



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



DOE Bioenergy Technologies Office (BETO) 2015 Project Peer Review

WBS 4.2.1.41

Addressing Global Barriers to Growth of the US Bio-Economy

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Analysis & Sustainability**

Keith L. Kline
klinekl@ornl.gov

Maggie Davis
davismr@ornl.gov

**Oak Ridge National
Laboratory (ORNL)**

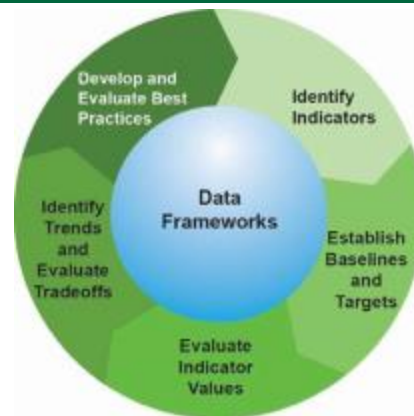
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Goal Statement: Address selected global barriers to growth of a sustainable US bio-economy

- ✓ Share BETO research results
- ✓ Build international consensus around criteria, definitions and measurement methods
- ✓ Support more consistent assessment of bioenergy sustainability

Focus areas (2015-17):

- International Organization for Standardization (ISO) Standard 13065, “*Sustainability Criteria for Bioenergy*”
- Address key barriers, e.g., related to sustainability assessment methods, food security, land-use change (LUC), reference case and carbon measurement



Support for DOE Goals

- Standards reduce risks and uncertainties and facilitate market stability and growth
- Accelerate tech transfer, adoption of clean bioenergy technologies
- Consistent science-based message

Industry Relevance

- Lower transaction costs
- Reduce export barriers
- Equitable access for emerging bioenergy markets

Quad Chart Overview

Timeline

- FY15-17
New project responds to 2013 Peer Review recommendations
- 85% progress on ISO (continuation)
- 15% progress on new tasks

Barriers

- *Scientific consensus* on bioenergy sustainability (ST-A)
- *Lack of Industry Standards , Lack of Acceptance* (Demo/Market Im-E, Im-H)
- *Lack of comparable, transparent and reproducible analysis* (AT-A)
- *Consistent communications...* (ST-B)

Budget

| \$k | FY 14 Costs (prior project) | FY 15 Approved funding | Planned (FY 16-Project End) |
|--------------------|-----------------------------|------------------------|-----------------------------|
| DOE Funded | \$133 | \$200 | \$650 |
| NSF-MTU Cost Share | \$80 | \$70 | \$50 |

Partners

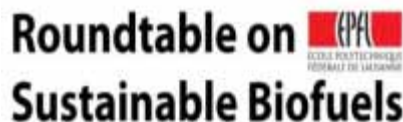
- ISO - collaborations with 42 national and international organizations
- Other labs, centers and agencies: ANL, NREL, GLBRC, BESC, USDA...
- International organizations (IEA, FAO, RSB, GBEP)
- Private sector, trade groups, standards bodies (CEN, ASTM International)

NSF-MTU: National Science Foundation-Michigan Technological University, Sustainable Bioenergy in Americas, Program for International Research & Educ.(PIRE) and Research Coordination Network (RCN)

Context

Legislative initiatives in US (Renewable Fuel Standard), California (Low-Carbon Fuel Standard) and EU (Renewable Energy Directive) –

- Set thresholds for GHG emissions and described aspirational goals for “sustainability”
- Created multiple systems and approaches to assess sustainability, e.g.:



Definitions, procedures, indicators and requirements too numerous, costly, inconsistent... → wide variation in results

Support for EERE and BETO goals

- “International engagement is essential” to achieve U.S. clean energy objectives
- Uncertainties about sustainability affect social acceptance and global market access with implications for all biomass products
- Adoption of clear standards is needed for consistent sustainability assessment
- Private sector relevance: Industry requests DOE support due to uncertainties about sustainability (standards, indirect effects, LUC)
- Need for clear, consistent communications on bioenergy sustainability

An advertisement for Industrial Wood Pellets. The top half features the text 'INDUSTRIAL WOOD PELLETS' in large, white, bold, sans-serif font against a dark background. Below this text are three small green boxes with white text: 'ABUNDANT', 'SUSTAINABLE', and 'CARBON BENEFICIAL'. The right side of the advertisement shows a photograph of tall, thin trees against a blue sky. At the bottom, there is a black box with white text: 'Example: exports at risk, US pellet exports Valued \$650M in 2013, > \$1B (est.) by 2016'. A vertical watermark 'www.researchgate.net' is visible on the right edge of the image.

1. Approach

A. Strategic focus

- Target high-impact decisions, policies, processes, reports (e.g., International standards, SCOPE, UN-CFS, CARB...)
 - ✓ Build on strengths, past experience
 - ✓ Identify and fill gaps (e.g. related to ILUC, reference case)



B. Leverage resources and expand / extend BETO impacts

- Partnerships where mutual interests lead to mutual rewards
- Join forces on reviews and analysis (e.g., ISO, IEA, FAO, IFPRI, Brazil, NSF)
 - ✓ Synthesis across projects/disciplines
 - ✓ Efficient distribution of effort, optimize use of available resources
 - ✓ Integration of sustainability in bi- and multi-lateral dialogues (e.g., strategic energy dialogue)



C. Accelerate tech-transfer

- Cost-effectively reach global audiences
- Contribute scientific expertise from BETO and partners
- Build synergy across labs, platforms, agencies
- Promote technically sound, peer-reviewed results
- Enhance impact of 'latest, greatest' sustainability research



1. Approach (Management Plans)

D. Milestones defined and delivered

- Revised and updated based on experience
 - Annual Operating Plan and Merit Review
 - Guidance from prior Peer Review
- ISO process and food security prioritized
 - Timelines
 - Tasks/ roles defined

Challenges
What if ISO
Standard is not
approved?

