



Governmental Programs, Japan

Japan's Nuclear Prospects

— How to Meet Challenges and Global Implication

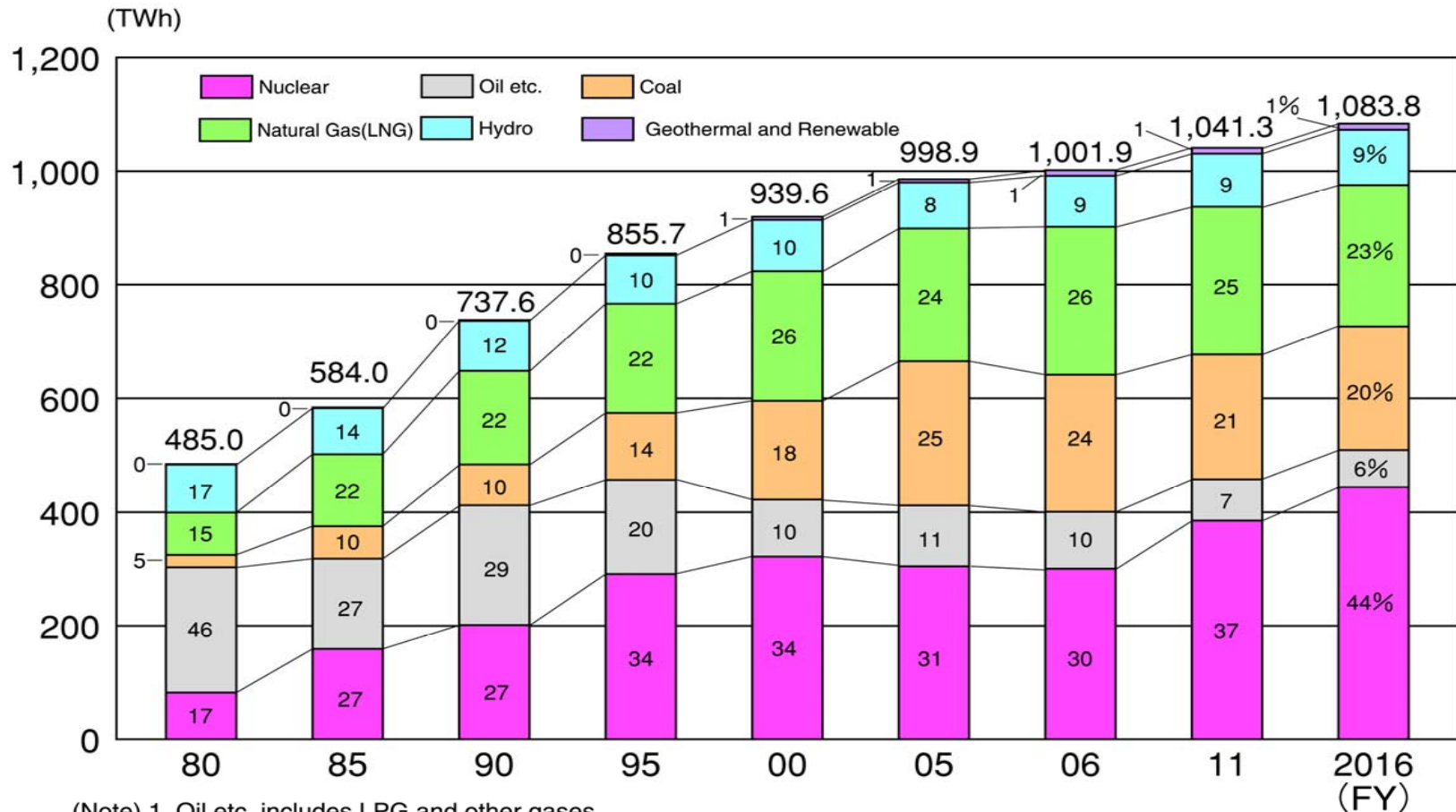
**September 5, 2008
Dr. Kaoru Kikuyama**

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Historical and Projected Power Generation Volume by Source

Electric power companies have managed power demand growth by diversifying sources, including nuclear and liquefied natural gas (LNG). Nuclear energy is accounting about 25% of total power generation in FY2008.



