(A38935)

Project at a glance

Oil Pipeline

- **Westerly flow**
- **Transport petroleum from near Edmonton to Kitimat**
- **1,177 km in length**
- **36 inches in diameter**
- **Will carry an average of 525,000 barrels of petroleum per day**

Condensate Pipeline

- **Easterly flow**
- **Transport condensate from Kitimat to near Edmonton**
- **1,177 km in length**
- **20 inches in diameter**
- **Will carry an average of 193,000 barrels of condensate per day**
- **Condensate is used to thin petroleum products for pipeline transport**

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The Enbridge Northern Gateway Project involves a new twin pipeline system running from near Edmonton, Alberta, to a new marine terminal in Kitimat, British Columbia to export petroleum and import condensate.

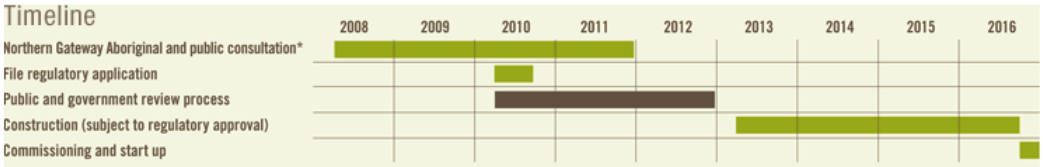
(A38935)

Strategy & Profile

Project Profile

The primary purpose of the Enbridge Northern Gateway Project is to provide access for Canadian oil to large and growing international markets, comprising existing and future refiners in Asia and the west coast of the United States.

Providing new pipeline transportation service to tidewater will allow Canada to diversify its market for the sale of oil and, conversely, will allow Pacific Rim refiners to consistently access Canadian oil supply and diversify their own sources of supply.



Northern Gateway believes that increasing the number of transportation options and markets for Canadian oil supply will lead to higher netbacks for all Canadian producers and encourage innovation in Canada's energy sector.

A secondary purpose of the project is to provide for the construction of a condensate import pipeline. Condensate will be imported from a variety of supply areas in the Asia-Pacific and Middle East and will be transported to sources of bitumen and heavy oil production in Alberta, for blending purposes.

Enbridge has secured $100 million funding from Western Canada producers and Pacific Rim refiners toward the costs of seeking the necessary regulatory approvals for the project.

The project involves:

- a 1,172-kilometre (728-mile) twin pipelines system, running underground from near Edmonton, Alberta, to Kitimat, British Columbia;
- associated pipeline facilities; and
- a tank terminal and marine terminal located in Kitimat.

One pipeline, a 36-inch diameter line with an initial capacity of 525,000 barrels per day (bpd), would be used to transport crude oil for export from the Edmonton area to Kitimat.

The other pipeline, a 20-inch diameter line with an initial capacity of 193,000 bpd, would be used to import condensate to markets in Alberta.

The Kitimat Terminal would include oil and condensate tanks, pump facilities, other associated facilities, two tanker berths and one utility berth.

Crossing the coastal mountains in British Columbia would require constructing two tunnels through the mountains between Clore River valley and Hoult Creek valley. The Clore Tunnel would be approximately 6.5 km (4 miles) long and the Hoult Tunnel would be approximately 6.6 km (4 miles) long.

The Enbridge Northern Gateway Project is expected to be in service in 2016, subject to finalization of commercial terms with industry, and regulatory approvals.

Enbridge Northern Gateway Project at a Glance

Economic Benefits

- Estimated $5.5 billion pipeline project
- Provides access to new growing markets
- Approximately 62,700 person-years of construction employment throughout the Canadian economy, including a peak workforce of 3,000 workers
- Estimated $4.3 billion of labour-related income across Canada during construction
- Approximately 1,150 long-term jobs across Canada during operations
- Estimated $2.6 billion in tax revenue throughout the life of the project

Oil Pipeline

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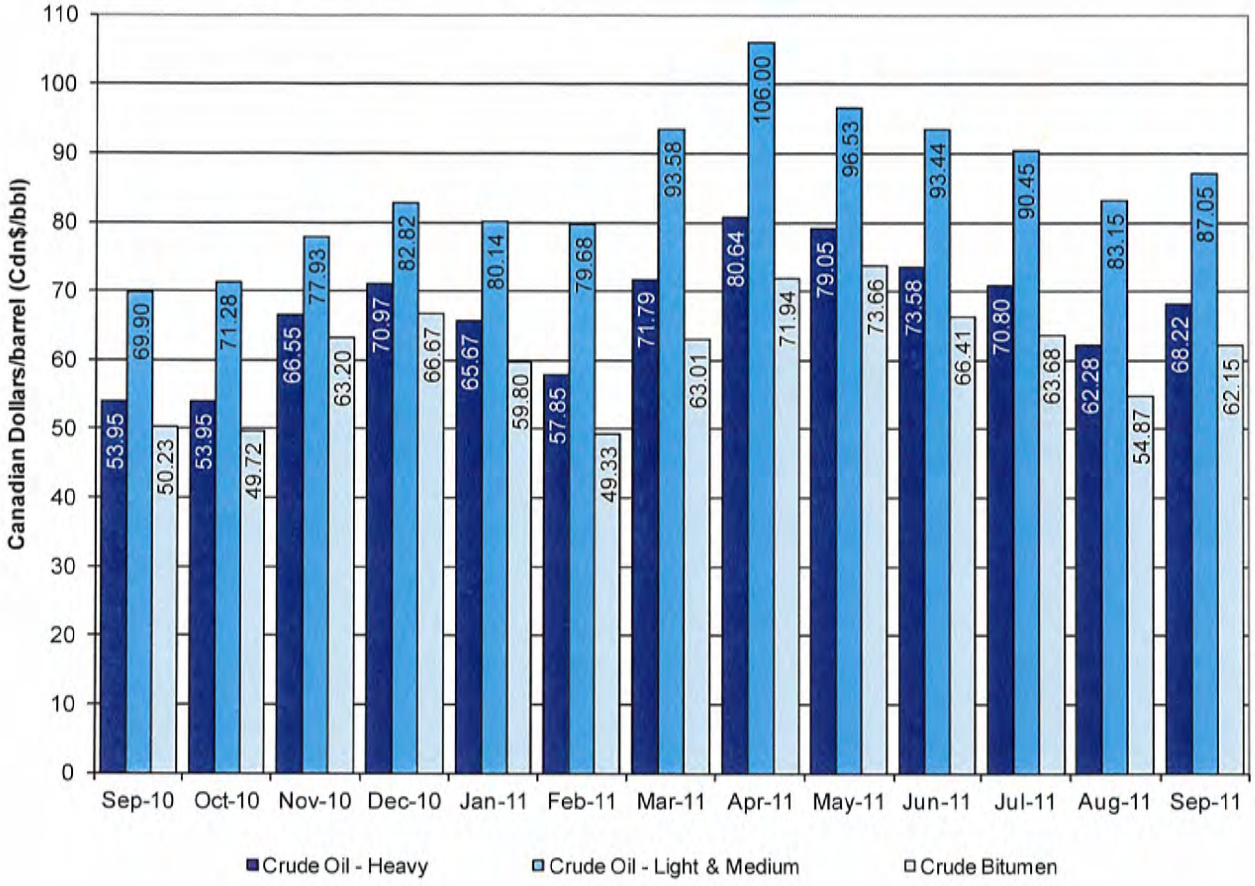
Alberta Official Statistics

Crude Oil and Bitumen Prices



Data Source: Energy Resources Conservation Board (ERCB)
ST-3 Report

- Crude oil is deemed to be "heavy" when it has a density of 900 kg/m^3 or greater and "light & medium" when it has a density of less than 900 kg/m^3.
- Crude bitumen is a naturally-occurring viscous mixture consisting mainly of hydrocarbons heavier than pentane. It may contain sulphur compounds. In its natural state, it will not flow to a well.

NATIONAL ENERGY BOARD
HEARING ORDER OH-1-2007

TransCanada Keystone Pipeline GP Ltd.
Application for Construction and Operation of Keystone Pipeline

Written Evidence of
Informetrica Limited

The following evidence was prepared by M.C. McCracken, Chair and CEO of Informetrica Limited, for the Communications, Energy and Paperworkers Union of Canada and for the purpose of assessing certain aspects of the public interest that are engaged by the present Applications. We have been asked to comment on whether the evidence introduced by the Applicants provides a sufficient basis upon which the Board can determine whether it is in the public interest to grant the approvals being requested.

For the purposes of preparing this report we have reviewed the relevant materials filed by the Applicant in support of its present applications. Having done so, we see no reason to substantively revise the analysis we offered when we carried out our review of the Transfer Application. With appropriate changes in reference, that assessment provided as follows:

For the purpose of carrying out this assessment we have identified three development scenarios that reflect the extent to which Canadian oil and gas resources that may be transported by the Keystone Project are processed in Canada. The scenarios illustrate the very different outcomes that may arise from the decisions the Applicants are asking the Board to make. The following summarizes our views with respect to the public interest as it relates to these outcomes:

- The public interest includes concerns about the industrial structure and regional allocation of economic activity throughout Canada. Decisions made by the Board concerning the establishment, conversion and use of pipeline infrastructure may greatly influence the future path of the Canadian refining and chemical industries.

- The extent to which Canadian oil and gas resources are processed in Canada prior to being exported to, or sold into, domestic and international markets will have a significant impact on the Canadian economy and employment in Canada.

- In the case of the Keystone Project, domestic processing could readily represent an additional 18,000 jobs per year to the Canadian economy when compared with a scenario in which only unrefined heavy crude oil is exported to the US markets.

- The future paths for oil and gas supplies and prices are uncertain. Parts of the sector (prices, supplies, and demands) are interdependent. This combination of uncertainty and complexity are characteristic of situations where the use of scenarios is helpful in identifying the consequences that are likely to arise from potential future circumstances.

- By declining to provide information about the nature, sources and end-uses of the energy goods that will be transported by the pipeline facilities at issue, the Applicants have failed to provide the Board with the information it requires to assess the likely economic, commercial, supply and market impacts of the removal of the Facilities from gas transportation service and conversion to oil transportation service. The Board is not therefore in a position to determine whether granting the present Applications would be in the public interest.

1 Background

The future demand and supply of fossil fuels is uncertain. Parts of the sector (prices, supplies, and demands) are interdependent. Growing population and a larger, richer Canadian economy will lead to increased demand for energy. The mix of fuels will reflect relative prices and availability. Continuing improvements in technology and conservation by energy users is expected to produce increased efficiency in use. This has been the continuing trend since the sharp rise in oil prices in the early 1970s. Nevertheless, the total demand for energy is likely to continue rising, in Canada and globally. Conventional Canadian oil production has been declining and is expected to continue to decline. Oil sands production is ramping up to much higher levels (and is expected to double or even triple by 2015 and further production increases are expected by 2025).

Conventional natural gas supplies from the Western Canadian Sedimentary Basin (WCSB) are expected to continue a decline that started in 2002. Unconventional gas supplies in the Basin such as coal bed methane and tight gas deposits will be an offsetting factor, but Western Canadian gas supplies continue to decline, even with the new supplies from the Mackenzie Delta.

The uncertainties about the energy sector include:

World oil price volatility – Will the current oil price soar to $100 per barrel or decline to $30 per barrel?

Heavy oil supplies - Will heavy oil supplies grow dramatically in the next few years or will shortages of workers, water, natural gas, or other constraints moderate the pace of development?

Natural gas availability – Will supplies from the Mackenzie Delta be delayed? Will conventional production decline more rapidly? Will unconventional gas supply expand rapidly or not?

Heavy oil exports – Will adequate supplies of diluent be available? Will the price of diluent make exports of heavy oil uneconomic?

The Board faces the difficult task of making sequential decisions in the face of these uncertainties. As the Board has acknowledged, in making these decisions it must ascertain whether a particular project or undertaking accords with the public interest of all Canadians. In the present case, the Applicants have declined to provide information about the nature of the energy goods (including any diluent that may be used) that will be transported by the pipeline

facilities once converted to oil service, including information about the extent to which such goods will be processed in Canada. It has also declined to provide adequate information about potential commercial, economic, supply and market impacts of the removal of the unprocessed heavy crude from the Canadian supply.

2 Development Scenarios

The following scenarios illustrate the very different economic impacts associated with the transportation of oil and gas resources depending upon whether pipelines are used to export unprocessed resources to foreign markets, or become an integral part of a Canadian energy infrastructure that includes significant resource processing prior to sale into domestic and international markets.

2.1 Moving Heavy Oil to US Markets

The focus in this scenario is on extracting heavy oil and moving it to the US market for further processing. This requires the use of a diluent to reduce the viscosity of the oil so that it can be transported by pipeline. Various petroleum-based products can be used as a diluent. However, in all cases it means a lower volume of heavy oil is moved and a potentially valuable liquid is lost to the Alberta and Canadian market.

This scenario accords closely with the present Application, which appears to be proceeding on the premise that unprocessed heavy crude oil and diluent will be exported to the US, where it will facilitate the further development of the refinery and chemical industries.

The Canadian public interest will not be served if, as in this scenario, supplies of energy goods to Canadian refinery and chemical industries are truncated, and the development of a diversified oil and gas industry in Canada is frustrated by this lack of supply.

The hearings process should seek to determine if there are any adverse effects on the industrial structure and regional allocation from this project. Concerns have been raised by other interveners about the effect on natural gas supplies outside of the WCSB. Our additional concern arises from the potential consequences of removing 400,000 barrels a day of heavy oil and diluent from the output stream in Alberta without further processing.

2.2 Increasing Value-Added for Canada

An alternative scenario would establish pipeline facilities to transport heavy oil to domestic facilities for upgrading, and from there as light crude to refineries and other end-users, including Canadian chemical producers. Because light crude is a higher value product, it has greater flexibility in the marketplace because it can be used as feedstock for the refinery industry, producing gasoline, jet fuel, and light fuel oil. Refineries also generate by-products that are the feedstock for the petrochemical industry. The increased value of light crude should be sufficient to support the costs of upgrading in Canada.

This path would see increases in upgrading facilities develop in line with expanding oil sands production. According to this scenario, the pace of development of the oil sands would be more in line with Canadian priorities rather than US priorities.

Consistent with this approach, the export of natural gas liquids as a diluent would occur only where it was not needed as feedstock for Alberta or other Canadian chemical industries. This would encourage the further development of the Albertan and Canadian chemical industries by ensuring adequate feedstock supplies in the future.

Through a growing refinery and chemical industry, there would be additional intermediate supplier opportunities. As a result there would be greater diversification of the Albertan and Canadian economies resulting in enhanced employment opportunities and rising real incomes.

Using an econometric model of the Canadian economy, we estimate that expansion of the Canadian refining industry as a source of demand for 400,000 barrels per day of heavy oil would add approximately 18,000 jobs per year to the Canadian economy as compared to the additional jobs generated by export of the crude. An increase in annual employment in the refinery industry of about 4,800 would constitute a 30 per cent increase in industry employment. For the economy as a whole, the refinery option would add 0.2 per cent to Canadian GDP when compared to a case where heavy oil is only exported. Impacts would be positive across provincial jurisdictions, including in scenarios where the addition to refinery capacity is concentrated in one province.

Expansion of the refining industry also provides feedstocks to support the Canadian chemical industries, in addition to the more conventional list of petroleum products – gasoline, fuel oil, jet fuel, etc. This support will create jobs in the chemical sector in addition to those projected to arise from upgrading and refining heavy oil products.

In this scenario the public interest is served through enhanced growth opportunities for many different firms in a number of industries.

2.3 A Third View

The most optimistic scenario foresees the expansion of oil and gas supply in Canada proceeding so rapidly as to fully satisfy the goals of both scenarios one and two. Thus, increases in oil sands production will provide by-products to support the Alberta and Canadian chemical industry, and to provide for its expansion. Upgrading of oil would occur to approximately 66% of oil sands production - three times the current volume. According to this scenario, supplies are sufficient to provide feedstock for the refining industry and a higher value-added export as well. The premise underlying this scenario is that, contrary to past experience, current high prices will extend well into the future. As a result the rapid development of heavy crude exports makes good sense, and will provide the cash flow to support additional investments in the oil sands in the future.

3 Serving the Public Interest

If one looks ahead to 2025, when oil sands production is anticipated to be three times greater, will Canada have a robust chemical and refining industry that creates quality employment and profitable operations? Or will an increasingly large proportion of Canadian oil and gas resources be exported to the US for processing and secondary end-uses?

In either case, we may look back at the decisions the Board will make in this case as “keystone” events that either truncated or fostered the economic development of the Canadian downstream energy industry.

To better assess the likely consequences of the approvals and determinations the Applicants are seeking, CEP formulated a number of questions to which the Applicants declined to provide a meaningful response[1], including the following:

- What is the nature of the oil products that are proposed to be transported pursuant to these contracts, and in what relative quantities will such exports occur? In particular, please identify the quantities of bitumen, other forms of heavy crude oil, and SCO that may be transported by Pipeline.

- How corrosive are the oil products that are proposed to be transported by the Pipeline relative to 1) the gas products now being transported by these facilities, and 2) other oil products that are more highly refined.

- Will diluent be required for such transportation and if so in what form(s) and quantities?

- Describe any end-uses to which this diluent may be put, and whether these will occur in Canada or the US.

- What is the source of this diluent? (Domestically produced or imported)

Similarly, the Applicants declined to provide substantive responses to other information requests concerning the impacts of the present Applications on existing and potential future value-added processing of the prospective oil products in question. Contrary to the Applicants' assertion, the issue is not whether a pipeline can carry any oil product, but rather if the line carries heavy oil and diluent will this inhibit the development of the downstream processing sector in Canada? This question is crucial to assessing the commercial, economic, supply and market impacts of the removal of the conversion of the Facilities from gas to oil service.

As it did in response to similar information requests in the Transfer Hearing, the Applicant pleads ignorance of the nature of the oil products that may be transported by the Keystone Pipeline, indicating only such products need meet certain technical standards[2]. Therefore, by declining to describe the source, nature and potential end-uses of the energy goods and diluent that may be used to transport them, the Applicants have failed to provide the Board with the evidence it needs to determine whether the proposal before it will foster or undermine the development of a diversified and robust energy and processing sector in Canada. This question is central to a determination of whether the present Applications will serve the Canadian public interest.

Accordingly the Board does not in our view have the evidence it needs in order to determine whether it is in the public interest to approve the Keystone Project.

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[1] TransCanada Keystone Pipeline GP Ltd, Response to CEP (OH-1-2007) April 2, 2007.
[2] Idem

UPGRADING ALBERTA'S FUTURE

Securing long-term economic opportunities through adding value to bitumen

A discussion paper

Submitted by: Jeff Johnson, MLA Athabasca-Redwater

Table of Contents

If we don't upgrade Alberta's future now, we stand to lose up to 48% of the potential revenue from our resource, which represents the loss of hundreds of billions of dollars over coming decades. Such a lost opportunity will affect the future stability, prosperity, and quality of life for generations of Albertans. As today's decision makers, can we ignore such an opportunity or responsibility as this?

1. Our Greatest Risk Is Doing Nothing

"[The export of Canadian bitumen rather than higher quality upgraded oil] could become the greatest loss of economic value for any country in world history."

- **Wilf Gobert**, Chairman Calgary Economic Development and Energy Analyst, Financial Post, November 2009.

Alberta is vulnerable. As diminishing portions of our bitumen is processed into higher value products at home, we are increasingly engaged in only one step of the value chain. Albertais not achieving our strategic downstream targets which puts us at the mercy of the markets when it comes to oil prices and are therefore subject to a variety of factors out of our control. We are at risk of losing our future advantage if we don't act today. Critical risks that impact us include:

1. **Market volatility.** Selling one raw product to one major customer makes Alberta too vulnerable to market volatility. Without the diversification and hedge that value-add can bring we have no means of mitigating this, which results in unnecessary exposure to uncontrollable market tides.

2. **Fuel and feedstock shortages.** Alberta's farmers have experienced diesel shortages during the last three harvests! In addition, Alberta's petrochemical industry is at risk of running short of feedstock, while we export a rich feedstock (bitumen). Without having more influence on the full value chain we will face serious shortages that will negatively impact our economy.

3. **'Dirty Oil' implications.** Opinions on the oil sands are becoming increasingly entrenched due to misconceptions surrounding Alberta's 'dirty oil'. Alberta needs a strategy with more market choices to help mitigate this risk. Consider as well that without new value-add projects, we will not be able to leverage our CCS strategy and green our barrels or realize the benefits of enhanced oil recovery (EOR) which has the potential to bring in $15-$30 billion in additional royalties over the next 30 years.

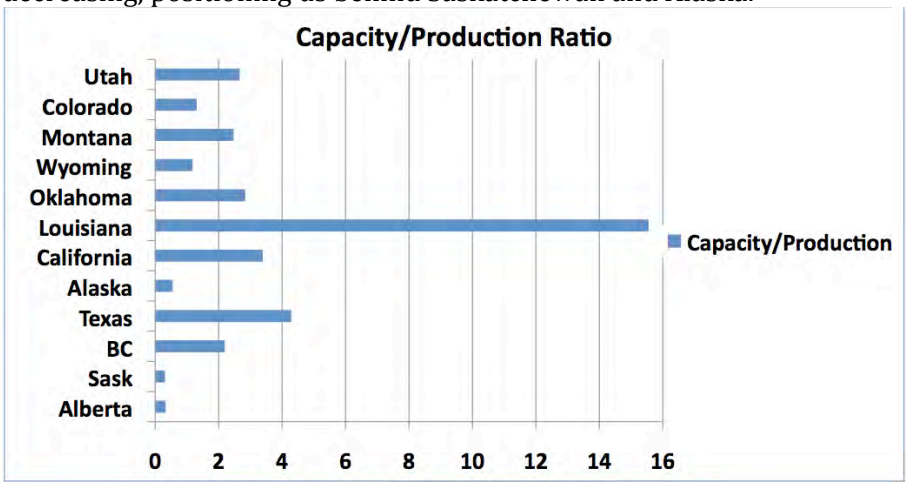
4. **Growing foreign influence over Alberta's resource development.** China, Korea, Japan, India, Norway, middle east countries and other jurisdictions increasingly own a greater piece of Alberta's resource industry. While foreign investment is not only welcome, its critical, these sovereign wealth funds and companies are not always tied to traditional market drivers. Some will be strategically looking forward in order to secure *their* economic and energy future. This should be considered in light of Alberta's *own* economic and energy future and *our* ability to compete, build wealth and quality of life.

Taken together, all of these factors put Alberta in a vulnerable position. Although we should not expect to process all our own bitumen, adding maximum value to our bitumen would allow us to have more control over these critical risk factors.

1. Our Greatest Risk Is Doing Nothing: Continued

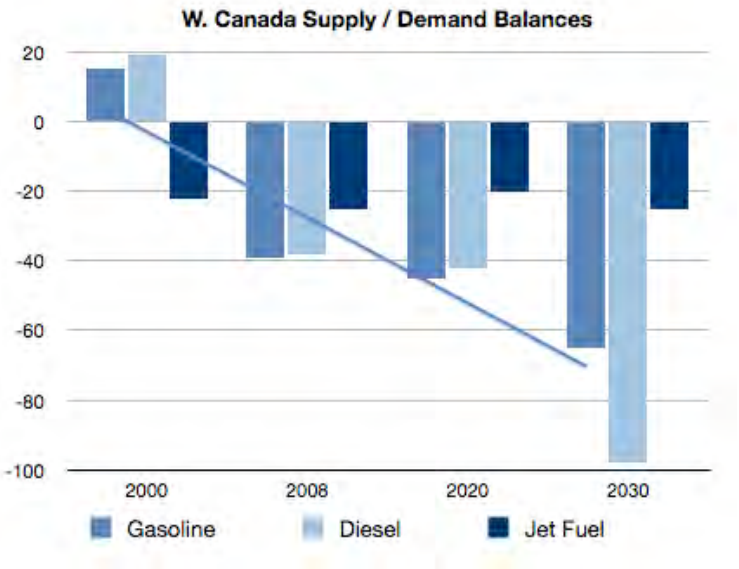
Untapped Potential - Alberta's Capacity and Production Lags.

When looking at both crude production levels and capacity for crude refinement, Alberta is lagging behind other North American jurisdictions. For example, British Columbia, Montana, and Colorado have the capacity to refine almost twice as much crude as they produce. In comparison, Alberta has far less capacity to refine the crude it produces and Alberta's capacity/production ratio is decreasing, positioning us behind Saskatchewan and Alaska.



Sources: EIA 2009, Statistics Canada 2010 Projection
Saskatchewan: Coop Regina refinery working on a 50 mbd expansion ^ mostly gasoline production
Notes: because of U.S. EIA reporting, 1659 bbls of U.S. Federal Offshore production is not allocated to specific states.

This is at a time when Albertans experience annual constraint of diesel fuel and when projections show that without new refinery capacity, Western Canada's transportation fuel deficits could reach nearly 200 KB/D by 2030 as demonstrated below.



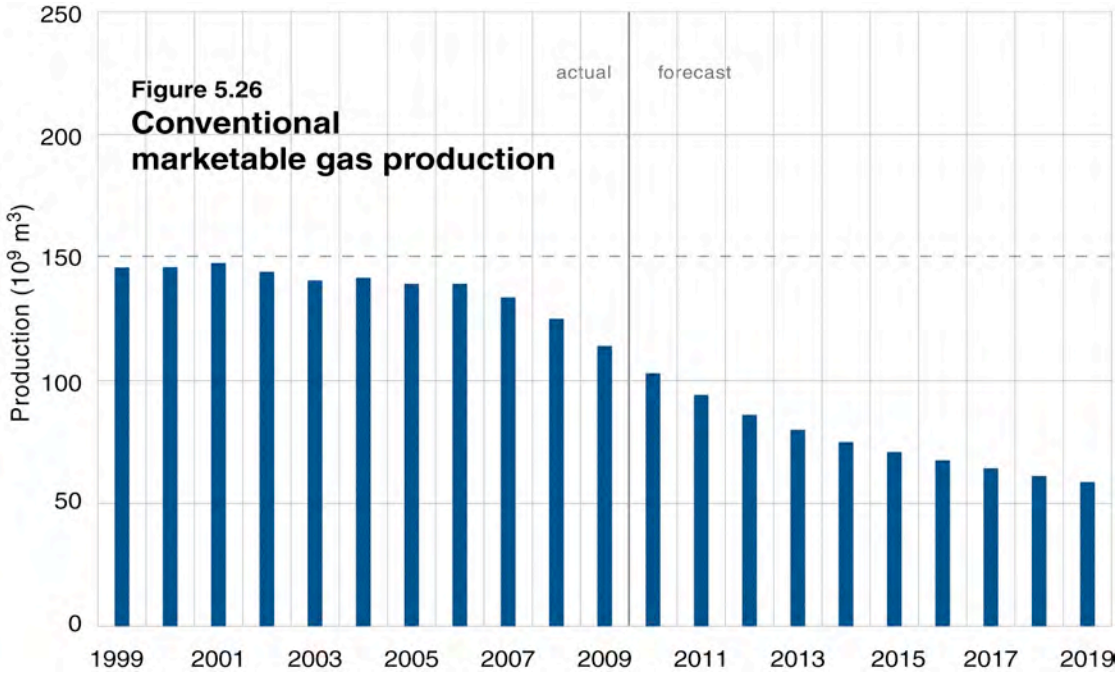
Units - ('000 B/D)
Source: Moncrieff Consulting, July 2010

1. Our Greatest Risk Is Doing Nothing: Continued

Alberta's Conventional Natural Gas Supply Is Dwindling.

"Alberta's conventional natural gas supply will be declining over the next decade. As indicated by the graph below, in 2019 marketable gas production is expected to be roughly one-third of what it was during the peak in 2001 due to of the age of the fields and the overall exhaustion of this resource.

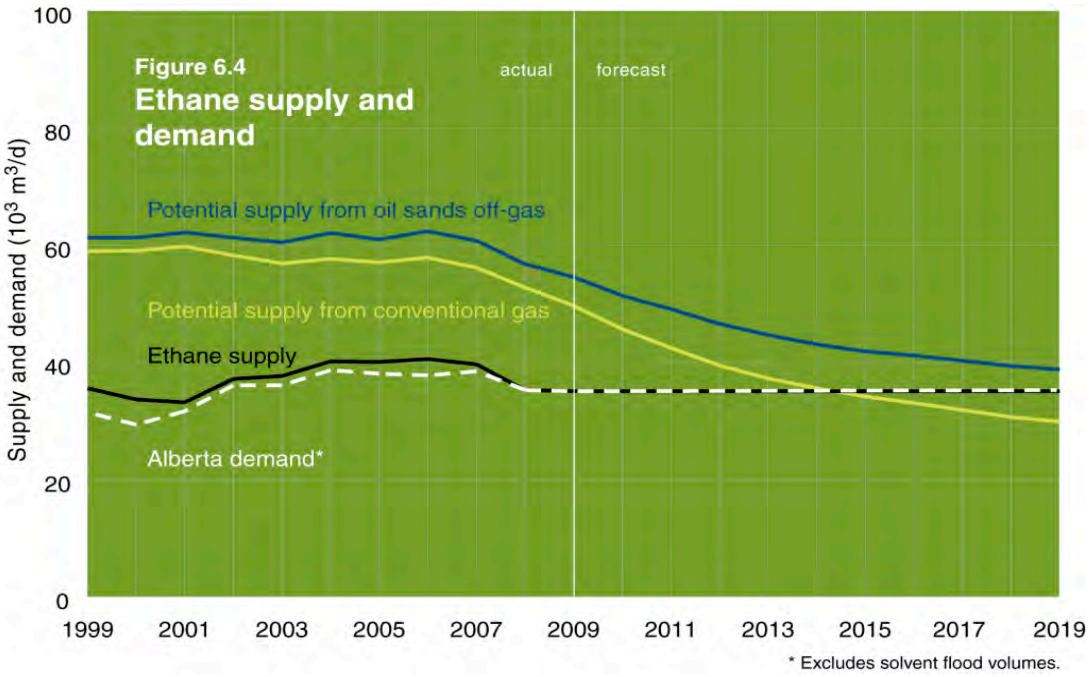
Source: ERCB Report, Alberta Energy Production Estimation, June, 2010



1. Our Greatest Risk Is Doing Nothing: Continued

Our Shifting Petrochemical Feedstock Supplies.

The reduction in conventional natural gas production will have a major effect on the supply of ethane, which is the main feedstock for Alberta's petrochemical industry. While we have new supplies of unconventional gas, such as coal bed methane and shale gas, these sources have little ethane and are not included in future projections for feedstocks. As a result of this decline, Alberta's demand for ethane for the petrochemical sector is expected to exceed the supply by 2014. While some companies are making plans to import ethane into Alberta, it will put a financial strain on the industry and erode our competitiveness. This may lead to a rationalization of the industry unless a new source of feedstock can be found.

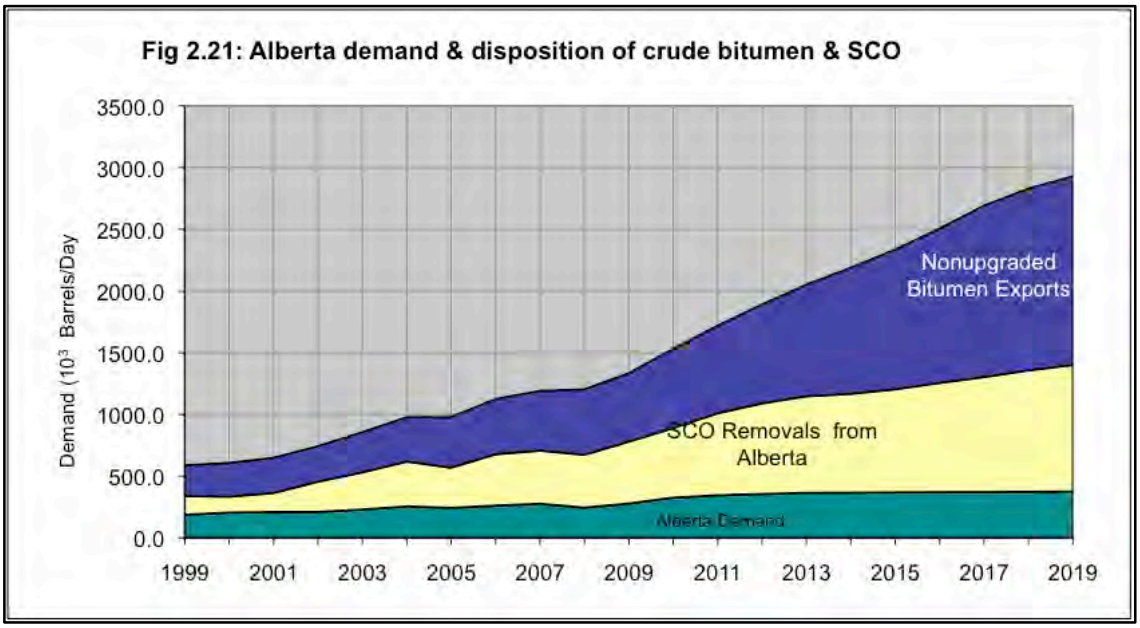


Source: ERCB Report, Alberta Energy Production Estimation, June, 2010

A major new source of feedstock can be found in the "off-gases" produced from the upgrading of Alberta's bitumen. As the chart above shows, the potential of supply from "off-gases" combined with our conventional supply is projected to meet our demands. This means that by encouraging upgrading in Alberta we can sustain and even grow our petrochemical sector based upon the off-gas potential that exists. In fact, the estimates from the ERCB show a declining supply from off-gases, which grossly underestimates the volumes that would be available. An additional 600,000 bpd of upgrading capacity has the feedstock potential to double the size of the petrochemical industry in Alberta.

1. Our Greatest Risk Is Doing Nothing: Continued

As Raw Bitumen Exports Increase, Our Potential Decreases.



Source: ERCB Report, Alberta Energy Production Estimation, June, 2010

ERCB estimates show that the amount of bitumen processed into synthetic crude within Alberta is decreasing from approximately 70% in 2008 to less than 50% over the next decade and falling dramatically. With the potential for the oil sands to realize production of 6,000,000 barrels per day over the next 3 decades ***the consequences of this trend is significant and will cut deeply into our revenue, GDP and high value, knowledge-based job creation potential in the province.***

1. Our Greatest Risk Is Doing Nothing: Continued

'The Anti Value-Add Argument'

There are some who argue against adding value by upgrading in Alberta. Anti value-add arguments do not hold up under scrutiny or against existing research. The benefit of upgrading Alberta's resources outweighs the upfront risks. Here are the some of the common arguments you might see publicized:

Risk	Misconception
Government could lose money if they get involved in value-add projects in Alberta.	**Not true.** The taxation alone related to a downstream barrel of oil captures more revenue than royalties today.
We can't make money on 'the spread' (differential between raw bitumen and SCO).	**Not true.** You don't make decisions to build upgraders on the spread in 2010 or 2009, two of the worst economic years in the last century. Investors know an upgrader is a 30-40+ year project affected by many factors. Factors including Alberta's practice of allowing transportation costs and diluent discounts as allowable royalty deductions. Some would argue this artificially inflates the spread for the more distant processing plants. **The spread is also a natural hedge for the day when bitumen prices (and royalties) per barrel decrease.**
We should rely on the free market to correct itself	**Not true.** Profits are greater elsewhere for large integrated producers and while this exists the large developing gap will not be corrected by the market. Government action is the only thing that will correct our diesel shortages, petrochemical feedstock shortages and build upgrades in the short term.
There is no appetite in Alberta for upgraders.	**Not true.** There is huge appetite for upgrading here. There is will, capacity and political support.
The government has no business being in the energy business.	**Not true.** We have always played a partnership role in facilitating energy development. This goes back to the earliest days of Suncor, Syncrude and other companies. We are also currently a shareholder in many major oil companies (over $1 billion in shares) on behalf of Albertans through the Heritage Trust Fund.
The Alberta government is 'intervening' in the free market and government involvement will distort the market.	**Not true.** Albertans own Alberta's resources! We are simply *facilitating growth*. Our policy has always been **to shepherd the best outcome for our children and grandchildren. I**n addition, increasingly, our industry investors are foreign governments and are motivated less by tradition 'market' drivers than by their strategic economic objectives. Alberta needs to use this same lens… just as we did 40 years ago.

2. The Benefits: Upgrading Alberta's Future

Our critical weaknesses can be overcome by increasing upgrading and refining capacity in Alberta.

The benefits of upgrading have wide-ranging strategic implications for Alberta. It will help stabilize our economy by making us less vulnerable and more competitive. We will be able to diversify our markets, and expand our customer base and opportunities for new tax revenues. It will create new knowledge-based jobs and ultimately make us more profitable. Exporting raw bitumen alone could not create all of this value. Upgrading our future potential, profitability and opportunities can happen right now. Here are some of the major benefits of achieving the maximum bitumen value-add possible in Alberta.

Benefits in Brief	Positive Outcomes
Upgrading and petrochemical development in the province allows for new taxation revenue streams.	Upgraders mean more revenues in corporate, personal and property tax that will go to governments. These new revenue streams represent billions of dollars every year.
By creating more market demand for bitumen, we can keep its price high	Increased upgrading creates competition and helps to support higher bitumen prices. High prices equates to more Crown revenue for all our barrels through taxes and royalties.
We have influence on more of the value chain, which means we can diversify our products and our customers.	By having more products to sell, we have more possible markets to sell into. We spread the risk while maximizing our profitability.
Albertan's economy will not be constrained by restraint of transportation fuels	Farmers and other Albertans will have a more reliable supply of diesel and Albertans will have best possible price at the pump.
We create new feedstocks, with it more product potential, opportunity and revenues.	We can secure a future for the higher value petrochemical industry – and billions of new revenue into Treasury.
We will create new knowledge-based jobs and keep skilled workers in Alberta.	Growing the downstream industry also means thousands of new jobs in construction, services, and maintenance sectors. It also creates more knowledge based jobs in the chemical manufacturing industry. This industry has the highest employment of university graduates next to the IT industry where 1/3 of employees have University degrees.
We mitigate the risk of having one major trading partner.	It's bad business practice to have only one customer to rely on. Upgrading in Alberta means we can more easily trade our products with other partners.
We mitigate our risk of foreign governments making decisions on how our resources get developed.	A 'made-in-Alberta' solution with long-term Alberta contracts helps secure a strategic legacy for Albertans.
We help facilitate increased pipeline capacity to the West Coast.	A pipeline to the West Coast offers the benefit of proximity and new markets; it's relatively close and offers huge Asian Pacific market potential.
We green our barrels and increase royalties from EOR	New projects will be tied to CCS strategies. This will allow the overall carbon footprint of oilsands barrels to be among the smallest on the market. It will also enable further revenue and jobs for Alberta from EOR
We keep our commitments that have both economic and political importance.	Value-add is part of our energy policy and oilsands strategy. It was part of our campaign platform in 2008 and are endorsed PC resolutions from 2008 and 2009.

2. The Benefits: Continued

What's in a barrel of oil? The revenue from a barrel of oil is much more than royalties. If strategic upgrading targets are not met we will be missing out on up to 48% of potential revenues. Below is a breakdown for every dollar in taxes received by all levels of government when a barrel of bitumen is processed domestically:

We lose this revenue opportunity if we don't upgrade and refine in Alberta.

Today we capture this revenue.

The Canadian Energy Research Institute (CERI), Economic Impacts of the Petroleum Industry in Canada (2009)

Downstream revenues includes corporate, personal and property taxes from upgrading, refining, and petrochemicals.

Upstream revenues include current revenues from taxes from oilsands mining and in-situ development.

Royalties are royalties from mining and in-situ.

2. The Benefits: Continued

We forgo this GDP when we forgo value add.

Today we realize this GDP.

GDP CREATION

According to the CERI study, when a barrel is completely processed domestically, the upgrading stage of the value chain creates the most GDP outperforming the GDP created by any of the other stages (mining, in-situ, conventional production, refining or petrochemicals).

Here's the broader breakdown of the potential GDP created by upstream and downstream activity from a barrel of bitumen.

Employment potential unrealized

Today we create these jobs.

JOB GROWTH

Alberta's greatest opportunity for quality employment also lies within our downstream potential. For every 100 potential jobs created by Alberta's oil industry, 57 of those (mostly knowledge-based) are created by upgrading, refining and petrochemicals (downstream)

Source: The Canadian Energy Research Institute (CERI)

3. The Urgency: Securing Our Economic Future

The doors of opportunity are closing on Alberta as every day passes. The time to position our value-add potential is now.

Bitumen value adding Alberta needs to be fast-tracked. As recently as June 2010, The Alberta Industrial Heartland Association was quoted as saying, "in order to meet Alberta's strategic objectives, **we need to have four additional upgrades running at 150,000 barrel per day capacity."** As of today, none are under construction. If we are going to secure Alberta's future, we need to start now. Here are some of the critical reasons why:

1. There is a lot of investment happening in extraction in Alberta, shaping the economic landscape around us. Plans are being made, contracts are being drawn, pipelines planned and ownership is being decided, and we don't have three years to wait on a policy decision. We will have missed those windows of opportunities by then and they may not return for generations.

2. Upgraders take time to negotiate, finance, approve, design, build, and start operating. Assuming no delays, the window of opportunity is as follows: two years for company due diligence; two years for regulatory approvals; and three to four years for construction. If we start today, it will be 7-8 years (year 2017-18) before we have significant new capacity. In order to have upgraders running in the province by 2020, we need to get companies interested and engaged now.

3. Heavy oil demand is growing. In order to be strategically placed at a time when construction costs are relatively low, we need to act now. We need to secure and stage out upgrader development now for a systematic, managed rollout to avoid costly inflation that comes with too many projects commencing at once.

4. As Alberta approaches oil sands production of 6 million bpd , there will likely be less excess upgrading and refining capacity in the US and our bitumen $/b will drop. Increasing capacity in Alberta mitigates this risk and will help keep our bitumen price (and royalties) as high as possible.

4. Facilitating Value Add: Part of Alberta's History

"Value-add upgrading is the most immediate, pressing policy decision of our government."

- **Mike Percy**, Dean of the School of Business, U of A, speaking to Industrial Heartland Mayors, February, 2010

Alberta is widely recognized for its entrepreneurial, trailblazing spirit. In the energy sector, the Alberta government has been a facilitator of this since it first partnered with oil and gas interests in the early 1970's in order to grow some of our best-known companies who are now the backbone of our economy here in Alberta and across the country. Companies such as Syncrude, Encana, Cenovus, Transcanada, Suncor and others, all **had their start in partnership** with government and would not have had such successful starts without Alberta's integral role in their development.

What made these partnerships successful were two things:

1. our early leadership and investment;
2. our eventual and timely exit.

We have always been a catalyst, looking for ways to maximize value and realize potential.

We understood that our role in these partnerships was to get an industry off the ground and allow it to become self-sustaining. We were **there to be a partner** and facilitate growth, **not to control operations**. . Our role is, and always has been, to develop and implement strategic economic policy. We have always looked to the future, imagined ways we could add value to industry through support of various kinds, and then got out of the way to let industry do what it does best.

Today, the opportunity exists for us to once again look to the future and find ways to nurture an industry and the future of this province for generations to come. Right now, we are seeing a dramatic erosion of bitumen upgrading in Alberta. Should this continue and we not change this trend, we will forfeit enormous opportunities for our children and grandchildren.

For the sake of short-term gain, are we divesting ourselves of our province's future wealth? Should we not put in motion a strategy that will bring more money from diverse sources into Treasury while ensuring a strong competitive and strategic position for our next generations? We can do all of this by achieving maximum bitumen value-add in the province of Alberta and diversifying our markets.

Albertans are the proud owners of arguably the world's largest hydrocarbon reserves. Just as we are now reaping the benefits of decisions made by the PC government decades ago, future generations of Albertans can reap the benefits of the decisions we make today on their behalf.

5. Conclusion: Value Add – Keeping Our Promise

'Keeping our promise' means more than keeping our word or sticking to strategy. It also means ensuring our future promise is fulfilled for the next generation of Albertans.

- **Consider that the real money is not just in selling the raw resource.** Royalties are only a part of the picture. **It's what we leverage that raw resource into that creates new and sustainable economic opportunities for future Albertans.** There are incredible economic benefits from the jobs, as well as, corporate, personal and property taxes that can be generated out of upgrading activities alone.

- **We need to diversify our products to mitigate our current market risk. If Alberta has maximum participation of all levels of the bitumen value chain, we mitigate risk**. The way to do this is to upgrade two-thirds of our own resources. Bitumen Value add in Alberta offers choices, new revenue streams, new feedstocks and new stability against market volatility.

- **Diversifying our products means we can also diversify our customers.** Bitumen value add in Alberta means we can offer more marketable products to more customers around the world.

- **We need to ensure the future of Alberta is secured.** Downstream activity offers new, stable, knowledge based jobs, new economic opportunities, new products, security of supply and new sustainability that will last for generations. Our children and grandchildren will thank us.

Today we reap the rewards of an industry that did not exist in Alberta decades ago because of the wisdom of the people who came before us. Today we also have the vision to build a strategy that will provide for the future. The opportunity to act is in our hands. It's up to us to ensure we secure a quality of life and a legacy for generations of Albertans who don't yet have a voice.

6. Sources

- *The Canadian Energy Research Institute (CERI), Economic Impacts of Alberta's Oil Resources: September 2008 Update*

- *The Canadian Energy Research Institute (CERI), Economic Impacts of the Petroleum Industry in Canada (2009)*

- *The Industrial Heartland, News Conference Press Release and Media Q & A, July 7, 2010*

- *The Calgary Herald, April 28, 2009 (Deborah Yedlin editorial, "Bitumen destined to head south")*

- *The Financial Post, November 2009*

- *Alberta Venture Magazine, May 20, 2010 (Paul Marck editorial, "Bitumen refinery could kick-start more projects")*

- *Alberta Finance and Enterprise, research findings*

- *The International Energy Agency (IEA)*

- *ERCB Annual Report Statistics, June 2010*

- *Moncrieff Consulting, July 2010*

(A38935)

Freedom To Create. Spirit To Achieve.

Alberta's Value Added Oil Sands Opportunities and Bitumen Royalty in Kind

Government of Alberta

(A38935)

The Bitumen Resource as a Feedstock for Upgrading

Alberta's opportunity rests on two global competitive advantages - feedstock and access to markets

MARKETS

- Growth in world demand
- Proximity to largest market in the world (US)
- Rail and pipeline access to Asia and North America
- Synergies with existing petrochemical industry in Alberta

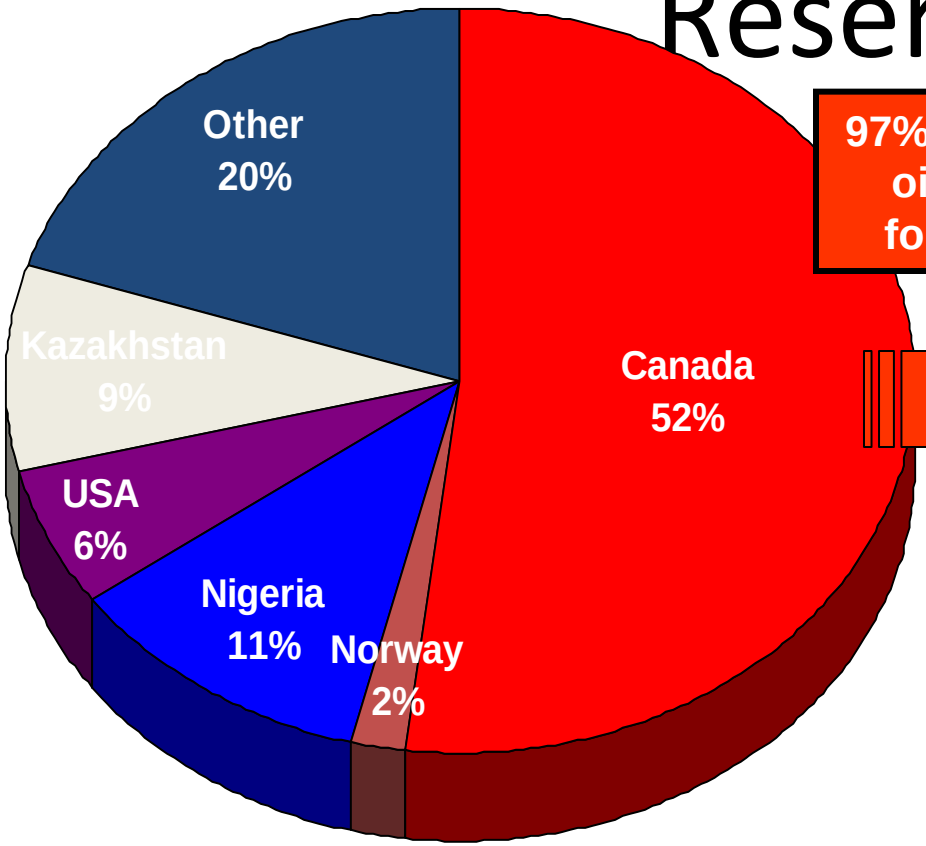
FEEDSTOCK

- Size of the Resource
  - 173 billion barrels recoverable reserves
- Properties of the Resource
  - Integrated processing offers economic and environmental benefits

Alberta
Freedom To Create. Spirit To Achieve.
Government of Alberta

“Investable” World Oil Reserves

(A38935)



97% of total Canada oil reserves are found in Alberta

Total = ~350 Billion Barrels

“Investable” represents reserves associated with political regimes open to foreign investment (excluding Iraq)

Factors Behind Alberta's Value-add Vision (A38935)

- The need to diversify our feedstock and market opportunities
- Alberta's petrochemical industry needs alternative sources of long-term secure feedstocks to sustain operations
- The industrial model in Alberta may change in the future to non-integrated facilities that are focused on specific operational expertise
- New technology opportunities will assist in reducing costs and providing low-cost feedstocks to support our industries
- Cluster development is successful all around the globe and are built on models similar to Alberta
- No one can predict what the future will bring and Alberta needs to be flexible to handle those changes

The Value-Add Strategy Opportunity for Alberta (A38935)

Moving the oil sands up the value chain to enhance product and market diversification

- Production of the bitumen from the oil sands is expected to reach 3 million bpd by 2020

- Upgrading and Refining of the bitumen produces by-products that can be used as low-cost feedstock for further value-add operations

- Alberta has the potential to become the next world-class eco-industrial integrated hydrocarbon processing hub based on the oil sands

2008 Statistics

- 88 oil sands projects
  - 1.3 million bpd production

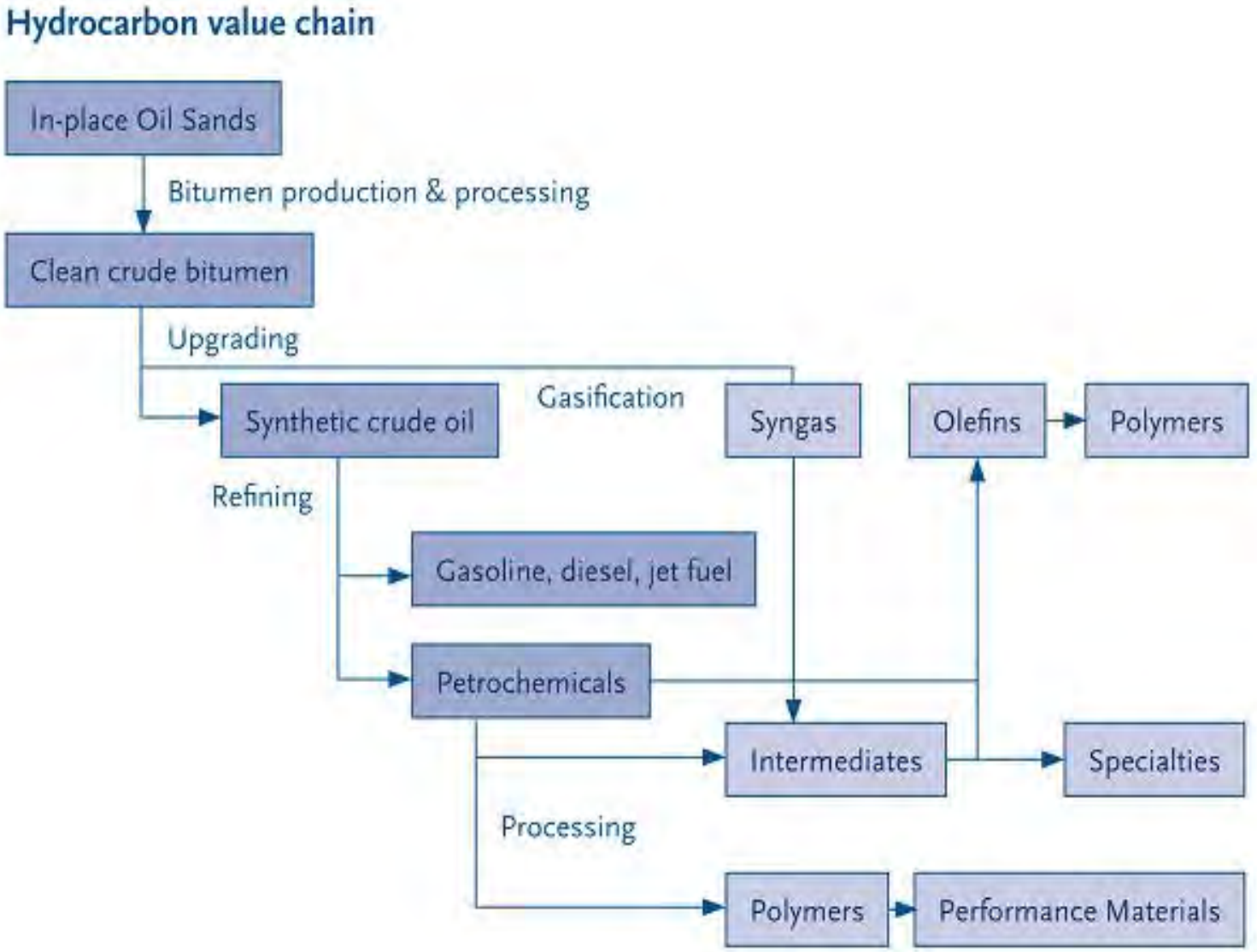
- 3 bitumen upgraders
  - 900 thousand bpd capacity

- 5 oil refineries*
  - 450 thousand bpd capacity
- 5 major petrochemical facilities
  - 9 billion pounds production

*Includes Bowden refinery which is not in use today.

Oil Sands Value Chain

(A38935)



Why? The Direct Economic Benefit

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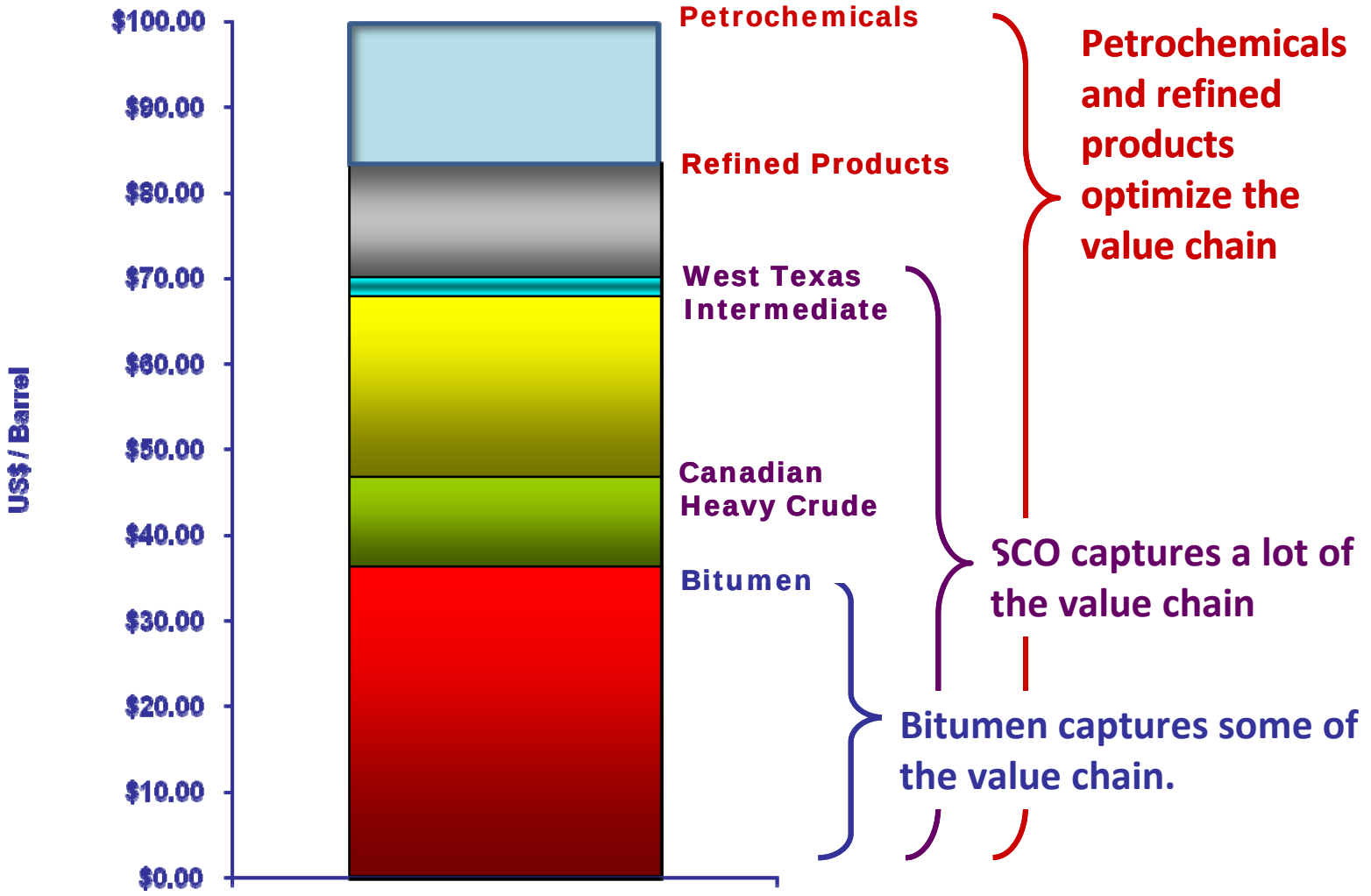

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Economic Benefits – Oil Sands

Economic Benefits of Bitumen and SCO Development
Mining, Insitu and Upgrading
$186 Billion Investment from 2010 to 2030

	Alberta	Rest of Canada	Total Canada	Outside Canada	Grand Total
Cumulative GDP (Trillion 2008$)	2.48	0.59	3.07	0.35	3.42
Employment (Thousand Persons)	638	317	955	196	1,151
	AB Gov't	Federal Gov't	Other Prov. Gov't	Municipal Gov't	Total Canada
Cumulative Gov't Revenues (Billion 2008$)	211	192	73	61	537

Source: CERI Report: Economic Impacts of Alberta's Oil Resources – September 2008 Update

Economic Benefits – Value-add Chain (A38935)

Economic Benefits of Value-add Development
Mining, Insitu, Conv Oil, Upgrading, Refining, Petrochemicals
$314 Billion Investment from 2010 to 2030

	Alberta	Rest of Canada	Total Canada	Outside Canada	Grand Total
Cumulative GDP (Trillion 2008$)	3.37	0.87	4.24	0.77	5.01
Employment (Thousand Persons)	1,053	509	1,562	430	1,992
	AB Gov't	Federal Gov't	Other Prov. Gov't	Municipal Gov't	Total Canada
Cumulative Gov't Revenues (Billion 2008$)	259	280	122	86	748

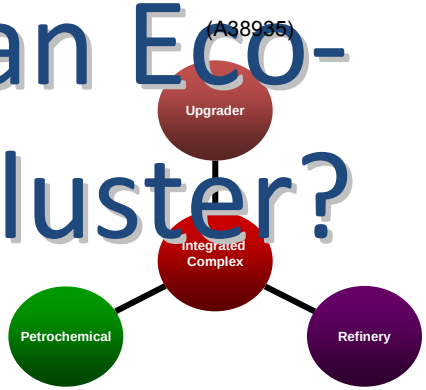
Source: CERI Report: Economic Impacts of Alberta's Oil Resources – September 2008 Update

Strategic Rationale for a Hydrocarbon Cluster in Alberta

(A38935)

- Wealth creation and more job opportunities
- More diverse slate of exported products
- Hedge against commodity downturns
- Reduces life cycle carbon footprint
- Builds Alberta companies in engineering, project management, construction, metal fabrication and logistics
- Deploys leading edge technologies
- Sustains Alberta's industry into the future

Why Does Alberta want an Eco-industrial Hydrocarbon Cluster?



