DOE Bioenergy Technologies Office 2017 Project Peer Review

Sun Grant/DOE Regional Biomass Feedstock Partnership (Award # GO85041; WBS 7.1.2.2)

6-9 March 2017

Technology Area Review: Feedstock Supply and Logistics

Vance Owens, Director
North Central Sun Grant Center
South Dakota State University

Today's Schedule

- 1:30-1:45 Introduction of the Partnership (Vance Owens)
- 1:45-2:15 Herbaceous Feedstocks (Vance Owens)
- 2:15-2:45 Woody Feedstocks (Tim Rials)
- 2:45-3:00 Outreach/BioWeb (Tim Rials)
- 3:00-3:15 Scheduled Break
- 3:15-3:40 National Yield Maps (Chris Daly)
- 3:40-4:00 KDF and use of the data (Laurence Eaton)

Goal Statement

- Development of more accurate cost supply information and improved communication with partners in the biomass feedstock supply chain
  - Replicated field trials across regions to determine the impact of residue removal on future grain yield
  - Replicated field trials to demonstrate the potential performance of energy crops within geographical regions
  - Regional assessment of feedstock resources which can be used to estimate supply curves

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Quad Chart Overview

Timeline

- Project start date: 1-15-2007
- Project end date: 12-31-2016
- Percent complete: 100%

Barriers

- Barriers addressed
  - Ft-A: Feedstock availability and cost
  - Ft-B: Sustainable production
  - Ft-C: Feedstock genetics and development

Budget

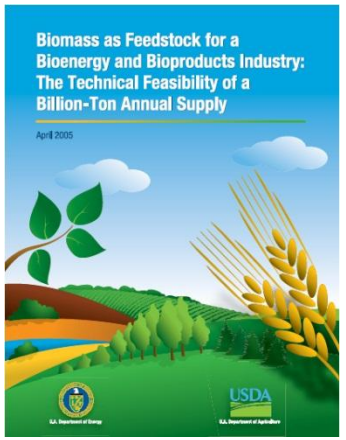
	Total Costs FY07–FY14	FY15 Costs	FY16 Costs	Total planned funding (FY 17-project end
DOE Funded	$18,303,923	$1,566,017	$561,898	$188,148
Cost Share (PI time)	$4,632,787	$0	$0	$0
Cost share (Monsanto)	$545,000	$0	$0	$0

Partners

- Sun Grant Initiative
- 28 Land-Grant Universities
- USDA-ARS
- Oak Ridge National Lab
- Idaho National Lab
- Monsanto
- Arborgen
- GreenWood Resources

1 - Project Overview

- Starting point
  - Sun Grant Mission
    - Enhance America's national energy security through development, distribution and implementation of biobased energy technologies.
    - Promote diversification and environmental sustainability of America's agriculture
    - Promote opportunities for biobased economic diversification in America's rural communities.
  - Initial Billion-Ton study (2005)
    - Estimated US annual sustainable biomass resource base at 1.3 billion tons



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1 - Project Overview

- Sun Grant Regional Biomass Feedstock Workshops
  - 2006 SE,NC
  - 2007 W, SC, & NE
  - Regional evaluation of Billion-ton study
    - Identified major feedstocks and projected potential sustainable supply within regions
- Sun Grant/DOE Regional Biomass Feedstock Partnership formed in 2007
  - Field trials initiated in 2008

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2 – Approach (Technical)

- Identified Near-Term Biomass Feedstocks
  - Herbaceous
    - Completed at 2015 Peer Review
      - Corn residues
      - Cereal crop residues (wheat straw primarily)
      - Cool & warm season grass mixtures
      - Sorghum (sweet, high biomass, forage)
    - 2017 Peer Review
      - Switchgrass
      - Miscanthus x giganteus
      - Energycane
  - Woody
    - Short rotation hybrid poplar
    - Short rotation willow

2 – Approach (Technical)

