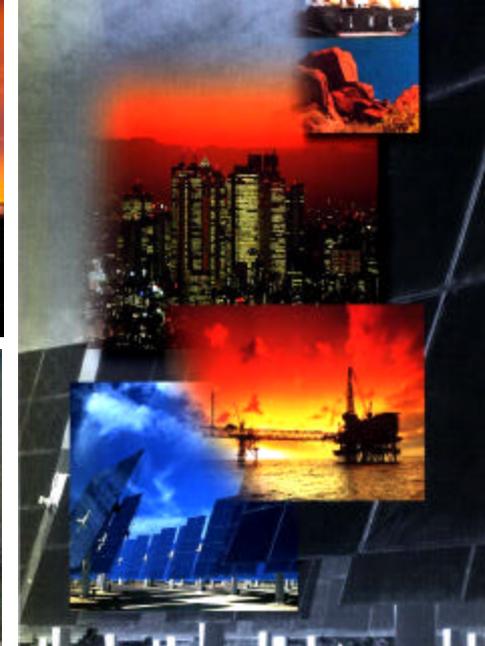
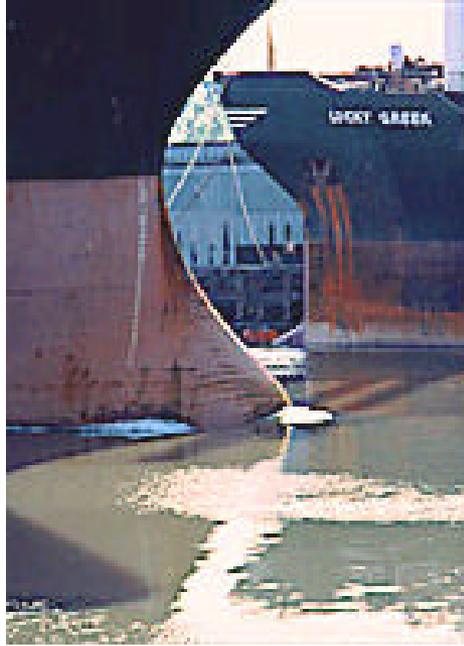




Asia-Pacific  
Economic Cooperation

Asia Pacific Energy  
Research Centre



# APEC Downstream Oil Market Study

**EWG30 Ulsan, Korea**

August 2005

Asia Pacific Energy Research Centre (APEREC)  
*in collaboration with the*  
Institute of Energy Economics, Japan (IEEJ)



# Outline

- *Scope of the study*
- *Characteristics of the APEC downstream oil market*
- *Case study: US and China*
- *Preliminary findings*
- *Initial recommendations*

