

## *ITER Project and USIPO Activities*

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FY 2010 OFES Budget Planning Meeting  
Gaithersburg, MD  
March 11, 2008



# U.S. ITER Project Scope

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- In-kind contributions of hardware and its delivery to France
- In-kind contribution of secondees to the ITER Organization
- Cash contributions for R&D and Common Fund expenses (e.g., ITER Organization direct staff and services, machine assembly/installation/commissioning)
- Operation of the U.S. ITER Project Office at ORNL in conjunction with partner Labs PPPL and SRNL
- Cash contributions to the Central Reserve (upon Council approval)

- Dr. Ray Orbach, DOE Under Secretary for Science, March 5, 2008 Congressional Testimony:  

**“The world faces a series of tough choices in meeting our energy needs over the next century. While no silver bullet may exist, fusion appears to be the closest. Fusion energy provides the real possibility of abundant, economical, and environmentally benign energy, starting around mid-century. Our investments today will have huge pay-offs for our children and grandchildren.”**
- Despite the FY2008 Budget shortfall, the U.S. ITER Project remains the highest priority in the DOE Office of Science’s *Facilities for the Future of Science: A Twenty-Year Outlook*.
- Using uncosted prior year funds and the \$10.6M FY2008 appropriation for ITER, the U.S. ITER Project has retained a core team and remained engaged with the ITER Organization in finalizing the ITER design and establishing a credible construction schedule. U.S. secondees remain on assignment in France. Our cash contributions and long-lead procurements, however, are being deferred until additional funds become available.

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# FY2009-10 ITER Budget Requests

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- President's FY2009 Budget Request calls for \$214.5M
  - **Consistent with previous funding projections**
  - **Enables U.S. to meet 2008 – 09 cash commitments to the ITER Organization**
  - **U.S. ITER Project staffing will be reconstituted**
  - **Permits U.S. design and R&D activities to move forward, and allows long-lead hardware procurements to be initiated**
  - **Helps restore international confidence in U.S. commitment**
- Realization of the FY2009 request is crucial for the success of ITER and for the future health of the U.S. Fusion Program.
- FES guidance for FY 2010 Budget Request (\$209.3M) is also consistent with previous projections, and it adequately supports ITER schedule.

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# Overall Status of ITER

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- International
  - ITER Organization became a legal entity in October 2007 and 1<sup>st</sup> ITER Council meeting was held in November
  - ITER Organization staffed to ~1/3 of full strength; employees are now under 5-year contracts
  - ITER Council's S&T and Management Advisory Committees are operational and engaged. Financial Audit Board has been formed and will meet in March.
  - Members' Domestic Agencies have all been formally established and are becoming operational (some faster than others)
  - ITER Organization has just submitted the Preliminary Safety Report to the French regulatory authorities

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# Overall Status of ITER

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- International (continued)
  - **Construction Site Preparations:**
    - Starting platform leveling
    - Excavation for Buildings to begin in early 2009
  - Design Review concluded, but there is urgent ongoing work to resolve some key technical issues identified by STAC: ELM control, plasma vertical stability, disruption forces, which have implications for design of vacuum vessel, first wall, and poloidal field magnets.
  - The first hardware Procurement Arrangements between ITER Organization and Domestic Agencies are being established.
  - ITER Organization is developing a bottoms-up Integrated Project Schedule. Indications are that construction completion will slip to 2018-19.

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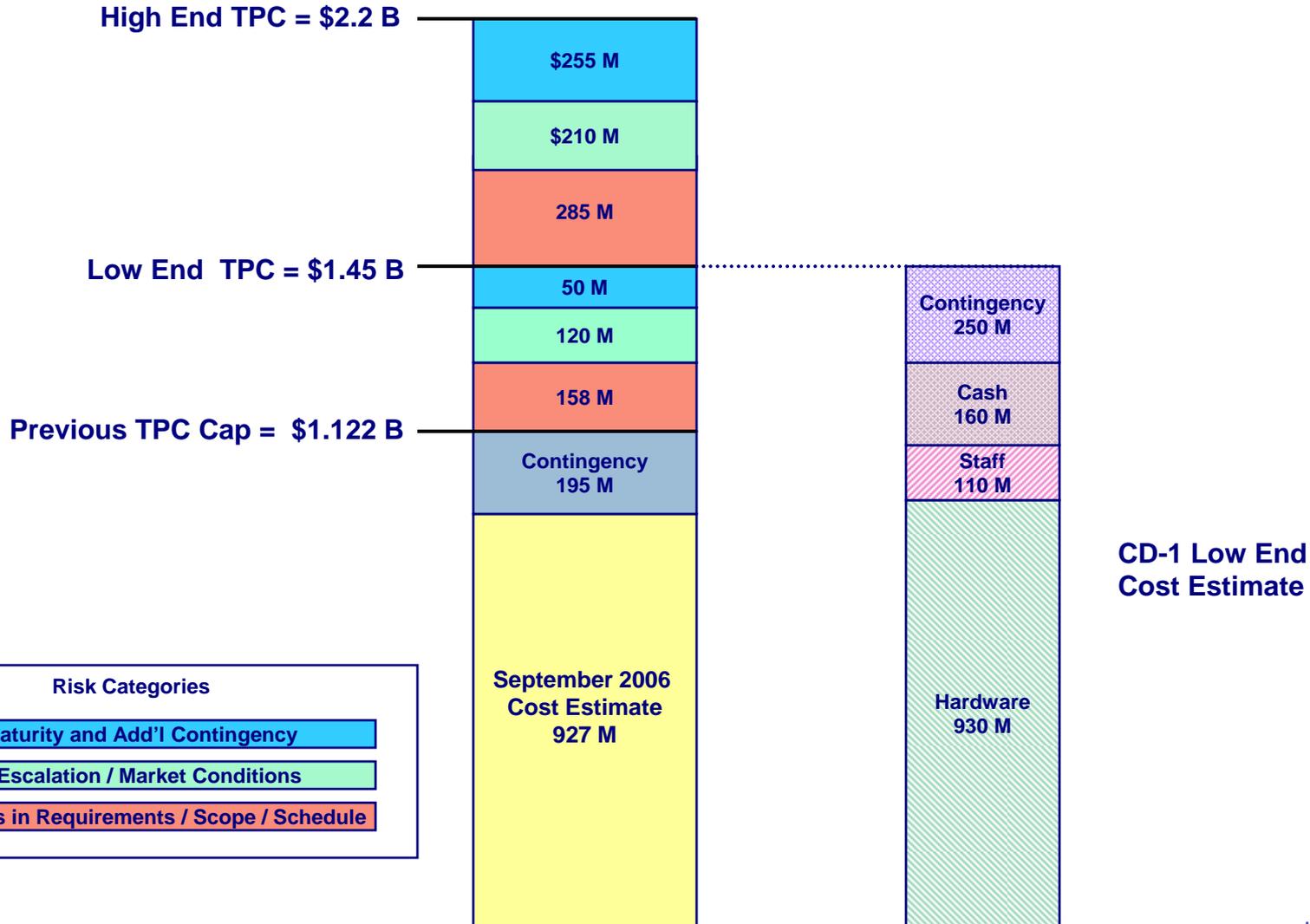
# Overall Status of ITER

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- Domestic (U.S. ITER Project)
  - Achieved Critical Decision 1 (Approve Alternative Selection and Cost Range) in January 2008. Total Project Cost range set at \$1.45B - \$2.2B based on analysis of risks and present market environment. This range supercedes the previous OMB cap of \$1.122B.
  - Critical Decision 2 (Approve Performance Baseline) is projected to occur in FY2009-10 depending on how soon the ITER Organization can establish their own baselines for the entire construction phase of ITER. DOE will conduct Lehman reviews and an External Independent Review at the appropriate times to validate schedule and cost estimates for the U.S. ITER Project. Baseline funding profile will be set.

# CD-1 TPC Range for U.S. ITER Project



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# ITER Test Blanket Module Program

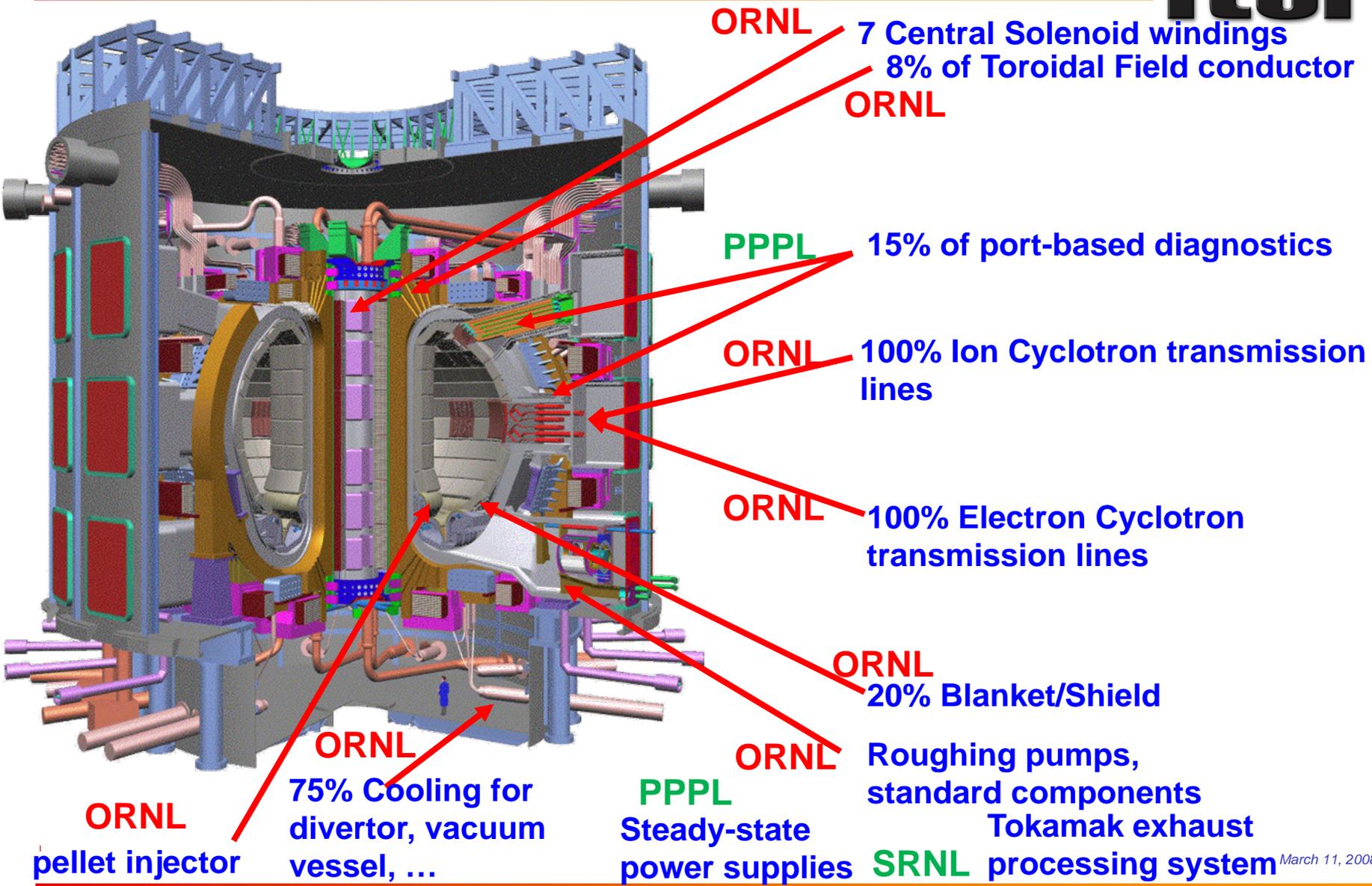
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- The U.S. does not plan to be one of the three TBM Port Masters, nor one of the six TBM Concept Leaders. For budgetary reasons, we will not lead any effort to design and build a TBM for installation on ITER.
- The U.S. has agreed to pay its 9.1% share (< \$10M) of the added civil infrastructure costs to accommodate an ITER TBM Program.
- Per OMB guidance, the U.S. cannot make further financial commitments for TBM involvement until ITER construction is more assured.
- The U.S. is reserving the option to be a future collaborator in design, R&D, fabrication, and testing of one or more TBM concepts.
- Any future involvement and commitment by the U.S. will be consistent with ITER's yet-to-be-developed TBM Program Plan, which is itself part of the ITER Research Plan. These Plans will be reviewed by STAC and MAC, and approved by the ITER Council.

