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Energy and Security Issues: Perspectives on Iran, India, and China

A Presentation to

CSIS Energy and National Security Program

By

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July 12, 2007
Washington, D.C.

Iran

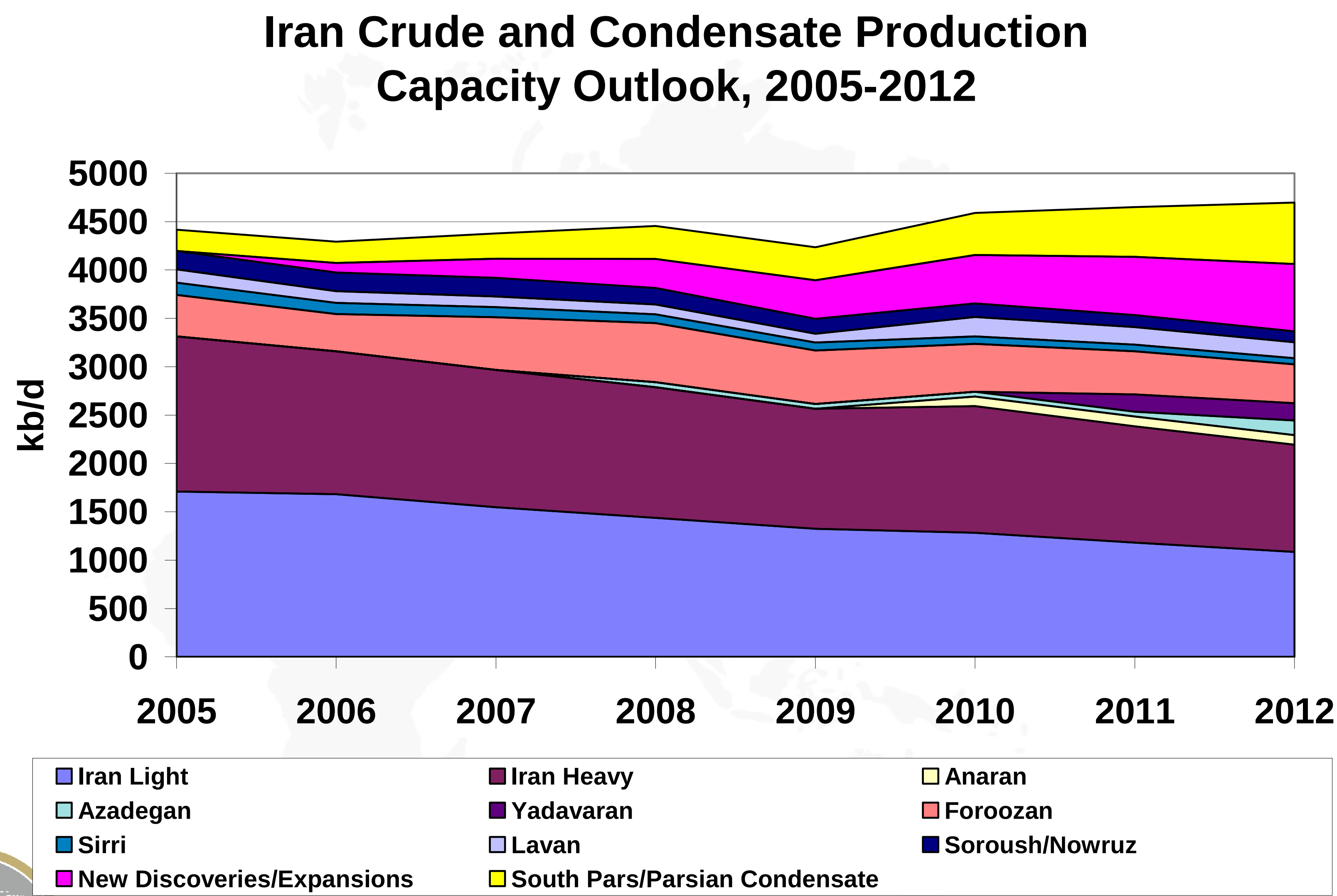
Energy Overview

- Iran has the 2nd largest oil reserves and 2nd largest gas reserves in the world. As of January 2006, officially announced proven oil reserves are put at **137 billion barrels** and proven gas reserves are estimated at **971 tcf.**
- Oil production in 2006 was estimated at 4,153 kb/d which included crude oil, condensates, and NGLs.
- Total primary energy consumption (PEC) in 2006 is estimated at **172 mtoe**: natural gas (50.4%), oil (48%), hydroelectricity (1%), and coal (0.5%).
- Electricity consumption has been growing strongly and was estimated at 188.5 TWH in 2006. Electricity demand is projected to grow at 5-6%/year through 2015.
- Overall, PEC is projected to grow at **6.1% annually** through 2015.

Crude and Condensate Outlook

- Crude and condensate production totaled 4.07 mmb/d in 2006. Combined crude and condensate production *capacity* was estimated at **4.3 mmb/d in 2006**. Iran's main crude oil grades are Iran Light and Iran Heavy. In recent years, bulk of the production increase has come from the South Pars condensate.
- Iran faces severe natural decline in its mature fields. Onshore decline rates are around 8% per year, while offshore decline rates could be as high as 13% per year. This implies some 400 kb/d of new capacity is needed each year just to maintain current production levels.
- The major field development projects in Iran include: Anaran (Norsk Hydro) the Ahwas Bangestan field (PetroIran), Azadegan field (domestic companies), Yadavaran field (China? not yet awarded), and various phases of the South Pars field.
- Iran's crude and condensate production capacity is projected to increase to **4.7 mmb/d by 2012 (+400 kb/d).** Almost the entire increase will come from South Pars field while new discoveries will struggle to keep crude oil production capacity at around 4 mmb/d.

Crude and Condensate Outlook



Oil Product Demand

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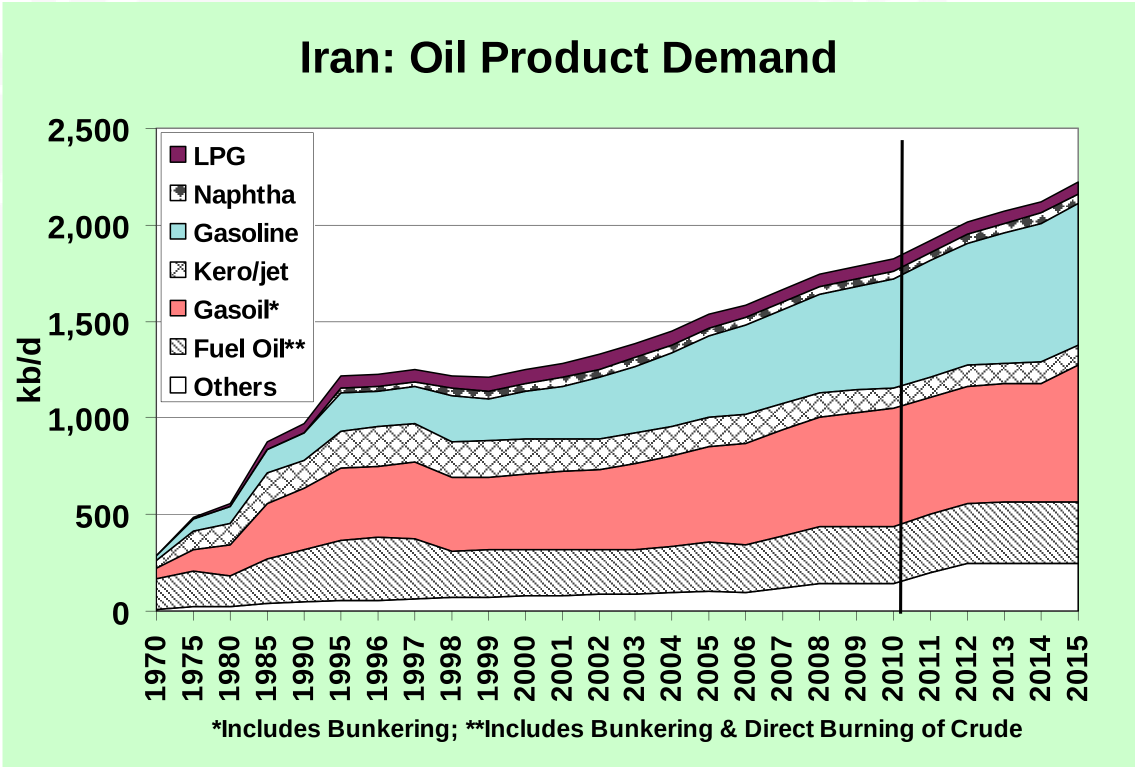
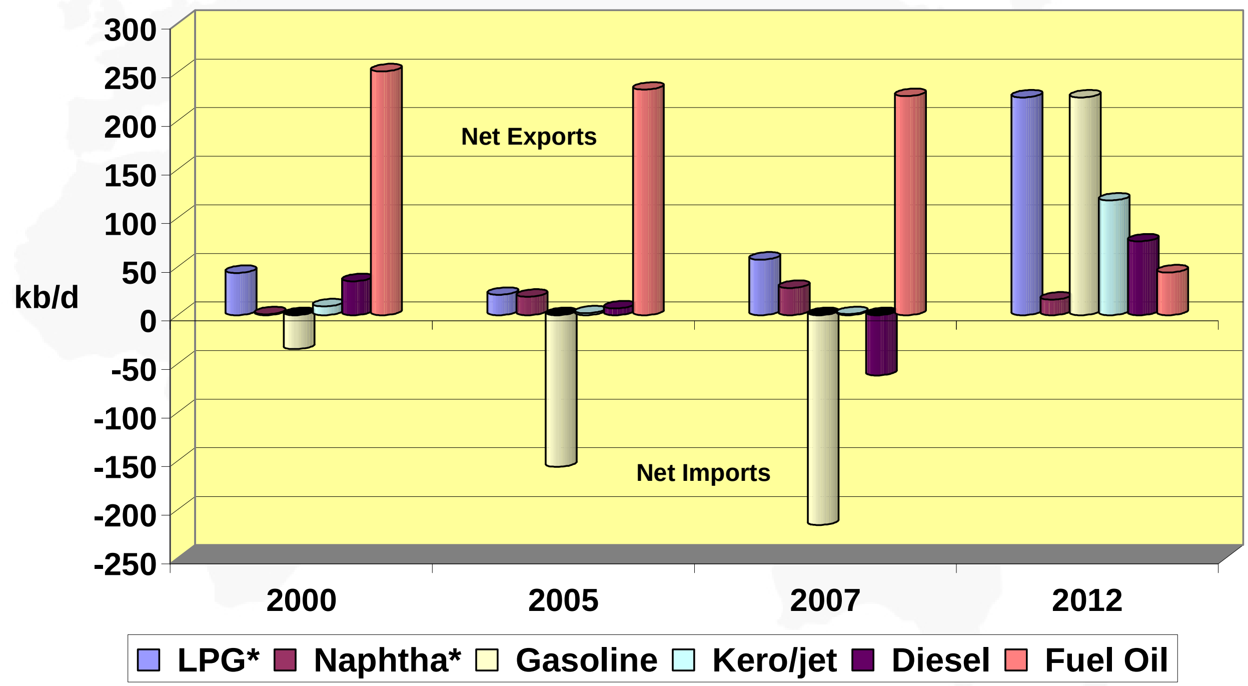
- Iran has a unique demand story. Strong growth is seen in gasoline and automotive gasoil while all the other products are facing decline due to substitution by natural gas.
- Iran's demand growth for gasoline which has been running at 10-11% annually is likely to decline to around 5%/year as a result of rationing, higher prices, and reduction in smuggling. CNG will also displace gasoline demand by some 30 kb/d by 2010.
- Automotive diesel will grow at 2-3% per year through 2015. On average, Iran would add **70-75 kb/d** of demand each year.



Iran Product Trade

- Two major changes are foreseen in Iran's product trade—Iran's gasoline imports are projected to disappear by 2011-2012 and Iran will emerge as a major net exporter of some 100-250 kb/d of gasoline.
- Iran's fuel oil exports will plummet with the completion of cracking projects and drop from 250 kb/d in 2006 to less than 50 kb/d by 2012.

Iran Product Balance, 2000-2012



* includes non-refinery sources

Political Impact on Energy Investments

- Current political situation in Iran in itself is unstable and not conducive to investment. This is worsened by the international political crisis over Iran's nuclear issues. The crippling US sanctions continue with negative impact on Iran's oil and gas industry.

- Some foreign companies have withdrawn from participating in Iran due to US pressure. Current political situation in Iran makes foreign investments difficult and there is a serious problem of project financing. No international bank is readily willing to back an energy project in Iran. Many projects are delayed in the upstream and financing has to be done internally or through Chinese and Indian banks.

- Absence of major companies/IOCs on Iran's oil and gas development scene has affected Iran's oil and gas production levels. This coupled with unstable political decisions has affected the country's economy and its people.

A Bumpy Ride for the Economy

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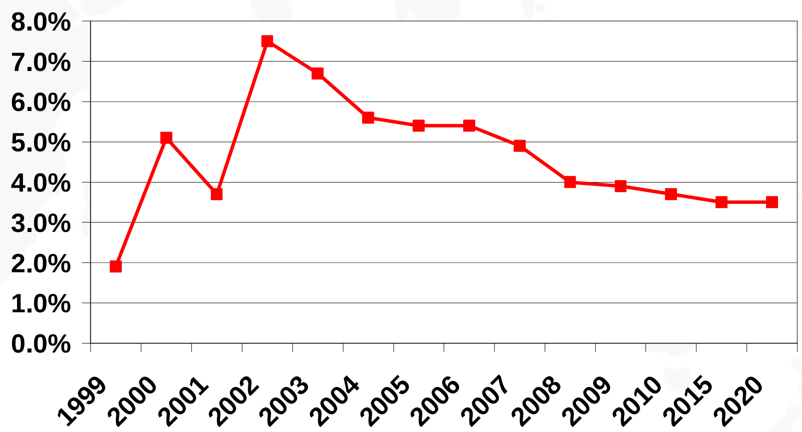
- Iran registered 5.4% real GDP growth in 2006. Real GDP is projected to grow by nearly 5% in 2007. In the future, growth is expected to slow down to about 3-4% per year.