- Other Tasks
  - Biomass Resource Assessment
    - Regional data bases on existing feedstock supply
  - Biomass Resource Development
    - Establish and maintain field trials of dedicated feedstocks
    - Impact of crop residue removal on sustainability
  - Education and Outreach

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2 – Approach (Management)

- Established Task Teams
  - Biomass Resource Assessment
    - Laurence Eaton; ORNL
      - NE – Peter Woodbury; Cornell
      - SE – Sam Jackson; Univ. Tennessee
      - SC – Michael Dicks; OK State Univ.
      - NC -Mike Wimberly; SD State Univ.
      - W – Chris Daly; OR State Univ.
      - USDA ARS Coordinator; Vince Breneman
  - Sustainable Corn Residue Removal
    - Doug Karlen; USDA ARS (Last harvest-2012)

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2 – Approach (Management)

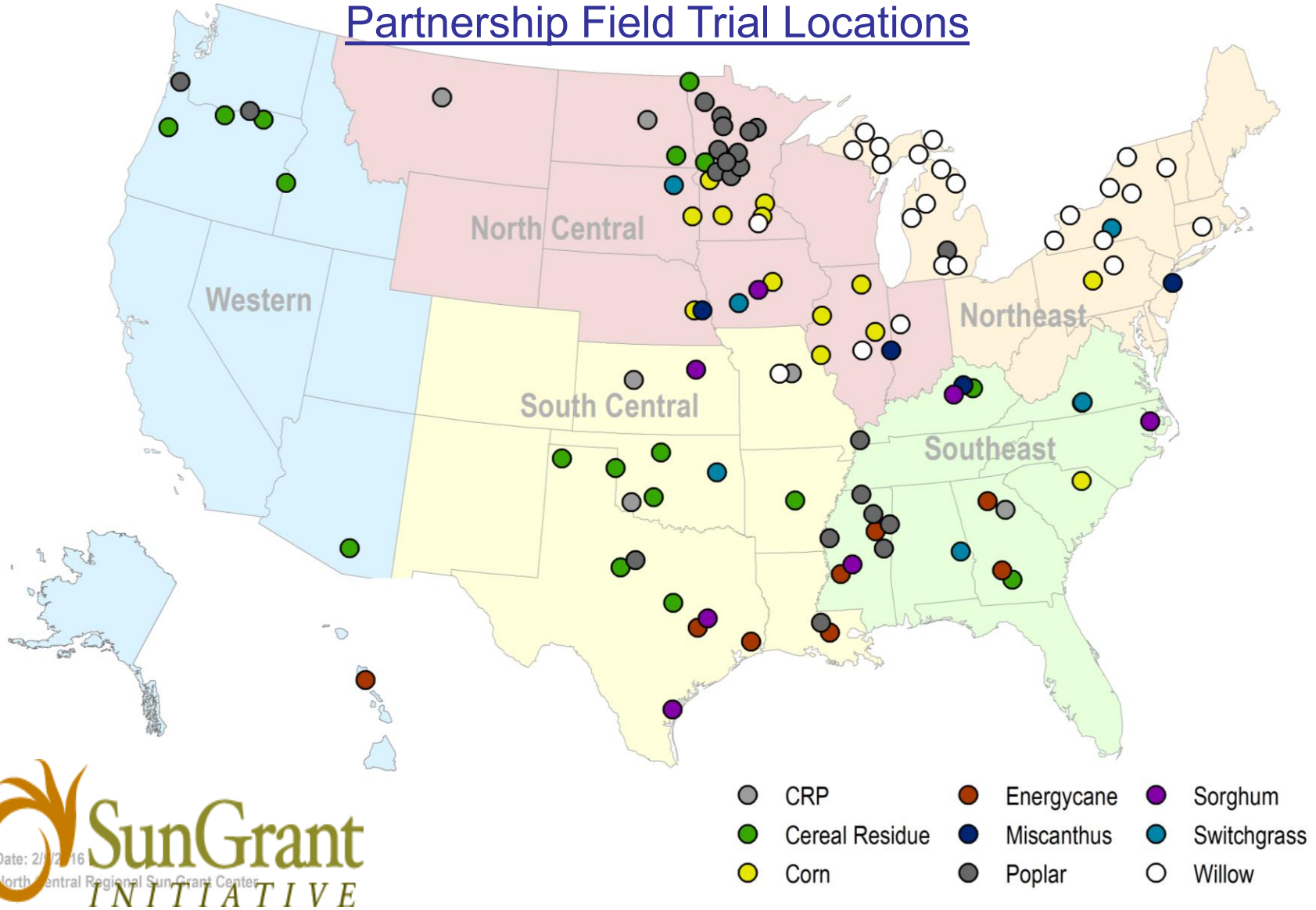
- Established Task Teams
  - Herbaceous Biomass Feedstock Development—Vance Owens, SDSU
    - CRP—DK Lee; Univ. of IL (Last harvest-2013)
      - USDA ARS Coordinator; Paul Adler
    - Energycane – Brian Baldwin; MS State Univ. (Last harvest-2015)
      - USDA ARS Coordinator; Ed Richard (retired)
    - Miscanthus – Tom Voigt; Univ. IL (Last harvest-2015)
      - USDA ARS Coordinator; Adam Davis
    - Sorghum – William Rooney; TX A&M Univ. (Last harvest-2012)
      - USDA ARS Coordinator; Jeff Pederson (retired)
    - Switchgrass – Vance Owens, SDSU; John Fike, Virginia Tech (Last harvest-2015)
      - USDA ARS Coordinator; Rob Mitchell

