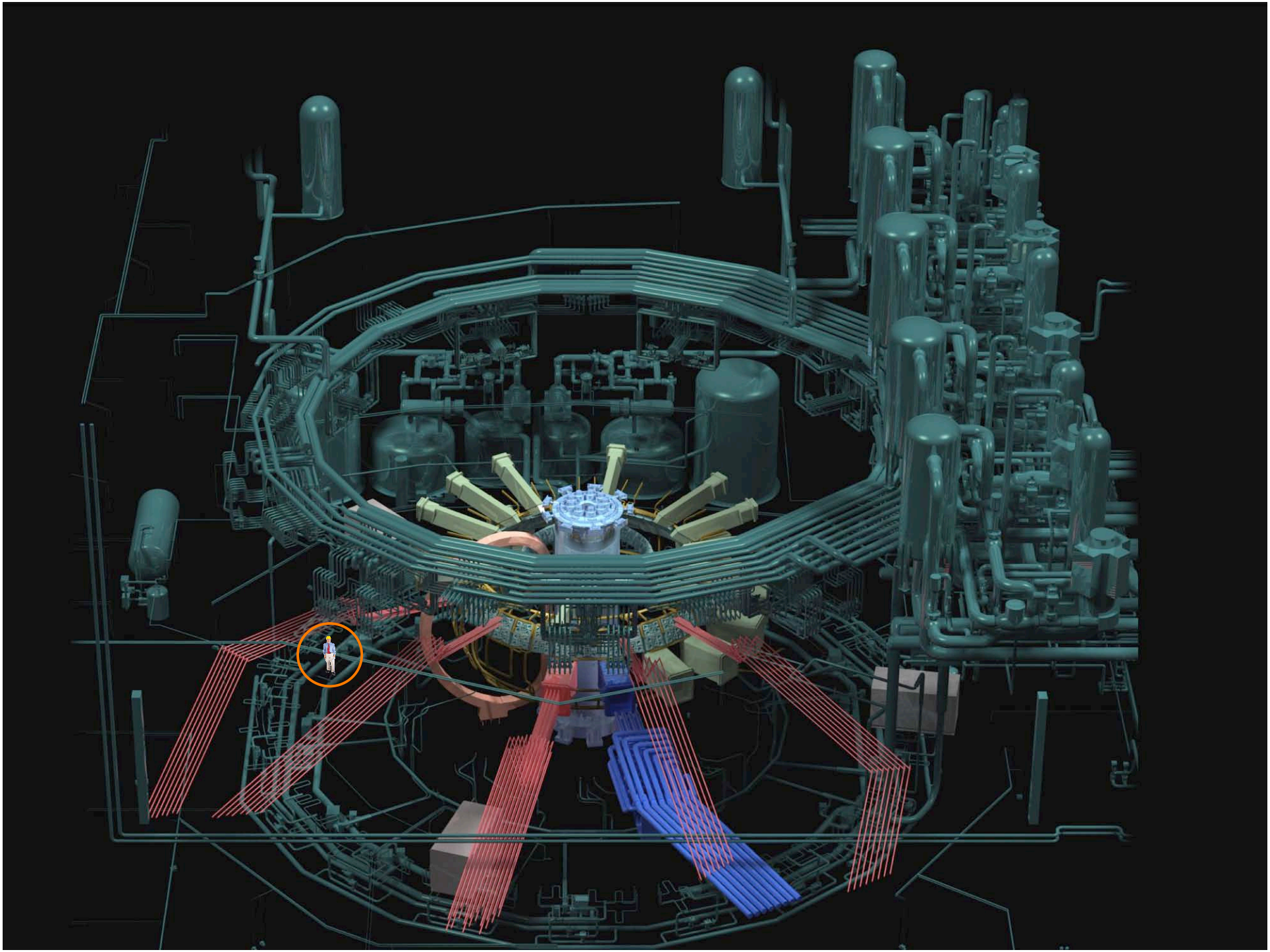
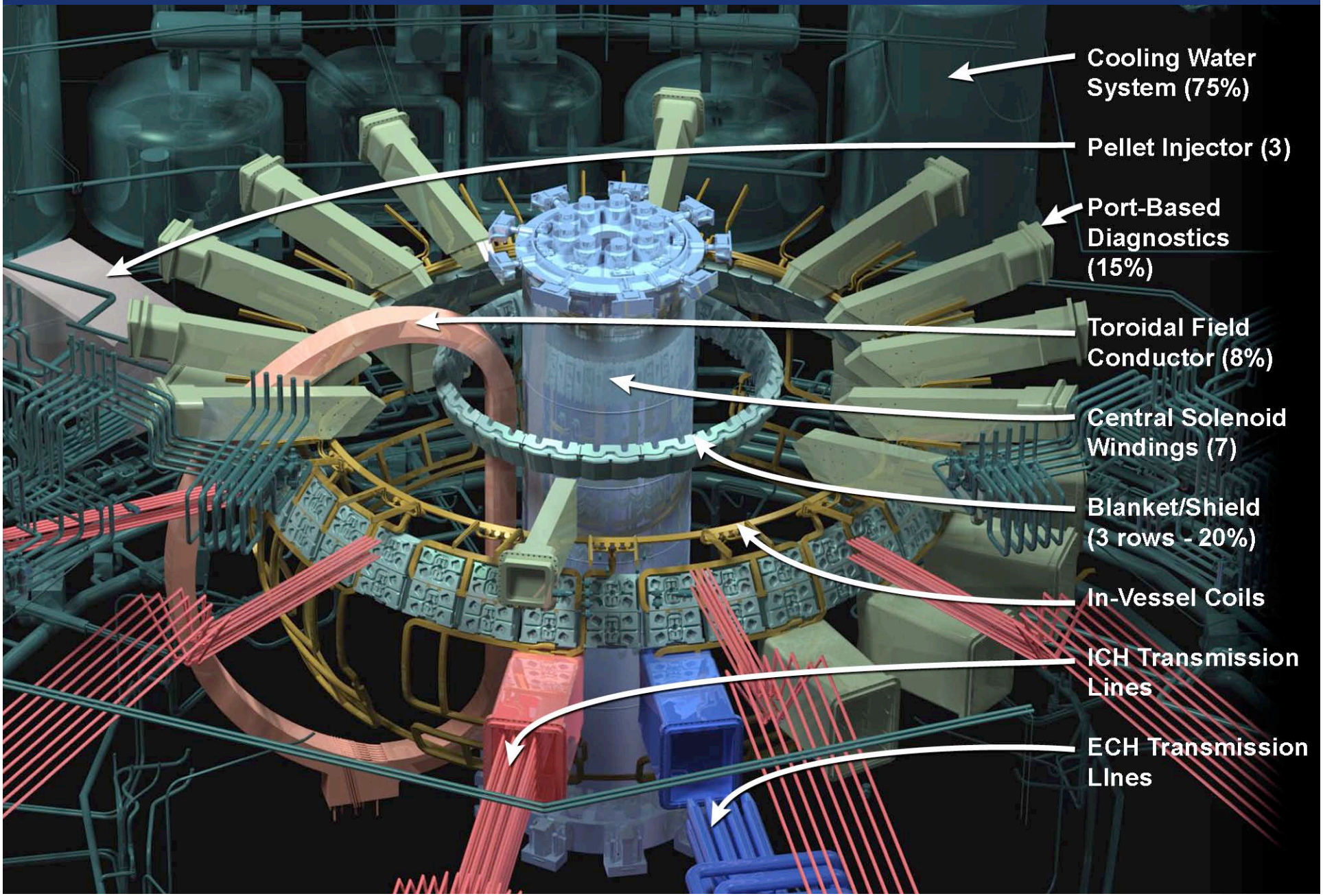
Status of U.S. Contributions to ITER

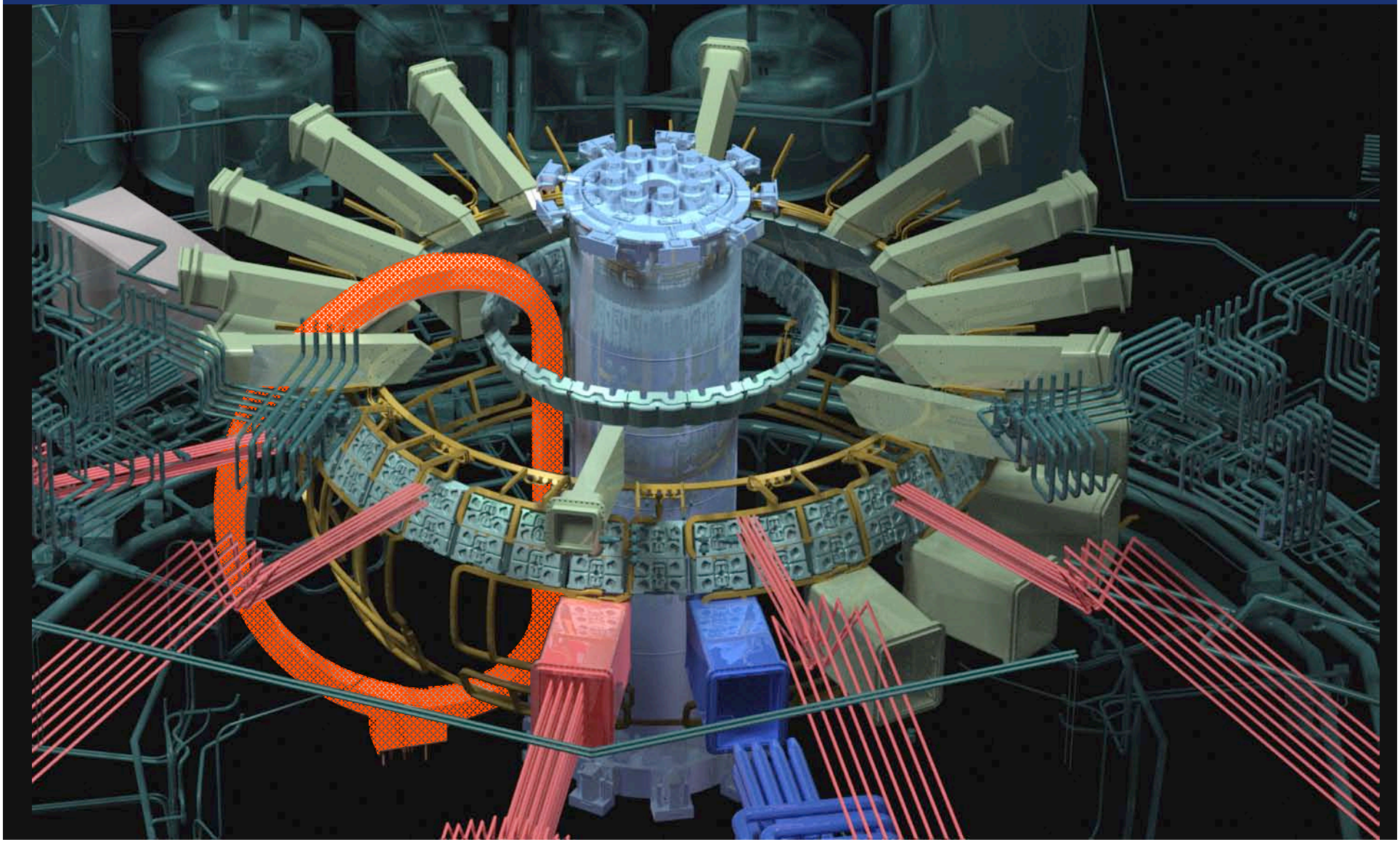
Ned Sauthoff
Oak Ridge National Laboratory



