<table>
<thead>
<tr>
<th><strong>DOCKETED</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Docket Number:</strong></td>
</tr>
<tr>
<td><strong>Project Title:</strong></td>
</tr>
<tr>
<td><strong>TN #:</strong></td>
</tr>
<tr>
<td><strong>Document Title:</strong></td>
</tr>
<tr>
<td><strong>Description:</strong></td>
</tr>
<tr>
<td><strong>Filer:</strong></td>
</tr>
<tr>
<td><strong>Organization:</strong></td>
</tr>
<tr>
<td><strong>Submitter Role:</strong></td>
</tr>
<tr>
<td><strong>Submission Date:</strong></td>
</tr>
<tr>
<td><strong>Docketed Date:</strong></td>
</tr>
</tbody>
</table>
California Natural Gas Market Transformation: Thoughts and Recommendations

Joint presentation by

Greg Lander, President
Skipping Stone

N. Jonathan Peress
EDF

www.skippingstone.com  www.skippingstone.co.jp

EDF
Finding the ways that work
Vision

To transform the CA natural gas business into a market that responds to price and operational signals on a sub-day basis to support, coordinate, inform and be informed by the sub-hour CA electric market.
A modernized gas market will enable penetration of higher amounts of variable low carbon resources into the grid, reduce need for bulk gas storage to maintain reliability, and reduce overall consumer costs.
Identify Deficiencies and Barriers

Major entities in the CA natural gas market have different rules that apply for natural gas forecasting, procurement and market monitoring/control – these differences do not reflect operational requirements but instead arise from their separate “positions” in the market.

Market conditions that exist today have created an inhospitable environment for clean energy resources capable of supplying flexible services to engage in, and receive full value of, their investments.

Historically, bulk natural gas storage has provided California a cushion that has allowed the state to avoid taking on serious gas-electric energy policy coordination, that historic cushion has changed.
Establish Rules

Start by establishing rules that expect and require that all users of the CA natural gas infrastructure play by the same rules, and utilize modern day technology for system operation.

Rules should include:

- Seller and all Shipper operation under contracts with the System Operator.
- Same requirements on gas supply department of the gas utilities for forecasting, scheduling, and balancing.
Implement

1. Have all users of the gas systems schedule flowing gas (from in-state and interstate sources) equal to their daily burn +/- 5% every day

2. Maintain Summer gas storage inventory levels at between 70% and 80% of working gas levels

3. Institute Winter gas storage refills when inventory drops below 60% (or other prudent level) and demand drops such that interstate capacity is available to refill to 70% (or other prudent level)
Next have the gas system operators automate their imbalance trading mechanisms as a Market Operator so that the imbalance trading mechanism can operate more frequently; beginning with monthly imbalances and proceeding to daily and sub-day.
Next, Establish the Proposed Imbalance Market
The Imbalance Market
Purpose of Imbalance Market

The Imbalance Market will:

- Facilitate more efficient gas market operations within the SoCal Operating Area
  - Possible California-wide applicability as well
- The Market Operator would provide an intraday balancing market to address within day variances of demand vs. supply
- Provide intraday price formation and price discovery in the gas market to compliment the within day/real-time price formation and price discovery in the electric market
  - Provide known and knowable prices for generators to show CAISO
In addition, the Imbalance Market would:

- Empower and unleash market forces to address reliability of both systems on a permanent self-correcting basis.
- Promote efficient market compatible investments on both the gas and electric side that acknowledge the real costs and benefits to market participants of operating in a reliable and efficient manner.
Some Particulars

Market Operator/System Operator would “run” the market, clear trades, post prices and volumes, and settle (i.e., sell or buy) imbalances that were not cleared by trades.

The existing monthly cash-out price references and bands (tiers) are readily adaptable to daily and eventually sub-daily and would be used by the Market Operator for normal operations.

The existing OFO cash-out prices and bands (tiers) are also readily adaptable to daily and eventually sub-daily and would be used by the Market Operator for strained operations.
Some Particulars – Cont’d

- The Imbalance trading point is a “paper pool” set-up and administered by the Market Operator/System Operator (much like the implicit “point” used to settle monthly imbalance trades).
- The Market Operator/System Operator can also use the imbalance paper pool to buy or sell gas to maintain storage inventory within the optimum bands set forth above.
- The Market Operator/System Operator would continue to assess delivery charges on gas delivered to end-use locations.
Establish Rules – Examples of Results

Start by establishing rules that expect and require that all users of the CA natural gas infrastructure play by the same rules. All Sellers and all Shippers operate under contracts with the System Operator. This includes the gas supply department of the gas utilities. Had this rule been in effect, the charts on the following slides indicate how different the SoCal market would have operated during the indicated periods.
Establish Rules – Examples of Results

SoCal End of Day Envoy Sendout and Envoy End of Day Receipts versus End of Day Receipts under New Rules over Full Period Studied (Dthd)

When Blue line exceeds Purple line
On-System Storage needed for supply

Aliso Canyon being drained

EOD Sendout  EOD Receipts Old  EOD Receipts w-New Rules Keep to Schedule of +/- 5%  95% of Interstate Receipt Capacity
Establish Rules – Examples of Results

SoCal Gas Scheduled Imbalances (Injections / (Withdrawals) Beginning of Day Over Full Period Studied (Dthd) vs Scheduled Injections Withdrawals Under New Rules

- BOD Scheduled Imbalance Old
- BOD Scheduled Imbalance New Rules

No Daily Imbalance Trading Market
Establish Rules – Examples of Results

Comparison of SoCal Scheduled Imbalance Pctgs (Injections / (Withdrawals) as % of Scheduled Sendout vs Scheduled Injections/Withdrawals under New Rules Over Full Period Studied

Note: When Green line exceeds -5% it is because Sendout exceeds 95% of SoCal’s Interstate Receipt Capacity

No Daily Imbalance Trading Market
SoCal Gas Scheduled Imbalances (Injections / (Withdrawals) Beginning of Day
Winter 2016 - '17 (Dthd) vs Scheduled Injections Withdrawals Under new Rules
SoCal Scheduled Imbalance Pctgs (Injections / (Withdrawals) as % of Scheduled Sendout
Winter 2016 - '17 vs Injections/Withdrawals Under New Rules

Note: When Green line exceeds -5% it is because Sendout exceeds 95% of SoCal's Interstate Receipt Capacity

No Daily Imbalance Trading Market
Establish Rules – Examples of Results

Comparison of Cumulative End of Day Storage Use Winter '16 - '17 Old Rules vs New Rules

Note 1: Chart is indicative due to 8 of 151 days when Envoy did not send data
Note 2: EOD under New Rules Modeled as entire system is out of balance in one direction based upon same direction that system was out of balance. This is not likely to be the case under a 5% +/- Rule because Shippers will likely be offsetting one another. In addition, under as Daily Gas Imbalance Market cumulative use could be even less.
Questions?

Thank you

Greg Lander
Skipping Stone
glander@skippingstone.com
978-717-6140

Thank you

Jonathon Peress
Environmental Defense Fund
jperess@edf.org
603-XXX-XXXX