

# **Overview of Korean Fusion Energy Policy and Programs**

Ministry of Science, ICT and Future Planning  
Republic of Korea

Monaco ITER International Fusion Energy Days  
Monaco, December 2-4, 2013

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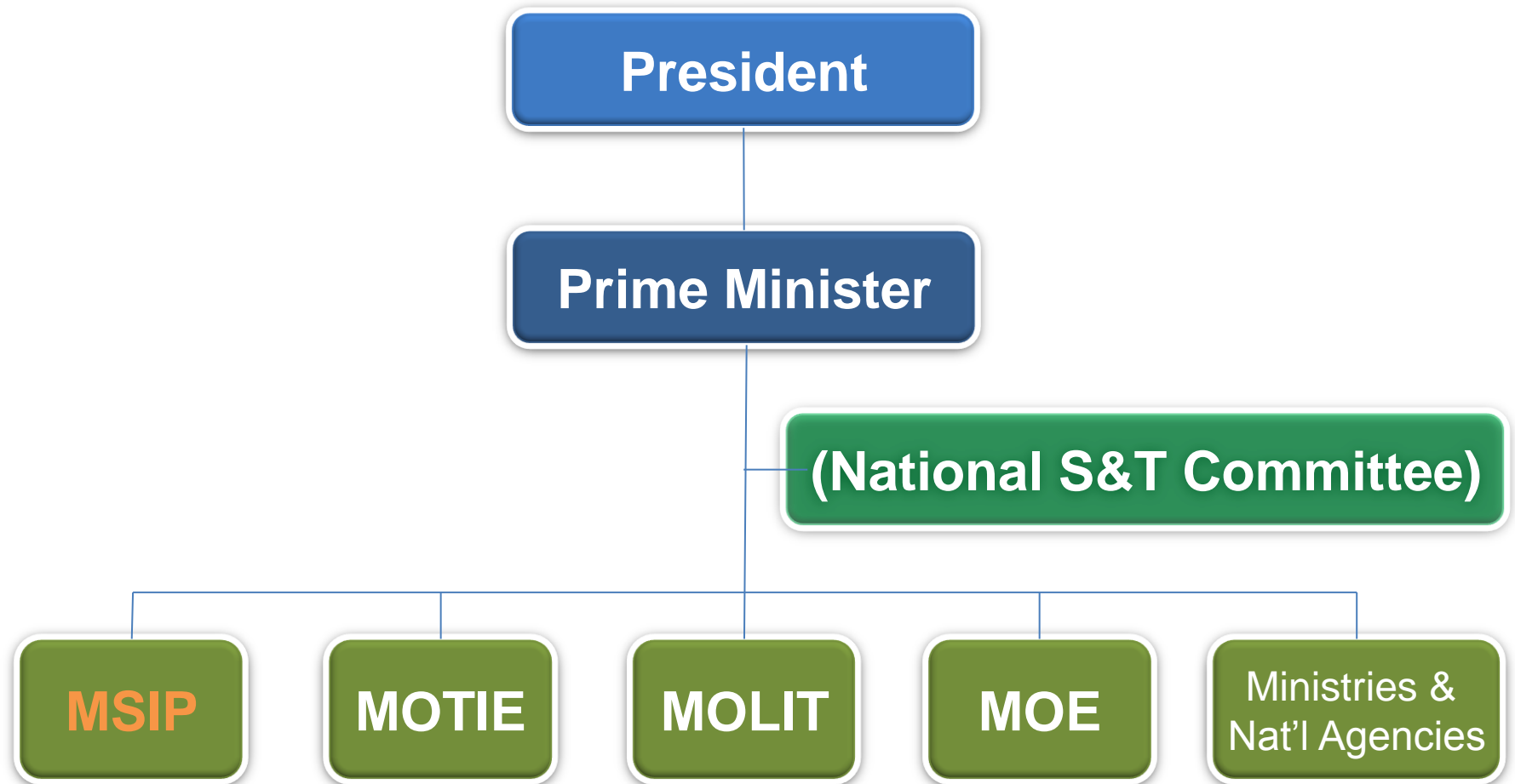
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# 1. S&T Governance

