

Challenges for Energy Policy in Japan after the Great Earthquake

Saving Electricity in a Hurry WS

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Outline

- 1. Short term challenges of energy policy after Great East Japan Earthquake and Fukushima Nuclear Incident**
 - Temporary shortage of fossil fuel and resolution
 - Shortage of electricity supply and the effort of electricity saving (summer 2011)
 - Power generation mix and fossil fuel consumption

- 2. Mid-long term challenges of energy policy in Japan brought about by Fukushima Accident**
 - review and restructure Basic Energy Plan

- 3. Next Step for Japan**
 - Policy Reforms

1. Short term challenges of energy policy in Japan after Great East Japan earthquake and Fukushima Nuclear Incident

Fuel Shortage after March 11 and Resolution

【Oil】

- Localized shortage of petroleum products supply
 - Shut down of crude oil processing facilities (1400kB/D, 31% of Japan Total)
 - Damage to transport routes, storage facilities, gas stations
- Supply strengthen and shortage dissolution
 - Temporary reduction of compulsory oil stock piling quota (70days→67days→45days)
 - Recovery of crude oil processing facilities, improvement in operating ratio
 - Restrain export, Increase import, grant aid from China(20kt oil)...
 - Recovery of Transport routes and Supply systems

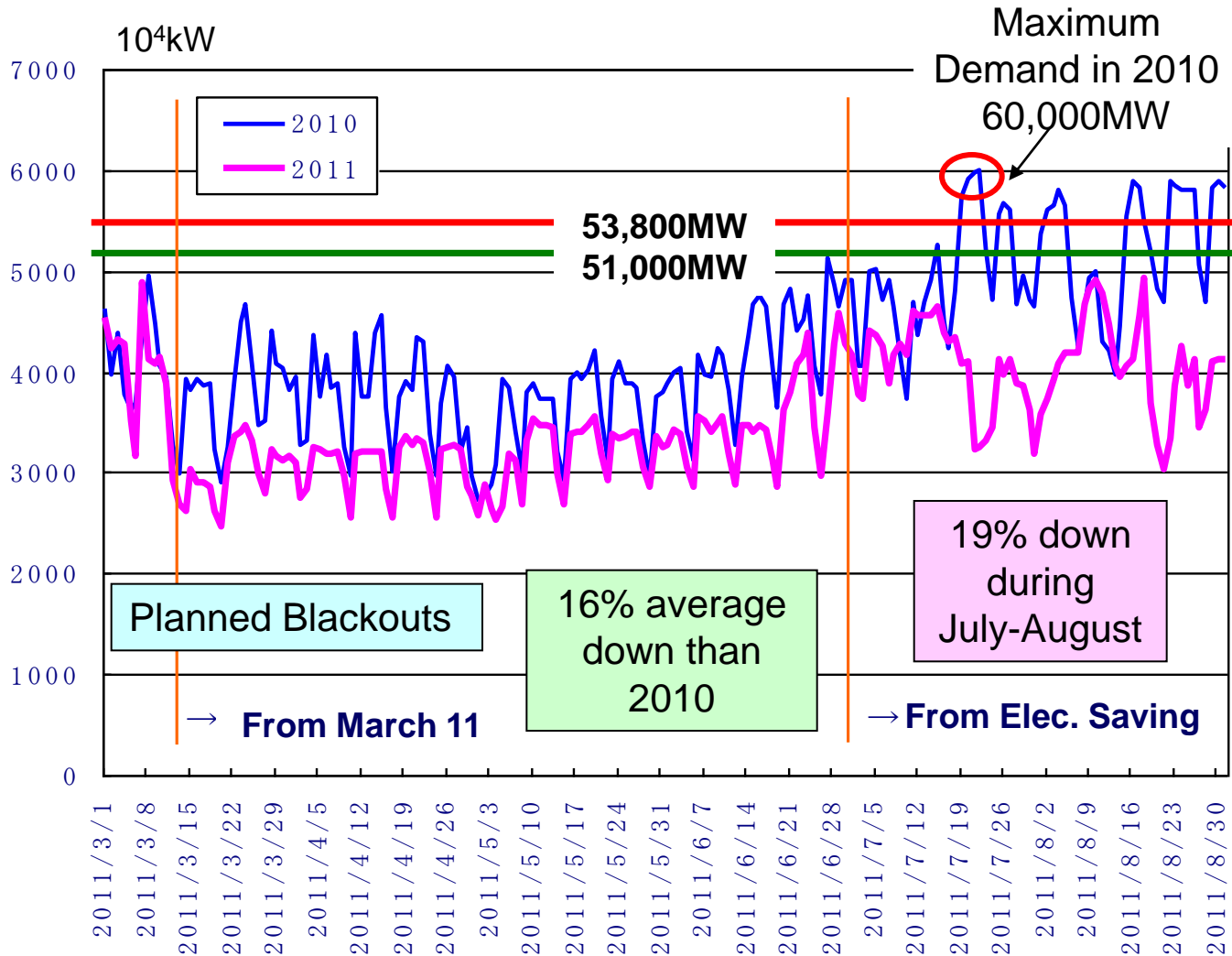
【Gas】

- Town gas supply stopped in devastated areas
 - Town gas supply for 460,000 users stopped
 - Shut down of LNG receiving terminal
- Recovery of Town gas supply
 - Additional LNG procurement, additional supply from producers: UAE, Qatar, Russia...
 - Recovery of gas supply systems (99% at the end of April)

Meanwhile, demand of LNG and oil for power generation rose, due to shut down of nuclear and coal-fired thermal power plants

Shortage of power supply after March 11

◆ Power demand at 14:00 (TEPCO's service area)



Target 15% cut

Maximum Demand in 2010 : 60,000MW

Prospect of Supply Capability : 53,800MW

Necessary reduction ratio of Demand : 10.3%

Source) Made by IEEJ with Tokyo Electric Power Company (TEPCO) briefing paper data

Summer Electricity Saving Effort by Sector

Achievements by different sectors:

- Households: almost achieved the target, partly because of less hot summer
- Small customers: higher than target, potential for power saving like to reduce lamp
- Large customers: higher than target, effect of restriction of electricity use by law
(300 law violator within 19,000 Large customers)

◆ Power demand compared to 2010 (TEPCO's service area)

kW	TEPCO※1	National Policy Unit※2
Households	▲6%	▲11%
Small customers	▲19%	▲19%
Large customers	▲29%	▲27%
Total	▲18%	▲19%

Source) TEPCO. National Policy Unit. Partly estimated by IEEJ

※1: Comparison between 2010/7/23 and 2011/8/18

※2: Comparison between elected days, in which the temperature is comparable.9:00-20:00

◆ Electricity volume compared to 2010 (TEPCO)

kWh	July-August
Households (lighting)	▲12.4%
Small customers	▲17.1%
Large customers	▲11.4%
Total	▲14.0%

【Government's actions】

■ Various deregulations

- Exemption of Environmental Impact Assessment Act for thermal power plant expansion
- Approve the delay of periodic inspection of thermal power plants

■ Promotion of private and distributed electric power generation

- Encourage private generators to sell electricity, support for installation and fuel cost

【Electricity companies' actions】

■ Restore damaged thermal power plants

■ Restart long-idled thermal power plants

■ Install new emergency power generator (gas turbine etc.)