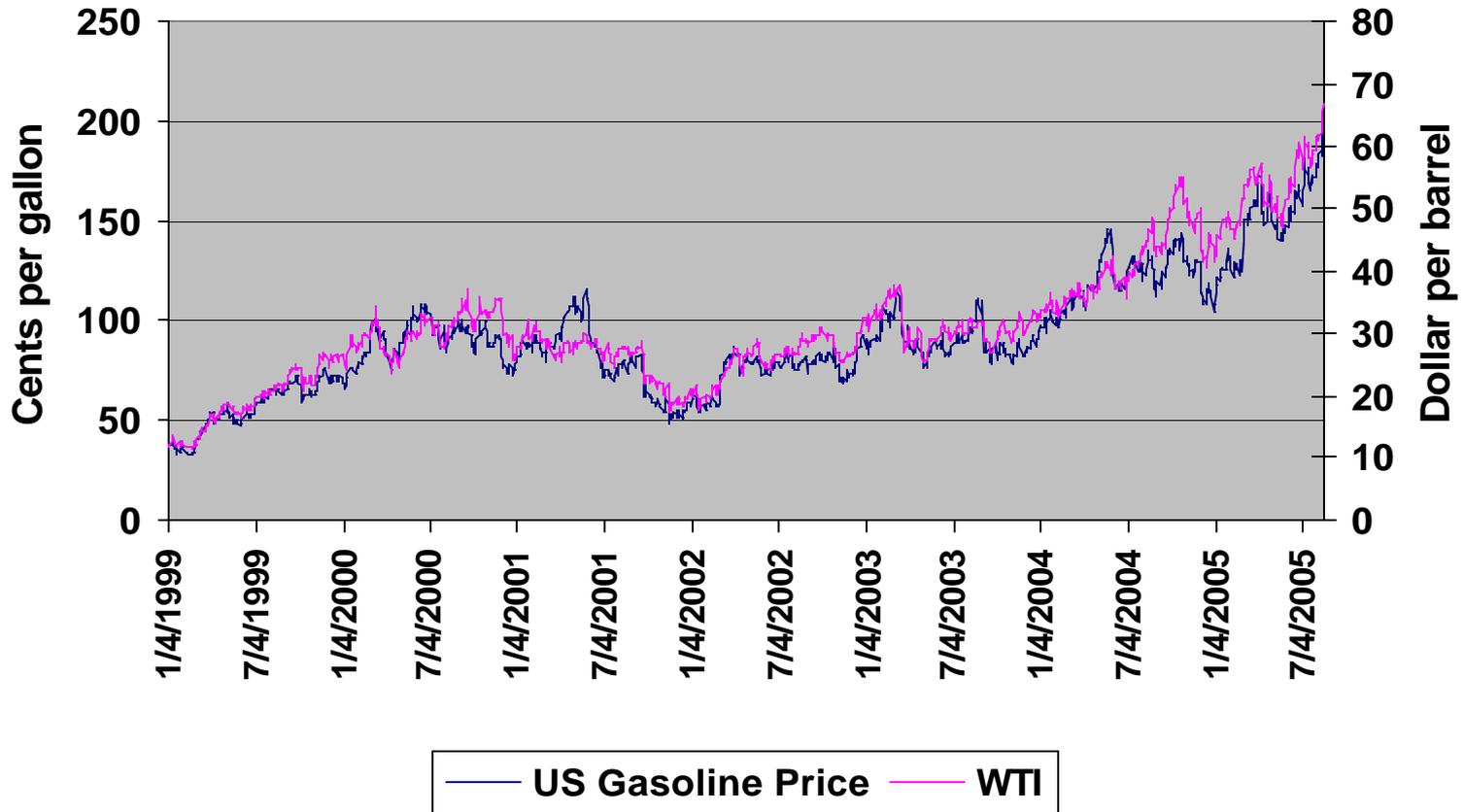


# Preliminary findings

- *There is a clear linkage between the recent high oil prices and the problems in the downstream oil industry:*
  - *rapid growth in oil demand*
  - *increased share of light vs heavy products*
  - *tighter and more stringent petroleum product specification*
  - *lower oil inventories*
  - *lack of refining capacity (CDU and upgrading facilities)*
  - *tight oil transport and storage facilities*
- *These problems are emerging or imminent in some APEC economies*
- *US and Chinese downstream oil market play important roles in stabilizing supply and demand in terms of its share to the market*
- *There is a growing need to address problems/barriers to market integration for APEC economies to streamline trade*



## Gasoline and Crude Oil Prices





## Scope of the study

### ***A. Examine/analyze the characteristics of the APEC downstream oil market***

- Petroleum product supply/demand balance***
- Refinery capacity, configuration (product mix), utilization rate, over/under capacity***
- Factors that limit investments***
- Government actions/strategies***

### ***B. Case study/analysis of US and China***

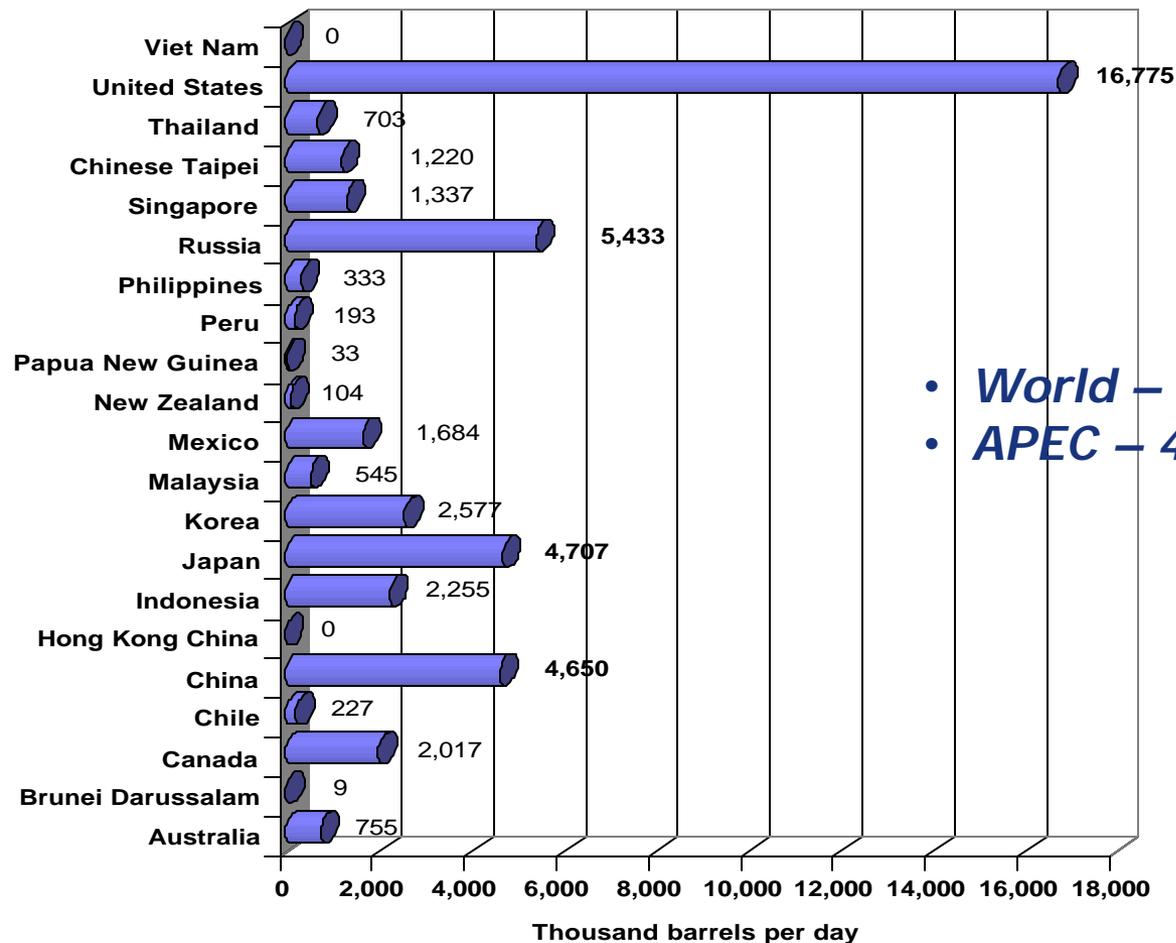
### ***C. Identify areas for possible joint regional cooperation:***

