Outlook for BAU Scenario

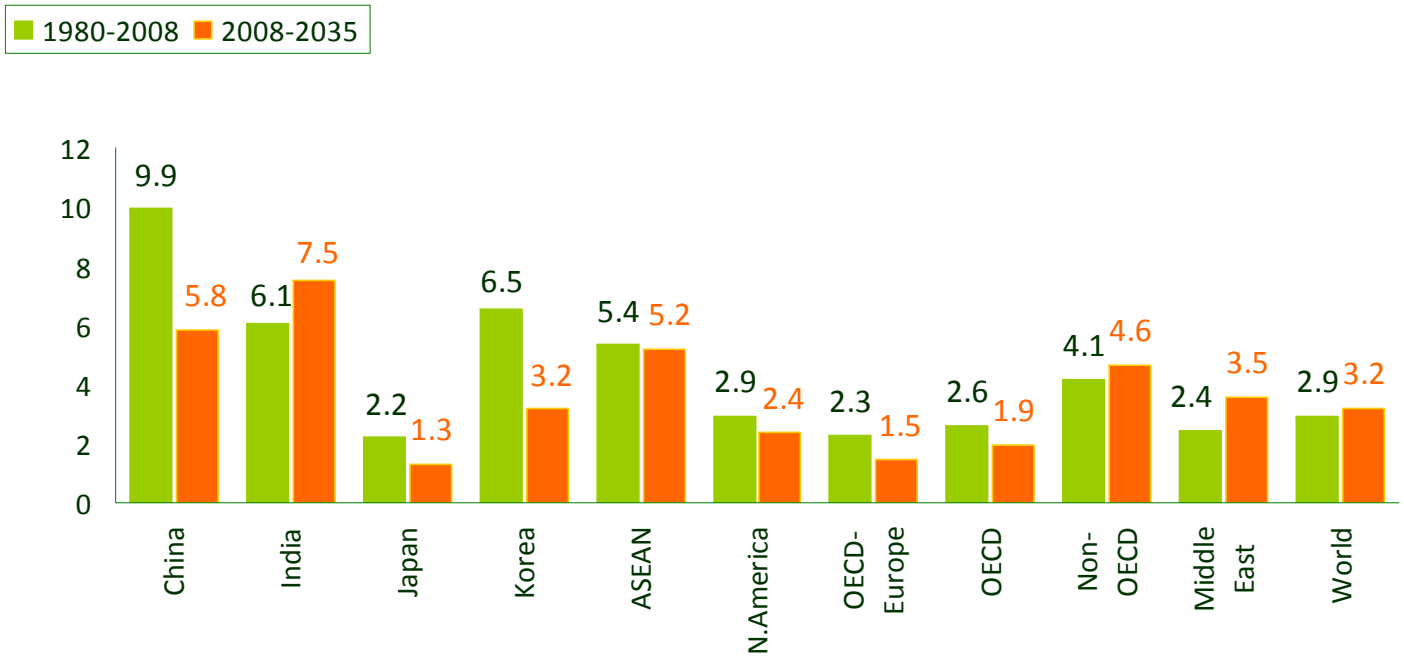
I. Asian Countries

The Institute of Energy Economics, Japan (IEEJ)

*Please note this outlook was finalised before the day of East Japan Great Earthquake, thus does not reflect any impacts of the event.

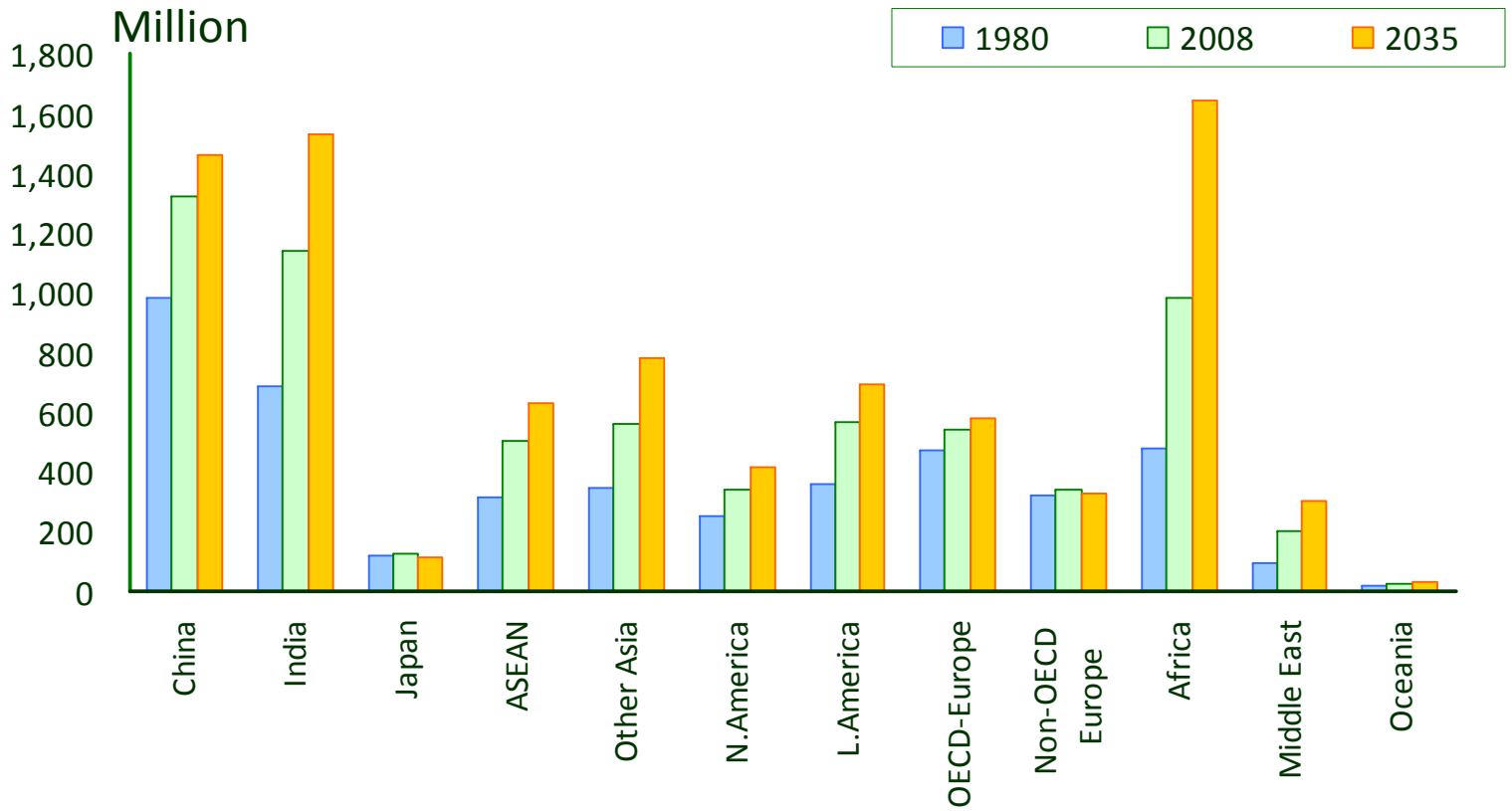
I. Major assumptions

GDP growth



■ World economy will continue to grow steadily at 3.2% per annum through 2035.
■ GDP in China will continue to achieve an annual growth rate of 6.0% per year shifting from the investment- and export-driven growth to the domestic demand-driven one.
■ GDP in India will register a high growth rate at 7.5% per year, reflecting increases in improved labor quality, and liberalization and direct investment from foreign countries.
■ ASEAN countries will achieve steady economic growth supported by industrialization and export increases.

Population

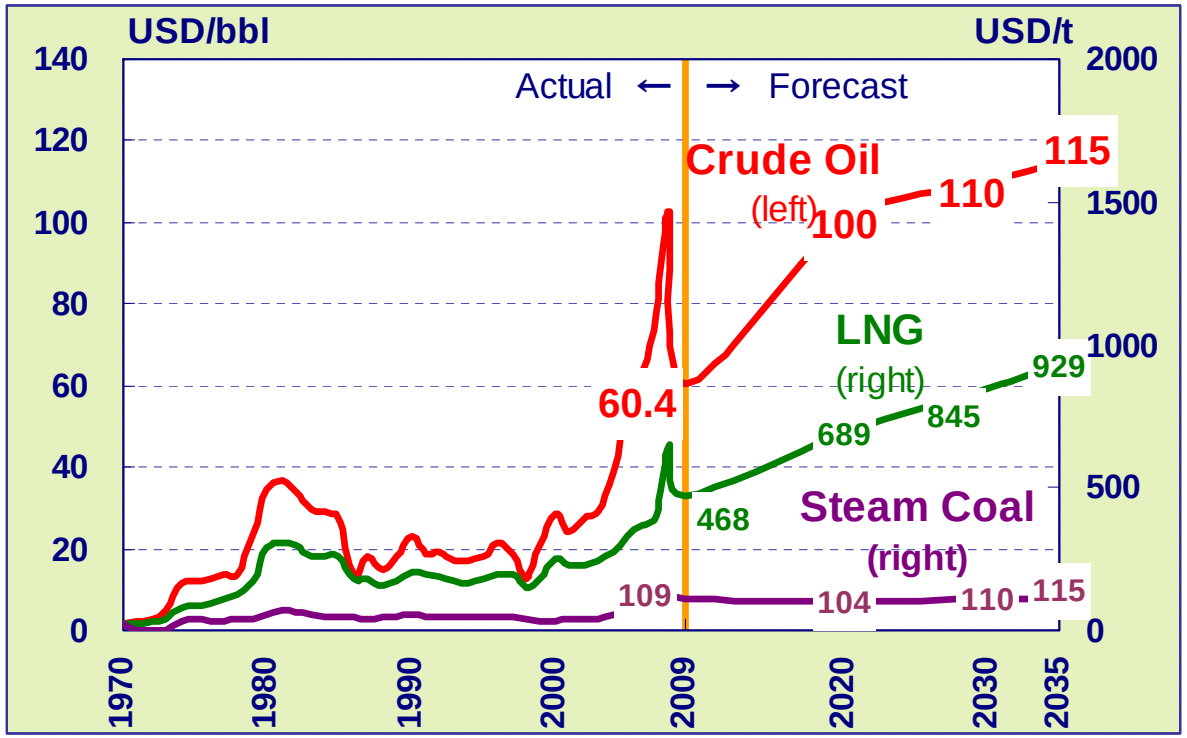


■ Of the total increase in world population over the period 2008-2035, developing countries account for roughly 90%.

■ Population in China and India together will reach about 3 billion and its share will increase to 35% by 2035.

■ Chinese population will peak in 2030 as a result of declining birth rate. India's population will represent the biggest in the world by 2035.

Energy prices



(*) 2009 real price (**) All the prices are calendar year data; In the graph, energy prices are explained by Japan's import energy price (on a CIF basis).

■ Despite a decline in crude oil price from the recorded high level in 2008 to 2009, crude oil price is assumed to continue to increase in the future. While oil demand is projected to increase driven mainly by Asia, incremental supply is likely to come with marginal cost to production expected to rise.

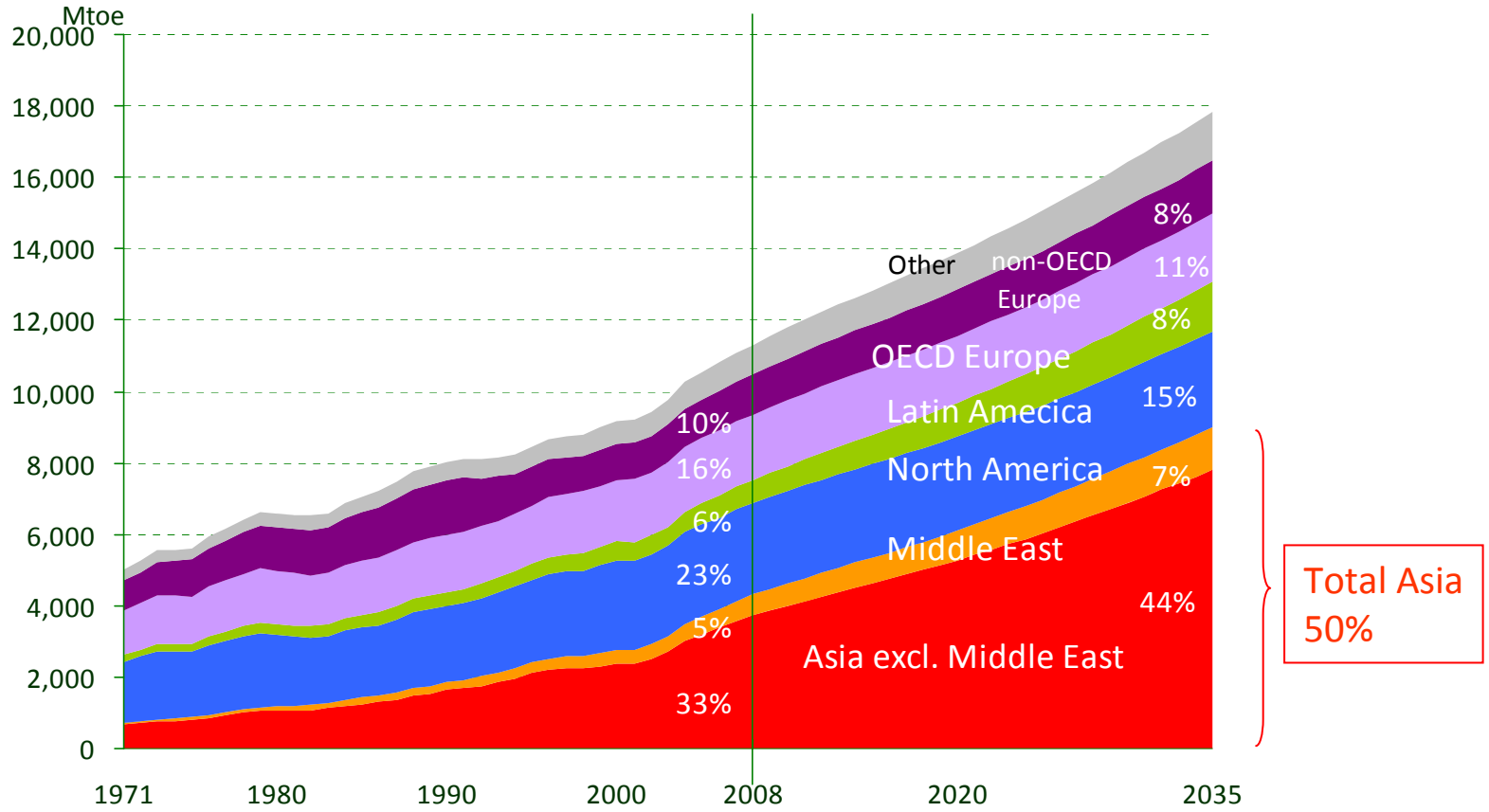
■ LNG price is projected to increase in accordance with crude oil price.

■ Coal price will show relatively moderate growth compared with the crude oil and LNG.

II. Energy Outlook for Asia / World

(BAU Scenario)

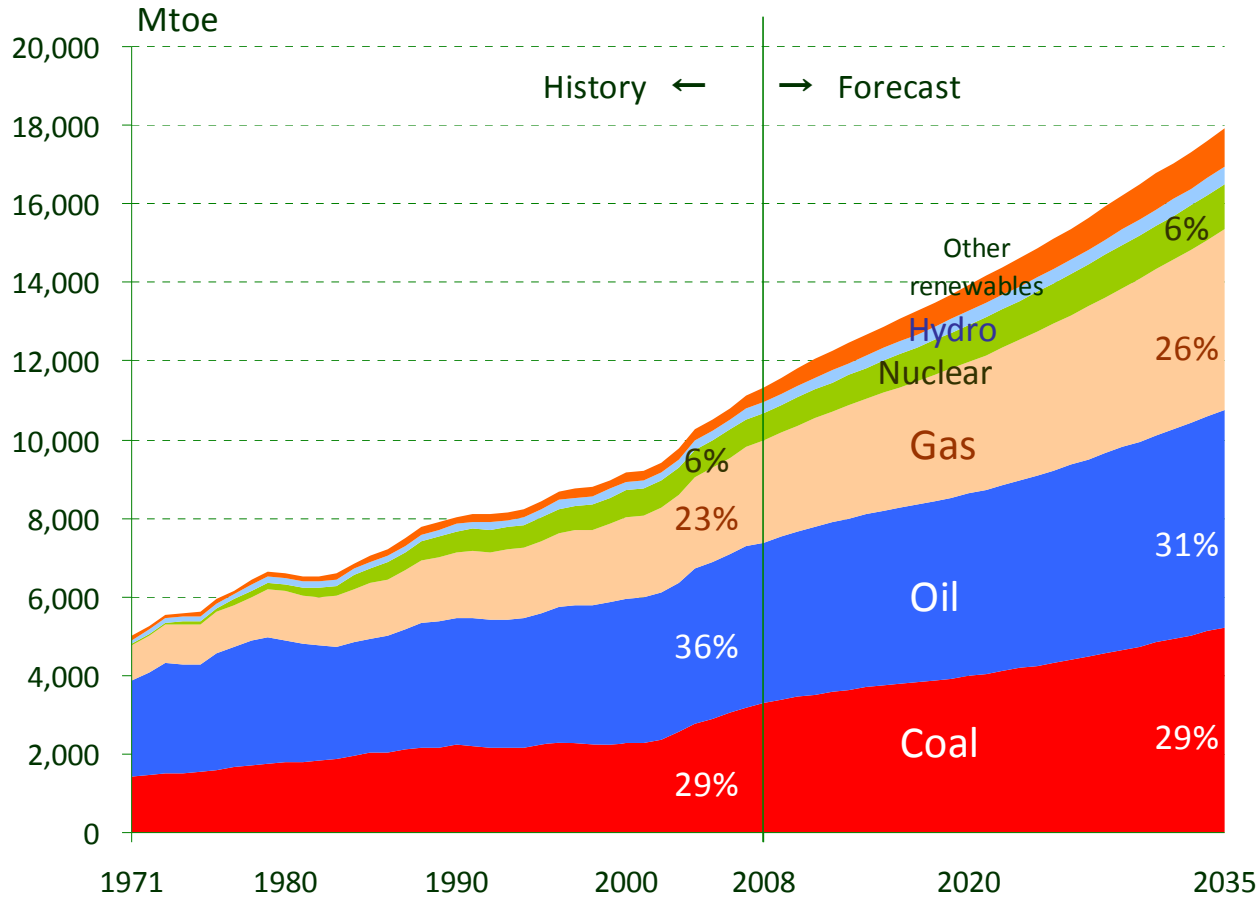
Primary Energy Demand (World : by region)



■ World primary energy demand will grow from 11.3 bil. toe in 2008 to 17.8 bil. toe in 2035, showing a 1.6-fold increase.

