



When is the “*Day of Reckoning*” and how will the industry respond?

2014 EIA Energy Conference

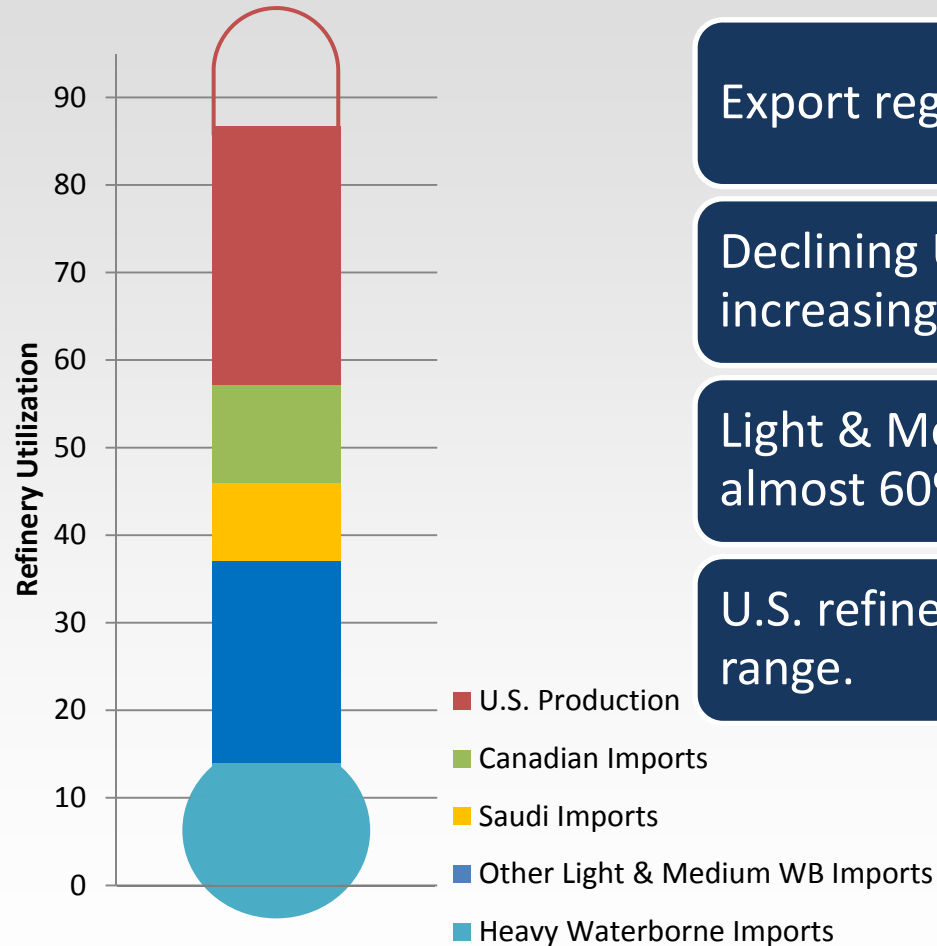
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Washington, D. C.

John R. Auers, P.E.

Executive Vice President

Pre U.S. Crude Boom (~2007/2008)



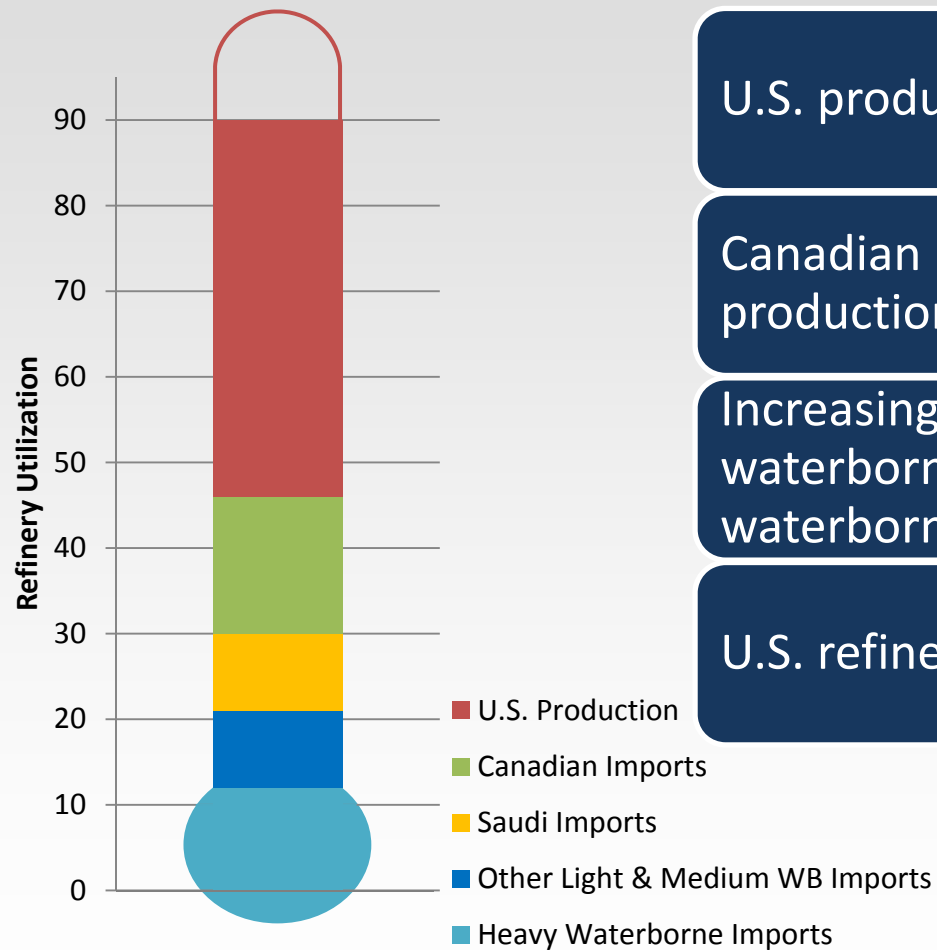
Export regulations irrelevant.

Declining U.S. crude production replaced by increasing imports – exceed 10 MM BPD

Light & Medium waterborne imports make up almost 60% of total imports.

U.S. refinery utilization holds in the mid 80% range.

Today



U.S. production rises 70% from 2008.