- measures and strategies to address structural problems and/or “bottlenecks”***



# APEC refining 2004

*Half of the world's refining capacity is in APEC*



- *World – 82.4 mil b/d*
- *APEC – 45.6 mil b/d (55%)*



## APEC refinery configuration 2004:

Economy	Refining (distillation) Capacity 1000B/d	Hydrotreating/ distillation ratio %	Cracking+reforming/ distillation ratio %	Cracking to distillation ratio %	Light products yield %
United States	16775	76	64	43	78
Russia	5433	40	22	7	51
Japan	4707	92	37	22	73
China	4650	7	23	20	74
Korea	2577	42	21	12	68
Canada	2017	50	56	37	74
Mexico	1684	58	40	23	53
Singapore	1337	43	23	13	67
Chinese Taipei	1220	41	26	16	66
Indonesia	2255	2	30	20	70
Australia	755	44	55	32	84
Thailand	703	65	31	18	67
Malaysia	545	40	23	7	74
Philippines	333	40	15	5	63
Chile	227		56	45	77
Peru	193	2	17	16	56
New Zealand	104	47	51	25	84
Papua New Guinea	33		11		65
Brunei Darussalam	9		66		85
<b>APEC</b>	<b>45557</b>	<b>56</b>	<b>43</b>	<b>27</b>	<b>71</b>
<b>World</b>	<b>82409</b>	<b>50</b>	<b>37</b>	<b>23</b>	<b>69</b>

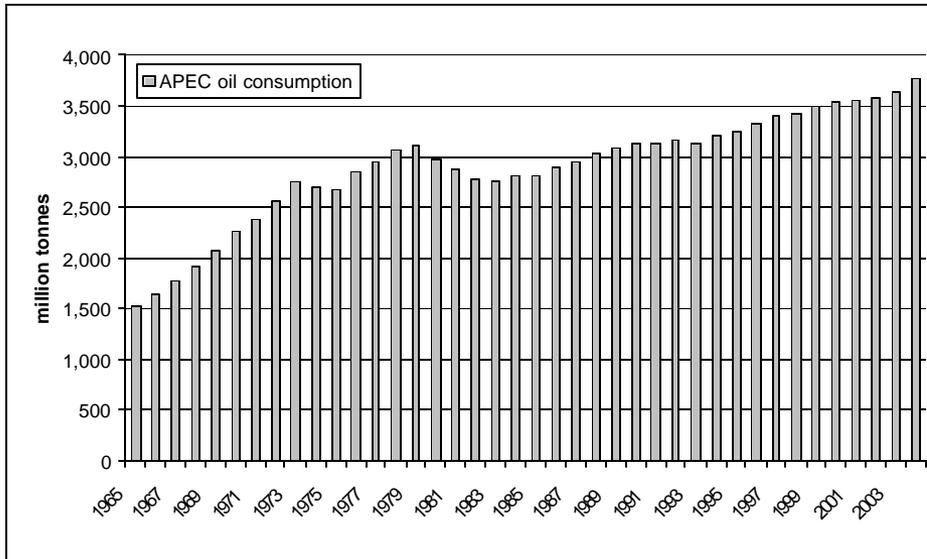
Source: Prepared by author from O&GJ/IEA data

