



Energy Analysts International

Westminster, Colorado





EAI, Inc. (Energy Analysts International)

Impact of Ozone Compliance Costs on Gasoline Supply, Logistics and Costs for the Denver Area

***Expanded Executive Summary
for the
Colorado Petroleum Association
June 10, 2008***



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Overview of Program

- Industry Survey and Respondents
- Executive Summary
- Colorado Front Range Market
- Colorado Front Range Gasoline Supply Structure
- Other Low RVP Markets and Impact on Price Observations
- Impact of Various Gasoline Fuel Grades on Supply, Cost and Market Price



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Industry Survey and Respondents



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Colorado Gasoline Supply Industry Survey: Company Participants

Colorado Front Range Gasoline Supplier Survey									
Company Name									
Company Address									
Company Phone/Fax									
Company Website									
Company Logo									
Company Description									
Company History									
Company Products									
Company Services									
Company Contact Information									
Company Comments									
<p><input type="checkbox"/> ConocoPhillips</p> <p><input type="checkbox"/> Frontier</p> <p><input type="checkbox"/> Magellan</p> <p><input type="checkbox"/> Sinclair</p> <p><input type="checkbox"/> Suncor</p> <p><input type="checkbox"/> Valero</p> <p><input type="checkbox"/> Representing 8 refineries and 4 major pipelines serving the Colorado Front Range Market</p>									





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Executive Summary



Summary of Key Findings

Colorado Ozone Attainment Strategy Support (1 of 3)

- ❑ **Refinery Impacts:** Refiners will realize ozone fuel attainment program impacts in two major ways; 1) most refiners will have to modify their refineries to make the various fuels being considered, and 2) most refiners will incur reductions of gasoline for the Front Range market through light ends rejection and/or shift of gasoline to other markets.
- ❑ **Modification/Implementation Schedule:** Refiners will require 36 to 48 months to implement capabilities to produce 7.8 and 7.0 psi-with waiver CBOB gasoline and 60 months for the 7 psi-no waiver or RFG gasoline grades.
- ❑ **Capital Cost Impacts:** Total industry costs to comply with the various gasoline grades being considered is in the range of 140 million to 1 billion dollars with not all refiners submitting their capital cost estimates. This cost range translates into a range of 1,738 to 10,575 dollars per daily non-attainment gasoline barrel.
- ❑ **Operating Cost Impacts:** The lowest average incremental operating costs are for the CBOB 7 psi-with waiver and 7.8-no waiver at 1.01 and 1.21 cpg respectively and the highest were estimated for the 7 psi-no waiver and RFG cases at 3.21 and 2.35 cpg respectively. It should be noted that the available cost estimates for the RFG cases were limited and the aforementioned numbers are most likely skewed low.

Summary of Key Findings

Colorado Ozone Attainment Strategy Support (2 of 3)

- ❑ **Impact on Supply Options:** Some of the proposed new fuels in the Colorado Front Range will most likely sever supply linkage with refiners north of Cheyenne and refiners east and south of El Dorado, Kansas. In addition, the “turn-up” capability for the balance of the Colorado supply refineries will be reduced on top of what is already a very tight supply chain.
- ❑ **Potential Supply Loss:** The Colorado Front Range is likely to experience a decline in available gasoline supply due to two major factors:
 - Rejection of light ends (butanes & pentanes plus) to meet gasoline pool RVP limits. This volume is estimated to be in the range of 8.4 to 12.6 MBPD or 10 to 16 percent of the non attainment (NATN) market.
 - Some refiners have access to other markets and will shift gasoline to these markets to avoid the cost of manufacturing some of the more stringent gasoline specs being considered for the Colorado Front Range market. The range of potential gasoline loss due to market shift is 7 to 25 MBPD with the higher end of the range representing the RFG and 7 psi-no waiver cases.
- ❑ **Supply Availability and Impact on Market Prices:** EAI, Inc.’s analysis indicates that there have often been 5 to 15 CPG market premiums paid for similar low RVP fuels (in Detroit and KC) relative to conventional fuels without imposing the “1 psi no-waiver” restriction. Denver can expect to observe a more extreme version of what has occurred in these markets based on a tighter supply situation.



Summary of Key Findings

Colorado Ozone Attainment Strategy Support (3 of 3)

- ❑ ***Supply Response to Higher Prices:*** With some likelihood that the Colorado Front Range will experience significantly higher prices during the ozone non-attainment periods, some refiners will most likely respond with increasing supply to this market and thus moderate some of the market price impacts. However, this cannot occur spontaneously and will require additional capital projects and/or higher production costs due to increasing rejection of light gasoline components.
- ❑ ***Lost Ethanol Related Costs:*** Revenue will decline due to the lost uplift from blending ethanol plus lost blender tax credit. Additional costs will be incurred with refiners-suppliers purchasing RINS in lieu of being able to blend ethanol. If all NATN gasoline supply were not blended with ethanol, the average RINS cost would be 0.6 cents per NATN gallon. The combination of lost opportunity blending plus RINS cost could be approaching 6.5 cpg for the “no ethanol” blending case. It is likely that ethanol blending will be limited for the non-RFG fuel cases. These costs are likely to increase each year as the required ethanol blended volume increases with the RFS.
- ❑ ***Boutique Gasoline Products and Fungability:*** As ozone non-attainment markets adopt low RVP gasoline “standards”, this product will be in greater supply and accessible to markets from more refinery options. It is important for states and local governments to work in tandem to adopt common standards that recognize not only the localized market but the overall capability of the fuel supply chain. Low RVP gasoline sounds generic but 7.8 psi gasoline is a much easier product to make than 7.0 psi gasoline and the 1 psi waiver option compounds the complexity & costs.



Summary of Key Findings

Colorado Ozone Attainment Strategy Support

PROGRAM-FUEL EVALUATION FACTOR	CBOB 7PSI / NO WVR	CBOB CBOB/7 PSI WITH WVR	CBOB 7.8 PSI / NO WVR	RFG SUMMER
Time to Implement (Max(W Contingency)) Months (For all mjr splrs to accommodate)	60	36(48)	36(56)	60
Incremental Op. Costs (CPG) (Average Industry Per NATN BBL)	3.21	1.01	1.21	2.35
Capital Costs (MM \$) (1)				
Total Industry	\$380	\$265	\$140	\$1,000
Per Daily NATN BBL	\$4,029	\$3,297	\$1,738	\$10,575
Highest for Reporting Companies	\$350	\$125	\$110	\$750
Lowest for Reporting Companies	\$10	\$10	\$10	\$20
Supply Reduction (MBPD)				
Light End Rejection	12.6	8.4	8.7	12.5
Gasoline Mrkt Shift	18.6	7.3	7.0	24.3
Supply Reduction (Percent of NATN Market)				
Light End Rejection	15.8%	10.5%	10.9%	15.6%
Gasoline Mrkt Shift	23.2%	9.1%	8.7%	30.3%
Lost Light End Value (CPG of ATNM Supply) (2)	8.67	5.75	6.01	8.59
(1) Not all respondents had cost estimates available so total and average per bbl costs are most likely low				
(2) Based on light end losses being all pentane plus material; if butane rej with recovery would lower cost				





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Impact of Ozone Compliance Costs on Gasoline Supply, Logistics and Costs for the Denver Area

Colorado Front Range Market



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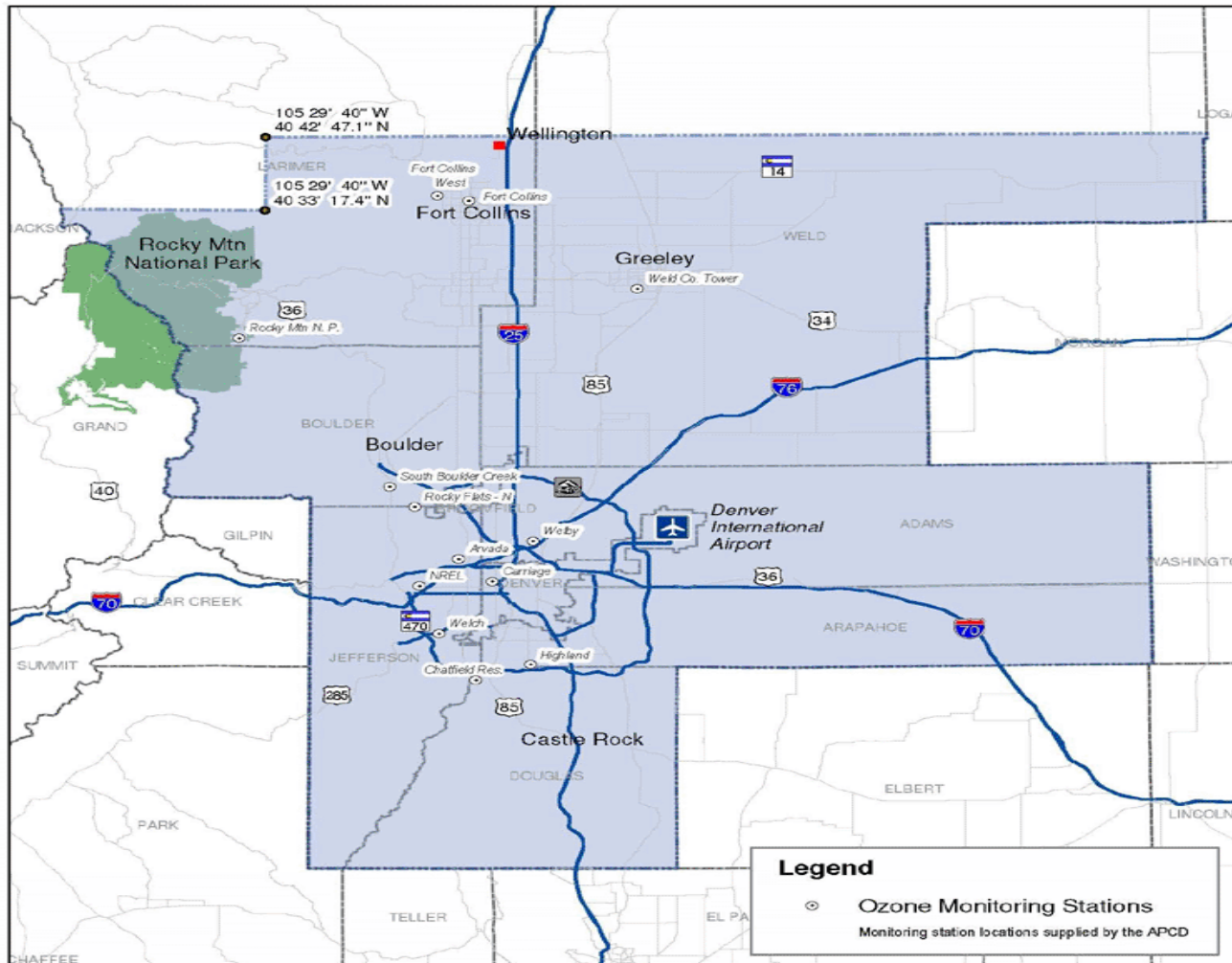
Gasoline Demand Distribution