U.S. ITER Contributions

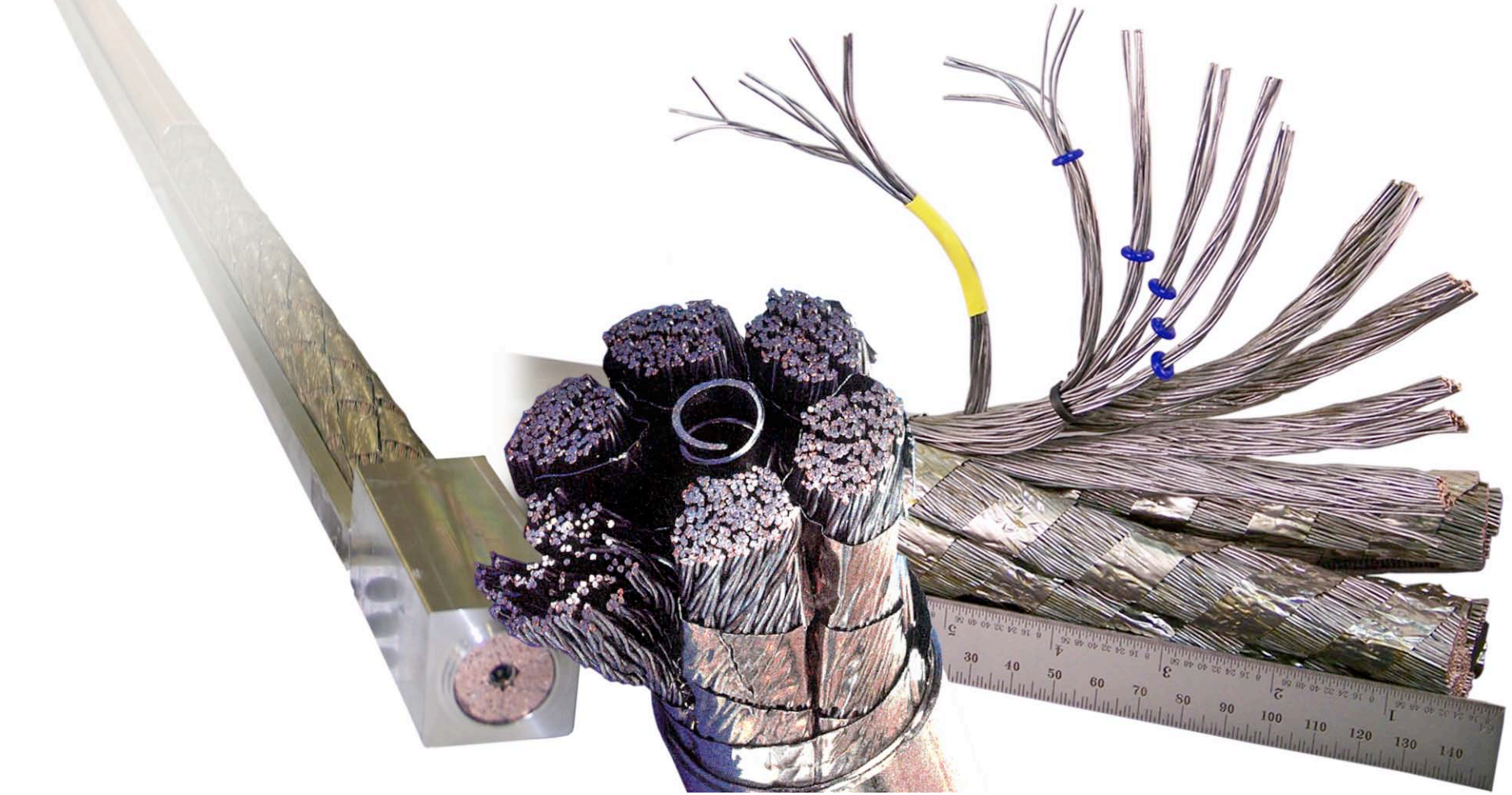


Toroidal Field Conductor:
The U.S. Role



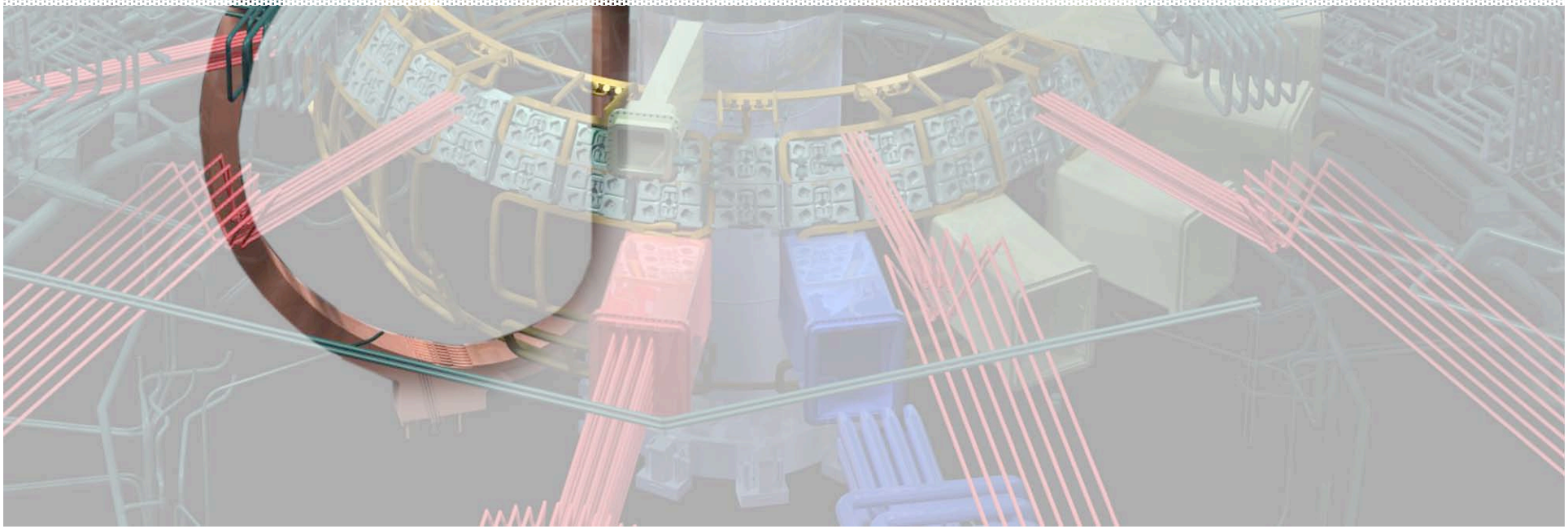
Toroidal Field Conductor:
Recent Accomplishments

- **Awarded contracts totaling >$33M for TF Conductor strand to Luvata Waterbury and Oxford Superconducting Technology.**

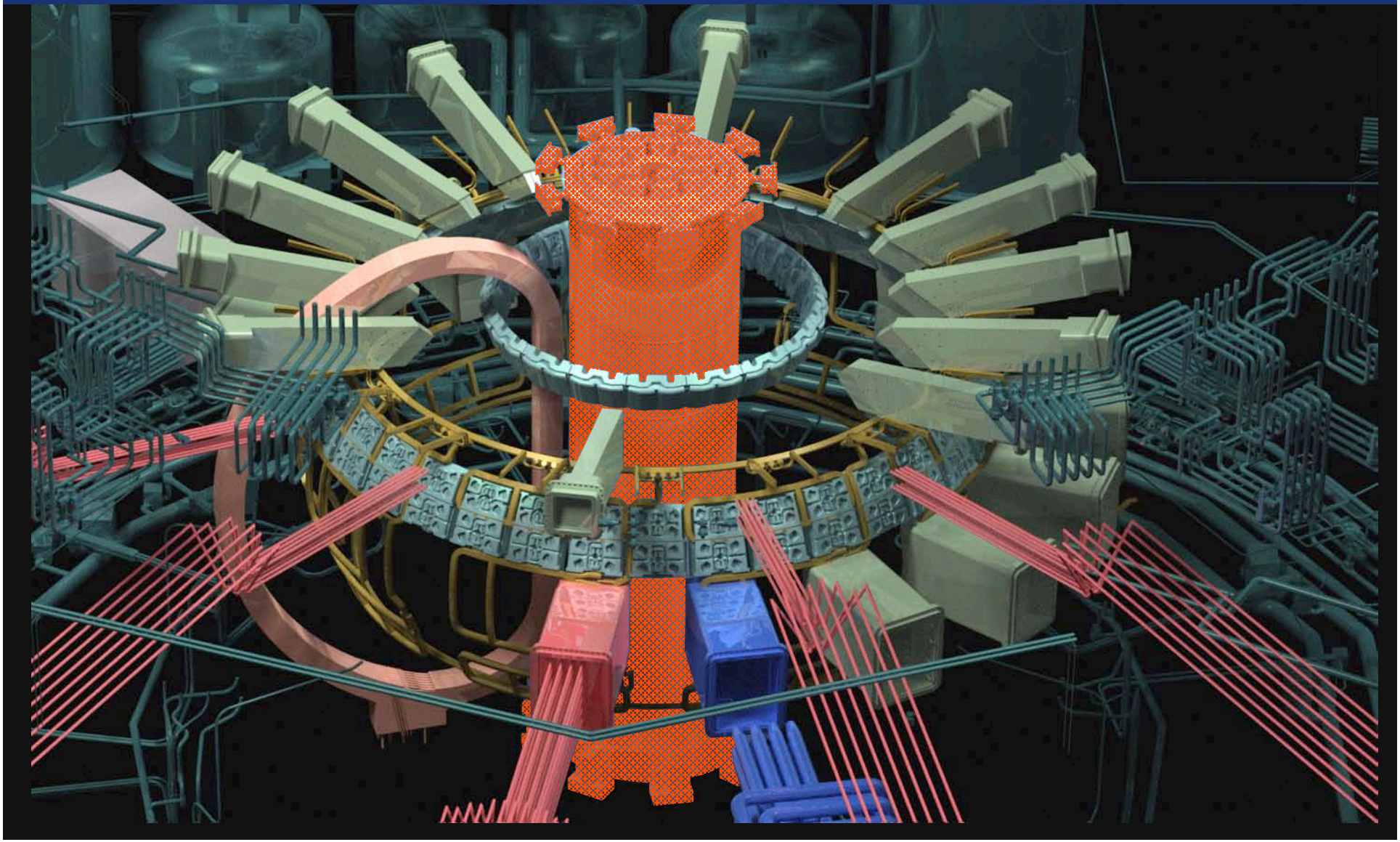


Toroidal Field Conductor:
What's Ahead

- Quality Assurance plan being developed.
- Cabling Services
- Jacket
- Jacketing, including compaction
- Shipment to EUDA