NB: HongKong China & Viet Nam currently have no refining capacity



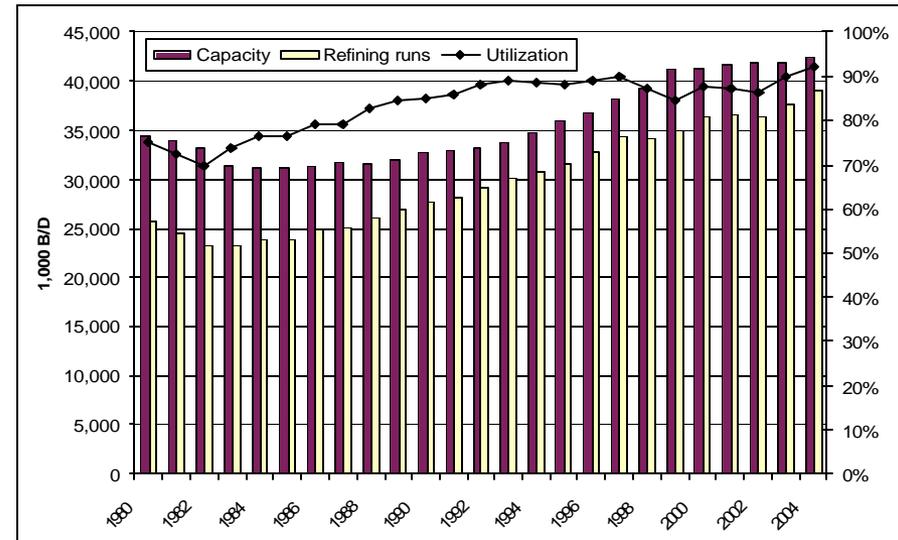
# APEC oil demand and refinery output

*Oil demand in APEC economies is growing, 1.7% pa*



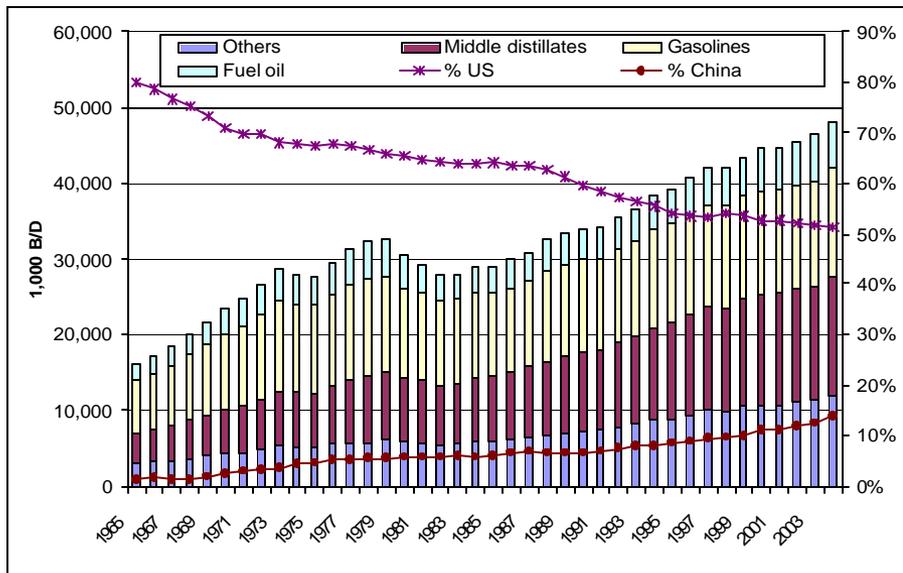
- Refining capacity increasing but demand growth outpacing supply increases*

- Refinery utilization rate in APEC reached 92% in 2004*





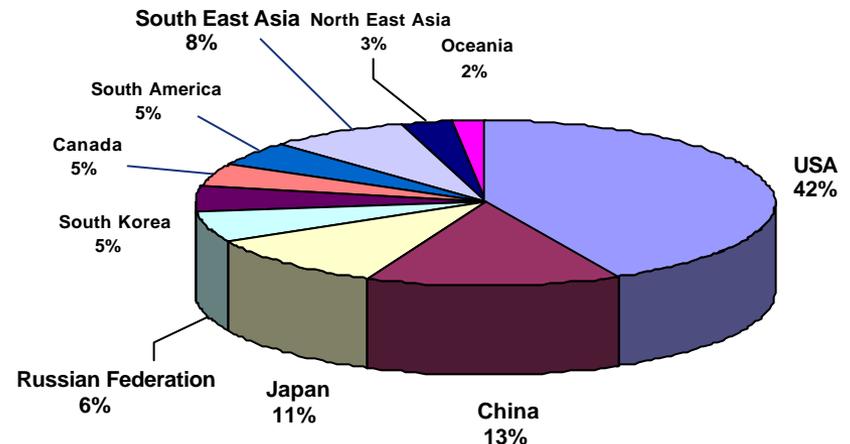
## Gasoline and middle distillates take up the lion's share of the product demand growth



