Bioenergy Technologies Office
Strategic Planning Overview
July 30, 2013
Strategic Planning Overview

• Strategic planning is a continuous process
• Our planning efforts provide a framework for
  – Inter- and intra-office collaborations /discussions across technology areas
  – Interactions with stakeholders
  – Alignment with EERE/DOE/Federal goals
• Aligns Office activities from project level to multi-year goals
Context: DOE and EERE Strategic Planning

- DOE required to update strategic plan every three years by Government Performance and Results Act (GPRA)
  - 2014 is next update.
- EERE has not released office-wide strategic plan in more than 10 years.
- EERE Strategic Plan is under development. The purpose of the plan is to:
  - (Re)define EERE
  - Provide information that is useful for EERE staff and contractors
  - Demonstrate the logical basis for our vision and goals
  - Connect to our stakeholders
- Offices in the Sustainable Transportation Sector are working closely together:
  - Bioenergy Technologies Office
  - Fuel Cell Technologies Offices
  - Vehicle Technologies Office
Sustainable Transportation Sector Objectives--DRAFT

- Reduce transportation oil use.
- Develop cost-competitive vehicle and fuel options.
- Ensure fuel and vehicle technology advancements that maintain or improve affordability, reliability, performance, safety, comfort, and environmental impact.
- Develop vehicle and fuel technologies needed to attain or exceed fuel economy, renewable fuels, and emissions standards.
- Advance development, adoption, and use of codes and standards that facilitate deployment of vehicle and fuel technologies and address our transportation energy and environmental objectives.
- Catalyze and accelerate at-scale market acceptance through pioneering demonstrations and strategic deployment of advanced vehicle and fuel technologies.
- Address key barriers associated with systems and grid integration, and infrastructure compatibility and deployment, to facilitate market acceptance.
BETO Strategic Planning Overview

- Purpose of BETO strategic planning:
  - Align objectives and activities across multiple stakeholders and interests
  - Document goals, current state of technology, and strategic plans
  - Inform budget processes
  - Track progress
  - Integrate learning
- Based on best practices for technology R&D planning
- Systems engineering approach

≥ 10 years
Roadmaps

~ 10 years
Program/Technology Area RLPs

~ 5 years
BETO MYPP

≥ 1 year
Project Management Plans/AOPs
BETO Integrated Planning Structure: Roadmaps

• A Technology Roadmap is a comprehensive summary of a specific technology or R&D topic of interest.
  • Provides a “state of technology” review and documents associated R&D challenges.
  • Synthesizes public comments and supporting scientific literature.
• BETO develops Technology Roadmaps that serve to guide researchers and engineers, policymakers, federal agencies, and the private sector in implementing national research, development, and deployment efforts.
• Roadmaps inform BETO’s RLP efforts and support the development of the MYPP.
Roadmaps

- **National Algal Biofuels Technology Roadmap** (2010)

- **Breaking the Chemical and Engineering Barriers to Lignocellulosic Biofuels: Next Generation Hydrocarbon Biorefineries** (2008)


- **Breaking the Biological Barriers to Cellulosic Ethanol: A Joint Research Agenda** (2006)

- **Top Value Added Chemicals from Biomass - Volume I, Results of Screening for Potential Candidates from Sugars and Synthesis Gas** (2004)
Roadmaps: Stakeholder Engagement

• Technology Roadmaps are prepared with significant input from stakeholders.
  – Usually stem from a workshop/meeting that convenes stakeholders from industry, academia, national laboratories, government agencies, and non-governmental organizations to explore the topic of interest.
  – Following the release of the initial draft of a Roadmap, a comment period is held to allow the public to evaluate the document for fidelity and incorporate new information, viewpoints, and criticisms not captured during the initial meeting.

• While BETO compiles and edits the Roadmap, it is not intended to represent DOE’s opinion, but rather aims to assimilate inputs from experts in the field.
BETO Integrated Planning Structure: RLPs

• Resource Loaded Planning (RLP)
  – 10-year scenario
    • Key activities required to reach program/technology area targets
    • Scoping, sequencing, and prioritizing
    • Actual investment dependent upon appropriations
  – Reviewed annually and updated as needed

≥ 10 years
Roadmaps

~ 10 years
Program/Technology Area RLPs
Resource-Loaded Planning

• BETO uses integrated framework to manage RDD&D activities and down-select the most promising opportunities.

• BETO implements this framework through a series of Resource Loaded Plans (RLPs).

• RLPs highlight all activities that need to be conducted over 10-year timeframe, in order for a program/technology area to meet its established goals.
  – Assess resource requirements over time.
  – Determine necessary steps in the process toward achieving goals.

• Longer-term context (10 years) within which shorter-term (1-3 year) activities are considered.

• Scenario showing links between MYPP goals, budget requests, and Annual Operating Plans (AOPs).

• Defines funding projections and trade-offs.
Resource Loaded Planning

- Key program/technology area activities to reach Office goals and targets.
  - Aligned with MYPP structure, goals, and milestones
  - Scoping, sequencing, and priorities
  - Dynamic – dependent on appropriations and Administration priorities
- Provides framework for PMPs/AOPs.

