U.S. Department of Energy's

Office of Science

Program Planning And Next Steps

Fusion Energy Sciences Advisory Committee

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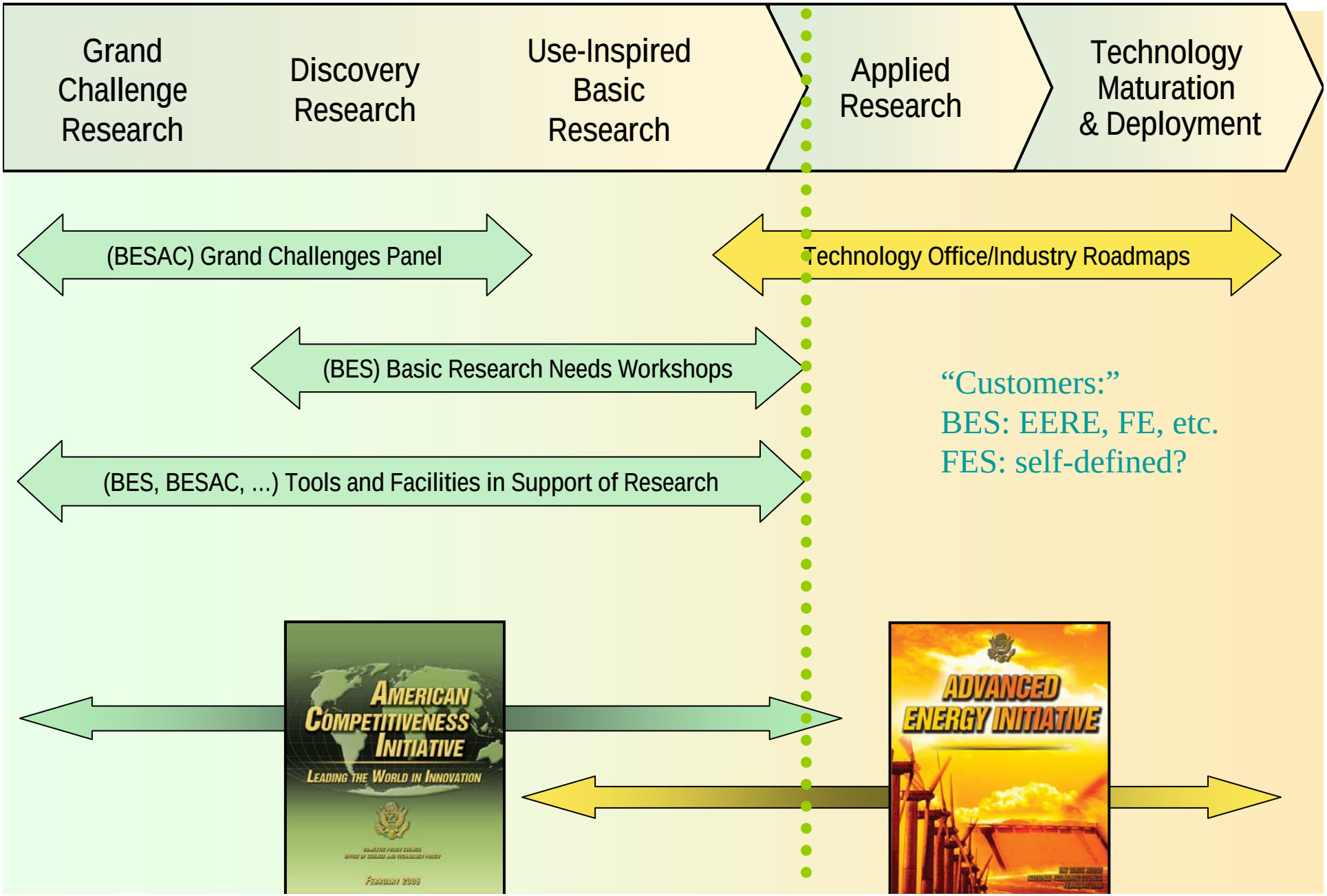
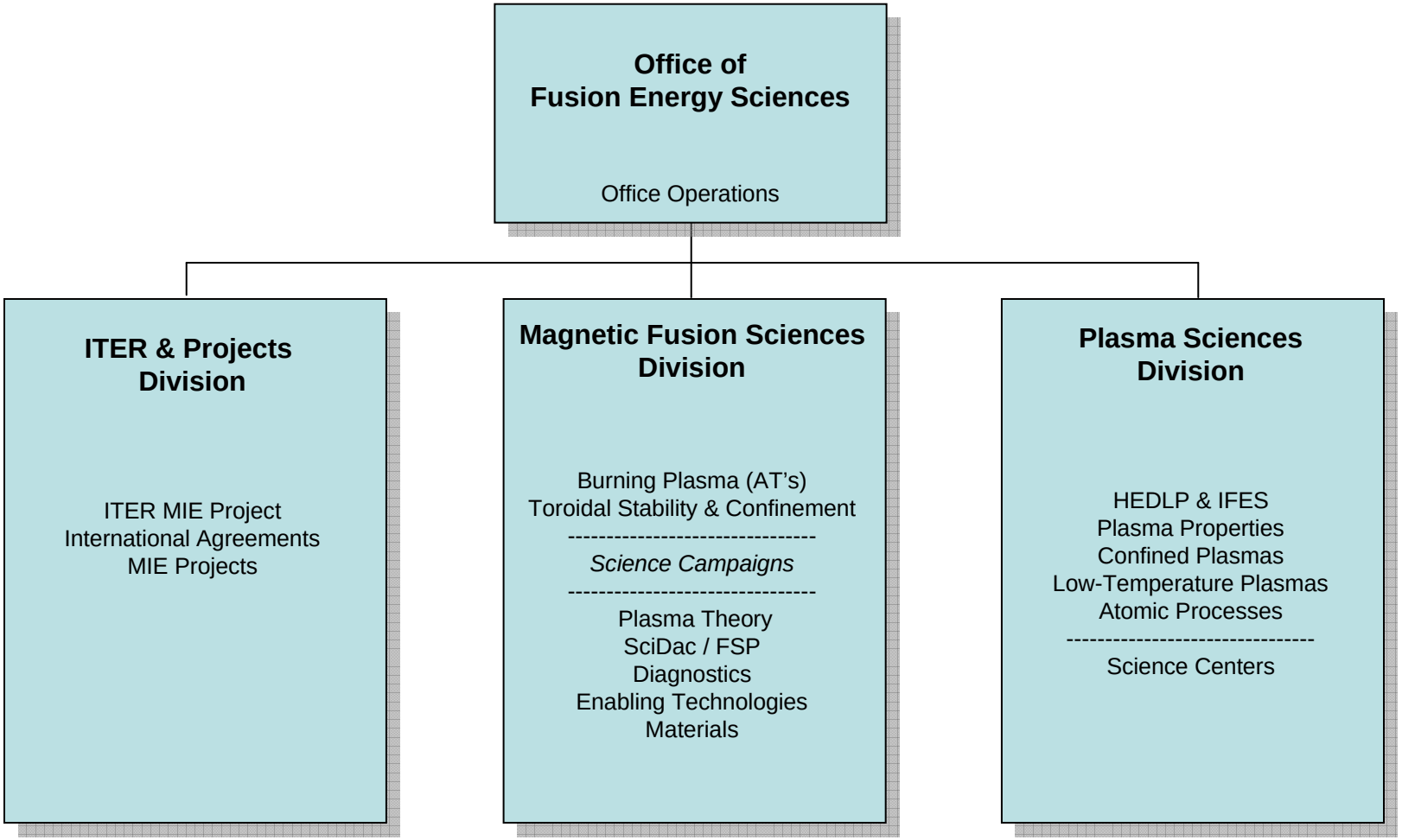
www.ofes.fusion.doe.gov