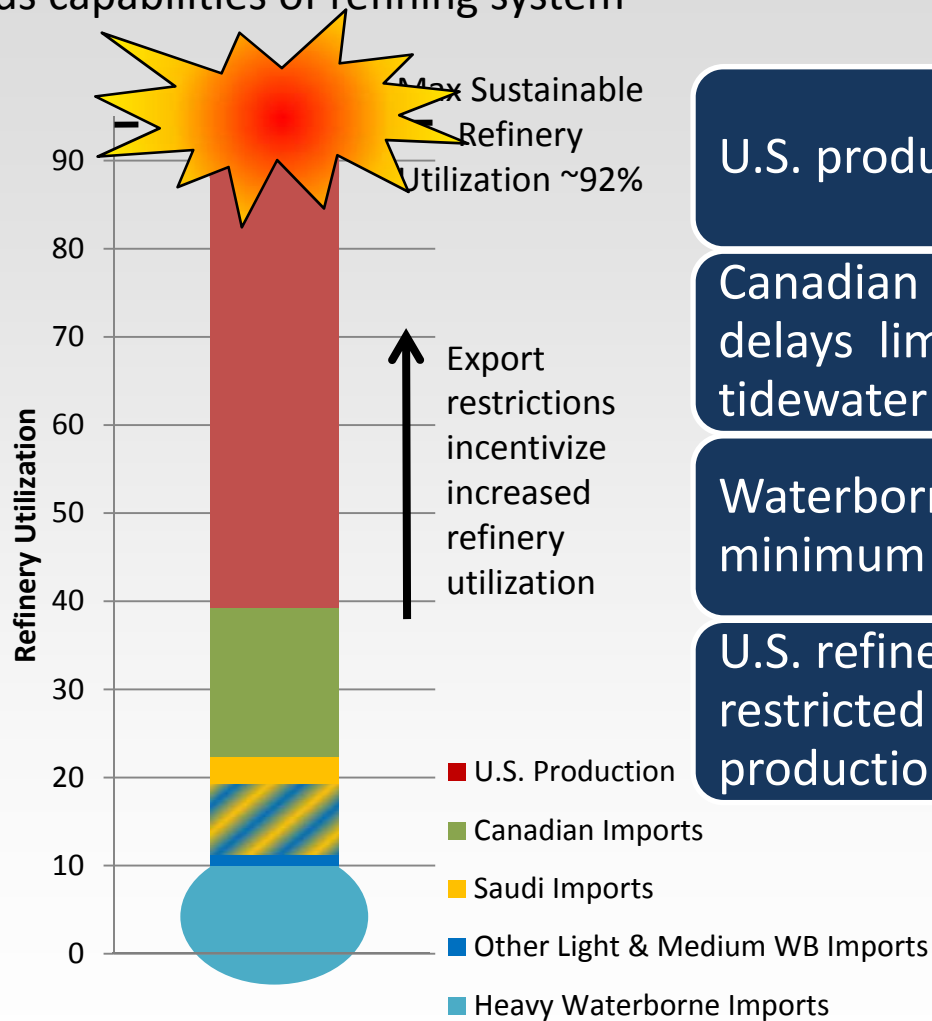
Canadian imports grow over 35% as oil sands production increases.

Increasing production squeezes out waterborne light imports – total light/medium waterborne imports down to 2.7 MM BPD

U.S. refinery utilization rises to near 90%.

“Day of Reckoning” when production exceeds capabilities of refining system

Future



U.S. production continues to grow

Canadian imports to U.S. continue to grow; P/L delays limit ability of Canadian crude to reach tidewater

Waterborne imports decline to “structural” minimum levels (Latin heavy/Saudi/other)

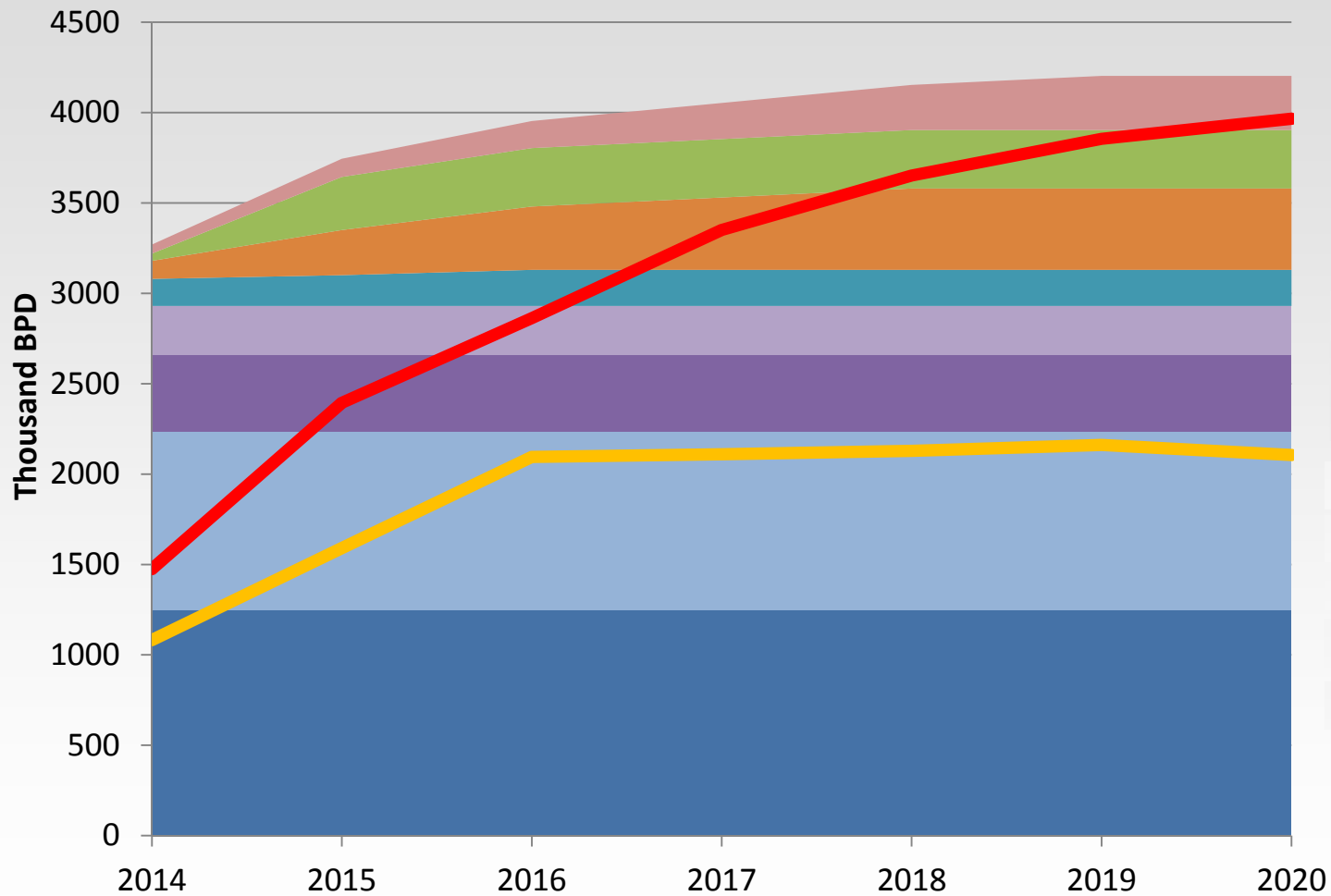
U.S. refinery utilization maxes out; with exports restricted there is no where else for new production to go

Factors Influencing “Day of Reckoning”