Colorado Markets and Ozone Attainment Area

- ❑ **Overall Market:** Total Colorado gasoline demand is estimated to have been 142 MBPD in 2007. Based on EAI, Inc.'s latest Micro-Market Demand analysis, the total gasoline demand in the Front Range non-attainment area is 80.4 MBPD. The total Colorado demand for gasoline outside the non-attainment area is 61.3 MBPD.
- ❑ **Front Range-Denver Area:** The overall Eastern Central & Northeast Colorado area demand from Douglas country north to the state border and East to the KS border is 99.5 MBPD consisting of 80.4 MBPD in the ozone 8 hour non-attainment area and 19 MBPD outside of the non-attainment area.
- ❑ **Other Markets-Southeast and Western Colorado:** The total gasoline demand in western Colorado and Southeast Colorado is roughly 16 and 26 MBPD. There is product flow between these areas and the 8-hour non-attainment area as follows:
 - Texas Panhandle supply flows to La Junta, Fountain (Co Springs) and the Denver area via ConocoPhillips & NuStar Pipelines
 - Wyoming and Denver area product can flow south to the Fountain terminal on the Plains (Kaneb) Pipeline system
 - Some Denver area product is moved via rail to the Grand Junction/West Slope market area.

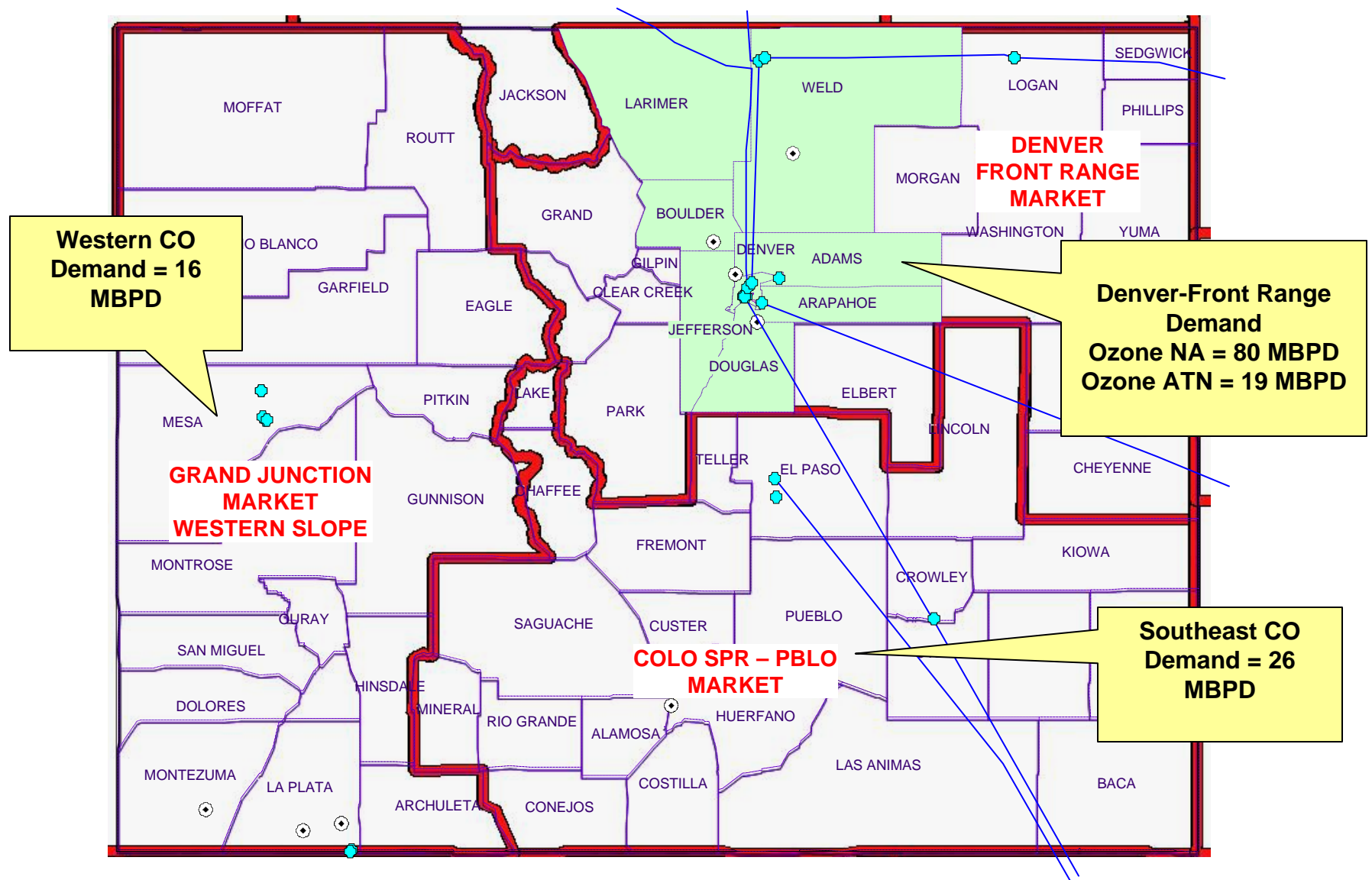


Denver-Boulder-Greeley-Fort Collins Eight Hour Ozone Control Area



Denver-Boulder-Greeley-Fort Collins, Colorado
Eight-Hour Ozone Control Area

Gasoline Demand Distribution Colorado by Geography and Ozone Attainment Status, 2007 MBPD Total Gasoline Demand at 141.8 MBPD





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Impact of Ozone Compliance Costs on Gasoline Supply, Logistics and Costs for the Denver Area

Colorado Front Range Gasoline Supply Structure



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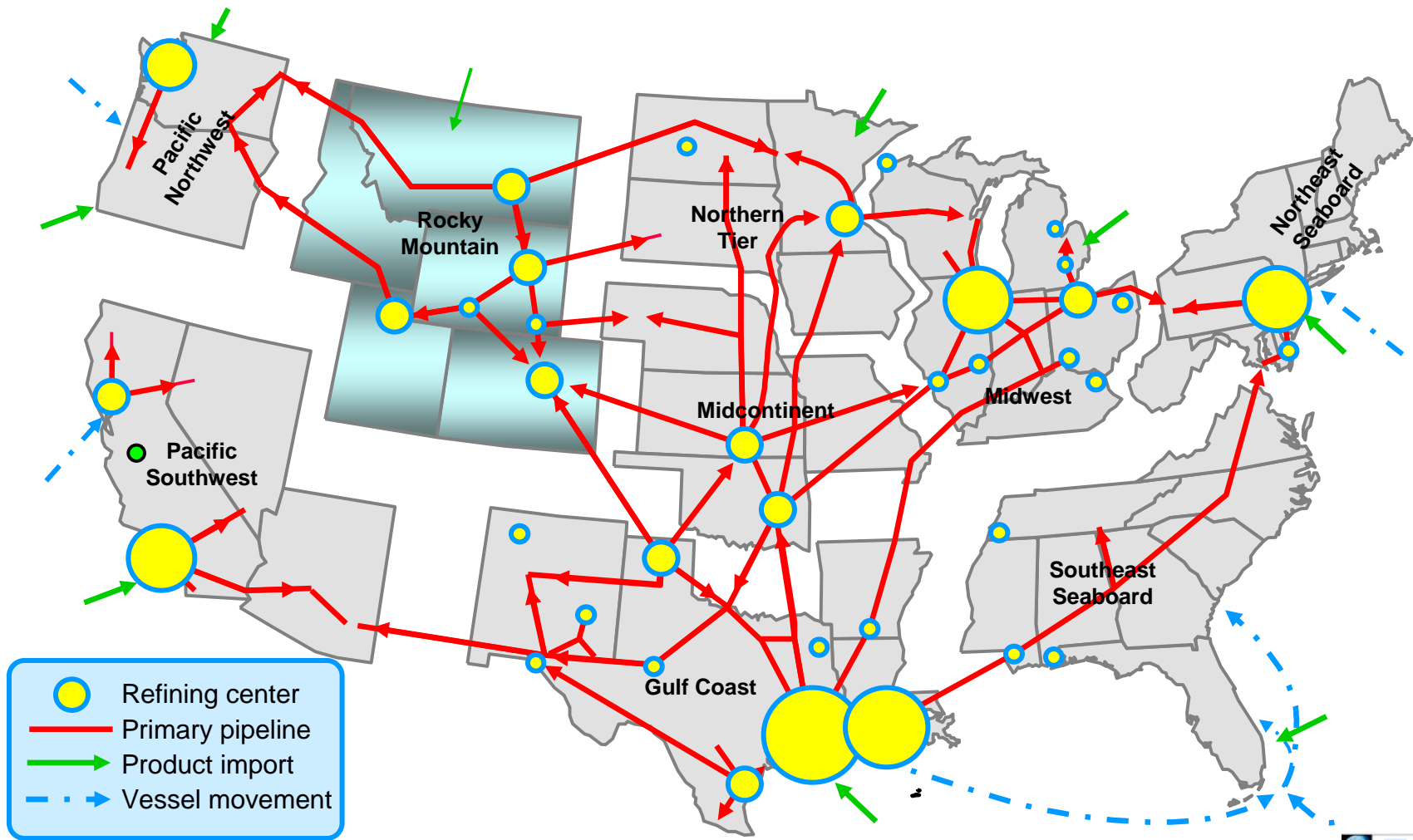
Colorado Gasoline Supply Chain Assessment Accommodating the New Fuel Specification

- ❑ ***Front Range Market and Refining Access:*** Total Colorado light product demand is 220 MBPD with gasoline at 143 MBPD. The Front Range light product market consists of 125 MBPD of gasoline demand. There are 8 refineries that can and traditionally do supply this market with an estimated total crude processing capacity of 775 MBPD and an effective capacity of approximately 300 MBPD (estimated as readily available to the Colorado Front Range market).
- ❑ ***Transportation Capabilities:*** There are five product pipelines serving the Colorado Front Range markets with source points in Wyoming, Billings (through connecting carriers), Texas Panhandle and the Midcontinent. The total capacity of these systems is approximately 214 MBPD and the available open effective seasonal capacity is estimated to be 22 MBPD. Thus, there is limited “slack” in the pipeline network to replace lost product in the Colorado Front Range market
- ❑ ***Shrinking Supply Orbit:*** Some of the proposed new fuels in the Colorado Front Range will most likely sever supply linkage with refiners north of Cheyenne and refiners east and south of El Dorado, Kansas. In addition, the “turn-up” capability for the balance of the Colorado supply refineries will be reduced on top of what is already a very tight supply chain.