Economic Opportunity

- The addition of integrated upgrading, refining and petrochemical production adds value to the bitumen resource in Alberta and creates product and market diversification for long-term benefits to the Province.

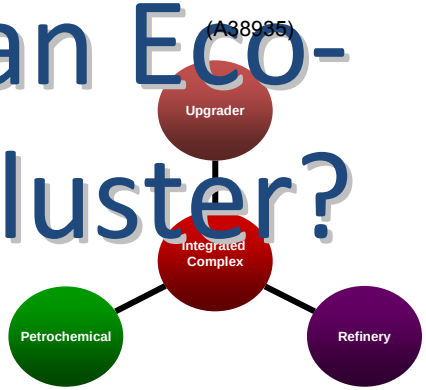
Environmental Responsibility

- Integration of industrial facilities with new technologies promotes increased efficiencies, enhanced synergies and reduces the overall environmental footprint.

Social Benefits

- Adding value in Alberta creates benefits such as employment creation and revenue generation to invest in social programs that promote in the development of sustainable, healthy, safe and vibrant communities.

Why Does Alberta want an Eco-industrial Hydrocarbon Cluster?



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Environmental Benefits of Industrial Integration (A38935)

- **Integrated oil sands processing delivers significant environmental benefits through a reduced environmental footprint and optimized operational efficiencies:**
  - Coordinated management of:
    - Infrastructure needs
    - water resources
    - energy inputs
    - land use
    - emission outputs
    - waste treatment

- **A study that analyzed the environmental benefits of integrated facilities compared to standalone upgrading, refining and petrochemical plants resulted in:**
  - Total emission levels for a standalone facilities are 50% greater than integrated facility
  - Water demand for standalone projects are up to 60% greater than for integrated facility

Why Does Alberta want an Eco-industrial Hydrocarbon Cluster?

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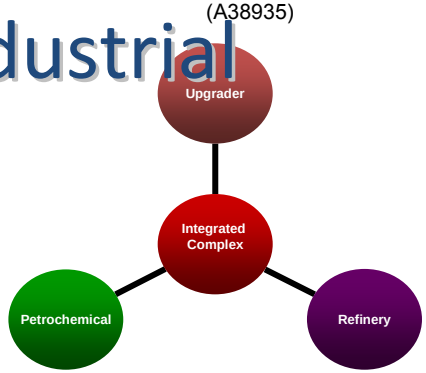

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Social Benefits

- Adding value in Alberta creates benefits such as employment creation and revenue generation to invest in social programs that promote in the development of sustainable, healthy, safe and vibrant communities.

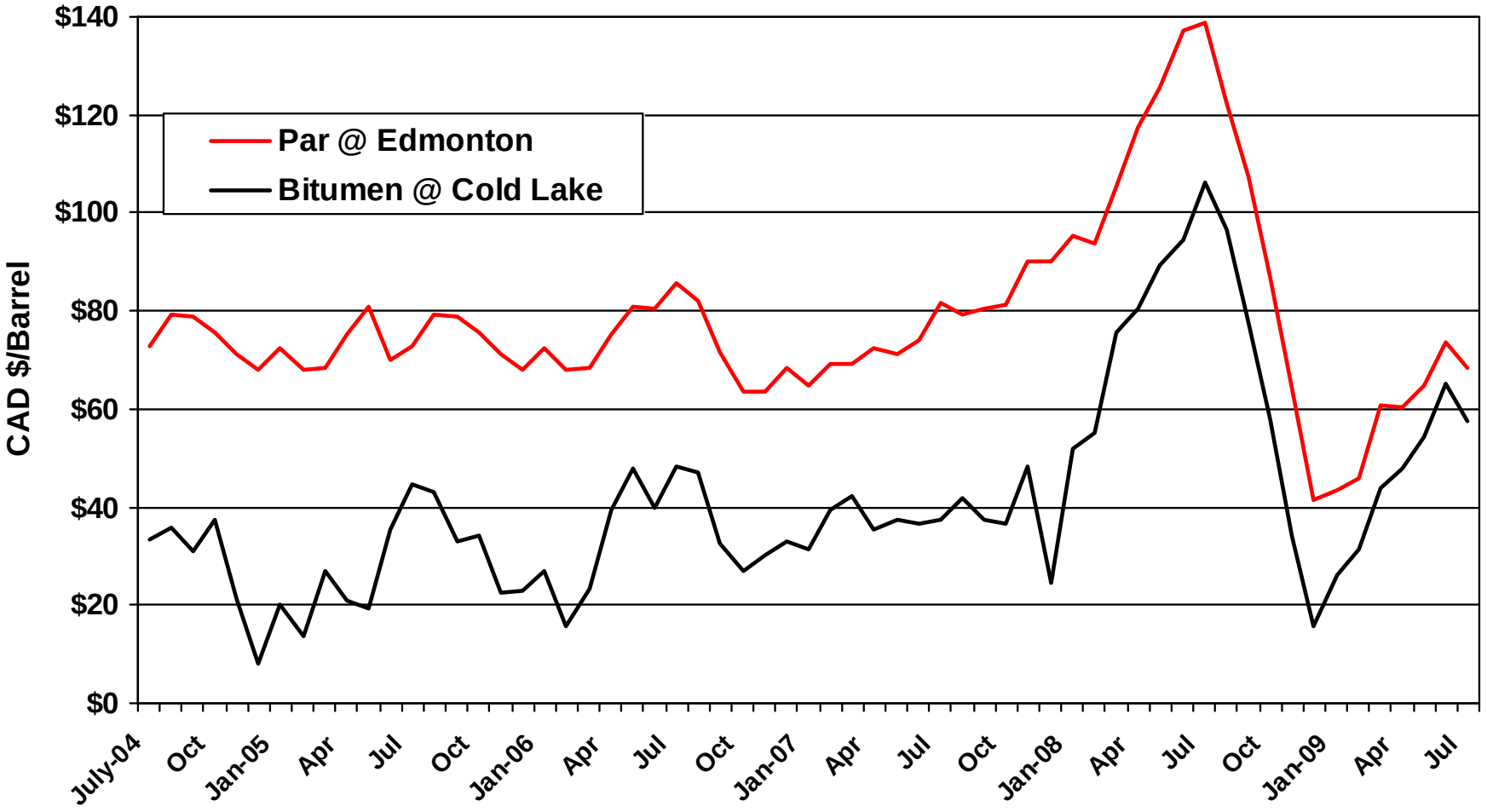
Upgrading in Alberta was Economic

- The bitumen market was once limited to a few large US refineries with significant market power
- Upgrading in Alberta reduced the exposure to volatile bitumen prices since SCO was priced against light oil
- Upgrading in Alberta resolved the problems of diluent cost, shipping and availability

Bitumen-Par Differentials

July 2004 to July 2009

(A38935)



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Current Upgrading Economics are Challenging

- More US refining and pipelines became available
- Bitumen netbacks improved as Mexican and Venezuelan crude are harder to acquire
- Capital costs in Alberta escalated
- Global economic uncertainty

The result is that today, bitumen extraction without upgrading in Alberta is a preferred strategy for many companies

In the Near Term, Refiners are Under Pressure

- Lower demand led to global excess refining capacity, in the short term, U.S refiners have reduced production and delayed capital expansions
- Increased U.S capacity to process heavy crudes has increased demand and prices for Alberta heavy crude
- Supplies of crude oil from Mexico and Venezuela into the U.S. have decreased
- Rationalization and consolidation of refining assets in North America will occur and new large world-scale integrated facilities will pre-dominate
- Fuel demand in the US is expected to rebound and follow economic recovery

Petrochemical Industry is Reassessing Long-Term Strategies

- New capacity in the Middle East and Asia must be absorbed before new plants will proceed. Some US capacity is idle.
- North American chemical producers can compete against global players if their feedstock costs are low
- Optimism is being expressed in the chemical industry for an economic rebound in 2010
- Many companies are reassessing their asset base, feedstock sources and planning strategic decisions to lean their operations
- Alberta ethylene producers are concerned about ethane supply. New US shale gas and low gas prices could lead to declines in Alberta natural gas exports to the US Midwest. Consequently, less natural gas will flow through straddle plants and less ethane will be extracted
- There is potential to extract ethane from oil sands upgrading plant gases (i.e. Suncor and Williams)

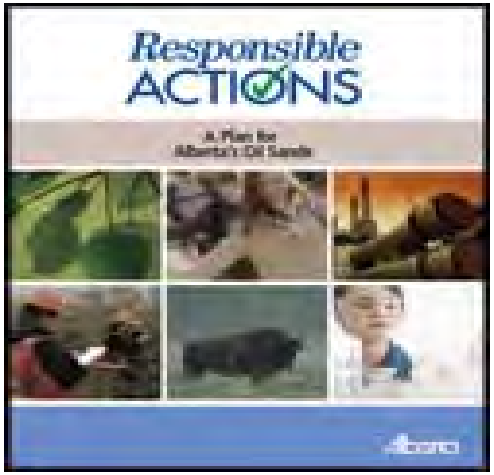
Government Strategies Set the Stage for the Next Level of Development in Alberta

(A38935)

Address the Environmental Footprint

Extend our Role Along the Value-Chain

Develop and Deploy Technology



Develop Alberta's oil sands in an environmentally responsible way

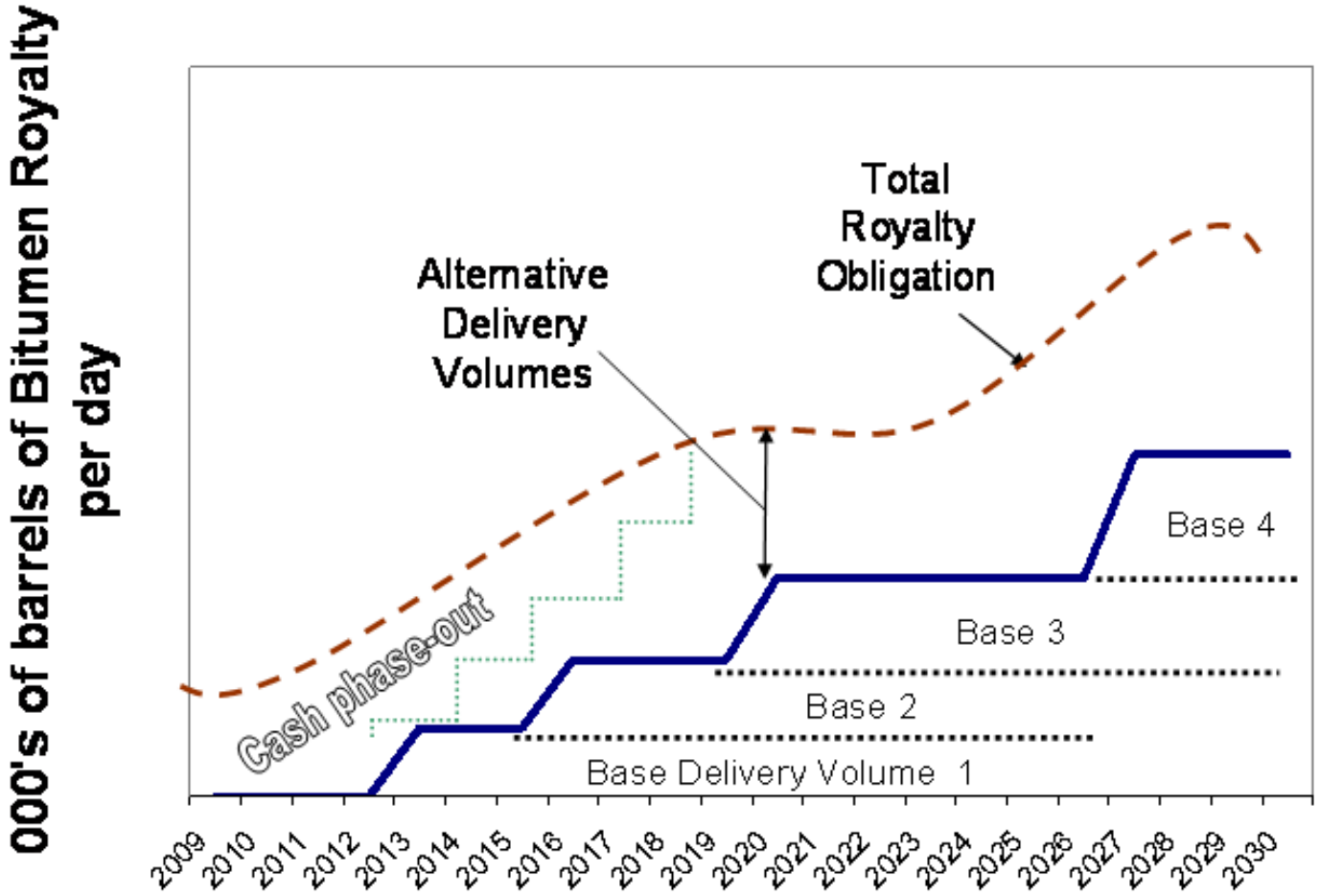
Maximize long-term value for all Albertans through economic growth, stability, and resource optimization

Government is taking steps towards Realizing the Value-add Opportunity for Alberta

(A38935)

- Provincial Energy Strategy and Oil Sands Strategy
- Bitumen Royalty In-Kind Policy
- Carbon Capture and Storage Fund
- Integrated Industrial Site Planning
- Technology Funding and Technical Feasibility Analysis
- Value-add Policy Development

Conceptual Illustration of Bitumen Royalty Obligation Allocated Between Base and Alternative Delivery Volumes



BRIK Contractual Parameters

- Purchase at market price or Process Crown bitumen
- Specify between 50,000 to 75,000 bpd of Crown bitumen supply
- Capacity – new facility or expansion with minimum of 100,000 bpd of bitumen
- Maximum Crown volume share of total facility capacity = 75%
- Must process to at least low-sulphur Synthetic Crude Oil (30 degree API)
- Term of 15 to 30 years Crown bitumen supply
- Term start between Jan 1, 2013 and Dec 31, 2016

BRIK Contractual Parameters (Cont.)

- Not contingent on further volume commitments, tax or royalty treatment.
- Alberta location (Alberta Industrial Heartland preferred in criteria for logistics and integration opportunities)
- The Processing Facility must be sufficiently flexible to accommodate variations in bitumen quality.

(A38935)

BRIK RFP Timelines

- Issuance of Initial RFP: July 21, 2009
- Information Meeting – Initial RFP: August 6, 2009
- Final Date for Comments on Initial RFP: August 31, 2009
- Issuance of Final RFP: Sep 30, 2009
- Final Date for Submission of Proposals: Dec 2, 2009
- Announcement of Selected Proposal (s): March 31, 2010
- Signing of Processing Agreement: 2010
- BRIK program comes into effect: 2012
- Supply of Bitumen begins under Processing Agreement: 2013 - 2016

Implications for Alberta

(A38935)

- In the short term low light/heavy oil price differentials support bitumen extraction in Alberta, but not upgrading or refining
- Lower construction costs now materializing
- If world heavy oil production increases as expected, light-heavy price differentials may widen thus improving upgrading/refining economics
- Petrochemicals – opportunities for expansion are limited without additional feedstock
- Off-gases from upgrading can become feedstock for petrochemicals
- Niche opportunities for diesel and polypropylene production could be accessed
- Longer term – large world scale integrated facilities based on low cost feedstock (bitumen) can be competitive in North America

Commitment to Value-add

(A38935)

The oil sands is a long-term business, not based on short-term fluctuations.

Two areas that government can influence direction:

1. Feedstock development
2. Facilitating investment

- **The current economic environment may provide opportunities for oil sands and value added development to proceed in an environmentally sustainable and more strategically planned manner.**
- **The Alberta government is focused on enhancing value-added activity, increasing innovation and building a skilled workforce to improve the long-run sustainability of Alberta's economy.**
- **A portion of bitumen production will continue to be exported to markets outside Alberta. However, there is a tremendous opportunity for an expanded Alberta upgrading, refining and petrochemicals industry to be based upon Alberta's growing oil sands production.**

Our challenge is to find a balance that is most beneficial to Alberta.

From Oil Sands to a World-Class Eco-Industrial Chemical Cluster for Greater Edmonton

Overview of Cluster Development Study

Alberta Employment, Immigration and Industry

Alberta Energy

The City of Edmonton

Edmonton Economic Development Corporation

Alberta's Industrial Heartland

Draft Final Report
17 October, 2007

eKline and COMPANY

INTELLIGENT INSIGHTS™

Contents

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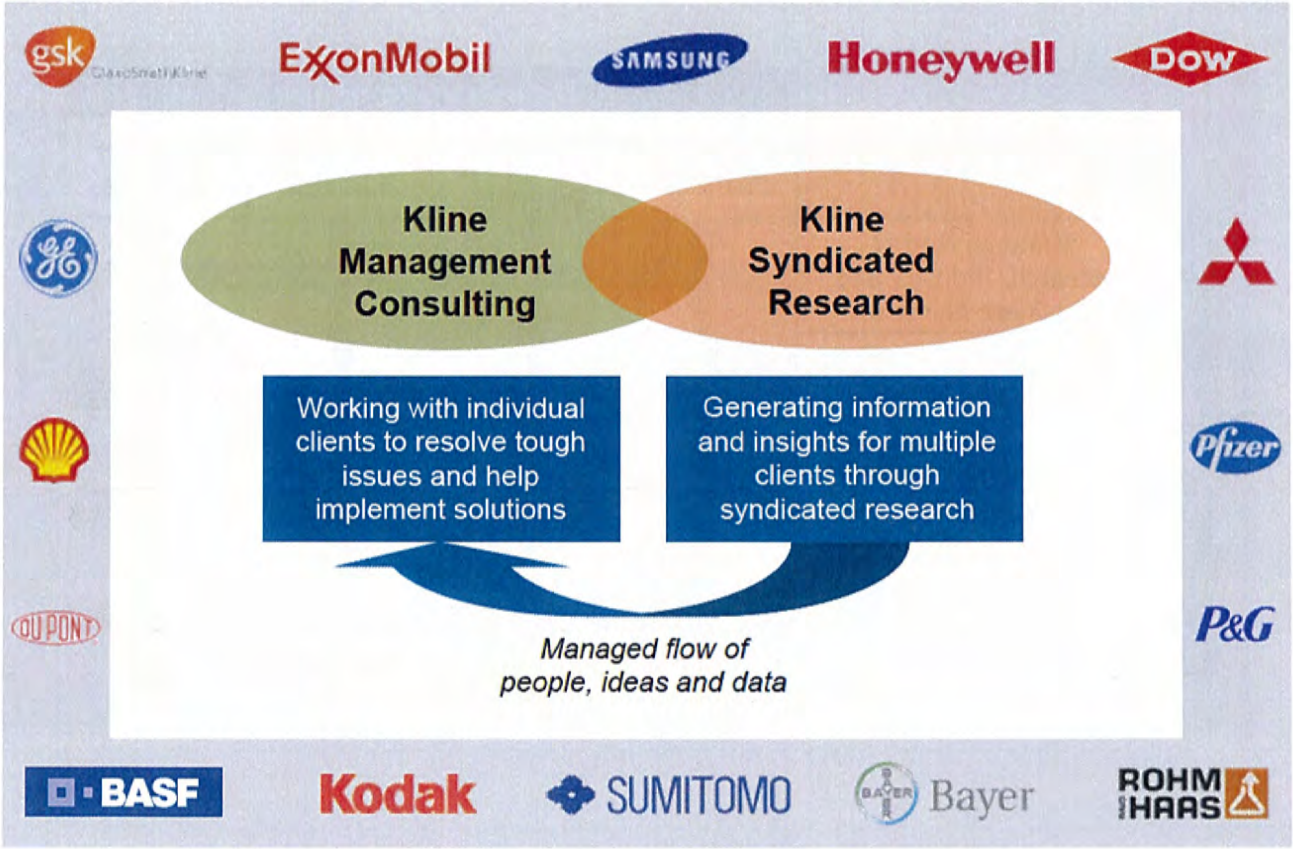
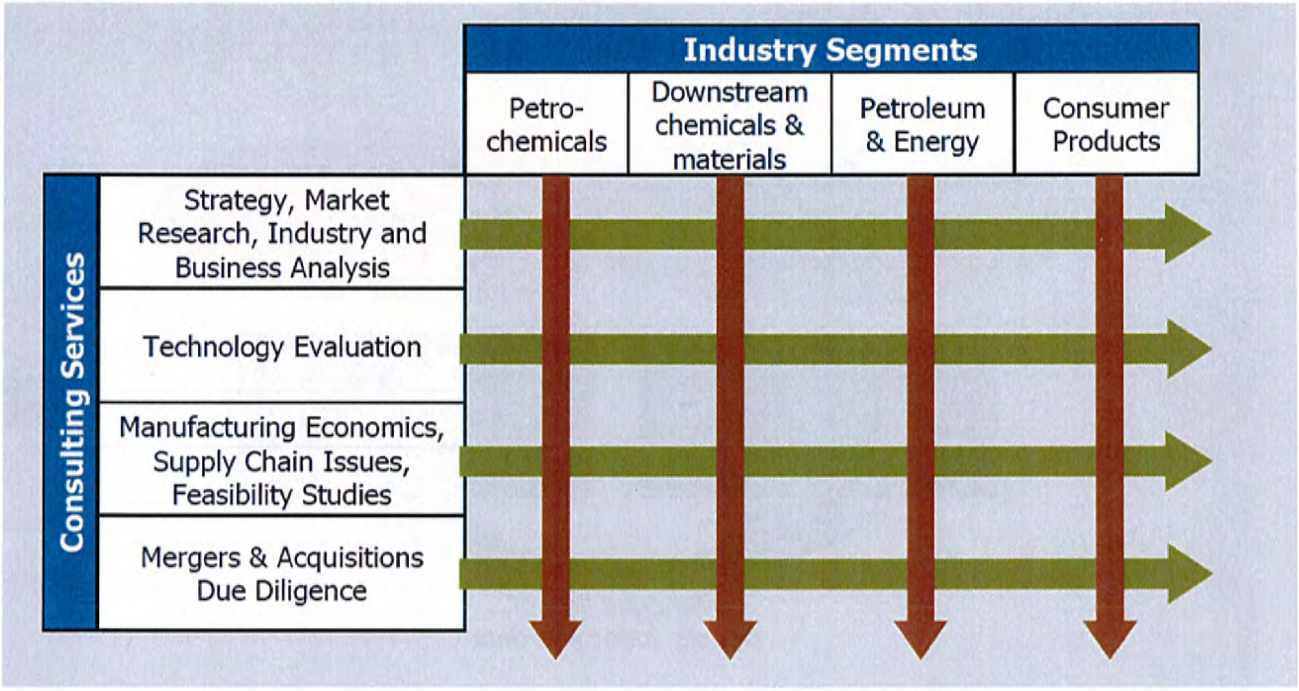


...with almost 50 years experience in chemical industry sectors and functional consulting



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PMR Consulting, Poland
G&P Consulting, Rumania
Foreign Market Consulting, Turkey

Objectives

Project Goals were formulated to address the major issues

- Develop world-class eco-industrial chemical cluster alternatives for Greater Edmonton
- Leverage Kline's understanding of the international chemical industry, chemical markets, and the competitive environment to quantify and qualify the potential in Greater Edmonton
- Develop an objective view of Alberta's potential for the development of a world class chemical cluster in Greater Edmonton
- Benchmark the best in class clusters in order to input key learning's into Greater Edmonton's cluster
- Encourage a coordinated, integrated cluster development strategy for Greater Edmonton
- Evaluate the strategic and economic impact of the cluster alternatives, with a view to eliminating associated risks
- Set a clear path to action and results

Overarching Concept

Definition of Eco-Industrial Complex

A community of businesses that cooperate with each other to efficiently share resources (information, materials, energy, infrastructure and natural habitat), leading to economic gains, improvements in environmental quality and equitable enhancement of human resources for business and the local community.

-- U.S. President's Council on Sustainable Development

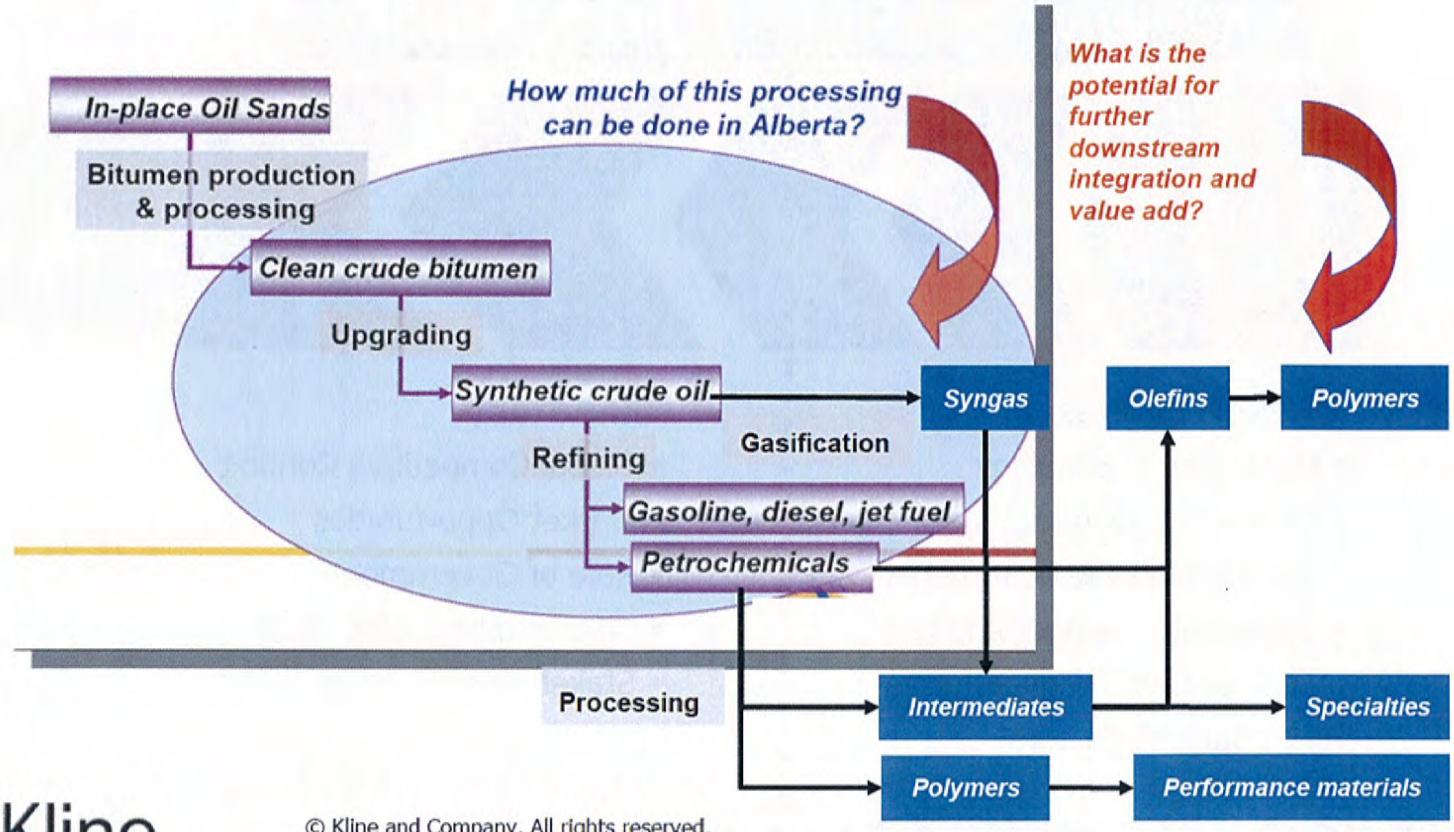
Study Perspectives

This Study has been developed to provide:

- **Global perspectives** on the potential for the development of a world-class eco-industrial chemical cluster for Greater Edmonton. This will include an examination of other **major international chemical clusters** and the issues relevant to Greater Edmonton.
- An overview of the current **raw-material processing approaches** and how these lead to the spectrum of base chemicals, intermediates, specialty chemicals and materials produced world-wide
- An overview of the approach for **selecting the most viable product clusters** for Greater Edmonton including:
  - Market analysis
  - Economic viability
  - Eco-industrial factors

Adding Value Downstream

Convincing the international oil refining and chemical industry to invest downstream is the key challenge



Adding Value Downstream

Key focus of Kline study is complementary to other studies as it looks much further downstream

Accelerating Downstream Development

Previous Studies

- Upgrading Technology
- Exploration Opportunities
- Infrastructure Requirements
- Upgrading Financial Analysis
- Logistics and Transportation
- Key Success Factors

Kline Study

- Global Competitive Context
- Market Opportunities
- Role of Government
- Cluster Integration Value
- Stakeholder Strategy Input

Benefits

Benefits of this Study to Greater Edmonton

- Review of **leading global practices and trends**
- Enhance Greater Edmonton's existing upgrading, refining and petrochemical cluster to take **advantage of global opportunities and challenges**
- Recommend specific **product clusters**
- Promote ongoing **partnership for development** of existing industry expansion plans
- Develop the **foundation for a coordinated investment attraction strategy**

Contents

Approach

We proposed a two-staged study with clear objectives

To be covered in a future proposal

	Stage 1: Developing the Cluster Alternatives		Stage 2: Selection, Promotion and Acquisition Strategies	
Phase	1 June 7 Seminar Lay the Groundwork	2 This Study Define the Context and Develop Concept	3 Cluster Marketing Strategy	4 Investment Acquisition Support

Objectives	▪ Build understanding of the potential with the regional players at Stakeholder leader and working group levels
	▪ Lay a solid foundation for the project in terms of process, team interactions, communications and knowledge base
		▪ Develop the integration opportunities based on Value Chain analysis
		▪ Evaluate the Market opportunities
		▪ Benchmark against best practice clusters
		▪ Develop alternative cluster concepts
		▪ Review cluster alternatives with Steering Group and Stakeholder groups
		▪ Recommend cluster alternative
			▪ Select cluster alternative
			▪ Prioritize Products for investment
			▪ Identify target investor groups
			▪ Develop promotional strategy
			▪ Develop investment acquisition strategy
				▪ Develop a comprehensive investment acquisition support program to enable Greater Edmonton to implement the Cluster marketing strategy in:
				  ▪ Pre-Start Up Phase
				  ▪ Start Up Phase
				  ▪ Post Start Up Phase
				▪ Recommend Additional expertise required to fully implement the investment acquisition strategy

Underlying Assumptions

The development of the Cluster Alternatives are based on several Key Underlying Assumptions (1/2)

- Bitumen Upgrading will exceed **3.0 million BBL/day by 2025** and **Upgrader bottoms production** will exceed demand for:
  - **Energy generation** in the region (as bottoms or coke)
  - **Coke** for energy generation in export markets

Outcome: this will result in a significant quantity of "Stranded Upgrader Bottoms" in Alberta

Whilst this appears to be a problem – this is the key opportunity for Alberta to become the leading Syngas production region in the world

This is the underlying opportunity

Underlying Assumptions

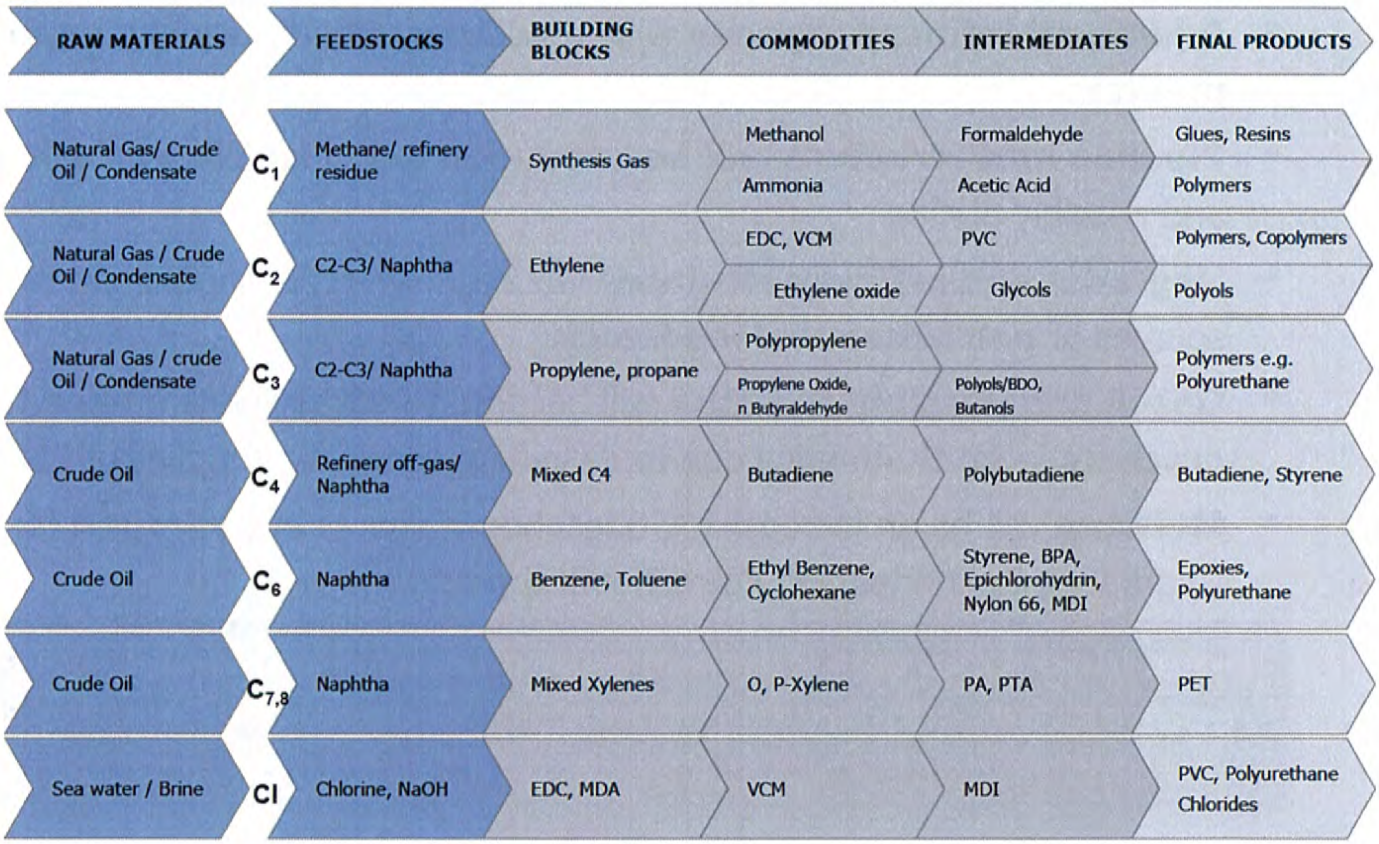
The development of the Cluster Alternatives are based on several Key Underlying Assumptions (2/2)

- **Additional refinery capacity** will be added in Alberta, serving **export markets**
- **Pipeline infrastructure will be expanded** to include **clean products** and possibly olefins
- **Upgrader and refinery off-gases** will become increasingly important sources of **petrochemical feedstock**
- **Gasoil and possibly Naphtha** will become **feedstocks of choice for crackers** in North America due to dwindling economic supplies of Ethane
- **Methane** will be an increasingly uneconomic source of **hydrogen** for Upgraders, Refineries and Petrochemical producers

Unlocking Alberta's Downstream chemical potential requires the industry to recognize the opportunities that "unconventional" raw materials and feedstocks provide

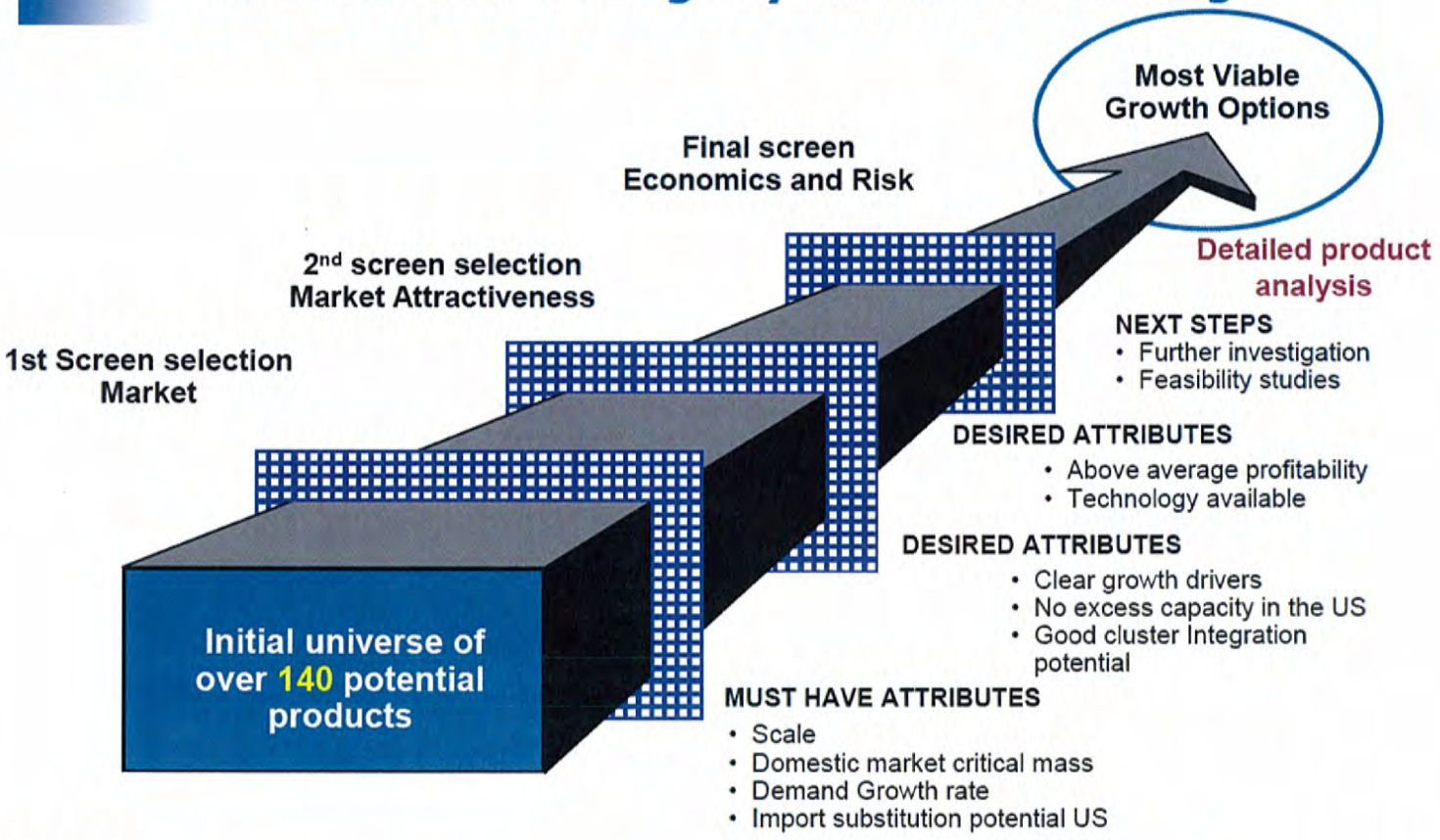
Product Value Chains

Product Flows from Primary Raw Materials (generic)



Approach

The Potential Products for Cluster Development were obtained through systematic screening



Approach

A "Product Universe" was developed which would provide the best fit for Greater Edmonton

- Using **value chains** a list of chemical products was compiled containing **140 potential products.**
- In developing the **Product Universe** the following were also considered:
  - Product portfolio's of the **successful chemical clusters**
  - **Stakeholder interview** feedback
- **End User products** cover applications in many sectors such as adhesives, agriculture, automotive, coatings, cosmetics, detergents, dyestuff, fuels, packaging, pharmaceuticals, plasticizers, plastics, resins, solvents, textiles, etc.
- **A detailed database** covering feedstock, market size, growth, technology, trade, profitability etc. was constructed to allow detailed screening and analysis.

Approach

The Chemical Universe – 140 key products

RAW MATERIALS		FEEDSTOCKS	BUILDING BLOCKS	COMMODITIES	INTERMEDIATES	FINAL PRODUCTS	
Natural Gas/ Crude Oil / Condensate	C_1	Methane/ refinery residue	1	1	14	7	23
Natural Gas / Crude Oil / Condensate	C_2	C2-C3/ Naphtha	2	2	14	5	23
Natural Gas / crude Oil / Condensate	C_3	C2-C3/ Naphtha	1	2	16	6	25
Crude Oil	C_4	Refinery off-gas/ Naphtha	2	2	12	10	26
Crude Oil	C_6	Naphtha	1	4	12	7	24
Crude Oil	$C_{7,8}$	Naphtha	1	3	6	4	14

Excludes N and Cl Value Chains

Total: 135

1st screen selection

The 1st Stage "Market Screen" focused on North American Imports

- Is the market large enough?
- Is there a net import requirement in North America?
- Is the market growing world-wide?
- Are there any immediate threats?
- Is there sufficient capacity in the US for their domestic market?

The expectation was that a significant percentage of the candidate products selected for the Product Universe would be eliminated in the first screening stage

1st screen selection

"1st Screen" – North American Market Net Imports

RAW MATERIALS		FEEDSTOCKS	BUILDING BLOCKS	COMMODITIES	INTERMEDIATES	FINAL PRODUCTS	
Natural Gas/ Crude Oil / Condensate	C_1	Methane/ refinery residue	1	1	7	7	16
Natural Gas / Crude Oil / Condensate	C_2	C2-C3/ Naphtha	2	1	11	4	18
Natural Gas / crude Oil / Condensate	C_3	C2-C3/ Naphtha	1	2	11	4	18
Crude Oil	C_4	Refinery off-gas/ Naphtha	2	2	11	9	24
Crude Oil	C_6	Naphtha	1	4	10	6	21
Crude Oil	$C_{7,8}$	Naphtha		3	6	3	12

Excludes N and Cl Value Chains

Total: 109

2nd screen selection

The 2nd screen selection process focused on Market Attractiveness

- The outcome of the first screen was primarily based on **numerical analysis**
- The 2nd screen provided a **qualitative assessment** of the overall **market attractiveness** using the same data collected for the 1st screen selection.
- This ensured that only products with **sufficient market attractiveness** were kept in the selection so that further screening was focused on those **products with the best potential and fit in the cluster**.
- In the 2nd screen a further **20 chemicals** where eliminated.
- The **reasons for elimination** vary, but are mainly related to:
  - Regional capacity distribution (e.g. overcapacity)
  - Poor growth rates in N.A.
  - Low capacity utilization combined with growth below GDP

2nd screen selection

"2nd Screen" - North American Market Attractiveness

RAW MATERIALS		FEEDSTOCKS	BUILDING BLOCKS	COMMODITIES	INTERMEDIATES	FINAL PRODUCTS	
Natural Gas/ Crude Oil / Condensate	C_1	Methane/ refinery residue	0	1	7	6	14
Natural Gas / Crude Oil / Condensate	C_2	C2-C3/ Naphtha	2	1	9	3	15
Natural Gas / crude Oil / Condensate	C_3	C2-C3/ Naphtha	1	1	10	3	15
Crude Oil	C_4	Refinery off-gas/ Naphtha	1	3	9	5	18
Crude Oil	C_6	Naphtha	1	4	9	3	17
Crude Oil	$C_{7,8}$	Naphtha	1	2	5	3	11

Excludes N and Cl Value Chains

Total: 90

Final screen selection

The Final screen focused on Economics and Risk

- "**Economics**" screen - final product selection and Kline recommendation
  - Are there any logistical or environmental issues?
  - Are the product margins attractive?
  - Is there sufficient cluster integration potential?
- A total of 77 chemicals were selected from the 90 chemicals remaining after the 1st and 2nd screen selection.
- The cluster of 77 chemicals include 18 products which are **currently manufactured in Alberta**.
- The **selected chemicals** cover several product clusters which are key to a number of **growing industries**:
  - PET
  - Acrylics
  - Fertilizers
  - Polyurethane
  - Polycarbonate
  - High performance Plasticizers
  - Barrier resins for packaging materials (EVOH, PVOH)

Final screen selection

"Final screen"- Economics and Risk

RAW MATERIALS		FEEDSTOCKS	BUILDING BLOCKS	COMMODITIES	INTERMEDIATES	FINAL PRODUCTS	
Natural Gas/ Crude Oil / Condensate	C_1	Methane/ refinery residue	1	2	6	6	15
Natural Gas / Crude Oil / Condensate	C_2	C2-C3/ Naphtha	1	1	5	5	12
Natural Gas / crude Oil / Condensate	C_3	C2-C3/ Naphtha	1	1	7	5	14
Crude Oil	C_4	Refinery off-gas/ Naphtha	2	1	5	5	13
Crude Oil	C_6	Naphtha	1	3	8	4	16
Crude Oil	$C_{7,8}$	Naphtha	1	2	2	2	7

*Of 77 chemicals selected, 18 are already made in Alberta

Excludes N and Cl Value Chains

Total: 77*

Final screen selection

Selected products – alphabetical order (1/2)

1. Acetic Acid
2. Acetone
3. Acrolein
4. Acrylic Acid
5. Acrylic acid esters
6. Acrylate polymers
7. Adipic Acid
8. Adiponitrile
9. **Ammonia**
10. **Ammonium Nitrate**
11. Aniline
12. Benzene
13. Bisphenol A
14. Butanediol (BDO)
15. Butene -1 / Isobutene
16. Butyraldehyde
17. Caprolactam
18. Cumene
19. Cyclohexane
20. Di-isooctyl phthalate (DIOP)
21. Dimethyl carbonate (DMC)
22. Dimethyl ether (DME)
23. dioctyl phthalate (DOP)
24. DPC
25. 2-Ethyl Hexanol (2-EH)
26. **Ethoxylates**
27. **Ethylene**
28. **Ethylene Glycol**
29. Ethylene Glycol Ethers
30. Ethylene oxide
31. **EVA Copolymers**
32. EVOH (Ethylene-Vinyl Alcohol Copolymer)
33. Formaldehyde
34. Gamma-Butyrolactone (GBL)
35. **IPA (isopropanol)**
36. **Isooctane**
37. iso-butene / Butene-1
38. **Linear Alpha Olefins (LAOs)**
39. **MEG**
40. Maleic Anhydride
41. MDI -- Methylene di-p-phenylene isocyanate
42. Melamine
43. Melamine resins
44. Methanol
45. Mixed C4 / Butane
46. MMA
47. Nitrobenzene
48. N-Methylpyrrolidone (NMP)
49. Nylon-6 (PA -6)
50. Nylon-6,6 (PA- 66)
51. o-Xylene

Currently manufactured and marketed in Alberta

Final screen selection

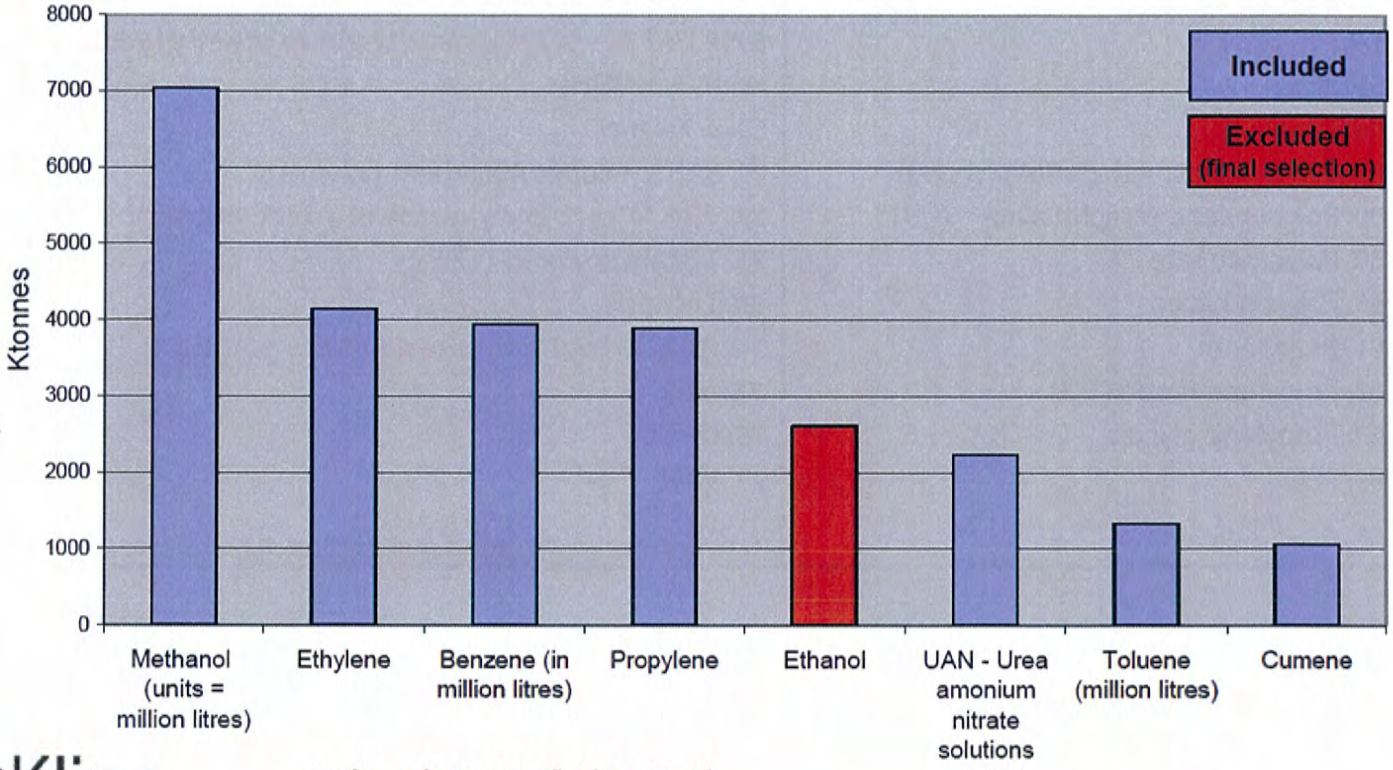
Selected products – alphabetical order (2/2)

52. PE-HDPE	65. PTA (Purified Teraphthalic Acid)
53. PE-LDPE	66. Pthalic Anhydride
54. PE-LLDPE	**67. PTMEG - polytetramethylene ether glycol**
55. PET	68. PVA (PVOH)
56. Phenol	69. p-Xylene
57. PMMA - polymethyl methacrylate	70. SAP's – Super Absorbent polymers
58. Polybutylene terephthalate - (PBT)	**71. TBA -- tert-butyl alcohol / tert-butanol**
59. Polycarbonate	72. Tetrahydrofuran (THF)
60. Polyurethanes	**73. Toluene**
61. Propylene	**74. UAN - Urea amonium nitrate solutions**
62. Propylene Oxide (PO)	**75. UREA**
63. Propylene glycols	76. UPR's
64. PPG	77. VAM
	Currently manufactured and marketed in Alberta

Market Critical Mass

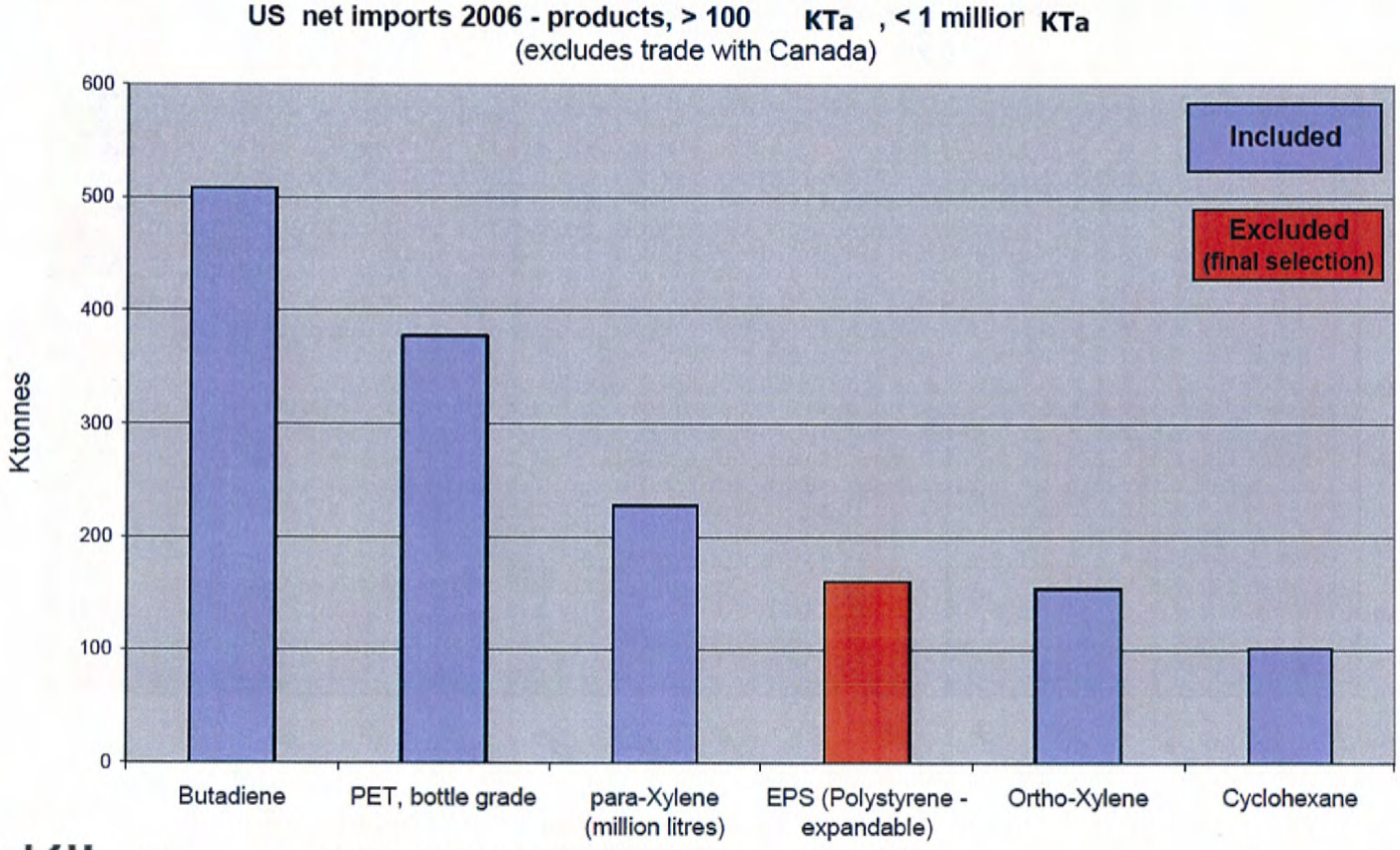
US net imports: a measure for the potential in regional petrochemical markets

US net imports 2006 - products > 1 million KTa
(excludes trade with Canada)



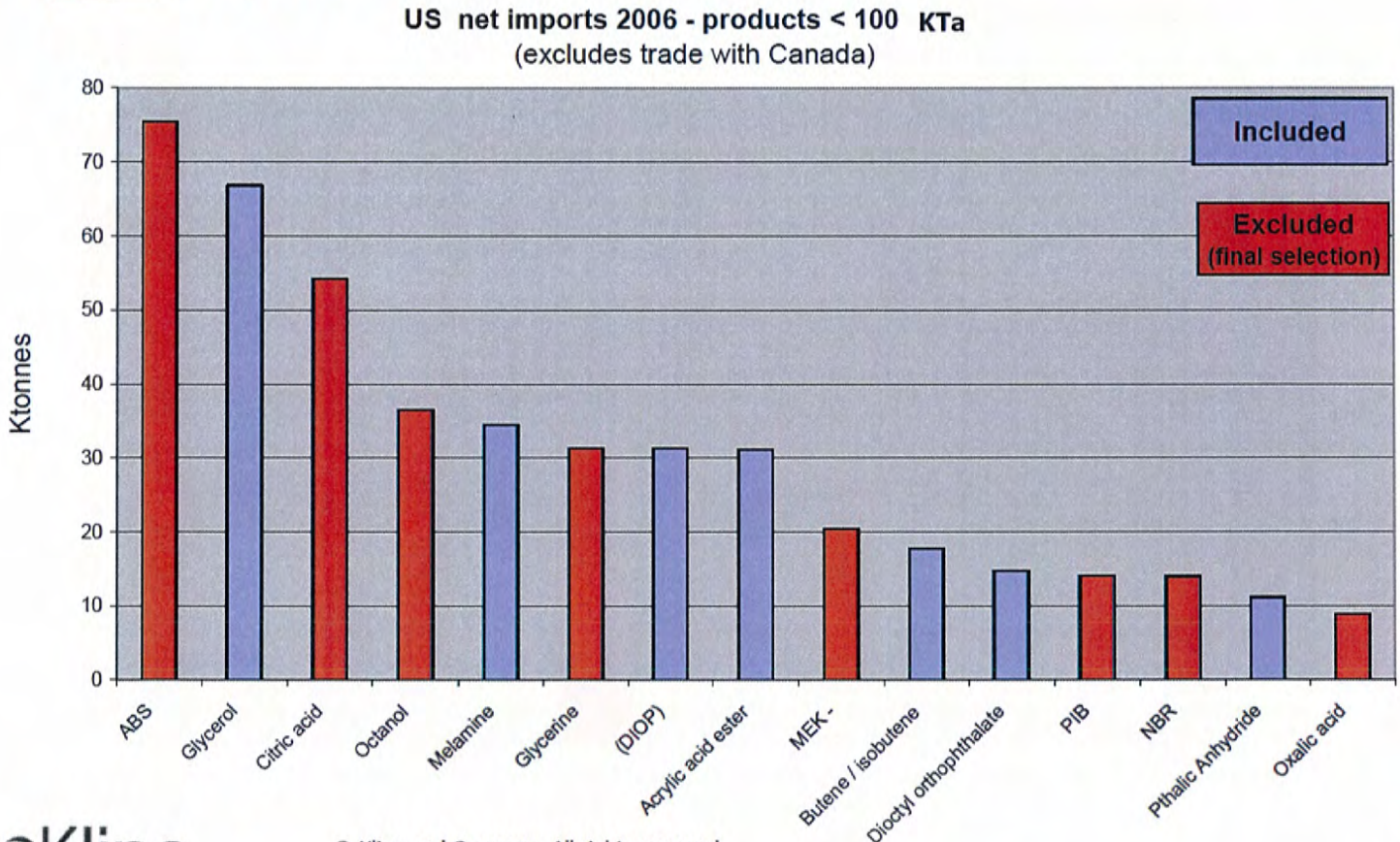
Market Critical Mass

US net imports: a measure for the potential in regional petrochemical markets



Market Critical Mass

US net imports: a measure for the potential in regional petrochemical markets



Cluster Potential

The Scale and Value of the Alternative Chemical Clusters is World Class

Value chain	# products	Capex (US$bn)	Production (Kta)	Sales value (US$bn/a)
C1	15	4.5	3,500	2.5
C2	12	3.6	2,700	3.5
C3	14	4.2	3,100	5.0
C4	13	3.1	2,400	4.0
C6	16	5.2	4,100	7.8
C7,8	7	2.6	2,200	2.2
Total	77	23.2	18,000	25.0