- The political situation in Iran is taking a toll on its economy which is going through a rocky period. Inflation was 16% in 2005 and is now hovering around 25-30%. Proper measures are not being undertaken to control it which could result in excess liquidity in the economy.

- The interest rates for loans and deposits have been reduced to 12%/year in government banks and to 13-14%/year in private banks. There is a danger of substantial outflow in the future which could upset the banking system. Some +$50 billion have gone to Dubai.

Iran's GDP Growth Rates (%)



Buyback Contracts and Inefficiency—The Achilles Heels

- The greatest obstacle to Iran's progress in increasing oil and gas production is not US sanctions but are problems created by themselves—the structure of buyback contracts and the inherent inefficiency in the Iranian system. As a result, upstream projects have been marred by delays, cost overruns, and production problems. Some examples are
  - ***Delays in Soroush and Nowruz developments***
  - ***Long delays in development of South Pars Phases 6-10 with massive cost overruns, revenue and production loss—a true lose-lose situation***
  - ***Lack of progress on NIOC LNG (South Pars Phase 12) due to the inability to find a foreign partner by Petropars***
  - ***Withdrawal of Japan's Inpex from the Azadegan project***
  - ***Slow progress on Yadavaran field which was to be awarded to Sinopec/OVL***
  - ***Slow progress on Ahwaz Bangestan project—withdrawal of Shell, BP, Total, and ENI and failure of PetroIran (subsidiary of NICO) to find a foreign partner. Oil production has dropped by 50% and may drop further***
  - ***Withdrawal of Norway's Aker Kvaerner from Phases 15 and 16, and award of the contract to a subsidiary of the Revolutionary Guards***

- The rates of returns from existing buyback contracts are not adequate to attract and retain foreign investments. It is apparent that nothing will change in the near future because of the political opposition of the conservatives. There are some modest changes in the contracts, including lengthening the number of years of buyback and more incentives for E&P projects, but by international standards, the terms are still not attractive.
- Iran's strategy of handling the issue has been simple—give any contract without foreign partner to local companies. However, domestic Iranian companies, though quite competent and experienced, lack the technology and expertise to be able to run such complex operations.
- It is our view that even if the US sanctions are lifted, under the present terms, no major US player would invest on a large scale in Iran. *In reality, Iran has sanctioned itself by offering such difficult terms.*

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Iran's Gasoline Woes

- Gasoline consumption in Iran has grown at 10% per year between 2000 and 2006. Iran's gasoline consumption averaged 496 kb/d in 1st week of May 2007 which was 9% higher than the same period last year. Gasoline prices in Iran were one of the lowest in the world at 8.7 cents per liter before the recent price hike resulting in a demand explosion.
- Gasoline import volumes for 2006 were estimated at 192 kb/d and cost the Iranian government over $5 billion. Some 40 kb/d of gasoline was being smuggled out of Iran. The government came up with a 4-pronged strategy to respond to the situation:
    - Refining expansion plans to increase gasoline output significantly
    - Gasoline price hike by 25% and introduction of Smart Cards to regulate gasoline consumption and reduce smuggling – *May 22*
    - Rationing to curb gasoline consumption beyond a certain level – *June 27*
    - Free market prices beyond the rationed volume (in 2 months?)

Iran's Gasoline Woes

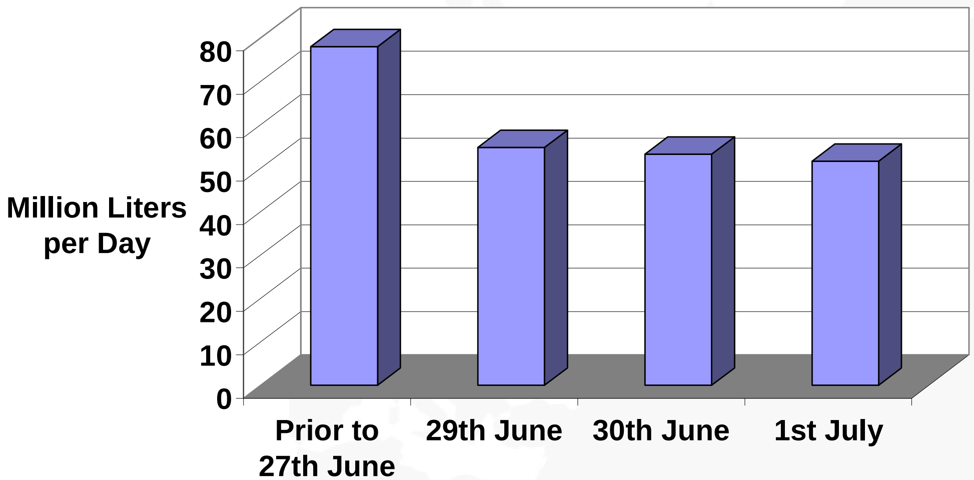
- Smart Cards and the price hike came into effect on May 22, 2007. The current quota allows 100 liters per month of gasoline purchase for car owners, 30 liters per month for motorcycles, and 800 liters per month for taxi drivers at a price of 1,000 Riyals/liter (US10.8 cents per liter) for every 4 month cycle or up to 400 liters.

- Rationing went into effect on June 27, 2007 and caused turbulence throughout Iran. Consumer panic and huge lines were seen. The price of gasoline beyond the quota was not defined. Iran's gasoline consumption dropped drastically from 75-80 million liters per day before rationing to 50-55 million liters per day after rationing.

- Thanks to the US Congress' threat of sanctions against gasoline imports to Iran, the government was emboldened to do the rationing—a move it had hesitated to adopt for long. Indeed, the US Congress did a favor to the Iranian Government by persuading them to do the right thing!

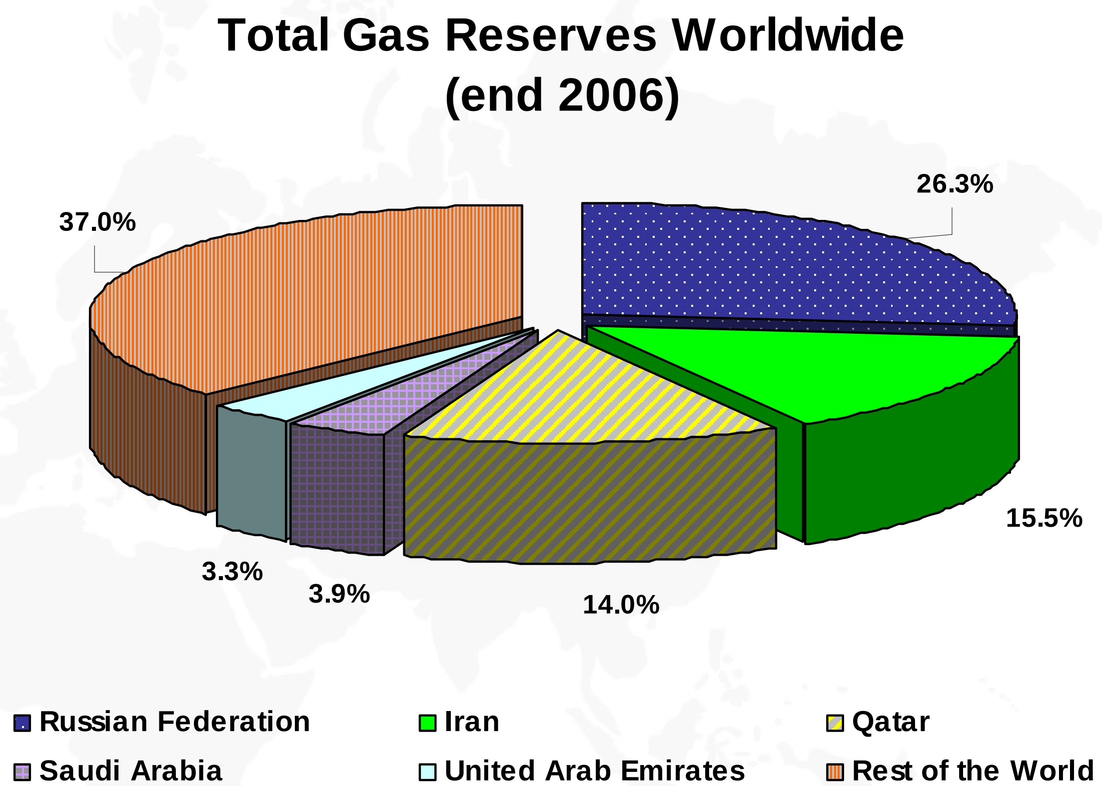
Gasoline Rationing—Implications

Iran's Gasoline Consumption Trend Before and After Rationing



- Gasoline rationing was met by general public in big cities with riots
- A higher average price with no rationing would have been the ideal solution
- Government is under pressure to announce realistic price beyond quota by September—probably at 50-60 cents per liter in line with international prices.
- Indeed the black market price is exactly the same as international price!
- It may not be feasible to continue gasoline rationing in the long term especially after the new refinery projects are completed
- Smuggling of gasoline out of Iran has stopped. Indeed, gasoline is being smuggled into Iran today, mainly from Iraq.

Overview of Iran's Gas Sector



Iran's gas reserves are estimated at 993 tcf as of January 2007, up from 971 tcf in January 2006. Iran has the second largest gas reserves after Russia in the world, with roughly 16% of the world's total reserves.

Overview of Iran's Gas Sector

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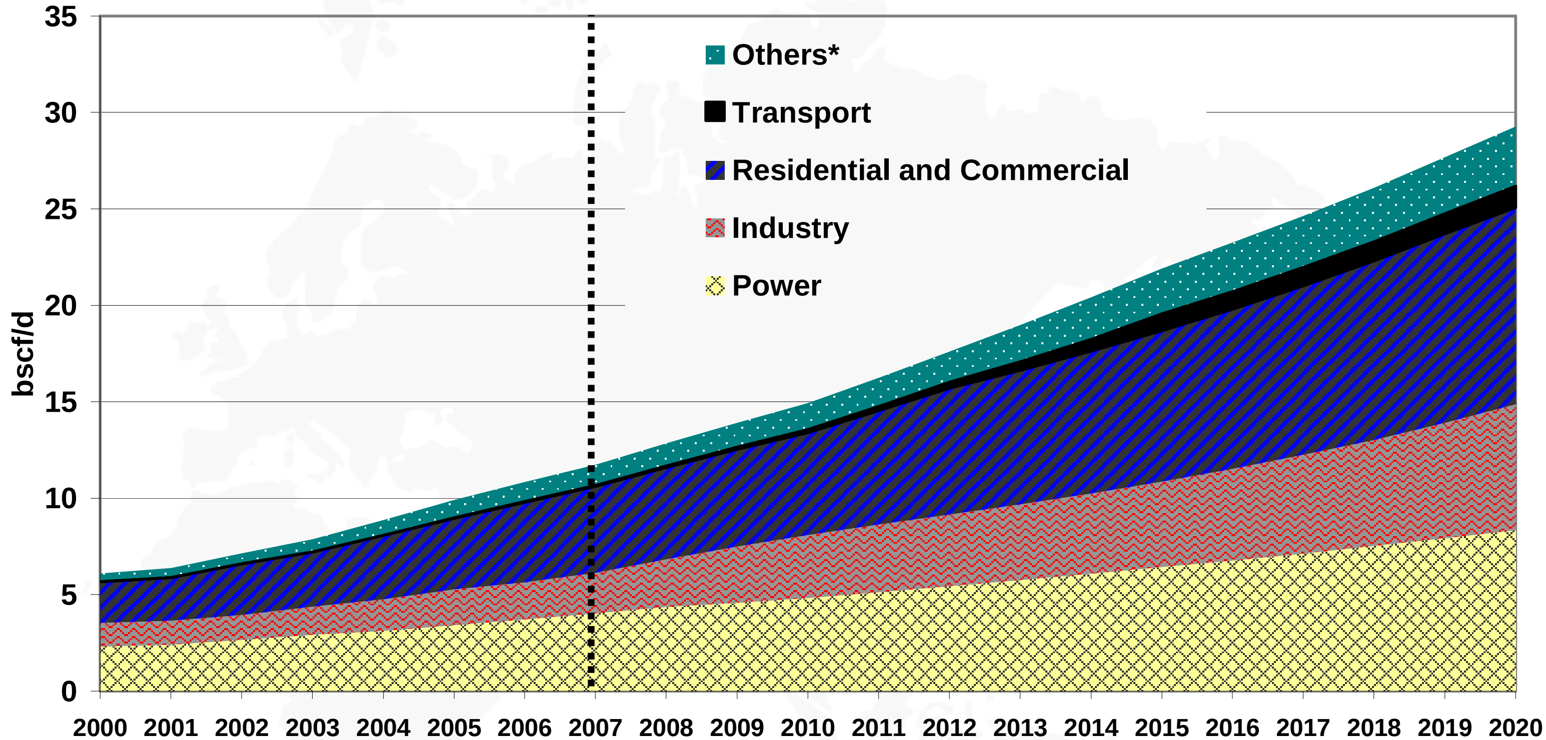
Iran's Domestic Gas Consumption (2000-2020)



** Including Oil Refineries, Gas compressor stations and non-specified others.*

Iran consumed approximately 11 bscf/d in 2006. Gas consumption in the domestic market has showed an AAGR of 10.1% from 2000-2006 and is expected to grow by 7.3% annually to 29 bscf/d by 2020.

Cheap Gas Prices = Rocketing Demand

Iran's Gas Prices in Different Sectors (2005)	
Sector	**US Cents/MMBtu**
Oil Refineries	13.7
Petrochemical Industries	35.3
Other Industries	54.3
Residential	31.4
Commercial	78.4
Transport	23.5
Power Plants	11.5

- With abundantly cheap gas prices, demand for natural gas in all sectors have seen strong growth.
- Price hikes across all sectors are put on hold—especially for the power and industrial sectors—to encourage the growth of these sectors.
- However, allowing domestic consumption to rise rapidly = less volumes available for exports!