# Science and Technology Governance (since 2013)



# Ministry of Science, ICT and Future Planning: MSIP

Minister

1<sup>st</sup> Vice Minister

- Office, Strategy and Planning
- **Office, Future Leading Research**
  - **R&D Policy Bureau**  
**(6 Div. & 2 Team)**
    - **Fusion R&D support Team**
  - Research Cooperation Bureau
  - Space & Nuclear R&D Bureau
- S&T Policy Bureau, S&T HR Bureau

2<sup>nd</sup> Vice Minister

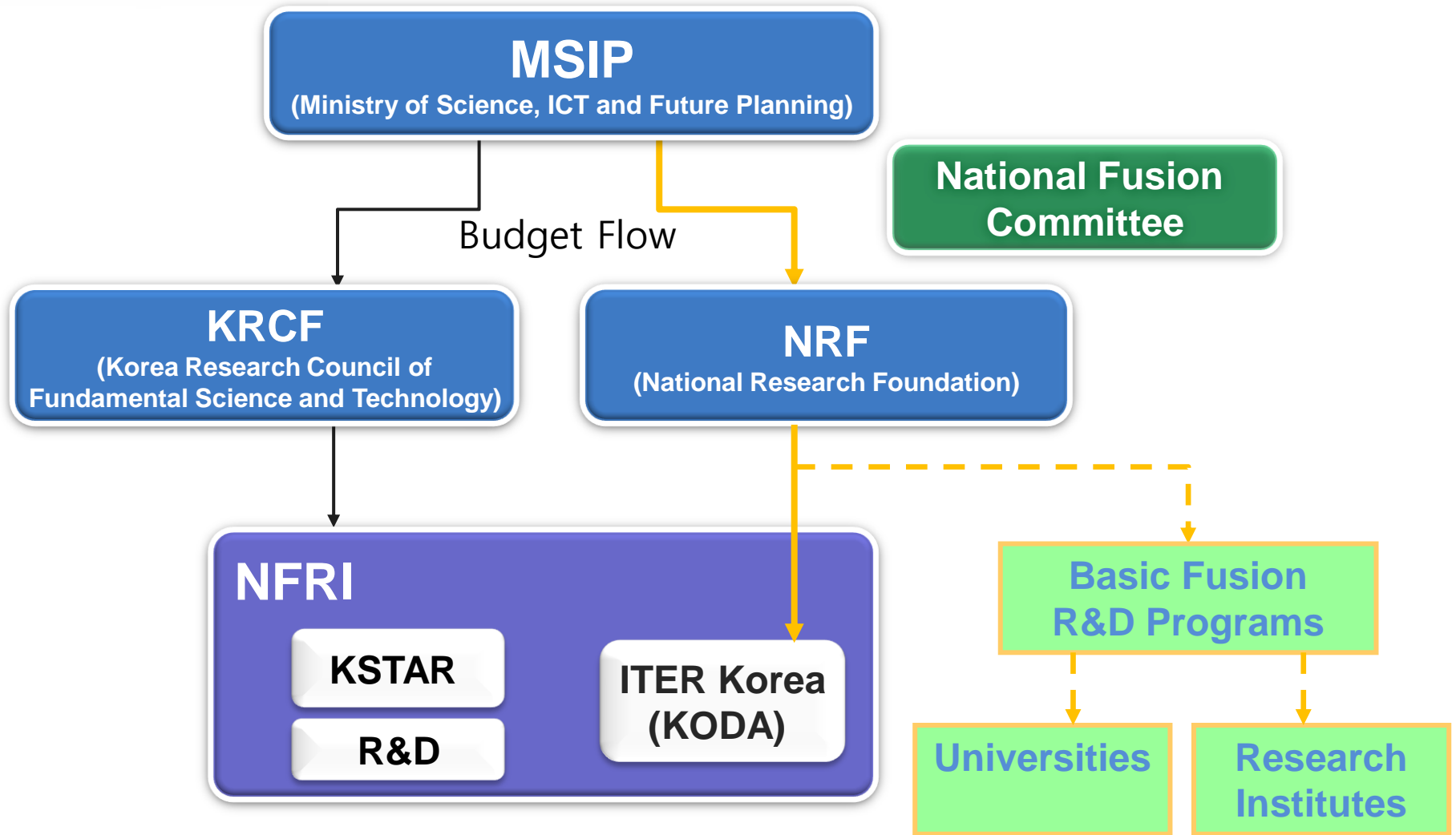
- Office, Broadcast & Com. Convergence
  - Convergence Policy Bureau
  - Broadcast Promotion Policy Bureau
  - Radio Policy Bureau
- ICT Industry Bureau
- Communication Policy Bureau ...