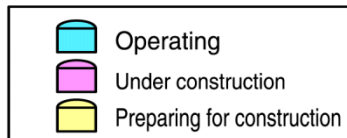
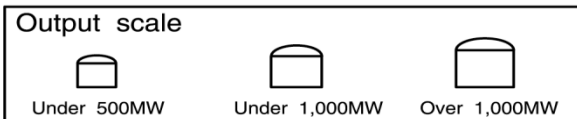
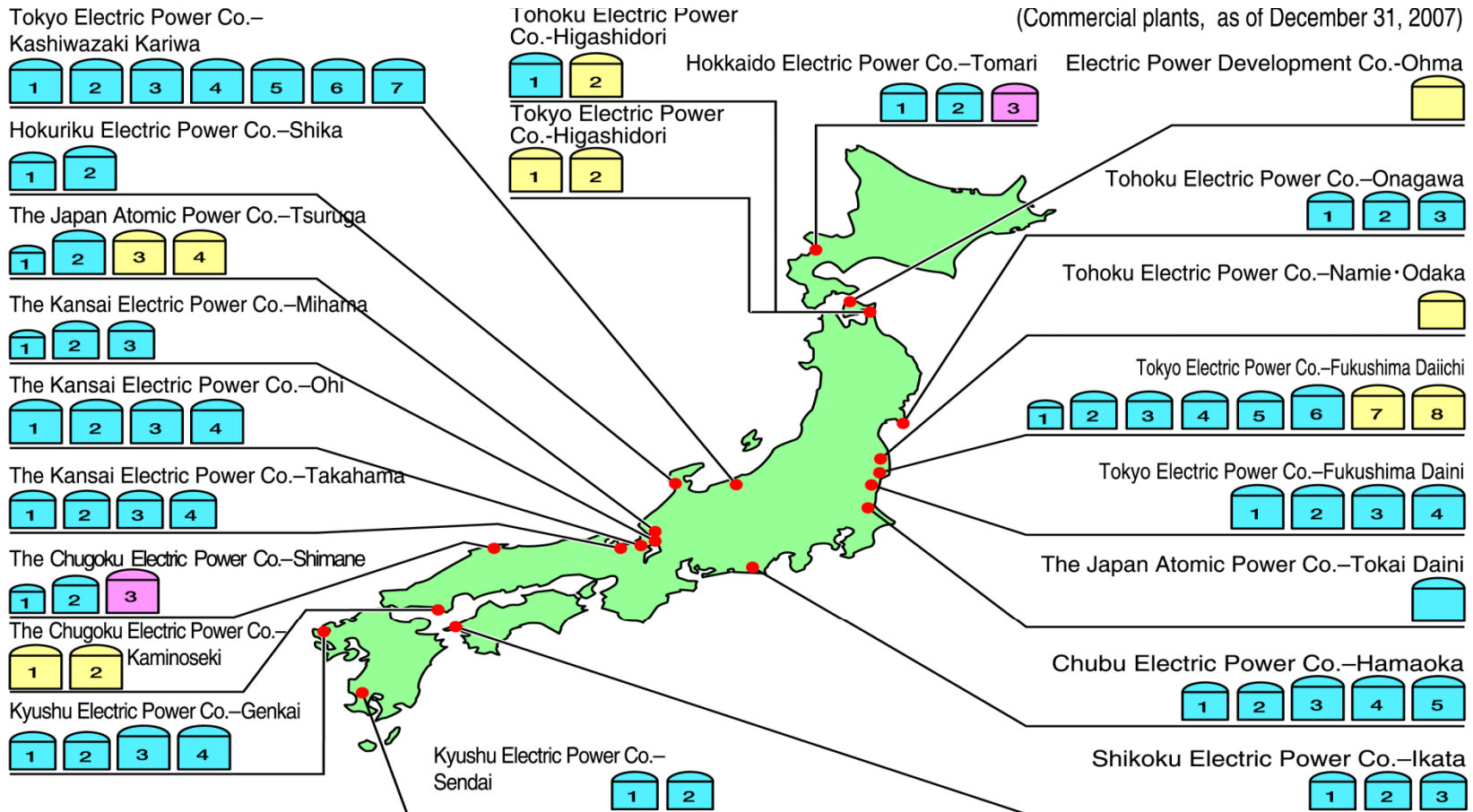
- (Note) 1. Oil etc. includes LPG and other gases.
- 2. Figures do not necessarily total to 100% due to rounded numbers.
- 3. Total of 10 electric power companies and power purchased.
- 4. Figures within the graph represent the composition ratio.