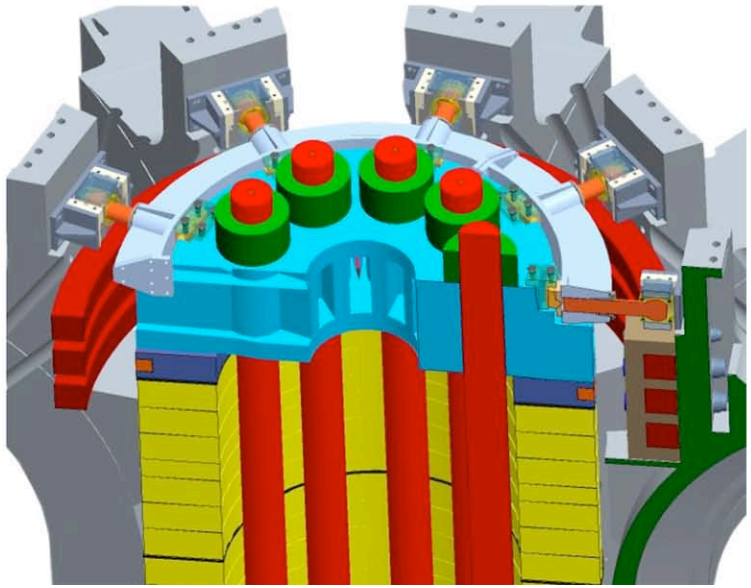


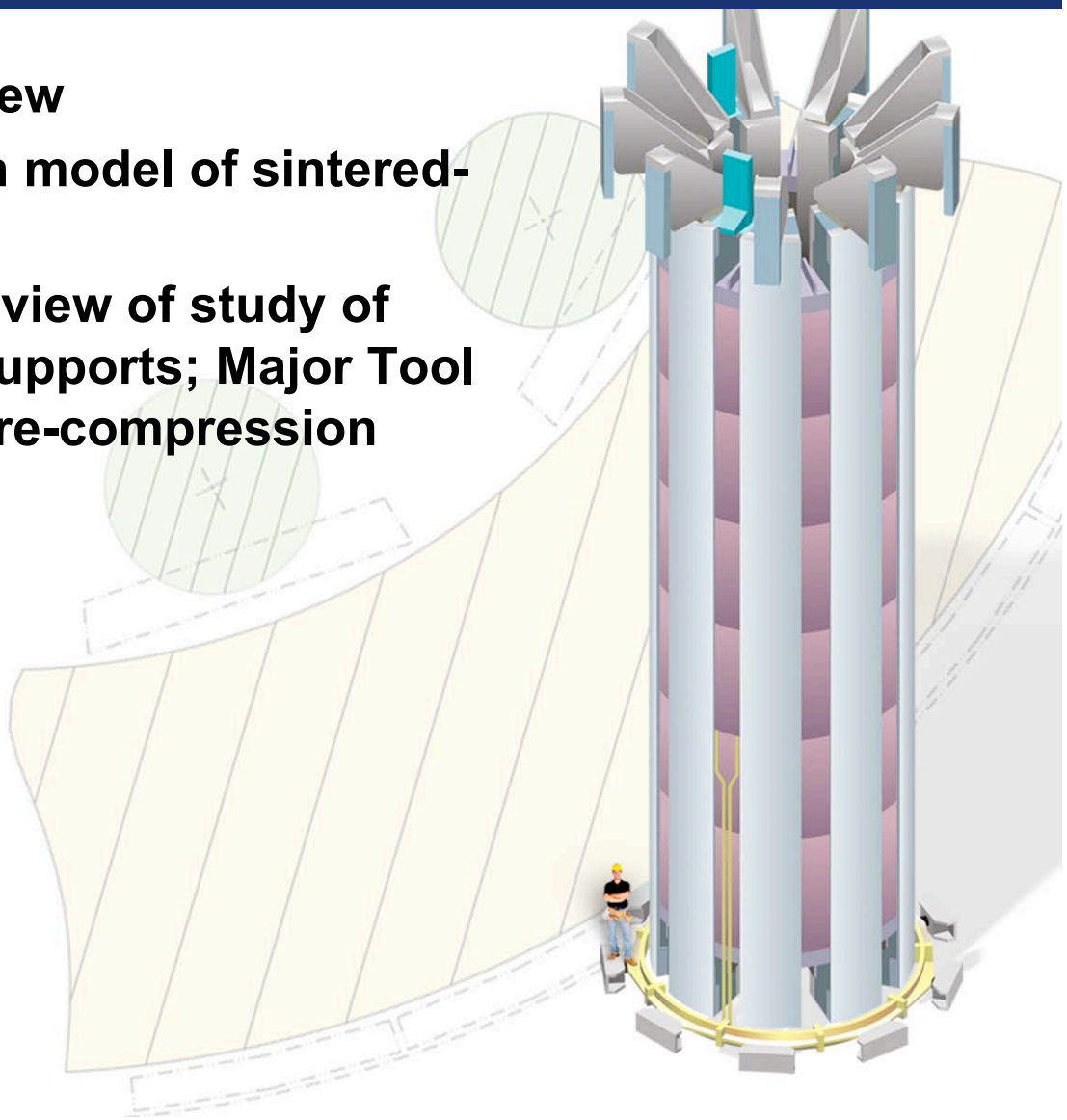
Central Solenoid Assembly:
The U.S. Role



Central Solenoid Assembly:
Recent Accomplishments

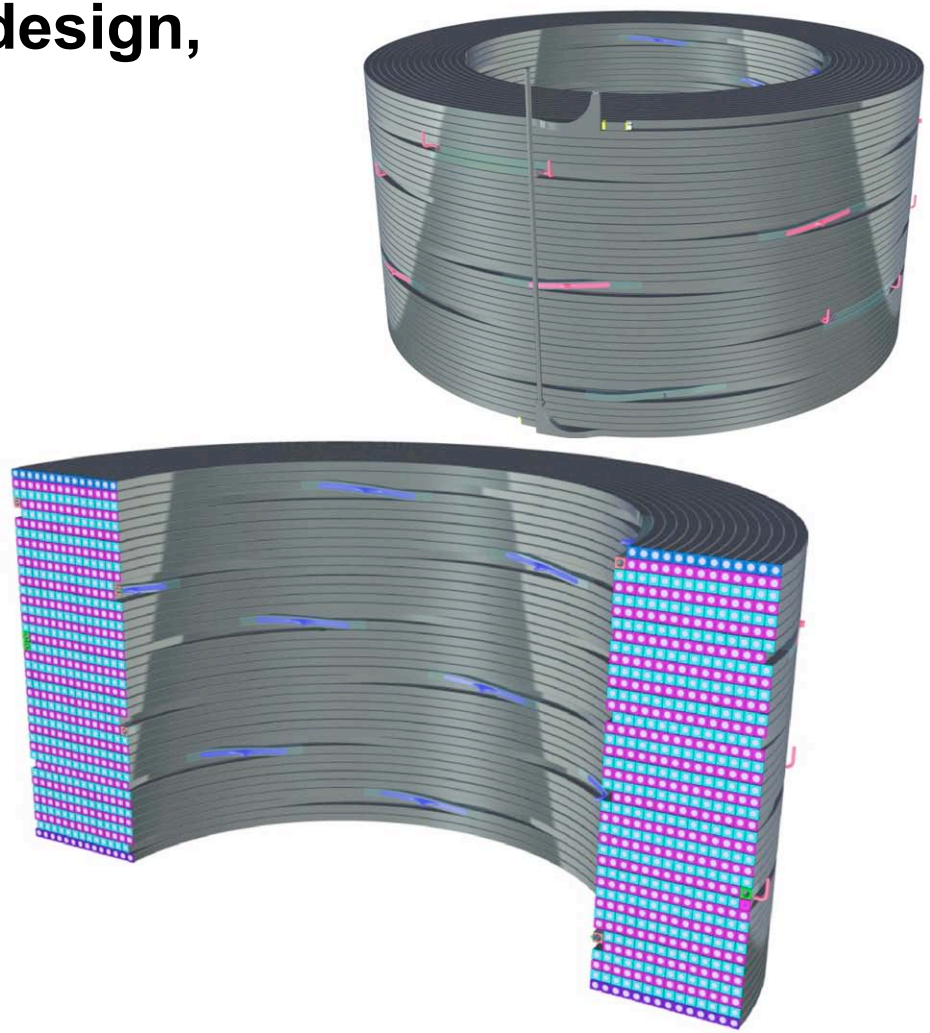
- Conceptual Design Review
- Fabrication of full-length model of sintered-splice
- Everson-Tesla design review of study of molded current feeder supports; Major Tool study of tie-rod-based pre-compression structure