■ 70% of the demand increase will take place in Asia. In 2035, Asia (including Middle East) will account for 50% of the world total primary energy demand.

Primary Energy Demand (World : by energy source)

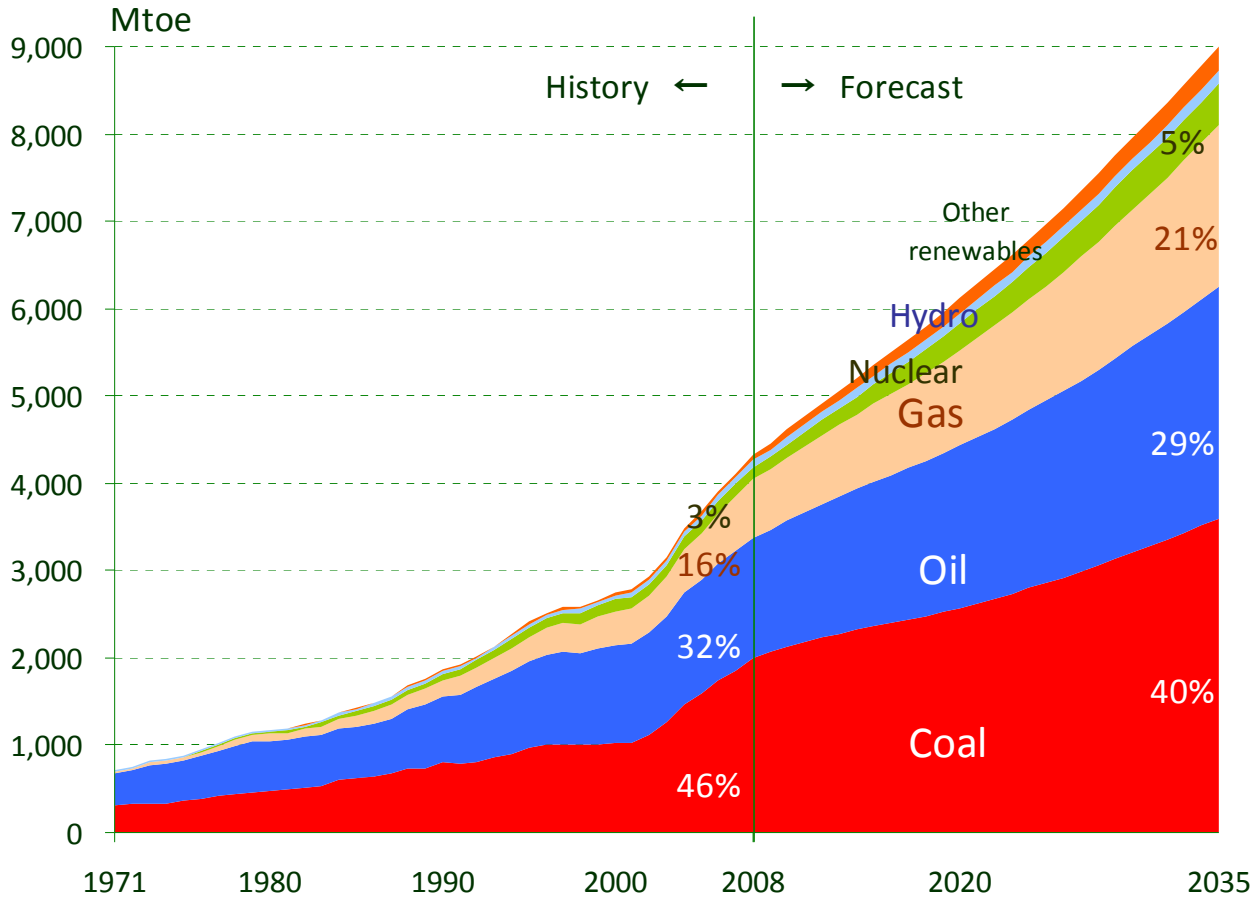


■ Oil will remain the dominant fuel in the primary energy mix until 2035, although the share in total energy demand will decrease from 36% in 2008 to 31% in 2035.

■ Growth in demand for natural gas will far surpass other fuels, backed by to its large supply availability and favorable environmental attributes.

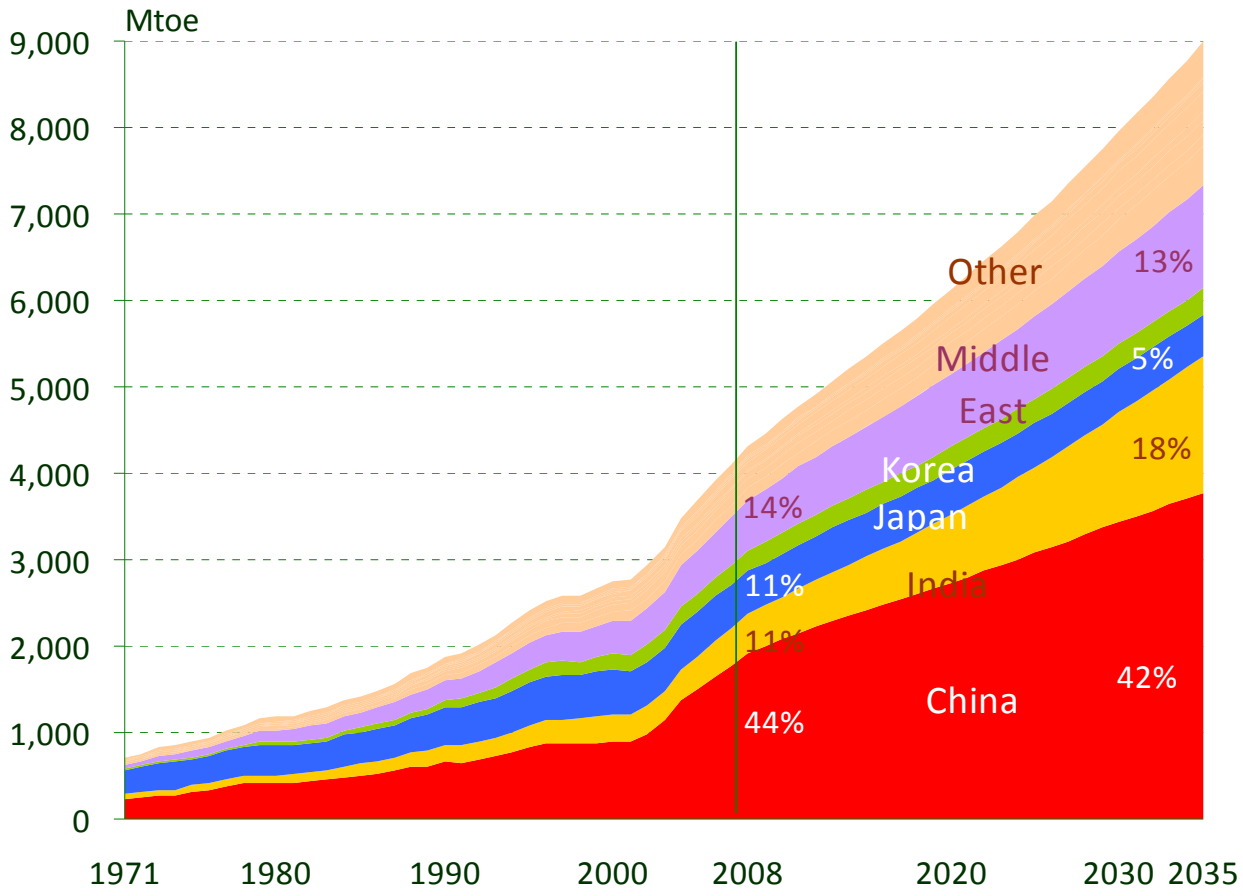
■ Fossil fuel share will be over 85% through to 2035.

Primary Energy Demand (Total Asia)



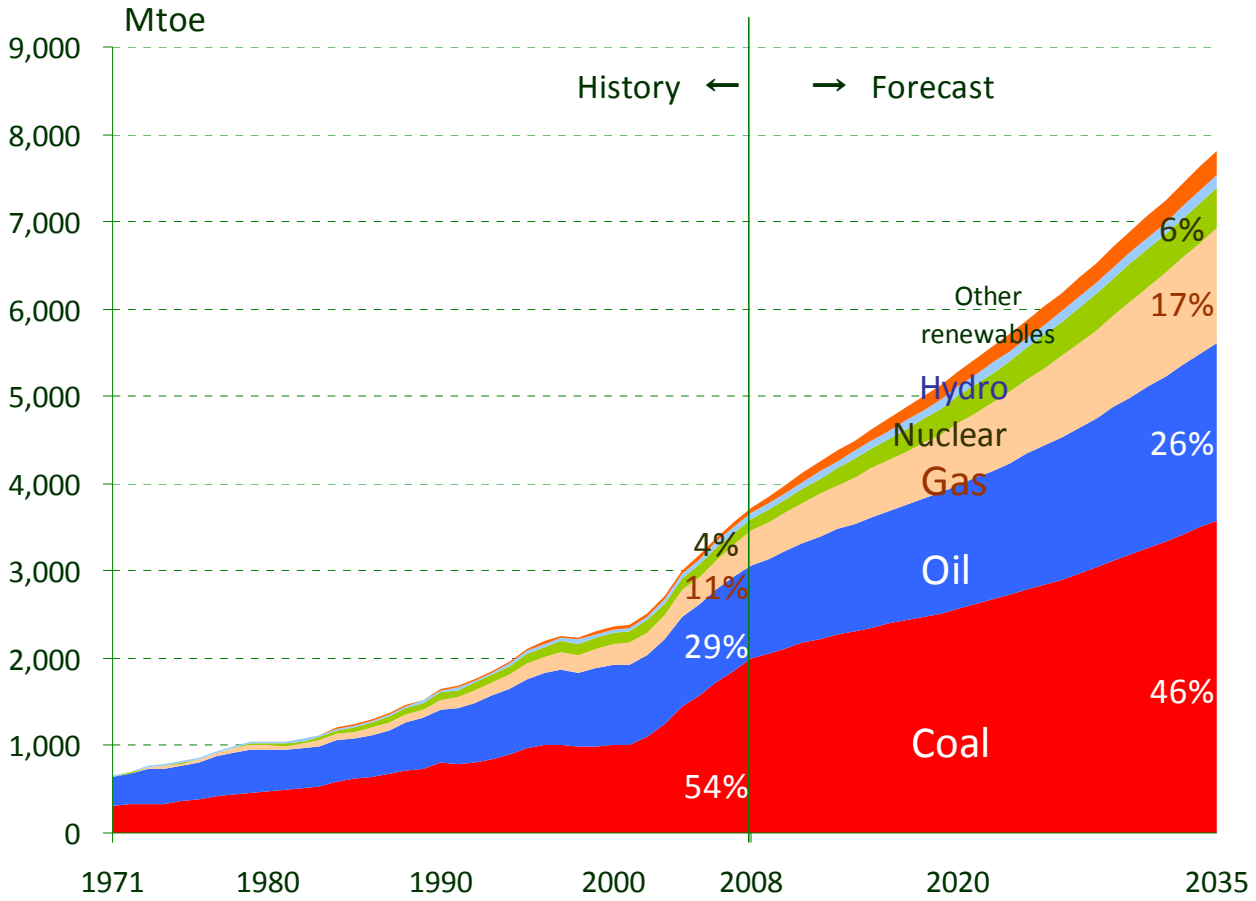
- Asia's energy demand will increase from 4.3 bil. toe in 2008 to 9.0 bil. toe in 2035, showing a 2.1-fold increase.
- In Asia, coal will remain the largest energy source until 2035.
- The share of natural gas will rise from 16% in 2008 to 21% in 2035.

Primary Energy Demand (Total Asia : by region)



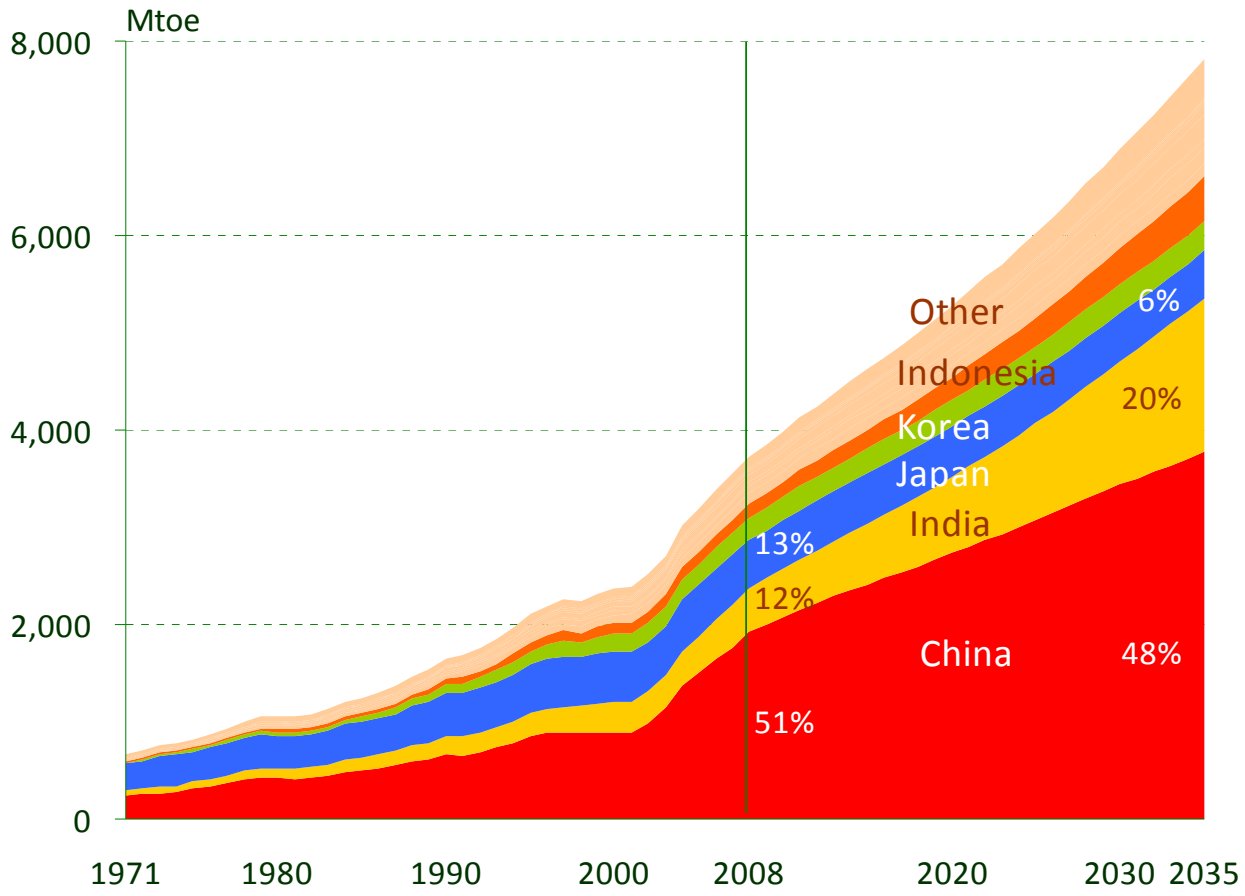
- China and India will account for 42% and 18% of total primary energy demand in Asia in 2035.
- The share of Middle East will slightly decline, from 14% in 2008 to 13% in 2035.

Primary Energy Demand (Asia excl. Middle East)



■ Total primary energy demand in Asia excluding Middle East will increase from 3.7 bil. toe in 2008 to 7.8 bil. toe in 2035, showing a 2.1-fold increase.

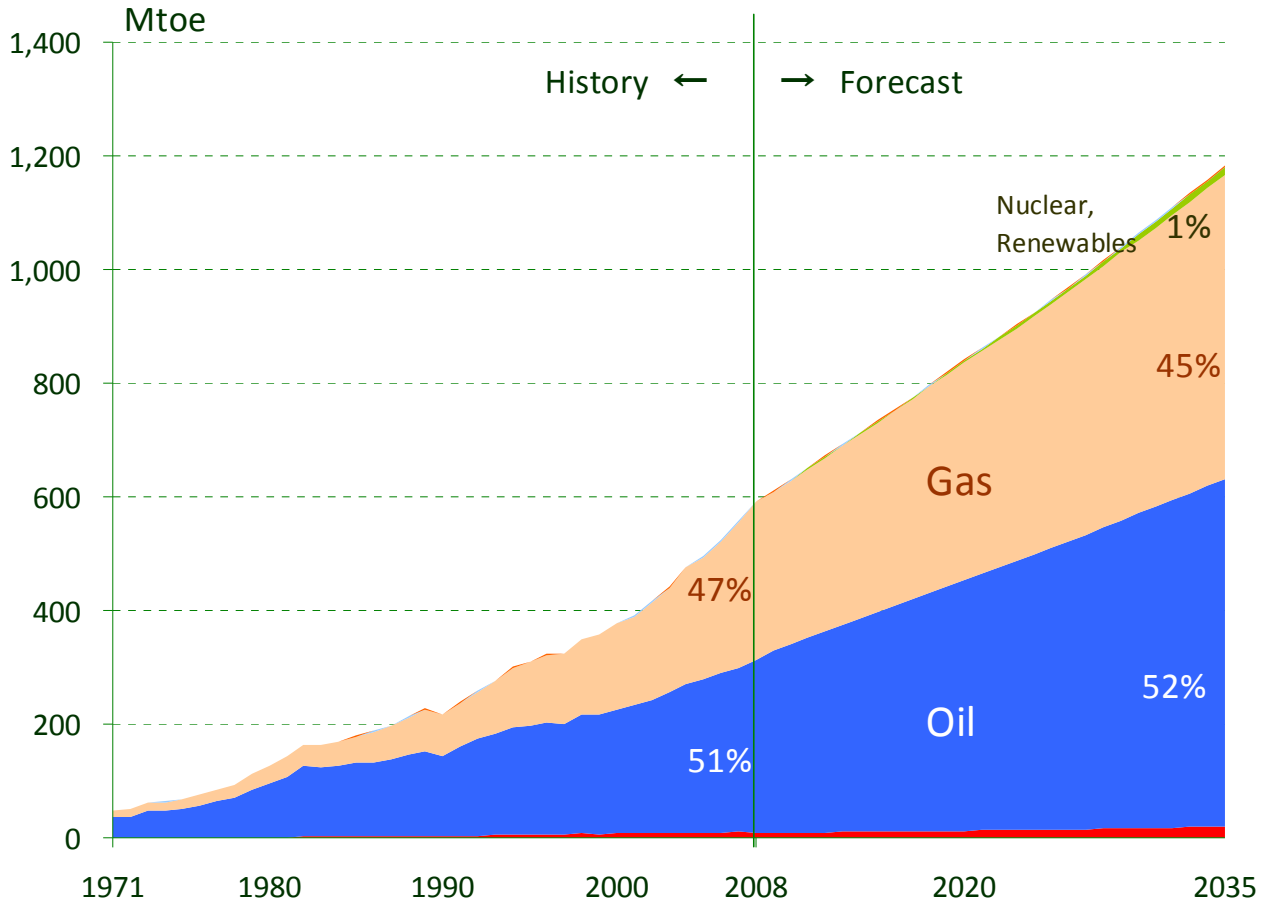
Primary Energy Demand (Asia excl. Middle East : by region)



■ China and India account for 70% of total primary energy demand in Asia excluding Middle East in 2035.

■ The share of Japan will decline from 13% in 2008 to 6% in 2035.

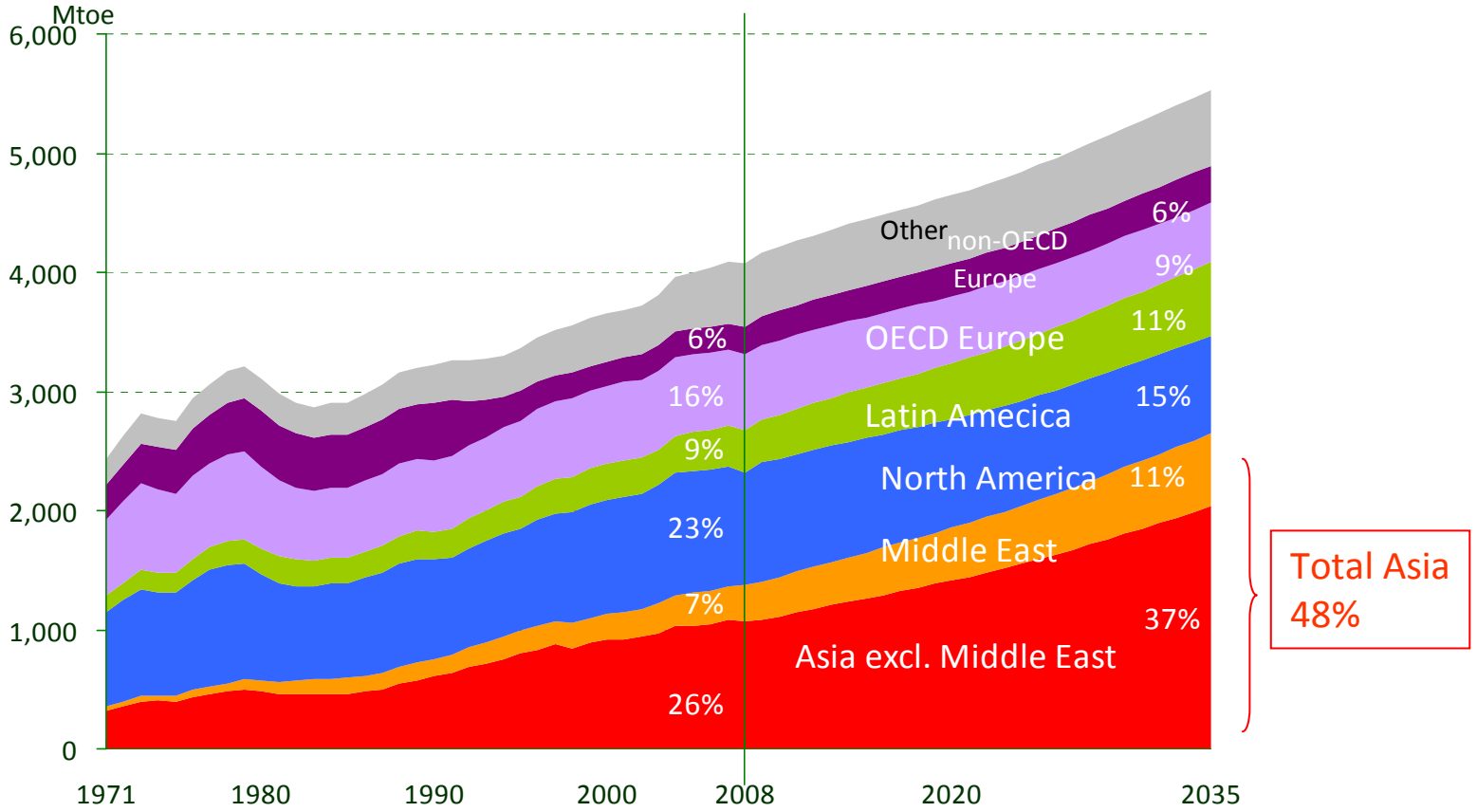
Primary Energy Demand (Middle East)



■ In Middle East, energy demand will double from 2008 to 2035.

■ Oil and natural gas together account for 98% of total primary energy demand in 2008, and will continue to dominate the energy demand in Middle East until 2035.

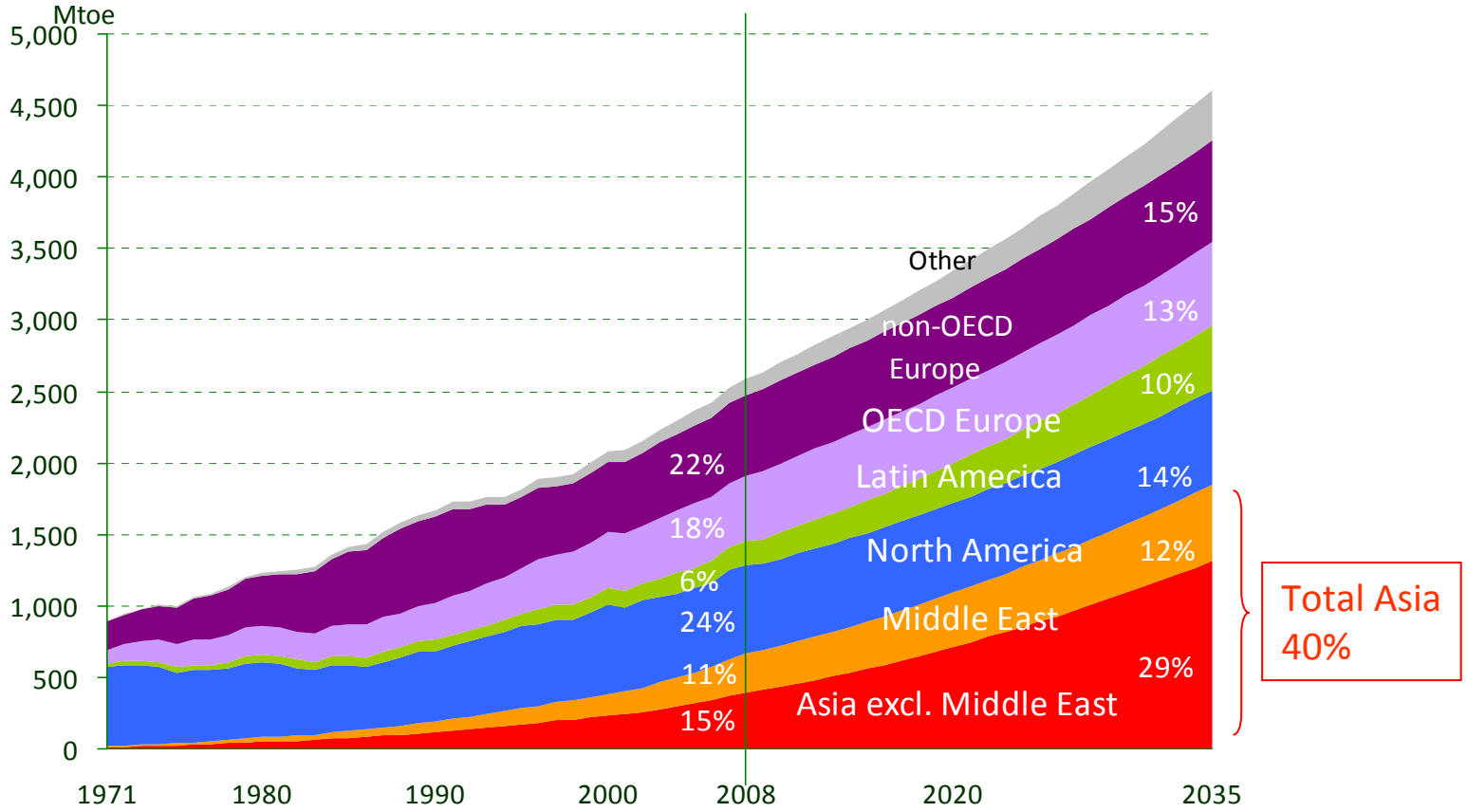
Oil demand (World : by region)



■ World oil demand will grow from 82 million b/d in 2008 to 112 million b/d in 2035. Asia will account for more than 80% of global oil demand growth from 2008 to 2035.

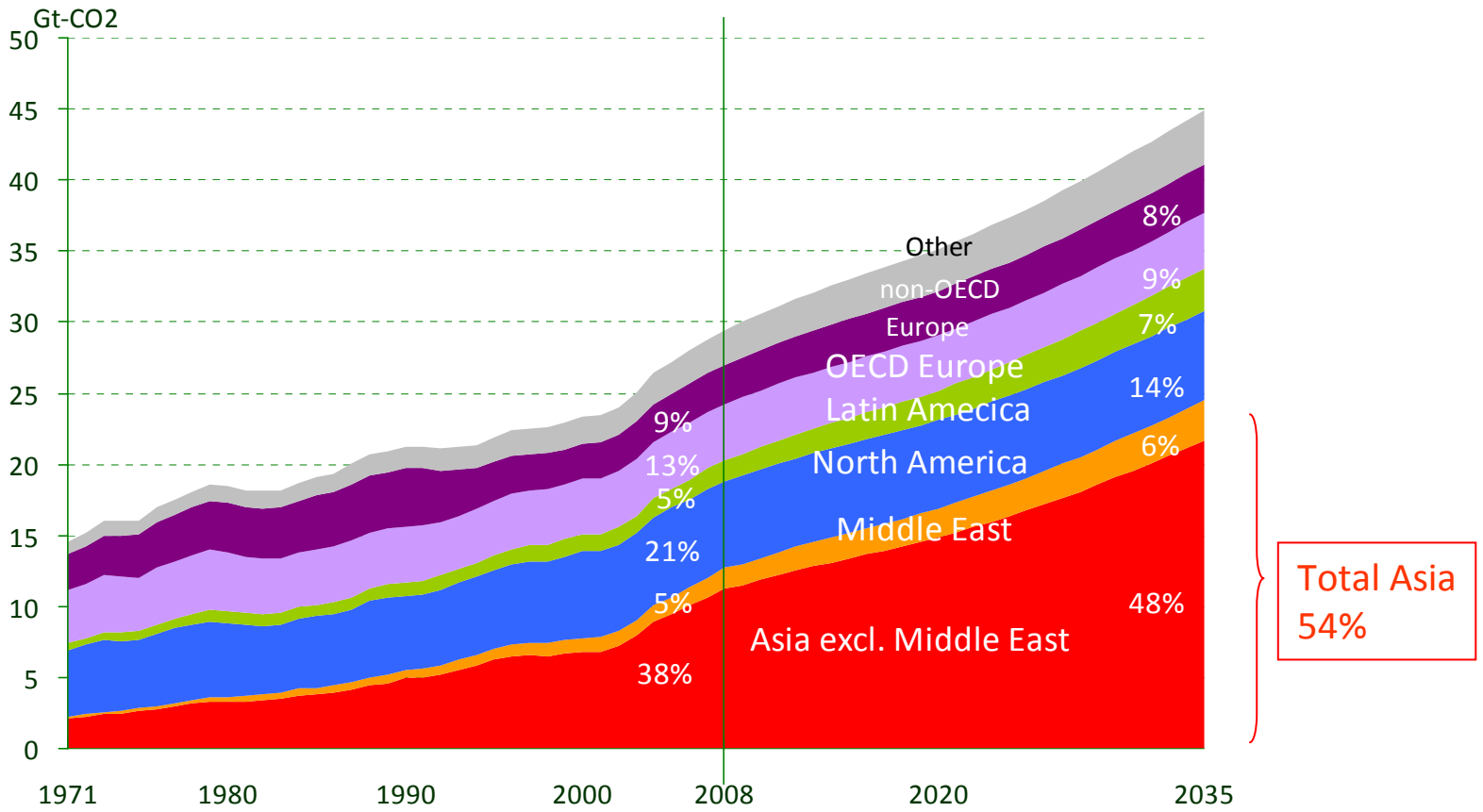
■ Oil demand in OECD countries started to decrease in 2005. The share of OECD will decline from 50% in 2008 to 23% in 2035.

Natural gas demand (World : by region)



- World natural gas demand is expected to increase from 2.9 Tcm in 2008 to 5.1 Tcm in 2035, a 1.7-fold increase.
- Asia will account for 60% of the total demand growth.

CO_2 emissions (World : by region)



- World energy-related CO_2 emission will increase from 29 Gt in 2008 to 45 Gt in 2035, showing a 53% increase.
- The share of Asia will rise from 43% in 2008 to 54% in 2035.

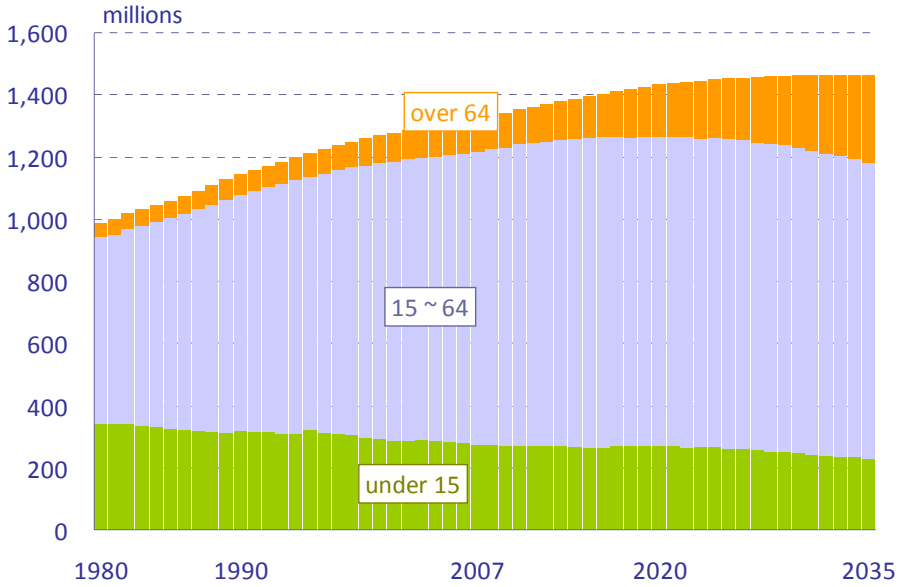
III. Energy Outlook for China

(BAU Scenario)

Assumption : Population and GDP Growth

China

Population



GDP growth rate

2011～2015	8.0%
2016～2020	6.6%
2021～2025	5.2%
2026～2030	4.6%
2031～2035	3.9%

2008-2035
5.8%

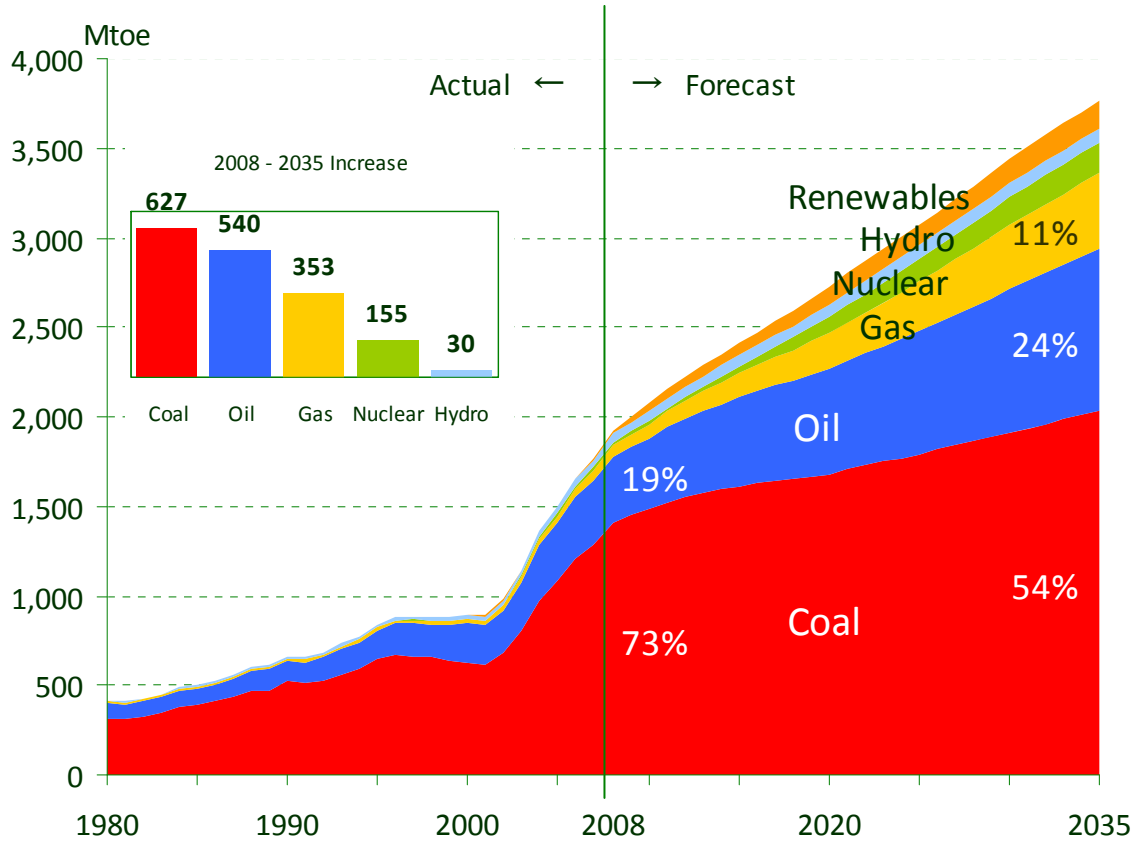
■ Population of China will peak at 1,460 million around 2030. The share of older people (above 65) will reach 19.2% in 2035. Labor force population will peak by 2015 and then begin to decrease.

■ China's economy will gradually grow at a moderate pace due to the shift from export and investment-driven growth to domestic consumption-led growth.

■ GDP per capita is expected to reach 8 thousand USD in 2035.

Primary energy demand

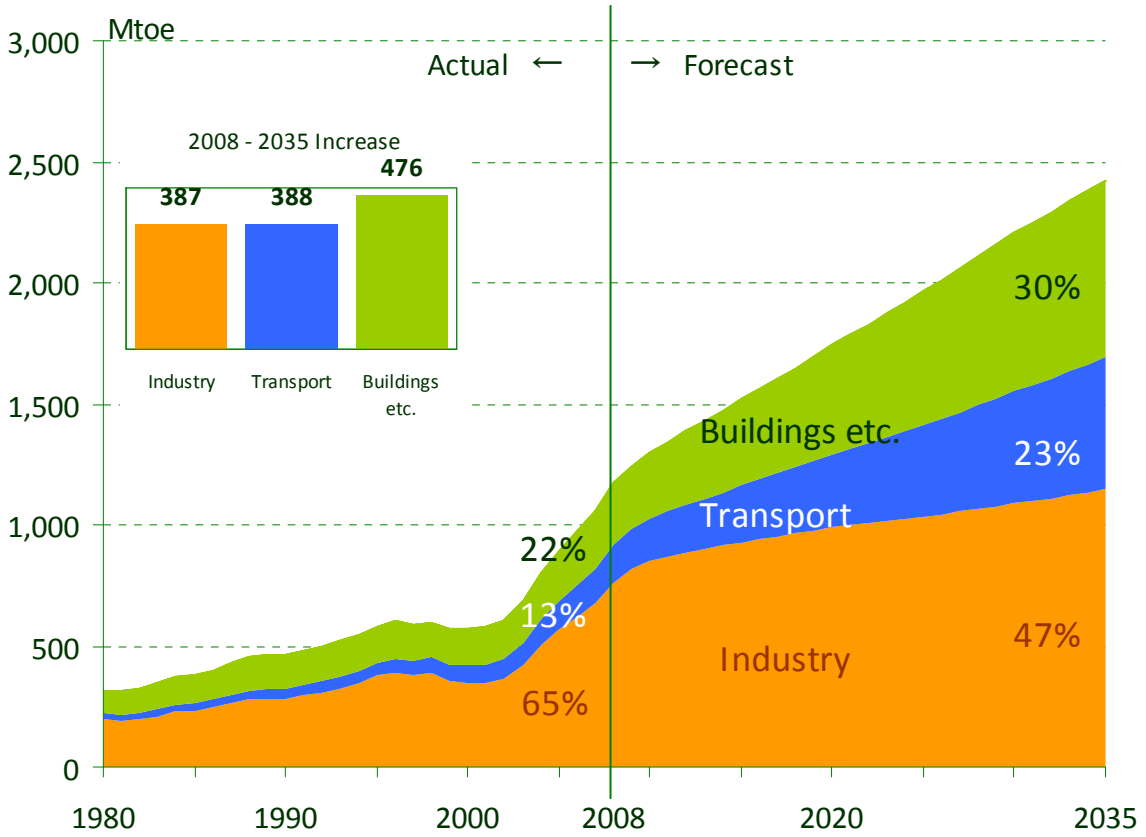
China



- Total primary energy demand in China will grow from 1,929 Mtoe in 2008 to 3,770 Mtoe in 2035 (2.0-fold increase).
- Coal will remain the main energy source, but the share will decrease to 54%.

Final energy consumption

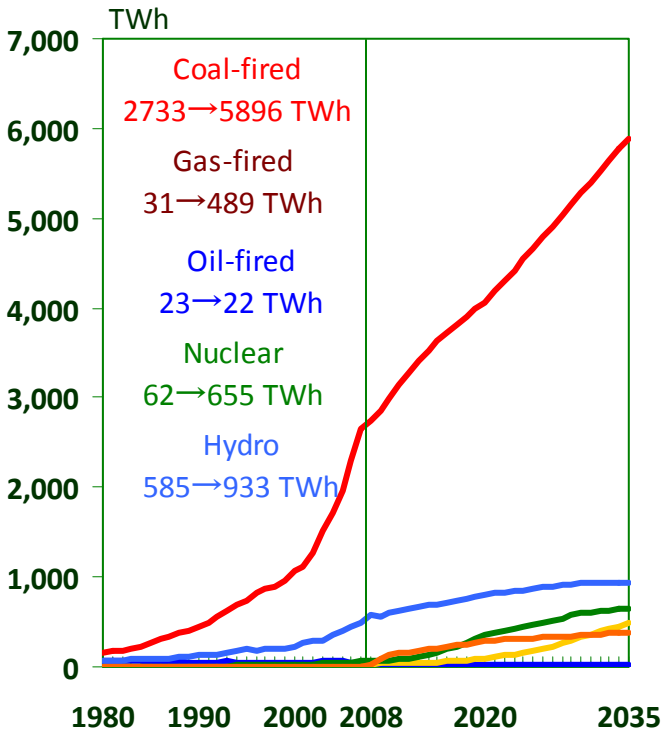
China

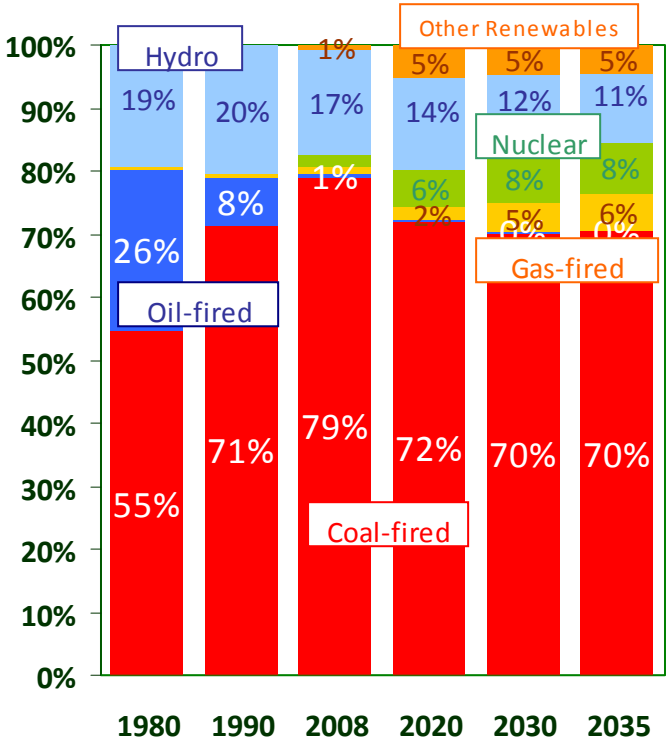


■ Final energy demand will grow from 1,173 Mtoe to 2,424 Mtoe (2.1-fold increase).

Electricity generation mix

China



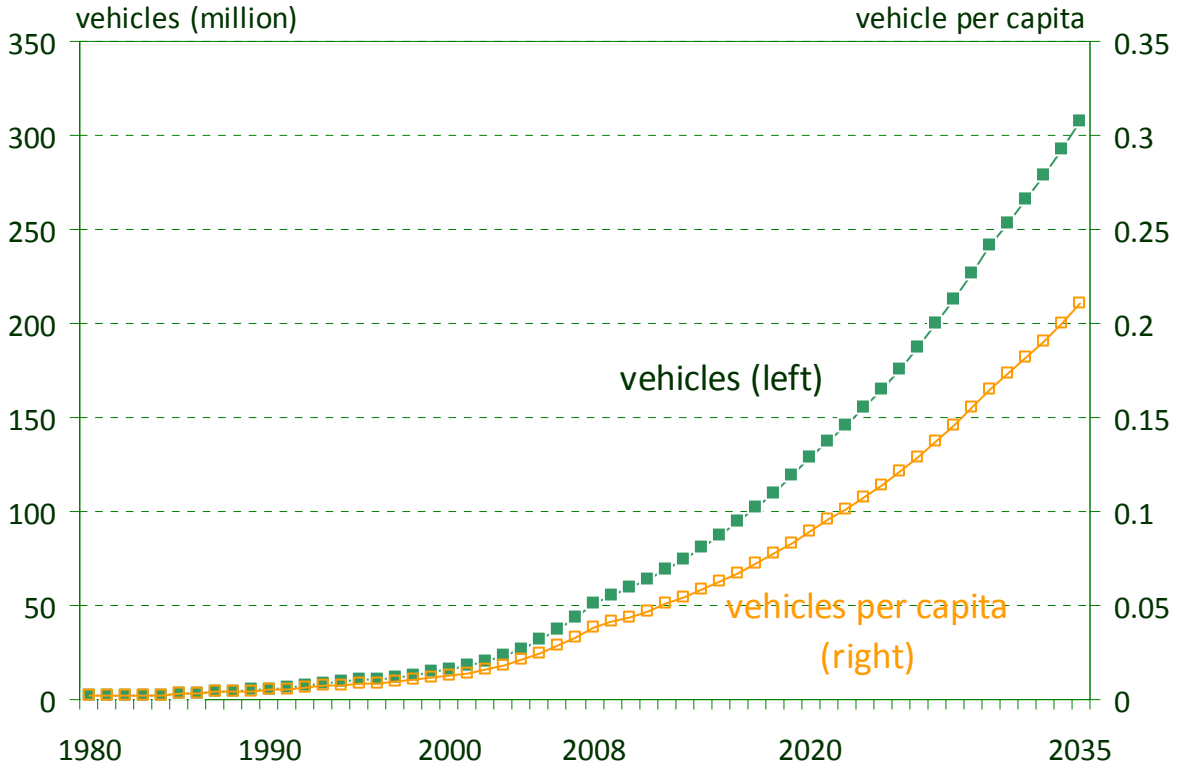


■ Coal-fired power generation will continue to supply most of China's electricity demand (more than 70%).

■ Natural gas and nuclear will increase the shares, while the share of hydropower will decease.

Car ownership

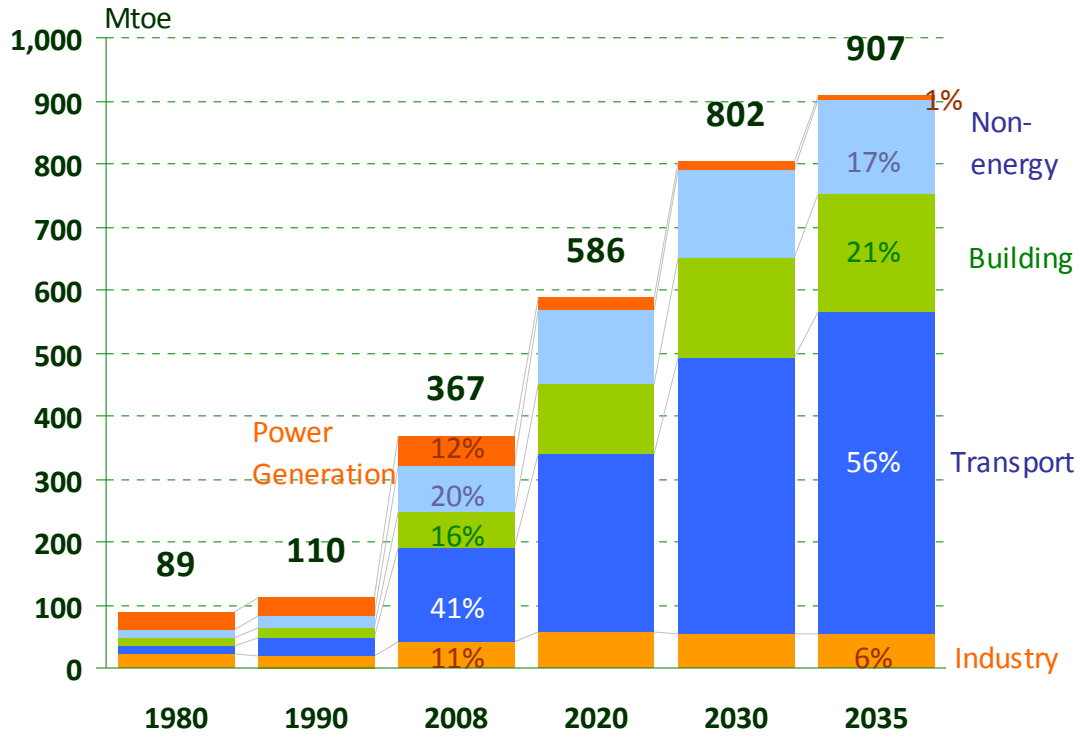
China



- Vehicle ownership will increase very rapidly.
- Vehicle per capita will be over 0.2 in 2035.

Oil consumption

China

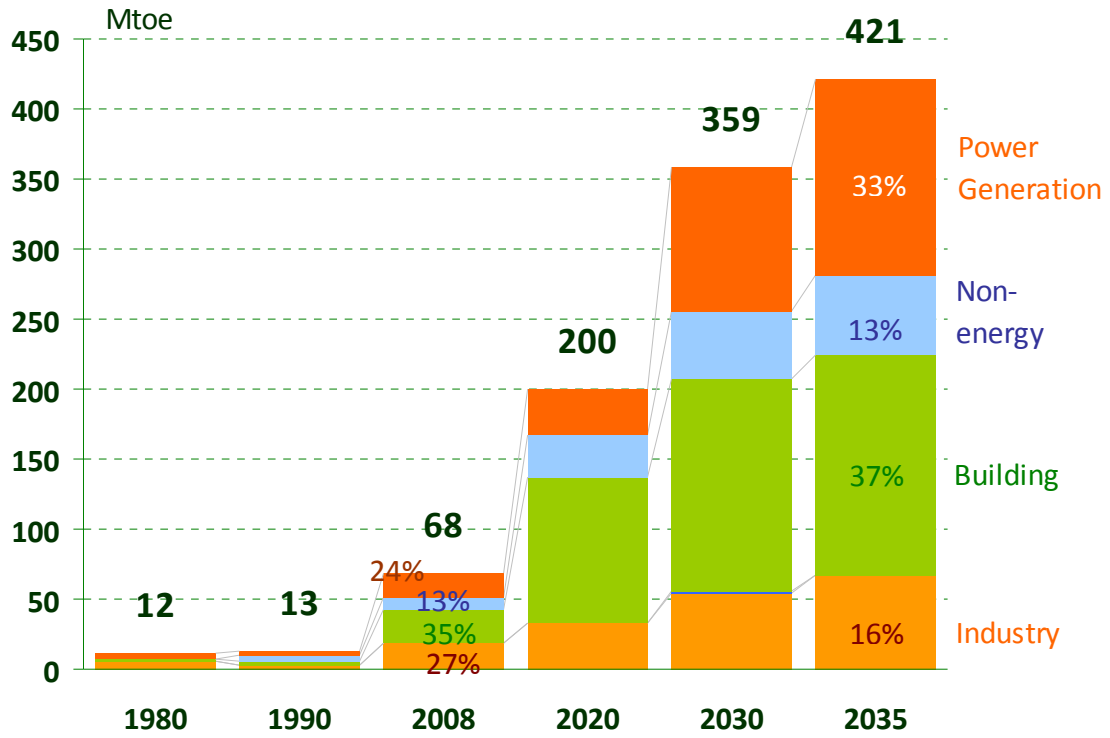


■ Oil consumption in China will grow from 367 Mtoe to 907 Mtoe (2.8-fold increase).

■ Transport sector will account for 56% of oil demand in 2035.

Gas consumption

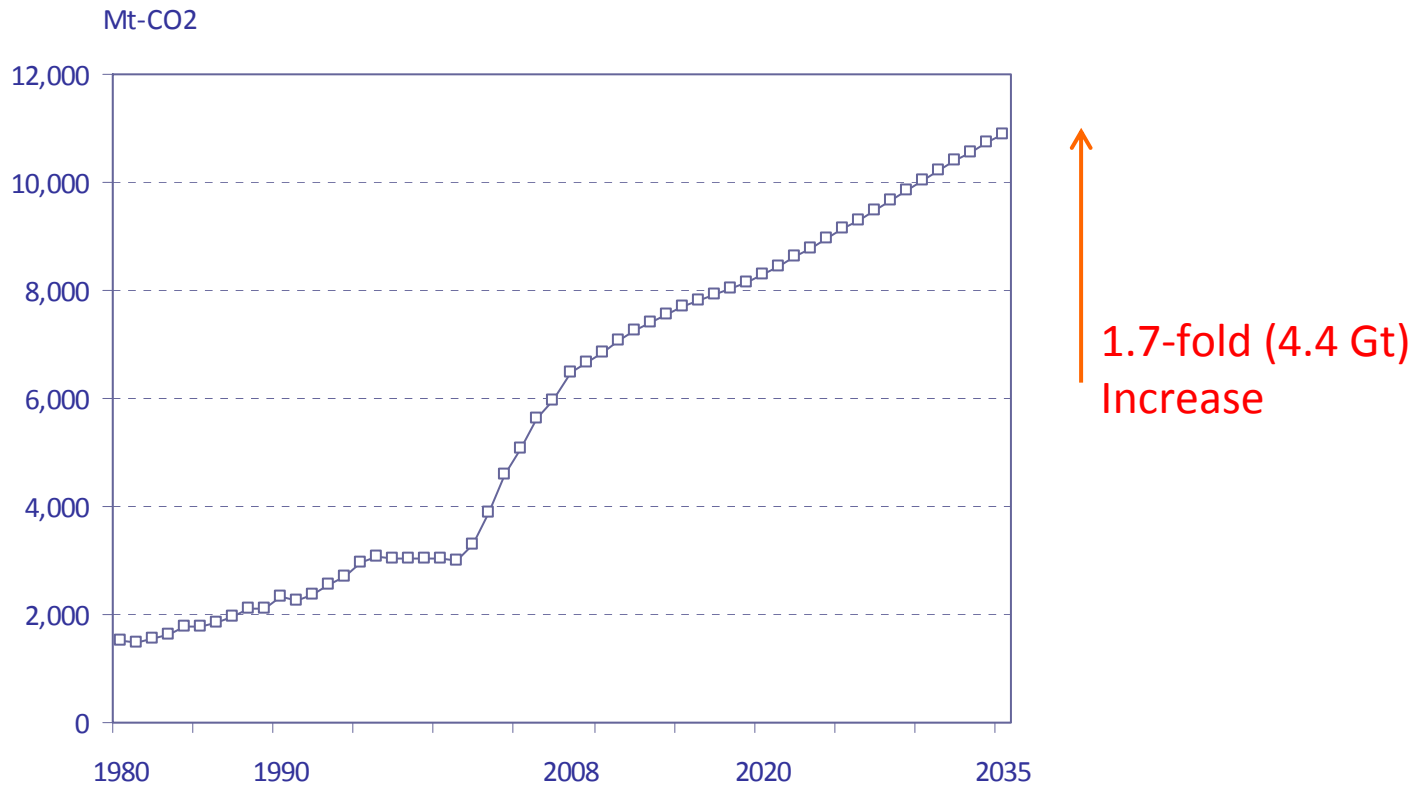
China



- Natural gas consumption in China will grow from 76 bcm in 2008 to 470 bcm in 2035.
- More than 70% of the increase will come from the power generation and buildings sectors.

CO_2 emission

China



- CO_2 emission of China will reach 10 Gt in 2030 in the BAU scenario.

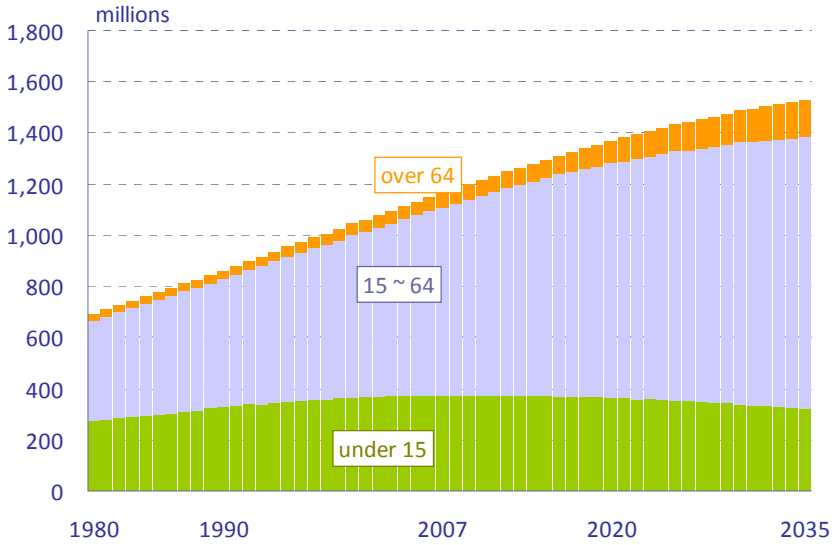
IV. Energy Outlook for India

(BAU Scenario)

Assumption : Population and GDP Growth

India

Population



GDP growth rate

2011～2015	8.0%
2016～2020	8.0%
2021～2030	7.4%
2031～2035	7.0%

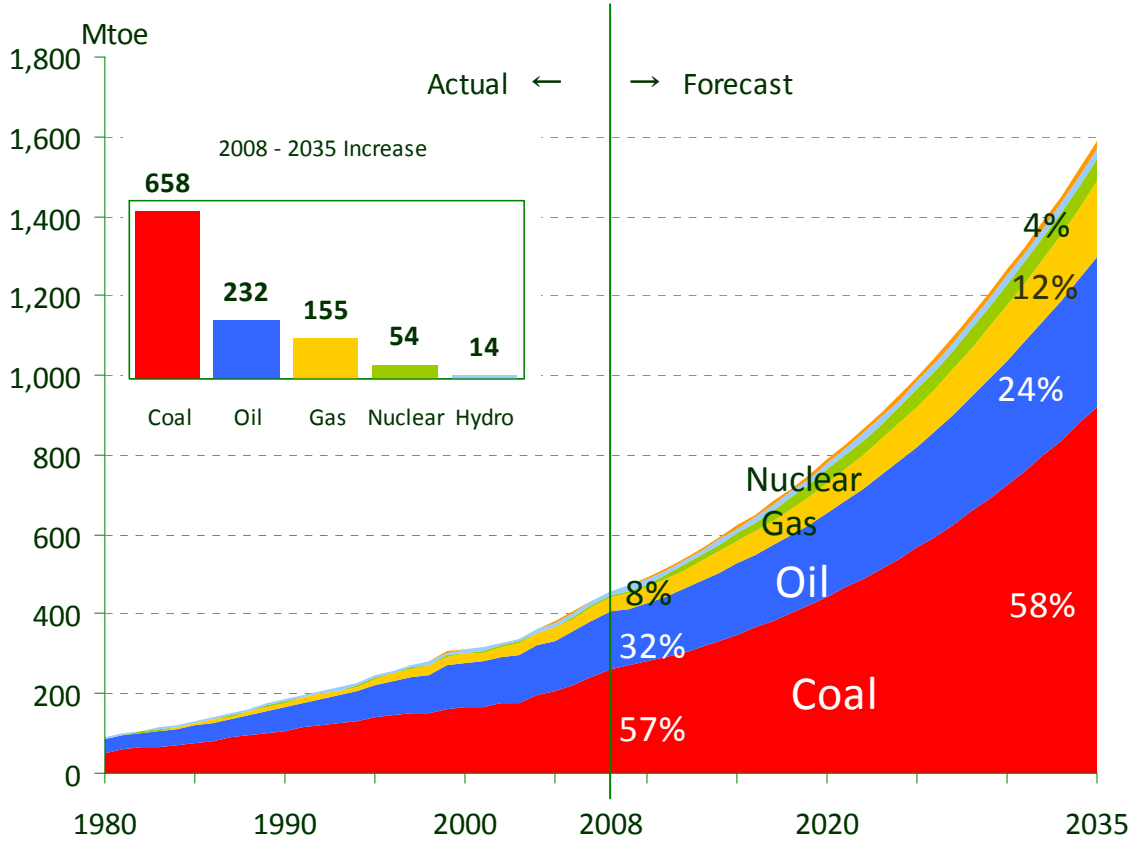
2008-2035
7.5%

■ Growing at an annual rate of 1.1%, population of India will reach 1.5 billion in 2035 to become the most populous country in the world. The share of labor population will continue to increase, reaching 70% of the total in 2035.

■ GDP will continue to grow robustly due to increase in workforce population, improved quality of labor force, and opening up of the market.

Primary energy demand

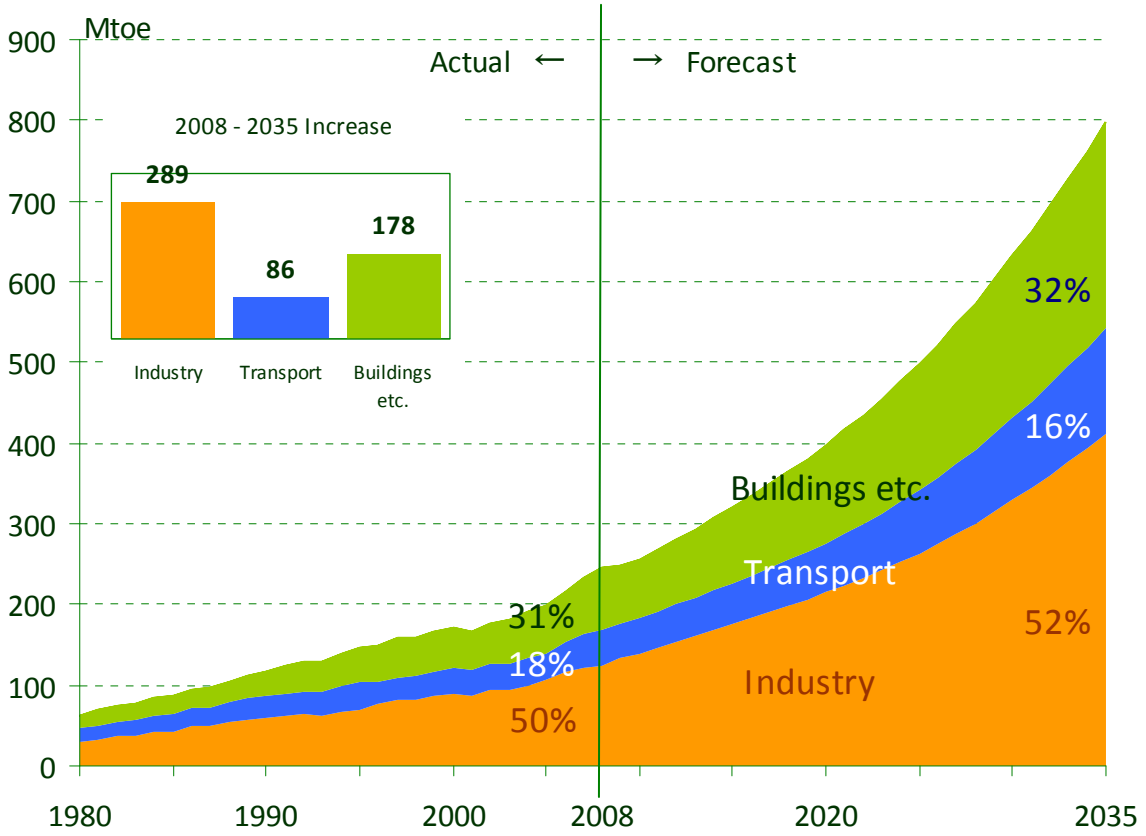
India



- Total primary energy demand in India will grow from 459 Mtoe in 2008 to 1,588 Mtoe in 2035 (3.5-fold increase).
- 4.7% growth rate from 2008 to 2035.

Final energy consumption

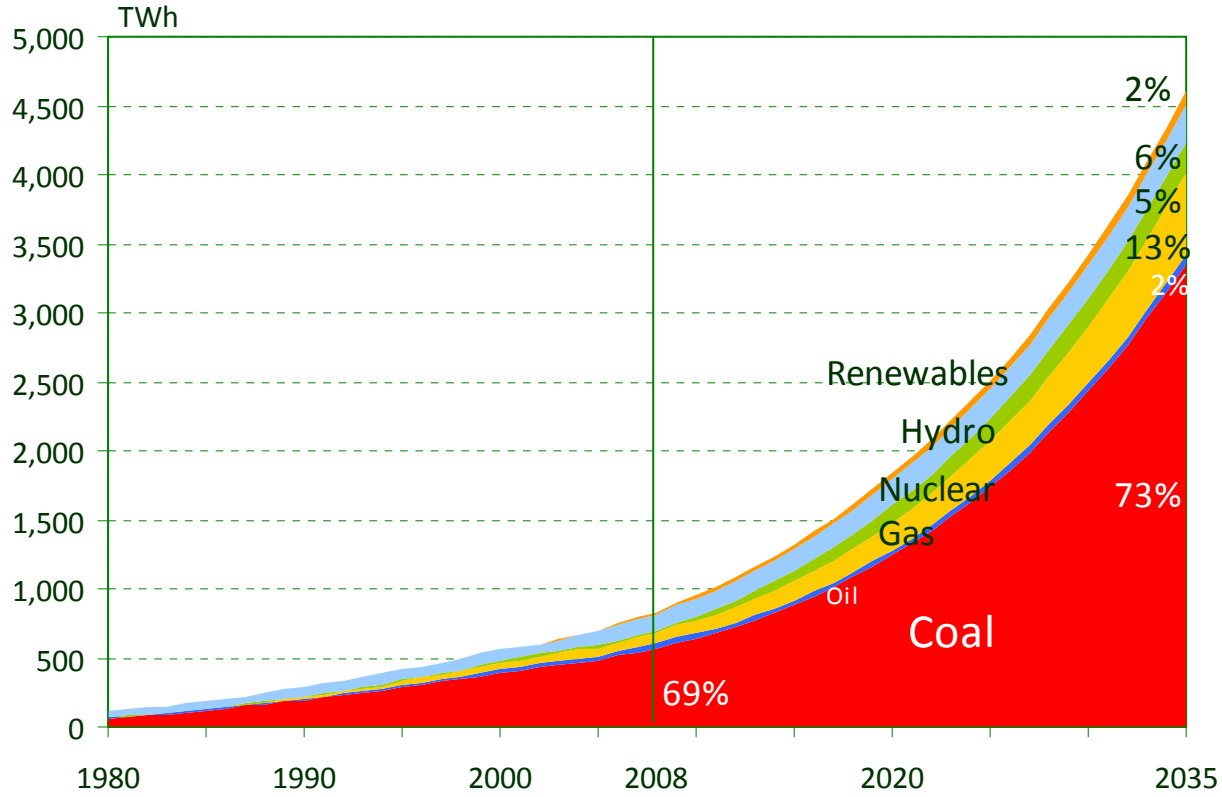
India



- Final energy consumption will grow from 245 Mtoe to 798 Mtoe (3.3-fold increase).
- Energy consumption increase in the industry sector will be significant.

Electricity generation mix

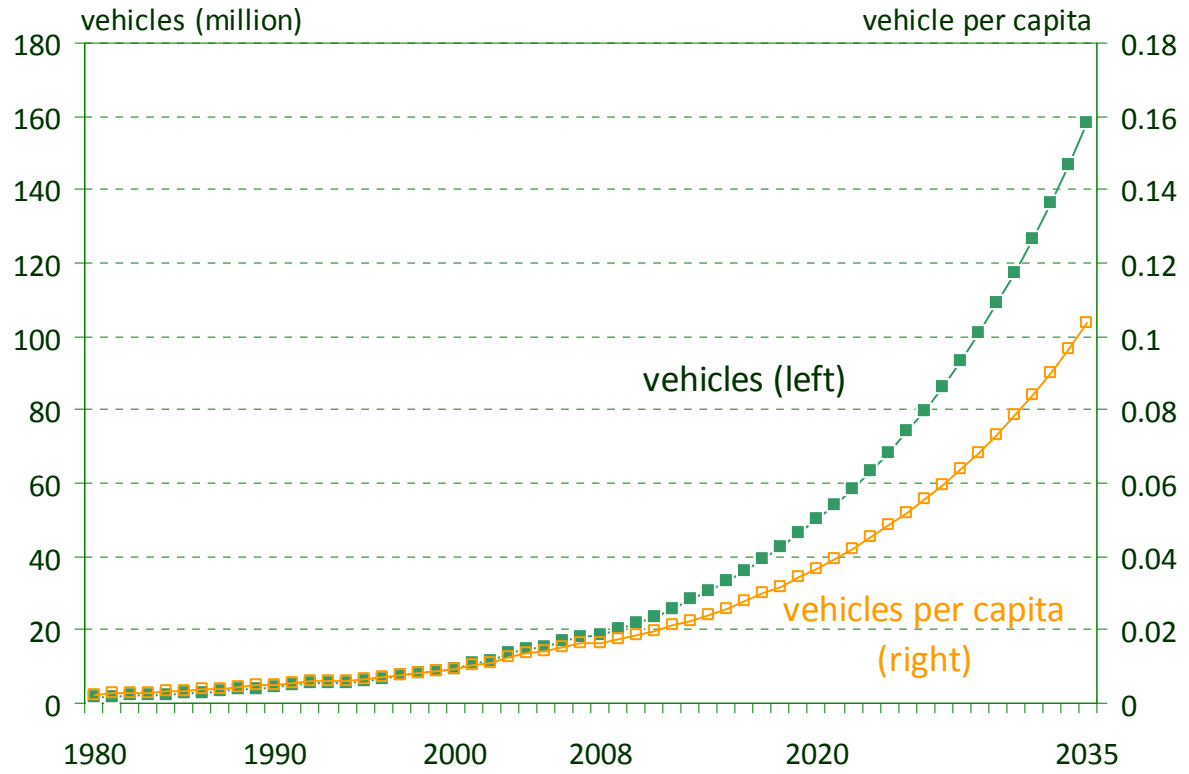
India



- Electricity generation in India will grow from 830 TWh in 2008 to 4,602TWh in 2035 (5.5-fold increase).
- 6.7% growth rate from 2008 to 2035.

Vehicle ownership

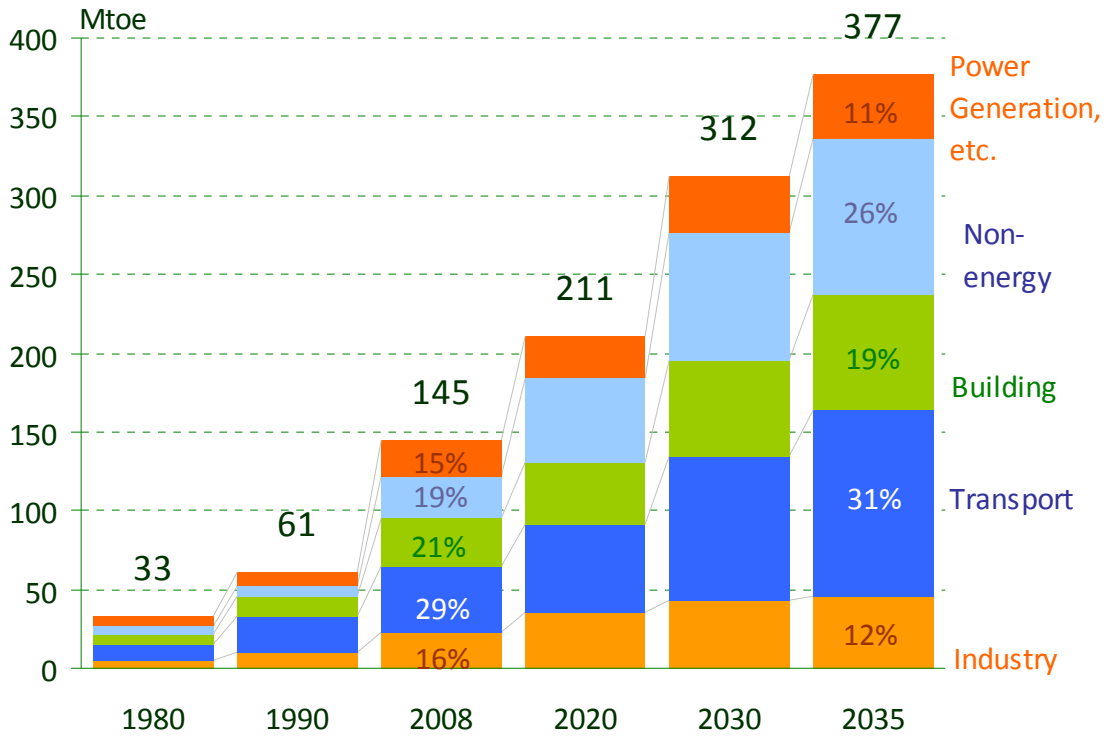
India



- Vehicle ownership in 2035 is 158 million.

Oil consumption

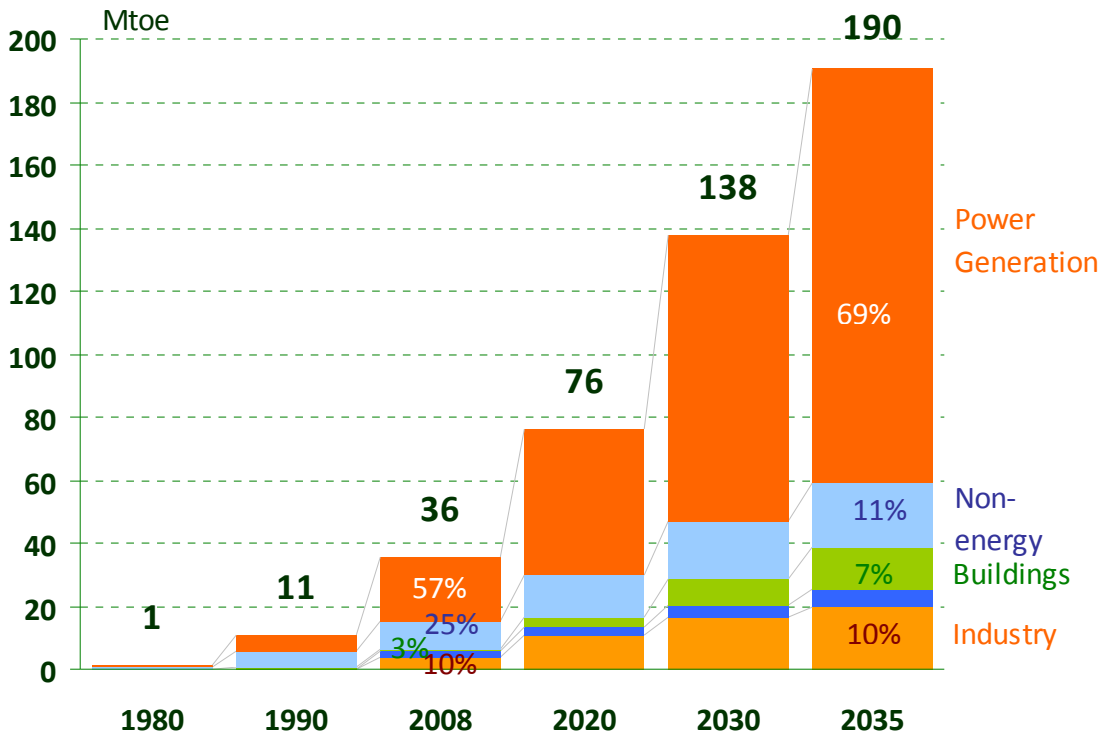
India



■ Oil consumption will grow from 145 Mtoe to 377 Mtoe (2.6-fold increase).

Gas consumption

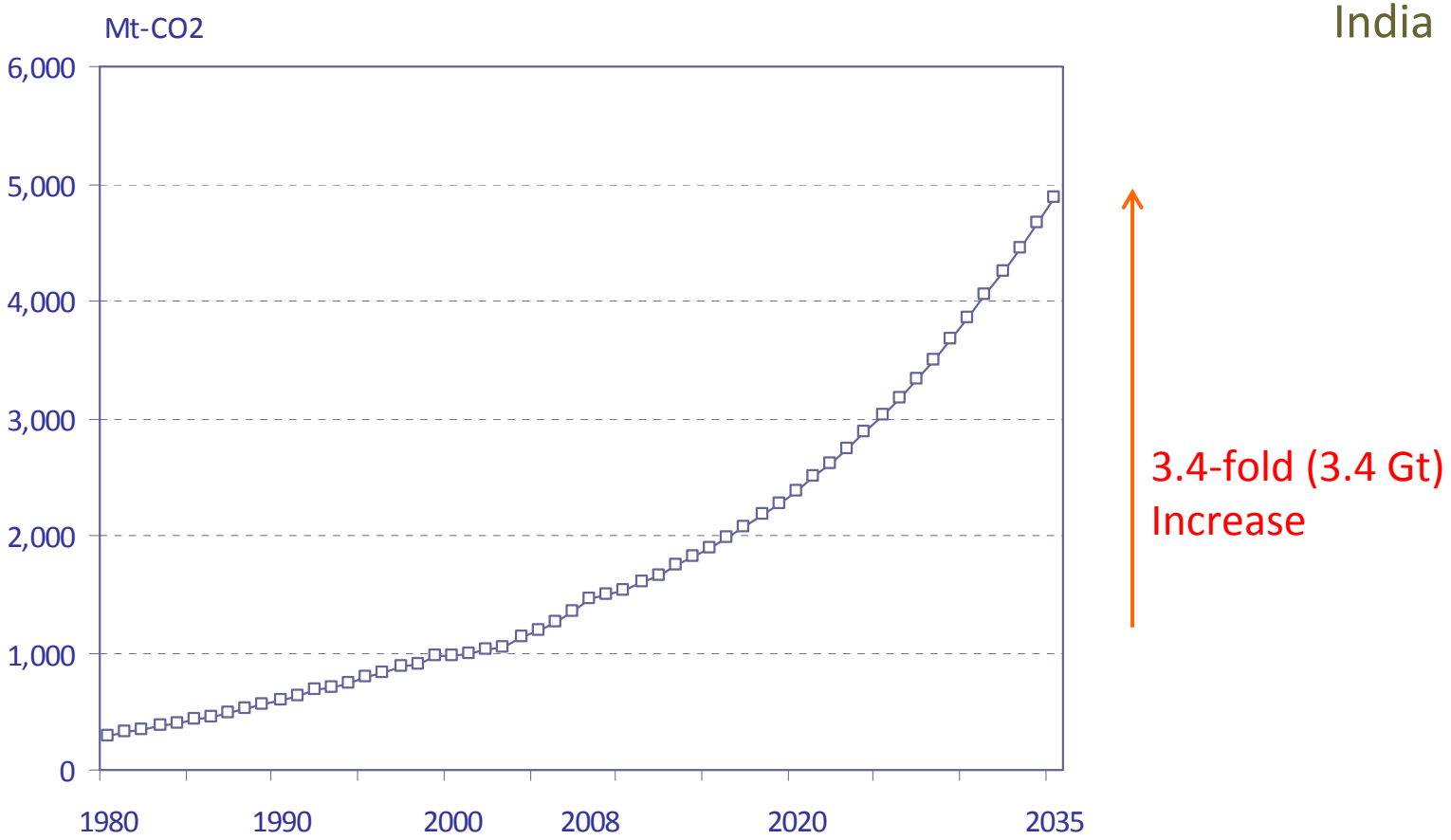
India



- Natural gas demand will increase from 40 bcm in 2008 to 212 bcm in 2035 (5.3-fold increase).
- Most of the demand growth will come from the power sector.

CO_2 emission

India



- CO_2 emission will exhibit a 3.4-fold increase.

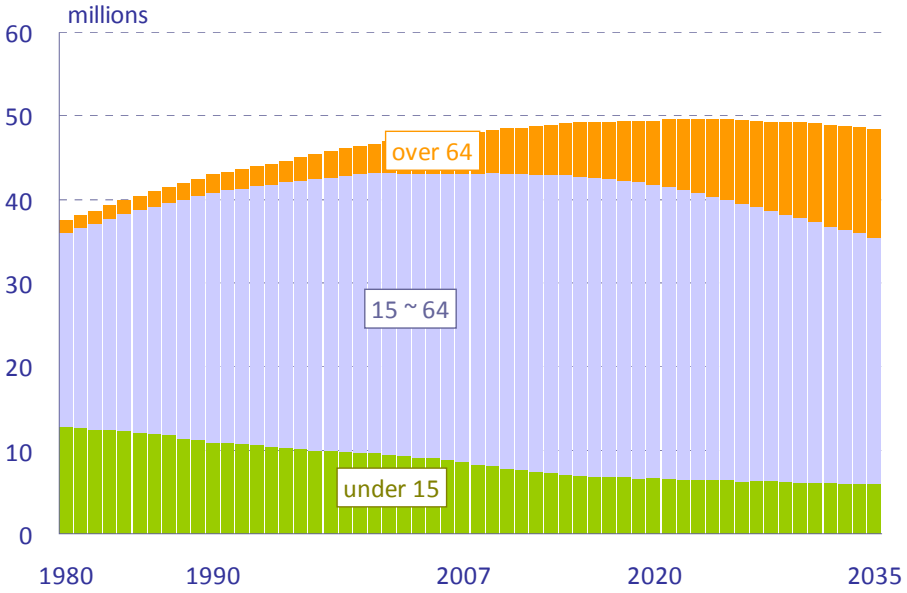
V. Energy Outlook for South Korea

(BAU Scenario)

Assumption : Population and GDP Growth

South Korea

Population



GDP growth rate

2011～2015	4.2%
2016～2020	3.5%
2021～2030	3.0%
2031～2035	2.5%

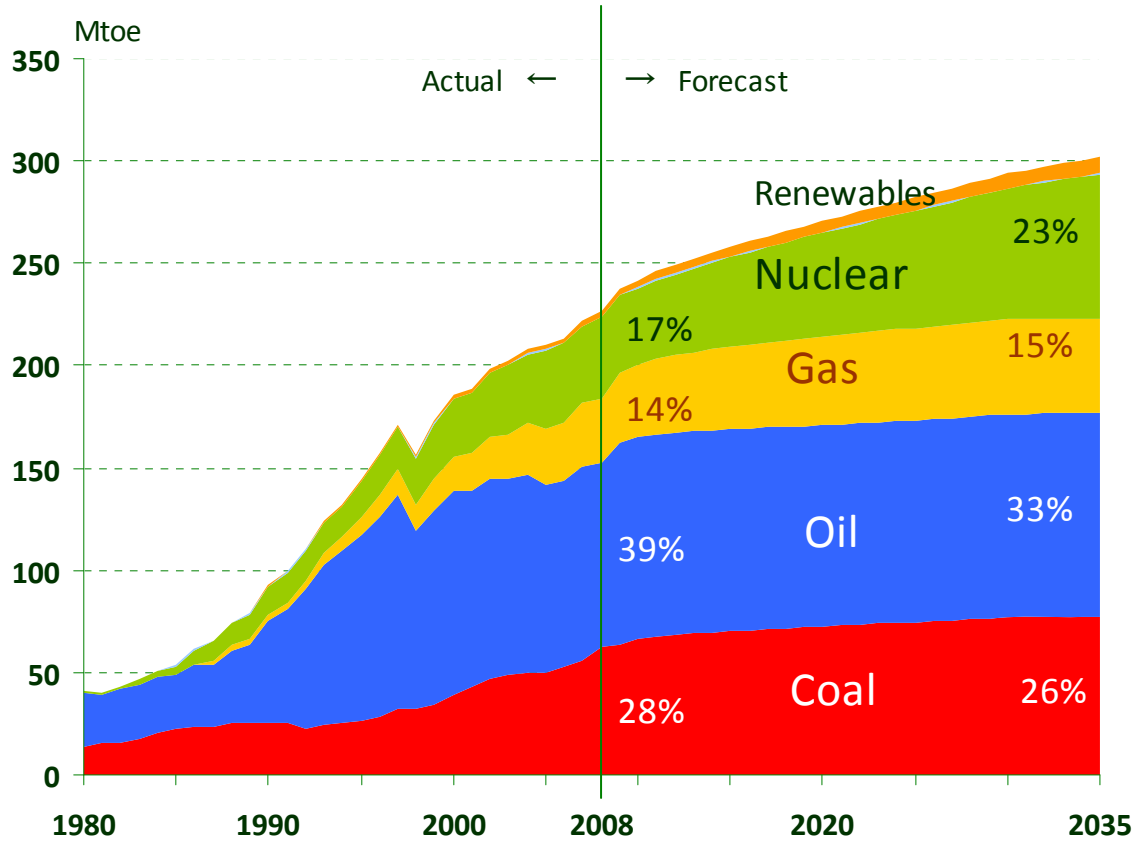
2008-2035
3.2%

■ The Population of South Korea will peak at 50 million around 2020. The share of older people (above 65) will reach 25% in 2035.

■ South Korea’s economy will grow at 3.2% from 2008 to 2035.

Primary energy demand

South Korea

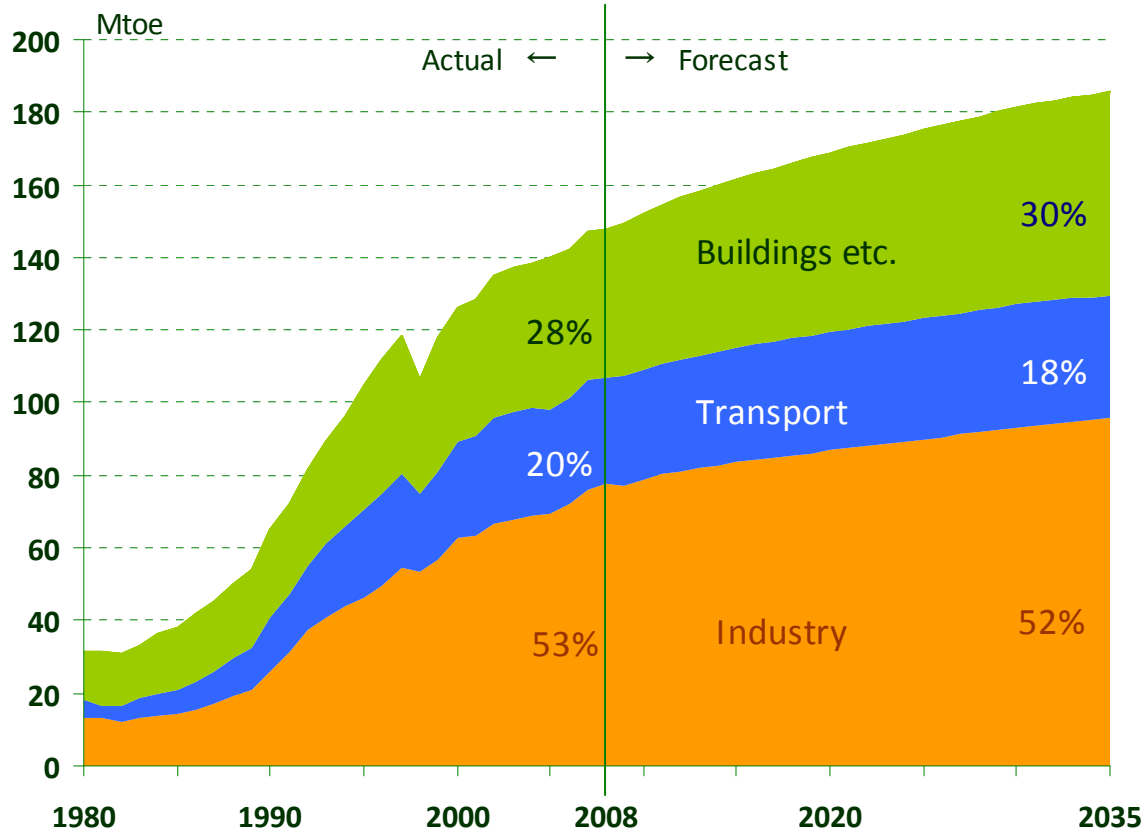


■ Total primary energy demand in South Korea will grow from 227 Mtoe in 2008 to 302 Mtoe in 2035 (33% increase).

■ The shares of oil and coal will decrease. Nuclear and natural gas will account for most of the energy supply increase.

Final energy consumption

South Korea

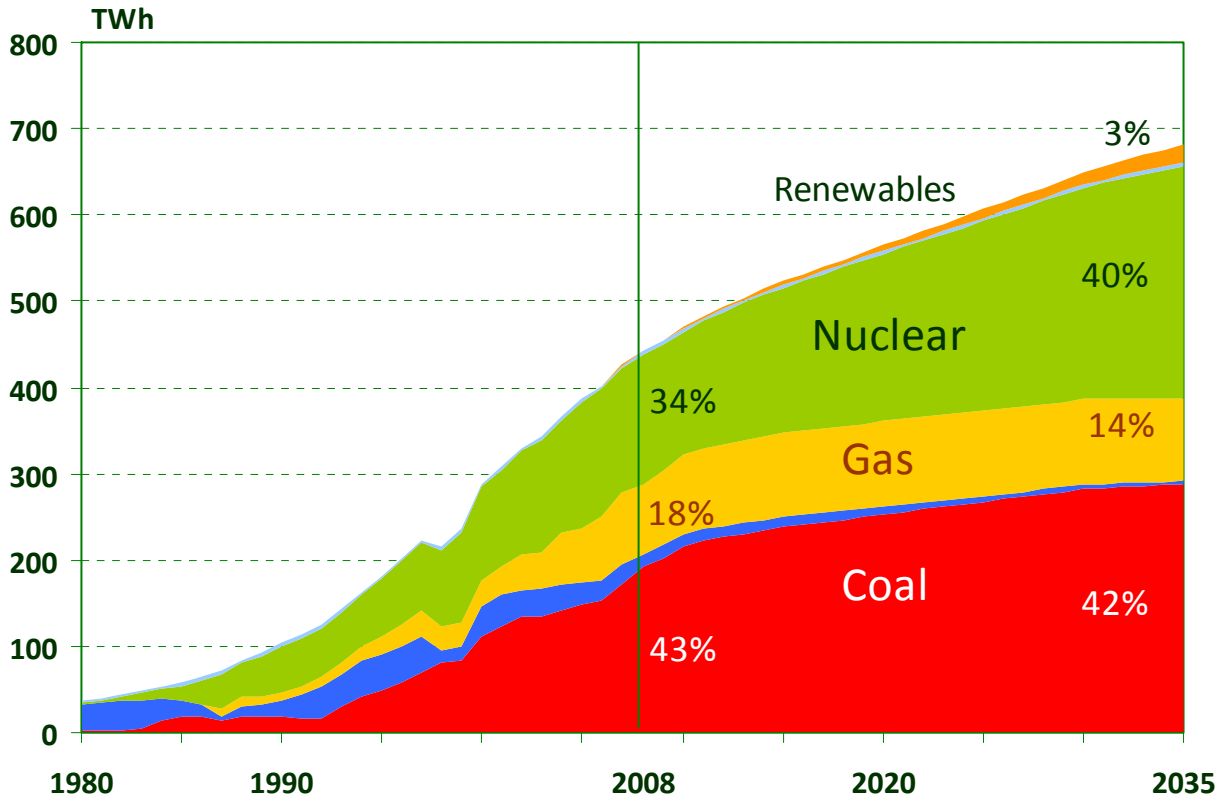


■ Final energy consumption will grow from 148 Mtoe to 186 Mtoe (25% increase).

■ The share of buildings sector (residential and commercial sector) will rise towards 2035.

Electricity generation mix

South Korea

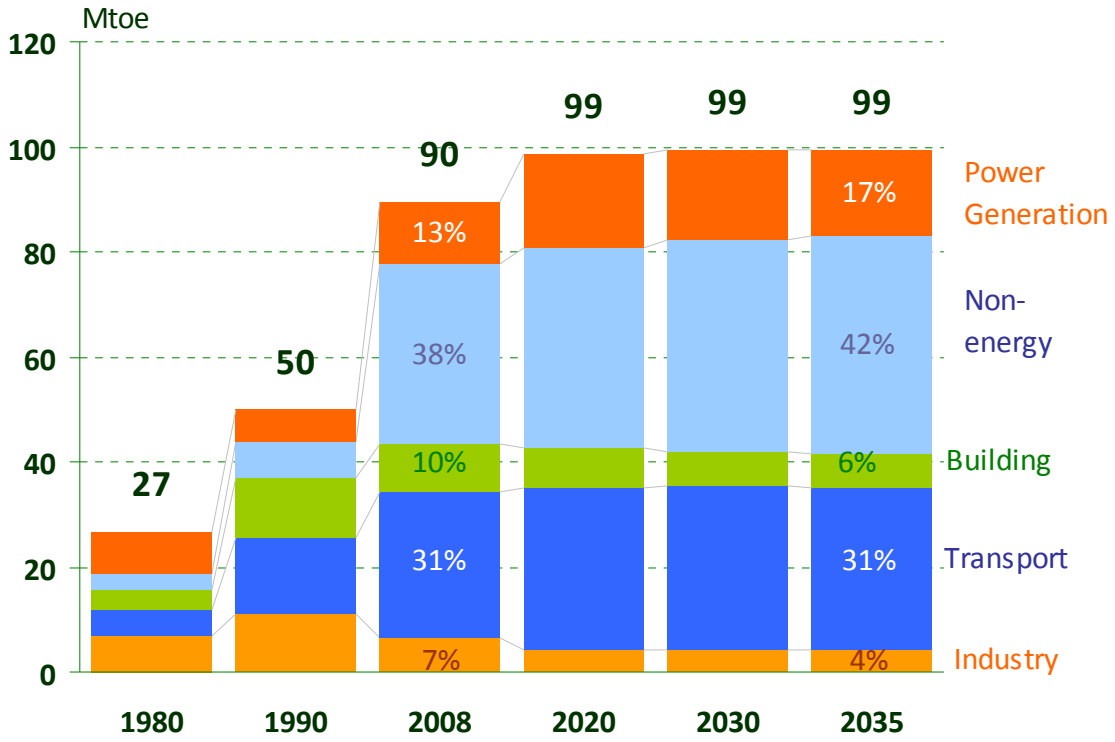


■ Electricity generation in South Korea will grow from 444 TWh in 2008 to 682 TWh in 2035 (54% increase).

■ The share of nuclear will rise to 40% by 2035, while renewable energy including hydro accounts for only 4% of total power generation.

Oil consumption

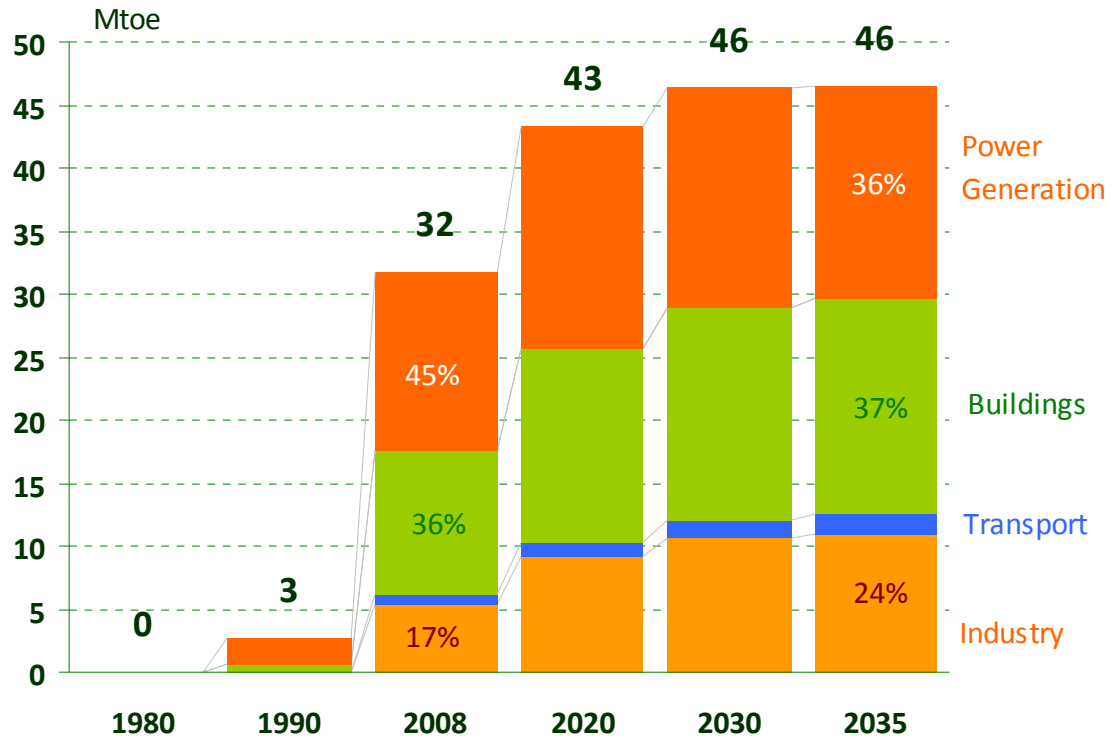
South Korea



■ Oil consumption in Korea has not been increased after 2000, and will remain almost flat at 2 million b/d until 2035.

Gas consumption

South Korea

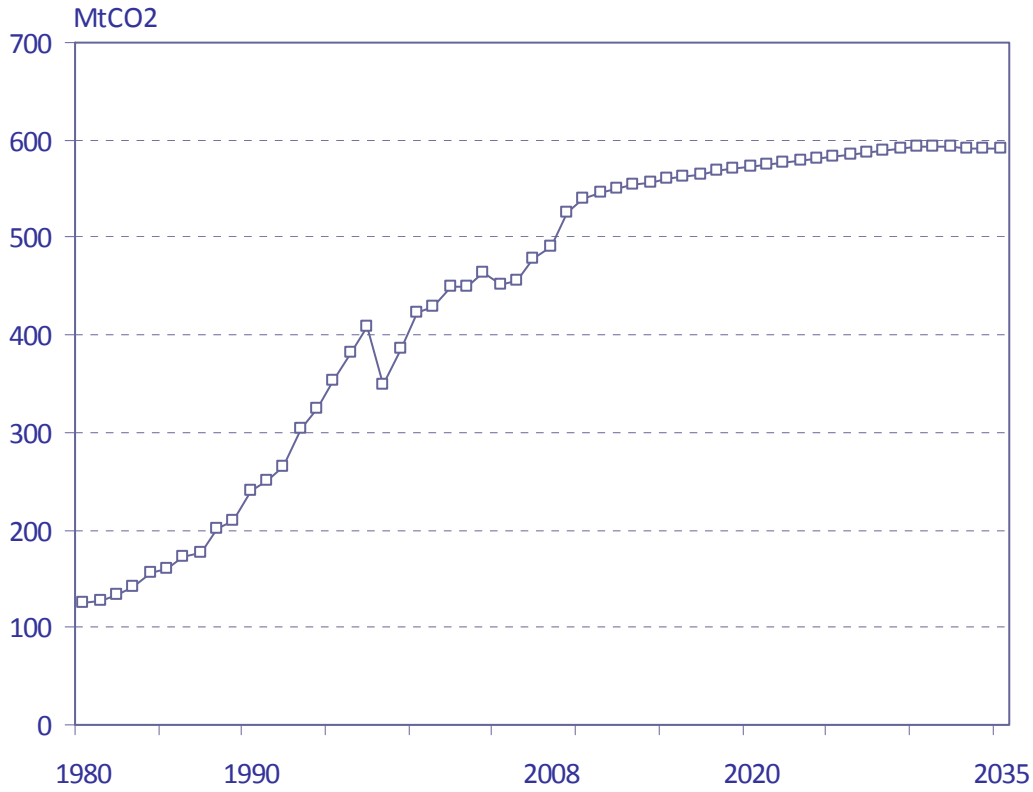


■ Natural gas demand will increase from 35 bcm in 2008 to 52 bcm in 2035 (46% increase).

■ Industry and buildings sectors will account for the most part of the increase.

CO_2 emission

South Korea



20% (100 Mt) Increase

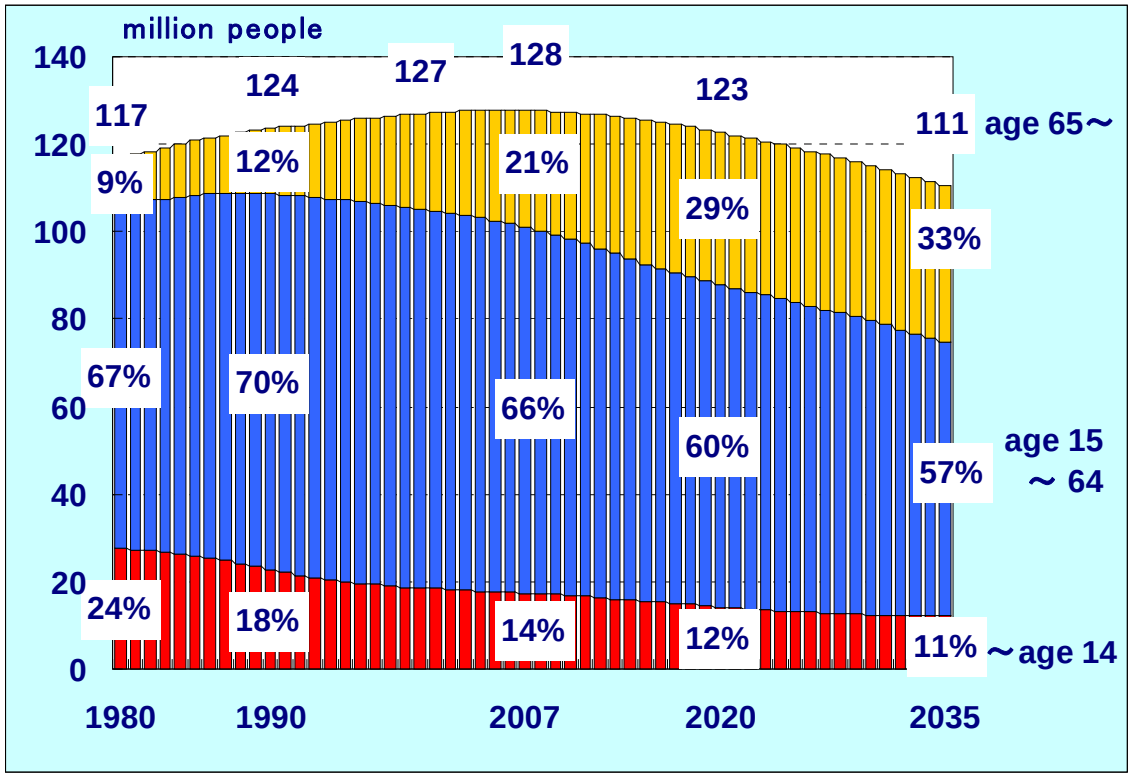
- CO_2 emission will grow by 20% from 2008 to 2035.

VI. Energy Outlook for Japan

(BAU Scenario)

Assumptions : Population

Japan



Average Growth Rate (%)	2007-2035
Total	-0.5
Over 65	1.1

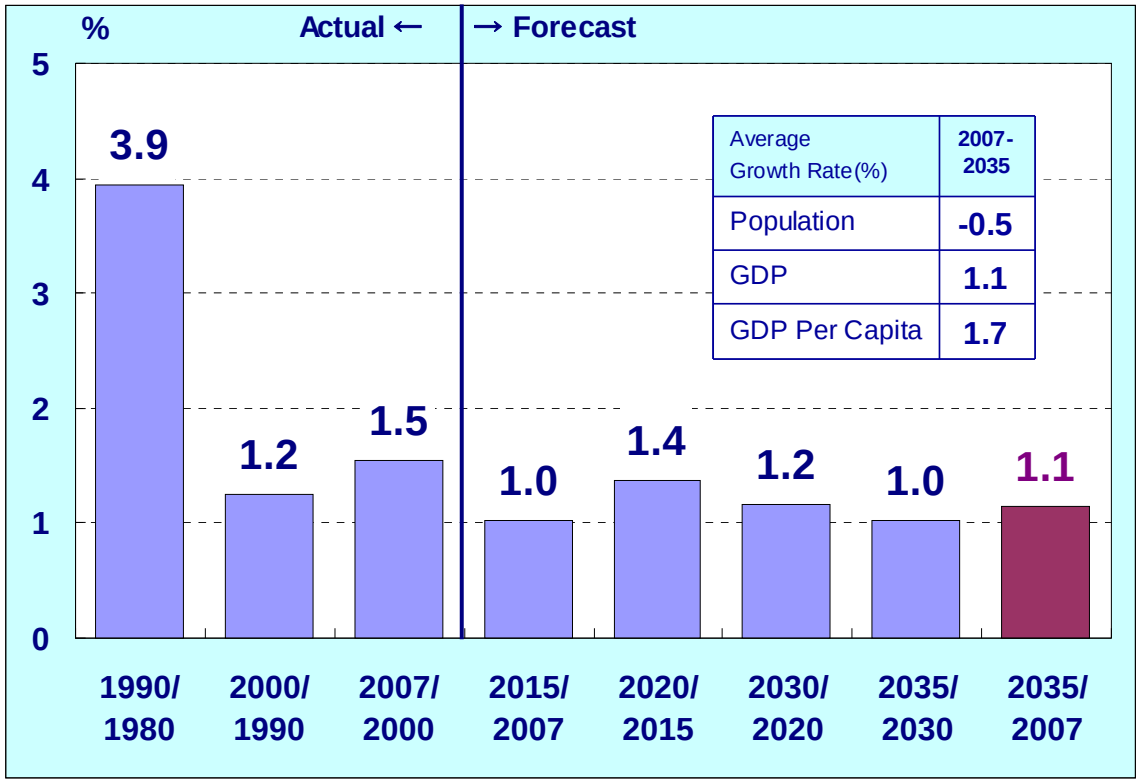
Total Population(Million)

2007
128
↓
2035
111

■ Japan's total population will show downward trend to 2035, while rapid population aging is projected combined with declining birthrate.

Assumptions : GDP growth

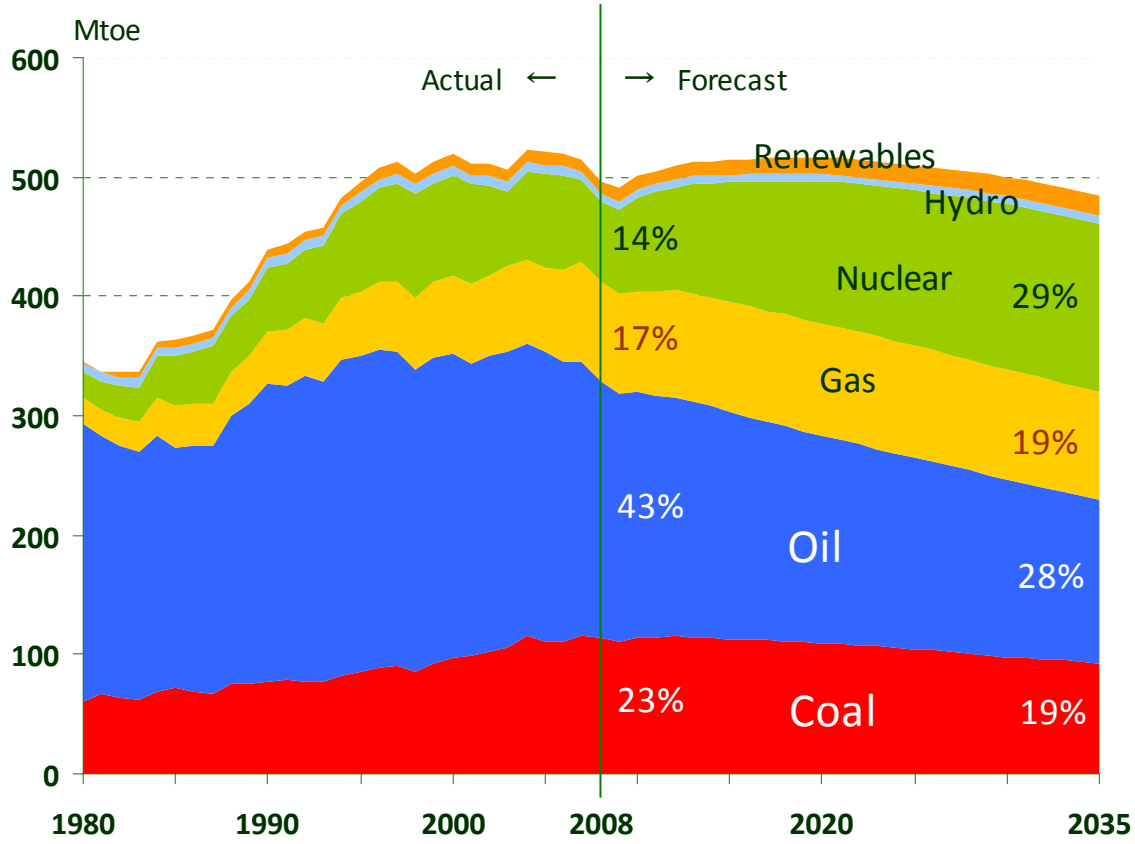
Japan



■ Reflecting on the decline of workforce population, future annual GDP growth rate in Japan is only sluggish around 1%, though technological advancement and productivity growth are expected.

Primary energy demand

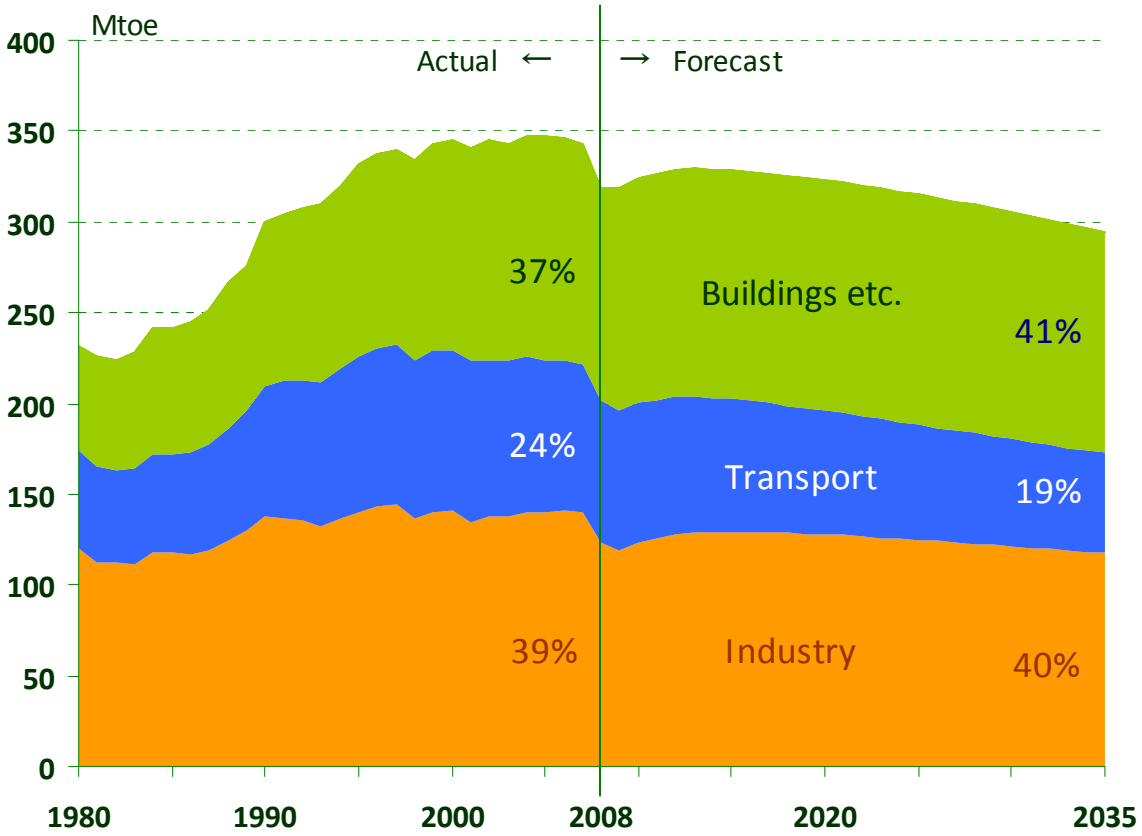
Japan



■ Oil demand will continue to decrease due to, for instance, the significant deployment of highly efficient vehicle, while nuclear and natural gas will expand its share to 2035.

Final energy consumption

Japan

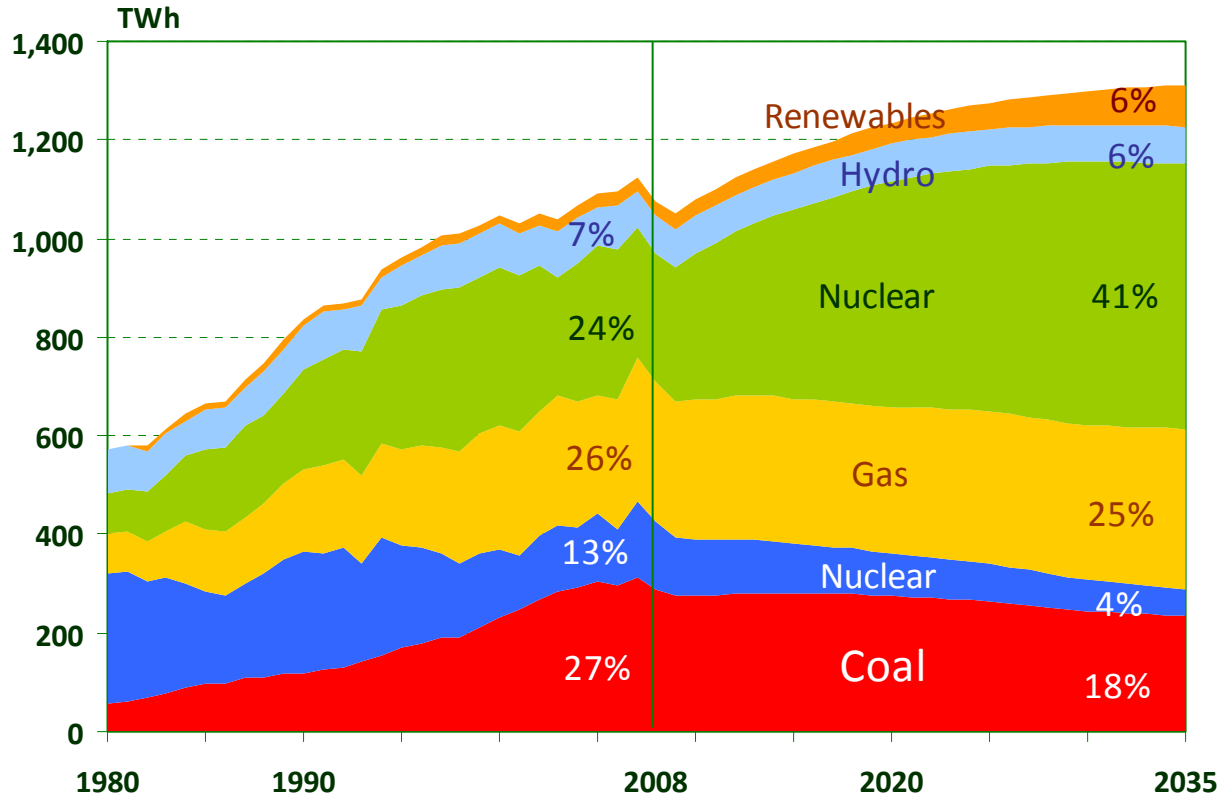


■ Final energy demand will decrease reflecting on population decline, the promotion of energy efficiency and saturated economic growth.

■Energy consumption in the Commercial and Residential sector will increase in this scenario.

Electricity generation mix

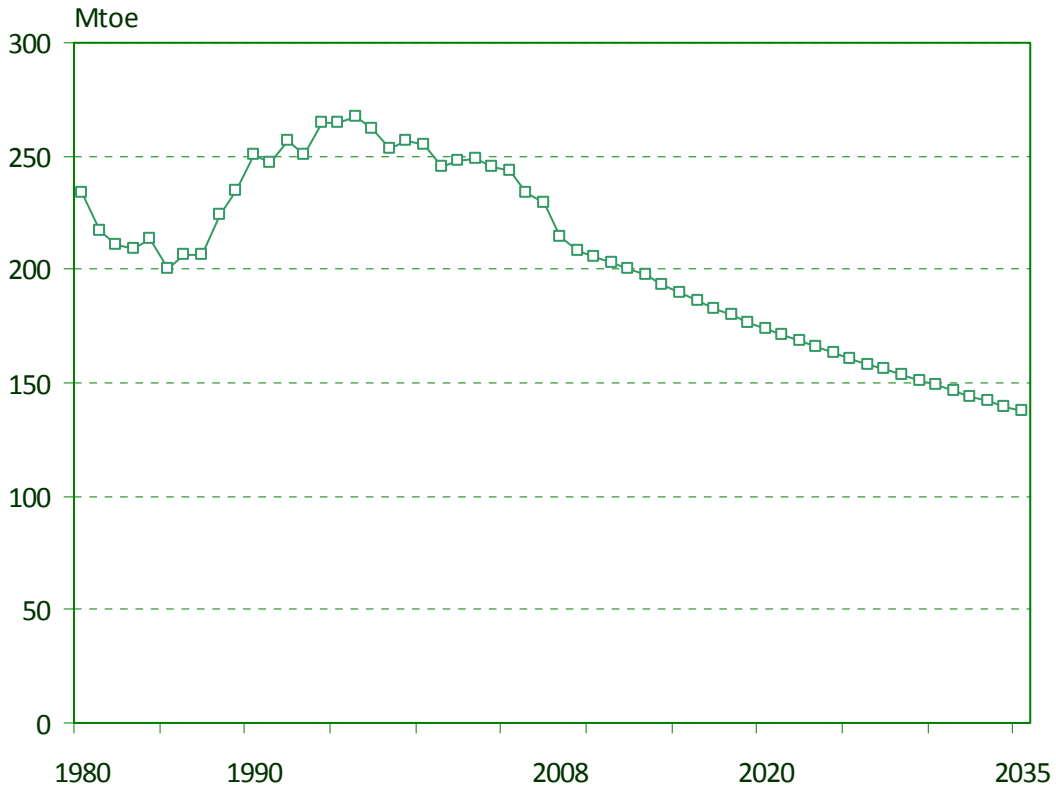
Japan



■ Nine unit of nuclear power plants will be additionally built to 2035, and non-fossil power generation will constitute nearly half of the power generation mix.

Oil consumption

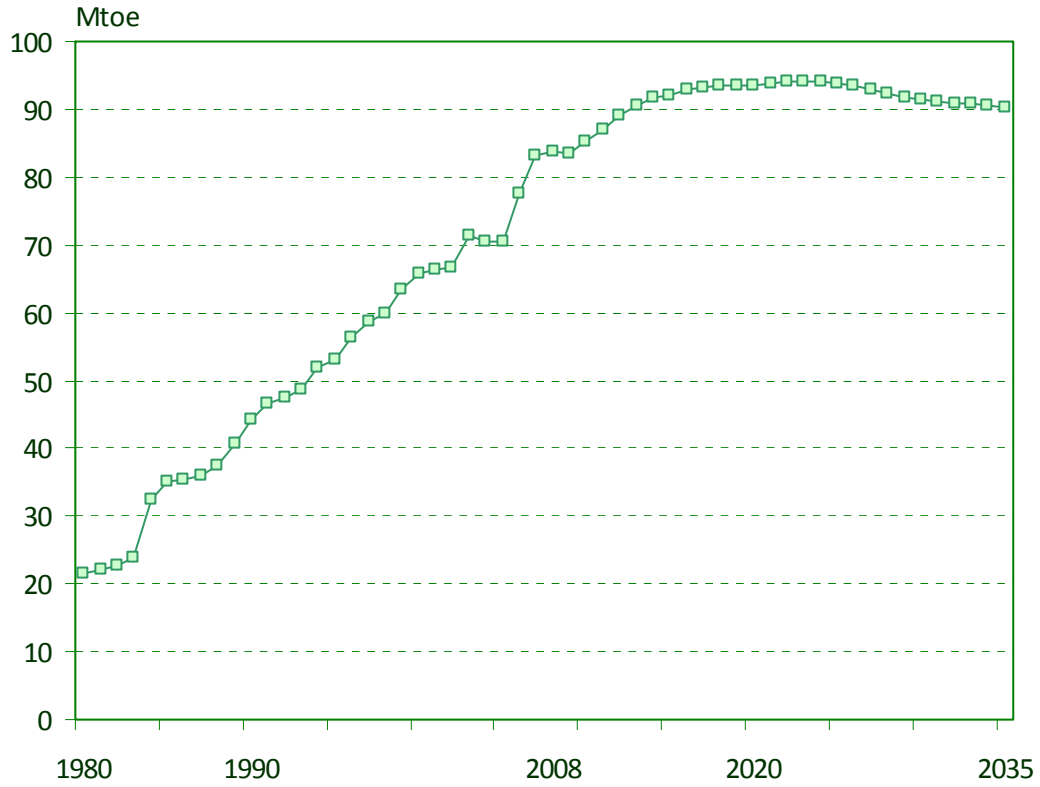
Japan



- Oil consumption will decrease in the future even in the BAU Scenario.
- 214 Mtoe(2008) to 138 Mtoe(2035) – 36% decrease from 2008-2035.

Natural gas consumption

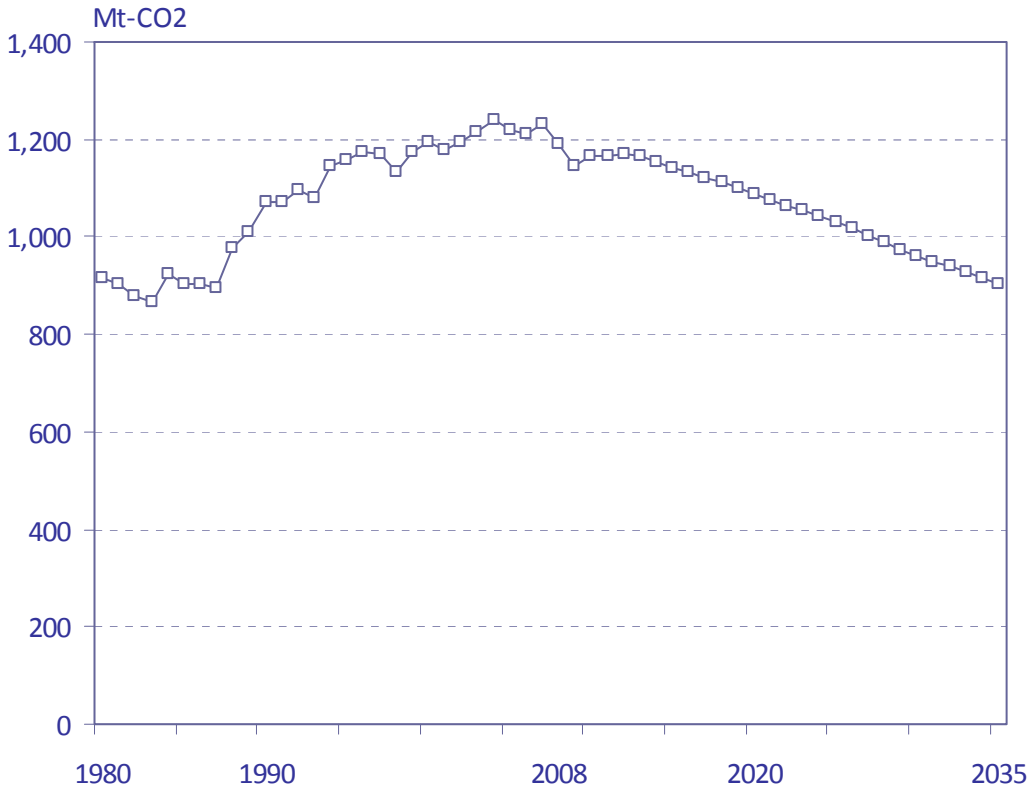
Japan



■ Natural gas consumption will peak around 2020 and then slightly decrease towards 2035.

CO_2 emission

Japan



- CO_2 emission will gradually decrease towards 2035.
- Emission in 2020 will be about the same level as 1990.

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