



**Biomass R&D Technical Advisory Committee**

August 19-20, 2014

**Elliott Levine**

DOE Updates

# Welcome Back!

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***“The wise man does in good times what the stupid man is forced to do in bad times” – German Proverb***

Just what should we be doing if we were/are wise?

# TAC Housekeeping

## Travel Process

- Natalie Roberts is the point of contact for all questions related to TAC travel and reimbursement. She can be reached at: [natalie.roberts@ee.doe.gov](mailto:natalie.roberts@ee.doe.gov) or 202-586-2325.
- Reimbursement submission deadline for the August meeting: **September 15<sup>th</sup>**

## New Members

- A Federal Register Notice was released on 5/19/2014, soliciting nominations for new members.
- The solicitation closed 6/9/2014.
- <https://www.federalregister.gov/articles/2014/05/19/2014-11497/biomass-research-and-development-technical-advisory-committee>

## Future Meeting Dates

- Tentative dates for the Q4 meeting have been identified below and will be confirmed during the meeting:
  - Q4: Week of December 1-5, 2014

# Q3 Binder Elements

## Contents:

1. Biomass R&D Technical Advisory Committee Meeting Agenda
2. Biomass R&D Act (as amended)
3. Biomass R&D Technical Advisory Committee Charter
4. Biomass R&D Technical Advisory Committee Members and Subcommittee Assignments
5. Biomass R&D Board Members and Operations Committee Members
6. Speaker Bios
7. DOE and USDA Biomass Updates
8. Proposed 2014 TAC Meeting Dates
9. 2014 Q2 Meeting Subcommittee Breakout Summaries
10. 2013 Final Committee Recommendations
11. 2012 Final Committee Recommendations
12. Site Visit Information
13. List of BRDI-Funded Projects

# Agenda at a Glance - Day 1 of 2

Tuesday, August 19<sup>th</sup>

## Introduction and Welcome

- 8:00 am – 8:30 am: Breakfast (*to be provided for the Committee*)
- 8:30 am – 8:40 am: Welcome – *Committee Co-Chairs*

## Presentations and Updates

- 8:40 am – 9:10 am: DOE Updates – *Elliott Levine (DOE)*
- 9:10 am – 9:30 am: USDA Updates – *Todd Campbell (USDA)*
- 9:30 am – 10:15 am: Overview of DOE Bioenergy Technologies Office Multi-Year Program Plan (MYPP) – *Amy Schwab (NREL-SI)*
- 10:15 am – 10:30 am: Break
- 10:30 am – 11:30 am: Biomass Products Panel
  - Dr. Brent H. Shanks, Director, NSF Engineering Research Center for Biorenewable Chemicals (CBiRC), Iowa State University
  - Bill Tittle, Nexant, Renewable Chemicals & Materials Opportunity Assessment Report
- 11:30 am – 11:45 am: Public Comment

## Lunch

- 11:45 am – 12:45 pm (*to be provided for the Committee*)
  - SGE Ethics Training for New Members – Melinda Comfort (DOE)

## Presentations and Discussion

- 12:45 pm – 1:15 pm: Instructions for Committee Breakouts – *Committee Co-Chairs*
- 1:15 pm – 5:30 pm: Subcommittee Breakouts – *Committee*