- Estimate based typical capex for 1 world scale plant for each product, USGC adjusted to Alberta project cost
- Estimate based on current sales prices delivered USA
- Excluding investments in utilities, sites services and general infrastructure

Cluster Potential

To put these figures into perspective the following should be considered:

- The Capex for 77 products is roughly equivalent to the Capex for 3 Upgraders (total capacity approximately 600,000 BBL/day)
- The quantity of bitumen processed would be 34,000 KTa
- The annual production of SCO would be roughly 25,000 KTa
- The annual Sales Value for 3 Upgraders is 12 bn US $ (80% yield, oil price: 70 US$/barrel, 350 day on-stream factor)
- This should be compared with 18,000 KTa chemicals at an annual Sales Value of 25 bn US $

This results in approximately 4 times the value per barrel of bitumen processed

Contents

Cluster Benchmarking

A Cluster benchmarking study was performed to provide "key learnings" for Greater Edmonton

- A number of **key attributes** were identified to **characterize the world class clusters**
- These attributes are considered as the "**Key Performance Drivers**" - high scores on these attributes are expected to result in a very successful cluster
- A **qualitative rating** of these attributes enabled a high level comparison between the clusters
- This provided an **understanding** of why these clusters are **successful**
- The following clusters were reviewed in this study:
  - Antwerp, Belgium
  - Houston, Texas, USA
  - Jurong Island, Singapore
  - Tarragona, Spain
  - Chemsite, Ruhrgebiet, Germany
  - Chemelot, Geleen, Netherlands
  - SCIP : Shanghai Chemical Industry Park, China

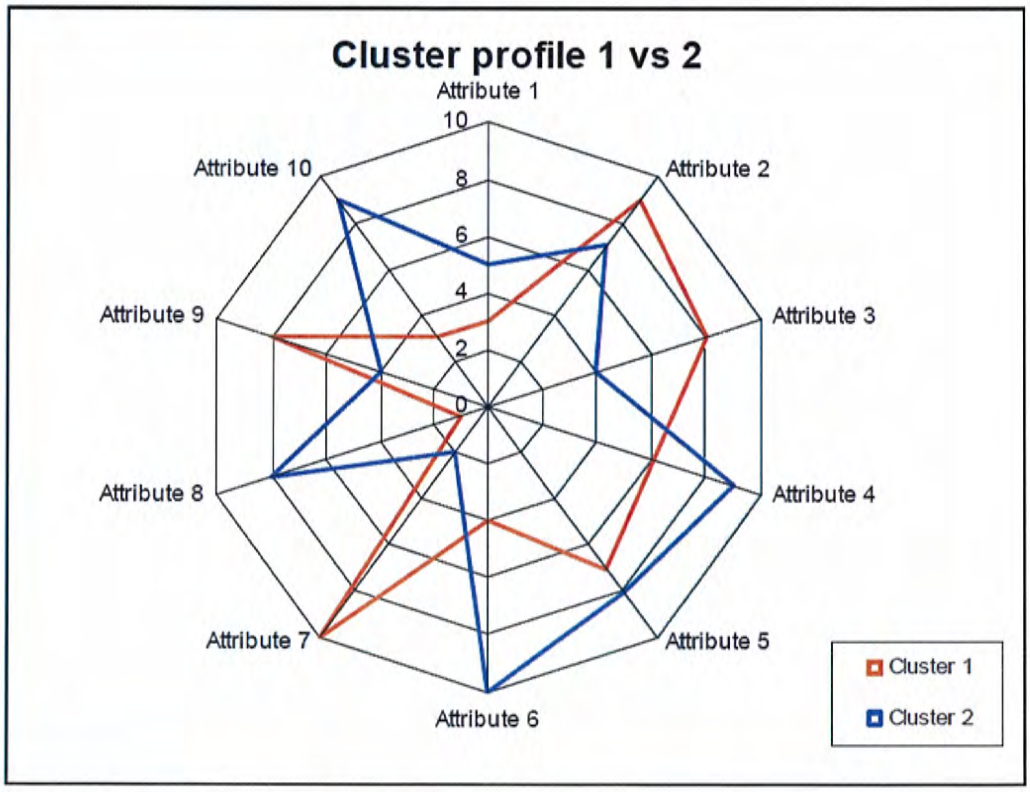
Cluster Benchmarking

Identifying the appropriate set of benchmarking criteria enables an objective comparison

- Considered cluster attributes ("Key Performance Drivers"):
  - **Infrastructure** (e.g. proximity of main port, transport infrastructure, pipelines etc..)
  - **Presence of leading global companies**
  - **Product Diversity**: broad versus narrow product range
  - **Sector Diversity**: commodity focus or specialty focused
  - **Proximity of key markets**
  - **Degree of cluster integration** (degree to which feedstock and products are linked)
  - **Cluster synergy** (e.g. sharing utility services, environmental management, infrastructure, manufacturing JV's)
  - **Investment environment** (Role and support of the authorities in providing incentives and support in the development of infrastructure)
  - **Cluster leadership**
  - **Energy supply structure** (degree to which the energy supply infrastructure provides advantages to the cluster companies, energy cost)
  - **Overall Supply chain structure**

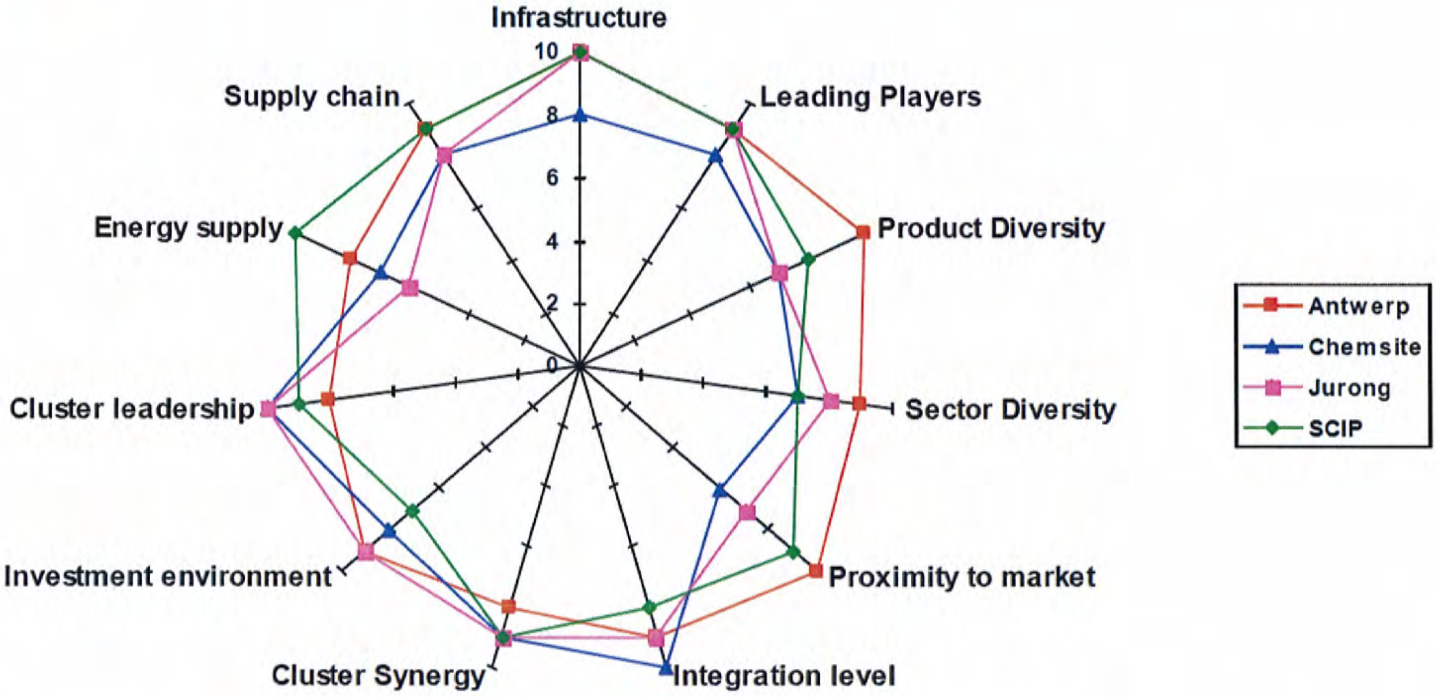
Cluster Benchmarking

Cluster profiles were compared using overlays on "Spider Charts"



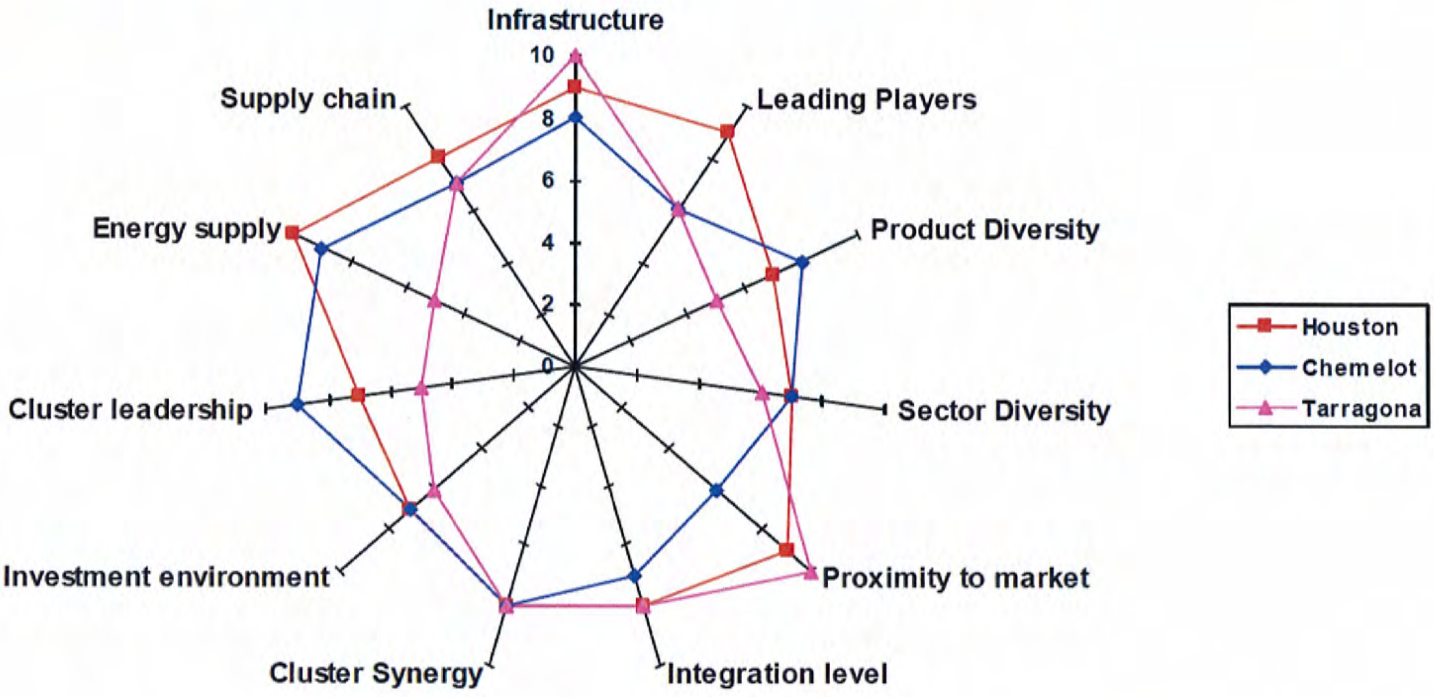
Key learnings

As would be expected with world-class clusters, profiles are quite similar (1/2)



Key learnings

Grouping contrasting clusters together provides a tangible "visual" difference (2/2)



Key learnings

The detailed analysis hi-lighted several important "key learnings" for Greater Edmonton (1/2)

- **Government participation and leadership helps in the overall growth of the cluster in a phased manner**
  - Government plays a primary role, e.g. Jurong, SCIP
  - Public Private Partnership (PPP) model, e.g. ChemSite
- **Involving global players early in the cluster development helps in achieving faster cluster growth & stronger integration**
  - Influences more players to invest in the cluster
  - Contributes through being a part of cluster leadership team
- **Investment by government/private sector in infrastructure, services, etc**
  - Builds confidence/commitment amongst the existing players towards the cluster
  - Induces further investment by private players, e.g. Chemelot
- **Better cluster integration together with product diversity helps in**
  - Promoting internal consumption within the cluster with efficient material flows, e.g. Jurong, SCIP
  - Consumption in local markets which further helps reduce supply chain costs

Key learnings

Insights (2/2)

- **Good infrastructure is common to all world class clusters**
  - Good transport network (rail, road, sea, pipeline network) helps to increase cluster's critical mass through efficient delivery to the customer
  - Communal utilities help reduce costs and ensures better service
- **Limited cluster scale** (e.g. Tarragona) can be **compensated by a less diversified, yet fully integrated, product range**
- **Some clusters are successful even in the total absence of a local market** (e.g. Jurong)
- Most clusters **serve a large geographical area, shipping mostly final products** rather than commodities or intermediates
- The establishment of a **"cluster promotion body"** (e.g. Chemelot) can be a **key success factor** (stakeholder representation & strong leadership)
- **Most successful clusters are purpose built**
- All clusters have strengths and weaknesses, the **key is to progressively and consistently focus on the promotion and development of strengths**

Contents

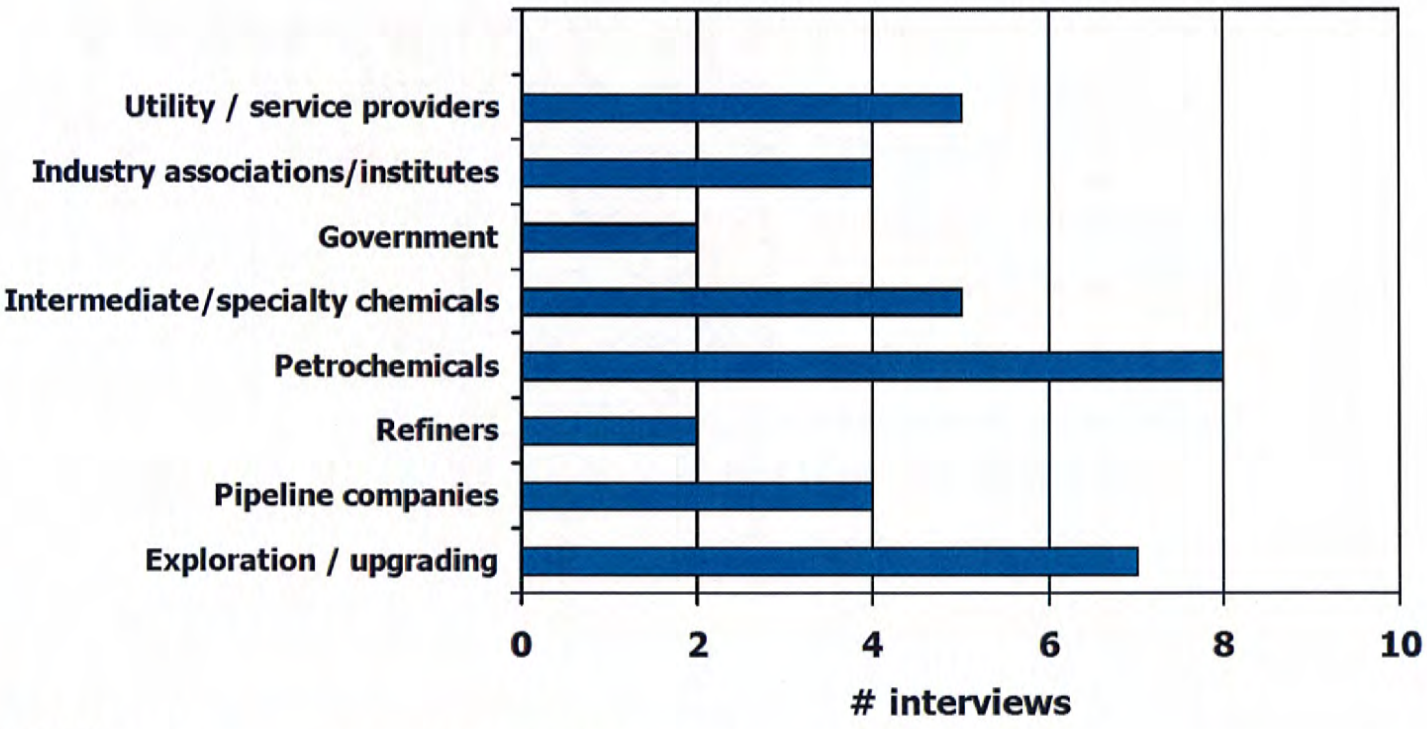
Interview scope & questions

Interviews were used to obtain the views and inputs of the regional Stakeholders

- Interviews were conducted with key stakeholders in the Hydrocarbon value chain. These include exploration & production/upgraders, refiners, petrochemical producers, intermediates/specialty producers, utilities/services companies, pipeline companies, government and industry associations.
- Questions were divided into 2 categories
  - General/common questions covering common challenges/issues for cluster development
  - Specific questions pertaining to their role in the cluster supply chain
- Interviews were conducted either in person or telephonically with prior appointments and questionnaires sent out in advance
- Feedback from the interviews was used to build the various views from the industry, extract issues and capture additional opportunities in developing a World-class Eco-Industrial Chemical Cluster.

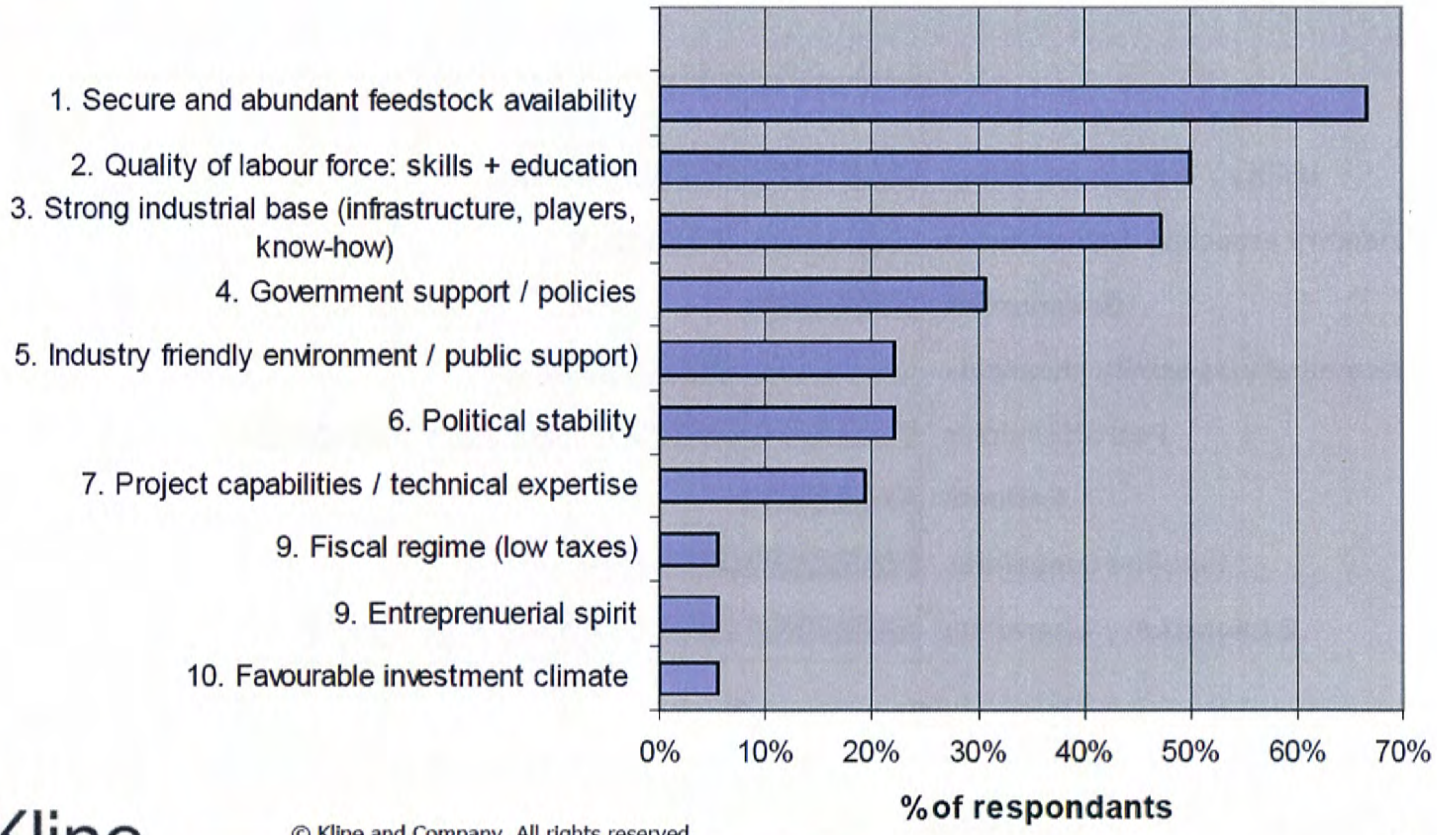
Interview scope & questions

In order to provide an objective view, a cross-section of stakeholders were interviewed - 37 in total.



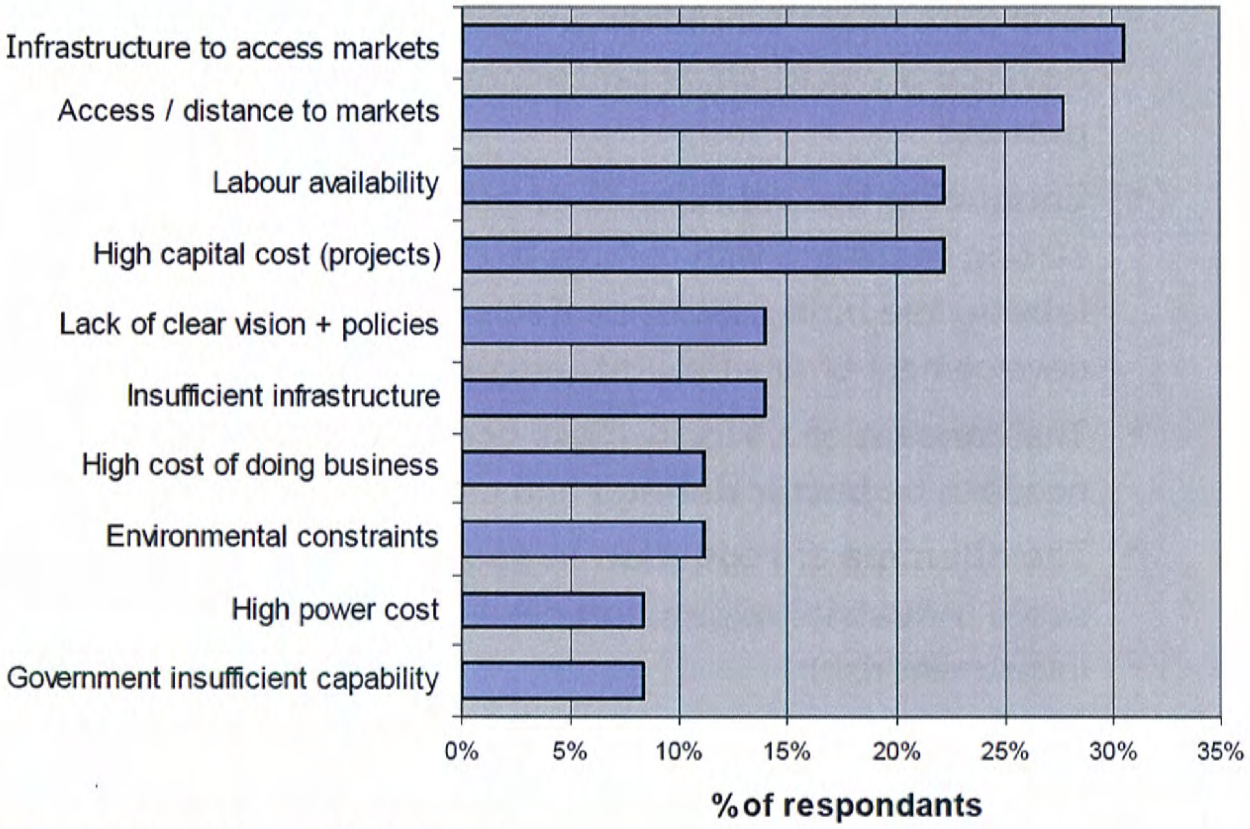
Detailed feedback

Feedstocks, existing Industrial base and Quality of Workforce are seen as key Strengths of the Region



Detailed feedback

Infrastructure, Market Access, and Labour availability are seen as key weaknesses



Conclusion & recommendations

- Over 90% of **stakeholders** are **confident** that the **fundamentals to develop a world-class petrochemical cluster in Alberta are present**
- **Enhancing the confidence of potential investors** will require a **strong message** with regards to tackling the **shortage of skilled labour**, the **high cost of projects** and approach to the further development of Alberta's **infrastructure** and **energy supply network**
- The **concept** of a **World-class Eco-Industrial Chemical Cluster** needs to be **better defined** and **communicated**.
- The **dilemma** of **reduction in greenhouse gas emissions** and **large scale industrial expansion** needs to be tackled (uncertainty increases investment risk)

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Path forward

Stage 1 provides the platform for action – Stage 2 addresses the action

To be covered in a future proposal

	Stage 1: Developing the Cluster Alternatives		Stage 2: Selection, Promotion and Acquisition Strategies	
Phase	1 Lay the Groundwork	2 Define the Context and Develop Concept	3 Cluster Marketing Strategy	4 Investment Acquisition Support

Objectives	▪ Build understanding of the potential with the regional players at Stakeholder leader and working group levels
	▪ Lay a solid foundation for the project in terms of process, team interactions, communications and knowledge base
		▪ Develop the integration opportunities based on Value Chain analysis
		▪ Evaluate the Market opportunities
		▪ Benchmark against best practice clusters
		▪ Develop alternative cluster concepts
		▪ Review cluster alternatives with Steering Group and Stakeholder groups
		▪ Recommend cluster alternative
			▪ Select cluster alternative
			▪ Prioritize Products for investment
			▪ Identify target investor groups
			▪ Develop promotional strategy
			▪ Develop investment acquisition strategy
				▪ Develop a comprehensive investment acquisition support program to enable Greater Edmonton to implement the Cluster marketing strategy in:
				  ▪ Pre-Start Up Phase
				  ▪ Start Up Phase
				  ▪ Post Start Up Phase
				▪ Recommend Additional expertise required to fully implement the investment acquisition strategy

Path forward

Phase 3: Developing the promotion and acquisition strategies

3

Cluster Marketing Strategy

Objective

- Select cluster alternative and establish product priorities
- Identify target investor groups
- Develop promotional strategy
- Develop investor acquisition strategy

Key Tasks

- Select the appropriate cluster alternative
- Establish product priorities for investment acquisition
- Develop a prioritized target investor list
- Develop an outline promotional strategy for the region
- Formulate the investor acquisition strategy together with the Steering Group
  - Approach to potential investors
  - Develop business cases
- Develop strategies to obtain buy-in from authorities to support the promotion and acquisition strategies

Deliverables

- Selected cluster alternative
- Product priority list
- Investor database
- Promotional "content"
- Qualified business cases for each product
- Prioritized investor acquisition strategy and schedule

Path forward

Phase 4: Supporting the region in the implementation of these strategies

4

Investment Acquisition Support

Objective

- Develop a comprehensive investment acquisition support program to enable Greater Edmonton to implement the Cluster marketing strategy in:
  - Pre-Start Up Phase
  - Start Up Phase
  - Ongoing development
- Recommend additional expertise required to fully implement the investment acquisition strategy

Key Tasks

- Draw up a comprehensive investment acquisition support program for the implementation of the Cluster Marketing strategy for the:
  - Pre-Start up phase
  - Start Up phase
  - Ongoing development
  - Special tasks/initiatives
- Identify qualified expertise in specific areas

Deliverables

- Support plan for all three phases
- Expert recommendations

The Kline Group

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If you require additional information about the contents of this document or the services that Kline provides, please contact:

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THE KLINE QUALITY COMMITMENT

We are committed to delivering consistently high quality in all the services we provide; to building and maintaining strong, long-term relationships with our clients; and to upholding the highest standards of competence, integrity, and professionalism in our people.

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G&P Consulting, Rumania
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OIL SANDS PRODUCTS ANALYSIS FOR ASIAN MARKETS

Prepared For:

ALBERTA ECONOMIC DEVELOPMENT

ALBERTA DEPARTMENT OF ENERGY

ALBERTA INDUSTRIAL HEARTLAND

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PURVIN & GERTZ INC.

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I. INTRODUCTION

The extensive resource base in the Alberta oil sands is expected to yield growing supplies of oil sands production. Some of this production could supply markets in Asia as well as traditional North American markets. This study focuses on specific Asian markets that are currently increasing their reliance on Middle Ease crude supplies, but could consider the Canadian oil sands as another important supply.

Alberta Economic Development (AED), Alberta Energy (ADOE), and Alberta Industrial Heartland (collectively referred to as the "Client"), are investigating the potential of Asian markets for Alberta's oil sands products. The objective of this study is to address potential Asian markets for bitumen blends, synthetic crude oil, and refined products produced from the oil sands, and to verify market assumptions, pricing methods, results, and to assess possible synergies with specific Asian refineries. Accordingly, the Client has retained Purvin & Gertz, Inc. to assist in the areas of market background for crude oil and refined products for China, Japan, Taiwan and South Korea and valuation of selected oil sands crudes in Asia including pricing netbacks for these products to Alberta.

This report is for the sole benefit of the Client. Neither the report nor any part of the report shall be provided to third parties without the written consent of Purvin & Gertz. Any third party in possession of the report may not rely upon its conclusions without the written consent of Purvin & Gertz. Possession of the report does not carry with it the right of publication.

Some of the information on which this report is based has been provided by others including the Client. Purvin & Gertz has utilized such information without verification unless specifically noted otherwise. Purvin & Gertz accepts no liability for errors or inaccuracies in information provided by others.

Purvin & Gertz conducted this analysis and prepared this report utilizing reasonable care and skill in applying methods of analysis consistent with normal industry practice. All results are based on information available at the time of review. Changes in factors upon which the review is based could affect the results. Forecasts are inherently uncertain because of the events or combinations of events that cannot reasonably be foreseen including the actions of government, individuals, third parties and competitors. NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY.

Glossary

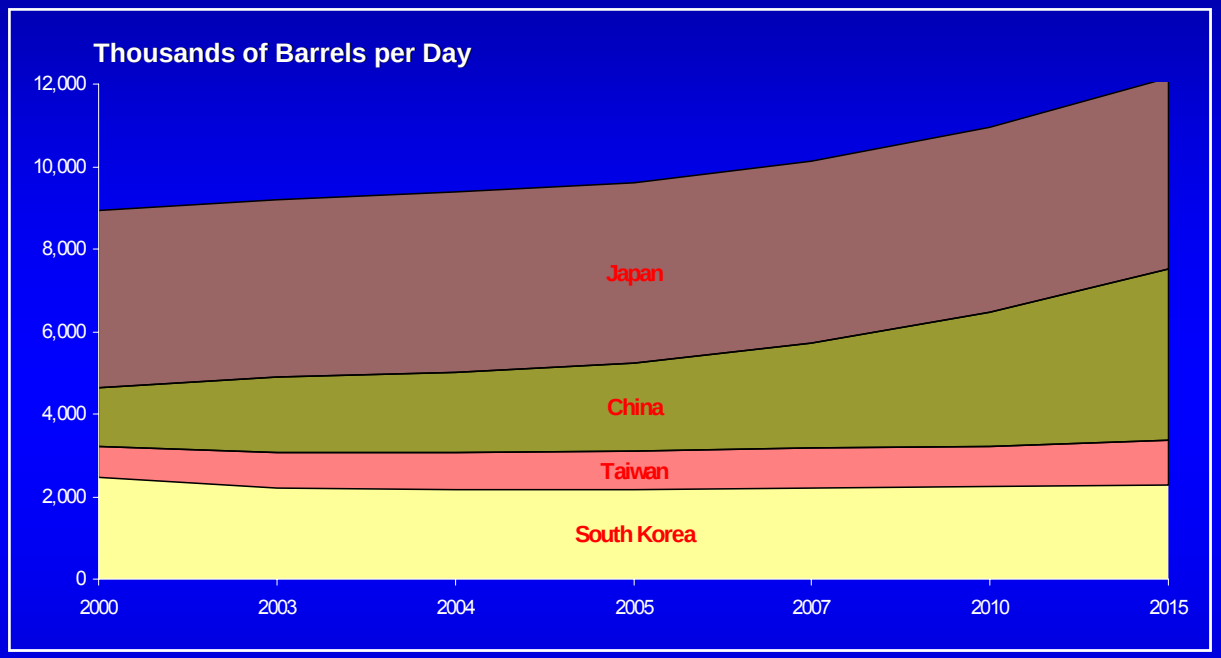
CRK	-	Cracking Refinery
FCC	-	Fluid Catalytic Cracking
HDS	-	Hydrodesulfurization
HSFO	-	High Sulfur Fuel Oil
HSK	-	Hydroskimming Refinery
KDWT	-	Thousand Dead Weight Tonnes
MBID	-	Thousands of Barrels per Day
PADD II	-	U.S. Midwest Market
RFCC	-	Residual Fluid Catalytic Cracking
SCO	-	Synthetic Crude Oil
SynBit	-	Canadian blend of Synthetic Crude Oil (48%) and Bitumen (52%)
SynSynBit	-	Canadian blend of Synthetic Crude Oil (64%) and Bitumen (36%)
TAN	-	Total Acid Number (mg KOH/g)

II. SUMMARY AND CONCLUSIONS

- ASIA MARKET BACKGROUND
- ASIA MARKET OUTLOOK FOR OIL SANDS
  - Bitumen Blends
  - Synthetic Crude Oil (SCO)
  - Refined Products
- OIL SANDS MARKET VALUES IN ASIA AND NETBACKS TO ALBERTA
  - Bitumen Blends
  - SCO
  - Refined Products

Growth in Asian Markets for Crude Oil

Crude Import Forecast for Japan, China, Taiwan & South Korea



- China is the only country in the study to show significant crude oil demand increases of the four countries studied.

Asian Crude Oil Demand Outlook

- Between 2004 and 2015, crude oil imports are expected to increase by 2.7 million barrels per day in Japan, China, Taiwan, and South Korea.
- China is expected to increase imports of crude oil by 2.2 million barrels per day over this period, which is most of the region's increase.
- Most of the growth in crude imports is expected to be light sour crude, coming mainly from the Middle East. By 2015, Middle East crude supplies are projected to supply 68% of China's requirements.
- Japan is also very dependent on Middle East crude supplies, although it is gradually shifting towards lighter, higher value crudes such as are available from Africa.
- Taiwan has been moving towards a heavier crude oil slate from the Middle East, but is offsetting that with West African crudes.
- All of these countries are looking for alternative crude supplies so as not to increase their dependence on Middle East crude supplies.

Crude Oil Valuation Approach to Value Oil Sands Crudes

IDENTIFY DELIVERED COST OF CRUDES

- Bonny Light from West Africa (light sweet benchmark)
- Dubai from Arab Gulf (light sour benchmark)
- Estimate costs for transportation, credit & insurance to:
  - Japan
  - South Korea
  - China
  - Taiwan

IDENTIFY ASIAN REFINING VALUES

- Apply benchmark refinery models for marginal configurations:
  - Hydroskimming
  - FCC Cracking
- Calculate break-even values for each crude based on product prices and refinery variable costs:
  - SCO
  - SynBit/ SynSynBit
  - Dubai
  - Bonny Light

DETERMINE CANADIAN BLEND NETBACKS

- Estimate Asian refining values for Canadian blends based on benchmark crude CIF prices and variable break-even differentials.
- Estimate Asian netbacks for Western Canada based on:
  - Waterborne transportation costs
  - Pipeline costs

Petroleum Product Prices Used to Calculate Crude Values

	Singapore	Japan	South Korea	Shanghai China	Taiwan
LPG	Export	Arab Gulf Imports	Arab Gulf Imports	Arab Gulf Imports + Tariff	Arab Gulf Imports
Naphtha	Export	Singapore Import	Japan CIF	Singapore Import + Tariff	Singapore Import
Gasoline	Export	Singapore Import	Vietnam Export	Singapore Import + Tariff	Vietnam Export
Jet	Export	Singapore Import	S. China Export - Tariff	Singapore Import + Tariff	S. China Export - Tariff
Diesel	Export	Singapore Import	S. China Export - Tariff	Singapore Import + Tariff	S. China Export - Tariff
Fuel Oil	Export	S. China Export - Tariff	S. China Export - Tariff	Singapore Import + Tariff	S. China Export - Tariff

- Pricing in each location is based on trade analysis.
- Singapore is a major export center and provides the basis for product pricing for most of the Asian region.
- Most product prices in China and Japan will reflect the cost of delivered imports.
- Prices in South Korea and Taiwan favor naphtha production.

Crude Quality Assumptions

- SynSynBit is a blend of 64% SCO and 36% Bitumen, and blended to approximate the quality of Middle East light sour crudes.
- SynBit is a blend of 48% SCO and 52% Bitumen.
- These blends approximate many of the key properties of Dubai and other light sour crudes.

	Bonny Light	Dubai	Sweet SCO	SynSynBit	SynBit	Athabasca Bitumen
API	34.6	30.6	34.8	24.2	19.9	8.3
Sulfur	0.2	2.0	0.1	1.8	2.5	4.8
LPG	2.0	2.4	2.8	1.8	1.3	0.0
Naphtha	26.7	24.8	17.7	11.9	9.3	1.5
Jet	13.7	9.8	12.0	8.3	6.7	1.7
Diesel	26.4	20.5	33.8	26.6	23.4	13.9
VGO	24.3	25.7	33.4	32.9	32.6	31.9
Resid	6.8	16.7	0.0	18.3	26.4	50.8

Asian Versus Chicago Pricing Drivers

- Very wide light/heavy price differentials occurred in 2004 and 2005. Future differentials expected to be higher than 1995 – 2003 period, but narrower than occurred in 2004 and 2005.
- Asian differentials did not widen as much in 2004 as in the US, but will likely remain wider in the future than historical because HSFO growth will be less than other products.
- Far East crude price premium did not occur in 2004, driven by strong Atlantic basin demand for crude oil. This premium is expected to return as the Far East continues to experience strong demand growth. This would help improve Oil Sands crude values in Asia relative to US Midwest.
- Tanker rates jumped in 2004, aggravating prices of HSFO in the US versus Asia and contributing to wider light/heavy price differentials. New tanker capacity coming on stream in next several years should bring tanker rates down somewhat closer to historical levels.
- Wider heavy light differentials in North America should support higher bitumen blend values in Asia than in North America.

Crude Oil Price Outlook

- **Crude oil prices and light heavy differentials are expected to return to sustainable levels based on industry fundamentals.**

BENCHMARK CRUDE OIL PRICE FORECAST (1)

U.S. $/Bbl

	2000	2001	2002	2003	2004	2005	2010	2015
Tapis, FOB	29.85	25.32	25.72	30.06	41.19	42.06	32.50	37.06
Brent, FOB	28.50	24.44	25.02	28.83	38.27	38.50	29.89	34.23
WTI, Spot Cushing	30.37	25.93	26.16	31.06	41.49	41.32	32.24	36.84
Bonny Light FOB	28.51	24.52	25.14	28.77	38.30	38.60	30.34	34.77
Bonny Light, CIF Japan	31.39	26.56	26.70	31.60	42.90	42.60	32.99	37.57
Bonny Light, CIF South Korea	31.06	26.34	26.55	31.36	42.50	42.23	32.72	37.28
Bonny Light, CIF Shanghai	30.92	26.25	26.48	31.25	42.32	42.06	32.60	37.15
Bonny Light, CIF Taiwan	30.88	26.21	26.46	31.18	42.20	41.97	32.55	37.10
Dubai, FOB	26.24	22.80	23.85	26.76	33.69	34.82	27.76	31.81
Dubai, CIF Japan	28.00	24.07	24.83	28.53	36.55	37.30	29.39	33.54
Dubai, CIF South Korea	27.79	23.93	24.73	28.33	36.22	37.01	29.21	33.34
Dubai, CIF Shanghai	27.65	23.83	24.66	28.23	36.06	36.85	29.09	33.21
Dubai, CIF Taiwan	27.62	23.81	24.64	28.18	35.97	36.79	29.06	33.18

Note: (1) Purvin & Gertz January 2005 Crude Oil Price Forecast.

Comparison of Crude Oil Prices/Values [1] (U.S. $/Bbl)

	Bonny Light	Dubai	Sweet SCO	SynSynBit	SynBit
Price/Value					
In Japan - 2000	31.39	28.00	31.54	26.31	24.67
In Japan - 2010 [2]	32.99	29.39	32.99	26.88	24.26
In China - 2000	30.92	27.65	31.25	26.21	24.72
In China - 2010 [2]	32.60	29.09	32.77	26.73	24.17
Netback Price in Alberta					
From Japan - 2000	-	-	28.51	23.25	21.54
From Japan - 2010 [2]	-	-	29.92	23.78	21.21
From China - 2000	-	-	28.07	22.99	21.44
From China - 2010 [2]	-	-	29.56	23.49	20.99
From U.S. Midwest - 2000	-	-	30.29	23.18	21.62
From U.S. Midwest - 2010 [2]	-	-	30.78	24.26	21.30

Notes:

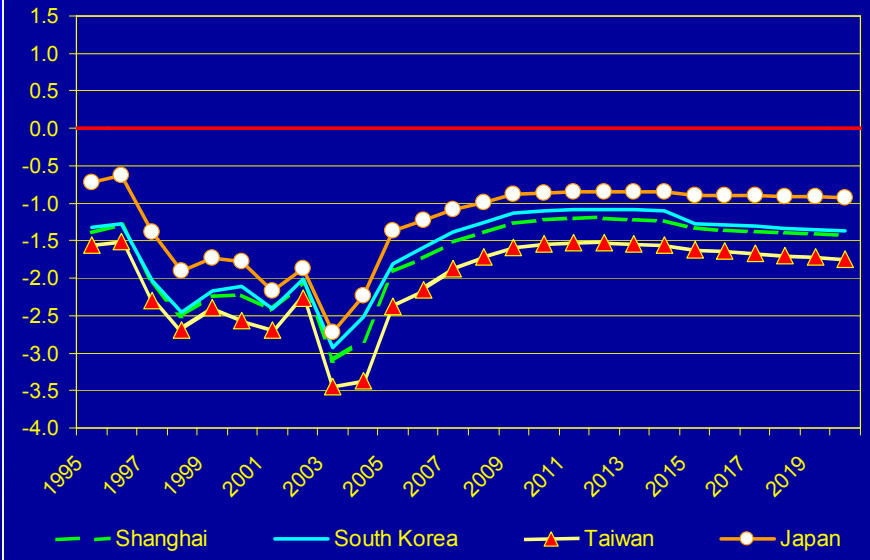
(1) Oil sands crude values in Asia are estimated from relative hydroskimming refining values. Both SynSynBit and SynBit also experience TAN penalties.

(2) Based on Purvin & Gertz price forecast.

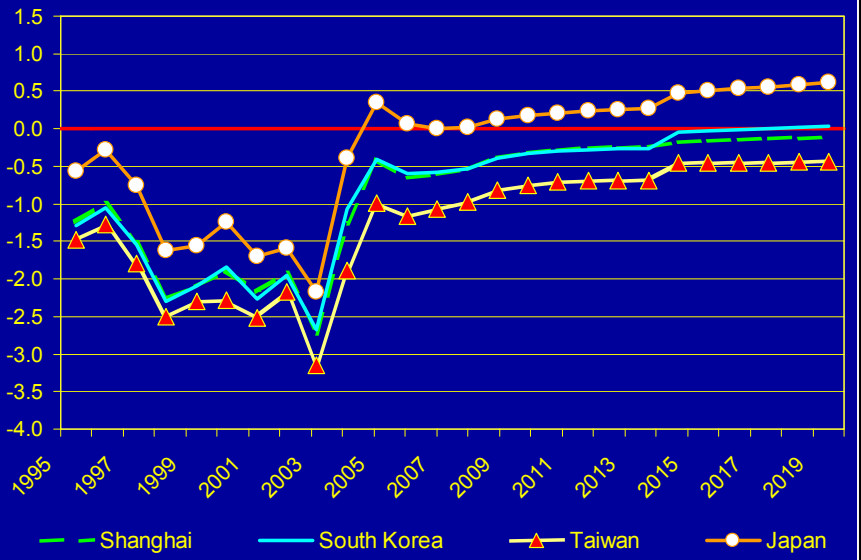
SCO Asian Netbacks At Edmonton

- Hydroskimming is the marginal refinery mode in Asia
- Asian hydroskimming netbacks for SCO relative to Bonny Lt. are projected to be slightly below Chicago netbacks at Edmonton.

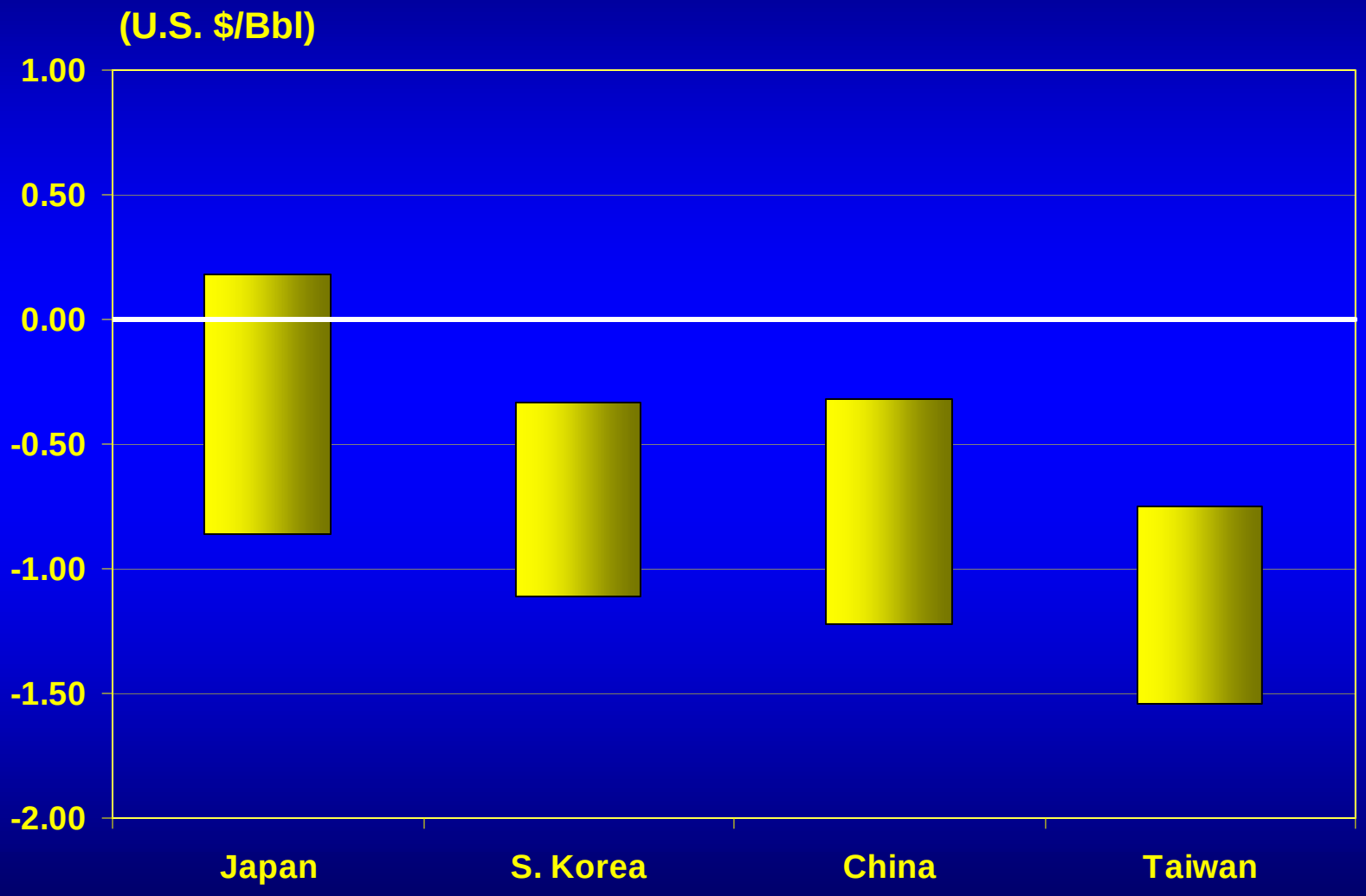
Asian Hydroskimming Versus Chicago Netback, (U.S. $/Bbl)



Asian Cracking Versus Chicago Netback (U.S. $/Bbl)



SCO Netbacks at Edmonton Relative to Chicago Netback - 2010(1)

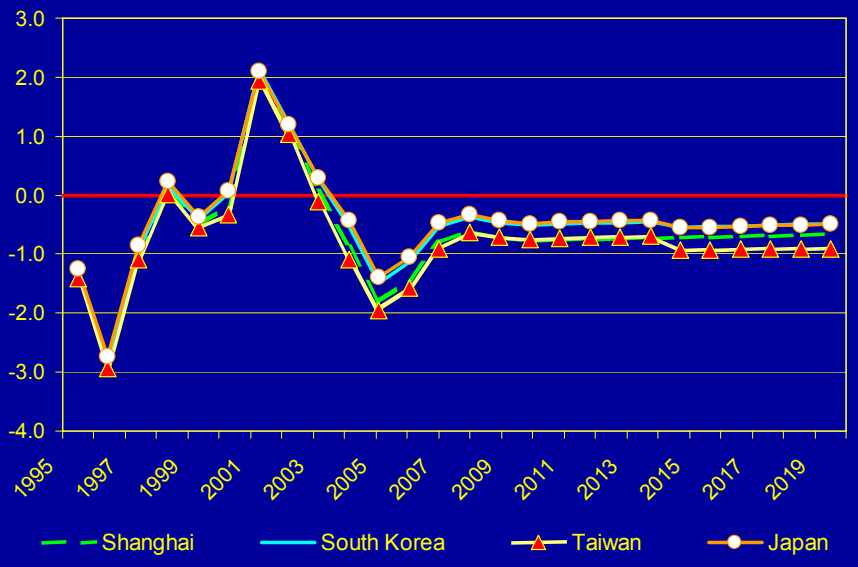


(1) Cracking value is top of range; hydroskimming value is lower end of range.

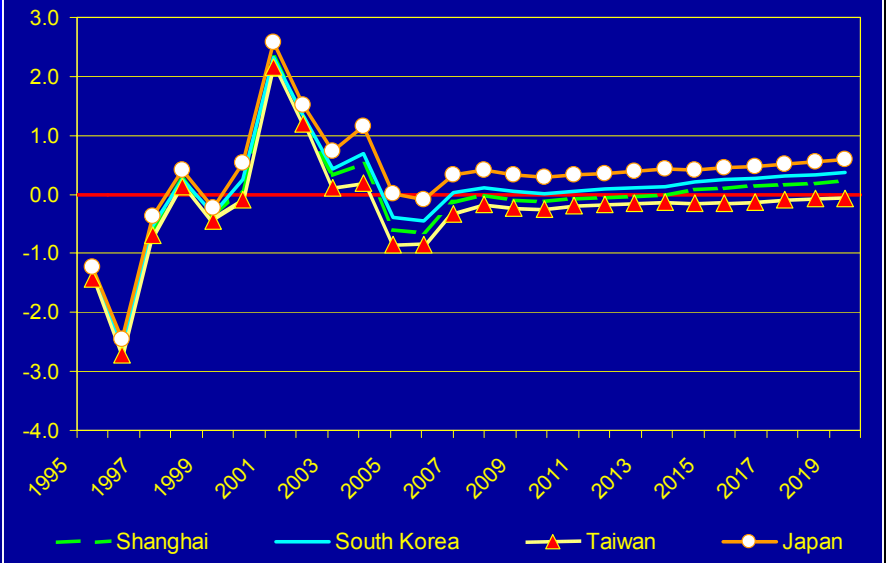
SynSynBit Asian Netbacks At Edmonton

- **Despite the relative strength of the Asian fuel oil market, Asian hydroskimming netbacks are projected to be slightly weaker than Chicago netbacks for SynSynBit at Edmonton.**

Asian Hydroskimming Versus Chicago Netback, (U.S. $/Bbl)

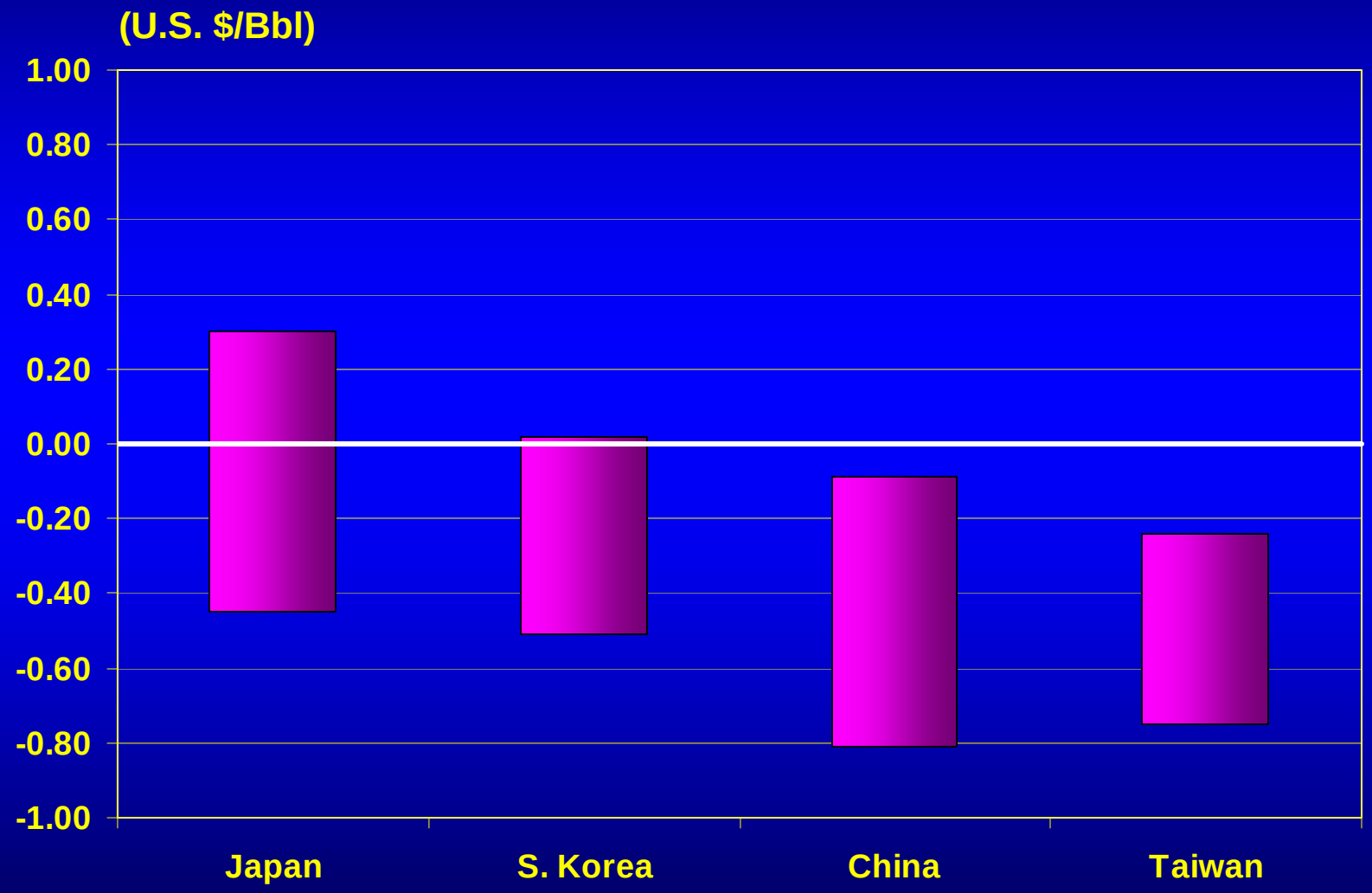


Asian Cracking Versus Chicago Netback (U.S. $/Bbl)



PURVIN & GERTZ INC.

SynSynBit Netbacks at Edmonton Relative to Chicago Netback - 2010(1)

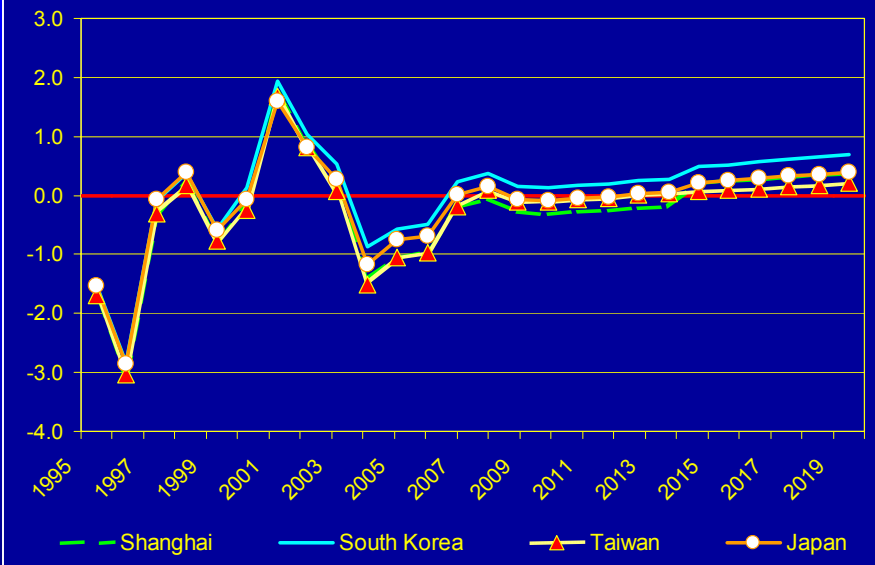


(1) Cracking value is top of range; hydroskimming value is lower end of range.

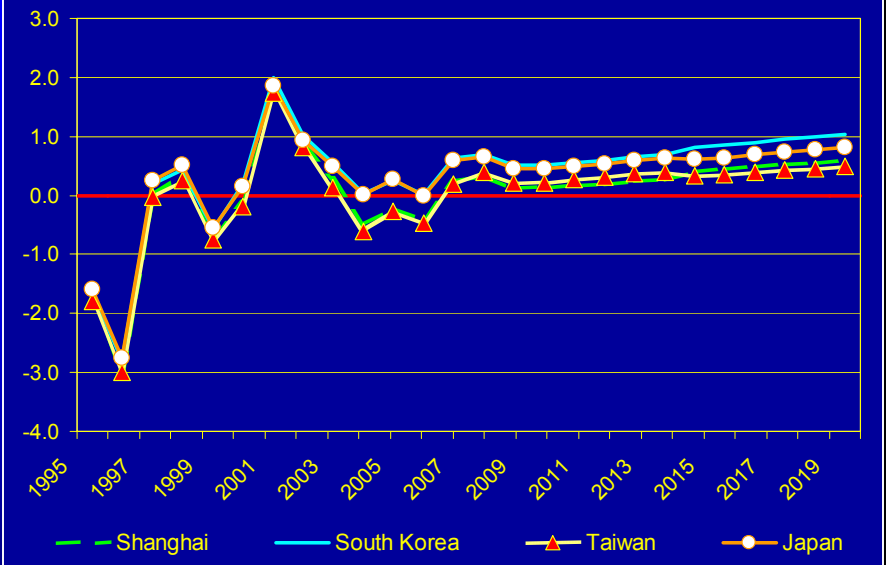
SynBit Asian Netbacks At Edmonton

- Hydroskimming is the marginal refining mode in Asia.
- Cracking mode valuations for SynBit are roughly $0.50/Bbl higher (relative to Dubai), and reflect possible upside in crude values.

