OVERVIEW

GENERAL ATOMICS

and Affiliated Companies

M-411(1)
7-2010

GENERAL ATOMICS

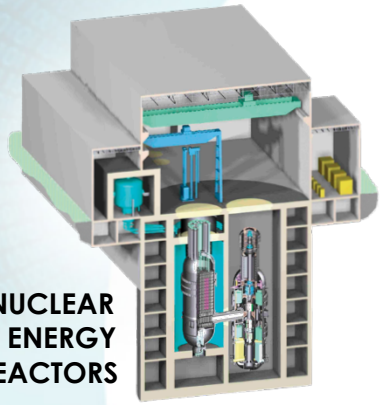
LOCATION: San Diego

FOUNDED: 1955 by General Dynamics

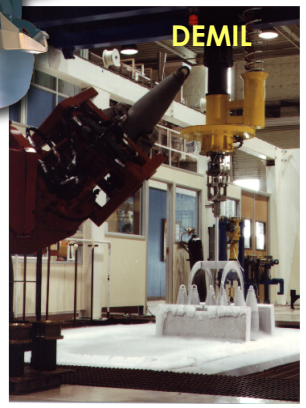
STATUS: Privately held corporation

BUSINESS: High technology research, design, manufacturing, and production for industry and Government worldwide

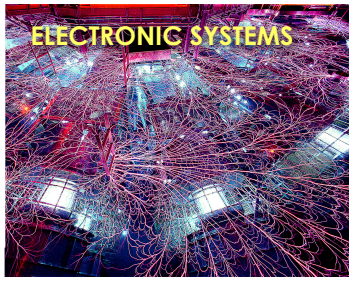
GENERAL ATOMICS AND AFFILIATES



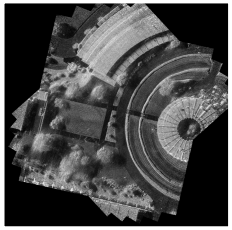
NUCLEAR ENERGY REACTORS