# Agenda at a Glance - Day 2 of 2

Wednesday, August 20<sup>th</sup>

## Welcome

- 8:00 am – 8:30 am: Breakfast *(to be provided for the Committee)*

## Discussion and Breakouts

- 8:30 am – 10:30 am: Subcommittee Report-Outs
- 10:30 am – 10:45 am: Break

## Closing Remarks

- 10:45 am – 11:45 am: Closing Comments and Next Steps – *Co-Chairs*

## Public Comment

- 11:45 am – 12:00 pm: Public Comment

## Closed Lunch

- 12:00 pm: Box Lunch Pick-up *(to be provided for the Committee)*

# Recommended TAC 2014 Work Timeline

Date	Committee Objectives
<p>Q1 2014 February 27-28, 2014 Place: Washington, DC</p>	<ul style="list-style-type: none"> <li>• Update on DOE R&amp;D activities</li> <li>• USDA update on biomass R&amp;D activities and Farm Bill</li> <li>• Subcommittee staffing plan</li> <li>• Determine initiatives to be examined by TAC – BRDI, and others</li> <li>• Determine committee needs to execute assignment</li> <li>• Provide guidance on BRDI solicitation</li> <li>• Determine need and location of site visit</li> </ul>
<p>Q2 2014 June 5-6, 2014 Place: Washington, DC</p>	<ul style="list-style-type: none"> <li>• Subcommittees to:               <ul style="list-style-type: none"> <li>• Begin framing general subcommittee-related R&amp;D recommendations outside of the listed areas with problem statement</li> <li>• Provide recommendations for R&amp;D based on the topics presented such as the feedstocks panel</li> <li>• Provide R&amp;D recommendations to BRDI based on the pathway selected by NIFA or others</li> <li>• Provide consideration to any applicable public comments</li> <li>• Review prior years' work to revisit any topics</li> </ul> </li> </ul>
<p>Q3 2014 August 19-20, 2014 Place: Kansas City, MO</p>	<ul style="list-style-type: none"> <li>• Subcommittees to:               <ul style="list-style-type: none"> <li>• Prioritize challenges/problems</li> <li>• Flesh out recommendations</li> <li>• Draft recommendations</li> </ul> </li> </ul>
<p>Q4 2014 Week of December 1, 2014 Place: Washington, DC</p>	<ul style="list-style-type: none"> <li>• Finalize and approve 2014 recommendations</li> <li>• Discuss annual report and PPT needs and write-up schedule</li> </ul>

# Committee Recommendations and Annual Report

- The 2014 TAC recommendations should be written to address the findings and needs of the Committee in the following areas:
  - Specific Committee Reporting Obligations – Conformity with BRDI Legislation
  - Information Requests from the Board
  - The Bioeconomy Activity
  - Subcommittee Recommendations
    - Sustainable Feedstocks Production and Logistics Recommendations
    - Conversion Recommendations
    - Products, Markets, and Systems Recommendations
- Recommendations are used to inform the Biomass R&D Board and provided to DOE and USDA Programs.
  - A report of recommendations consented to by the TAC to frame the TAC Annual Report to Congress.

# July 31<sup>st</sup> Bioeconomy Workshop

The Biomass R&D Board planned an open workshop on July 31<sup>st</sup> following DOE's annual event, *Biomass 2014*. The purpose of the meeting was to receive comments on the established bioeconomy—a national economy based on the use of biomass for biofuels, bioproducts, and biopower.

- Attendees represented industry, academia, and a host of other organizations.
- The day focused on two main components:
  - Two question and answer periods were facilitated by Jonathan Male and Todd Campbell to allow the public to gain more information on the Biomass R&D Board and the potential for an expanding bioeconomy.
  - Three public comment sessions were held, focused on Feedstocks and Logistics, Conversion Technologies, and Distribution and End Use, in order for attendees to discuss the opportunities and challenges facing the bioenergy sector today.
- Input from the workshop is being consolidated and reviewed to be presented at the September Board meeting. A public workshop summary report will be compiled and posted to the Board website.

# Highlights from Bioeconomy Workshop

- Industry will need to find balance between what is ‘technically feasible’ versus ‘economically viable.’
  - The future self-sustaining bioeconomy needs to include energy return on investment, and capital intensity.
- Bioeconomy should be inclusive and part of the ‘all of the above’ energy strategy.
  - Natural Gas, conventional feedstocks, and other pathways should be explored for synergistic benefits.
- An expansion of the bioeconomy will rely on certainties:
  - Government policy
  - Sustainable feedstock supply
  - Market demand

# Next Steps and Path Forward

- Future listening sessions may be planned with a more thematic design.
  - Potential topics under consideration are Environmental Sustainability and Biomass Resources/Feedstocks Logistics
- Additional pathways to further engagement from stakeholders are being considered.
- Biomass Research and Development Board Meeting scheduled for September 10, 2014, in Washington, DC, at the U.S. Department of Agriculture.
  - TAC Co-Chairs are invited to audit meeting.