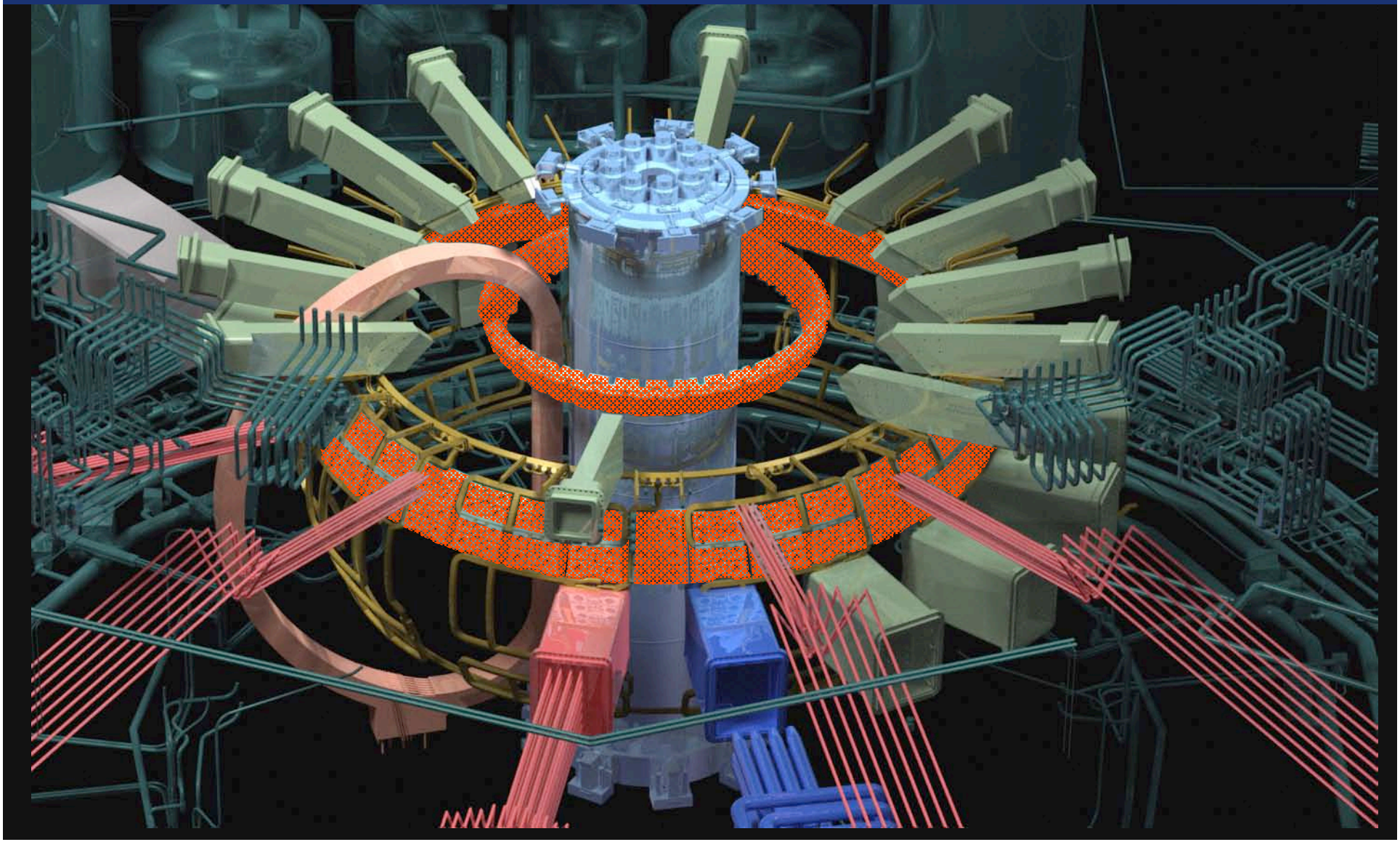
Central Solenoid Assembly:
What's Ahead

- **Completing R&D and design, with the IO.**
- **Manufacturing CS-Insert Coil for testing in Japan, and 7 modules to be tested in Tosca prior to delivery to ITER.**



Blanket Shielding and Port Limiter Systems

The U.S. Role



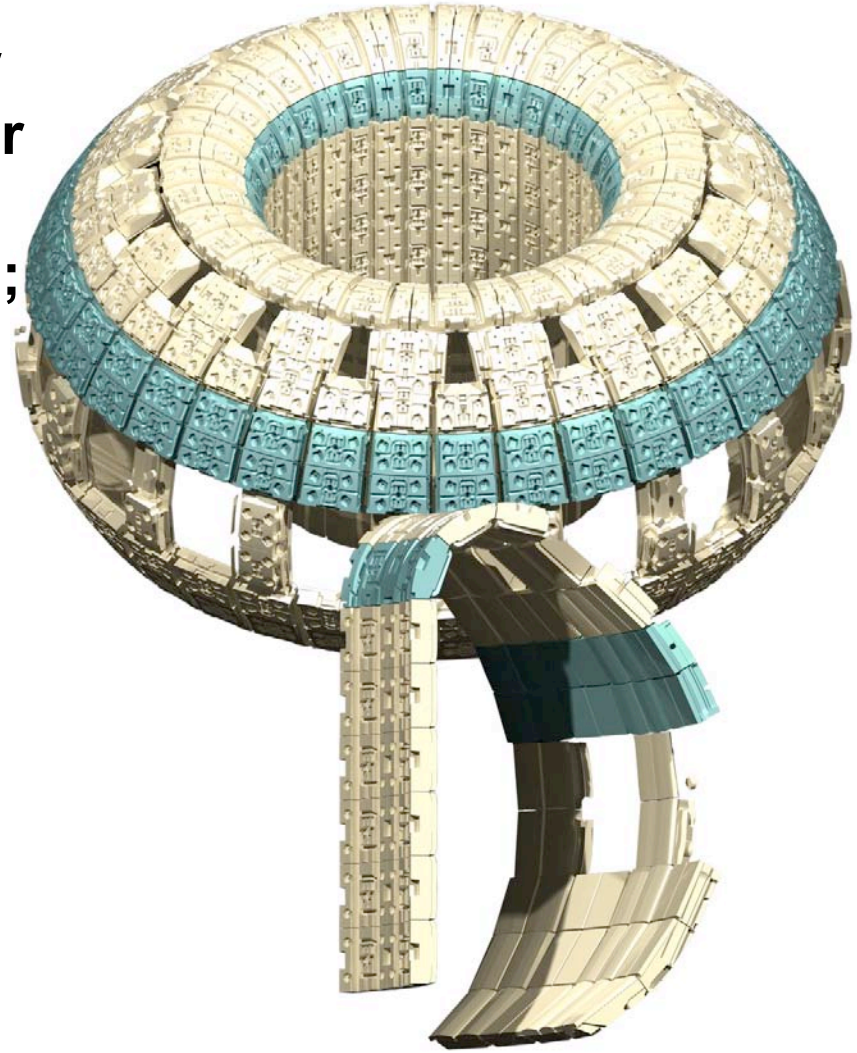
Blanket Shielding and Port Limiter Systems

Recent Accomplishments

- **Redesigning the blanket for new thermal loads; improving nuclear shielding by development of thicker inboard blanket modules; completing electromagnetic analyses of new design.**

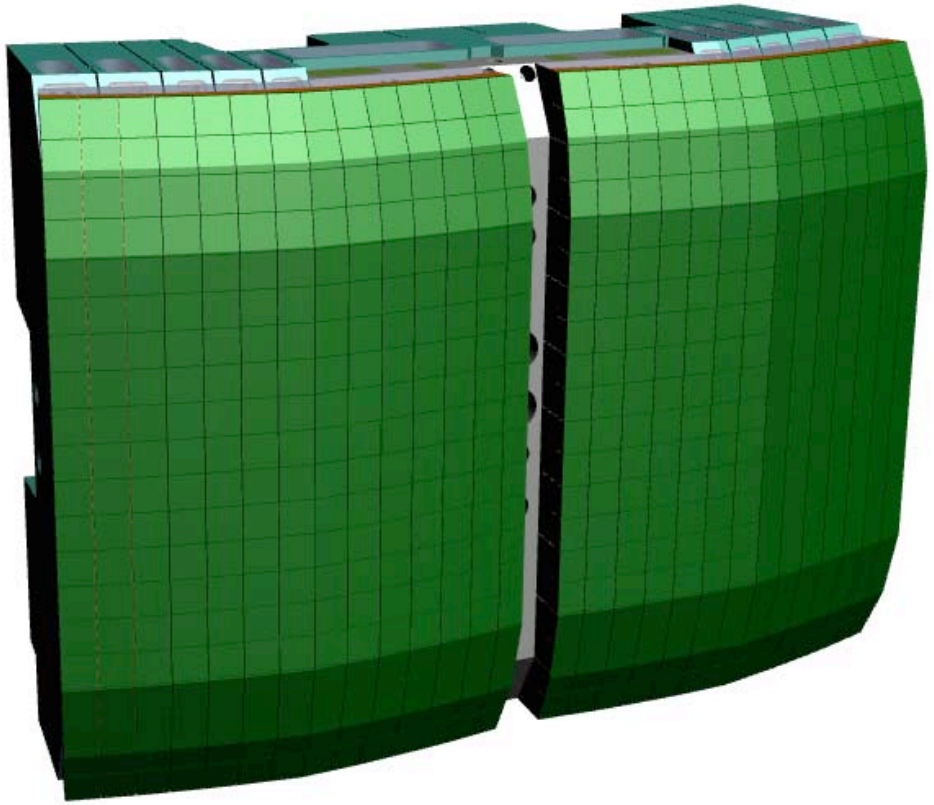
- **Completed second round of testing of U.S. First Wall Qualification Mockups; formatting final report.**

