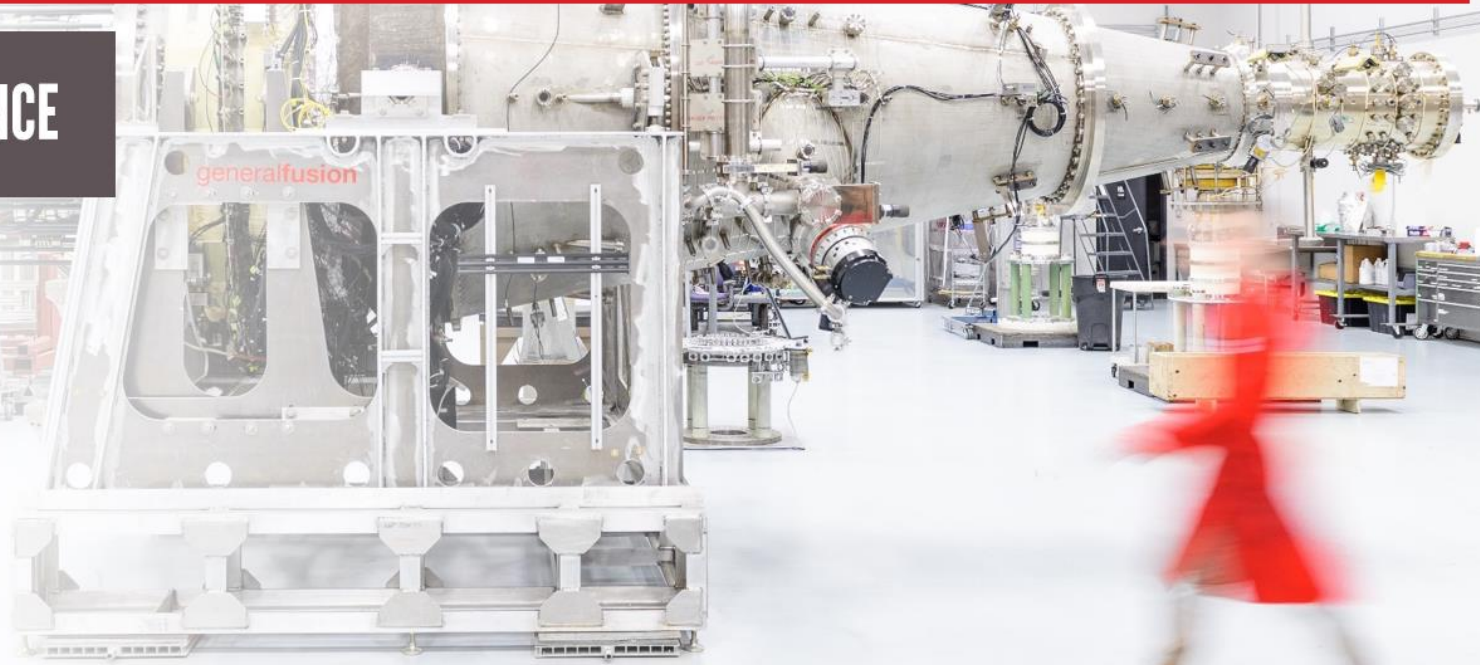


TRANSFORMING HOW WE ENERGIZE THE WORLD

OTTAWA CNS 2019 CONFERENCE

generalfusion®

generalfusion



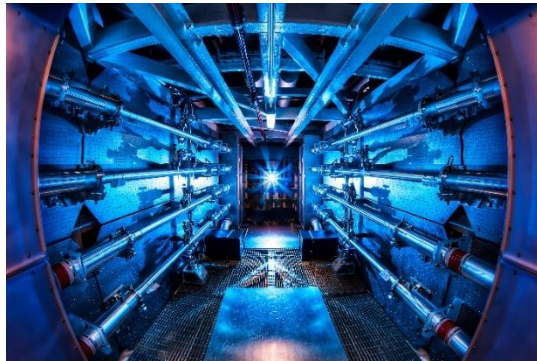
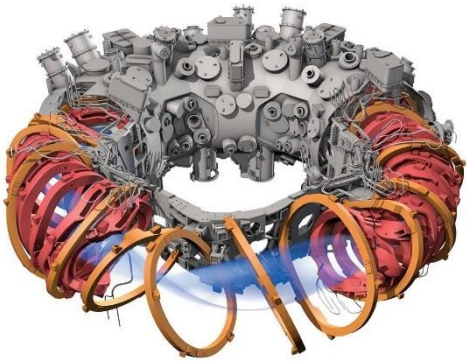
General Fusion

- Founded in 2002 by Dr. Michel Laberge
- Based in Vancouver, Canada
- 75 employees
- Focused on building a practical, commercially viable path to fusion energy



