Innovation of Nuclear Energy and Contribution to Society

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Science & Technology Basic Plan

Aiming to be an advanced science and technology-oriented nation :

- **Science and Technology Basic Law (enacted in 1995)**
- **1st Basic Plan (FY1996~2000) \17 Trillion**
- **2nd Basic Plan (FY2001~2005) \24 Trillion**
- **3rd Basic Plan (FY2006~2010) \25 Trillion**

3rd S&T Basic Plan

- **Basic concept promote S&T**

  - to be supported by public and to benefit society

  - emphasize fostering human resources and competitive research environment

"shifting from hard to soft and placing special emphasis on individuals"

Strategic priority setting in S&T

- **Primary prioritized area;**
  - **Life science**
  - **IT**
  - **Environmental science**
  - **Nano-tech & Materials**

- **Secondary prioritized areas;**
  - **Energy**
  - **MONOZUKURI tech. (manufacturing tech.)**
  - **Infrastructure**
  - **Frontier (space and oceans)**

Basic Plan of S&T on Energy sys.

- **Diversification of energy source**
  - **Reduce dependence on oil**
  - **Clean coal tech.**
  - **Renewable energy**
  - **Hydrogen/Fuel cell**
  - **Nuclear power**
- **Enhancement and improvement of reliability in energy supply system**
- **Energy conservation**

Harmonization of related policy

- **Energy policy (METI)**
  - **simultaneous achievement of 3E**

- **Environmental Policy (MOE)**
  - **realizing low carbon society**

- **R&D policy (Cabinet office)**
  - **S&T innovation**

Innovation in Energy Field

- **Cool Earth – Energy Innovation Technology plan :METI (Mar.2008)**

---Realizing low carbon society and improving energy efficiency

- **21 innovative technologies were selected in environment & energy field**

Nuclear : Fast breeder reactor and fuel cycle tech.

- **Roadmap and diffusion scenario was established**

Innovation in Nuclear Energy(1)

Basic concept

- Realizing **sustainable development**

- Simultaneous achievement of **3E**

- Pursuing **low carbon society**

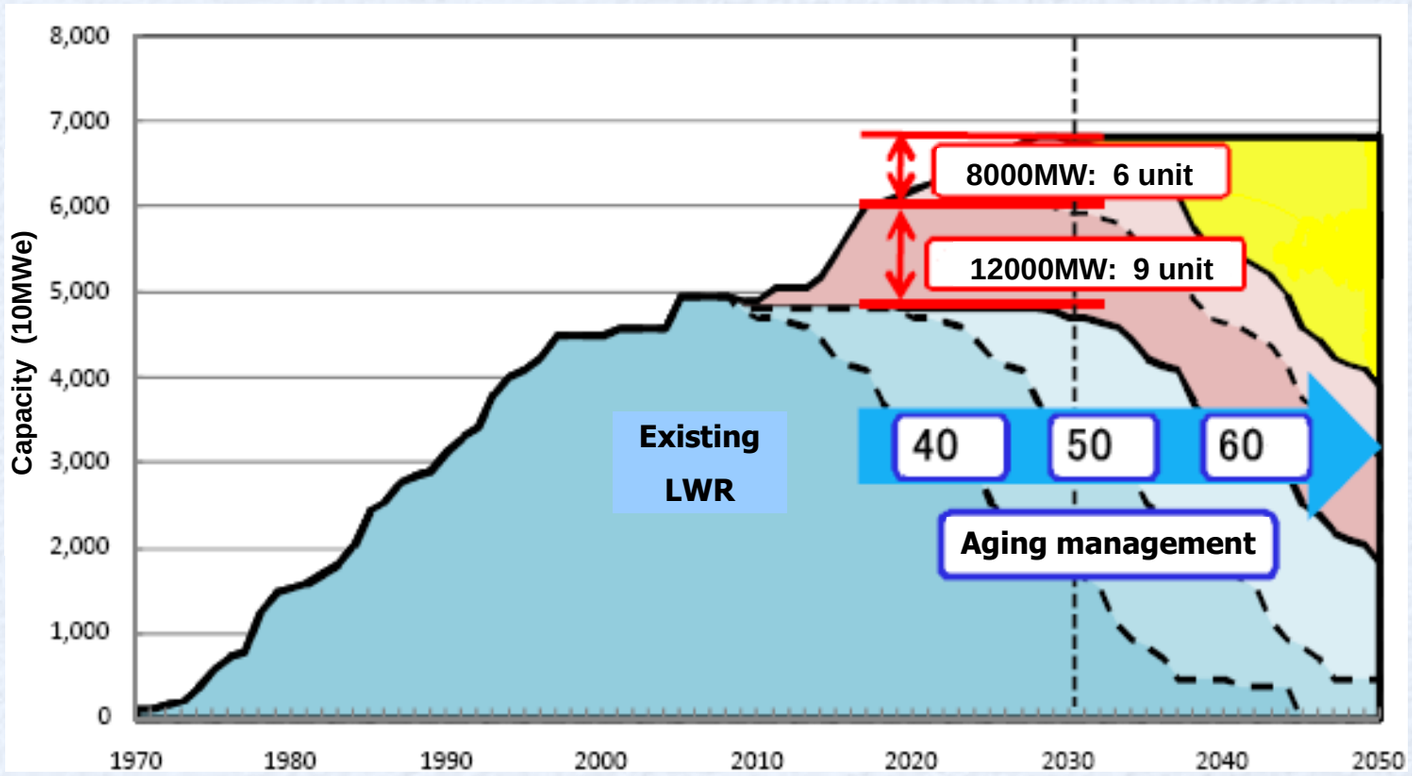
Innovation in Nuclear Energy(2)