## **2. Introduction to Fusion R&D in Korea**

# History of Fusion R&D in Korea

- Dec. 1995 Confirmation of the 「**National Fusion R&D Master Plan**」  
- **KSTAR Project launched**
- Jun. 2003 Official entry into the 「ITER Project」
- Oct. 2005 Establishment of 「**NFRI**」
- Mar. 2007 Enact “**Fusion Energy Development Promotion Law**”
- Aug. 2007 1<sup>st</sup> Framework Plan for Fusion Energy (2007-2011)
- Sep. 2007 Completion of **KSTAR** device construction  
- ITER Korea (Domestic Agency for KO) launched
- Jul. 2008 KSTAR **First Plasma achieved**
- Dec. 2011 **2nd Framework Plan** for Fusion Energy(2012-2016)

# Governance and Budget Flow of Fusion R&D





# Fusion Energy Development Promotion Law

- To establish a **long-term and sustainable legal framework** for fusion energy development phases
- To promote industries and institutes participating fusion energy development by support and benefit

**National Fusion Committee**

The highest legal decision making body for Fusion R&D



**Framework Plan for Fusion Energy**

5 years' term of R&D FP  
Adopted by NFC

# 2<sup>nd</sup> Framework Plan for Fusion Energy Development during 2012 - 2016

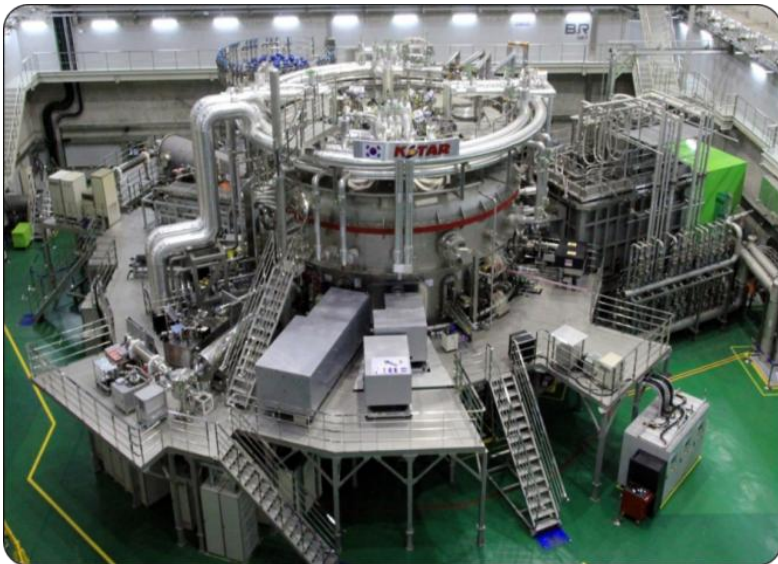
## ◆ Primary Strategy for the 2<sup>nd</sup> Framework Plan

- to obtain **high-performance plasmas at KSTAR** and begin the basic study for DEMO technology
- to promote basic researches in fusion areas and cultivate competent man-power for fusion research
- to enhance international cooperation and **to improve KO contributions for ITER future operations**
- to develop the fusion/plasma technologies for commercialization and enhance the public awareness