■ Increase power transfer among interconnected regions

Increase in gas and oil fired power

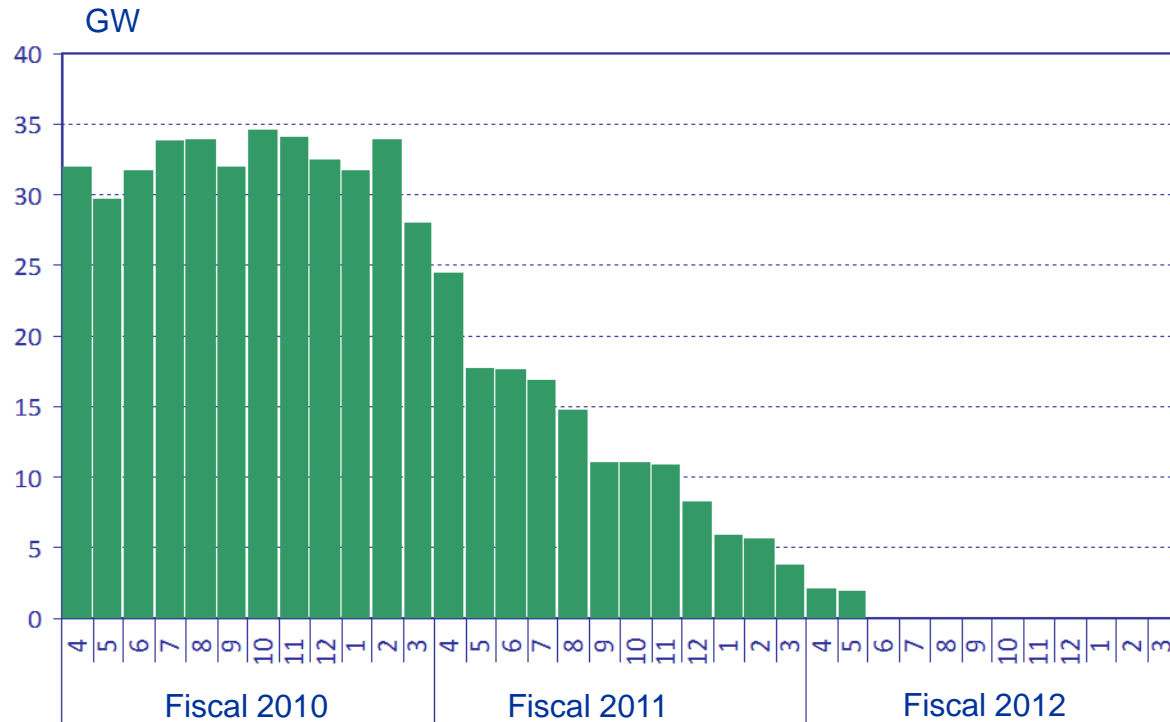
■ Nuclear plant: incident-affected, stop, delay of re-operation

■ Coal fired plants stop due to disaster, Coal demand decrease in 2011

■ Increase in gas, oil fired power of electricity companies and private generators

Possible Electricity shortage

◆ Outlook for the Operation of Nuclear Power Plants in Japan (worst-case scenario)



© In the worst-case scenario, supposing long delays in starting up nuclear power plants after scheduled outages, the gradual loss of generation capacity will make it difficult for the utilities to cope with peak electricity demand in the summer 2012, seriously affecting industrial activity, etc.

Possible impact on generation cost and CO₂ emission.

◆ Assuming that the presently shut-down reactors, as well as the reactors which will soon enter scheduled outages, will not resume operation . . .

(1) The supply and demand for electricity will be very tight in the summer of 2012, possibly affecting employment.

•The gross generation capacity of electric utilities in Japan will be at least 7.2% lower than the peak electricity demand. If the utilities are to maintain at least a 5% reserve capacity ratio, it will be necessary to reduce electricity consumption by as much as 12.2%.

(2) Major increase of fuel cost

* If the reduction in output is to be compensated by thermal power plants, the fuel costs including coal, LNG and petroleum, will increase from the 2010 level by 3.3 trillion yen. If this is directly charged to power consumers, the electricity price will increase by 3.6 yen/kWh. For an average household, the electricity bill will rise by 1,024 yen (18%) per month, and the rate for industrial consumers by 35%.