Back-up plans
updated each year
include options for
improved product
regardless of vote

E. Work plans, teams meetings, decision points

- Regular meetings, calls, reports and reviews
 - IEA and International: biweekly
 - BETO Sustainability, Center for Bioenergy Sustainability (CBES) and Resource Assessment teams: monthly
- Monthly reports, wide distribution, facilitate coordination
 - E.g. with ANL (GREET), NREL (LUC, TEA, certification schemes), Canada (standards), Brazil (ISO, SCOPE, indicators),
 - BETO and NSF multi-disciplinary teams (social, economic, environmental...indicators)

F. Risks and challenges assessed; options identified

- Coordinated US leadership and gap-filling roles (ISO, IFPRI examples)
- Backup plans at multiple levels (e.g., plenary, voting, overall result)
- Building international consensus via multiple networks (ISO, IEA, NSF-research coordination in Americas, FAO-IFPRI food security... examples)

Synopsis of FY14 Accomplishments (prior project)

- Outreach: 15 presentations
- Publications and reports: 9
- ISO 13065 “Sustainability Criteria for Bioenergy” –
 - ✓ Over 100 contributions logged
 - ✓ Supported US analysis, vote and comment documents.
 - ✓ Guided international editing committee through review and revision process
- ASTM International Committee E.48 –
 - ✓ Support subcommittee E48.80 Sustainability
 - ✓ Technical Advisory Group for ISO...
- Review and comment on FAO and GBEP initiatives submitted to BETO
- Co-author of SCOPE Report on Bioenergy, Chapter 1, Land and Bioenergy
- Planning, guidance regarding bioenergy-food security interaction issues



- **Project builds on prior success**
- **External Merit Review**
- **Approved after ORNL and BETO input**

2. Technical Accomplishments

Support ISO "Sustainability Criteria for Bioenergy"

A. Filling gaps, leadership roles

- Leadership roles
 - Chair's Advisory Group –working group & committee conveners
 - Lead Editing Committee
- Defended position on indirect effects
 - Changes suggested with each iteration
 - After fulfilling mandate, updated report with documentation to support current language
 - Proposed ISO stand-alone document not approved
 - New initiative from work group leaders: draft paper for journal submission
 - Reported impacts on voting

*Text related to
Indirect Effects:*

*"The Standard considers the **measurable effects** under the control of the economic operator and **caused by the process being analyzed**"*

2. Technical Accomplishments

Support ISO "Sustainability Criteria for Bioenergy"

B. Provided strategic decision support

- Contribute to all Work Groups: “If you’re not at the table, you’re on the menu”
- Principles and Indicators: six sub-groups, US team maintained presence in all groups

C. Supported process

- Consensus-based
- Substantive contributions
 - International webinars
 - >100 written comments

D. Coordination and reports

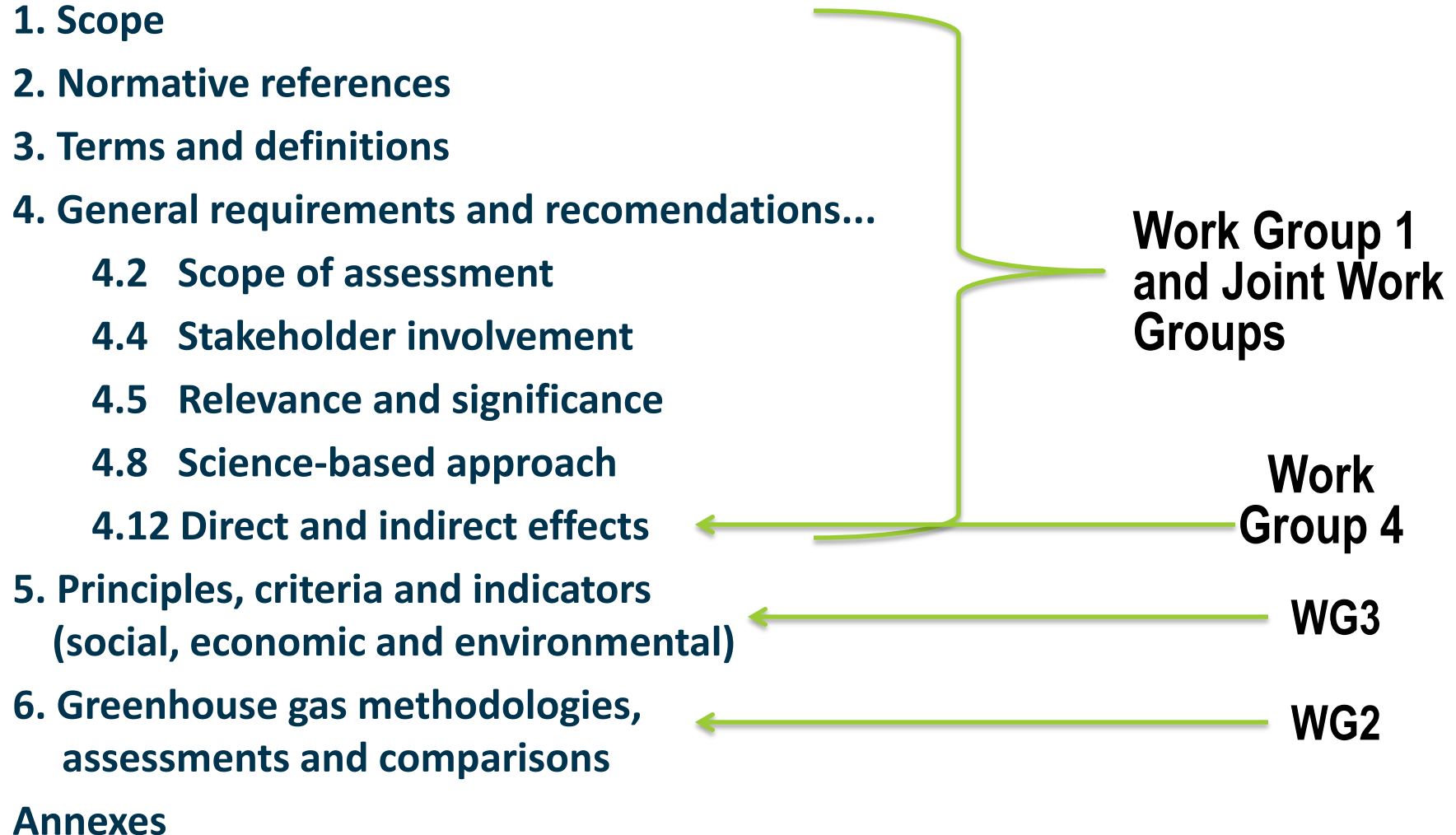
- Two ISO progress reports
- Five informative updates

E. Key contributions

- Communications and resolutions to address scope, vision
- Avoid indirect “show-stoppers”
- Reduce ambiguity and reporting burdens
- Emphasize **science-based** approach



ISO 13065, Contents (Outline excerpts, March 2015)



Note: Draft under review and subject to change.