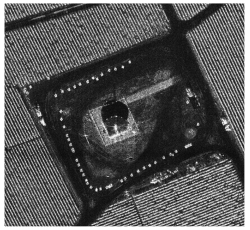


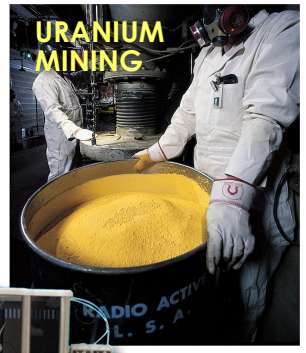
RAILWAY MAINTENANCE VEHICLES

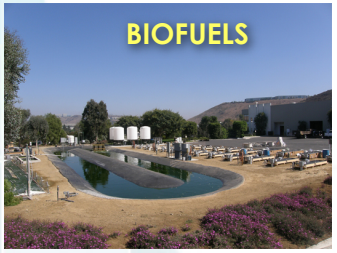


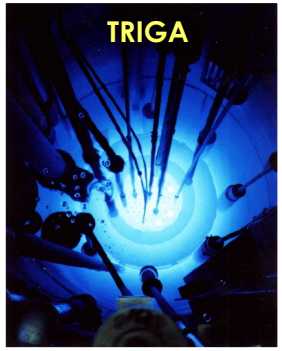
RECONNAISSANCE SYSTEMS

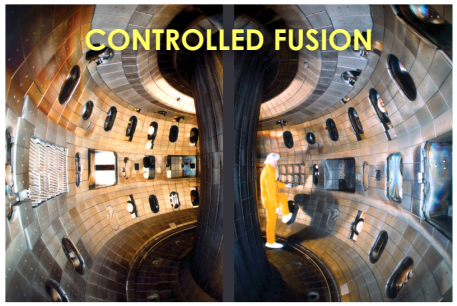




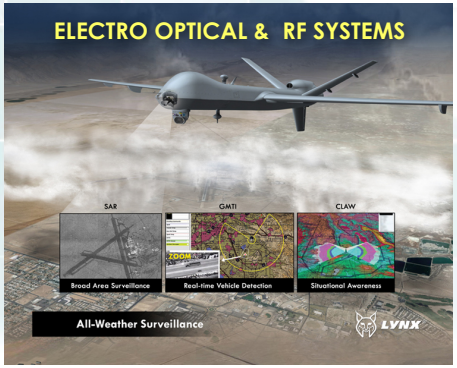








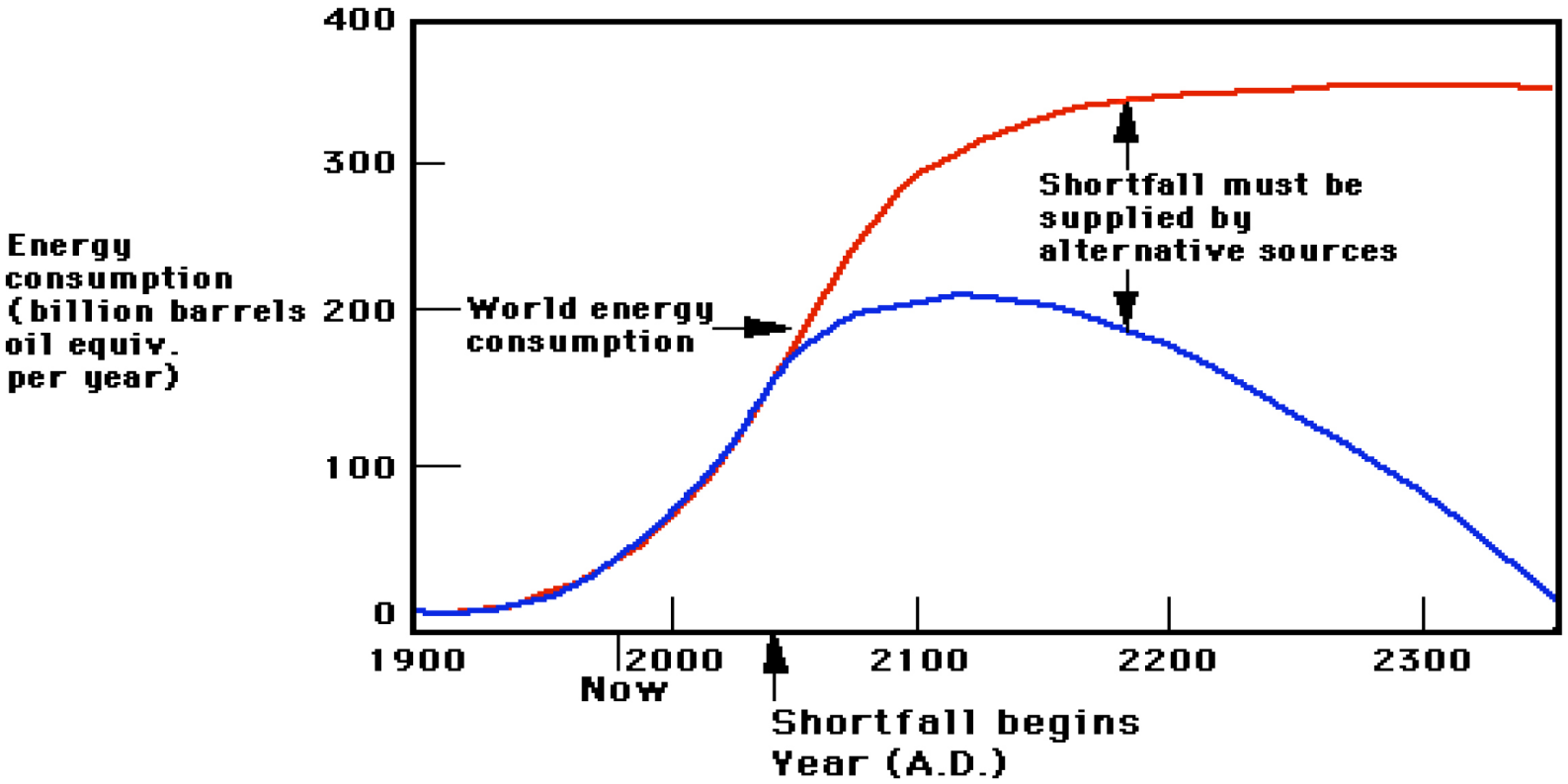
BIOTECH DIAGNOSTICS



HIGH-TECHNOLOGY SYSTEMS DEVELOPMENT

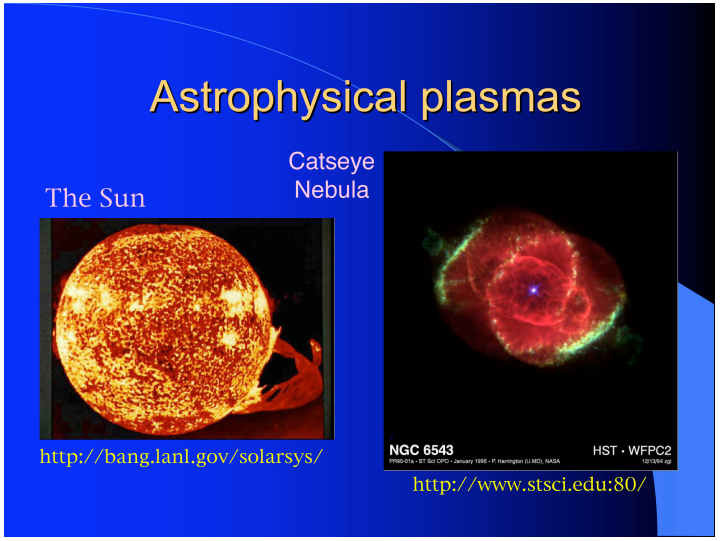
GENERAL ATOMICS

Why do we need new sources of energy?



Fusion Power is Star Power

