2017 PROJECT PEER REVIEW

U.S. DEPARTMENT OF ENERGY
BIOENERGY TECHNOLOGIES OFFICE

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Analysis & Sustainability

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Technology Manager

Analysis & Sustainability (A&S) Overview

- The Team
- Goals and Approach
- Challenges
- Activities & Partnerships
- Budget
- 2015 Peer Review Comments
- Key Accomplishments
- Upcoming Activities

Introductions: Analysis & Sustainability Team

Alicia Lindauer

Kristen Johnson

Clayton Rohman

Diana Scott

Art Wiselogel

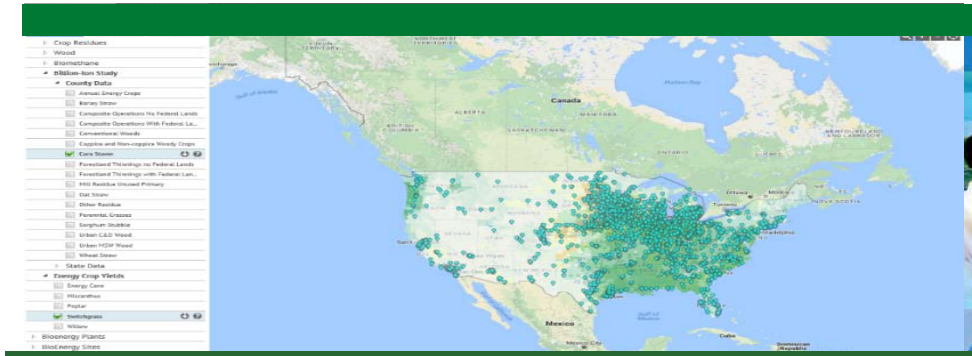
Carlos Villacis

Analysis and Sustainability – Goals and Approach

Strategic Goal: *Develop **science-based strategies** to understand and enhance the **economic, social, and environmental benefits of advanced bioenergy** relative to conventional energy systems.*

Approaches:

- Ensure high-quality, consistent, reproducible, peer-reviewed analyses.
- Develop and maintain analytical tools, models, methods, and datasets to support science-based quantification and improved decision-making.
- Develop sustainable system designs that increase bioenergy production while enhancing economic, social, and environmental outcomes.
- Ensure broad engagement with stakeholders.



Enhancing the economic, social, and environmental benefits of a growing bioeconomy.

Analysis and Sustainability Goals

Strategic Analysis

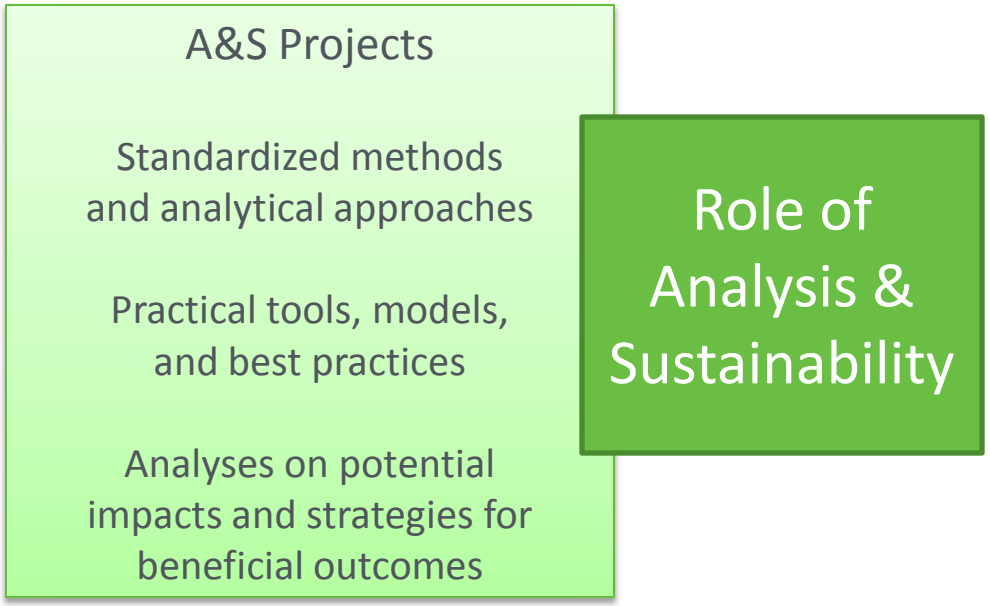
Provide context and justification for decisions at all levels by establishing the basis of quantitative metrics, tracking progress toward goals, and informing portfolio planning and management

Cross-Cutting Sustainability

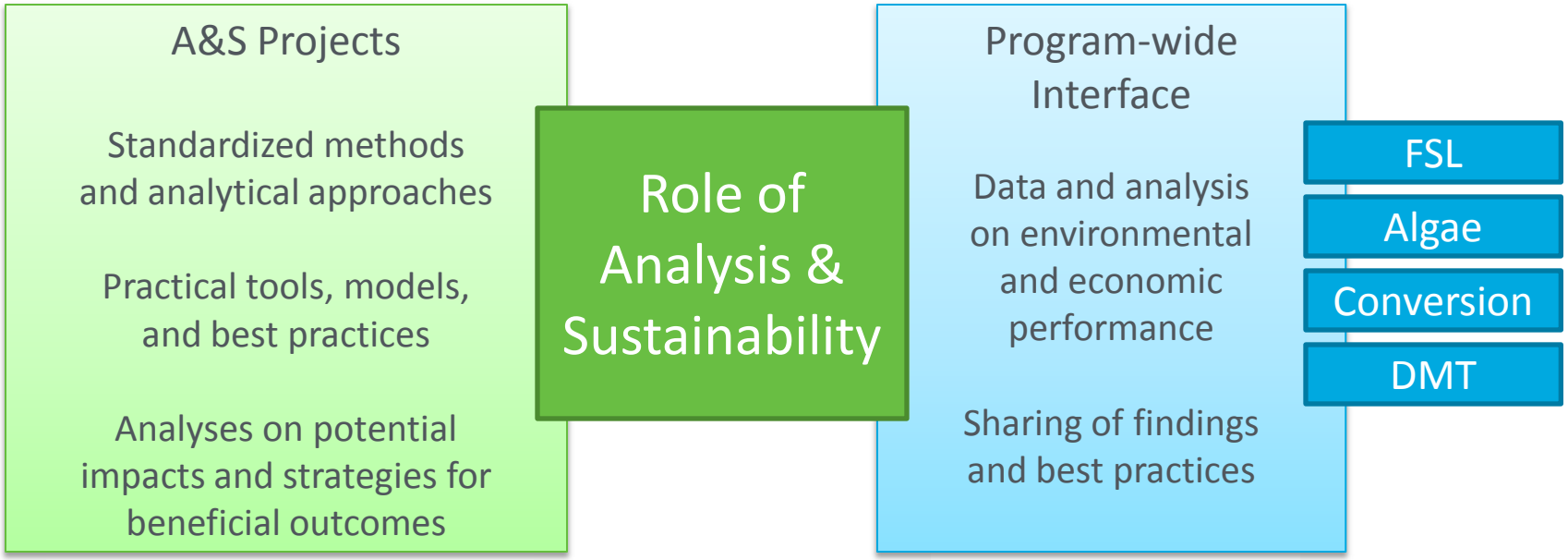
Understand and promote the positive economic, social, and environmental effects and reduce the potential negative impacts of bioenergy production activities