2. Technical Accomplishments

- Workshop organizing role
- Identified and facilitated Science Committee
- Build on comments to FAO Committee on Food Security (CFS-40) Final Report and advice for bioenergy policies that support food security
- Hosted by International Food Policy Research Institute (IFPRI) Washington, D.C., November 2014
- Broad, international participation
- Synergies build on collaborations with ISO, IEA, Brazil, SCOPE and others

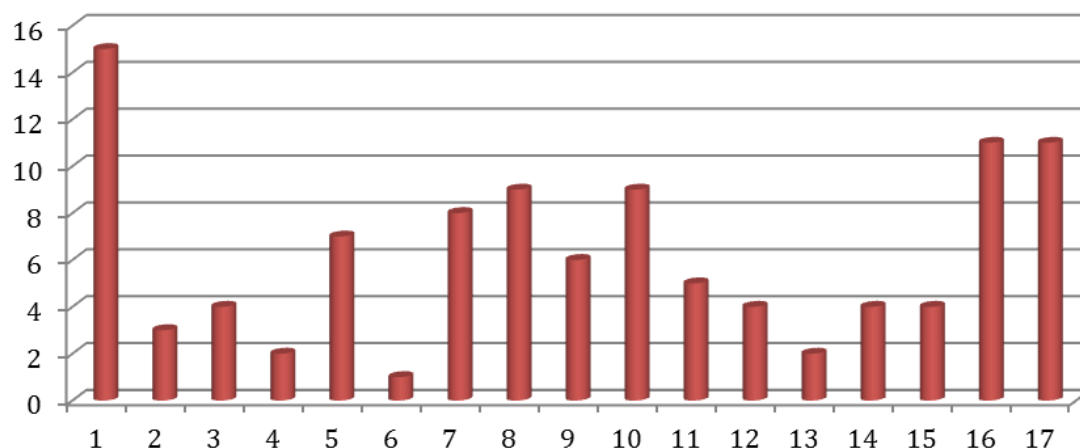


2. Technical Accomplishments

Workshop conclusions include:

- Local context is key
- Issues of food security and biofuel policy effects defy simplification and generalization
- Approaches to modeling the impacts of biofuel policies on food and nutrition merit revisions based on evidence to date
- Impacts (positive or negative) depend on many local variables (who most at risk, who gains/loses coping abilities)
- Need better communications to address misunderstandings
- Available guidelines can address most concerns

Figure 2: Priorities from participants regarding key questions



Top-ranked research issues

How do biofuels affect -

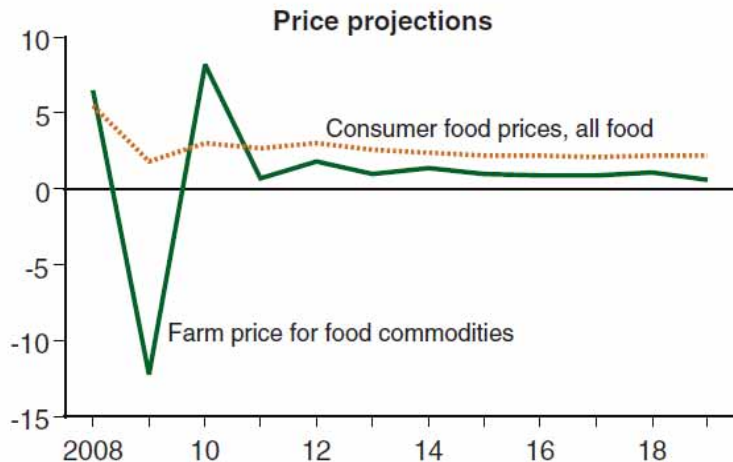
1. Rural incomes, poverty and income distribution?
8. Food-price volatility?
10. Can we simultaneously achieve multiple goals: environmental, food and energy security?
16. How can integration of biofuels within food supply systems affect productivity?
17. Rural investment and agricultural development?
7. What can be learned from experiences to date?

2. Technical Accomplishments

Workshop example:

- Modeling merits revision based on evidence and more accurate and consistent use of terms
- About 90% of US food dollar is driven by “off-farm” markets
 - For example: If #2 yellow corn price increases 35%; #2 yellow $\approx 10\%$ of farm-based inputs to food basket; and farm/agribusiness $\approx 11.6\%$ of food dollar; then
 - ✓ Effect on food price = 0.4% [$35\% \times 10\% \times 11.6\%$]
 - ✓ Temporary effect – long term impacts may be opposite
 - ✓ Assumes population at risk of food insecurity depends on #2-based products

Figure 7
Long-term U.S. price and expenditure projections, 2008-
Year-to-year percent change in price indexes



Canning P. 2011. A better understanding of our food costs. USDA-ERS # 114

2. Technical Accomplishments

Leverage support to assess and improve sustainability assessment

- Advanced School for Bioenergy
 - 120 international students, next generation of researchers
- Brazil Bio-Energy, Science and Technology Conference
 - Communications, awareness, joint presentations on sustainability, food security, carbon accounting
- National Science Foundation coordination network...



Better practices and protocols for indicator measurement – example

- Lack of consensus on sampling, measurement and verification methods
- Differences influence reported SOC values
- Identified options to reduce potential variability:
 - Stratified sampling
 - Guidance on depth increments...