(Source) The Central Electric Power Council "Long Term Electric Power Facilities Development Plan, March 2007" and others.

(projection)

Nuclear Power Plants in Japan

As of the end of December 2007, 55 commercial nuclear power reactors were in operation in Japan, with a total generation capacity of 49,467MW.

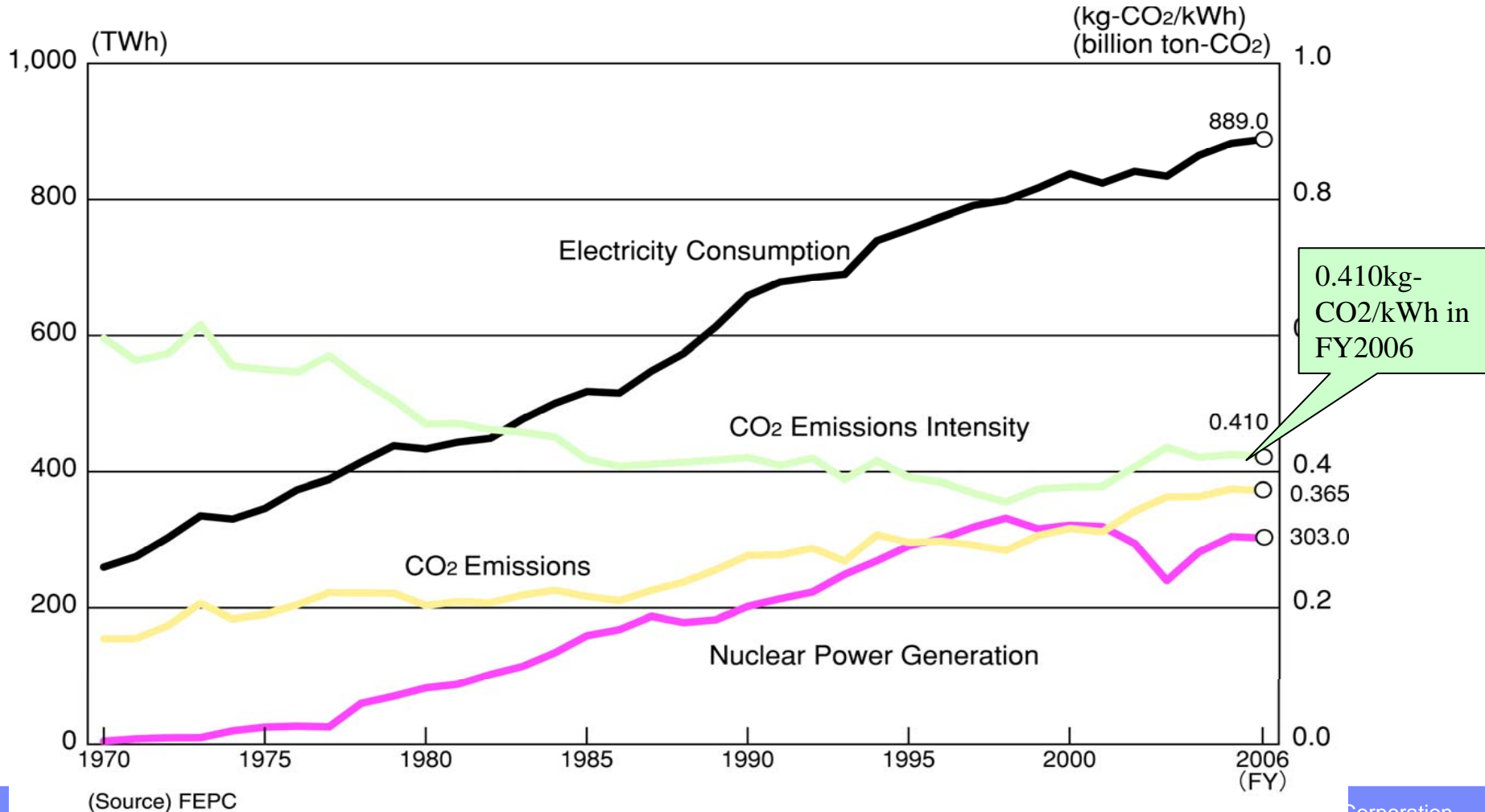


	Number of Units	Total Output (MW)
In operation	55	49,467
Under construction	2	2,285
Preparing for construction	11	14,945
Total	68	66,697

