

**OPERATING AND
COMPLYING
UNDER AB 32**
REALITIES AND CONSTRAINTS

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SITUATION – CHEVRON RICHMOND REFINERY

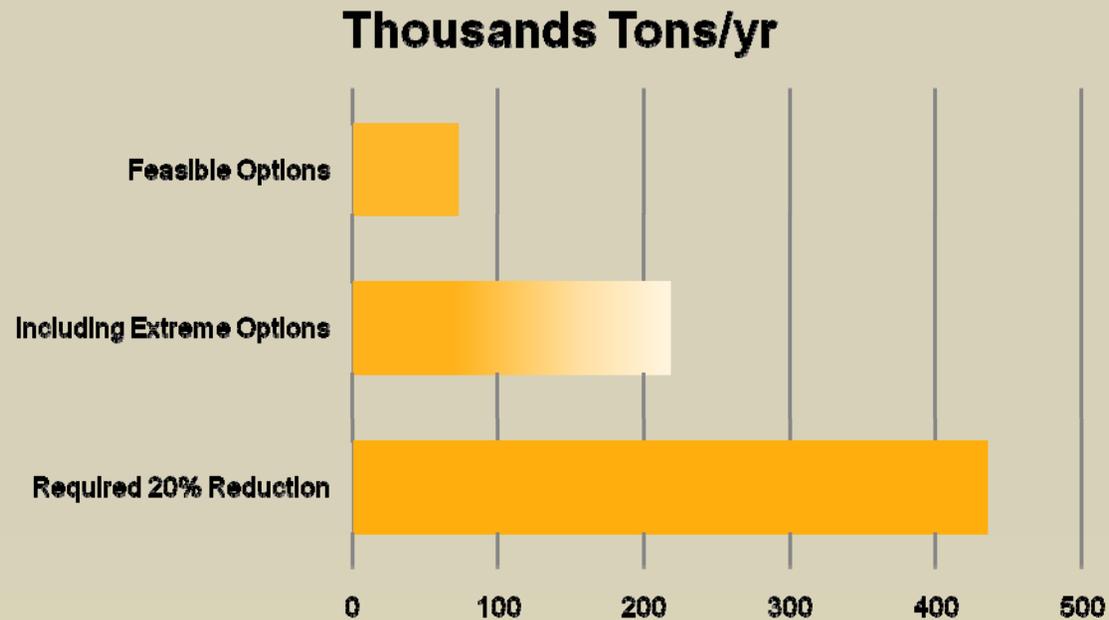
- The refinery is already very energy efficient – 20% more efficient than 10 years ago
- A 20% CO₂ reduction is required between 2009 and 2020 by the Conditional Use Permit for the Richmond refinery project sources
- The CUP requires 36,000 tons per year reduction beginning in 2009. (432,000 tons in total)
- The refinery began planning a year ago and is right now developing and implementing projects to meet it's reduction obligations
- Note: Running the new hydrogen plant at design capacity would require an additional 900,000 tons CO₂ reduction

***THESE ARE REAL MANDATED REDUCTIONS
RIGHT NOW!***

Compliance Options – Richmond Refinery

- **Feasible Options**
(known and implementable)
 - 2 Years less than \$100/ton
- **Extreme Options**
(Ever done before anywhere)
 - 4 years with costs ranging from ~\$100 to 200+/ton
- **Compliance Reality**
 - Carbon Sequestration (~\$150/ton) or Offsets (~\$40/ton)

RICHMOND REFINERY REQUIREMENTS VERSUS POSSIBLE



Richmond Refinery Lessons

1. Known cost-effective reduction opportunities are limited.
2. New technology offers only small additional opportunities. These are exploratory and have associated safety concerns.
3. CCS and Offsets are the only options
4. CCS & New Technology cost ~\$50 Million/year

***OFFSETS AND/OR CCS ARE ESSENTIAL JUST TO
MAINTAIN CURRENT OPERATIONS***

***THESE RESULTS WILL BE SIMILAR FOR ALL OF OUR
FACILITIES.***

El Segundo Heavy Oil Project

Breakthrough technology

\$1.2 Billion project

500 construction jobs

50 full time employees

Permitting uncertainty

200,000 tons year of CO₂

***PROJECT TRANSFERRED TO PASCAGOULA
MS AT END OF 2006 AFTER PASSAGE OF
AB32***

SAN JOAQUIN VALLEY NEW PRODUCTION PROCESS

- Unique new technology application
- Provides new production opportunity
- increased barrels per day and/or prolonged field life
- Continued jobs and economic activity
- Significant increased CO₂

New and expanded production only possible if offsets are allowable

CONCLUSIONS

In an efficient facility ---

1. *Compliance with simple reductions will be very expensive without offsets*
2. *Expansions and new facilities are only possible with CCS and/or offsets*
3. *Linkage to existing world carbon market(s) is the best way keep CA sources competitive*