U.S. Refined Product Supply-Demand Network

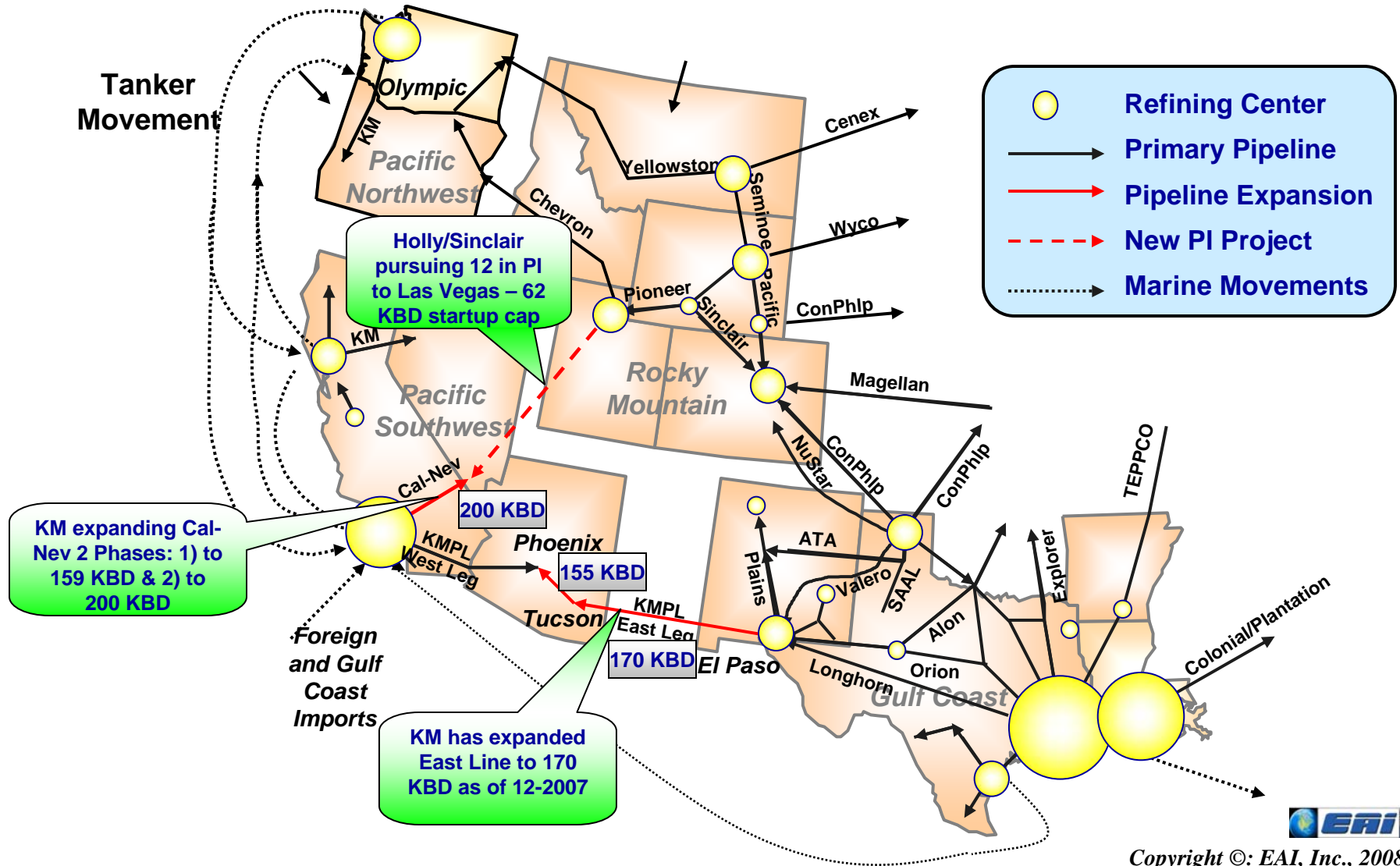
Definition of EAI, Inc. U.S. Product Distribution Hubs and Regions

The Rocky Mountain petroleum market is one of the most isolated areas in the U.S.



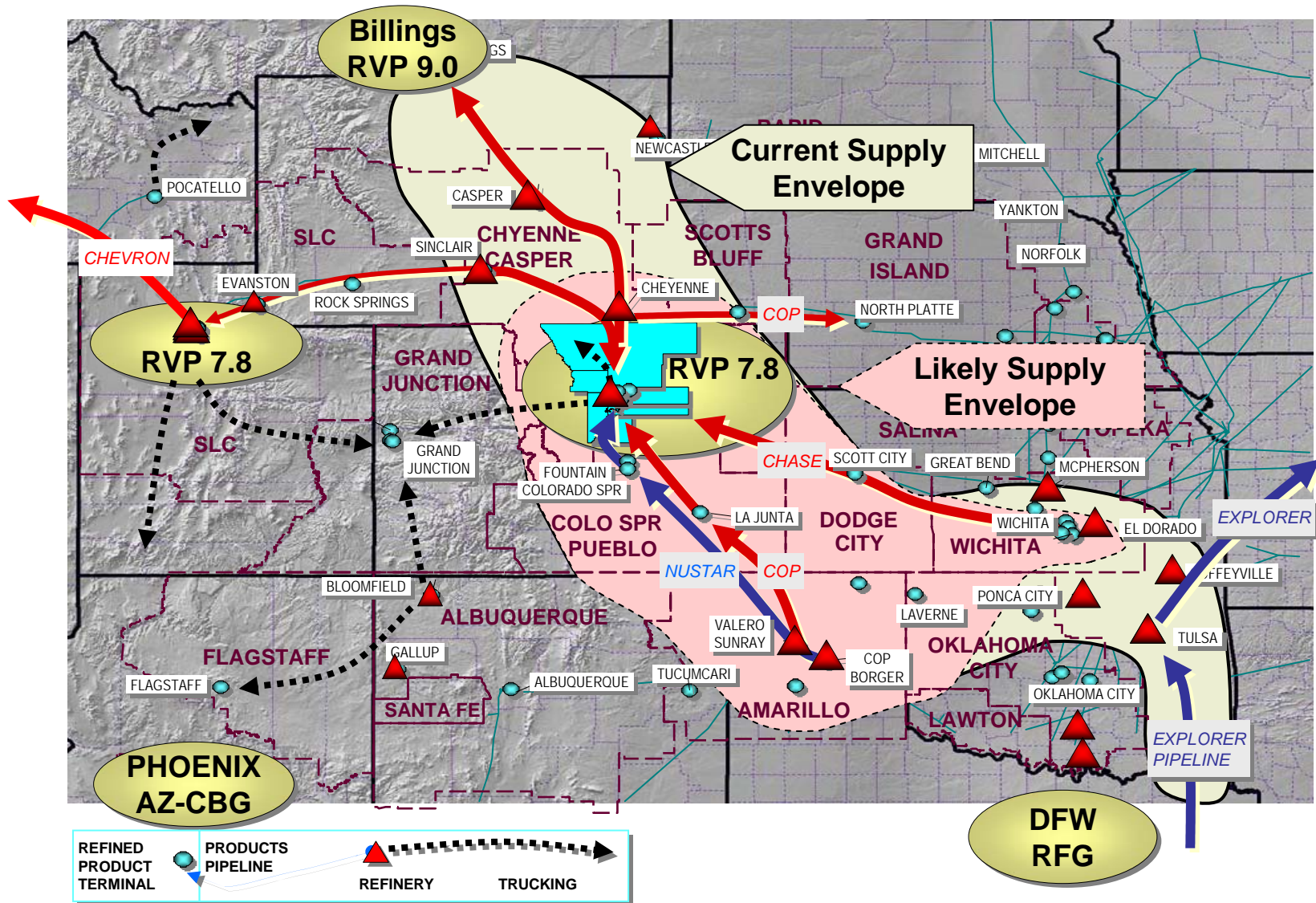
Western Region Refined Product Network Primary Transport Routes and Expansion Projects

Western Region has been relatively isolated from Gulf Coast until Longhorn started up in late 2005 and KMPL East Leg was expanded in two phases 1) 2Q2006 & 2) 4Q-2007. The Rocky Mountain refiners (SLC) are pushing a project to supply Las Vegas.