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# U.S. ITER In-kind Hardware Contributions



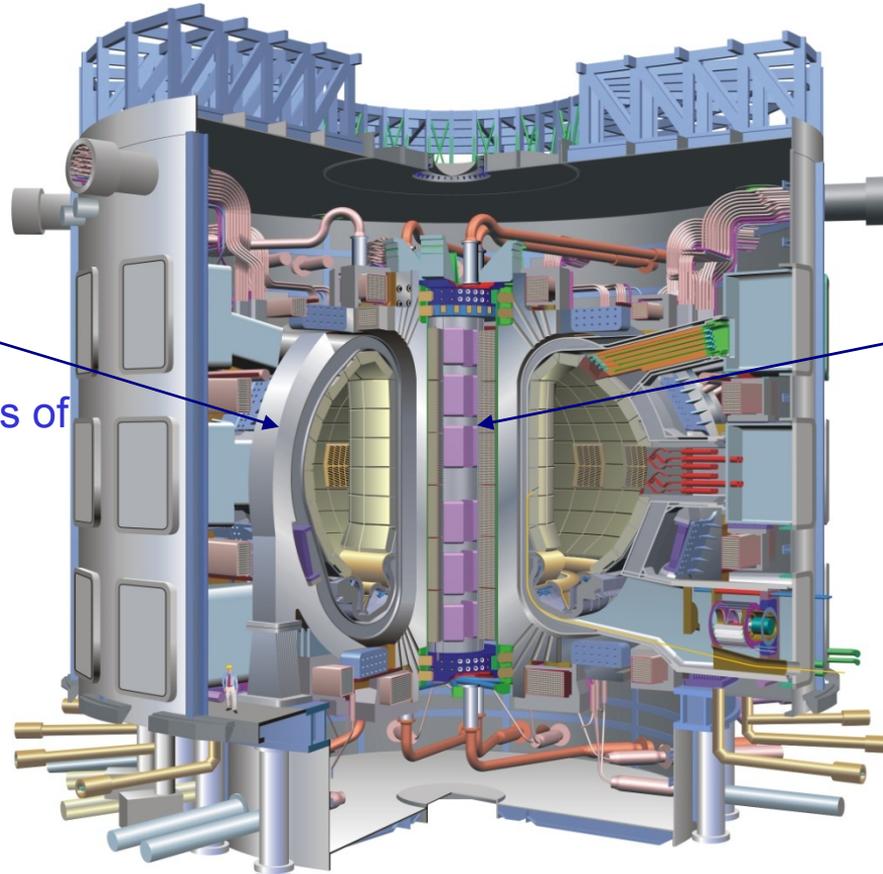
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# Magnet Systems Tasks: TF Conductor and Central Solenoid



## TF Coil:

U.S. produces 9 "long" double-pancake lengths of active cable-in-conduit conductor (CICC) plus 1 dummy length (8% of total)

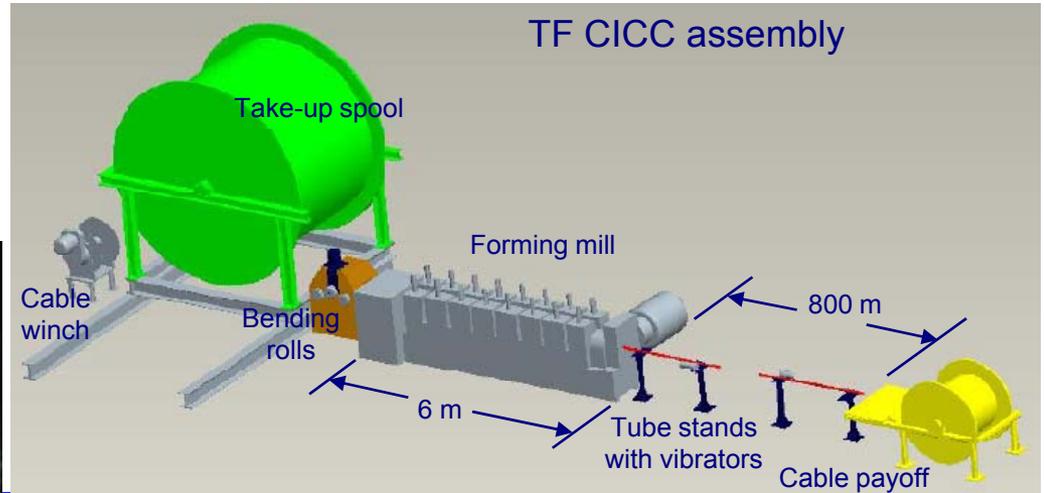
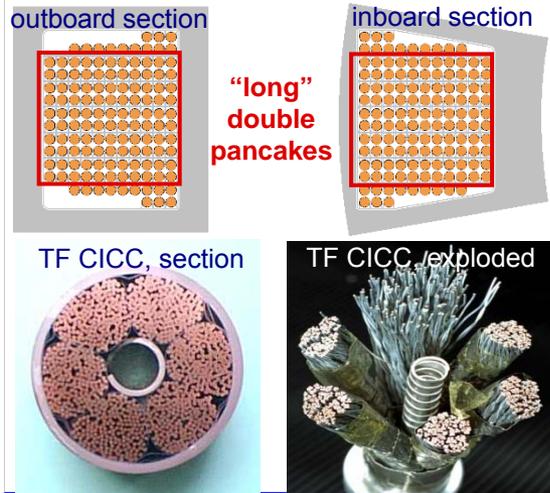
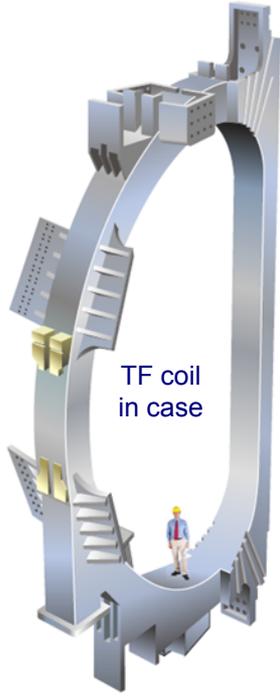


## CS Coil:

U.S. produces 7 coil modules (6 and 1 spare) using JA-supplied CICC plus the structure for pre-compression and suspension of the CS from the TF assembly

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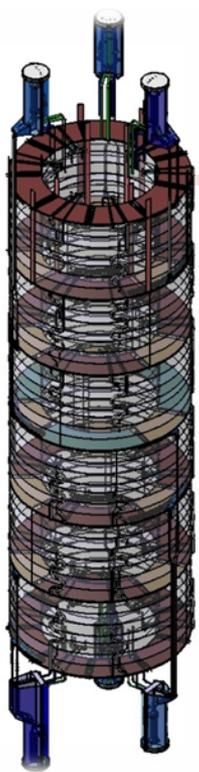
# Toroidal Field Coil Conductor



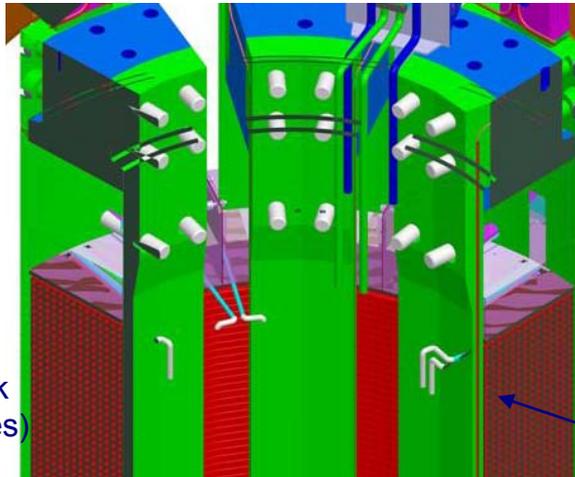
	R&D	Design & Fabrication
<b>FY 2008:</b>	<ul style="list-style-type: none"> <li>Minimal R&amp;D due to budget reductions.</li> <li>Approximately \$800K, mostly for Nb<sub>3</sub>Sn sub-element billets (longest lead)</li> </ul>	<ul style="list-style-type: none"> <li>Continue conductor design with the IO.</li> <li>Expect agreement on a Procurement Arrangement.</li> </ul>
<b>FY 2009:</b>	<ul style="list-style-type: none"> <li>100m dummy CICC, process development</li> <li>Complete CICC integration facility</li> <li>800m dummy CICC, process qualification</li> <li>Two 100m active CICC, process qualification</li> </ul>	<ul style="list-style-type: none"> <li>Award procurement contracts (wire, cabling services, conduit steel, and tubing).</li> </ul>
<b>FY 2010:</b>		<ul style="list-style-type: none"> <li>Continue fabrication and procurement of components.</li> </ul>

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# Central Solenoid Coil



CS stack  
(6 modules)



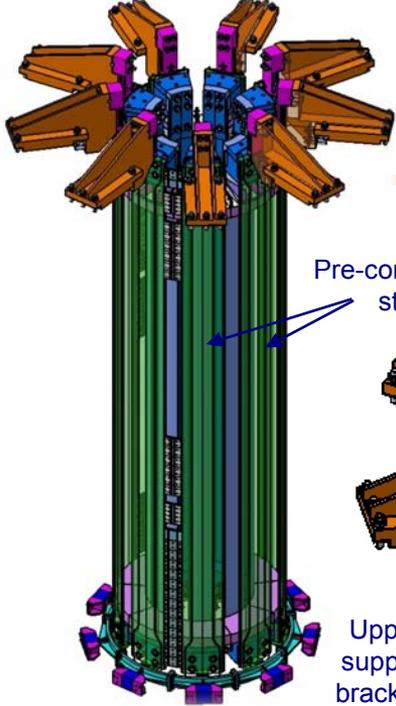
CS module  
winding pack

JA-supplied CICC



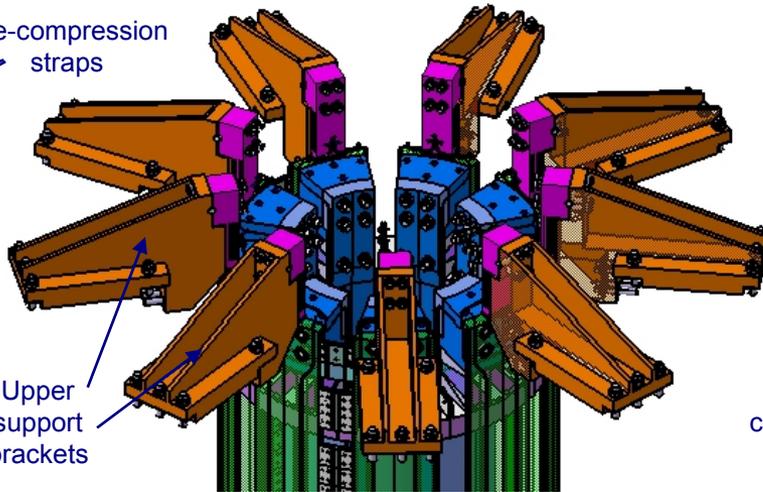
	R&D	Design & Fabrication
<b>FY 2008:</b>	<ul style="list-style-type: none"> <li>Minimal R&amp;D due to funding reductions.</li> <li>Commercial vendors develop tooling, process and critical components.</li> </ul>	<ul style="list-style-type: none"> <li>Continue CS coil design and interfaces with the IO.</li> <li>Expect agreement on a Procurement Arrangement.</li> </ul>
<b>FY 2009:</b>	<ul style="list-style-type: none"> <li>Complete major R&amp;D tasks (joint development, NDE process, JA jacket material characterization).</li> </ul>	<ul style="list-style-type: none"> <li>Select coil design and manufacturing vendors.</li> <li>Perform detailed design.</li> <li>Fabricate tooling and fixtures.</li> </ul>
<b>FY 2010:</b>		<ul style="list-style-type: none"> <li>Complete design.</li> <li>Continue establishing manufacturing capability.</li> </ul>

# Central Solenoid Structure

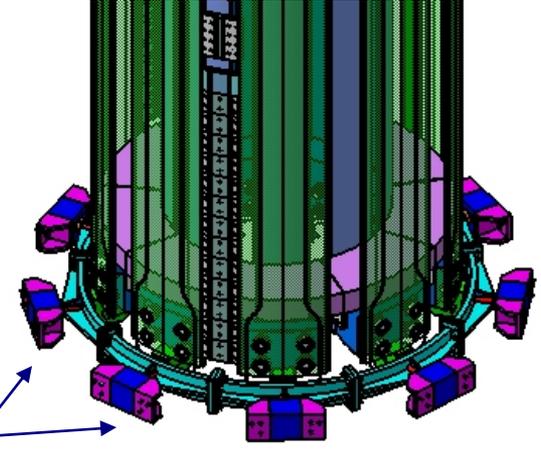


Pre-compression straps

Upper support brackets



Lower centering blocks



	R&D	Design & Fabrication
<b>FY 2008:</b>	<ul style="list-style-type: none"> <li>Minimal R&amp;D due to funding reductions.</li> <li>Commercial vendors develop tooling and critical components.</li> </ul>	<ul style="list-style-type: none"> <li>Continue CS coil design and interfaces with the IO.</li> <li>Expect agreement on a Procurement Arrangement.</li> </ul>
<b>FY 2009:</b>	<ul style="list-style-type: none"> <li>Complete R&amp;D.</li> <li>Start development of fabrication methods and tests.</li> <li>Develop materials database.</li> </ul>	<ul style="list-style-type: none"> <li>Perform preliminary design and analysis.</li> <li>Bulk purchase of 316LN stainless steel.</li> </ul>
<b>FY 2010:</b>		<ul style="list-style-type: none"> <li>Complete design and produce fabrication drawings.</li> </ul>