# DOE's BETO Announcements & Updates



# Recent BETO Award Announcements

## Algal Biofuels Research

- Following a FOA, DOE announced \$3.5M in additional funding to support the Department's goal of producing 2,500 gallons of algal biofuel feedstock per acre per year by 2018, an important milestone toward reducing the cost of algal biofuels to cost-competitive levels of 5,000 gallons per acre per year by 2022.
- **Cellana, LLC**, in Kailua-Kona, Hawaii, was selected to receive \$3.5M to develop a fully integrated, high-yield algae feedstock production system by integrating the most advanced strain improvement, cultivation, and processing technologies into their operations at Kona Demonstration Facility.

## Carbon, Hydrogen and Separation Efficiencies

- Following a FOA, DOE announced \$6.3M in additional funding to support lowering production costs by maximizing the renewable carbon and hydrogen from biomass that can be converted to fuels and improving the separation processes in bio-oil production to remove non-fuel components.
- **SRI International** of Menlo Park, California will receive \$3.2M to produce a bio-crude oil from algal biomass that will maximize the amount of renewable carbon recovered for use in fuel and reduce the nitrogen content of the product in order to meet fuel quality standards.
- **Research Triangle Institute (RTI)** of Research Triangle Park, North Carolina will receive \$3.1M to maximize the biomass carbon and energy recovery in a low pressure process, therefore lowering production costs, to produce a bio-crude oil that can be efficiently upgraded into a finished biofuel.

# Renewable Carbon Fibers Awards

- Following an open FOA, DOE announced \$11.3M to develop a cost competitive pathway to produce high performance carbon fiber for vehicle lightweighting from renewable non-food biomass.
- This funding supports the Department of Energy's [Clean Energy Manufacturing Initiative](#), a cross-cutting effort to ensure U.S. manufacturers remain competitive in the global marketplace.
- **Southern Research Institute** of Birmingham, Alabama, will receive up to \$5.9M to innovate on a multi-step catalytic process for conversion of sugars from non-food biomass to acrylonitrile.
- **National Renewable Energy Laboratory (NREL)** of Golden, Colorado, will receive up to \$5.3M to investigate and optimize multiple pathways to bio-acrylonitrile



# DOE Joins Farm to Fly 2.0

- In 2013, USDA and FAA made a commitment to the aviation industry to help meet their goals with the Farm to Fly 2.0 agreement.
- This effort seeks to increase the nation's supply of renewable jet fuel with the end goal of producing about 1 billion gallons of drop-in aviation biofuels per year by 2018
- DOE is actively committed to accelerating the adoption of sustainable aviation biofuels that require no jet engine modifications.
- In July 2014, Secretary Moniz signed an amendment officially making DOE the newest partner agency in this significant initiative.
- Farm to Fly 2.0 will enable the Department of Energy to strengthen its current role in the Federal Aviation Administration's newly formed Center for Alternative Fuels and Environment.



# Upcoming Award Announcements

## **BETO Incubator (DE-FOA-0000974)**

- Submission Deadline was 5/23/2014.
- ~5 awards expected to be issued.
- Open FOA for “off-roadmap ideas” for ideas at TRL 2-4.
- Up to \$10M total funding, award size between \$0.5-2.0M, for up to 12-24 months.
- Merit Review completed and selections expected later in 2014.