- **Fusion is the power of the sun and the stars**
  - All elements heavier than hydrogen created through stellar necleosynthesis



- **Fusion Power**
  - Quest to create a star on earth
  - Human's attempt to put the sun in a box (or bottle)
  - Many times hotter than the center of the sun
  - 1951: Argentina's dictator Juan Peron (prematurely) announces solving fusion power

Advantages of fusion as an energy producer

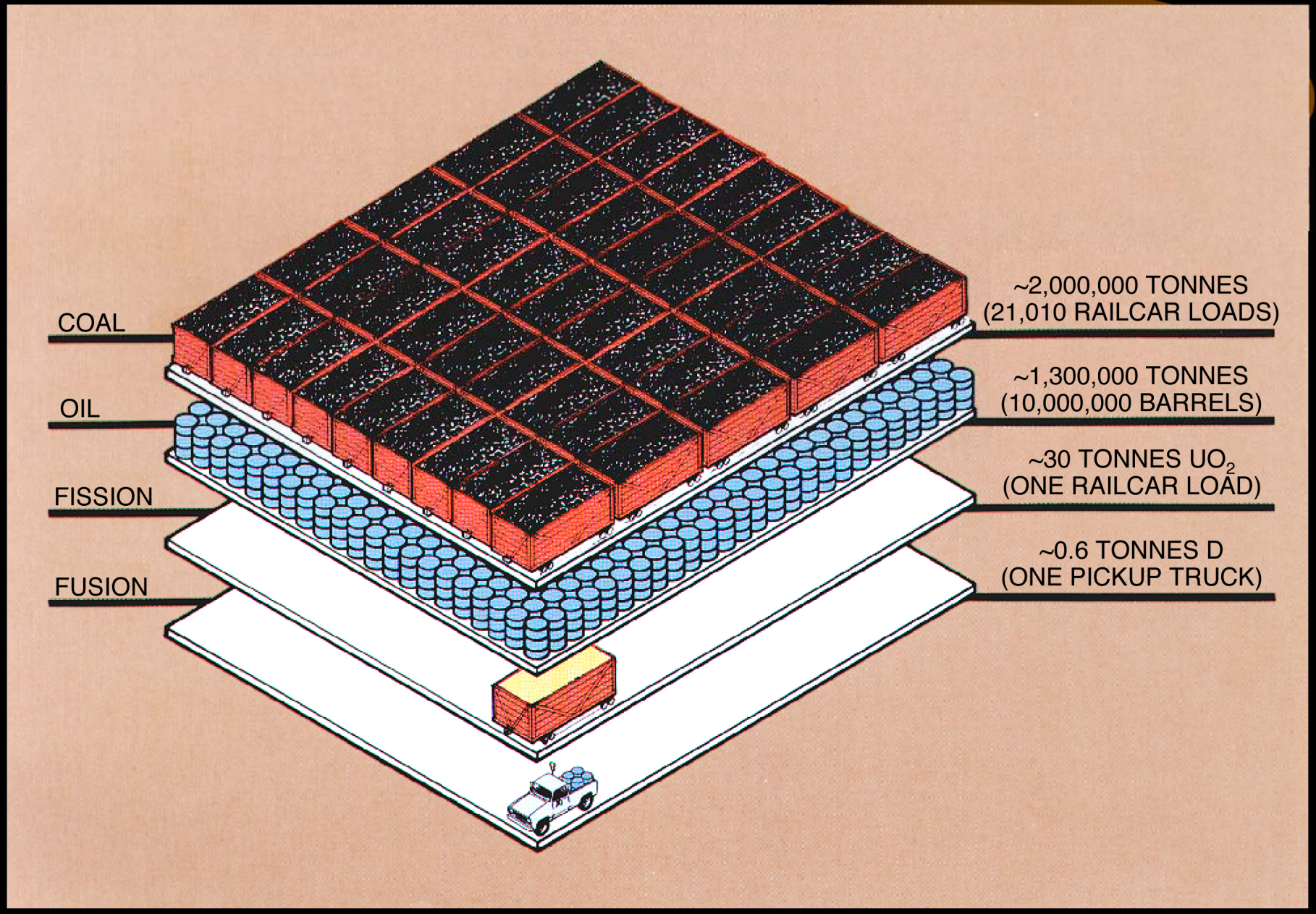
- Fusing deuterium and tritium to produce significant energy is achievable