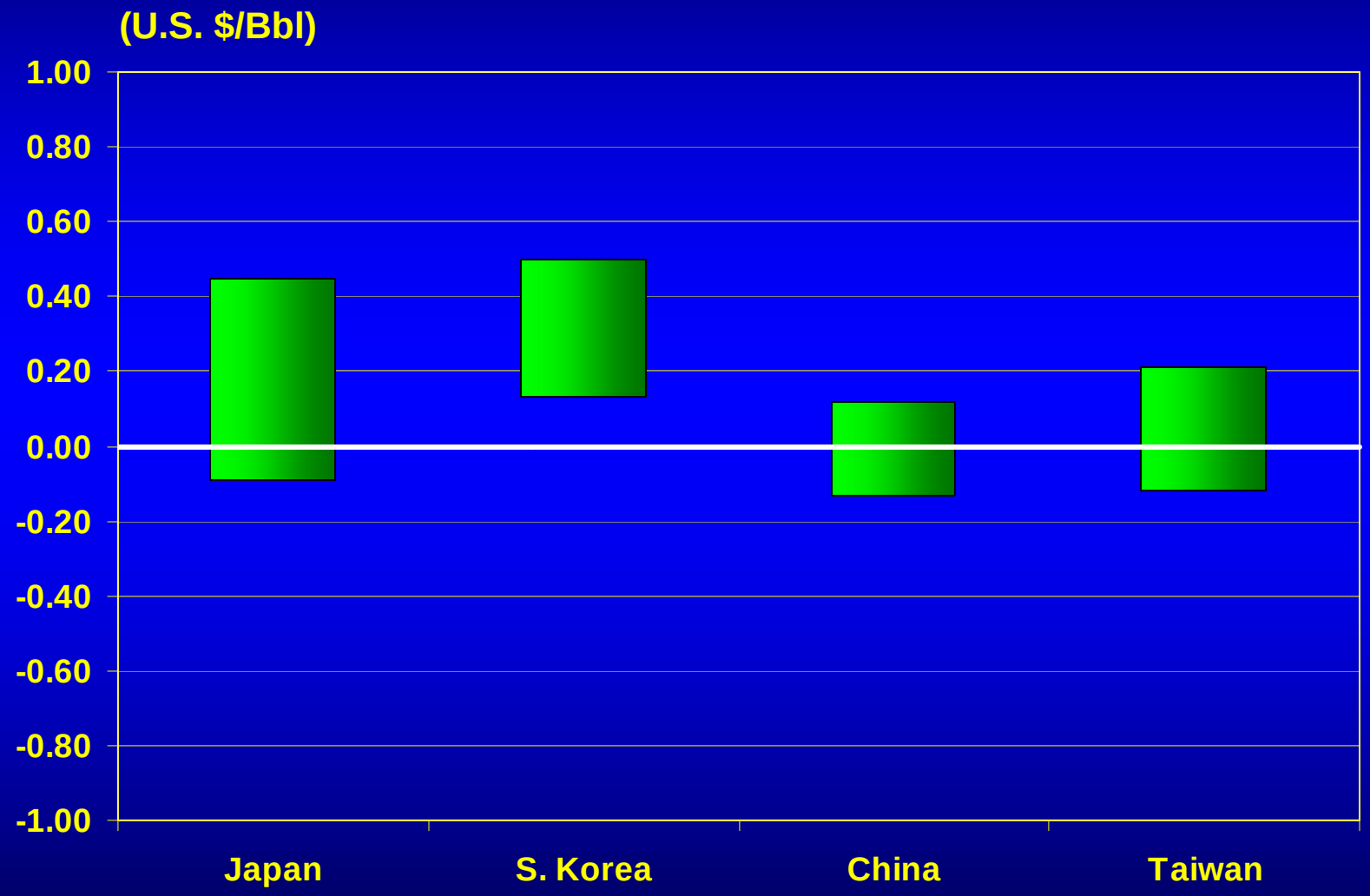
Asian Hydroskimming Versus Chicago Netback, (U.S. $/Bbl)



Asian Cracking Versus Chicago Netback (U.S. $/Bbl)



SynBit Netbacks at Edmonton Relative to Chicago Netback - 2010(1)



(1) Cracking value is top of range; hydroskimming value is lower end of range.

General Conclusions - SCO

- Sweet SCO should find its best value in the Japan market, which is gradually lightening its crude slate. It is forecast to be around $0.80/Bbl less than its Midwest value to $0.20/Bbl above. Other Asian markets would value SCO to be lower.
- As SCO supplies increase, further price discounts in the U.S. Midwest may result. Should SCO experience further price discounting in the U.S. Midwest, Asia could become the incremental market of choice for SCO.
- Markets in China may be less interested in SCO because of their interest in residual fuel oil and asphalt. SCO does not yield any residual fuel oil. SCO seems to best fit the Japan market.
- Cracking refineries in Asia will value SCO higher than hydroskimming refineries, and this provides potential for further improvements above hydroskimming values in netback prices from Asia.

General Conclusions - SynSynBit

- SynSynBit (64% SCO, 36% Bitumen) has a yield profile that is somewhat similar to Middle East sour crudes. Thus, it could fit many of the refineries in Asia.
- Its highest values were found to be refineries in Japan and South Korea.
- Historically, between 1998 and 2003, SynSynBit should have provided a higher netback than Chicago. In the forecast,due mainly to an outlook for wider price differentials, the forecast netbacks are slightly less in a hydroskimming mode than from Chicago.
- SynSynBit has only been marketed to U.S. Midwest refineries in a minor way so far. This blend may experience more discounts in Chicago than forecast in order to obtain significant market penetration. Further discounts could result in Asia providing better netbacks.

General Conclusions - SynBit

- SynBit (52% bitumen, 48% SCO) has a yield profile that is somewhat heavier than Middle East Light Sour (Dubai), but likely similar to Arab Heavy. The residual yield is important to Asia which has large residual fuel oil markets.
- SynBit prices historically between 1997 and 2003 would have been better than Chicago netbacks. Between 2003 and our forecast to 2007, Asian hydroskimming values would be less than from Chicago, as relative wider light/heavy differentials in Asia reduced SynBit values. After 2007, differentials should narrow somewhat, and stronger HSFO prices in Asia should provide higher SynBit values than from Chicago.
- Future Chicago prices reflect significant price discounts to encourage the market to use more bitumen blends. This gives higher netback prices from Asia.
- Cracking refineries in Asia will find SynBit to have higher values than hydroskimming refineries, and provides potential for further improvements in netback prices from Asia.
- Markets for SynBit are expected to be more limited than SynSynBit because of the large residual yield and its high sulfur content. Only a few refineries will be capable of using substantial volumes of SynBit, although new refineries in China could be designed to run SynBit.

Potential for Refined Product Imports

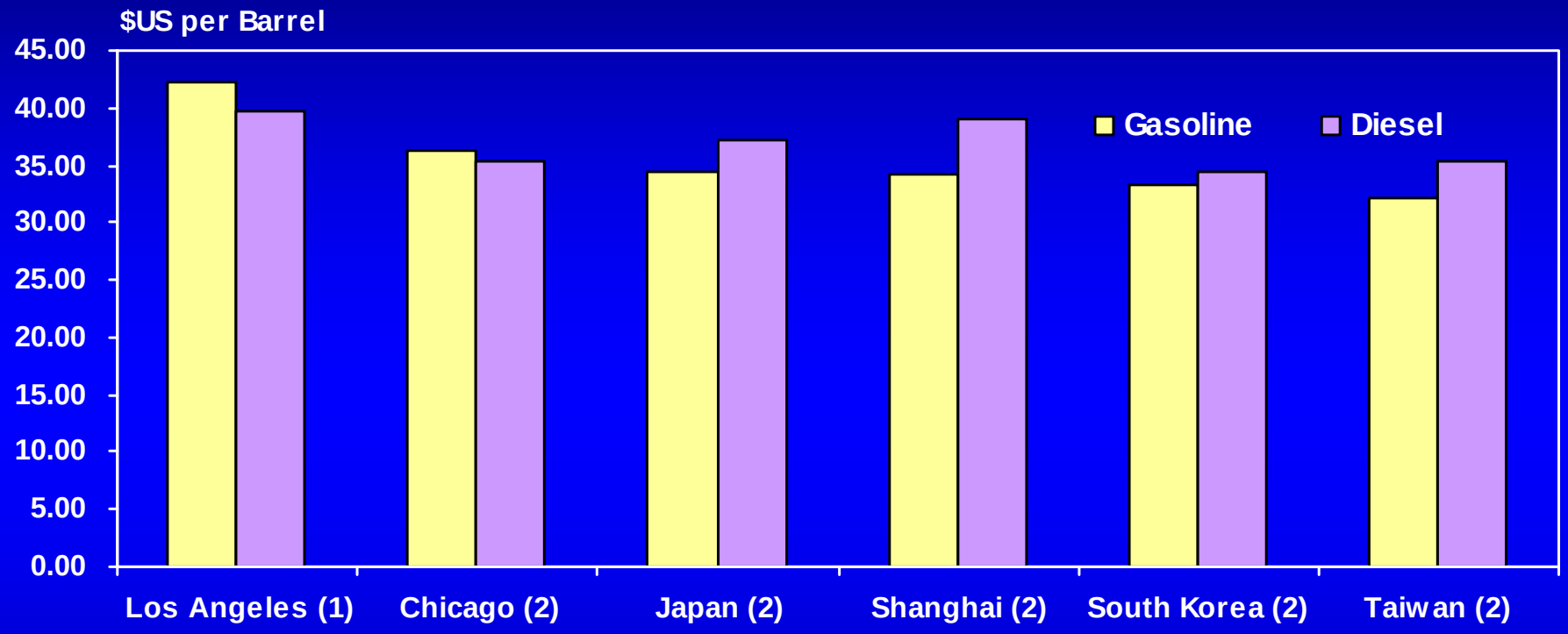
- These Asian countries try to produce most of their domestic requirements for refined products. They tend to use small volumes of imports, and sometimes exports, for balancing purposes. Distillate imports will be higher than gasoline.
- China is not expected to be a major importer of products, but this assumes that it constructs the equivalent of six 200,000 barrels per day (B/D) refineries by 2015.
- China's largest imports are residual fuel oil; around 425,000 B/D in 2003. It could import over 350,000 B/D of distillate by 2015.
- South Korea is a large importer of naphtha for petrochemical use; minor for other products. It exports distillate and residual fuel oil.
- Japan is expected to increase imports of gasoline. Naphtha is largest imported product, mainly for petrochemical feedstock.
- Taiwan is expected to be mainly an exporter, with only minimal imports.
- The only significant potential for product imports into this region would occur in China if this country is not able to build all the refining capacity that it needs.

Export of Refined Products from Alberta

- If bitumen is upgraded all the way to gasoline or diesel fuel, netbacks from Asia to Alberta would provide higher returns than if upgraded to SCO(1).
- The resulting netback prices from Asia were compared to exporting products to Chicago and Los Angeles (1).
- Diesel fuel netbacks are higher from Asia than from U.S. Midwest.
- Diesel demand growth in Asia will continue to outpace gasoline. Further, diesel production from the oil sands is easier to produce than gasoline.
- Asia market could grow to accept refined products from Alberta, but there may be merit in sharing output with California market in order to achieve an orderly market development.

(1) Purvin & Gertz, "Phase II - Refined Products and Petrochemicals from Bitumen", December 17, 2004, prepared for the Government of Alberta and an Industry Group.

Petroleum Product Prices Netback to Edmonton From U.S. and Asia Markets - 2010



1) CARB Specifications. Gasoline is CARBOB (prepared for ethanol blending).
2) Low Sulfur Specifications

- This analysis assumes refined products are produced in Alberta and exported.
- Diesel prices from Japan, China, and Taiwan are higher than netbacks from Chicago.
- Gasoline prices from Asia slightly lower than U.S. netbacks.

Canadian Oil Sands – Potential to Supply Asia

- The Canadian oil sands could become a significant supplier of crudes to the Asian market. They would likely be sweet SCO and bitumen blends.
- SCO/bitumen blends could be suitable substitutes for Middle East sour crude supplies. The Asian countries studied are seeking to reduce their dependence on Middle East crude.
- SCO may have the highest value to cracking refineries in Japan.
- Bitumen blends high TAN values may limit the amount of bitumen blend that Asia refineries can process.
- High sulfur content of residual fuel may limit the market acceptability of bitumen blends.
- Refined products produced from an export refinery based on oil sands could find outlets in Asia ; distillate to China, gasoline to Japan.
- Potential to serve Asian markets is subject to achieving a satisfactory price for these products relative to traditional North American markets.
- Cracking or coking refineries should be prime targets to maximize the value of oil sands crudes.

General Conclusions

- Asian netbacks for Canadian oil sands crude blends are expected to be fairly close to competitive with Midwest netbacks at Edmonton.
  - Hydroskimming values are the most likely results, and are slightly less.
  - Cracking values are comparable or even superior to Chicago netbacks.
  - Cracking value represents an upside to be shared between buyer and seller.
- Further discounts in the U.S. Midwest are possible as supplies grow. If this happens, hydroskimming values from Asia could be better than Midwest results.
- While the Asian refining base is generally less sophisticated, the relative strength of the Asian fuel oil market and the Far East premium for crudes provides economic support for Canadian deliveries such that Asia should be a viable alternative for bitumen blends.
- SCO should be a good substitute for light sweet crude, except that its naphtha will be less desirable for petrochemical production.
- Cracking or coking refineries should be targeted customers, as they should be in best position to provide highest values for oil sands crudes.
- If Far East premium does not continue, netback prices from Asia would be lower.

Other Conclusions

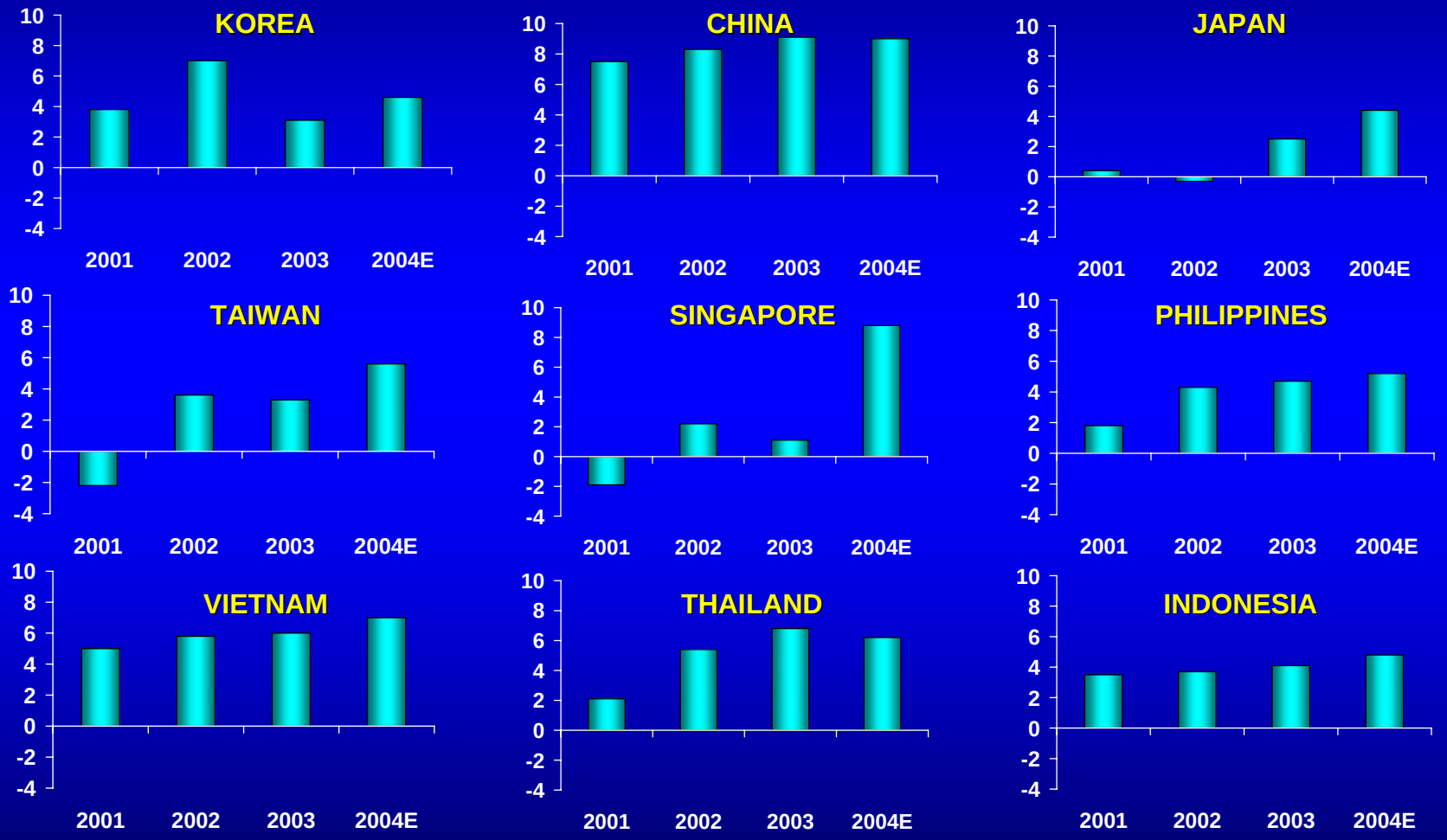
- If China develops refineries that are designed for oil sands, the amount of oil sands crudes that can be processed should not be constrained.
- Asia market could grow to accept refined products from Alberta, but likely would need California market to take some of the exports, at least initially.
- There may be merit in an Alberta upgrader exporting gasoline to the U.S. and diesel to Asia, as these are the products each area prefers.
- Another upgrading option would be to produce diluent for use in Alberta to blend with bitumen, and distillate for export.
- Potential to achieve a lower pipeline shipping cost on light crudes from Edmonton to Kitimat would help improve netbacks for SCO and SynSynBit.

III. ASIA MARKET BACKGROUND

- ECONOMIC REVIEW
- COMPARISON OF ASIAN REFINED PRODUCT MARKETS TO OTHER REGIONS
- COMPARISON OF ASIAN REFINERIES TO OTHER MARKETS
- ASIA REFINING SYSTEM
- CHINA
- JAPAN
- SOUTH KOREA
- TAIWAN

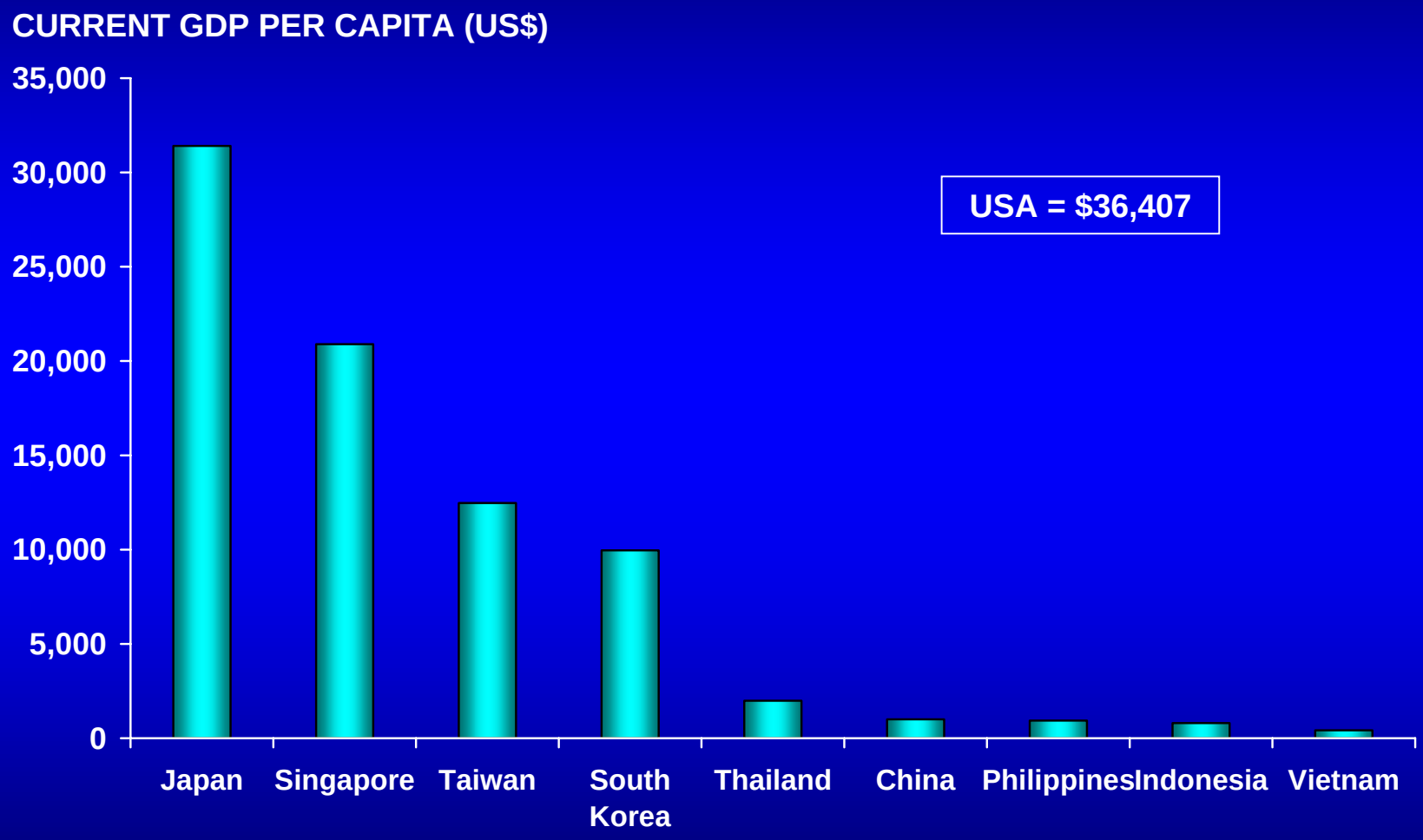
Economic Growth (GDP) in Asia

Real GDP Growth, %



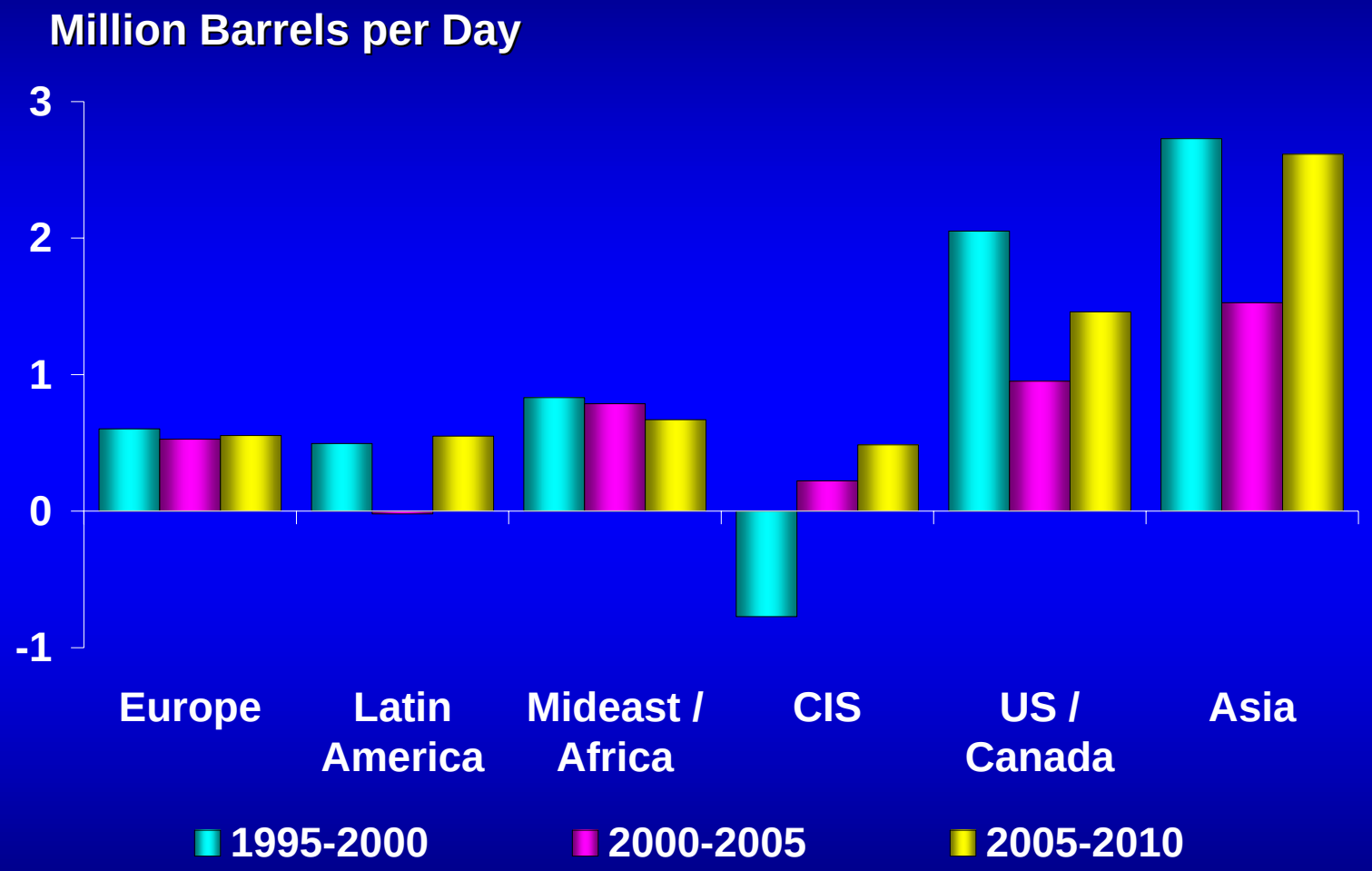
- Economic growth has returned to nearly all countries in Asia.

Current Relative Economic Status of Asian Countries



- Significant growth potential for many Asian markets to catch up with Japan and Singapore.

Global Refined Product Demand Growth

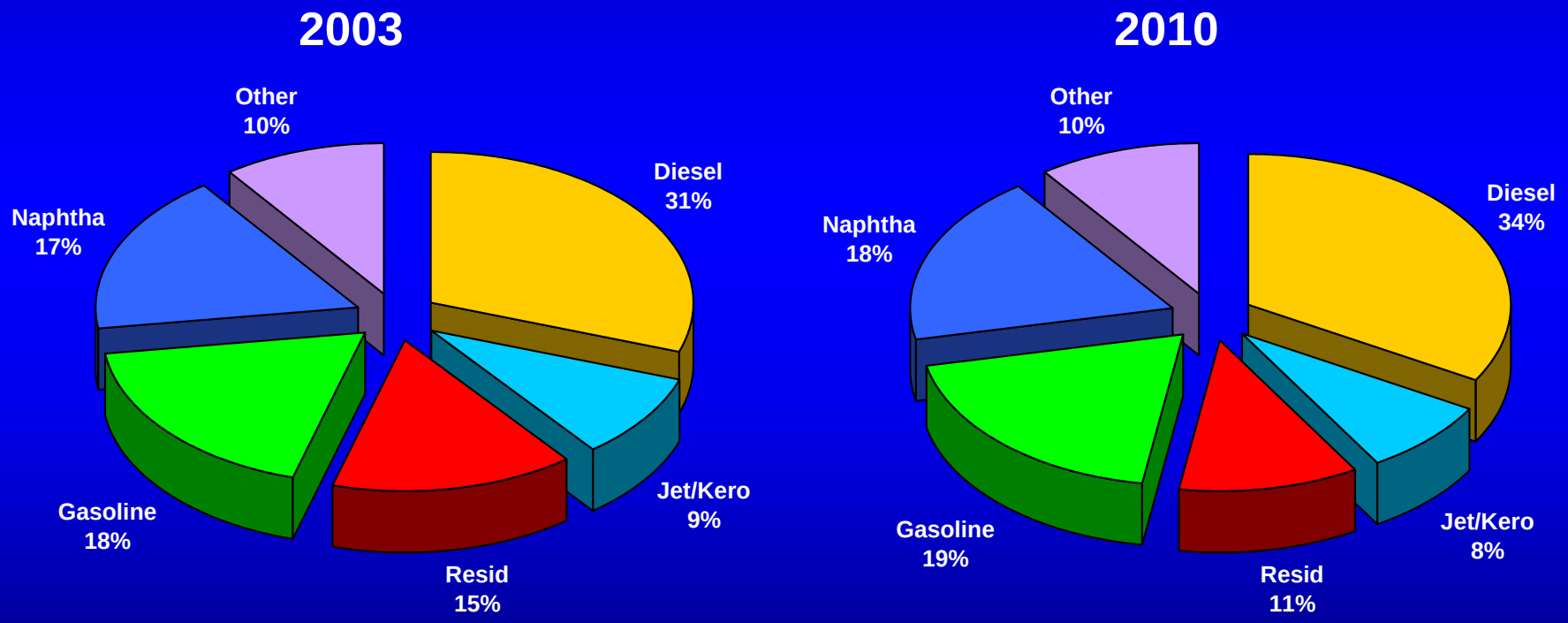


- Asian countries are expected to outpace demand growth in other regions.

Asian Refined Product Slate

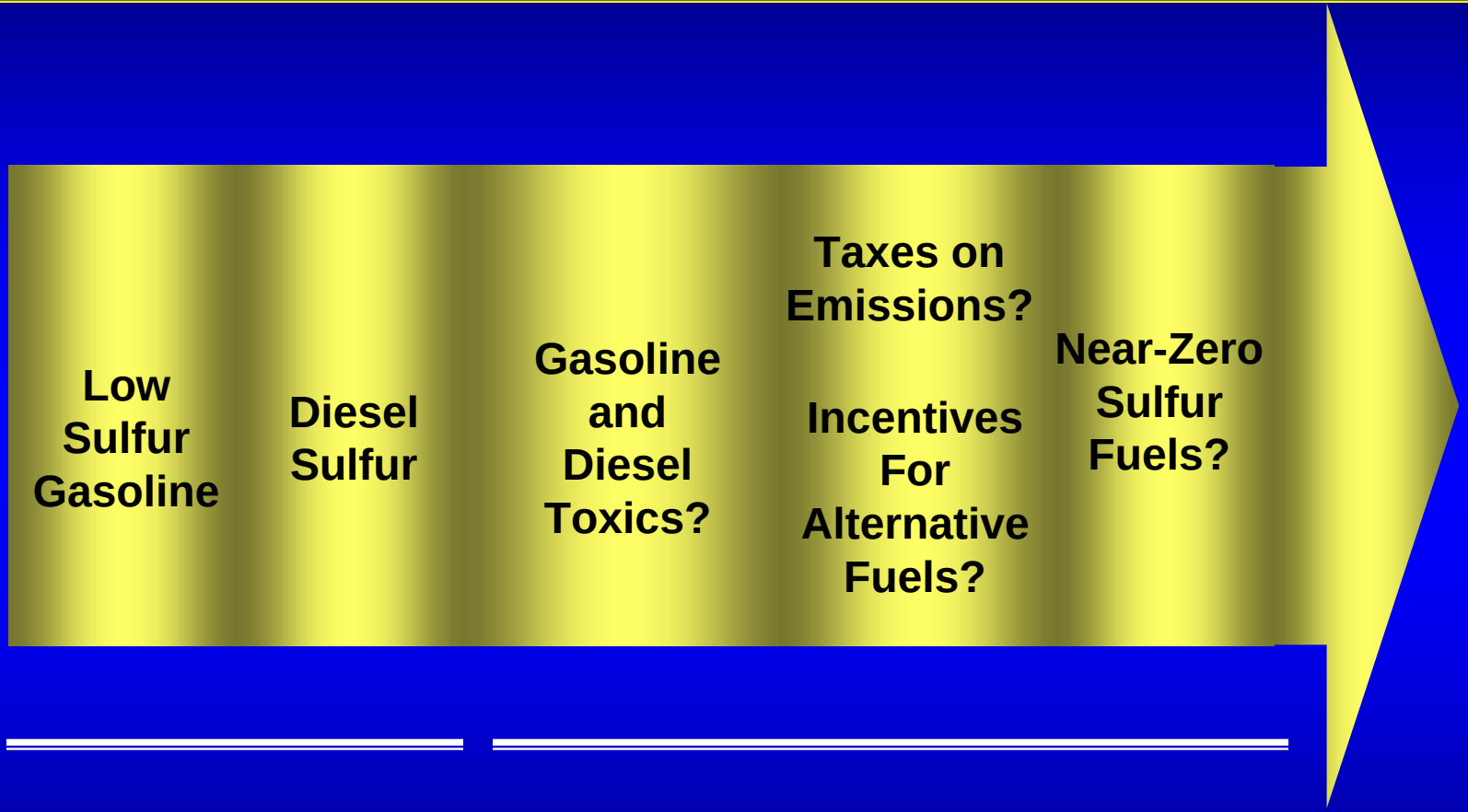
Asian Product Demand By Type

Percent of Demand



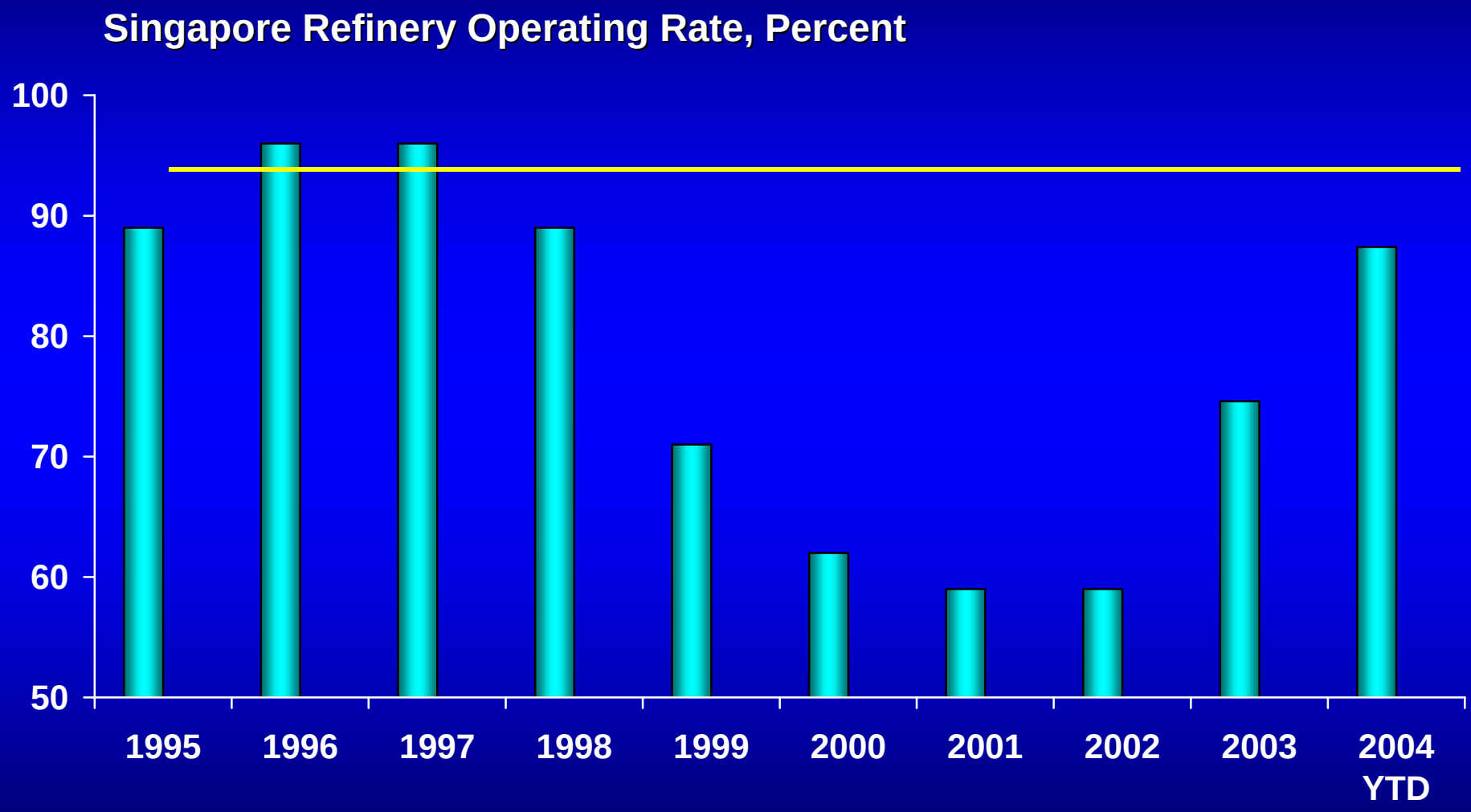
- Natural gas and transport fuel growth will further product shift slate to light products.

Asian Product Specification



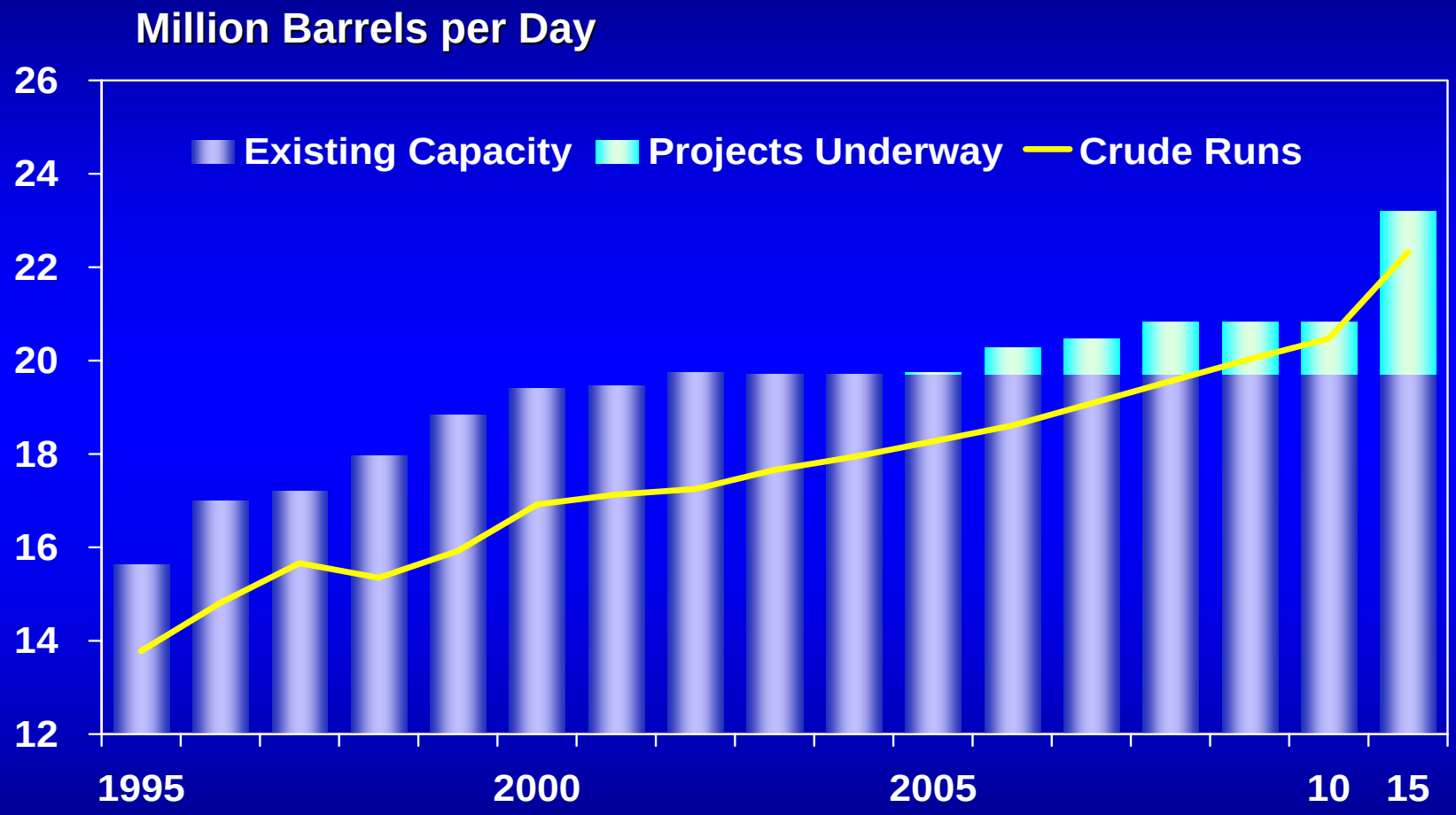
- Asian nations adopting clean fuels programs similar to those in US and Europe.

Asian Regional Refinery Utilization



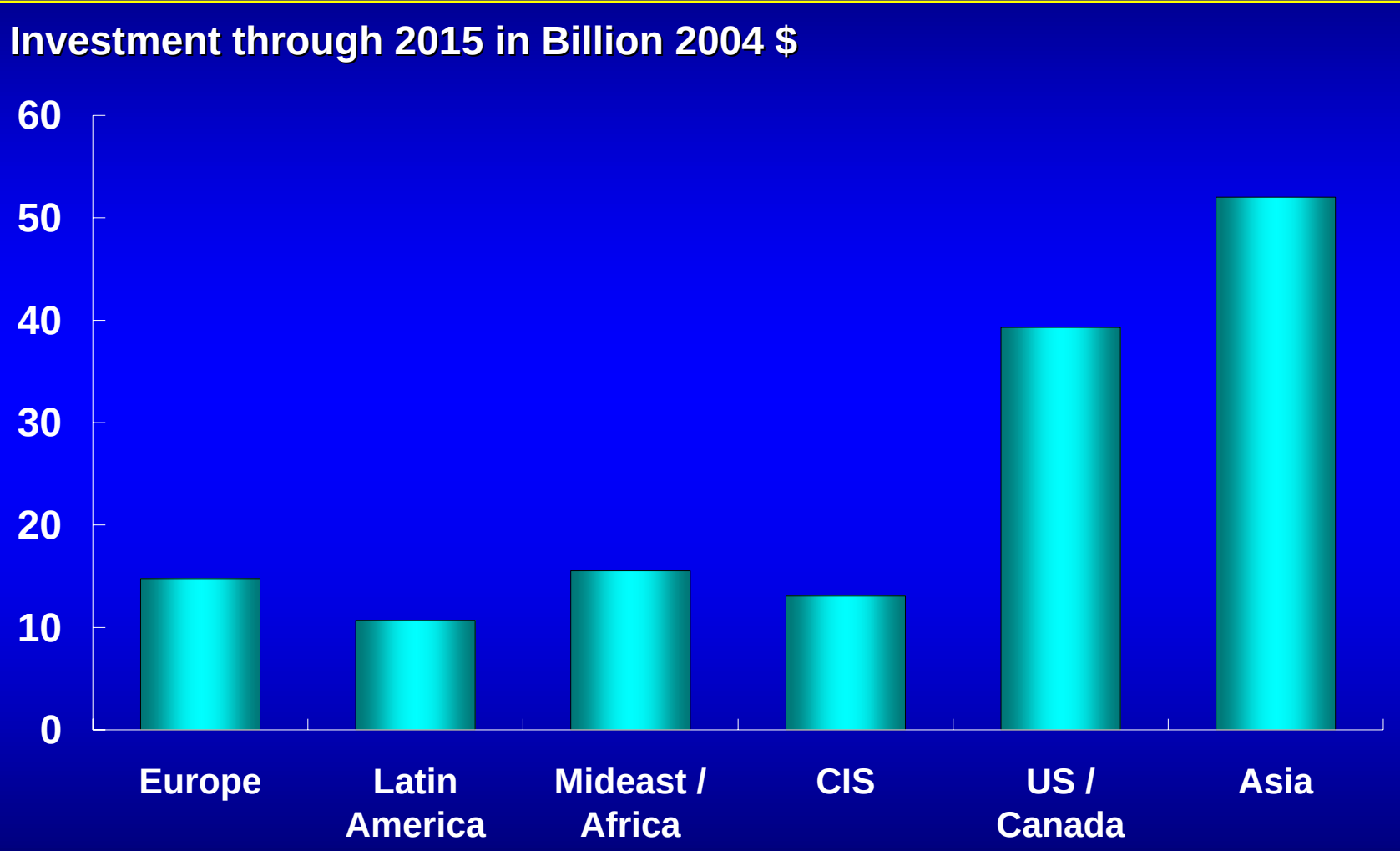
- Refinery throughput has increased since 2001 in response to stronger demand for petroleum products.

Asian Refinery Capacity Versus Crude Runs



- Asian refinery capacity utilization has improved and required expansion projects are now underway.

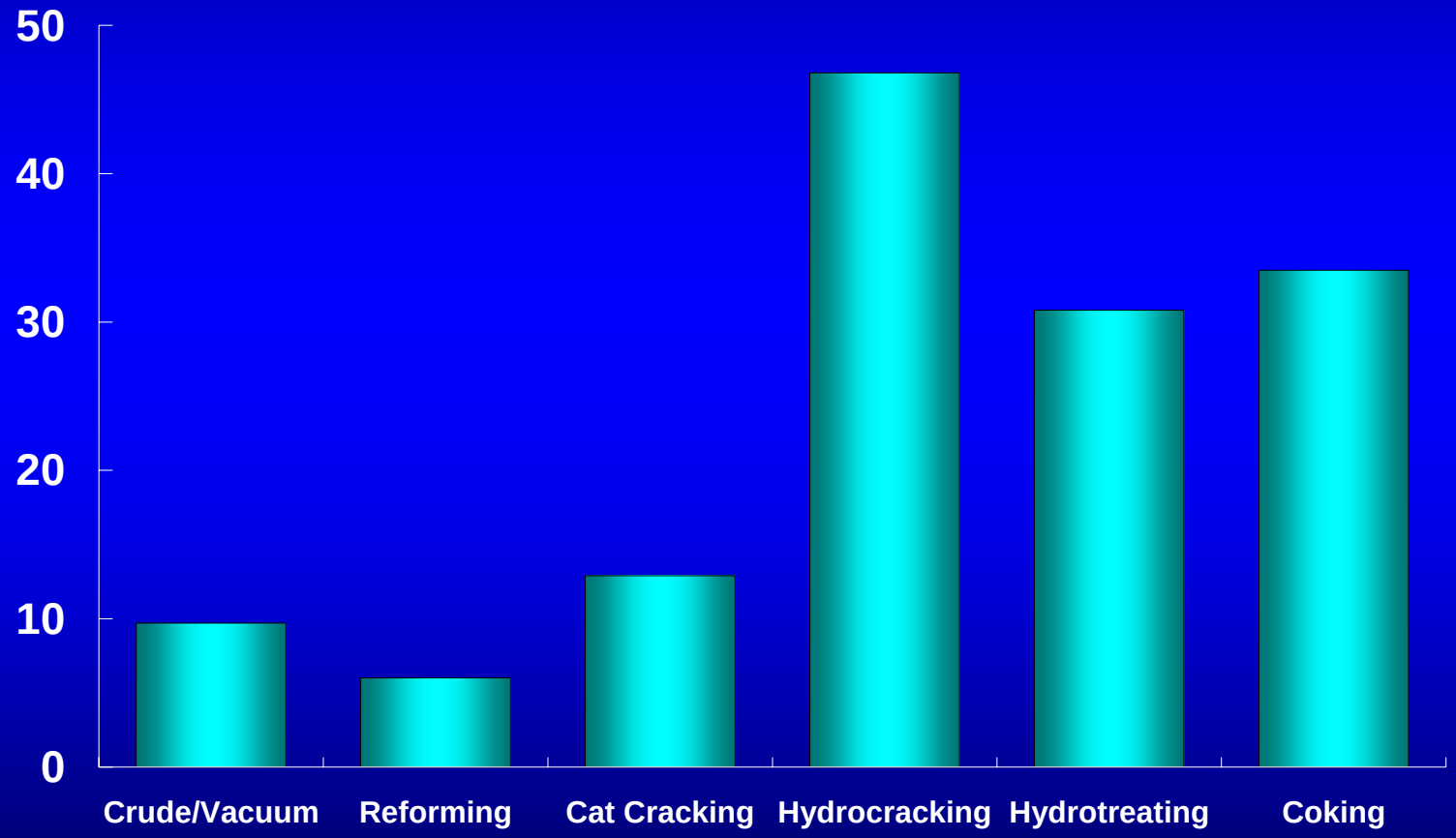
Expected Refining Investments Comparison



- Asia to receive greatest amount of future refining investment.

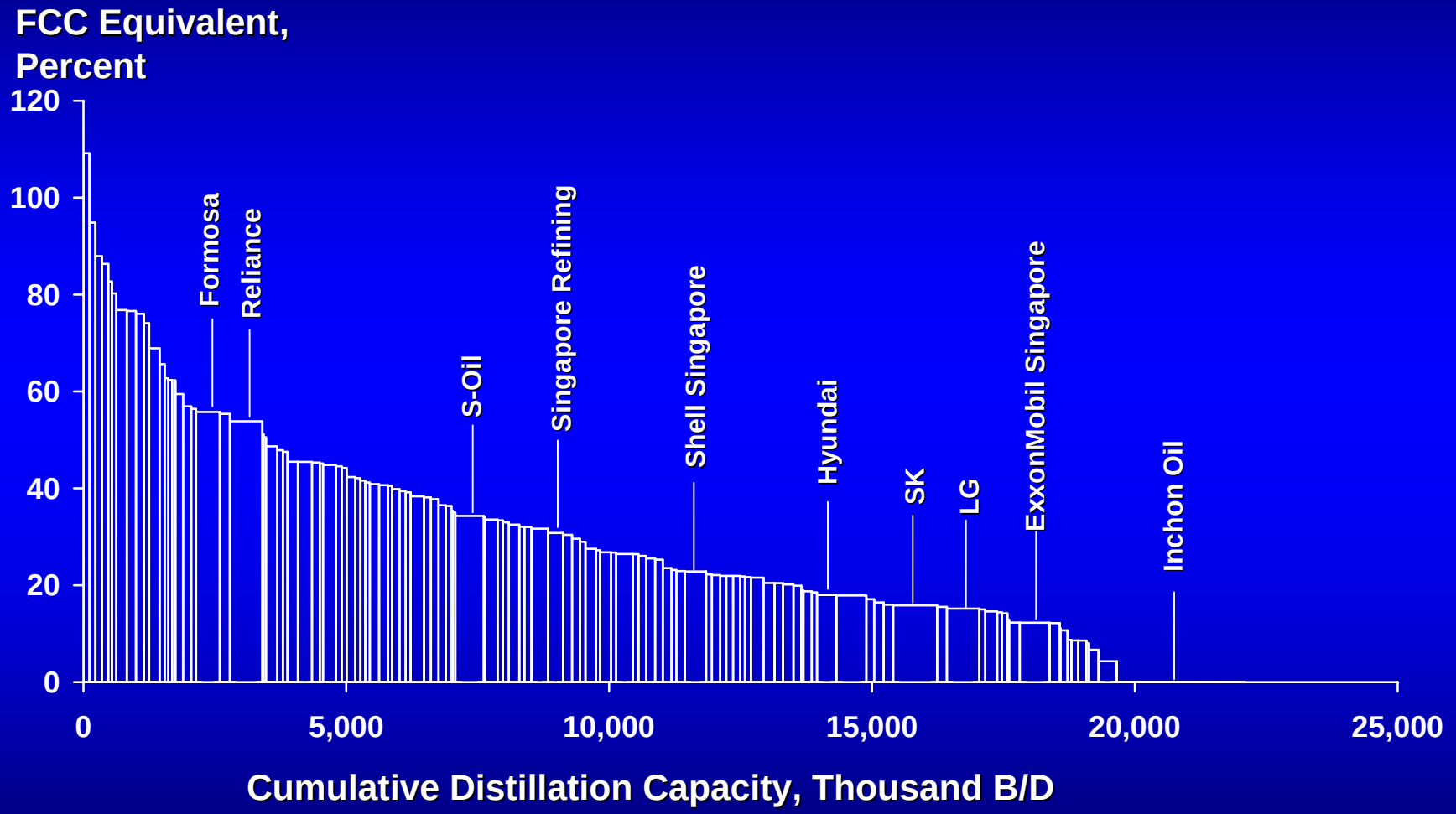
Expected World Refining Investments

World requirements through 2015,
% of 2003 Capacity



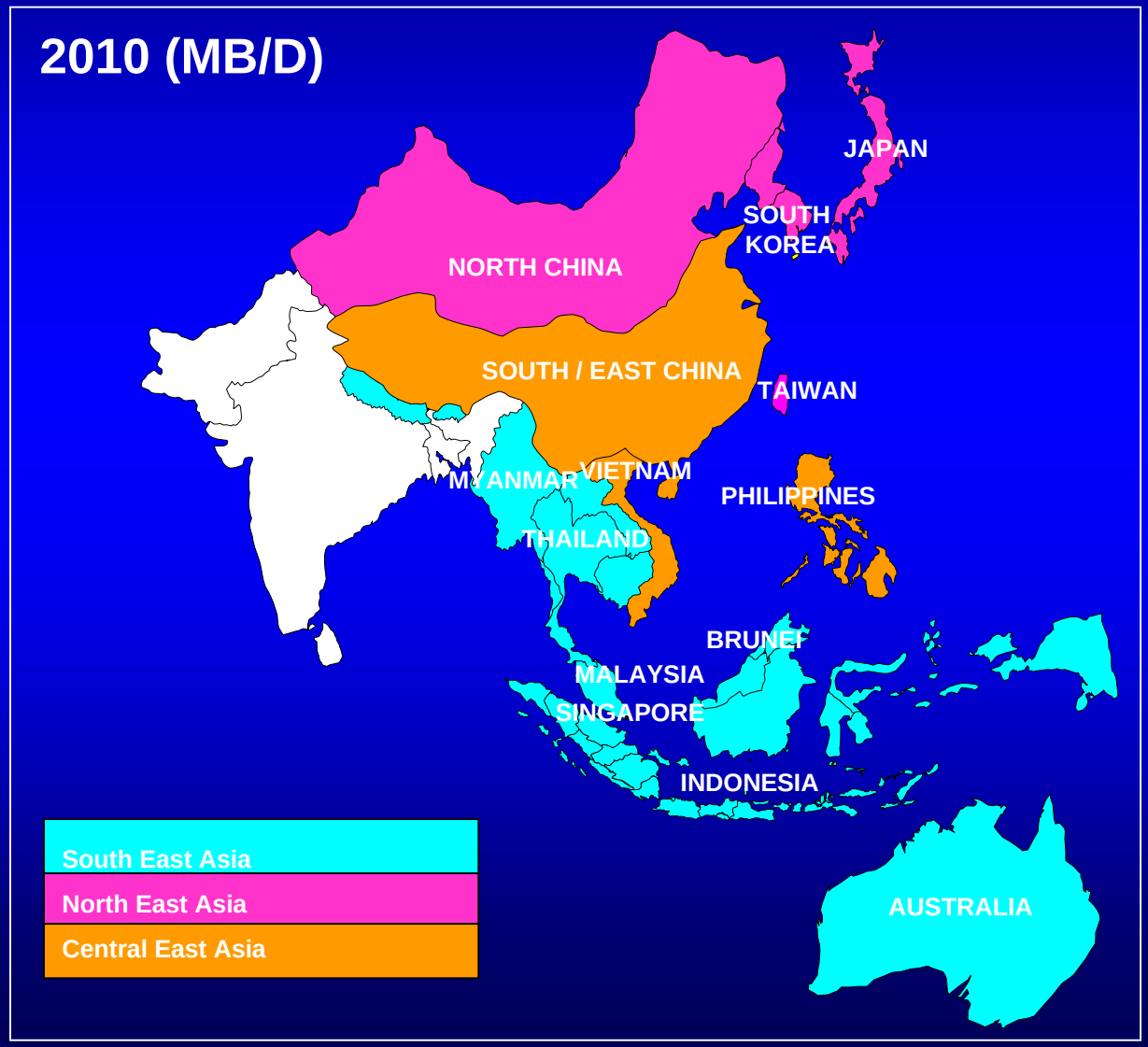
- Hydroprocessing and bottoms conversion to see the greatest capacity increases.

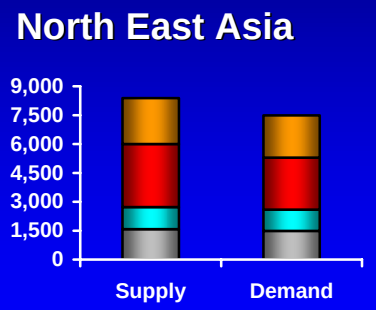
Asian Refinery Profile (Bottoms Upgrading Capability)

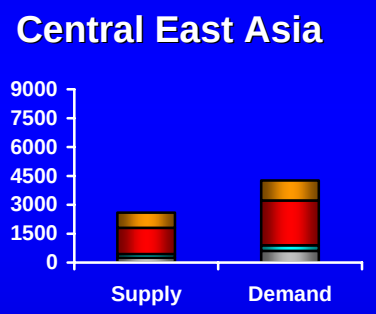


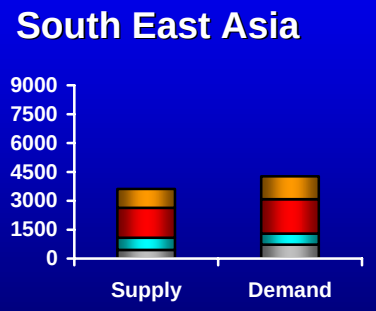
- Higher conversion refineries in Asia to profit more from widening light/heavy spread.