• **USA, the largest oil consumer in 2004 (42%), China (13%)**

**China 1.4% – 13%**

**Middle distillates 32.9%  
Gasoline 29.7% , 2004**



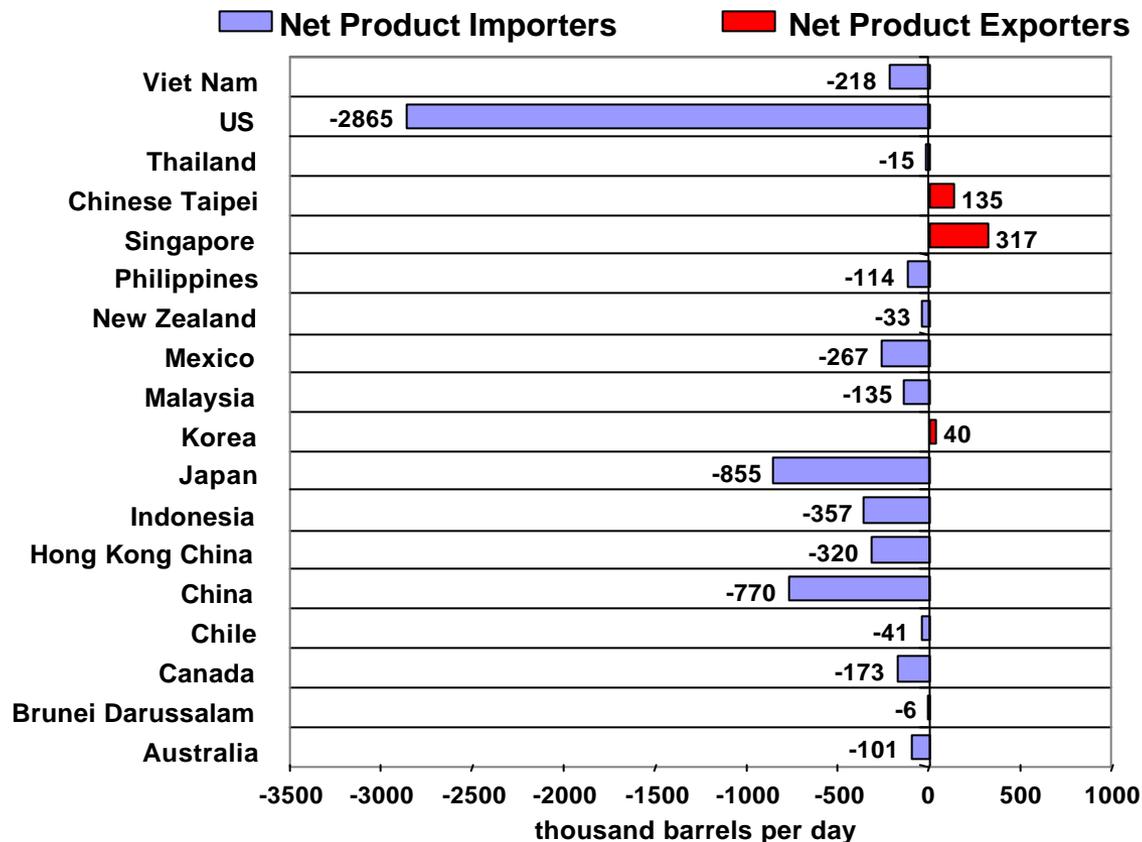


## ***Tightening Oil Products Specification in APEC***

- ***Initiatives are taken to tighten product specification to mitigate problems on air pollution in APEC economies (particularly in major cities):***
  - ***lower sulfur content of gasoline, diesel, etc.***
  - ***limit specific component (e.g. olefin content) of gasoline***
  - ***introduction of “reformulated” gasoline, etc.***
- ***Current status and future plan to step up product specification differ by economy (depending on economic, social and oil industry structure)***
- ***US and Japan lead the introduction of stringent specification, followed by developing APEC economies (e.g. voluntary introduction of “sulfur-free” gasoline in Japan, started in April 2005)***



## *Despite refinery capacity additions, APEC will remain a net importer of petroleum products in 2010*





# APEC downstream oil market

## *In summary...*

- *Lag in APEC refining capacity; increasing only at 1.3% against a 1.7% increase in APEC petroleum product demand*
- *As a result the APEC regional refinery utilization rate reached 92% in 2004*
- *With a larger share of oil demand taken up by transportation – the share of “white products” in the refining slate has increased dramatically (63% of oil products are middle distillates/gasoline)*
- *US and China could play an important role in the APEC downstream oil market currently with 65% of demand for petroleum products*