2 – Approach (Management)

- Established Task Teams
  - Sustainable Cereal Crop Residue Removal (completed 2011)
    - Russ Karow; Oregon State Univ.
    - USDA ARS Coordinator; Hal Collins
  - Woody Biomass Feedstock Development
    - Tim Rials; Univ. of TN
    - Poplar – Bill Berguson; Univ. of MN-Duluth (Last harvest-2016)
    - Willow – Tim Volk; SUNY (Last harvest-2016)
    - USDA FS Coordinator; Marilyn Buford
  - Education and Outreach
    - Jessica McCord; Univ. TN

3 - Technical Accomplishments/ Progress/Results

Partnership Field Trial Locations



3 - Technical Accomplishments/ Progress/Results

- Scientific Outputs
  - 134 peer-reviewed papers to date (some still pending)
  - 2 special journal issues (a third is in review)
  - 4 book chapters
  - 26 conference proceedings articles
  - 192 presentations at meetings and conferences
- 2012 National Sun Grant Conference
  - 120+ presentations and posters; a special journal issue
- Outreach Outputs
  - 48 extension/outreach publications
  - BioWeb…an online resource for bioenergy and bioproducts

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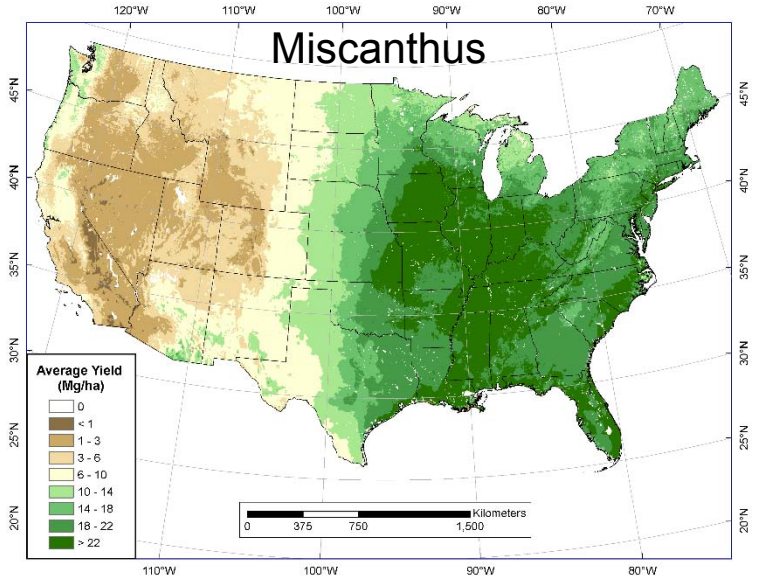
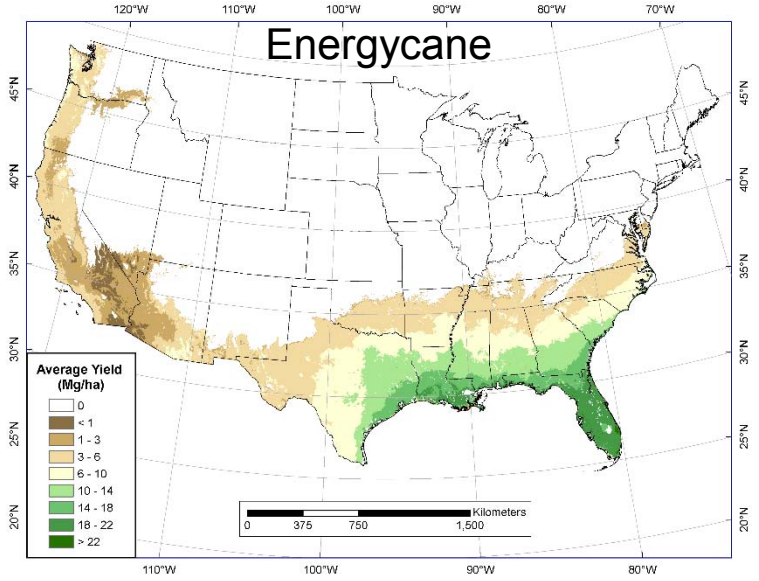
3 - Technical Accomplishments/ Progress/Results

- Development of national yield potential maps using PRISM-ELM
- Field plot yield data and treatment information uploaded to the Knowledge Discovery Framework (KDF) for use by public
- Biomass samples sent to INL for composition analysis and archiving in the Biomass Library





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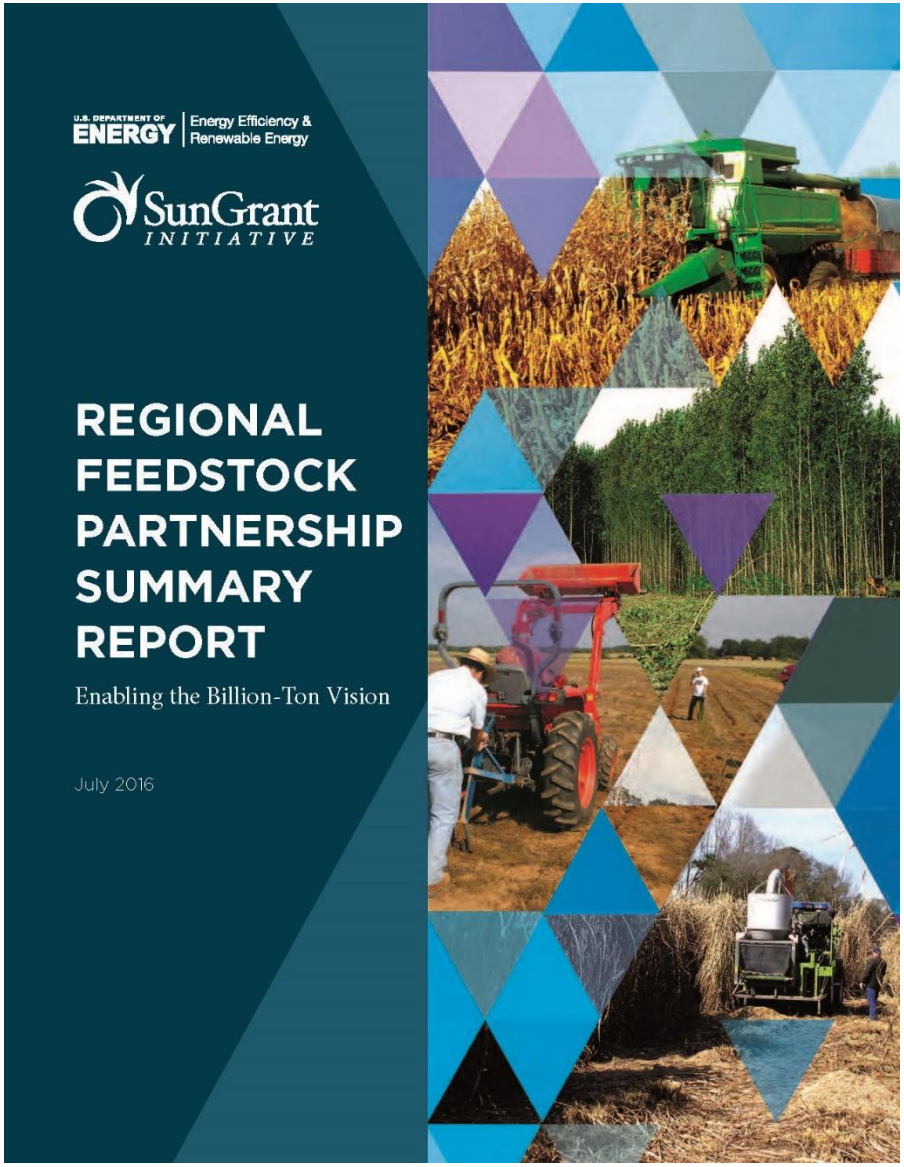
3 - Technical Accomplishments/ Progress/Results