BES: Continuum of Research, Development, and Deployment



Draft, Conceptual OFES Organization



Classical Elements of a Strategic Plan

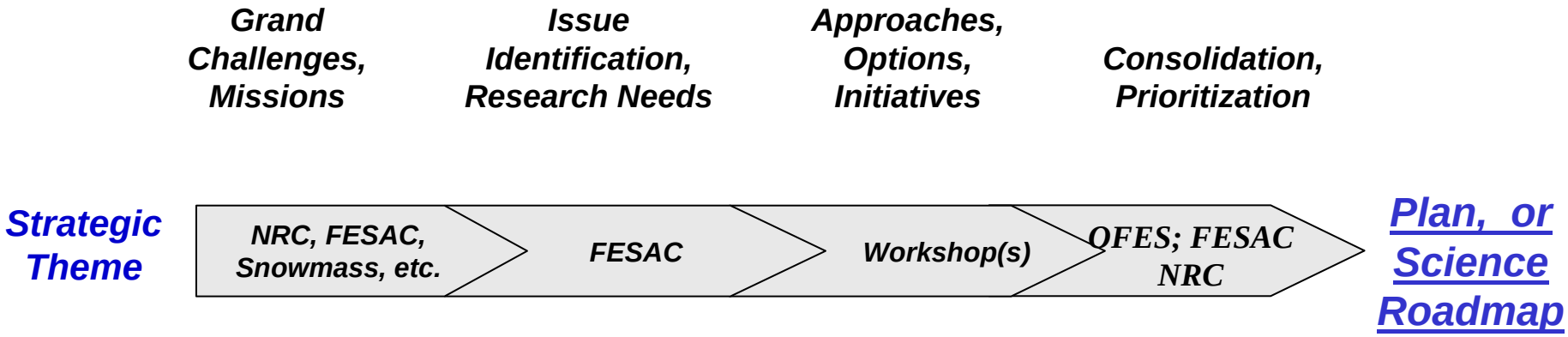
- **Mission statement**
  - Why do we exist?
- **Vision statement**
  - Where do we want to be in 5, 10, 15 years?
- **SWOT**
  - What are our strengths, weaknesses, opportunities, and threats?
- **Competitive advantage**
  - What are we best at?
- **E.Strategic Objectives**
  - What are the key activities we need to perform to achieve our vision?
- **Strategies**
  - How do we achive our objectivves?
- **Short-term goals/priorities/initiatives**
  - What are our 1,3,5 year goals to achieve our strategic objectives?
- **Action Items / Plans**
  - Specific plans to implement our goals
- **Scorecard**
  - Key performance measures to track our progress towards realizing our vision
- **Financial assessment**

Parts of a Strategic Plan - 2

- **Mission statement**
  - The FES program supports world-leading science and technical research to develop the knowledge base for fusion energy sources, and to support fundamental Plasma Physics and High Energy Density Laboratory Plasma Physics.
- **Vision statement**
  - On the ITER time frame: answer key scientific and technical questions necessary to offer fusion as a viable energy option; plasma physics is a vibrant academic discipline; and HEDLP is a mature scientific discipline answering questions about extreme states of matter – all of tremendous potential value to the country.
- **Strategic Plan needs to deliver results along three strategic themes**
  - Fusion Energy Source(s)
  - Fundamental Plasma Physics
  - High Energy Density Laboratory Plasmas