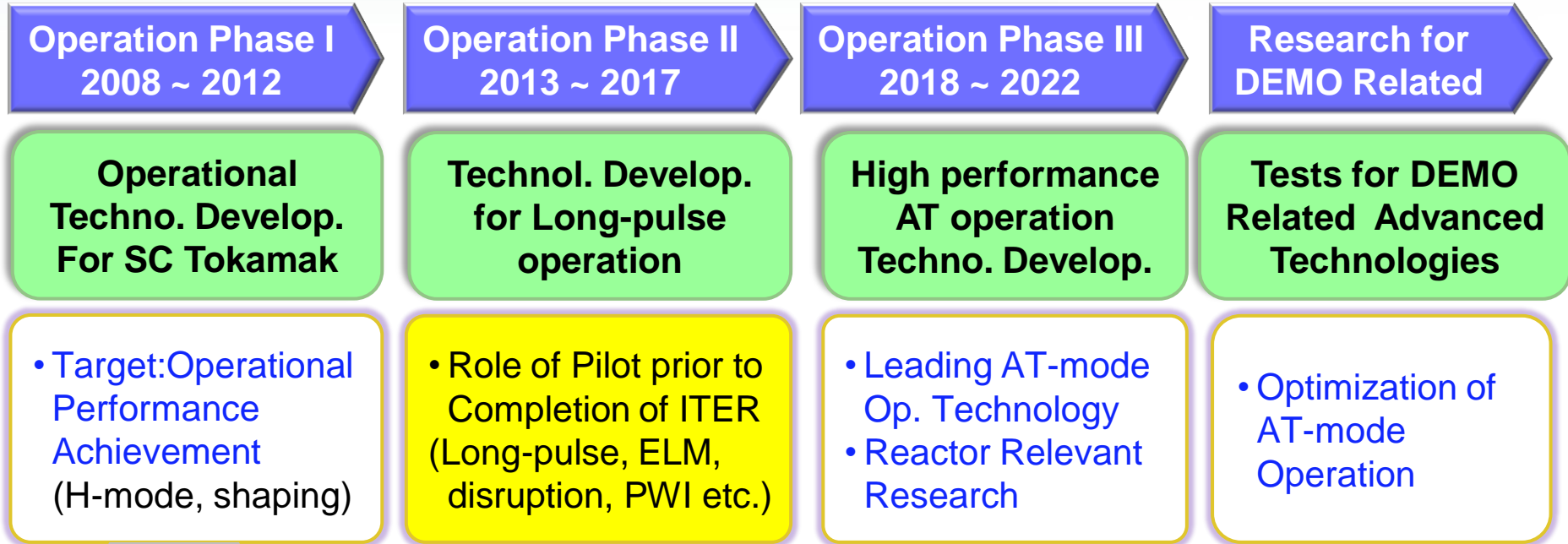
# **3. Major Fusion R&D Programs**

# Four Major R&D Programs ;

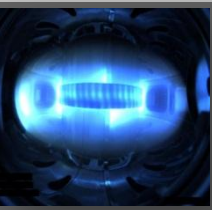
- (1) KSTAR related R&Ds
- (2) ITER Korea Project
- (3) Basic Fusion Energy R&Ds
- (4) Plasma and Other Fusion Energy R&Ds



