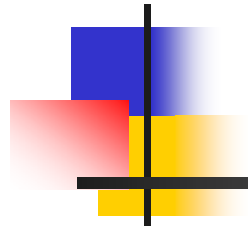


Outlook and Challenges for Oil Supply-Demand in Asia



4th IEEJ/CNPC Joint Seminar

Japan-China Joint Symposium on Asian Oil & Gas

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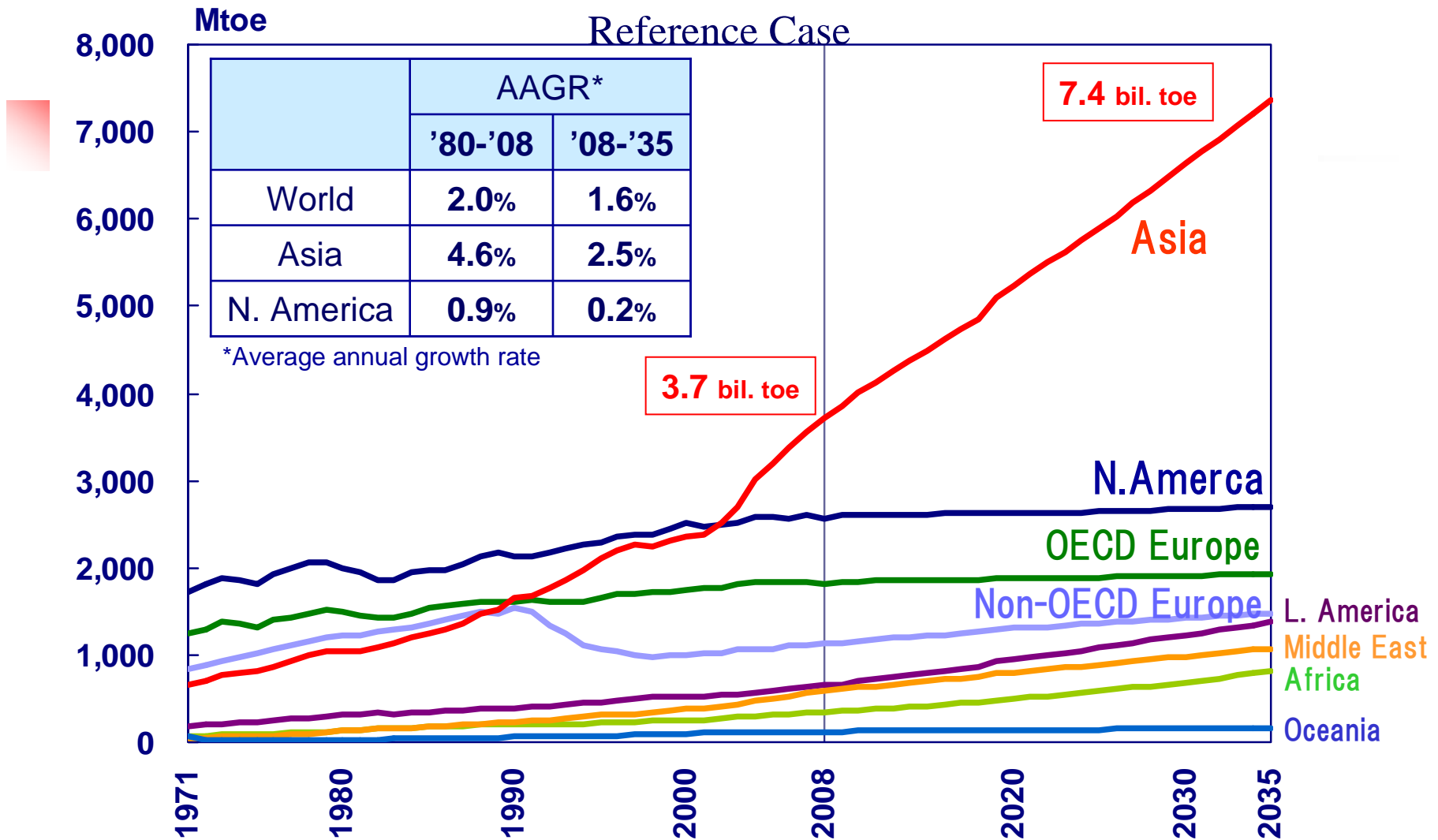
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Presentation Topic



- **Growing energy demand in Asia, fossil fuels as a centerpiece**
- **Asia's oil demand expected to rise, driven by Chinese growth, and its implications**
- **Outlook for global gas supply-demand and the importance of Asian market**
- **Impacts of “Advanced technology” on global/Asian energy supply-demand and its implications**
- **Conclusion**

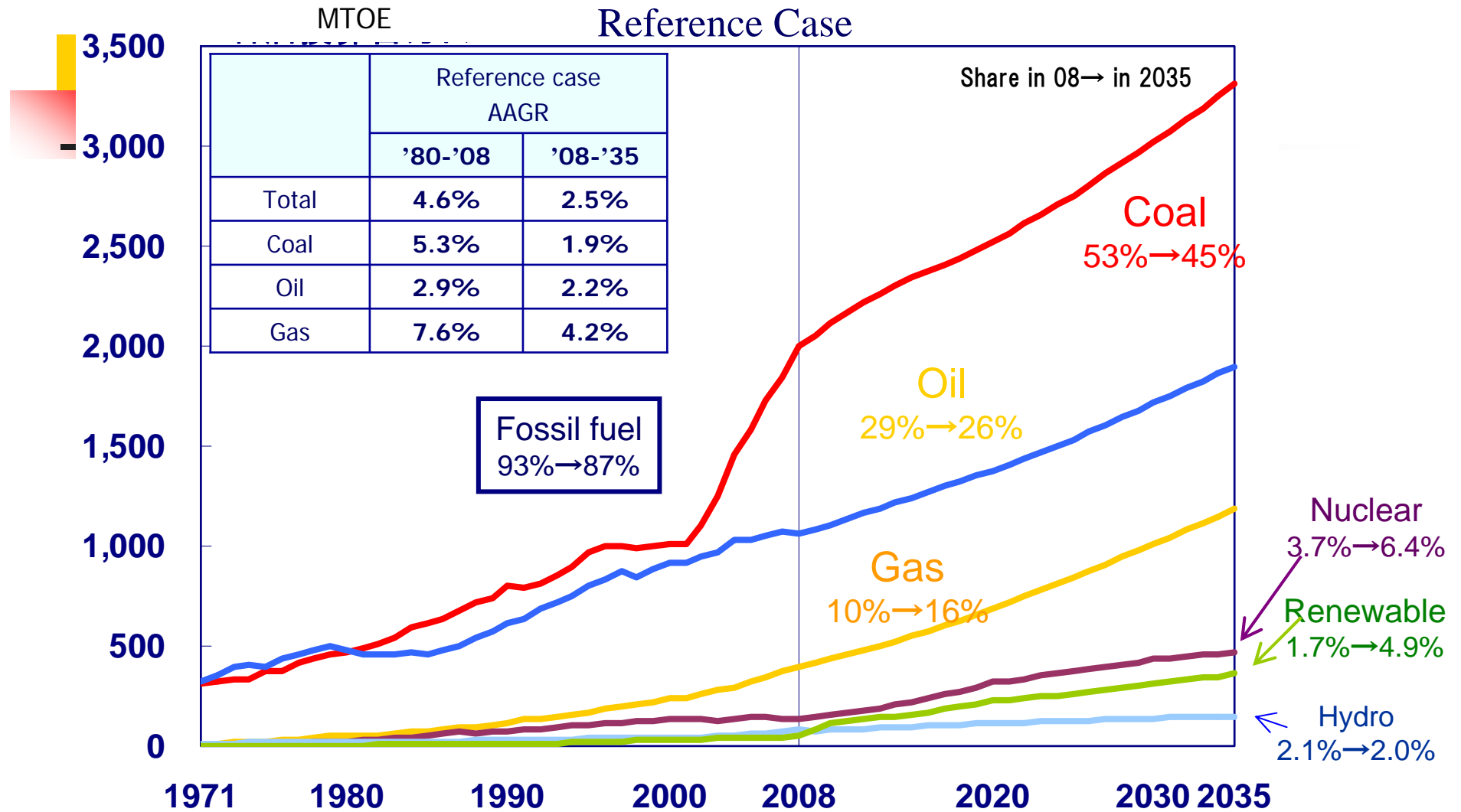
Outlook for global energy demand (by region)



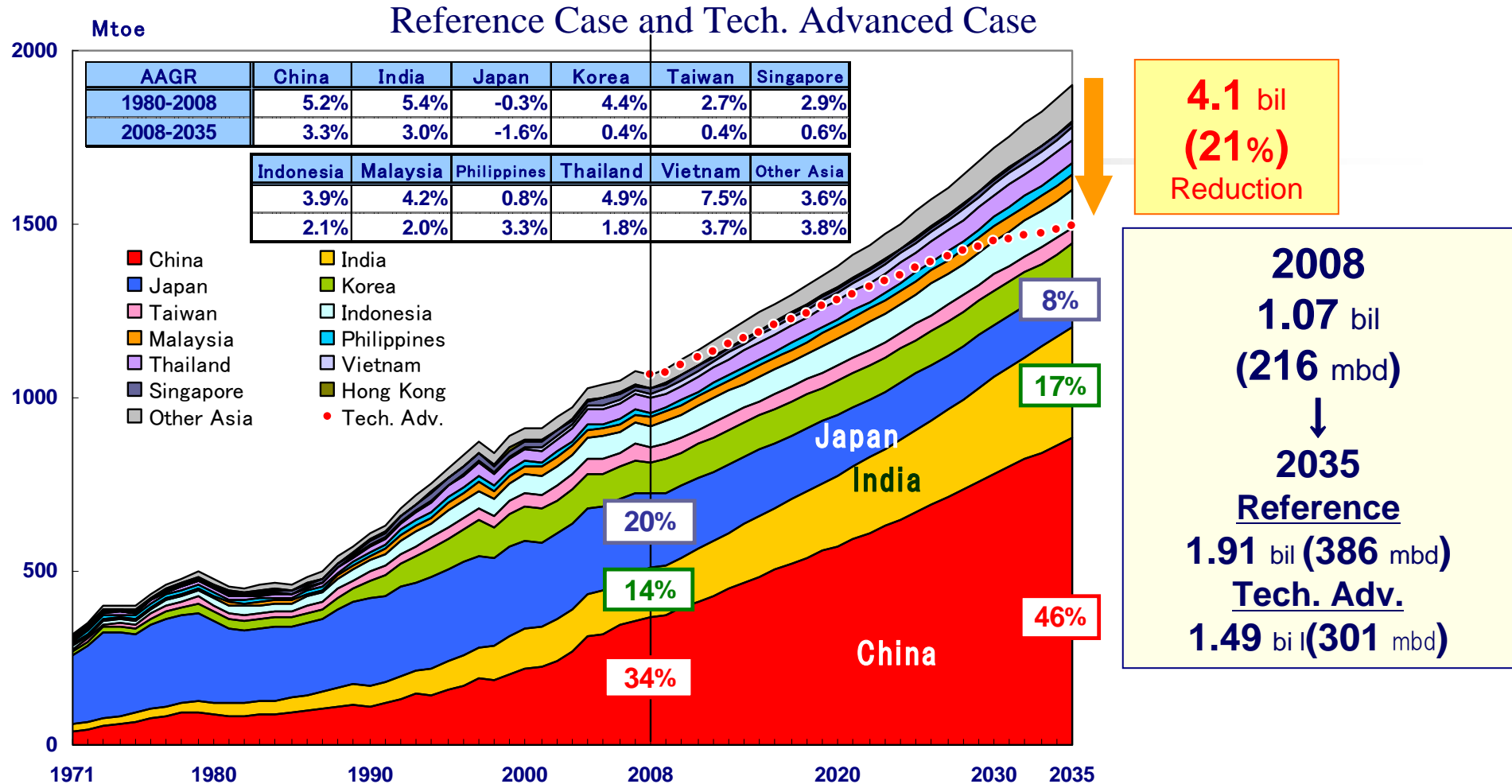
- By 2035, primary energy demand of Asia will double from the current level, reflecting high economic growth; 3.7 billion toe(2008) → 7.4 billion toe(2035).
- Non-OECD will represent 90% of incremental growth of global energy demand toward 2035.

Source: IEEJ (Asia/World Energy Outlook 2010)

Outlook for energy demand in Asia (by fuel)



Outlook for oil demand in Asia (by country)



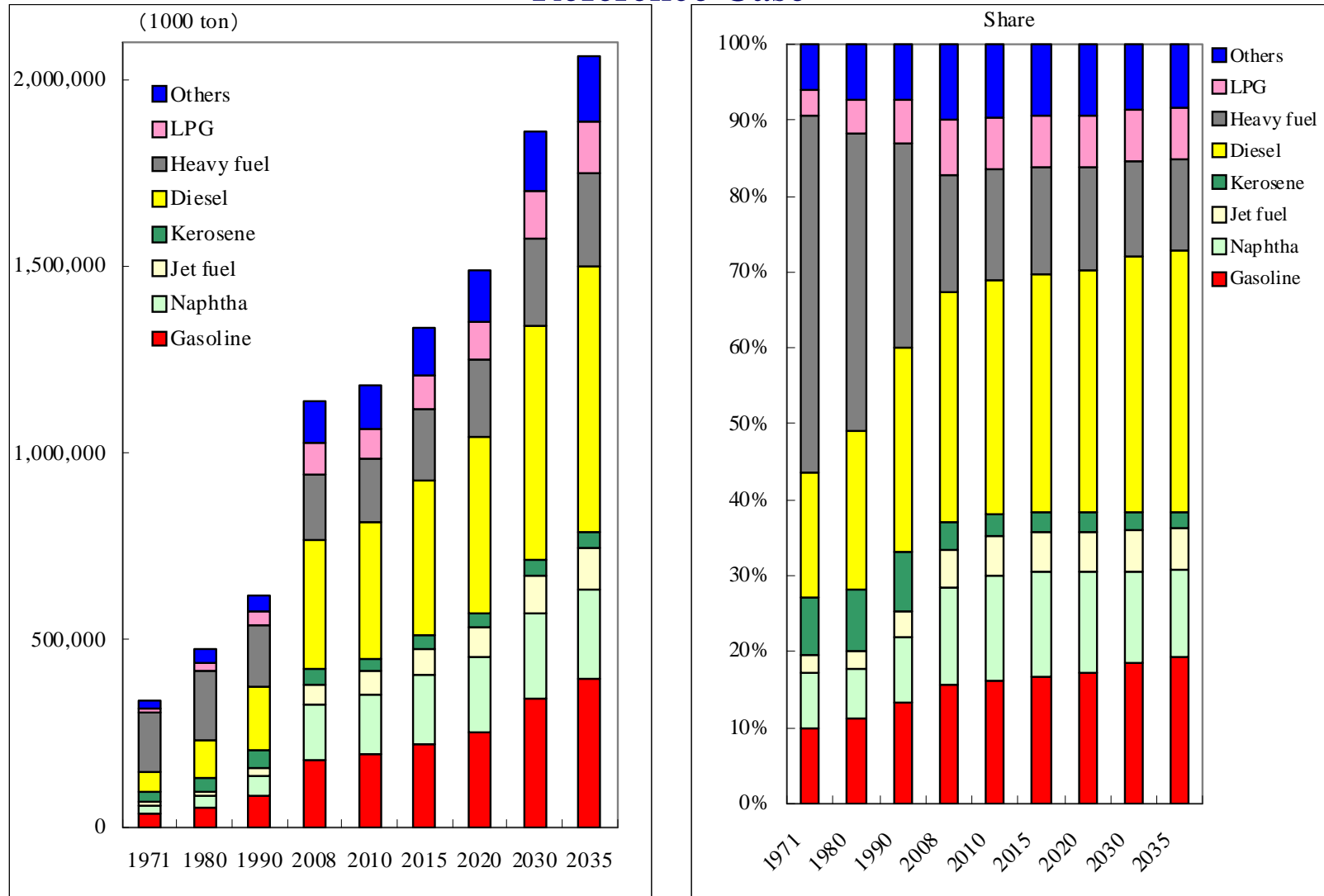
■ Though the vehicles' fuel efficiency may be improved, and clean energy vehicles may expand, oil demand in China will expand from 7.4 million B/D in 2008 to 19.0 million B/D in 2035, due mainly to its escalating vehicle ownership. The share of China and India together in Asian oil demand will grow from 46% in 2008 to 61% in 2035.

■ Even in the Tech. Adv. Scenario, oil demand will not peak out and grow continuously. Projected oil demand saving will be equal to 21% of the Reference Scenario in 2035.

Source: IEEJ (Asia/World Energy Outlook 2010)

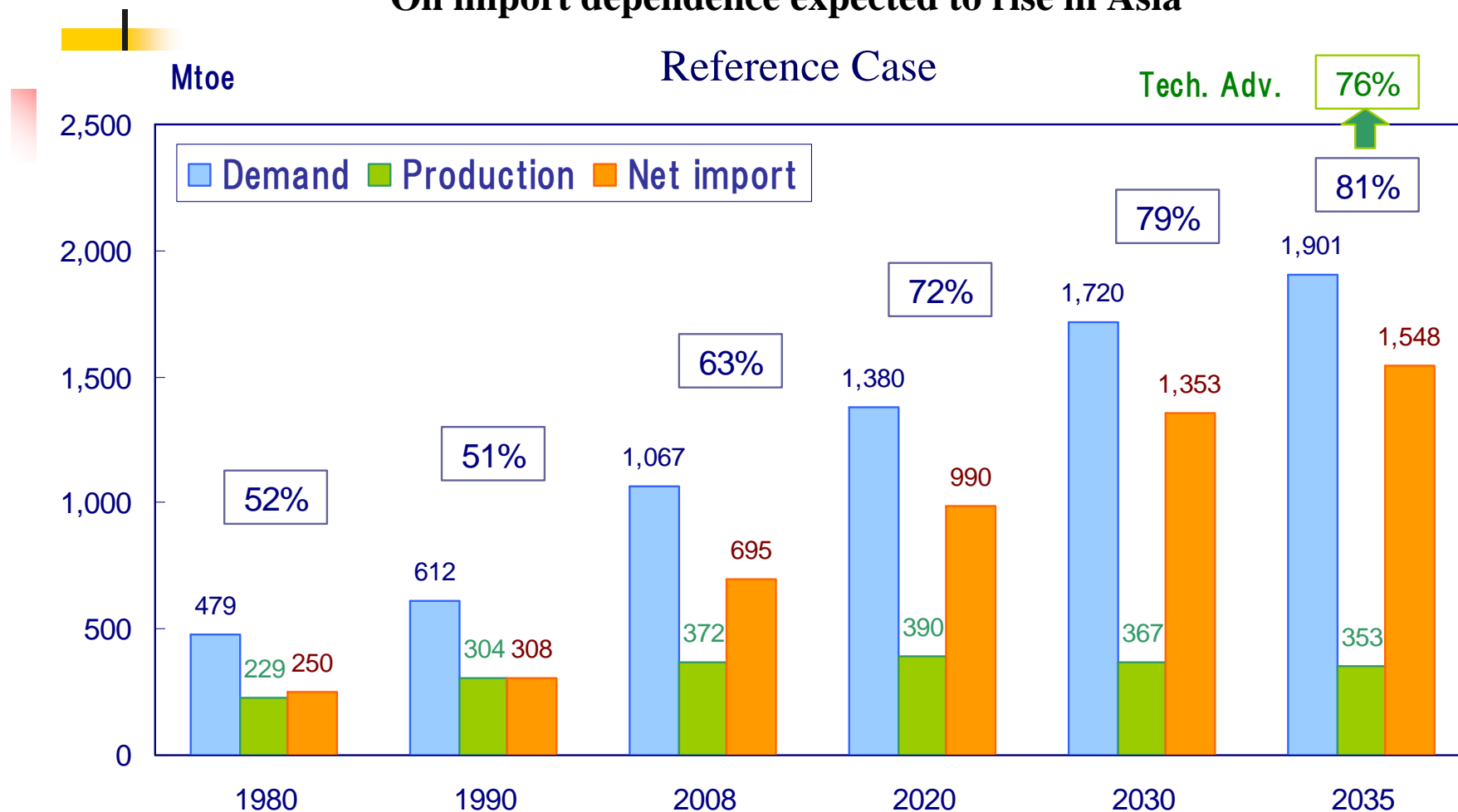
Outlook for oil demand in Asia (by product)

Demand continues to grow with a shift to lighter product mix
Reference Case



Outlook for oil supply-demand in Asia

Oil import dependence expected to rise in Asia



- Net oil import in Asia will expand from 14 mb/d (695 Mtoe) in 2008 to 31 mb/d (1,548 Mtoe) in 2035.
- Oil production in Asia (such as China, India, Indonesia and Malaysia) will marginally increase, while oil demand will steadily increase. Therefore, net oil import ratio will reach 81% in the Reference Scenario, and 76% in the Tech. Adv. Scenario by 2035 (compared with 63% in 2008).

Source: IEEJ (Asia/World Energy Outlook 2010)

Competition for Access to Energy Resources



- **Growing import dependence is perceived as “vulnerability”**
- **Strategy being taken as a counter measure:**
 - Domestic energy resource development
 - Energy diversification
 - Overseas resource development
 - Promotion of NOCs
- **Excessive (exclusive) pursuit of “Mercantilism” may lead to politicize and destabilize world energy markets**
- **Behavior of emerging giants attracts attentions in global energy community**

China's importance in global energy landscape

■ Energy demand

- 2nd largest in total energy consumption, oil consumption and oil import in 2009. The respective global share is 20%、10%、10%
- Annual consumption growth rates in 2009 are: 9% for total energy; 7% for oil; 9% for gas; and 10% for coal
- Demand continued to grow even in 2008-2009. Increasingly higher presence in global market
- Energy demand is expected to grow in the long run, backed by economic growth, motorization, etc.
- NO1 emitter of CO2 in 2009 (global share 24%)

■ Energy supply

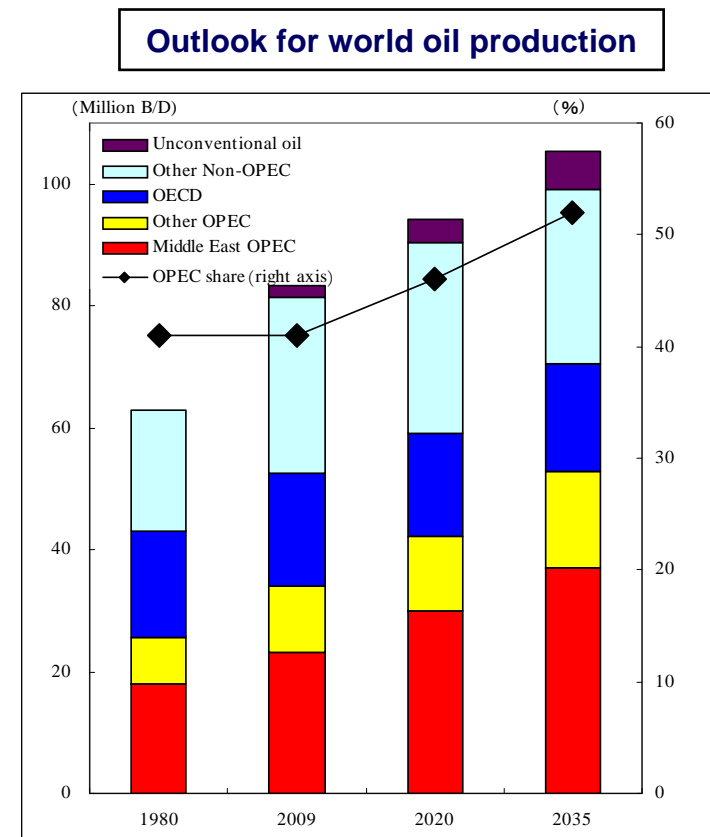
- Domestic oil production grew only gradually, and China became a net importer of oil in 1993. Net import continued to grow strongly
- China also became net gas and coal importer

■ Political/strategic aspects

- Growing influence in global politics, economy and energy market
- Rapidly expanding China's presence and concerns for China's "Assertiveness"
- Uncertainty over future economic growth and social stability
- Strategy implementation to enhance energy security and its impacts
- Climate change policy and its impacts on international negotiation

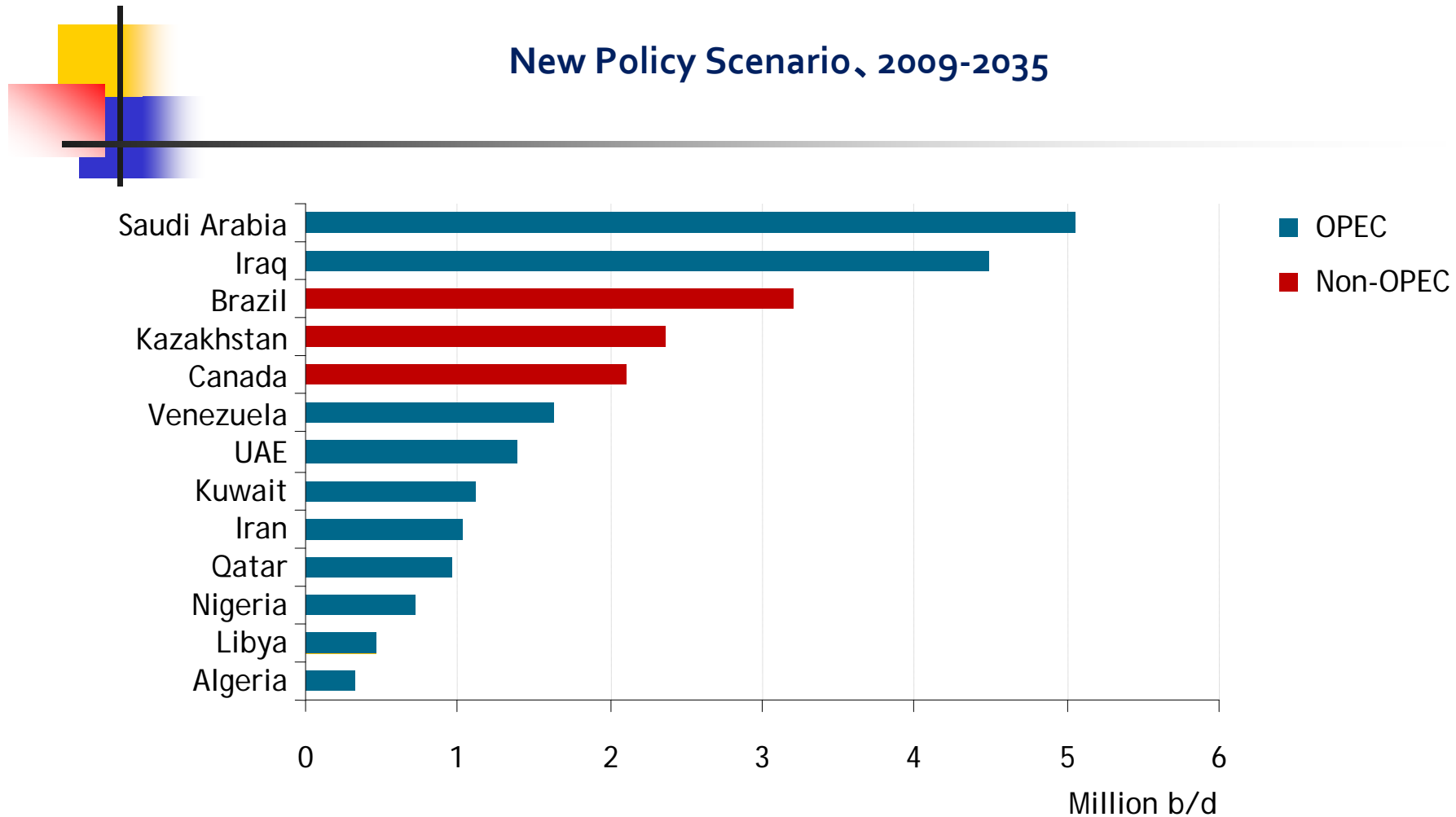
Emerging concerns for energy supply constraints

- Resource constraints (Peak oil): A real threat?
- Production in matured areas continue to decline (Decline in “Easy oil”)
- Accelerating natural decline in existing fields
- Rising costs and difficulties for access to equipments & skilled manpower
- State & NOC dominance in access to energy resources
- Rising “resource nationalism”
- Huge investment requirement and uncertainties over realization of sufficient and timely investment



(Source) Prepared from IEA “World Energy Outlook 2010”

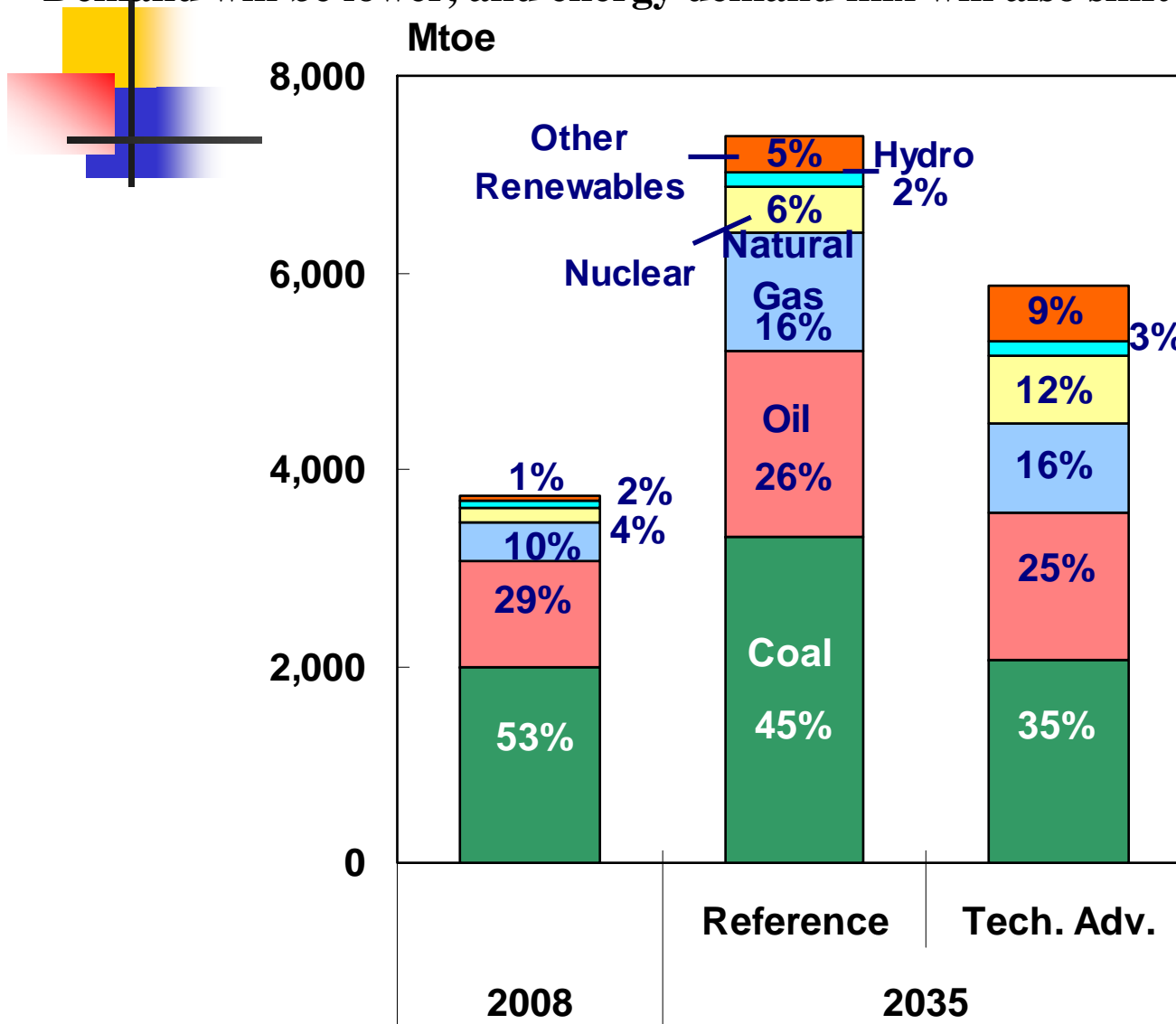
Oil production growth by country in WEO2010



(Source) Prepared from IEA “World Energy Outlook 2010”

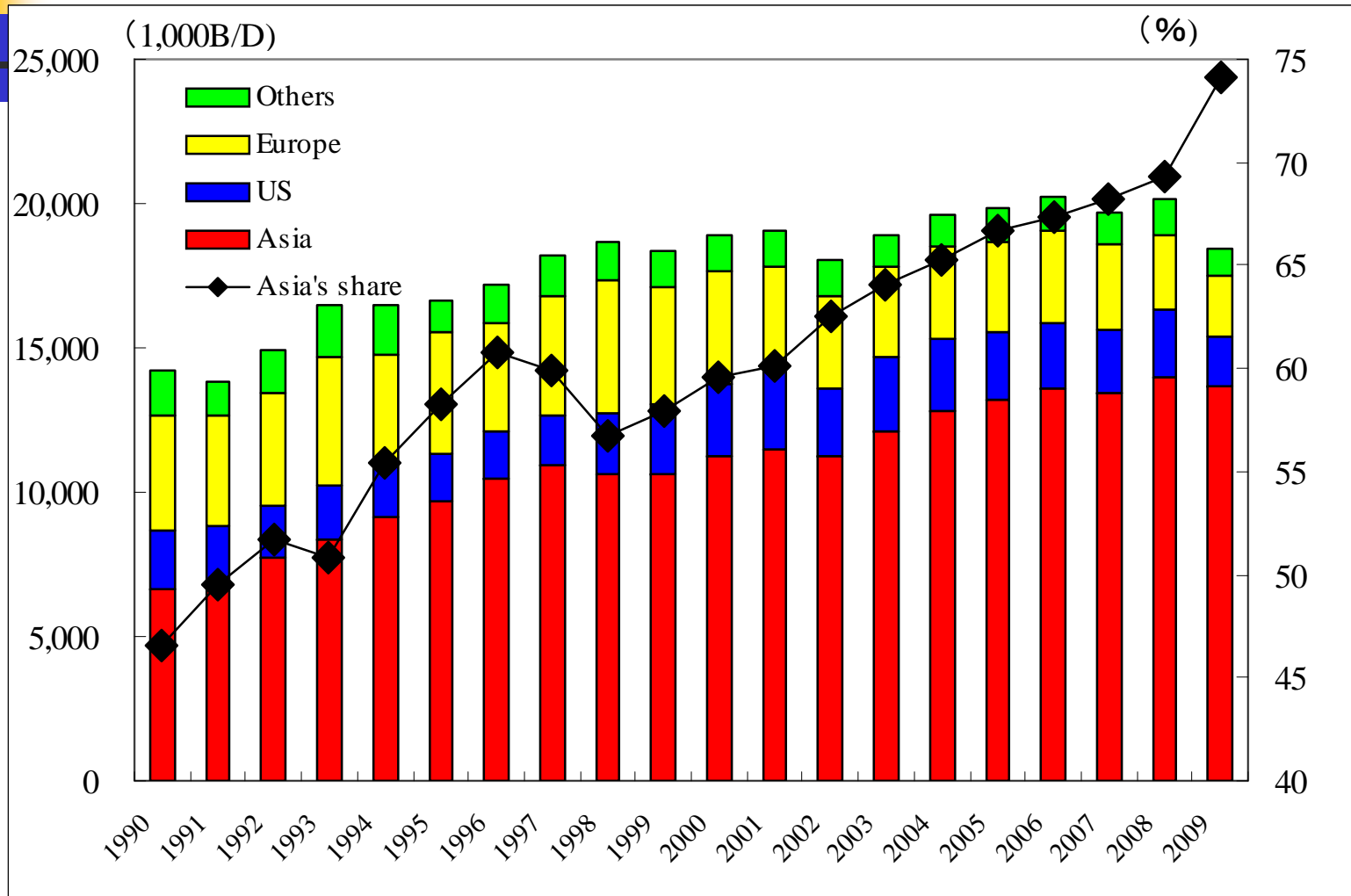
Changes in Asia in Tech Advanced case

Demand will be lower, and energy demand mix will also shift to “low carbon” structure



Source: IEEJ (Asia/World Energy Outlook 2010)

Middle East Oil Export Destination

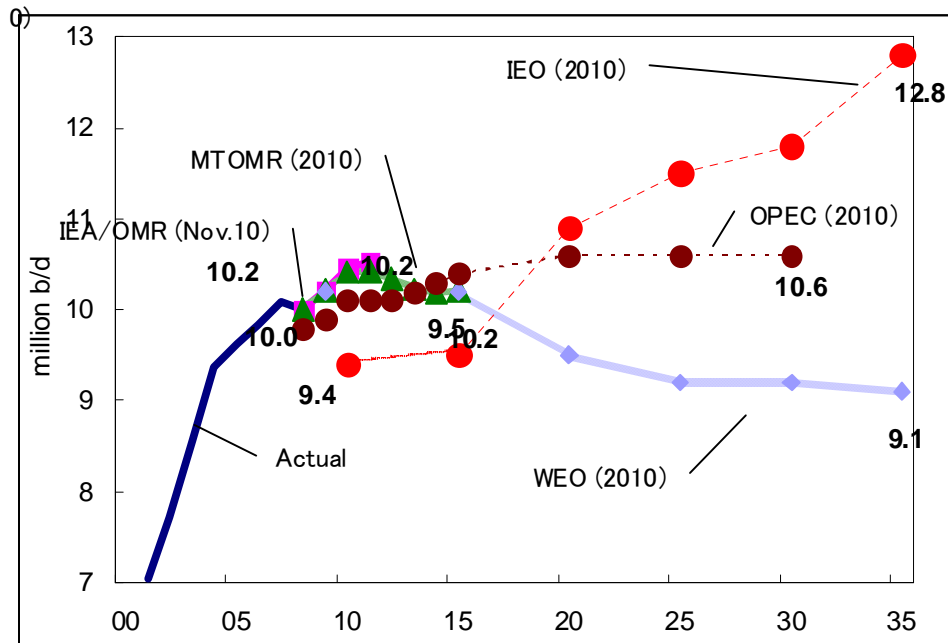


(Source) BP Statistical Review of World Energy 2010

Outlook for Russian oil production

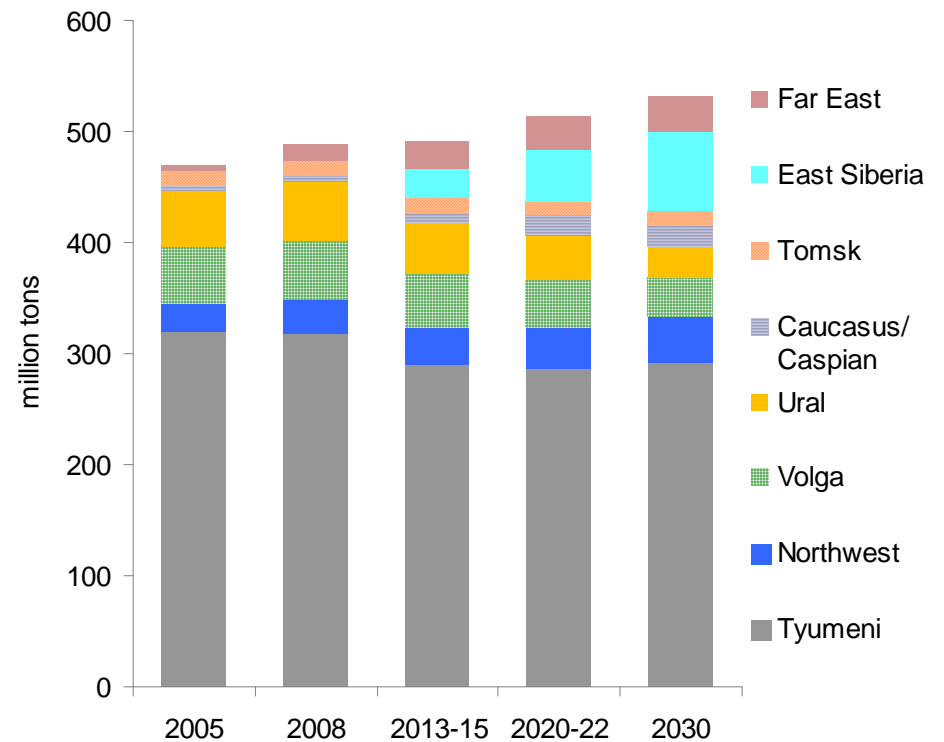
Uncertainty over long term prospects for oil production. Frontier development is a key

Russian oil production outlook by organization



(Source) prepared from EIA, IEA, OPEC data

Russian government oil production outlook

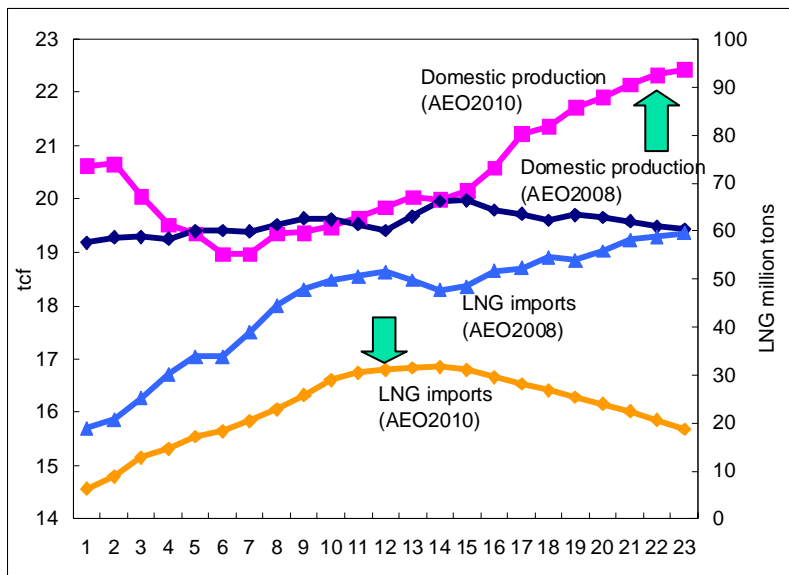


(Source) prepared from "Russia's energy strategy 2030"

Impact and implication of US unconventional gas revolution

- Impacts
 - Lower US LNG demand impacts on global gas market
 - Higher expectation for role of Gas in US, as important domestic energy source as well as low carbon/clean energy
 - Expectation for unconventional gas development outside US
- Challenges
 - Lower gas price and it impacts on gas development economics
 - Unconventional gas development and its impacts on environmental/pollution problem

Downward revision for US LNG demand by EIA



World unconventional gas resource

Region	CBM tcf	Shale gas tcf	Tight gas tcf	Total tcf
N America	3,017	3,840	1,371	8,228
C&S America	39	2,116	1,293	3,448
W Europe	157	509	353	1,019
C&E Europe	118	39	78	235
FSU	3,957	627	901	5,485
Middle East / N Africa	0	2,547	823	3,370
Sub-Saharan Africa	39	274	784	1,097
China and Plannned Economy Asia	1,215	3,526	353	5,094
OECD Pacific	470	2,312	705	3,487
Other Asia	0	313	549	862
S Asia	39	0	196	235
World	9,051	16,103	7,406	32,560

Source: "Tight Gas Sands", Journal of Petroleum Technology (2006/6)

Issues for global gas supply-demand



■ Global gas demand expected to grow in the long run

- While impact of climate change policy on gas demand remain uncertain, expectation for gas is rising worldwide, as gas being regarded as important and realistic low carbon/clean energy option as well as domestic energy source
- Gas supply security will become important agenda in many countries, as gas demand continues to grow which results in higher gas import dependence

■ Ample supply potential exists to meet growing demand

- In addition to conventional source, unconventional resource potential is very large
- Supply can keep up with demand, if timely investment is materialized
- Share of unconventional gas supply will increase gradually in global supply mix

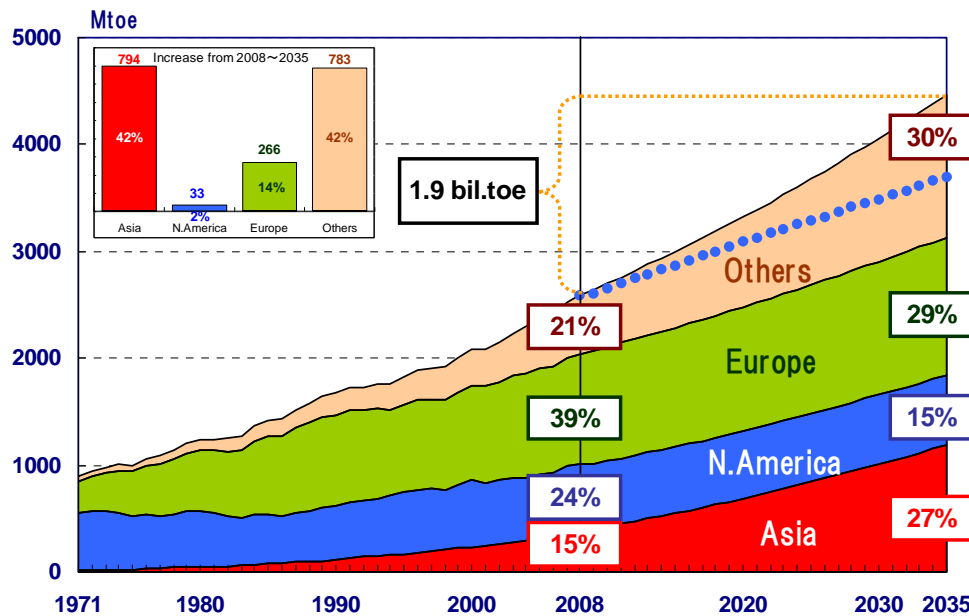
■ Issues to be considered for future outlook

- How long the current supply surplus can last?
- To what extent will US “shale gas revolution” affect and change other regional gas market including Asian market
- What is the impact of expanded gas utilization on other source of energy?
- Analysis based on the follow-up of changing global gas situation is essential

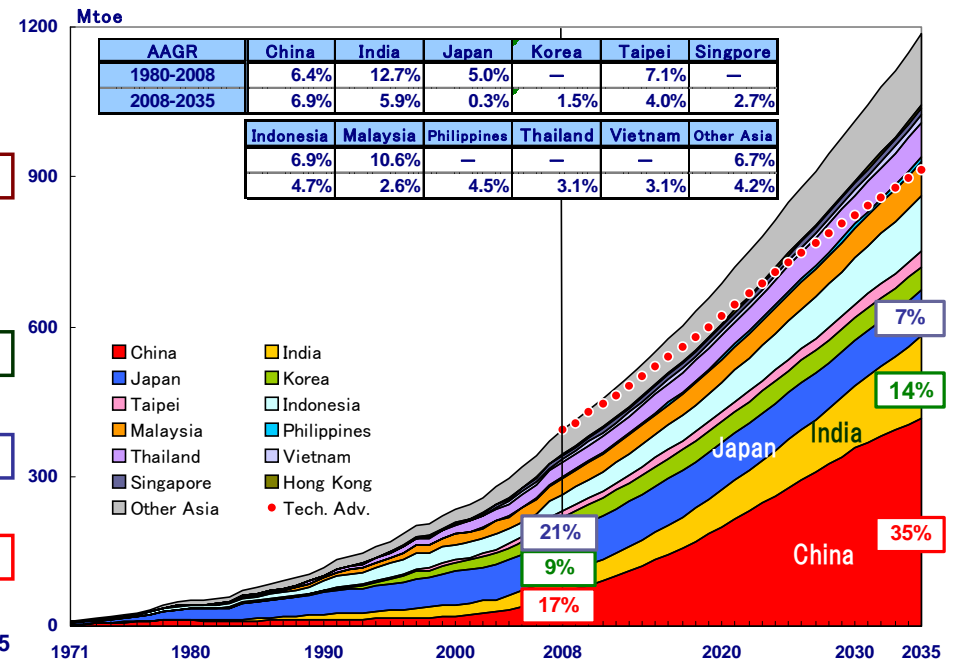
Outlook for global and Asian gas demand

Gas demand in Asia (and in China) is key to global demand growth, which will affect global supply-demand balance

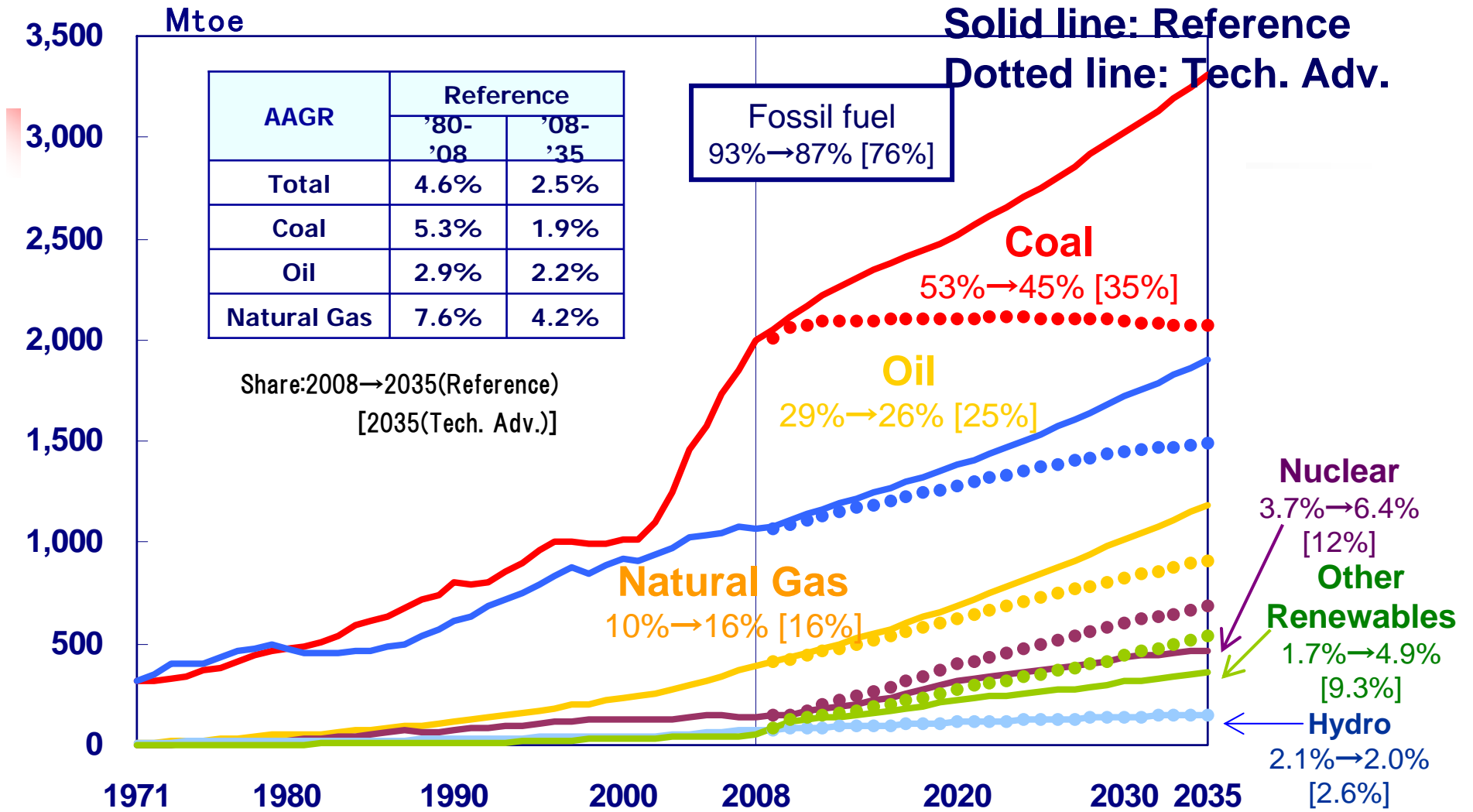
Global gas demand outlook
(dotted line for Tech Advanced case)



Asia gas demand outlook
(dotted line for Tech Advanced case)

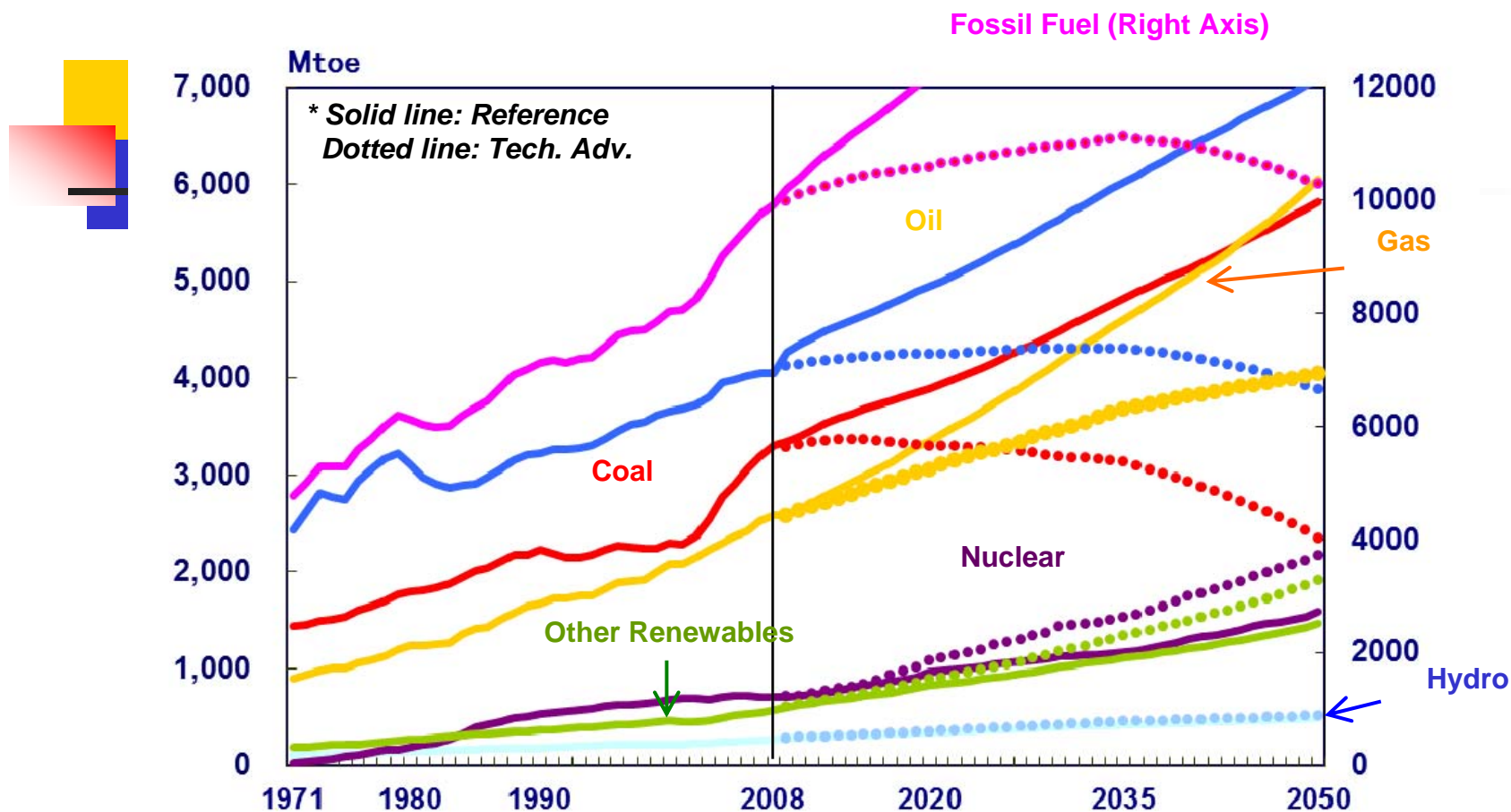


Outlook for energy demand in Asia (by fuel)



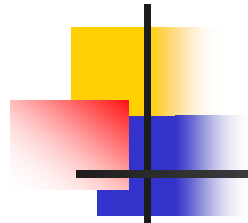
- Coal and oil will continue to maintain the dominant share in Asian energy demand through 2035. The share of natural gas will increase substantially reaching 16% by 2035, driven mainly by power generation.
- Coal share in the Tech. Adv. Scenario will significantly decrease, but will maintain the largest share (35% of total) in primary energy mix by 2035.

Outlook for global energy demand up to 2050

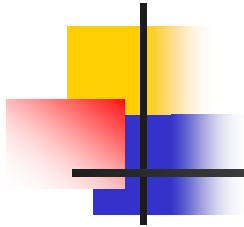


- Fossil fuel demand will peak in 2035 under the Tech. Adv. Scenario.
- In the Tech. Adv. Scenario, the world oil demand will decrease from 82 mbd in 2008 to 78 mbd in 2050, and world coal, from 4.6 Btce in 2008 to 3.4 Btce in 2050.
- By contrast, natural gas demand will continue to increase towards 2050 even in the Tech. Adv. Scenario. Adequate investment needs to be maintained to explore and develop natural gas resources.

Conclusion

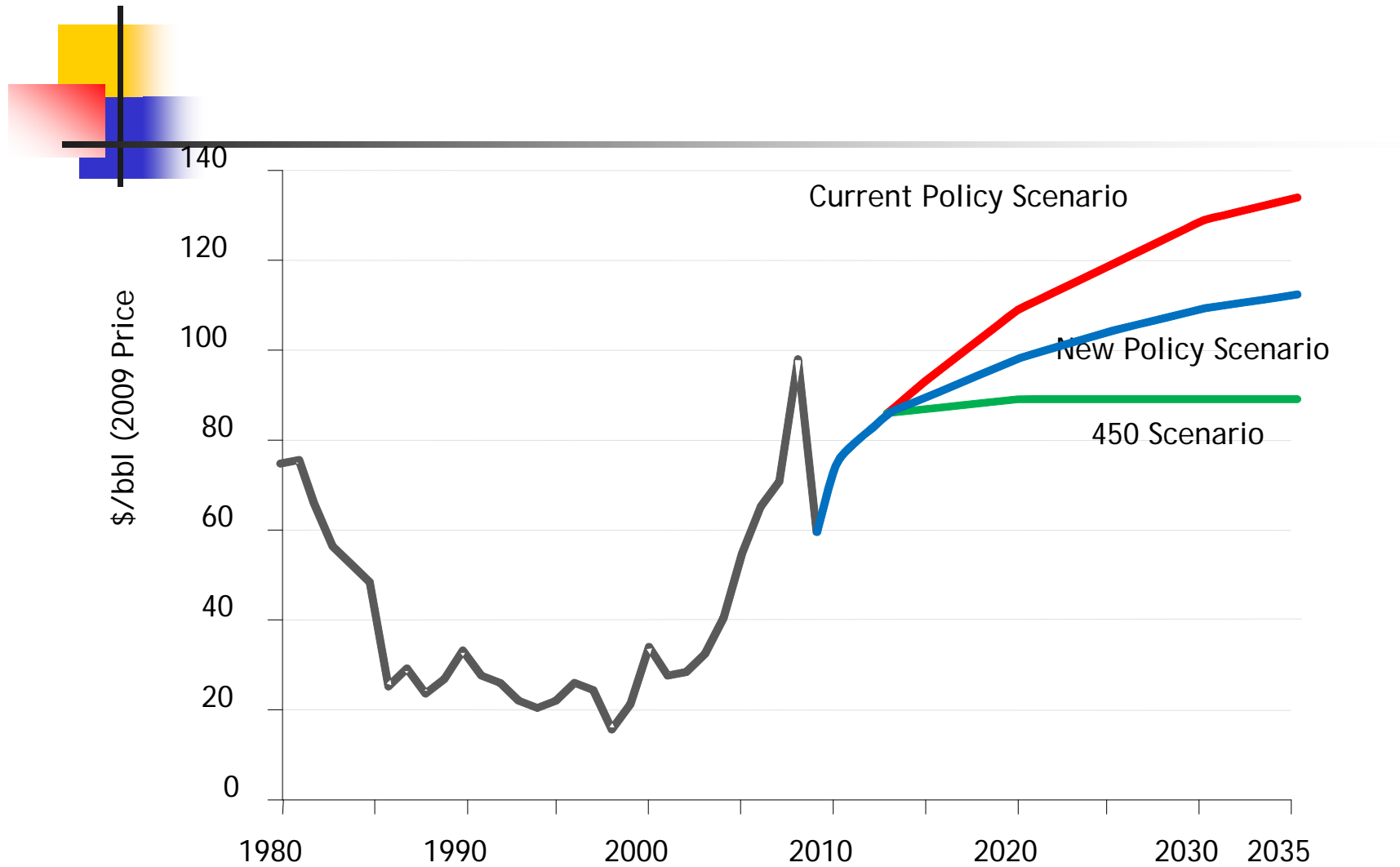


- **Many challenges and uncertainty remain in global energy landscape**
- **Under the circumstance, Asia's energy demand will grow substantially lead by China's growth**
- **Asia's growth is the driver for global demand for oil and gas. The demand growth results in challenges for supply-demand balance and market stability**
- **Advanced technology will change Asia's energy supply-demand. However, oil and gas will remain as important energy in the region, and its market stability continues to be crucial agenda**



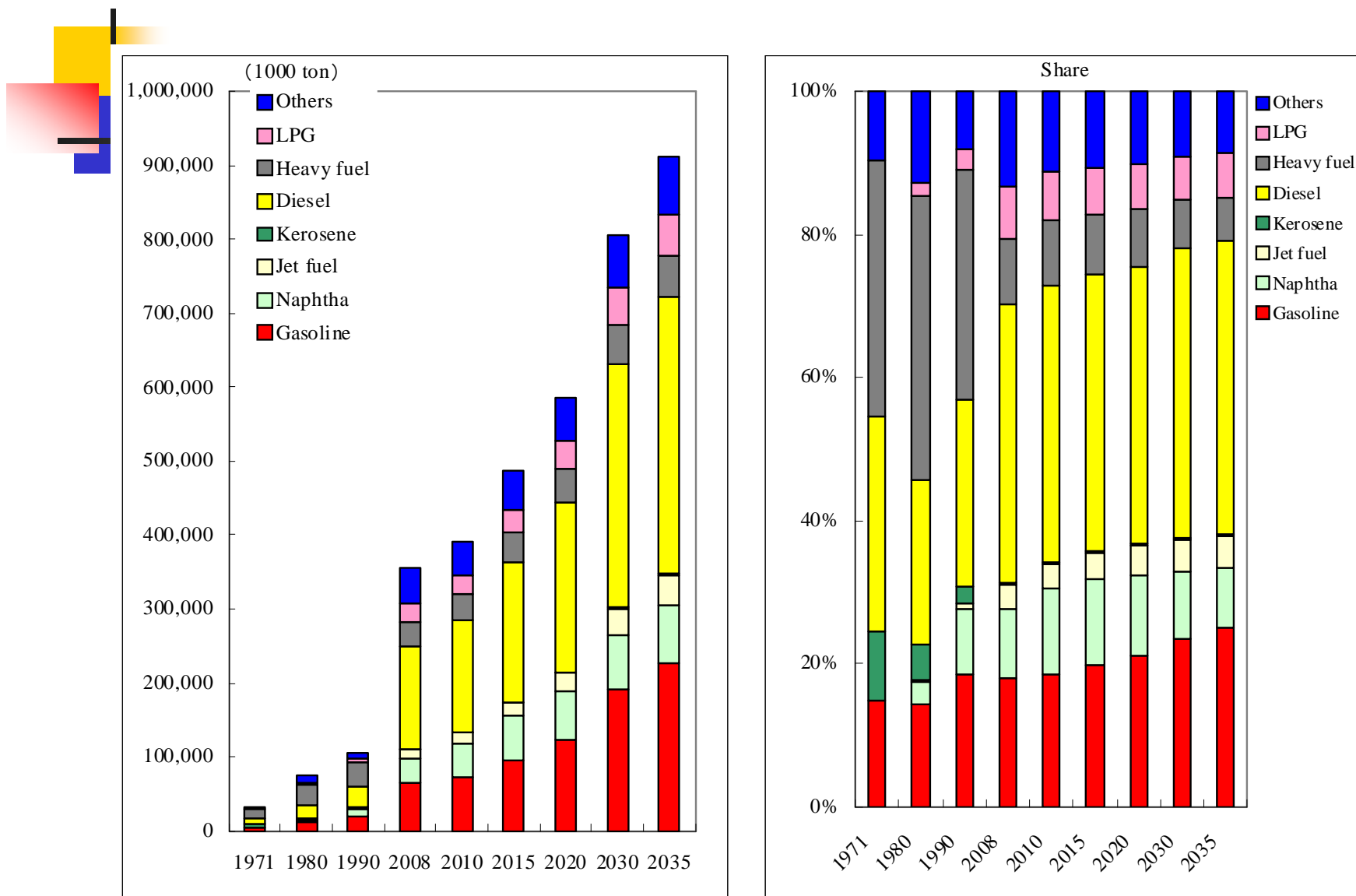
Annex

Annex 1 Oil price assumption in WEO 2010 (IEA)



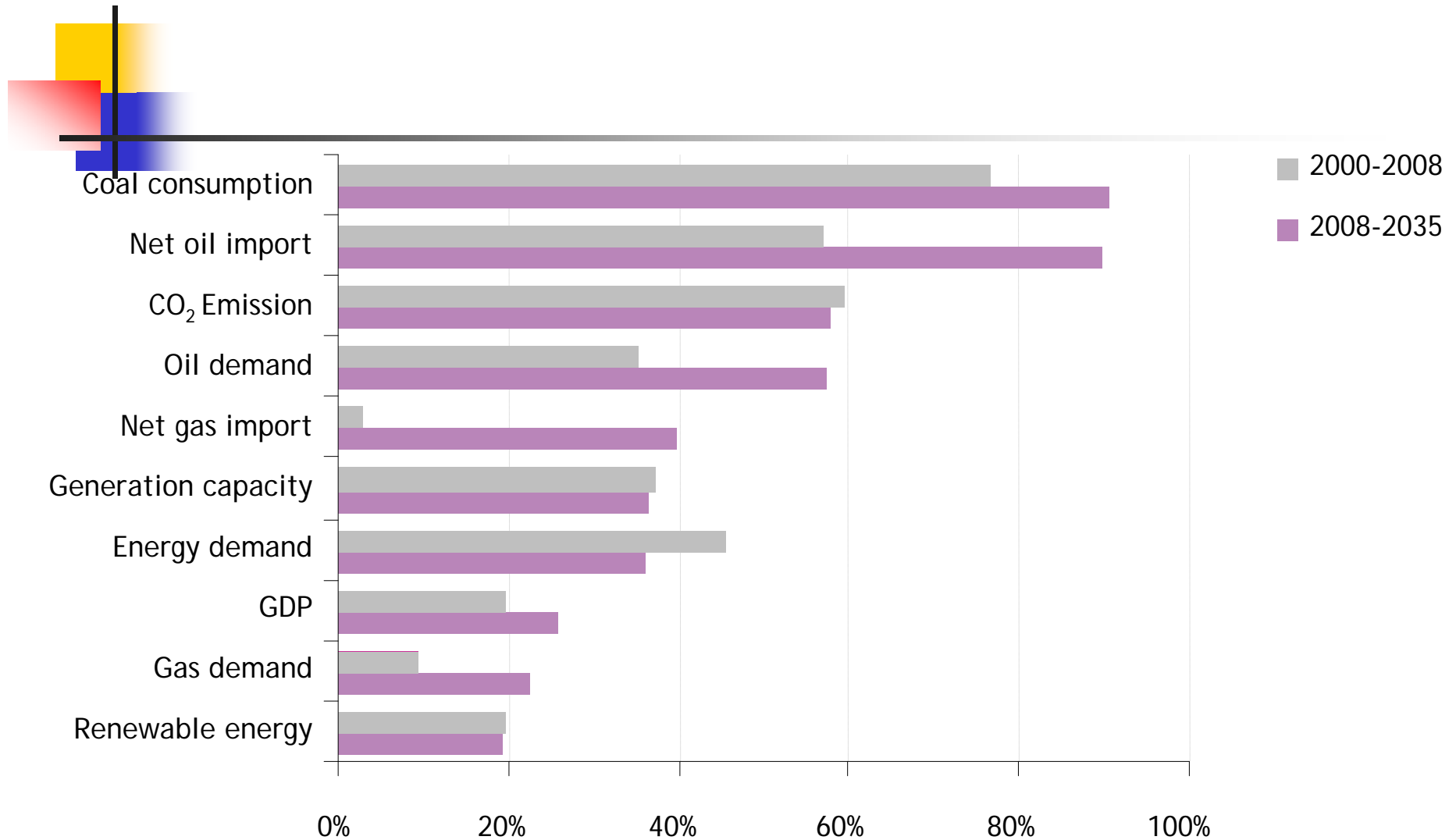
(Source) Prepared from IEA “World Energy Outlook 2010”

Annex 2 Outlook for oil product demand in China



Source: IEEJ (Asia/World Energy Outlook 2010)

Annex 3 China's importance in global context



(Source) Prepared from IEA “World Energy Outlook 2010”