Key factor to promote innovation

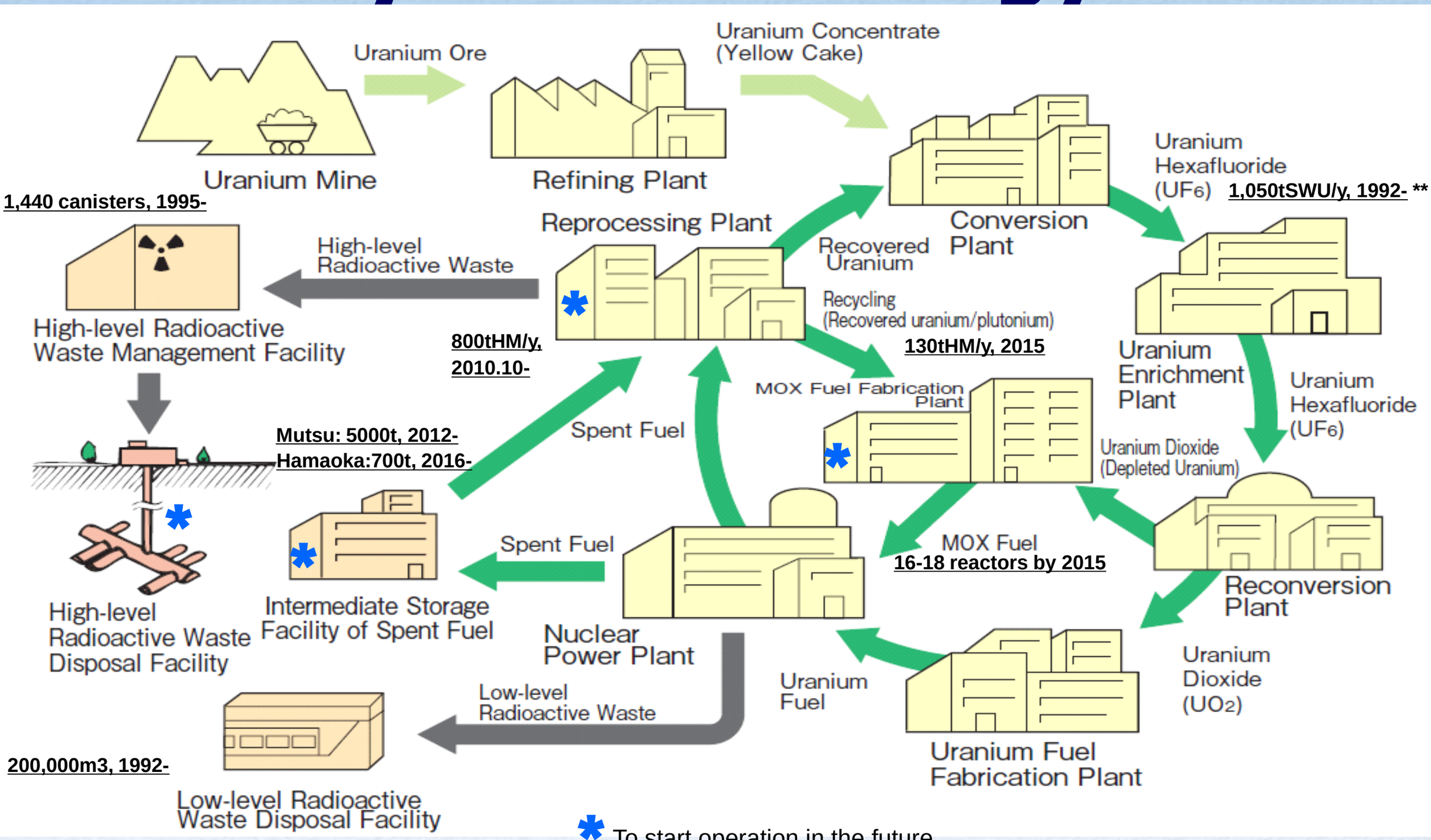
- Fully supported by Gov. policy
- Cooperation among Gov., Industry and Academia
- Human resources development
- International cooperation
- Securing 3S (safeguards, safety, security)

