

MFE Burning Plasmas and Innovative Confinement Concepts (ICCs)

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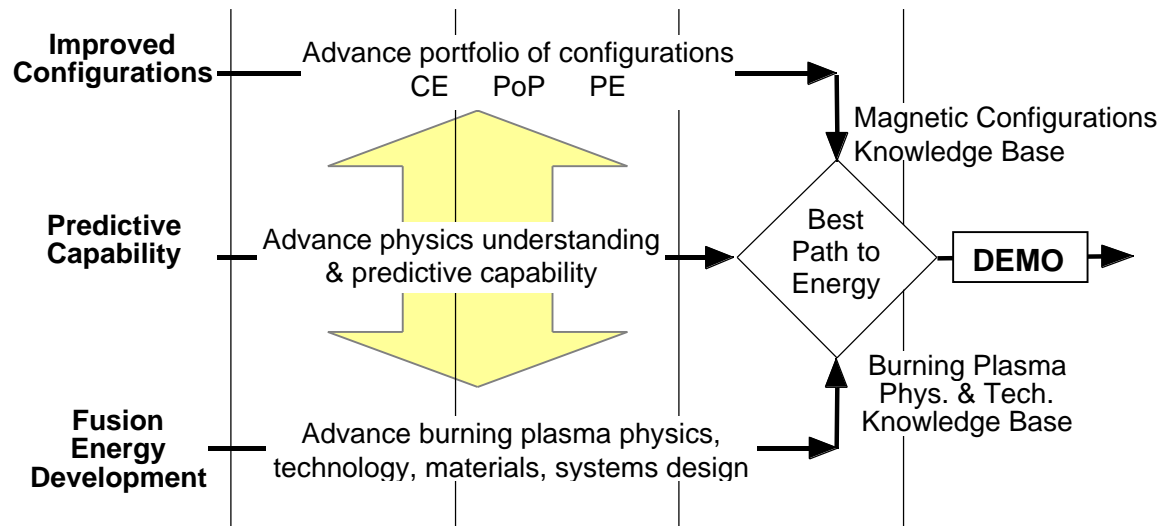
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A "portfolio strategy" provides for development and innovation in magnetic fusion configurations

Effective development of economic magnetic fusion power requires:

- A burning plasma experiment
- An advancing portfolio of ICCs
- Plasma physics unified through theory, modeling, and simulation
- Fusion materials and technology development



ICCs contribute to fundamental understanding and predictive capability for fusion plasmas

Coupling the tokamak burning plasma experiment and the toroidal ICCs will challenge and extend our understanding of toroidal plasma physics, to the benefit of both the BPX and the ICCs

- **A predictive capability will be based on:**
 - **Comprehensive diagnosis of the burning plasma and ICCs**
 - **Fundamental theory**
 - **Computational modeling**
- **The portfolio strategy expands the magnetic geometry and parameter space for the science of attractive fusion:**
 - **Symmetry versus quasi-symmetry**
 - **Magnetic helical pitch and shear**
 - **Role of plasma current**
 - **Aspect ratio**
 - **Beta**

The range of experiments provides a unique perspective on physics issues, including

- **Physics of reconnection**
- **Flow shear**
- **Wall stabilization**
- **Magnetic vs electrostatic transport**

The ICCs link our fusion energy quest to the broader science and educational community by:

- **Working with a broad range of plasmas under differing physical conditions**
 - **Stimulating cross fertilization with other fields of science**
- **Strengthening university plasma science and technology programs**
 - **Engaging faculty by providing opportunities to contribute to plasma and fusion science with small-to-medium size experiments**
- **Attracting bright, young talent through**
 - **The vision of unlimited energy for mankind, as furthered by BPX**
 - **The opportunity to participate in experiments they can “get their hands around.”**

A Burning Plasma Experiment will shorten the development time for magnetic fusion energy for all concepts

All magnetic fusion energy concepts share common science and technology:

- **The physics of confined plasmas**
- **The dynamics of burning plasmas**
- **Fusion and nuclear technology**

A plasma experiment will maximize its contributions and effective coupling to the ICCs by

- **Being capable of exploring a broad range of physics parameters**
- **Having good access and flexibility of operation**
- **Including a complete set of diagnostics, room for expansion, and a well thought-out diagnostic plan**
- **Being supported by a strong theoretical and computational modeling effort**