Dimensions of Bioenergy Sustainability

A&S Plays a Cross-cutting Role



A&S Plays a Cross-cutting Role



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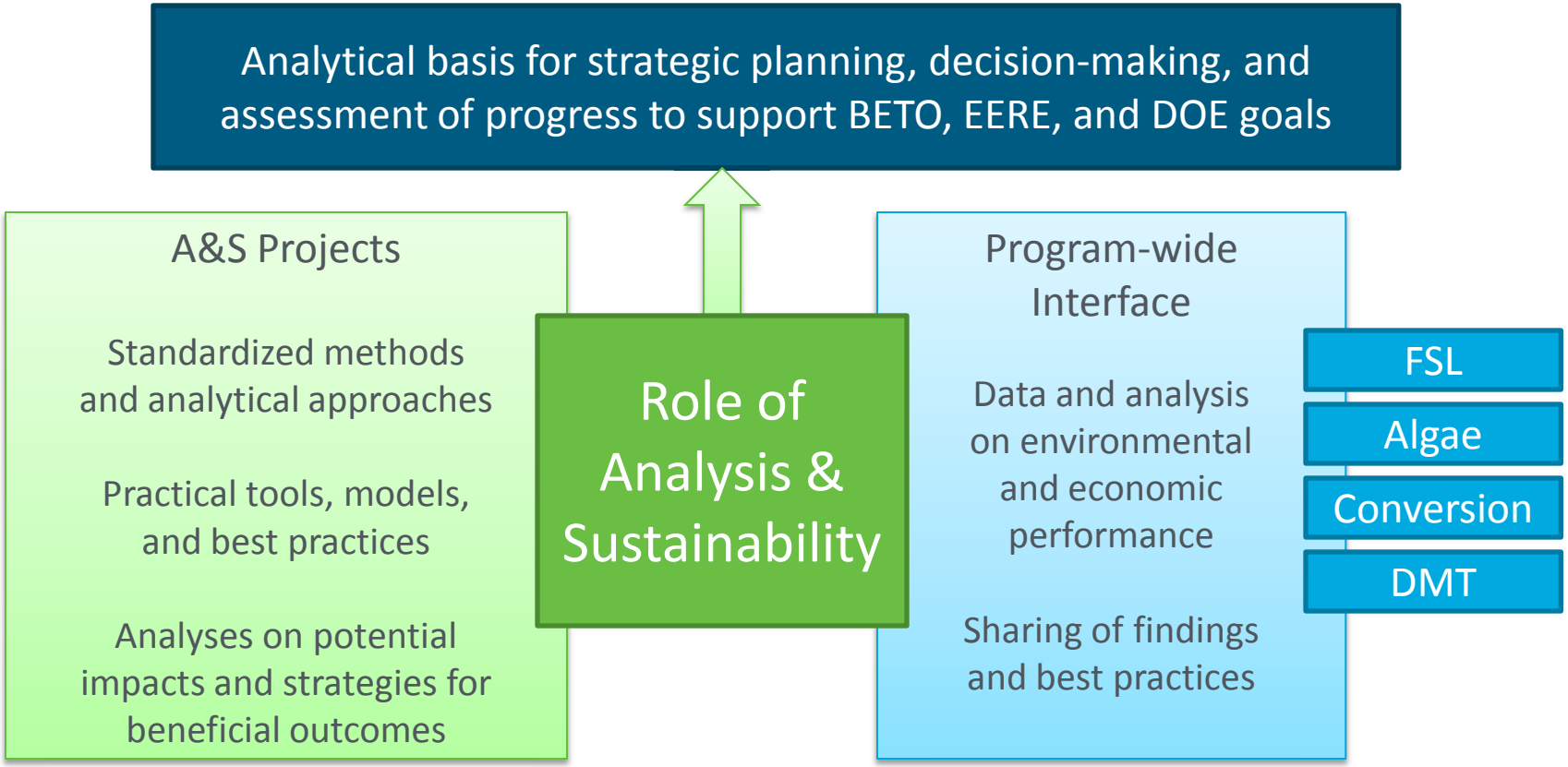
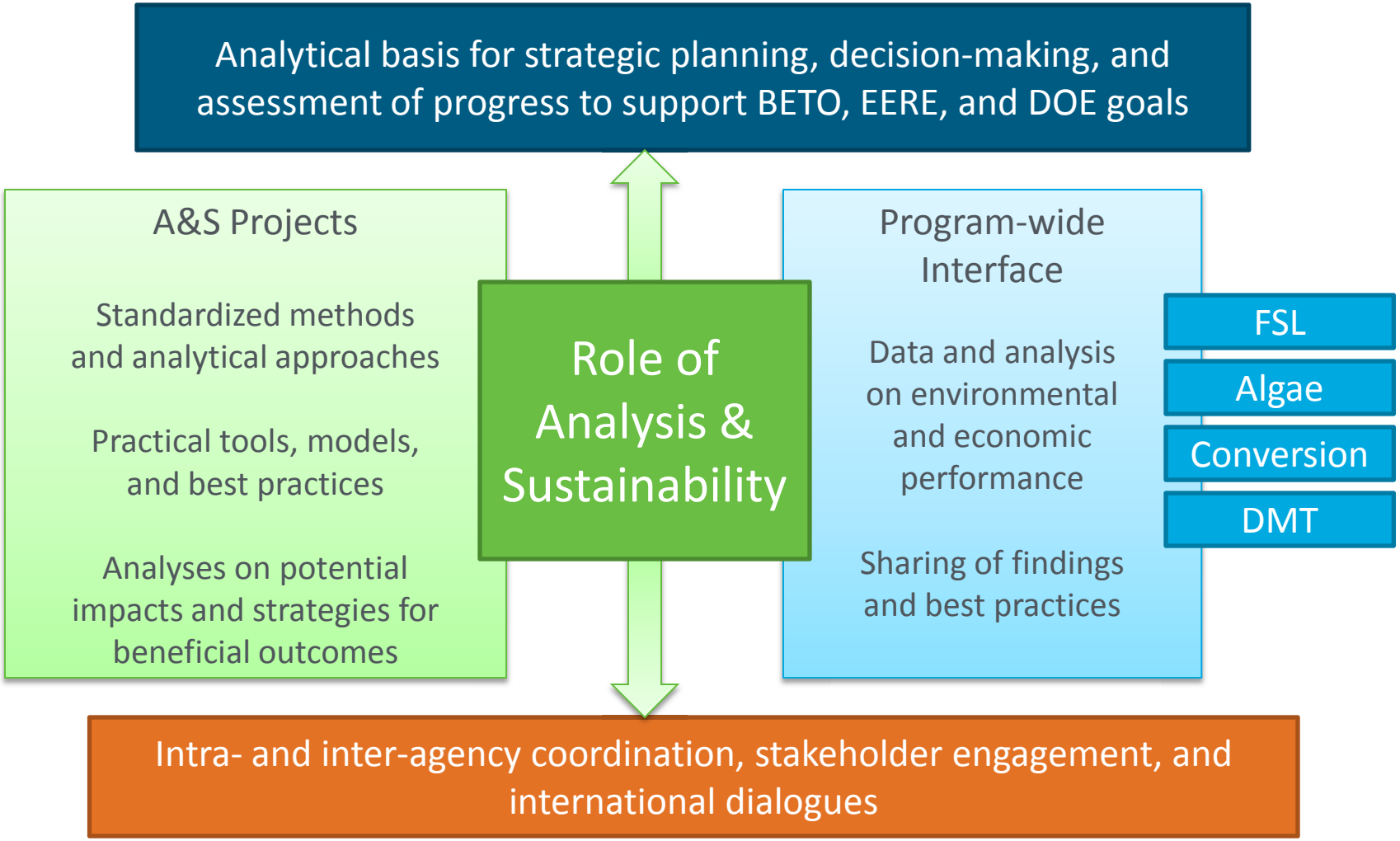
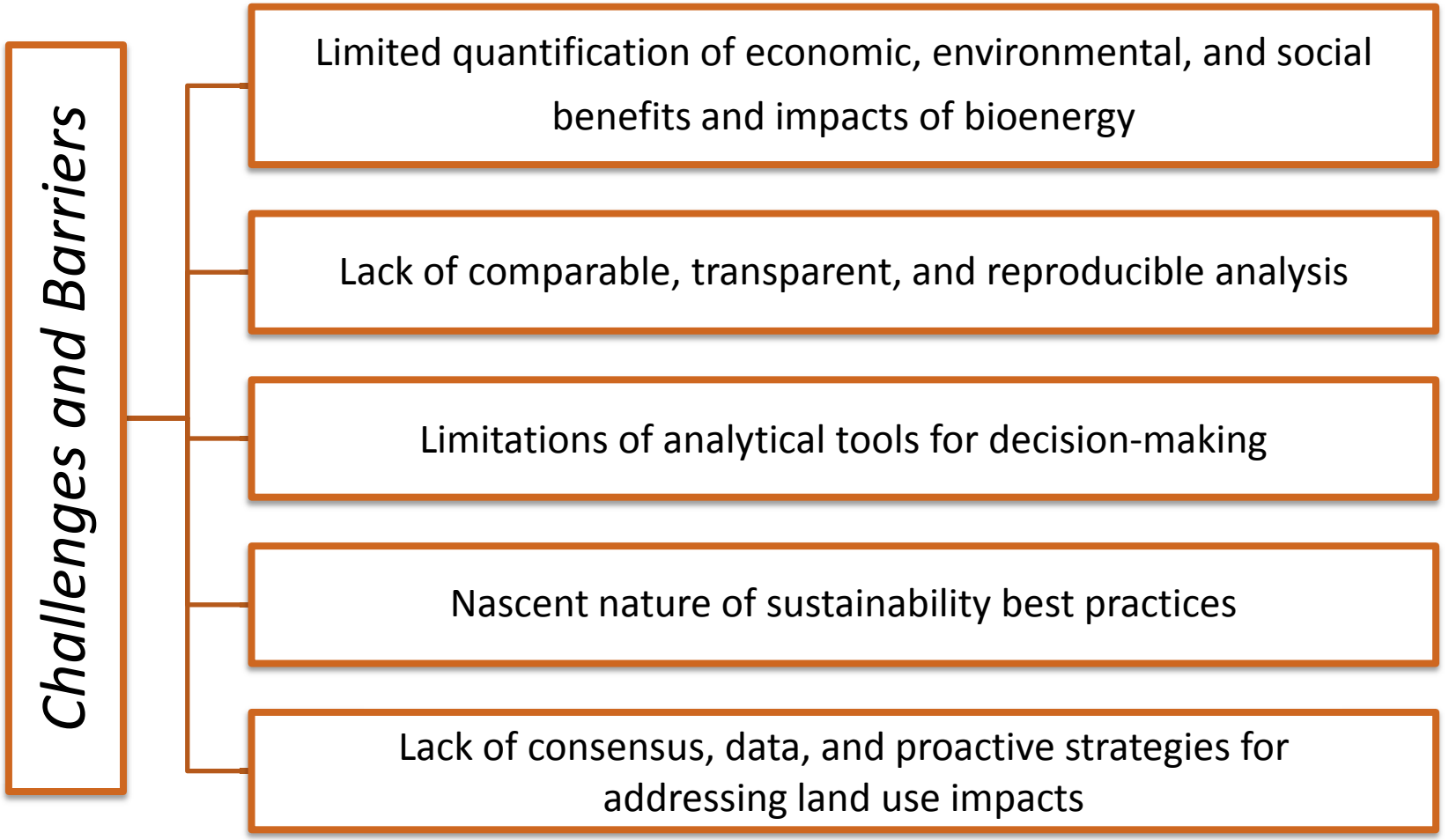


