

Future R&D Programs Using Monju

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History and Current Status of Monju

- Max. Output: 280 MWe (714MWt)
- Coolant: Sodium (3 Loop-Type)
- Fuel: Pu-U MOX fuel

May 1983 **Construction permit** granted
Oct. 1985 Construction started
Apr. 1994 **Initial criticality**
Aug. 1995 Initial connection to the grid
Oct. 1995 Attainment of 40% rated power
Dec. 1995 **Secondary Sodium leakage**

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Cause Investigation and
Comprehensive safety review

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Jun. 2001 Modification permit applied
Dec. 2002 Modification permit granted
Mar. 2005 Plant modification works started
Oct. 2006 Modification permit applied for
refueling

Dec. 2006 **Modified system function tests**
started
Aug. 2007 **Entire system function tests**
started
Aug. 2009 System start-up test preparation
& inspection started

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**Now on a process toward the
restart**

Prototype Fast Breeder Reactor: Monju

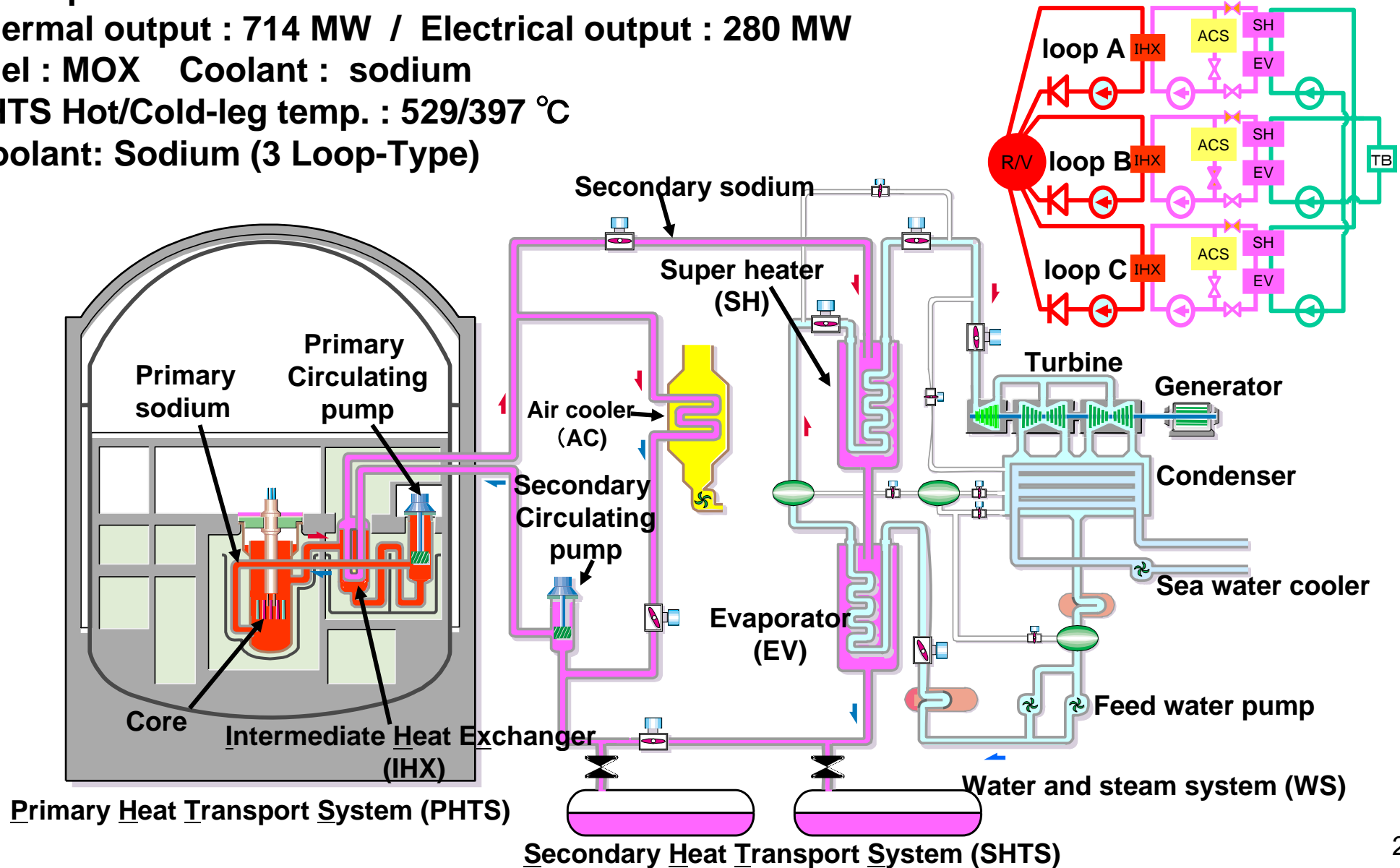
Plant Specifications

Thermal output : 714 MW / Electrical output : 280 MW

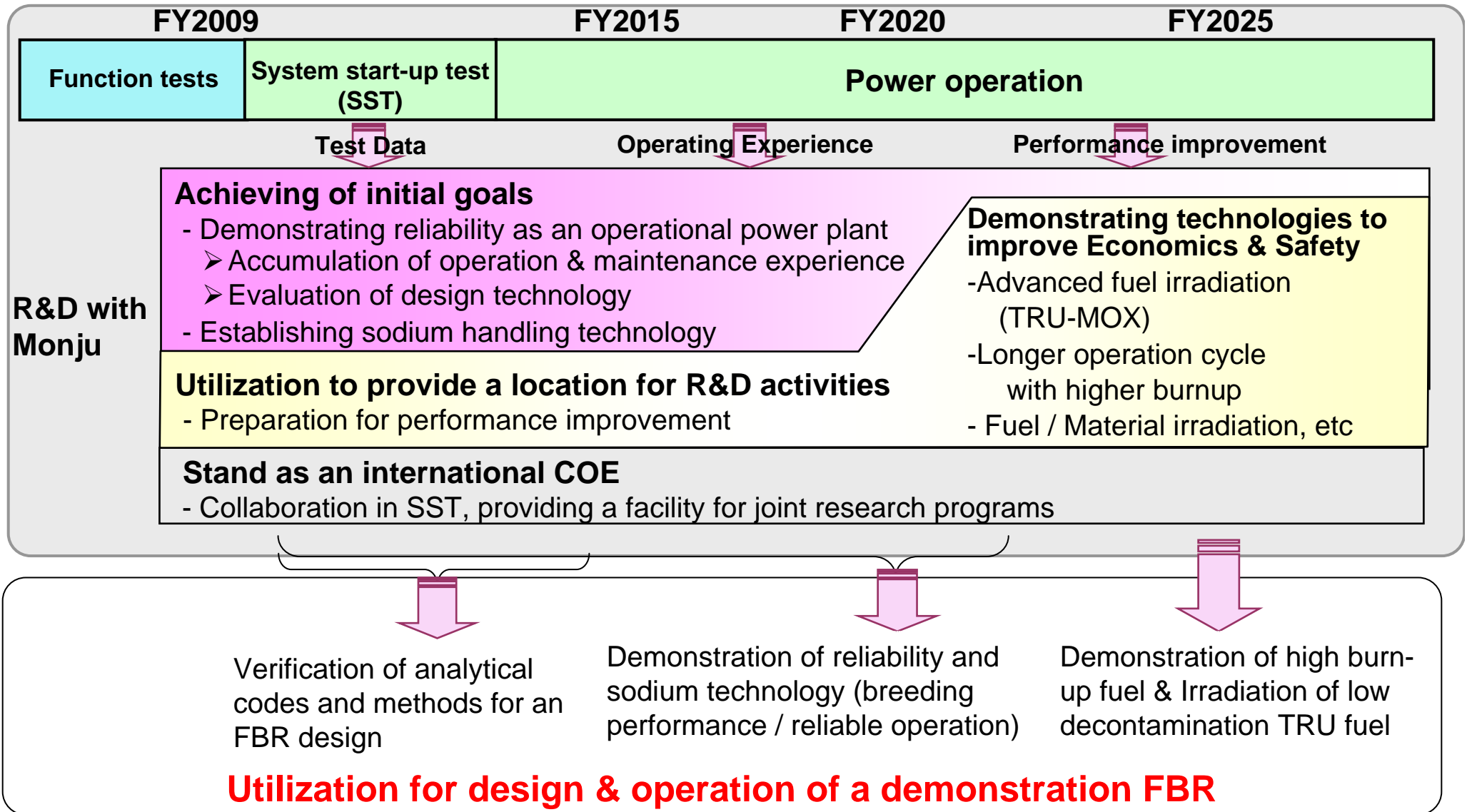
Fuel : MOX Coolant : sodium

PHTS Hot/Cold-leg temp. : 529/397 °C

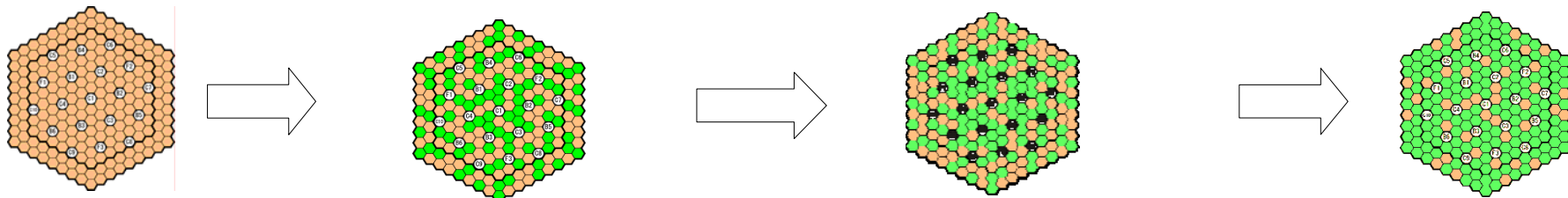
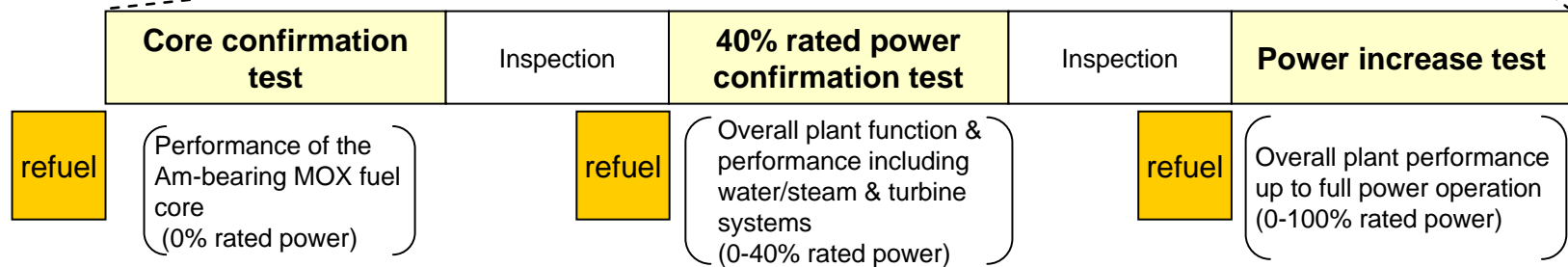
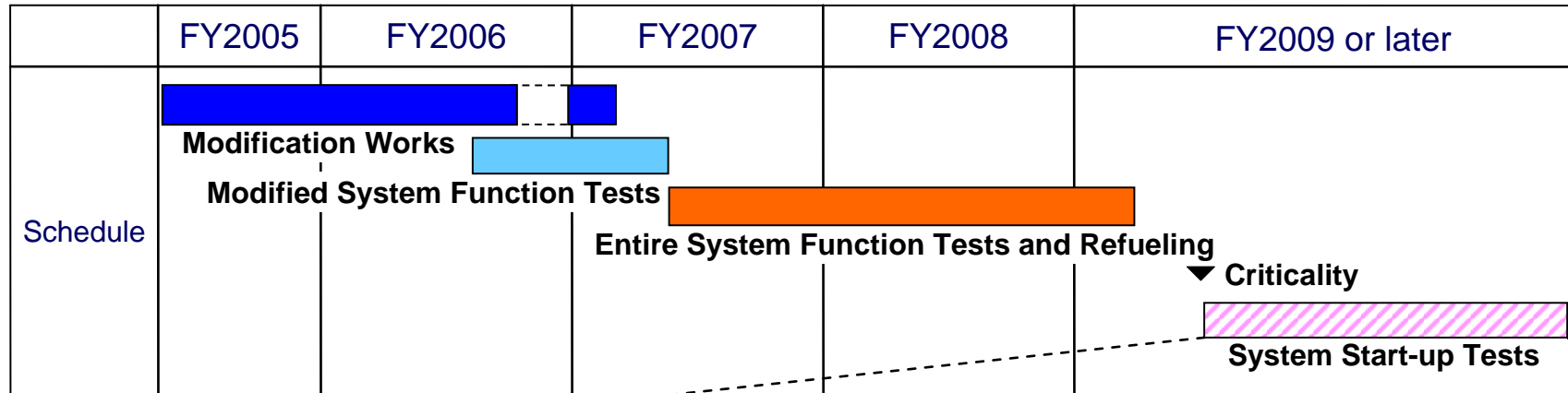
Coolant: Sodium (3 Loop-Type)