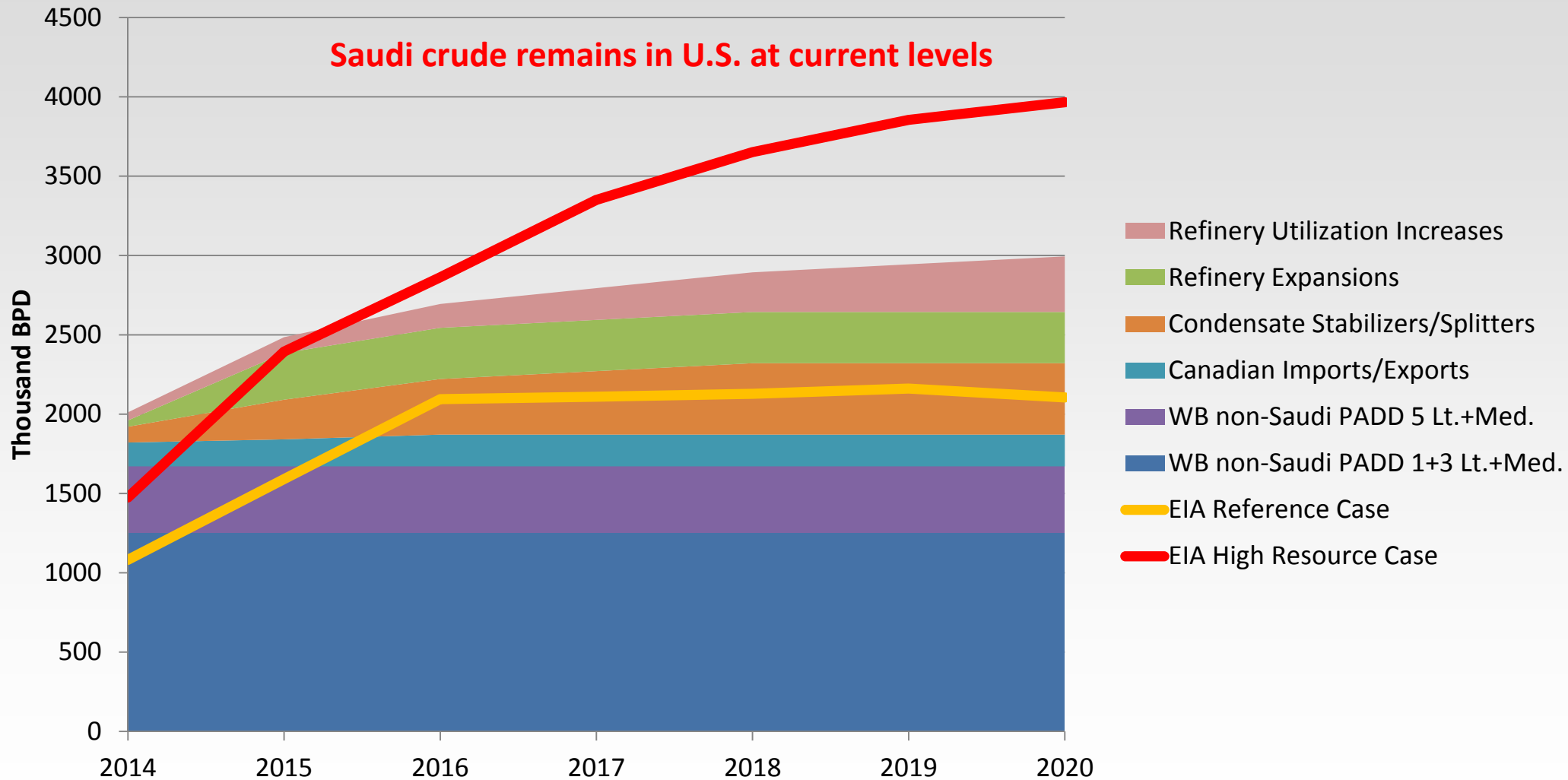
When Export Restrictions “Strand” Domestic Crude

- Actual Level of Production Growth
 - Estimates vary widely
 - EIA Reference Case has 2013 to 2020 growth at 2.1 MMBPD ; High Resource Case is 4.0 MMBPD
- Ability to Expand Exports to Canada
 - 2013 Light/Medium Waterborne (non-U.S.) Imports into Canada > 500 MBPD
 - 2013 Light/Medium Imports into U.S. from Canada = 1.0 MMBPD
 - Dependent on build-out of Canadian pipelines to Tidewater
- Ability to Access West Coast Markets
 - This would also influence economics for exporting ANS
 - Infrastructure build out delayed by local opposition/California LCFS will also impact crude decisions
- Ability of U.S. Refining System to Displace Lt. Sour/Medium Crudes
 - **Very dependent on Saudi market decisions**
- Level of U.S. Processing Additions/Increased Utilization at Existing Plants
 - These include both additions inside and outside refinery gates
- How Current Export Restrictions are Applied
 - **What does recent BIS “clarification” mean/what is the impact?**
- “Day of Reckoning” Could be as early as 2015/16 or after 2020+