Central East Asia Key Regional Destination Market





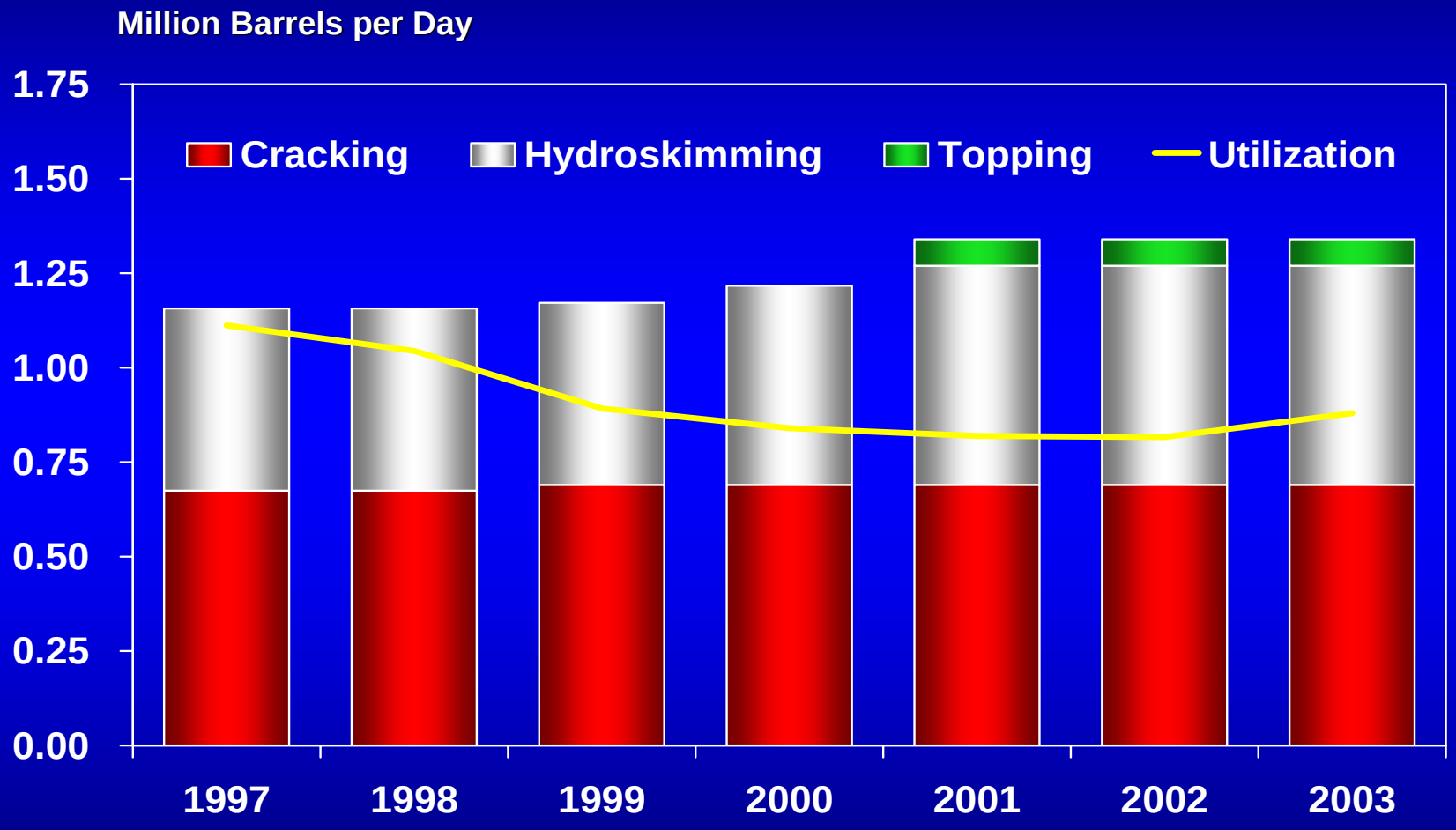




Gasoline
Diesel
Kero/Jet
Residual Fuel

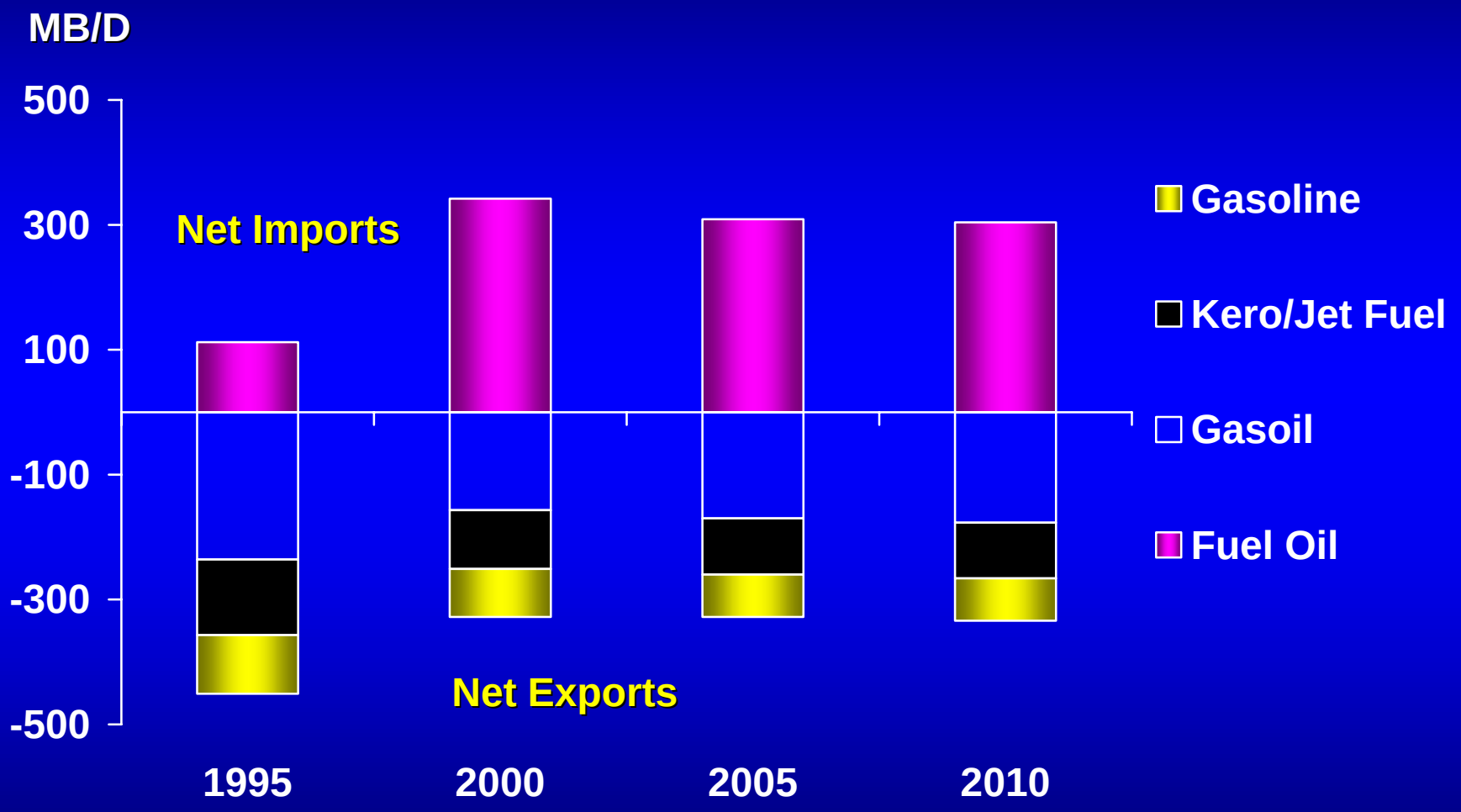
PURVIN & GERTZ INC.

Singapore Refining Capacity Versus Crude Runs



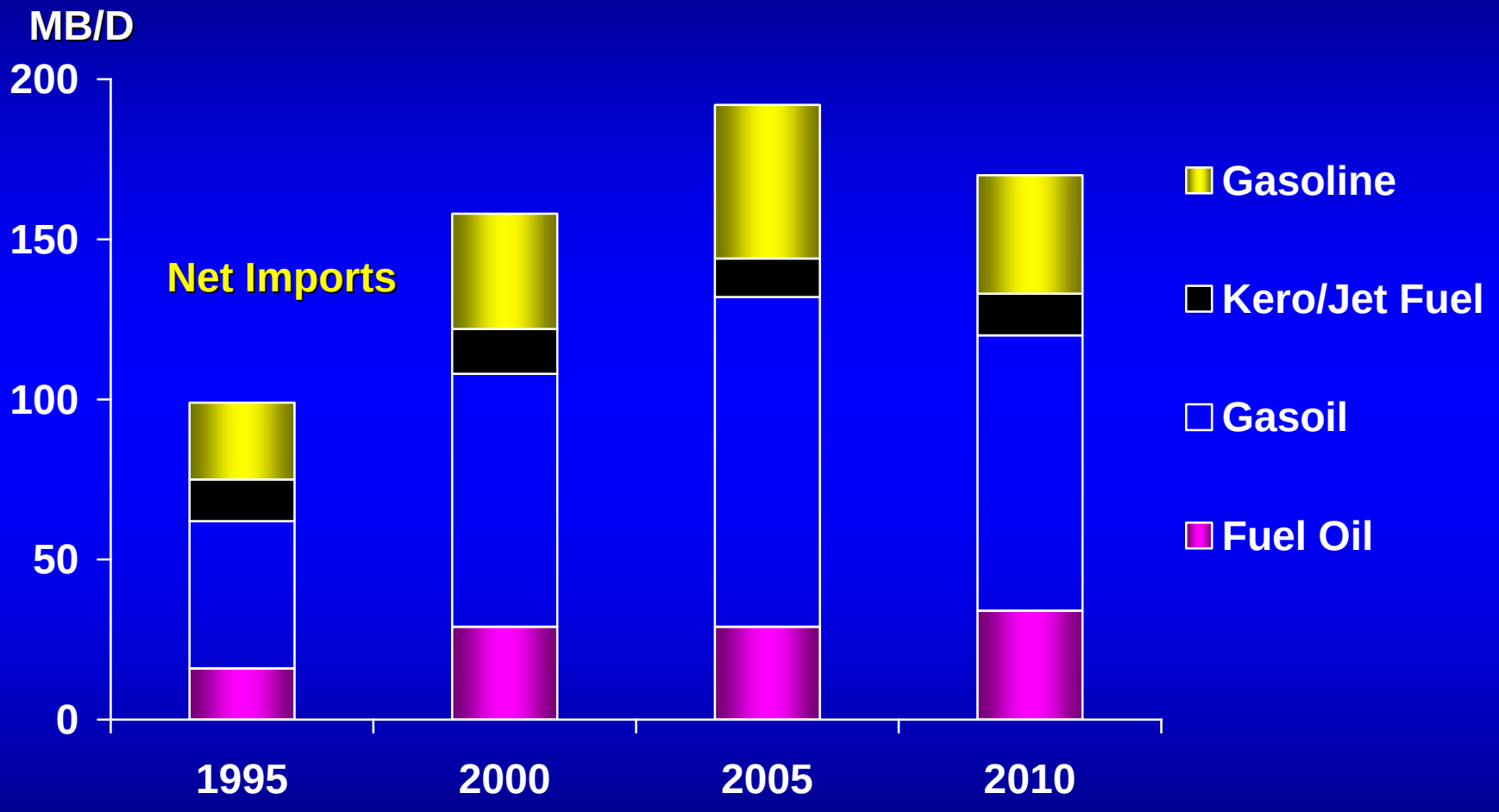
- Hydroskimming is the regional price-setting configuration.

Singapore Petroleum Products Supply and Demand



- Singapore's role as bunkering center to ensure continuing imports of residual fuel.

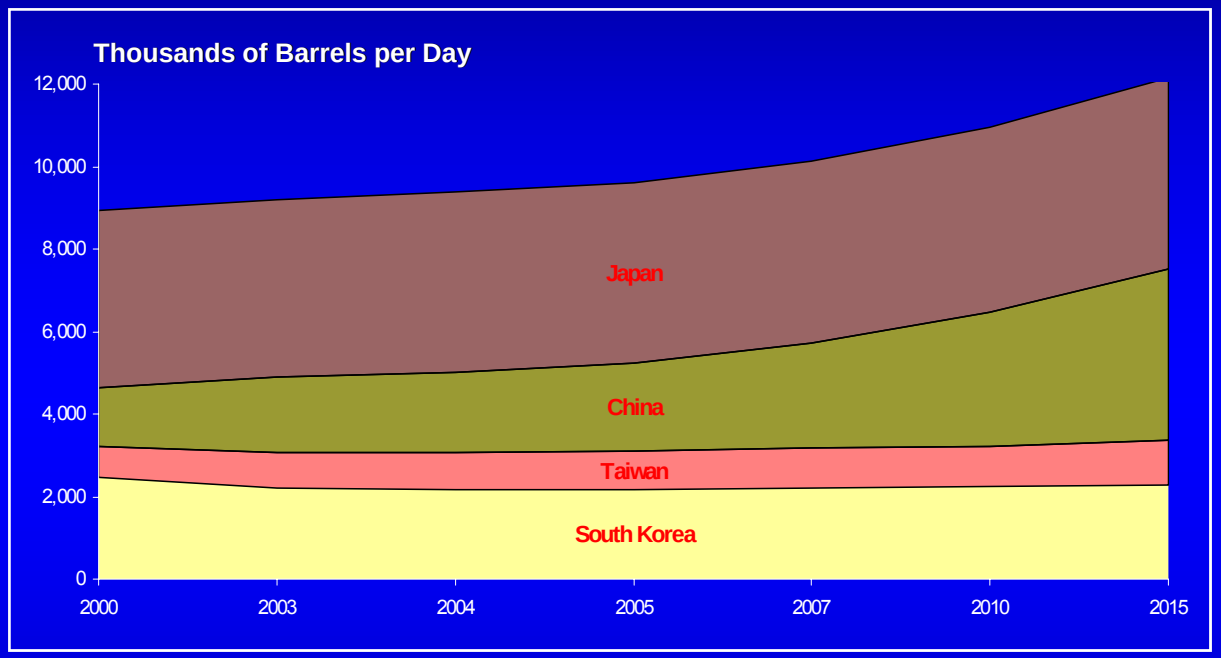
Vietnam Imports of Petroleum Products



- Vietnam to remain an importer even assuming one grassroots refinery later this decade.

Growth in Asian Markets for Crude Oil

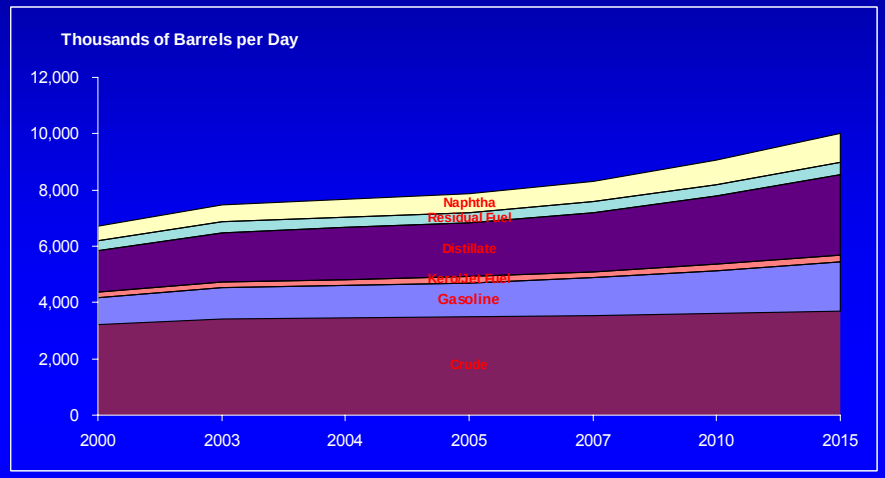
Crude Import Forecast for Japan, China, Taiwan & South Korea



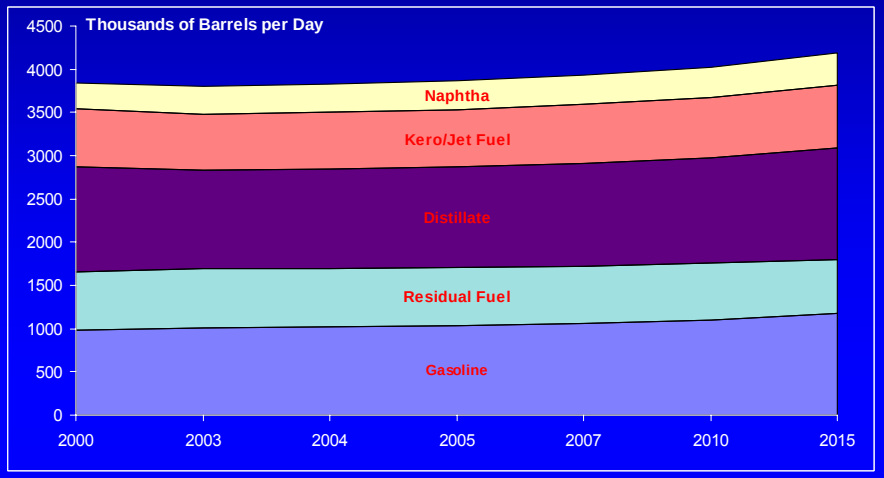
- China is the only country in the study to show significant crude oil demand increases of the four countries studied.
- Much of future Chinese demand for crude oil is expected to be supplied by light sour crude from the Middle East.

Petroleum Product Production Outlook - Japan, China, Taiwan & South Korea

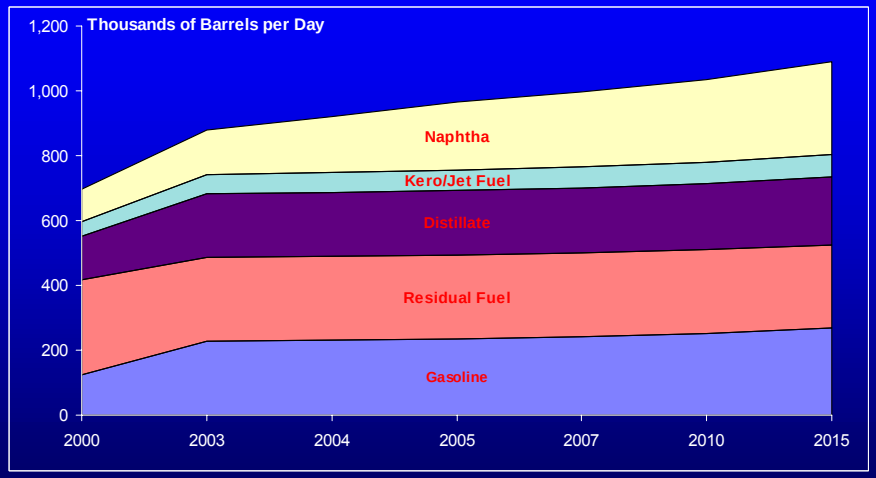
CHINA



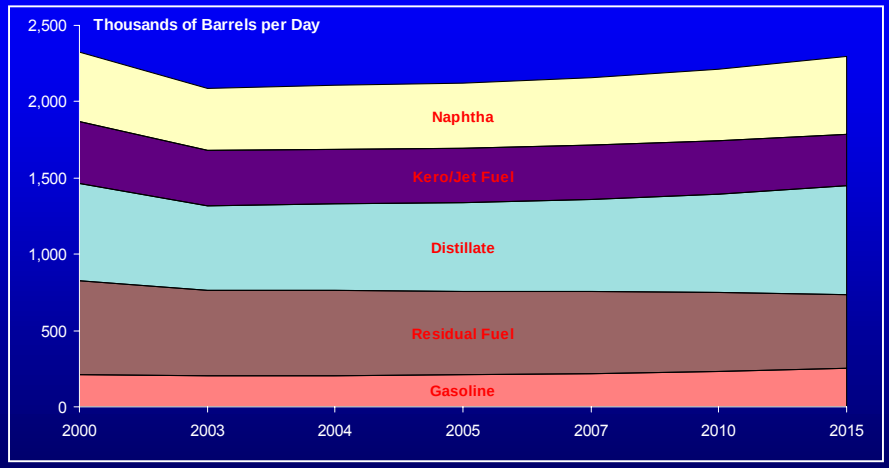
JAPAN



TAIWAN



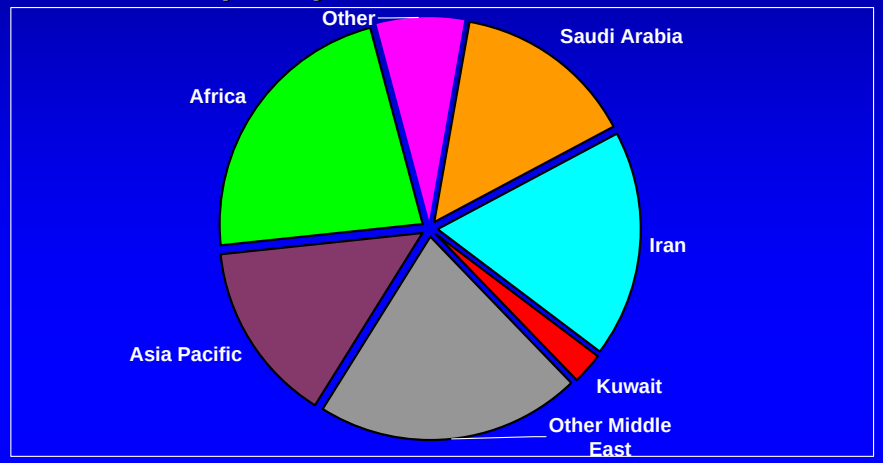
SOUTH KOREA



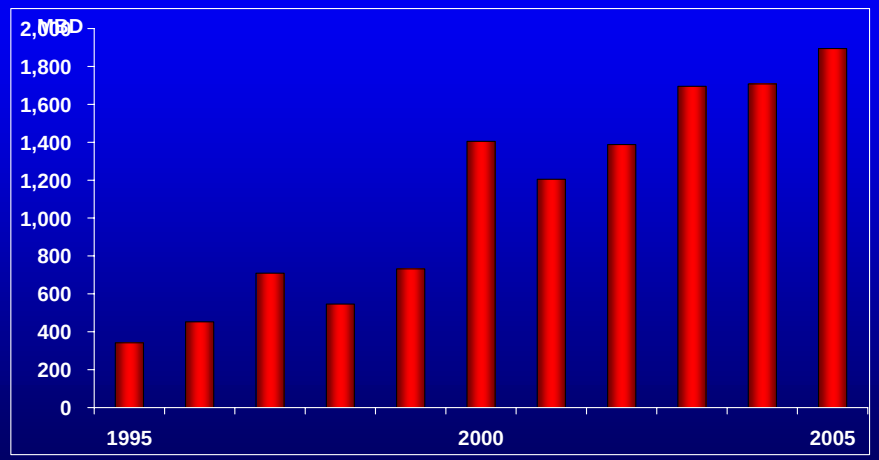
PURVIN & GERTZ INC.

China Crude Oil Imports Outlook

Crude Import by Source



Crude Imports



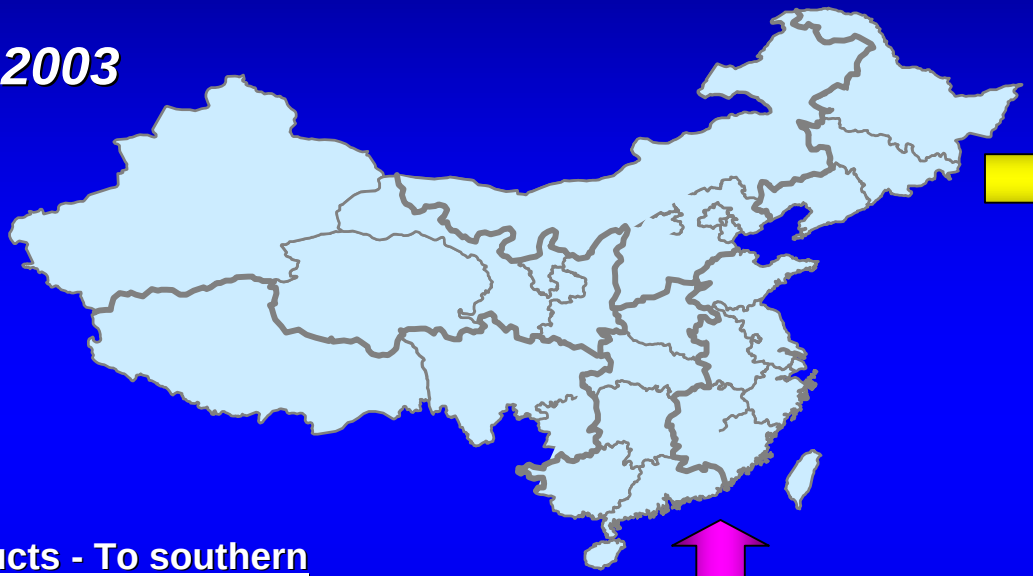
- China's crude imports are from a relatively diverse sources
- Historically, with no crude imports, refineries were configured for domestic crude
  - Generally, heavy, sweet with small naphtha yield
  - RFCC/coking configurations with small reforming and little HDS
- Most available import grades do not fit this configuration and investment is needed
  - Reforming for naphtha
  - HCU in lieu of FCC for distillate/gasoline ratio
  - HDS for sulfur removal
- Product qualities are relatively loose, but expected to tighten to Euro II soon in metro areas

China Crude Oil Imports Outlook (continued)

- China produced 3.4 million B/D of crude oil in 2003 and imported 1.8 million B/D. By 2015, domestic production is forecast to reach 3.7 million B/D, but imports are expected to reach 4.2 million B/D.
- Light sour crude from CIS expected to increase by over 300,000 B/D between 2004 and 2015.
- China also exports 200,000 B/D, mainly to Japan for direct burning.
- China is now a significant crude oil importer, and its dependence on the Middle east is expected to increase.
- Ensuring long-term oil supply security is of major concern to the Chinese government.
- The Chinese government plans to strengthen both domestic and international E&P activities.
- Joint ventures with non-OPEC producers likely to occur.

China's Integration with Global Oil Markets

2003



EXPORTS

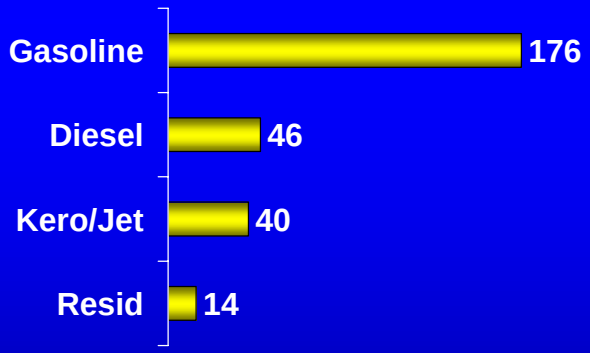
Crude

163 MB/D

- Mostly to Japan

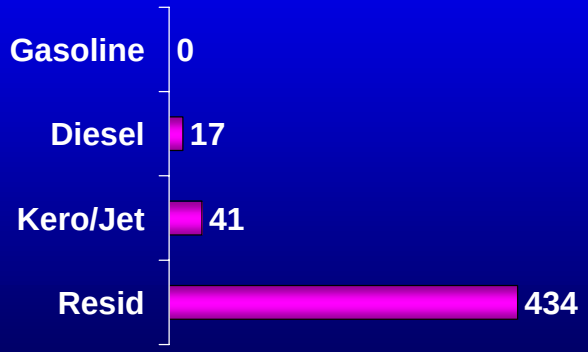
Products - To Southeast Asia

MB/D



Products - To southern and eastern provinces

MB/D



IMPORTS

Crude

1,823 MB/D

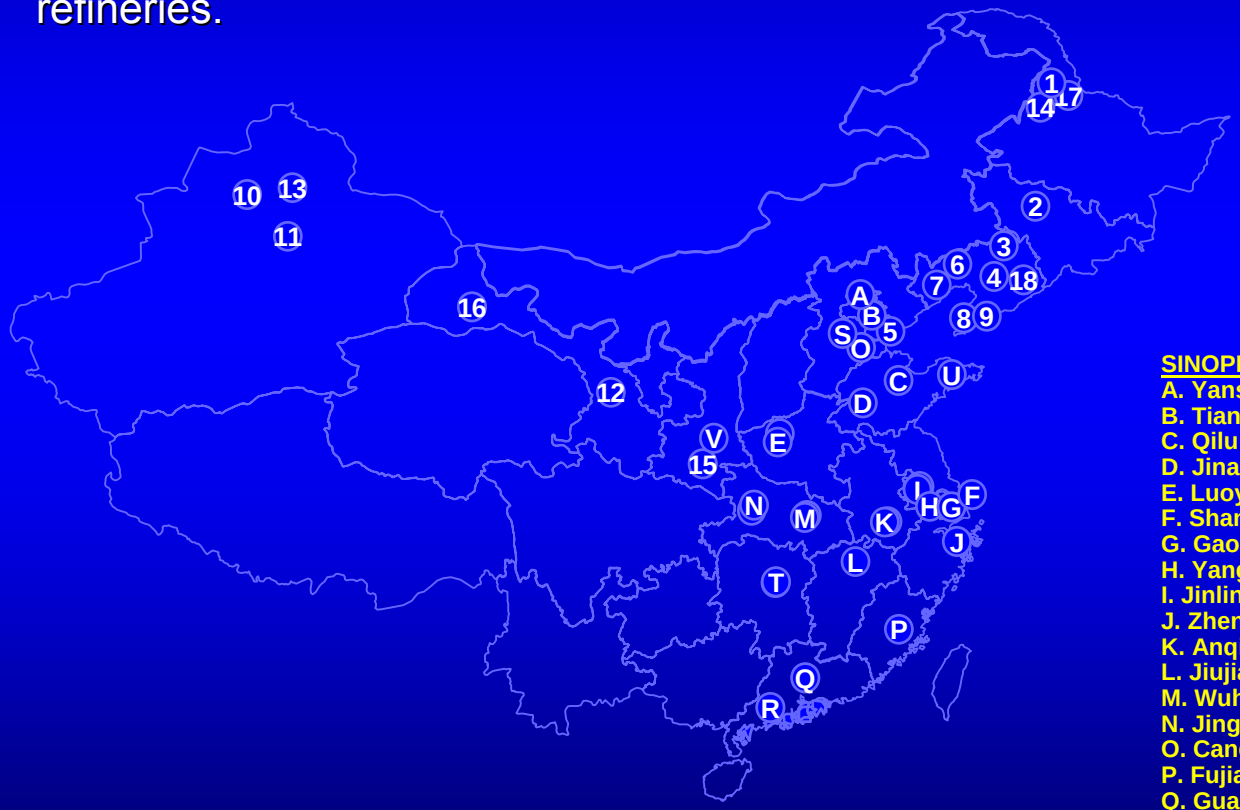
- Mostly from Africa and Middle East

- Increasing rapidly

- Primarily to large coastal refineries

Chinese Refinery Locations

- A majority of China's refineries are at inland locations where domestic production is used.
- Efficient access to waterborne crudes is mostly limited to coastal refineries.



Note: Only refineries with capacities greater than 50 MB/D are shown

CNPC GROUP
1. Daqing Petrochemical
2. Jilin Chemical
3. Fushun Petrochemical
4. Liaoyang Chemical Fiber
5. Dagang Petrochemical
6. Jinzhou Petrochemical
7. Jinxi Petrochemical
8. Dalian Petrochemical
9. WEPEC
10. Dushanzi Refinery
11. Urumqi Petrochemical
12. Lanzhou Refinery
13. Kalamayi Petrolchemical
14. Harbin Petrolchemical
15. Yanchang Oil Industry Group
16. Yumen Refinery
17. Daqing Oilfield Accessory
18. Liaohe Oilfield Asphalt

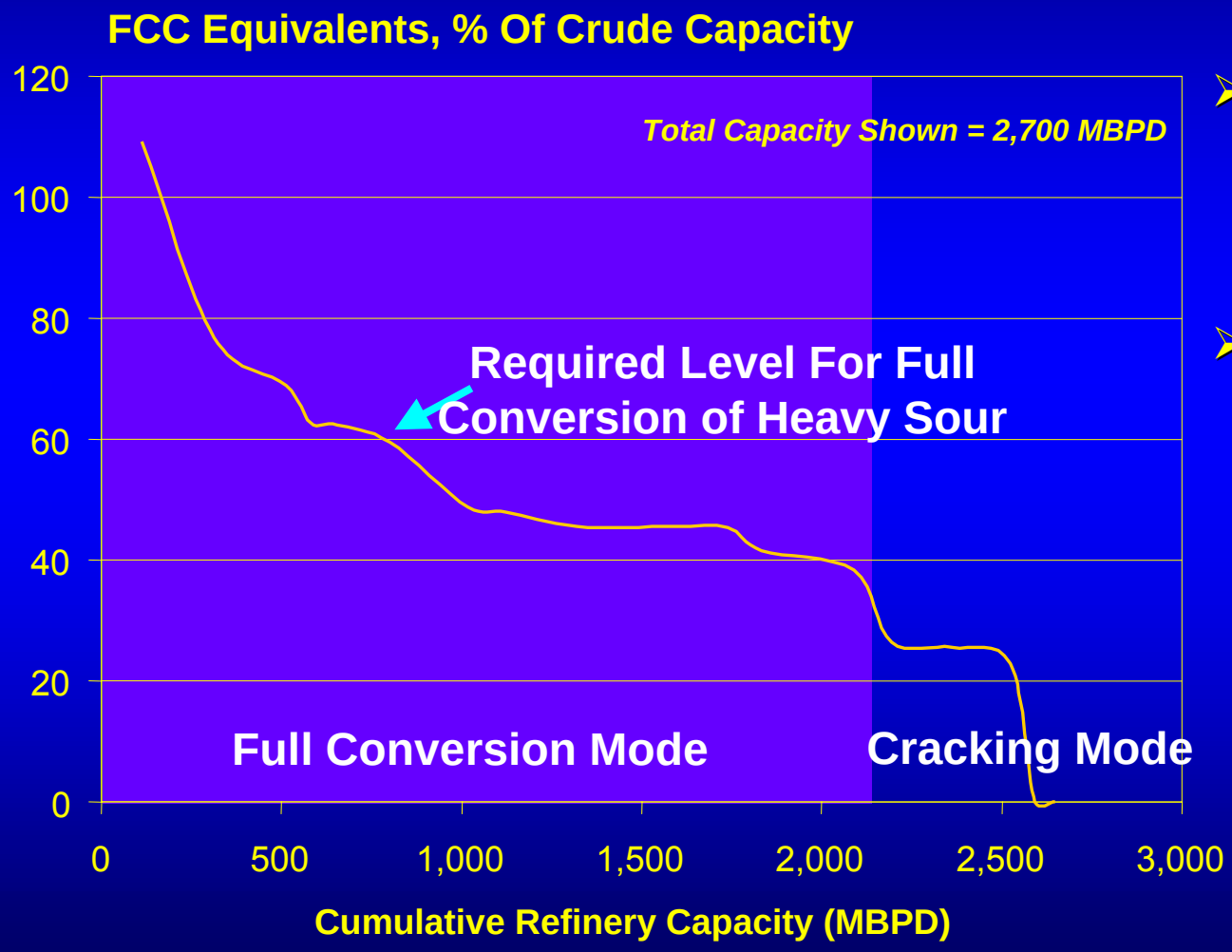
SINOPEC GROUP
A. Yansan Petrochemical
B. Tianjin Petrochemical
C. Qilu Petrochemical
D. Jinan Refinery
E. Luoyang Petrochemical
F. Shanghai Petrochemical
G. Gaoqiao Petrochemical
H. Yangzi Petrochemical
I. Jinling Petrochemical
J. Zhenhai Refinery
K. Anqing Petrochemical
L. Jiujiang Refinery
M. Wuhan Petrochemical
N. Jingmen Petrochemical
O. Cangzhou Refinery
P. Fujian Petrochemical
Q. Guangzhou Petrochemical
R. Maoming Petrochemical
S. Shijiazhuang Refinery
T. Changling Refinery
U. Qingdao Petrochemical
V. Xinxing Petroleum Corp.

Coastal Chinese Refineries

Crude Slate Type	Refinery Type	Company	Location	Agency	Crude Capacity (MB/D)	Avg. Nelson Complexity (Comp/Bbl)	FCC Equivalents (MB/D)	FCC Equivalents (% Crude)
SWT	TOP	Qingdao Petrochemical Plant	Qingdao	Sinopec	57	1.00	0	0.0
SWT	TOP	Dagang Refinery	Dagang	Sinopec	67	1.00	0	0.0
SWT	CRK	Tianjin Petrochemical	Tianjin	Sinopec	95	5.44	40	41.6
SWT	CRK	Jinxi Chemical	Jinxi	CNPC	105	4.70	28	26.4
SWT	CRK	Yangzi Petrochemical	Yangzi	Sinopec	162	4.91	37	22.9
SWT	CRK	Dalian Petrochemical	Dalian	CNPC	200	7.57	153	76.8
LSR	COK	Cangzhou Oil Refining	Cangzhou	Sinopec	67	6.03	42	62.7
LSR	COK	Fujian Oil Refining	Fujian	Sinopec	76	4.88	47	62.4
LSR	COK	Jinzhou Petrochemical	Jinzhou	CNPC	105	4.08	50	47.8
LSR	COK	Daqing Petrochemical	Daqing	CNPC	114	14.88	124	109.2
LSR	COK	Guangzhou Petrochemical	Guangzhou	Sinopec	146	5.85	87	59.5
LSR	CRK	West Pacific Petrochemical	Dalian	CNPC	152	7.62	69	45.3
LSR	COK	Shanghai Petrochemical	Jinshan	Sinopec	167	2.72	43	25.5
LSR	COK	Jinling Petrochemical	Jinling	Sinopec	200	4.30	91	45.5
LSR	COK	Qilu Petrochemical	Qilu	Sinopec	200	7.61	137	68.9
LSR	COK	Shanghai Gaoqiao Petrochem	Shanghai Gaoqiao	Sinopec	215	4.94	104	48.7
LSR	COK	Maoming Petrochemical	Maoming	Sinopec	257	5.41	98	38.4
LSR	COK	Zhenhai Petrochemical	Zhenhai	Sinopec	266	4.98	121	45.5

- While significant upgrading exists, sour crude infrastructure is limited.
- Largest refineries along coast are being upgraded/expanded for light sour crudes.
- Inland refineries are less complex and rely on domestic sweet crude.

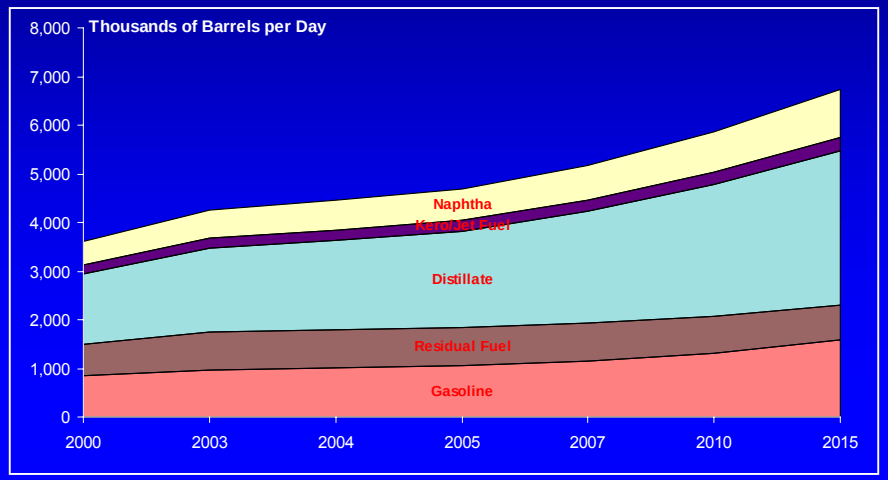
Coastal Chinese Refinery Capacity (Illustrative Purposes Only)



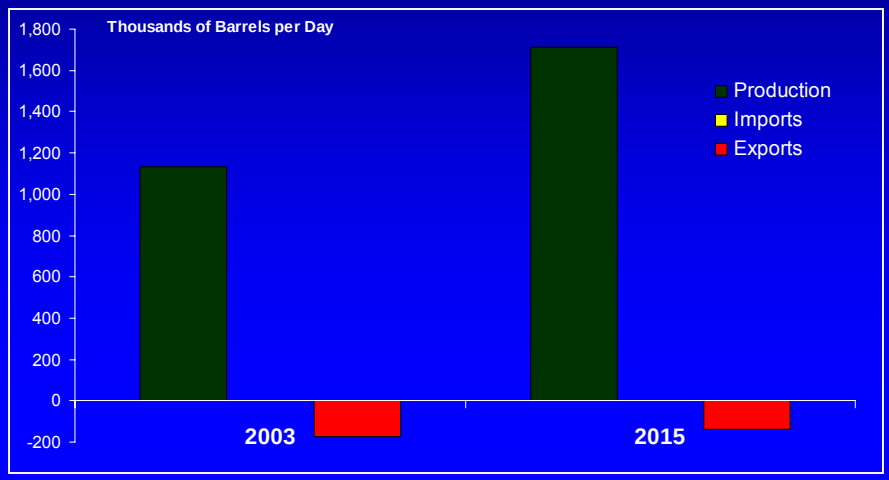
- Crude runs consist of 50% light sweet and 50% light sour crude.
- Roughly 28% of the existing refinery capacity has sufficient upgrading to fully convert a heavy sour crude.

China Product Demand - Gasoline

Forecasted Net Demand All Products



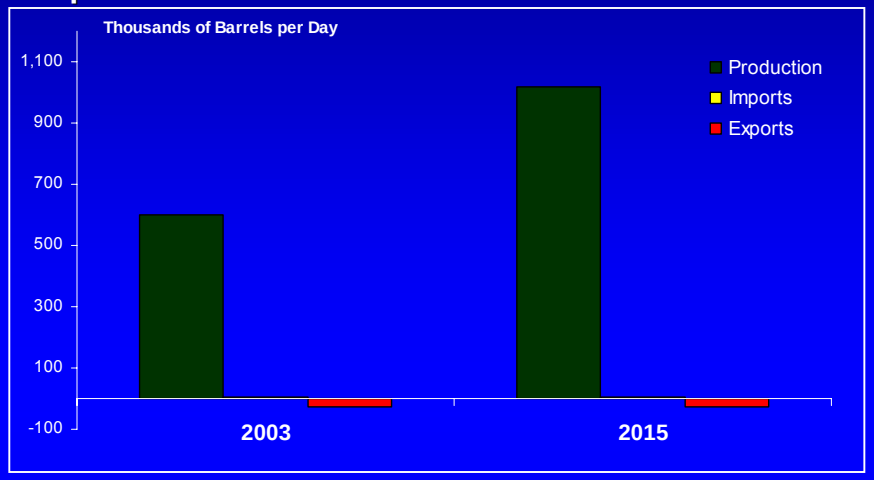
Gasoline



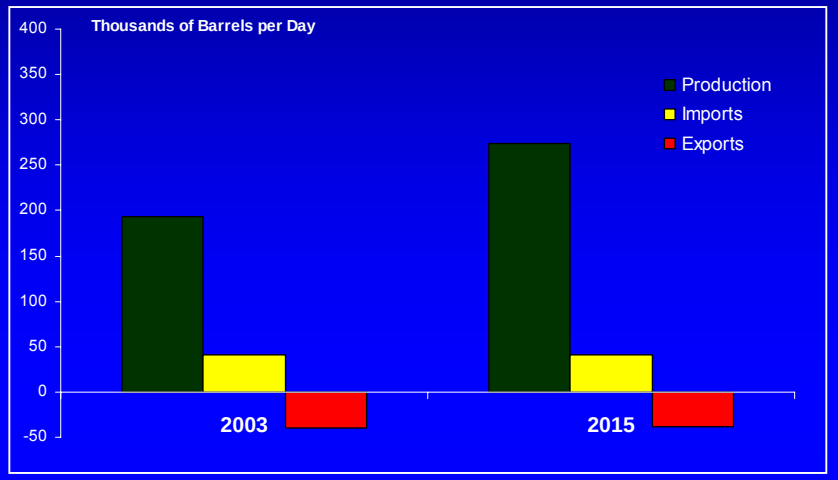
- **China currently exports surplus gasoline. Future demand is expected to be satisfied through domestic production with small volumes of exports continuing.**
  - Gasoline is the primary transportation fuel used both in trucks and automobiles.
  - The private automobile market has expanded rapidly with sales rising 75% in 2003 alone. This is expected to continue to support gasoline demand growth as the economic forecast remains positive.
  - A government ban on importing gasoline and distillate imposed in late 1998 was lifted when China entered the WTO in late 2000.
- **The Chinese government in the past has been reluctant to allow imports of petroleum products. With entry into the WTO however, import bans were dropped. Import tariffs on petroleum products encourages production from domestic refineries.**

China Products – Naphtha, Kero/Jet Fuel

Naphtha



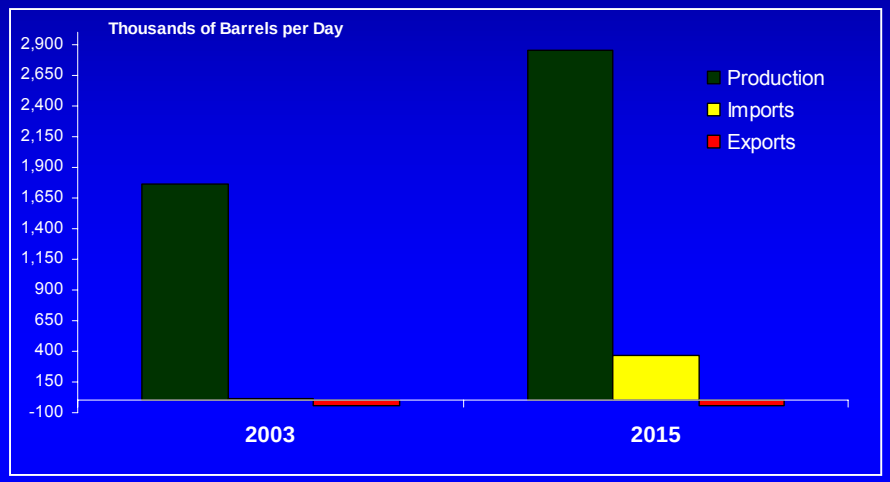
Kero/Jet Fuel



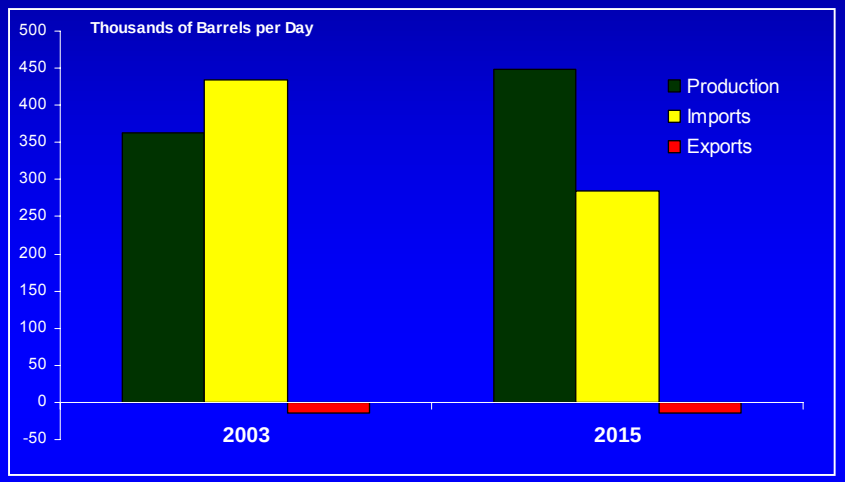
- **China currently exports very small volumes of naphtha. Future demand for naphtha is expected to increase because of growth in the petrochemicals industry.**
  - Although not an importer of naphtha, China is a net importer of end products as it is unable to meet demand through domestic petrochemical manufacturing.
  - Demand growth for naphtha is supported by government and foreign investment into the petrochemical sector. Chinese government policy does not encourage large volumes of naphtha imports, therefore requirements will be met by local refineries running more crude.
- **Jet fuel demand is growing as Chinese policy encourages tourism.**

China Products – Distillate, Residual Fuel

Distillate



Residual Fuel



- **Distillate demand is expected to increase significantly driven by growth in transportation services.**
  - Currently a large percentage of trucks are gasoline-powered. This is changing as more diesel-powered trucks are going on road.
- **Current demand for residual fuel oil is satisfied by significant volumes of imports.**
  - Chinese refineries has reduced fuel oil production through increased fuel oil conversion investment over the last 20 years. Fuel oil yield is now at 7.5% of crude run and could trend lower.

China Potential Interest in Oil Sands

- **China's Coastal refineries have around 2.65 million B/D of capacity.**
- **Around 560,000 B/D of capacity is sweet cracking.**
  - Good candidates to use SCO, potential 100,000 - 150,000 B/D.
  - SCO could help meet cold flow properties that are limited using domestic crude.
- **Close to 2 million B/D of capacity are light sour coking refineries with FCC capacity.**
  - Coking capacities are small compared to crude rates, so some SCO could also be used in these refineries.
  - Should have potential to process some SynBit or SynSynbit blends.
  - The amount of bitumen blends that likely can be run dependent on the ability to handle high sulfur residue and blend it off after the coking units are filled.
  - Hydrogen treating capabilities are limited.
- **China will need to add around 1.2 million B/D of new refinery capacity over the next 10 years. Such capacity is expected to be oriented towards heavy, sour crude.**
  - Could provide substantial outlets for bitumen blends.
  - Will likely include substantial hydrotreating.

China Refining Industry Analysis

WTO Member

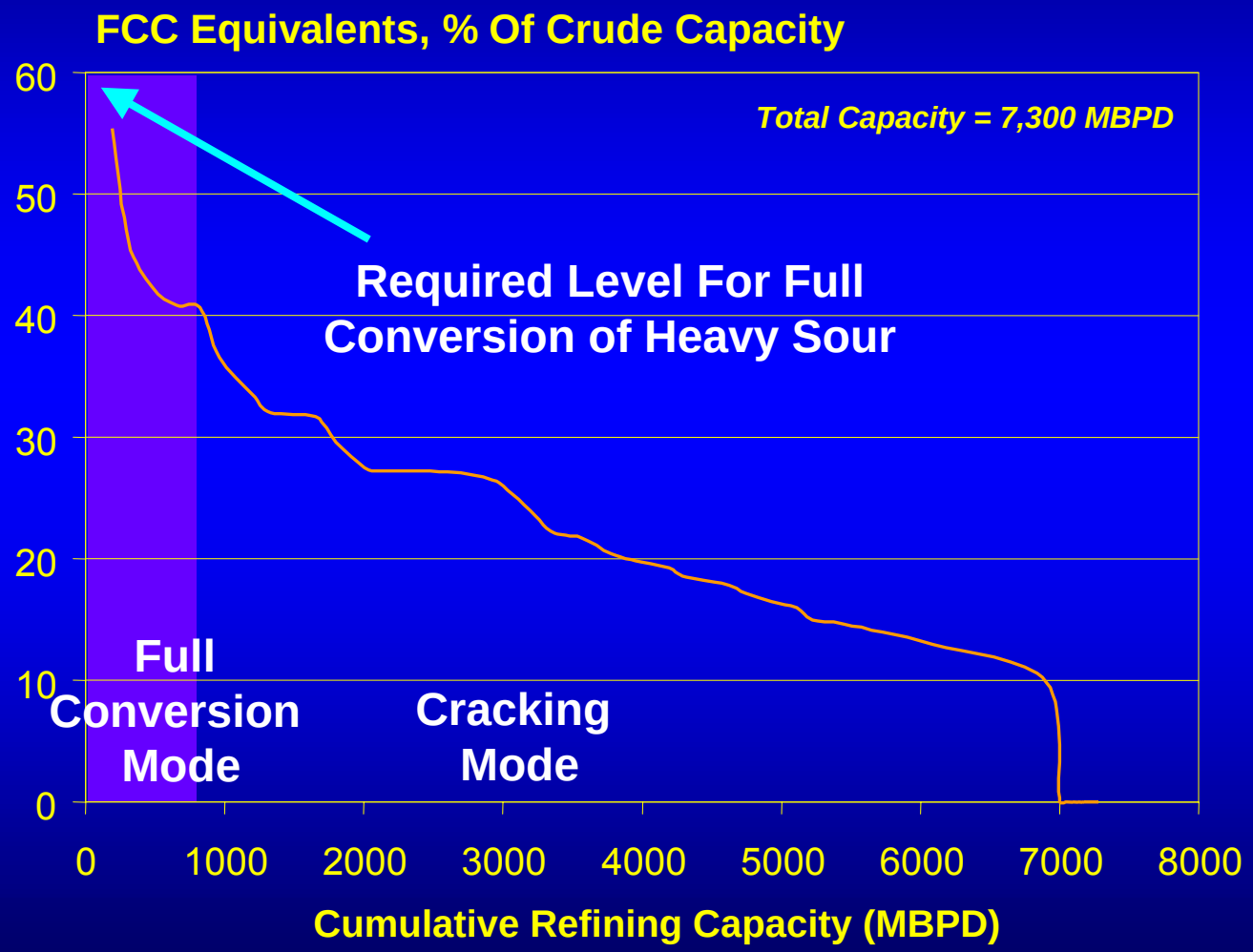
Growing demand for petroleum products

Significant reliance on Middle East crudes

- **The Chinese government currently imposes high tariffs on energy imports.**
- **China's entry into the WTO in 2001 committed them to trade and investment liberalization which if fully implemented will open the economy to foreign firms.**
- **Refinery utilization was 94% in 2003 and is expected to hit full utilization in the period between 2007 and 2010.**
- **The demand increase by 2015 is equivalent to six new 200,000 B/D refineries.**
- **Middle East Crude supplies account for 51% of all crude imports and is expected to increase to 68% by 2015.**
- **Lack of adequate refining capacity suitable for heavier crudes is forcing China to rely more on Middle East light sour crudes.**

- China is entering a growth phase that will likely see increased imports of petroleum products.

Japan/Korea Refinery Capacity (Illustrative Purposes Only)



- Many Japanese refineries have resid desulphurization.
- Utilization of many Korean refineries is low.
- Overall crude slate includes
  - 10% Light Sweet
  - 83% Light Sour
  - 7% Heavy Sour

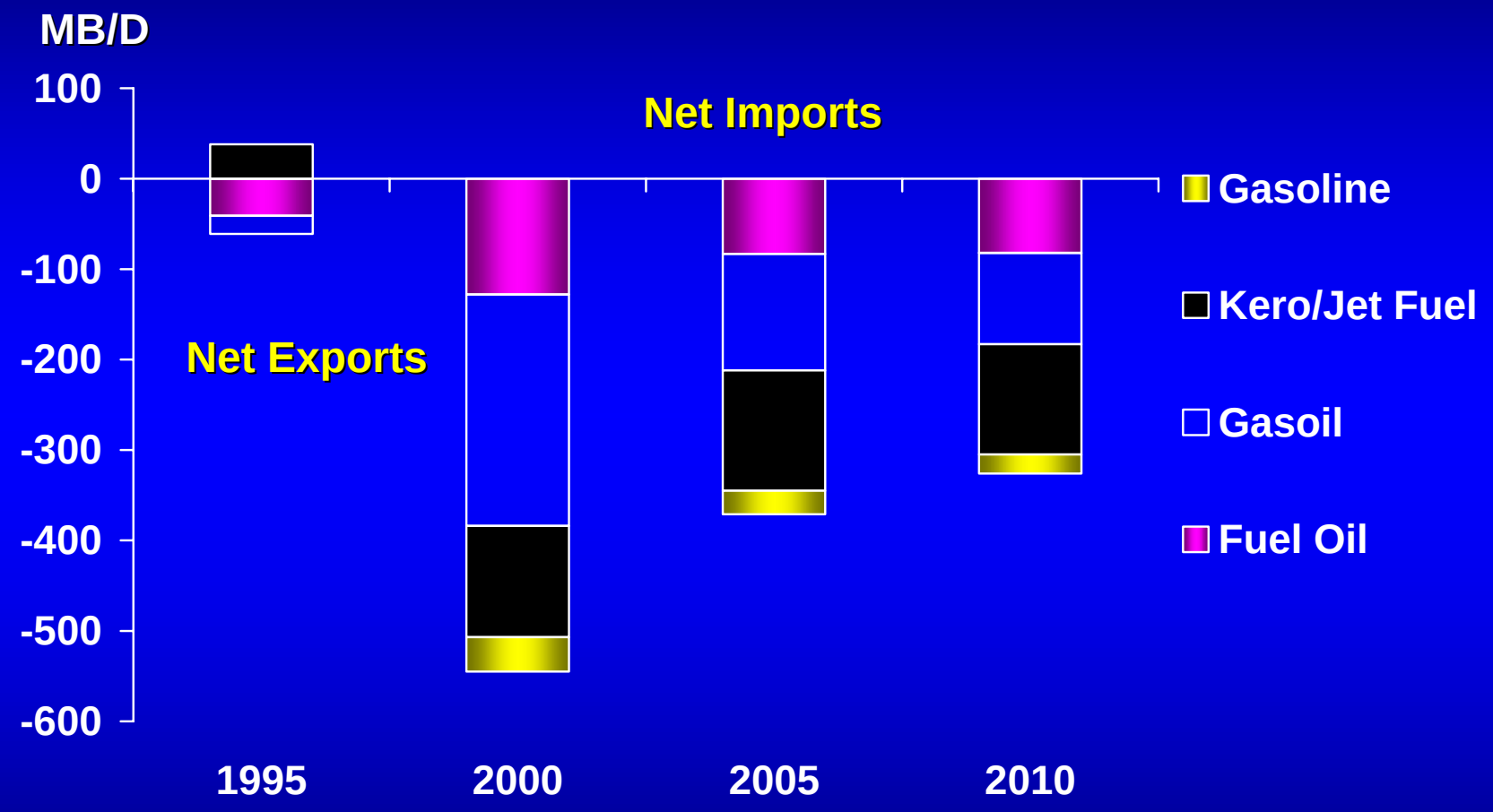
South Korea Refining Capacity

South Korea Refining Capacity[(1)]
(Barrels per Day)

Refinery	Location	Crude	Vacuum Distillation	Coking	Catalytic Cracking	Reforming	Hydro-cracking	Distillate Hydro-treating	Resid Hydro-treating	Cat Feed Hydro-treating
Hyundai Oil Refinery Co	Daesan	310,000	41,000	19,000		20,000	22,000	12,000		
Hyundai Oil Refinery Co	Inchon	270,000	18,000			27,900		86,850		
LG-Caltex	Yoso	650,000	11,000		82,000	75,400		36,000	180,000	
S-Oil Corp	Onsan	520,000	160,000		60,000	43,000	71,000	85,000	50,000	40,000
SK Corp	Ulsan	817,000	78,850		94,500	20,070	27,000	213,300	27,000	
Total		2,567,000	308,850	19,000	236,500	186,370	120,000	433,150	257,000	40,000

Note :1) Oil & Gas Journal, Dec 20, 2004; 2004 Worldwide Refining Survey

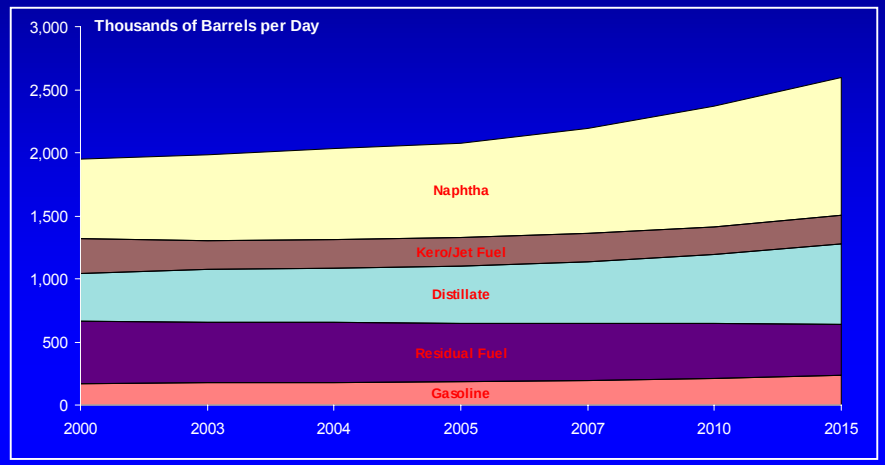
South Korea Petroleum Product Supply and Demand



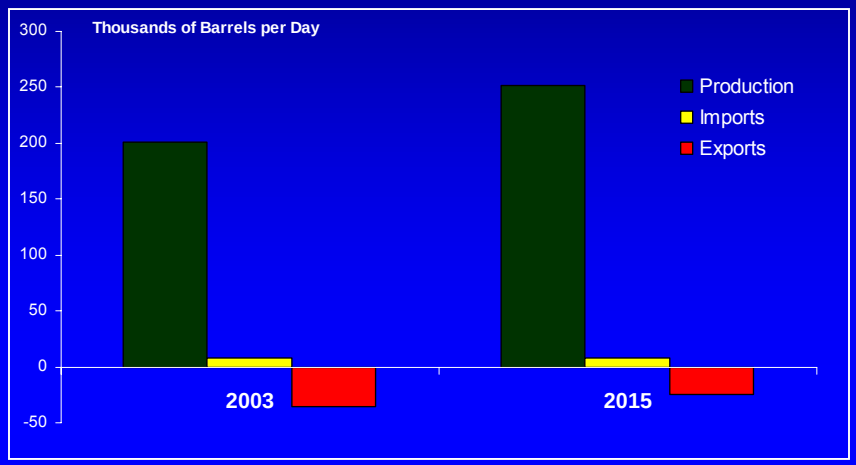
- South Korea is a major exporter of petroleum products.
- Korean product surplus to decline as domestic market grows.