R&D Programs Using Monju



Monju System Start-up Test Schedule



Orange circle: Current core fuels

Green circle: Stocked fuels or new fuels to be fabricated



WBS of R&D Programs Using Monju

1. Demonstrating reliability as an operational power plant

1) Achieving safe and reliable operation

2) Achieving system start-up tests

3) Evaluating design concept of Monju & its generalization

2. Establishing sodium handling technology

1) Establishing sodium handling management technology

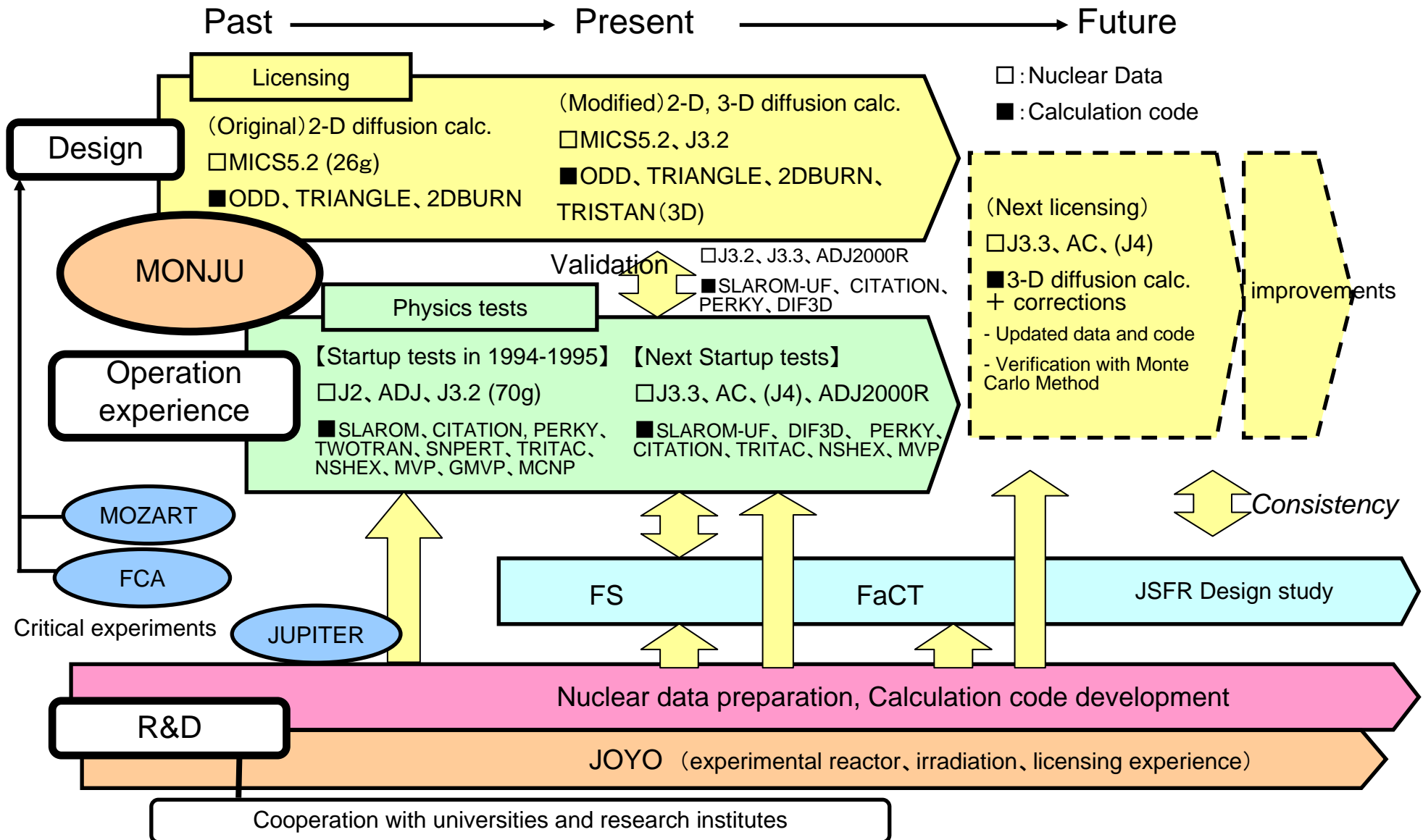
2) Establishing plant maintenance technology