Existing Light Water Reactors

- **Efficient use of existing LWRs**
  - **Improvement of capacity factor**
  - **Life extension**
  - **Power up-rating**
- **New construction**
- **Decommissioning and replacement**
- **Participation in NPP-related projects of emerging nuclear countries**



Fuel Cycle Technology



* To start operation in the future

** Advanced Centrifuge System to be introduced from 2010

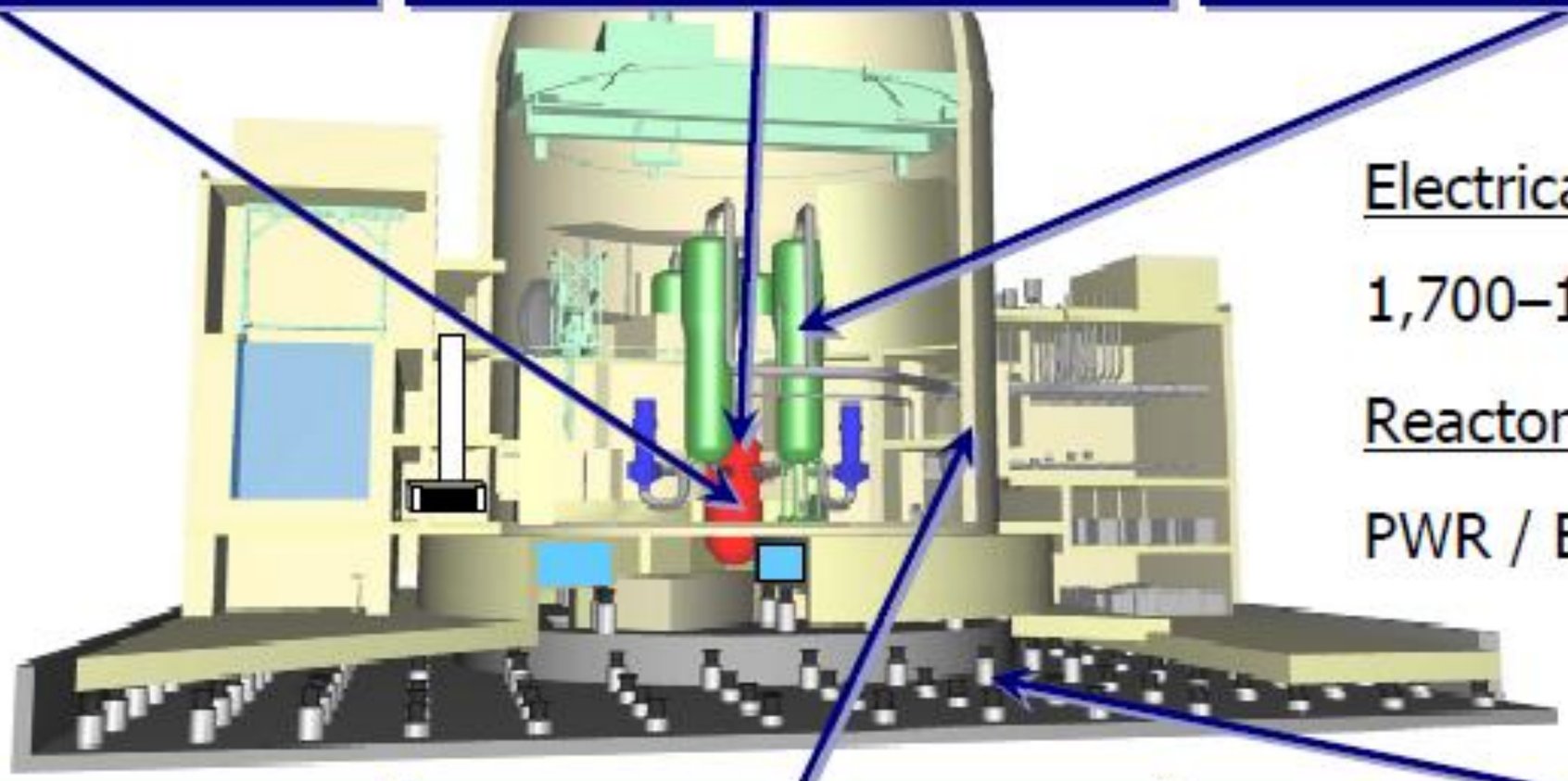
Source: Grafical Flip-chart of Nuclear & Energy Related Topics 2009, Federation of Electric Power Companies of Japan (partly amended)