- **Completed Systems Requirement Document review.**



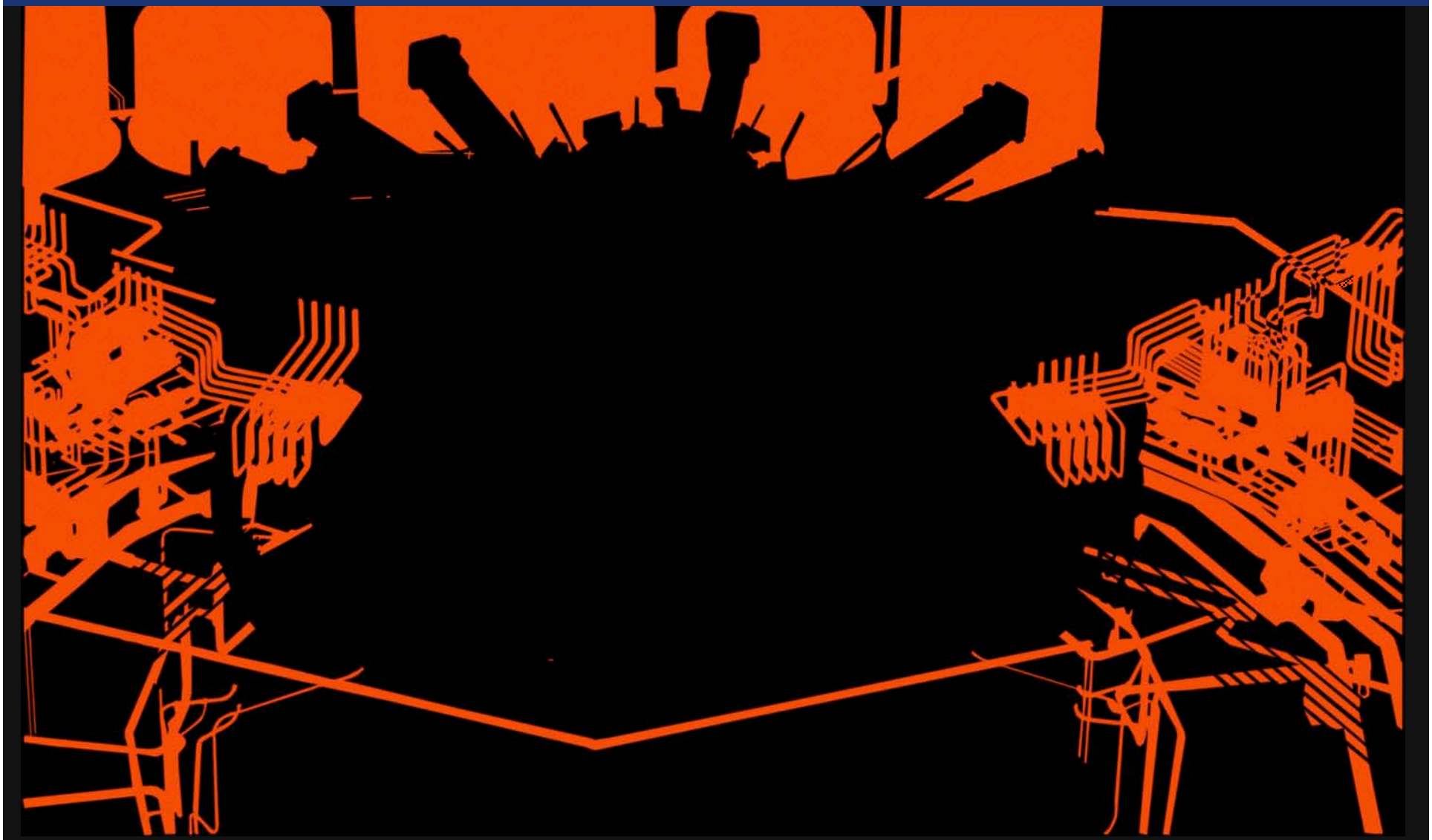
What's Ahead

- Continue to investigate alternative cost-saving fabrication methodologies.
- Provide support to IO on generic blanket module concept in preparation for January Conceptual Design Review.
- Support development of process for direct bonding of beryllium to steel (for expected use in equatorial port blanket shield modules).



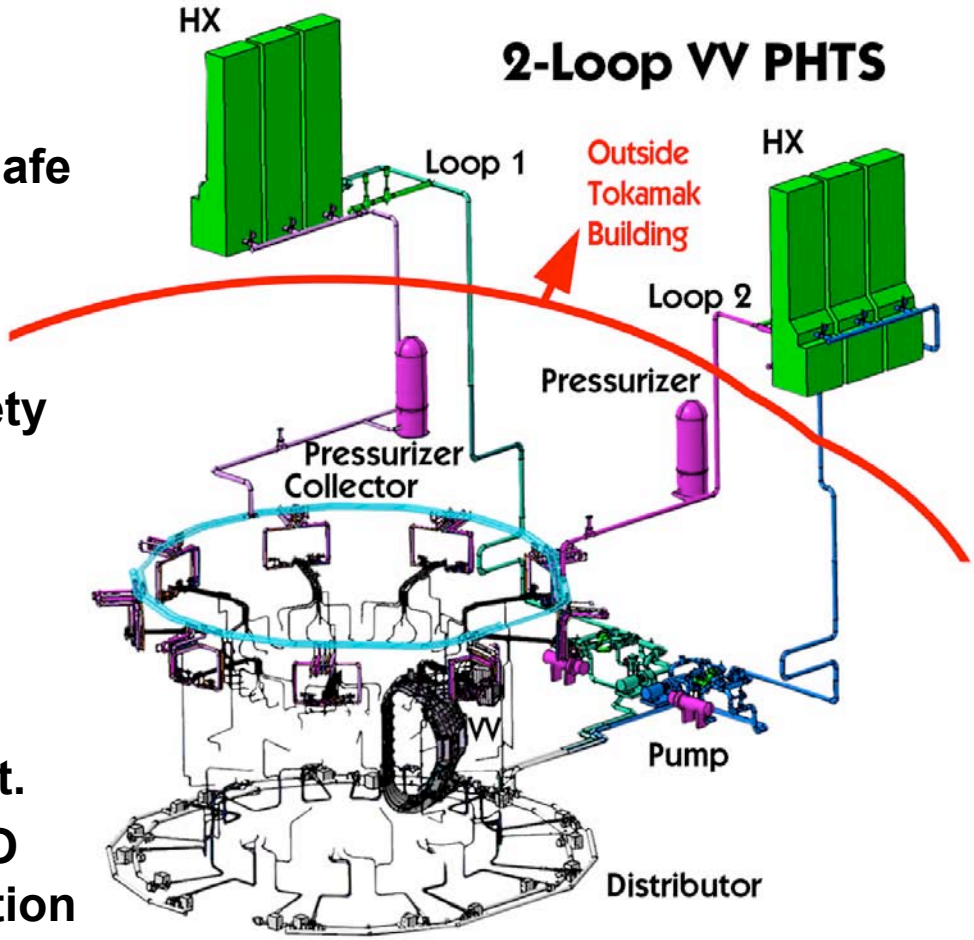
Tokamak Cooling Water Systems

The U.S. Role



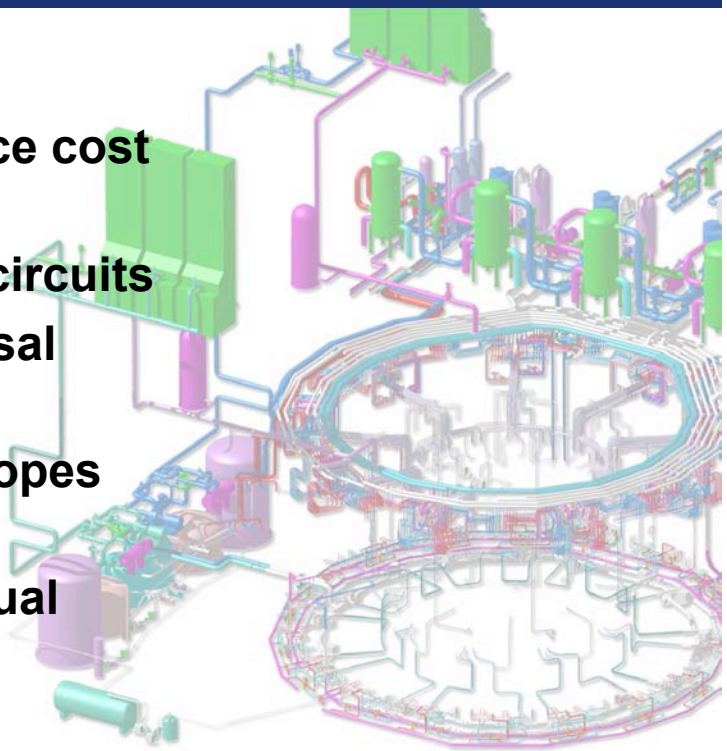
Tokamak Cooling Water Systems:
Recent Accomplishments

- Demonstrated that fusion is inherently safe because cooling water is not required to ensure safe shutdown under accident conditions.
- Modified design of Primary Heat Transfer System to improve safety and result in ~$8M cost saving.
- Developed TCWS conceptual design and presented design to external review panel.
- Completed, gained approval for Systems Requirement Document.
- Secured assurances that ITER-IO will provide nuclear indemnification of DA activities.