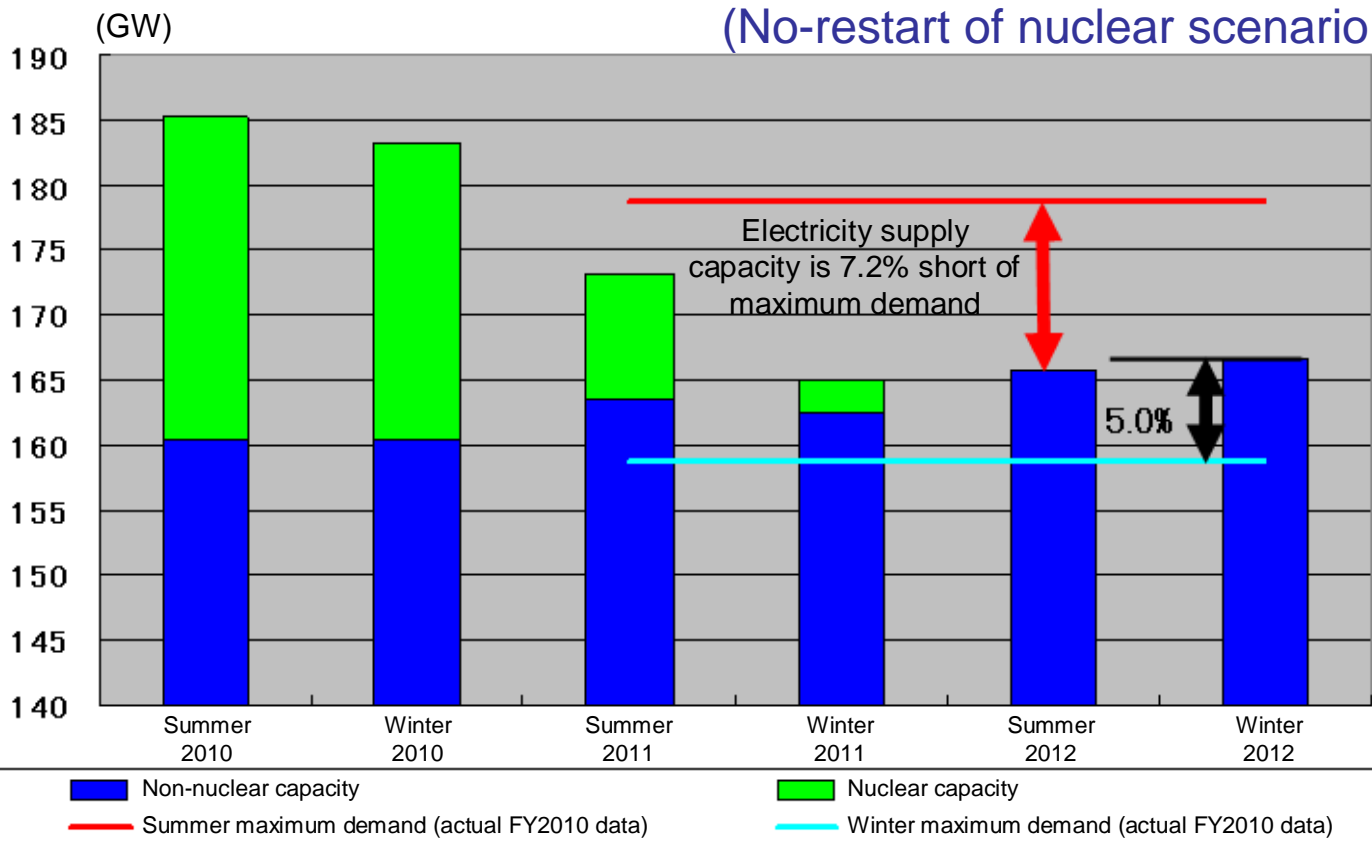
(3) Major increase of energy-derived CO₂ emissions

* The increased use of fossil fuel will cause the CO₂ emissions in 2012 to rise to 1.21 billion tons, up 14.1% from the 1990 level.

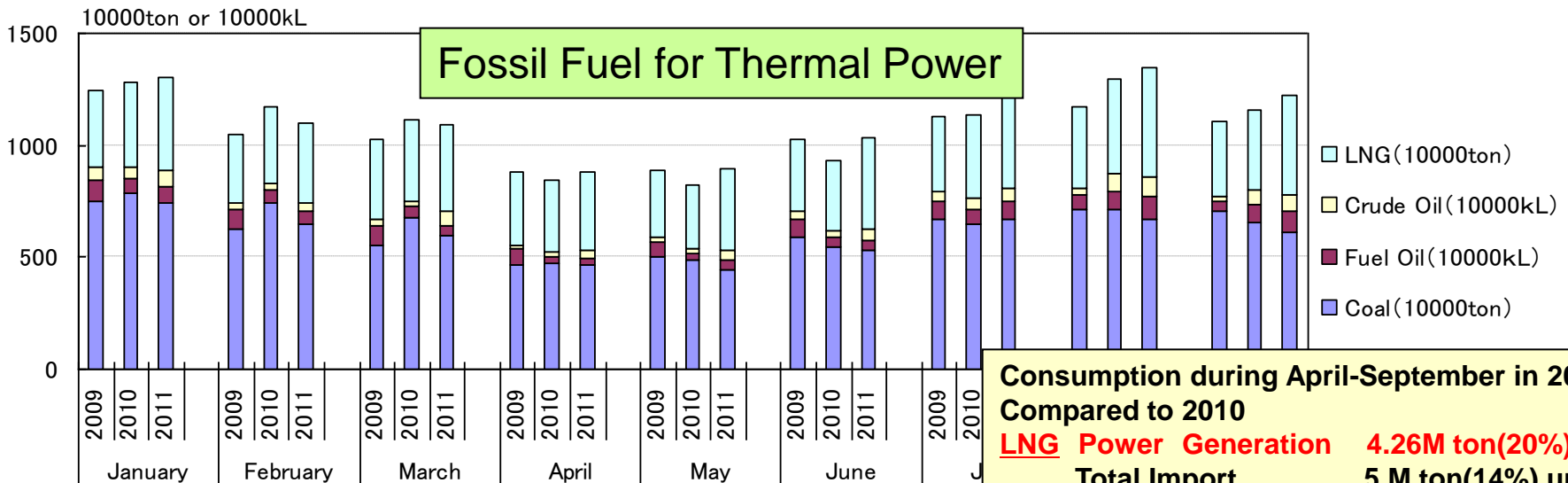
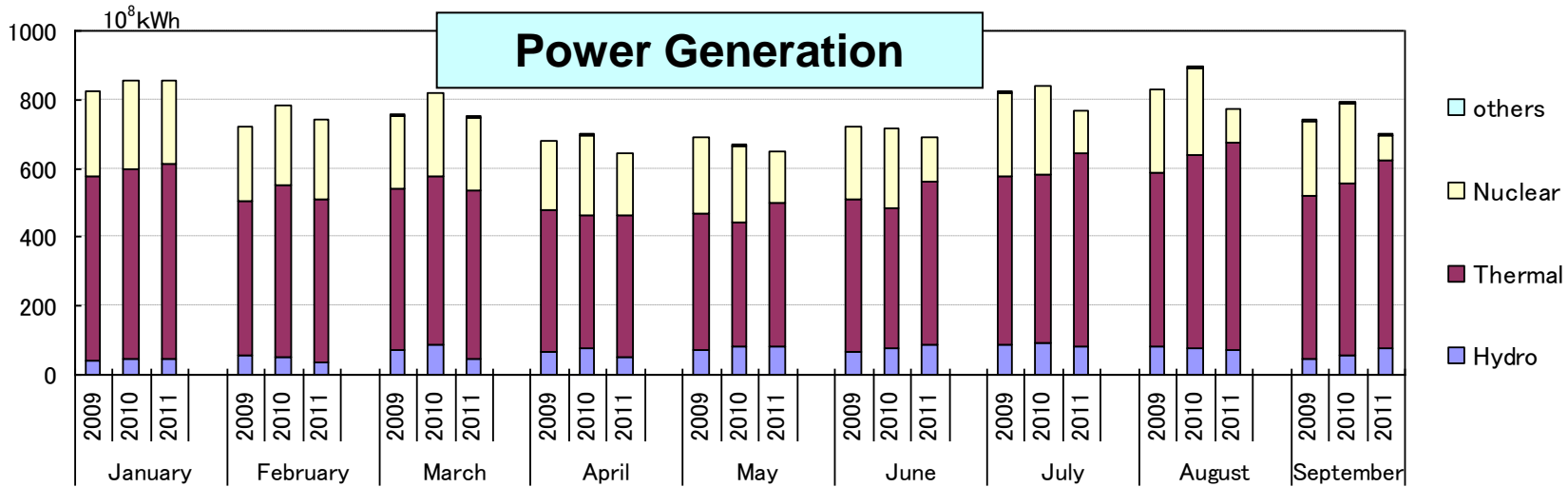
Power shortage is not over