- No CO_2 (or other greenhouse gas) output

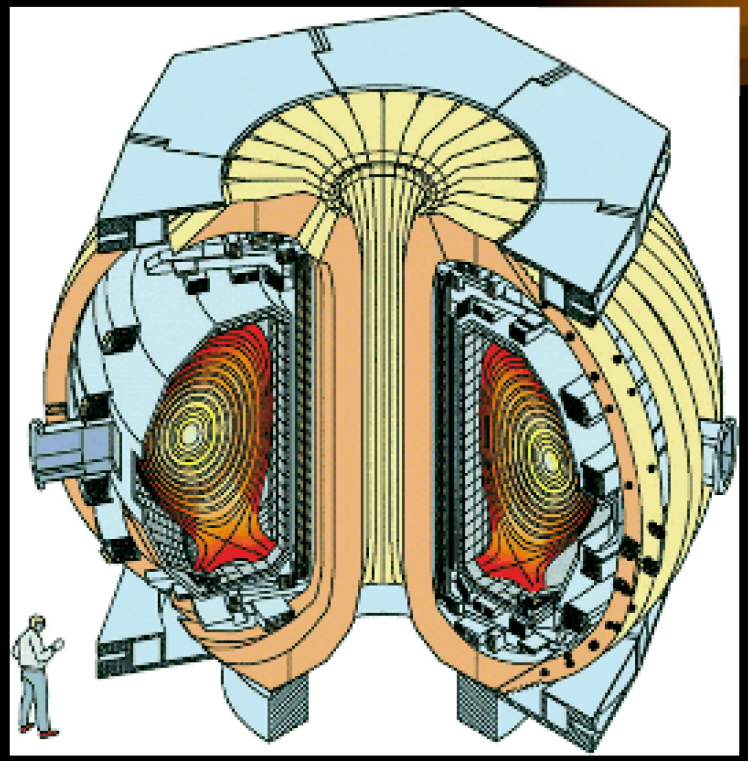
- Fuel resource will last many millions of years
  - Deuterium, a hydrogen isotope, is found in the ocean
  - Tritium is a byproduct of the process and is harvested for reuse

- No radioactive wastes - although there will be local activation of structural materials

FUEL NEEDED FOR ONE YEAR OF POWER PLANT OPERATIONS (1000 MWe)