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# U.S. ITER - Magnet Industrial Procurements



**FY08**

**FY09**

**FY10**

**FY11 and Beyond**

*CS Jacket Material Characterization*  
*CS Coil and Structure Design Studies*  
*TF Fabrication Facility Studies*

*CS Coil Structure Manufacturing Studies*  
*CS Coil Design and Development*  
*CS Coil Tooling Design and Development*  
*TF Conductor Prototypes Manufacturing/Qualification*

*Bulk Steel Material*  
*CS Coil Fabrication*  
*CS Structure Fabrication*  
*TF Facility Integration*  
*TF Conductor Fabrication*



**R&D**

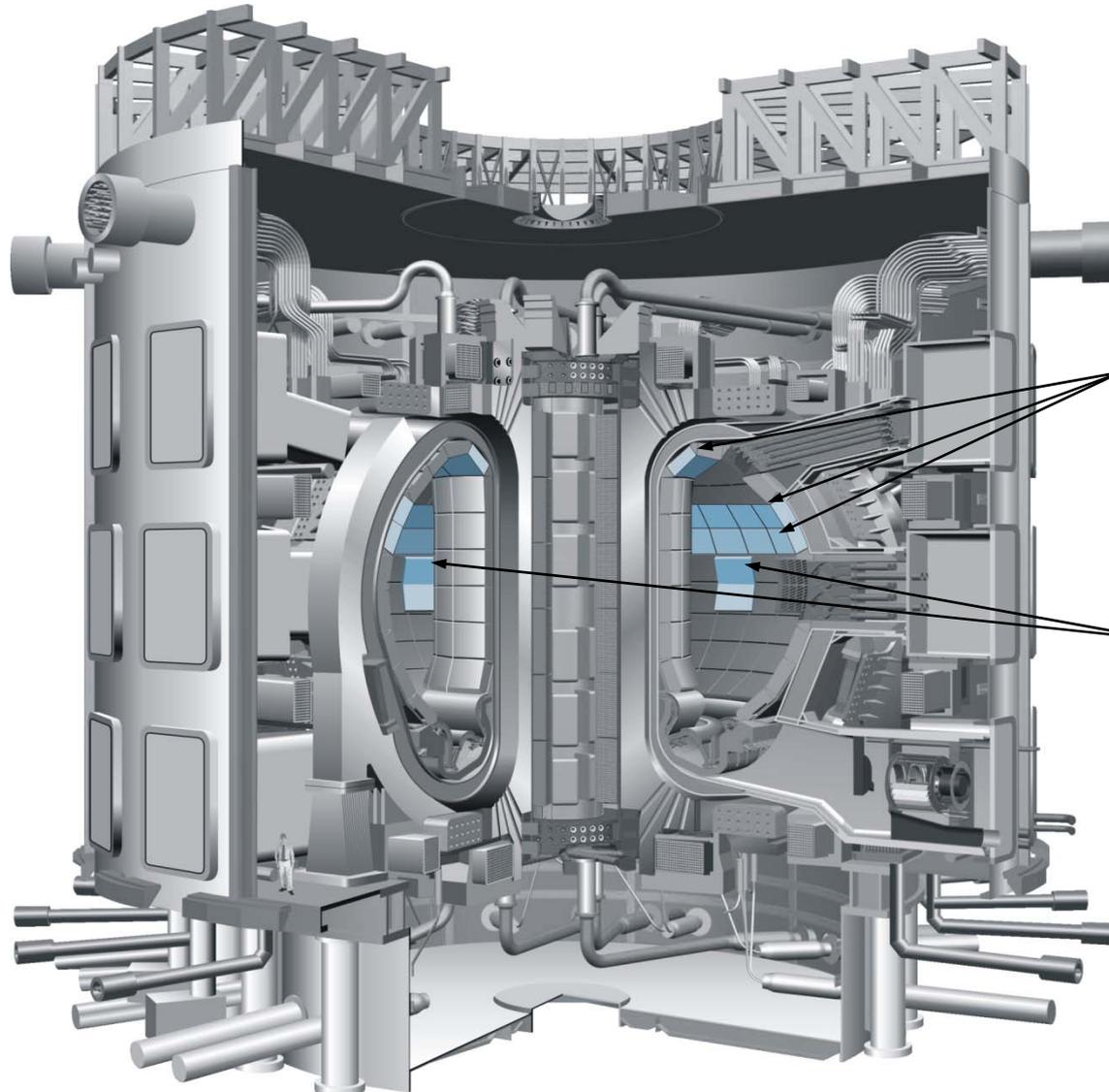


**Industrial Engineering**



**Industrial Fabrication**

# Blanket and Port Limiter Systems



**U.S. ITER  
Blanket Module  
Allocation  
(20%)**

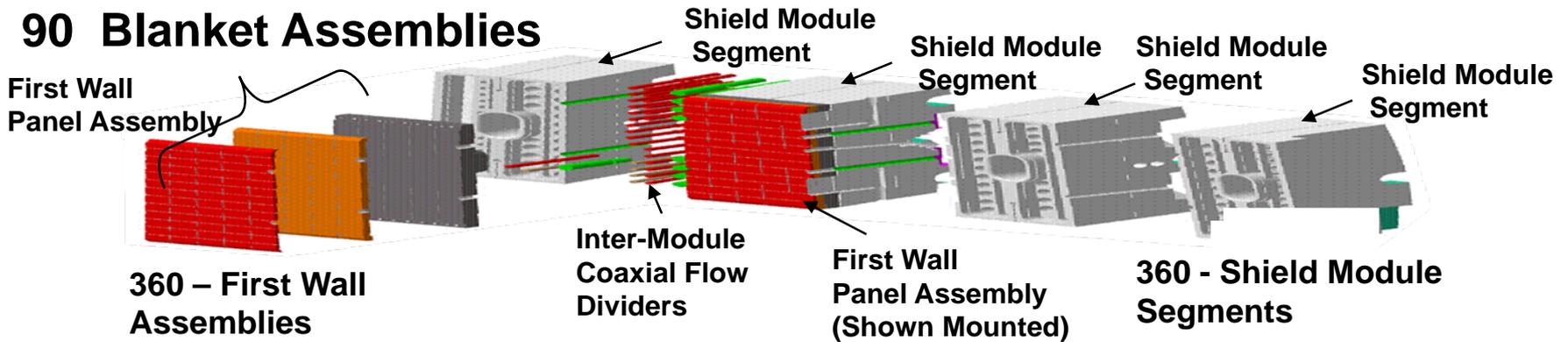
**U.S. ITER  
Port Limiter  
Allocation  
(100%)**

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# First Wall and Shield



## 90 Blanket Assemblies



	R&D	Design & Fabrication
<b>FY 2008:</b>	<ul style="list-style-type: none"> <li>• Complete all residual R&amp;D work activities.</li> <li>• Perform First Wall Quality Mockup tests.</li> </ul>	<ul style="list-style-type: none"> <li>• Assist the IO in the generic blanket design.</li> </ul>
<b>FY 2009:</b>	<ul style="list-style-type: none"> <li>• Construct First Wall “semi-prototype” and Shield Module Qualification Mockups.</li> </ul>	<ul style="list-style-type: none"> <li>• Assist the IO in the generic blanket design.</li> <li>• Begin design of first wall and shield.</li> <li>• Bulk purchase of 316LN stainless steel.</li> </ul>
<b>FY 2010:</b>	<ul style="list-style-type: none"> <li>• Perform First Wall “semi-prototype” and Shield Module Qualification Tests.</li> </ul>	<ul style="list-style-type: none"> <li>• Perform design of first wall and shield.</li> <li>• Draft Technical Specification Document with the IO.</li> </ul>

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# U.S. ITER - Blankets Industrial Procurements



**FY08**

**FY09**

**FY10**

**FY11 and Beyond**

*Cast Material Characterization  
Process Qualifications (welding)*

*Studies for Cost, Process, Comparison/Optimization  
Expression of Interest/Market Research  
Initiate Commercial Manufacturing Studies*

*Vendor Qualification  
Prototype Fabrication  
Manufacturing of Blanket  
Shield Modules and  
First Wall Assemblies*



**R&D**



**Industrial Engineering**



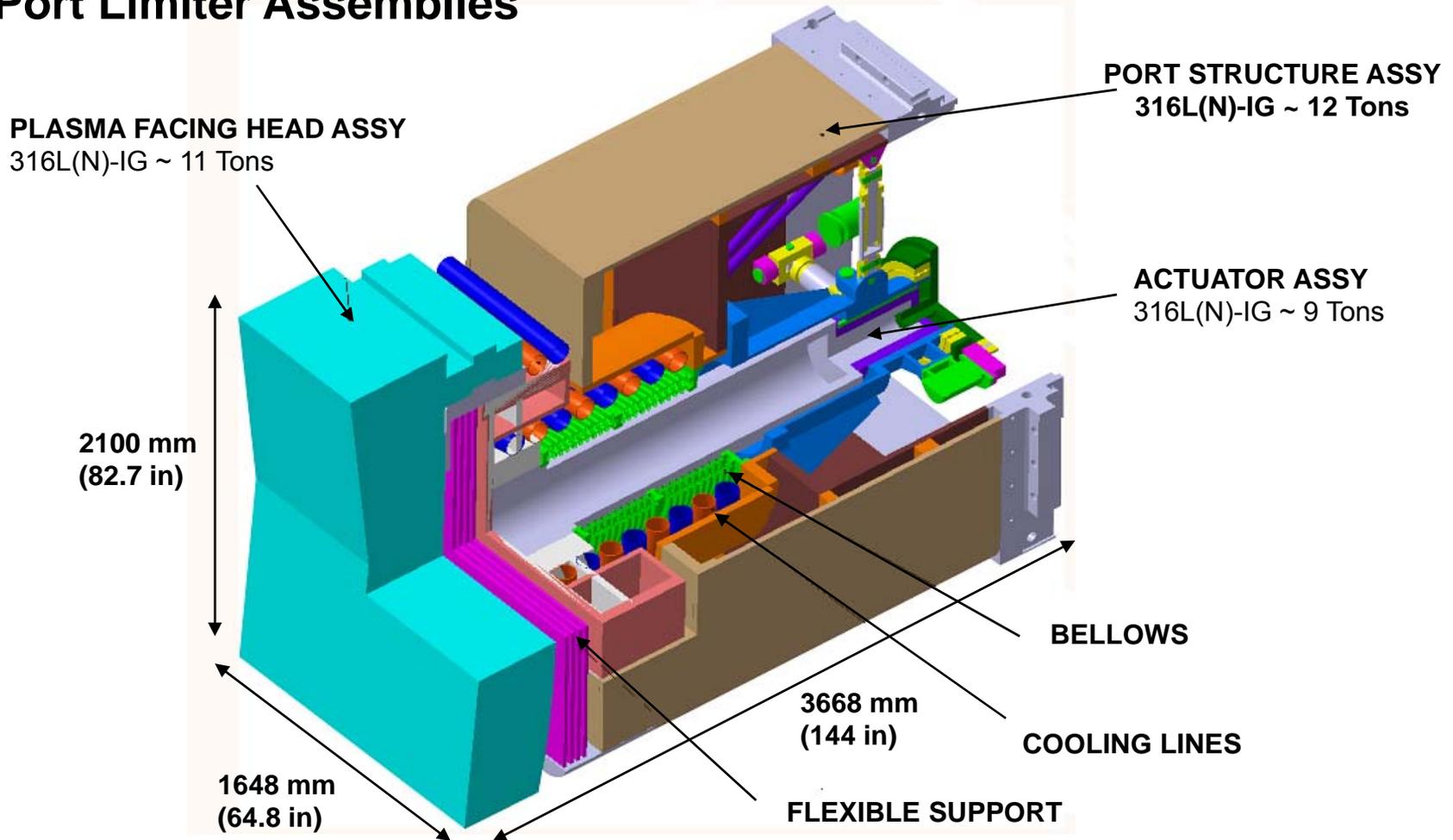
**Industrial Fabrication**

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# Port Limiter System



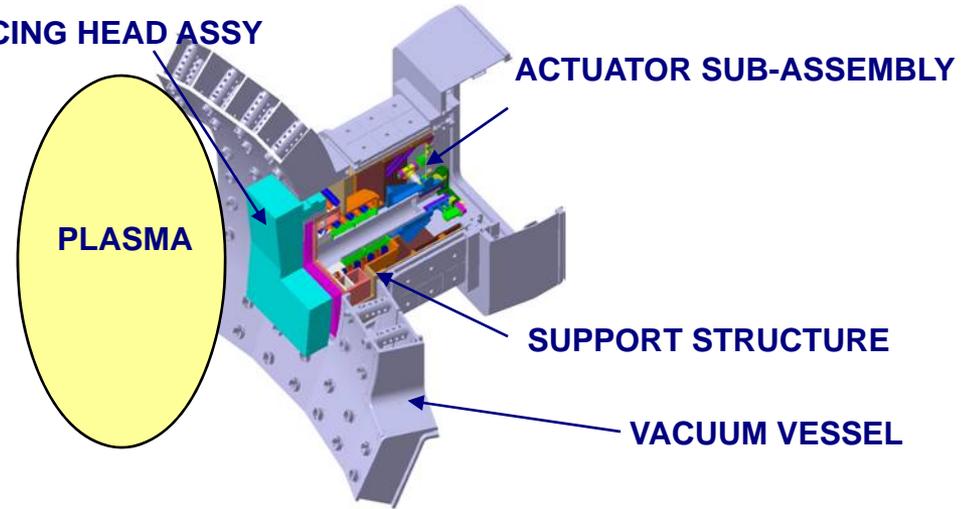
## 2 Port Limiter Assemblies



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# Port Limiters

All work on hold until decision of eliminating (or not) the port limiters is made.