- In case of no-restart of nuclear power plant, Japan may fall into electricity supply shortage in 2011 Winter and 2012 Summer.
- If reserve capacity(5%) is taken into consideration, 3.1% electricity saving is required in 2011 Winter, and 12.4% in 2012 Summer.

◆ Comparison of Japan's total power generation capacity and peak demand (No-restart of nuclear scenario)



Impact on Fossil Fuel for Power Generation



Consumption during April-September in 2011 Compared to 2010

LNG	Power Generation	4.26M ton(20%) up
	Total Import	5 M ton(14%) up
Oil	Power Generation	1.57M kL(27%) up
	Net Import	0.46M kL(0.5%) up

Source) Monthly Report on Electric Power Statistics

Note: Total of Electric Utilities

Impact on demand/supply balance of oil and gas

◆ Impact on worldwide demand/supply of oil and gas

■ Reducing factors

- ◇ Reduction of demand due to slowing down of economic growth, general decline in industrial activity

■ Growth factors (expected to have a larger impact)

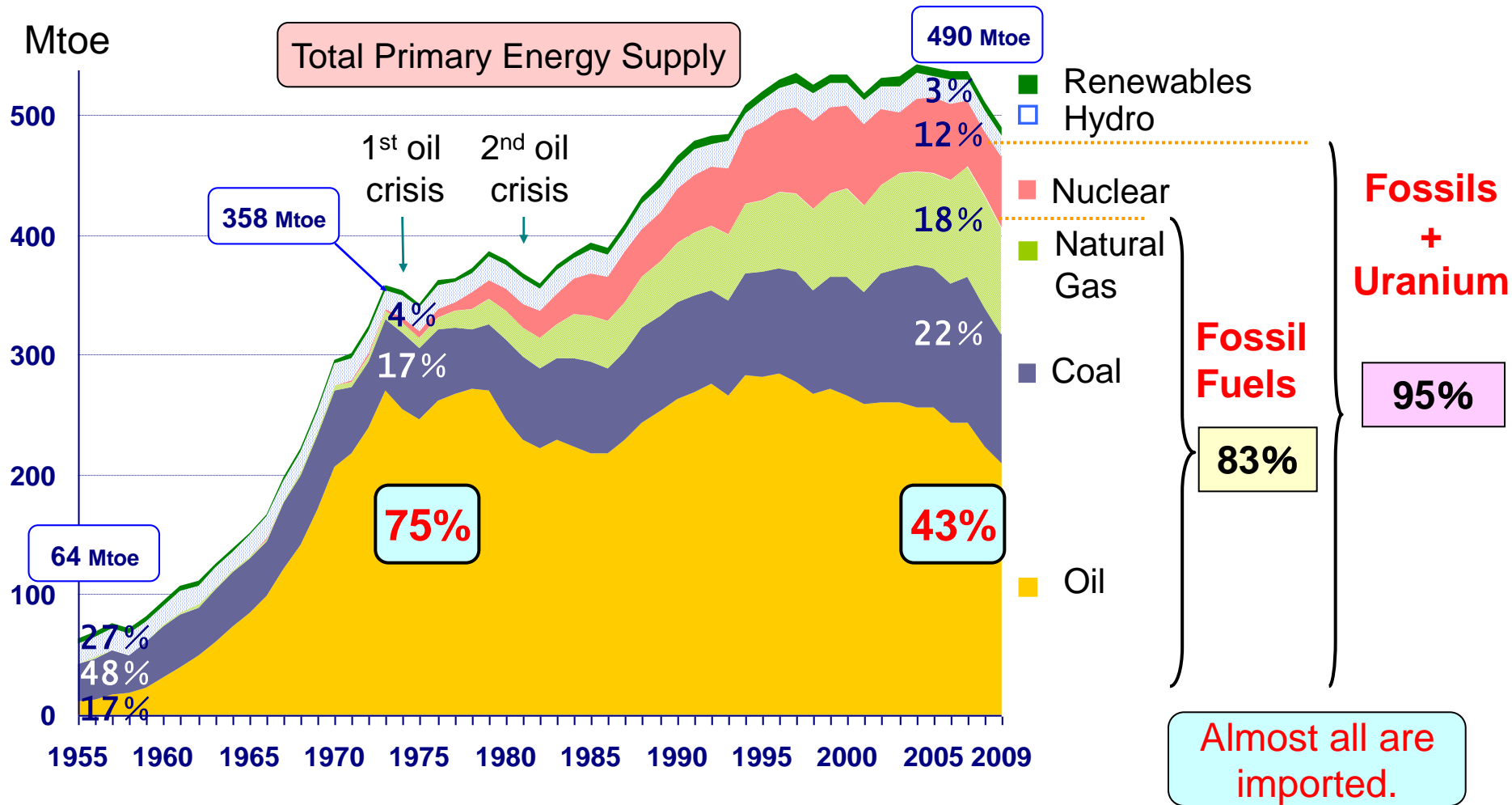
- ◇ Additional operations of oil- and gas-fired thermal power plants by TEPCO and Tohoku Electric
 - ◇ Additional demand by other electric power companies
 - Possibility of delay in restarting units after periodic inspection
 - Increase of in-house power generation
 - ◇ The increment for fiscal 2011 is given as a ratio of increase from fiscal 2010. 50-210 thousand B/D of oil and 11-15 million tons of LNG.
 - ◇ The increase for fiscal 2012 could be 5mil B/D of oil and 20 mil tons of LNG

■ Supply of both oil and LNG seems to be assured as a whole.

- ◇ Extra supply is available on international markets.
- ◇ Can use various procurement channels.
- ◇ However, there are some restraints on supply/demand (especially LNG).
- ◇ Regarding LNG, another concern is a lack in transportation capacity.