### Sample RLP Timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>Initial blend data design reports completed</td>
</tr>
<tr>
<td></td>
<td>Analysis based blend testing</td>
</tr>
<tr>
<td></td>
<td>Decide “model” for “base case” feedstock</td>
</tr>
<tr>
<td></td>
<td>R&amp;D on base case feedstocks at a certain set of specification</td>
</tr>
<tr>
<td>2014</td>
<td>Initial report on conversion testing of blended feeds completed</td>
</tr>
<tr>
<td></td>
<td>Begin bench scale testing on best candidates</td>
</tr>
<tr>
<td></td>
<td>Bench scale performance testing on blends</td>
</tr>
<tr>
<td></td>
<td>BLENDECISION</td>
</tr>
<tr>
<td>2015</td>
<td>DECISION ON 2017 VALIDATION – TRL 5 (IDEALLY)</td>
</tr>
<tr>
<td></td>
<td>Testing on selected technology</td>
</tr>
<tr>
<td>2016</td>
<td>Deliver tonnage of blended feedstocks for FY17 validation</td>
</tr>
<tr>
<td></td>
<td>Begin making blended feedstocks from INL PDU for 2017 validation</td>
</tr>
<tr>
<td></td>
<td>IMPLEMENT PRE-PROCESSING AT $80/T0N TARGET</td>
</tr>
<tr>
<td>2017</td>
<td>Validation and other pipeline R&amp;D</td>
</tr>
<tr>
<td></td>
<td>HIT $3/GAL PRODUCTION TARGET</td>
</tr>
</tbody>
</table>

- Thermochemical Timeline
- Feedstock Timeline
- General Timeline

Use NABC evaluation data as a starting point (yellow/green)
BETO Integrated Planning Structure: MYPP

- Multi-Year Program Plan (MYPP)
  - 5-10 year planning horizon (based on 2022 goals)
  - Office goals
  - Technology Area/Program Planning
  - Coordination across BETO programs/technology areas
  - Revised as needed; subject to change control procedures
The BETO MYPP is intended for use as an operational guide to help the Office manage and coordinate its activities, as well as a resource to help articulate BETO’s mission and goals to internal and external stakeholders.
Multi Year Program Plan

• Purpose of BETO Multi-Year Program Plan (MYPP):
  – Sets forth Office goals and structure.
  – Identifies RDD&D activities that BETO will focus on over the next five years.
  – Outlines why these activities are important to meeting energy and sustainability challenges facing the nation.

• Single planning document that integrates the work happening across BETO programs/technology areas and aligns goals across the Office.

MYPP

Feedstocks  Algae  Biochemical Conversion  Thermochemical Conversion  Demonstration & Deployment  Strategic Analysis & Crosscutting Sustainability
MYPP: Change Management

• Change Management (CM) is a standardized process for initiating, reviewing, and approving proposed changes to all base-lined and approved BETO documents.
  - Maintains integrity of program planning products, specifically MYPP.
  - Includes control of changes to content, versions, and distribution of information, and focuses on disciplined control of programmatic and technical aspects of planning products.
  - Ensures that everyone is working toward, and reporting from, the same version of a BETO document.

• CM uses the processes of change REDI
  1. Request
  2. Evaluation
  3. Disposition
  4. Implementation
BETO Integrated Planning Structure: Project Management Plans

- **Project Management Plans (PMPs)/Annual Operating Plans (AOPs)**
  - Project-level
  - Aligned with program/technology area milestones, barriers, etc.

- Roadmaps
  - ≥ 10 years

- Program/Technology Area RLPs
  - ~ 10 years

- BETO MYPP
  - ~ 5 years

- ≥ 1 year

- Project Management Plans/AOPs
Strategic Planning as part of Systems Integration

Systems Level Planning:
- Establishing well-documented, focused, integrated targets and plans aligned with program objectives
- Implementing formal change control on key programmatic documents

Performance Verification
- Verifying that technology and system designs meet program requirements

Portfolio Analysis (Integrated Baseline)
- Track technical progress of program
- Identify gaps/overlaps/strategic balance

Systems-Level Analysis
- Providing consistent systems-level analyses
- Identifying and assessing technical and programmatic risks
Strategic Analysis and Planning

- BETO’s Strategic Analysis work informs strategic planning efforts.
- High level techno-economic analyses (TEAs) help identify the most promising biomass technology pathways.
- Design cases are developed to facilitate target development.
- State of technology reports document progress toward goals.
Cellulosic Ethanol Achievement Example

1999-2002
- Basic design report developed
- Provided model process and baseline cost; identified areas of R&D that would have the most impact on TEA
- Set technical targets

2002-2005
- Targeted R&D through labs and contracts for enzymes, pretreatment, and organism development

2005-2008
- Began integration and scale-up work
- Evaluated R&D and set the definition of “cost-competitive”
- Roadmapping

2008-2011
- Scale-up and targeted large scale R&D
- Ethanologen solicitation
- Cellulases solicitation
- Process integration and improvements FOA
- Roadmapping

2012
- Pilot-scale run to produce data necessary to run model – met 2012 cellulosic ethanol target
Summary

• Strategic planning is a continuous process and focus for BETO
• Our planning efforts are multi-faceted and occur on multiple time-scales
• They provide a framework for collaboration, communication, and alignment for those within and external to our office