# (1) KSTAR Related R&Ds

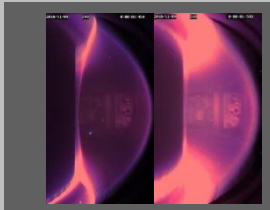


**First Plasma (2008)**

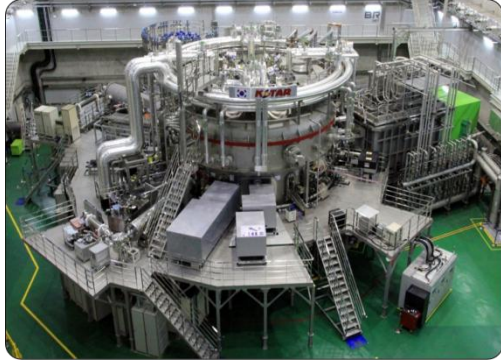


133 kA  
0.25 sec  
1.5 Tesla

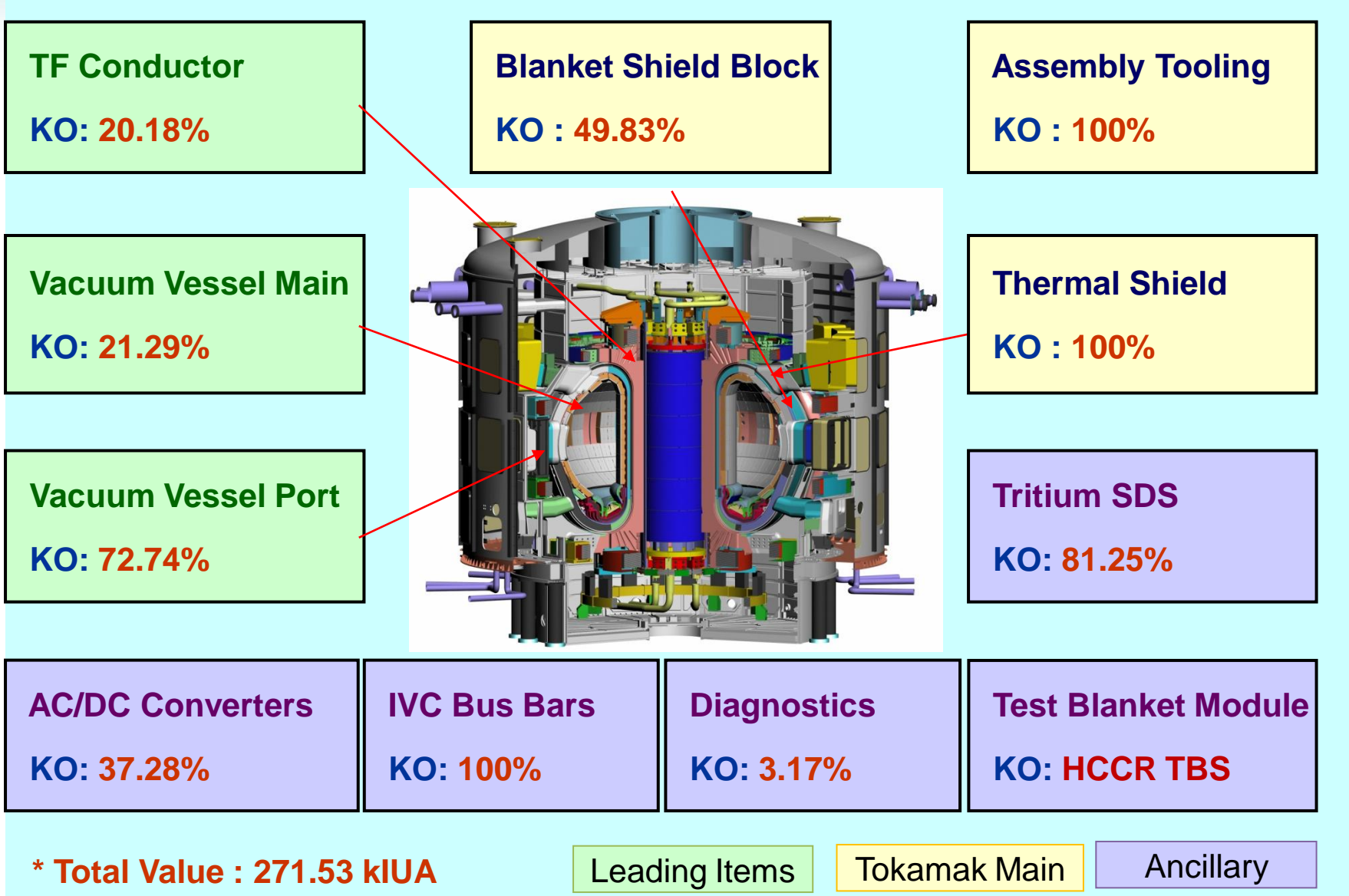
**H-mode plasma (2012)**



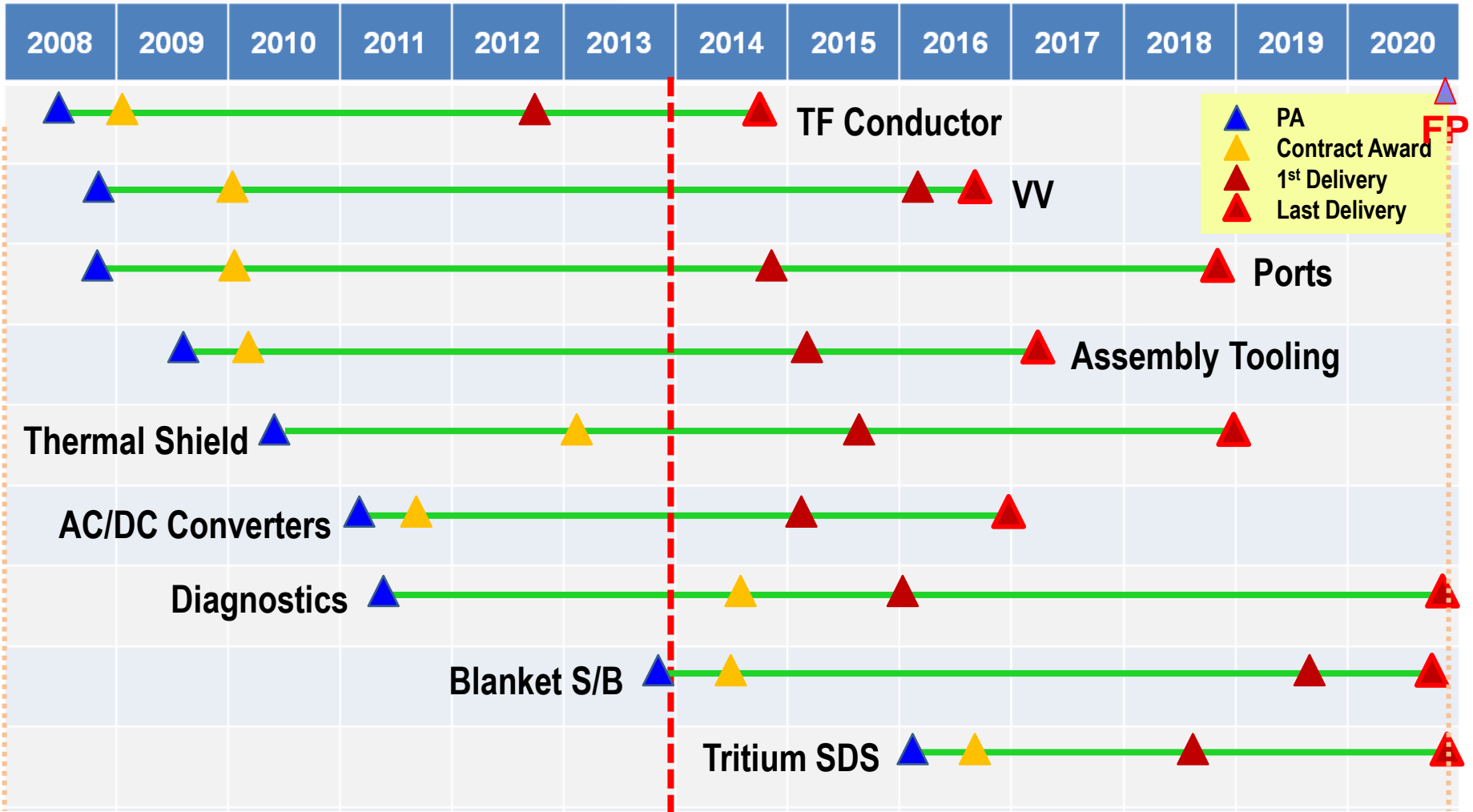
~0.9 MA  
> 17 sec  
1 ~ 3.5 Tesla



# (2) ITER Project: Procurement Packages(1/2)



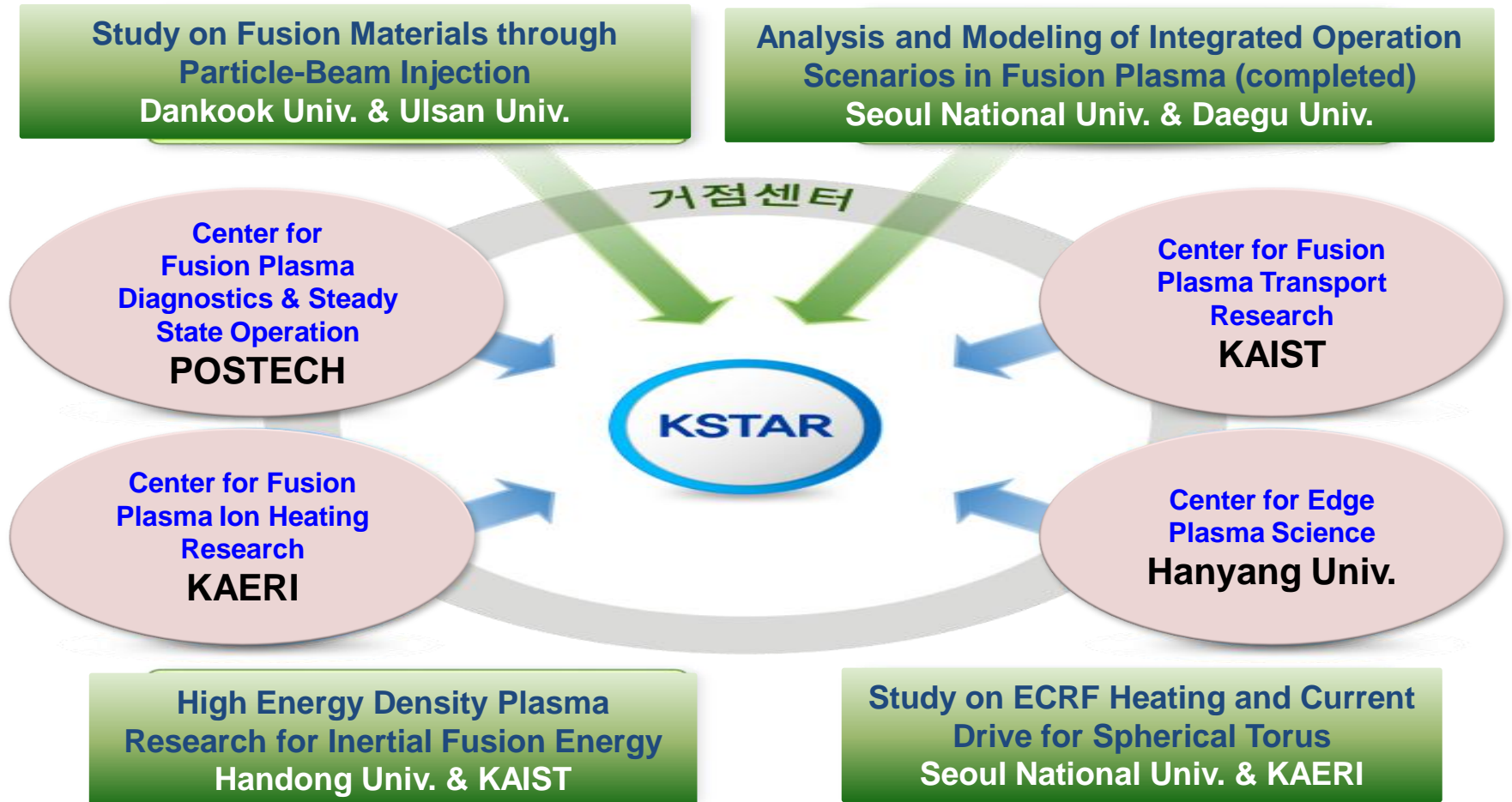
# (2) ITER Project: Procurement Schedule(2/2)



\* IVC Bus Bar : TBD

# (3) Basic Fusion Energy R&D Programs

- Development of fusion core technologies and human resources through University-based basic fusion programs since 2009

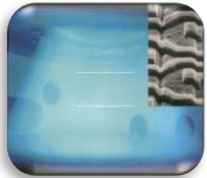




# (4) Plasma and Other Fusion Energy R&Ds

## Plasma Application Technologies

Semiconductor Etching