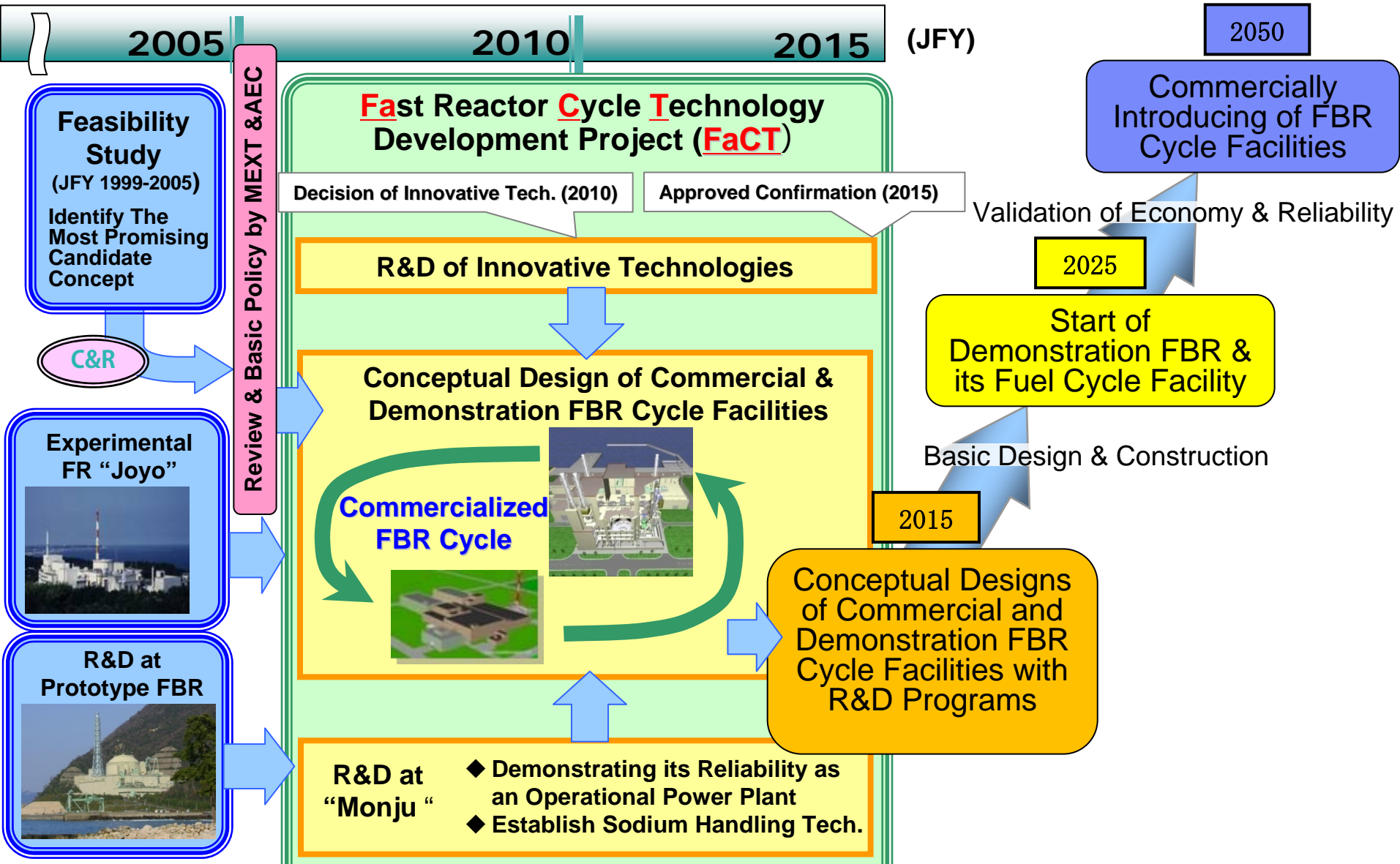
Emissions from Power Generation

The electric power industry has achieved an approximately 30% reduction in intensity of CO₂ emissions (CO₂ emissions per kWh of user end) since the first oil crisis of the 1970s.

By fiscal 2010, it aims to further reduce CO₂ emissions intensity by approximately 20% from the fiscal 1990 level, to about 0.34kg-CO₂ /kWh.