3) Construction of an integrated database system of Monju

3. Utilization to provide an asset for R&D activities toward commercialization

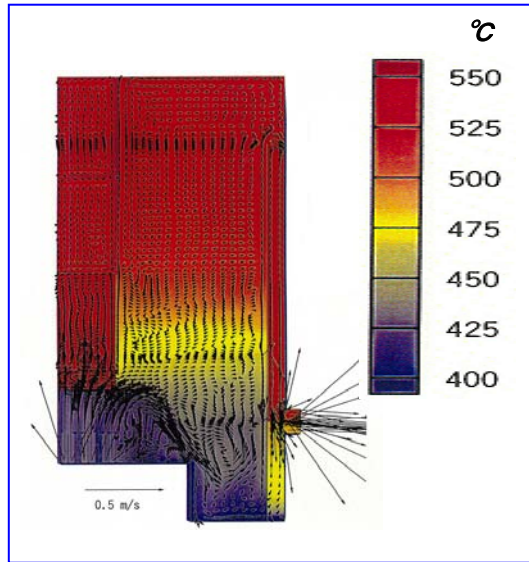
1) Monju performance improvement

Note: A comes from 'Framework for Nuclear Energy Policy' by AEC

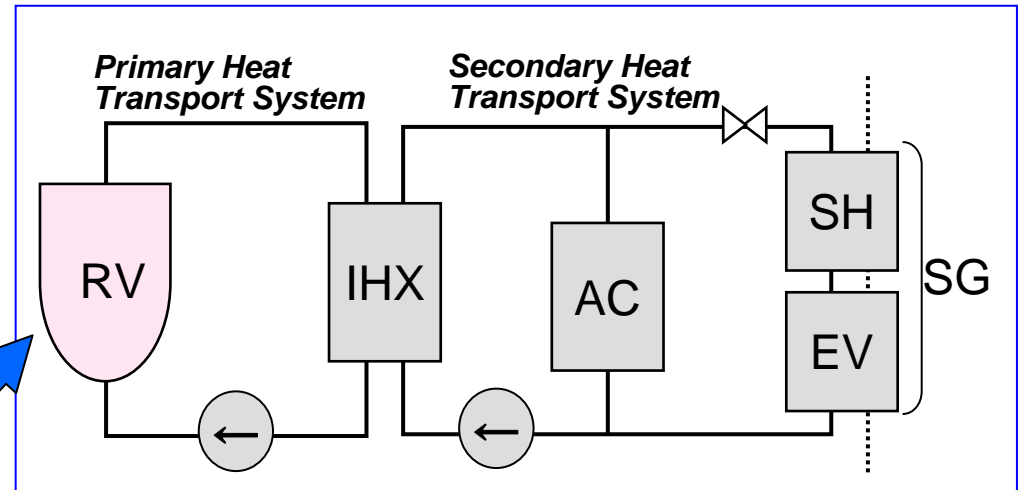


(1) Detailed Analyses of RV Upper Plenum Thermal-hydraulics

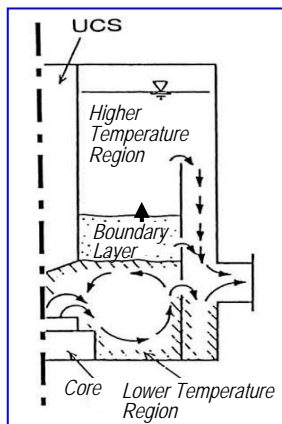
<< Detailed Calculation >>



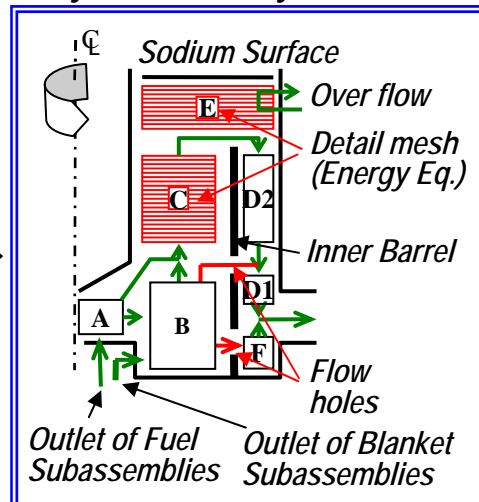
<< Whole-plant Dynamics Analysis Model >>



Flow rate
Temperature



Integrate into Whole-plant
Dynamics Analysis Model



(3) Modeling of other main components

- Construct FNM of other components (IHX, AC, SG, etc.)



(4) Whole-plant Dynamics Simulation

- Verification by Monju start-up test results

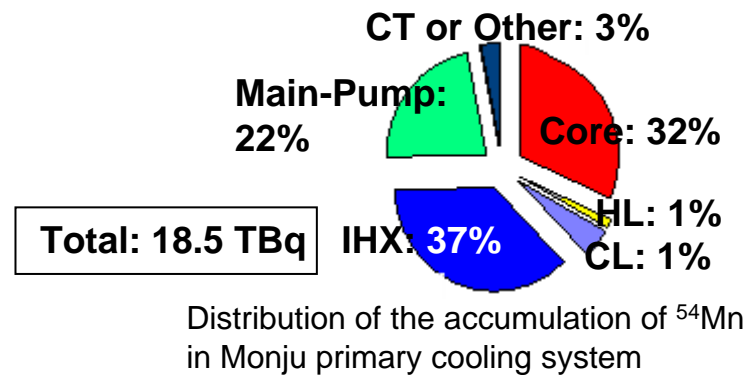


>> Enable to Evaluate Plant Dynamic Behavior in Short Calculating Time and Appropriate Accuracy for Future FBR