Plasma Display



Plasma Torch



Waste Incineration



Bio Applications



Odor Treatment



Ceramic Manufacturing



Plasma Farming



purification of wastewater



Plasma Engine



Plasma Coating



Plasma Light bulb



## Conceptual Study of DEMO

- ❖ Demonstrate full power core and plant subsystems as representative of a future commercial power plant
- ❖ Entirely remotely maintenance
- ❖ 100% non-inductive tokamak plasma for steady state operation

# **4. Cooperation Activities**

# International Cooperation Activities

- Bi-lateral **Fusion Cooperation Arrangement/Agreement** with **4 states** for Fusion Energy Research: **Japan, US, EU and China**
- Collaborating Fusion R&D Institutes around the World
  - Asia: China (ASIPP, SWIP), Japan (JAEA, NIFS), India (IRP)
  - US: PPPL, ORNL, LLNL, GA, etc.
  - Europe: France (CEA), UK (CCFE, Oxford Univ.), Germany (KIT, IPP), Netherlands (TU/e, DIFFER), Hungary (HAS/Wigner RCP), Italy (ENEA), Switzerland (CRPP-EPFL), etc.
  - Others: Australia (ANU), Canada, etc.

# Summary

- Korea is keen to accumulate key fusion technologies for commercialization of fusion energy in the future based on KSTAR and ITER project.
- The successful ITER project will induce a good opportunity for KO to undertake a fast track to build a fusion reactor.
- KO is collaborating and ready to collaborate in all areas of nuclear fusion technologies with other ITER Members.

**Thank you for your attention!**