## **Biological and Chemical Upgrading for Advanced Biofuels and Products (DE-FOA-0001085)**

- Concept Paper Submission Closed 5/1; Full Applications were due 6/13/2014.
- Open FOA to diversify the Biochemical Technology Area’s Portfolio to include a variety of chemical and biological upgrading technologies for the production of a suite of hydrocarbon fuels, fuel intermediates and chemicals (beyond ethanol).
- Up to \$10M total funding, award size between \$1.0M - 3.5M, for up to 36 months.
- Merit Review completed and replies to reviewer comments were due on 7/11.
- While the original expected date for selection notifications was 8/15, an announcement is expected soon.

# Bioenergy Technologies – FY 2015 Budget Request

<b>Subprograms (\$000's)</b>		<b>FY 13 Enacted</b>	<b>FY 2014 Enacted</b>	<b>FY 2015 Request</b>
<b>Feedstocks</b>		<b>\$47,359</b>	<b>46,972</b>	<b>30,500</b>
	Feedstock Production	\$4,847	4,997	4,000
	Feedstock Logistics	\$13,294	11,993	12,500
	Algae and Advance Feedstocks	\$29,128	29,982	14,000
<b>Conversion</b>		<b>\$75,140</b>	<b>101,384</b>	<b>100,500</b>
<b>Demonstration and Market Transformation (formerly Demonstration and Deployment)</b>		<b>\$43,630</b>	<b>64,790</b>	<b>105,000</b>
	Integrated Biorefineries	\$25,733	19,790	35,000
	Biofuels Compatibility/Infrastructure	\$6,500	-	10,000
	Defense Production Act (DPA)	-	45,000	60,000
	Other Projects (FY13)	\$11,397	-	-
<b>Strategic Analysis and Cross-cutting Sustainability</b>		<b>\$14,939</b>	<b>12,146</b>	<b>11,000</b>
	Strategic Analysis	\$9,000	6,080	5,500
	Cross-cutting Sustainability	\$3,939	6,066	5,500
	Systems Integration	\$2,000	-	-
<b>Cookstoves</b>		<b>\$4,122</b>	<b>1,998</b>	<b>-</b>
<b>NREL Site-wide Facility Support</b>		<b>\$0</b>	<b>5,000</b>	<b>6,200</b>
<b>Total</b>		<b>\$185,190</b>	<b>232,290</b>	<b>253,200</b>

# Bioenergy Technologies – Future Priorities

## Terrestrial Production and Logistics

- Comprehensive feedstock characterization dataset in which analysis can be performed to determine feedstock characteristics and variability, and a set of tools to assist in managing the data and extracting information.
- Develop and validate simulation tools to address challenges in scaling up a feedstock industry capable of supplying 155 million DT/year by 2017.

## Algae

- The strategy for the next five years is to actively manage the new R&D awards, the core lab portfolio, and initiate a longer-term national lab hub for polyculture research efforts.
- A critical decision point in 2016 will assess overall progress towards the 2018 goal for the sustainable algal biomass production of 2,500 gal/acre/year of biofuel intermediate.

## Conversion Technologies

- By 2015, achieve an n<sup>th</sup> plant modeled conversion cost contribution of \$3.69/GGE via a thermochemical conversion pathway. Translates to a MFSP of \$4.75/GGE for a gasoline/diesel blendstock.
- This SOT target is mostly based on a 20% decrease in costs associated with the upgrading catalysis processes over 2014 SOT.
- Future priorities for biochemical conversion will focus on Integration and scale-up, selection of upgrading technology for demonstration, increased focus on refinery integration, and evaluation of alternative pathways.