Next Generation LWR

Reactor core system with very high burn-up fuel

Advanced safety system [passive and active]

Long-lived materials & innovative water chemistry technologies



<u>Electrical Output</u>

1,700–1,800 MWe

<u>Reactor Type</u>

PWR / BWR

World leading digital technology

Innovative construction technology

Seismic isolation system

[Note] The figure shows an example of PWR

Source: IEA, Japan

Small and Medium Size Reactor

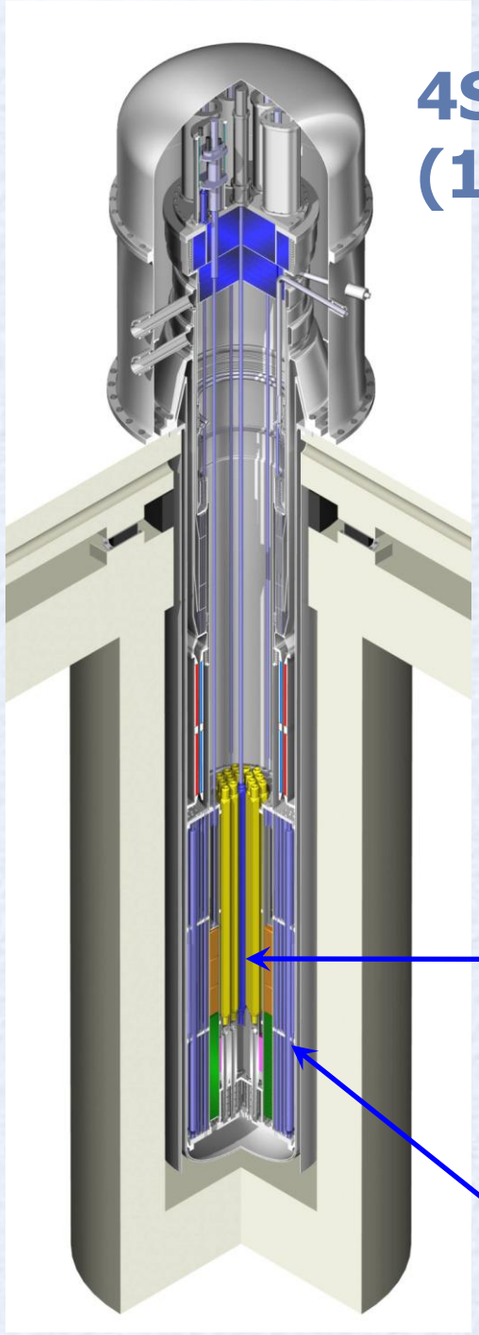
- **4S (Super-Safe, Small & Simple)**

4S Features

(1) No refueling

(2) Lower Maintenance Requirements

(3) Small Initial Investment, etc.