DIII-D Tokamak Operated by General Atomics, San Diego

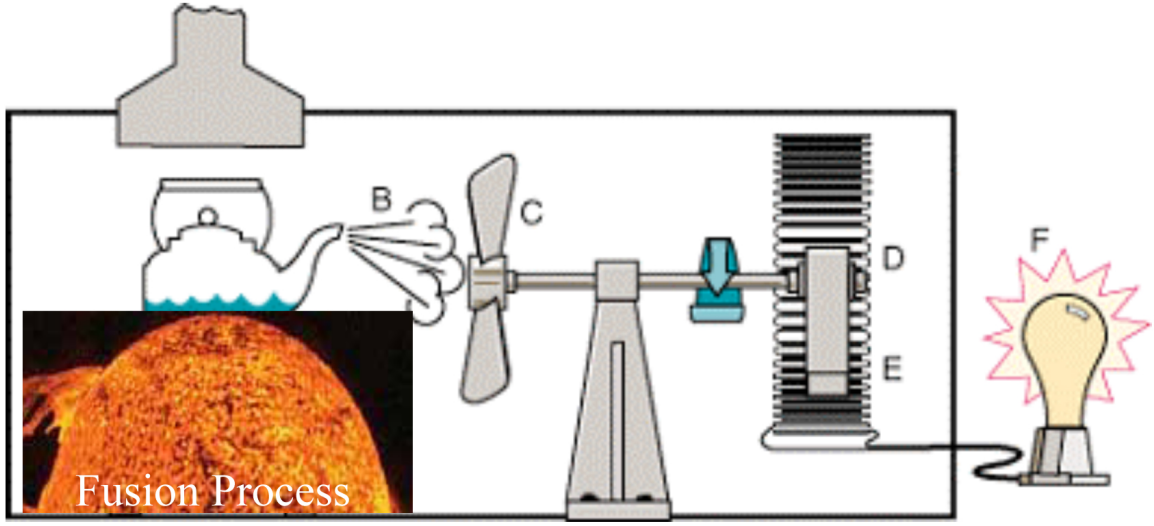


Tokamak – a magnetic bottle

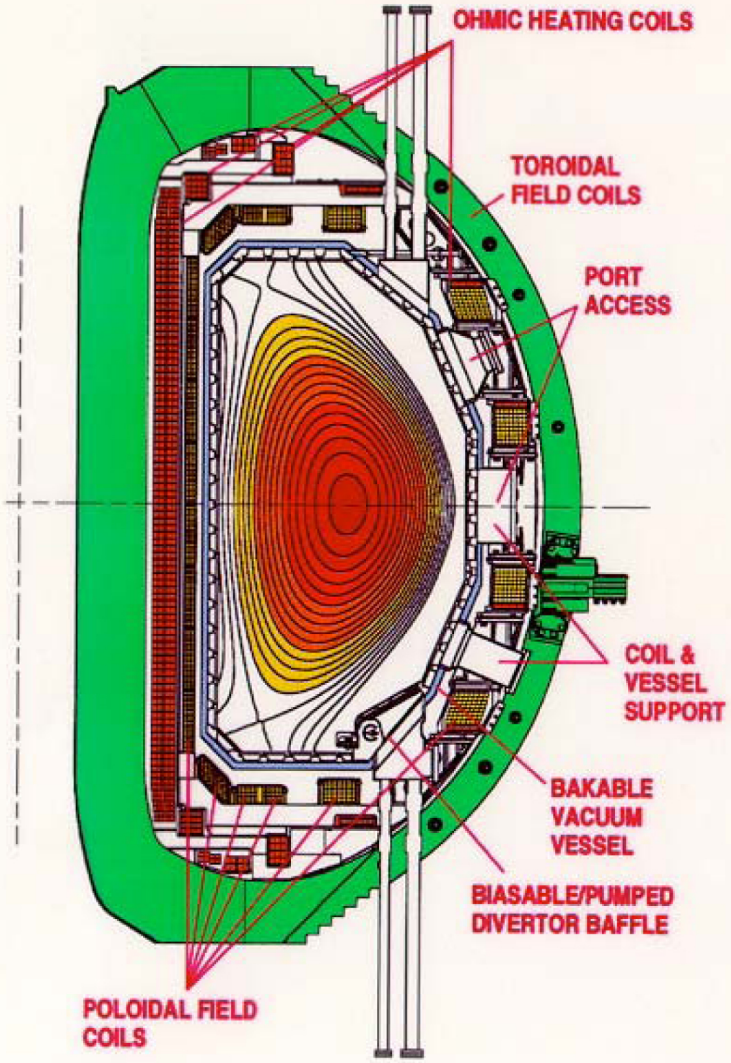
In a nutshell (summary point!), the ultimate goal of the world-wide fusion research effort is…

To use energy from the process of fusion on Earth to

1. heat water
2. make steam
3. turn a turbine (propeller set)
4. turn an electrical generator
5. make electricity