## Analysis and Sustainability

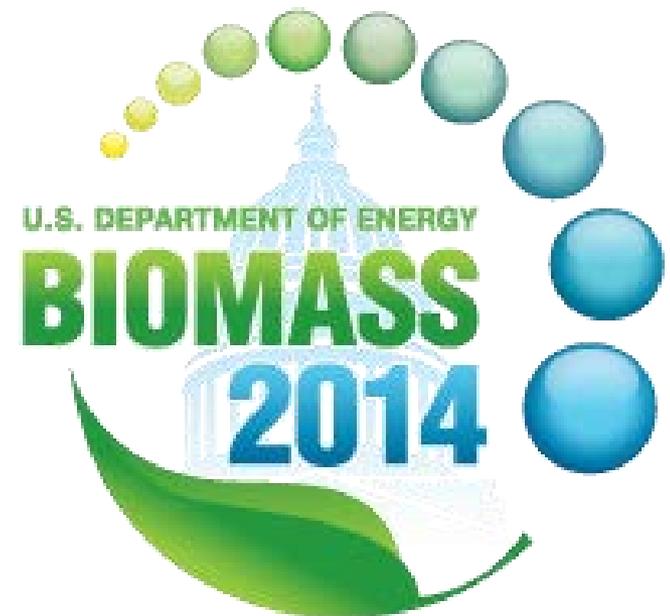
- Future priorities include: continuing to ensure high-quality, consistent, reproducible, peer-reviewed analyses; continued development and maintenance of analytical tools, models, methods, and datasets to advance the understanding of bioenergy and its related impacts; validation of biofuel pathways against sustainability metrics (including GHG emissions and water use); and demonstration of landscape design approaches.

# Seventh Annual Biomass Conference

## *Biomass 2014: Growing the Future Bioeconomy*

July 29-30, 2014 at Washington Convention Center, Washington, DC

- *Biomass 2014: Growing the Future Bioeconomy* was attended by several distinguished speakers including Senator Debbie Stabenow (D-MI), Federal Environmental Executive Kate Brandt, and Captain James Goudreau of the U.S. Navy.
- Several key industry leaders spoke as well LanzaTech Chief Executive Officer Jennifer Holmgren and Algenol Biofuels Inc. Founder, Chairman, Chief Executive Office and President Paul Woods
- *Biomass 2014* recorded a two-day attendance of 580 individual attendees, a 33% increase over *Biomass 2013*. The amazing turnout at this year's conference signifies the strong interest in continuing to invest and grow the bioeconomy.
- Assistant Secretary for Energy Efficiency and Renewable Energy David Danielson announced that the Energy Department is joining Farm to Fly 2.0 to support the development of sustainable biofuels that require no jet engine modifications.
- During *Biomass 2014*, the Energy Department also announced up to \$11.3M for two projects aiming to advance the production of cost-competitive, high-performance carbon fiber material from renewable, non-food-based feedstocks, such as agricultural residues and woody biomass. The award recipients are Southern Research Institute (SRI) and the National Renewable Energy Laboratory (NREL).



# Bioenergy Industry Codes and Standards Workshop

- **Date:** July 31, 2014
- **Location:** Battelle Office, Washington, DC
- Workshop focused on recent changes being made to the 2015 editions of the both the International Code Council (ICC) and the National Fire Protection Association (NFPA) international fire and building codes.
- Participants from industry, government discussed experiences in building first-of-a-kind cellulosic and advanced biofuels processing plants.
  - Recognized a need to engage other technical and industry expertise to guide the nascent biofuel industry toward the highest level of operational and public safety.
  - Discussed the formation of an Industry Panel on Codes and Standards to foster open dialog on safety, codes and standards pertaining to this emerging industry.
  - Heard presentations on BETO's Integrated Biorefinery Demonstration & Deployment Lessons-Learned, and information on Codes and Standards development activities being conducted in other EERE offices.



# Waste-to-Energy Workshop

**Date:** Fall 2014

**Location:** Arlington, Virginia

- The workshop will gather waste to energy experts to identify key technical barriers to the commercial deployment of liquid transportation fuels from waste feedstocks, and ultimately develop a roadmap, which highlights the key pathways and metrics to meeting this goal.
- Feedstocks of interest:
  - Wastewater residuals
  - Biosolids
  - Foodstuffs
  - Other wet organic streams
- Conversion processes of interest:
  - Anaerobic digestion
  - Hydrothermal liquefaction.