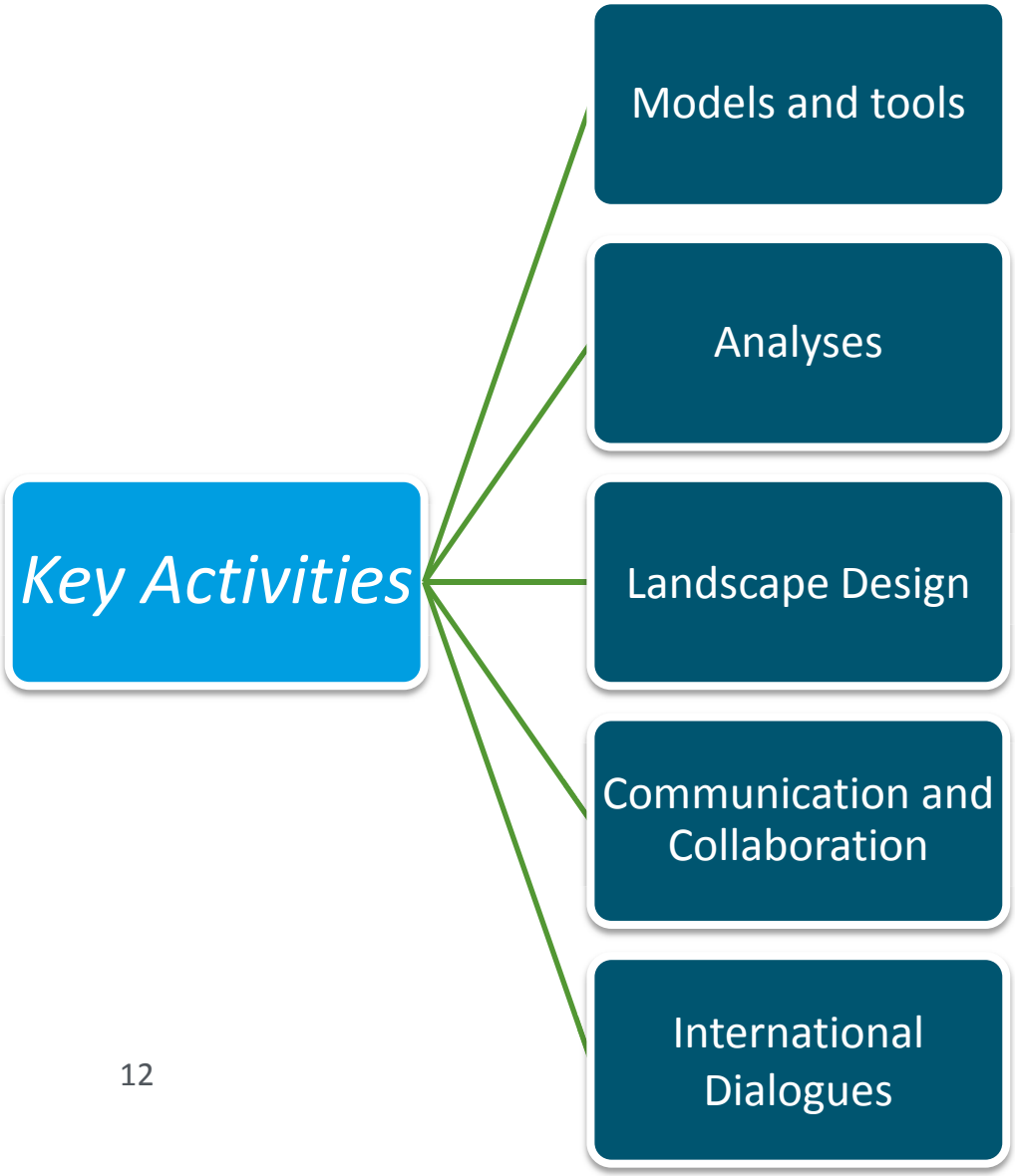
A&S Plays a Cross-cutting Role



Key Challenges



Key Activities and Partners



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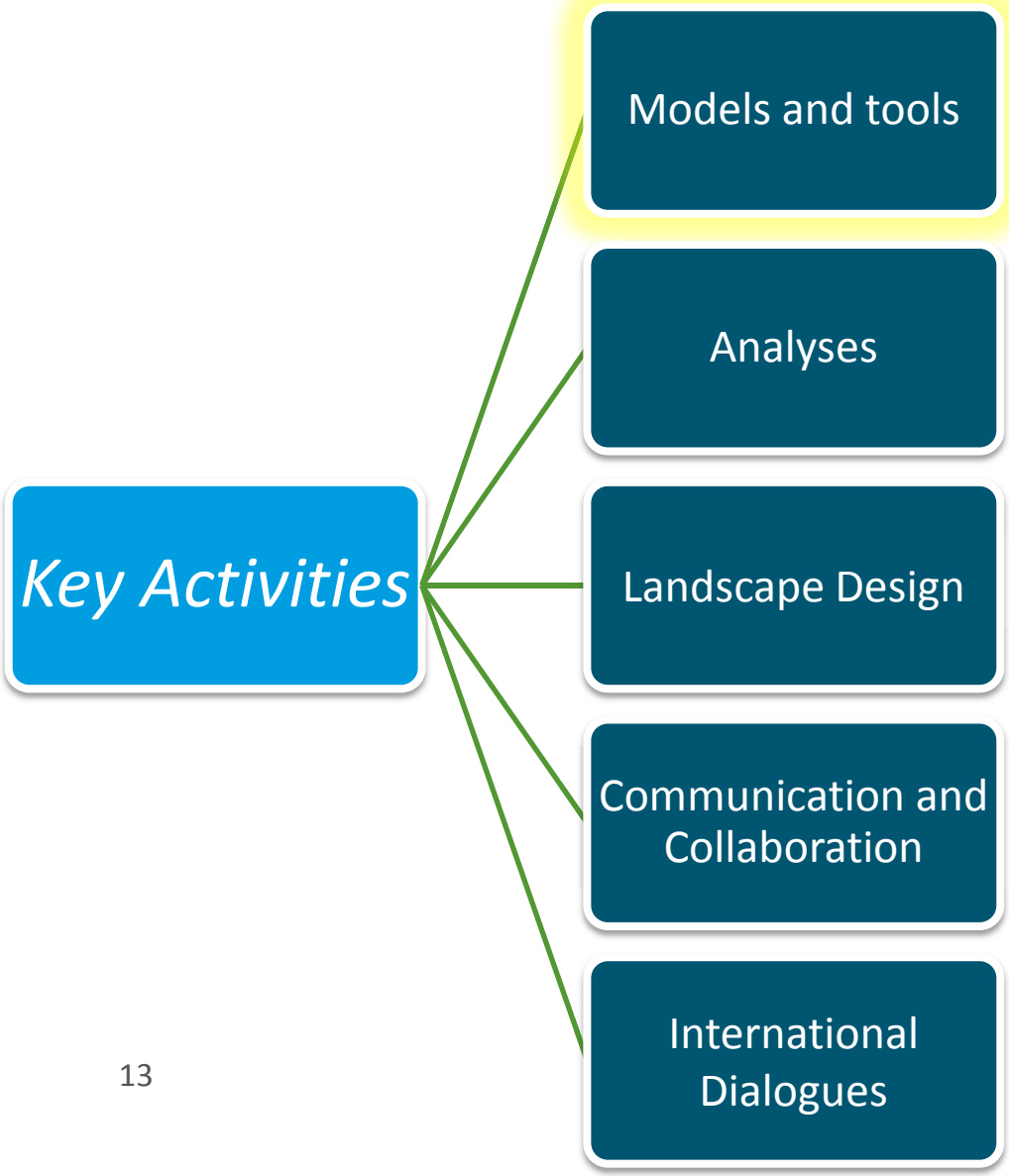