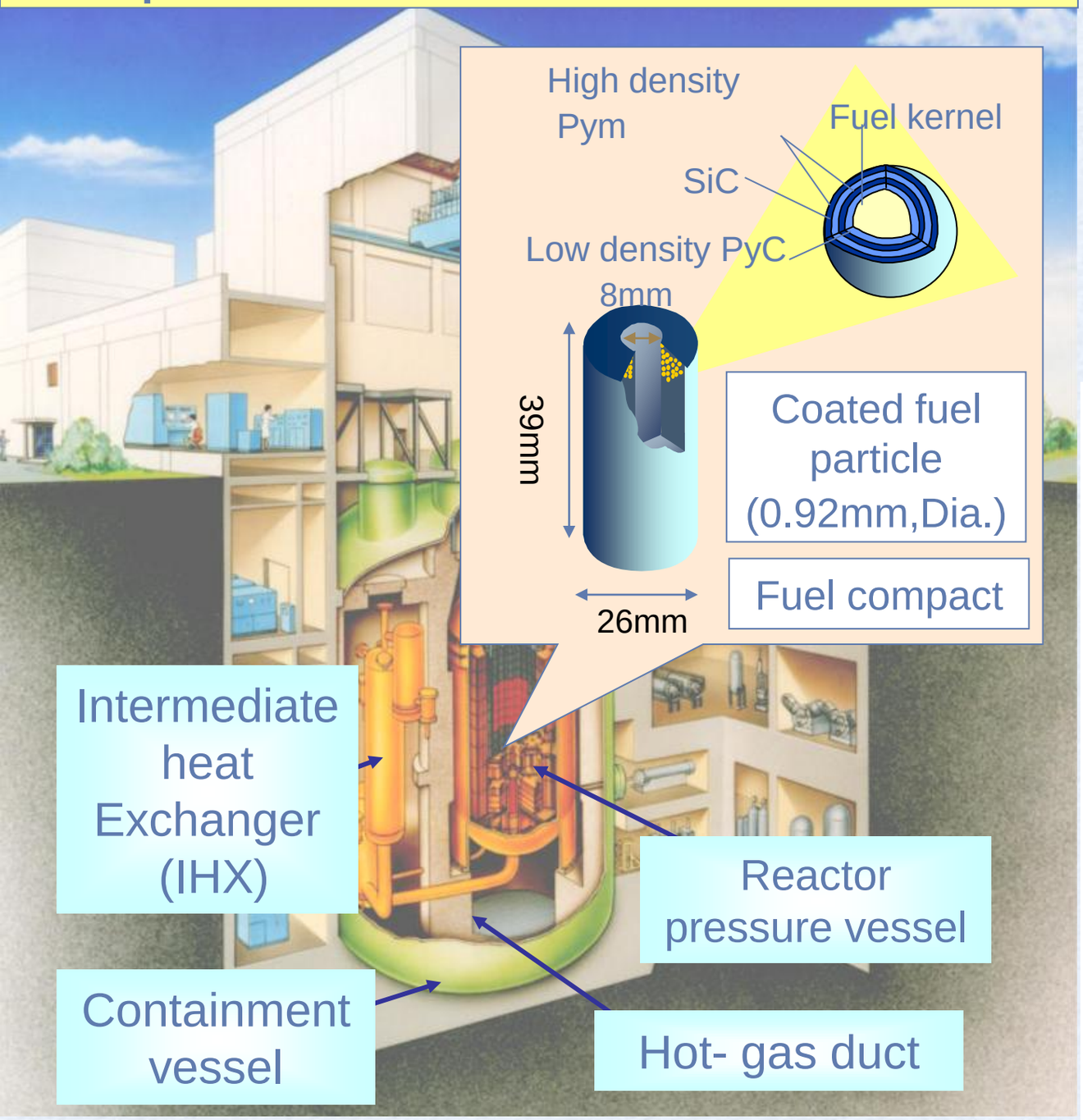
4S (10MWe)