# Recent BETO-backed Publications

## Logistics, Costs, and GHG Impacts of Utility-Scale Cofiring with 20% Biomass

- Report released in partnership with Idaho National Laboratory and Pacific Northwest National Laboratory.
- Examined 20% cofiring of switchgrass and Southern pine in representative-sized coal plants in AL and OH (5,200-5,900 MWe) to determine changes in costs and GHG impacts.
- Large amounts of collected biomass required torrefying and leaching to make compatible with existing coal feed systems.
- Large amounts of biomass supply requires a depot type collection system to collect, treat, and densify.
- Pretreatment and torrefying or steam explosion of biomass may enable cofiring without modifying the plant feed systems and equipment.
- Biomass retrofit of a coal plant required lower capital cost compared to natural gas retrofit or large wind and solar.
- In all cases, biomass cofiring increased the production cost of electricity produced and reduced the carbon produced per electricity produced.

## Bioenergy Technologies Multi-Year Program Plan (MYPP) Released

- Amy Schwab will discuss this publication in more detail following the USDA updates at 10:30 am this morning.
- A printed version will be made available to each of the subcommittees and the co-chairs.
- The MYPP is available online here:  
<http://www.energy.gov/eere/bioenergy/downloads/bioenergy-technologies-office-multi-year-program-plan-july-2014-update>

# Recent and Future VTO Biomass Projects

- **Sandia National Laboratory:** Advanced Lean-Burn, Direct Injection Spark Ignition Fuels Research (\$1.3M Across FY13 and FY14)
- **National Renewable Energy Laboratory:** Fuel Properties and Performance of Biomass-Derived Oxygenates
- **Oak Ridge National Laboratory:** Advanced Combustion Work to Better Understand High Octane Engines
- Potential future collaborative work with BETO for Fuel and Vehicle Systems Optimization

# Vehicle Technologies Office Updates

## I-75 Clean Fuels Corridor Continues Success

- Supported by a 2009 award from the Energy Department's Clean Cities program, the 1,786 mile route now includes 26 retail stations selling E85 and 9 stations selling B20.
- Private investment has exceeded expectations and have now reached \$1.6M, in addition to DOE's \$818,000 initial investment.

## New National Clean Fleets Biofuels Partnership

- *CHS*, the largest retailer of E85 in the United States has partnered with the Vehicle Technologies Office to grow their retail fueling stations selling alternative fuels and to maximize alternative fuels sales and investigate new opportunities in this area.



*This sticker should be showing on all project pumps and includes the project and funder logos, and the Web address.*

## **Plant Feedstocks Genomics for Bioenergy (DE-FOA-0001034)**

- FOA aims to:
  - Improve biomass characteristics, biomass yield, or sustainability, water and nitrogen use efficiency.
  - Understand carbon partitioning and nutrient cycling in feedstocks.
  - Enhance fundamental knowledge of structure, function, and organization of feedstock plant genomes.
  - Enable plants to be efficiently bred or manipulated for such use.
- Ten Awards totaling \$12.6M in total funds (FY 14-16), including two funded by the National Institute of Food and Agriculture (NIFA, USDA).
- Full FOA available here: [http://science.energy.gov/~media/grants/pdf/foas/2014/SC\\_FOA\\_0001034.pdf](http://science.energy.gov/~media/grants/pdf/foas/2014/SC_FOA_0001034.pdf)

## **Systems Biology of Bioenergy-Relevant Microbes to Enable Production of Next-Generation Biofuels (DE-FOA-0001060)**

- Research to advance the development of promising new model organisms relevant to biofuels production.
- Development of novel microbial functional capabilities and biosynthetic pathways relevant to the production of advanced biofuels and the development of strategies to overcome associated metabolic challenges resulting from pathway modification.
- Development of novel analytical technologies or high-throughput screening approaches.
- Fourteen awards totaling \$19.6M in total funds (FY 14-16).
- Full FOA available here: [http://science.energy.gov/~media/grants/pdf/foas/2014/SC\\_FOA\\_0001060.pdf](http://science.energy.gov/~media/grants/pdf/foas/2014/SC_FOA_0001060.pdf)