NREL NATIONAL RENEWABLE ENERGY LABORATORY

Argonne NATIONAL LABORATORY

INL Idaho National Laboratory

Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET)

Water Assessment Tool for Energy Resources (WATER)

Biomass Scenario Model (BSM)

Landscape Environmental Assessment Framework (LEAF)

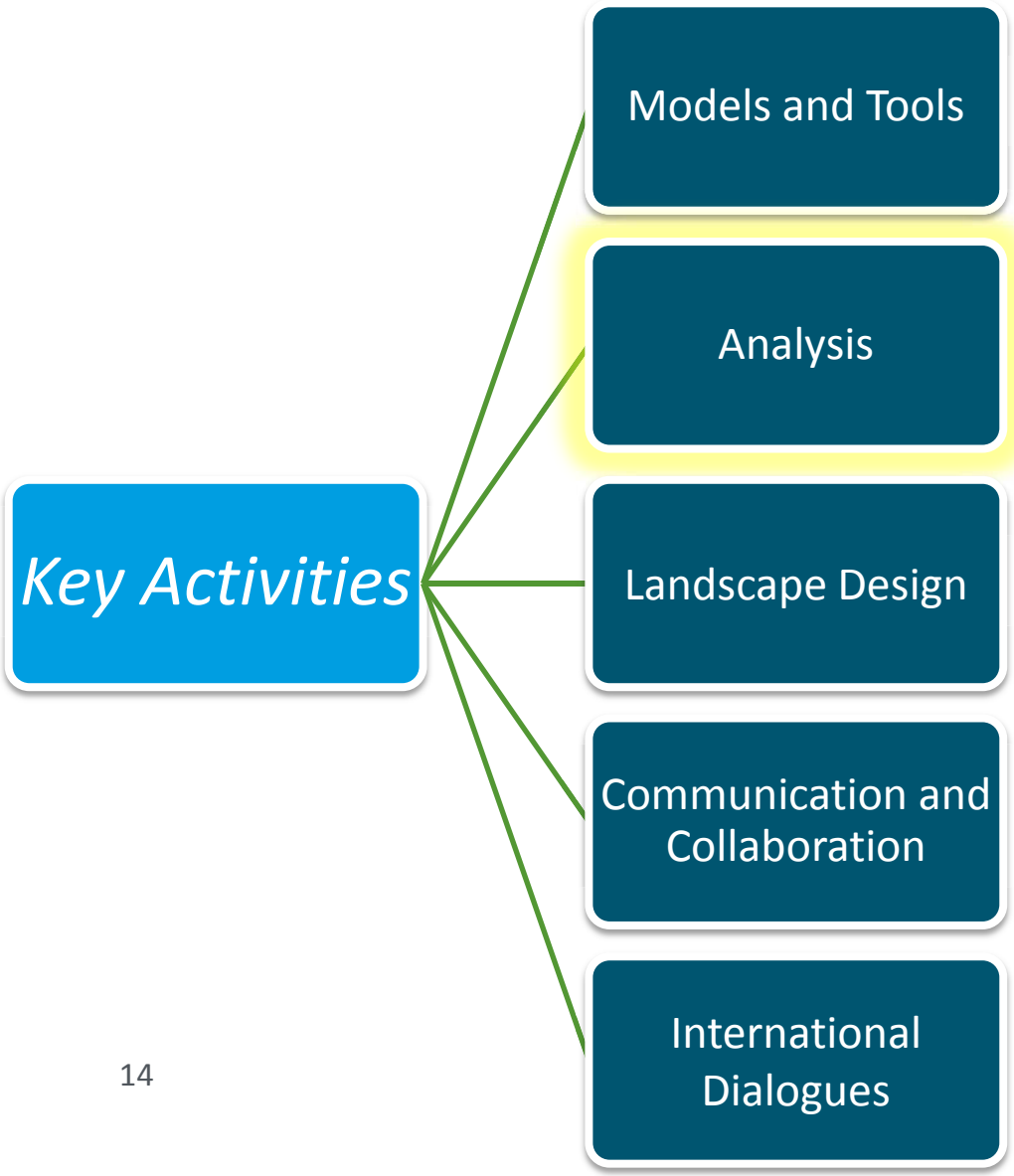
Jobs & Economic Development Impact (JEDI)

Soil & Water Assessment Tool (SWAT)