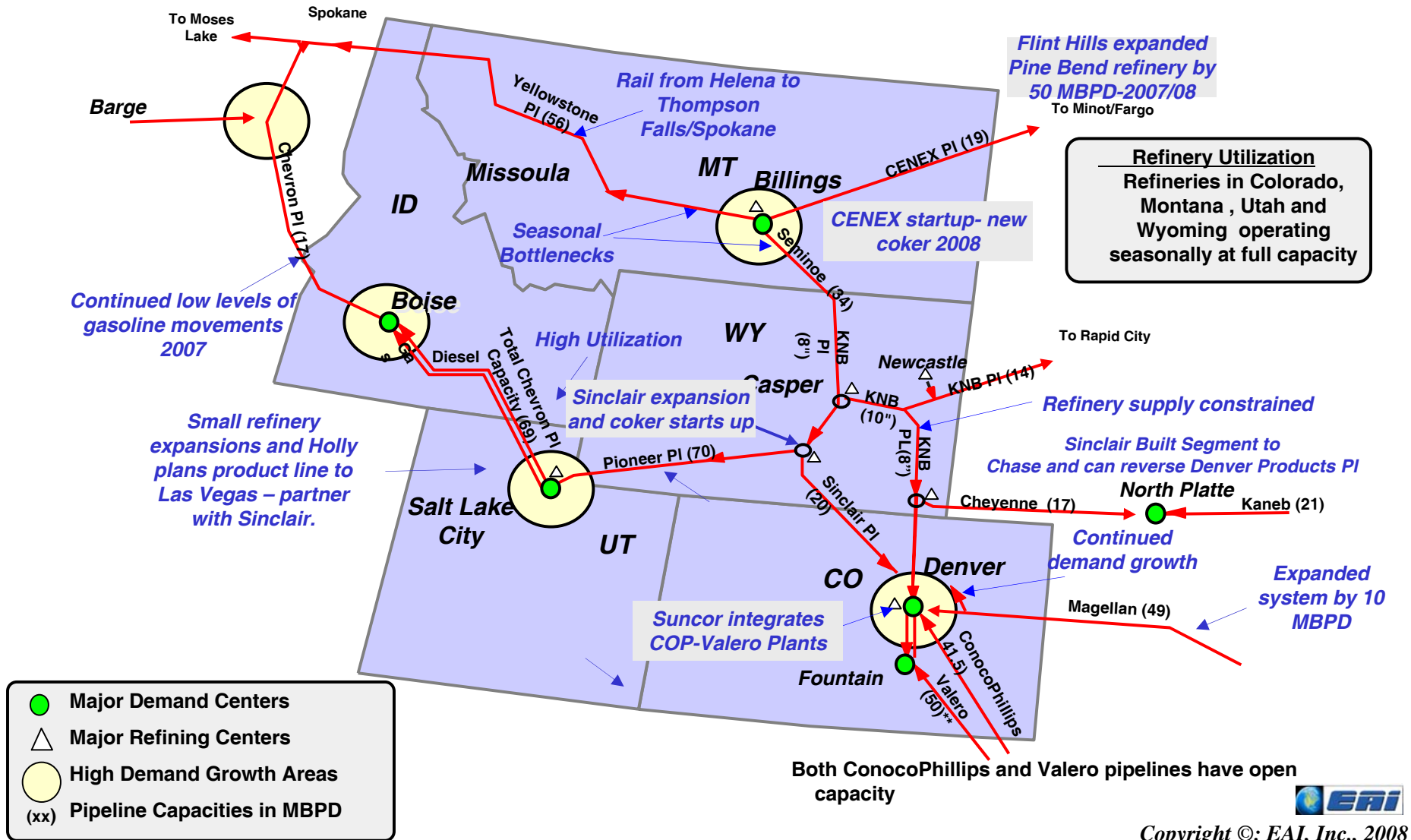


Current Potential & Likely Future Colorado Front Range Gasoline Supply Source Envelope

Pre and Post 7psi – no waiver or RFG Gasoline Requirement

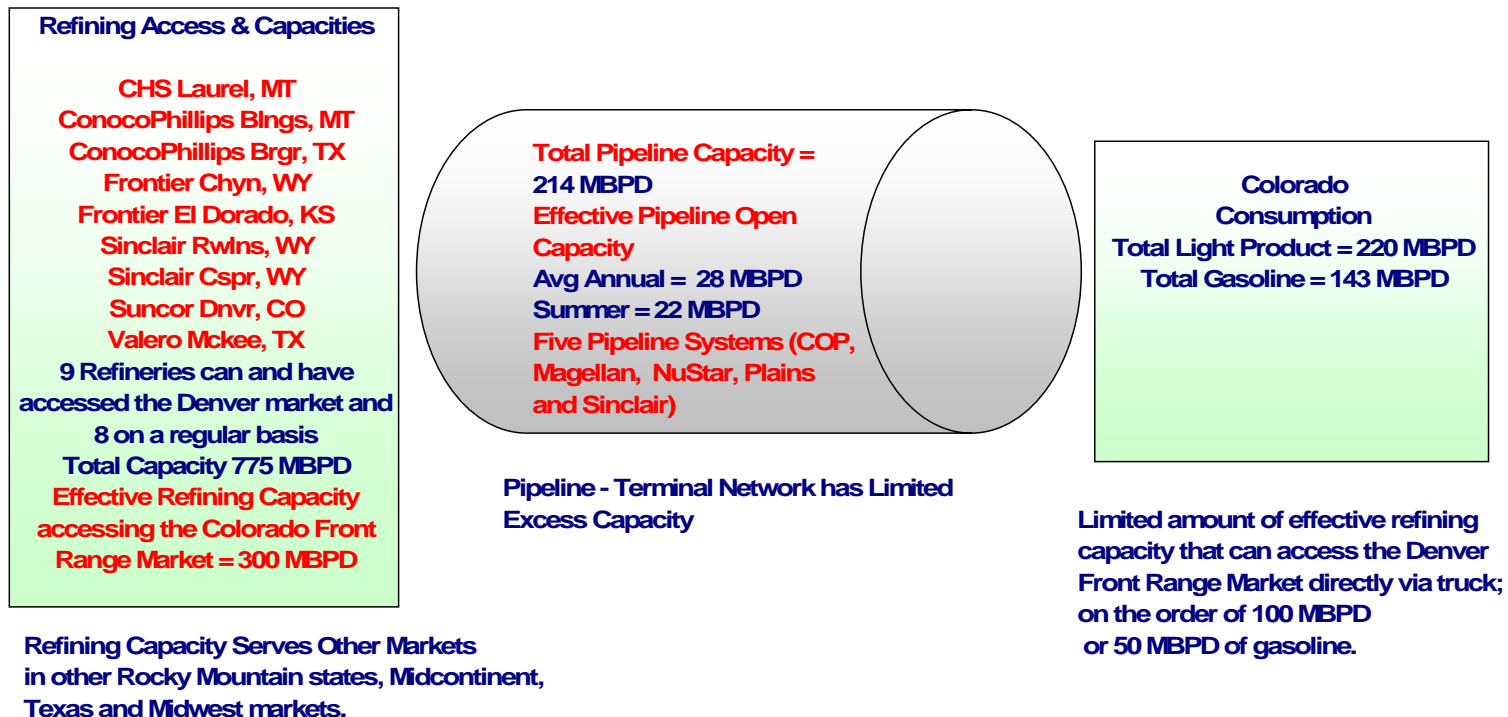


Refined Product Network Status Rocky Mountain Region – 2008



Colorado Light Product Supply Chain and Capacities, 2007 MBPD

The refining, light product transport and terminalling supply chain servicing the Colorado market is a relatively tight system. Loss of product such as gasoline is not easy to replace currently and will be even more difficult as the Front Range diverges from other nearby market specifications





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Other Low RVP Markets and Price Impact Observations



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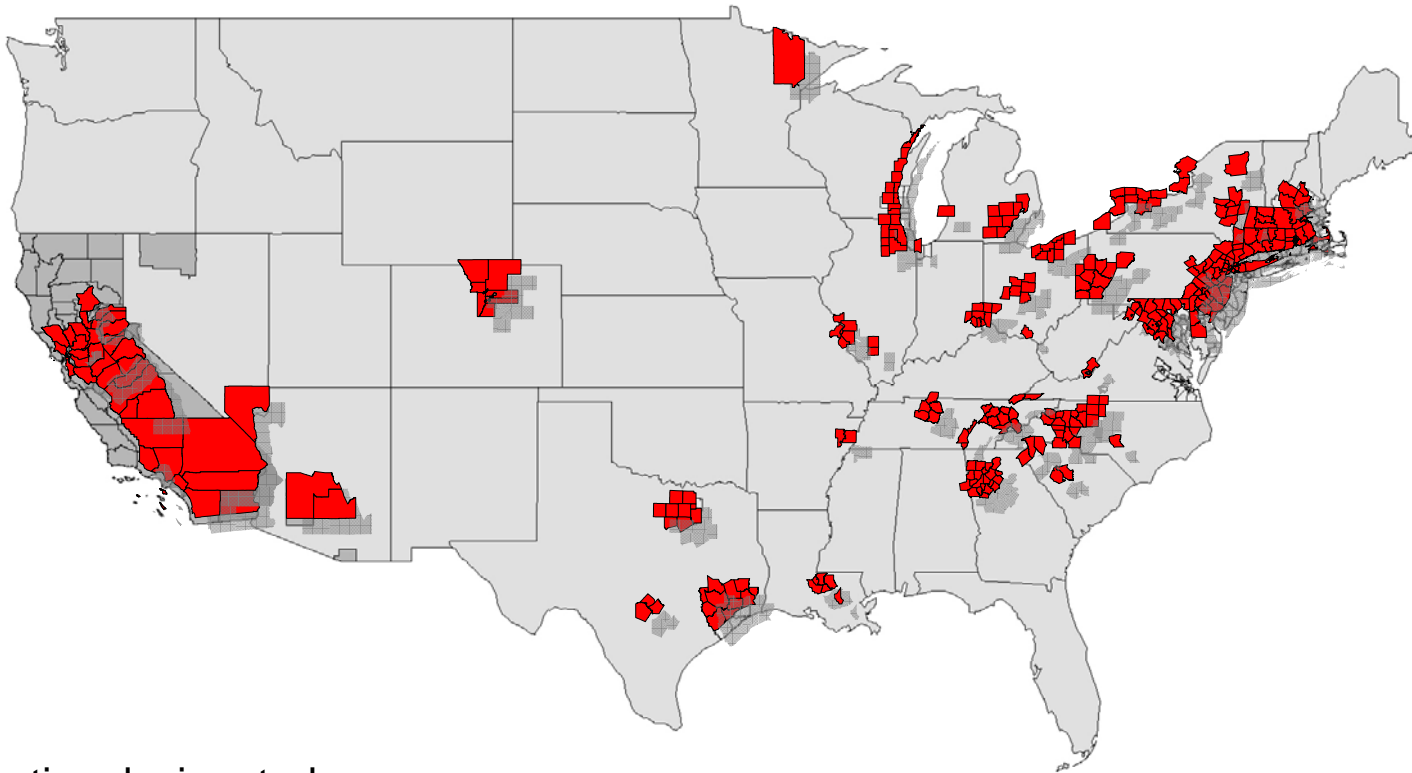
Other Low RVP Markets


Impact of Fuel Shift on Supply and Pricing

- ❑ **Other LRVP Markets:** Detroit and Kansas City have instituted low RVP gasoline specifications for their markets over the past few years with Kansas City at 7.0 psi and Detroit having shifted from 7.8 psi to 7.0 psi (in 2007).
- ❑ **Supply Optionality:** In general, EAI, Inc.'s work in these other markets have indicated they have much more supply optionality than does Denver with access to supply from the Gulf Coast and as well as local area refineries.
- ❑ **Apparent Price Impacts:** Although these markets may still be seeking an “equilibrium” with supply, EAI, Inc.'s analysis indicates that there have often been 5 to 15 CPG market premiums for the low RVP fuels relative to conventional fuels net of transportation charges. This price differential can and has exceeded this range. Denver can expect to observe a more extreme version of what has occurred in these markets based on these observations.
- ❑ **Low RVP Gasoline – Increasing Fungibility?:** As ozone non-attainment markets adopt low RVP gasoline “standards”, this product will be in greater supply and accessible to markets from more refinery options. It is important for states and local governments to work in tandem to adopt common standards that recognize not only the localized market but the overall capability of the fuel supply chain. Low RVP gasoline sounds generic but 7.8 psi gasoline is a much easier product to make than 7.0 psi gasoline and the 1 psi waiver option compounds the complexity and costs.