Source: Toshiba

High Temp. Gas Cooled Reactor

HTTR

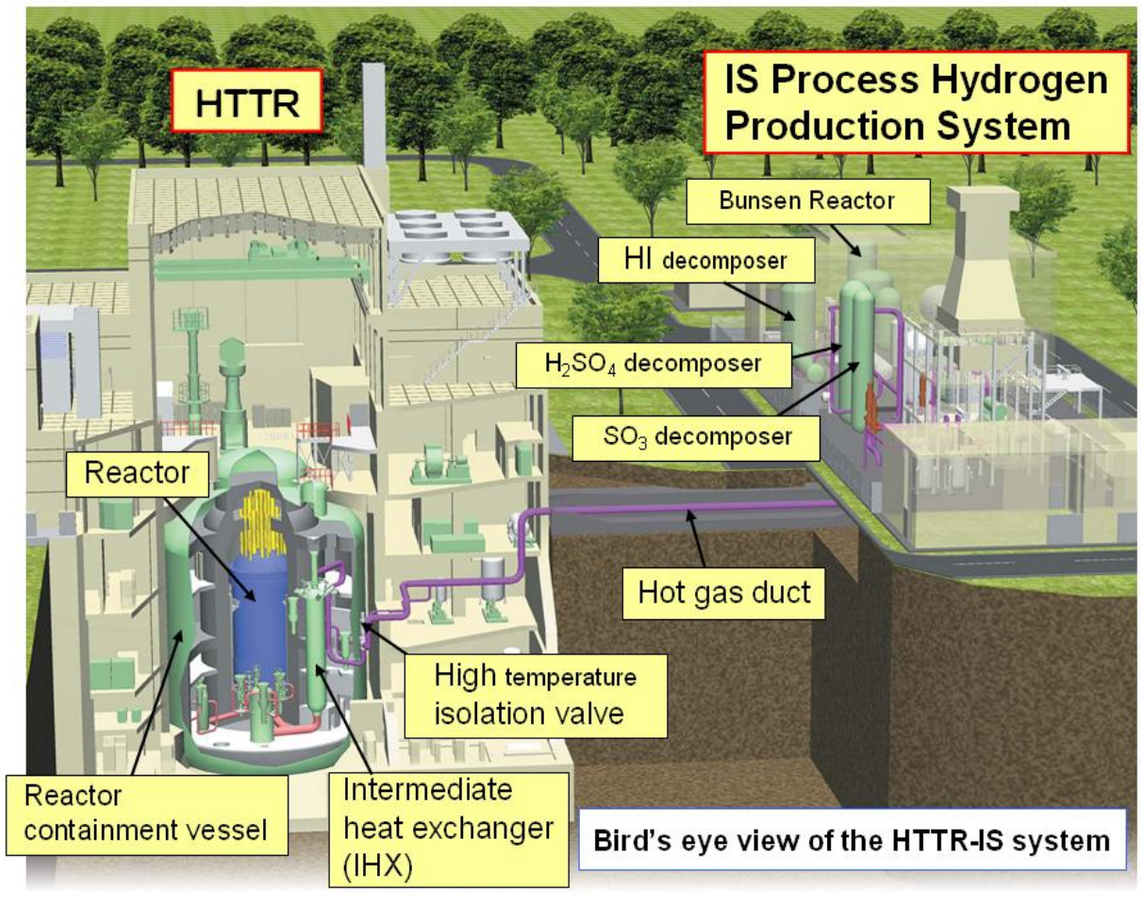
Graphite-moderated and helium-cooled HTGR