Table 1 from Davis et al. (submitted)
Reviewed studies on SOC measures

| Author | Crop ^a | Sample Design | Method | Depth (cm) |
|-----------------------------------|-------------------|---------------|--------------|------------|
| Follett et al. (2012) | C/SG | Systematic | Cores | 150 |
| Gál et al. (2007) | C-S | Systematic | Cores | 100 |
| Wilts et al. (2004) | C/W/O | Random | Cores | 45 |
| Duiker and Lal (1999) | C/W | Systematic | Cores | 30 |
| Karlen et al. (2013) ^a | C-S | Systematic | Cores | 15 |
| Franzluebbers Stuedemann (2013) | C/S/W | Random | Cores | 150 |
| Galdos et al. (2009) | Sc | Systematic | Pits | 100 |
| Tivet et al. (2013) | Sc | Random | Pits | 100 |
| Rossi et al. (2013) | Sc | Systematic | Pits/ auger* | 60 |
| Calegari et al. (2008) | C/S | Systematic | Pits | 60 |
| Cerri et al. (2004) | Sc | Systematic | Pits | 20 |

2. Technical progress, FY15 milestones

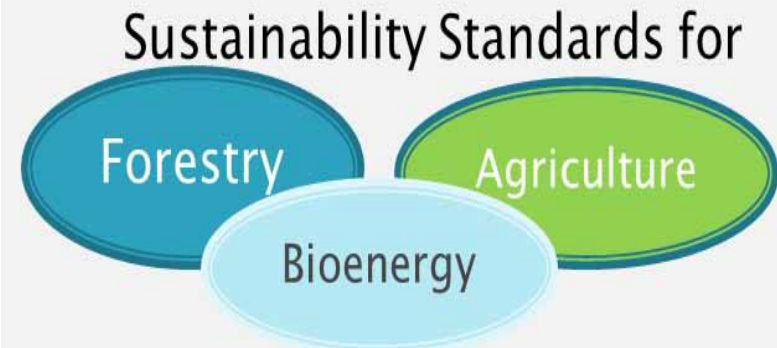
| Qtr | FY 2015 Milestone description (excerpts) | % Complete |
|-----|--|---------------|
| Q1 | Global experts review issues and perceptions surrounding bioenergy, policies and food security – help organize and implement an international workshop | 100% |
| Q2 | Support US team, develop comments and resolutions, contribute to plenary meetings/negotiations and editing of Draft International Standard 13065 “Sustainability Criteria for Bioenergy” | 95% (Feb.) |
| Q3 | Collaborations identify variables influencing measurement of soil organic carbon and ways to ensure more transparent, consistent and comparable measurements. | 75% |
| Q4 | Fact sheet on bioenergy policies and food security developed and peer reviewed | 15% |

3. Relevance: Why ISO?



--> Criteria: making a difference

- Tremendous potential global impacts
 - 163 member countries
 - Over 19,000 published International Standards
- Rio 1992: Series of Environmental Standards (ISO 14000)
 - 250,000 users
 - Applied in 155 countries
- Social Responsibility (ISO 26000, 2006)
- ISO Standards 14064:2006 and ISO 14065:2007
 - Framework for measuring GHGs
 - So that “a tonne of carbon is always a tonne of carbon”
- Rio+20 ISO commitment to foster Sustainable Development



Sustainable Development

3. Relevance – BETO, benefits to bio-economy

Impact on commercial viability of biofuels and bio-products

- International forums facilitate dialogue and consensus on key constraints (land-use, food and fuel security)
- Project insights, shared across global partners and scientific community, help inform decisions about legislation and regulations
- Internationally recognized standards for sustainable bioenergy can facilitate trade and broader bio-industry market development



Photo Credit: Jim Spaeth, BETO

Impact on social and environmental performance of bioenergy

- Research helps improve methods and metrics for more consistent performance measurement
- Cooperation stimulates distributed discovery, innovation, ownership and communications
 - Ingredients for ***transformational change***
 - Accelerate development of better practices and technologies

Collaborative networks that share knowledge and support consensus on sustainability can speed global deployment of clean technologies that reduce GHG emissions

3. Relevance to DOE Goals

supports

Project

- Respond to industry concerns
- Share and apply results from others
- Consistent methods for calculations (GHG, carbon...)
- Define approaches to address key barriers (LUC, food security)
- Leverage resources via collaborations

supports

BETO MYPP Goals

- Reduce uncertainties about market access
- Increase understanding of science-based approaches for assessment
- Standards support high-quality, reproducible, analyses conducive to
 - Continual improvement
 - Increasing sustainability
 - Better practices

DOE-EERE Goals

- Address key barriers for market acceptance
- Accelerate deployment of advanced tech for
 - Clean
 - Secure
 - Renewable energy
- Reduce GHG emissions
- Lower transaction costs
- Reduce investment uncertainties

3. Relevance – industry perspectives (critical success factors - technical, market, business)

The US is a global leader, but continued market growth for a bio-economy requires agreement on standards.

The US Head of Delegation to ISO 13065, Sustainability Criteria for Bioenergy, states –

- ***The ISO standard has strategic importance for the growth of US biomass-based products industries.***
- ***An inappropriate ISO standard could create barriers to trade and bioenergy market growth.***
- ***The US has made substantive contributions toward science-based approaches in developing bioenergy sustainability criteria and methods for measurement.***



Photo Credit: Jim Spaeth, BETO

4. Challenges and critical success factors

Challenges

Strategies and critical success factors

Reaching consensus on controversial issues

- Use international fora
- Stress science-based approach
- Build on prior success, other research, documentation

Avoiding surprises and back-tracking

- Participation in key roles
- Strategic plans for coverage, recruitment, continuity
- Presence: *If you're not at the table, you're on the menu*

International agreement to publish final ISO product

- Create broad *ownership*
- Technical Specification or guidance
- Persistence

Standardization applicable across feedstocks, pathways, cultures, continents

- Broad participation in process
- Adoption and use in market place
- Applicable to any supply chain, bio-products

Fair comparison—vs—potential misuse, trade barriers

- Avoid subjective, ambiguous text
- Follow-up to assess gaps, issues, impacts

Costs, complexities of *sustainability assessment*

- Minimize burdens, focus on measurable performance
- Consider small producers, added value to users
- Follow-up to assess options that reduce costs

5. Future Work (1)

Reach the ISO finish line Steps to complete ISO-13065

FY15

- March-April: Kline leads Editing Committee to produce 'Final Draft' (FDIS)
- June: Circulate FDIS for voting
- July: US Technical Advisory Group reviews, agrees on strategy, final comments
- Sept: Voting results define options, next steps

FY16

- Publish final ISO product
- Begin joint assessments

FY17

- Review and evaluate
 - Effects of new standard in the market place – identify value, document issues or gaps
 - What is the value-added from DOE participation: lessons for future