U.S. 8 Hour Ozone Non-Attainment Areas as of April 2008

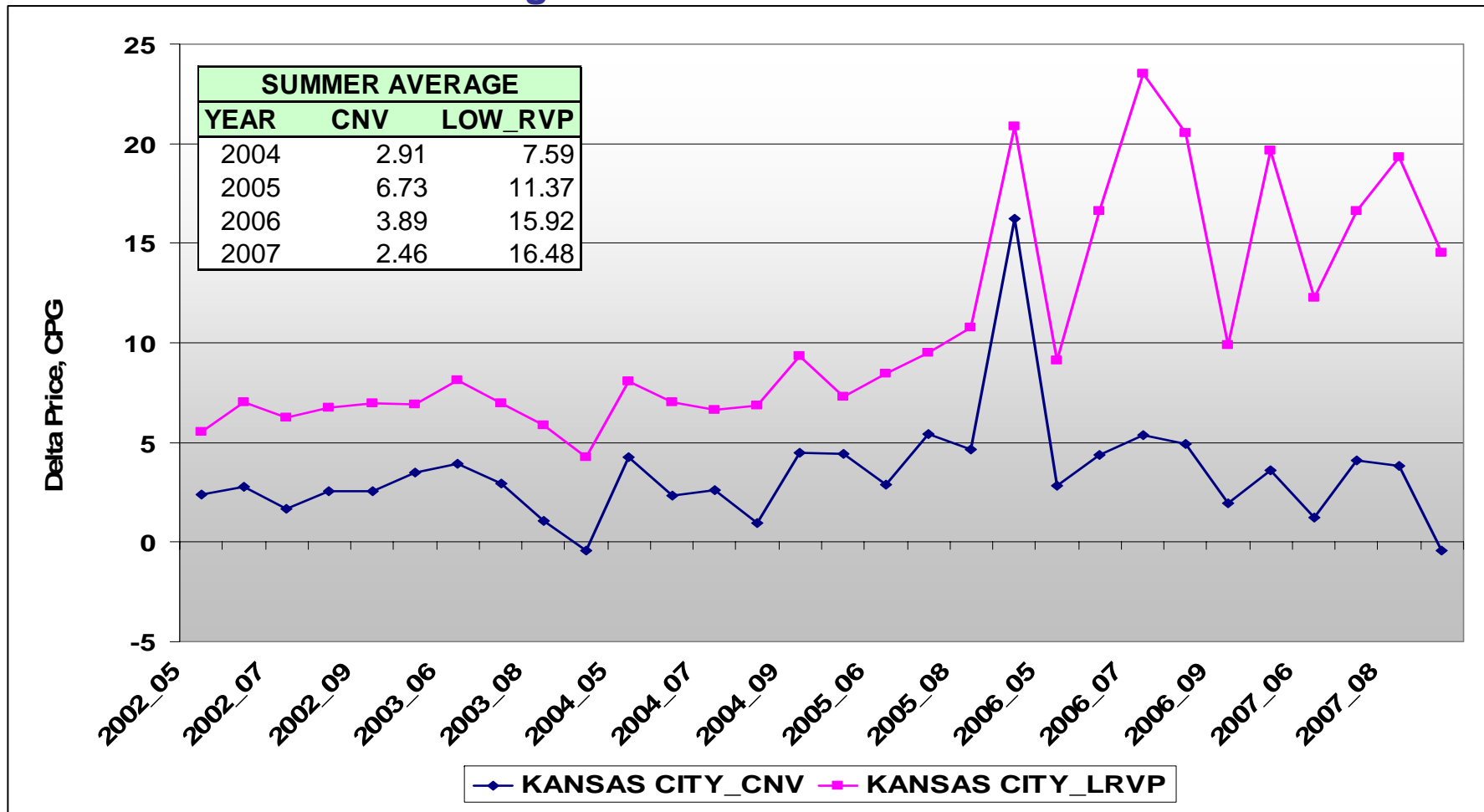


 Counties designated as
8 Hour Non-Attainment Areas
As of April 2008.

Gasoline Wholesale Price Impacts

Kansas City Low RVP Gasoline vs Conventional KC Referenced to MC
Spot Net of Transportation Costs

Source of Pricing Data: Oil Price Information Service



LRVP Season = May thru Mid September

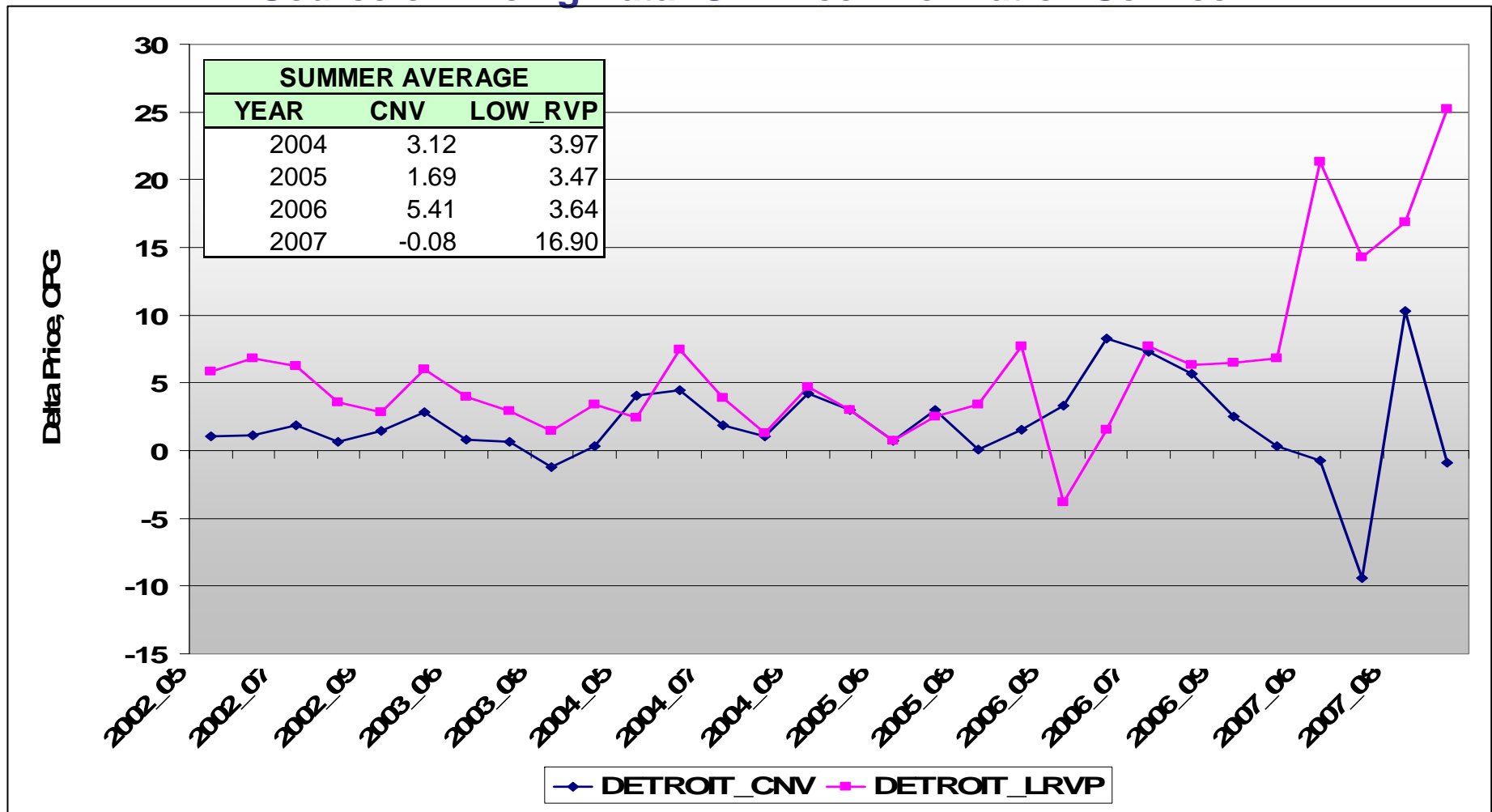
LRVP = 7 for Kansas City; Gasoline grade = conventional clear



Gasoline Wholesale Price Impacts

Detroit Low RVP Gasoline vs Conventional Lima Gasoline Referenced to Chicago Spot Net of Transportation Costs

Source of Pricing Data: Oil Price Information Service



Note: Lima pricing used for Detroit conventional

LRVP Season = May through Mid September

LRVP = 7.0, Decreased to 7.0 from 7.8 in 2007. Gasoline grade = conventional clear





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Impact of Ozone Compliance Costs on Gasoline Supply, Logistics and Costs for the Denver Area

Impact of Various Gasoline Fuel Grades on Supply, Cost and Market Price



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Project Schedules for Refineries Supplying Colorado to Make Various Gasoline Specification Options

- ***Components of Schedule:*** Once the fuel specification for Denver is set, companies have to conduct several key project activities to implement the necessary changes to accommodate:
 - Finalize a Detailed Refinery Process and Logistical Plan to Accommodate the New Fuel Specification
 - Implement Environmental Permit Activities for Required Changes
 - Detailed Engineering
 - Equipment Procurement
 - Construction and Startup

- ***Greatest Areas of Uncertainty:*** The environmental permit process is generally the most time consuming and adds the greatest level of uncertainty to project schedules. Equipment procurement and construction schedules and associated costs are also fraught with uncertainty due to the high level of global demand for steel, equipment and engineering talent.