OAK RIDGE National Laboratory

Pacific Northwest NATIONAL LABORATORY

A&S: Key Activities and Partners



Techno-economic analysis

Lifecycle analysis

Economic and security benefits

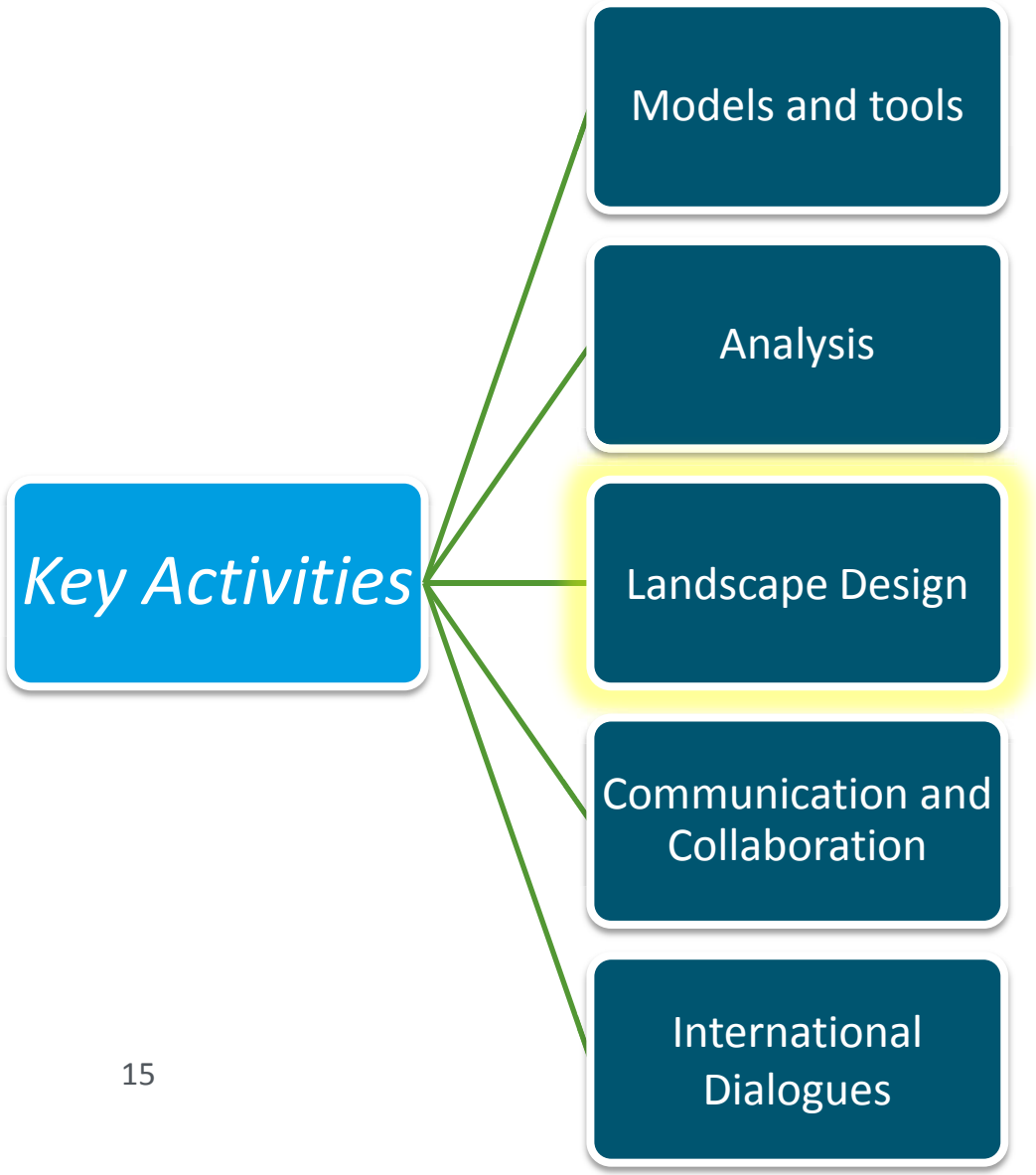
Market analysis

Environmental and socio-economic effects

Land-use change

Integrative scenario analysis

A&S: Key Activities and Partners

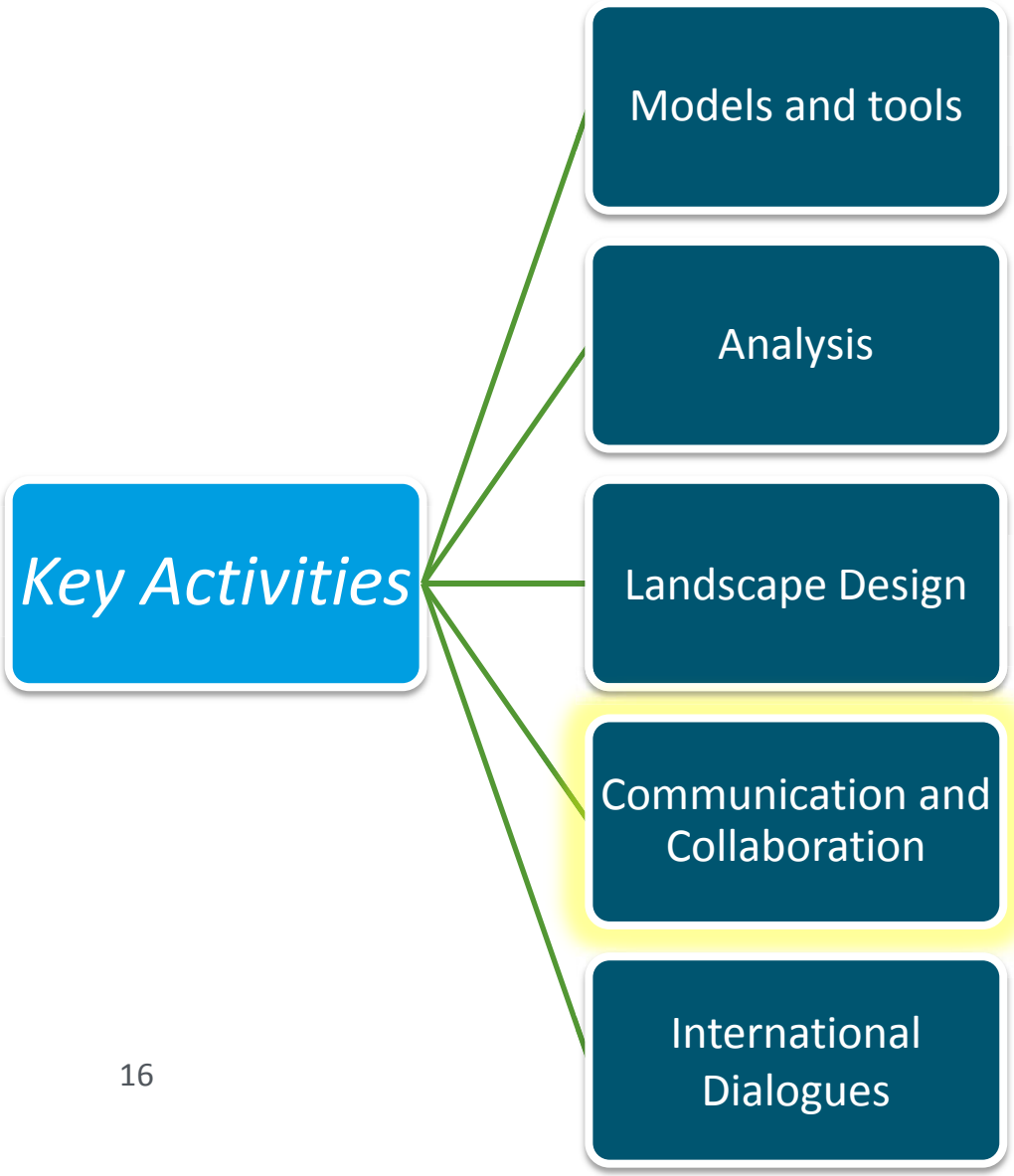


Stakeholder-driven design

Watershed modeling

Field research

A&S: Key Activities and Partners



Federal agencies

Non-profit organizations

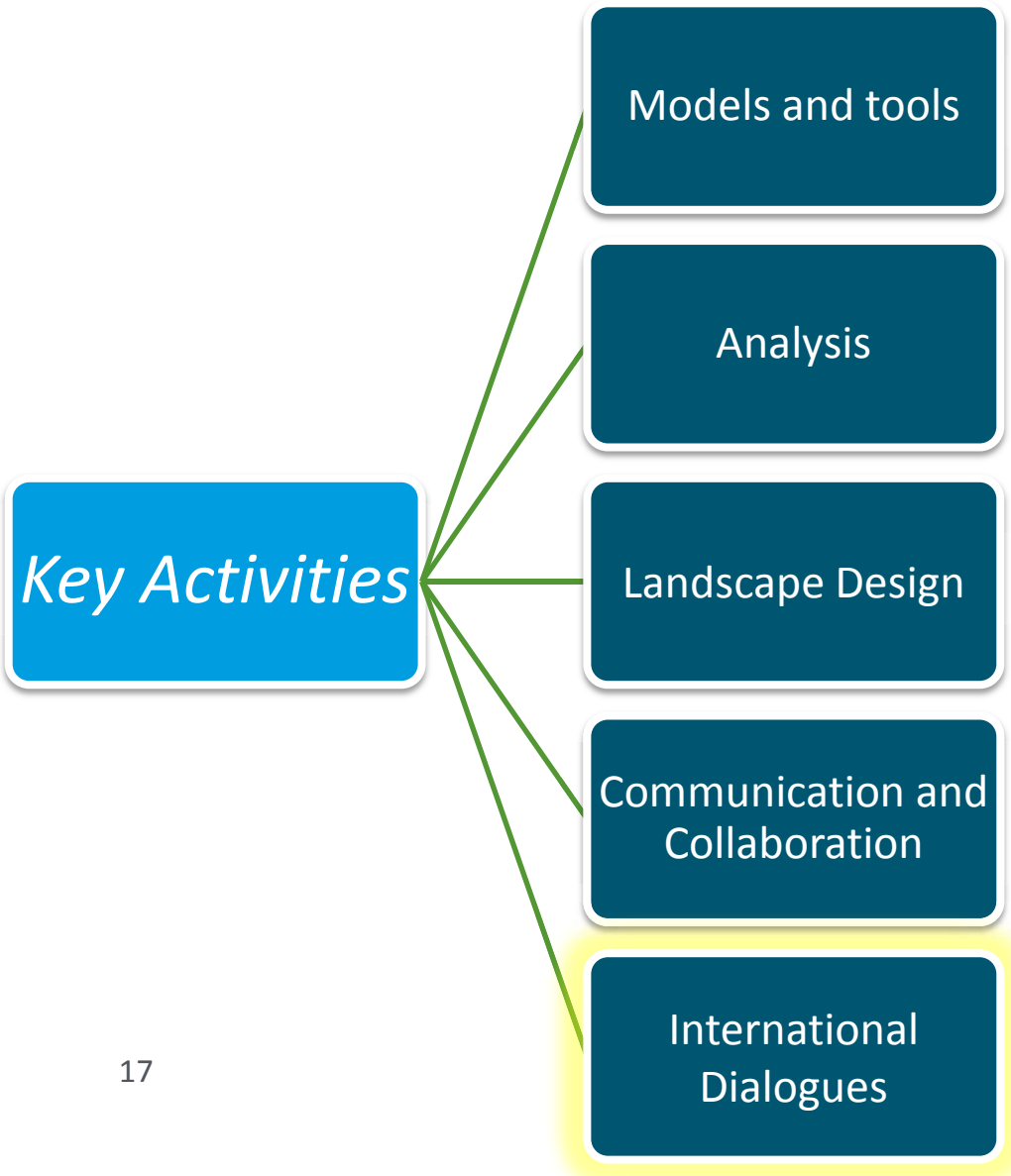
Environmental community

EERE Sustainable Transportation Offices

Biomass R&D Board

US DRIVE

A&S: Key Activities and Partners



GBEP Global Bioenergy Partnership

iea

International Energy Agency – Bioenergy