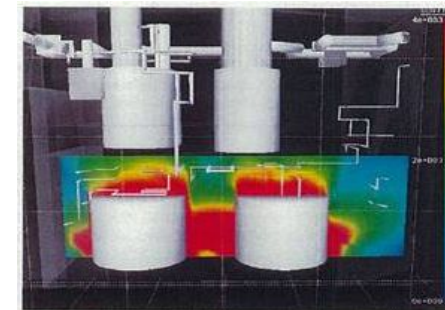
(2) Construction of Flow Network Model (FNM)

Radioactive materials behavior in sodium cooling systems

- Evaluation of production and transfer behavior of corrosion products and fission products in LMFBR cooling systems.
- Evaluation of radioactivity distribution in LMFBR plant.



Development and validation of dose rate estimation system for LMFBR maintenance



Prediction of dose rate in primary coolant system room of Monju by DORE system

Demo Plant and Commercial Plant

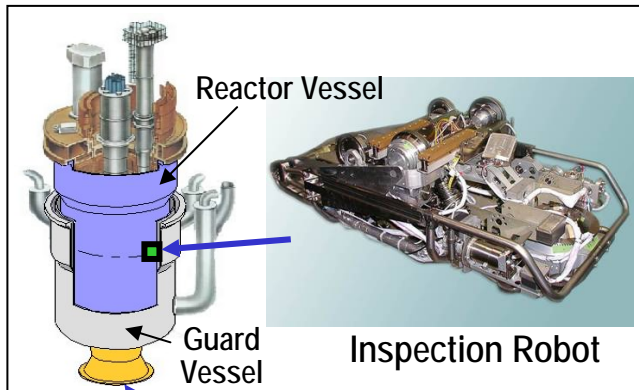
The calculation results will be applied to the radiation shielding design.

The sodium cleaning experience of sodium components and spent fuels using sodium cleaning system will be applied to the design of fuel handling and its support systems.

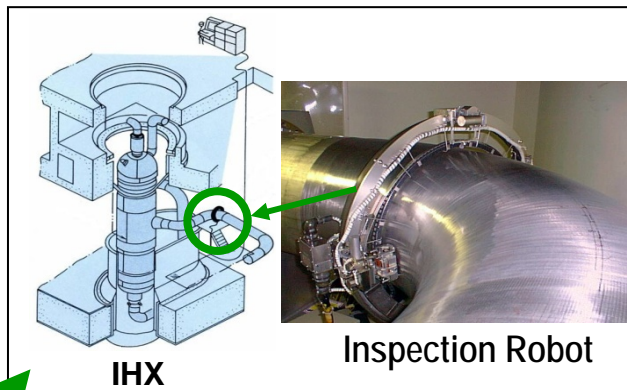
This research progress will be reflected to the establishment of operation and maintenance management system.