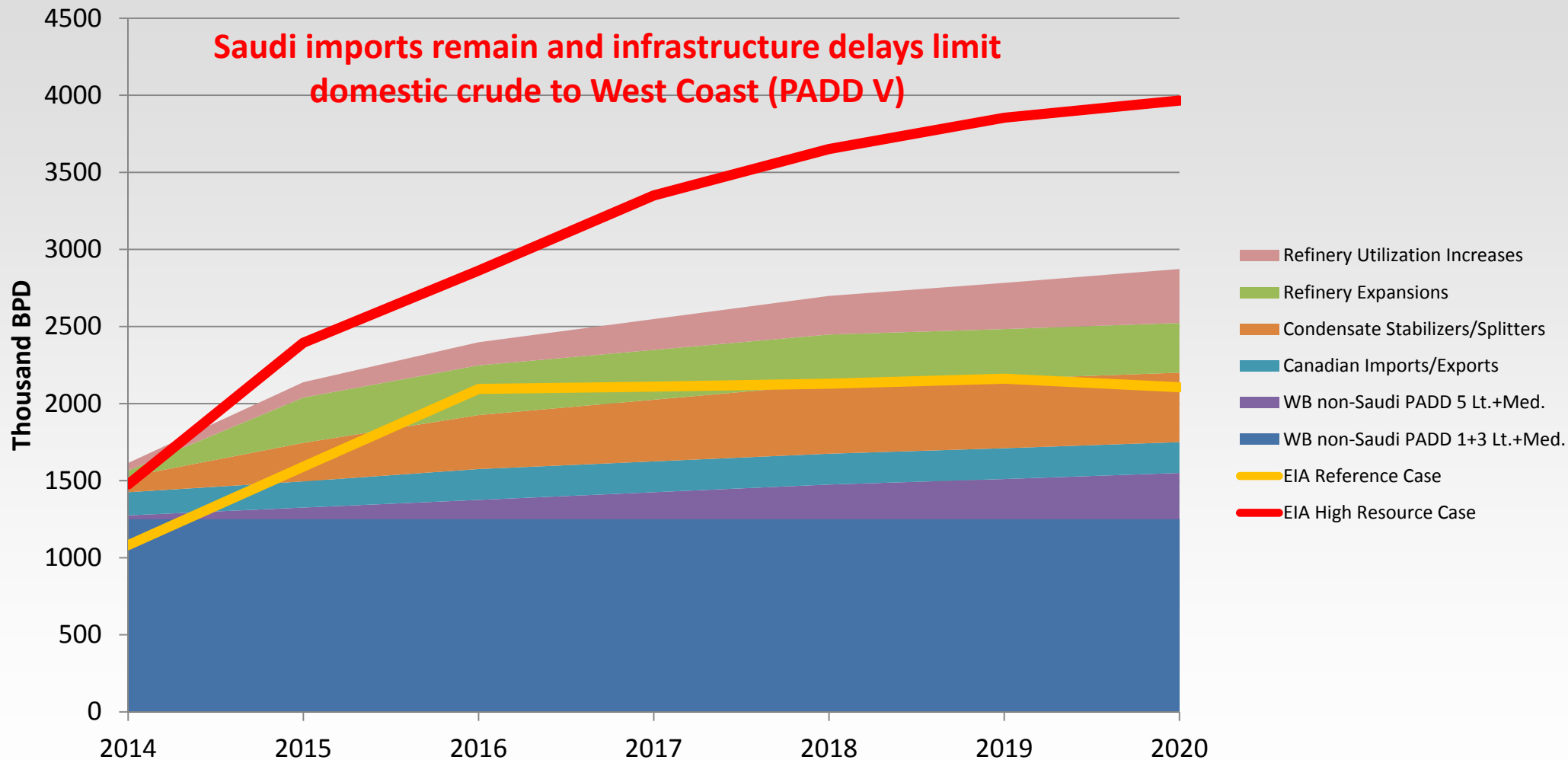
Day of Reckoning Scenarios



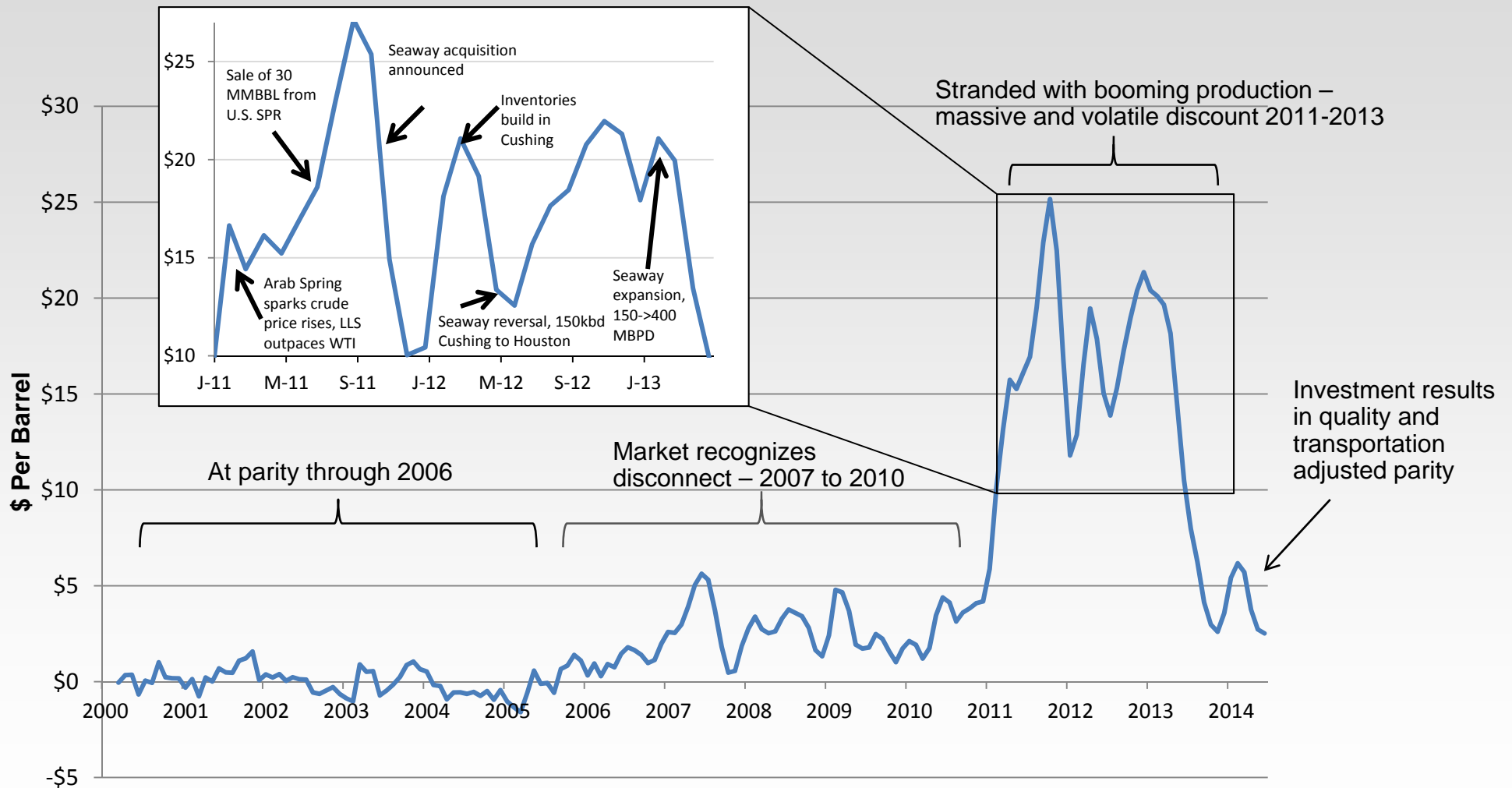
Day of Reckoning Scenarios



Day of Reckoning Scenarios

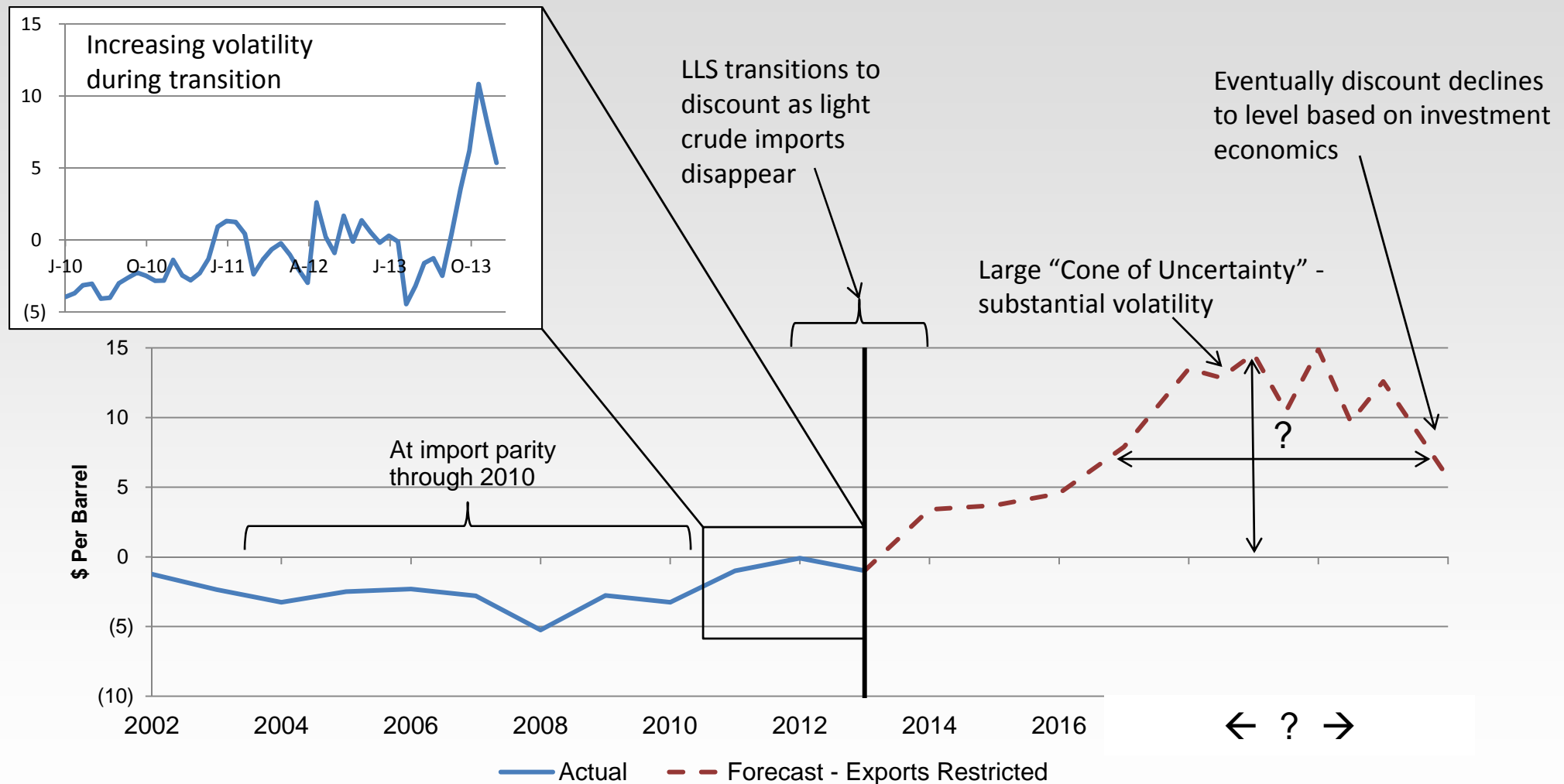


LLS-WTI Experience



Domestic-to-International Discount

Brent (Dated) – LLS (St James) Forecast



Industry Already Making Investments

- Made to provide industry the ability to run very light crudes and condensates – delays “Day of Reckoning”
- Most being done within refinery gates
 - Focused on Eagle Ford; also some Utica
 - Refinery specific/new atmospheric units, pre-flash towers, etc.
- Upstream and midstream also making processing investments
 - Field condensate stabilizers – to facilitate safe storage and transportation
 - EF Condensate splitters – located on the coast (Corpus Christi and Houston)
- Additional “opportunistic” investments to take advantage of regional proximity to advantaged crudes
 - PADD IV/North Dakota/Permian
 - Size limited by regional demand

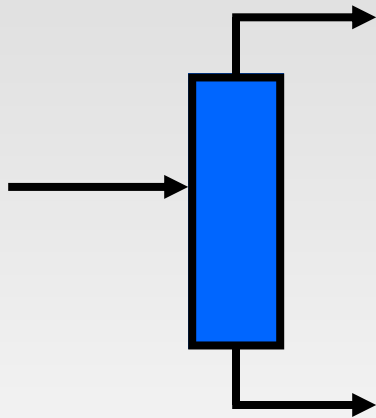
Investments in Reaction to Saturation

- Made to convert crude to “exportable” products
- Market/regulatory uncertainty will incentivize low cost/complexity projects