South Korea Product Demand - Gasoline

Forecasted Net Demand All Products



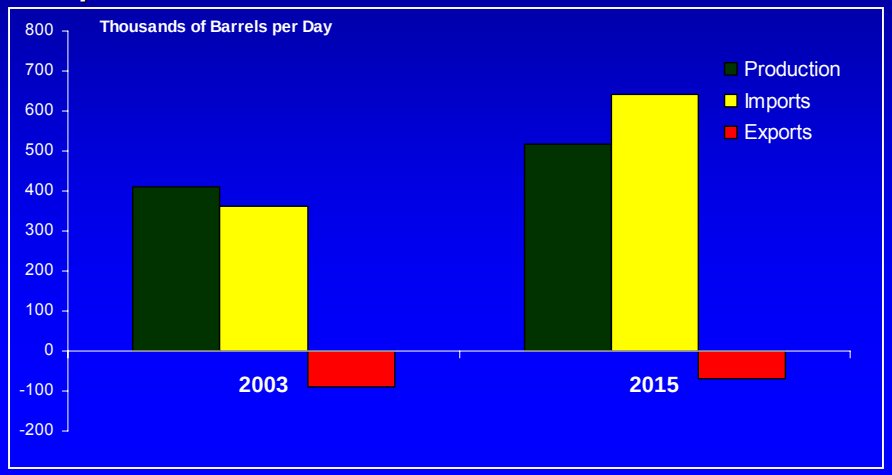
Gasoline



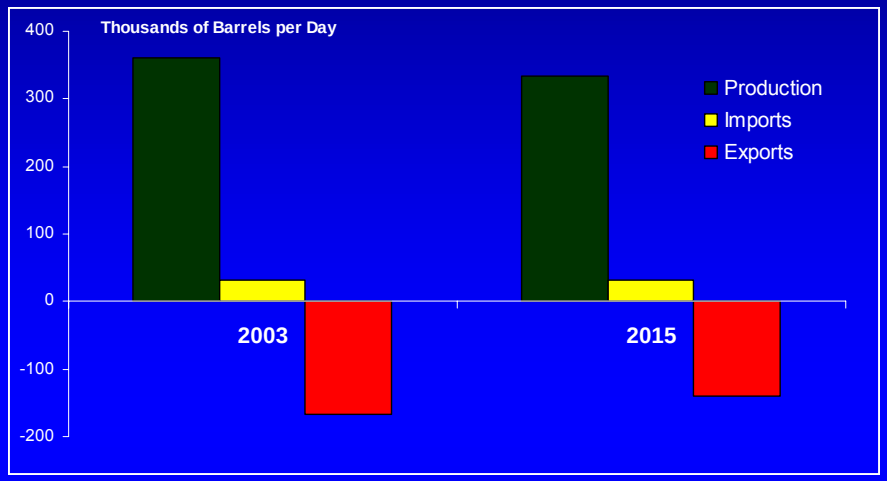
- **South Korea has experienced strong economic growth since the late 1990s.**
  - Future growth may be tempered by fundamental domestic financial issues. Some reforms have been implemented, however more are expected.
- **Gasoline consumption is anticipated to grow with rising national income and increased vehicle ownership.**
  - Korea produces all of its domestic requirements for gasoline, rather than relying on imports. It is likely to continue to be a net exporter, with most of its exports destined to local Asian markets.

South Korea Products – Naphtha, Kero/Jet Fuel

Naphtha



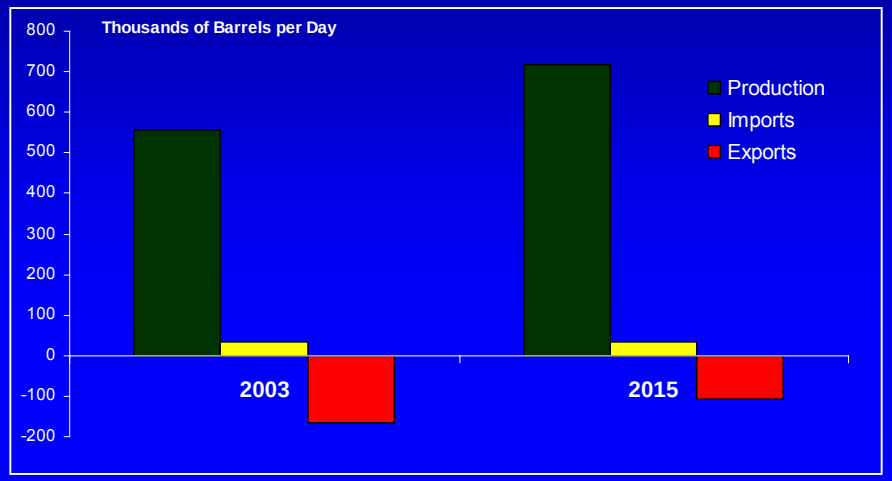
Kero/Jet Fuel



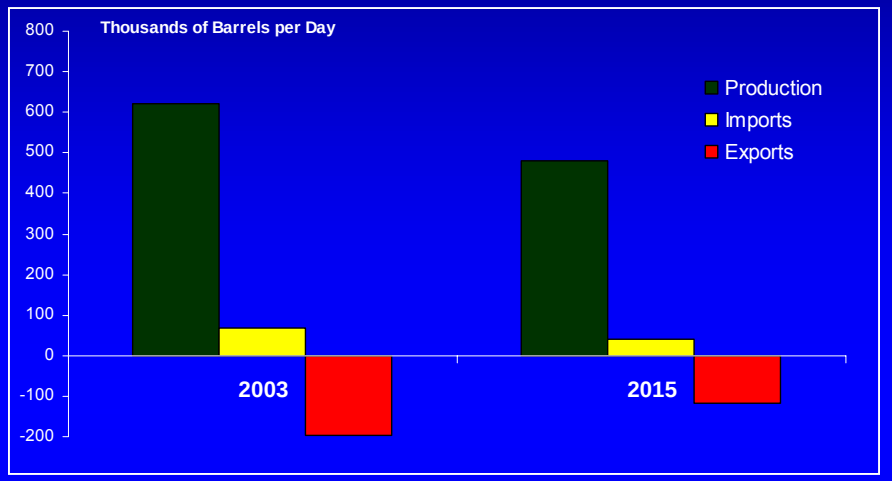
- **South Korea currently imports comparable volumes of naphtha to what it produces domestically. Future demand is forecast to grow significantly with increased reliance on imports.**
  - Ethylene facilities are supplied by both light naphtha from local refineries as well as imports from the Middle East and other sources.
- **Kerosene utilization for lighting and cooking far exceeds the use of jet fuel in Korea. The market for kerosene is expected to soften as consumers begin switching to natural gas for heating due to a government mandate.**
  - Exports are expected to decrease with increasing domestic consumption.
  - LNG imports are forecast to increase, providing natural gas for domestic growth.

South Korea Products – Distillate, Residual Fuel

Distillate



Residual Fuel



- **Demand for distillate product is expected to grow. Domestic production is expected to meet future requirements.**
  - 70% of all gasoil/diesel is consumed in the transportation sector with demand expected to grow.
  - New refinery capacity has created a sizeable surplus for export to other Asian countries, but exports should decline as demand grows.
- **Fuel oil demand has dropped significantly as LNG and imported bituminous coal have become the fuels of choice for power generation.**

South Korea Crude Oil Demand

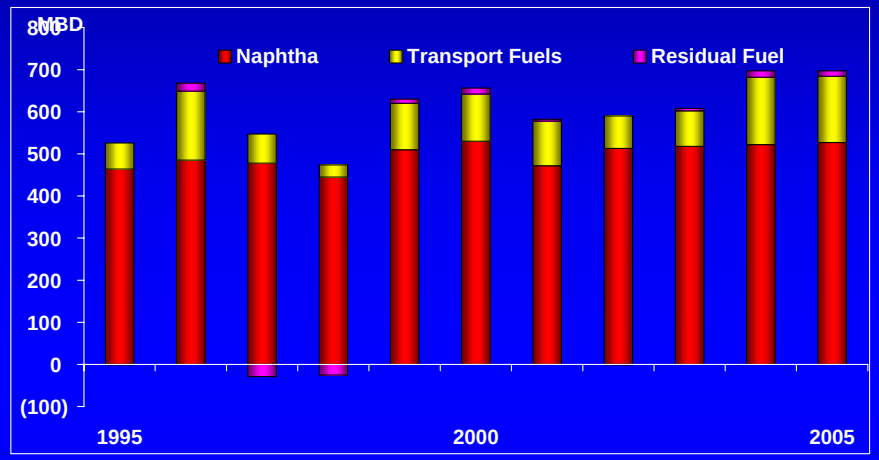
- **South Korea has no crude oil production.**
- **Korea imports crudes from a variety of sources.**
  - 5% of demand is met by African crudes.
  - 15% is Asia/Pacific sweet crudes.
  - 5% of the crude originates in Latin America.
  - Saudi Arabia accounts for about 40% of crude imports.
- **Crude oil runs are currently around 2.2 million B/D.**

South Korea Potential Interest in Oil Sands

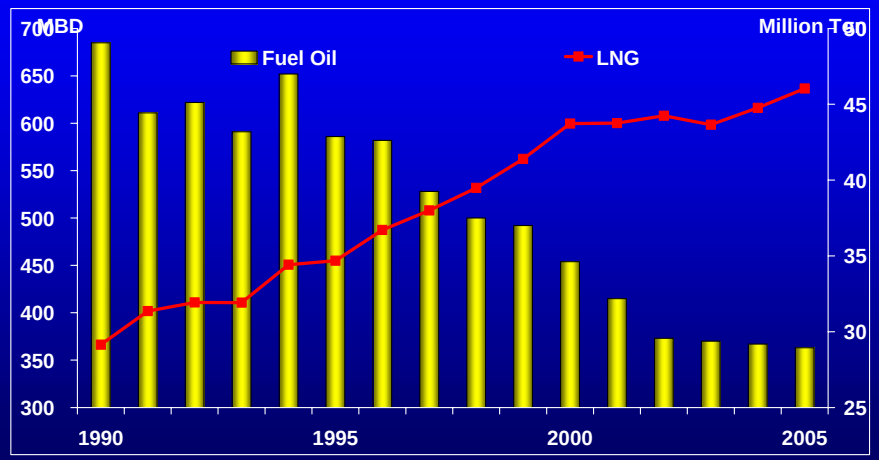
- **South Korean refineries have around 2.6 million B/D capacity in five large scale refining complexes.**
- **These refineries process primarily sour Middle East crudes. Around 20% is light sweet crude.**
- **South Korea should be able to process around 100,000 to 180,000 B/D of SCO, based mainly on replacing other sweet crude supplies.**
- **South Korea's refineries should be able to process some bitumen blends, but if they can handle the high sulfur bottoms is the main issue.**
  - Resid hydrotreating capabilities are likely limited to lower sulfur stocks.
  - Very little coking capability available to eliminate residual.
  - Already export high sulfur residual fuel oil.

Japan Petroleum Products Supply and Demand

Product Balance



Power and Industrial Demand

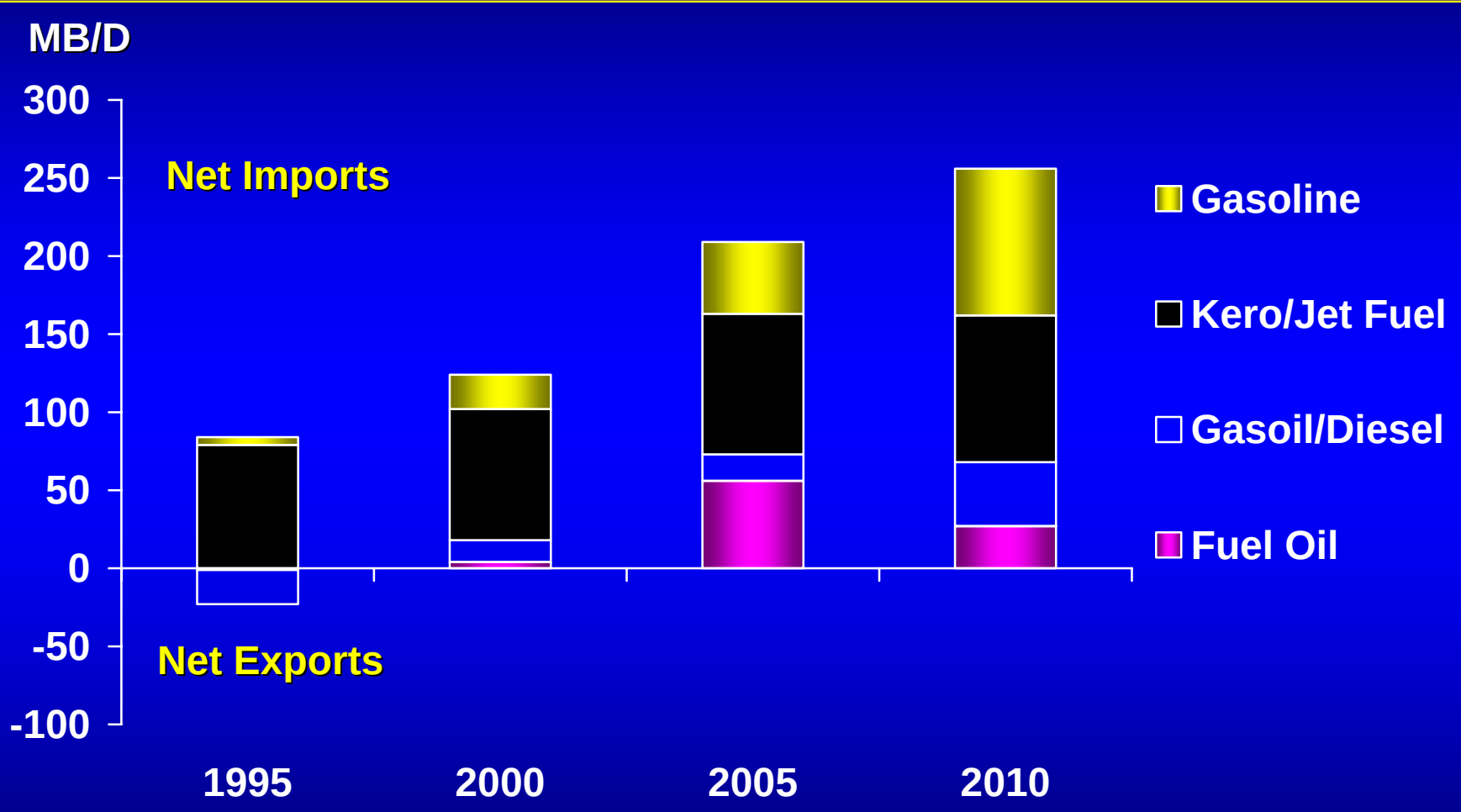


- Japan has remained largely balanced in transportation fuels with some imports in small vessels from South Korea.
- Petrochemical naphtha is a key product and substantial imports are required, supplying half of demand.
- LNG is replacing residual fuel in power and industrial sectors.
- Residual demand has declined by half since 1990 but exports have been minimal as result of shifting to lighter crude slate.
- Ultra-low sulfur gasoline and diesel regulations are forthcoming.
  - Little advantage in low sulfur crude.

Japan Refining Capacity

Refinery	Location	Crude Type	Crude	Vacuum	Visbreaking	Coking	FCC	Hydrocracking	Reforming	Hydrotreating			
										Resid	VGO	Distillate	Naphtha
Cosmo													
Cosmo Oil CL	Chiba	Light Sour	228,000	57,000	-	-	33,300	-	32,850	64,800	31,500	120,600	34,200
Cosmo Oil CL	Yokkaichi City	Light Sour	147,250	70,300	-	-	25,200	-	17,550	-	43,200	67,500	17,550
Cosmo Oil CL	Sakaide	Light Sour	114,000	39,425	-	-	17,100	-	12,600	27,000	15,480	57,600	12,600
Cosmo Oil CL	Sakai	Light Sour	76,000	32,300	-	-	20,700	-	7,200	-	18,000	48,600	9,900
Esso													
Tonen/General Sekiyu Seisei KK	Kawasaki	Light Sour	318,250	116,850	-	-	82,800	22,500	47,000	22,500	77,000	149,000	59,000
Tonen/General Sekiyu Seisei KK	Wakayama	Light Sour	161,500	70,300	-	-	38,000	-	20,700	-	39,500	84,500	42,000
Tonen/General Sekiyu Seisei KK	Sakai	Light Sour	148,200	66,500	-	-	37,500	-	30,600	-	35,000	68,700	42,500
Idemitsu													
Idemitsu Kosan CL	Ichihara, Chiba	Light Sour	209,000	62,700	-	-	42,750	10,440	15,300	36,000	44,550	105,300	22,500
Idemitsu Kosan CL	Chita, Aichi	Light Sour	152,000	-	-	-	45,000	-	16,200	49,500	-	71,100	23,400
Idemitsu Kosan CL	Tomakomai	Light Sour	133,000	22,800	-	-	27,000	14,850	16,200	34,200	-	49,500	24,300
Idemitsu Kosan CL	Tokuyama	Light Sour	114,000	52,250	-	-	24,700	-	18,000	-	40,500	49,500	18,000
Japan Energy													
Japan Energy	Mizushima	Light Sour	190,190	103,550	-	23,400	43,200	27,900	39,600	58,900	68,850	98,010	39,150
Fuji Oil CL	Sodegaura	Light Sour	182,400	52,250	21,600	-	16,200	-	26,910	-	52,300	77,450	38,700
Kashima Oil CL	Kashima	Light Sour	180,500	39,900	-	-	29,700	-	19,800	27,000	22,500	85,500	20,700
Mitsubishi													
Nippon Mitsubishi Petroleum Refining Co.	Mizushima	Light Sour	237,500	73,150	-	-	61,400	11,700	18,000	40,500	41,100	72,000	40,500
Nippon Oil CL	Sendai	Light Sour	137,750	30,000	-	-	38,700	-	16,200	46,800	31,100	18,500	12,000
Mobil													
Kyokuto Petroleum Ltd.	Chiba	Light Sour	166,250	78,850	-	-	34,000	34,650	24,300	-	-	78,500	27,500
Nippon													
Nippon Mitsubishi Petroleum Refining Co.	Negishi	Light Sour	323,000	123,500	18,000	-	71,000	-	45,000	33,000	85,400	137,000	69,500
Nippon Mitsubishi Petroleum Refining Co.	Muroran	Light Sour	171,000	61,750	-	-	27,000	40,500	32,400	16,000	45,000	59,000	59,000
Kyushu Oil CL	Oita	Light Sour	147,250	62,700	-	-	18,900	9,900	24,300	-	36,000	61,200	25,200
Nippon Oil CL	Marifu, Yamaguchi	Light Sour	120,650	60,800	-	17,100	26,600	-	21,600	-	48,000	36,000	32,000
Nippon Oil CL	Osaka	Light Sour	109,250	57,000	-	-	24,300	-	12,600	-	18,900	41,400	19,800
Showa Shell													
Showa Yokkaichi Sekiyu CL	Yokkaichi	Light Sour	199,500	99,750	-	-	54,900	-	63,720	40,500	36,900	74,800	61,500
Toa Oil CL	Kawasaki	Light Sour	175,750	83,600	-	24,000	31,050	-	44,008	-	55,800	84,350	54,500
Seibu Oil CL	Yamaguchi	Light Sour	114,000	41,800	-	-	25,000	-	20,430	50,000	-	66,000	26,000
Taiyo													
Taiyo Oil CL	Ehime	Light Sour	96,900	25,650	-	-	-	17,100	29,700	-	-	48,000	37,000
AVERAGE REFINERY CAPACITY			167,427	60,949	1,523	2,481	34,462	7,290	25,876	21,027	34,099	73,447	33,423
UNIT CAPACITY AS % OF CRUDE				36.4%	0.9%	1.5%	20.6%	4.4%	15.5%	12.6%	20.4%	43.9%	20.0%

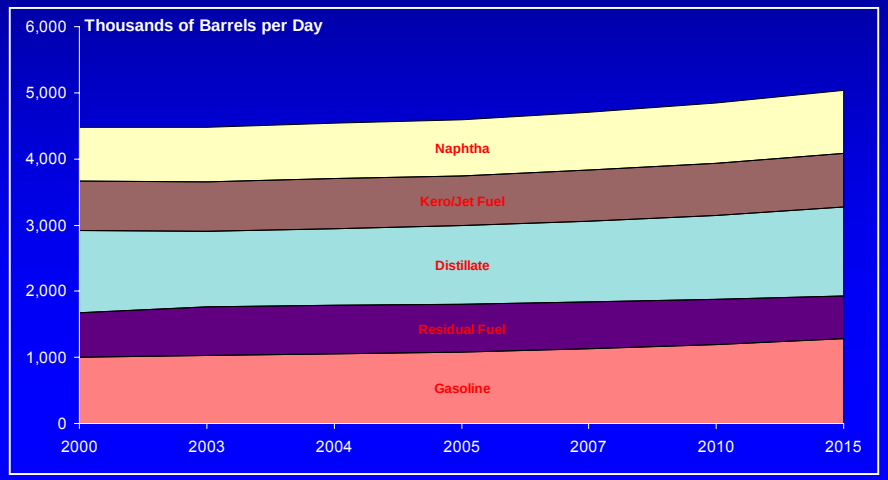
Japan Products Imports and Exports



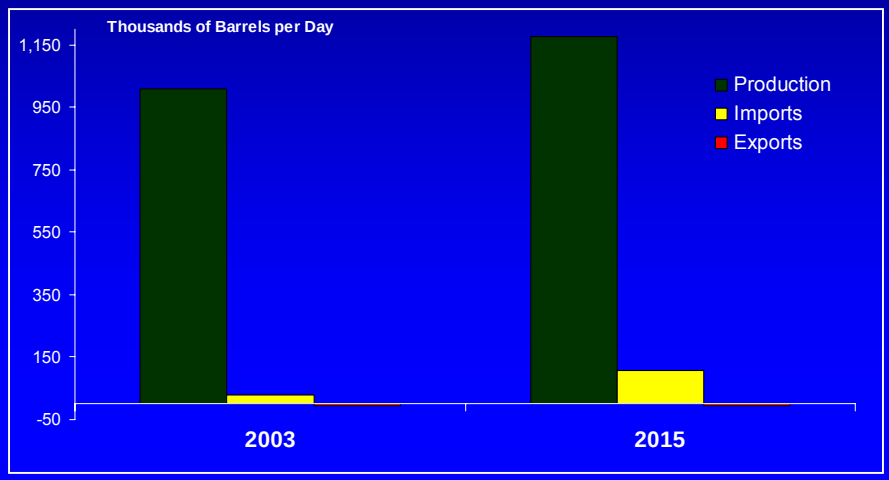
- Japan to gradually increase imports particularly gasoline.

Japan Product Demand - Gasoline

Forecasted Net Demand All Products



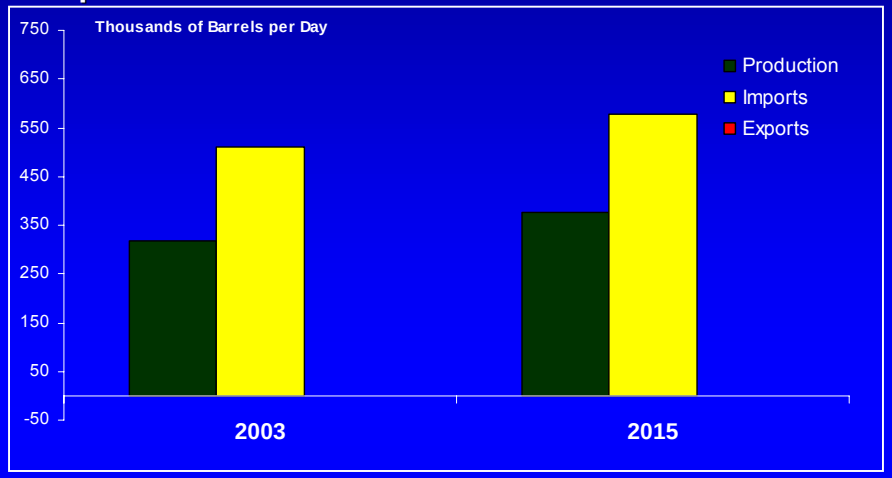
Gasoline



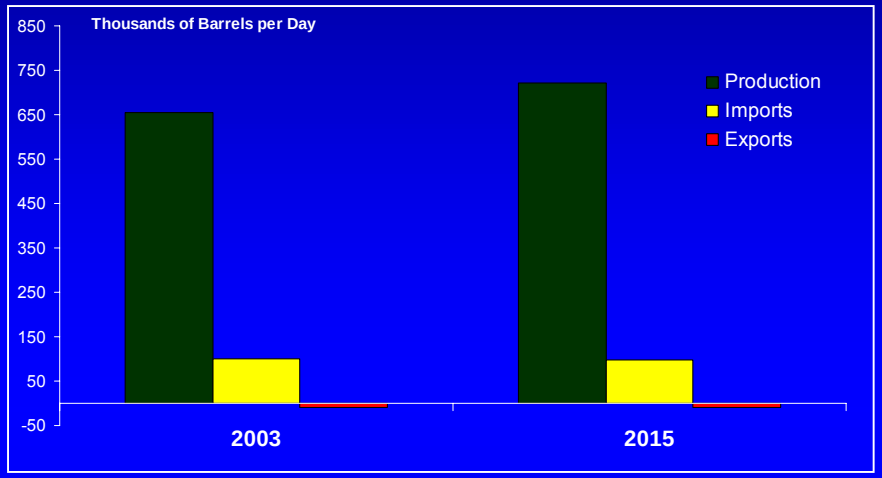
- **Primary energy demand in Japan has grown less than 1% annually since 1995.**
  - This is a result of limited production of domestic fossil energy and consequently; energy efficiency has been given a high priority.
  - The most commercially important sources of imported products are Korean refiners who have surplus capacity available at short-haul distances.
- **Gasoline demand is expected to increase, supporting slightly higher levels of imports.**
  - Demand growth has averaged about 2% annually over the past five years.
  - Gasoline imports consist of unfinished blendstock that is reprocessed or blended to meet Japanese specifications.

Japan Products – Naphtha, Kero/Jet Fuel

Naphtha



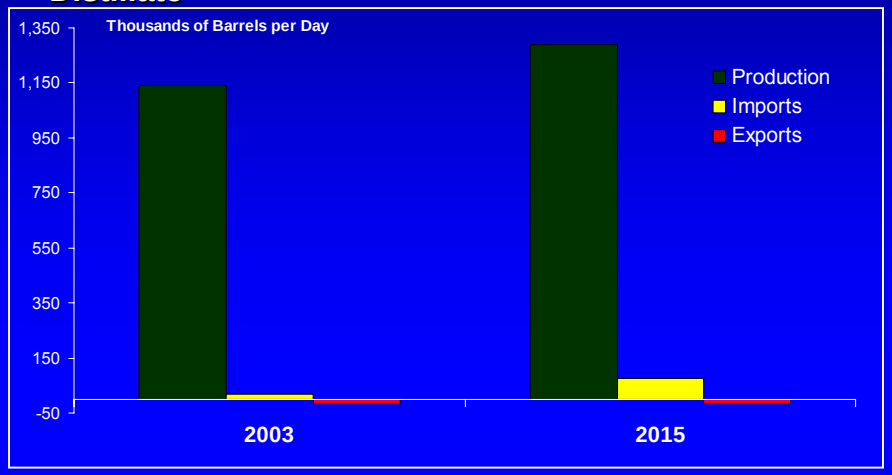
Kero/Jet Fuel



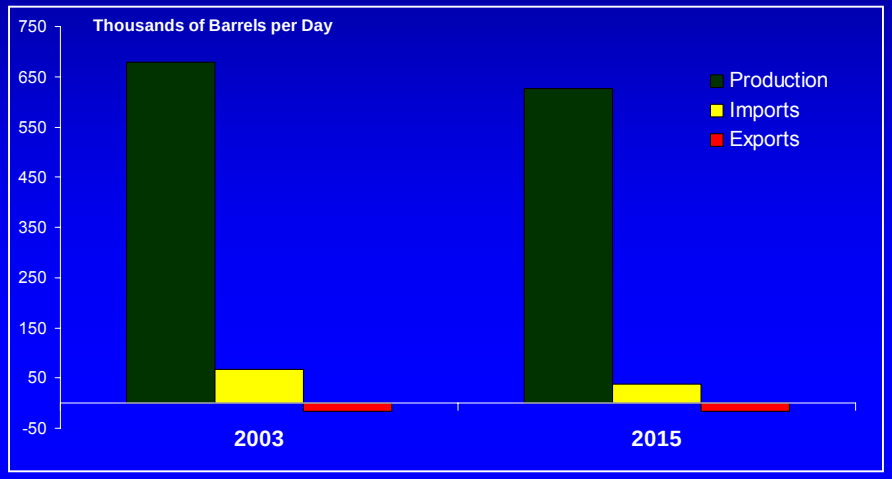
- **Naphtha demand is mainly satisfied through significant volumes of imports from the Middle East. This trend is expected to continue in future.**
  - Principal use for naphtha is for olefins manufacture of which over 95% of production is based on naphtha cracking.
- **Demand for jet fuel is forecast to increase moderately and in pace with air travel and economic growth.**

Japan Products – Distillate, Residual Fuel

Distillate



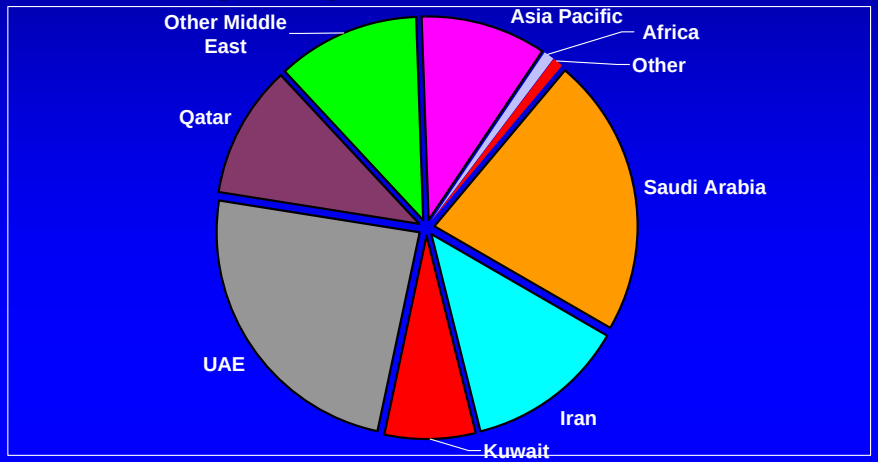
Residual Fuel



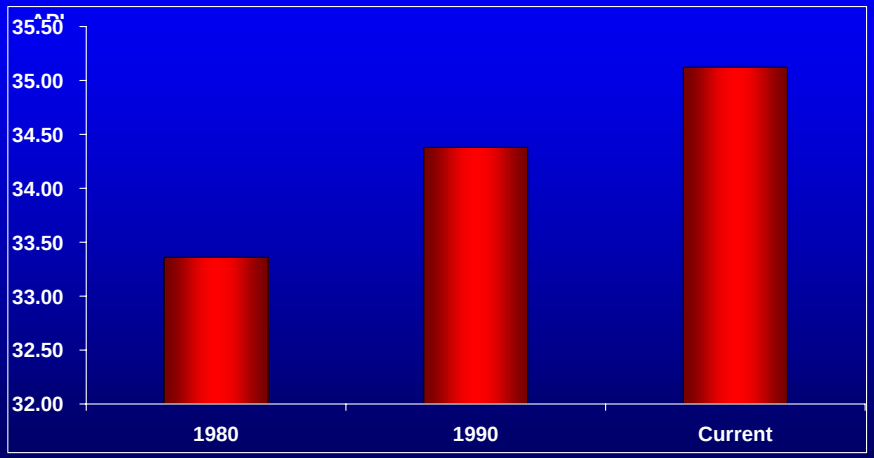
- **Distillate demand is forecast to experience moderate growth.**
  - Almost half of consumption is in the transportation sector.
- **Residual fuel oil demand is forecast to decrease slightly with very little make up from imports.**
  - The decline in fuel oil consumption is due primarily to substitution of nuclear power and natural gas in the power generation sector.

Japan's Crude Oil Slate

Crude Imports by Source



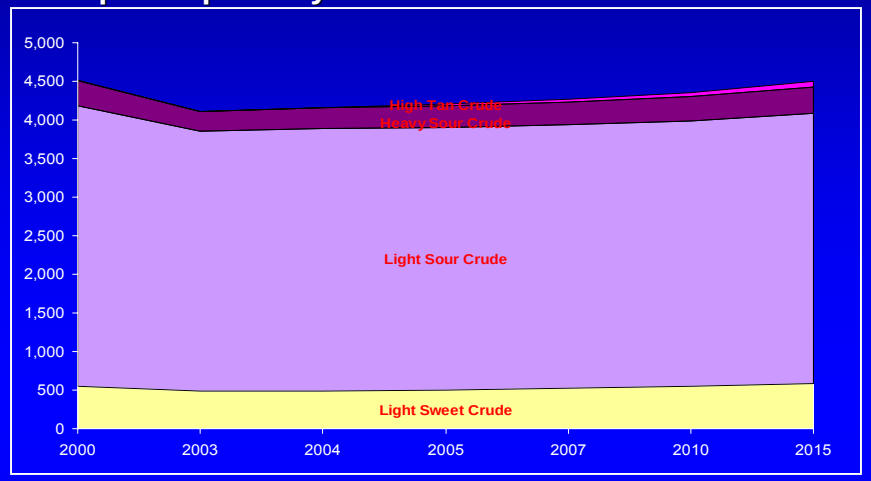
Average Crude API



- **Japan has strong extremely reliance on Middle East crude imports.**
- **The country is less reliant on sweet crude and imports very little West African crude.**
- **One feature of the industry is its shift to a lighter and lighter crude slate over the past decades in lieu of conversion investment.**
- **With a few exceptions, Japan refineries are common in size and configuration.**
  - 100 – 200 MB/D capacity
  - FCC and Resid HDS units
  - Very few coking units
  - Many are integrated with petrochemicals

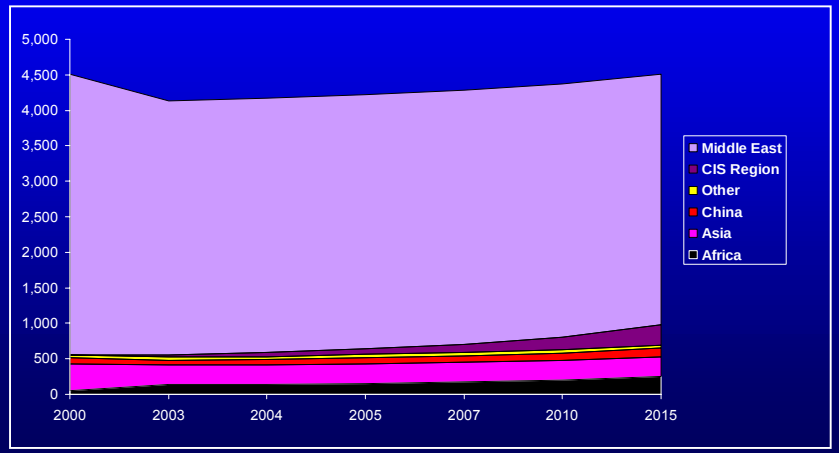
Japan Crude Oil Demand

Japan Imports by Crude Slate



Crude Imports - Other

Japan - Crude Import Forecast by Source



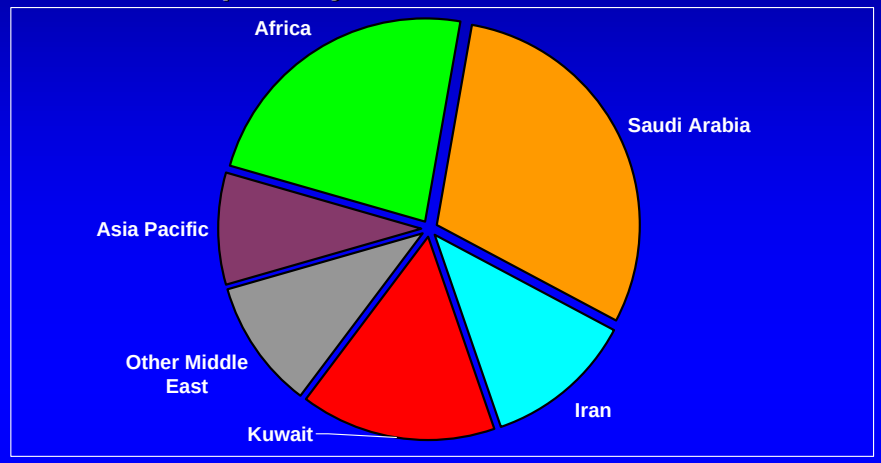
- Crude imports are expected to grow 22.8% by 2015 relative to 2003.
- Light sweet crude supplied from Africa is forecast to increase by 150,000 B/D over the next ten years.
- The Middle East will provide the largest portion of import demand mainly through increased supply of light sour and heavy sour crudes.
- The Former Soviet Union (CIS Region) will provide approximately 300,000 B/D of the light sour crude imports by 2015.
- Japan's crude slate is primarily Middle East grades and shifting towards lighter, high value crudes.

Japan Potential Interest in Oil Sands

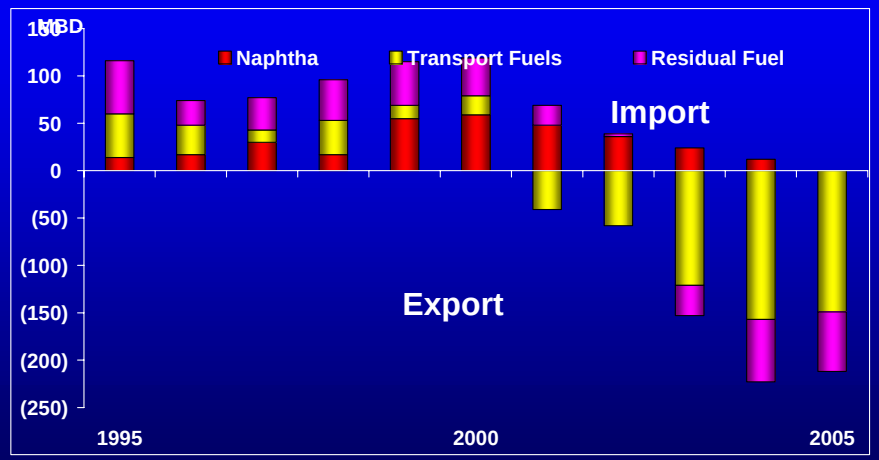
- **Japan refining industry consists of 30 refineries with 4.5 million B/D of capacity.**
- **Nearly 90% of Japanese refining capacity are Lt. Sour cracking refineries, although FCC capacity is only 20% of crude capacity.**
  - **Should be able to accommodate up to 500,000 B/D of SCO based on North American experience.**
  - **SCO would likely replace West African and other light sweet crudes.**
- **60% of total capacity are Lt. Sour cracking refineries with Resid Hydrotreating.**
  - Many of these hydrotreat long residue.
  - Should be able to accommodate some SynSynBit or SynBit Blends, but depends on capability to desulfurize such high sulfur residuals.
- **Refineries with Coking are 10% of capacity.**
  - Potentially these should be best candidates to process SynSynBit or SynBit Blends.

Taiwan's Refining Industry

Crude Imports by Source



Product Balance

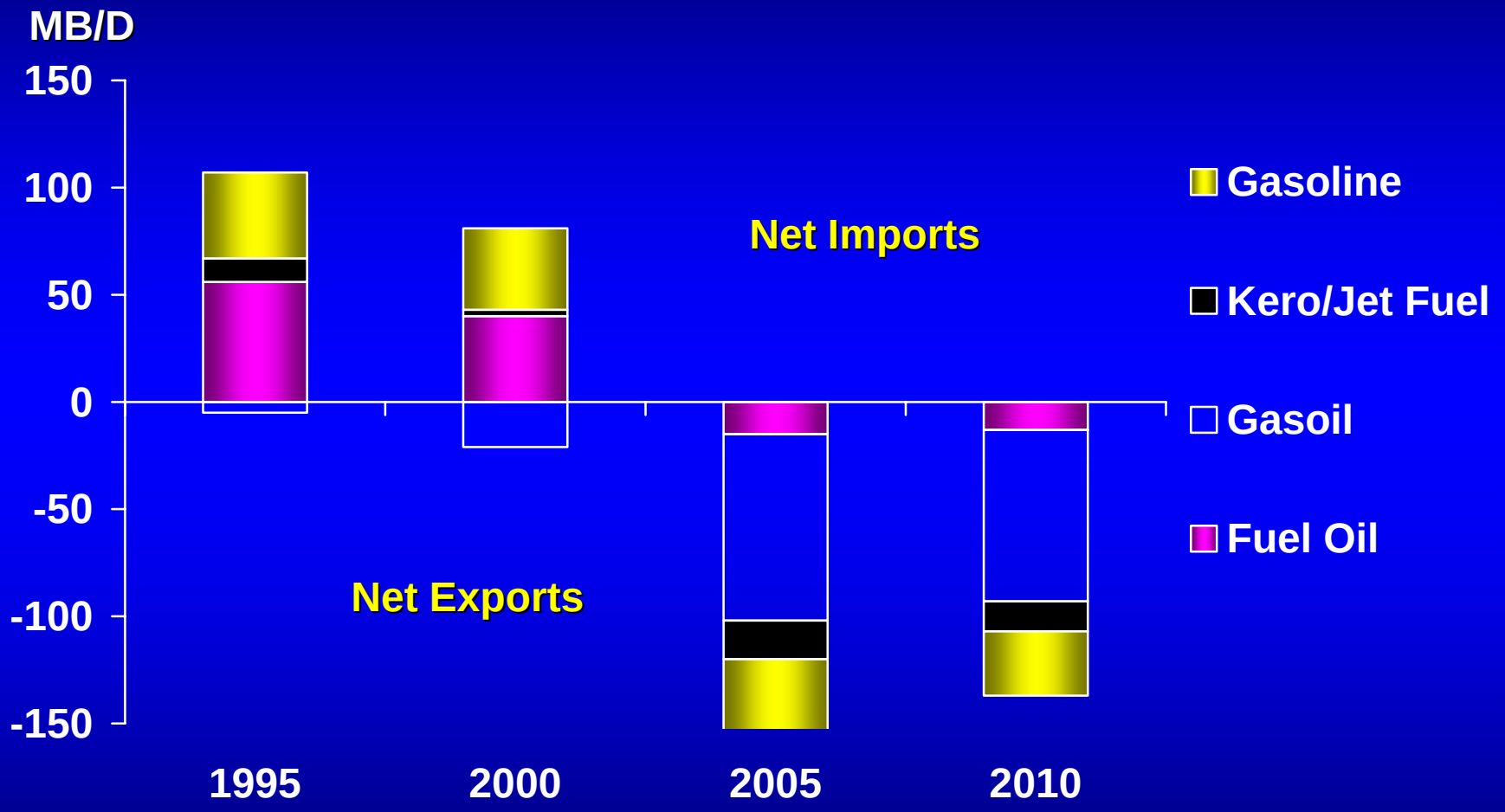


- **Taiwan is a large importer of West African crude.**
- **The Middle East portion of the crude slate is heavier than Japan's and quite sour.**
- **The country now has four refineries: 3 CPC refineries and Formosa Plastics.**
  - Formosa Plastics is a deep conversion 450,000 B/D complex with full RFCC and coking integrated with olefins and aromatics.
  - CPC refineries are much simpler with small conversion but are also integrated with Pchem.
  - Similar to Japan and South Korea, a feature of the Taiwan industry is significant resid HDS.
- **Taiwan is now a product exporting country joining South Korea and Singapore.**

Taiwan Refining Capacity

Refinery	Location	Crude Type	Crude	Vacuum	Visbreaking	Coking	FCC	Hydrocracking	Reforming	Hydrotreating			
										Resid	VGO	Distillate	Naphtha
Chinese Petroleum Corp.	Kaohsiung	Light Sour	570,000	75,500	-	15,000	50,000	18,080	70,000	90,000	32,000	13,560	115,000
Formosa Petrochemical Co.	Mai-Liao	Light Sour	450,000	80,000	-	36,000	146,000	-	35,000	140,000	52,000	63,000	35,000
Chinese Petroleum Corp.	Taoyuan	Light Sour	200,000	36,000	-	-	50,000	-	45,000	-	20,000	58,000	45,000
AVERAGE REFINERY CAPACITY			406,667	63,833	-	17,000	82,000	6,027	50,000	76,667	34,667	44,853	65,000
UNIT CAPACITY AS % OF CRUDE				15.7%	0.0%	4.2%	20.2%	1.5%	12.3%	18.9%	8.5%	11.0%	16.0%

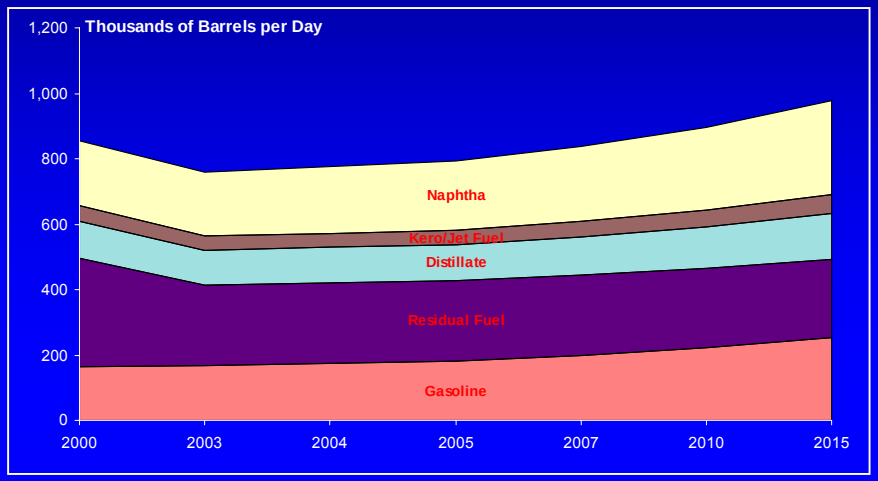
Taiwan Exports and Imports



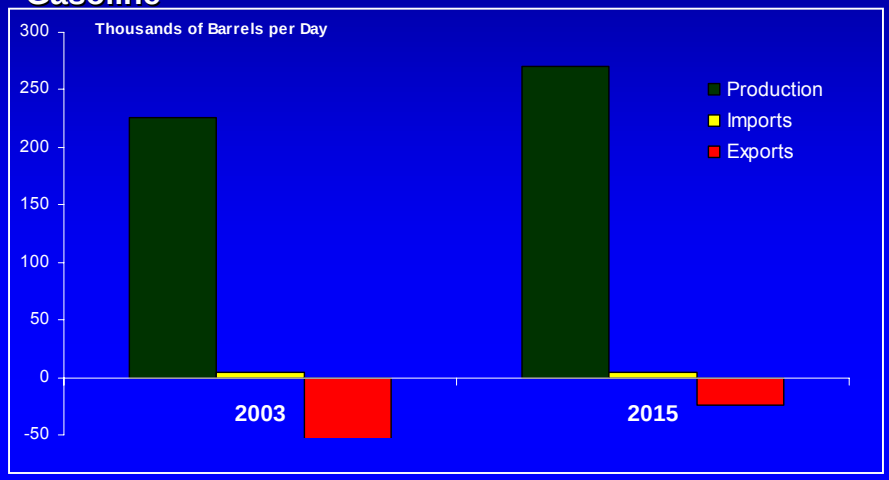
- Taiwan to remain an exporter.

Taiwan Product Demand - Gasoline

Forecasted Net Demand All Products



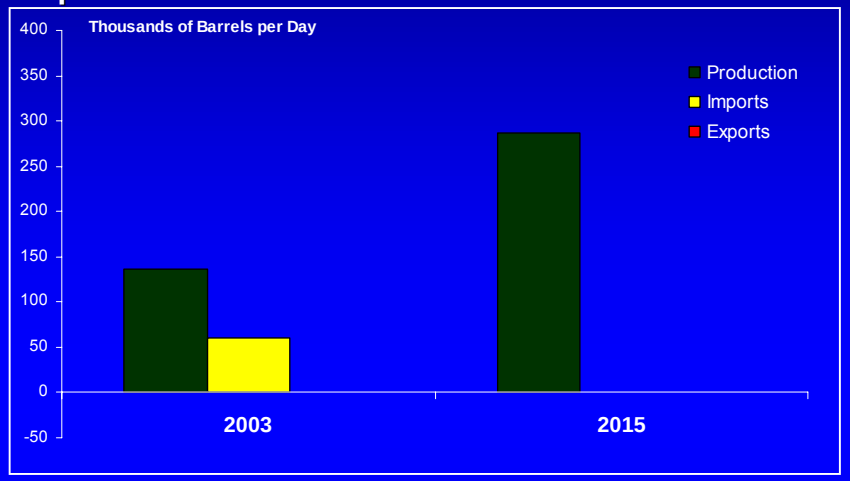
Gasoline



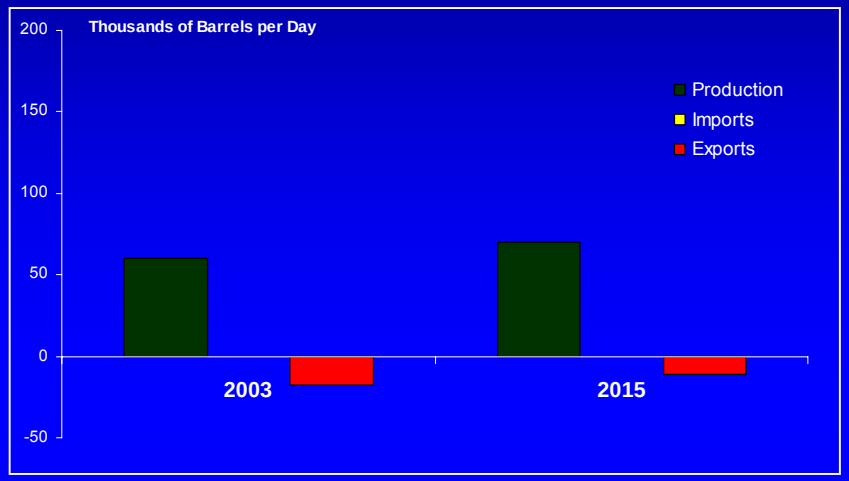
- **Taiwan has had exceptional economic growth fueled primarily by exports of manufactured goods.**
  - Continued solid economic performance is projected.
  - Few indigenous energy resources are available rendering Taiwan dependent upon imported petroleum and other energy products.
- **Demand for gasoline is forecast to grow in step with economic development.**
  - Gasoline demand has averaged 8% growth annually since 1995.
  - Gasoline exports should decline over time.

Taiwan Products – Naphtha, Kero/Jet Fuel

Naphtha



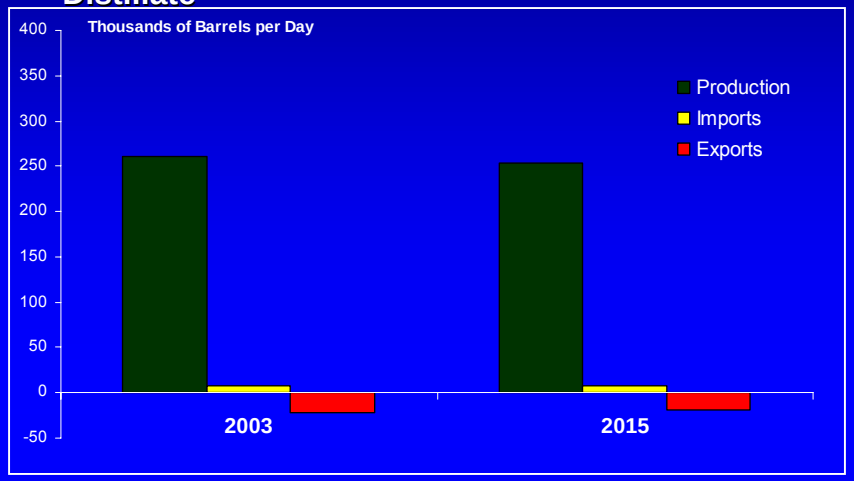
Kero/Jet Fuel



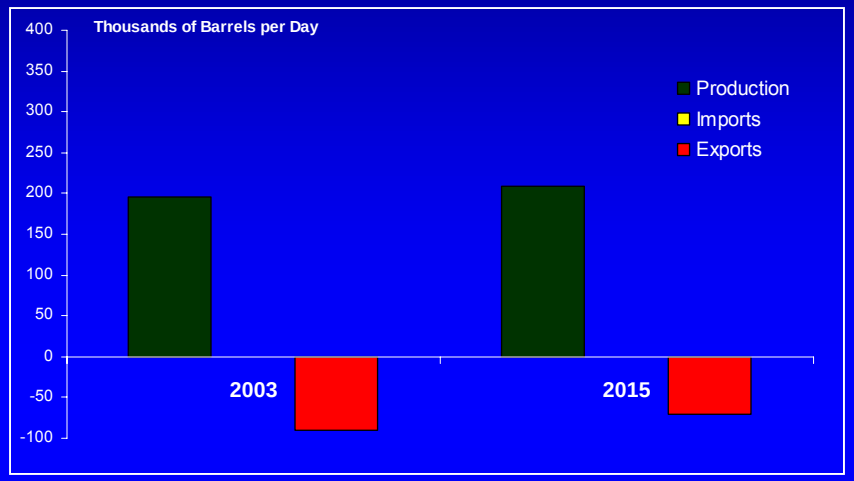
- **Taiwan has a well developed petrochemical industry that has entered another phase of growth. Several new naphtha crackers have started up in recent years. Naphtha demand is forecast to grow significantly as a result of expansions of existing plants and plans for new greenfield plants.**
  - Future imports of Naphtha are not expected as demand is expected to be satisfied domestically.
- **Jet fuel currently accounts for the majority of total kerosene/ jet fuel demand.**

Taiwan Products – Distillate, Residual Fuel

Distillate



Residual Fuel



- **Distillate demand is expected to be minimal.**
  - Distillate exports have increased since the completion of the Formosa Petrochemical refinery expansion.
- **Fuel oil demand is primarily for power generation, but is expected to decline as LNG imports increase. Taiwan Power Company has planned to replace some fuel oil with coal for power generation.**
  - Environmental concern has prompted a shift to natural gas.

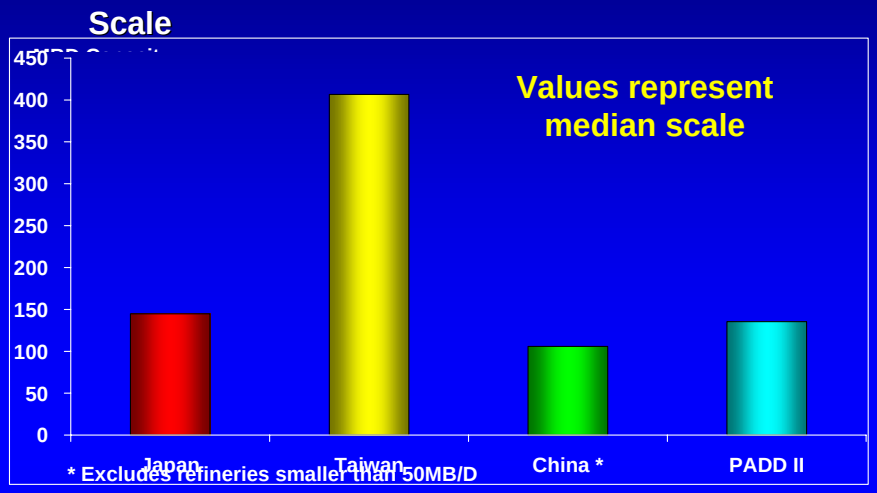
Taiwan Crude Oil Demand

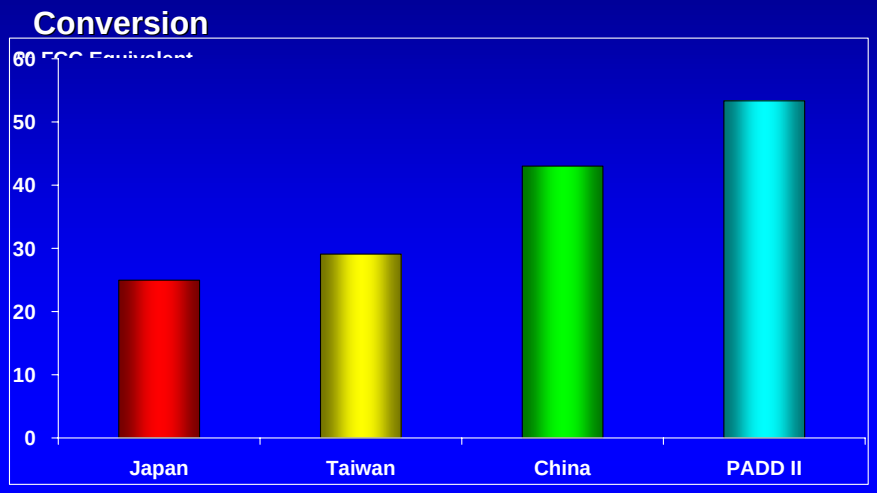
- Crude production in Taiwan consists of a small amount of condensate. Therefore, all crude demand is imported.
- Taiwan is a large importer of West African crude.
- The Middle East portion of the crude slate is heavier than Japan's and quite sour.
- Current refinery crude capacity is around 1.2 million B/D.

Taiwan Potential Interest in Oil Sands

- Taiwan's refineries have around 1.2 million B/D capacity, located in 3 refining centres.
- They are designed for light sour crude, but contain some coking, catalytic cracking, and resid hydrotreating.
- Taiwan exports high sulfur residual fuel, but imports low sulfur residual fuel.
- Taiwan should have potential to process 100,000 to 150,000 B/D of SCO, mainly replacing West African crudes.
- The resid hydrotreating capability may be limited in how much bitumen residue can be processed. This may limit the interest in running bitumen blends.

Asia Refineries Compared to PADD II

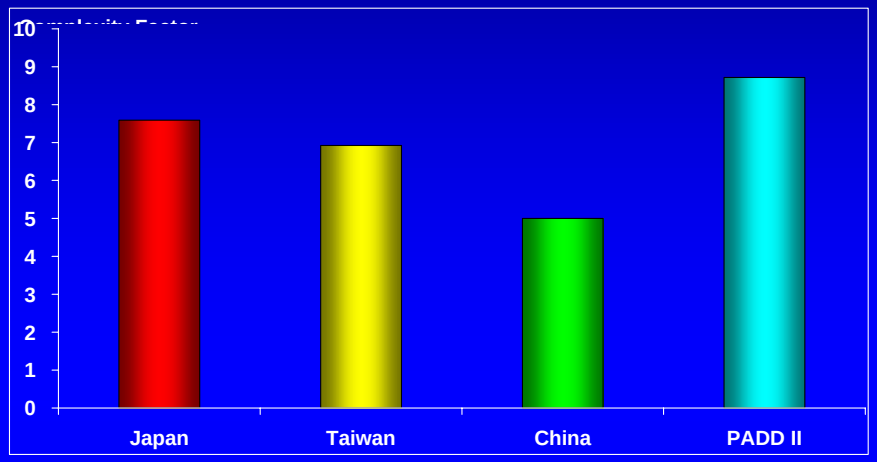




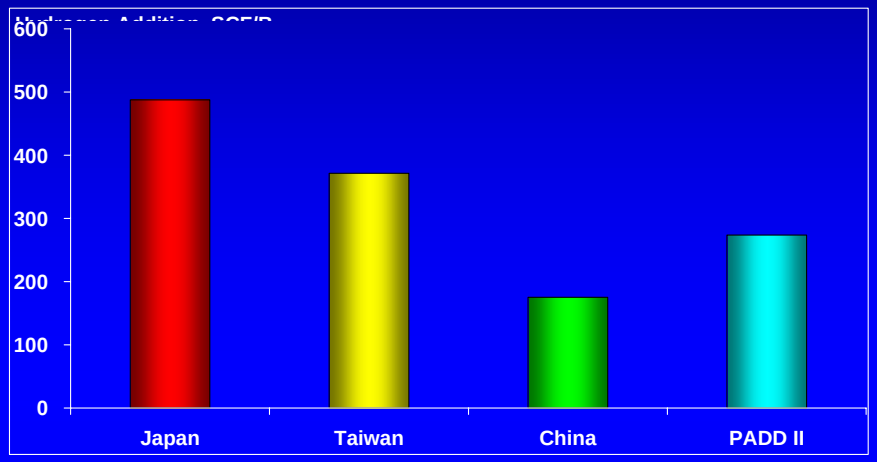
- Asia target market refineries have less conversion but comparable scale to PADD II.