Competing Needs for Gas in Iran

Iran's gas exports will not be huge. We see 20-30 million tonnes as lifetime LNG ceiling and small volumes of pipeline gas. The reasons are:

- Large domestic grid at an average prices of 35 cents per million BTU
- Massive gas injection requirements of some 10 billion cf/d (equal to total Qatari LNG exports by 2010).
- Massive gas-based petrochemical projects.
- CNG projects to provide a major volume of gasoline supplies as early as end of this decade.
- Major domestic political opposition to gas exports.

Iran Gas Export Projects

LNG

- Three projects each with two trains of 5 to 8 mtpa are planned with gas supply from the S. Pars field (463 tcf)
  - **Iran LNG (2 x 5 mtpa)**
    - Currently 100% National Iranian Oil Company (NIOC)
    - Future of project uncertain
  - **Pars LNG (2 x 5 mtpa)**
    - NIOC (50%), Total (30%), Petronas (20%)
    - Was ahead of the other two but Total has announced a delay because costs much higher than expected (FID is expected in early 2008)
    - Total and Petronas will purchase LNG from train 1. Thailand and China possible markets for train 2
  - **Persian LNG (2 x 8 mtpa)**
    - NIOC (50%), Shell (25%), RepsolYPF (25%)
    - FID targeted for mid 2008
    - Shell and Repsol to purchase output from train 1
    - Office opened in Tokyo to market train 2 volumes

Pipelines and Pipedreams

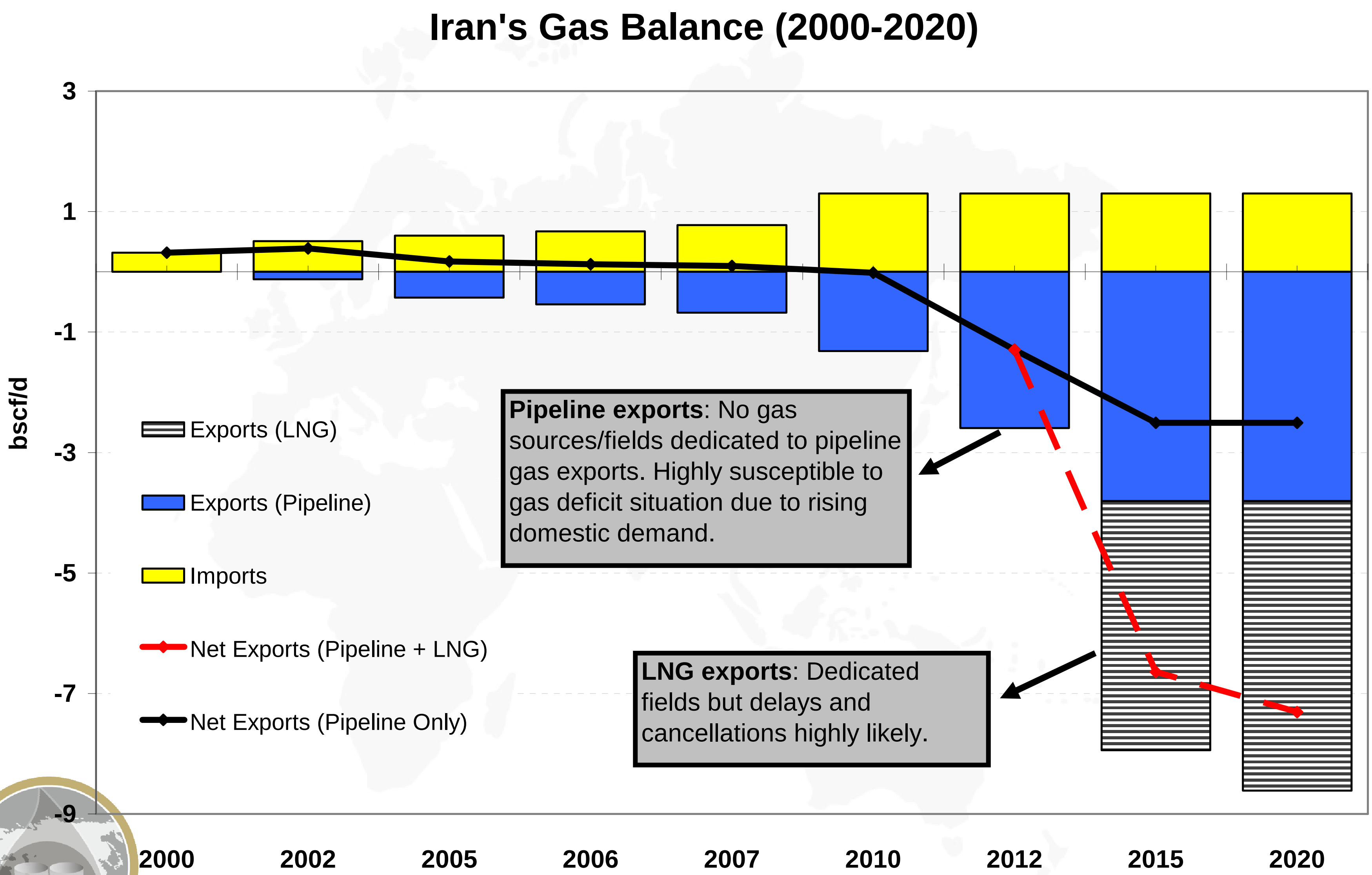
- **Iran-Turkey:** A success story (high prices) after many hiccups.
- **Iran-Pakistan-India:** Many discussions and after many years looking more like a reality.
- **Iran-UAE (Crescent)**: (Sharjah) SPA. For now, suspended pending price renegotiations.
- **Iran-UAE (DUSUP):** (Dubai) Main contractual terms agreed but negotiations stopped because of DUSUP and Dolphin GSPA.
- **Iran-UAE (Mobadalla):** (Abu Dhabi) No final deal due to price.
- **Iran-Kuwait:** A Term Sheet agreed but it is suspended pending price revision as well as gas discovery (35 tcf) by Kuwait.
- **Iran-Oman:** New potential (10-25 bcm/y) but no final deal.
- **Iran-Bahrain:** Limited demand (primary negotiations).
- **Iran-Europe:** (Nabucco project) Many discussions, nothing final, but depends on political issues.
- **Iran-Armenia:** Barter contract signed, Iran delivers gas (1.1 to 2.3 bcm/y) from first of 2007 and Armenia will pay gas price with electricity.
- **Iran-Azerbaijan-Nakhichevan Gas Swap:** It is operational from 2005 but quantities are limited to 300-350 million cm/y.

It must be noted that pipeline exports are particularly affected by rising domestic consumption as there are no designated gas fields/sources.

Why Aren't Things Moving Forward?

- Iran's oil and gas industry needs large injection of funds. The international financial sector's loan to Iran has dried up in the past 12 months.
- Iran as the 2nd largest gas reserves holder, has massive internal needs, and gas exports are politically unpopular.
- Gas exports are frequently delayed due to the inefficient project structures for both pipeline and LNG.
- Although there have been several MOUs, HOAs, and contracts signed with foreign investors and governments alike, many are symbolic and do not mean real projects.
  - We consider these more of "sound bites" than real activities and do not expect many to materialize in the foreseeable future.
- For "done deal" contracts, many will face delays and may not come up on time as planned.
- However, some exports are inevitable, particularly for political reasons:
  - China
  - India

Iran Does Not Have Surplus Gas! Exports are of Low Priority



India

Energy Overview

- India ranks 5th in the world in terms of total Primary Energy Consumption (PEC). In 2006, total PEC was estimated at 607 mtoe up from 356 mtoe in 1990 and 511 mtoe in 2000.
- Combustible, renewable, and waste (CR&W) dominates the energy scene (37%), followed by coal (35%), oil (20%), and natural gas (6%). Natural gas has been the fastest growing fuel in recent years.
- Oil demand growth has been fluctuating. AAGR between 2000 and 2006 was 2%, while 2007 is projected to register 3-4% growth.
- Power consumption has been growing at 5-6%/year and the future outlook remains strong.
- Overall, PEC is projected to grow at 3.4% annually through 2015.

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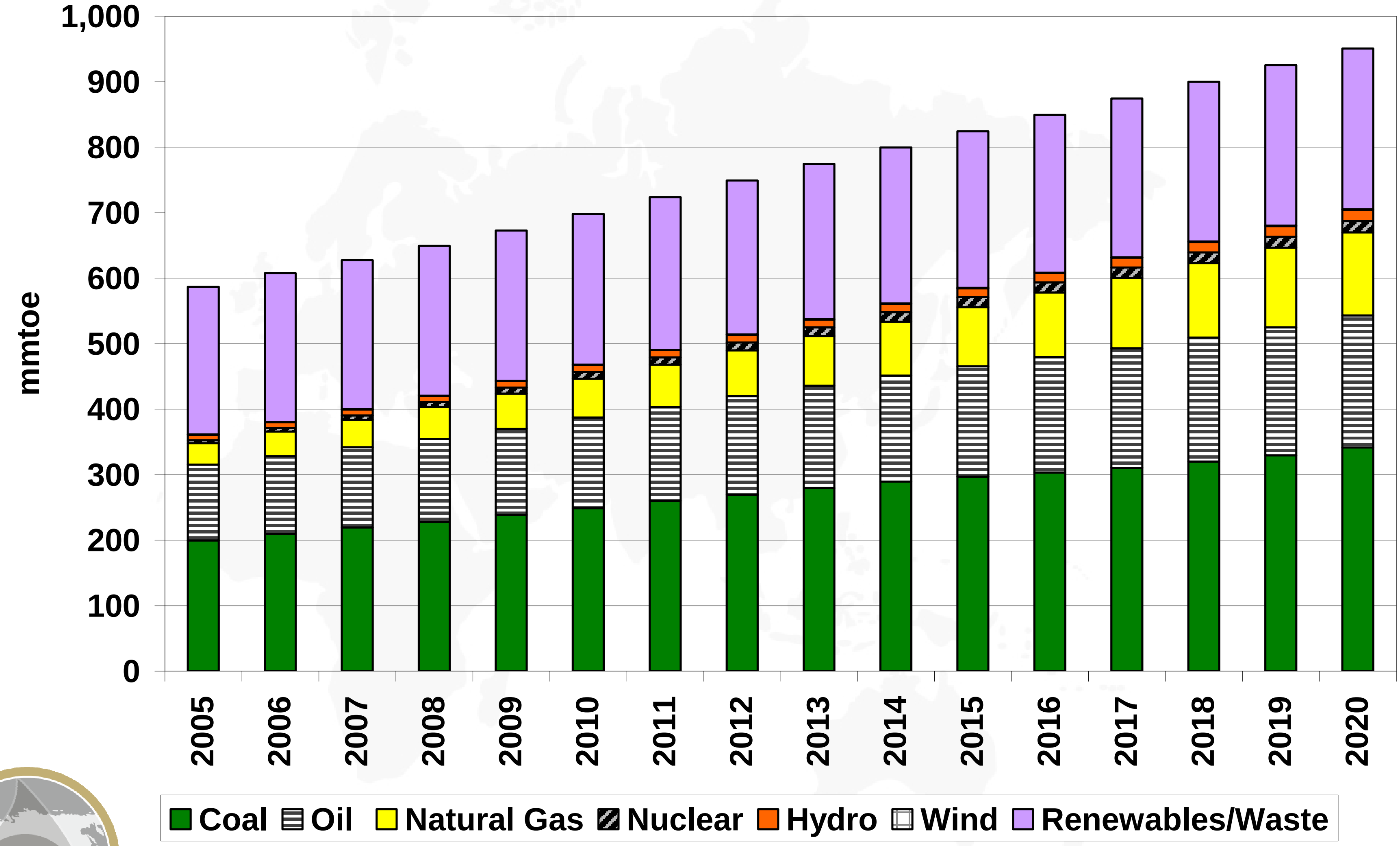
India's Primary Energy Consumption, 2005-2020