Project Schedules for Refineries Supplying Colorado to Make Various Gasoline Specification Options

- ❑ **Overall Schedule Summary:** The schedules to conduct the aforementioned activities across all the responding refineries and fuel spec scenarios ranges from 12 to 60 months with the average schedule length ranging from 34 to 38 months. The fastest track schedules to accommodate all major suppliers are associated with the 7 PSI-1 psi waiver and 7.8 PSI-No Waiver fuels.
- ❑ **RFG & 7 PSI- CBOB No 1 PSI Waiver Cases:** Projects to accommodate the RFG and 7 psi/no 1 psi waiver fuel specifications require the most time ranging from 12 to 60 months and averaging approximately 38 months.
- ❑ **CBOB 7.0 PSI / With 1 PSI Waiver & CBOB 7.8 PSI-No Waiver:** The schedules for these programs range from 12 to 48 months with an average schedule length of 29 months. Desired schedule for 7.8 program would extend longest schedule to 56 months to optimize implementation plan with RFS requirements.
- ❑ **RFG Schedules, Costs and Impacts:** Both a winter and summer RFG program were specified as fuel options. The difference between the two programs is generally allowable blending components and ethanol blend levels. The schedules and costs to implement address both the summer & winter cases.

Refinery Project Schedules to Meet Various Proposed Fuel Specifications

Total Mnths	6	12	18	24	30	36	42	48	54	60
Schedule Year	2008		2009		2010		2011		2012	
Half Yr Intervals	6_2008	12_2008	6_2009	12_2009	6_2010	12_2010	6_2011	12_2011	6_2012	12_2012
CBOB 7 PSI / NO 1 PSI WAIVER										
Ref 1										
Ref 2										
Ref 3										
Ref 4										
Ref 5										
Ref 6										
CBOB 7 PSI W / 1 PSI WAIVER										
Ref 1										
Ref 2										
Ref 3										
Ref 4										
Ref 5										
Ref 6										
CBOB 7.8 PSI / NO 1 PSI WAIVER										
Ref 1										
Ref 2										
Ref 3										
Ref 4										
Ref 5										
Ref 6										
SUMMER RFG										
Ref 1										
Ref 2										
Ref 3										
Ref 4										
Ref 5										
Ref 6										
WINTER RFG										
Ref 1										
Ref 2										
Ref 3										
Ref 4										
Ref 5										
Ref 6										

Clear / no pattern indicates base schedule

Pattern indicates extended range of schedule

Ref "Number" represents each refinery participating in survey



Impact of New Gasoline Grade Specifications on Colorado Front Range Supply (1 of 5)

- **Supply Impact Summary:** There are four major categories of factors impacting Colorado Front Range gasoline supply for the various gasoline specifications being considered:
 - 1) **Light End Removal:** Removal and rejection of light end-high RVP material such as butanes and pentane plus material to reduce overall gasoline pool RVP.
 - 2) **Reduction of Gasoline Pool Fungibility & Shift to Other Markets:** Some refiners that could supply the Denver Front Range market currently will not be able to supply the market with most of the new fuels being considered. Also, some refiners will shift gasoline supply from the Colorado Front Range market to other markets with less stringent gasoline specifications.
 - 3) **Conversion of Light End Material:** Adding or expanding process units to convert some of the light end materials to lower RVP components while meeting other gasoline specifications (Octane, drivability index, distillate curve, etc).
 - 4) **Ethanol Blending:** Limitations on ethanol blending volumes, especially the “no 1 psi waiver cases”, due to the high blending RVP of ethanol and the very low RVP base gasoline stock required (generally 6 to 6.8 psi blendstock material required).

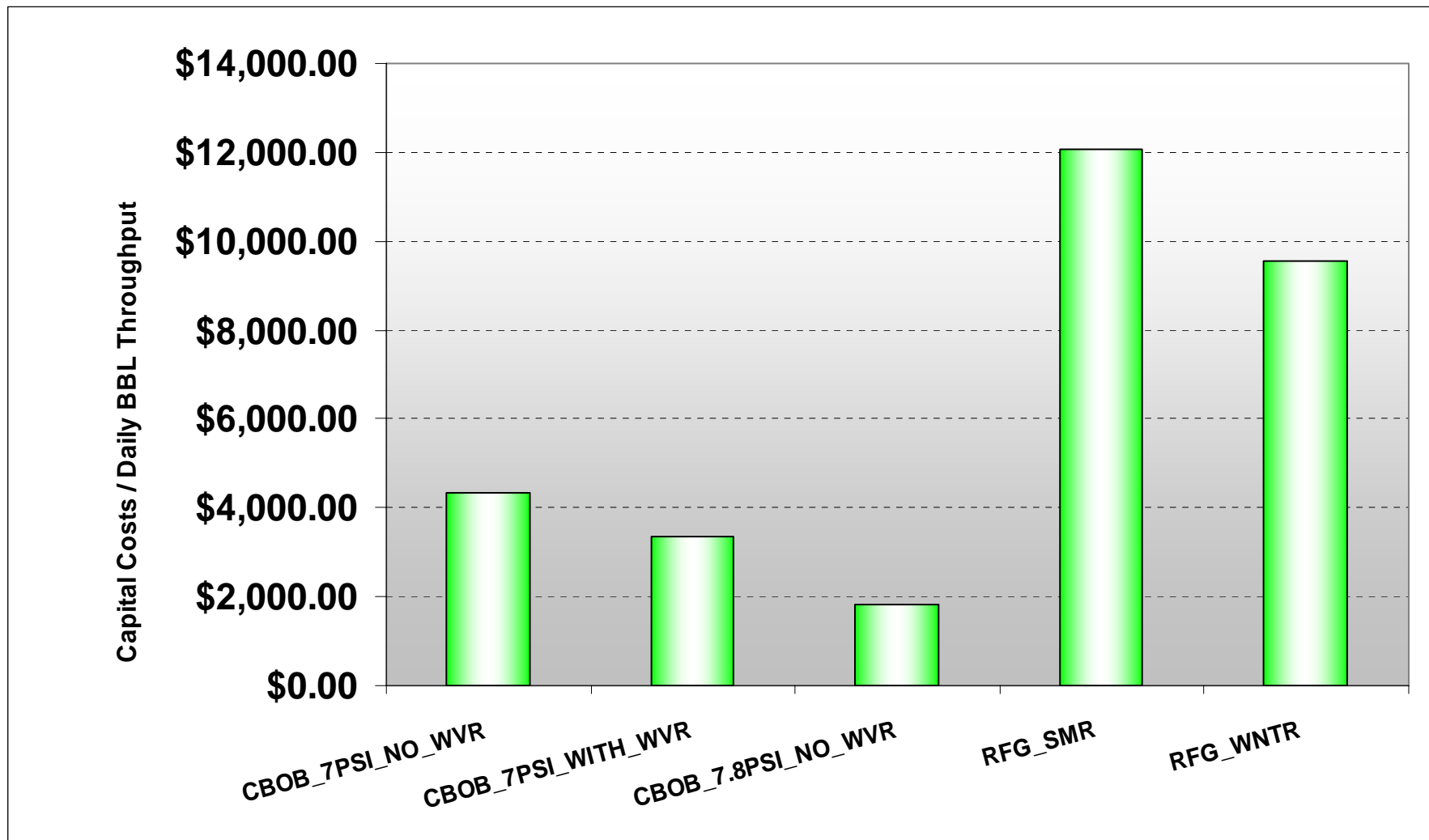
Impact of New Gasoline Grade Specifications on Colorado Front Range Supply (2 of 5)

- **Light End Removal and Rejection:** Butanes, pentanes, light olefins and light straight run gasoline all are currently major contributors to the Colorado gasoline pool. More stringent summertime RVP restrictions in the Denver area and some surrounding markets has already reduced summertime butane blending.
 - Lowering RVP to 7.0 psi or imposing the no 1 psi waiver restriction requires deeper light end cuts and rejection of higher value components to markets generally having less value than gasoline.
 - Refinery projects for extraction and/or conversion such as saturated gas plants, de-pentanizers, alkylation units and associated infrastructure changes (utilities, integration with existing units, etc) are significant investments (10 million to 350 million investment range for individual refineries as quoted by respondents) with long lead time schedules (12 to 60 months).
 - The costs presented in the following slide summarize total industry costs normalized to estimated non-attainment area gasoline production volume. These costs range from \$1,800 to \$4,300 per daily barrel of output for the CBOB cases and \$9,500 to \$12,000 for the RFG cases (summer and winter).
 - The estimated light end rejection volume (gasoline loss) is estimated to be in the range of 5 to 13 MBPD representing 6 to 15 percent of the Colorado Ozone Non-Attainment market.



Refinery Capital Cost Summary for Various Gasoline Specifications Being Considered

Expressed as Total Industry Investment Requirement Divided by Total Estimated Non-Attainment Volume for Companies Responding to Capital Cost Question



Impact of New Gasoline Grade Specifications on Colorado Front Range Supply (3 of 5)

- ***Reduction of Gasoline Pool Fungibility & Shift to Other Markets:*** A number of the Front Range gasoline suppliers have access to other markets besides the Colorado Front Range market. Most of the markets surrounding the Colorado Front Range are not RFG and very few require Low RVP with the specifications now being considered by Colorado (Kansas City and El Paso are the exceptions).
- At least one and most likely two refining centers that traditionally have placed gasoline product into the Colorado market will most likely not be able to supply summertime gasoline to the non-attainment market.
- Depending on the fuel chosen, Gulf Coast / Midcontinent supply will be more severed from accessing the Colorado non-attainment market as there are no provisions to receive and store such product in the Tulsa area distribution hub.
- Depending on relative price and production capability, there are several refiners that are likely to shift gasoline supply out of the Colorado Front Range market. Higher prices could attract some of this product back depending on the spec chosen. Generally product shifted out of the market cannot shift back without major capital projects being completed.