Roundtable on Sustainable Biomaterials

Global Bioenergy Partnership

Other multi-national partnerships

RSB ROUNDTABLE ON SUSTAINABLE BIOMATERIALS

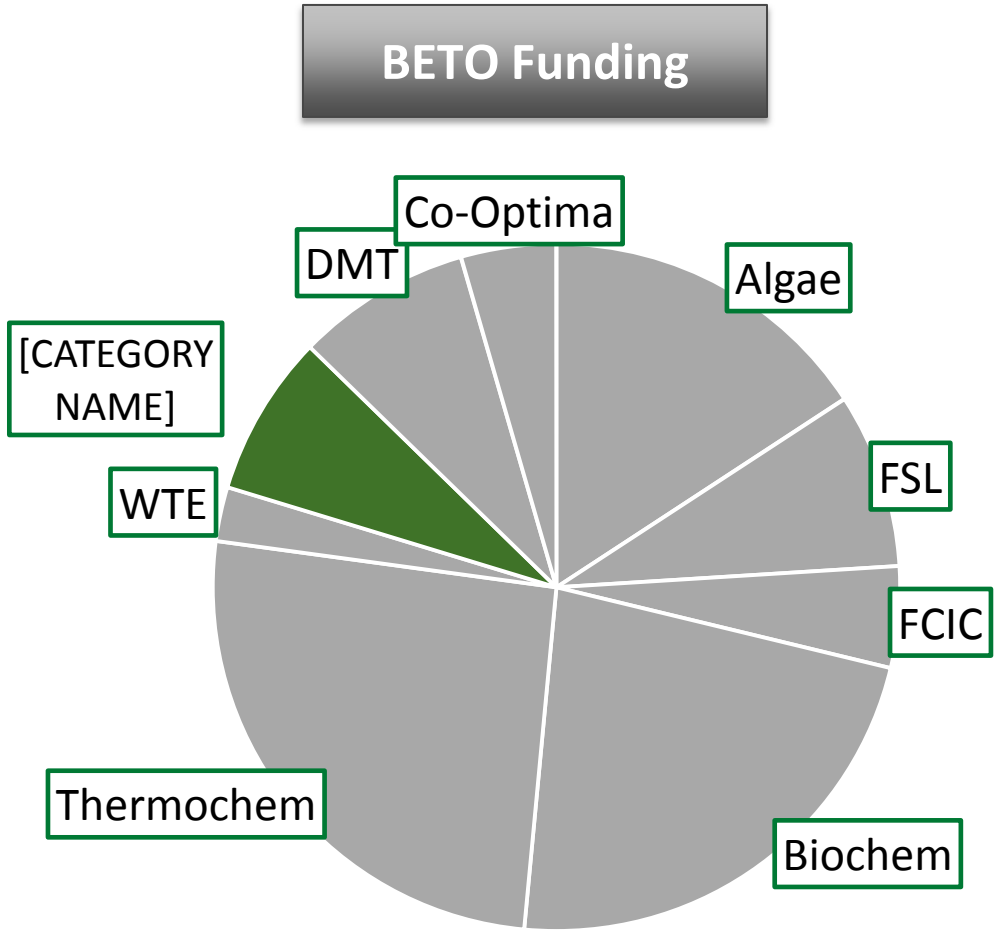
A&S Budget

Annual budget about $11 M

- Strategic Analysis
- Cross-cutting Sustainability

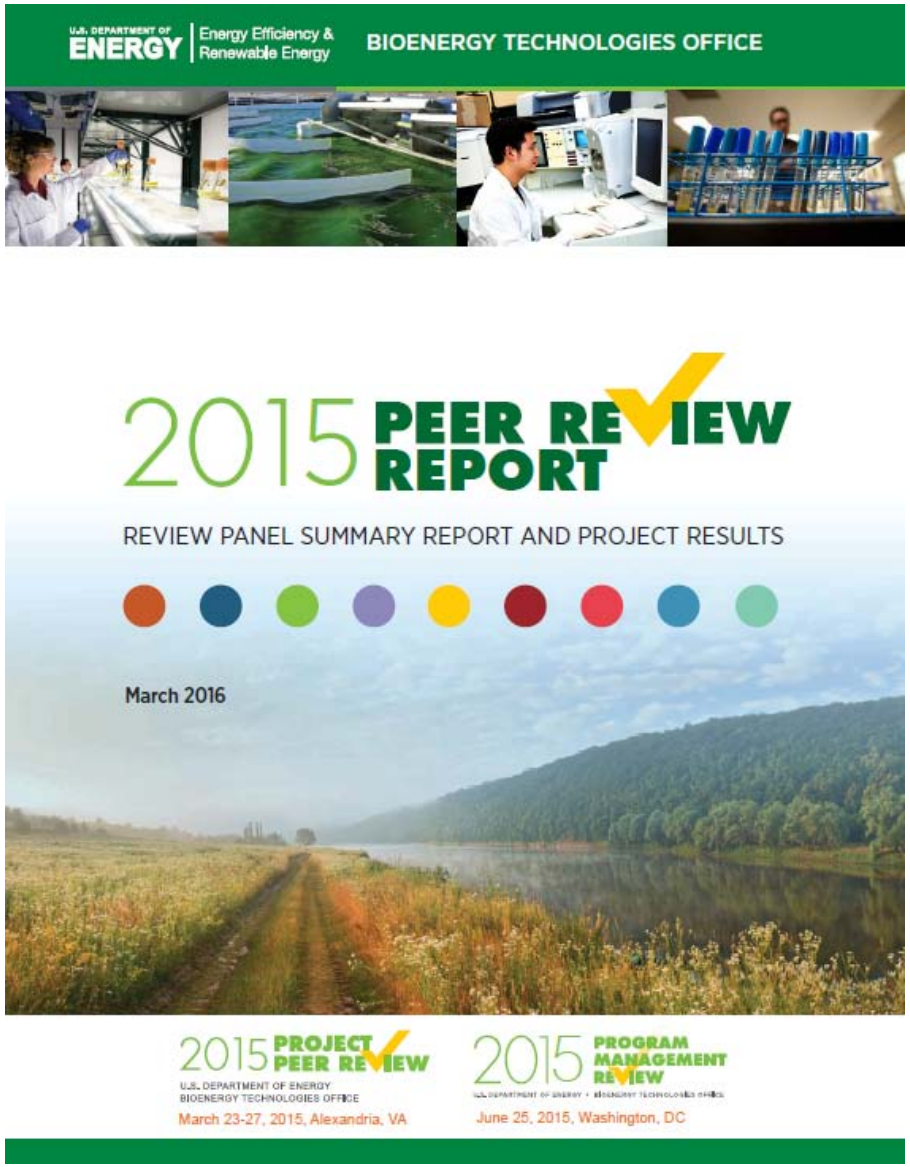
27 projects will be reviewed

- 23 national lab projects
- 4 academic/industry projects



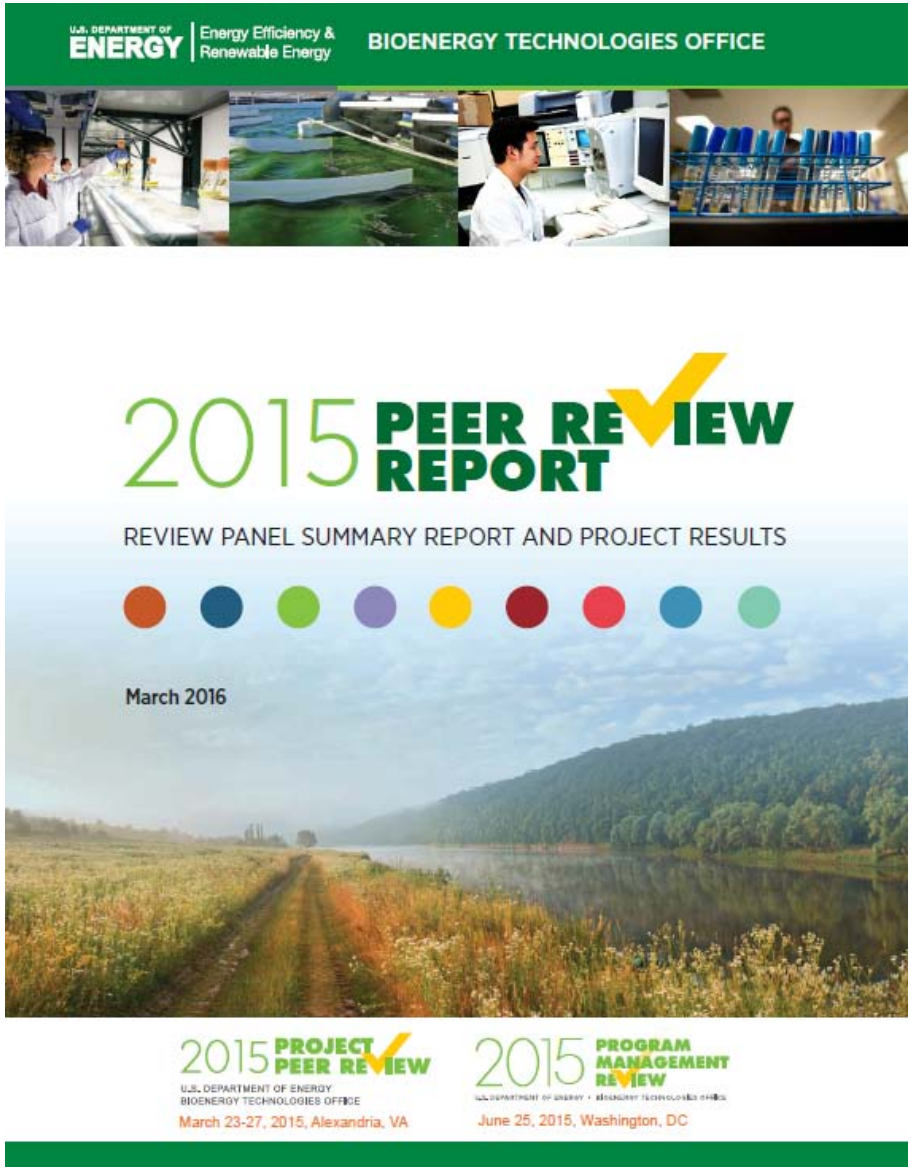
Reviewer Comments from 2015 Peer Review

- Strengthen the linkage of sustainability to decision making.
- Continue integration of environmental, social, and economic analyses.
- Continue to incorporate BETO-generated knowledge into the international dialogue.
- Strengthen the effort to understand the human dimensions of sustainable bioenergy.