 - Similar to forces driving crude-by-rail vs. pipeline
 - No incentive to add to global gasoline surplus
- Various types – will depend on governmental guidelines
 - Current rulings would favor simple crude stabilizer
 - Large USGC located facilities to process growing WTI crude would meet current criteria
 - Other facilities would also be built/WTI diesel hydroskimmers could become price-setter if BIS imposes “minimum” criteria on definition of distillation
- Midstream segment likely to sponsor many of the projects
- Conversion of existing heavy crude refineries to light crude is least attractive option

Processing Options

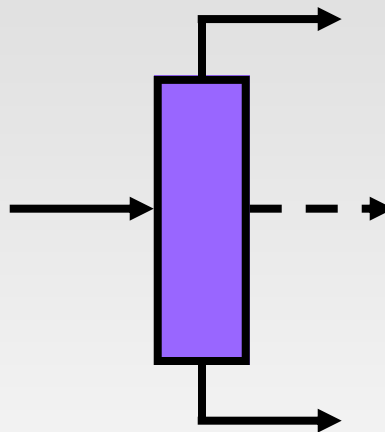
Distillation

Field Condensate Stabilizer



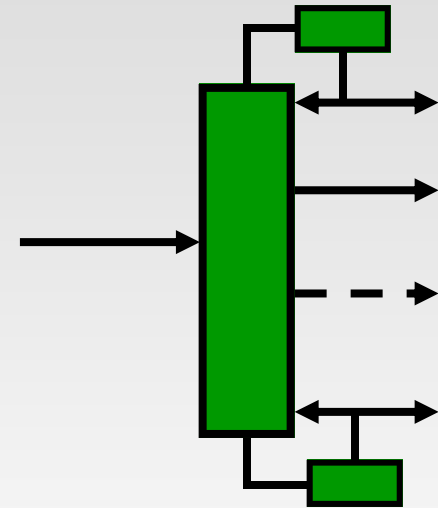
Capacity: : ~5 mbbl/day
 Cap. Cost: ~ Several million \$
 Op. Cost: \$0.50-\$1.00/B
 Construction: ~12 months

USGC Crude Stabilizer



Capacity: 100 mbbl/day
 Cap. Cost: \$150 - 200 MM
 Op. Cost: \$0.75-\$1.00/B
 Construction: 12-18 months

Condensate Splitter



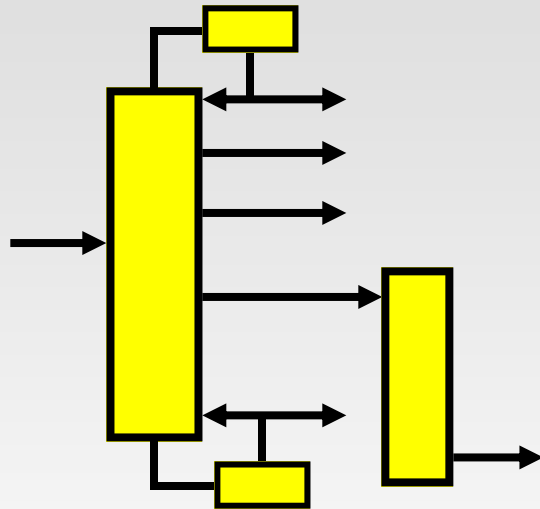
Capacity: 100 mbbl/day
 Cap. Cost: \$300-400 MM
 Op. Cost: \$1.00 to \$1.50/B
 Construction: 18-24 months