2. Mid-long term challenges of energy policy in Japan brought about by Fukushima Accident

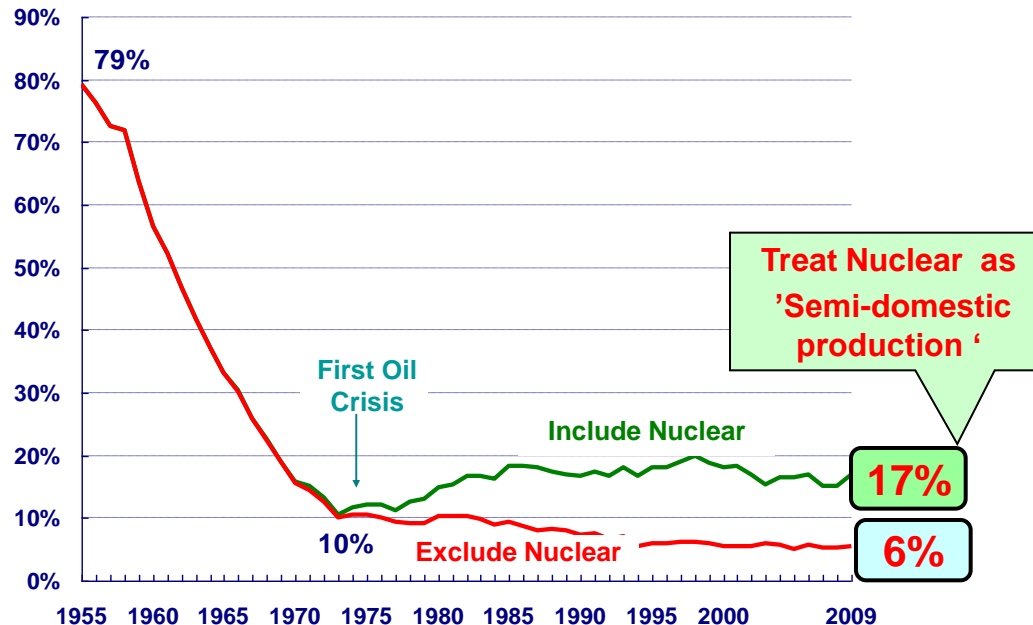
Japan's Energy Mix



Japan has promoted energy diversity since the oil crises.
But the dependency on both fossil fuel and import energy is still high.

Insufficient energy security

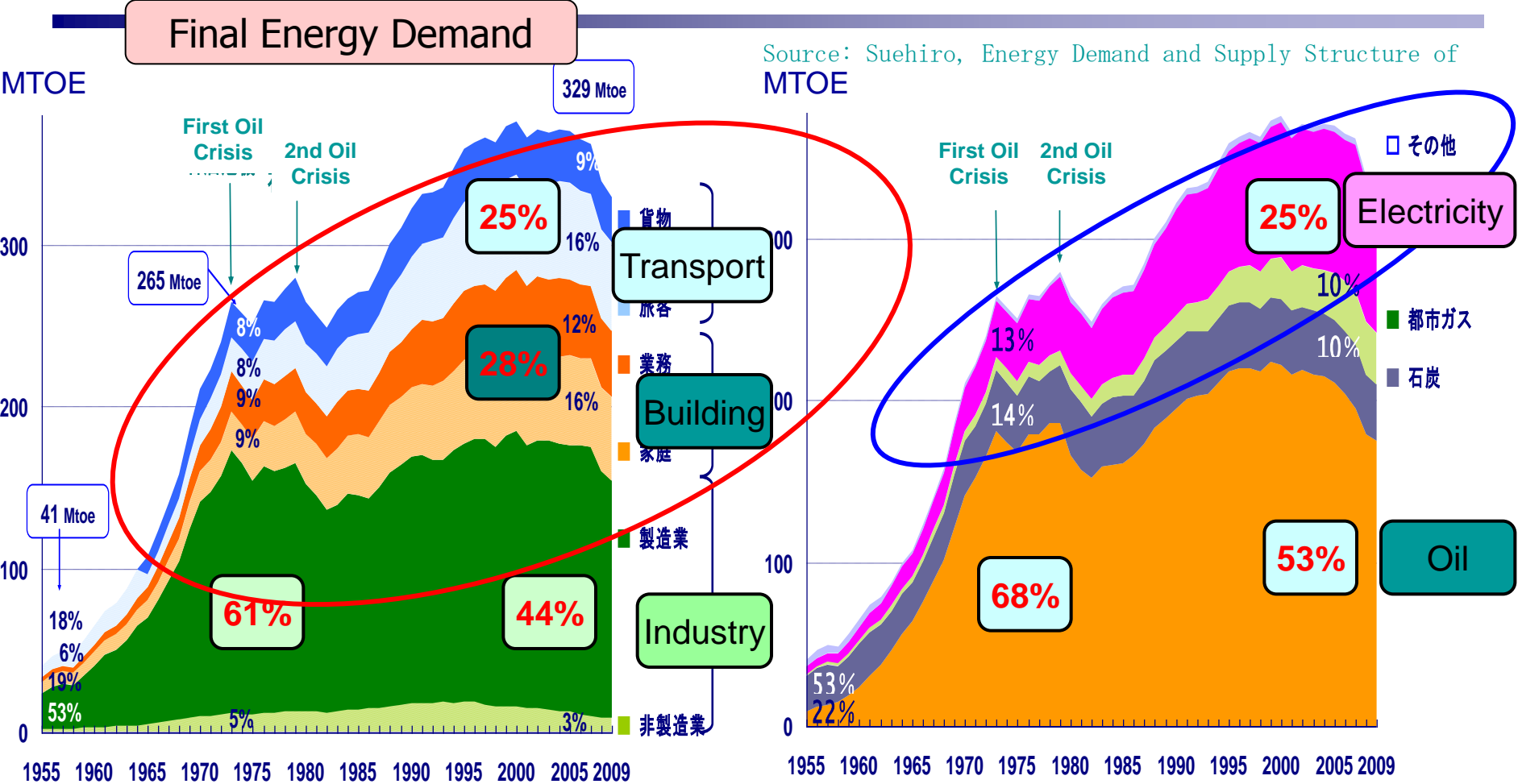
Low energy self-sufficiency



If excluding nuclear, energy self-sufficiency will be only 6%, and it will rise to 17% when taking nuclear as 'semi-domestic production'.

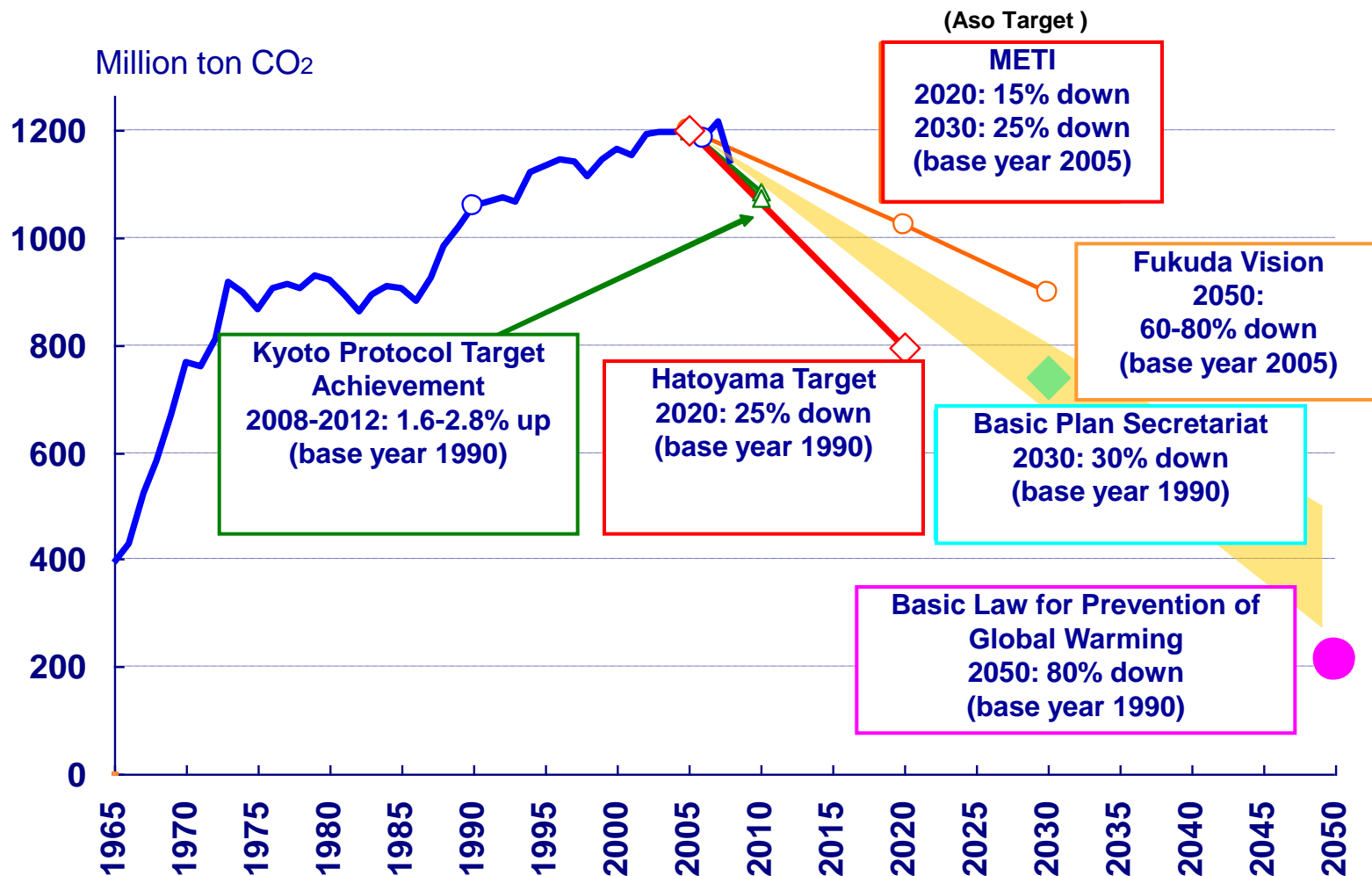
Trends: Increase in Transport & Building Sectors

Electrification of demand



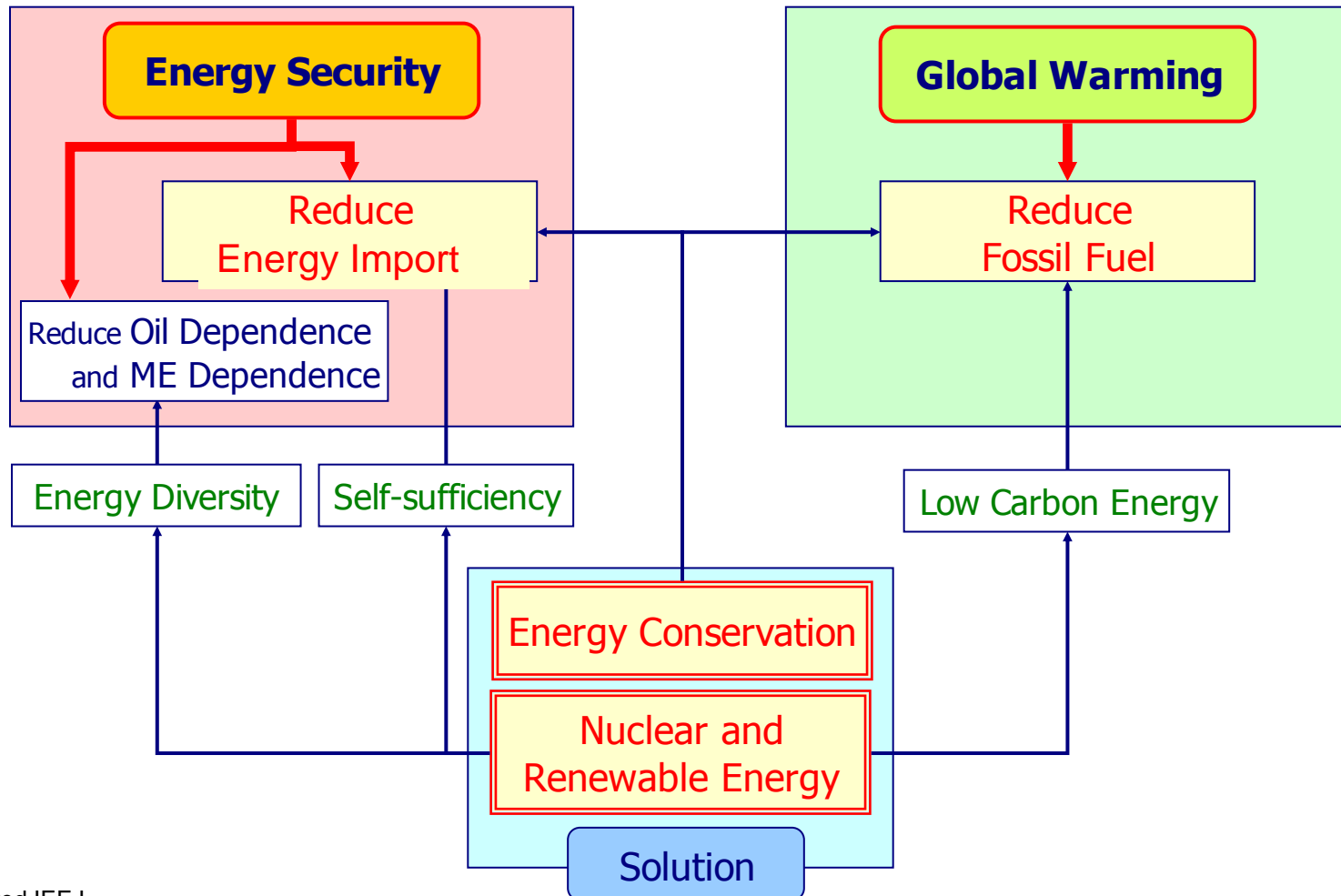
- Final energy use by industry sector has been stable since oil crises while transport and building sectors has been increasing its energy use.
- Oil demand decreased after the oil crises, but then started to increase again while electricity demand has been increasing steadily.

CO₂ Emission Reduction Targets of Japan



Targets of Japan's Energy Strategy

The main target is to secure the energy supply and mitigate GHGs. The two targets can be met at the same time by promoting energy conservation and using low carbon energies.



Basic Act on Energy Policy

(enacted in June 2002)

【Fundamental Principles】

- ① Securing of a stable supply
- ② Environmental suitability
- ③ Utilization of market mechanisms

The government must formulate a basic plan on energy supply and demand in order to promote measures on energy supply and demand on a **long-term, comprehensive and systematic** basis.

Basic Energy Plan

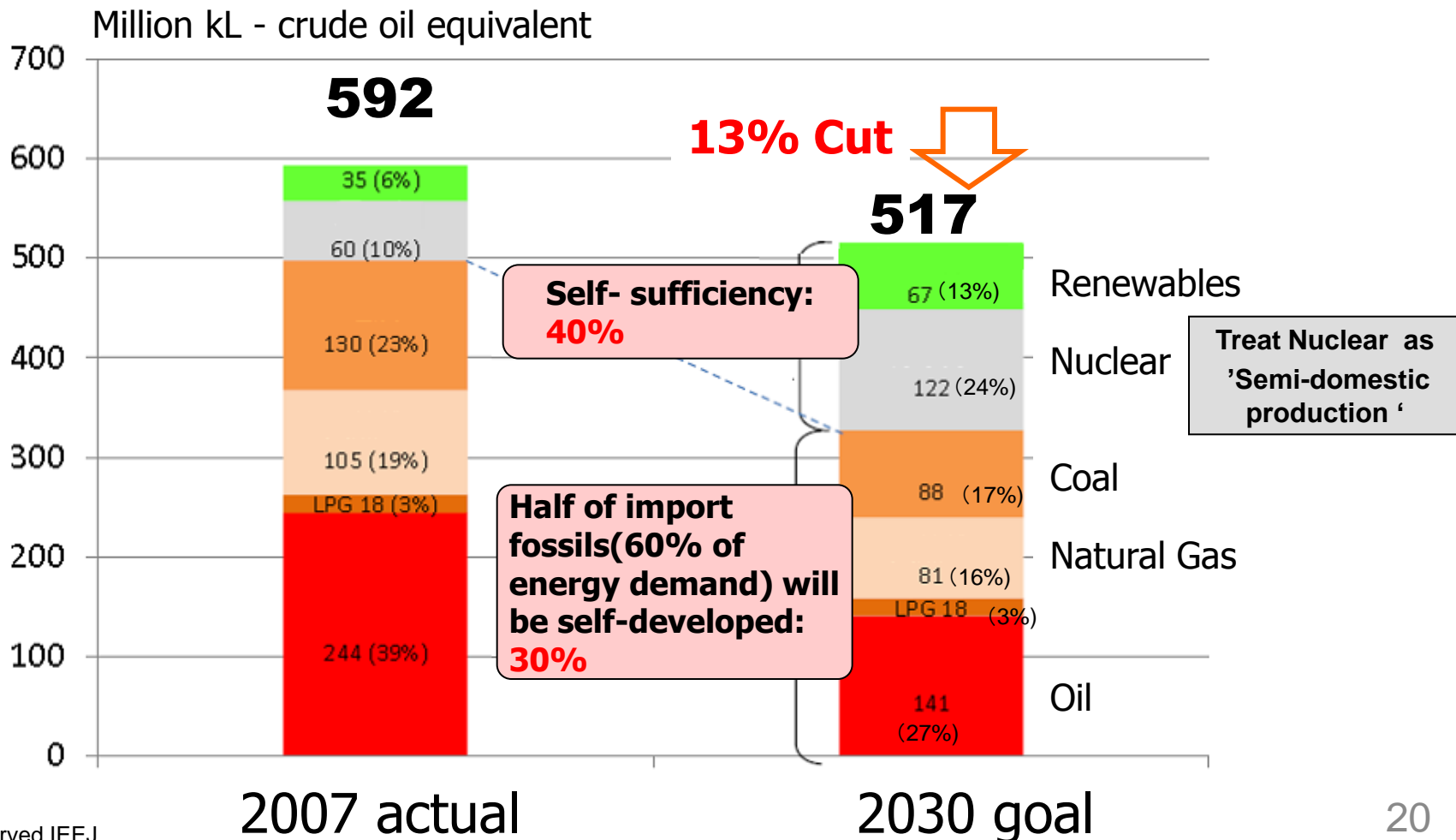
(Formulation October 2003,
Revision: March 2007

June 2010)

- Energy security
- Environmental protection
- Efficient supply
- Energy-based economic growth
- Reform of the energy industrial structure