Commercialization of Fusion Energy is Accelerating

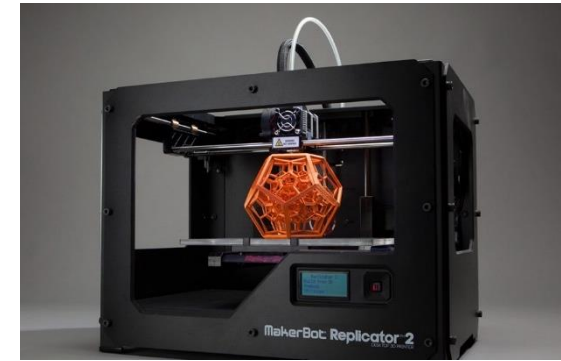
Progress of Fusion Science



- Plasma physics knowledge
- Advanced simulation codes (U.S. DOE Exascale Project)
- Experimental confirmation of fusion theory



Maturing Enabling Technologies



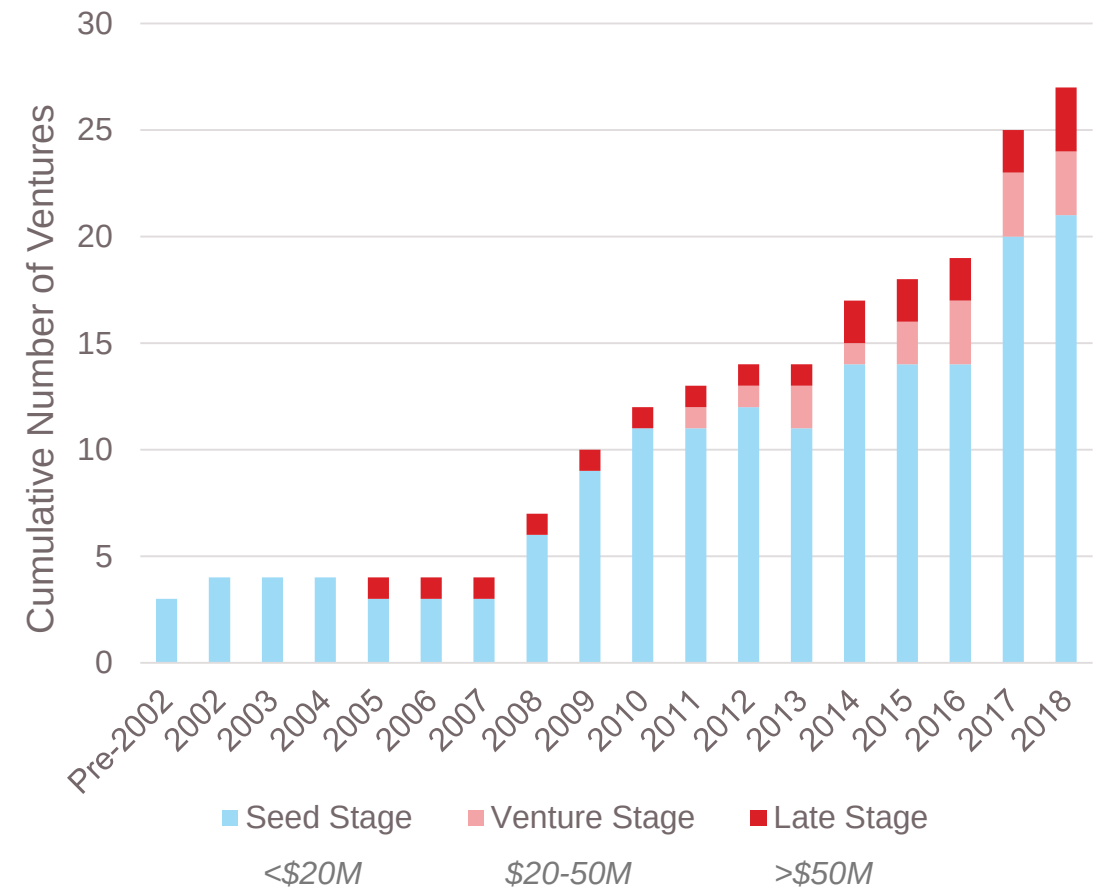
- Advanced manufacturing (3D printing)
- Computational power and big data analytics
- High speed digital control systems
- High temperature superconducting magnets