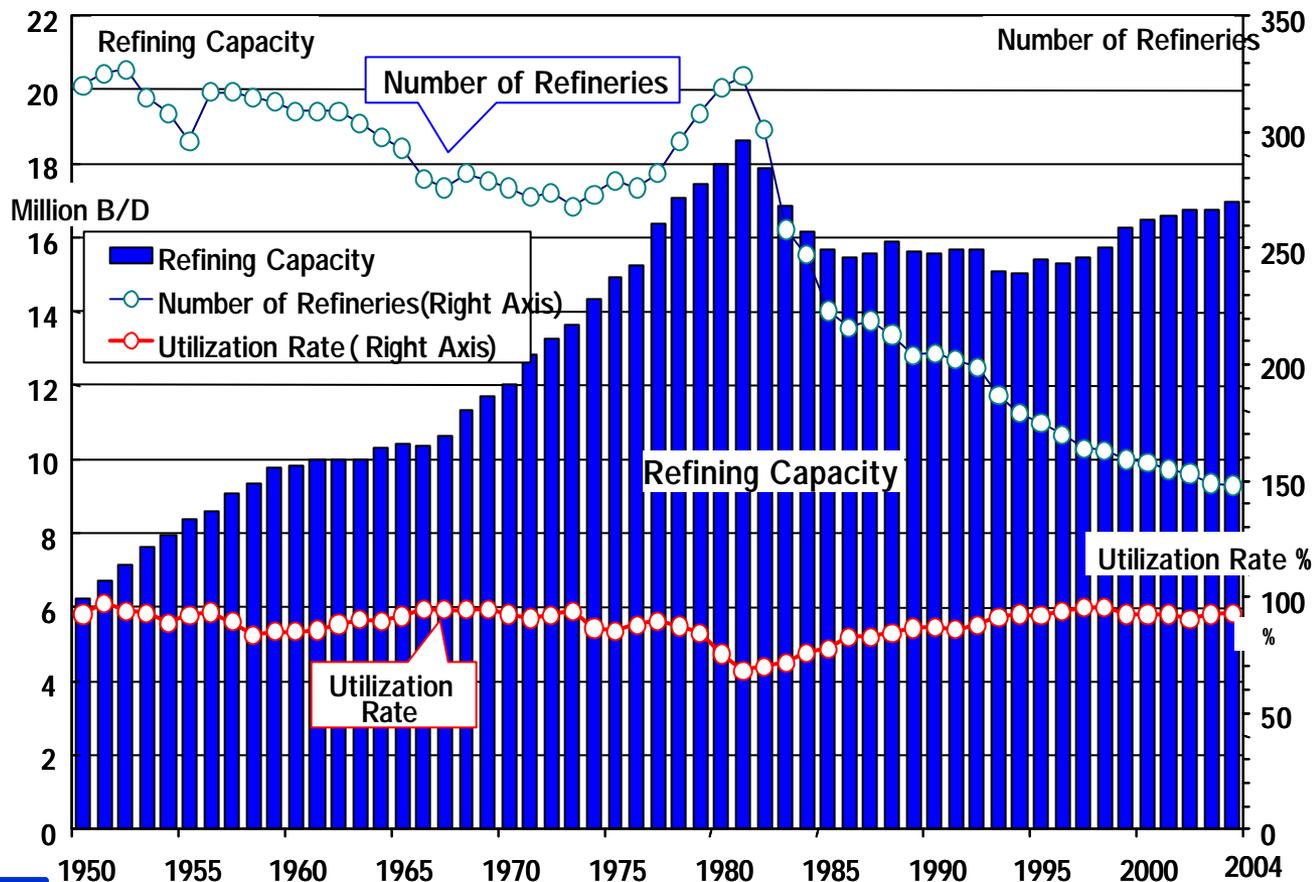
## Case Study – US & China

***The next section are snapshots of the two largest APEC economies, US and China case studies.***

*\* It should be noted that this is just presented to give an overview of some of the issues pertaining to the downstream oil market in APEC; all economies will be studied and collectively reported*



# Case Study – USA



Average Refinery Capacity (x 1000 B/D)

21

32

44

56

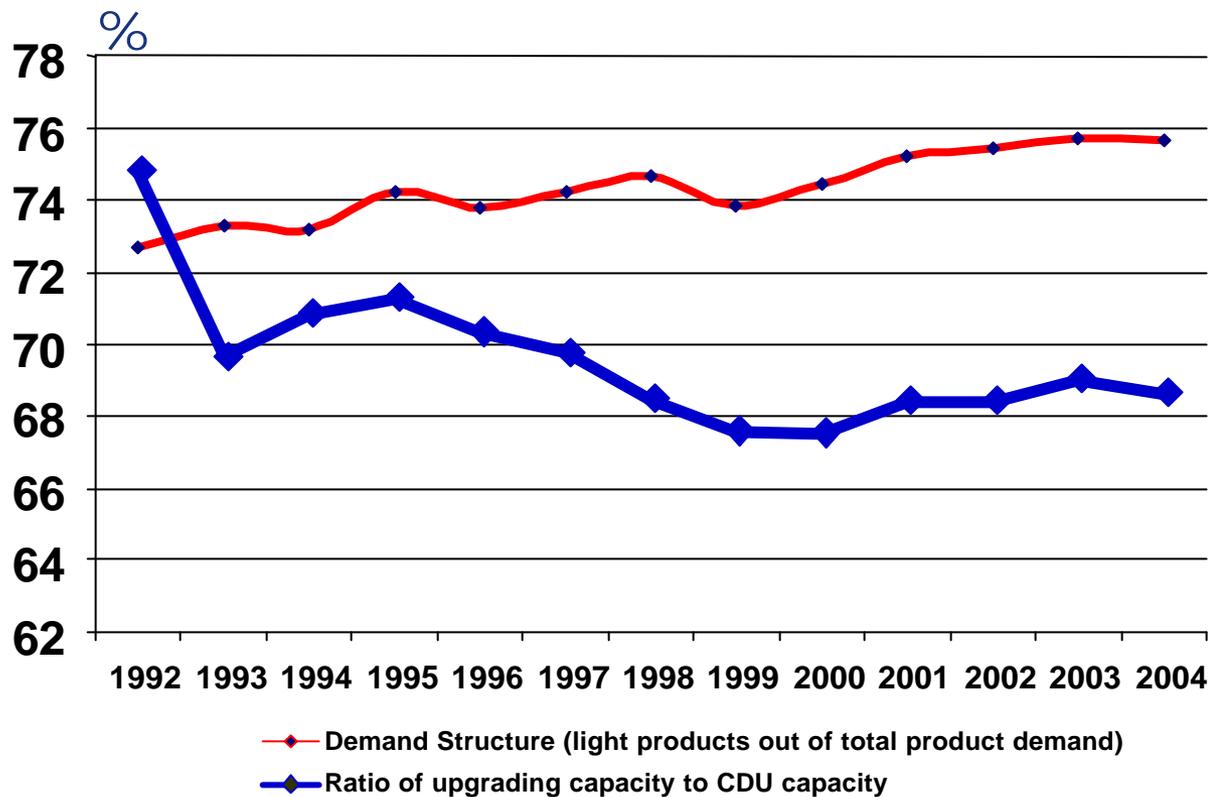
76

104

115



## US Ratio of upgrading capacity to CDU capacity





# Case Study – USA

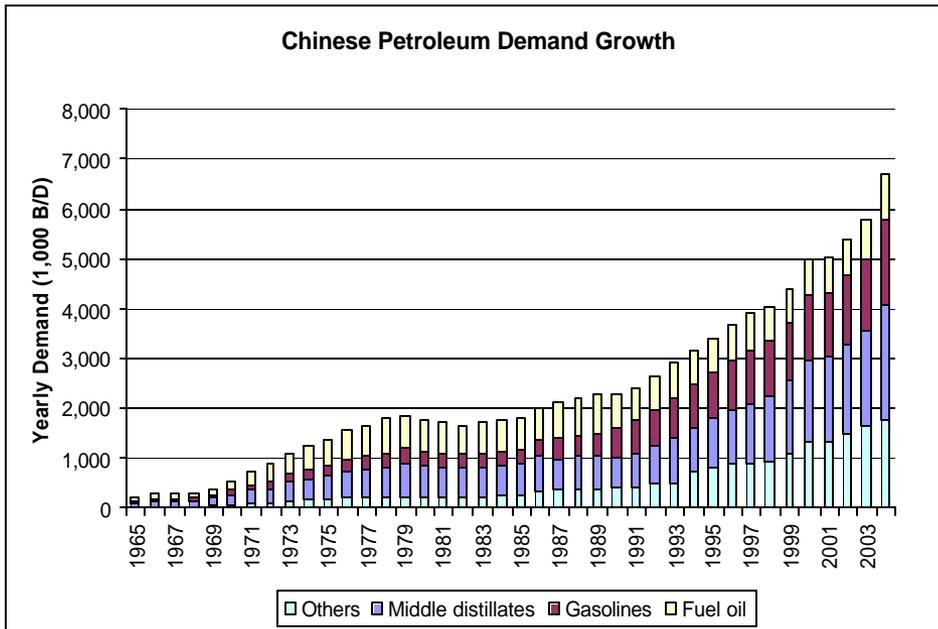
## *In summary...*

- *Streamlining of the refining industry has significantly improved capacity utilization rate; to the point where a minor incident may cause sudden supply disruption and/or impact on price.*
- *Main reasons why refinery capacity has not kept pace with demand growth are:*
  - *historical low rate of return*
  - *siting and permitting problems*
  - *increased environmental compliance*
    - *“boutique fuels” have necessitated exporting countries to make special product components; which in turn forced exporters to demand higher prices for their products, albeit reducing the number of import sources.*
- *Reluctance of refiners to build additional capacity exerts an upward pressure on the US’s dependence on imports.*



# Case Study – China Downstream oil market

## *China's oil consumption by product*



- *Backed by high economic growth, oil consumption grew at AAGR 7% over last decade*

- *Petroleum product demand has doubled since 1990:*
  - *2003-2004: 16%*
  - *2002-2004: AAGR 8.0%*
  - *1990-2004: AAGR 6.0 %*

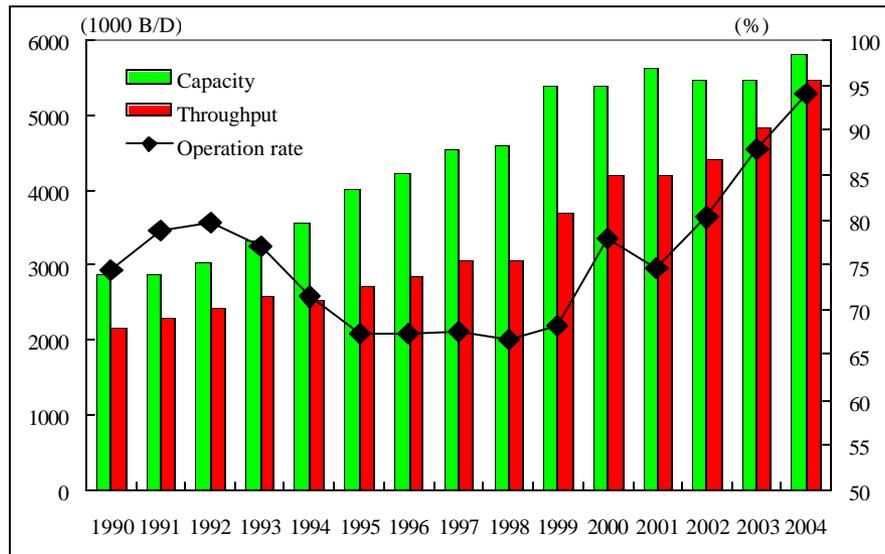
*Middle distillates 34.3% – 35.2% ; Gasoline 15.3% – 25.2%*

- *bulk of the growth came from the transport sector*
  - *In 2005, stricter gasoline specifications (sulfur 0.05%, olefin 30%) introduced in selected cities. Diesel to follow in 2008*



# Case Study – China

## *China's refining capacity and operation rate*



- *Refining capacity has almost doubled in the past 15 years*

- *At present 3.5 million B/D of new refining capacity is planned by CNPC, Sinopec and others*

*The demand increase for transportation fuels and distillate fuel oil for electricity production, refinery utilization rates increased rapidly reaching almost 95% in 2004*



# Case Study – China Downstream oil market

## *In summary...*

- *In China's domestic downstream market, such factors as:  
a. growing demand, b. changing product mix, c. tighter specification, and d. changes in crude type for refining, etc, have become important factors, which might have implications for future policy planning at the government and industrial levels*
- *Huge investment for refining capacity is required to address the above problems*
- *Regional approach (optimal utilization of the regional capacity and infrastructure) may be a useful solution*



## Preliminary findings

- *Rapid and unexpected growth in petroleum product demand (particularly lighter petroleum products), tighter and more stringent product specifications, and low surplus refinery capacity (CDU and upgrading facilities) have contributed to the upward pressure on oil prices.*
- *These problems are emerging or imminent in some APEC economies*
- *US and Chinese downstream oil market play very important roles in stabilizing supply and demand in terms of its share to the market*
- *There is a growing need to address problems/barriers to market integration for APEC economies to streamline trade*



# Preliminary findings

- *There exist investor constraints (although may differ in existence and degree by economy) for refinery investments:*
  - *low return on investments (low refinery margins)*
    - *huge upfront (capital) costs*
    - *high risk due to instability (and uncertainty) of market*
  - *siting and permitting problems*
  - *stringent environmental standards and changing fuel specifications*
  - *country and political risk*
- *Some potential for either refinery expansion and reactivation based on current and future oil demand growth.*



# Initial recommendations

***To address the problems, it is necessary to:***

- ***Facilitate the optimal utilization of existing refining capacity and infrastructure available within the APEC region***
- ***Remove barriers/constraints to freer oil product trade***
- ***Facilitate investment in refining sector both for CDU and upgrading facilities.***
  - ***either through:***
    - ***market incentives (or government subsidies) \****
    - ***support for R&D and technology development (lowering cost of cracking, alternative fuels-biofuels)***
    - ***transparency in information/sharing (JODI)***
- ***Possible facilitation of investment in other downstream infrastructure (pipeline, terminals, etc)***



**THANK YOU**