【Basic Energy Plan】 Energy Mix

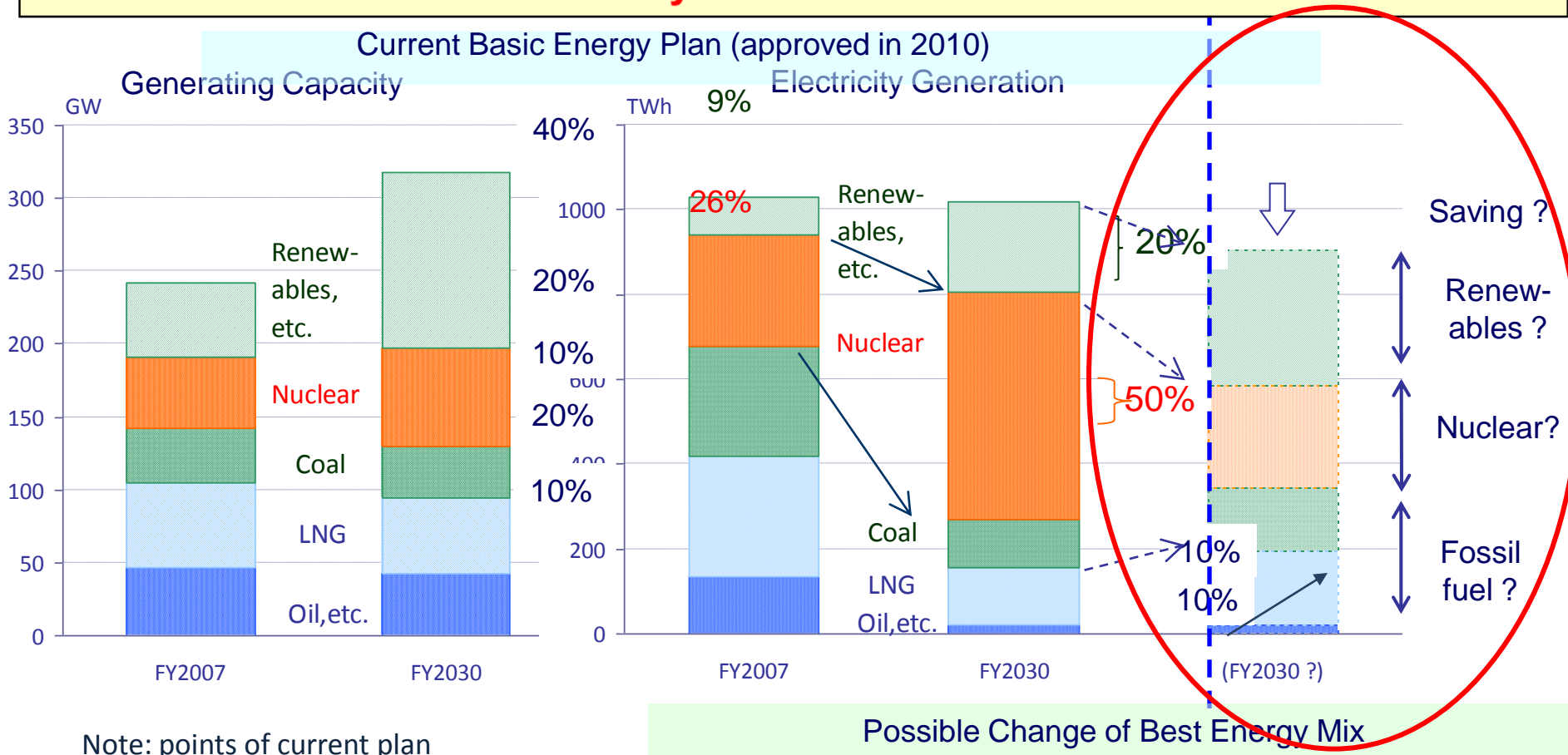
- Raise Energy Independence Ratio** (Self-sufficiency + Self-development rate) from 38%(2007) to 70% (2030)
- Reduce CO₂ Emission** by 30% vs. 1990 level



3. The mid-long term challenges

: Possible Revision of Best Energy Mix

- **Build 14 new nuclear reactors** and raise utility factor from 60% to 90%
- **Introduce 2.4 times as much renewable** (15 times for non-hydro renewables)
- **Increase zero-emission electricity share from 34% to 70%**



Note: points of current plan

- ① raise self-sufficiency of energy supply : 38 -> 70
- ② reduce emissions by 30% in 2030 compared to 1990 level

On-Going Discussion

- **Basic Energy Plan** (by summer 2012)
(Basic Issues Committee, Advisory Committee for Natural Resources and Energy, METI)
 - Discussion on energy mix and different options in preparation for new Basic Energy Plan by summer.
- **Innovative Energy/Environment Strategy** (by Summer 2012)
(Energy-Environment Meeting, National Policy Unit, Cabinet Secretariat)
(27th July 2011: Preliminary Report ⇒ Summer 2012: Final Report)
 - 6 priority areas (energy efficiency, renewable energy, resource/fuel, nuclear, electricity system, energy-environment industry)
- **Action Plan for Energy Regulation and Regulatory System Reform**
 - 26 items for reform including those to streamline electric power system reform, renewable energy promotion and strengthening energy efficiency improvement.
- **Report on Cost, etc. Verification Committee** (January 2012)
(Energy-Environment Meeting, National Policy Unit, Cabinet Secretariat)
 - Re-estimation and verification of different types of power generation
- **New Framework for Nuclear Energy Policy** (under discussion at Atomic Energy Commission)
- **Action Plan for Stabilization of Energy Demand & Supply**
(Electricity Demand & Supply Meeting, Energy-Environment Meeting, National Policy Unit (1 Nov.))
 - Action plan on stable energy demand-supply balance for the coming 3 years.
 - Action plan to avoid blackout in the summer 2012 while avoiding issuance of regulation (Article 27 of Electricity Utility Act).
 - List of actions such as tariff reform (time of use), introduction of additional renewable energy and energy efficient systems (demand cut and strengthening supply) which must be done by GOJ, utilities, industries and households.
- **Energy Efficiency and Conservation Subcommittee** (under public comment process)
(Advisory Committee for Natural Resources and Energy, METI)
 - Basic concept towards revision of the Energy Conservation Act including peak load cut, strengthening building material energy efficiency standards, etc.
- **Global Environment Sub-Committee, Central Environment Council** (by Summer 2012)
 - Discussion and drafting of different options for global environment policies.

Way Forward for JAPAN

Big challenge! (Leadership, robust integrated policies, consensus...)

Finding **new Energy Mix** and designing **new Basic Energy Plan**

New task for Energy Conservation Act!

Reduction of electricity **peak demand** to be included.

Consumer behavior remains the key!

Installation of **smart meters** for all the households in TEPCO area

- Survey shows that industrial sector would not endure the severe power saving efforts again (Keidanren survey (Nov. 2011)).
- Estimation based on consumer survey also indicates that household end-users may cease to save electricity by 2015 (Energy Conservation Committee (January 2012))

Regulatory rules are revisited!

- **Tariff restructure** is discussed,
- Regulation regarding **national parks** to be relaxed to enable installation of **geothermal power plants**

New infrastructure required!

- Grid connection, additional bulk introduction of renewable power, distributed heat and power, etc. are being revisited and considered.

Thank you for your attention!