Creating an Emerging Private Sector

generalfusion



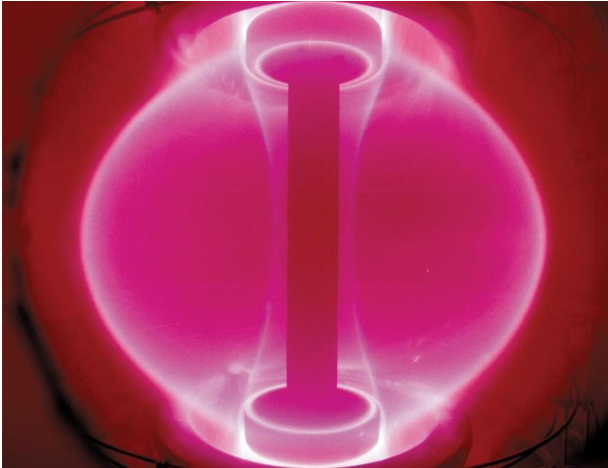
Private Fusion Ventures



The Challenges of Fusion Energy

Fusion Conditions

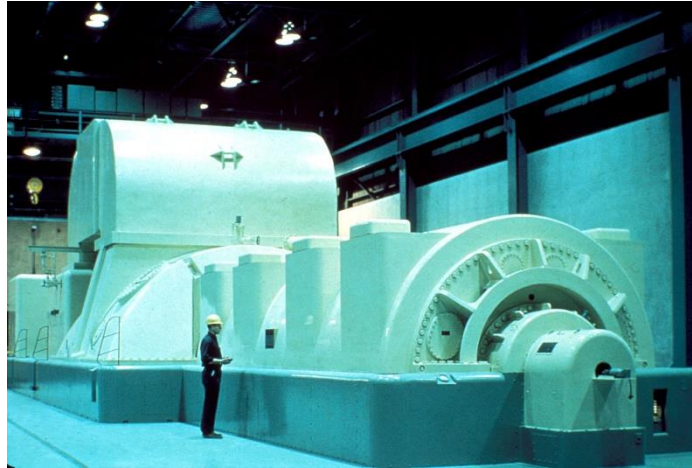
Challenge of creating and sustaining fusion conditions to produce energy



Nearly all public and private fusion efforts are focused here...

Energy Conversion

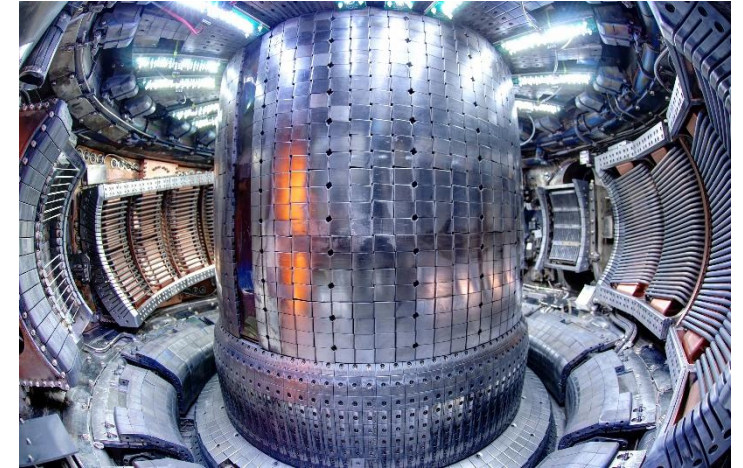
Challenge of capturing the energy produced from fusion and producing electricity