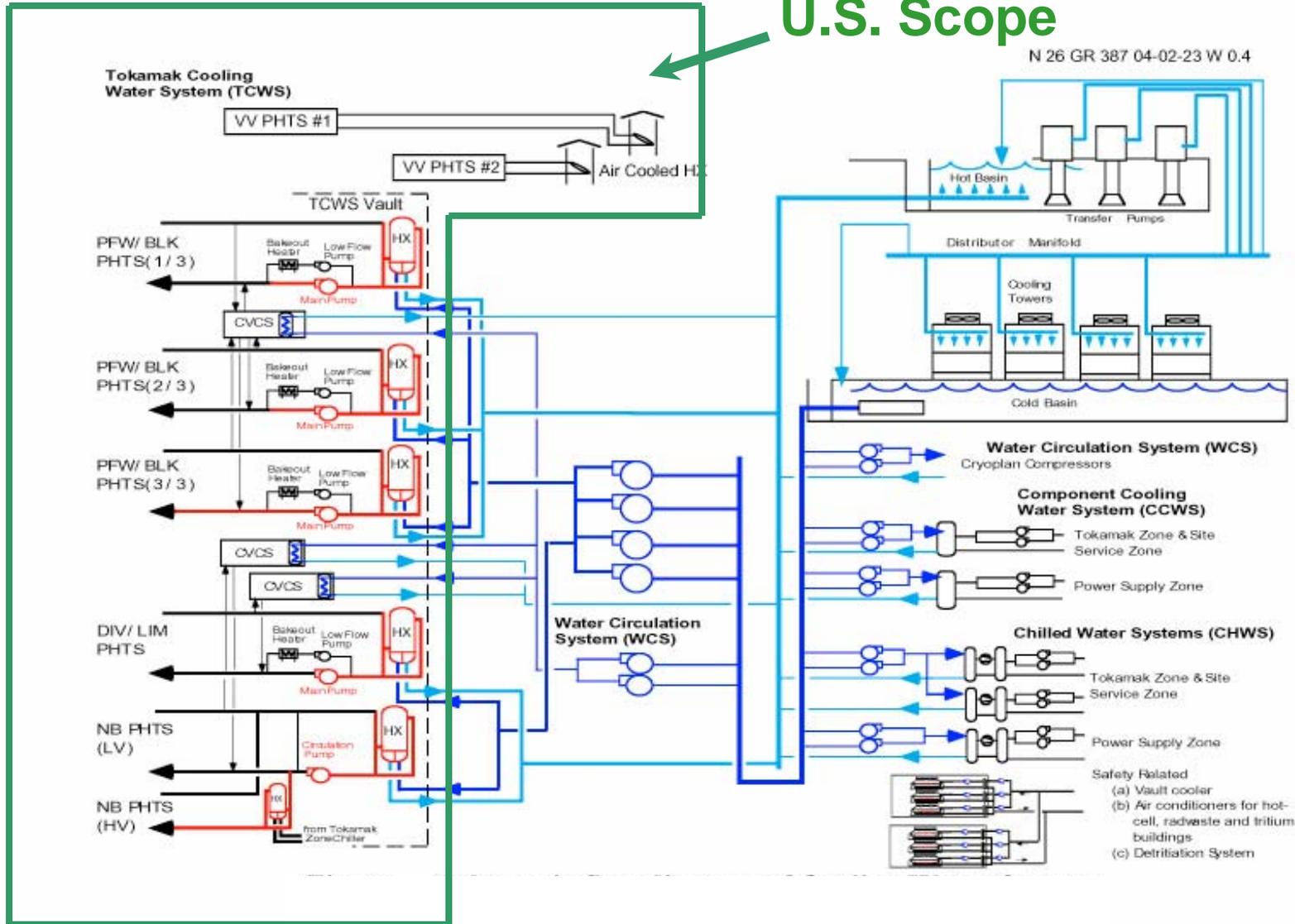


	R&D	Design & Fabrication
FY 2008:		
FY 2009:		
FY 2010:		

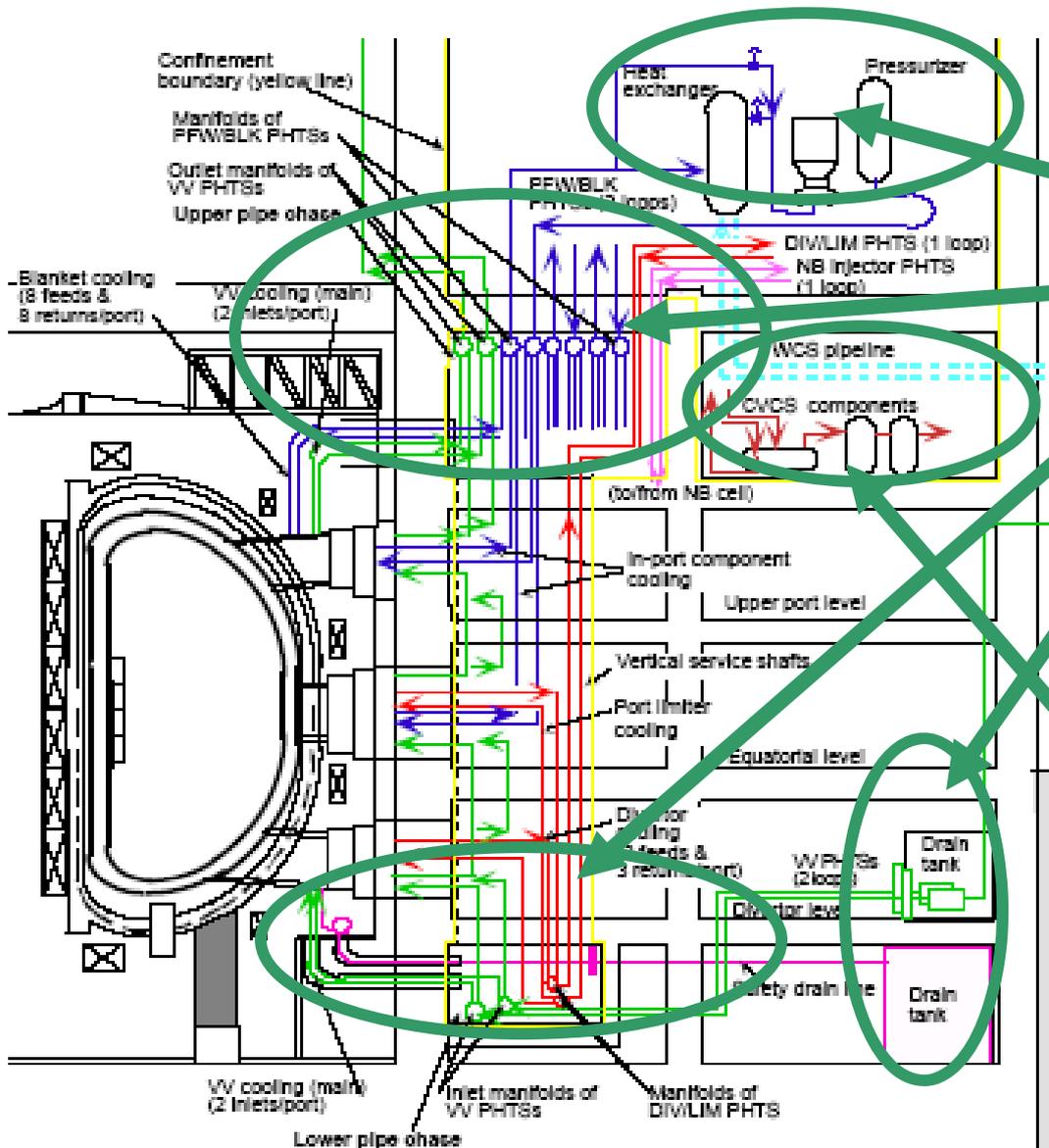
# Tokamak Cooling Water System (TCWS)



U.S. Scope



# Tokamak Cooling Water System



## Primary Heat Transfer:

- Vault
- Upper Pipe Chase
- Roof
- Lower Pipe Chase

## Support Systems:

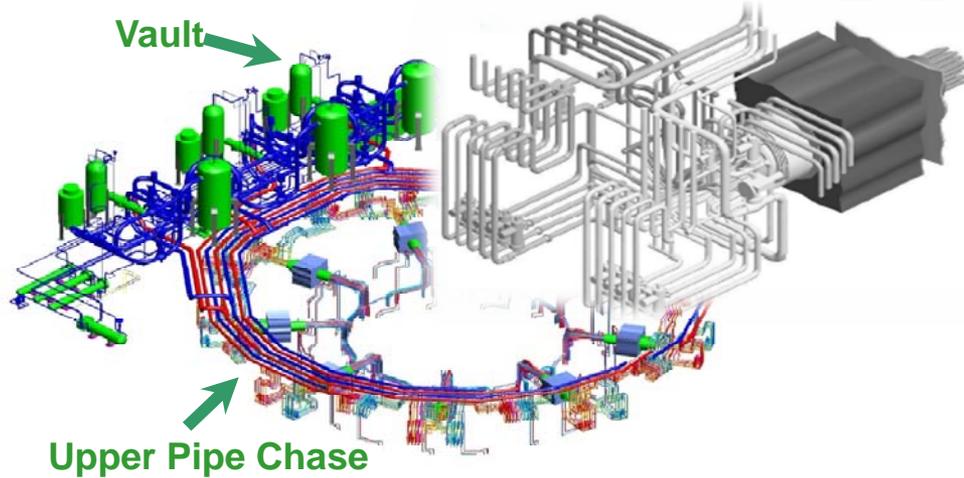
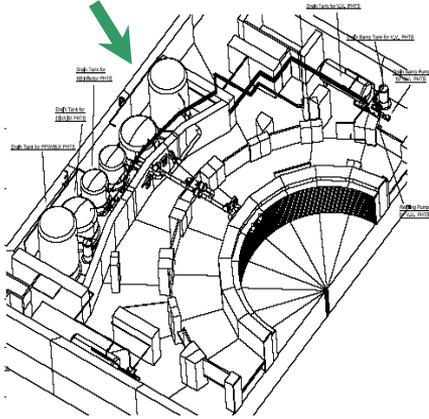
- Draining and Refilling (WBS1.2.1.6)
- Chemical and Volume Control System (WBS1.2.1.5)
- Drying (WBS1.2.1.7)

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# Tokamak Cooling Water System



## Draining and Refilling Subsystem



	R&D	Design & Fabrication
<b>FY 2008:</b>	<ul style="list-style-type: none"> <li>No R&amp;D required.</li> </ul>	<ul style="list-style-type: none"> <li>Continue planning, requirements definition and interfaces with the IO; evaluate design, including modeling and A/E review.</li> <li>Revise conceptual design.</li> </ul>
<b>FY 2009:</b>		<ul style="list-style-type: none"> <li>Complete conceptual design</li> <li>Start preliminary design.</li> </ul>
<b>FY 2010:</b>		<ul style="list-style-type: none"> <li>Complete preliminary design and begin detailed design.</li> <li>Review draft Procurement Arrangement with IO.</li> <li>Begin fabrication/procurement of early-delivery components.</li> </ul>