Economy

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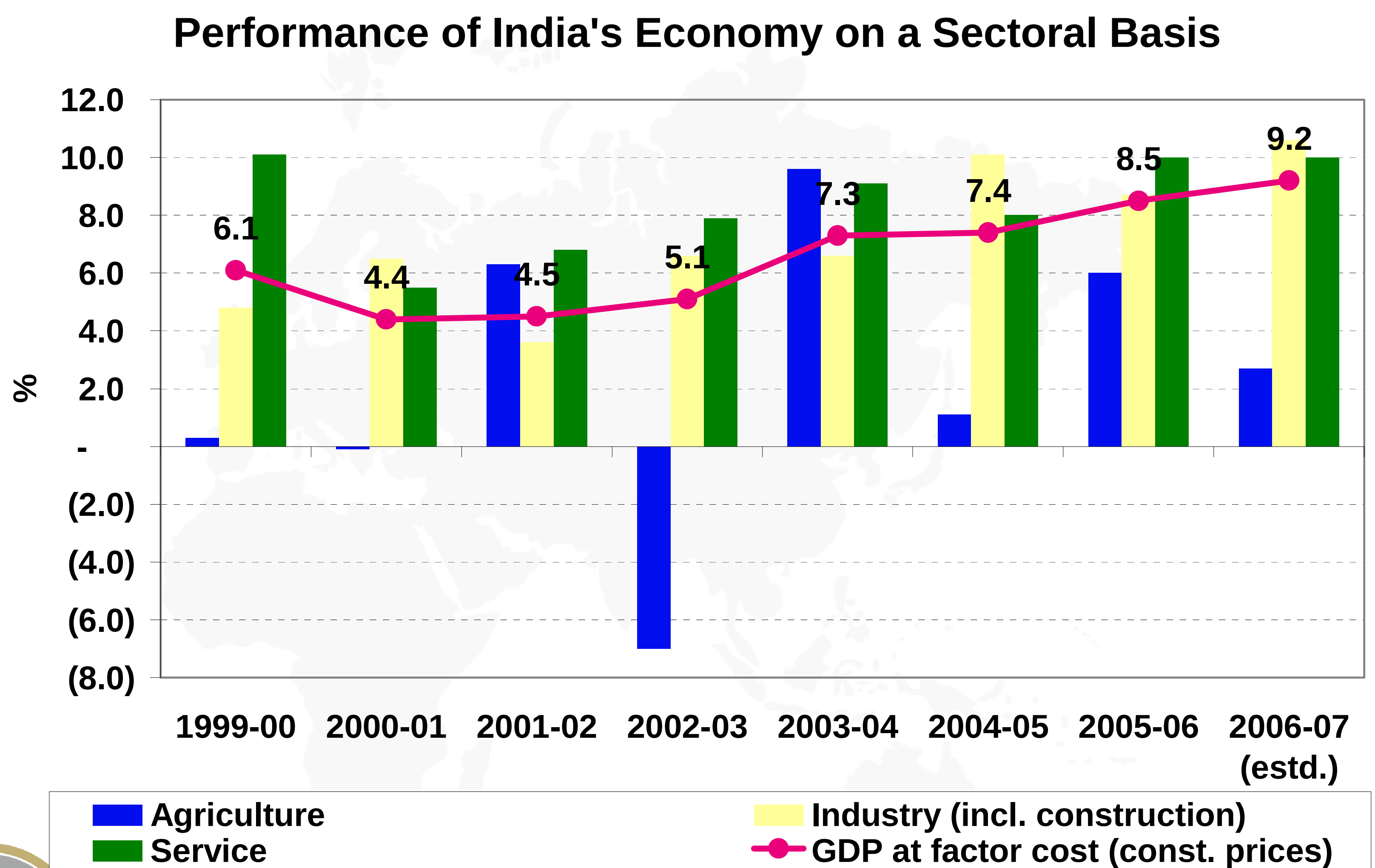
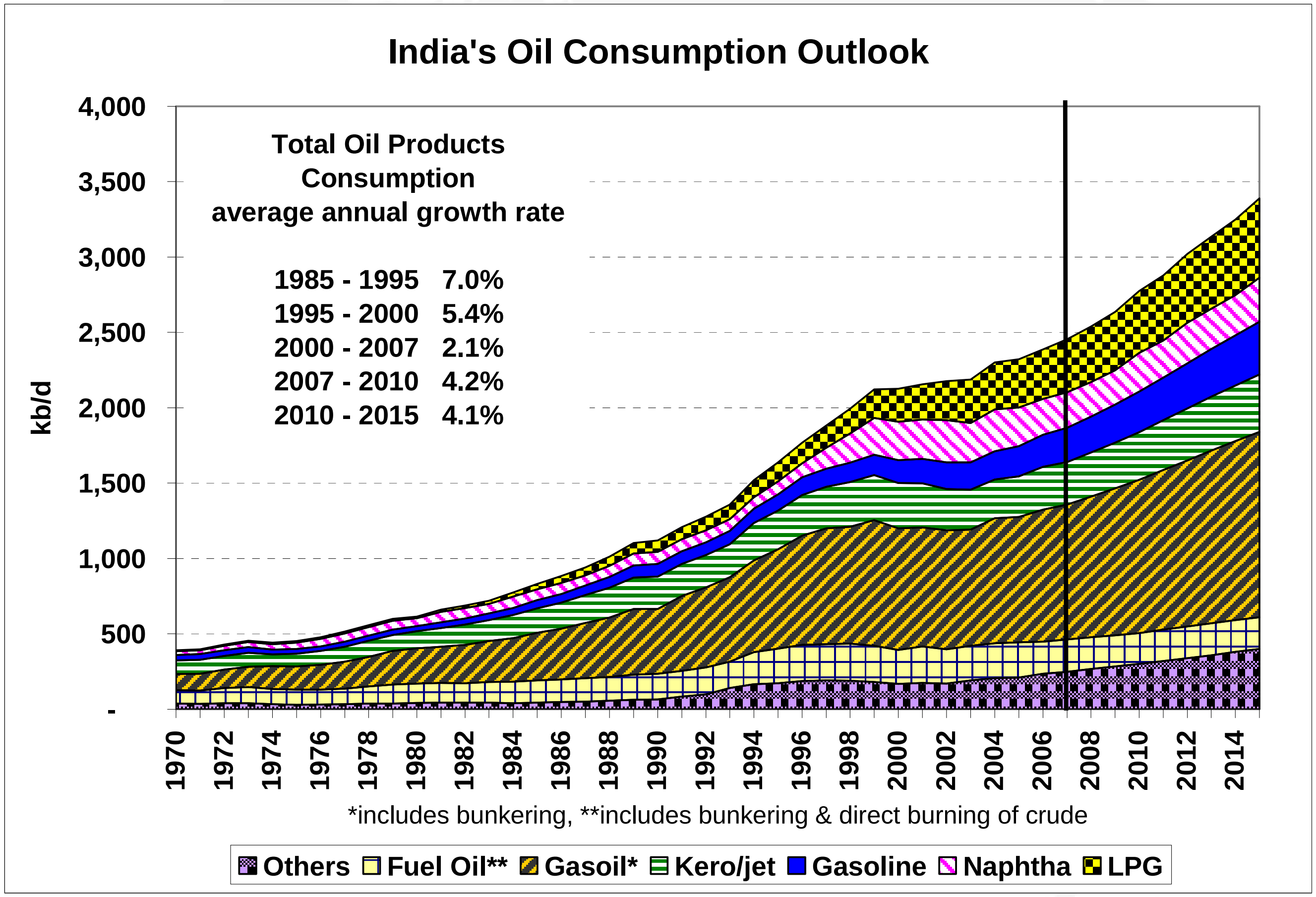


Source: Center for Monitoring Indian Economy

Oil Product Demand

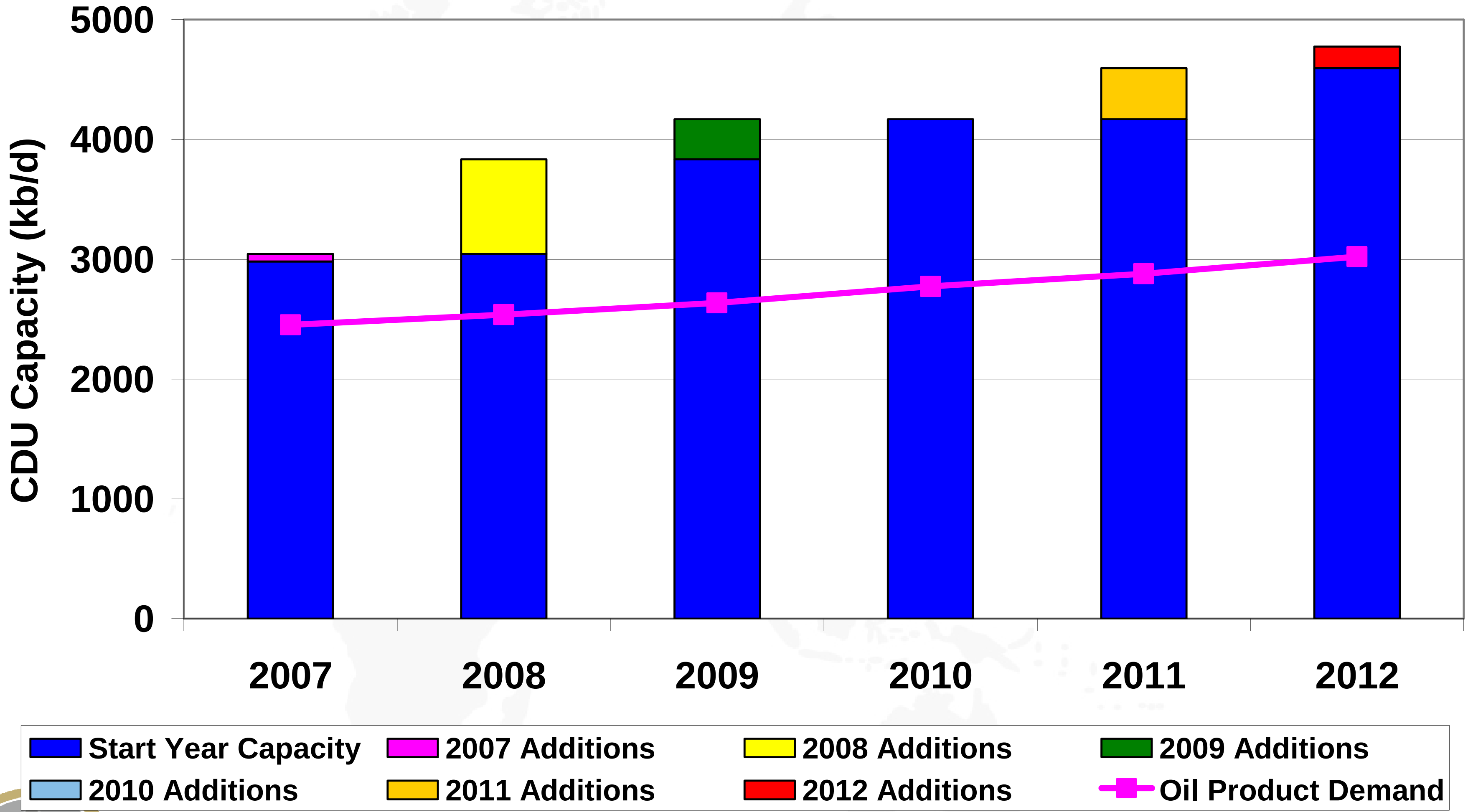
India's oil product demand growth has been modest despite record GDP growth. Oil product consumption grew at a meager 2% annually between 2000 and 2006. There are both positive and negative drivers influencing India's oil product demand growth. We project, India's oil product consumption to grow at 4.2% annually through 2010 and at 4.1% annually between 2010 and 2015. Key demand drivers will be LPG, gasoline, jet fuel, and gasoil.



India—Emergence of a Refining Giant

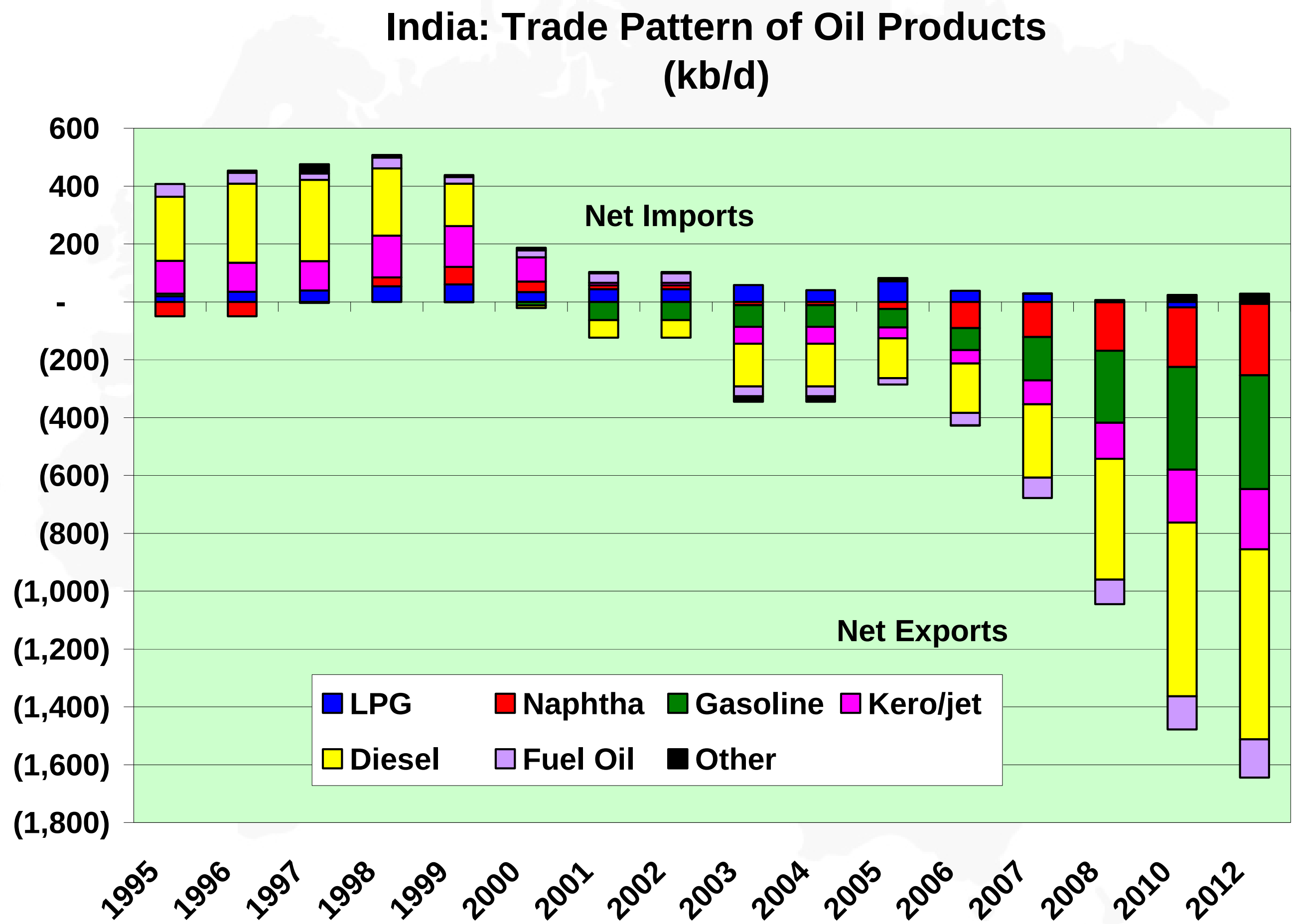
- India has mammoth refining capacity additions planned in the next 5 years. If all projects materialize as planned and on schedule, India will add above 2.2 **mmb/d** of additional capacity between now and 2012.
- New and advanced refineries like Essar Oil's are planning to invest in upgrading the metallurgy of their refinery to process high volumes of high TAN (acidic) crude. India will become the center of high quality,export-oriented refineries in Asia and globally.
- By late next year, India's Reliance Industries alone will export 1 million b/d of products to US and Europe.