## **Research for Sustainable Bioenergy: Linking Genomic and Ecosystem Sciences**

- 2014 workshop held in June, report forthcoming.
- 2013 workshop published May 2014 and is available here: <http://genomicscience.energy.gov/sustainability/>

# Increased Access to DOE-Funded Scientific Research

- On August 4, 2014, DOE announced that it is introducing new measures to increase access to scholarly publications and digital data resulting from Department-funded research.
- DOE's Office of Science has launched the **Public Access Gateway for Energy and Science (PAGES)**, a web-based portal that will provide free public access to accepted peer-reviewed manuscripts or published scientific journal articles within 12 months of publication.
- All proposals for research funding submitted to the Office of Science will be required to include a Data Management Plan that describes whether and how the digital research data generated in the course of the proposed research will be shared and preserved.
- The new requirements regarding management of digital research data will appear in funding solicitations and invitations issued by the Office of Science beginning October 1, 2014. See DOE News Release here: <http://www.energy.gov/articles/us-department-energy-increases-access-results-doe-funded-scientific-research>

# Useful Links

## References:

1. BETO's Meetings Web page <http://www1.eere.energy.gov/bioenergy/meetings.html>
2. Peer Review Report [http://www1.eere.energy.gov/bioenergy/peer\\_review2013.html](http://www1.eere.energy.gov/bioenergy/peer_review2013.html)
3. Bioenergy Technologies Office Multi-Year Program Plan <http://www.energy.gov/eere/bioenergy/downloads/bioenergy-technologies-office-multi-year-program-plan-july-2014-update>
4. Bioenergy KDF <https://www.bioenergykdf.net/>
5. Bioenergy KDF Facebook <https://www.facebook.com/BioenergyKDF>
6. Bioenergy KDF Twitter <https://twitter.com/BioenergyKDF>
7. Bioenergy KDF LinkedIn <http://www.linkedin.com/groups/BioenergyKDF-3901719>
8. Bioenergy KDF YouTube <http://www.youtube.com/user/BioenergyKDFChannel>
9. Board Resources Library [http://www.biomassboard.gov/committee/tac\\_library.html](http://www.biomassboard.gov/committee/tac_library.html)
10. Committee Resources Library <http://www.biomassboard.gov/committee/committee.html>
11. Scientific Research Access News Release <http://www.energy.gov/articles/us-department-energy-increases-access-results-doe-funded-scientific-research>
12. Biomass 2014 Website <http://www.energy.gov/eere/bioenergy/biomass-2014-growing-future-bioeconom>
13. Plant Feedstocks Genomics for Bioenergy FOA [http://science.energy.gov/~media/grants/pdf/foas/2014/SC\\_FOA\\_0001034.pdf](http://science.energy.gov/~media/grants/pdf/foas/2014/SC_FOA_0001034.pdf)
14. Systems Biology of Bioenergy-Relevant Microbes to Enable Production of Next-Generation Biofuels FOA [http://science.energy.gov/~media/grants/pdf/foas/2014/SC\\_FOA\\_0001060.pdf](http://science.energy.gov/~media/grants/pdf/foas/2014/SC_FOA_0001060.pdf)
15. I-75 Clean Fuels Corridor <http://www.cleanfuelscorridor.com>
16. Research for Sustainable Bioenergy Workshop Report <http://genomicscience.energy.gov/sustainability/>

## Useful Links:

1. BETO News and Announcements <http://www1.eere.energy.gov/bioenergy/news.html>
2. Upcoming Solicitations [http://www1.eere.energy.gov/biomass/biomass\\_solicitations.html](http://www1.eere.energy.gov/biomass/biomass_solicitations.html)
3. Biomass R&D Board <http://www.biomassboard.gov/>
4. Biomass 2014 Registration: <http://www.energy.gov/eere/bioenergy/biomass-2014-growing-future-bioeconomy>

# Backup Slides