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# U.S. ITER - Cooling Water Industrial Procurements



**FY08**

**FY09**

**FY10**

**FY11 and Beyond**

**Design Requirements & Revised Design Concept**

**Conceptual Design**

**Preliminary Design**

**Detailed Design**

**Fabrication of eight major areas of the TCWS:**

- Draining and Refilling System
- Lower Pipe Chase Components
- Chemical & Volume Control System
- Heat Exchangers in Vault
- Pumps in Vault
- Roof Heat Exchangers
- Drying System
- Upper Pipe Chase Components

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*Establish Basic Ordering Agreements for Design Basis, and Design and Fabrication Management*



**R&D**



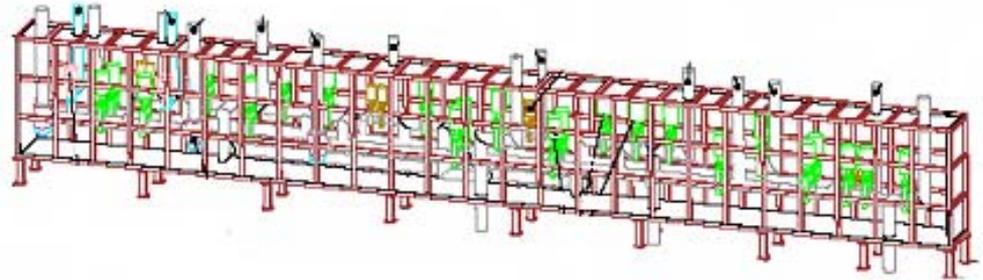
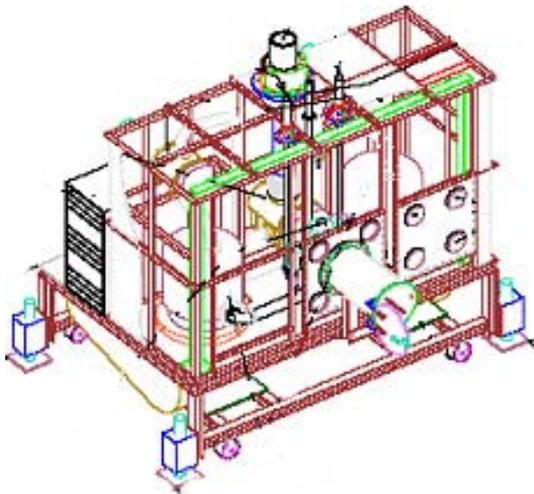
**Industrial Engineering**



**Industrial Fabrication**

Roughing pump and  
valve box assemblies

R&D and qualification tests of roughing pump  
system reliability and tritium compatibility



# Standard Vacuum Components



Standard vacuum components (~3000 parts)

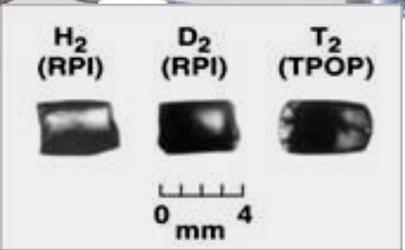
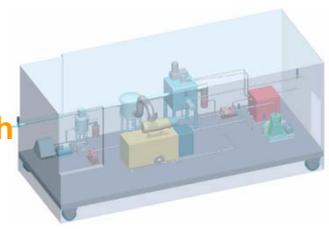
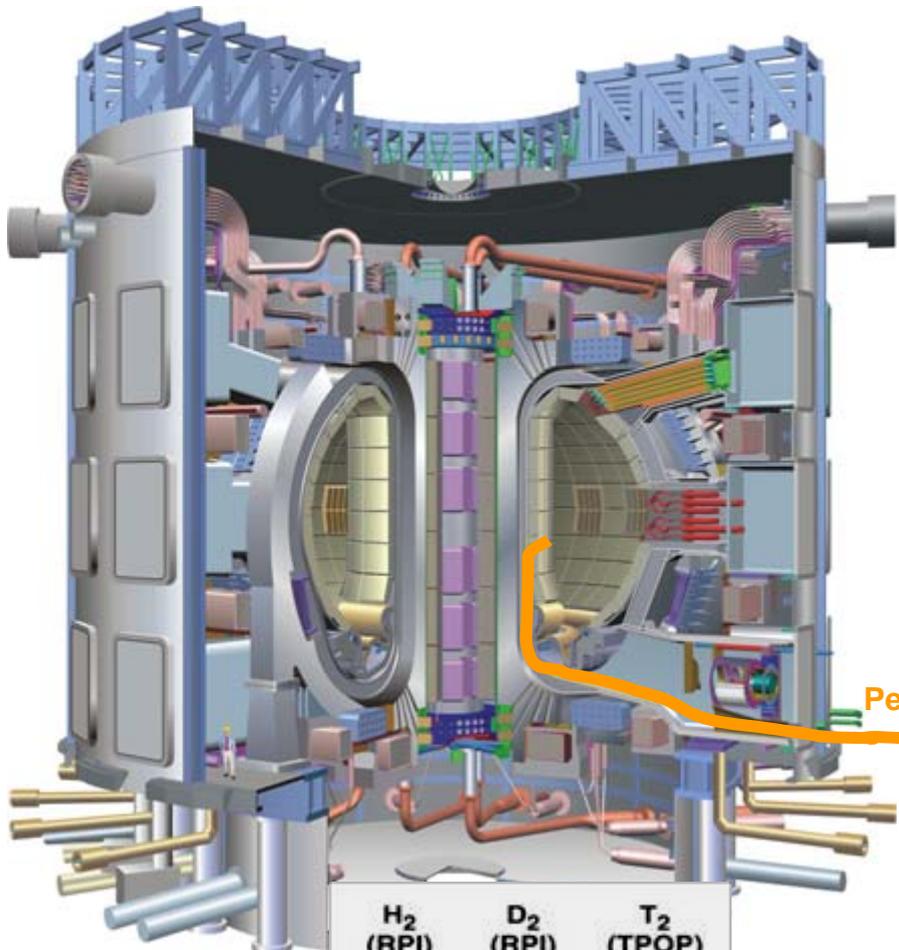


	R&D	Design & Fabrication
FY 2008:	<ul style="list-style-type: none"> <li>No R&amp;D required.</li> </ul>	<ul style="list-style-type: none"> <li>Continue scope definition/ clarification with the IO.</li> </ul>
FY 2009:		<ul style="list-style-type: none"> <li>Start preliminary design.</li> </ul>
FY 2010:		<ul style="list-style-type: none"> <li>Expect agreement on a Procurement Arrangement.</li> <li>Complete design.</li> </ul>

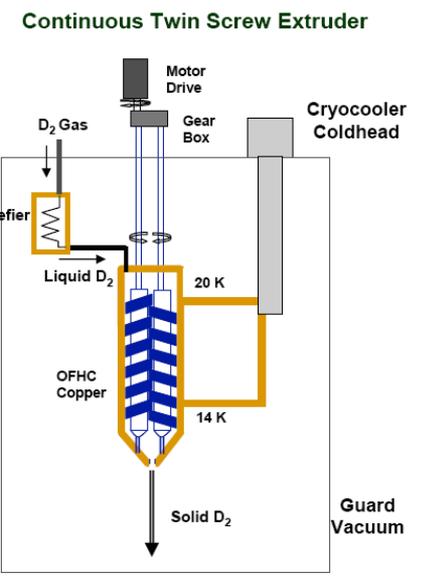
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# Pellet Fueling of ITER

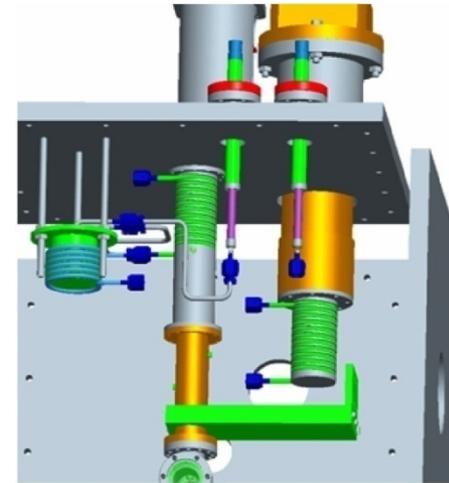
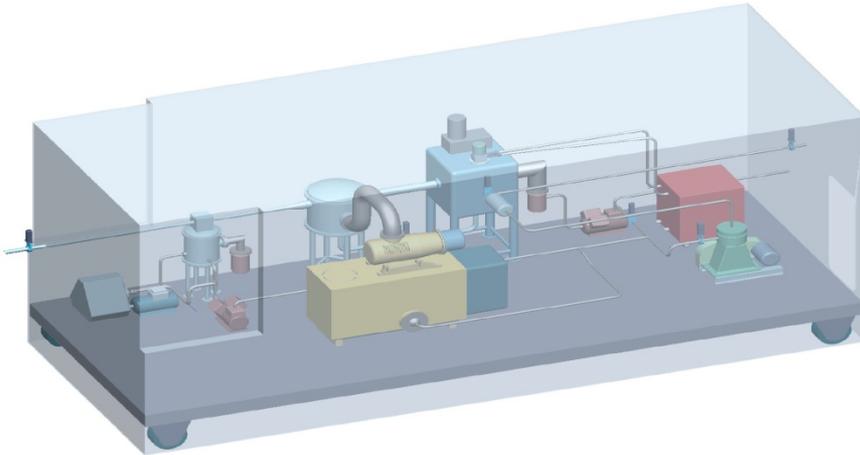
- Pellet injection to achieve efficient core tritium fueling
- R&D tests of pellet injector reliability tritium compatibility and High D/T fuel throughput
- High throughput extruder under development



Hydrogen, Deuterium and Tritium Pellets @ 14° Kelvin



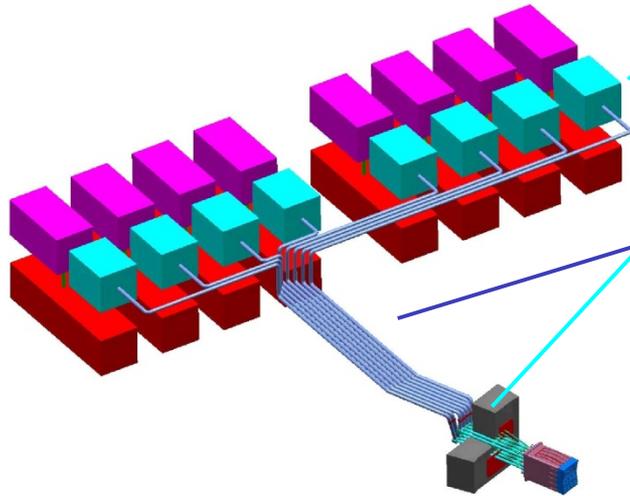
# Pellet Injector



	R&D	Design & Fabrication
<b>FY 2008:</b>	<ul style="list-style-type: none"> <li>Minimal R&amp;D on the extruder prototype: cool down and initial test of prototype extruder.</li> </ul>	<ul style="list-style-type: none"> <li>Continue planning, requirements definition and interfaces with the IO.</li> </ul>
<b>FY 2009:</b>	<ul style="list-style-type: none"> <li>Continue R&amp;D on the extruder; start R&amp;D on the pellet accelerator.</li> </ul>	<ul style="list-style-type: none"> <li>Conceptual design for the pellet injector system.</li> </ul>
<b>FY 2010:</b>	<ul style="list-style-type: none"> <li>Complete R&amp;D on the extruder and pellet accelerator; start R&amp;D on the guide tube.</li> </ul>	<ul style="list-style-type: none"> <li>Begin preliminary design for pellet injector system.</li> </ul>

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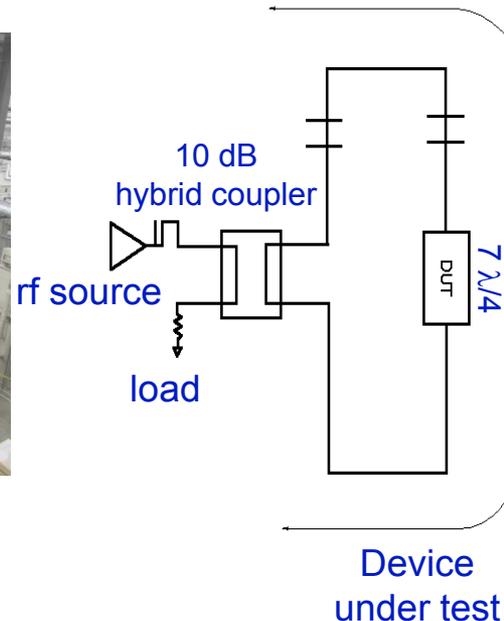
# Ion Cyclotron Transmission Lines