Increasing Level of Separation and Complexity

Processing Options

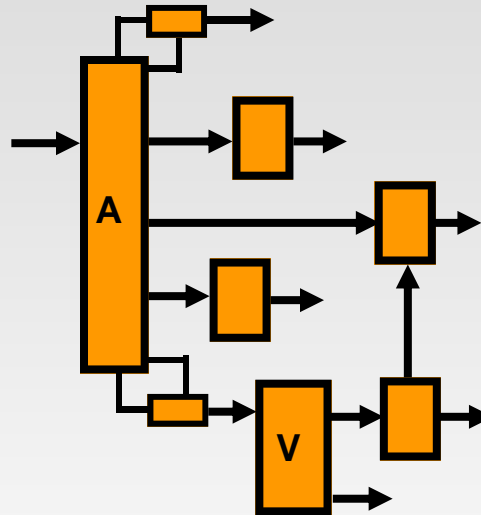
Refining

Distillate Hydroskimmer



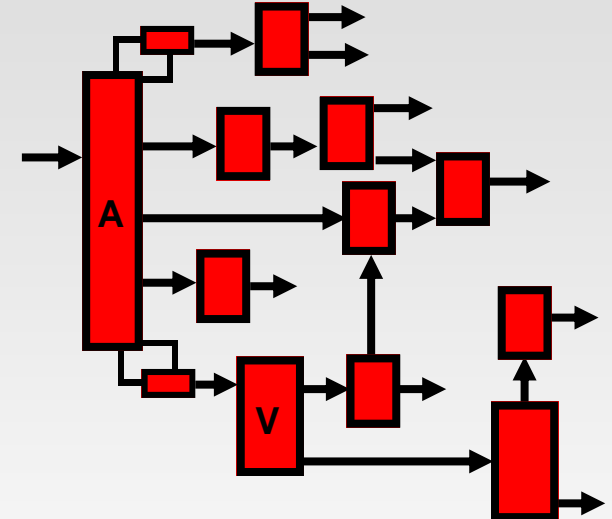
Capacity: 100 mbbl/day
 Cap. Cost: \$600 MM
 Op. Cost: \$2.00-\$3.00/B
 Construction: 2 to 3 years

Light Crude Refinery



Capacity: 200 mbbl/day +
 Cap. Cost: \$2 Billion +
 Op. Cost: \$3.00-\$5.00/B
 Construction: 3+ years

Heavy Crude Refinery

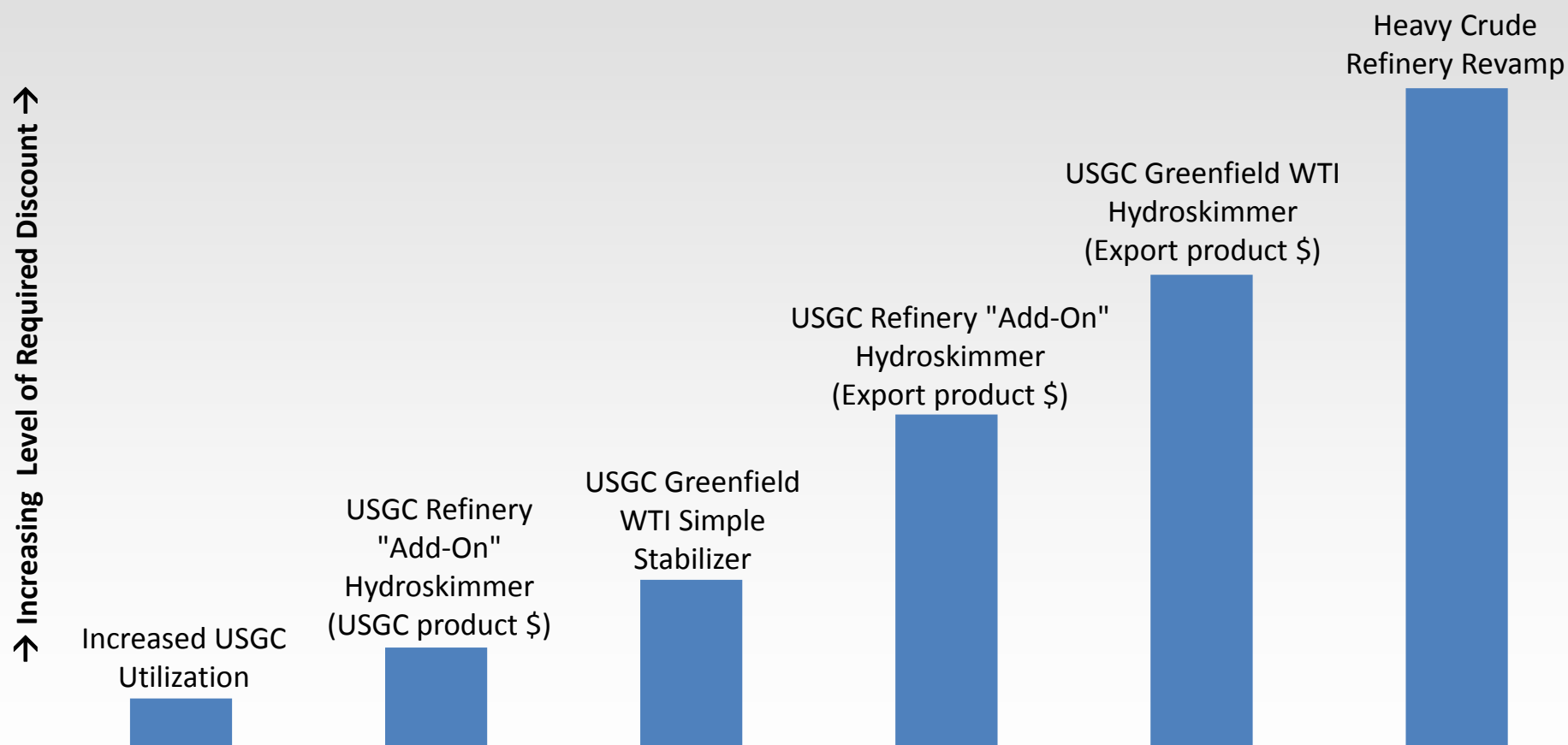


Capacity: 200 mbbl/day +
 Cap. Cost: \$4 Billion +
 Op. Cost: \$5.00-\$7.00/B
 Construction: 4+ yrs

Increasing Level of Separation and Complexity

Economic Ranking of Processing Options

Based on Capital and Operating Costs and TM&C Product Price Forecast



Final Thoughts

- U.S. Prod. Growth On-Pace to Surpass Light/Medium Domestic Refining Capacity
 - “Day of Reckoning” influenced by many factors – anywhere from 2015/16 to 2020+
 - Domestic prices already impacted for “problem crudes” and during T/A season
- Strict Export Restrictions could Lead to “Stranded Crude”
 - Domestic prices discounted; situation similar to WTI/LLS experience
 - Large “Cone of Uncertainty” - Duration and depth of discount hard to predict/volatile
- Industry Responds with Investment in Crude-to-Product Facilities
 - Investment delayed by policy uncertainty
 - Ultimate discount based on incremental cost of marginal investment type
- Recent BIS “Clarification” is a starting point – is there more to come?
 - With no additional limitations, low cost USGC crude stabilization would become the marginal investment – low hurdle/limited domestic crude discounts
 - USGC distillate hydroskimmer could be price setter with more restrictive rulings
- Hydrocarbon Exports Poised to Grow – U.S. To Become Net Exporter – Policies Key
 - All segments of U.S. industry are world leaders in efficiency and technology
 - Policies impacting costs, access, demand will influence future competitiveness

Presenter



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Executive Vice President

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- Univ. of Houston MBA
- Formerly with Exxon
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- Leads Outlook team
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Extra Slides

Refinery Expansions

Required Crude Expansions

Operator	Location	MBPD*	Startup
Flint Hills	Corpus Christi, TX	30	Late 2014
Valero	Houston, TX	90	2Q 2015
Valero	Corpus Christi, TX	70	3Q 2015
Marathon	Canton, OH	10	2014
Marathon	Catlettsburg, KY	35	2015

Opportunistic Crude Expansions

Operator	Location	MBPD	Startup
Dakota Prairie Refining/Calumet	Dickinson, ND	20	2014-2015
Valero	McKee, TX	25	2015
HollyFrontier	Woods Cross, UT	29	2015/16
Calumet	Great Falls, MT	10	2015
Tesoro	Salt Lake City, UT	4	2015

*Project will allow refinery to run higher volumes of very light crude and condensate from regional tight oil production. Estimated total expansion of crude capacity is not necessarily equal to capacity of new condensate splitter or preflash tower and is TM&C's estimate.