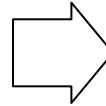
FBR Cycle Development Program in Japan



World Energy Situation and Energy Strategy in Japan

Energy Situation in Japan

- Low self-sufficiency ratio in the energy supply (4%)
- High dependency on fossil-fuels from particular countries



Recent Global Energy Situation

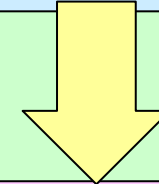
Ensuring energy security and addressing global warming have been more and more important.

- Growing energy demand (e.g. China) and intensified competition for access to energy resources
- Rising nationalism among countries which reserve large amount of resources
- Expanding efforts in response to global warming
- Increasing political uncertainty and the impact of natural disasters
- Appreciation of energy prices from market speculation

Nuclear Policy in Japan

Framework for Nuclear Energy Policy (adopted Oct. 2005 by the Cabinet)

- to continue to meet at least 30 to 40% of electricity supply even after 2030 by nuclear power generation
- to further promote the nuclear fuel cycle
- to aim at commercializing practical FBR cycle



concrete actions for achieving the basic goals of the above framework

Japan's Nuclear Energy National Plan (Aug. 2006)

- Promote nuclear fuel cycle and strategically reinforce nuclear industries
- Early commercialization of FBR cycle

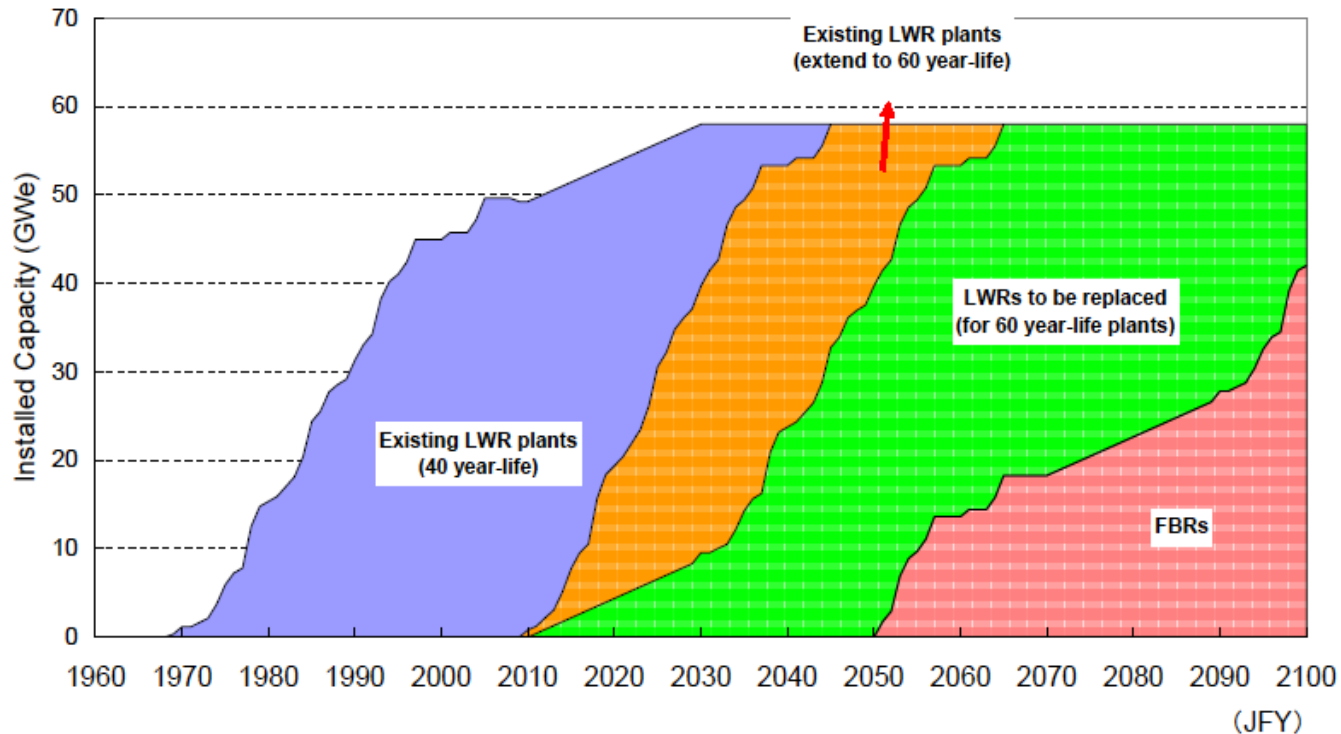
(adopted Mar. 2007 by the Cabinet as a part of Basic Energy Plan)