## Transmission line and tuning

- Tuning/Matching components
- 8 water cooled coax lines @2.5 MW ea.
- 1000 m total length

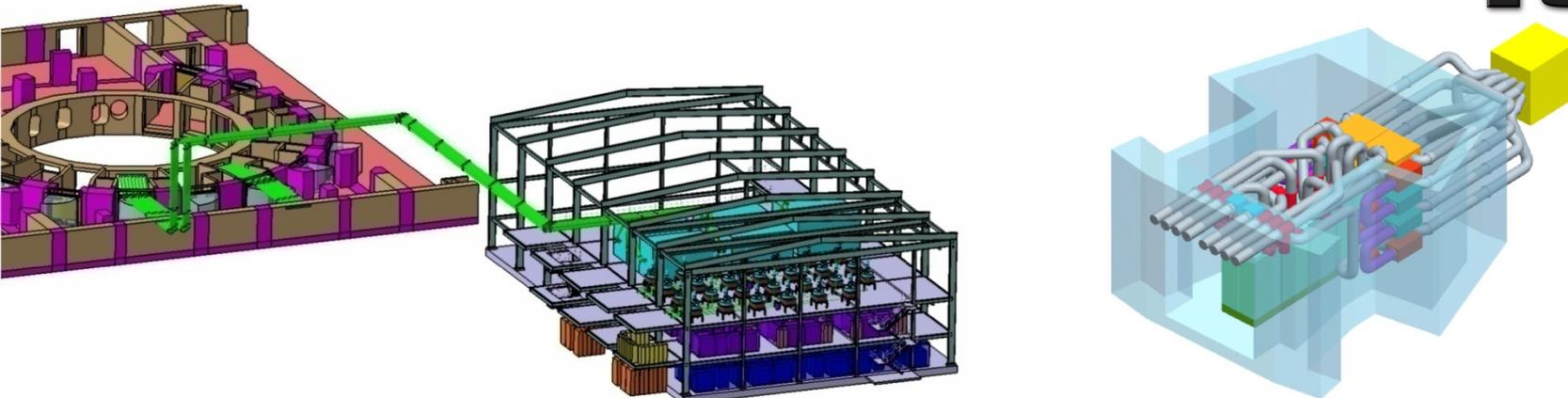
5MW RF resonant ring test stand (ORNL) will be used to develop and qualify long pulse high power components



Test long pulse tuning components

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# Ion Cyclotron Transmission Lines



	R&D	Design & Fabrication
<b>FY 2008:</b>	<ul style="list-style-type: none"> <li>Initial high power tests of ICH resonant ring test stand.</li> </ul>	<ul style="list-style-type: none"> <li>Ion cyclotron transmission line package scope definition/ clarification with the IO.</li> <li>Initial layout of ICH transmission line.</li> </ul>
<b>FY 2009:</b>	<ul style="list-style-type: none"> <li>Continue ion cyclotron transmission line and matching R&amp;D using high power test stands.</li> </ul>	<ul style="list-style-type: none"> <li>Expect agreement on a Procurement Arrangement.</li> <li>Start preliminary design of ICH transmission line and matching system.</li> </ul>
<b>FY 2010:</b>	<ul style="list-style-type: none"> <li>Complete ion cyclotron transmission line and matching R&amp;D program.</li> </ul>	<ul style="list-style-type: none"> <li>Continue preliminary design and evaluate design variants.</li> </ul>

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# ECH Transmission Lines

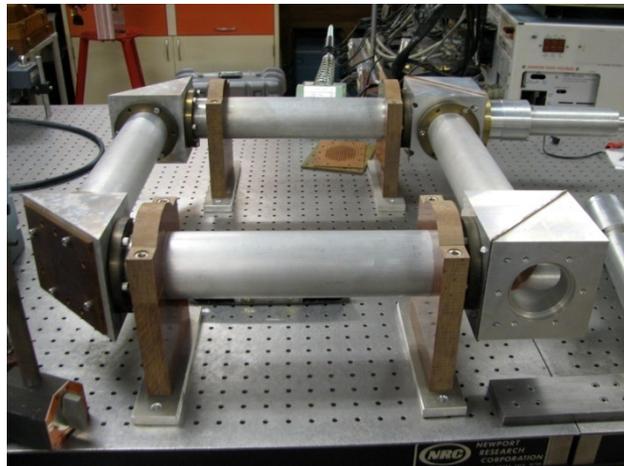


ECH waveguide vacuum pump out



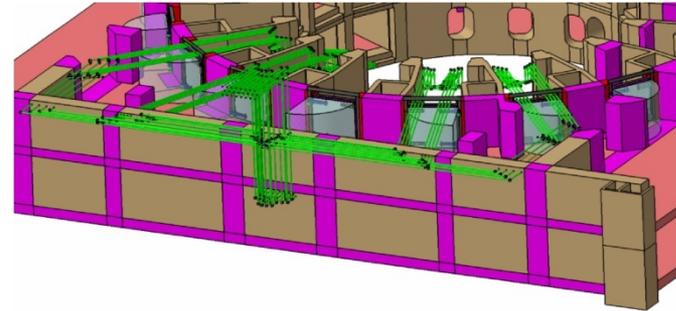
Waveguides with elbows and expansion joints

2MW 170 GHz resonant ring test stand will be used to qualify long pulse high power components



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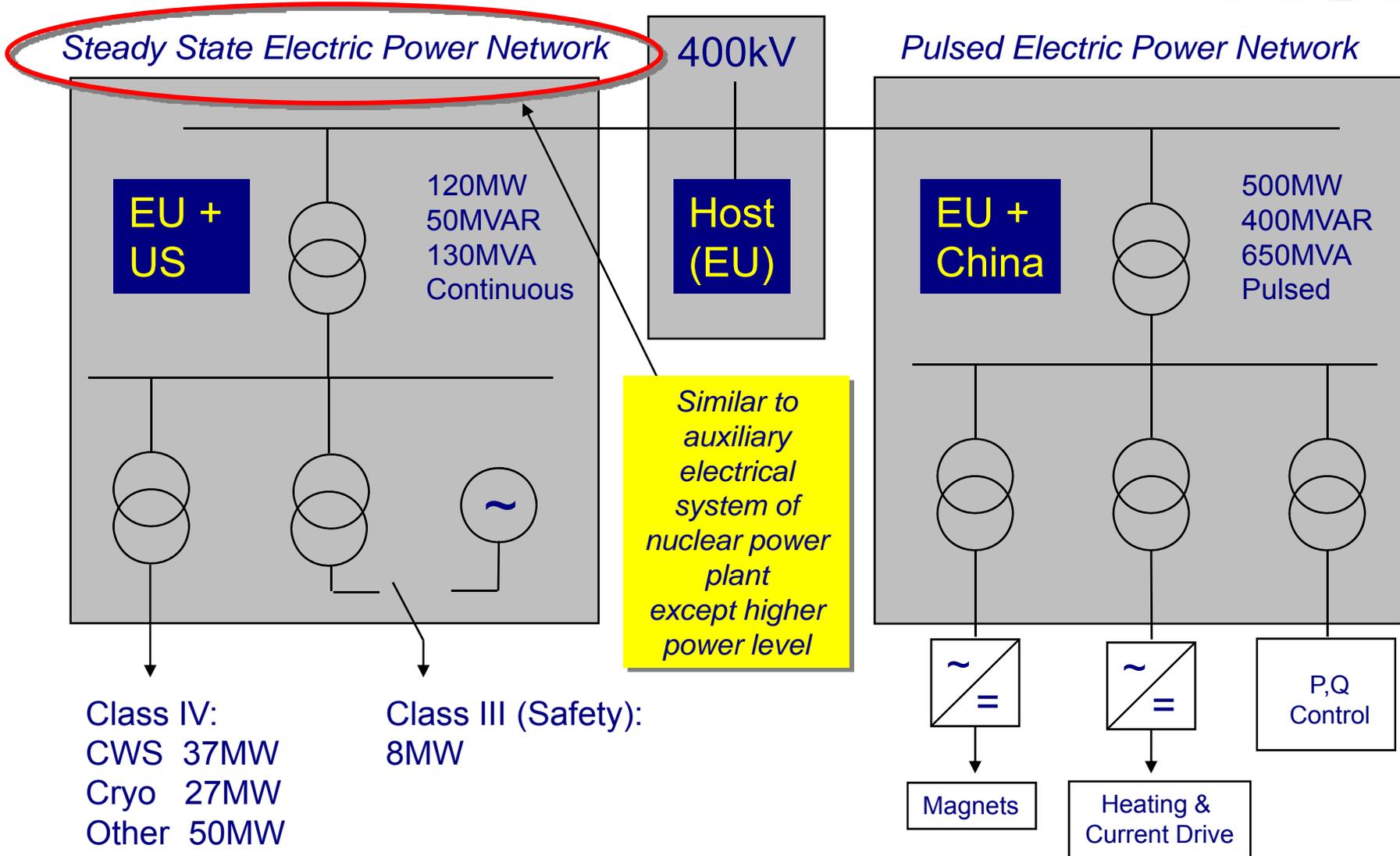
# Electron Cyclotron Transmission Lines



	R&D	Design & Fabrication
<b>FY 2008:</b>	<ul style="list-style-type: none"> <li>Initial installation of 140GHz gyrotron.</li> </ul>	<ul style="list-style-type: none"> <li>Electron cyclotron transmission line package scope definition/ clarification with the IO.</li> <li>Initial layout of ECH transmission line.</li> </ul>
<b>FY 2009:</b>	<ul style="list-style-type: none"> <li>Continue electron cyclotron transmission line and matching R&amp;D; prepare high power test stand for ohmic and mode conversion loss.</li> <li>170GHz tube will be purchased.</li> </ul>	<ul style="list-style-type: none"> <li>Expect agreement on a Procurement Arrangement.</li> <li>Start preliminary design of ECH transmission line and mode control.</li> </ul>
<b>FY 2010:</b>	<ul style="list-style-type: none"> <li>Complete electron cyclotron transmission line and mode control R&amp;D using high power test stand.</li> </ul>	<ul style="list-style-type: none"> <li>Continue preliminary design and evaluate design variants.</li> </ul>

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# Steady State Electric Power Network (SSEPN)



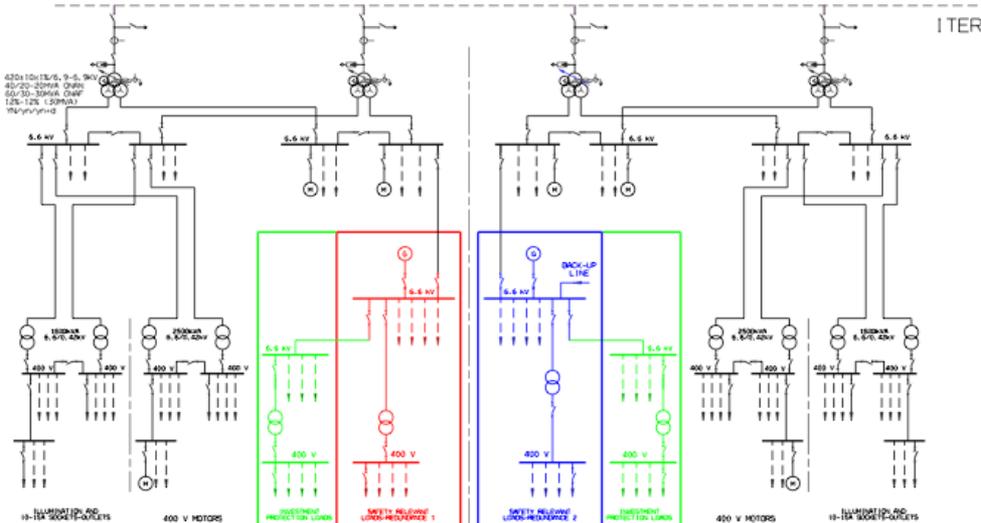
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# SSEPN Roles of EU and U.S.