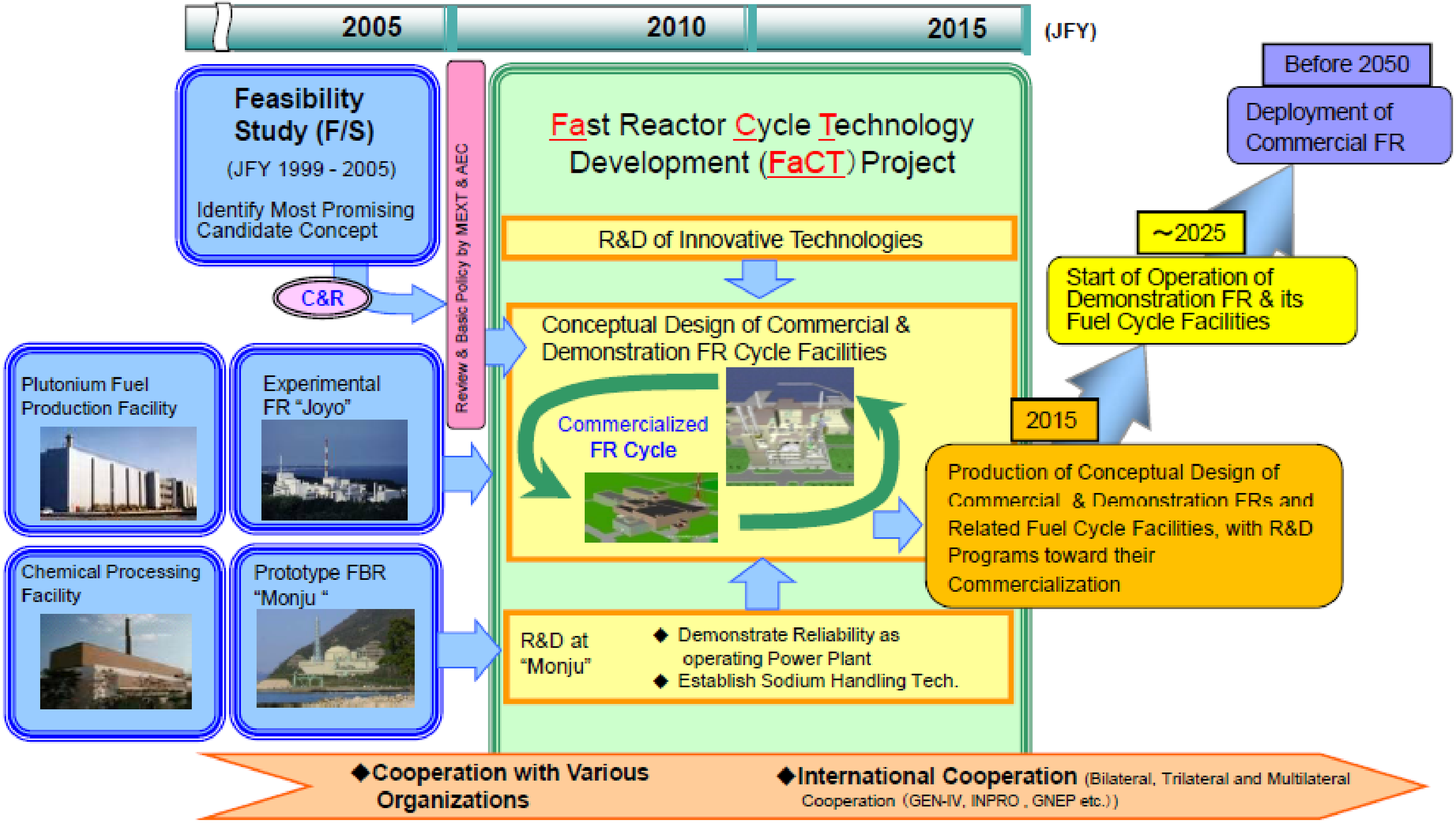
Major specification

Thermal power	30 MW
Fuel	Coated fuel particle / Prismatic block type
Core material	Graphite
Coolant	Helium
Inlet temperature	395 °C
Outlet temperature	950 °C (Max.)
Pressure	4 MPa

HTTR-IS Nuclear Hydrogen Production System



Fast Reactor Cycle



Source: JAEA

Conclusion

to realize Innovation in Nuclear Energy :

- **Share the long term vision**
  - **roadmap, diffusion scenario**
- **Establish the portfolio**
  - **selection & focusing, allocation**
- **Pursue the international cooperation**
  - **finance, installation, human resources**

Thank you for your attention!

Спасибо за внимание!

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