Long Term Framework for Nuclear Energy in Japan

- ◆ Make the greatest possible use of existing nuclear power plants while assuring the safety and security and steadily address the siting of new power plants.
- ◆ Beginning around 2030, an improved version of existing light water reactors (LWRs) should be utilized. These should mostly be large LWRs, to enjoy the advantage of scale.
- ◆ Beginning around 2050, work toward introducing fast breeder reactors (FBRs) on a commercial basis, considering the supply-demand trends for uranium and the performance of Monju.

If the conditions required for introducing FBRs are not fulfilled by around 2050, continue introducing improved LWRs until those conditions are met.

<Reference> Long Term Framework for Nuclear Energy in Japan (Basic Projection as a Visual Image)

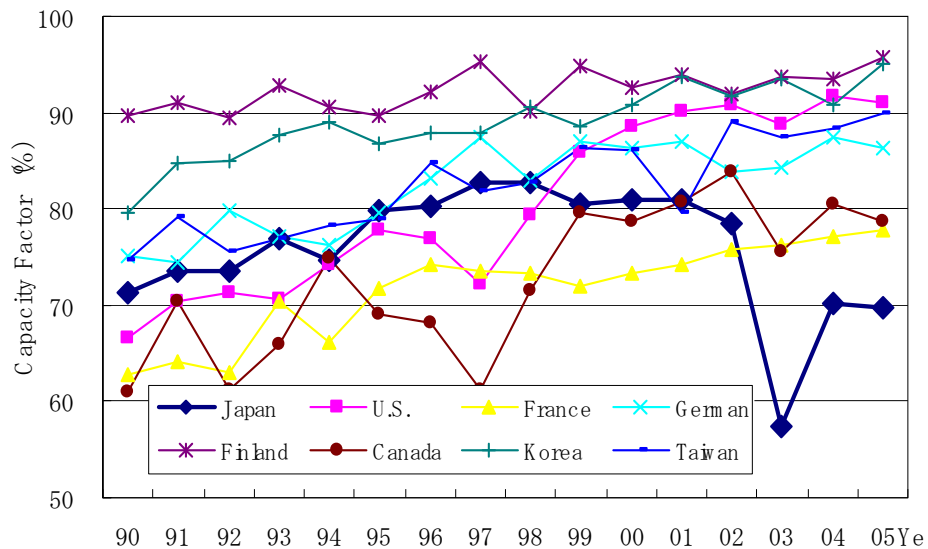


* The installed capacity is assumed to reach saturation at 58GW, for illustrative purpose.

Source: “Japan’s Nuclear Energy National Plan” (METI)

Capacity Factor of Nuclear Power in Japan

Capacity Factor

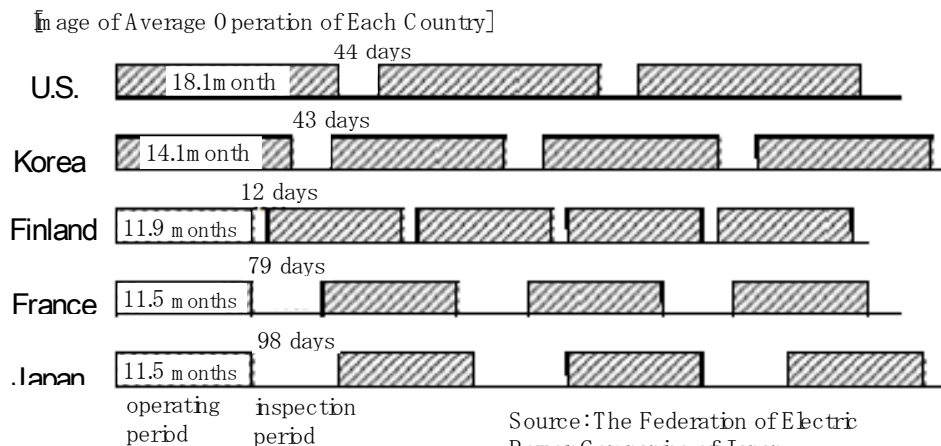


Frequency of unplanned shutdown (2002)

Country	U.S.	Korea	Finland	France	Japan
Frequency (Time/Reactor year)	1.1	0.3	0.8	2.0	0.3

Source : Nuclear Power Nation Plan (August 2006)

Average Operating Period and Inspection Period



Source: The Federation of Electric Power Companies of Japan

Source : "Nuclear Facility Operation Management Annual Report(2006 ed.)