Condensate Splitters

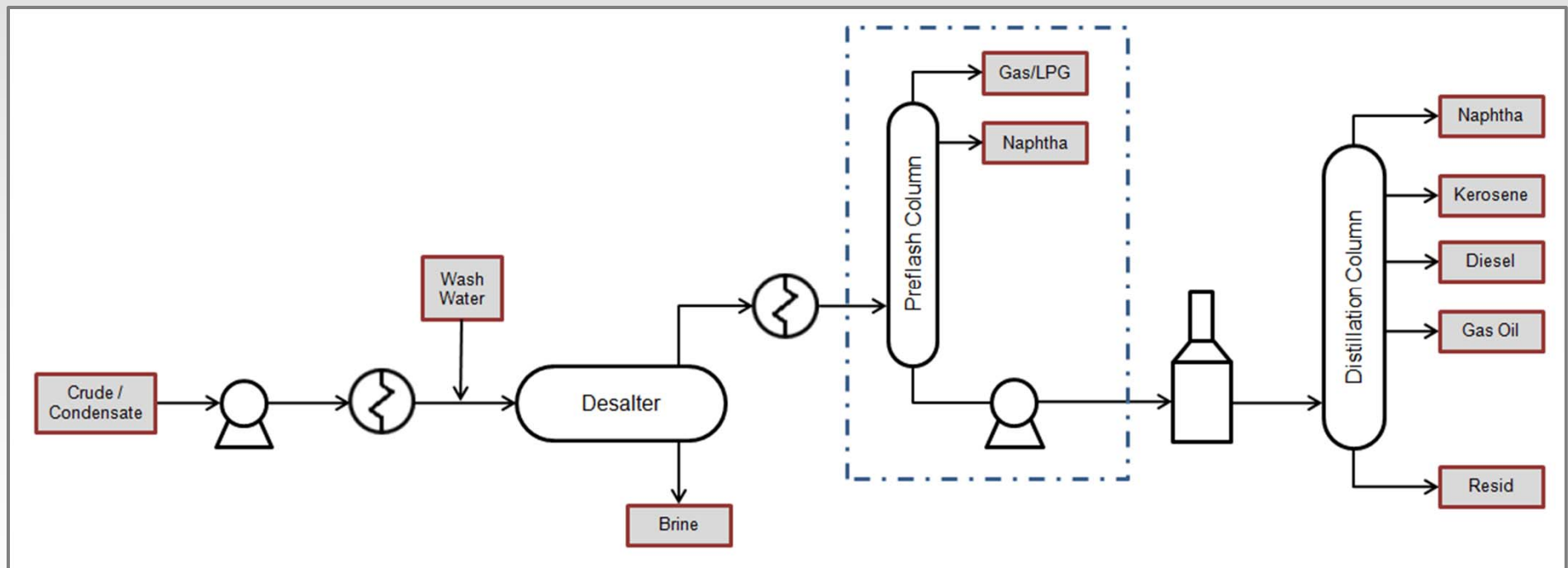
Under Construction

Operator	Location	MBPD	Startup
Kinder Morgan, Phase 1	Houston, TX	50	2Q 2014
Kinder Morgan, Phase 2		50	2Q 2015
Trafigura	Corpus Christi, TX	50	4Q 2014

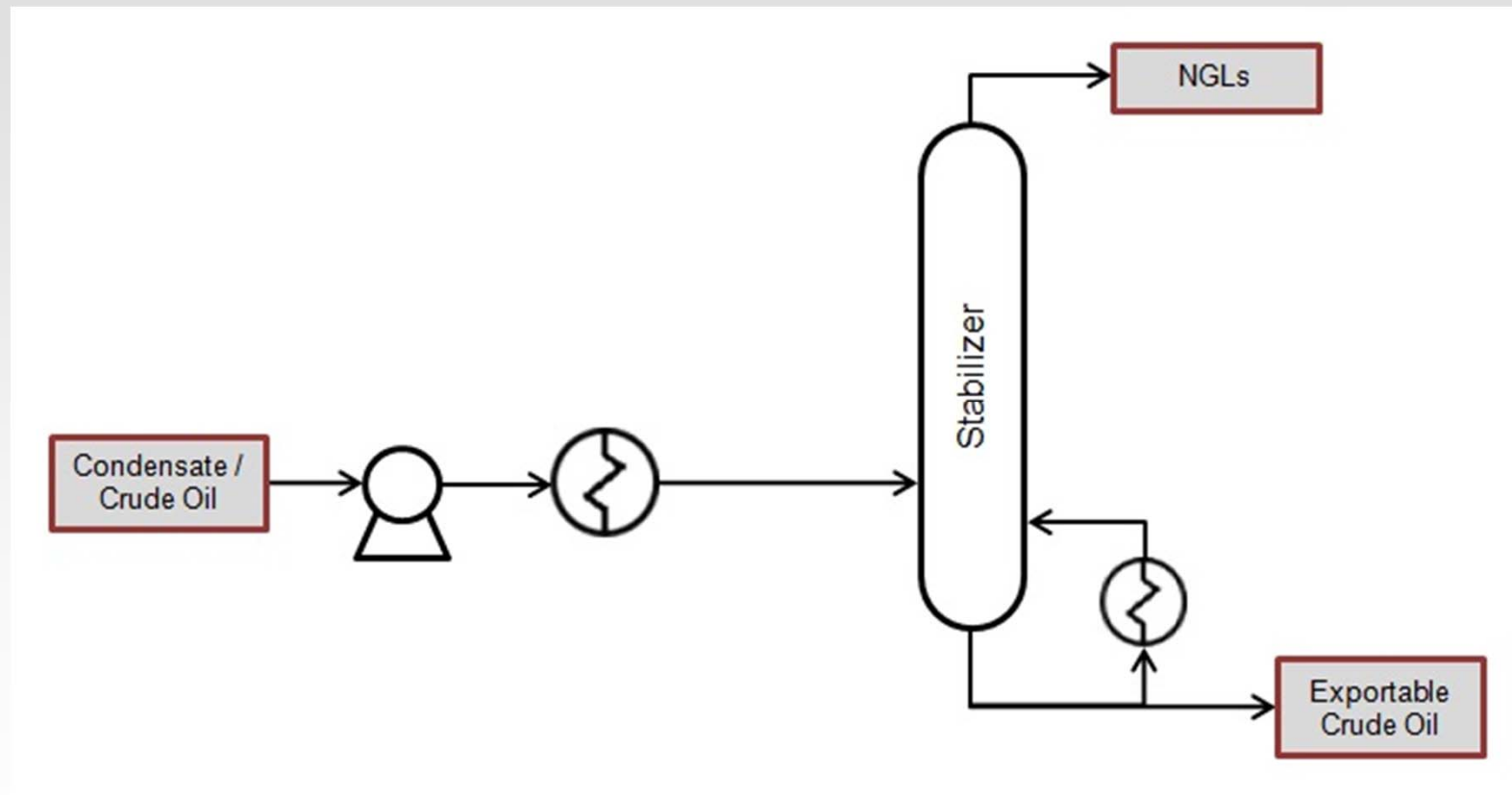
Proposed

Operator	Location	MBPD	Startup
Magellan	Corpus Christi, TX	50	2H2016
Martin Midstream	Corpus Christi, TX	Up to 100	1-2Q 2016
Targa Resources	TBD	TBD	TBD
Castleton Commodities	Corpus Christi, TX	TBD	TBD
Phillips 66	Sweeny, TX	TBD	TBD