...but not here, despite the difficult technical challenges to be solved

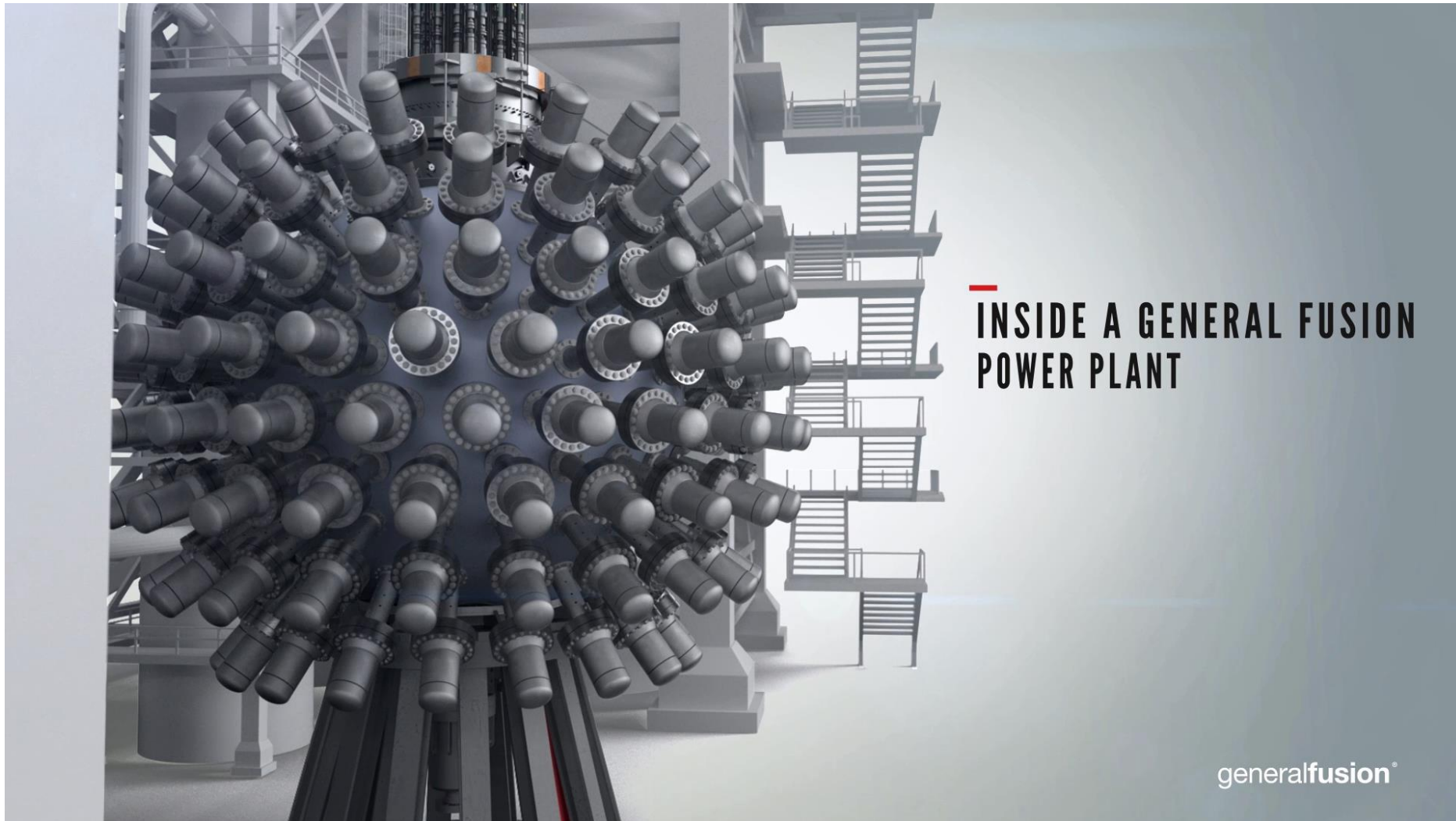
System Durability

Challenge of materials and structures which are not damaged by fusion reactions



General Fusion has a cost-effective, end-to-end solution

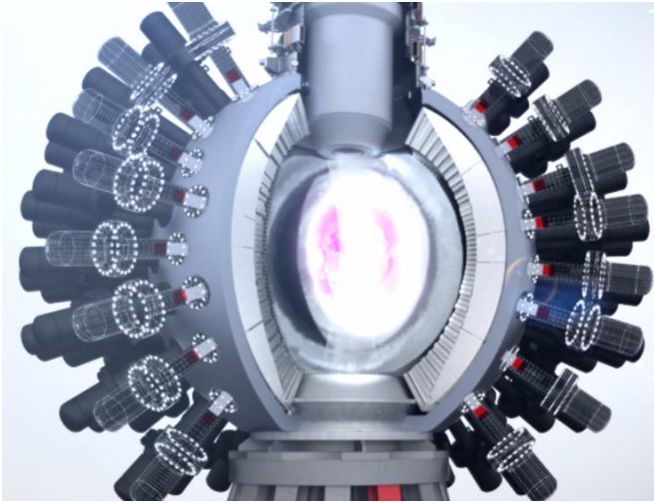
Architecture Provides Commercialization Pathway...



A pulsed machine - The fusion equivalent of a diesel engine

...by Resolving Traditional Barriers to Fusion

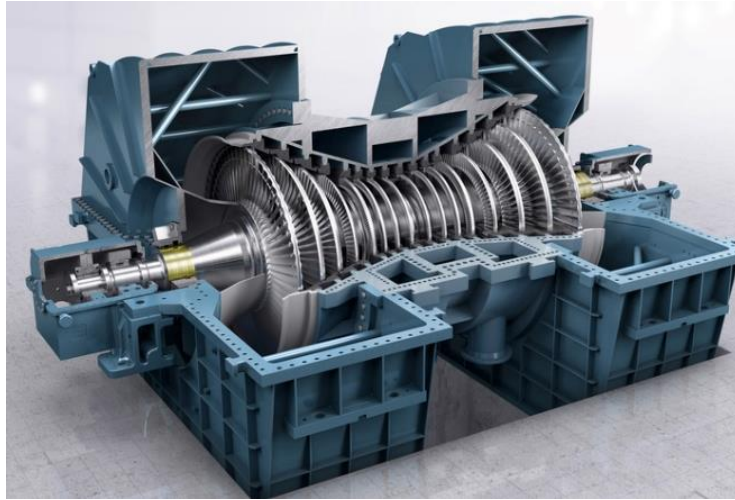
Fusion Conditions



General Fusion's pulsed fusion process eliminates the need for complex and costly:

- Long-term stabilization of plasma
- Complex plasma heating systems
- Consumable fuel targets

Energy Conversion



General Fusion's energy conversion system uses well understood energy technology:

- Liquid metal heat exchanger
- Conventional steam turbine/generator
- Efficient fusion driver source

System Durability



General Fusion's liquid-metal plasma compression and fusion cavity avoids:

- Structural materials degradation
- Problem of insufficient tritium creation

A uniquely practical solution to the challenges of fusion

Development and Commercialization Program

2003 - 2008

2009 - Present

Demonstration Program

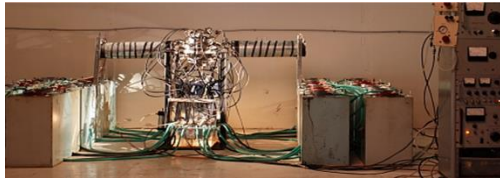
Early Experiments

Science and Technology
Development

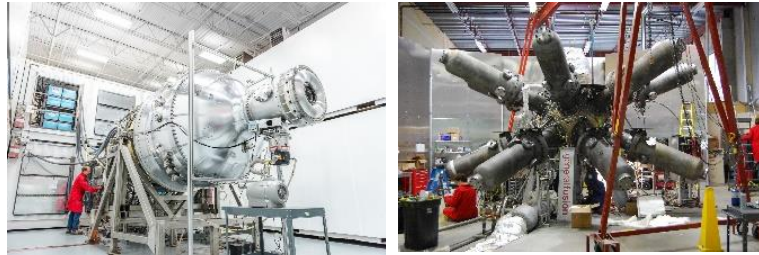
Integrated Large Scale
Demonstration

Commercial
System

Concept Exploration
Compression Neutrons



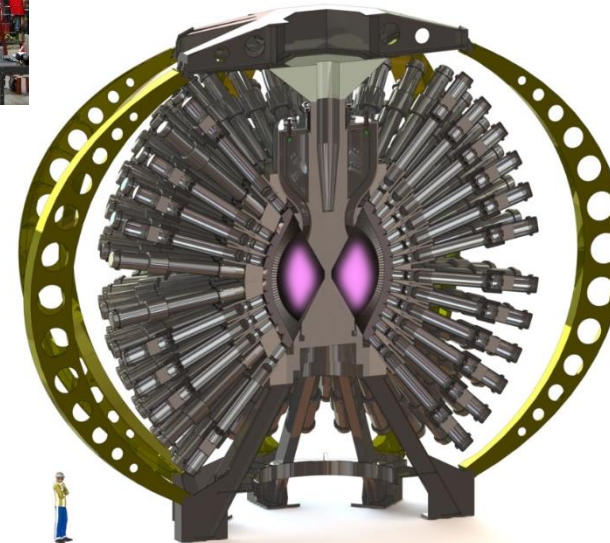
System Development



Plasma Compression Science



Integrated Solution
Fusion Temperatures
Repeatability



Repetition Rate
Closed Fuel Cycle
Reliability



New Capabilities: Pi3 Large Injector

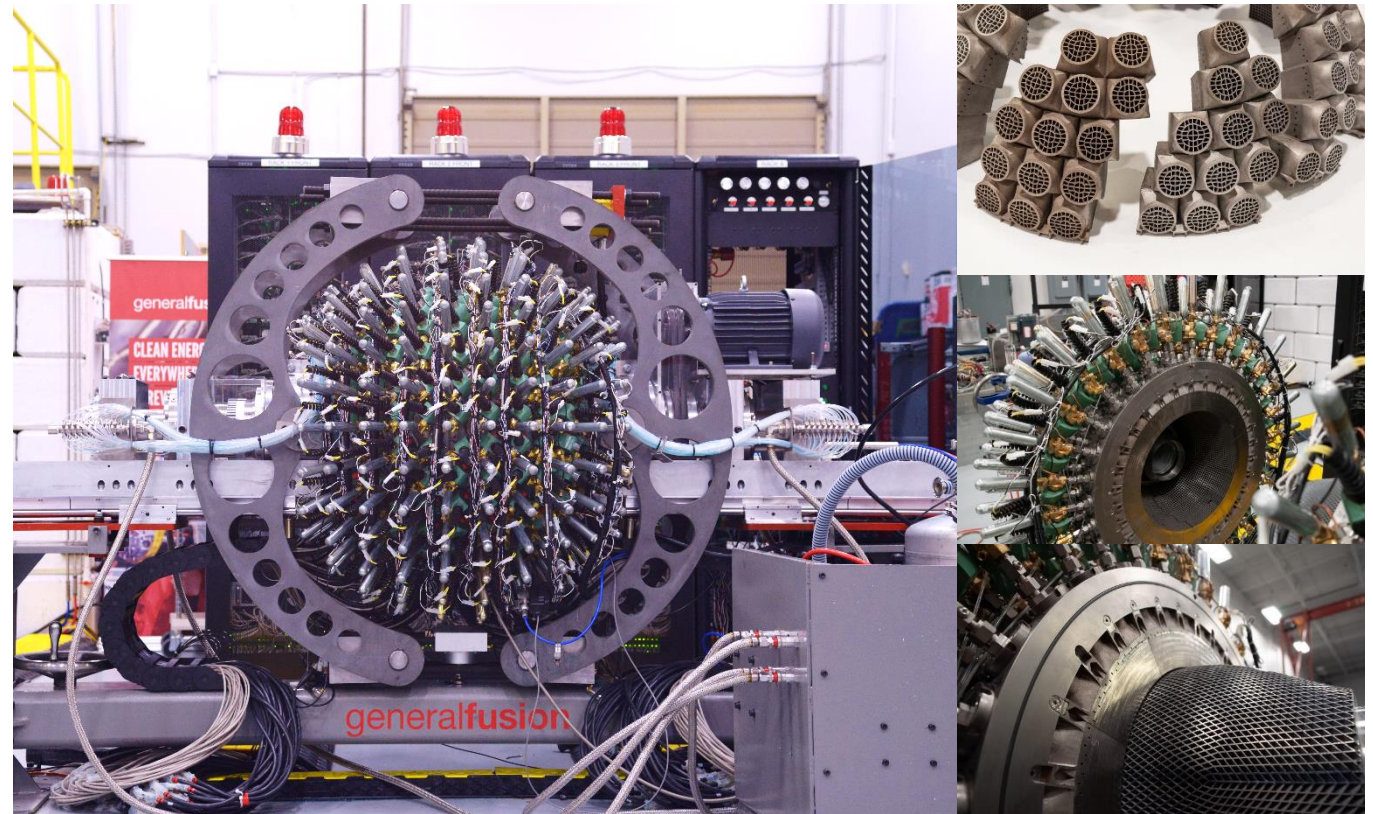
Goals, at Prototype-relevant scale:

- Validate plasma performance
- Develop and demonstrate technology
- Spherical tokamak plasma target
- 2 meter plasma radius: 500% increase in from SPECTOR
- 10 MJ pulsed power supply
- In commissioning



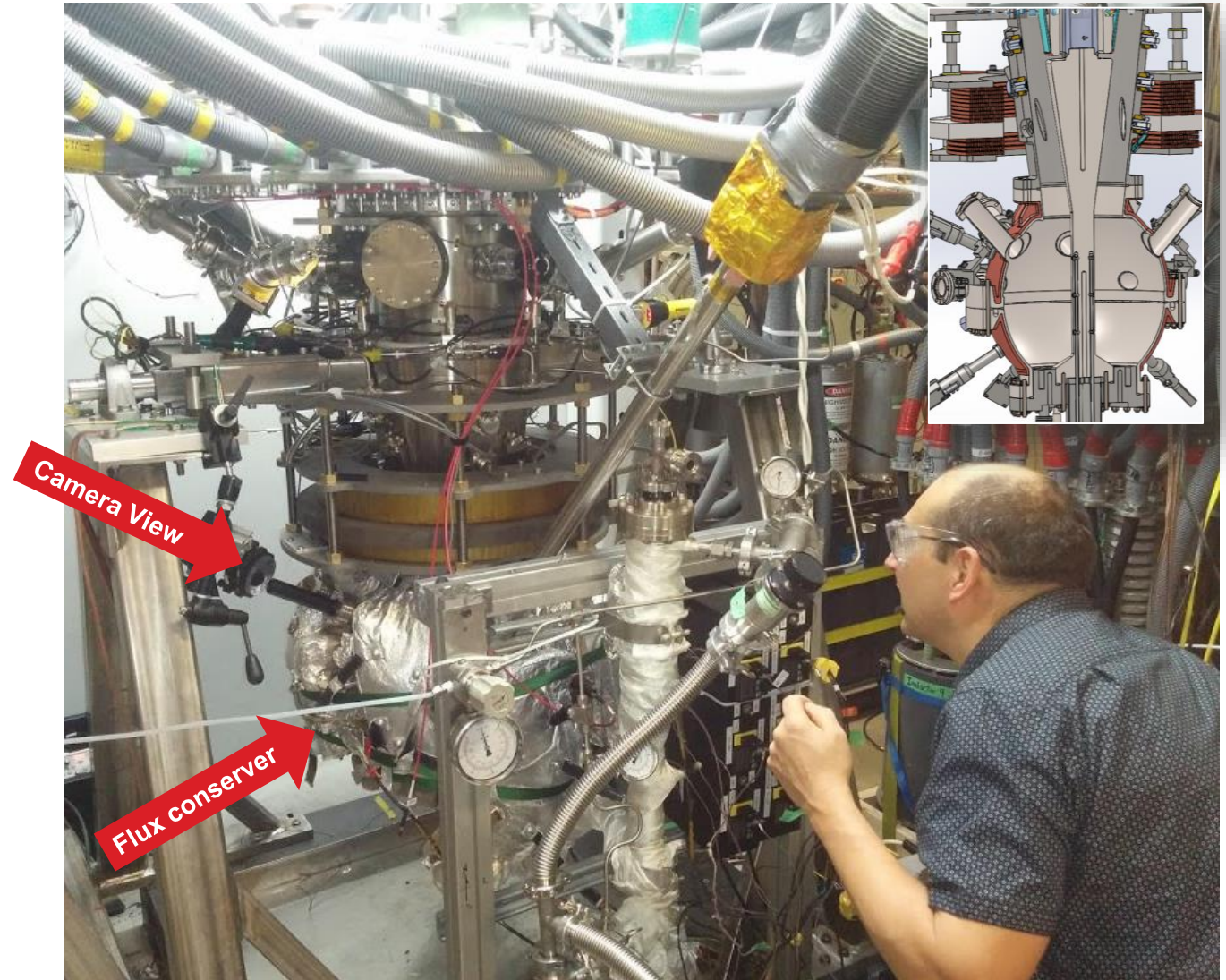
New Capabilities: SWC Compressor

- 1/10th scale (in radius) of Fusion Demonstration Plant, representative geometry
- Water-filled
- 3D printed titanium spherical cavity formation system
- Operating now



New Capabilities: SLiC

- SPECTOR plasma injector modified to add a molten lithium system
- Study plasma interaction with liquid metal (lithium) free surface