Planning for OFES Science Research Programs

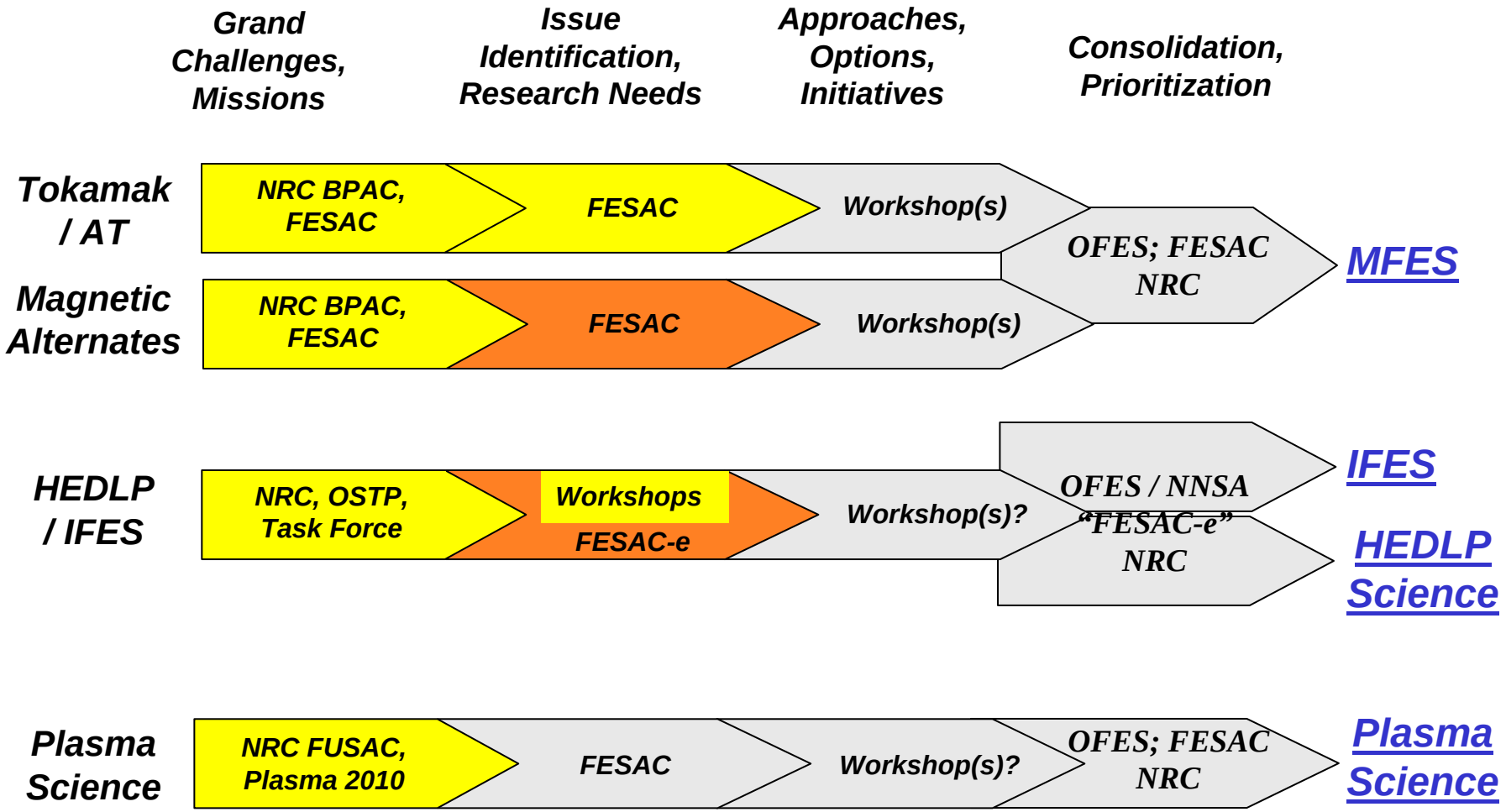
- **Identify long-range goals and map backwards**



Planning Stages

- **Grand challenges, missions**
  - Limitations of knowledge for goals; discovery topics
- **Research Needs – Information gathering**
  - Big, overriding science issues
    - *Goal – defined or knowledge-defined*
  - Opportunities for Leadership, Gaps
- **Options & Approaches – in-depth workshops**
  - Drill down – extract underlying scientific issues
  - ID ways to resolve/address issues
  - Develop conceptual initiatives & options
    - *Mission*
    - *Scope*
    - *Readiness & dependencies*
- **Consolidation and Prioritization**

Planning for OFES Science Research Programs



Yellow = done

Orange = in process (soon)