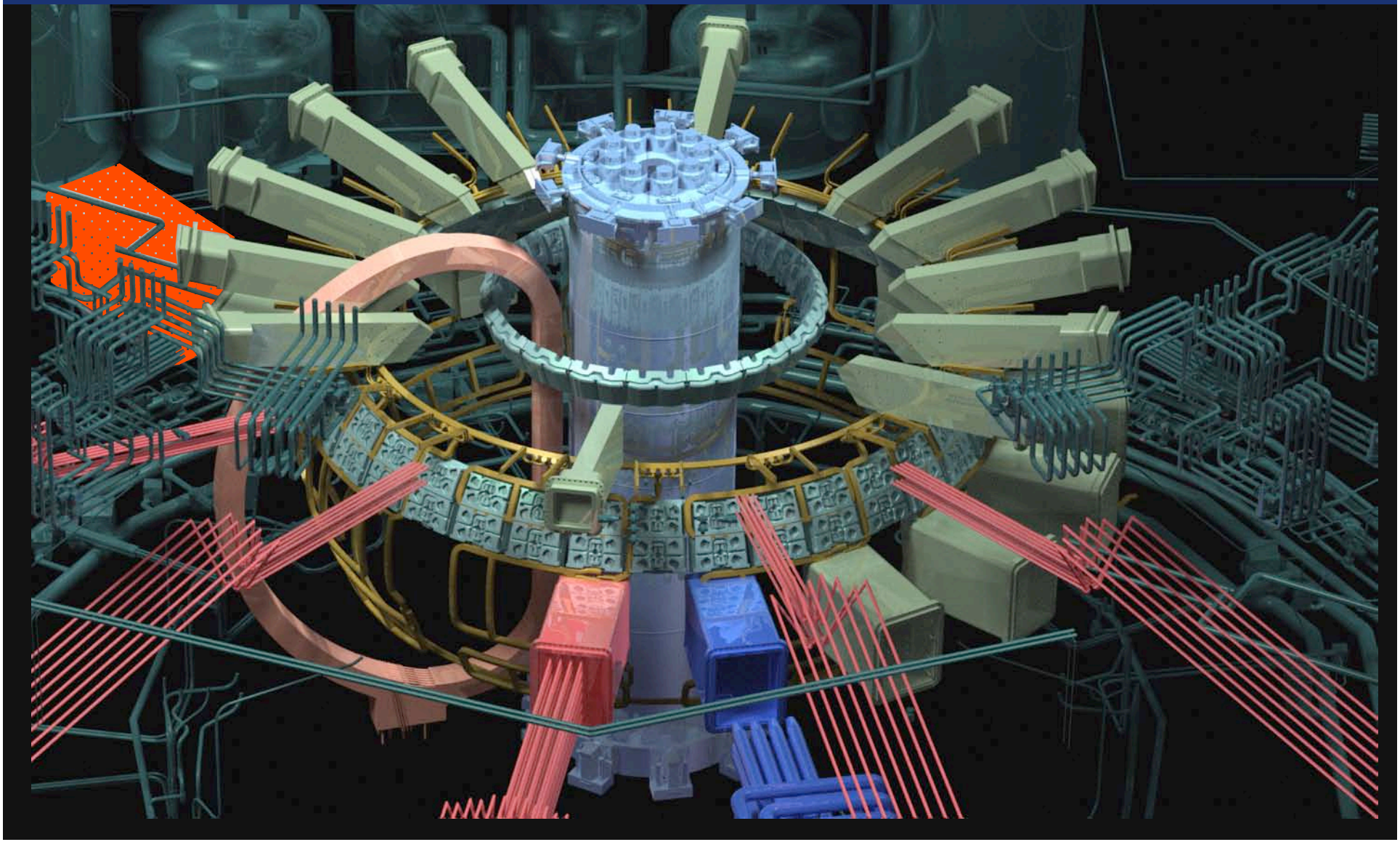


Tokamak Cooling Water Systems:
What's Ahead

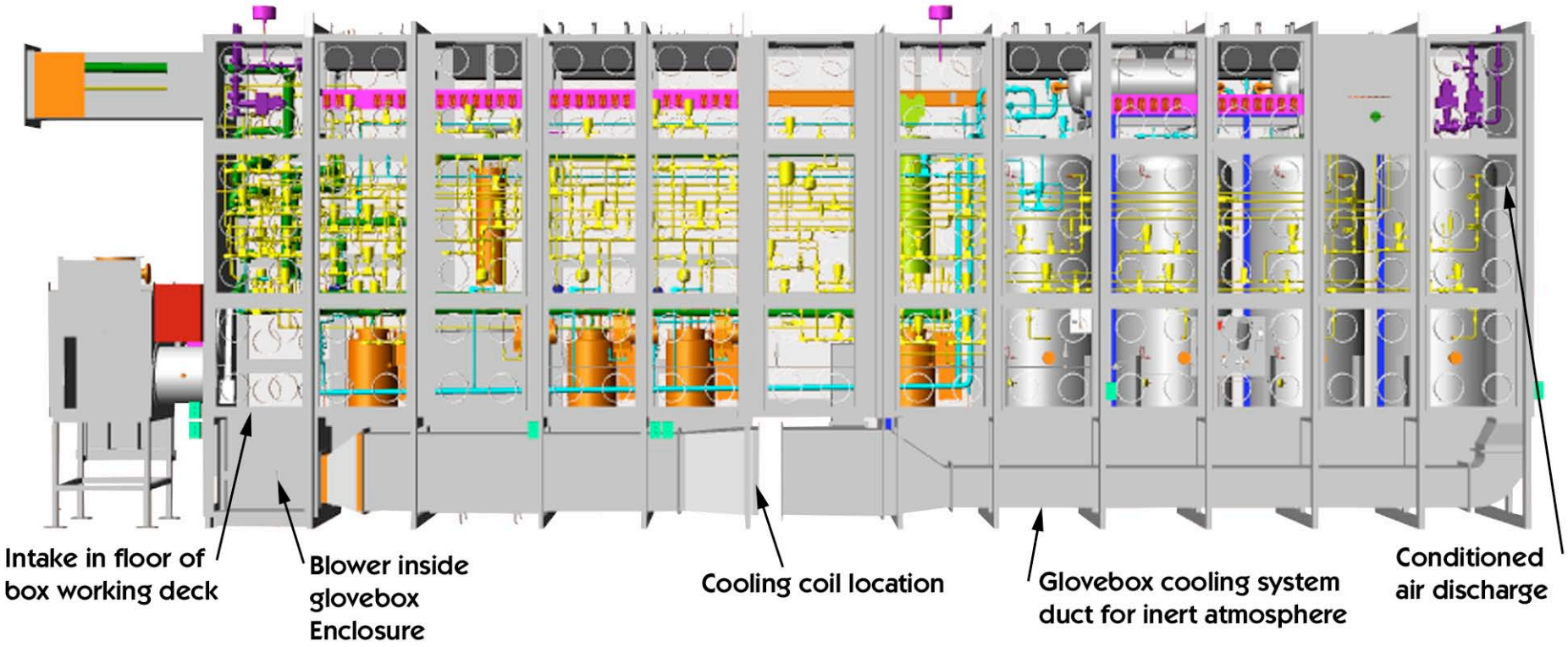
- Large TWCS contract nearing award.
- Examining additional opportunities to reduce cost and improve operability, reliability, safety.
  - Combining in-vessel component cooling circuits
  - Determining safe radioactive waste disposal options
  - Analyzing effects of carbon, nitrogen isotopes generated because of neutron interactions.
- Resolving comments, issues from Conceptual Design Review.
- Updating System Requirements, Design Description documents to include preliminary design requirements.
- Examining additional opportunities to reduce cost and improve operability, reliability, safety.
- Resolving comments, issues from Conceptual Design Review.



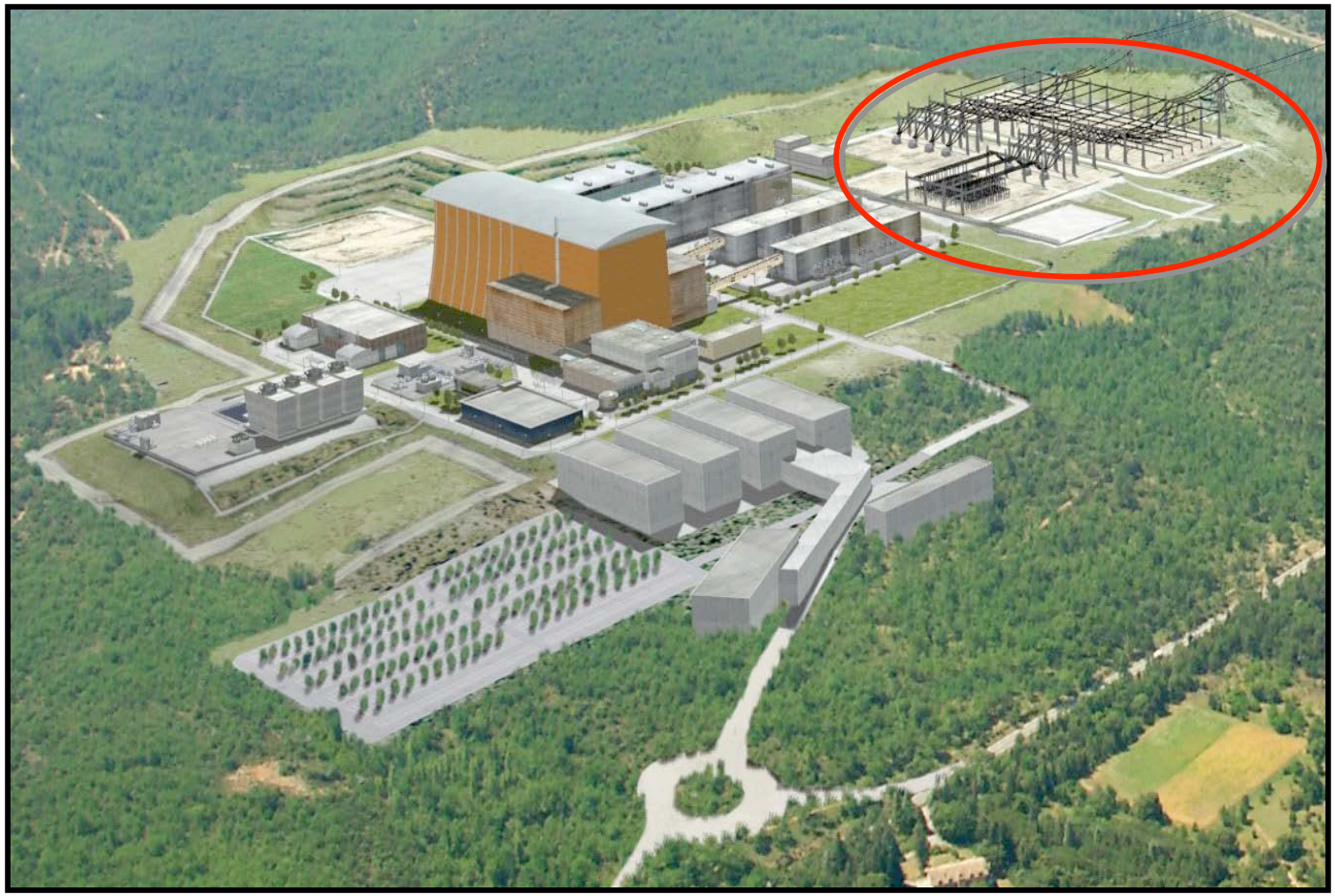
Vacuum Pumping and Fueling Systems
The U.S. Role