Key Changes Since 2015 Peer Review

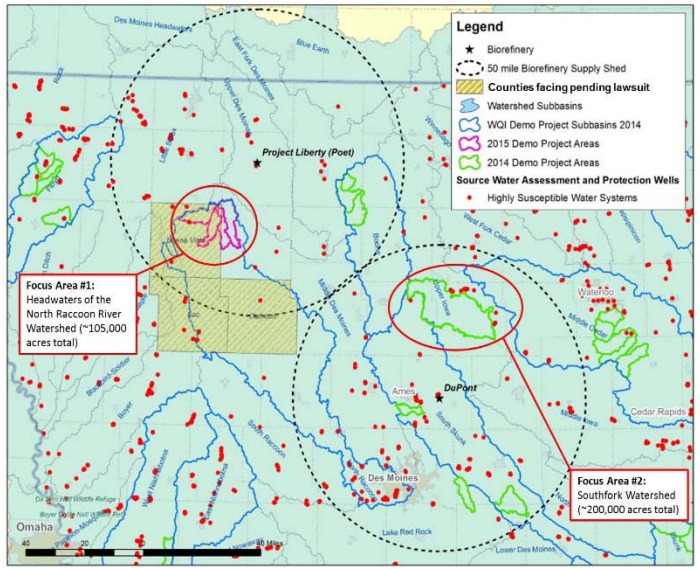
- ✓ Ensured integration of economic, social and environmental sustainability in BETO Strategic Plan
- ✓ Initiated mapping effort of BETO-funded models and tools
- ✓ Enhanced socio-economic considerations in several projects
- ✓ Strengthened strategic international collaborations focusing on high-impact publications
- ✓ Initiated Sustainable Bioeconomy Interagency Working Group

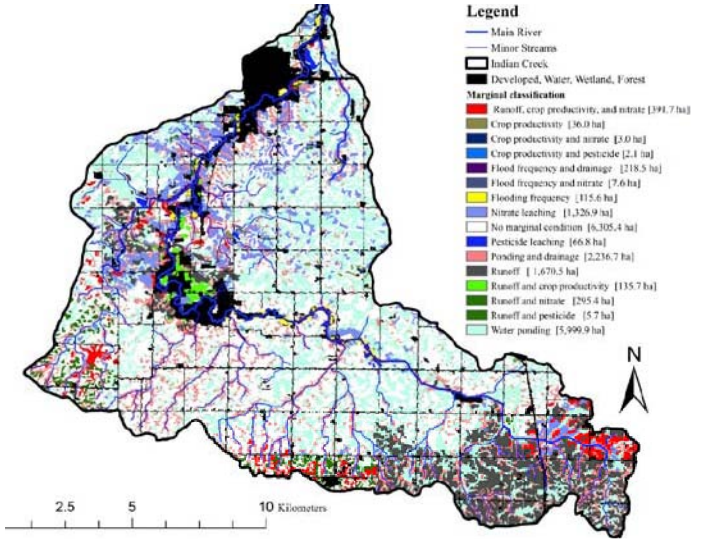


Key Accomplishments

Landscape Design

- Antares Group Inc: Enabling Sustainable Landscape Design for Continual Improvement of Operating Bioenergy Supply Systems
- Argonne National Laboratory: Economic Evaluation of Shrub Willow Production
- Bioenergy Solutions to Gulf Hypoxia Workshop

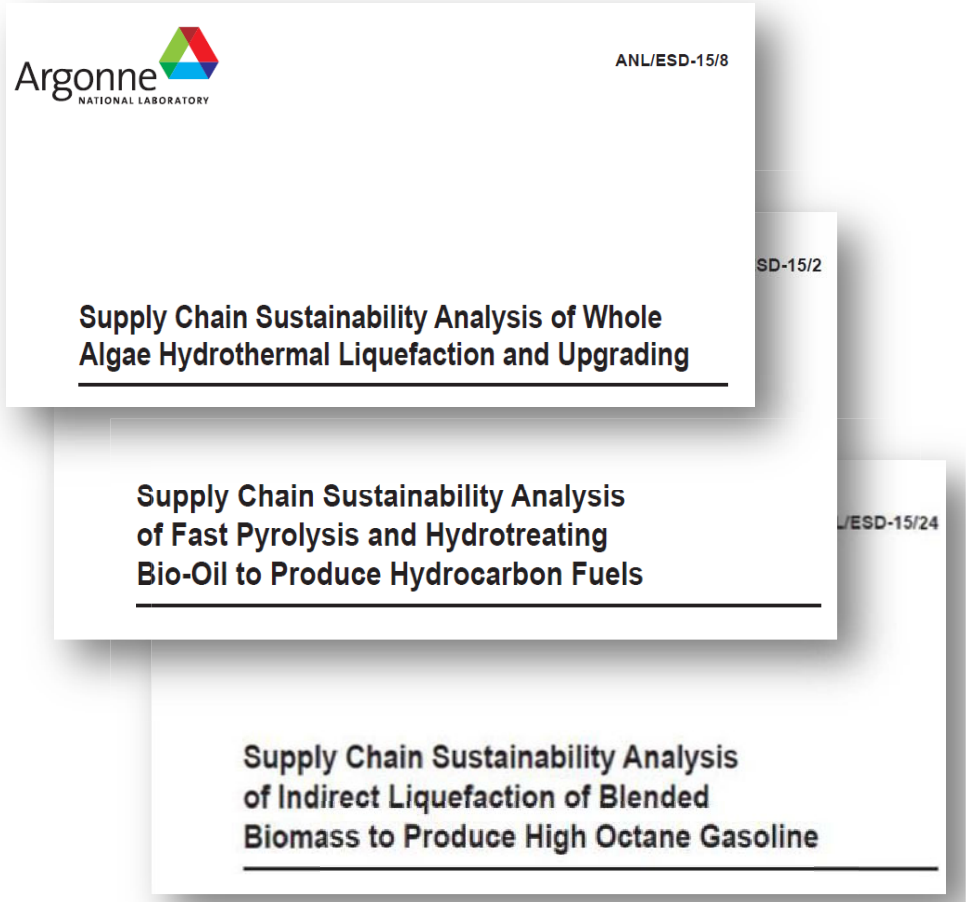




Key Accomplishments

Further Integration of Techno-economic and Lifecycle Analysis

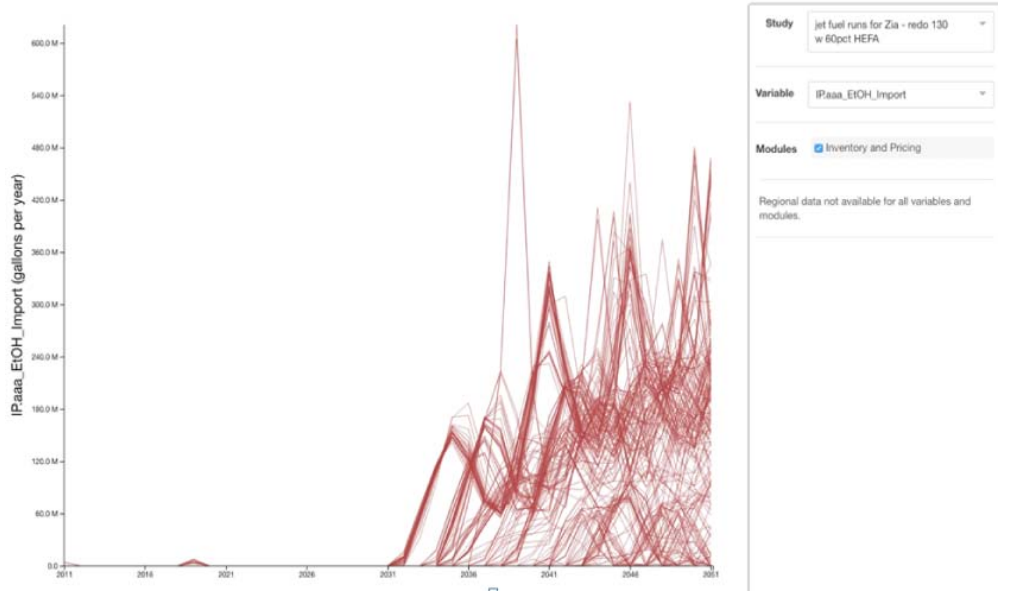
- Supply Chain Sustainability Analysis
  - GREET analysis used to conduct full life-cycle analysis on multiple design cases
  - Identifies drivers of life-cycle energy and environmental metrics to help guide R&D efforts to mitigate impacts
- Coordination between INL, NREL, PNNL, and ANL
  - Sharing data and results