Related tasks over next 2 years

- Publications and exchanges on indirect effects to improve approaches to modeling
- Support other initiatives per BETO requests and resource availability:
 - IEA Bioenergy
 - FAO (LUC-Food & Fuel security)
 - National and State initiatives
 - GBEP
 - RSB (ILUC)
 - Other “high-impact” opportunities

5. Future Work (2)

Collaborative reports and publications on

- Biofuel policy interactions with food security
 - ✓ Fact sheet
 - ✓ Peer review process
 - ✓ Go/no go challenge
- Standardized sustainability measurement methods
 - ✓ Indirect effects (ILUC)
 - ✓ Reference case/counterfactual



Examples of papers in development with international coauthors
(see extra slides for list)

- ✓ Reconciling biofuels and food security: what are priorities for action? and supplementary “fact-sheet” (Executive Summary)
- ✓ Biodiversity and biofuel development in the Americas
- ✓ Science-based approaches to consider “indirect effects” for fuel supply pathways
- ✓ Soil organic carbon measurement protocols: A USA and Brazil comparison and recommendation

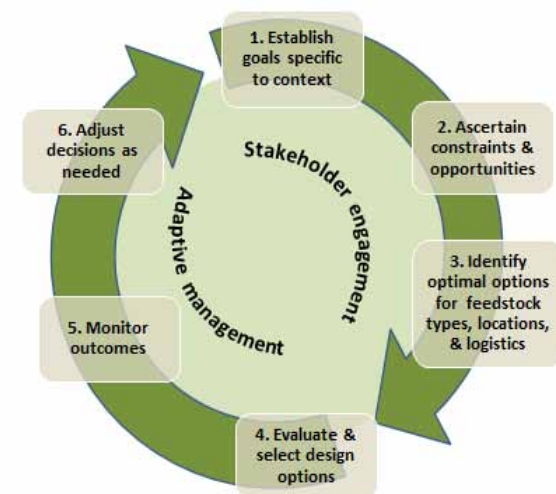
5. Future Work – Extend BETO impact

A. Advance common definitions of key terms related to sustainability of bioenergy systems

- Apply BETO learning to international processes
- Build ownership and “buy-in” to science-based approach
- Develop tools and approaches that focus on the most challenging sustainability aspects to measure, e.g., those related to land use, food security and biodiversity - all linked to “indirect effects.”

B. Quantify opportunities, risks and trade-offs associated with sustainable bioenergy production in specific contexts

- Help others test concepts, measures and verify comparability across different contexts
- Facilitate exchanges on BETO research (example: landscape design)
- Leverage participation from others and share results (example: evaluate sustainability indicators across the Americas)
 - ✓ EU, UK, Netherlands
 - ✓ Argentina, Brazil, Mexico
 - ✓ Canada, USA, others...



Summary

Approach

- ✓ Strategic focus on key barriers
- ✓ Aligned to DOE and industry goals
- ✓ Collaborations that leverage resources
- ✓ Selecting opportunities to make a difference



Technical accomplishments

- ✓ Progress achieved/milestones met, barriers overcome (ISO, ILUC...)
- ✓ BETO impacts expanded due to partnerships (ISO, IEA, ASTM, FAO...)
- ✓ FY15 Progress includes:
 - ISO 13065 near completion, more science-based
 - Food Security / Biofuels Workshop
 - Outreach: 3 Publications, 8 Presentations, 6 reports, manuscripts in prep

Relevance



Export value at risk estimated to exceed US\$1B by 2016

“If the U.S. pellet export industry certifications don’t meet or ‘harmonize’ with sustainability standards under development in Europe, pellet mills may lose their markets there” (Breining and Horstman 2014)

Summary

Relevance

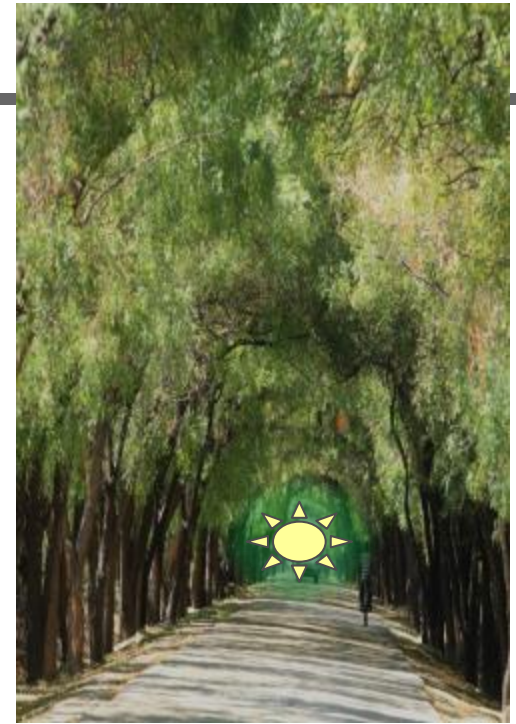
- ✓ Provides foundations for market growth, trade
- ✓ Extends value of DOE / BETO projects
- ✓ Engages industry and other stakeholders

Critical Success Factors / Challenges

- ✓ Build on prior success, do not “leave the table”
- ✓ Reach agreement on definitions and methods
- ✓ Build broad ownership
- ✓ Effective transfer of concepts to global community
- ✓ Back-up plans for outcomes

Future Work

- ✓ Publish final ISO product and assess impacts/lessons
- ✓ Strive for consensus on methods to address global barriers
- ✓ Improve consistency and transparency of assessment results
- ✓ Collaborate to develop new insights and methods that are
 - Cost-effective, practical, comparable
 - Define measures and incentives for improved management and “beneficial LUC’s”
- ✓ Document results via peer-reviewed publications with international participation



Conclusion

To be addressed effectively, global barriers to bioenergy such as concerns about ILUC and food security require broad-based consensus on

- Standard definitions
- Criteria and methods for measurement

International standard development and similar forums provide an effective, transparent platform for sharing DOE research and building consensus around global issues affecting clean energy deployment.