Asia Refineries Compared to PADD II (continued)

Complexity



Product Upgrading



- Asian refineries have similar complexity to PADD II, and add more hydrogen per barrel processed than in PADD II.

Potential Opportunity for Canadian Oil Sands

Asian netbacks are comparable to netbacks from Chicago

- Bitumen blends experiencing significant discounts in US markets
- SCO facing US market resistance

Secure Crude Supplies

- No exploration necessary
- Politically stable
- Major Investments Planned

- **Optimize potential of Alberta oil sands products**
- **Diversify exports, create new markets**

Growing dependence on Middle East Crude imports

- Middle East crudes comprised 53% of total crude imports in 2003 and are forecast to increase to 68% by 2015

Supply/Demand Analysis Major Markets
Non-Middle East

MAJOR GROWING MARKETS
Imports

2003		2015
1,990	China	4,345
1,716	India	2,483
9,646	USA	13,177
13,352		20,005

6,653

Countries Competing for supplies

COUNTRIES WITH SIGNIFICANT SUPPLY POTENTIAL
Exports

2003		2015
1,512	Canada	2,674
1,594	Venezuela	2,498
5,697	Africa	7,713
4,593	Russia	7,501
13,396		20,386

6,990

Countries competing for markets

Non-Middle East Strategic Suppliers to China

RUSSIA

- Continental proximity
- Trading partners in other resources
- Government seeking to diversify exports

- Major infrastructure investment required, i.e. pipelines
- Major supplier and partner to Japan → increased competition

CANADA

- Imports by tanker can access coastal areas where growth largest
- Transportation route avoids Malacca Strait → Pacific route
- Government seeking to diversify exports
- Flexible crude quality to fit specific needs

- Strong US ties underlined in NAFTA → May cause security concerns to other nations

VENEZUELA

- Imports by tanker can access coastal areas where growth largest
- Common goals in preserving national interest in energy supply/demand
- National oil companies dictated by country governments can be a common framework for relationship/trade
- Government seeking to diversify exports
- Flexible crude quality to fit specific needs

- Transportation costly, Panama Canal inadequate for big tankers
- Requires additional partner to add technical knowledge and know how

Africa

- Politically controversial assets available for acquisition → less competition, discounted valuations

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- Political risk
- Transportation route through the Malacca Strait

IV. PRICING AND VALUATIONS

- VALUATION APPROACH
- PRODUCT PRICING BASIS
- ASIAN REFINING VALUES
- EDMONTON NETBACKS
- REFINED PRODUCTS NETBACK TO ALBERTA

Crude Oil Valuation Approach to Value Oil Sands Crudes

IDENTIFY DELIVERED COST OF CRUDES

- Bonny Light from West Africa (light sweet benchmark)
- Dubai from Arab Gulf (light sour benchmark)
- Estimate costs for transportation, credit & insurance to:
  - Japan
  - South Korea
  - China
  - Taiwan

IDENTIFY ASIAN REFINING VALUES

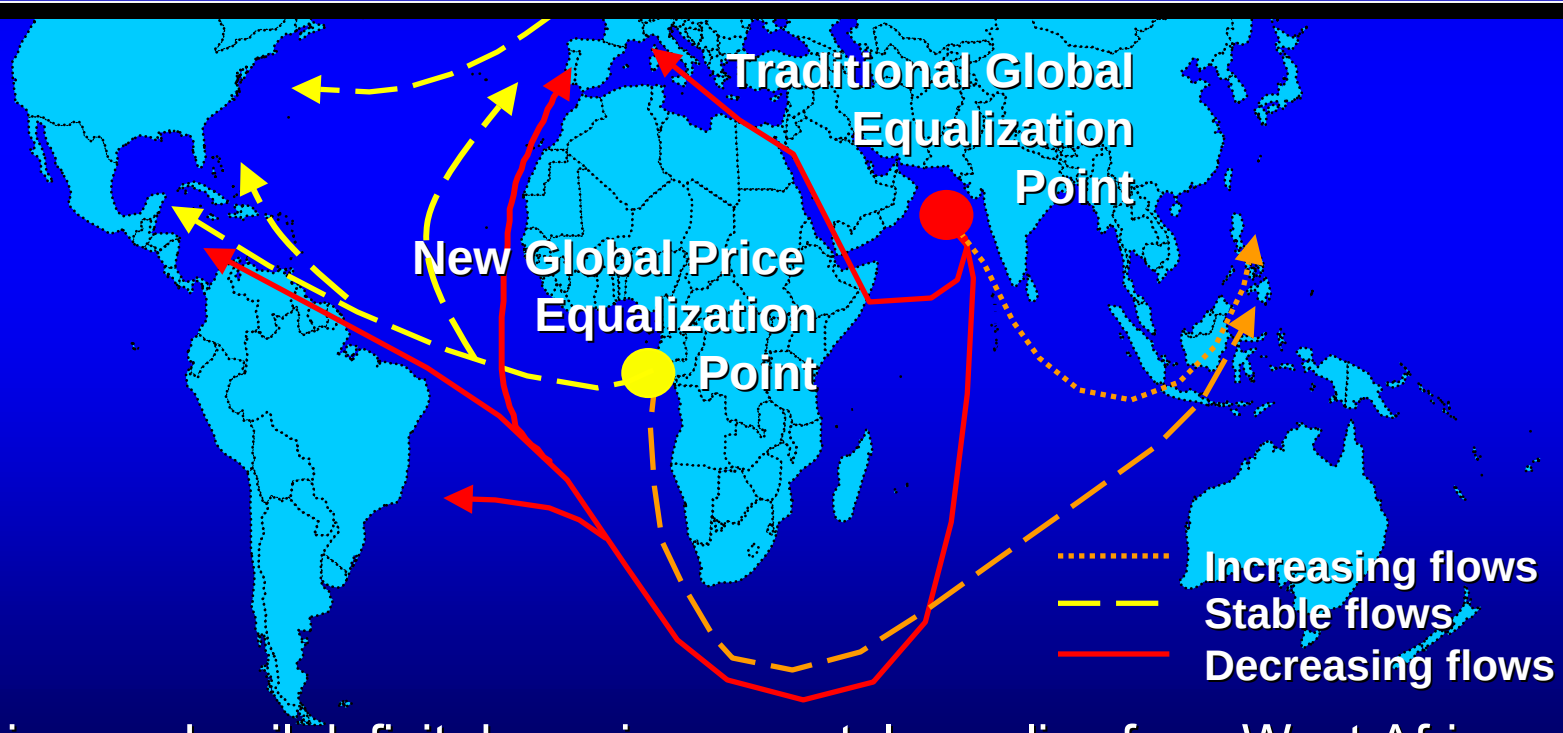
- Apply benchmark refinery models for marginal configurations:
  - Hydroskimming
  - FCC Cracking
- Calculate break-even values for each crude based on product prices and refinery variable costs:
  - SCO
  - SynBit/ SynSynBit
  - Dubai
  - Bonny Light

DETERMINE CANADIAN BLEND NETBACKS

- Estimate Asian refining values for Canadian blends based on benchmark crude CIF prices and variable break-even differentials.
- Estimate Asian netbacks for Western Canada based on:
  - Waterborne transportation costs
  - Pipeline costs

Asian Crude Oil Pricing

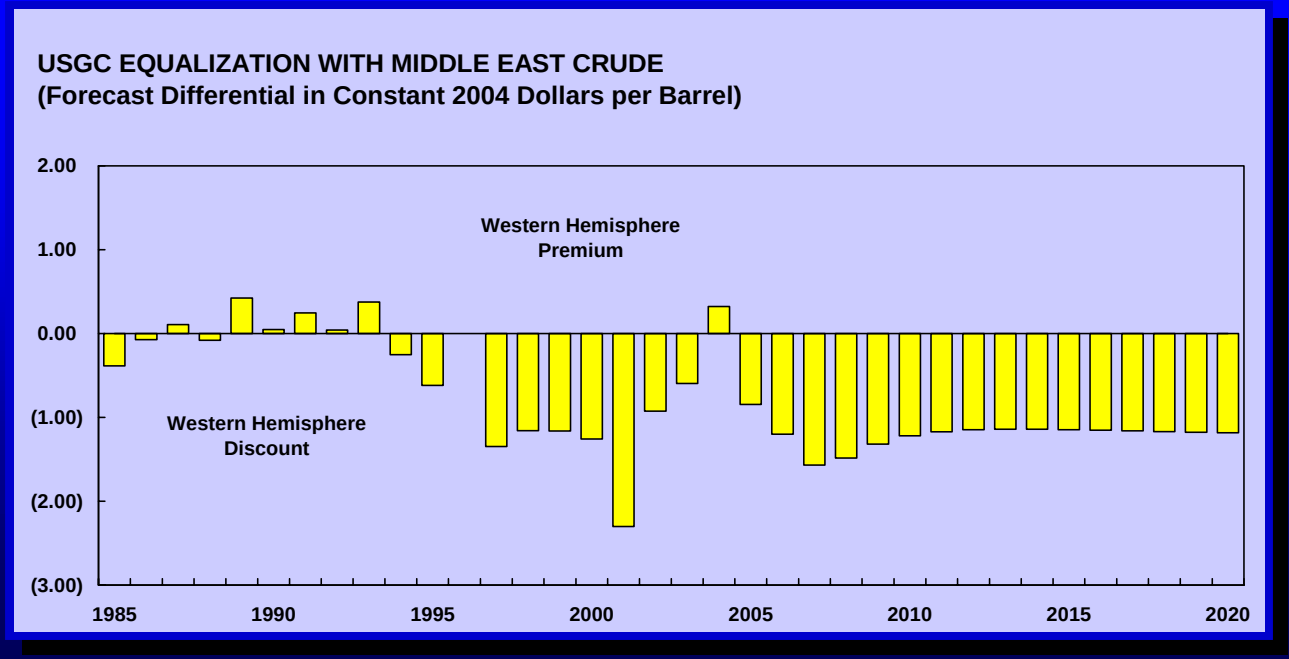
- Middle East deliveries to Europe and the Western hemisphere have increased the freight cost for incremental crude supplies to the Asia region.
- Incremental supplies are routinely drawn from West Africa, which has many Asian refiners to diversify their feedstock base with West African light sweet crude.
- Both Asia and the Western Hemisphere are priced in parity based on deliveries from West Africa.



➢ The Asian crude oil deficit draws incremental supplies from West Africa instead of the Middle East, which results in higher prices.

Far East Crude Oil Price Premium

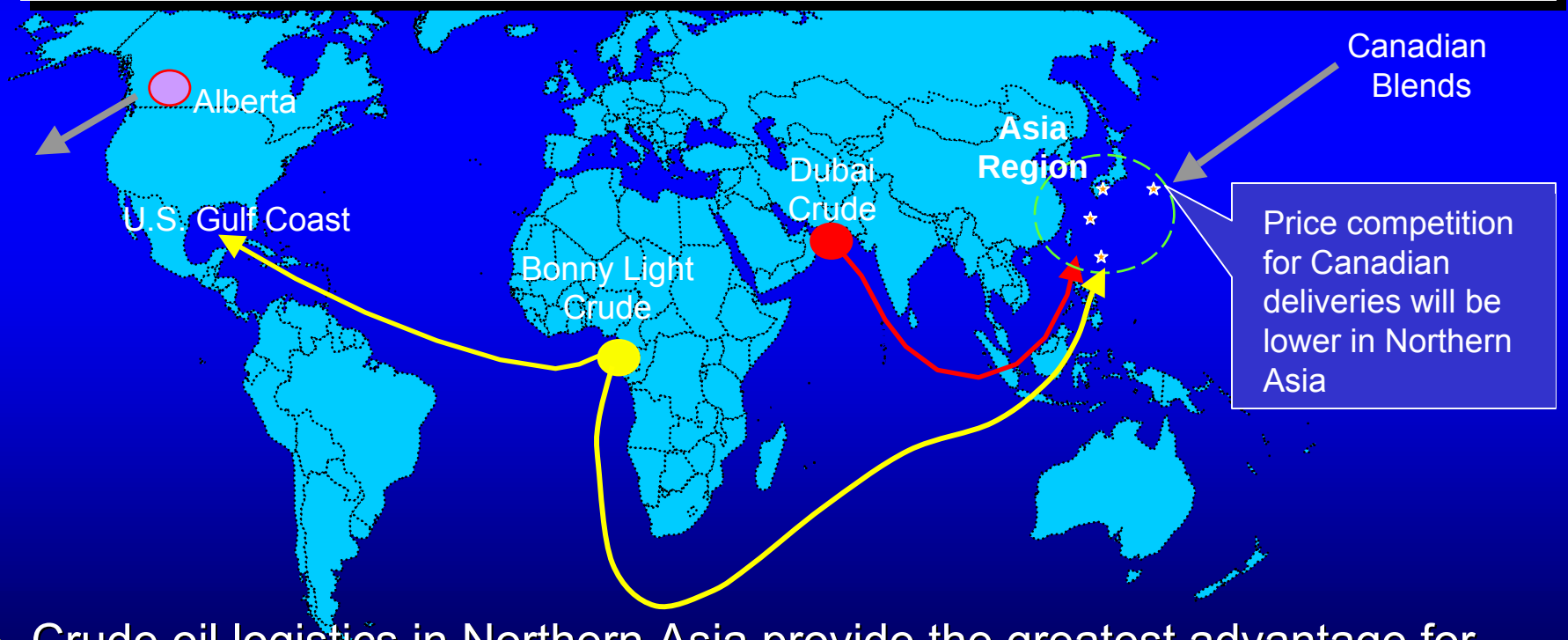
- Middle East producers typically receive a higher netback for sales to Asia than for sales to the West.
- The Far East premium (or Western Hemisphere discount) is defined by the amount Dubai is "out of the market" compared to competitive Atlantic Basin crude oils.
- The strong Atlantic Basin crude oil market in 2004 provided a temporary reversal of the Far East premium.
- In our forecast the Far East Premium is expected to continue at around $1.20 per barrel.



PURVIN & GERTZ INC.

Crude Oil Delivery to Asia

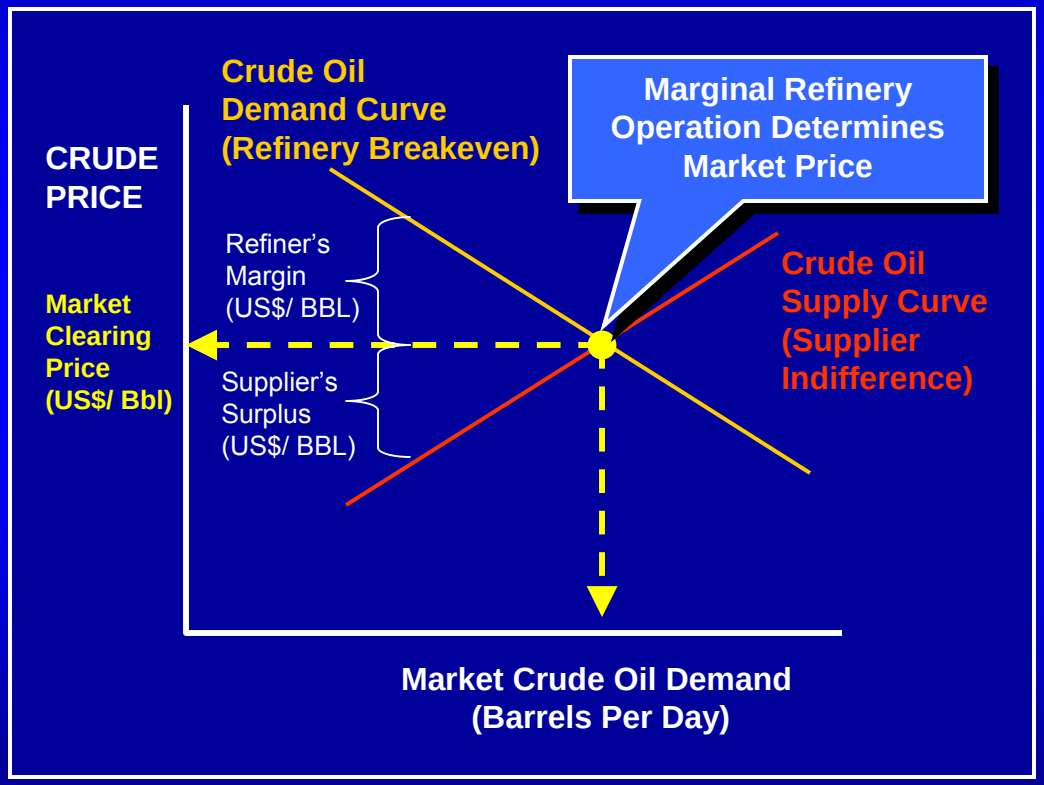
- Asian deliveries of Bonny Light are assumed to be priced in parity with deliveries to the U.S. Gulf Coast.
- Dubai FOB prices are forecast based on Asian refining value parity with Bonny Light.
- Delivery costs for Dubai and Bonny Light are highest in Northern Asia. For this reason, Japan and South Korea are likely to provide the greatest logistical advantage for Canadian supplies.



➢ Crude oil logistics in Northern Asia provide the greatest advantage for Canadian deliveries.

Crude Oil Valuation Methodology – Fundamental Principles

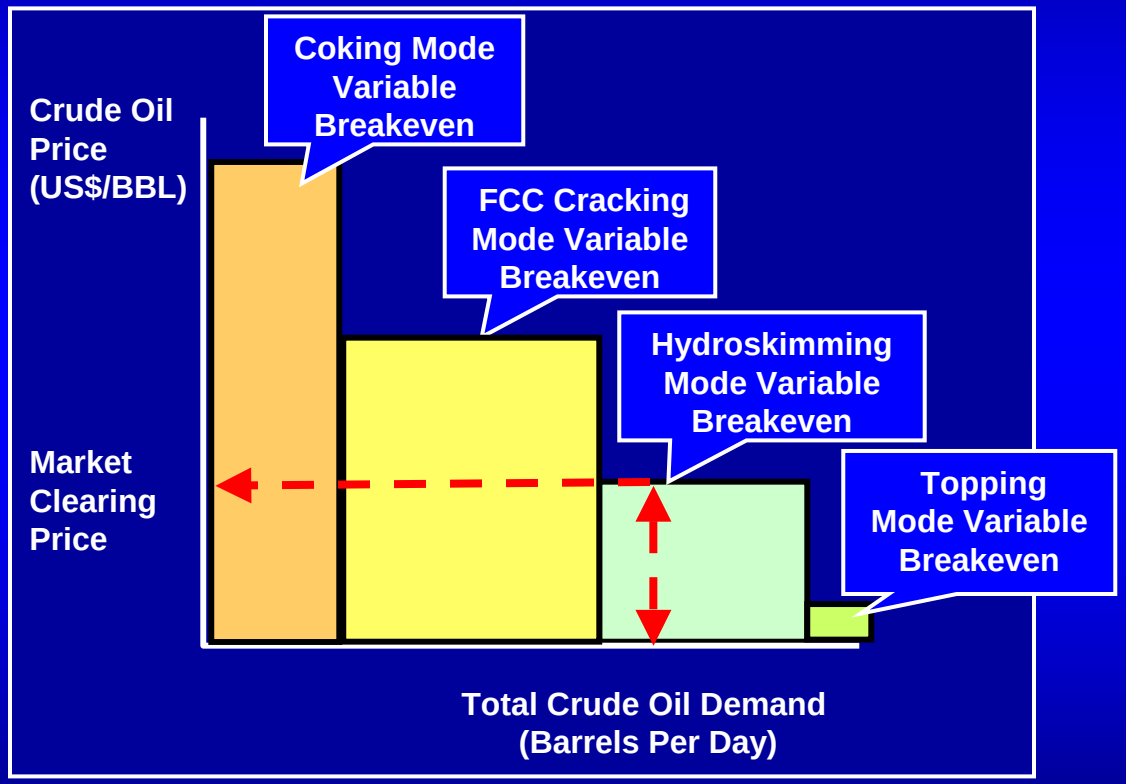
CLASSIC SUPPLY-DEMAND FRAMEWORK



- In theory, crude oil demand elasticity is described by the breakeven economics of the various refinery operations within a market.
- The marginal refinery operating mode is used to evaluate the relative refining value of each crude oil.
- In a competitive market, the crude oil price differentials are expected to be in parity with their refining value differentials based on the marginal mode.

Crude Oil Valuation Methodology Application

APPLIED SUPPLY-DEMAND FRAMEWORK



- Purvin & Gertz routinely evaluates the marginal refinery mode for each region based on refinery utilization and profitability.
- While refinery complexity and configurations vary widely, each refinery may include several operating modes, depending on the degree of utilization.
- Hydroskimming is the marginal refinery mode in the Asian region.
- Longer term, as investment in conversion capacity continues, hydroskimming operations may eventually become rationalized in favor of FCC cracking operations.

Canadian Crude Valuations in Asia - Calculation Outline for SynBit

- ***The steps in Purvin & Gertz' netback pricing methodology are shown below.***

		ASIAN Dubai Example
Determine benchmark delivered market price and refinery value.		**Dubai CIF, Japan / Taiwan / S. Korea / China**
Apply refinery value differential between benchmark crude and bitumen blend to benchmark delivered price.	=	**Dubai, CIF + (Canadian Blend Refining Value – Dubai Refining Value)**
Deduct transportation costs for bitumen blend via VLCC vessel size.	-	**SynBit Ocean Freight (Kitimat to Asia)**
Deduct pipeline tariff from production location	-	**SynBit Pipeline Tariff (Edmonton to Kitimat)**
Canadian Blend Netback Value (Compare Against Mid-west Netback)	=	**SynBit Netback Price (FOB Edmonton)**

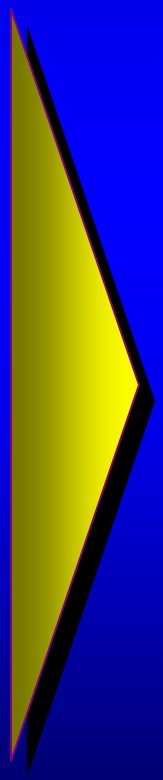
Valuation Assumptions - Main Product Specifications

- ***Most Asian markets will eventually adopt European Union 2005 specifications by 2015.***
- ***Sulfur and benzene reductions are the most significant changes and will drive modest increases in variable cost.***

2005 ASIAN SPECIFICATIONS

Gasoline
- Sulfur < 500 ppm
- Benzene < 2%

Diesel
- Sulfur < 0.2% wt
- Cetane 45



2015 ASIAN SPECIFICATIONS

Gasoline
- Sulfur < 50 ppm
- Benzene < 1%

Diesel
- Sulfur < 500 ppm
- Cetane 45

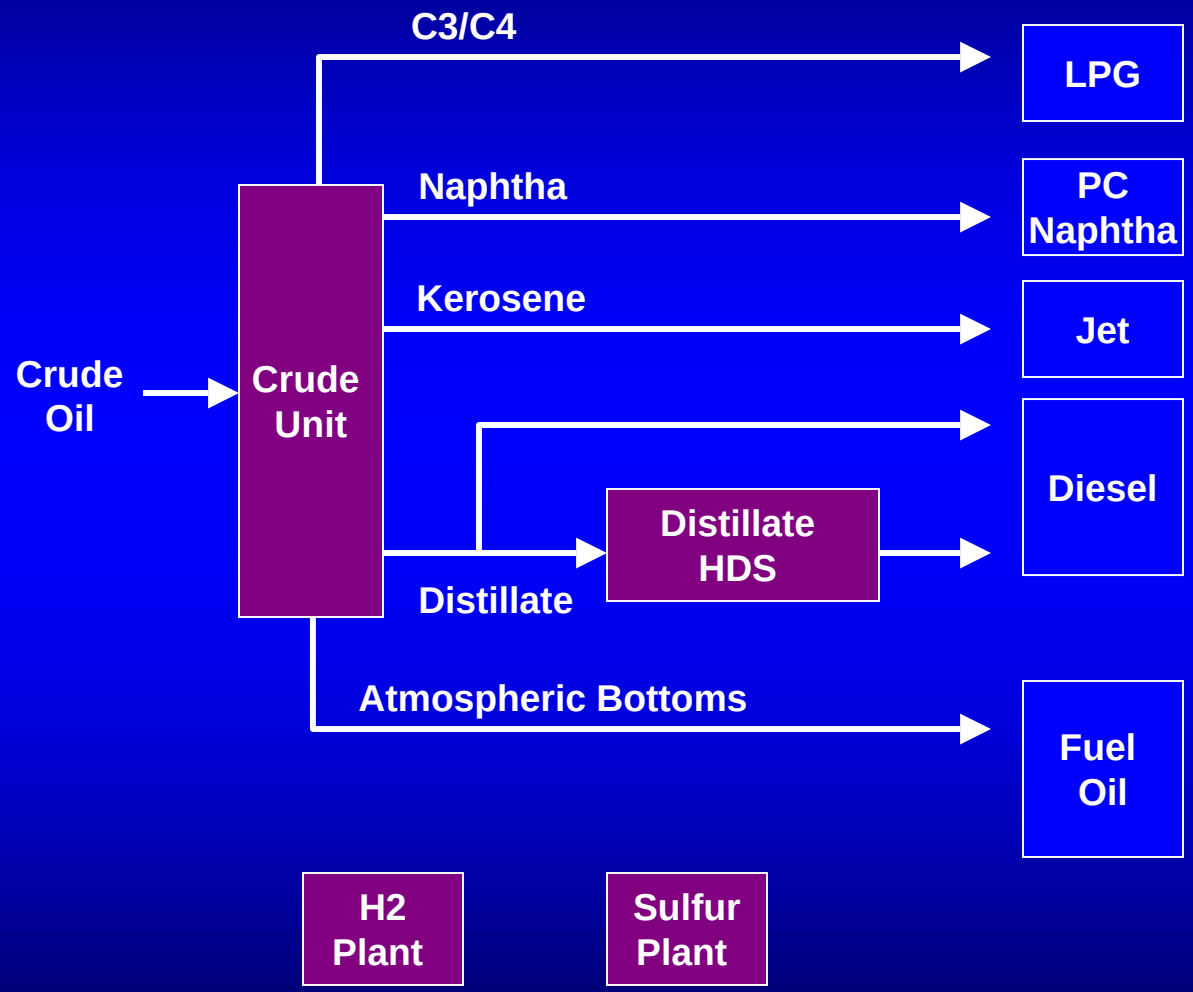
Valuation Assumptions - Crude Quality Assumptions

- A SynSynBit blend of 64% SCO and 36% Bitumen provides close to the same vacuum resid content as Arab Light. This should provide a broad market base, since many expansion projects are designed for Arab Light (Arab Light characterized as Dubai).
- SynBit is a blend of 48% SCO and 52% Bitumen. It has a similar vacuum resid content to Arab Light or Dubai.

	Bonny Light	Dubai	Sweet SCO	SynSynBit	SynBit	Athabasca Bitumen
API	34.6	30.6	34.8	24.2	19.9	8.3
Sulfur	0.2	2.0	0.1	1.8	2.5	4.8
LPG	2.0	2.4	2.8	1.8	1.3	0.0
Naphtha	26.7	24.8	17.7	11.9	9.3	1.5
Jet	13.7	9.8	12.0	8.3	6.7	1.7
Diesel	26.4	20.5	33.8	26.6	23.4	13.9
VGO	24.3	25.7	33.4	32.9	32.6	31.9
Resid	6.8	16.7	0.0	18.3	26.4	50.8

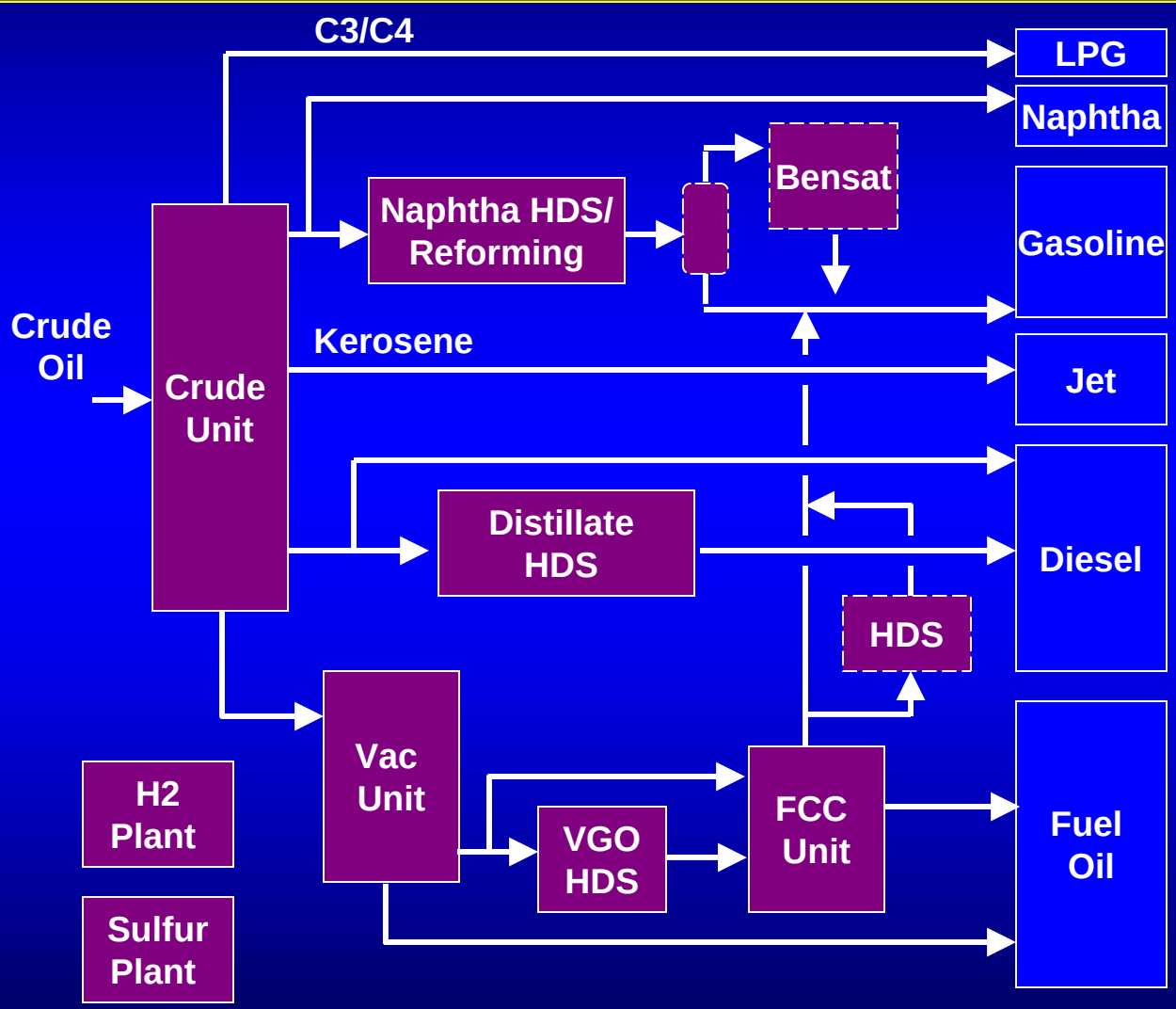
Note: Resid content based on cutpoint of 1000 deg F.

Yardstick Hydroskimming Refinery Configuration



- Hydroskimming remains the marginal refining mode in Asia.
- Fuel oil production includes both vacuum resid and vacuum gas oil (VGO).
- Petrochemical naphtha is produced from incremental hydroskimming operations.

Yardstick Cracking Refinery Configuration



- VGO is converted to gasoline and low quality distillates.
- Incremental VGO hydrotreating is required for sour crudes.
- By 2015, investment for benzene control and FCC gasoline sulfur control will be required.

Hydroskimming Versus Cracking Yields

- **Incremental cracking yields favor gasoline production over naphtha and reduce low value fuel oil production through VGO conversion.**

BONNY LIGHT YIELDS

	Hydroskimming	Cracking	Delta
LPG	1.7	5.7	4.0
Naphtha	19.8	10.0	-9.8
Gasoline	0.0	24.0	24.0
Jet	8.5	8.5	0.0
Diesel	38.5	40.7	2.2
Fuel Oil	31.1	11.4	-19.7
Total	99.6	100.4	0.8

DUBAI YIELDS

	Hydroskimming	Cracking	Delta
LPG	2.1	6.2	4.1
Naphtha	17.9	11.0	-6.9
Gasoline	0.0	21.7	21.7
Jet	16.6	16.6	0.0
Diesel (1)	20.5	18.7	-1.8
Fuel Oil	42.4	26.2	-16.2
Total	99.6	100.4	0.9

Basis: 100 MB/D Of Crude; 2005 Specifications

Note (1): Net diesel yield after cutter purchases, if any.

Asian Hydroskimming Yield Comparison

- The low viscosity of bitumen residue increases its fuel oil yield in the hydroskimming mode.
- Regional fuel oil prices should weigh heavily on the projected value of various bitumen blends because of the high fuel oil yields from bitumen blends.

COMPARATIVE HYDROSKIMMING YIELDS

	Bonny Light	Dubai	SCO	SynSynBit	SynBit
LPG	0.3	0.6	0.0	0.0	1.2
Naphtha	21.2	19.5	14.3	9.4	6.0
Gasoline	0.0	0.0	0.0	0.0	0.0
Jet	8.5	16.6	18.0	12.4	10.0
0.2% Diesel	23.5	20.5	0.0	26.6	23.4
0.05% Diesel	15.0	0.0	33.8	0.0	0.0
Cutter	0.0	0.0	0.0	-8.6	-13.4
Fuel Oil	31.1	42.4	33.4	59.8	72.4
Total	99.6	99.6	99.5	99.6	99.7
Fuel, FOE/Bbl	0.02	0.03	0.02	0.03	0.03
Water, Mgal/Bbl	0.04	0.04	0.04	0.04	0.04
Catalyst & Chem, $/Bbl	0.02	0.03	0.02	0.02	0.02
Electricty, KW-Hr/Bbl	1.35	1.92	1.37	1.50	1.59

Asian Cracking Yield Comparison

- SCO is highly differentiated in the cracking mode due to its low fuel oil yield and high distillate yield.
- Canadian bitumen blends generally produce more gasoline and fuel oil in the cracking mode due to their VGO content and resid viscosity.

COMPARATIVE CRACKING YIELDS

	Bonny Light	Dubai	SCO	SynSynBit	SynBit
LPG	5.7	6.2	7.3	5.9	5.3
Naphtha	10.0	11.0	3.3	2.2	2.3
Gasoline	24.0	21.7	32.4	28.0	26.5
Jet	8.5	16.6	14.0	9.3	6.7
0.2% Diesel	27.6	20.5	8.7	26.6	23.4
0.05% Diesel	13.1	0.0	32.9	0.0	0.0
Cutter	0.0	-1.8	0.0	-4.7	-10.9
Fuel Oil	11.4	26.2	1.6	32.9	47.1
Total	100.4	100.4	100.1	100.2	100.4
Fuel, FOE/Bbl	0.01	0.03	0.00	0.02	0.03
Water, Mgal/Bbl	0.05	0.06	0.05	0.05	0.06
Catalyst & Chem, $/Bbl	0.08	0.12	0.10	0.12	0.13
Electricty, KW-Hr/Bbl	4.60	5.84	5.92	6.20	6.44

Sulfur, Cetane & TAN Value Adjustments

FUEL OIL SULFUR PENALTY

- Bitumen residue has a sulfur content of 6.4%.
- Incremental fuel oil from SynBit or SynSynBit exceeds the high sulfur fuel oil specification of 3.5% sulfur.
- A value penalty (or credit) is applied based on the price spread between low sulfur and high sulfur fuel oil and the variance from standard fuel oil specifications.
- The sulfur penalty in the SynBit cracking case is roughly $0.40 per barrel.
- In comparison, SCO and Bonny Light cases received a value credit.

DIESEL CETANE PENALTY

- Bitumen blends have relatively poor diesel cetane.
- A penalty is applied to raw distillates with a cetane index below 45.
- Cetane value penalties are assumed to be $0.15 per cetane-barrel based on the expected cost of cetane improver additives.
- Relative to Dubai, Canadian bitumen blends received a value penalty of approximately $0.20 per barrel in most cases.

CRUDE OIL TAN DISCOUNT

- Bitumen has a TAN of approximately 4 mgKOH/g.
- Metallurgy improvements or additives for corrosion inhibitor are usually required for processing crudes with TAN > 0.5.
- Dilution of Bitumen reduces the TAN penalty associated with bitumen blends, but the estimated penalty is still significant.
- Approx. SynBit TAN penalty = $0.68/Bbl (TAN = 2).
- Approx. SynSynBit Penalty = $0.47/Bbl. (TAN = 1.4)
- No penalty was assigned to Sweet SCO.

Naphtha Pricing Basis

- Japan and Singapore Establishes the basis for naphtha pricing.
- Incremental naphtha supplies are received from Singapore and the Arab Gulf.
- The cost of delivered supplies from Singapore is used to develop pricing in each importing country.
- Japan is the largest and most significant naphtha importer.
- South Korean naphtha imports are assumed to be equivalent to Japan CIF.
- Chinese naphtha pricing provides for a 6% import duty, which is assumed to decline to 3% by 2015.
- Naphtha freight costs are estimated based on 50 KDWT vessels from Singapore with allowances for insurance and losses.

Gasoline Pricing Basis

- Vietnam is the main destination for incremental gasoline exports.
- Marginal gasoline supplies from North Asia must be shipped as far as South China and Vietnam, where they compete must with supplies from Singapore.
- While Shanghai routinely receives imported supplies from Singapore, it also ships gasoline to South China due to tariff advantages.
- Deliveries to Chinese locations are assumed to require an import duty of 6%, which declines to 3% by 2015.
- Pricing in Shanghai and Japan are expected to reflect delivered costs from Singapore.
- Pricing in South Korea and Taiwan should reflect netbacks from Saigon.
- South Korean export costs based on 50 KDWT vessel. All other gasoline freight costs based on 30 KDWT vessels.

Jet Fuel and Diesel Pricing

- South China establishes jet and diesel pricing.
- Guangzhou projected to remain a significant distillate import location
- Yosu, Singapore and Taiwan marginally export to Guangzhou.
- Some supplies are also shipped from Shanghai due to import duty shelters.
- Chinese locations are assumed to require an import duty of 9% for jet fuel and 6% for diesel. Chinese import duties are expected to decline by 50% in 2015.
- Pricing in South Korea and Taiwan are expected to reflect South China netbacks.
- Pricing in Shanghai and Japan are expected to reflect delivered costs from Singapore.
- All distillate freight costs based on 50 KDWT vessels.

Fuel Oil Pricing Basis

- South China is the destination for Asian refinery fuel oil surplus.
- Japan and Shanghai pricing is expected to reflect delivered costs from Singapore
- Taiwan and South Korean pricing is expected to reflect netbacks from South China, where supplies must compete with deliveries from Singapore.
- Import duty shelters allow supplies from Shanghai to compete in South China.
- Chinese import duties are assumed to be 6% until 2015. In 2015, Chinese import duties are assumed to decline by 50%.
- All fuel oil freight costs are based on LR-1 vessels.

Petroleum Product Pricing Basis for Asia

	Singapore	Japan	South Korea	Shanghai China	Taiwan
LPG	Export	Arab Gulf Imports	Arab Gulf Imports	Arab Gulf Imports + Tariff	Arab Gulf Imports
Naphtha	Export	Singapore Import	Japan CIF	Singapore Import + Tariff	Singapore Import
Gasoline	Export	Singapore Import	Vietnam Export	Singapore Import + Tariff	Vietnam Export
Jet	Export	Singapore Import	S. China Export - Tariff	Singapore Import + Tariff	S. China Export - Tariff
Diesel	Export	Singapore Import	S. China Export - Tariff	Singapore Import + Tariff	S. China Export - Tariff
Fuel Oil	Export	S. China Export - Tariff	S. China Export - Tariff	Singapore Import + Tariff	S. China Export - Tariff

- Pricing in each location is based on trade analysis.
- Singapore is a major export center and provides the basis for product pricing for most of the Asian region.
- Product prices in China and Japan will reflect the cost of delivered imports.
- Prices in South Korea and Taiwan favor naphtha production.

Regional Product Prices Relative to Singapore

2010 Regional Price Versus Singapore, 2004$/Bbl

	Japan	South Korea	Shanghai China	Taiwan
LPG	3.1	2.5	3.2	2.5
Naphtha	1.6	1.6	2.9	0.9
Gasoline	1.4	-0.4	3.5	-0.2
Jet	1.5	0.1	4.4	0.3
Diesel	1.6	0.1	3.4	0.4
Fuel Oil	-0.2	0.1	2.3	0.2

- **Product pricing in China and Japan will be strongest due to broad product deficits.**
- **Prices in both Japan and China reflect import parity across most products.**
- **Extra incentive is provided for jet production in China due to a slightly higher import tariff of 9%.**
- **Relative to other markets, prices in South Korea and Taiwan favor naphtha production.**

Japan Market Pricing

PRODUCT PRICING

	2000	2005	2010	2015
LPG	30.16	34.33	27.50	30.62
Naphtha	30.24	43.42	34.18	38.78
90 RON Gasoline	32.01	48.03	37.43	42.52
Jet	36.27	50.05	40.09	45.50
0.2% Sulfur Diesel	34.99	49.47	39.69	45.07
0.05% Sulfur Diesel	35.25	50.31	40.14	45.58
Cutter	33.73	48.18	38.26	43.49
3.5% 380 cst Fuel Oil	23.69	27.38	22.36	25.83
Sulfur, $/LT	4.11	4.77	5.29	5.84
Utilities				
Fuel, $/FOE	23.90	27.64	22.54	26.01
Water, $/Mgal	0.50	0.51	0.57	0.63
Catalyst & Chemicals, $	1.00	1.03	1.14	1.25
Electricity, $/Kw-Hr	0.08	0.09	0.09	0.10
Net Dubai HSK Realization	28.42	37.75	30.30	34.57
Net Dubai Cracking Realization	29.68	40.70	32.33	36.78
Net Bonny Light HSK Realization	30.12	41.21	33.21	37.79
Net Bonny Light CRK Realization	31.75	44.77	35.53	40.35

DELIVERED CRUDE COSTS

	2000	2005	2010	2015
Dubai, FOB	**26.24**	**34.82**	**27.76**	**31.81**
Fateh To Yokohama WS100, $/MT	10.11	12.57	12.57	12.57
VLCC Spot Rate, %WS	115.41	131.96	84.80	89.27
Freight Cost, $/MT	11.67	16.59	10.66	11.22
Freight Cost, $/Bbl	1.60	2.28	1.46	1.54
Losses & Insurance	0.14	0.19	0.15	0.17
Credit Float, $/Bbl	(0.02)	(0.01)	(0.01)	(0.01)
Port Fees	0.03	0.03	0.03	0.04
Total Transportation	1.76	2.48	1.63	1.73
Dubai, CIF $/Bbl	**28.00**	**37.30**	**29.39**	**33.54**
Bonny Light, FOB	**28.51**	**38.60**	**30.34**	**34.77**
Bonny To Yokohama WS100, $/MT	16.59	20.65	20.65	20.65
VLCC Spot Rate, %WS	115.41	131.96	84.80	89.27
Freight Cost, $/MT	19.15	27.25	17.51	18.43
Freight Cost, $/Bbl	2.58	3.67	2.36	2.48
Losses & Insurance, $/Bbl	0.16	0.21	0.16	0.19
Credit Float, $/Bbl	0.11	0.09	0.08	0.10
Port Fees, $/Bbl	0.03	0.03	0.03	0.04
Total Transportation, $/Bbl	2.88	4.00	2.64	2.80
Bonny Light, CIF $/Bbl	**31.39**	**42.60**	**32.99**	**37.57**

Shanghai China Market Pricing

PRODUCT PRICING

	2000	2005	2010	2015
LPG	31.06	34.82	27.68	30.39
Naphtha	31.50	45.22	35.57	39.26
90 RON Gasoline	33.85	51.04	39.77	43.90
Jet	39.14	54.14	43.37	47.21
0.2% Sulfur Diesel	36.69	52.05	41.75	46.07
0.05% Sulfur Diesel	36.95	52.89	42.21	46.58
Cutter	35.43	50.76	40.32	44.50
3.5% 380 cst Fuel Oil	26.81	31.15	25.16	28.10
Sulfur, $/LT	4.11	4.77	5.29	5.84
Utilities				
Fuel, $/FOE	23.90	27.64	22.54	26.01
Water, $/Mgal	0.50	0.51	0.57	0.63
Catalyst & Chemicals, $	1.00	1.03	1.14	1.25
Electricity, $/Kw-Hr	0.08	0.09	0.09	0.10
Net Dubai HSK Realization	30.82	40.91	32.73	36.11
Net Dubai Cracking Realization	31.89	43.73	34.67	38.19
Net Bonny Light HSK Realization	32.26	44.11	35.45	39.13
Net Bonny Light CRK Realization	33.66	47.52	37.68	41.53

DELIVERED CRUDE COSTS

	2000	2005	2010	2015
Dubai, FOB	**26.24**	**34.82**	**27.76**	**31.81**
Fateh To Shanghai WS100, $/MT	8.44	10.49	10.49	10.49
VLCC Spot Rate, %WS	115.41	131.96	84.80	89.27
Freight Cost, $/MT	9.74	13.84	8.89	9.36
Freight Cost, $/Bbl	1.34	1.90	1.22	1.29
Losses & Insurance	0.14	0.18	0.14	0.17
Credit Float, $/Bbl	(0.10)	(0.08)	(0.07)	(0.08)
Port Fees	0.03	0.03	0.03	0.04
Total Transportation	1.41	2.04	1.33	1.40
Dubai, CIF $/Bbl	**27.65**	**36.85**	**29.09**	**33.21**
Bonny Light, FOB	**28.51**	**38.60**	**30.34**	**34.77**
Bonny To Shanghai WS100, $/MT	14.69	18.38	18.38	18.38
VLCC Spot Rate, %WS	115.41	131.96	84.80	89.27
Freight Cost, $/MT	16.96	24.25	15.59	16.41
Freight Cost, $/Bbl	2.29	3.27	2.10	2.21
Losses & Insurance, $/Bbl	0.15	0.21	0.16	0.18
Credit Float, $/Bbl	(0.06)	(0.05)	(0.04)	(0.05)
Port Fees, $/Bbl	0.03	0.03	0.03	0.04
Total Transportation, $/Bbl	2.41	3.46	2.25	2.38
Bonny Light, CIF $/Bbl	**30.92**	**42.06**	**32.60**	**37.15**

South Korea Market Pricing

PRODUCT PRICING

	2000	2005	2010	2015
LPG	30.25	34.48	26.86	29.92
Naphtha	30.24	43.42	34.18	38.78
90 RON Gasoline	29.74	45.38	35.34	40.27
Jet	34.52	48.06	38.51	43.80
0.2% Sulfur Diesel	32.72	47.15	37.50	42.68
0.05% Sulfur Diesel	33.36	48.18	38.46	43.76
Cutter	31.46	45.86	36.07	41.10
3.5% 380 cst Fuel Oil	24.02	27.83	22.67	26.15
Sulfur, $/LT	4.11	4.77	5.29	5.84
Utilities				
Fuel, $/FOE	23.90	27.64	22.54	26.01
Water, $/Mgal	0.50	0.51	0.57	0.63
Catalyst & Chemicals, $	1.00	1.03	1.14	1.25
Electricity, $/Kw-Hr	0.08	0.09	0.09	0.10
Net Dubai HSK Realization	27.80	37.13	29.72	33.93
Net Dubai Cracking Realization	28.56	39.48	31.25	35.61
Net Bonny Light HSK Realization	29.25	40.32	32.40	36.91
Net Bonny Light CRK Realization	30.23	43.10	34.07	38.77

DELIVERED CRUDE COSTS

	2000	2005	2010	2015
Dubai, FOB	**26.24**	**34.82**	**27.76**	**31.81**
Fateh To Ulsan WS100, $/MT	8.88	11.04	11.04	11.04
VLCC Spot Rate, %WS	115.41	131.96	84.80	89.27
Freight Cost, $/MT	10.25	14.57	9.36	9.86
Freight Cost, $/Bbl	1.41	2.00	1.29	1.35
Losses & Insurance	0.14	0.18	0.15	0.17
Credit Float, $/Bbl	(0.03)	(0.02)	(0.02)	(0.02)
Port Fees	0.03	0.03	0.03	0.04
Total Transportation	1.55	2.19	1.45	1.53
Dubai, CIF $/Bbl	**27.79**	**37.01**	**29.21**	**33.34**
Bonny Light, FOB	**28.51**	**38.60**	**30.34**	**34.77**
Bonny To Ulsan WS100, $/MT	15.26	19.10	19.10	19.10
VLCC Spot Rate, %WS	115.41	131.96	84.80	89.27
Freight Cost, $/MT	17.62	25.20	16.19	17.05
Freight Cost, $/Bbl	2.37	3.40	2.18	2.30
Losses & Insurance, $/Bbl	0.15	0.21	0.16	0.19
Credit Float, $/Bbl	(0.01)	(0.01)	(0.01)	(0.01)
Port Fees, $/Bbl	0.03	0.03	0.03	0.04
Total Transportation, $/Bbl	2.55	3.63	2.37	2.51
Bonny Light, CIF $/Bbl	**31.06**	**42.23**	**32.72**	**37.28**

Taiwan Market Pricing

PRODUCT PRICING

	2000	2005	2010	2015
LPG	29.57	33.79	26.86	29.92
Naphtha	29.43	42.31	33.28	37.81
90 RON Gasoline	30.05	45.61	35.52	40.47
Jet	34.80	48.33	38.73	44.05
0.2% Sulfur Diesel	33.46	47.67	38.27	43.54
0.05% Sulfur Diesel	33.72	48.51	38.72	44.05
Cutter	32.20	46.38	35.88	40.90
3.5% 380 cst Fuel Oil	24.18	28.04	22.74	26.21
Sulfur, $/LT	4.11	4.77	5.29	5.84
Utilities				
Fuel, $/FOE	23.90	27.64	22.54	26.01
Water, $/Mgal	0.50	0.51	0.57	0.63
Catalyst & Chemicals, $	1.00	1.03	1.14	1.25
Electricity, $/Kw-Hr	0.08	0.09	0.09	0.10
Net Dubai HSK Realization	27.91	37.15	29.77	33.98
Net Dubai Cracking Realization	28.73	39.57	31.41	35.78
Net Bonny Light HSK Realization	29.38	40.34	32.47	36.99
Net Bonny Light CRK Realization	30.47	43.24	34.29	39.02

DELIVERED CRUDE COSTS

	2000	2005	2010	2015
Dubai, FOB	**26.24**	**34.82**	**27.76**	**31.81**
Fateh To Kaoshung WS100, $/MT	7.99	9.93	9.93	9.93
VLCC Spot Rate, %WS	115.41	131.96	84.80	89.27
Freight Cost, $/MT	9.22	13.11	8.43	8.87
Freight Cost, $/Bbl	1.27	1.80	1.16	1.22
Losses & Insurance	0.14	0.18	0.14	0.17
Credit Float, $/Bbl	(0.05)	(0.04)	(0.04)	(0.05)
Port Fees	0.03	0.03	0.03	0.04
Total Transportation	1.38	1.97	1.30	1.38
Dubai, CIF $/Bbl	**27.62**	**36.79**	**29.06**	**33.18**
Bonny Light, FOB	**28.51**	**38.60**	**30.34**	**34.77**
Bonny To Kaoshung WS100, $/MT	14.12	17.66	17.66	17.66
VLCC Spot Rate, %WS	115.41	131.96	84.80	89.27
Freight Cost, $/MT	16.30	23.31	14.98	15.77
Freight Cost, $/Bbl	2.20	3.14	2.02	2.13
Losses & Insurance, $/Bbl	0.15	0.21	0.16	0.18
Credit Float, $/Bbl	(0.01)	(0.01)	(0.01)	(0.01)
Port Fees, $/Bbl	0.03	0.03	0.03	0.04
Total Transportation, $/Bbl	2.37	3.37	2.21	2.34
Bonny Light, CIF $/Bbl	**30.88**	**41.97**	**32.55**	**37.10**

Asian Refining Values

- SCO
- SynSynBit
- SynBit
- Notes
  - 2004 and 2005 price differentials are viewed as an anomaly due to strong Atlantic Basin prices for crude oil and record light/heavy price differentials.
  - Longer term, restoration of Far East premium and somewhat narrower light/heavy price differentials expected.

Crude Oil Price Outlook

- **Crude oil prices and light heavy differentials are expected to return to sustainable levels based on industry fundamentals.**

BENCHMARK CRUDE OIL PRICE FORECAST (1)

U.S. $/Bbl

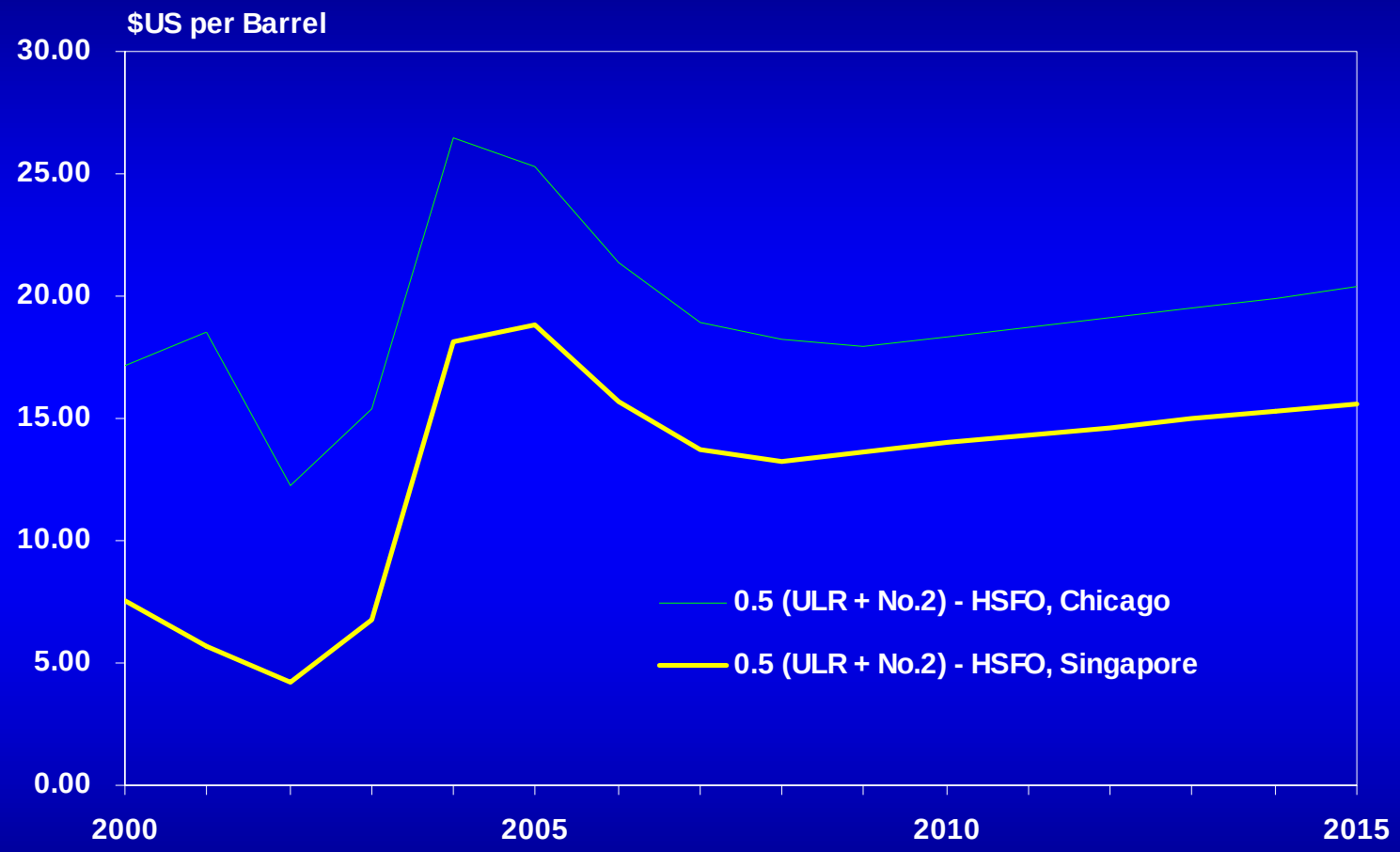
	2000	2001	2002	2003	2004	2005	2010	2015
Tapis, FOB	29.85	25.32	25.72	30.06	41.19	42.06	32.50	37.06
Brent, FOB	28.50	24.44	25.02	28.83	38.27	38.50	29.89	34.23
WTI, Spot Cushing	30.37	25.93	26.16	31.06	41.49	41.32	32.24	36.84
Bonny Light FOB	28.51	24.52	25.14	28.77	38.30	38.60	30.34	34.77
Bonny Light, CIF Japan	31.39	26.56	26.70	31.60	42.90	42.60	32.99	37.57
Bonny Light, CIF South Korea	31.06	26.34	26.55	31.36	42.50	42.23	32.72	37.28
Bonny Light, CIF Shanghai	30.92	26.25	26.48	31.25	42.32	42.06	32.60	37.15
Bonny Light, CIF Taiwan	30.88	26.21	26.46	31.18	42.20	41.97	32.55	37.10
Dubai, FOB	26.24	22.80	23.85	26.76	33.69	34.82	27.76	31.81
Dubai, CIF Japan	28.00	24.07	24.83	28.53	36.55	37.30	29.39	33.54
Dubai, CIF South Korea	27.79	23.93	24.73	28.33	36.22	37.01	29.21	33.34
Dubai, CIF Shanghai	27.65	23.83	24.66	28.23	36.06	36.85	29.09	33.21
Dubai, CIF Taiwan	27.62	23.81	24.64	28.18	35.97	36.79	29.06	33.18

Note: (1) Purvin & Gertz January 2005 Crude Oil Price Forecast.

Longer Term Price Outlook for Light/Heavy Differentials Relative to 2004-2005

- Forecast prices reflect shift from 2004 and 2005, considered unusual relative to history and the longer term outlook.
- Very wide light/heavy price differentials occurred in 2004 and 2005. Future differentials expected to be higher than 1995 – 2003 period, but narrower than occurred in 2004 and 2005.
- Asian differentials did not widen as much in 2004 as in the US, but will likely remain wider than historical because HSFO growth will be less than other products.
- Far East crude price premium did not occur in 2004, driven by strong Atlantic basin demand for crude oil. This premium is expected to return as the Far East continues to experience strong demand growth.
- Tanker rates jumped in 2004, aggravating prices of HSFO in the US versus Asia and contributing to wider light/heavy price differentials. New tanker capacity coming on stream in next several years should bring tanker rates down somewhat closer to historical levels.