Gray = not started

Workshops

- **Workshops, similar to BES approach, will be used to develop approaches and possible initiatives**
- **Scientific /Technical Themes lead to Workshop Topics**
  - Greenwald Panel
    - *Theme A -Creating predictable, high performance steady-state plasmas*
    - *Theme B -Taming the Plasma-Materials Interface*
    - *Theme C -Harnessing fusion power*
  - An additional theme- *Accessing the Burning Plasma State*
  - Expect FESAC charges to lead to additional themes
- **Low Temperature Plasma Sciences Workshop is planned for March**

"Basic Research Needs" Workshops

We have identified the basic science needed for the next-generation energy technologies

All workshop reports are accessible at: http://www.sc.doe.gov/bes/reports/list.html

- **Basic Research Needs to Assure a Secure Energy Future**
  BESAC Workshop, October 21-25, 2002
  The foundation workshop that set the model for the focused workshops that follow.
- **Basic Research Needs for the Hydrogen Economy**
  BES Workshop, May 13-15, 2003
- **Nanoscience Research for Energy Needs**
  BES and the National Nanotechnology Initiative, March 16-18, 2004
- **Basic Research Needs for Solar Energy Utilization**
  BES Workshop, April 18-21, 2005
- **Advanced Computational Materials Science: Application to Fusion and Generation IV Fission Reactors**
  BES, ASCR, FES, and NE Workshop, March 31-April 2, 2004
- **The Path to Sustainable Nuclear Energy: Basic and Applied Research Opportunities for Advanced Fuel Cycles**
  BES, NP, and ASCR Workshop, September 2005
- **Basic Research Needs for Superconductivity**
  BES Workshop, May 8-10, 2006
- **Basic Research Needs for Solid-state Lighting**
  BES Workshop, May 22-24, 2006
- **Basic Research Needs for Advanced Nuclear Energy Systems**
  BES Workshop, July 31-August 3, 2006
- **Basic Research Needs for the Clean and Efficient Combustion of 21st Century Transportation Fuels**
  BES Workshop, October 30-November 1, 2006
- **Basic Research Needs for Geosciences: Facilitating 21st Century Energy Systems**
  BES Workshop, February 21-23, 2007
- **Basic Research Needs for Electrical Energy Storage**
  BES Workshop, April 2-5, 2007
- **Basic Research Needs for Materials under Extreme Environments**
  BES Workshop, June 10-14, 2007
- **Basic Research Needs for Catalysis for Energy**
  BES Workshop, August 5-10, 2007

Alternate Magnetic Confinement Configurations: (Draft) Element I

- **Consider stellarators, spherical tori, reversed field pinches, and compact tori**
- **Concepts that may evolve toward energy producing systems**
  - Identify and justify a long-term goal for the ITER era
    - *At minimum, a burning plasma or beyond*
- **Repeat Methodology of recent Gaps & Opportunities Report**
  - Critically evaluate each concept's goal and merits for fusion development
  - Identify/prioritize scientific questions that must be answered to achieve the goals
  - Assess available means to address the questions
  - Identify research gaps and generally how to address them

(Draft) Element II:
Capturing the Dual-Nature of Alternates

- **Alternative Concepts Sub-panel in July 1996 FESAC Report: two reasons for research in alternate confinement configurations**
  - Advance fusion energy science to produce knowledge not accessible through the study of a single configuration
  - Potential for evolution to a fusion energy system

- **Elucidate the merits of an alternate configuration outside of its potential as a fusion energy concept**
  - Identify and prioritize unique toroidal science issues that a concept can explore to improve basic understanding of toroidal confinement and/or improve concepts that may evolve toward energy through integrated science campaigns

Summary

- **FESAC can expect a request to undertake a study of the major alternate confinement configurations: possible issues**
  - Reflect the dual purposes for studying these configurations
  - Identify aggressive goals for the ITER time frame
- **A gaps and opportunities report for concepts with potential as fusion energy systems**
  - Merits of chosen goal
  - Prioritized scientific goals
  - Assessment of available means
  - Gaps identification
- **Elucidating merits for synergistically improving other fusion concepts through deeper understanding of toroidal confinement**
  - Specific issues, with prioritization depending on potential impact
  - Develop claims made generally in past studies (e.g., Snowmass 2002)
- **Tasks not defined until formal charge issued by Under Secretary**