Key Accomplishments

Enhanced Key Models and Tools

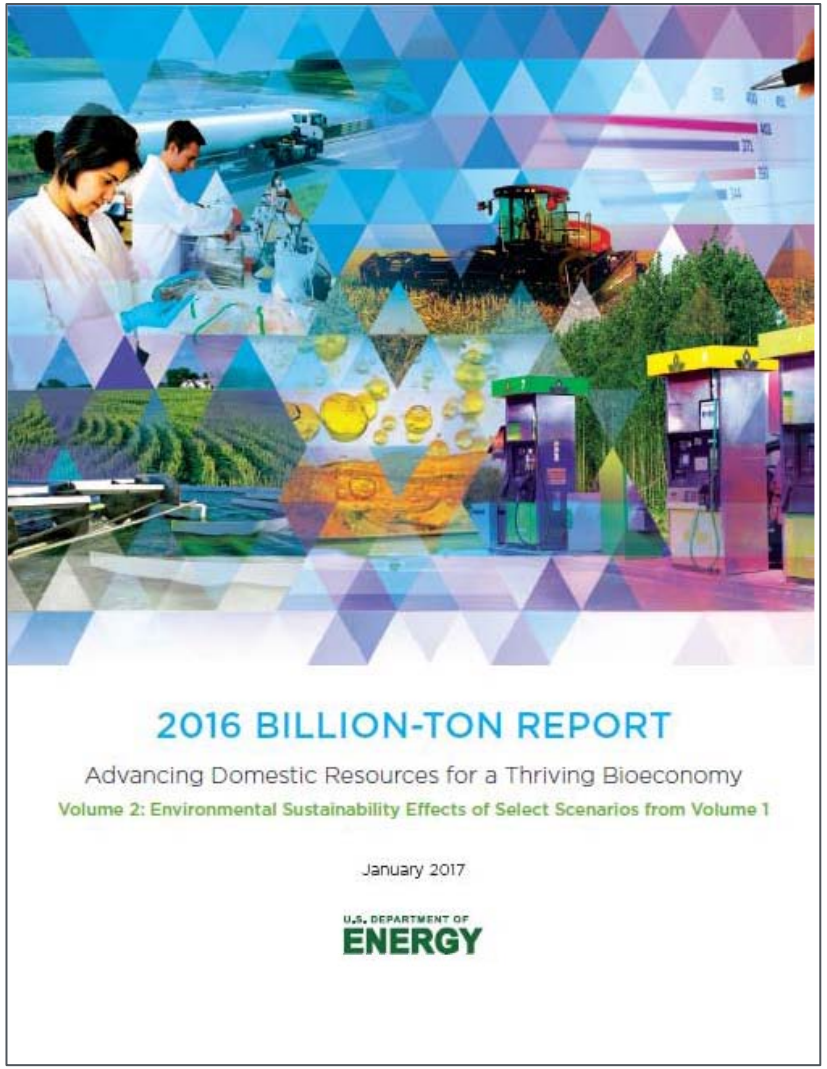
- GREET
  - Enhanced water consumption and soil organic carbon capabilities
  - Collaboration with CORRIM on woody feedstocks
- Feedstock Production Emissions to Air Model (FPEAM)
  - Alignment with POLYSYS
- Biomass Scenario Model (BSM)
  - Progress on public access to model and results
- Bioenergy Supply Chain Modeling Workshop
  - Improved collaboration among modeling community
  - Initiated model mapping effort



Key Accomplishments

Billion-Ton 2016 (BT16) Report, Volume 2

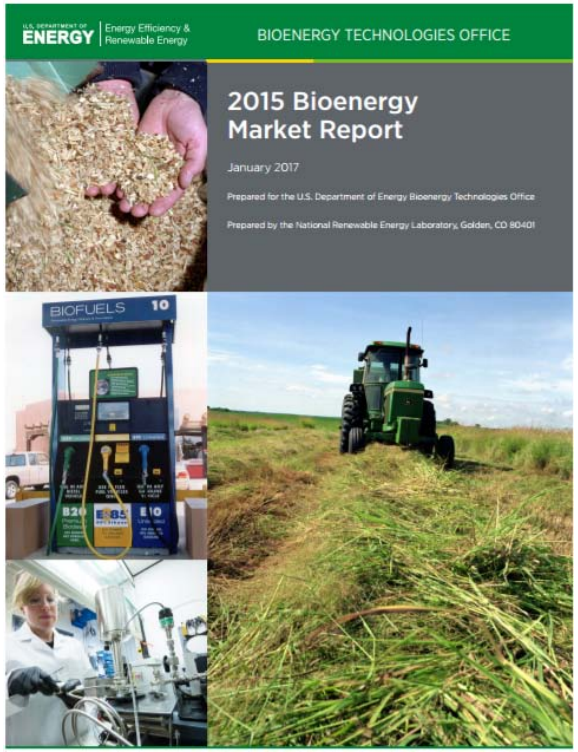
- Volume 1 (July 2016) United States has the potential to produce at least 1 billion dry tons of nonfood biomass resources annually by 2040.
- Volume 2 (January 2017) Environmental Sustainability Effects of Select Scenarios from Volume 1
  - Analyzes potential environmental effects associated with near- and long-term biomass production scenarios

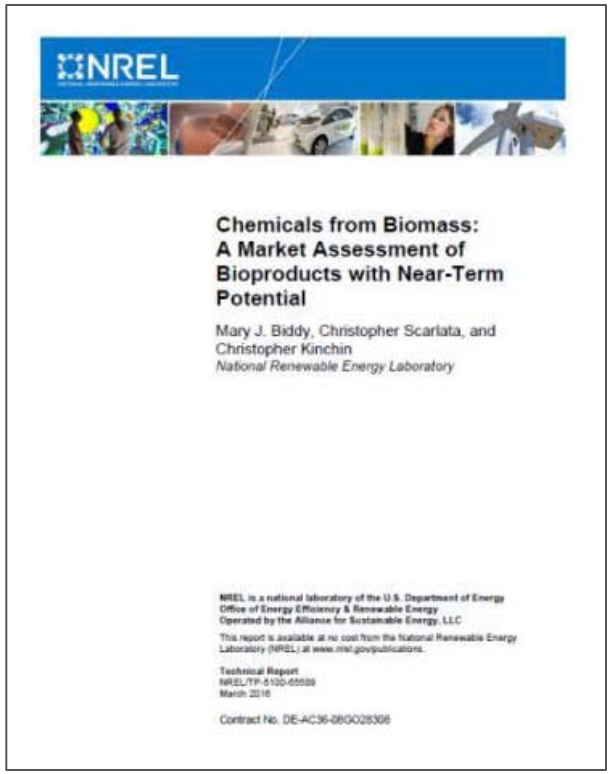


Key Accomplishments

Published Additional Key Reports

- 2015 Bioenergy Market Report (February 2017) http://www.nrel.gov/docs/fy17osti/66995.pdf
- Chemicals from Biomass: A Market Assessment of Bioproducts with Near-Term Potential (March 2016) www.nrel.gov/docs/fy16osti/65509.pdf





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Upcoming Activities

- July 11-12, Bioeconomy 2017
  - Plenary on Sustainability
- Dissemination and outreach of BT16 volume 2
- Publish Bioenergy Solutions to Gulf Hypoxia Workshop Report
- Continue to improve:
  - Quantification of and agreement on bioenergy sustainability and its value proposition
  - Quantification of risk and business uncertainties
  - Coordination across national lab projects

BIO ECONOMY
U.S. DEPARTMENT OF ENERGY
2017

Peer Reviewers

- Candace Wheeler (Lead Reviewer) – *General Motors (Ret.)*
- Christopher Galik– *North Carolina State University*
- Troy Hawkins– *Eastern Research Group, Inc.*
- Ruben Lubowski – *Environmental Defense Fund*
- John Sheehan– *Colorado State University*
- David Simpson – *Environmental Protection Agency*

THANK YOU, REVIEWERS!