Core Technologies are in Place

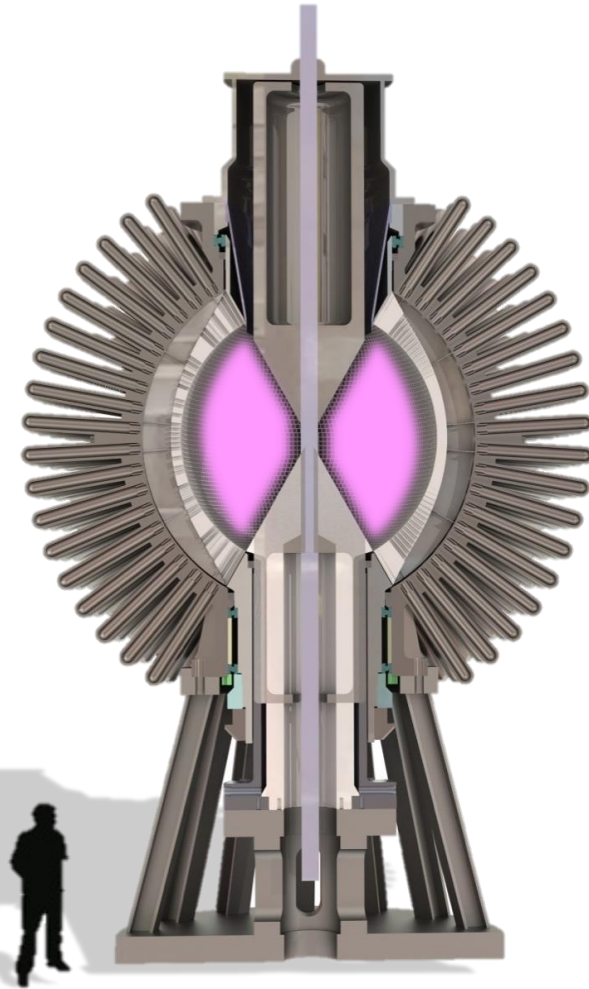
Plasma Injector System



Compression System



Fusion Process Stability



Backed by years of R&D progress, core technologies are in place, constructed, and tested at large scale

Demonstration Program Goals

Goals:

- Demonstrate, at scale, that fusion relevant temperatures can be achieved using General Fusion's technology
- Refine commercial power plant economics (ONC and LCOE), based on actual performance

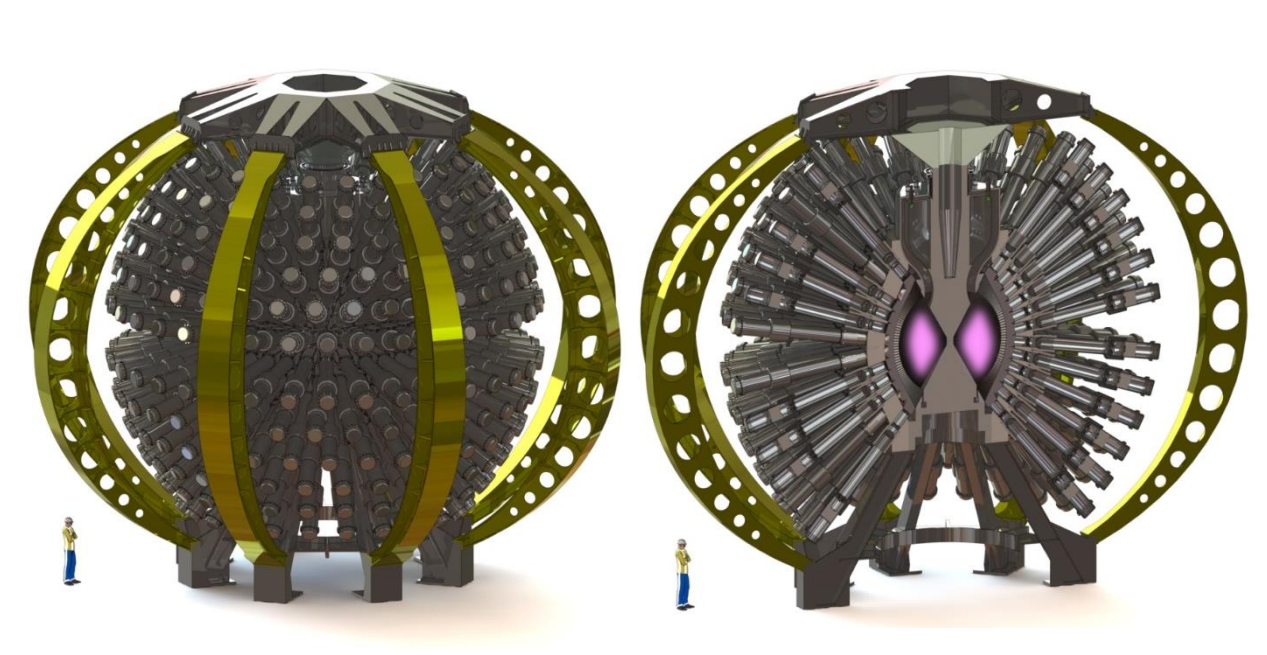
Strategy:

- Optimize performance with flexible operating envelope
- Modularize systems to permit rapid innovation

Key Features and Specifications:

- 3 meter diameter plasma (~70% of power plant)
- 15-25 MJ of plasma formation bank
- Liquid lithium
- 3.5 to 4 ms compression time
- Up to 10:1 radial compression ratio
- Heating to 10 keV, 10% of Lawson Criterion
- Design for 1 compression shot/day operating rate





DEMONSTRATION FACILITY



Canadian Strategic Innovation Fund (“SIF”) Project

- CAD \$49.3 million payable over 4 years
- Minister for Innovation, Science & Economic Development Navdeep Bains, and Minister for National Defense Harjit Sajjan, announced investment at General Fusion in October 2018
- SIF scope of work commencement in H1 2019