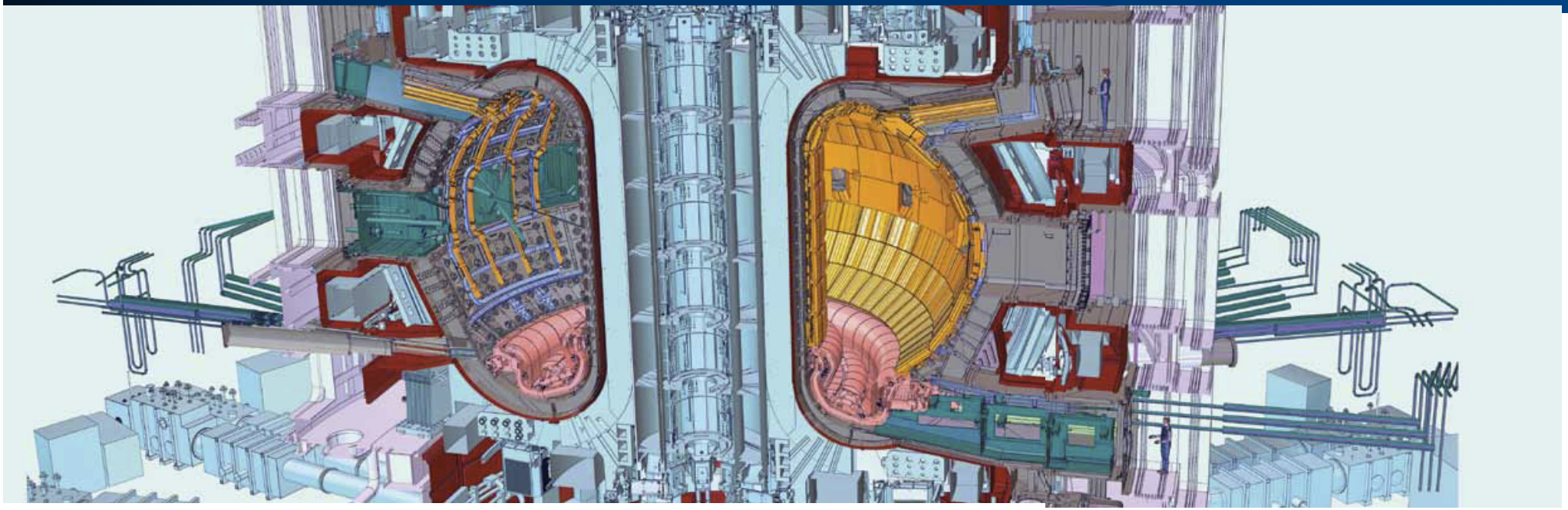
DIII–D TOKAMAK CAPABILITIES



	PRESENT	PROPOSED
Major radius	1.67 m	
Minor radius	0.67 m	
Maximum toroidal field	2.2 T	
Available OH flux	5.0 V–s	7.5 V–s
Maximum plasma current	3.0 MA	3.5 MA
Neutral beam power (80 keV)	20 MW	
ECH power (110 GHz)	2 MW	10 MW
ICH power (30–120 MHz)	6 MW	
Current flattop (divertor at 2 MA)	5 s	10 s

GENERAL ATOMICS

ITER project



- Q ≥ 10 represents the scientific goal of the ITER project: to deliver ten times the power it consumes.
- Taxes of 34 nations pay for ITER
- More than half the world's population united to peacefully study fusion, and to create a fusion power plant

An opportunity for GA employees to improve K-12 science education: GASSSS Program

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General Atomics Aeronautical Systems, Inc (RSG)
General Atomics Sciences Education Foundation
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STEM is really important

- **STEM**
  - Don't need PHD to contribute to STEM
- **STEM Literacy**
  - Uninformed public will choose poor public policies
  - Science *is* important and it *is* cool
- **Importance of Science**
  - Science is *not* just another class, like spelling class or gym class
  - STEM permeates through all facets of our daily lives, and will likely continue to increase
  - All of STEM knowledge will likely double many times in our lifetimes, much faster than any generation has ever experienced

STEM Outreach

- **Some children will never be encouraged to pursue science careers**
  - Some will not know what science is
  - Science is "too hard" or "beyond understanding" to all but a few
- **What does a scientist look like?**
  - Anyone can be a scientist!
  - Stereotype: old white male mad scientist detached from the world, playing god
- **Inspire someone like you have been inspired**
  - Real people are passionate about this stuff