

Outlook for Global Energy Markets after the Great Recession: With Perspective on China and Iran

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World Oil Markets

World Oil Demand 2007-2010

- Negative demand growth of the world for 2009 is unprecedented!

World Oil Demand 2007-2010 (mmb/d)

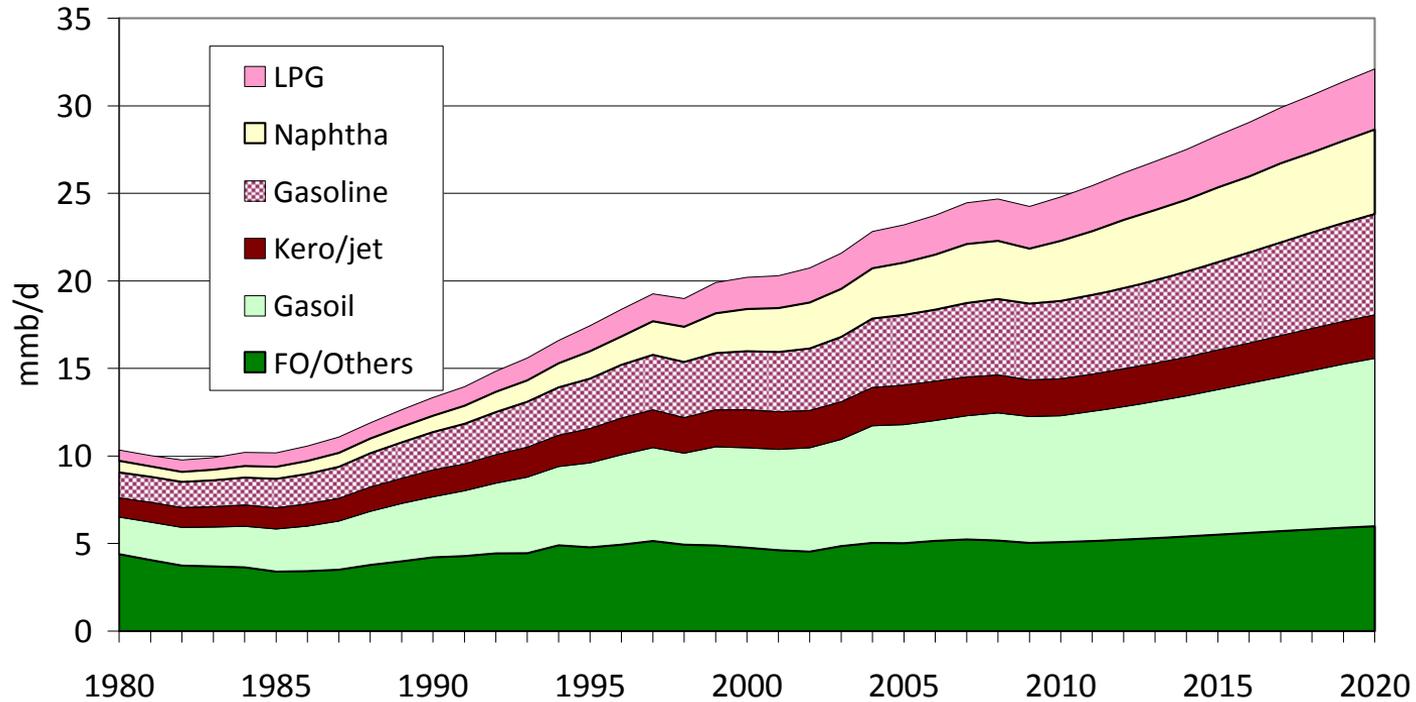
	2007	2008	2009	2010
Total Demand	87.7	87.7	85.6	86.3
Incremental Growth	1.3	0	-2.1	0.7
Percentage Growth	1.5%	0%	-2.4%	.08%

Source: EMC/FGE September 2009 Quarterly World Oil Balance and Forecast.

Asian Demand Growth

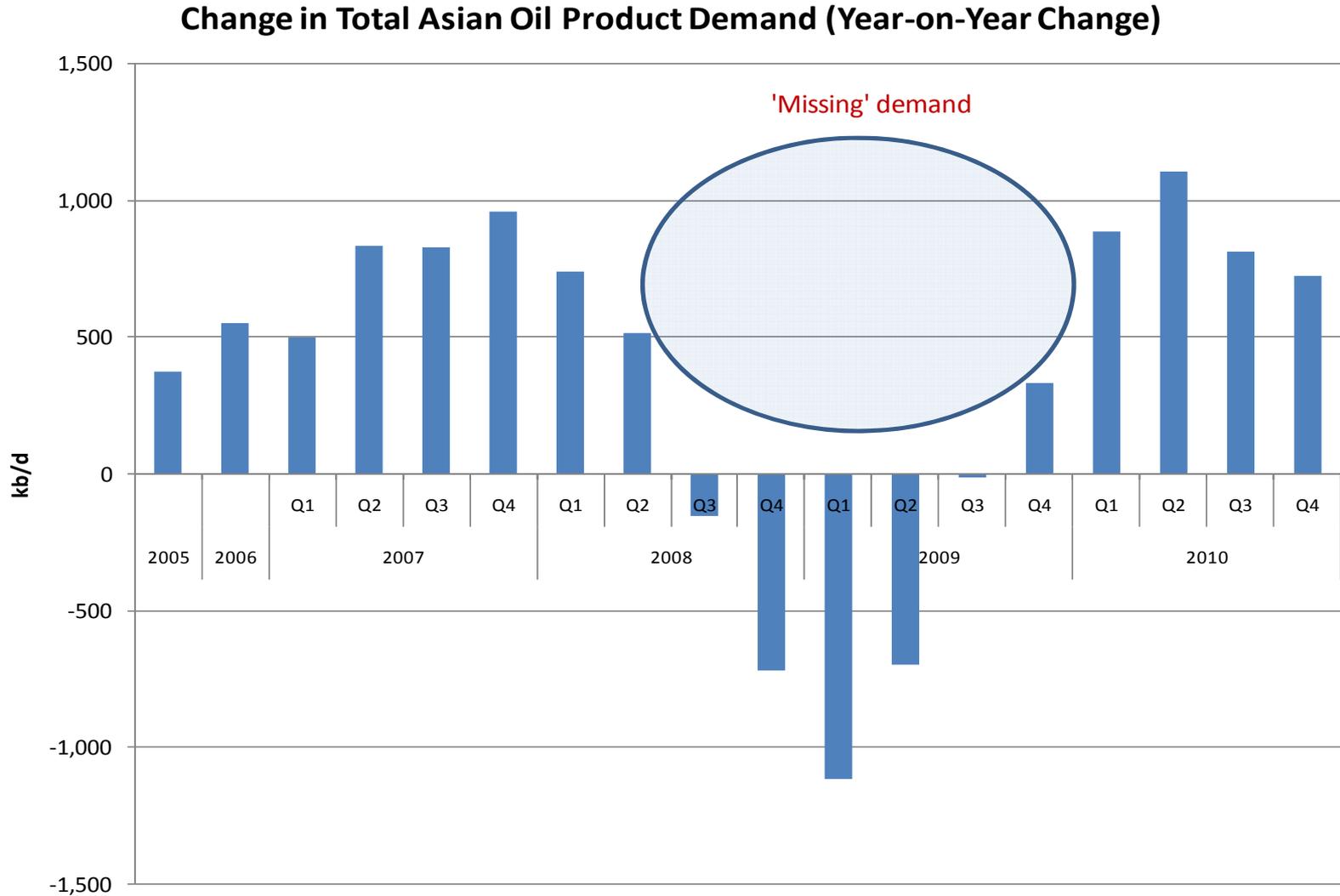
➤ A “dent” is emerging in 2009, the first time since 1998.

**Petroleum Product Demand in the Asia-Pacific Region
1980-2020**



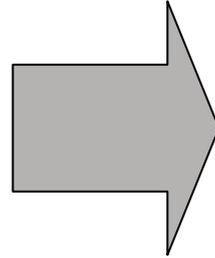
Note: 2009-2020 data are projections.

Sudden, Sharp Impact on Asian Demand



Longer Term: Oil Market Demand Will be Led by 3 Demand Centers

Structural demand shift



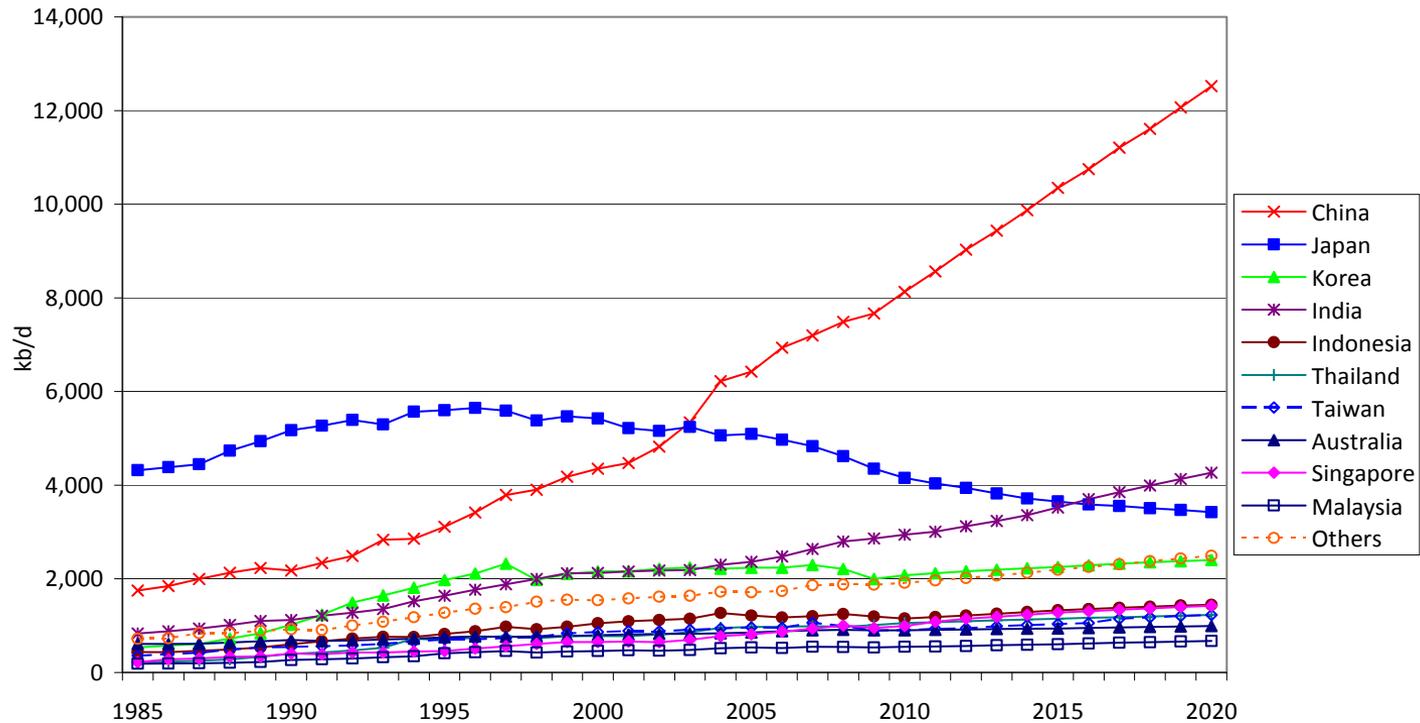
**Strong “baseload” demand
once global economy
recovers**

	Annual Growth 2007-15 (kb/d)
China	380
India	115
Other Asia	10
Middle East	340
Total	0.8-0.9 mmb/d

Longer Term: Oil Market Tightness to Return

- Over the long term, China and India will lead not only regional, but also global oil demand growth.

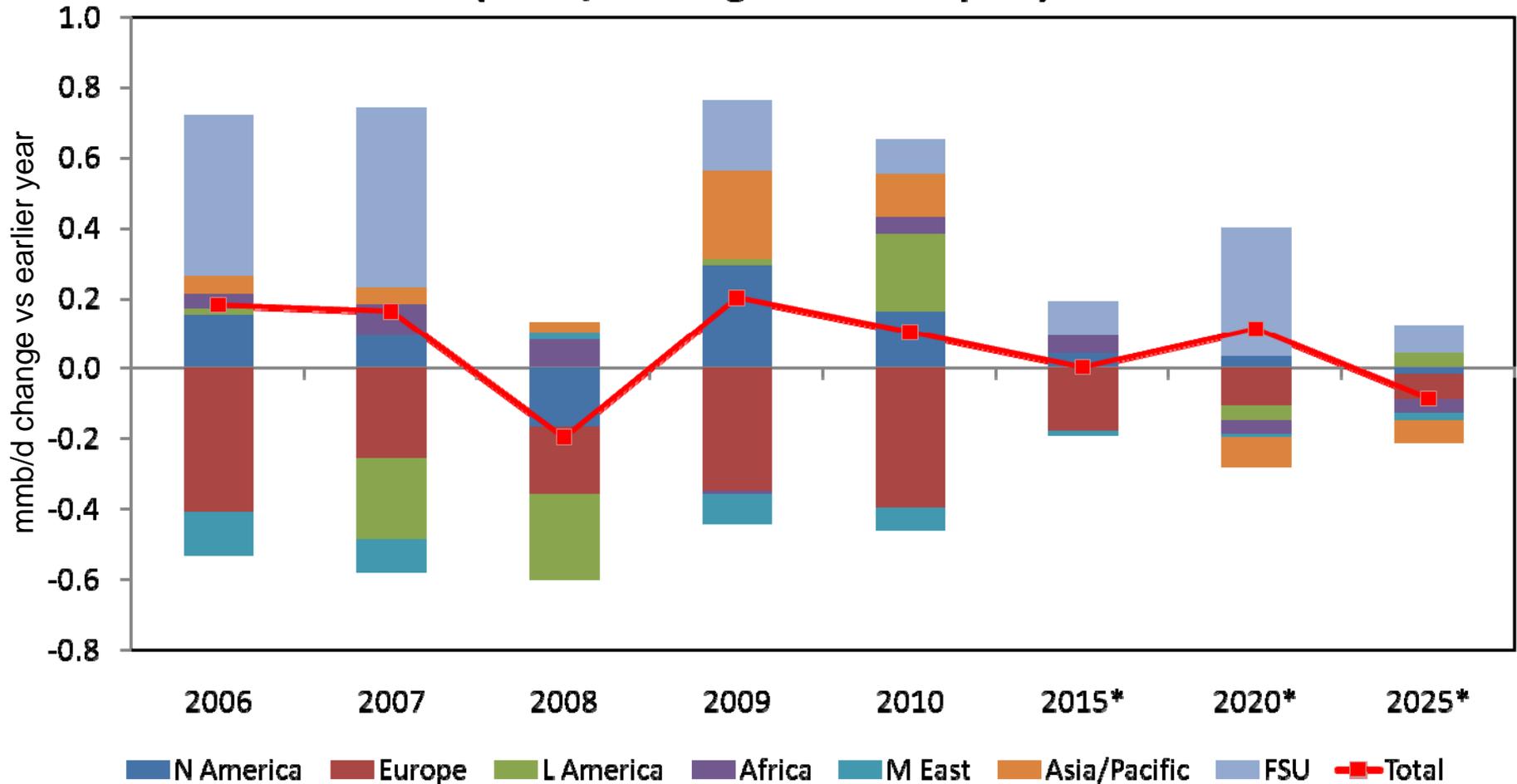
Asian Petroleum Product Demand by Country, 1985-2020



Source: FGE (2009).

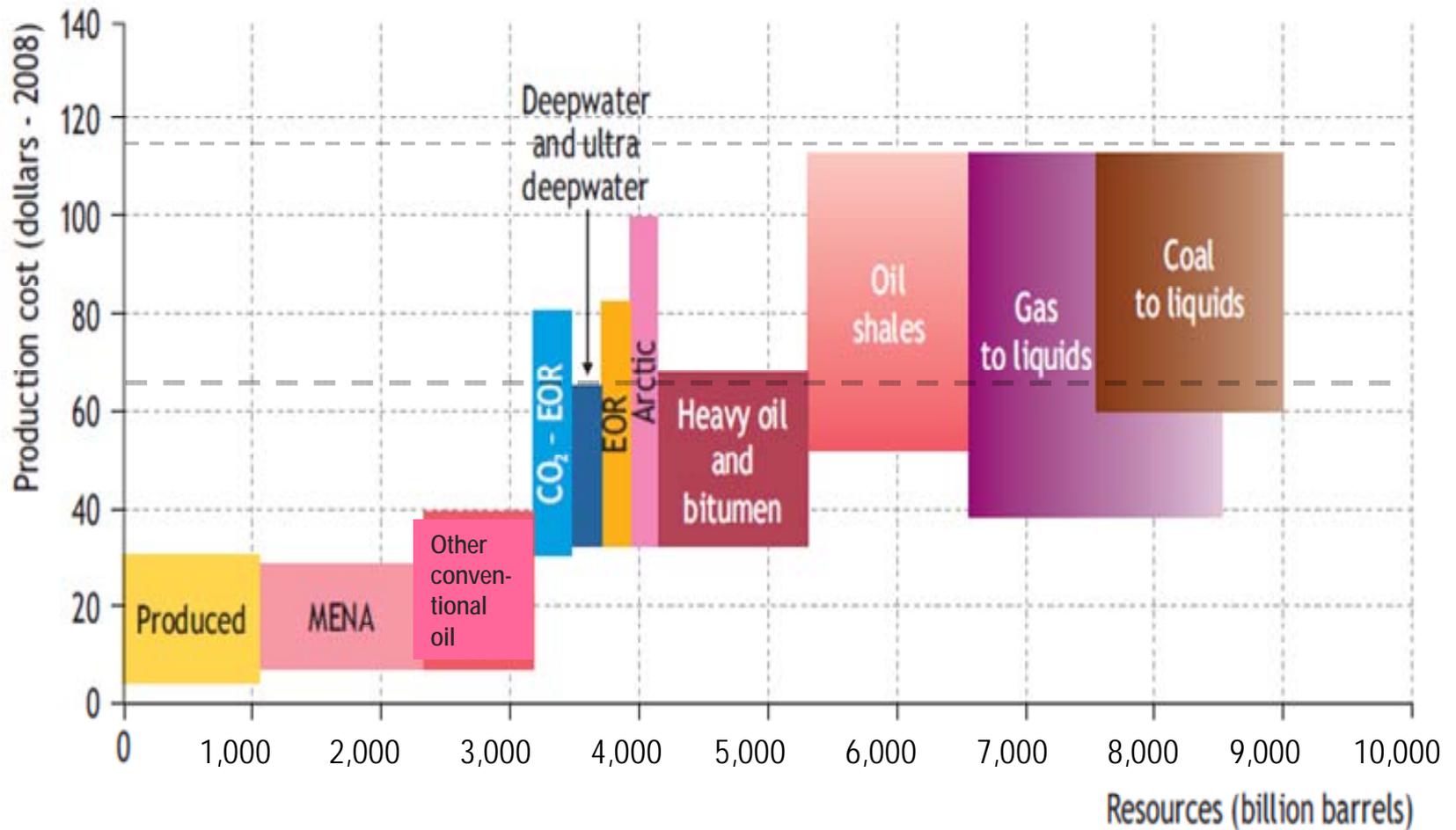
Non-OPEC Production Plateau

Non-OPEC Production, 2006-2025 (mmb/d change vs earlier year)



* Average of 5 years change vs year earlier.

High-Cost Projects Exposed Again?



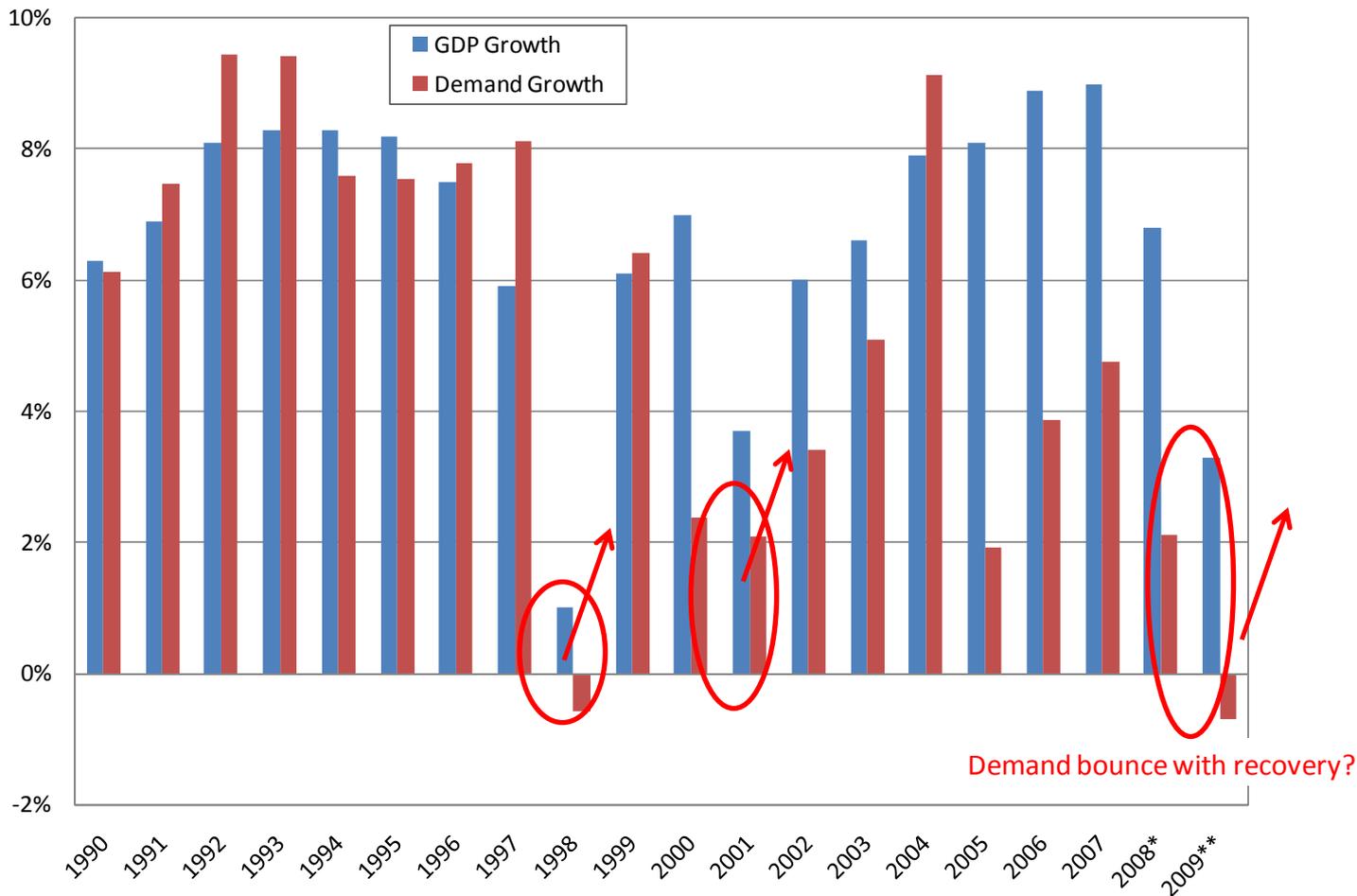
Source: IEA

OPEC Coming to Fill the Supply/Demand “Gap”?

- After a short-term spike, **non-OPEC supply growth will slow and plateau** sometime between 2012-2015.
- OPEC faces a **natural decline of some 1.5 mmb/d**.
 - Adding capacity is difficult, as **much new capacity is needed just to stay in the same place**.
- OPEC may have **trouble adding up to 1 mmb/d of additional capacity** annually, which may be required once non-OPEC plateaus.
 - Political, legal, and management problems are unlikely to allow for new capacity additions large enough to respond to the demand growth.
 - Is the oil there? No one really knows for sure—reserves are simply guesstimates driven by politics in certain countries.
 - At the very least, OPEC will have an easier time sustaining price levels.
 - Global oil production is likely to reach a plateau of 95-100 mmb/d by mid-next decade. This is not a geological limit, but a geopolitical limit.

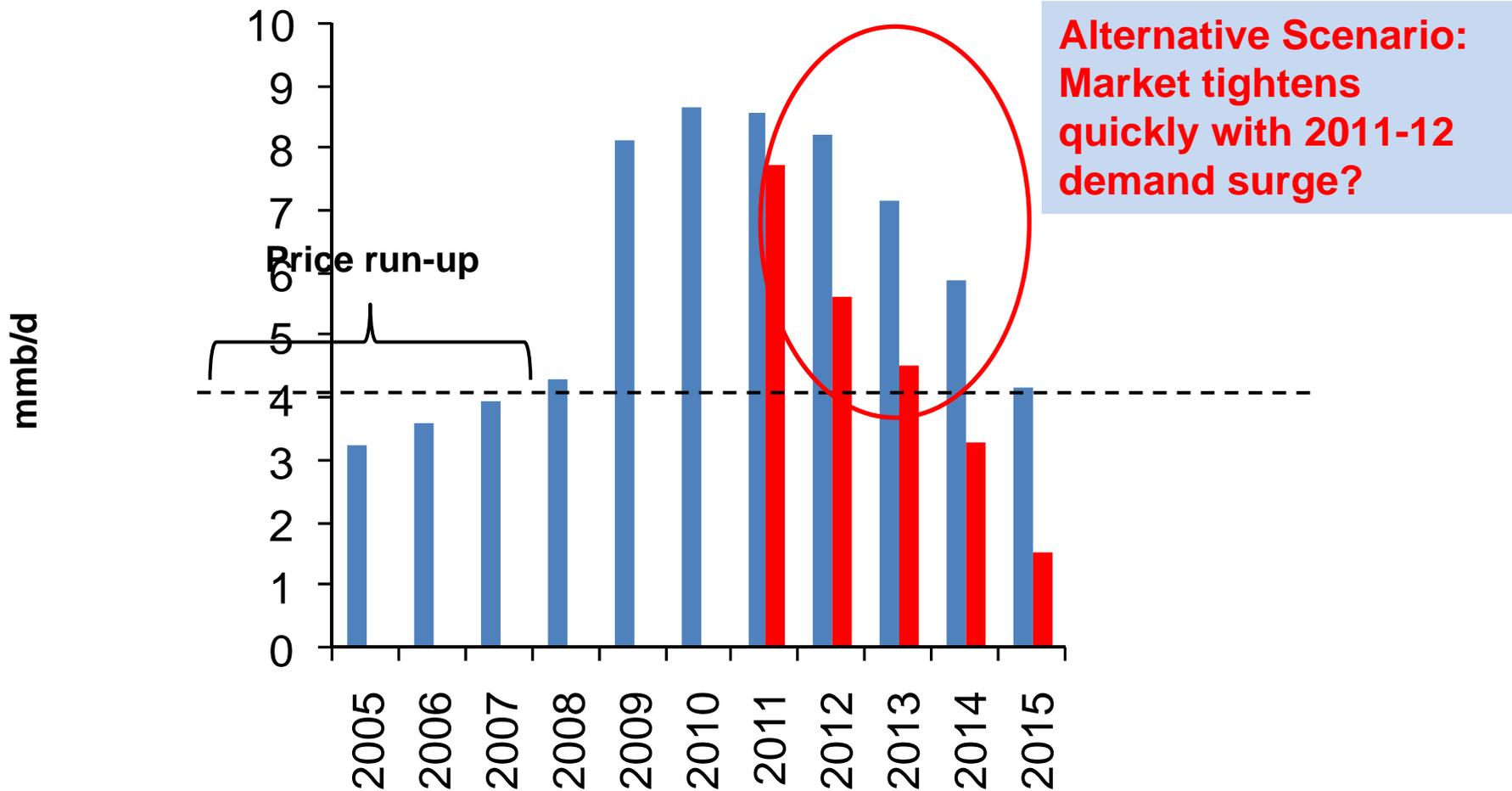
Key Uncertainty: Demand Surge Reducing Spare Capacity?

Developing Asia GDP Growth Versus Oil Demand Growth



Notes: *Estimated; **Projected.

OPEC Spare Capacity Outlook



(Note: Effective spare capacity may be lower than depicted here—key is to observe the change in level.)

In a Nutshell...

- Supply side issues are unchanged from the past.
- Overall supply is perhaps getting worse, due to lack of investment.
- In the short run, spare capacity exists.
- In the long run, however, supply will be tight.
- 90 mmb/d is the limit for non-conventional oil production.

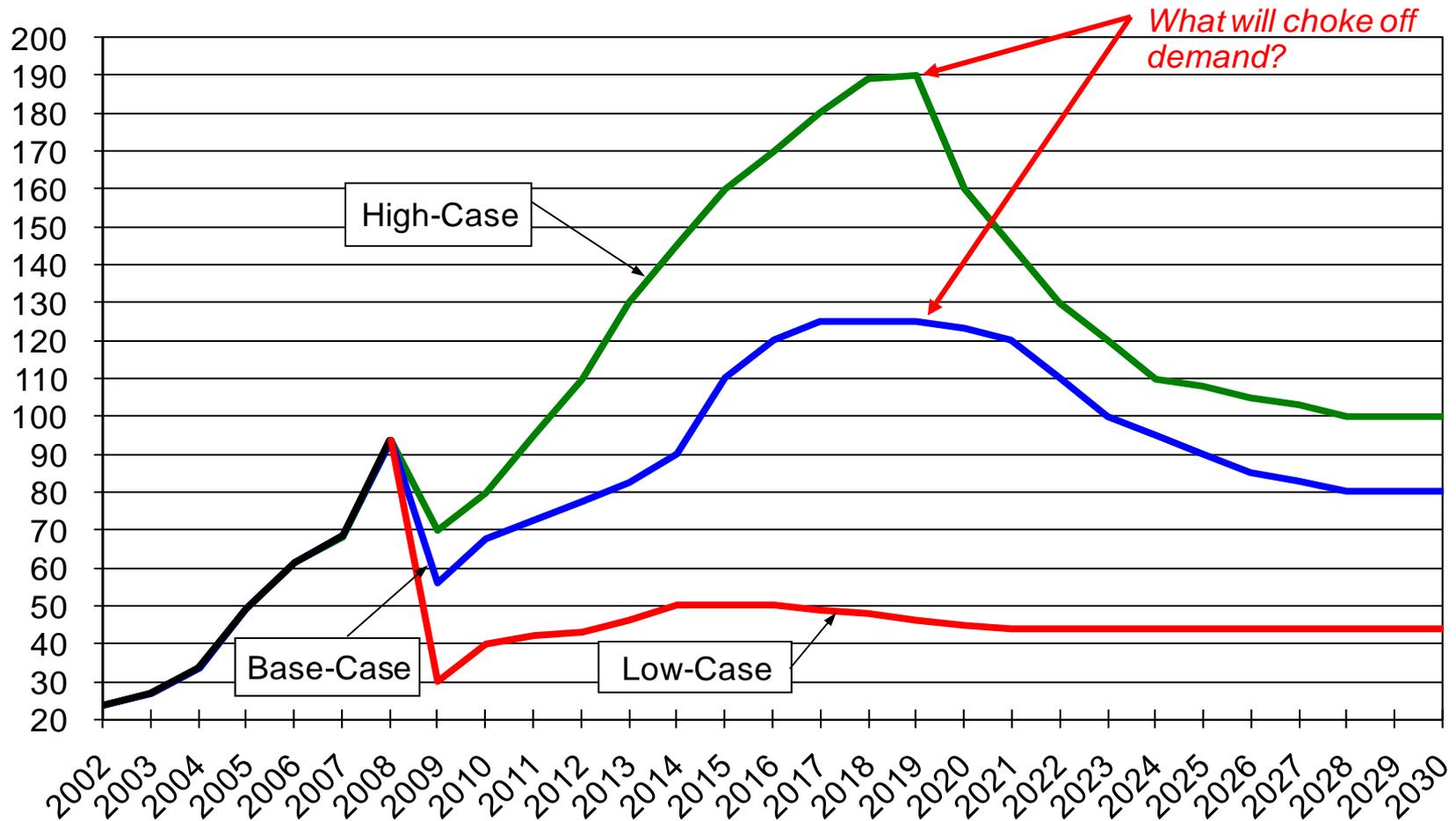
Implications for Oil Prices

Prices for 2008-2010

Dubai Crude (Base Case)				
	Q1	Q2	Q3	Q4
2008	\$91.38	\$116.99	\$113.34	\$52.60
2009	\$44.30	\$59.10	\$65.00	\$59.70
2010	\$62.50	\$67.50	\$68.50	\$71.50

Same Price Cycle Again—But Extended

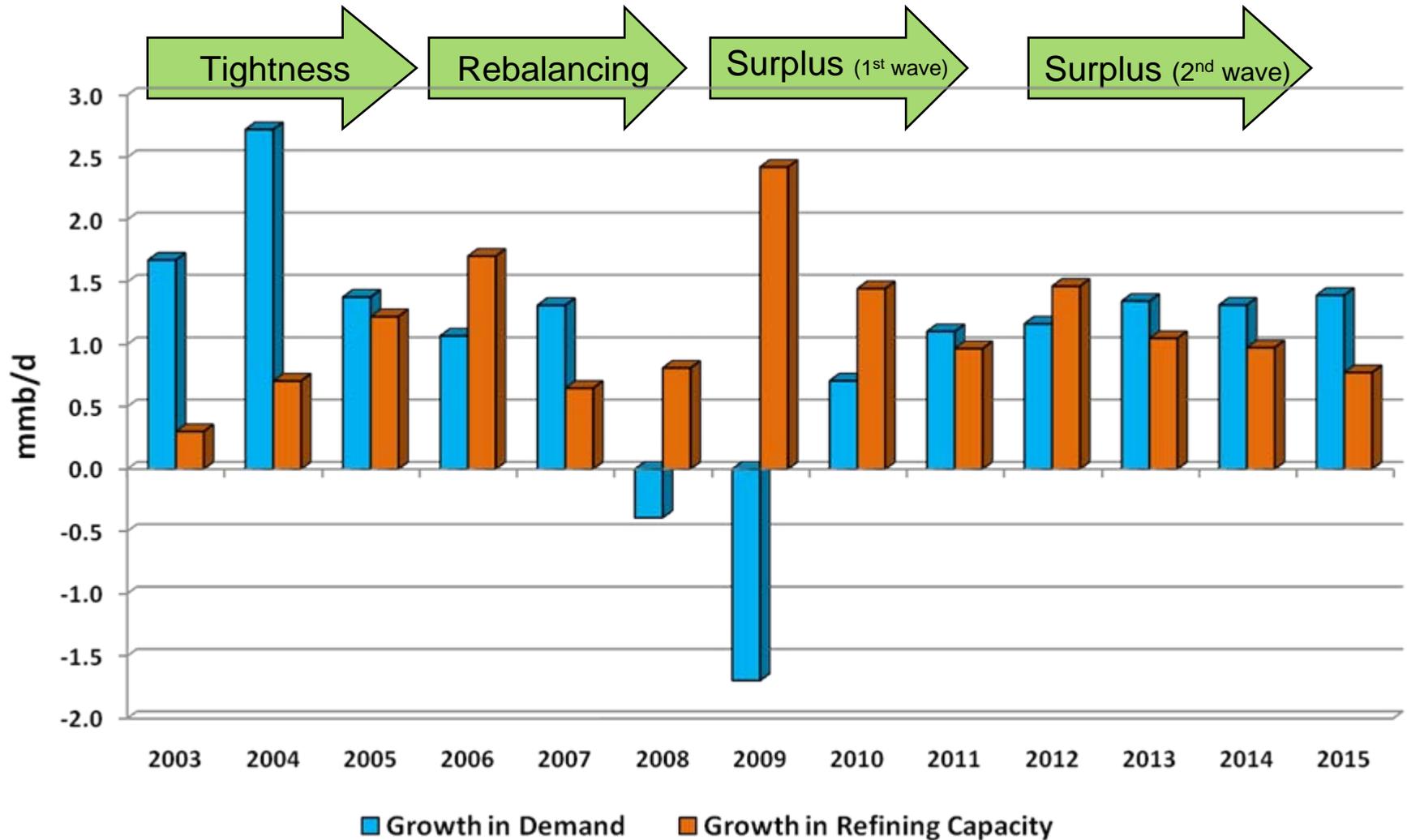
High, Base, and Low Price Forecasts for Dubai, US\$/bbl



Note: Actual up to 2008 and forecasts in 2009\$ thereafter.

Refining Sector Developments and Product Trade

Global Pressure: Capacity Growth Outpacing Demand (Including Closures of 1.7 mmb/d)

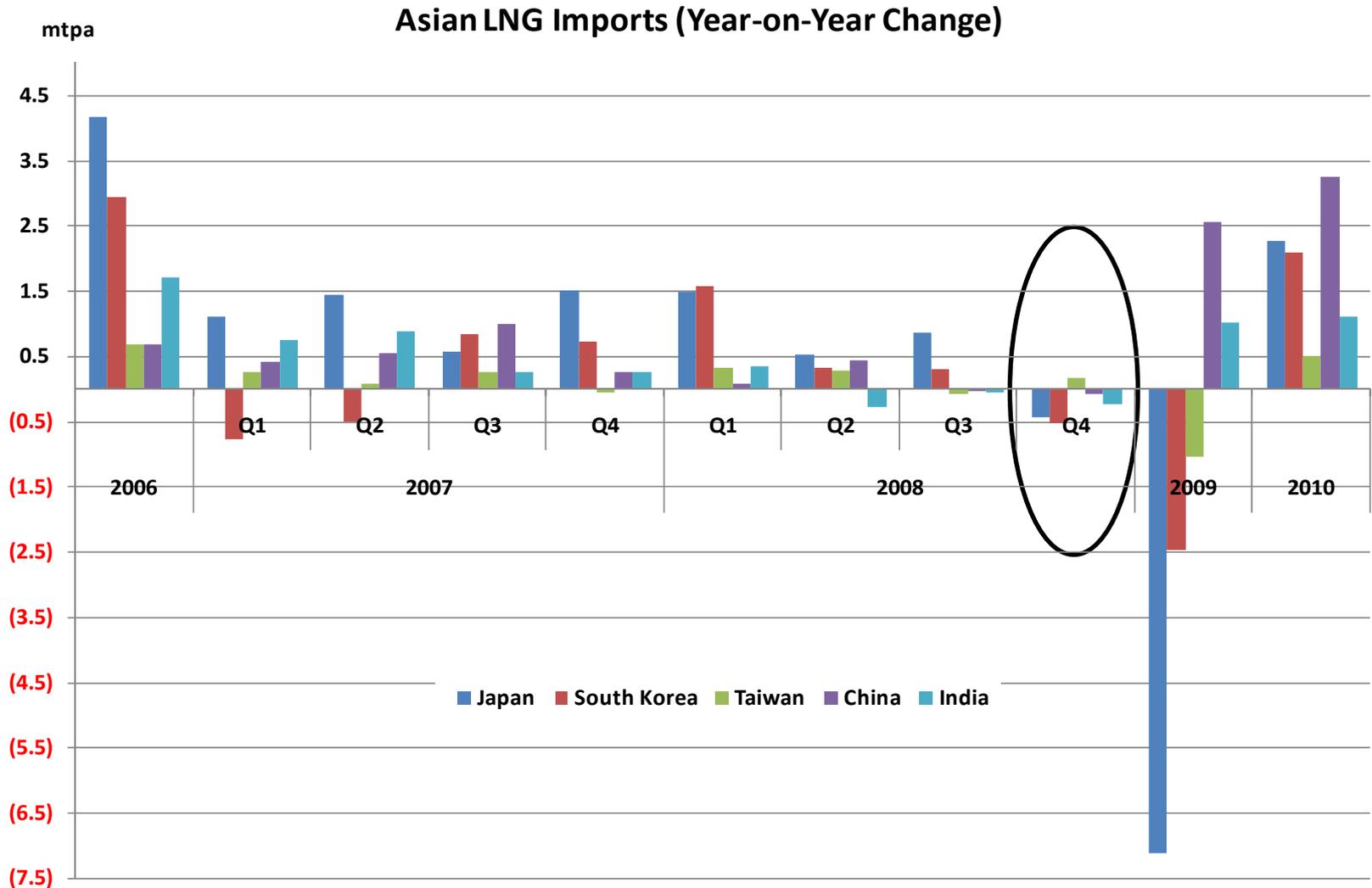


World LNG Markets

A Radically Different LNG Market

- The LNG market has changed radically in the last 6-9 months.
- More change is expected through the end of 2009!
 - Markets were extraordinarily tight, in favor of sellers.
 - Result: High prices
 - Radical change in the short term due to a combination of factors:
 - US gas revolution
 - Global economic crisis
 - Unprecedented LNG supplies expected from 2009-2011
 - Buyers in a much better negotiating position.
 - How will this impact short-, mid-, and long-term contracts?

Economic Downturn: Impact on Asian Imports



Who is the Next Big LNG Supplier?

Liquefaction Capacity (in mtpa)

	In Operation	Under Construction	Planned	Total
Qatar	38.5	39.0		77.5
Nigeria	22.2		40.4+	62.6+
Australia	20.1	4.3	73.2	97.6
Russia	4.8	4.8	7.5+	17.1+
Iran			69.7	69.7

> 3 / 4 of planned capacity globally

Middle East Gas—Feast or Famine?

Iran export volumes will be much smaller than Qatar.

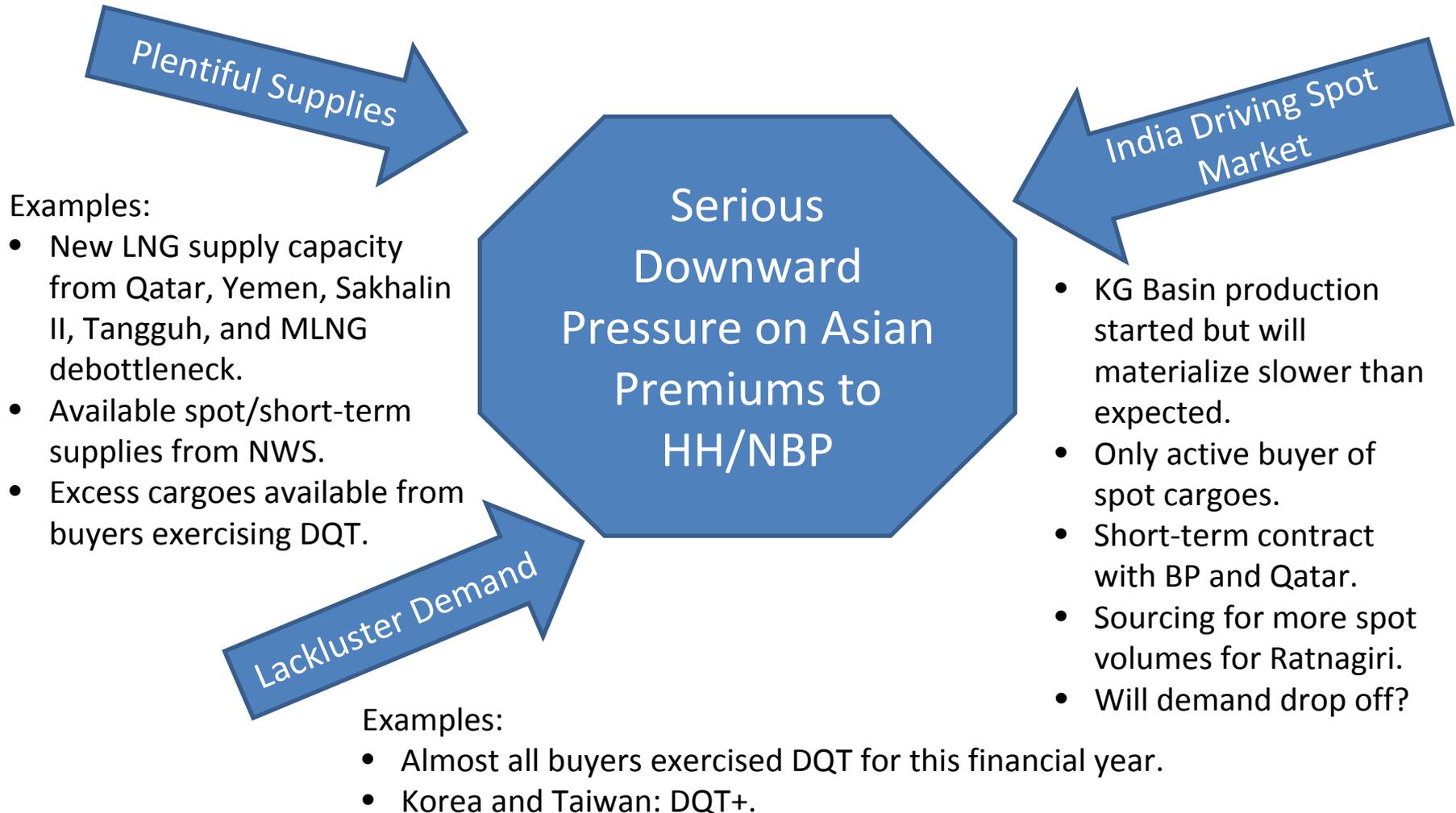
- Large domestic grid—price \$0.4/MMBtu
- Massive gas re-injection of some 10 -11 bcf/d
- Substantial political opposition to gas exports

Qatar is now the largest LNG exporter in the world.

- Mistake to assume infinite supplies
- Around 90-100 million tonnes might be the limit
- About 77 million tonnes are already committed
- For now, no new sales are contemplated
- Qatar has a moratorium on further LNG expansion

Yemen, Oman, and Abu Dhabi are **out of supply.**

Short-Term Pricing: Pressure Points



Focus on China

Energy and the Economy

- Economy was hit but recovery is on the way:
 - Real GDP Growth: Slowdown since 2007.
 - up by 13% in 2007
 - up by 9% in 2008
 - up by 8% in 2009 (projected)
 - Exports: Growth has been negative since late 2008.
 - up by 26% in 2007
 - up by 17% in 2008
 - down by 22% during the first seven months of 2009

Energy and the Economy (cont'd)

- On a quarterly basis, GDP growth declined between Q3 of 2007 and Q1 of 2009, but a rebound occurred in Q2 of 2009.



Source: China National Bureau of Statistics.

Energy and the Economy (cont'd)

- Energy demand was hit as well but will recover:
 - Oil demand growth.
 - up by 3.8% in 2007
 - up by 4.0% in 2008
 - up by 3.7% in 2009 (projected)
 - Natural gas demand growth.
 - up by 26.1% for 2007
 - up by 11.5% for 2008
 - up by 13.6% in 2009 (projected)
 - Electric power demand growth.
 - up by 14.5% for 2007
 - up by 6.1% in 2008
 - up by 3.0% in 2009 (projected)

Climate Change Policies

- For the past three decades between 1978 and 2008:
 - China's real GDP growth: 9.8% per annum
 - China's PCEC growth: 5.4% per annum
- However, between 2000 and 2008:
 - China's real GDP growth: 10.4% per annum
 - China's PCEC growth: 10.1% per annum
- Challenges for China and the World:
 - China has overtaken the US as the largest CO₂ emitter in the world. By 2015, China is likely to overtake the US as the largest PCEC country in the world. Including non-commercial energy, China will be the largest energy user soon after 2010.

Climate Change Policies (cont'd)

- China's efforts to deal with energy efficiency, conservation, and environmental protection:
 - Reduce the energy intensity by 20% for 2006-2010. This policy may be extended beyond 2010.
 - Use cleaner coal and more efficient power generators.
 - Promote the use of wind power, solar energy, other renewable energy, hydro, and nuclear power.
 - Tighten standards against emissions of various pollutants for various energy products, including transportation fuels.
 - Actively deal with air, land, and water pollution issues.

Climate Change Policies (cont'd)

- China's action and policies over CO₂ emission reductions:
 - Greater emphasis on energy efficiency, conservation, and environmental protection efforts outlined above.
 - Active promoter of the carbon development mechanism (CDM).
 - Beginning to consider very long term (2050) CO₂ emission ceilings.
 - Resist any international call for mandatory CO₂ emission reductions and quantitative measures.
 - Oppose the proposed carbon tariffs by the US government and view them as protectionist measures. However, some Chinese scholars suggest taking positive steps to deal with the impact.

Energy Security for China: SPRs

- The National Energy Administration, under the NDRC, is in charge of the work and home to the National Office of Strategic Petroleum Reserves (SPRs).
- Plan for Phase I (by 2008): 16.4 million m³ or 103 million bbl (approximately 31 days of net imports or 15 days of total consumption) in four sites (Zhenhai, Zhoushan, Huangdao, and Dalian). Phase I construction has been underway since 2004 and was completed end of 2008.
- Target for Phase II (by 2011/12): Another 26.8 million m³ or 169 million bbl, totaling 272 million bbl (approximately 60 days of net imports or 33 days of total consumption).
- Target for Phase III (by 2015): To establish 500 million bbl of SPRs.

Energy Security: Overseas Investment

- Recent loans for oil deals with oil producing countries:
 - In Feb 2009, China signed a US\$25 billion loan deal with Russia's Rosneft and Transneft in return of its oil supplies. Under the deal, Rosneft will export 300 kb/d of oil to China for 20 years from 2011.
 - In Feb 2009, China and Venezuela agreed to double their joint-investment fund to US\$12 billion, with China contributing US\$8 billion and Venezuela contributing US\$4 billion. Both parties signed 12 agreements to boost cooperation. One of them calls for Venezuelan state oil company, PDVSA, to sell CNPC 80-200 kb/d of crude to cover a loan from China's Development Bank to Venezuelan Development Bank Bands.

Energy Security: Overseas Investment (cont'd)

- Recent loans for oil deals with oil producing countries (cont'd)
 - In mid-April, CNPC signed a framework agreement to loan Kazakh state-owned oil and gas company, KazMunaiGaz, US\$5 billion. At the same time, CNPC and KazMunaiGaz formed a 50-50 joint venture and paid US\$3.3 billion to acquire Kazakh oil producer, MangistauMunaiGaz (MMG), which holds proven and probable reserves of 370 mmb of crude and 41.8 billion cubic meters of gas.
 - In May 2009, the China Development Bank agreed to provide Brazil's Petrobras a US\$10 billion loan. In return, Petrobras will supply Sinopec with up to 200 kb/d of oil for the next decade.

Role of China in Iran's Upstream Development

Despite direct and/or indirect political pressures on international oil companies, Chinese contractors are still active in Iran.

List of Upstream Agreements Between Iran and China in Recent Years					
Project	Type of Contract	Signature Date	Estimated Value	Contractor(s)	Remarks
Exploration and Development in the Garmsar Block	Binding Contract	2005	Minimum US\$20 Million For Exploration Activities	Sinopec	Sinopec committed for exploration of the Garmsar block. However, exploration activities have not showed any commercial oil reserves in the block.
Exploration and Development in the Koohdasht Block	Binding Contract	2005	Minimum US\$18 Million For Exploration Activities	CNPC	The exploration of the block will be completed by end 2009. Recent exploration activities have not showed any significant commercial oil reserves in Koohdasht.
Development of the North Pars Gas Field	Preliminary Agreement	2006*	US\$16.0 Billion	CNOOC	NIOC and CNOOC agreed for development of the North Pars gas field and construction of a 20 mtpa LNG plant in Kangan.
Development of the Yadavaran Oil Field	Binding Contract (Buyback)	2007	US\$2.0 Billion	Sinopec	The first phase will take four years and will produce 85 kb/d of crude oil. The second phase will raise production by 100 kb/d, boosting total crude oil production to 185 kb/d.
Development of the Azadegan Oil Field	Binding Contract (Buyback)	2009	US\$1.8 Billion	CNPC	CNPC is expected to produce 75 kb/d of crude oil in the first phase. In the second phase, total oil production will increase to 150 kb/d.
Development of the Resalat Oil Field	Preliminary Agreement	2009**	US\$1.0 Billion	Malaysian Amona (Main Contractor), Chinese COSL and CNOOC	China Oilfield Services Limited (COSL) will undertake drilling operations, while China National Offshore Oil Corporation (CNOOC) will build the required offshore infrastructure.
Development of the South Pars Phase 11	Preliminary Agreement	2009	US\$4.7 Billion	CNPC	NIOC signed a preliminary agreement with CNPC for the development of Phase 11 of the South Pars gas field, replacing France's Total.

* CNOOC signed an upstream contract with NIOC in the form of a buyback agreement in 2008 to develop the North Pars gas field. However, the negotiation in downstream section (construction of a LNG plant) has remained in early stages.

** The original buyback contract was signed between Malaysian Amona and NIOC in 2008. Amona, finalized negotiations with two Chinese contractors to join the Resalat development project consortium in July 2009.

Role of China in Iran

- Iran seems to indicate a greater willingness to provide more benefits to China, while the latter is lured by the attractive contracts offered despite the risky environment.
- A review of recent buyback agreements, especially with Chinese companies shows there have been more attractive terms offered to Chinese contractors.
- The recent signed buyback contracts with CNPC and Sinopec provides more flexibility in fiscal terms, shorter payback periods, and finally a 3% higher rate of return (ROR) for contractors compared with other regular buyback contracts in the past.

Role of China in Iran (cont'd)

- It should be noted Chinese companies are not only involved in development of oil and gas fields. They are key suppliers for upstream equipment when Iran faces sanctions for American suppliers. Chinese companies are the most active players to provide upstream well equipment for the South Pars gas projects.
- Chinese companies are also key providers of jack-up and land rigs for Iran. Recently, the Iran Offshore Engineering Construction Company (IOEC) inked a contract with Shanghai Zhenhua Heavy Industry (ZPMC) worth US\$2.2 billion to build 10 jack - up rigs and seven land rigs.
- Chinese corporations are heavily invested in Iran's domestic sectors.

Focus on Iran

Rapid Growth in Iran's Energy Consumption

Cheap energy prices caused low efficiency in Iran's energy sector and resulted in a rapid growth of energy consumption in recent years.

Energy Prices in Iran (2008)

Petroleum Products

Product	Price (US Cents/Liter)
Gasoline*	10.5
Kerosene	1.7
Gasoil	1.7
Fuel Oil	1.0

* Rationed Price

Electricity Price:	1.7 US Cents/KWh
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Natural Gas

Sector	Price (US Cents/MMBtu)
Residential*	37
Commercial	75
Power Plants	15
Industry	47

* Average Price

Energy Price Increase is Hugely Unpopular!

Energy Subsidies in Iran (2007)							
US\$ billion	Residential	Industry	Agriculture	Transportation	Commercial	Public	Total
Gasoline	-	-	-	9.9	-	0.1	10.0
Kerosene	4.0	0.1	-	-	0.1	0.1	4.2
Gasoil	0.5	1.9	2.5	10.9	0.4	0.8	16.9
Fuel Oil	-	2.2	-	0.3	0.4	0.2	3.2
LPG	1.3	0.2	-	0.1	0.0	-	1.6
Electricity	3.6	2.7	1.3	-	0.3	1.5	9.3
Natural Gas	3.2	1.7	-	0.1	0.2	0.2	5.4
Total	12.5	8.7	3.8	21.3	1.5	2.8	50.6

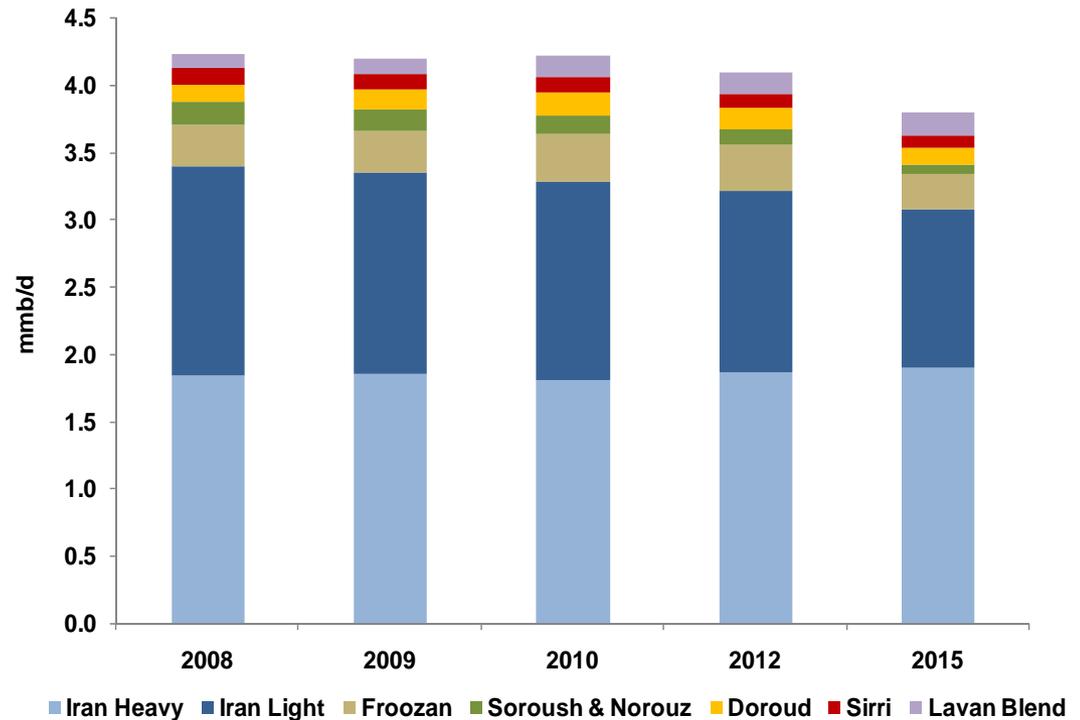
- In 2007, the Iranian government announced that the country's energy subsidies exceeded more than US\$50 billion.
- The transportation sector received 42% of the total subsidies at US\$21.3 billion, despite the country introducing a rationing system for gasoline consumption in the aforementioned sector.
- Iranian officials have noted that energy price subsidies and even the rationing system will not be supportable in the long term.
- Energy price increases are hugely unpopular. A move to market prices would increase the inflation rate to as high as 15-20%.

Iran's Oil Production Woes

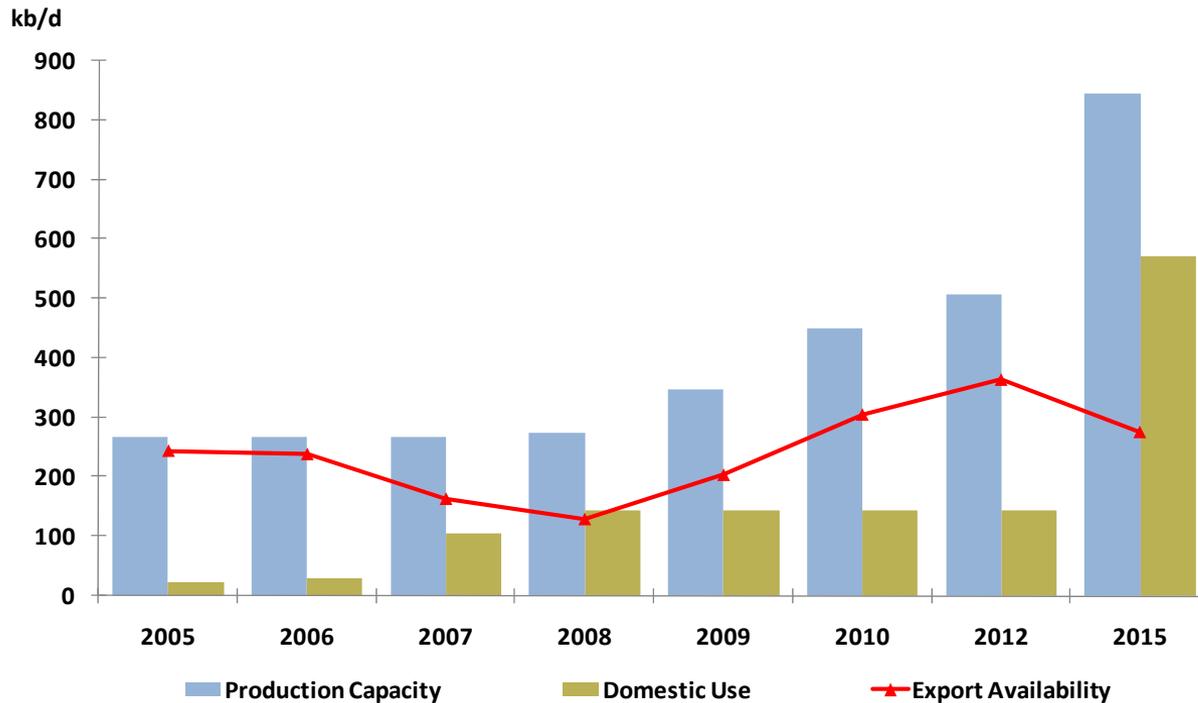
Key Issues:

- Natural decline rate in Iran's crude oil production is estimated to be 8-11% per annum.
- In 2015, crude oil production capacity is expected to decrease from the current 4.2 mmb/d in 2008 to around 3.8 mmb/d.
- It is also possible that oil production will fall faster if the sanctions continue under the business-as-usual scenario. In the worst case scenario, production may decline to 3.3 mmb/d by 2015.

Iran's Crude Oil Production Capacity by Stream
(2008-2015)



Condensates Help Liquid Output



Condensate production in Iran is rising dramatically because of the commissioning of the South Pars phases.

This raises the liquid production in Iran and explains why Iran's oil (liquid) production is keeping up despite lack of investments.

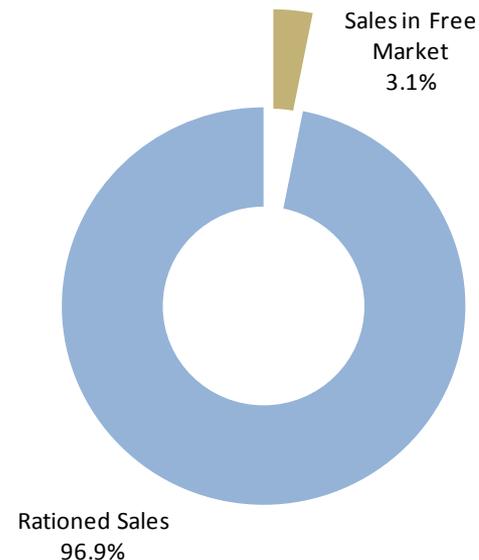
Iran's Smart Cards are Really Smart

- Iran's smart cards are unique. The government can change the gasoline ration volumes from a central data center and then tell the consumer their new quota. The central data center is able to reduce the quota volumes and force people to consume less, or buy more gasoline from the free market.
- The rationing system of using smart cards resulted in a significant decrease in gasoline consumption (from 491 kb/d before rationing to an average of 359 kb/d immediately after rationing and 410 kb/d in 2009). Smuggling was reduced significantly (estimated reduction is 30-40 kb/d).
- We expect gasoline consumption will increase to 415 kb/d in 2010 and 512 kb/d in 2015.

Gasoline Sales in the Free Market

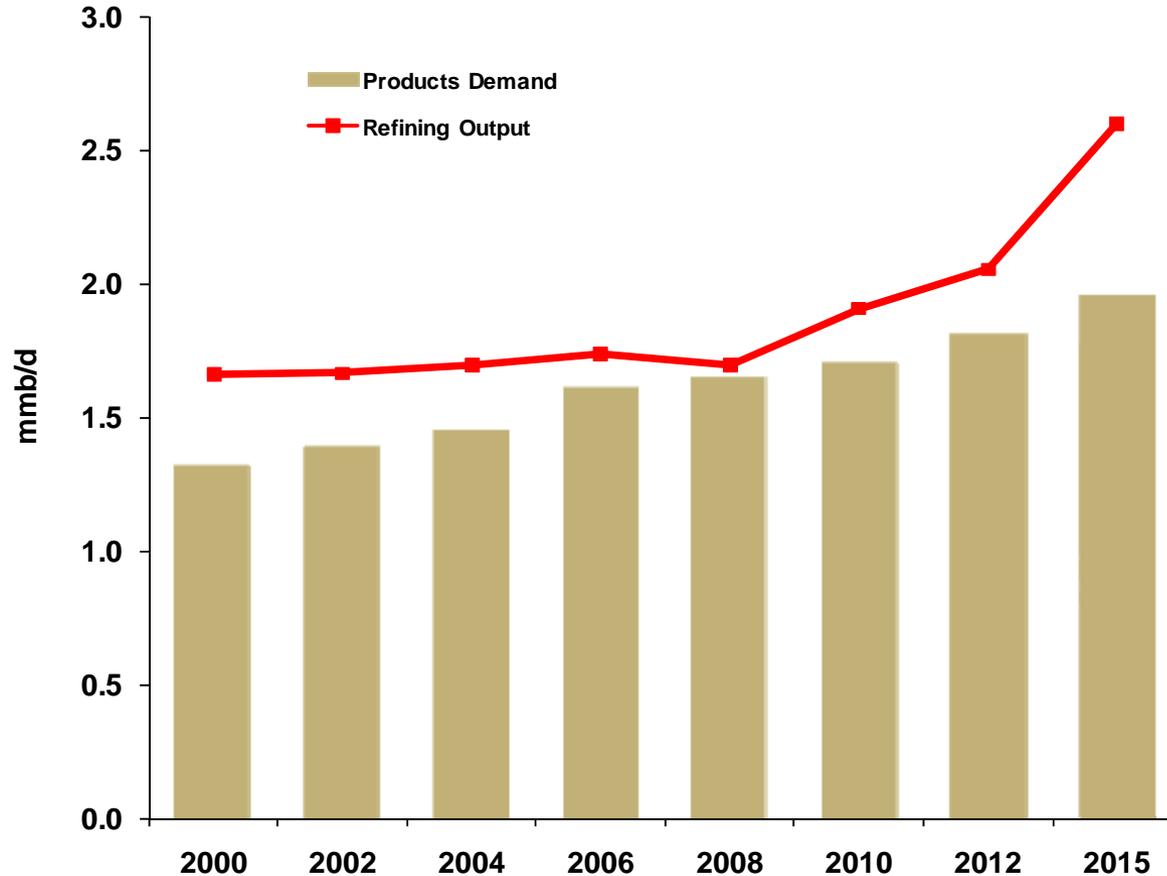
- Roughly 97% of the gasoline in Iran is sold at the low-rationed price of US 10 cents per liter and only 3% are sold at free market prices (US 41 cents per liter).
- It is evident now that the quota of 100 liters per car per month is sufficient for citizens and quotas for taxies and other public transportation vehicles (600 liters per month) are too high.

Iran's Gasoline Supply (2008)
Total: 415.8 kb/d



There is room to reduce the quotas substantially by moving volumes to free market prices thus reducing demand if there are sanctions on gasoline trade.

Iran's Refining Output vs Products Demand (2000-2015)



By 2012/2013, Iran's gasoline imports are expected to be zero and there will be exports due to the significant additions in refining capacity, as well as upgrading capacity.

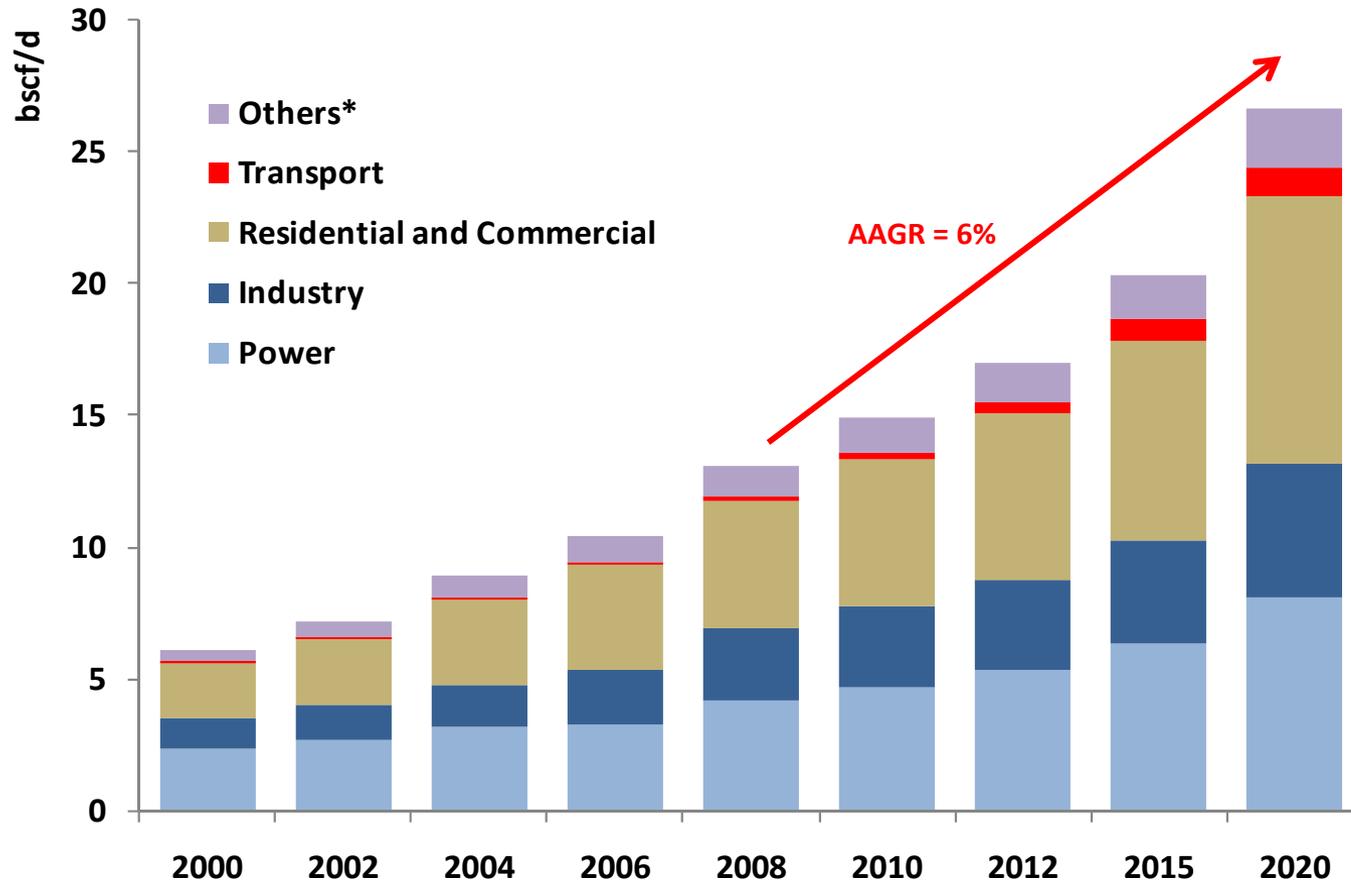
US Sanctions on Gasoline Exports to Iran (1)

- There has been much talk about sanctions on companies exporting gasoline to Iran.
- It is argued by certain US lawmakers that gasoline sanctions will bring Iran to its knees and force an end of their nuclear policy.
- This is an unlikely scenario. Iran is able to withstand the pressure by several means:
 - It is impossible to plug all exports to Iran and Iran is able to buy gasoline from dozens of traders. Realistically imports by Iran might fall by 25-50%.
 - Iran can manage to squeeze more gasoline from their existing refineries by changing the crude diet and improving the yield by changing refinery “cut points.” This allows for production of lower octane gasoline and blending with octane enhancers to give a temporary boost to gasoline production.

US Sanctions on Gasoline Exports to Iran (2)

- Iran can change the monthly allocations of smart cards and move more volume to free market prices, reducing consumption.
- Iran will appeal to nationalistic feelings and will reduce consumption as a national cause.
- Any such sanctions are highly unlikely to succeed. They will not result in policy changes and will damage the US government's good will with the public.
- Finally, such sanctions will save the Iranian government billions of dollars in imports and result in a more efficient gasoline consumption.
- In due time, it will be judged as a favor to the Iranian government.

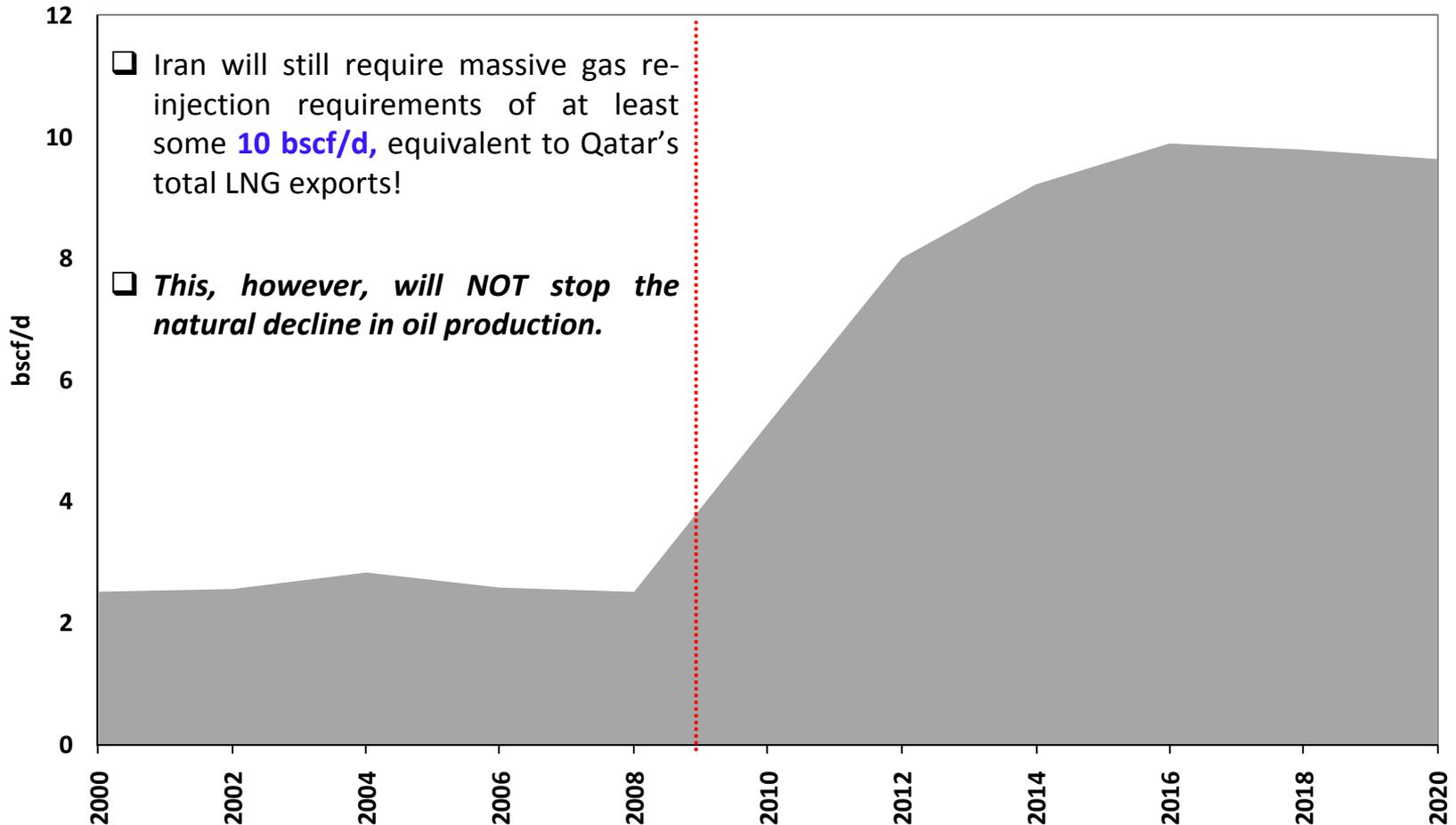
Natural Gas Consumption in Iran (2000-2020)



*Includes gas consumption in oil refineries, gas compressor stations, and non-specified others; excludes distribution losses and gas re-injection.

Iran Needs Gas Re-injection (1)

Iran's Gas Re-injection (2000-2020)



Iran's LNG Export Projects

Three projects each with two trains of 5 to 8 mtpa are planned with gas supply from the South Pars gas field (463 tcf).

➤ **Iran LNG (2 x 5.4 mtpa)**

- NIGEC (49%), the Pension Fund Organization (50%), and the Pension Fund Investment Organization (1%).
- Signed MOU with OMV for a 10% share in the liquefaction plant.
- Startup: likely to be in 2015/2016.

➤ **Pars LNG (2 x 5 mtpa)**

- NIOC (50%), Total (40%), and Petronas (10%).
- Total and Petronas will purchase LNG from Train 1. India, Thailand, and China are possible markets for Train 2.
- No FID as a result of Iran's political environment and huge cost escalation in the project.

➤ **Persian LNG (2 x 8.1 mtpa)**

- NIOC (50%), Shell (25%), and Repsol YPF (25%).
- Shell and Repsol to purchase output from Train 1.
- Possible Startup: 2017/2018 (at earliest).

New Iranian LNG Dreams: Will They Become a Reality?

- **Golshan and Ferdowsi:** Signed a US\$6 billion buyback contract in December 2007 with Malaysian company, SKS, for development of the Golshan and Ferdowsi gas fields.
 - NIOC and SKS also agreed on an MOU for the production of 10 mtpa of LNG from the Golshan and Ferdowsi gas fields.
 - NIOC/NIGEC will be in charge of marketing 5 mtpa of LNG and the rest of the capacity is tentatively committed to SKS.
- **North Pars:** Signed an MOU in December 2006 with Chinese company CNOOC for the production of 20 mtpa of LNG from the North Pars gas field.
- **Qeshm LNG:** Signed an HOA with Australian LNG Ltd in Dec 2006 for the production of 1.0-3.5 mtpa LNG in Qeshm Island.

FGE does not expect the recent Iranian LNG projects (Golshan, North Pars, and Qeshm) to materialize before 2018/2019, if ever.

Iran's Gas Export Potential

For Iran, we expect much smaller export volumes. In our base case, we only see 21-26 million tonnes as the lifetime LNG ceiling and small volumes of pipeline gas (2-2.5 bscf/d). The reasons for these are:

- Lack of financial resources especially international financing for development of gas resources.
- Large domestic grid at prices of US\$0.4/MMBtu.
- Massive gas re-injection requirements of some 10 bscf/d at the minimum.

Conclusions

- Lack of financial resources is the main challenge for Iran's oil and gas industry. Iran's projects are frequently delayed due to lack of access to capital and experienced contractors to carry out projects on time.
- Although Iran has one of the largest oil and gas reserves in the world, it has massive internal needs.
- The combination of US and UN sanctions, political problems created by the current Iranian government, informal pressure by the US Treasury and key European countries have kept many serious foreign companies away from Iran. This is not necessarily resulting directly from sanctions, but from the general lack of confidence in the stability and sustainability of the Iranian economy.
- Current development plans are not sufficient to increase oil capacity significantly. In fact, it will be a challenge to maintain oil production at current levels. Thus, Iran's crude oil production is expected to face challenging issues in the near future as NIOC is not provided the necessary investment for the capital.
- Massive gas exports are unlikely—we expect only small export volumes. In our base case, we see 20-25 million tonnes of export capacity as the lifetime LNG export ceiling and small volumes of pipeline gas.

Thank You!