Tokamak Exhaust Processing System
The U.S. Role



Electric Power Systems
The U.S. Role



HV Switchgear

HV Transformers

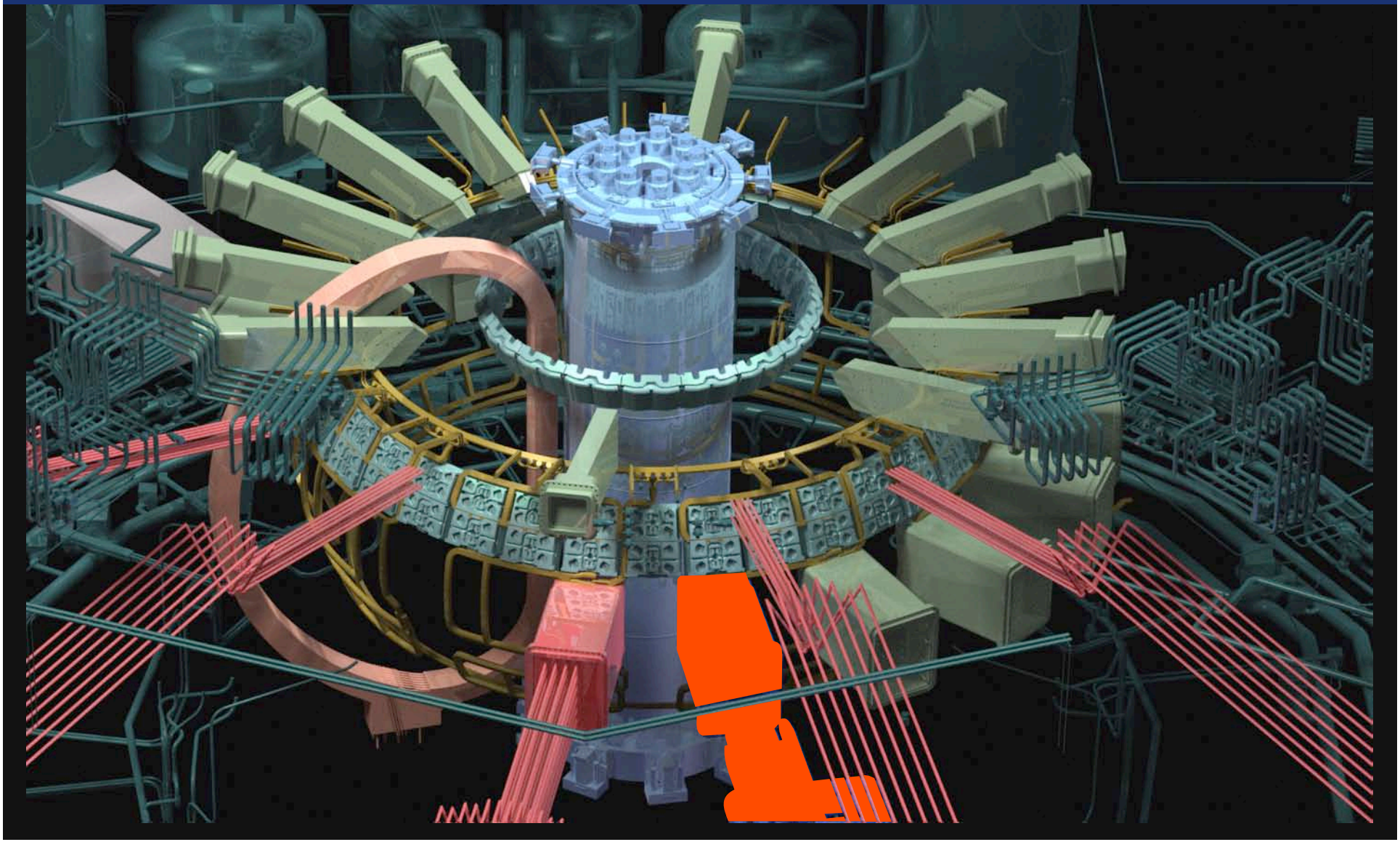
MV Switchgear

MV Transformers

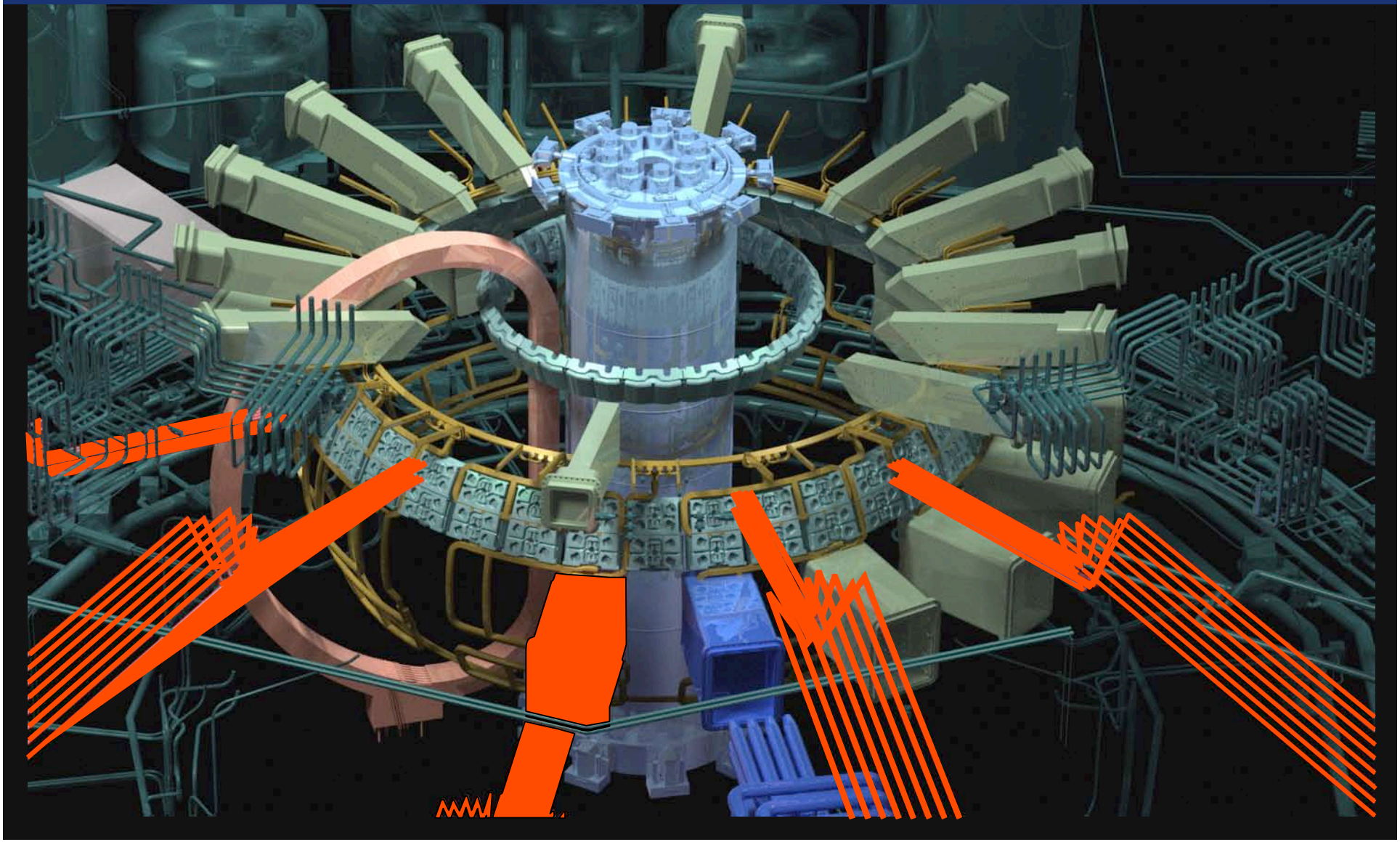
LV Load Centers

Ion Cyclotron Heating Systems

The U.S. Role

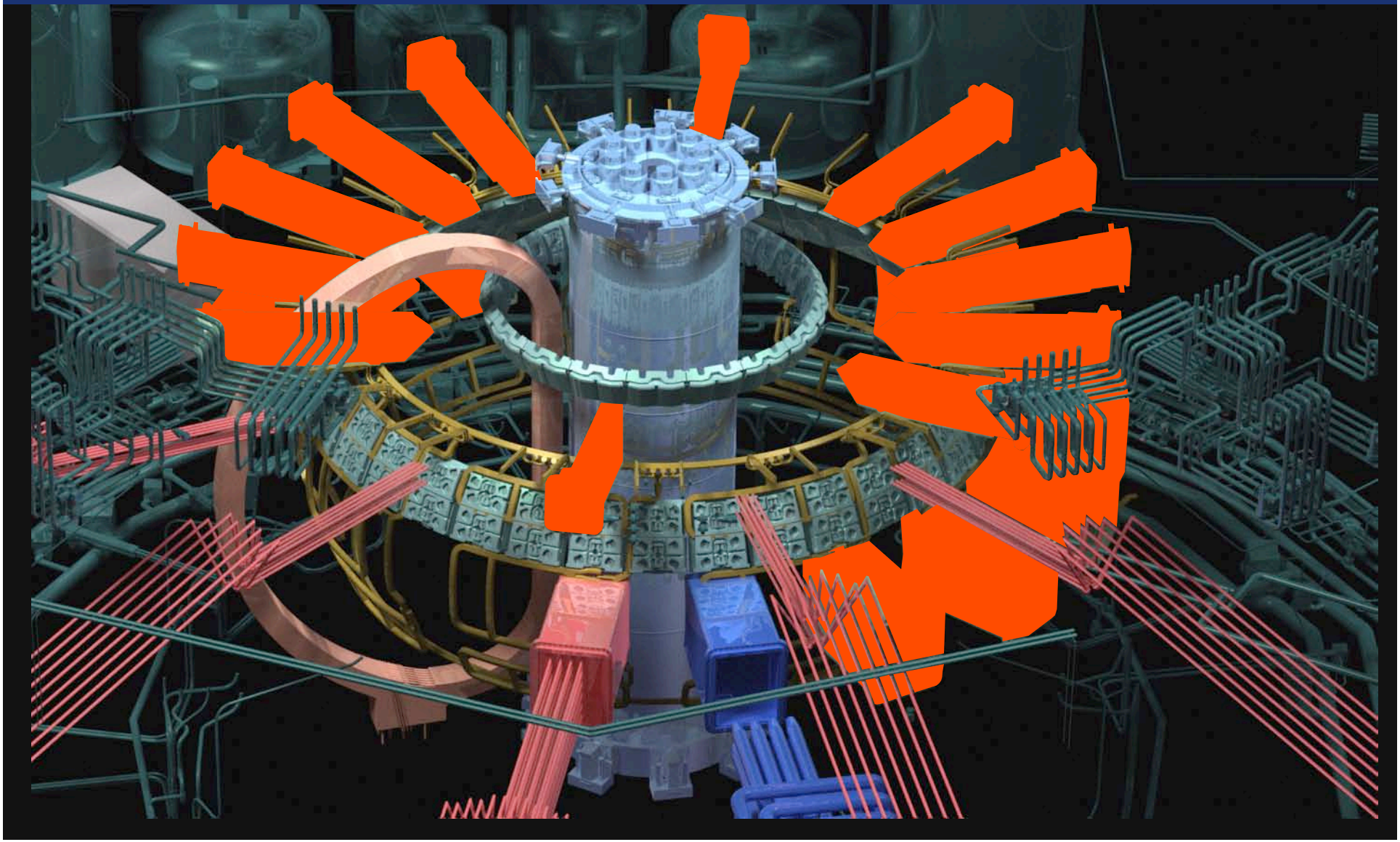


Electron Cyclotron Heating Systems
The U.S. Role



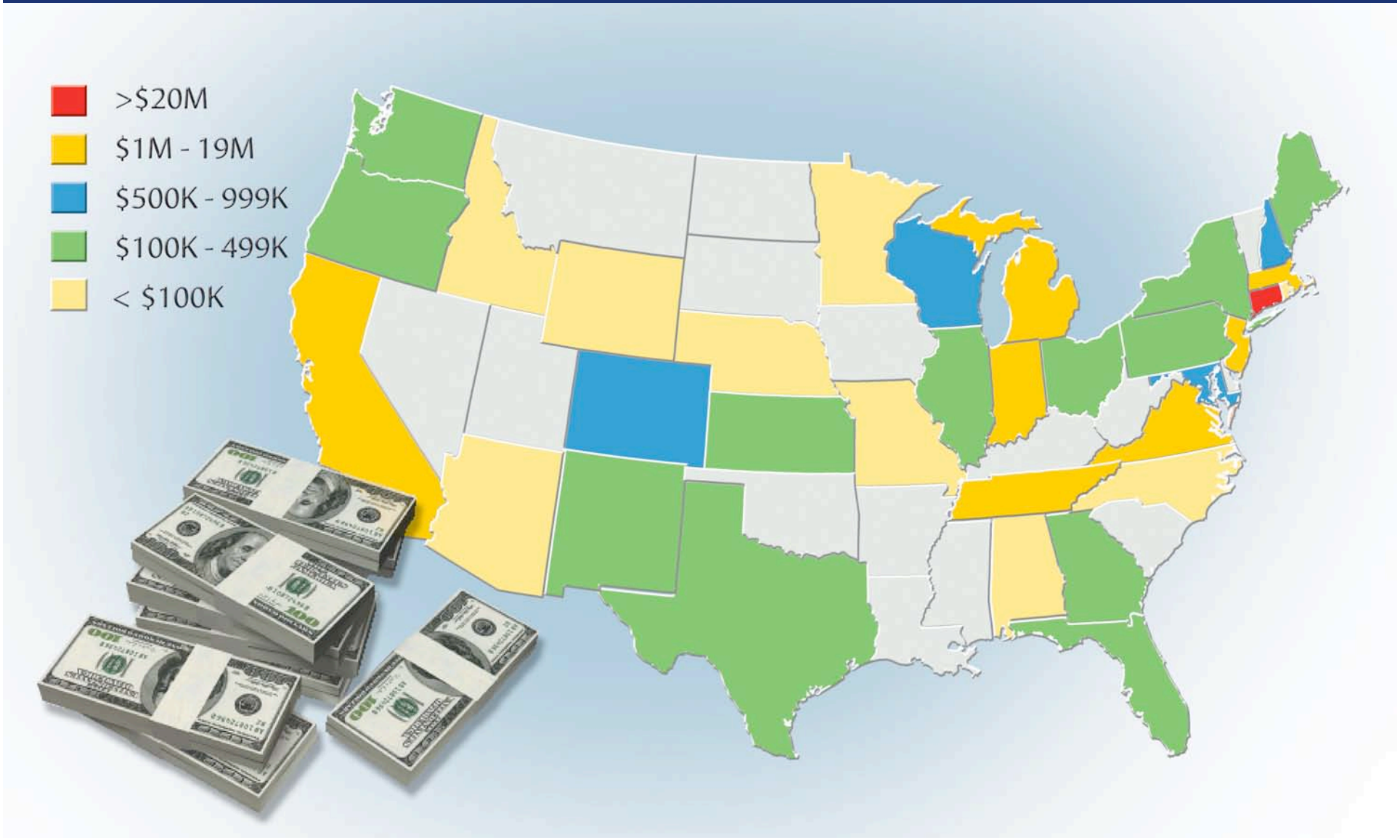
Diagnostics