TASK	EU ROLE	US ROLE
Engineering Design	Lead	Monitor
Cabling	100%	
Diesel Generators & UPS systems	100%	
All other equipment from 400kV grid to consumer interface	25%	75%
Installation & Commissioning	Lead	

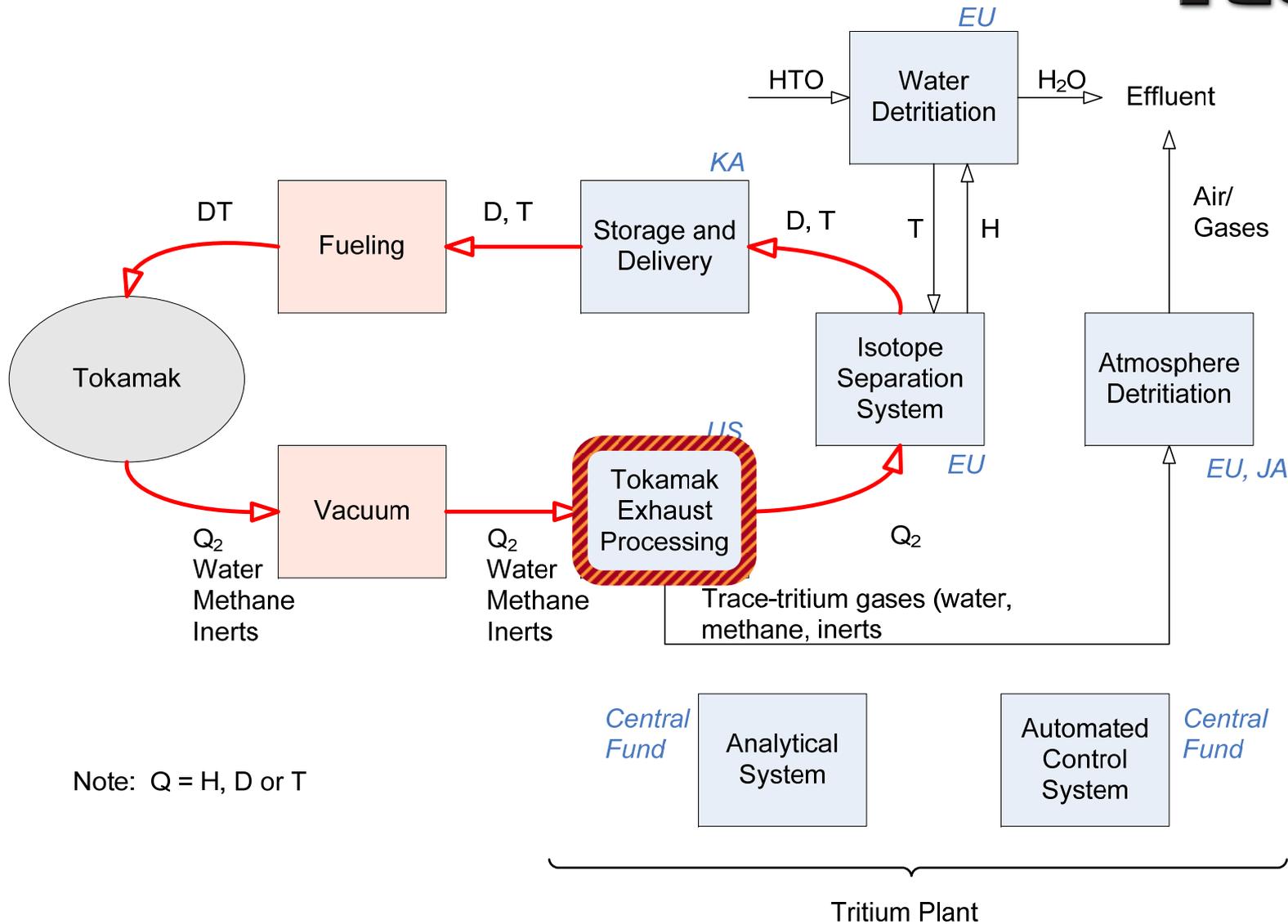
# Steady State Electric Power Network



	R&D	Design & Fabrication
<b>FY 2008:</b>	<ul style="list-style-type: none"> <li>No R&amp;D required.</li> </ul>	<ul style="list-style-type: none"> <li>Monitor preliminary design activity by EU.</li> <li>Participate in preliminary design review.</li> </ul>
<b>FY 2009:</b>		<ul style="list-style-type: none"> <li>Update cost estimates, negotiate split of component procurements with EU.</li> <li>Monitor final design activity by EU and participate in final design review.</li> </ul>
<b>FY 2010:</b>		<ul style="list-style-type: none"> <li>Expect agreement on a Procurement Arrangement.</li> <li>Issue specifications and award contracts to industry.</li> </ul>

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# Tokamak Exhaust Processing



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# Tokamak Exhaust Processing



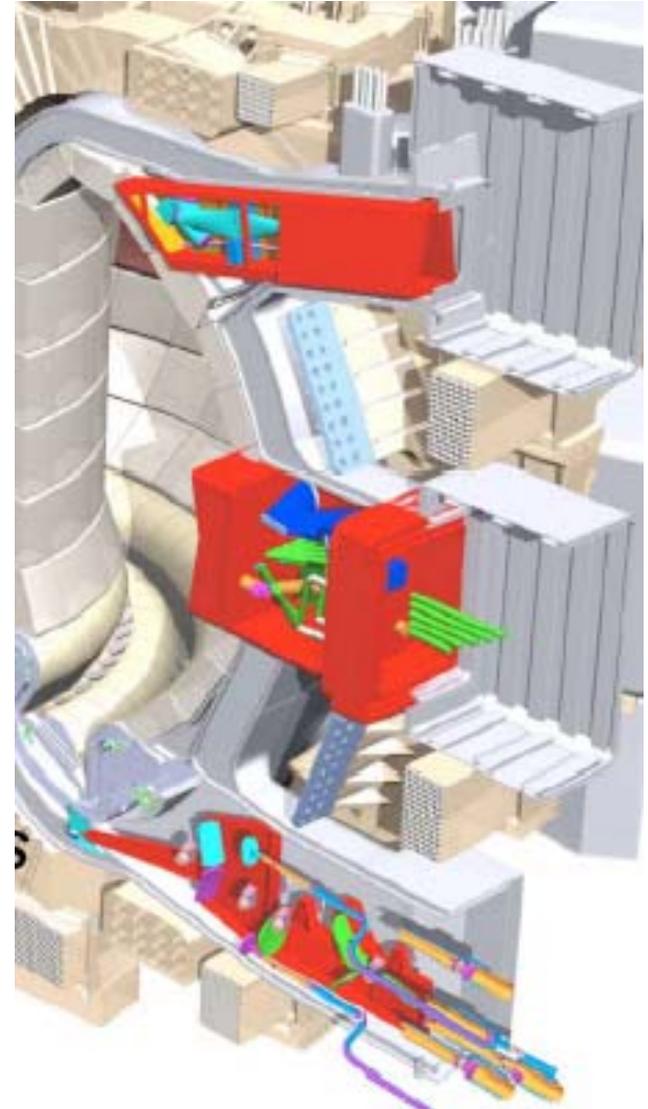
Part of 1/10<sup>th</sup> scale TEP

	R&D	Design & Fabrication
FY 2008:	<ul style="list-style-type: none"> <li>Perform experiments to characterize catalyst performance and evaluate the reference technology selections.</li> </ul>	<ul style="list-style-type: none"> <li>Continue planning, requirements definition/clarification and interfaces with the IO.</li> <li>Evaluate design, including computer modeling.</li> </ul>
FY 2009:	<ul style="list-style-type: none"> <li>Complete tritium plant R&amp;D studies/tests.</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary and detailed design.</li> </ul>
FY 2010:		<ul style="list-style-type: none"> <li>Expect agreement on a Procurement Arrangement.</li> <li>Start final design.</li> <li>Begin procurement/fabrication of long delivery components.</li> </ul>

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# Diagnostic Instrumentation

- Diagnostics are the means by which we observe the ITER plasma behavior, measuring some ~ 45 parameters.
- The U.S. has been allocated 16% of the ITER diagnostics.
- Implementing diagnostic front-end components, deeply embedded in massive port plug shield, and functioning in the harsh ITER environment, will be new and technically challenging.
- Diagnostics experts in the U.S. Fusion Community are eager to meet these challenges.



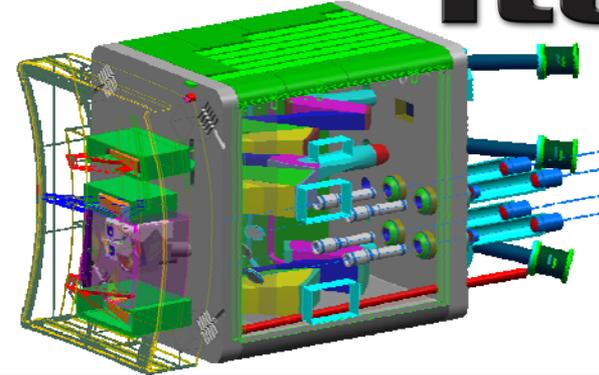
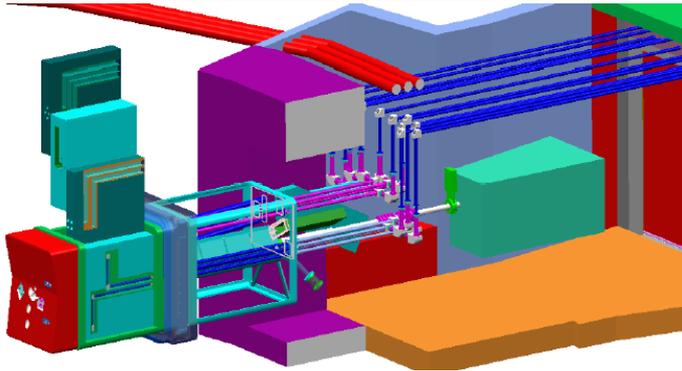
# U.S. Diagnostic Scope



WBS	Instrumentation Packages	Scope
1.5.3.1	Upper IR/Visible Cameras	Packages include “front-end” viewing optics, relay optics or waveguides in the ports, along with additional relay systems to bring signals to diagnostic hall, and source and detector hardware in the diagnostic hall.
1.5.3.2	Low Field Side Reflectometry	
1.5.3.3	Motional Stark Effect	
1.5.3.4	Electron Cyclotron Emission	Some have viewing systems in ports provided by other parties.
1.5.3.5	Divertor Interferometer	Package includes oversight of testing on ports prior to shipment to ITER.  ECE and IXCS shared with India.
1.5.3.10	Toroidal Interferometer/Polarimeter	
1.5.3.12	Imaging X-Ray Crystal	
1.5.3.6	Residual Gas Analyzer	Attached to three vacuum appendages.
<b>Port Packages</b>		
1.5.3.7	Upper Ports (U5, U17)	Packages include design, fabrication, assembly and testing of U.S. port plugs.  Preliminary integration assumed to be done by IT – subject to IT approval.
1.5.3.8	Equatorial Ports (E3, E9)	
1.5.3.9	Lower Port Structures (L8)	
1.5.3.11	Diagnostic Management	Oversight and coordination.

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# Diagnostics



	R&D	Design & Fabrication
FY 2008:	<ul style="list-style-type: none"> <li>Assess R&amp;D needs:  <u>Completed</u> - modeling and analysis of particle and heat flux to diagnostic mirrors and mirror response  <u>Ongoing</u> – development of ECE hot calibration source; neutronics and activation benchmarking of ATTILA</li> </ul>	<ul style="list-style-type: none"> <li>Refine planning and scope definition with the IO.</li> <li>Assist IO in generic design of port plugs.</li> </ul>
FY 2009:	<ul style="list-style-type: none"> <li>Continue diagnostics R&amp;D.</li> </ul>	<ul style="list-style-type: none"> <li>Complete initial assessment studies.</li> <li>Expect agreement on a Procurement Arrangement.</li> <li>Bulk purchase of 316LN stainless steel.</li> </ul>
FY 2010:	<ul style="list-style-type: none"> <li>Continue diagnostics R&amp;D.</li> </ul>	<ul style="list-style-type: none"> <li>Start preliminary design for some systems.</li> </ul>

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# Support to the International Organization



	IO Staff to be Supported by the U.S. (Employees and Secondees)	Cash Contribution**
FY 2008:	~ 22 man years*	Deferred to FY09***
FY 2009:	~ 31 man years	\$35M (2008 & 2009 contribution)
FY 2010:	~ 36 man years	\$27M

\* Currently 5 U.S. secondees and 7 U.S. personnel directly employed by ITER

\*\* Supports IO employees and organization expenses, IO directed R&D, and work scope to be accomplished with the general FUND

\*\*\* ≈1M of CY2007 IO cash contribution paid in FY2008. CY2008 cash contribution deferred to FY2009

# **Project Management Budget is flat throughout the years**

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Budget includes labor, travel, office space, materials, and services for the following:

- Project Management
  - Project Manager, Deputy Project Manager, and seven WBS managers
- Environmental, Safety, Health
- Quality Assurance
- Procurement
- Systems Engineering and Design Integration
- Business/Finance
- Project Controls
- Document/Records Management
- Information Systems
- HR
- Communications