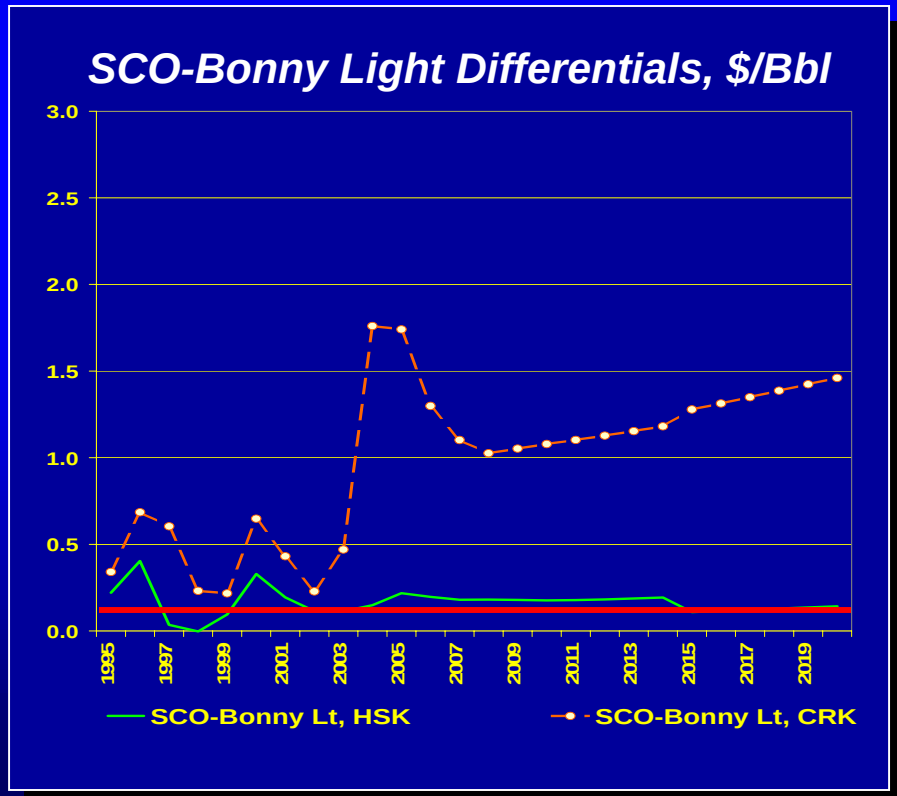
Product Heavy/Light Spread



- **Both markets are expected to have wider light/heavy price differentials in the future than experienced prior to 2004.**

SCO Refining Values: Shanghai China

- Refinery cracking operations forecast to favor SCO over Bonny Light due to the low vacuum residue.
- SCO is further differentiated by FCC cracking economics due to its relatively high VGO content.

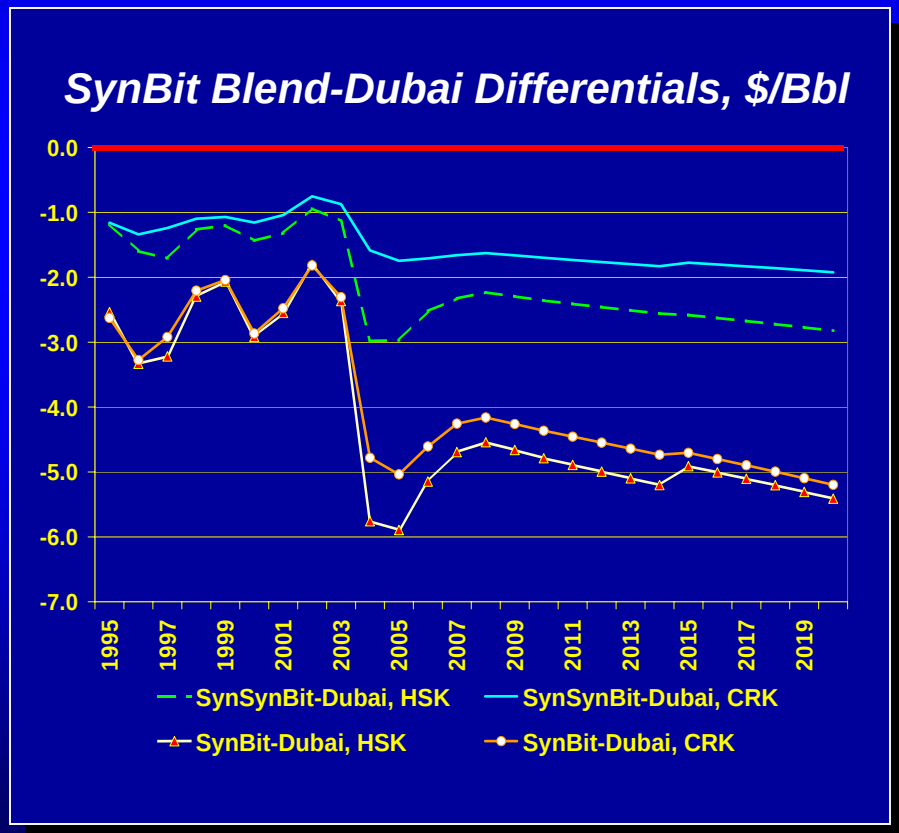


SCO SHANGHAI REFINING VALUE

	2000	2005	2010	2015
Bonny Light, CIF	30.92	42.06	32.60	37.15
Bonny Light HSK Realization	32.25	43.96	35.34	39.03
SCO HSK Realization	32.58	44.18	35.51	39.14
HSK Refining Value Differential	(0.33)	(0.22)	(0.18)	(0.11)
Bonny Light CRK Realization	33.66	47.52	37.68	41.23
SCO CRK Realization	34.31	49.26	38.75	42.51
CRK Refining Value Differential	(0.65)	(1.74)	(1.08)	(1.28)
SCO HSK Value, CIF	31.25	42.28	32.77	37.26
SCO CRK Value, CIF	31.57	43.80	33.68	38.43

Bitumen Blend Refining Values: Shanghai China

- Chinese import tariffs will widen the light-heavy differential slightly.
- Import tariffs are assumed to decline by 50% in 2015.

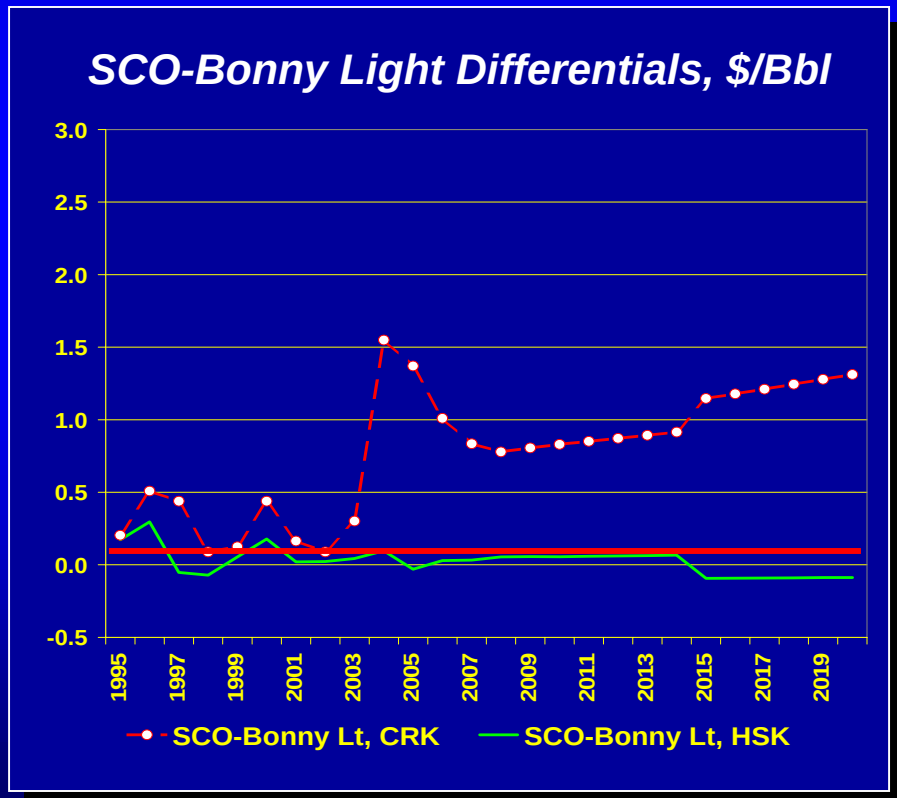


BITUMEN BLEND SHANGHAI REFINING VALUE

	2000	2005	2010	2015
Dubai, CIF	27.65	36.85	29.09	33.21
Dubai HSK Realization	30.81	40.74	32.61	35.81
SynSynBit HSK Realization	29.79	38.20	30.72	33.75
SynSynBit TAN Penalty	(0.42)	(0.43)	(0.47)	(0.52)
HSK Refining Value Differential	1.44	2.97	2.36	2.58
Dubai CRK Realization	31.89	43.73	34.67	38.03
SynSynBit CRK Realization	31.15	42.41	33.44	36.77
SynSynBit TAN Penalty	(0.42)	(0.43)	(0.47)	(0.52)
CRK Refining Value Differential	1.16	1.75	1.70	1.77
SynSynBit HSK Value, CIF	**26.21**	**33.88**	**26.73**	**30.63**
SynSynBit CRK Value, CIF	**26.49**	**35.11**	**27.39**	**31.44**
Dubai HSK Realization	30.81	40.74	32.61	35.81
SynBit HSK Realization	28.50	35.46	28.50	31.65
SynBit TAN Penalty	(0.60)	(0.62)	(0.68)	(0.75)
HSK Refining Value Differential	2.92	5.89	4.79	4.91
Dubai CRK Realization	31.89	43.73	34.67	38.03
SynBit CRK Realization	29.62	39.31	30.99	34.07
SynBit TAN Penalty	(0.60)	(0.62)	(0.68)	(0.75)
CRK Refining Value Differential	2.87	5.04	4.36	4.70
SynBit HSK Value, CIF	**24.73**	**30.96**	**24.30**	**28.30**
SynBit CRK Value, CIF	**24.78**	**31.82**	**24.72**	**28.51**

SCO Refining Values: South Korea

- The relative value of SCO is expected to increase as low sulfur diesel specifications are implemented (in 2015 below).
- The robust outlook for light-heavy differentials will favor lighter crudes.

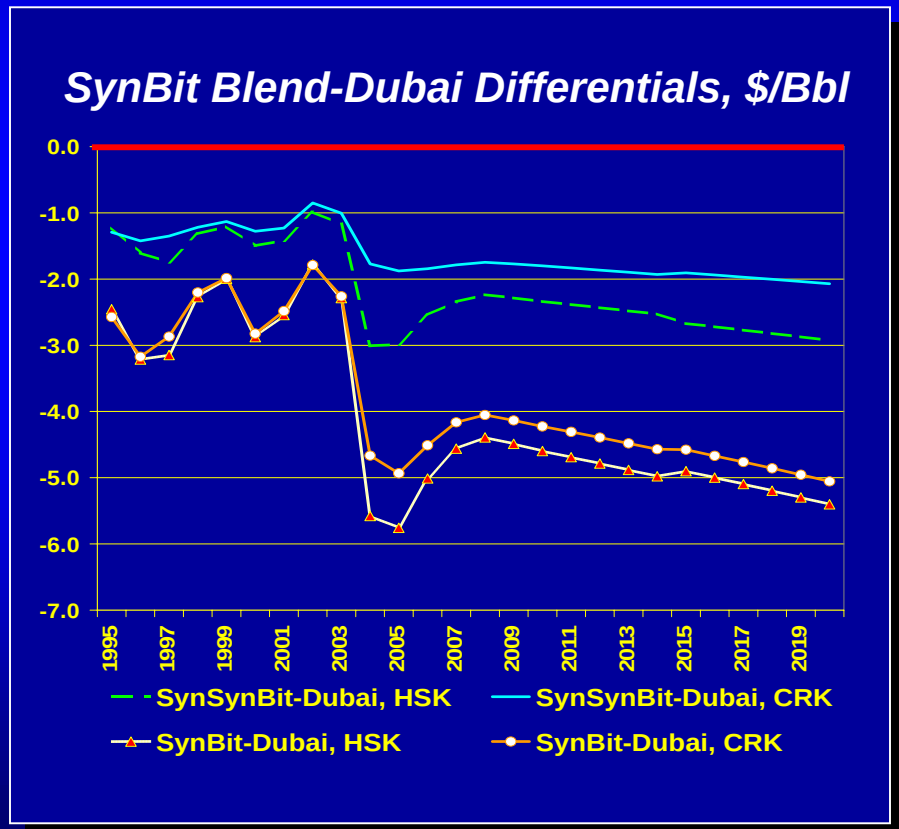


SCO SOUTH KOREA REFINING VALUE

	2000	2005	2010	2015
Bonny Light, CIF	31.06	42.23	32.72	37.28
Bonny Light HSK Realization	29.25	40.19	32.30	36.95
SCO HSK Realization	29.43	40.16	32.35	36.85
HSK Refining Value Differential	(0.18)	0.03	(0.06)	0.09
Bonny Light CRK Realization	30.23	43.10	34.07	38.54
SCO CRK Realization	30.66	44.47	34.90	39.69
CRK Refining Value Differential	(0.44)	(1.37)	(0.83)	(1.15)
SCO HSK Value, CIF	31.24	42.20	32.77	37.18
SCO CRK Value, CIF	31.50	43.60	33.55	38.42

Bitumen Blend Refining Values: South Korea

- **Refining value differentials in South Korea are very similar to Shanghai China.**

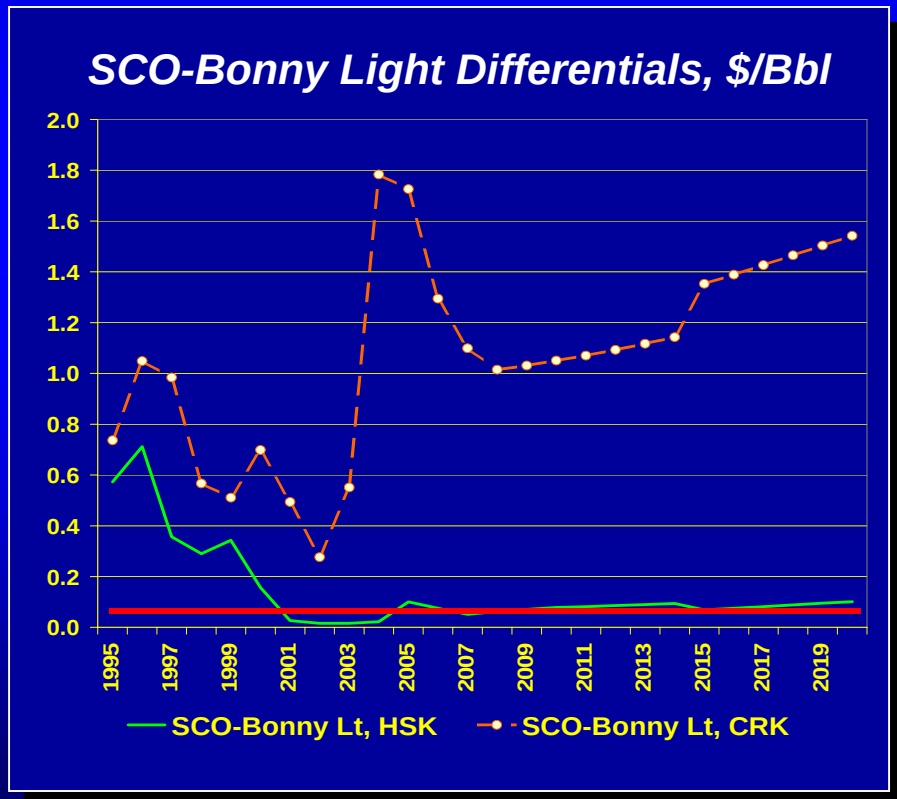


BITUMEN BLEND SOUTH KOREA REFINING VALUE

	2000	2005	2010	2015
Dubai, CIF	27.79	37.01	29.21	33.34
Dubai HSK Realization	27.80	36.99	29.61	33.81
SynSynBit HSK Realization	26.72	34.43	27.74	31.66
SynSynBit TAN Penalty	(0.42)	(0.43)	(0.47)	(0.52)
HSK Refining Value Differential	1.50	2.99	2.34	2.67
Dubai CRK Realization	28.56	39.48	31.25	35.63
SynSynBit CRK Realization	27.70	38.03	29.92	34.24
SynSynBit TAN Penalty	(0.42)	(0.43)	(0.47)	(0.52)
CRK Refining Value Differential	1.28	1.88	1.80	1.91
SynSynBit HSK Value, CIF	**26.29**	**34.02**	**26.87**	**30.67**
SynSynBit CRK Value, CIF	**26.51**	**35.14**	**27.40**	**31.44**
Dubai HSK Realization	27.80	36.99	29.61	33.81
SynBit HSK Realization	25.53	31.85	25.69	29.66
SynBit TAN Penalty	(0.60)	(0.62)	(0.68)	(0.75)
HSK Refining Value Differential	2.88	5.76	4.60	4.90
Dubai CRK Realization	28.56	39.48	31.25	35.63
SynBit CRK Realization	26.34	35.17	27.71	31.80
SynBit TAN Penalty	(0.60)	(0.62)	(0.68)	(0.75)
CRK Refining Value Differential	2.82	4.93	4.22	4.58
SynBit HSK Value, CIF	**24.91**	**31.25**	**24.61**	**28.44**
SynBit CRK Value, CIF	**24.96**	**32.08**	**24.98**	**28.77**

SCO Refining Values: Japan

- While product pricing is Japan is relatively strong, the differential between light and heavy products is similar to other Asian countries.

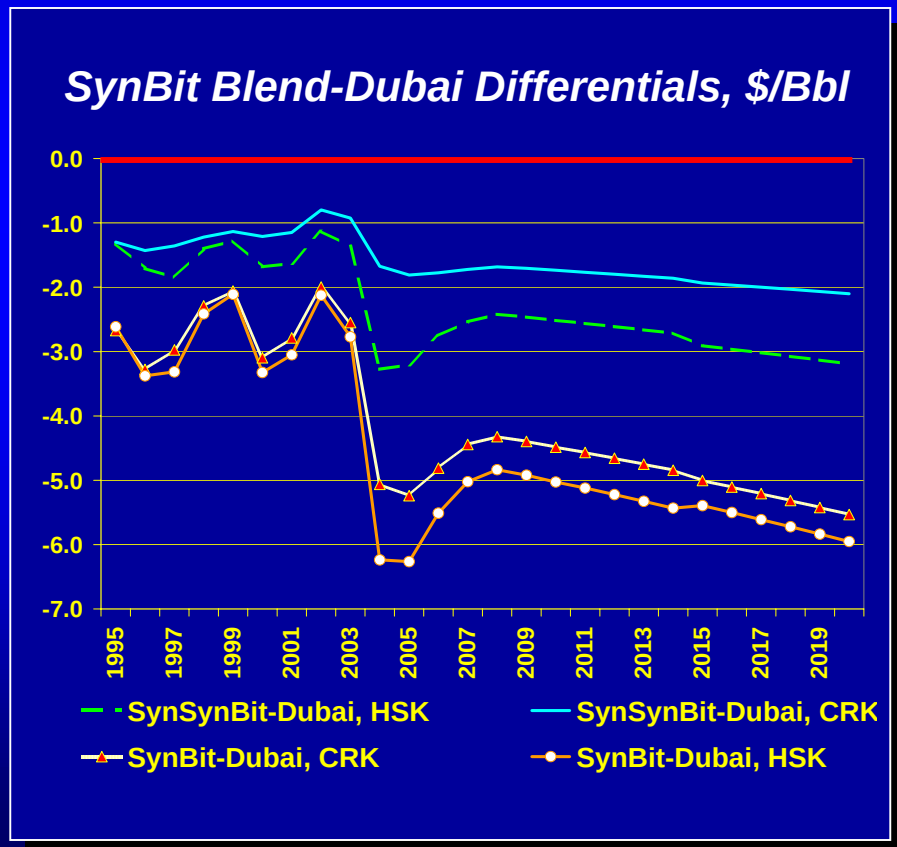


SCO JAPAN REFINING VALUE

	2000	2005	2010	2015
Bonny Light, CIF	31.39	42.60	32.99	37.57
Bonny Light HSK Realization	30.12	41.21	33.21	37.82
SCO HSK Realization	30.27	41.32	33.29	37.89
HSK Refining Value Differential	(0.16)	(0.10)	(0.08)	(0.07)
Bonny Light CRK Realization	31.75	44.77	35.53	40.04
SCO CRK Realization	32.45	46.49	36.58	41.39
CRK Refining Value Differential	(0.70)	(1.73)	(1.05)	(1.35)
SCO HSK Value, CIF	31.54	42.70	33.06	37.64
SCO CRK Value, CIF	32.09	44.33	34.04	38.92

Bitumen Blend Refining Values: Japan

- **While product pricing is Japan is relatively strong, the differential between light and heavy products is similar to other Asian countries.**

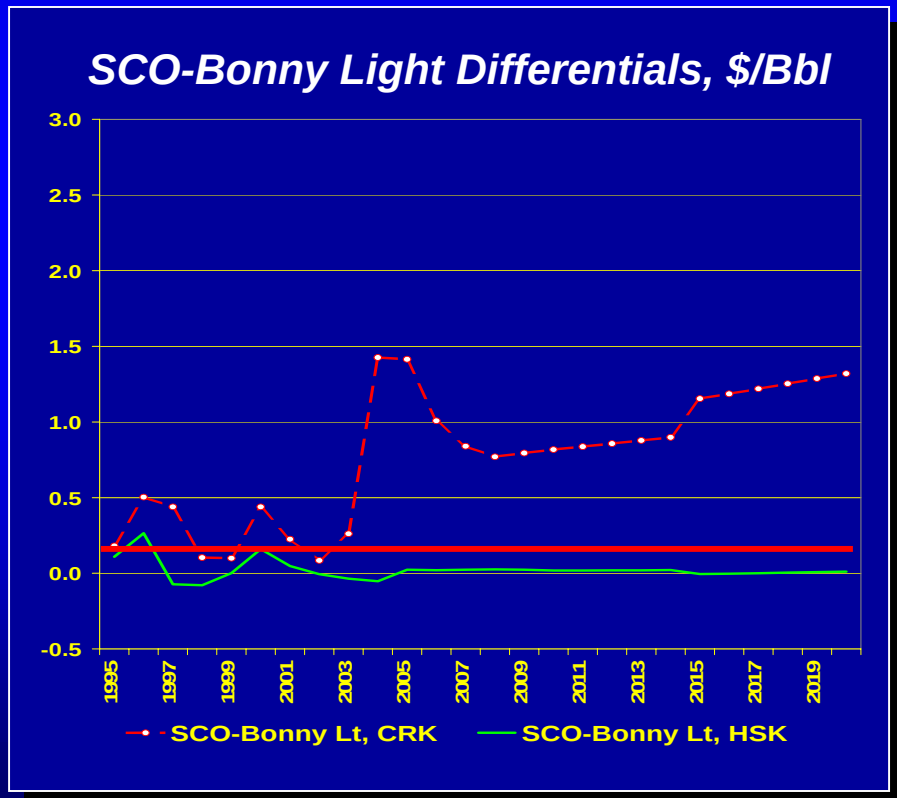


BITUMEN BLEND JAPAN REFINING VALUE

	2000	2005	2010	2015
Dubai, CIF	28.00	37.30	29.39	33.54
Dubai HSK Realization	28.42	37.60	30.20	34.36
SynSynBit HSK Realization	27.15	34.82	28.16	31.97
SynSynBit TAN Penalty	(0.42)	(0.43)	(0.47)	(0.52)
HSK Refining Value Differential	1.68	3.21	2.51	2.91
Dubai CRK Realization	29.68	40.70	32.33	36.70
SynSynBit CRK Realization	28.89	39.31	31.07	35.29
SynSynBit TAN Penalty	(0.42)	(0.43)	(0.47)	(0.52)
CRK Refining Value Differential	1.21	1.81	1.74	1.93
SynSynBit HSK Value, CIF	**26.31**	**34.09**	**26.88**	**30.63**
SynSynBit CRK Value, CIF	**26.79**	**35.49**	**27.66**	**31.61**
Dubai HSK Realization	28.42	37.60	30.20	34.36
SynBit HSK Realization	25.69	31.95	25.85	29.71
SynBit TAN Penalty	(0.60)	(0.62)	(0.68)	(0.75)
HSK Refining Value Differential	3.33	6.27	5.03	5.39
Dubai CRK Realization	29.68	40.70	32.33	36.70
SynBit CRK Realization	27.19	36.07	28.53	32.45
SynBit TAN Penalty	(0.60)	(0.62)	(0.68)	(0.75)
CRK Refining Value Differential	3.10	5.24	4.49	5.00
SynBit HSK Value, CIF	**24.67**	**31.03**	**24.36**	**28.15**
SynBit CRK Value, CIF	**24.90**	**32.06**	**24.91**	**28.54**

SCO Refining Values: Taiwan

- Export pricing in Taiwan reduces the premium of SCO over Bonny Light.

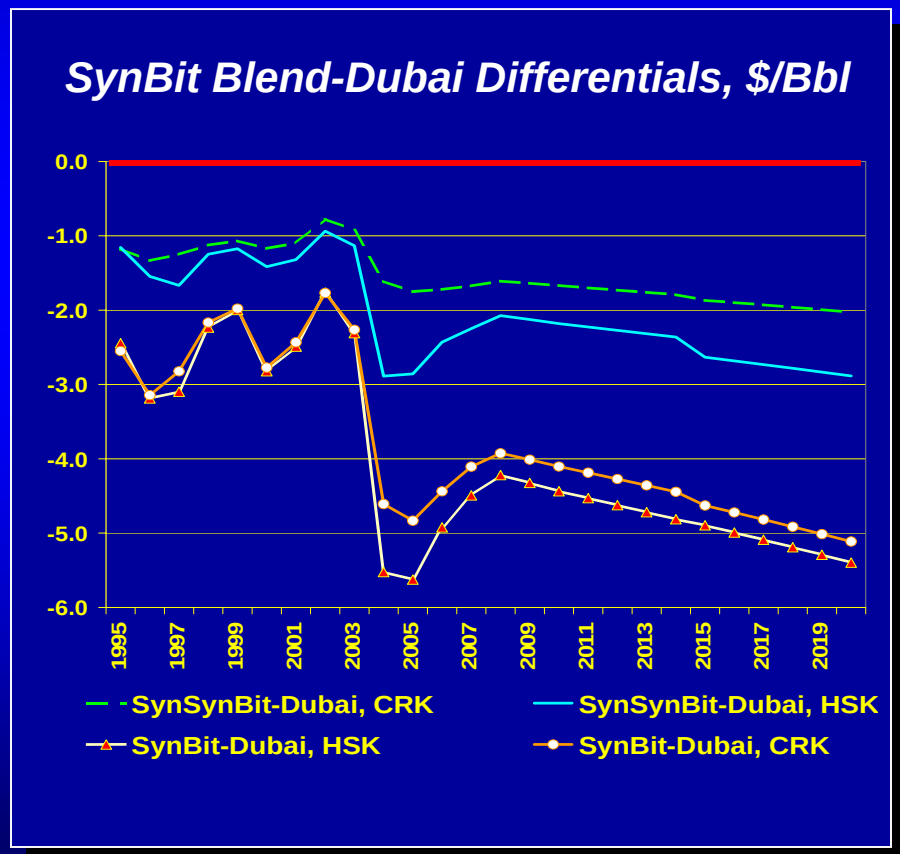


SCO TAIWAN REFINING VALUE

	2000	2005	2010	2015
Bonny Light, CIF	30.88	41.97	32.55	37.10
Bonny Light HSK Realization	29.38	40.22	32.38	36.91
SCO HSK Realization	29.54	40.24	32.40	36.90
HSK Refining Value Differential	(0.16)	(0.02)	(0.02)	0.01
Bonny Light CRK Realization	30.47	43.24	34.29	38.68
SCO CRK Realization	30.91	44.65	35.11	39.84
CRK Refining Value Differential	(0.44)	(1.41)	(0.82)	(1.15)
SCO HSK Value, CIF	31.04	42.00	32.57	37.10
SCO CRK Value, CIF	31.32	43.39	33.37	38.26

Bitumen Blend Refining Values: Taiwan

- **The relative value of Canadian bitumen blends will be adversely affected by fuel oil export pricing.**



BITUMEN BLEND TAIWAN REFINING VALUE

	2000	2005	2010	2015
Dubai, CIF	27.62	36.79	29.06	33.18
Dubai HSK Realization	27.91	37.02	29.67	33.76
SynSynBit HSK Realization	26.91	34.59	27.96	31.65
SynSynBit TAN Penalty	(0.42)	(0.43)	(0.47)	(0.52)
HSK Refining Value Differential	1.41	2.86	2.18	2.63
Dubai CRK Realization	28.73	39.57	31.41	35.67
SynSynBit CRK Realization	27.97	38.24	30.21	34.32
SynSynBit TAN Penalty	(0.42)	(0.43)	(0.47)	(0.52)
CRK Refining Value Differential	1.17	1.75	1.67	1.87
SynSynBit HSK Value, CIF	**26.21**	**33.93**	**26.88**	**30.55**
SynSynBit CRK Value, CIF	**26.45**	**35.04**	**27.39**	**31.32**
Dubai HSK Realization	27.91	37.02	29.67	33.76
SynBit HSK Realization	25.69	32.01	25.91	29.62
SynBit TAN Penalty	(0.60)	(0.62)	(0.68)	(0.75)
HSK Refining Value Differential	2.82	5.63	4.44	4.89
Dubai CRK Realization	28.73	39.57	31.41	35.67
SynBit CRK Realization	26.55	35.35	27.98	31.79
SynBit TAN Penalty	(0.60)	(0.62)	(0.68)	(0.75)
CRK Refining Value Differential	2.77	4.83	4.10	4.63
SynBit HSK Value, CIF	**24.80**	**31.16**	**24.62**	**28.29**
SynBit CRK Value, CIF	**24.85**	**31.96**	**24.95**	**28.56**

Edmonton Netback Pricing Results

- **Netback Crude Prices**
  - **Asia**
  - **Chicago**
- **Netback Product Prices at Edmonton, Alberta**
  - **Based on proposed new pipeline from Edmonton to Kitimat, and VLCC shipments to Asia**
  - **Compared to existing Taresen crude oil line to Vancouver, and LR1 tanker shipments to Asia.**

Asian Versus Chicago Market Product Pricing

2010 Regional Price Versus Chicago, 2004$/Bbl

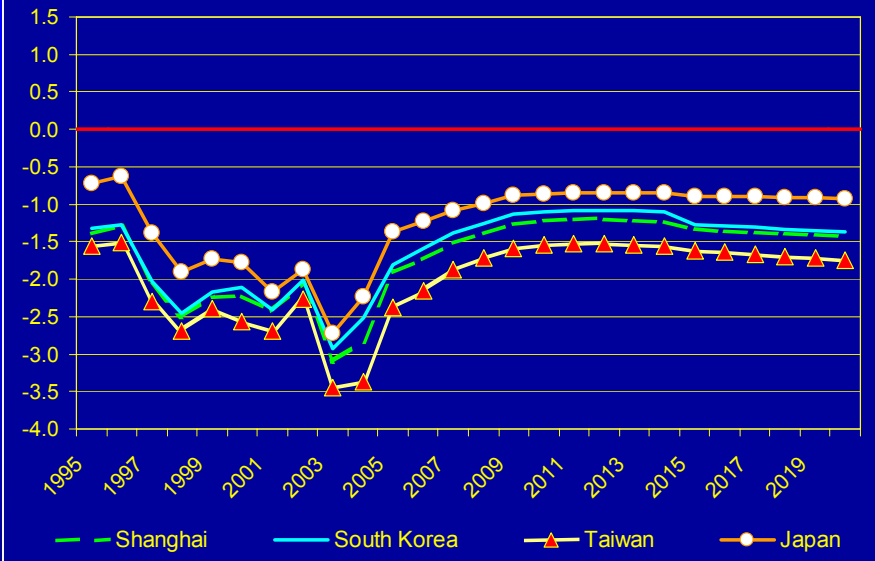
	Japan	South Korea	Shanghai China	Taiwan
LPG	0.7	0.1	0.8	0.1
Gasoline	-0.7	-2.5	1.4	-2.4
Jet	1.9	0.5	4.8	0.7
Diesel	2.6	1.1	4.4	1.3
Fuel Oil	3.2	3.5	5.7	3.5

- Fuel oil prices are significantly higher in Asia, which provides greater support for refinery fuel oil production in Asia.
- North American pricing favors gasoline production, while Asian pricing favors jet and diesel production.
- Chicago pricing is largely reflective of refinery FCC cracking economics.

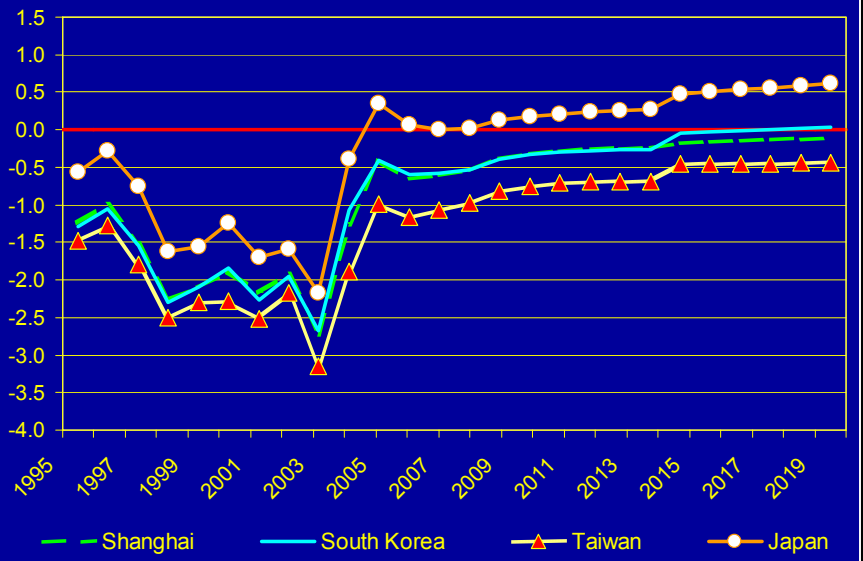
SCO Asian Netbacks At Edmonton VLCC

- **Asian hydroskimming netbacks are projected to be slightly below Chicago netbacks at Edmonton.**

Asian Hydroskimming Versus Chicago Netback, (U.S. $/Bbl)



Asian Cracking Versus Chicago Netback (U.S. $/Bbl)



SCO Asian Netbacks At Edmonton: Detail

- **Cracking netbacks are roughly $1.20/Bbl higher than hydroskimming netbacks. This is due to the relatively high VGO content of SCO.**

Asian Hydroskimming Netback (U.S. $/Bbl)

	2000	2005	2010	2015
SCO, Japan CIF	31.54	42.61	32.99	37.55
SCO, South Korea, CIF	31.24	42.20	32.77	37.18
SCO, Shanghai CIF	31.25	42.28	32.77	37.26
SCO, Taiwan CIF	31.04	42.00	32.57	37.10
Spot VLCC Rate, %WS	136.11	162.95	100.98	104.72
Total Waterborne Transportation Costs				
Kitimat to Yokohama	1.18	1.77	1.15	1.22
Kitimat to South Korea	1.20	1.80	1.18	1.25
Kitimat to Shanghai	1.33	1.98	1.29	1.37
Kitimat to Kaoshung	1.46	2.16	1.41	1.50
Pipeline Costs - Enbridge Tariff	1.85	1.85	1.92	2.07
Edmonton Netbacks, VLCC/Enbridge				
From Japan	**28.51**	**38.99**	**29.92**	**34.26**
From South Korea	**28.18**	**38.55**	**29.67**	**33.87**
From Shanghai	**28.07**	**38.45**	**29.56**	**33.82**
From Taiwan	**27.73**	**37.98**	**29.24**	**33.53**
From Chicago	30.29	40.36	30.78	35.15
Edmonton Netbacks, LR1/TMPL				
From Japan	28.19	38.71	29.84	34.20
From South Korea	27.84	38.25	29.58	33.80
From Shanghai	27.62	38.06	29.41	33.69
From Taiwan	27.17	37.50	29.01	33.33

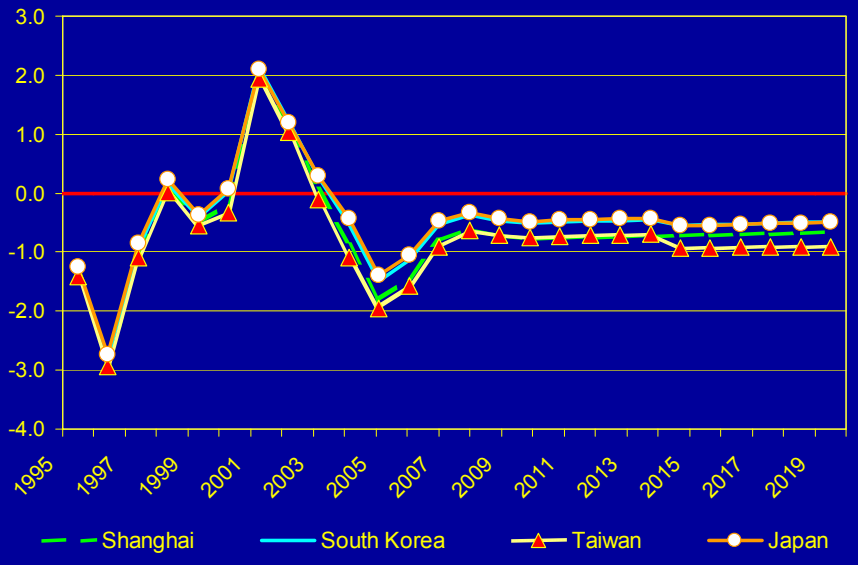
Asian Cracking Netback (U.S. $/Bbl)

	2000	2005	2010	2015
SCO, Japan CIF	32.09	44.33	34.04	38.92
SCO, South Korea, CIF	31.50	43.60	33.55	38.42
SCO, Shanghai CIF	31.57	43.80	33.68	38.43
SCO, Taiwan CIF	31.32	43.39	33.37	38.26
Spot VLCC Rate, %WS	136.11	162.95	100.98	104.72
Total Waterborne Transportation Costs				
Kitimat to Yokohama	1.18	1.77	1.16	1.23
Kitimat to South Korea	1.21	1.80	1.18	1.25
Kitimat to Shanghai	1.32	2.00	1.29	1.37
Kitimat to Kaoshung	1.46	2.17	1.42	1.50
Pipeline Costs - Enbridge Tariff	1.85	1.85	1.92	2.07
Edmonton Netbacks, VLCC/Enbridge				
From Japan	**29.05**	**40.71**	**30.96**	**35.63**
From South Korea	**28.44**	**39.95**	**30.45**	**35.11**
From Shanghai	**28.40**	**39.95**	**30.46**	**34.99**
From Taiwan	**28.01**	**39.37**	**30.03**	**34.69**
From Chicago	30.29	40.36	30.78	35.15
Edmonton Netbacks, LR1/TMPL				
From Japan	28.74	40.42	30.88	35.57
From South Korea	28.10	39.64	30.36	35.04
From Shanghai	27.95	39.56	30.31	34.85
From Taiwan	27.45	38.89	29.81	34.48

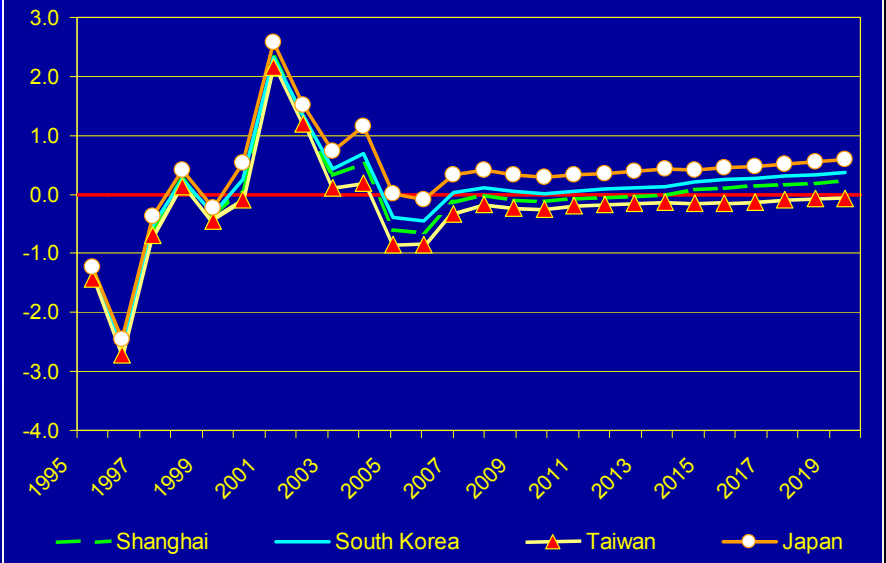
SynSynBit Asian Netbacks At Edmonton

- Chicago netbacks are largely based on FCC cracking economics.
- Despite the relative strength of the Asian fuel oil market, Asian hydroskimming netbacks are projected to be slightly weaker than Chicago netbacks at Edmonton.

Asian Hydroskimming Versus Chicago Netback, (U.S. $/Bbl)



Asian Cracking Versus Chicago Netback (U.S. $/Bbl)



SynSynBit Asian Netbacks At Edmonton: Detail

- **Asian cracking netbacks are roughly $1/Bbl higher than hydroskimming.**

Asian Hydroskimming Netback (U.S. $/Bbl)

	2000	2005	2010	2015
SynSynBit, Japan CIF	26.31	34.09	26.88	30.63
SynSynBit, South Korea, CIF	26.29	34.02	26.87	30.67
SynSynBit, Shanghai CIF	26.21	33.88	26.73	30.63
SynSynBit, Taiwan CIF	26.21	33.93	26.88	30.55
Spot VLCC Rate, %WS	136.11	162.95	100.98	104.72
Total Waterborne Transportation Costs				
Kitimat to Yokohama	1.21	1.80	1.18	1.25
Kitimat to South Korea	1.24	1.84	1.20	1.27
Kitimat to Shanghai	1.37	2.02	1.32	1.40
Kitimat to Kaoshung	1.50	2.21	1.44	1.53
Pipeline Costs - Enbridge Tariff	1.85	1.85	1.92	2.07
Edmonton Netbacks, VLCC/Enbridge				
From Japan	**23.25**	**30.44**	**23.78**	**27.32**
From South Korea	**23.20**	**30.34**	**23.75**	**27.33**
From Shanghai	**22.99**	**30.01**	**23.49**	**27.17**
From Taiwan	**22.85**	**29.87**	**23.51**	**26.95**
From Chicago	23.18	31.83	24.26	27.88
Edmonton Netbacks, LR1/TMPL				
From Japan	22.89	30.13	23.68	27.24
From South Korea	22.83	30.00	23.63	27.24
From Shanghai	22.50	29.59	23.31	27.01
From Taiwan	22.25	29.35	23.26	26.72

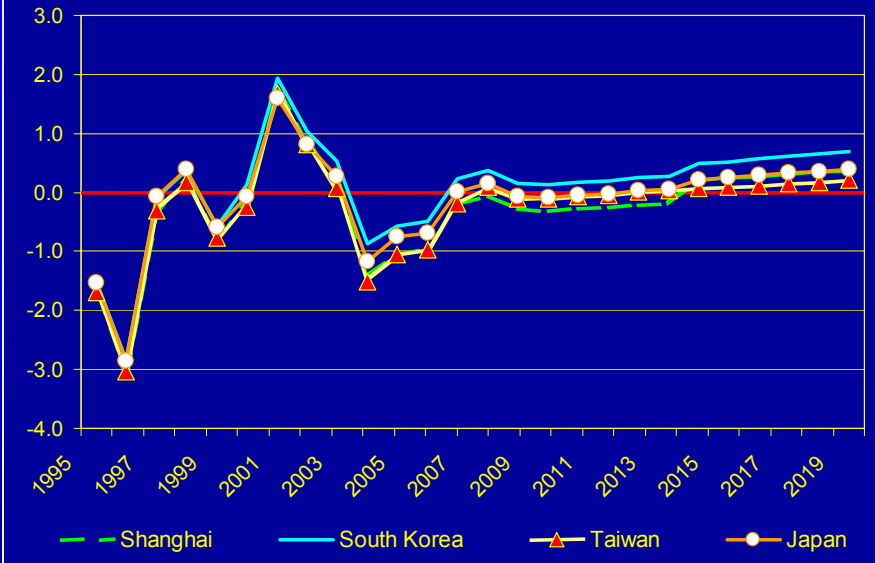
Asian Cracking Netback (U.S. $/Bbl)

	2000	2005	2010	2015
SynSynBit, Japan CIF	26.79	35.49	27.66	31.61
SynSynBit, South Korea, CIF	26.51	35.14	27.40	31.44
SynSynBit, Shanghai CIF	26.49	35.11	27.39	31.44
SynSynBit, Taiwan CIF	26.45	35.04	27.39	31.32
Spot VLCC Rate, %WS	136.11	162.95	100.98	104.72
Total Waterborne Transportation Costs				
Kitimat to Yokohama	1.22	1.80	1.18	1.25
Kitimat to South Korea	1.24	1.84	1.20	1.27
Kitimat to Shanghai	1.37	2.02	1.32	1.40
Kitimat to Kaoshung	1.50	2.22	1.45	1.53
Pipeline Costs - Enbridge Tariff	1.85	1.85	1.92	2.07
Edmonton Netbacks, VLCC/Enbridge				
From Japan	**23.72**	**31.83**	**24.56**	**28.29**
From South Korea	**23.42**	**31.45**	**24.28**	**28.10**
From Shanghai	**23.27**	**31.24**	**24.15**	**27.97**
From Taiwan	**23.10**	**30.97**	**24.02**	**27.72**
From Chicago	23.18	31.83	24.26	27.88
Edmonton Netbacks, LR1/TMPL				
From Japan	23.36	31.52	24.45	28.21
From South Korea	23.05	31.11	24.17	28.00
From Shanghai	22.78	30.81	23.96	27.81
From Taiwan	22.49	30.46	23.77	27.48

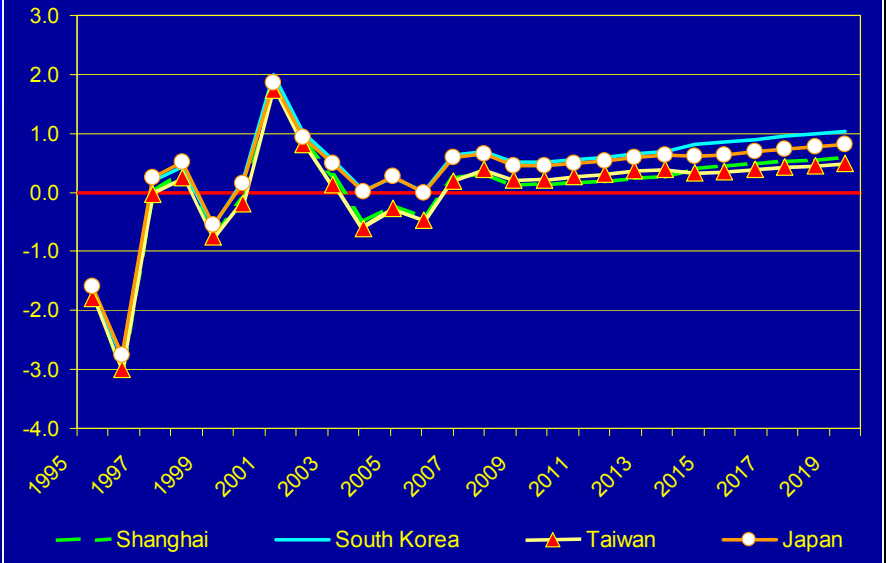
SynBit Asian Netbacks At Edmonton

- **SynBit valuations are more dependent on fuel oil pricing, which is significantly higher in Asia.**

Asian Hydroskimming Versus Chicago Netback, (U.S. $/Bbl)



Asian Cracking Versus Chicago Netback (U.S. $/Bbl)



SynBit Asian Netbacks At Edmonton: Detail

- **Cracking mode valuations are roughly $0.50/Bbl higher.**
- **Demand for SynBit in Asia, however, is expected to be limited.**

Asian Hydroskimming Netback (U.S. $/Bbl)

	2000	2005	2010	2015
SynBit, Japan CIF	24.67	31.03	24.36	28.15
SynBit, South Korea, CIF	24.91	31.25	24.61	28.44
SynBit, Shanghai CIF	24.73	30.96	24.30	28.30
SynBit, Taiwan CIF	24.80	31.16	24.62	28.29
Spot VLCC Rate, %WS	136.11	162.95	100.98	104.72
Total Waterborne Transportation Costs				
Kitimat to Yokohama	1.28	1.89	1.23	1.31
Kitimat to South Korea	1.30	1.93	1.26	1.33
Kitimat to Shanghai	1.44	2.12	1.38	1.47
Kitimat to Kaoshung	1.58	2.32	1.52	1.60
Pipeline Costs - Enbridge Tarif	1.85	1.85	1.92	2.07
Edmonton Netbacks, VLCC/Enbridge				
From Japan	**21.54**	**27.29**	**21.21**	**24.77**
From South Korea	**21.76**	**27.48**	**21.43**	**25.04**
From Shanghai	**21.44**	**26.99**	**20.99**	**24.77**
From Taiwan	**21.37**	**26.99**	**21.18**	**24.62**
From Chicago	**21.62**	**28.04**	**21.30**	**24.55**
Edmonton Netbacks, LR1/TMPL				
From Japan	21.12	26.93	21.07	24.66
From South Korea	21.32	27.09	21.28	24.91
From Shanghai	20.88	26.51	20.77	24.56
From Taiwan	20.68	26.41	20.89	24.34

Asian Cracking Netback (U.S. $/Bbl)

	2000	2005	2010	2015
SynBit, Japan CIF	24.90	32.06	24.91	28.54
SynBit, South Korea, CIF	24.96	32.08	24.98	28.77
SynBit, Shanghai CIF	24.78	31.82	24.72	28.51
SynBit, Taiwan CIF	24.85	31.96	24.95	28.56
Spot VLCC Rate, %WS	136.11	162.95	100.98	104.72
Total Waterborne Transportation Costs				
Kitimat to Yokohama	1.28	1.89	1.23	1.31
Kitimat to South Korea	1.30	1.93	1.26	1.33
Kitimat to Shanghai	1.43	2.14	1.38	1.47
Kitimat to Kaoshung	1.58	2.33	1.52	1.61
Pipeline Costs - Enbridge Tariff	1.85	1.85	1.92	2.07
Edmonton Netbacks, VLCC/Enbridge				
From Japan	**21.77**	**28.32**	**21.75**	**25.16**
From South Korea	**21.81**	**28.30**	**21.80**	**25.37**
From Shanghai	**21.50**	**27.82**	**21.42**	**24.97**
From Taiwan	**21.42**	**27.78**	**21.51**	**24.88**
From Chicago	21.62	28.04	21.30	24.55
Edmonton Netbacks, LR1/TMPL				
From Japan	21.35	27.95	21.61	25.04
From South Korea	21.37	27.91	21.65	25.23
From Shanghai	20.94	27.34	21.20	24.77
From Taiwan	20.73	27.20	21.22	24.60

NETBACK VALUES OF OIL SANDS CRUDES DELIVERED TO JAPAN - 2010

(U.S. Dollars Per Barrel)

	Bonny Light	Dubai	Arab Ext Lt	Arab Heavy	Sweet SCO	SynSynBit	SynBit
API	34.6	30.6	36.6	27.3	34.8	24.2	19.9
Sulfur Content (Wt. %)	0.2	2.0	1.35	3.06	0.1	1.8	2.5
Product Yields (Vol %)**(1)**							
LPG	1.7	2.1	1.4	2.4	2.5	1.6	1.2
Naphtha	19.8	17.9	20.6	14.9	11.8	7.8	6.0
Jet/Kerosene	8.5	16.6	22.9	13.3	18.0	12.4	10.0
Diesel	38.5	20.5	21.9	17.5	33.8	26.6	23.4
Fuel Oil	31.1	42.4	32.9	51.2	33.4	51.2	59.0
Price/Value in Japan **(2)**	32.99	29.39	32.84	26.49	32.99	26.88	24.36
Tanker Freight, Kitimat to Japan (VLCC)					1.15	1.18	1.23
Pipeline Tariff, Edmonton to Kitimat					1.92	1.92	1.92
Netback Price in Edmonton					**29.92**	**23.78**	**21.21**

NOTE: (1) Hydroskimming yields based on Purvin & Gertz' refining model.
(2) Based on Purvin & Gertz' January 2005 product price forecast, and crude prices for Bonny Light, Dubai, Arab Extra Light, and Arab Heavy into Japan.

Potential for Discounts in Traditional U.S. Markets

- **Canadian oil sands crudes (SCO, SynBit, and SynSynBit) will face further market hurdles in traditional U.S. markets as supplies increase.**
  - SynBit and other bitumen blends are already experiencing significant discounts.
  - SynSynBit is a new crude, and it may face discounts from the forecast used in order to get established in the market.
  - SCO is expected to face more market resistance as supplies increase.
  - New markets will be further away, and will provide lower netbacks.
- **New investments in U.S. refineries could help them process more oil sands crudes. Likely, discounts will be required to support such investments.**
- **Expected pricing of SynBit shows that prevailing discounts should allow SynBit to achieve a higher value in Asian markets.**
- **If discounts on SCO and SynSynBit begin to occur in a significant way, then Asian markets may be preferred for all oil sands crudes.**
- **Diversification of markets into Asia is recommended so that oil sands crudes do not become discounted further.**

Potential for Refined Product Imports into Asia

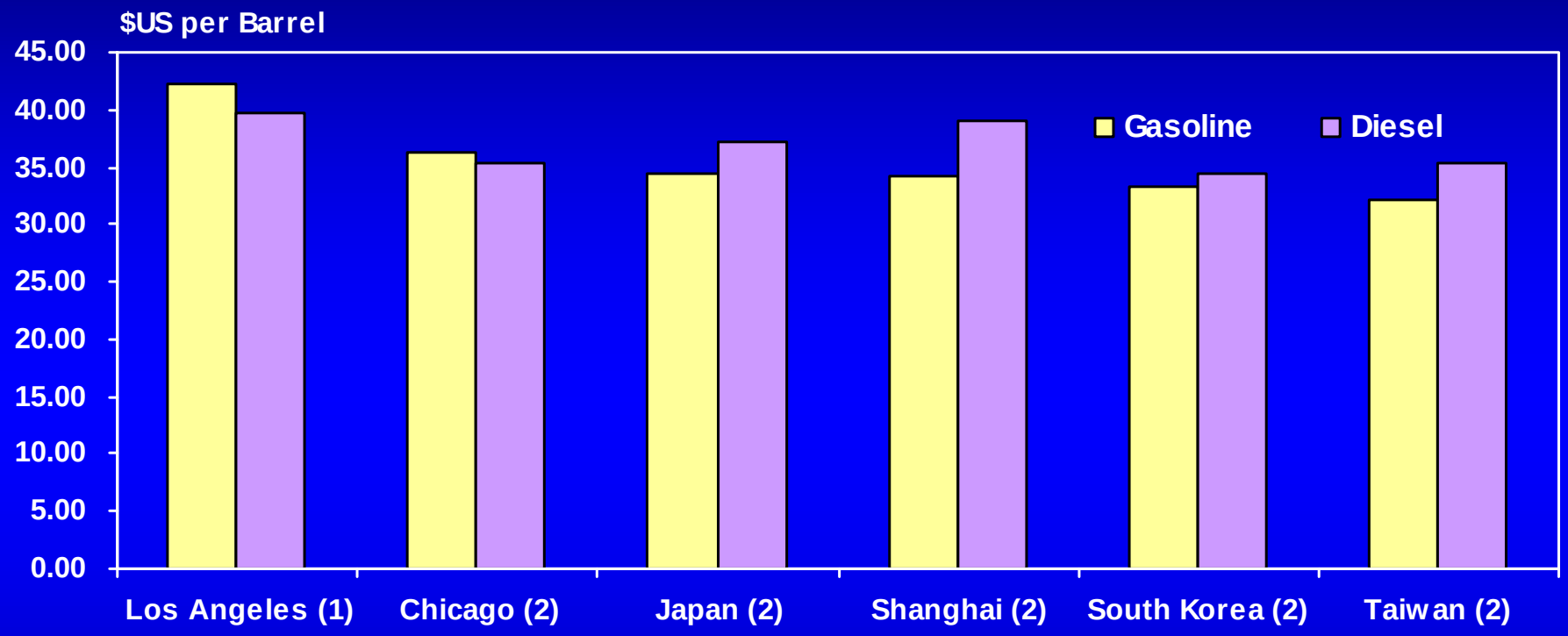
- These Asian countries produce most of their domestic requirements for refined products. They use small volumes of imports, and sometimes exports, for balancing purposes. Distillate imports will be higher than gasoline.
- China is not expected to be a major importer of products, but this assumes that it constructs the equivalent of six 200,000 B/D refineries by 2015.
- China expected to increase its distillate imports by over 300,000 B/D by 2015.
- Japan is expected to increase imports of gasoline.
- If China is not able to build all the refining capacity that it needs, product imports could be much higher.

Export of Refined Products from Alberta

- We examined the potential of producing refined products in Alberta in a new bitumen based refinery and delivering petroleum products (gasoline and diesel fuel) to Chicago and Los Angeles (1). The resulting netback prices were updated consistent with Purvin & Gertz' January 2005 pricing outlook.
- Imported product prices in Japan, China, Taiwan and South Korea were netted back to Alberta based on utilizing LR-1 tankers.
- Gasoline and diesel qualities were assumed to be the same for Chicago and Asia, all low sulfur. California products are of higher quality to meet CARB specifications.

(1) Purvin & Gertz, "Phase II - Refined Products and Petrochemicals from Bitumen", December 17, 2004, prepared for the Government of Alberta and an Industry Group.

Petroleum Product Prices Netback to Edmonton - 2010



1) CARB Specifications. Gasoline is CARBOB (prepared for ethanol blending).
2) Low Sulfur Specifications

- This analysis assumes refined products are produced in Alberta and exported.
- Diesel prices from Japan, China, and Taiwan are higher than netbacks from Chicago.
- Gasoline prices from Asia slightly lower than U.S. netbacks.

Export of Refined Products from Alberta

- If bitumen is upgraded all the way to gasoline or diesel fuel, netbacks from Asia to Alberta would provide higher returns than if upgraded to SCO(1).
- The resulting netback prices from Asia were compared to exporting products to Chicago and Los Angeles (1).
- Diesel fuel netbacks are higher from Asia than from U.S. Midwest.
- Diesel demand growth in Asia will continue to outpace gasoline. Further, diesel production from the oil sands is easier to produce than gasoline.
- Asia market could grow to accept refined products from Alberta, but there may be merit in sharing output with California market in order to achieve an orderly market development.

(1) Purvin & Gertz, "Phase II - Refined Products and Petrochemicals from Bitumen", December 17, 2004, prepared for the Government of Alberta and an Industry Group.

Canadian Oil Sands – Potential to Supply Asia

- The Canadian oil sands could become a significant supplier of crudes to the Asian market. They would likely be sweet SCO and bitumen blends.
- SCO/bitumen blends could be suitable substitutes for Middle East sour crude supplies. The Asian countries studied are seeking to reduce their dependence on Middle East crude.
- SCO may have the highest value to cracking refineries in Japan.
- Bitumen blends high TAN values may limit the amount of bitumen blend that Asia refineries can process.
- High sulfur content of residual fuel may limit the market acceptability of bitumen blends.
- Refined products produced from an export refinery based on oil sands could find outlets in Asia ; distillate to China, gasoline to Japan.
- Potential to serve Asian markets is subject to achieving a satisfactory price for these products relative to traditional North American markets.

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