Planning of construction of a new Sodium Test Facility in Shiraki, Tsuruga

ISI Device for Reactor Vessel

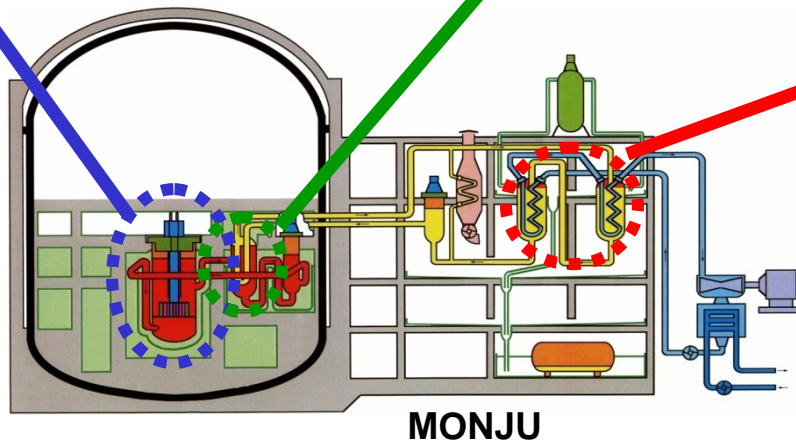
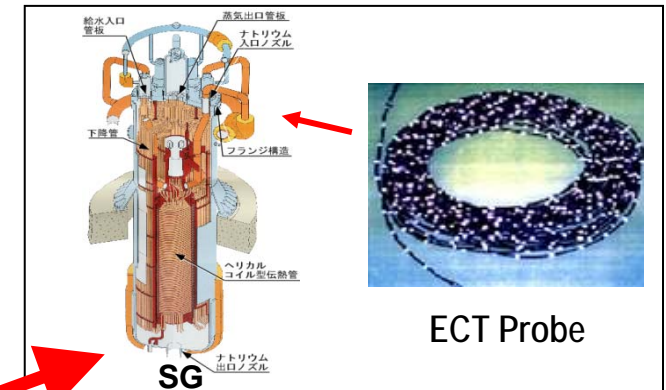


ISI Device for PHTS* Piping

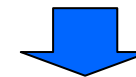


* Primary Heat Transport System

ISI Device for SG Tubes



Demonstration of applicability and performance of the ISI Devices by the practical use in MONJU



- Improvement of performance (high sensitivity on small defects, quantitative evaluation)
- Improvement of reliability and easy handling
- Reduction in time and cost of each inspection



Time Schedule of R&D Programs Using Monju 1/2

Item	2010	2015	After 2015
<p>Monju</p> <p>Entire System Function Test ▼ System Start-up Test Full Power Operation</p> <p>Current Core Advanced Core</p>			
<p>1.1) Achieving safe & reliable operation</p>	<p>Improvement of standard</p>	<p>Feedback of SST activities</p>	
<p>1.2) Achieving system start-up tests</p>	<p>Preparation of SSTs</p>	<p>Carrying-out of SSTs</p>	
<p>1.3) Evaluating design concept of Monju & its generalization</p>	<p>Evaluation of former SSTs</p>	<p>Straightening-up of SSTs</p> <p>Evaluation of SSTs</p>	<p>Utilization of design of a demo-FBR</p>
<p>2.1) Establishing sodium handling management technology</p>	<p>Accumulation of plant data</p>	<p>Development of purification system & sodium cleaning system</p>	<p>Development of analytical code on behavior of radioactive materials</p>



Time Schedule of R&D Programs Using Monju 2/2

Item	2010	2015	After 2015
Monju	Entire System Function Test Criticality System Start-up Test	Full Power Operation	Current Core / Advanced Core
2.2) Establishing plant maintenance technology	Development of apparatus for ISI	Application to Monju	Improvement
2.3 Construction of an integrated database system of Monju	Development of DB	Test-using of DB	Improvement
3.1) Monju performance improvement	Preparation of performance improvement	Design & Licensing	Operation

- Monju is challenging toward the restart.
- After system start-up tests are performed for around three years, Monju will operate at rated power 280 MWe.
- Monju will be expected to produce many useful experimental data for evaluation of design methods which can be utilized as design tools of a demonstration fast breeder reactor.
- Monju will be expected to establish ways of operation and maintenance of a fast breeder reactor. These will be systematized as documents.
- Monju will be utilized as an irradiated facility after attainment of the desired ends.