“Additionality” here means we build on and amplify existing projects to

- Respond to “windows of opportunity” to influence strategic decisions, policies and reports (make a difference)
- Build trust, cooperation and sense of teamwork
- Generate “spin-off” benefits

Challenges

- Different views on purpose of international standards and certification
- Effective incentives for adoption, compliance and continual improvement
- Demonstrating sustainability with low transaction costs and high value-added



Thank you

Center for Bioenergy Sustainability

<http://www.ornl.gov/sci/ees/cbes/>

See the website for

- Reports
- Forums
- Other presentations
- Recent publications



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The views in this presentation are those of the authors, Keith L. Kline and Maggie Davis, who are responsible for any errors and omissions. We give sincere thanks to many the many other collaborators who are too numerous to list here.

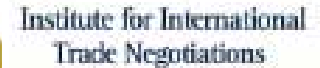
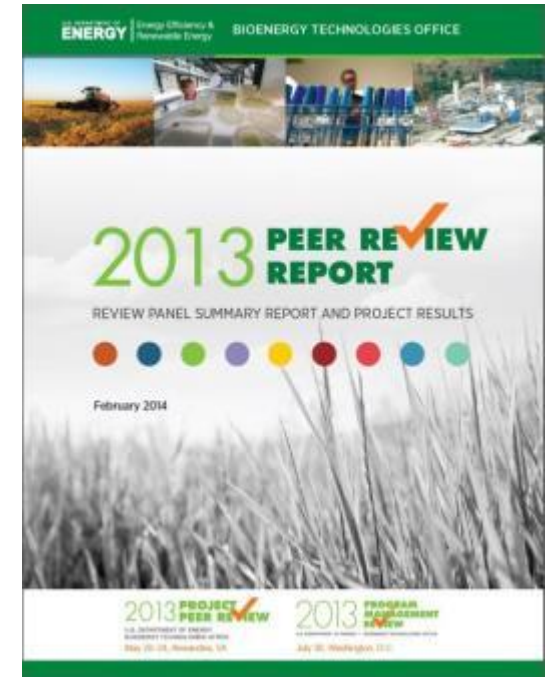


CBES

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Sustainability

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Additional Slides



Prior Peer Review - comments/response

The Peer Review confirmed the value of international collaborations. Excerpts from the published Peer Review Report (2014) and PI responses follow

- Pg 666 (conclusions): “Without strong government engagement, these international standard could become a barrier to trade”
 - PI: We agree and recognize more work is required to assure barriers to trade are avoided.
- Pg 200: International Sustainability (ORNL, Kline/Davis) was ranked **highest** of all A&S platform projects in Overall score (8.9), Relevance (9.6), Technical Progress (9.2) and Future work (8.6).
- Pg. 120: Peer review recommended that BETO do more to assess the implications of a US bio-economy on food security and sustainable agriculture.
 - PI: This Project was designed to help implement this recommendation.
- Pg. 115: Review Panel Summary, key Impacts: “Stakeholder engagement activities with international bioenergy and standardization communities are viewed as **essential to the success** of a US bioenergy industry. Even though it is difficult to measure the effect of having a consistent presence within the international community, these efforts are likely to have large impact on the future [bio-economy].” and on Pg 116 noted that this work, “**is crucial to the long-term success of the biofuel industry**, particularly in light of current and future regulatory considerations and international standards development.” [emphasis added]
 - PI Response: Agree! The management approach, annual reviews, revisions of milestones and deliverables... are adequate to monitor and assess progress of a project of this magnitude.
- Pg 120: BETO commitment: “We will continue strong participation and leadership in GBEP and other international partnerships to advance science-based understanding of the relationship between bioenergy and food security and to contribute to proactive solutions. ...and we will continue to assess and promote the social aspects of sustainability through strategic collaborations.”
 - PI Response: This project was designed to help BETO fulfill this commitment.
- Pg 666: International engagement efforts are essential to create seat at table for international standards.

Results of 2013 Review

| Evaluation Criteria | Sustain-ability Mean | This Project |
|--------------------------|----------------------|--------------|
| Critical success factors | 6.8 | 7.6 |
| Future work | 7.0 | 8.6* |
| Project approach | 7.2 | 8.8 |
| Relevance | 8.0 | 9.6* |
| Tech. progress | 7.0 | 9.2* |
| Overall score | 7.0 | 8.9* |

* Highest score in entire A&S Platform

Publications (FY 2014-2015)

2015

- Woods J, Lynd LR, Laser M, Batistella M, de Castro Victoria D, Kline KL, Faaij A. (*forthcoming 2015*). Chapter 1 in Scientific Committee on Problems of the Environment (*SCOPE*) Rapid Assessment Process on Bioenergy and Sustainability, Paris, France (Souza GM and Joly CA, editors)
- Kang S., D. Wang, J.A. Nichols, J. Schuchart, K.L. Kline, Yaxing Wei, D.M. Ricciuto, S.D. Wulschleger, W.M. Post, R.C. Izaurralde (2015) Development of mpi_EPIC model for global agroecosystem modeling. *Computers and Electronics in Agriculture* 111:48–54.
- Dale VH, Parish ES, Kline KL (2015) Risks to global biodiversity from fossil-fuel production exceed those from biofuel production. *Biofuels, Bioproducts & Biorefining* DOI: 10.1002/bbb.1528

2014

- Dale B, Anderson J, Brown R, Csonka S, Dale V, Herwick G, Jackson R, Jordan N, Kaffka S, Kline K, Lynd L, Malmstrom C, Ong R, Richard T, Taylor C, Wang M. (2014) Take a Closer Look: Biofuels Can Support Environmental, Economic and Social Goals. *Environmental Science & Technology* 48(13): 7200-7203.
- Kang S, S Nair, KL Kline, JA Nichols, D Wang, WM Post, C Brandt, S Wulschleger, N Singh, and Y Wei. (2014) Global simulation of bioenergy crop productivity: analytical framework and case study for a perennial bioenergy crop – switchgrass. *Global Change Biology-Bioenergy* 6(1):14-24
<http://onlinelibrary.wiley.com/doi/10.1111/gcbb.2013.6.issue-1/issuetoc>

Reports (examples from FY 2015 and 2014)

