouver Island, Canada**
  - Mt. Hayes Storage Project
  - Peak Shaving Facility
  - Terasen Gas
  - 1.0 Bcf/d

- **Sonora, Mexico**
  - Sonora LNG Facility
  - Sonora Pacific LNG/DKRW Energy LLC
  - 1.0 Bcf/d
US LNG imports are down 60% from 2007

2008 LNG imports projected at 480 Bcf, 38% less than 2007’s record level of 770 Bcf
Natural Gas Supply

• United States natural gas production from 1998 to 2006 was flat
  
  - 2007 4% increase
  - 2008 8.0% projected increase
  - 2009 3.7% projected increase
Natural Gas Supply

• Production increases:
  1. Higher prices drive additional drilling
  2. Discoveries of new, substantial reserves
  3. Technological advancements
NATURAL GAS

DEMAND
California Natural Gas Use by Sector

Source: Utility and pipeline filings to the California Energy Commission
Natural Gas Demand Growth In the Next Decade

- Energy Commission staff projects continued demand growth over the next decade

<table>
<thead>
<tr>
<th>Region</th>
<th>Overall Demand</th>
<th>Power Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>2.3</td>
<td>5.7</td>
</tr>
<tr>
<td>United States</td>
<td>2.1</td>
<td>5.6</td>
</tr>
<tr>
<td>California</td>
<td>1.3</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Source: 2007 Natural Gas Market Assessment Report
California’s Outlook
Natural Gas Demand

California Energy Commission Staff, 2007
Natural Gas Demand

- Natural gas is critical to meet CA’s energy needs
- Electricity generation, fastest growing use of NG
- Strong worldwide demand and higher prices
- Energy efficiency advances
- Aggressive Renewable generation goals of AB 32
NATURAL GAS PRICES
Natural Gas & Oil Spot Prices
US Dollar – Euro Value

Prepared by CEC Staff 9/03/2008
### Henry Hub Spot Prices - California Differential -

<table>
<thead>
<tr>
<th>Differential</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Differential</td>
<td>-1.50</td>
</tr>
<tr>
<td>-1.00</td>
<td></td>
</tr>
<tr>
<td>-0.50</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>2.50</td>
<td></td>
</tr>
<tr>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>3.50</td>
<td></td>
</tr>
<tr>
<td>4.00</td>
<td></td>
</tr>
</tbody>
</table>

Prepared by CEC Staff 9/02/2008

---

![Graph](image-url) - (Henry Hub - Point of Interest)

- Green line: PG&E Malin Differential
- Red line: PG&E Citygate Differential
- Blue line: SoCalGas Border Average Differential

['01/02/07', '02/16/07', '04/04/07', '05/21/07', '07/06/07', '08/21/07', '10/05/07', '11/20/07', '01/11/08', '02/28/08', '04/15/08', '05/30/08', '07/14/08', '08/27/08']
U.S. Storage
Monthly Inventory

Current U.S. Natural Gas Storage Capacity: 3,703 Billion Cubic Feet; Sources: EIA

Prepared by CEC Staff 9/02/2008
California Storage Capacity and Utilization

Prepared by CEC Staff 9/02/2008

Beginning of the month levels, unless indicated. California Energy Commission Staff's estimate
Natural Gas Prices

Supply Issues

- LNG imports are down significantly
- Low storage levels coming out of winter
- Independence Hub shutdown
- Active hurricane season in the Gulf of Mexico
- Increasing domestic production
Natural Gas Prices

Demand Issues

- Electric generation demand for natural gas
- Worldwide LNG demand remains strong
- Energy efficiency and Renewables impact on natural gas demand
Natural Gas Prices

Non-Market Fundamentals

- Weak dollar increases attraction of dollar traded commodities
- Link to higher petroleum prices
- Escalating costs of drilling equipment
Natural Gas Uncertainties

• GHG impacts from escalating use of NG for power generation

• Impact on demand as more Renewable resources come online

• LNG: liquefaction vs. regasification balance

• Continuing geo-political risks

• Creation of a NG/LNG international cartel