

A Strategic Plan for U.S. Burning Plasma Research

“Comments”

Mike Mael, Columbia University, Co-Chair
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November 5, 2018
Meeting of the APS Division of Plasma Physics
University Fusion Association

<http://nas.edu/fusion>

Outline

- Appreciation for your input (Thank you!)
- Statement of Task
- Status
- Three comments

Fusion Community Input (Thank you! Part 1 of 2)

- **Seven meetings 39 presentations:** Mohamed Abdou, Hans-Henrich Altfeld, Michl Binderbauer, Amitava Bhattacharjee, Bernard Bigot, Richard Buttery, Tony Donné, Gianfranco Federici, Phil Ferguson, Stefan Gerhardt, Chuck Greenfield, Martin Greenwald, Sibylle Guenter, Richard Hawryluk, Dave Hill, Amanda Hubbard, Yong-Seok Hwang, Thomas Klinger, Mike Jaworski, Sam Lazerson, Gyung-Su Lee, Jiangang Li, Tim Luce, David Maurer, Jon Menard, Bob Mumgaard, Yuichi Ogawa, Stewart Prager, Soren Prestemon, Juergen Rapp, Ned Sauthoff, Oliver Schmitz, Ed Synakowski, Tony Taylor, Jim Van Dam, Mickey Wade, Dennis Whyte, and Mike Zarnstorff.
- > 100 White Papers

Fusion Community Input (Thank you! Part 2 of 2)

- Report of the FESAC Subcommittee on ***Transformative Enabling Capabilities Toward Fusion Energy*** (Rajesh Maingi and Arnie Lumsdaine; February 2018). This report describes several “*revolutionary*” ideas that would dramatically increase the rate of progress through increased performance, simplification, reduced cost or time to delivery, or improved reliability and/or safety.
- Two weeklong community **Workshops on Strategic Directions for U.S. Magnetic Fusion Research**, hosted by the University of Wisconsin at Madison (July 2017) and by the University of Texas at Austin (December 2017)
- Thank you to leadership of the workshop co-chairs, **David Maurer, Jon Menard, Hutch Neilson, and Mickey Wade.**
- **16 technical summaries:** Strategic Elements, Strategic Approaches, Working group Summaries.

Study Origin

CONSOLIDATED APPROPRIATIONS ACT, 2016

PUBLIC LAW 114–113—DEC. 18, 2015

(129 STAT. 2410) That not later than May 2, 2016, the Secretary of Energy shall submit to the Committees on Appropriations of both Houses of Congress **a report recommending either that the United States remain a partner in the ITER project after October 2017 or terminate participation**, which shall include, as applicable, an estimate of either the full cost, by fiscal year, of all future Federal funding requirements for construction, operation, and maintenance of ITER or the cost of termination.

Statement of Task: Two Reports

A committee of the National Academies ... will **study the state and potential of magnetic confinement-based fusion research in the U.S. and provide guidance on a long-term strategy...**

✓ **Interim Report:**

- Describe and **assess the current status of U.S. research** that supports burning plasma science
- **Assess the importance of U.S. burning plasma research** to the development of fusion energy as well as to plasma science and other science and engineering disciplines.

➔ **Final Report:** *In two separate scenarios in which, after 2018,*

(1) the United States is a partner in ITER, and

(2) the United States is not a partner in ITER

provide guidance on a long-term strategic plan (*covering the next several decades*) for a national program ... given the U.S. strategic interest in realizing **economical fusion energy in the long term.**

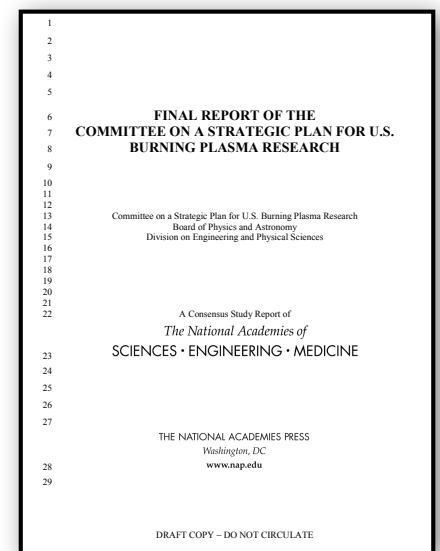
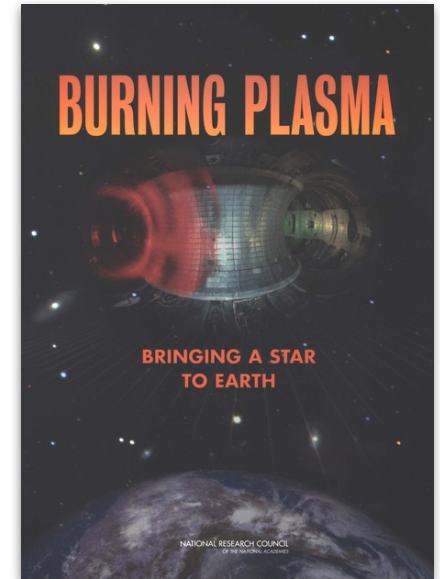
As compared with *BP2004*, *BPStrategy* is tasked with an Explicit Long-Term Energy Goal

- ***NAS BP2004* Task:**

- ▶ “assessment of scientific and technical readiness”
- ▶ “strategy aimed at **maximizing the yield of scientific and technical understanding**”
- ▶ “The committee is not asked to evaluate fusion as an energy option.”

- ***NAS BPStrategy* Task:**

- ▶ “consider the scientific and engineering challenges and opportunities associated with advancing magnetic confinement fusion as an energy source”
- ▶ “The committee may **assume that economical fusion energy within the next several decades** is a U.S. strategic interest.”



Status

- *Interim Report* released on December 21, 2017
- Draft *Final Report* in review / revision / final editing
- Hopefully, the *Final Report* goes public in December 2018

Interim Report: <https://doi.org/10.17226/24971>

PREPUBLICATION COPY – SUBJECT TO FURTHER EDITORIAL CORRECTION

INTERIM REPORT OF THE COMMITTEE ON A STRATEGIC PLAN FOR U.S. BURNING PLASMA RESEARCH

Committee on a Strategic Plan for U.S. Burning Plasma Research
Board on Physics and Astronomy
Division on Engineering and Physical Sciences

A Consensus Study Report of
*The National Academies of
SCIENCES • ENGINEERING • MEDICINE*

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Draft Final Report

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Three Comments

- (Assessment 2) “Our **confidence** that a burning plasma experiment such as ITER will succeed” has substantially improved
- (Assessment 3) “Operation of a burning plasma experiment is a critical, **but not sufficient**, next step toward the realization of commercial fusion energy. In addition, further research ...”
- (Assessment 7) “If the U.S. seeks to continue its pursuit for abundant fusion power, the development of **a national strategic plan for fusion** energy that spans several decades is necessary”

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“Comments”

Discussion / Questions

<http://nas.edu/fusion>