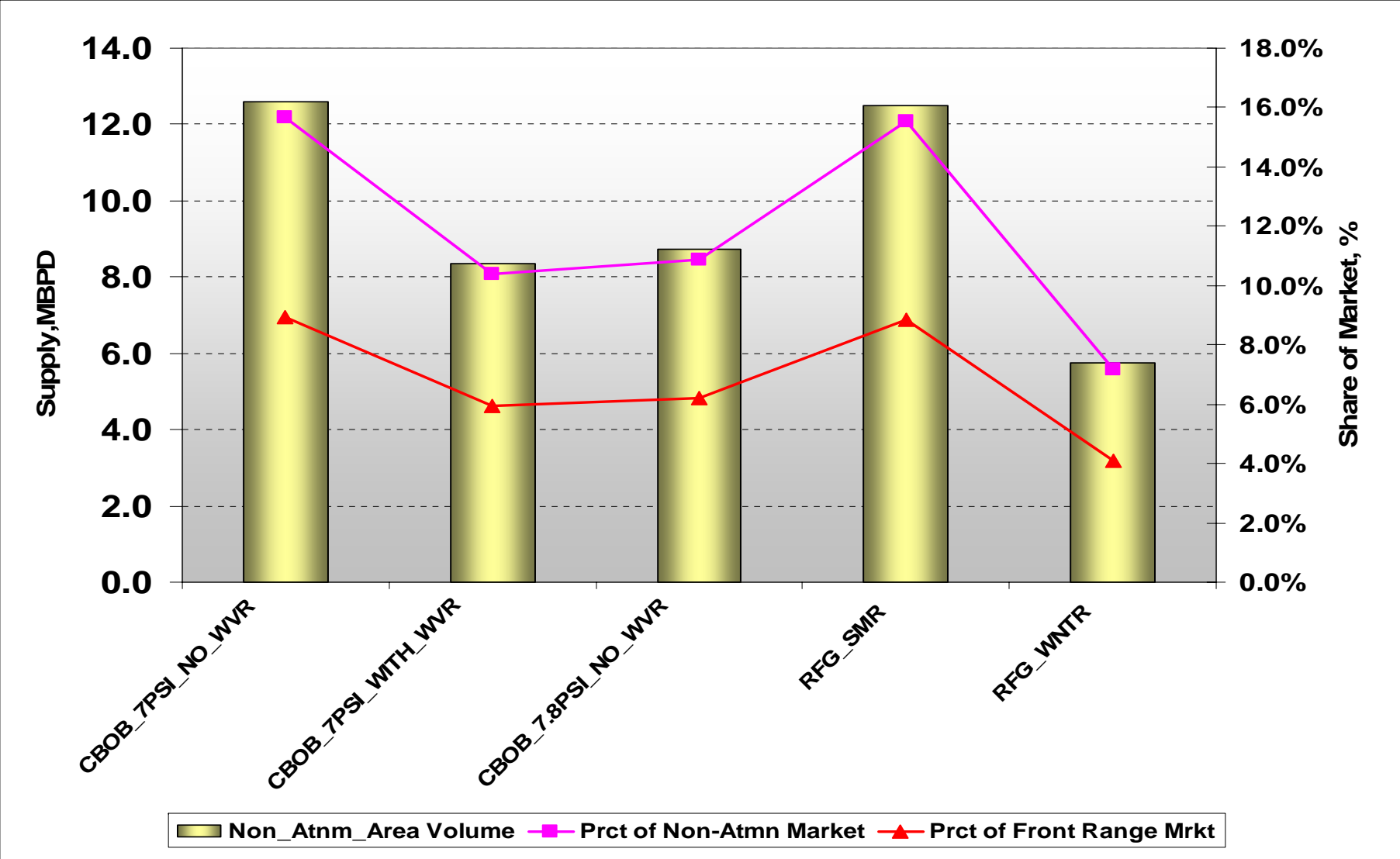
Impact of New Gasoline Grade Specifications on Colorado Front Range Supply (4 of 5)

- ***Conversion of Light End Material and Other Processing Requirements:*** Most refiners that supply the Colorado Front Range are limited in gas processing, light end extraction and/or conversion of light ends to lower RVP gasoline blendstocks. Extraction and/or Conversion of additional material requires major investments, permitting processes and project schedules.
 - ***Fuel Specs Exceed Refinery Capabilities:*** Most refiners serving this market are fairly well balanced and most units are highly utilized. Shifts in product specs and intermediate stream processing generally requires equipment expansion or addition.
 - ***High to Moderate Risk Projects:*** Most of the projects being considered will add limited market value to the existing gasoline pool. Refinery derived octane barrel demand/value is being lowered with increasing ethanol use. Thus, there is high risk that the costs associated with most of the projects being considered in response to the various fuel scenarios will have to be absorbed by the refiners in an era of declining refinery margins.

Impact of New Gasoline Grade Specifications on Colorado Front Range Supply (5 of 5)

- ❑ The volume lost to the Colorado market ranges from 5.7 to 12.6 MBPD representing 7 to 16 percent of the ozone non attainment market and 4 to 9 percent of the overall Front Range market.
- ❑ The RFG summertime program & CBOB 7 PSI / No Waiver cases result in the highest losses-approximately 12.5 MBPD or 15.5 percent of the Colorado non-attainment market.
- ❑ This volume will be difficult to replace with shrinkage of the overall gasoline pool, barriers to ethanol blending and reduction in the number of refiners that can supply the Colorado Front Range market.
- ❑ As stated previously, there is also some potential that refiners will shift some or all of their Colorado gasoline supply to other markets. The impact of the gasoline shift to other markets was determined to be in the range of 7 to 19 MBPD for the CBOB cases. The RFG cases resulted in a potential loss in the 19 to 24 MBPD range.
- ❑ These volume losses will most likely be accompanied by higher wholesale and retail gasoline prices in the Denver-Front Range creating more incentive for refiners to shift product here. This will occur but not instantaneously and will require project schedules on the order of those defined previously in this document.

Gasoline Supply Loss Due to Light End Rejection Total Colorado Front Range & Non-Attainment Market



RFG winter and summer losses should be combined and annualized to assess "total" RFG case impact



Renewable Fuels Standards

(1 of 2)

- ❑ **Ethanol Blending:** EISA 2007 requires that 36 billion gallons of the U.S. gasoline pool (~25%) be supplied with renewables (generally corn based ethanol in the short term) by 2022. In order to meet this target, each year EPA establishes an increasing percentage of the gasoline pool that is mandated to be renewable fuel known as the Renewable Fuels Standard (RFS). In 2007 the RFS was 4.02 percent – 2008 7.76 percent.
- ❑ **RINs:** Refiners that cannot meet the RFS requirement are required to purchase RINs (aka ethanol blending credits) that are offered by suppliers that have exceeded their blending requirement in other markets.
- ❑ **Blending Impact:** Ethanol has a relatively high RVP (18 psi) and adds approximately 1 to 1.3 psi to 10 percent ethanol-gasoline blends.

Renewable Fuels Standards

(2 of 2)

- ❑ ***Ethanol Blending Limits***: Summertime blending of ethanol under conditions of no 1 psi waiver cannot be achieved by several refiners while maintaining constant gasoline supply to the Colorado non-attainment market. Even the 7 lb limit with a 1 lb waiver poses major challenges and gasoline supply reduction.
- ❑ ***Limited Options***: Currently, the Front Range market uses approximately 6.5 MBPD of ethanol and would need approximately 14 MBPD if all supply was blended up to 10 percent. This level may actually decline with several refiners indicating they would have to curtail or reduce their ethanol blending and purchase RINS to cover their Front Range blending requirements.

Ethanol Blending and RIN Values

- ❑ **Ethanol Blending Uplift** – Year 2007 Denver average ethanol blending uplift, without blender excise tax credit, at 2.27 cpg*, historically has been highly variable. Ethanol generally priced to capture as much of the uplift as possible.
- ❑ **RINs Strategy**: Buying RINs required to make up delta between RFS and amount of ethanol blended gasoline actually sold. Situation for every Front Range refiner/supplier different due to national level of RFS - smaller, more localized refiners may have more difficult problem, i.e. have to buy more RIN's to make up for Front Range blending losses.
- ❑ **RINs Values**: Year 2007 average RINs value around 4 cpg. Year 2008 values have been 5 to 7 cpg so far.
- ❑ **Implications for Costs**: Revenue will decline due to the lost uplift from blending ethanol plus lost blender tax credit. Additional costs will be incurred with refiners-suppliers purchasing RINS in lieu of being able to blend ethanol. If all NATN gasoline supply were not blended with ethanol, the average RINS cost would be 0.6 cents per NATN gallon. The combination of lost opportunity blending plus RINS cost could be approaching 6.5 cpg for the “no ethanol” blended case. It is likely that ethanol blending will be limited for the non-RFG fuel cases. These costs are likely to increase each year as the required ethanol blended volume increases with the RFS.

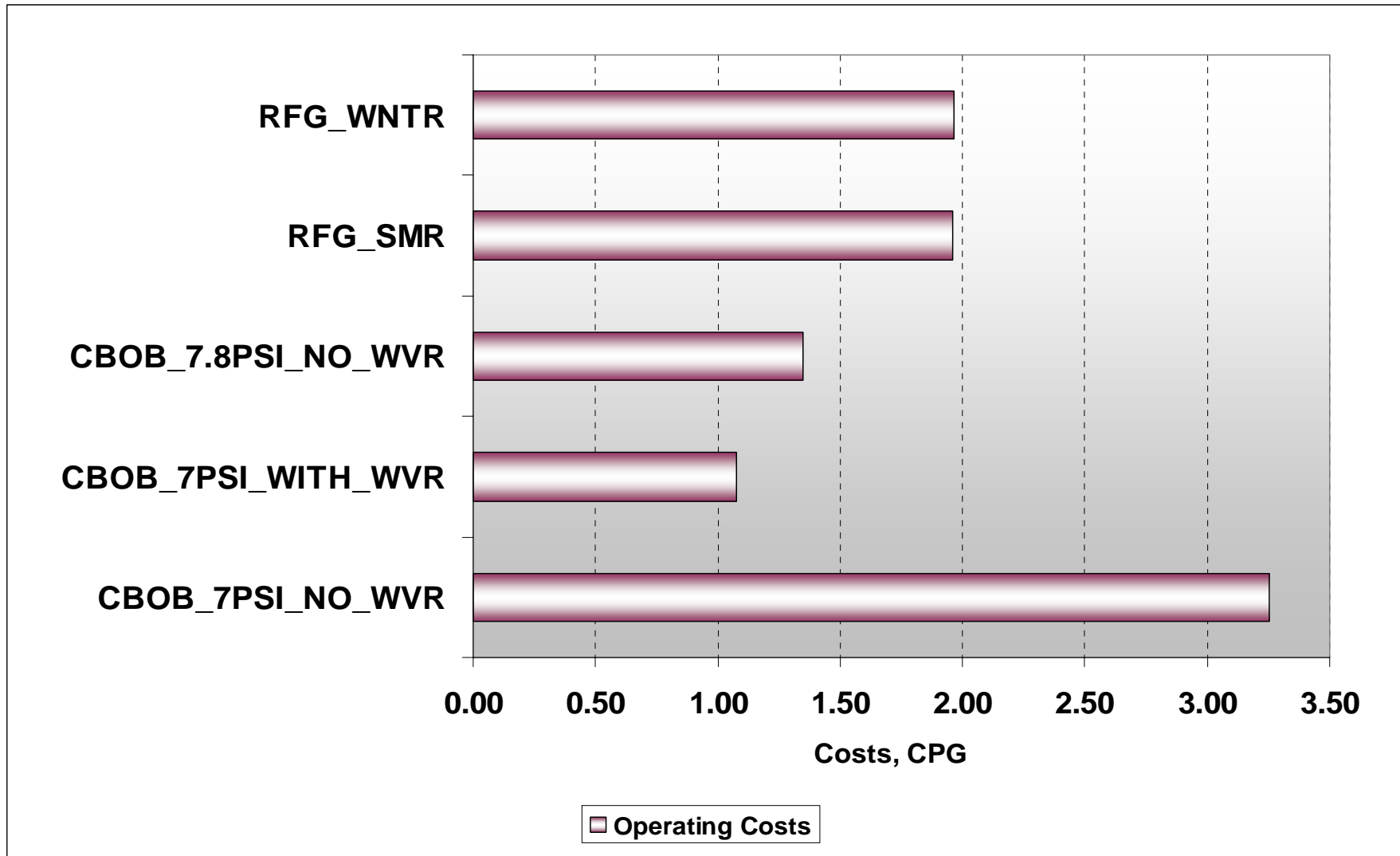
* Ethanol blending uplift calculated as Denver 7.8 RVP gasoline rack minus 0.9 Denver conventional rack gasoline minus 0.1 laid in Chicago spot ethanol.