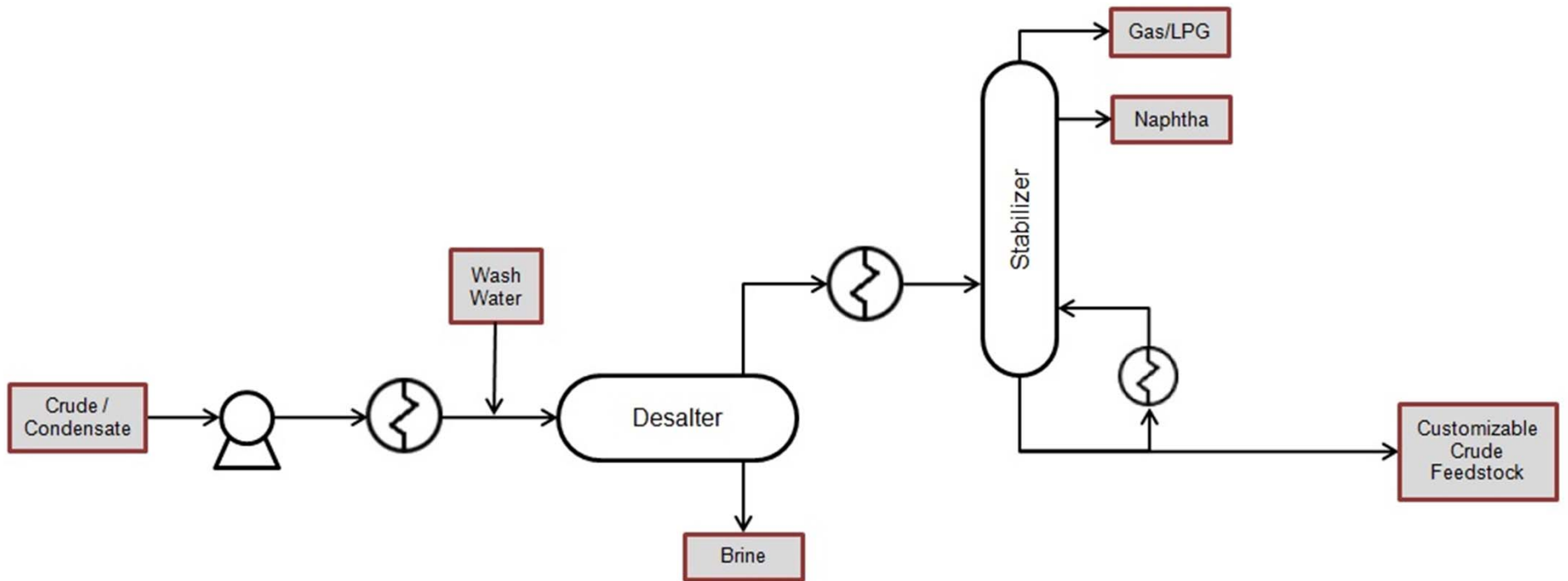
Pre-Flash Column Process Flow



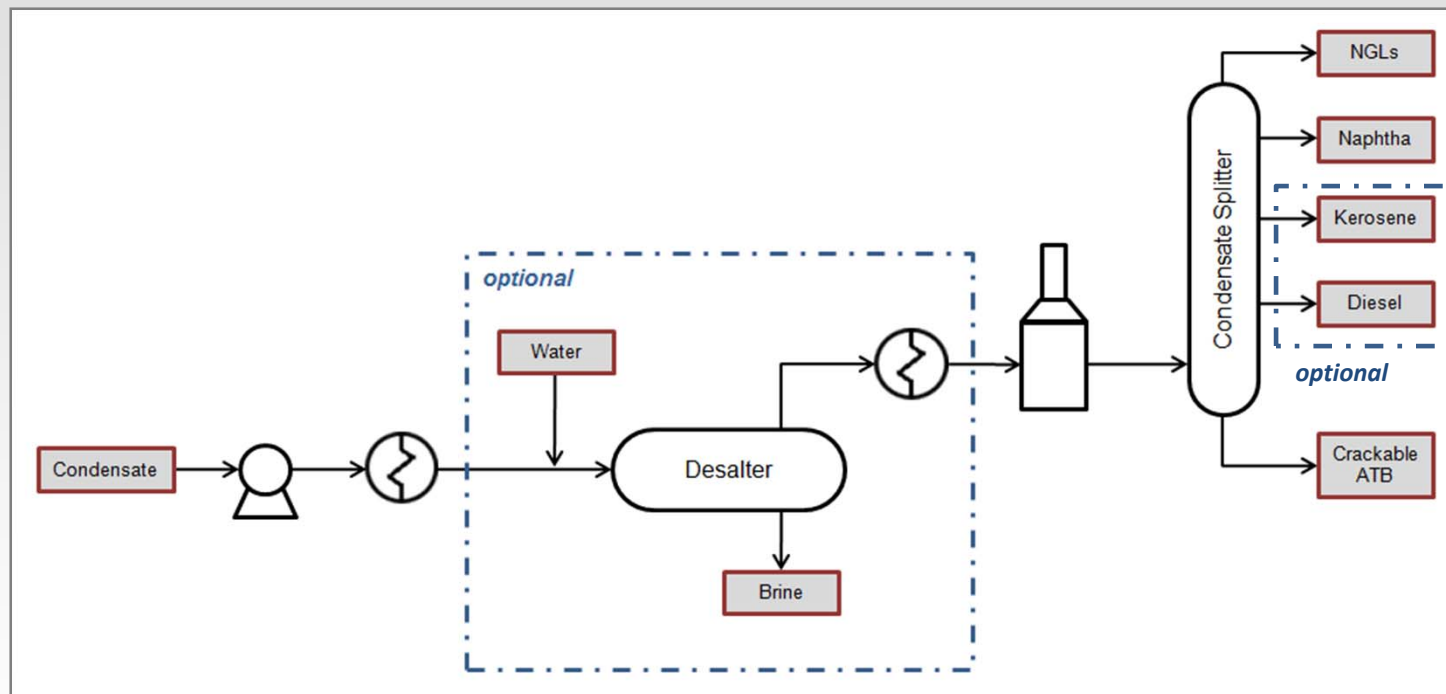
Simple Stabilizer Process Flow



Complex Stabilizer Process Flow



Condensate Splitter Process Flow



WTI Hydroskimmer Block Flow