FY 2015

- Kline and Davis (Jan'15): ISO Update Report #13, ORNL contributions to Berlin Plenary and anticipated FDIS vote.
- Kline KL and Msangi S (Dec '14): Report on the Workshop on Biofuels and Food Security Interactions, hosted at the International Food Policy Research Institute (IFPRI) Nov 18-20, 2014 [Draft Report for BETO].
- Kline and Davis (Nov'14): Update #12 on ISO Project Committee 248, "Sustainability Criteria for Bioenergy" with summary report and supporting documents related to US position on the DIS, committee Voting Results and plans for ISO Plenary Meeting January 19-23 in Berlin.
- Kline KL, 2014 (Oct'14) Biofuels and Price Volatility - Briefing paper on key research questions and issues for Biofuels and Food Security Interactions.
- Kline /Davis (ongoing): Substantive contributions to ISO-related reports: strategic brief on plenary (Nov '14); US Comment Tables (Oct'14 and preceding iterations); PC248 ISO 13065 Committee Draft Ver2 (Apr'14); PC-248 Work Group 4 Annotated Bibliography on State of Science for Indirect Effects of Bioenergy...
- Kline KL, 2014 (Oct) "Recommendations to permit improved measurement and modeling of changes in land cover, land management and land functions," a report to BETO.

FY 2014

- Kline KL and Davis MR (Sept '14): "Update on international collaborations on sustainability: Report and presentation to BETO on progress of Task B including collaborations on 3 draft papers" [BETO Q4 deliverable].
- Dale VH, Elless M, Johnson K, Kline K, Negri C. 2014. Incorporating Bioenergy into Sustainable Landscape Designs: Summary of a workshop held in New Bern, North Carolina, on March 4-6, 2014. <http://web.ornl.gov/sci/ees/cbes/workshop.shtml>
- Kline/Davis (July): ISO Update Report to BETO on current draft, voting and issues for US Mirror Committee
- Kline/Davis (June): "Status Log for WBS 4.2.1.41 Strategic International Collaborations on Standards & Sustainability: "Implement PC strategy... text for the next iteration of ISO 13065...and document at least twenty contributions" [BETO deliverable]
- Kline (April): Climate Change Science Institute, ORNL. Kline shared a report on "Multi-Disciplinary Research: Bioenergy, Land Use Change and Food Security and Global Calculator" [opportunities for collaboration on the international initiative: <http://globalcalculator.org/>]
- Kline (April '14): Suggestions submitted to BETO (K. Johnson) on potential speakers and presentation content for consideration in planning for GBEP Mozambique outreach meetings.
- Kline/Davis (April '14): In cooperation with international partners, 4 abstracts were submitted to the Research Coordination Network "RCN Conference on Pan American Biofuels and Bioenergy Sustainability" <https://www.iche.org/panamrcn>
- Kline/Davis : Climate Change Science Institute (news article): "US–Brazil Partnership Seeks to Reduce Barriers to Bioenergy Development"

Presentations (examples from 2015 and 2014)

FY 2015

- Jan 29 – Kline presented “Bioenergy Sustainability Criteria and Oil Palm expansion in Villahermosa” for the PIRE-NSF team project meeting at *Universidad Juarez Autonomo de Tabasco* (UJAT), Mexico.
- November 20 – Kline presented: “Introduction to Price Volatility Issues” for the International Workshop on Biofuels and Food Security Interactions, IFPRI, Washington, D.C.
- Dec 2 – Keith Kline gave invited presentation on “Integrating pellet production into sustainable landscape design for the Southeastern USA” for a BE-Basic Workshop with European stakeholders and utility representatives.
- Dec 1 – Keith Kline presented invited seminar, “Biomass for bioenergy: an overview of research at ORNL” for the Copernicus Institute and BE-Basic Sustainable Bio-Economy team at Utrecht University, Netherlands.
- October 9-17 – Keith Kline presented “Biomass for bioenergy: resources today and in the future,” as invited lecturer “São Paulo Advanced School on the Present and Future of Bioenergy” University of Campinas <http://www.nipe.unicamp.br/espca/>
- October 19-23 – Kline and Davis presented (i) “Incorporating bioenergy into sustainable landscape design,” and (ii) “Brazil’s strategic role in future biofuels—a joint assessment” respectively, at the 2nd Brazilian Bioenergy Science and Technology Conference in Campos do Jordão, Brazil. <http://bbest.org.br/> Also presented at BBEST:
 - (iii) Davis et al., poster on “Soil organic carbon measurement protocols”
 - (iv) Kline coauthored presentation titled “Food Security and Biofuels: Can Policy Flexibility Mitigate Food Price Crises for the Poor?”

FY 2014

- Feb 26: Kline presented, “Biomass, Bioenergy and Land Use” as invited speaker in the “Pathways to Climate Solutions: Assessing Energy Technology and Policy Innovation Workshop” organized by the Aspen Global Change Institute, Colorado.
- Davis presented “Integrated analysis: metrics, best practices, and food security” and Kline presented “Bioenergy Crop Models and Issues of Disturbance,” in the FAPESP-Global Sustainable Bioenergy Project (GSB-LACAf, Nov 11-13).
- Kline presented “Sustainability Criteria for Bioenergy” at the October Transatlantic Trade in Wood for Energy: A Dialogue on Sustainability Standards and Greenhouse Gas Emissions Workshop in Savannah, Georgia; Pinchot Institute for Conservation.
- June 19 and 26 –Dr. Manoel Regis, Institutional Relations Coordinator of CTBE-Brazilian Bioethanol Science and Technology Laboratory, hosted by Kline and Davis, presented “Landscape Design in the Sugarcane Based Ethanol Production System in Brazil” for the BETO Landscape Design Workshop at ANL.