Investment and Operating Cost Impacts

Supplier Response to New Fuel Specifications (1 of 3)

- ❑ ***Operating Cost Basis:*** Operating cost impacts expressed in terms of “Cents per Gallon (CPG) of Colorado Gasoline produced for the ozone non-attainment market. Operating cost estimates were provided by some of the company survey respondents and are considered rough estimates at this point in time. Operating cost estimates for RFG production were limited and the numbers presented in this report are most likely skewed low.
- ❑ ***CBOB Production Costs:*** Incremental operating costs for producing CBOB 7 PSI / with no waiver were the highest among the 3 cases at 3.25 CPG. The 7 PSI – with waiver and 7.8 PSI with no waiver estimated incremental operating costs were in the range of 1.08 to 1.35 CPG. The capital costs for the CBOB fuel cases were in the range of zero to 350 million dollars per specific refinery. The lower cost cases generally resulted in large volumes of gasoline being lost through light end rejection and/or gasoline shift to alternative markets.
- ❑ ***RFG Summer and Winter Cases:*** The data provided addressing the RFG cases was limited as this is more complex to address and most refiners did not have enough time to complete more in-depth assessments. The operating cost responses were very limited and indicated incremental non-attainment area gasoline supply costs of roughly 2 cpg. Capital costs (again limited) ranged from minimal (low volume available) to 750 MM dollars.

Comparative Operating Cost Assessment Ozone Non-Attainment Fuel Scenarios Aggregate Refineries Supplying Colorado, CPG



Investment and Operating Cost Impacts

Supplier Response to New Fuel Specifications (2 of 3)

- **Other Considerations:** There are a number of factors to be considered when assessing potential investments, incremental operating costs and incremental values to be realized including but not limited to the following:
 - **Lost Revenues Due to Light End Loss:** The value of rejected butanes/pentanes/higher order hydrocarbons is estimated to be on the order of 40 to 75 percent of overall gasoline pool value depending on the mix of rejected material. This is not included in the refinery operating cost estimate. However, this impact can range from 5 to 11 cents CPG based on the total non-attainment fuel supply produced. The average differential netback value between Denver gasoline and C5/C6 material is on the order of 55 CPG.
 - **Light End Markets and Infrastructure:** The light end market for butanes, pentanes and other light end material is very limited in the Rocky Mountain region. Increasing rejection of these materials from local gasoline supply will require exporting the material to the Gulf Coast market via railroad. This will require significant improvements/additions to extract and store the material as well as receiving, loading and sending out railcars.
 - **Possible “value-added” market for Pentane Plus Material:** There is a growing need for pentane plus material (generally referred to as condensate) in the Alberta, Canada market to blend with bitumen to make it shippable on pipeline. Condensate had an average price roughly 8 dollars above WTI crude netback to Edmonton in 2007. Currently, those refineries supplying the Front Range market have no easy access to this market other than limited and relatively costly railroad transport and the cost would negate the premium above WTI value.



Investment and Operating Cost Impacts

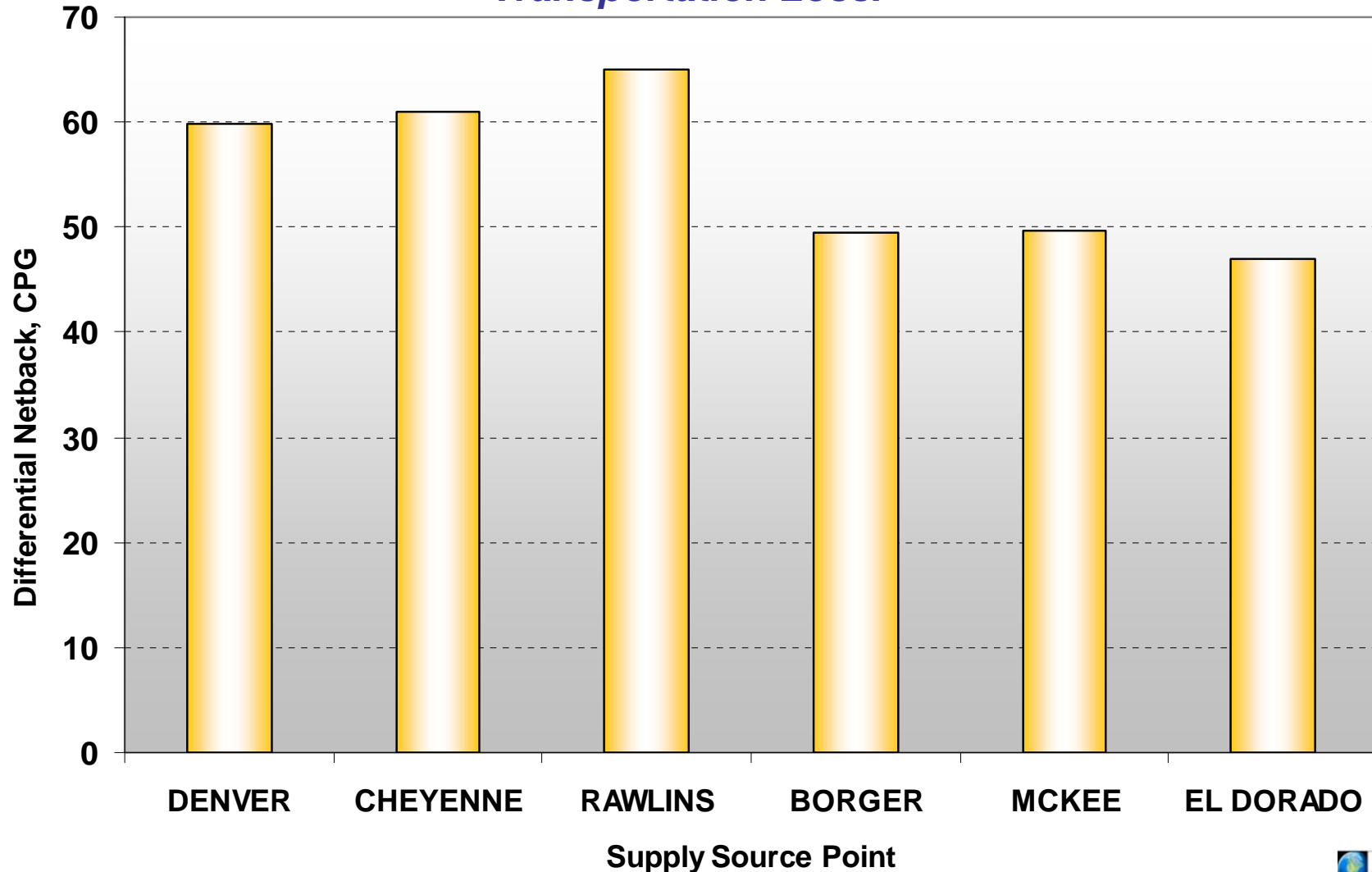
Supplier Response to New Fuel Specifications (3 of 3)

- **Compatibility with Other Environmental Requirements:** The EPA requires all refiners (and importers) to meet a lower average benzene content as part of a new regulation referred to as Mobile Source Air Toxics (MSAT) II, which will limit the amount of benzene in U.S. gasoline to 0.62 vol. % by 2011. Benzene levels in RFG gasoline in PADD II averaged 0.6 vol percent in 2005 compared to conventional gasoline for which benzene levels averaged 1.07 percent (including oxygenate in the calculations).
- **Other Requirements to Make RFG Gasoline:** RFG gasoline requires a minimum reduction level of VOC, NOX and air toxin levels (such as benzene and formaldehyde) relative to a refiners baseline gasoline. Reduction of benzene/other aromatics, RVP and sulfur levels in gasoline are all key targets for refiners to achieve the necessary emission reductions. The ethanol/oxygen requirement for RFG was waived in May of 2006 as directed by the Energy Policy Act of 2005 which had its own specifications for ethanol use requirements.
- **Crude Slate Changes:** Many of the refineries supplying the Colorado Front Range market are planning or implementing significant changes to their crude slates- generally going to heavier and more sour crude types. These changes will alter each plants product slate and light end yield structures thus changing how they might have to respond to the various new gasoline types proposed.

C5/C6 Extraction Value Loss Basis

EAI, Inc. Estimate

Denver Market Gasoline Value vs Mt. Belvieu C5/C6 Value Including Transportation Loss.





EAI, Inc. (Energy Analysts International)

Impact of Ozone Compliance Costs on Gasoline Supply, Logistics and Costs for the Denver Area

Open Session and Questions



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