Japan's Nuclear Sector's Challenges – Japan Unique?

- Declining Workforce and Aging Society
- Ungrowing Domestic Nuclear Market / Supply Chain Management
- Increasing Reliance on Nuclear Energy as the Electricity Source
- Fuel Cycle with Assured Security
- HLW Disposal
- Industry Transformation

International Collaboration and Political Leadership

Multinational

- GNEP, Generation IV
- Forum for Nuclear Cooperation in Asia (FNCA) – GoJ Initiative

Bilateral

- Vietnam, Indonesia - safety regulation and the plant operation and management training
- Turkey, Thailand, South Africa – non-proliferation, safety regulation, and workforce training <from FY2009>
- Nuclear Energy National Plan

New Proposal

- G8 Summit
 - 3S: Safety, Security, Safeguards
 - Sharing good practice, experience, information, and cooperate on infrastructure development with the IAEA collaboration

Unconventional Approach – Innovation for Nuclear Industry

Our Common Goal

- How can we utilize the nuclear energy to the maximum value and extend this use to more nations and people living there and to the next generations?
- How can we share and pass on these valuable asset and knowledge in the global nuclear community and to the following generation?
- How can we do it in the sustainable manner within the limited resource available?

A Solution for Complex Issue Challenges

- **Huge computing/software capability enhancement since last nuclear boom**
 - Potential revolution in DBOM strategies based on computation capabilities now available
 - Comprehensive human capital/information management approach
 - Improved maintenance and work management decision-making through more accurate, timely information and fleet-wide best practices
 - Enhanced document and records management for streamlined maintenance and workflow, as well as accurate and efficient compliance
 - Optimized supply chain processes, including procurement sourcing, inventory management, in order to maximize plant availability, enhance cash flow, and reduce risk

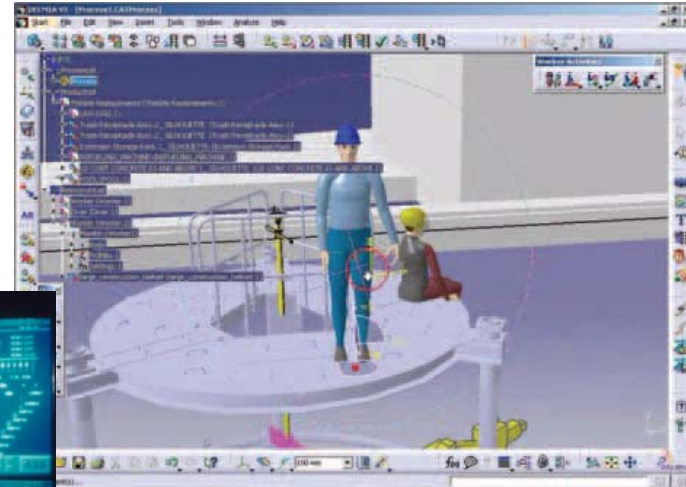
- **Application of HPC for previously intractable/prohibitively expensive problems**
 - On-line, real time, high fidelity simulation for operations, engineering, and safety/transient mitigation
 - Plant equipment modification - simulation to shorten outages at existing plants
 - Life extension - material degradation analysis
 - Up-rate analysis for existing plants
 - Safety margin simulation
 - Enhanced operational “what-if” analysis to determine best practices
 - Next generation nuclear plant design/analysis

Innovation – Advanced Technology for Modern Industry

- **New build cycle underway – conventional and new technology**
 - advanced IT is a key component
 - “Digital Plant”
 - Open, flexible, IT architecture across DBOM cycle
 - Data management / application integration – information lifecycle management
 - Collaborative design environment
- **Existing fleet efficiency / availability**
 - HPC/simulation and PLM - key for plant modifications
 - Driven by accurate and accessible data
 - Modernize plant data management / contents management
- **Industry Partnerships are critical**
 - Designers/Constructors collaborate with technology partner to modernize IT Infrastructure
 - Efficient IT operation/data management, HPC/simulation

Create a vision into the future...

From....



To....



Making use of available advanced technology to allow more accurate modeling, managing and decision making for the sustainable nuclear future