India Refining Capacity Growth vs Demand Growth, 2007-2012



Product Trade

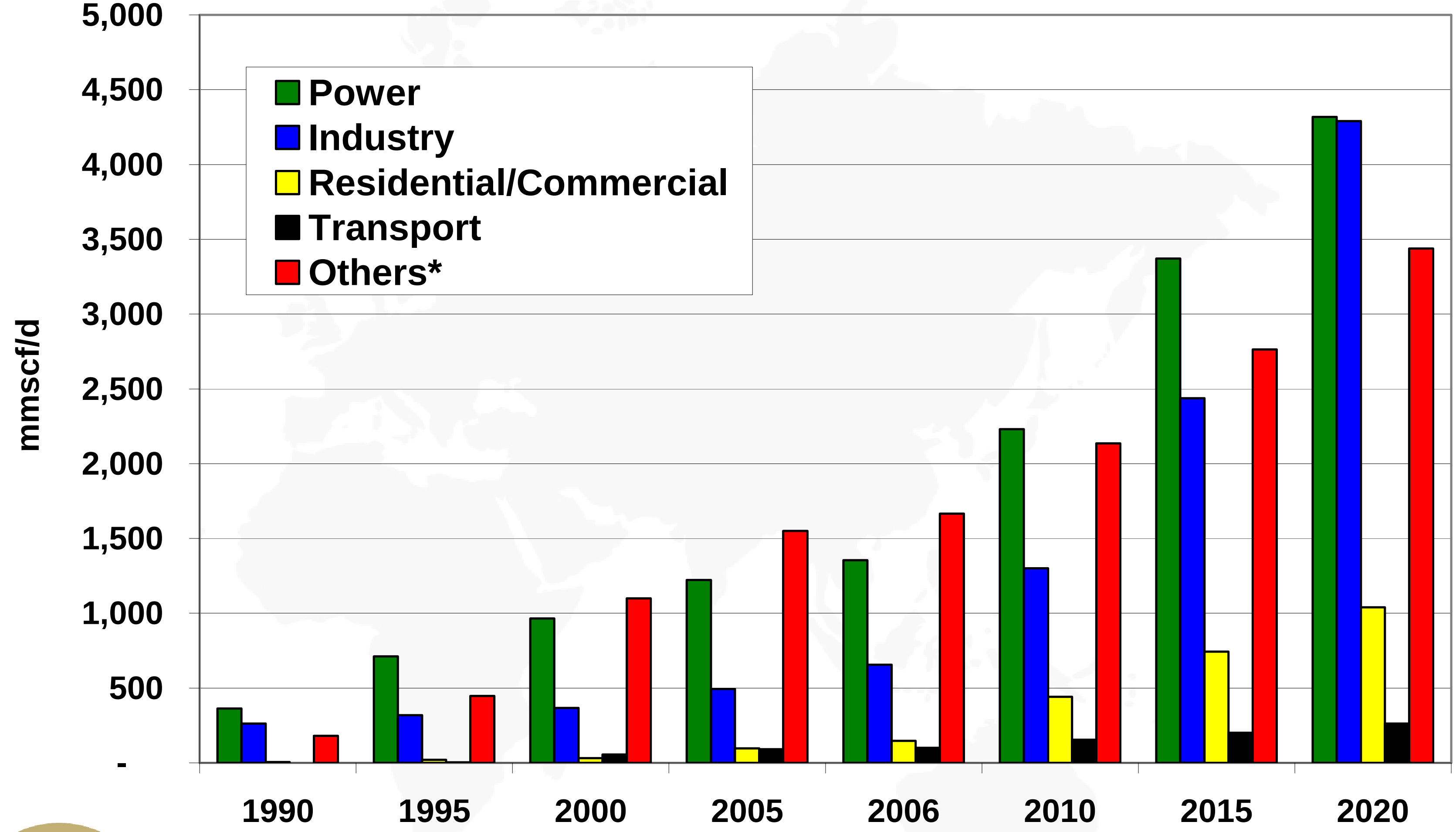
India will surpass Singapore and become the largest refined product exporter in Asia, exporting over 1.6 mmb/d by 2012.



Sectoral Gas Demand

- India's current natural gas consumption stands at close to 4.0 bscf/d. The power sector is the biggest user of gas, with around 34.5% share, followed by the fertilizer sector (29.6%) and industrial sector (17%).
- Gas demand in India is a perceived demand rather than real, which makes it difficult to forecast. Two factors will play a key role—supply of gas and the affordability of Indian consumers. There is currently a differentiated consumer base and a fragmented pricing mechanism for both domestic gas, as well as LNG. Our view is that after Reliance's K.G. Basin gas comes into the market at $4.50/MMBtu delivered to consumers, both domestic and LNG prices will tend to converge towards this figure.
- We project domestic gas consumption to grow at above 12% annually, through 2010, and at a slower pace of 8-9% through 2015 and 7% through 2020. Looking into the future, India's gas demand is projected to be around 6.3 bscf/d by 2010, rising to above 9.5 bscf/d by 2015 and 13.4 bscf/d by 2020. The key drivers of growth will be the industrial, city gas, and fertilizer sectors—*not the power sector.*

India's Sectoral Gas Consumption



* Includes agricultural use, fertilizer use and non-specified others; excludes distribution losses.

India's Gas Supply

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- **Domestic Gas:** Current production stands around 3.3 bscf/d. Existing fields will plateau and reach 2.9 bscf/d by 2015. Massive gas discoveries have been announced in the East Coast of India, primarily in the Krishna Godavari Basin. This includes finds by Reliance, GSPC, and ONGC. Total reserves are estimated to be anywhere between 40 and 120 tcf. These will significantly boost domestic gas production.

- **Pipeline Imports:** The only plausible pipeline import project is the Iran-Pakistan-India (IPI) pipeline project. After satisfying domestic needs in Iran, some 2.1 bscf/d will be made available to be shared between India and Pakistan via a domestic Iranian pipeline currently under construction. India will find Iranian gas too expensive, but the price for Pakistan is a bargain.

- **LNG Imports:** India started importing LNG in 2004. LNG imports in 2006 are estimated at 6.2 mt. Currently India has two long-term LNG contracts: 7.5 mtpa with Qatar's RasGas and 5 mtpa with Iran. The viability of the Iran contract remains a question and we consider it almost dead. We project, India's LNG imports will increase to 9.0 mtpa by 2010, 14.0 mtpa by 2015, and 22.0 mtpa by 2020.

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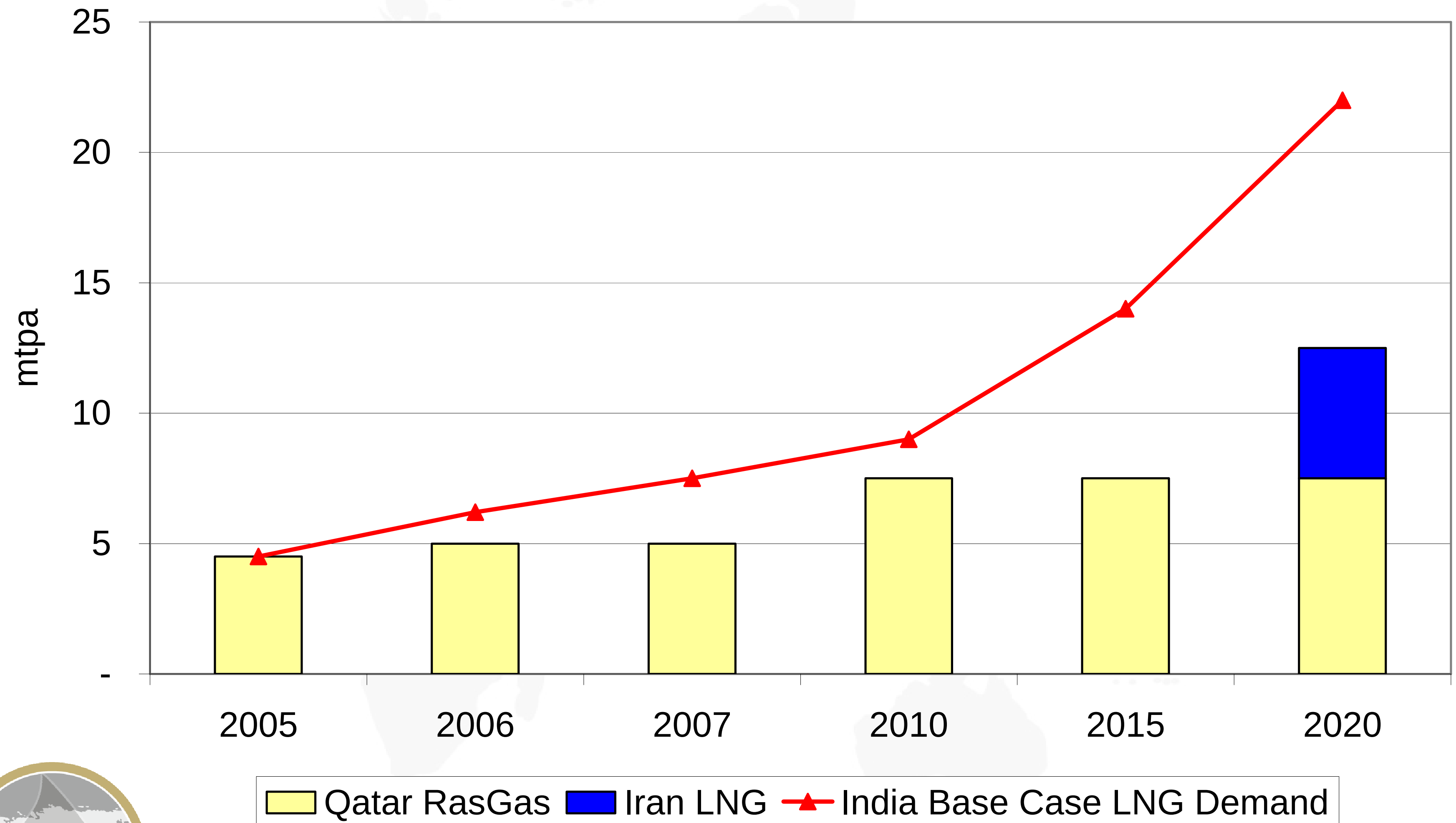
India: Long and Mid Term Contracted Supplies and Demand



State of Existing & Proposed Terminals

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Terminal	Status	Capacity (mtpa)	Start	Supply
Dahej (Petronet LNG)	In operation	5*	Jan-04	Qatar: Long term contract with RasGas for 7.5 mtpa Iran: Possible long term contract for 5 mtpa Spot purchases
Hazira (Shell, Total)	In operation	2.5	1Q 2005	Spot (merchant model): 0.18 mt (3 cargoes) received in 2005 and 0.56 mt received in 2006
Dabhol (NTPC, GAIL)	Inactive	5**	2007	No long term supply secured yet Spot volumes from Petronet and GAIL
Kochi (Petronet)	Under Construction	2.5	4Q 2009	No long term supply secured yet Talks ongoing with ExxonMobil of Gorgon
Mangalore (ONGC)	Proposed	5	2010 +	No supply secured yet
Ennore (IOC)	Proposed	2.5	2010 +	No supply secured yet

* Actual handling capacity is close to 7.0 mtpa

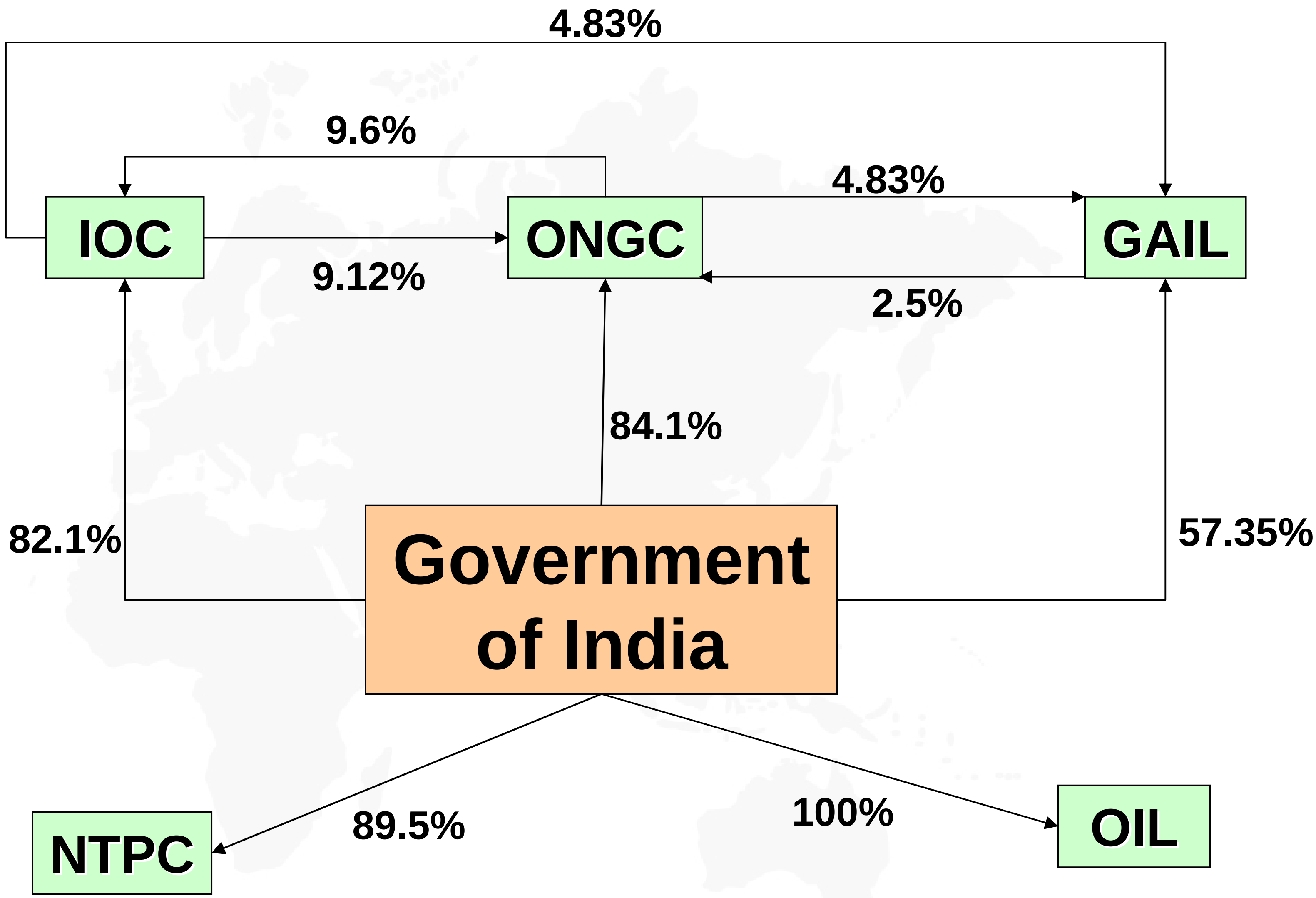
** Design capacity is 5 mtpa but will only be achieved in 2009 when breakwater jetty facilites will be completed

- The main issue for most projects is their ability to secure LNG supplies.
- Cheap domestic gas and retail prices in India make it difficult to find competitive LNG supplies in today's high priced environment.

Indian NOCs

- Indian NOCs are very powerful and have close and inseparable ties with the Government who protects them.
- The NOCs from India represent a new force in the international arena for buying assets, finding oil and gas, adding reserves, and producing more hydrocarbons.
- The Indian NOCs do not have to do project financing and can borrow on their assets. The ability of the NOCs to execute projects is much higher.
- Access to resources is a government mandate, more important than economics and is driven by government policy. That is why private companies have not been successful in competing with NOCs in sourcing overseas oil equity.
- The driving force for the Indian NOCs are access to resources and surplus cash at home that needs to be spent. The objective is to grow themselves bigger and stronger through acquisitions of more assets, diversification, and having more weight in the international arena.

Indian NOC Structure*



*There are two other major NOCs: HPCL and BPCL with government holding majority shares, but at much lower rates

Energy Security—Six Pronged Approach

1. Development of domestic production and resources
2. Overseas investments for assets/acreage in different parts of the world
3. Long-term LNG contracts
    - With Qatar for 7.5 million tonnes for 25 years
    - With Iran for 5.0 million tonnes for 25 years, plus 2.5 million tonnes optional volume: Unlikely
4. Trans-national gas pipelines
    - Iran-Pakistan-India pipeline
    - Turkmenistan-Afghanistan-Pakistan-India pipeline: Unlikely
    - Myanmar-India pipeline: Unlikely
5. Opportunistic investments in producing and consuming nations
6. Enhancing dialogue between producing and consuming nations and India
    - First roundtable ministerial meeting in January 2005
    - Second roundtable ministerial meeting in November 2005

India’s SPR

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- India’s Strategic Petroleum Reserves (SPR) has been under discussion for many years but no construction has yet begun. Plan is to set up SPR of 5 million tonnes at various locations in the country: Mangalore (1.5 mt), Vizag (1.0 mt), and Padur, Mangalore (2.5 mt). Future plan is expansion to 10 million tonnes.

- India’s SPR is to be managed by Indian Strategic Petroleum Reserves Ltd. (ISPRL). The funding is by Indian Oil Development Board (IODB). The reserve will hold stocks for about 15 days of the country’s total oil demand.

- The proposed strategic crude oil storages would be in underground rock caverns/concrete structures and are projected to come by 2011-2012. The estimated construction cost of the project is $600 million. The cost of crude oil is estimated at $2.25 billion @ $55/b crude oil price.

- Progress: EIL has been appointed as contractor for Vizag site, land acquisition in Mangalore is in advanced stages with pipeline route survey in Padur nearing completion.

India – Iran Energy Relations

- India goes long way back in its relations with Iran—historical, cultural, political, and social. India's energy involvement with Iran are on many different fronts –
  - ***Crude oil imports*** ***– India is a substantial buyer of Iranian crude oil. Iranian crude imports into India averaged 104 kb/d in 2004, 119 kb/d in 2005, and 122 kb/d in 2006.***
  - ***Gasoline exports*** ***– India's Reliance is one of the key suppliers of gasoline to Iran.***
  - ***Upstream participation*** ***– IOC and OVL own 40% each of Farsi offshore block. India had been promised shares of Yadavaran and Juffeyr fields but these promises have not borne fruit.***
  - ***Iran-India-Pakistan Gas pipeline***
  - ***Iran-India LNG contract***
- India is in a delicate position in its involvement with Iran. On the one hand, energy and social ties are crucial and on the other hand there is increasing pressure from the US to lessen its involvement with the Persian nation.

Pipeline Imports from Iran

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- There are two possible pipelines that have been considered: (a) extension from the domestic 56 inch IGAT-7 pipeline, and (b) constructing a totally new pipeline. In the first option, Iran will send gas from Assaluyeh to the city of Iranshahr which is close to the border of Pakistan. After satisfying domestic needs, some 2.1 bscf/d will be made available to be shared between India and Pakistan. This pipeline is 20% complete and will be ready for full operation by late 2009.
- In the second option, a totally new pipeline (IPI) parallel to IGAT-7 will have to be constructed. The pipeline will be 2,775 km long with a proposed diameter of 56 inches and with a capacity of 5.3 bscf/d. Several impediments remain in this option and the new pipeline would be very expensive (>$8 billion). In our view only option (a) will materialize.
- Progress has been made on the pricing of gas. Iran has asked for a price of US$4.93/MMBtu at the border of Iran-Pakistan. The transportation tariff charged by Pakistan is around $0.5-0.7/MMBtu. Disagreements however continue over the issue of transit fees. The delivered price to consumers in India is likely to be above $7/MMBtu and much higher than domestic gas which is expected to average around $4.5/MMBtu. Furthermore, Iran proposes a three-year price review which India/Pakistan oppose.

China

Energy Overview

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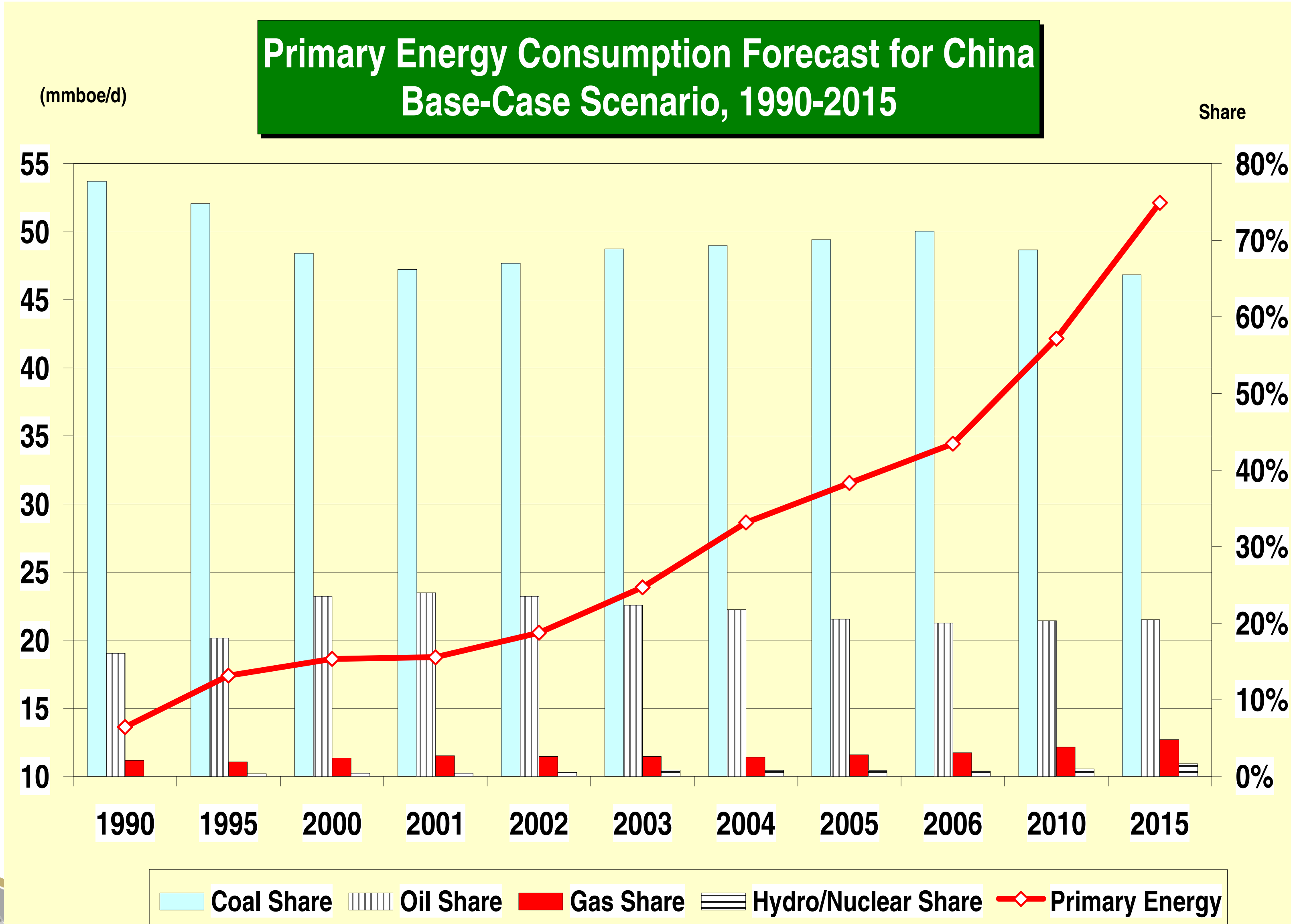
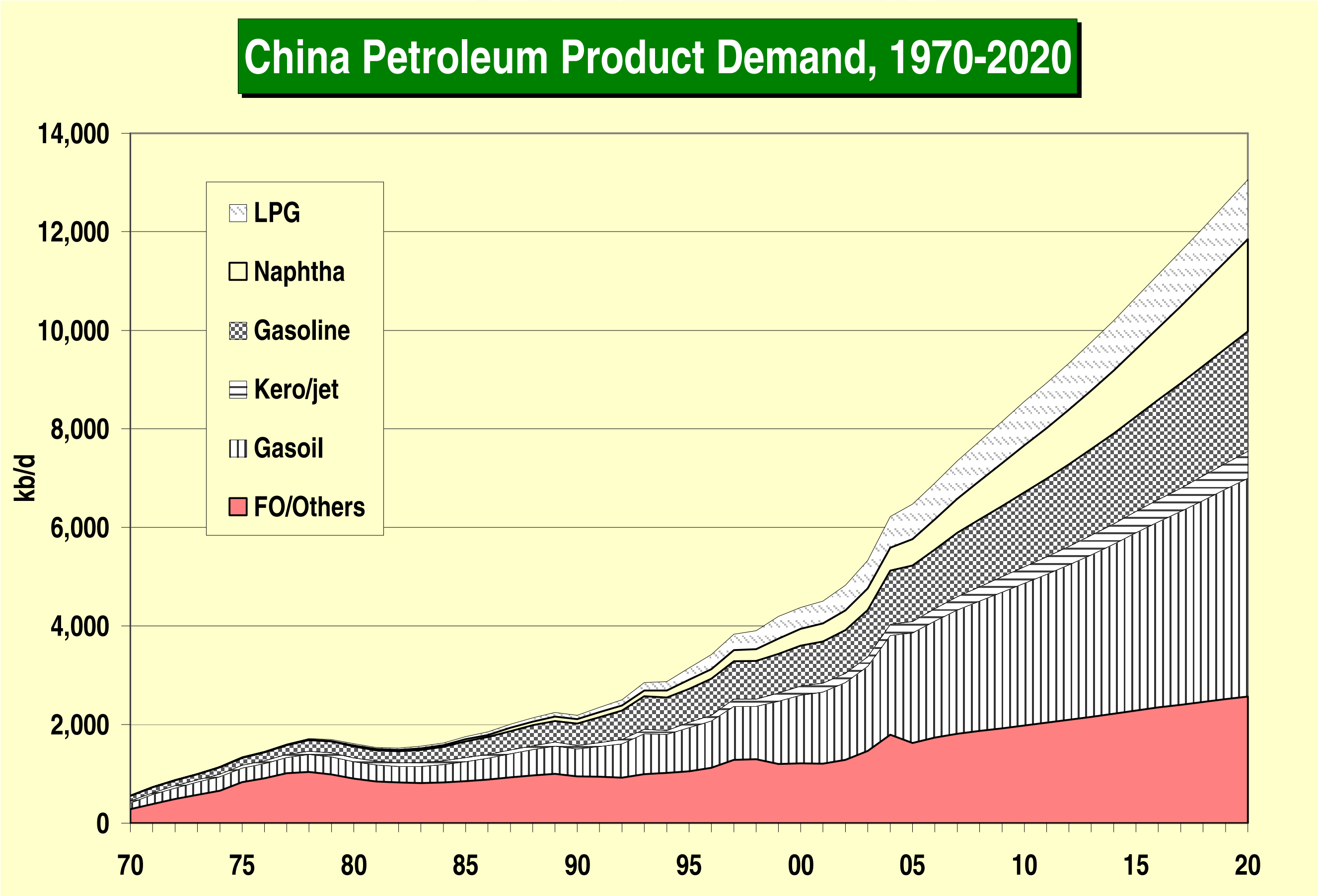
- Total primary commercial energy consumption grew 19.6% in 2004, 10.4% in 2005, and 10.3% in 2006.
- Huge energy production and consumption: China is currently the world's second largest primary energy consuming country and the third largest primary energy producer.
- Coal consumption grew 20.4% in 2004, 11.7% in 2005, and 10.9% in 2006. Oil demand growth reached 16.7% in 2004 but was eased to 4.1% in 2005. The demand growth for 2006 is estimated to have reached 6.5%. Natural gas demand has been strong overall. Electric power demand has had double-digit growth per annum since 2001. Future growth will be strong.
- Structural changes of primary energy use continues.


Primary Energy Consumption Forecast for China
Base-Case Scenario, 1990-2015
(mmboe/d)
Share
55
50
45
40
35
30
25
20
15
10
80%
70%
60%
50%
40%
30%
20%
10%
0%
1990
1995
2000
2001
2002
2003
2004
2005
2006
2010
2015
Coal Share
Oil Share
Gas Share
Hydro/Nuclear Share
Primary Energy

Oil Product Demand

Petroleum product demand in China reached 6.9 million b/d in 2006 (which include some 200 kb/d of crude burning). For 2007, the demand is estimated to have increased to 7.3 million b/d. China is currently the second largest oil consumer in the world after the US, though its consumption is still less than one-third of that of the US.

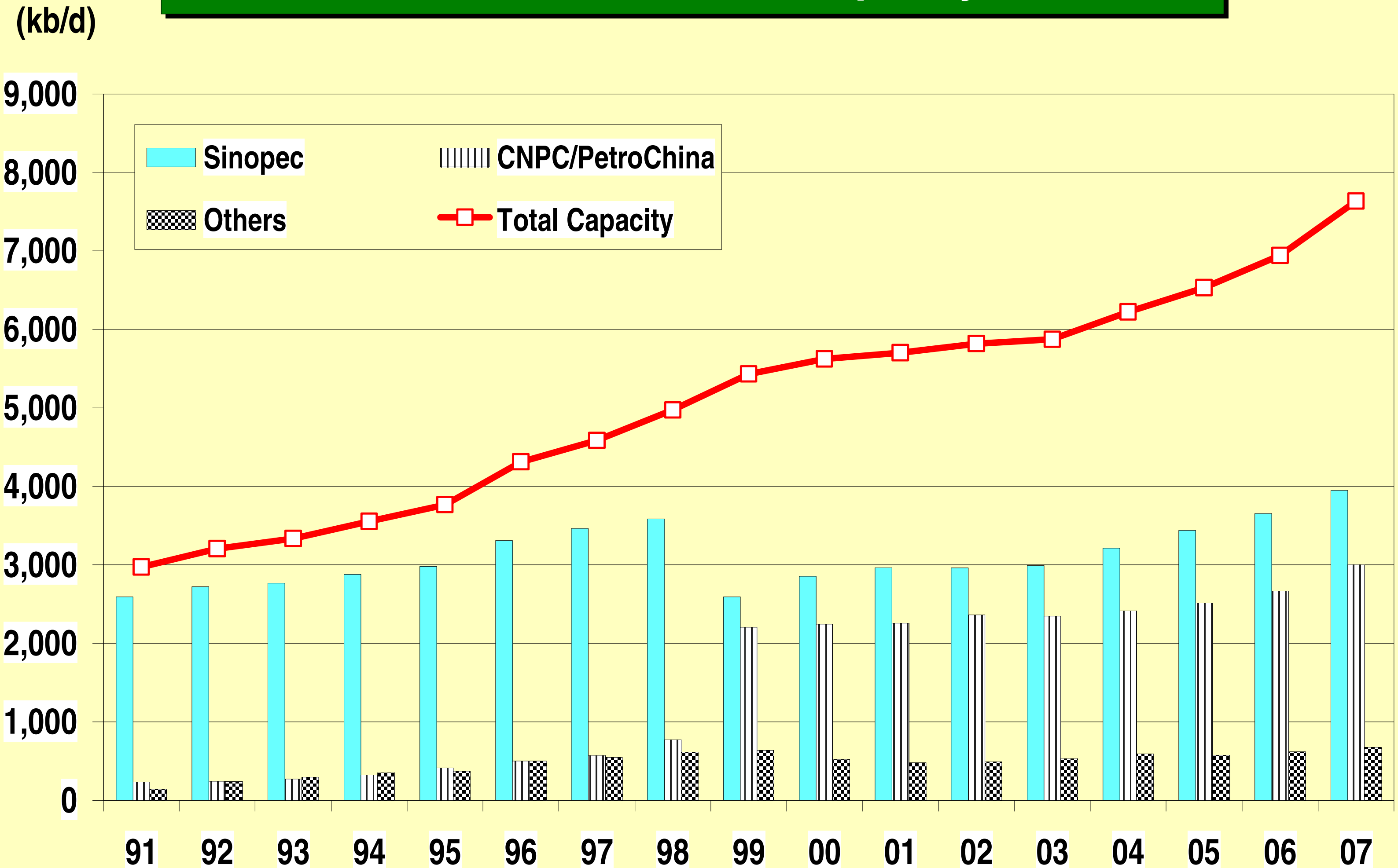


Note: 1970-2005 data are actual; 2006 is preliminary; 2007-2020 data are projections.

China—Increasing Refining Capability

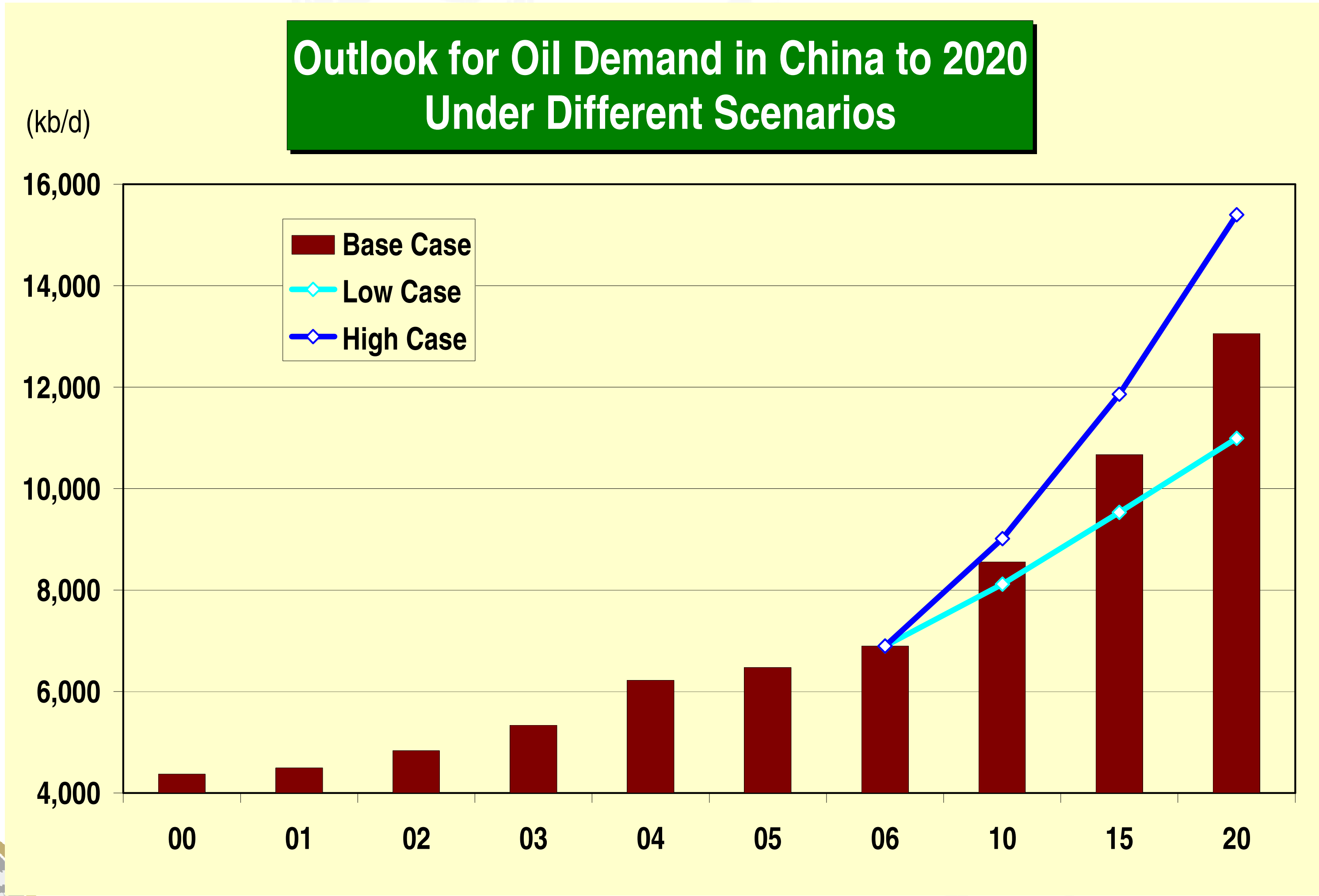
- At the start of 2007, China's total refining capacity stood at 7.6 million b/d, which include most locally-owned small refineries; up sharply from 6.9 million b/d at the start of 2006. Back in 1996, China's total CDU capacity was 4.6 million b/d.
- In 2006, China processed 6.1 million b/d of crude oil, up 3.9 million b/d from 1990 and 2.2 million b/d from 2000.
- The utilization rate reached over 84% in 2006 as compared to 86% in 2005, 72% in 2000 or the low of 64% in 1998.
- China has huge plans to expand and upgrade its refining capacity. Between the start of 2007 to the end of 2012, 2.7 million b/d of new refining capacity will be added under firm and likely plans. Another 1.4 million b/d of new capacity is proposed in the meantime by various players, but their status is uncertain at this point in time.

China's Start of the Year CDU Capacity, 1991-2007

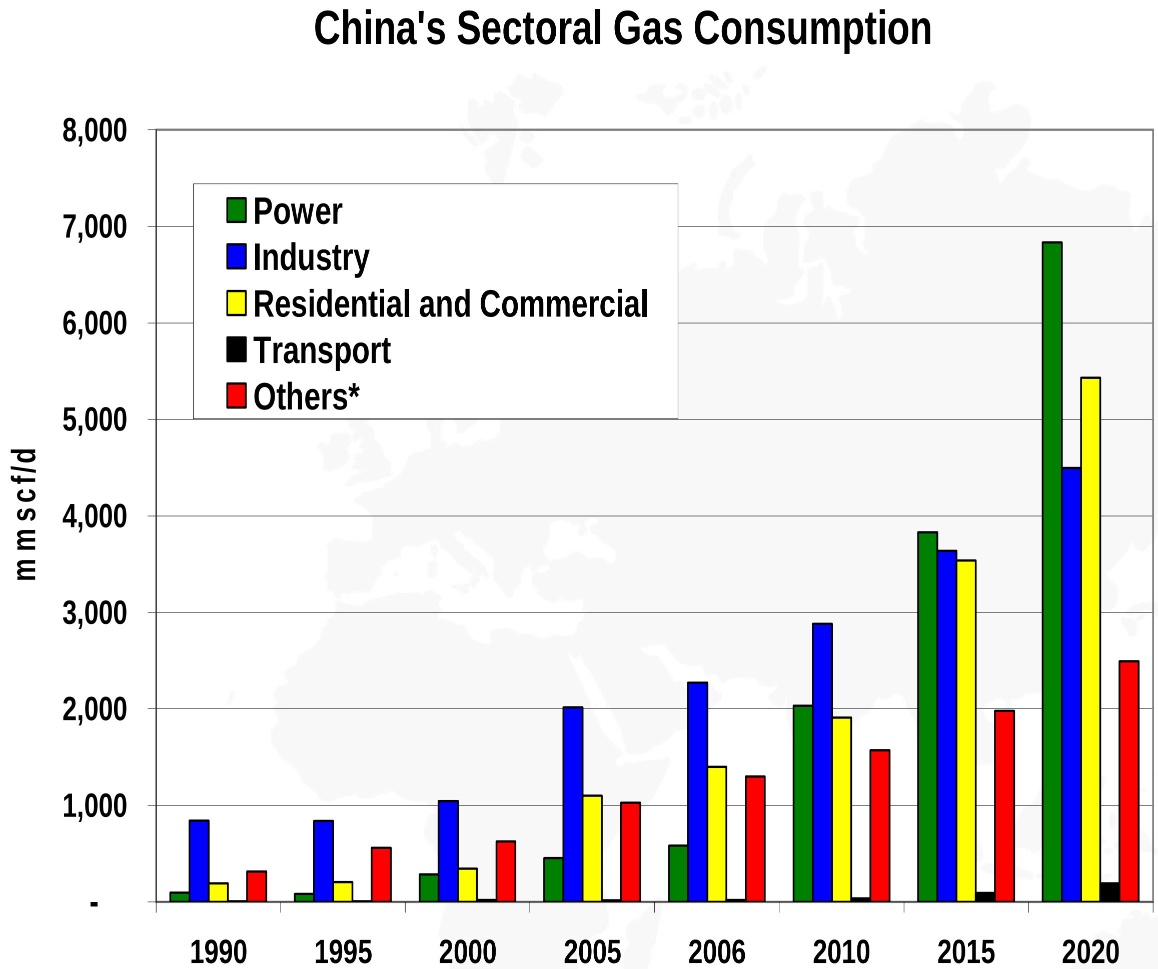


Note: Others are locally-owned small refineries.

Uncertainty of China's Future Oil Demand



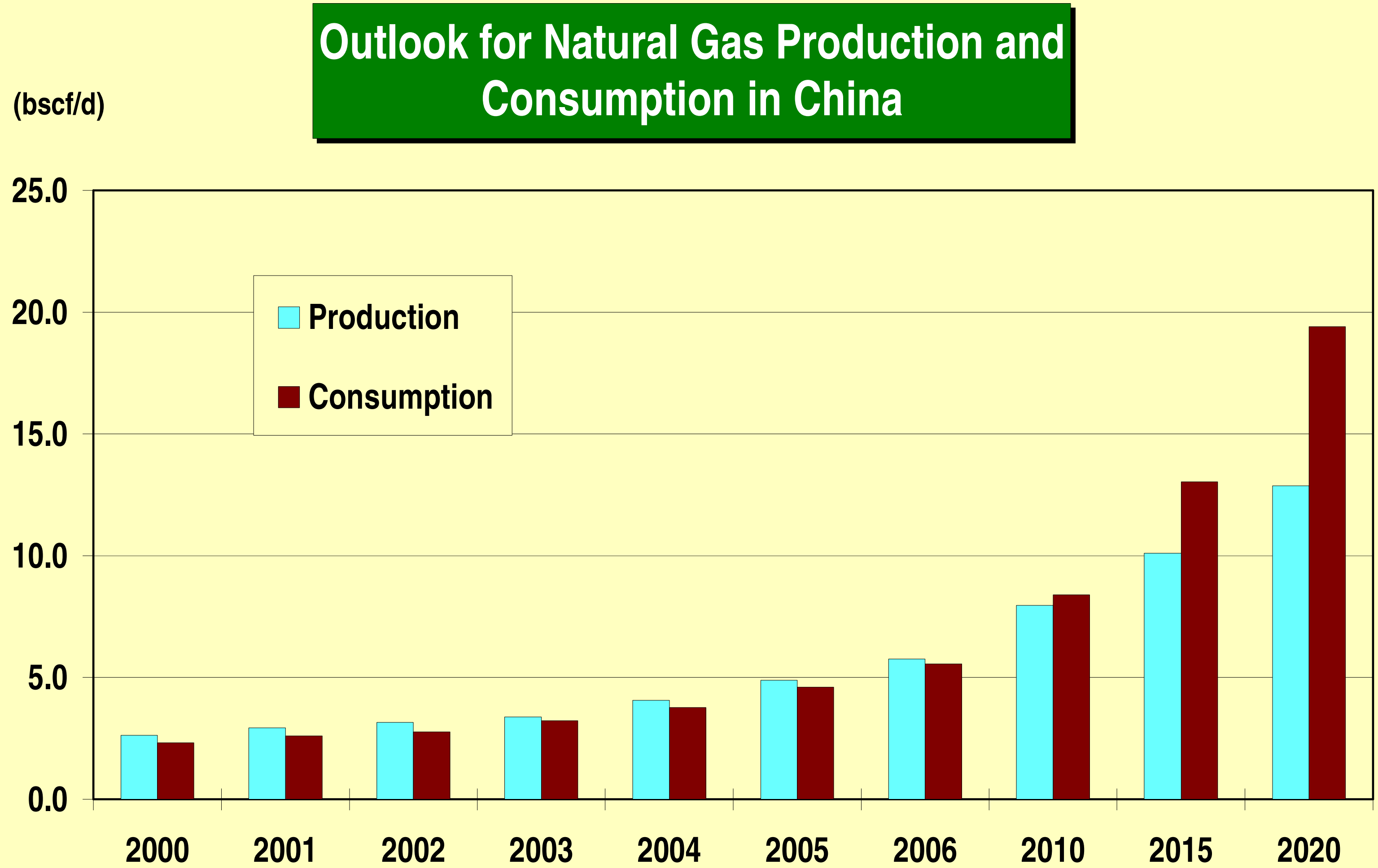
Sectoral Gas Demand and Production



* Includes agricultural use, and non-specified others; excludes distribution losses.

- ✓ **Current use is dominated by the industrial sector, particularly fertilizer production**
- ✓ **Residential/ commercial use is sizable too**
- ✓ **Use for power generation is low**

Sectoral Gas Demand and Production



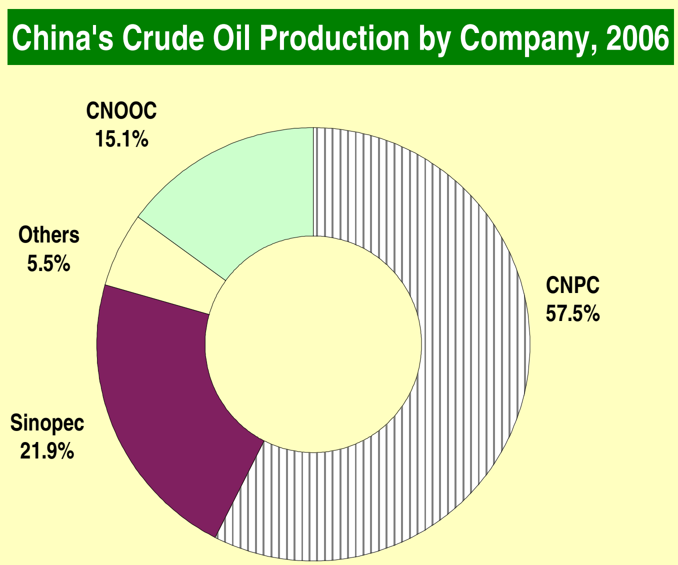
Note: 2010-2020 are projections.

State of LNG Contracts

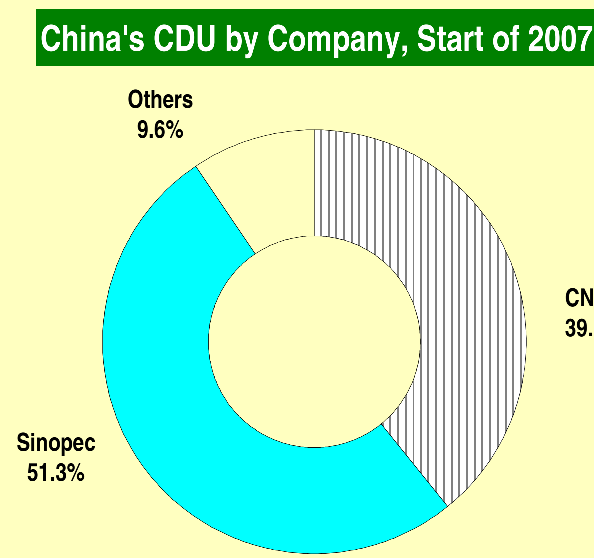
China's Existing LNG Contracts (mtpa)							
Exporter	**Contract Volume**	**Start-Up Date**	**2006**	**2007**	**2010**	**2015**	**2020**
NWS	3.3	2006	0.7	2.0	3.7	3.7	3.7
Tangguh	2.6	2009	-	-	1.5	2.6	2.6
MLNG	3.0	2010	-	-	1.0	3.0	3.0
Total	**8.9**		**0.7**	**2.0**	**6.2**	**9.3**	**9.3**
FACTS Base-Case LNG Demand Forecast			**0.7**	**2.0**	**6.2**	**15.3**	**32.6**
China Uncommitted Demand			**-**	**-**	**-**	**6.0**	**23.3**

Chinese NOCs

Nearly all segments of China's petroleum industry are dominated by the three NOCs: CNPC/PetroChina, Sinopec, and CNOOC. Upstream by all three. Pipelines by all three. Downstream refining by Sinopec and CNPC/PetroChina, wholesale by Sinopec and CNPC/PetroChina. Sinopec and PetroChina also have prominent presence in the retail oil market. China's overseas investment is also dominated by the NOCs. Chinese non-state/private companies do play various roles in oil retailing, gas marketing, and other areas.

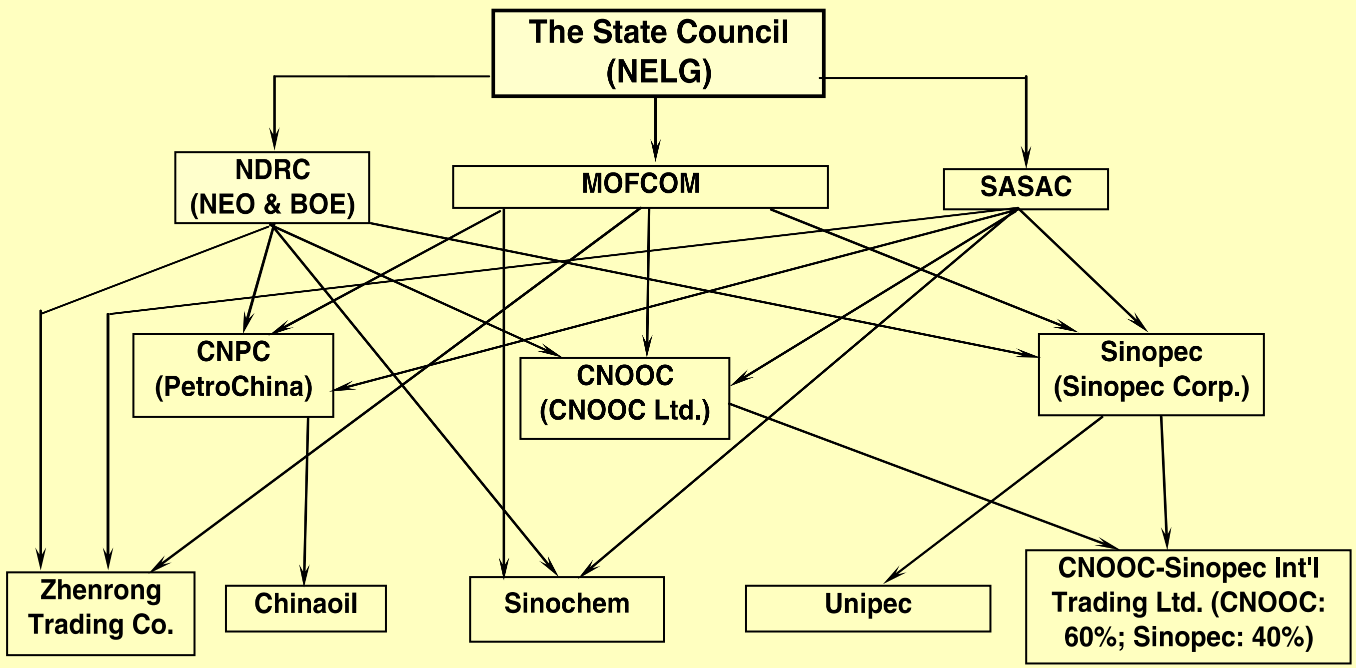


Note: Total output was 3.67 million b/d.



Note: Total capacity was 7.6 million b/d.

Organizational Chart of the Petroleum Industry in China (State), 2007



NDRC: National Development and Reform Commission. MOFCOM: Ministry of Commerce.
NELG: National Energy Leading Group, established in June 2005. BOE: Bureau of Energy
NEO: National Energy Office. SASAC: State-Owned Assets Supervision and Administration Commission
CNPC: China National Petroleum Corporation. PetroChina: PetroChina Company Limited.
Sinopec: China Petrochemical Corporation. Sinopec Corp.: China Petroleum and Chemical Corporation
Unipec: United International Petroleum & Chemicals Co., Ltd. Chinaoil: China National United Oil Corporation.
CNOOC: China National Offshore Oil Corp.
Note: The CNOOC-Sinopec company was established in May 2004 as a state oil trading company.

Elements of China's Energy Security Strategies

- Enhance domestic oil and gas E&P activities and maximize oil and gas production.
- Diversify the sources of oil and gas imports, increasing the share of oil and gas imports from Russia and Central Asia.
- Strengthen the overseas investments by state oil companies, particularly in the Middle East, Asia Pacific, Russia, and Central Asia.
- Increase the investment in oil and gas infrastructure and open more channels to imports.
- Establish the strategic or government petroleum reserves.
- Use of more nuclear power.
- Enhance energy conservation and improve efficiency.
- Promotion of renewable energy development.

China's SPR

- NDRC is in charge of the work. The NDRC Energy Bureau is home to the National Office of SPRs.
- Plan for Phase I (by 2008): 16.4 million m^3 or 103 million bbl (approximately 31 days of net imports or 15 days of total consumption). Phase I construction has been underway since 2004.
- Target for Phase II (2010): Another 32 million m^3 or 204 million bbl, totaling 305 million bbl (approximately 60 days of net imports or 35 days of total consumption).
- The four selected sites for Phase I:
  - Zhenhai (Zhejiang) with Sinopec: 33 million bbl
  - Aoshan (Zhejiang) with Sinochem: 31 million bbl
  - Huangdao (Shandong) with Sinopec: 20 million bbl
  - Dalian (Liaoning) with PetroChina: 19 million bbl

China's SPR

- Zhenhai was ready in August 2006 and filling up has since started. By mid 2007, it was almost completely filled.
- Part of the Aoshan site was completed at the end of 2006. Part of Huangdao was completed in June 2007. Rest of Aoshan and Huangdao, as well as the Dalian site will be completed in 2007/08.
- Commercial operations and management of the storage may be allowed to a certain degree while the government retains overall control.
- The government is passing laws that will require oil companies to also establish a minimum level of storage as a supplement to the national storage.

FACTS GLOBAL ENERGY
GROUP OF COMPANIES

China – Iran Energy Relations

- China and Iran have maintained a friendly relationship since the 1970s. China's energy links with Iran include the following major elements:
    - Iran's crude exports to China: In 2006, Iran was China's third largest crude oil import source. China took 335 kb/d of crude oil from Iran—almost all imported by Zhenrong—a trading company originating from the military. Imports from Iran accounts for 12% of China's total crude imports. Iran's exports to China increased to 414 kb/d during the first five months of 2007.
    - Iran's LNG exports to China: Both PetroChina and Sinopec have signed agreements to import LNG from Iran, though it is still too early to say when the actual exports will occur.
    - China's oil and gas investment in Iran: All three Chinese companies have signed various agreements and contracts with Iran to conduct petroleum investment in the country.

China's Petroleum Investment in Iran

Sinopec

- Sinopec signed an upstream risk exploration service contract in 2001.
- During 2000-2003, Sinopec provided engineering services worth a total of US$150 million to upgrade the Tehran and Tabriz refineries and conducted two infrastructure projects in northern Iran.
- In October 2004, Sinopec won the rights to develop the Yadavaran oil field with a 50% interest under buyback schemes. Till now, no firm contract has been signed, but the negotiations are nearing completion. There is also a 10 million tonnes LNG purchase MOU for Qindao terminal.
- In 2006, Sinopec was awarded a major contract for the expansion and upgrading contract for Arak refinery in Iran together with a domestic engineering company Sazeh.

China's Petroleum Investment in Iran

CNPC/PetroChina

- CNPC in August 2000 won a contract to drill 19 gas wells in the southern part of the country.
- In early 2004, CNPC purchased the Cyprus-based subsidiary of Canada's Sheer Energy with interest in Iran.
- In 2005, PetroChina signed MOU for 3 million tonnes of LNG from Pars LNG for Dalian Terminal.
- Since early 2007, CNPC has been negotiating with the NIOC for a US$3.6 billion development of the South Pars offshore oil field and an associated LNG export plant.
- In 2006, PetroChina was awarded a contract to build the three large condensate splitters in Iran in a consortium: Persian Gulf Star.

CNOOC

- In December 2006, CNOOC was in talks with National Iranian Oil Company to explore offshore North Pars natural gas field and build a large 16 million tonnes LNG export facility.


Thank
You!