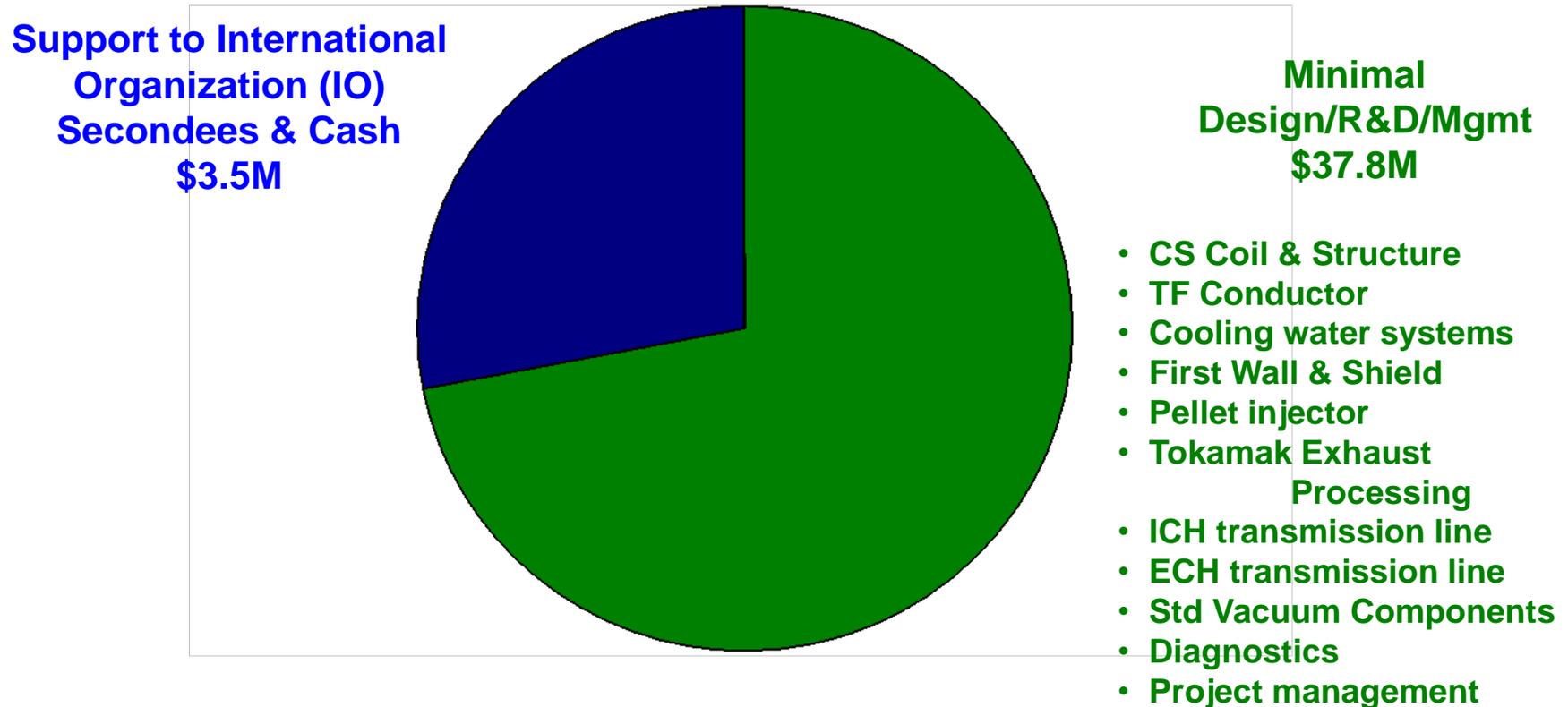
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# U.S. ITER Funding for FY08

## Distribution of Funding

Total of \$41.3M in FY08

\$10.7M in New Funding & \$30.6M in Carryover



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# U.S. ITER Funding for FY09

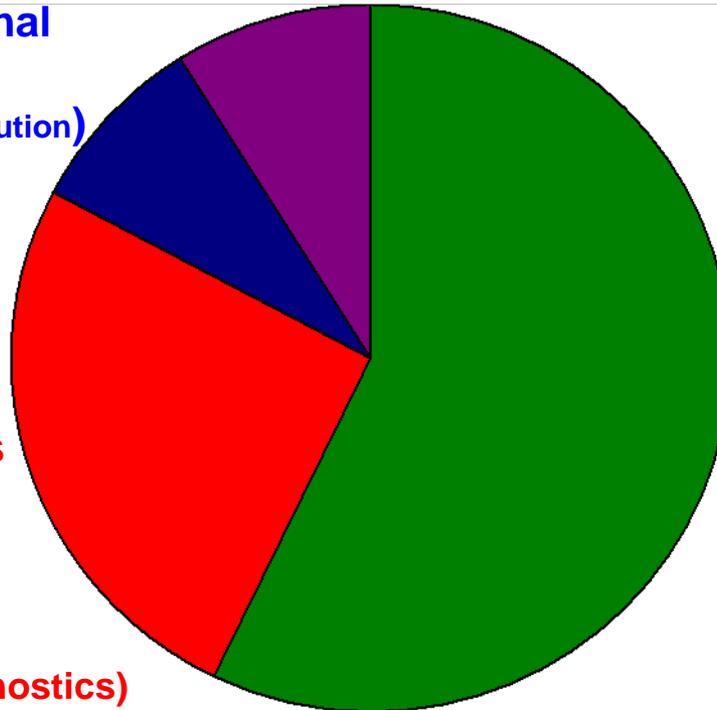
## Distribution of Funding Total of \$214.5M in FY09

Cash to IO  
(FY08 & FY09 Contribution)  
\$19M

Staff Support to International  
Organization (IO)  
Employees (FY08 & FY09 Contribution)  
& Secondees  
\$18M

Hardware Commitments  
\$55M

- Magnet components
- Bulk Steel Buy  
(Magnets, Blankets & Diagnostics)



Design/R&D/Mgmt/Contg.  
\$122.5M

- CS Coil & Structure
- TF Conductor
- Cooling water systems
- First Wall & Shield
- Pellet injector
- Tokamak Exhaust Processing
- ICH transmission line
- ECH transmission line
- Std Vacuum Components
- Diagnostics
- Project management
- Contingency

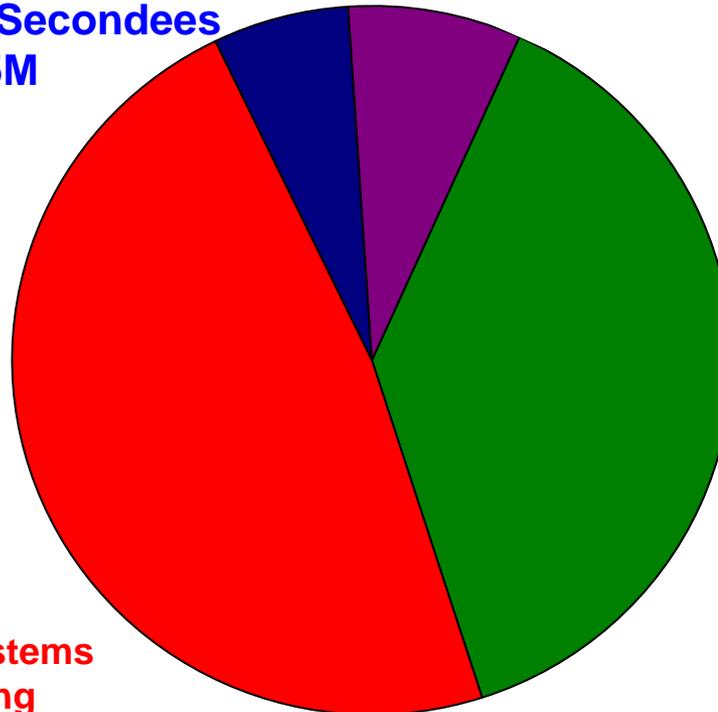
# U.S. ITER Funding for FY10



## Distribution of Funding Total of \$209.3M in FY10

**Staff Support to International  
Organization (IO)  
Employees & Secondees  
\$12.5M**

**Cash to IO  
\$16.5M**



**Design/R&D/Mgmt/Contg.  
\$80.3M**

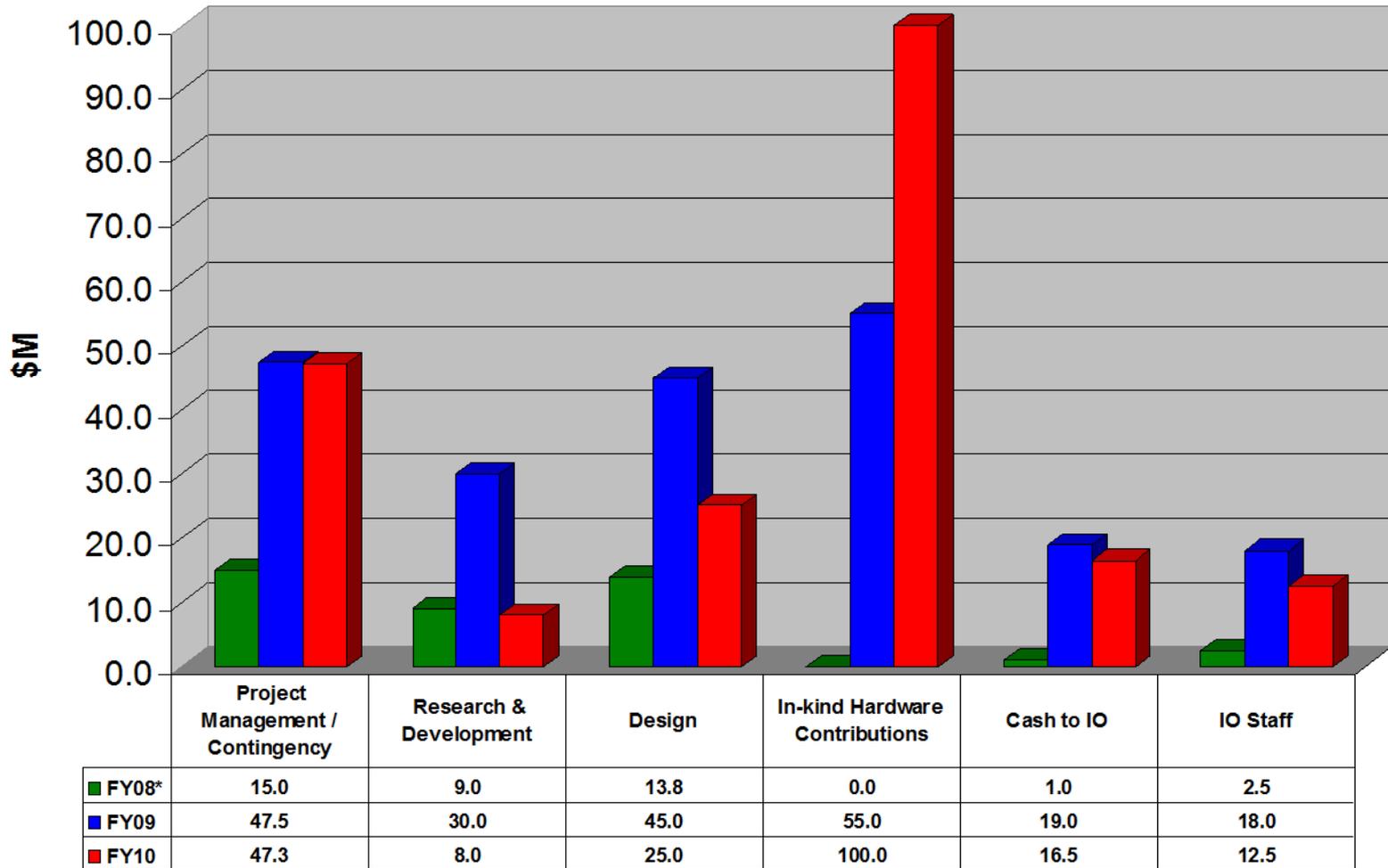
**Hardware Commitments  
\$100M**

- Magnet components
- Tokamak Cooling Water Systems
- Tokamak Exhaust Processing
- Steady State Electrical Power

- CS Coil & Structure
- Cooling water systems
- First Wall & Shield
- Pellet injector
- Tokamak Exhaust Processing
- ICH transmission line
- ECH transmission line
- Std Vacuum Components
- Diagnostics
- Project management
- Contingency

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## Summary of Budget Major Areas of Contribution



\* Includes carry over and new funding.

# Summary of Budget Request



	FY08 Omnibus	FY09 President's Request	FY10 Request
<b>MIE</b>	\$9.0M	\$184.5M	\$201.3M
<b>OPC</b>	\$1.6M	\$30.0M	\$8.0M
<b>Totals</b>	\$10.6M	\$214.5M	\$209.3M

# Bottom Line

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- FY08 budget reduction has severely limited industrial participation
- Requested FY09 funding will enable:
  - strong industrial design activity aimed at improved manufacturability
  - completion of many Procurement Agreements
  - manufacturing process development
  - start of procurements for materials, services, tooling and components
  - completion of most R&D
- Requested FY10 funding will enable:
  - completion of most design
  - intensified fabrication