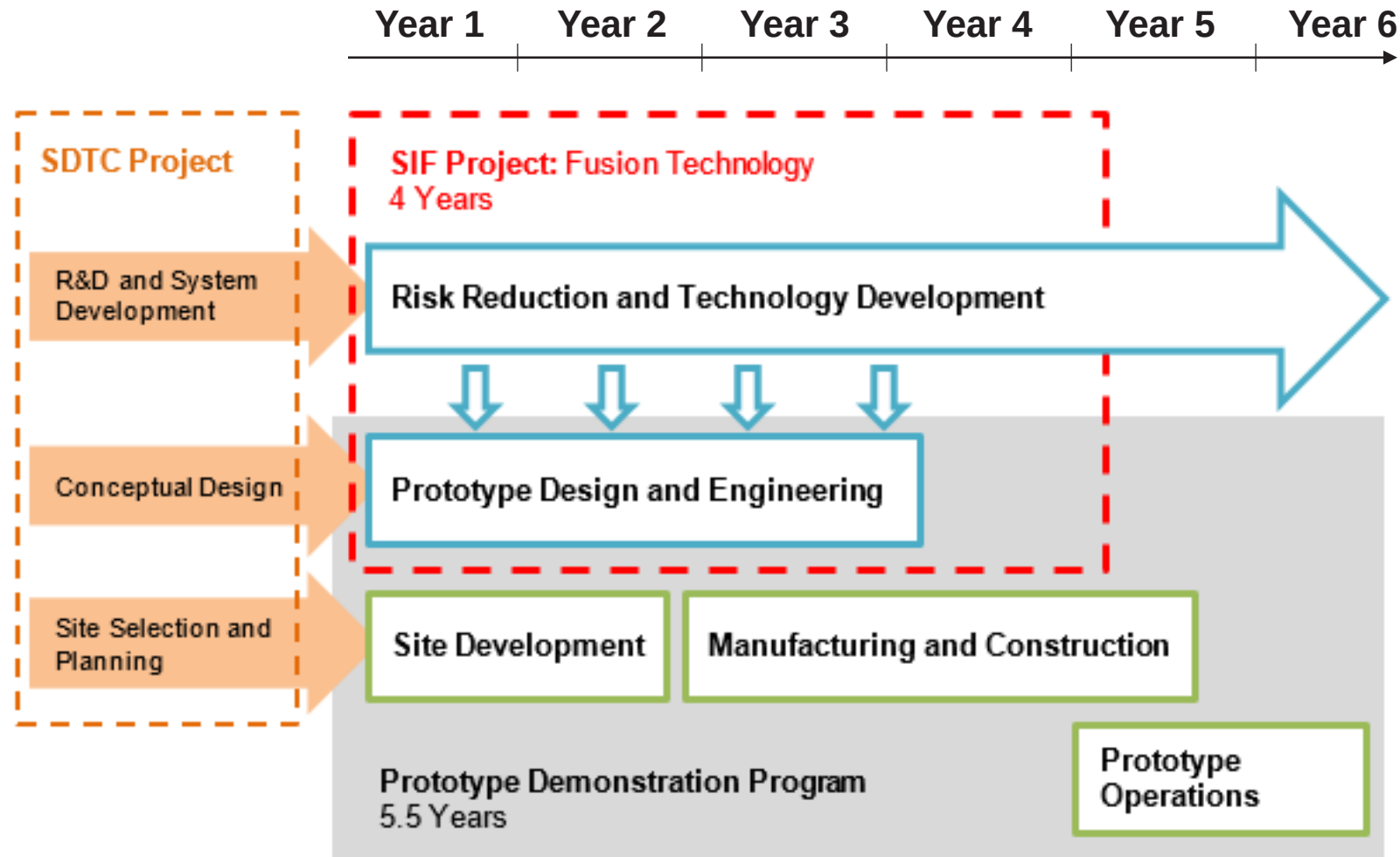
“General Fusion has the real potential to transform how the world generates abundant clean energy.”

The Honourable Navdeep Bains,
Minister for Innovation, Science
and Economic Development,
Government of Canada



Chris Mowry describes liquid compression technology to Ministers Bains and Sajjan, BC Minister of Jobs, Trade and Technology Bruce Ralston, and MLA Rick Glumac.

SIF Project & Prototype Demonstration Program



Supported by a Highly Engaged Network of Partners

Relationships lever new enabling technologies, prepare for commercial deployment, and access additional technical resources

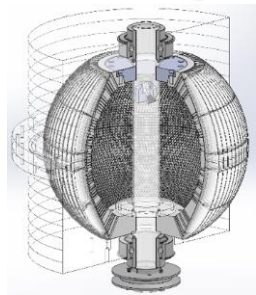
Additive Manufacturing and Specialized Equipment

Big Data, AI, and High Speed Computing



GE Additive

SHEFFIELD FORGEMASTERS
INTERNATIONAL



Scientific Collaboration

Engineering



generalfusion



QUESTIONS?

CLEAN ENERGY. EVERYWHERE. FOREVER.

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