The U.S. Role



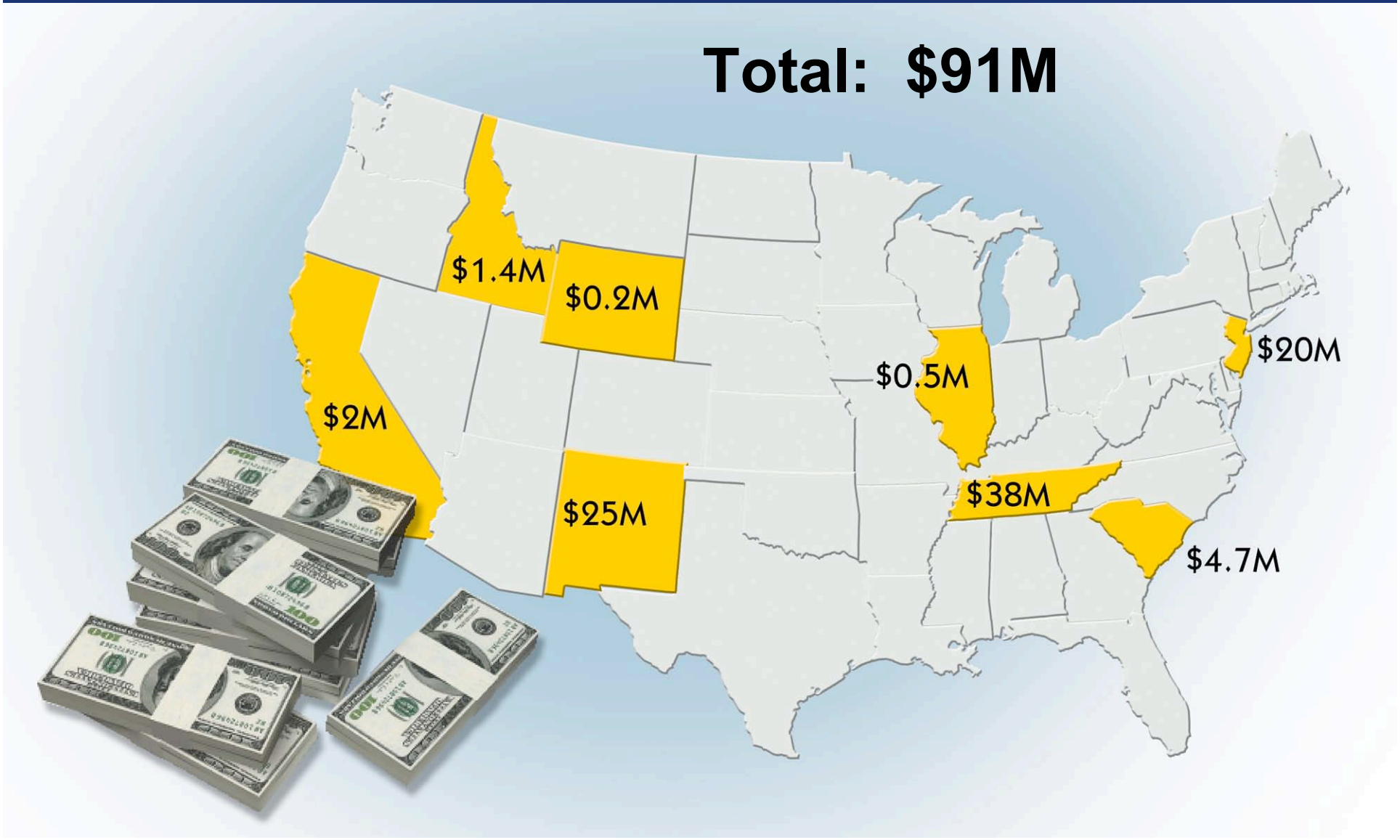
U.S. ITER Obligations

Industries and Universities

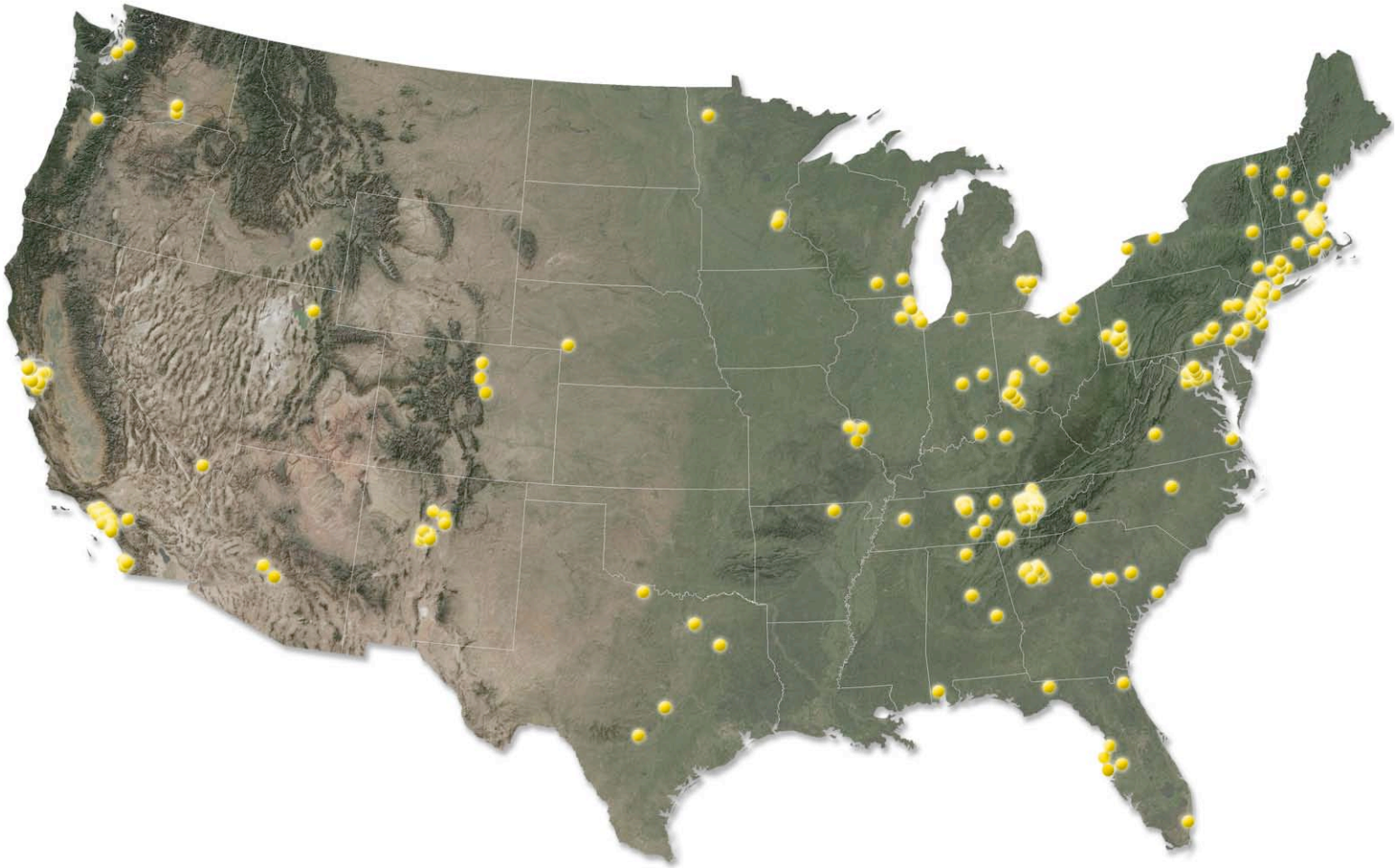


U.S. ITER Obligations

DOE Labs



Future Collaborations



Business Opportunities with U.S. ITER

Interested companies, universities, research institutions may contact U.S. ITER Procurement Manager Jeff Geouque via phone (865-241-5399) or e-mail (geouquerj@ornl.gov).

For more information, see www.usiter.org.