Publications in Review and Development (FY 2015)

- Kline KL, Mayer AL, Martinelli FS, Medeiros R, Oliveira COF, Sparovek G, da Silva Walter AC, Venier L, *Environmental Management* (submitted) for Special Issue on Biofuels in the Americas: Bioenergy and biodiversity: Key lessons from the Pan America Region.
- Davis M., Kline K., Karlen D., Galdos M. Alves B., Abulebdeh D. Soil organic carbon measurement protocols: comparison of USA and Brazil (v4 Draft shared with BETO and co-authors; submitted to *Geoderma*)
- Kline K., Davison B., Davis M..., Brazil's strategic role in the future of Biofuels: a joint assessment (draft prepared and shared with coauthors)
- Dale VH, KL Kline, MA Buford, TA Volk, CT Smith, I Stupak (In review) Incorporating Bioenergy into Sustainable Landscape Designs.
- Dale VH, RA Efroymson, KL Kline, and M Davitt. (In review – minor revision requested) A framework for selecting indicators of bioenergy sustainability. *Biofuels, Bioproducts & Biorefining*
- Kline and approx. 15 international co-authors (in development based on workshop participant interest) Reconciling bioenergy and food security: priorities for action [tentative title]
- Davis MR, Kline KL, Goldin Ghatala F. (under internal revision). Science-based approaches to consider “indirect effects” for fuel supply pathways
- Efroymson R, KL Kline, A Angelsen, PH Verburg, VH Dale, JW Langeveld, A McBride (internal revision). Causal analysis for land-use change: A framework for assessing the role of bioenergy. Fourth revision complete.
- Joris H., Cantarella H., Davis M, Kline K. Nutrient and Land Requirements of Bioenergy Crops in Brazil and USA. (second draft under internal revisions).
- Koponen K, Soimakallio S, Cowie A, Pingouda K, Brandão M, Kline KL, Goss-Eng A, et.al. (initial draft internal review – IEA Task effort). Quantifying the climate effects of bioenergy systems: identifying the appropriate reference system.
- Nair S, S Kang, KL Kline, N Singh, JA Nichols, SD Wullschlegler, D Wang, WM Post, et al. Global Biomass Productivity Assessment with Different Complexity of Models: Options, Limitations and Future Work (1st draft in revision).

Committees and Workshops (examples, 2014-2015)

- Ongoing: Kline and Davis serve on ISO Project Committee 248 (between them, official members of all Work Groups).
- Ongoing: Keith Kline serves on ASTM International Committee E-48 and sub-committees on bioenergy sustainability, biomass definitions, and ISO Technical Advisory Group.
- March-April 2015 – Keith Kline will lead the International Editing Committee of PC-248 to assemble the next iteration of ISO 13065, “Sustainability Criteria for Bioenergy.”
- Dec 2 – Keith Kline participated as invited expert in the workshop, “Biobased economy (BBE) in northwest Europe, wishful thinking or real opportunities?”
- November 18-20 –Keith Kline supported the planning and execution of the workshop on Biofuels and Food Security Interactions hosted at the International Food Policy Research Institute (IFPRI) in Washington, D.C., November 18-20.
- Sept 30-Oct 4 – Keith Kline and Maggie Davis attended the International Organization for Standardization (ISO) PC 248 Plenary to review second committee draft of ISO 13065, Sustainability Criteria for Bioenergy.
- June 24-26 – Keith Kline and Arnado Walter (Brazil) participated in the 2nd BETO Workshop on “Incorporating Bioenergy in Sustainable Landscape Designs: Agricultural Landscapes” at Argonne National Laboratory (NL) in Illinois. Participants discussed case studies and the utility of landscape design to improve planning and assessment of sustainability of bioenergy pathways.
- May 20-22 –Several staff from ORNL participated in a workshop at the International Maize and Wheat Improvement Center (commonly called by its Spanish acronym CIMMYT for *Centro Internacional de Mejoramiento de Maíz y Trigo*) including presentations on “Environmental and Socioeconomic Indicators for Sustainability.”
- March 4-6 – Virginia Dale, Keith Kline, Yetta Jager and Natalie Griffiths attended the “Incorporating Bioenergy into Sustainable Landscape Designs” Workshop in New Bern, North Carolina. This workshop was hosted by the U.S. Department of Energy (DOE), Bioenergy Technologies Office. Virginia spoke on “A Landscape Design for Bioenergy Feedstocks,” and Keith spoke on “Biomass Standards.”
- March 2014 – Keith Kline led an international editing committee to assemble the next iteration of ISO 13065, Sustainability Criteria for Bioenergy, which was circulated for vote in June-July.

Useful abbreviations

Direct funding partners:

- MTU-NSF: Michigan Technological University - National Science Foundation awards to work under (i) “Sustainability, Ecosystem Services, and Bioenergy Development Partnerships across the Americas” (Program in Research and Education, PIRE)) and (ii) Research Coordination Network on Bioenergy in the Americas (RCN-Bioenergy)
- GSB: Global Sustainable Bioenergy Project (matching financial support from UT/Battelle and Sao Paulo Science Res. Found. (FAPESP)
- FAPESP-LACAF: Sao Paulo Science Research Foundation – Latin America, Caribbean and Africa sustainable biofuels project

Other collaborating organizations and initiatives:

- ANL = Argonne National Lab
- ASTM International, known until 2001 as the American Society for Testing and Materials (ASTM)
- BESC = Bioenergy Science Center (DOE BER-funded)
- BMAS = Biomass Market Access Standards (formerly Council for Sustainable Biomass Production (CSBP))
- BMP = Best Management Practices
- CBES = Center for Bioenergy Sustainability (at Oak Ridge National Lab)
- CEN = European Committee for Standardization
- CTBE = Brazil Research Center for Bioethanol Technology
- CRC = Coordinating Research Council (includes EPA, fuels and auto industries)
- FAO = Food and Agriculture Organization
- GBEP = Global BioEnergy Partnership
- GLBRC = Great Lakes Bioenergy Research Center (DOE BER-funded)
- IPCC = International Panel on Climate Change
- IBSS = Southeastern Partnership for Integrated Bioenergy Supply Systems
- IEA = International Energy Agency
- IFPRI = International Food Policy Research Institute
- ISO = International Organization for Standardization
- NCASI = National Council on Air and Stream Improvement
- NREL = National Renewable Energy Laboratory
- NSF = National Science Foundation
- PC 248 = ISO Project Committee 248 on sustainable bioenergy
- RCN = Research Collaborative Network (a project at Michigan Tech supported by NSF)
- RSB = Roundtable for Sustainable Biomaterials
- SCOPE = Scientific Committee on Problems of the Environment
- UN-CFS = United Nations Committee on Food Security
- UNICAMP = University of Campinas, Brazil; (USP) University of Sao Paulo, Brazil,
- USDA = United States Department of Agriculture, FAS = Foreign Agricultural Service; ERS = Economic Research Service;
- USFS = United States Forest Service