- RFP Summary Report (July 2016)
- Special program following Bioenergy 2016

https://www.energy.gov/eere/bioenergy/downloads/regional-feedstock-partnership-report



4 - Relevance

- This partnership project is crucial to DOE/EERE's Biomass Multi-year Program Plan mission to "develop and transform our renewable biomass resources into commercially viable, high performance, biofuels, bioproducts, and biopower through targeted research, development, demonstration, and deployment supported through public and private partnerships".
  - Collection of field-scale and small-plot yield data of promising energy crops provides critical information to determine viability of a commercial-scale supply system
  - Data available for public use
  - Long(er)-term biomass yields important for all species/mixtures, particularly to identify sustainable, high quality feedstock supplies and the risks associated with their production
  - Synergies created through the partnership will help quantify the range of feedstock properties across regions and growing conditions

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5 - Future Work

- Complete Final Technical Report
- Synergies/leveraging the data/trials
  - Public use in the KDF
  - Herbaceous species (part of comprehensive journal article)

Summary

- The Regional Biomass Feedstock Partnership has completed field trials over several seasons for dedicated biomass crops and for crop residues
- Data from the field trials have been uploaded to the KDF for public access
- Herbaceous data also available through to-be published journal article
- Long-term yield trials critical in increasing our understanding of temporal and spatial variability in yield, persistence, quality

Additional Slides

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Responses to Previous Reviewers' Comments

- "The Regional Feedstock Partnership project is a good example of a coordinated research effort. The results have greater impact and validity given the wide range of field trials and the replication of measures across multiple sites."
  - We agree and appreciate the long-term support for this project. Species were selected to try to maximize impact of the broader effort.
- "The synthesis effort is critical to draw together broad conclusions and to extract the most meaningful information from this investment."
  - We look forward to releasing the synthesis report to demonstrate key findings and also to identify important next steps.
- "Would like to see greater discussion - detail of PRISM modeling. Clarification of assumptions would be encouraged for any published results/estimates for maps. How definitive is the mapping results?"
  - PRISM modeling efforts will be included in the synthesis report. Further, general model assumptions and conditions accompany the maps in order to reduce misuse or misrepresentation.

Publications and Presentations

- Click on the MS Word document link below (this is Appendix B from the Regional Feedstock Partnership Summary Report) to see a list of all publications and presentations that have been completed by Regional Feedstock Partnership participants: