Local Bioenergy: Benefits and Challenges

Steve John
Agricultural Watershed Institute
sfjohn@agwatershed.org

EESI Biomass Crops Briefing
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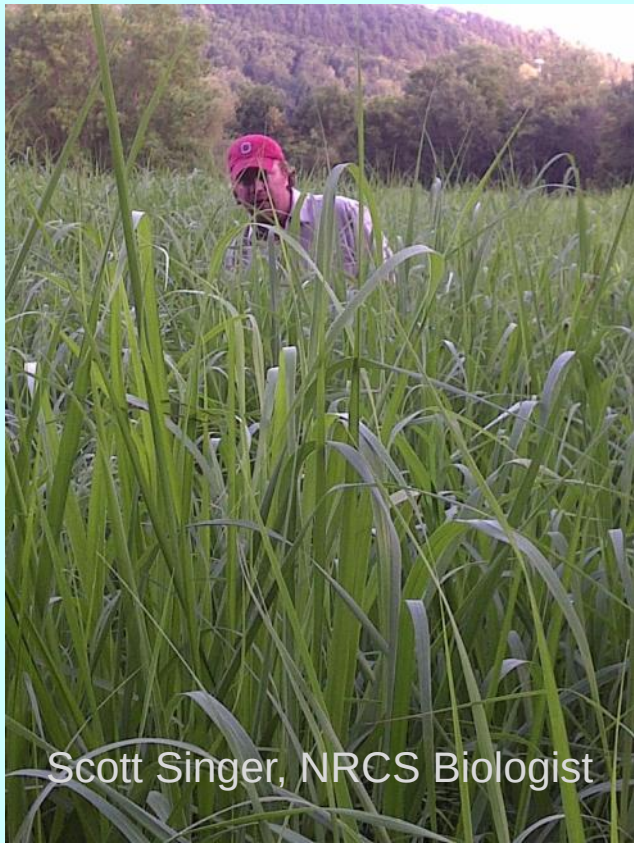
Agricultural Watershed Institute

Innovative stakeholder-led projects are demonstrating how to combine biomass production & conservation

- In some cases, existing Farm Bill programs support these projects.
- With modest tweaks, USDA could do more to advance multifunctional agriculture.


Scott Singer, NRCS Biologist

Native Grasslands in Pennsylvania

for

Food, Fiber, Fuel and Wildlife Habitat

Slide credit: Scott Singer

Environmental Quality Incentive Program (EQIP)

- Assists farmers by providing incentives for seeding native grasslands for multiple uses

•Additional incentives for grass management benefiting wildlife

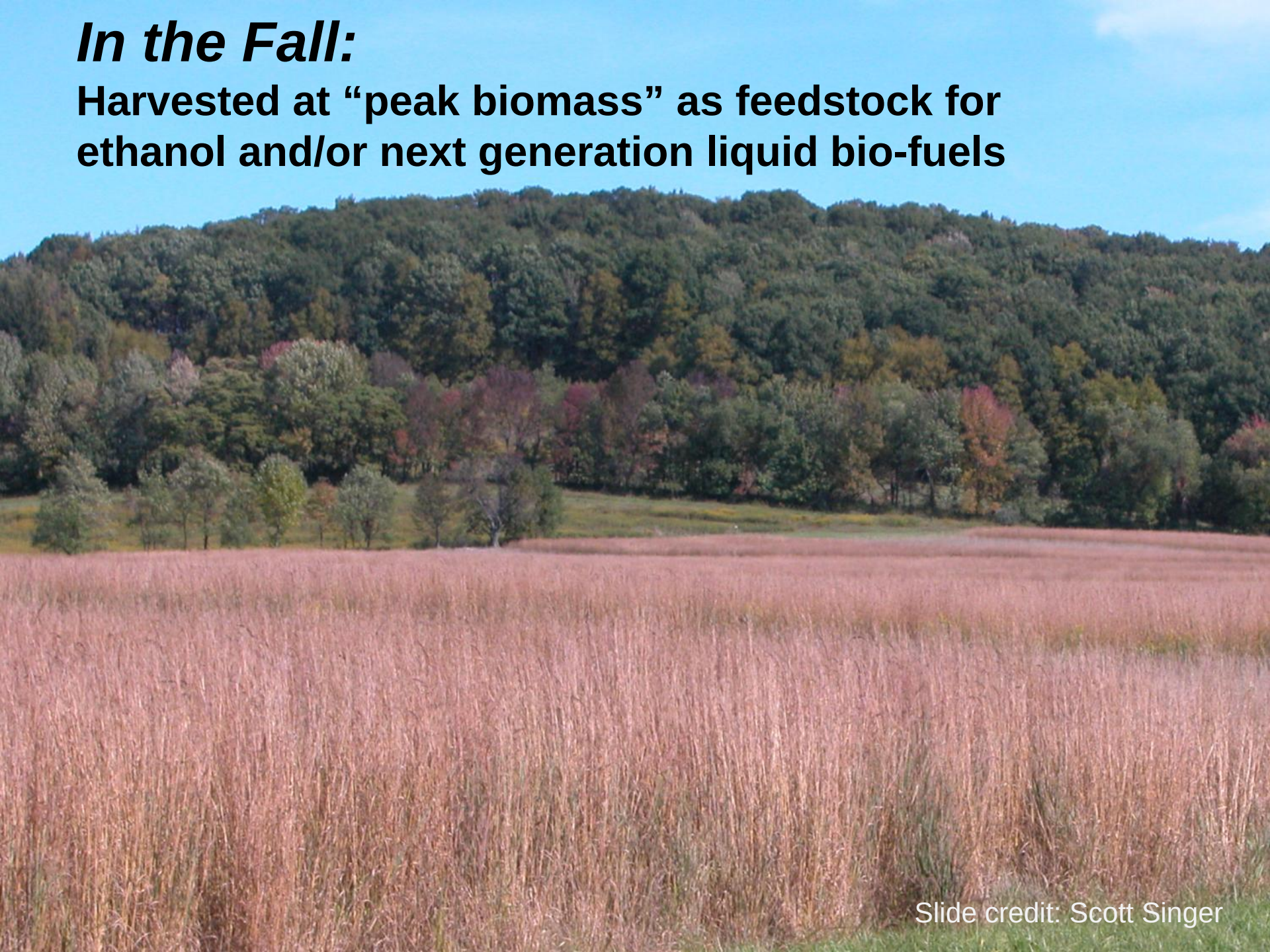
•Has assisted many farmers in the Benton PA area to start growing native grassland biomass

Slide credit: Scott Singer


In the Summer:
Harvested as hay or grazed as a late summer forage
Slide credit: Scott Singer

In the Fall:

Harvested at “peak biomass” as feedstock for ethanol and/or next generation liquid bio-fuels



Slide credit: Scott Singer

In the Late Winter or Early Spring:

Harvested after overwintering to be densified into solid fuels (pellets or briquettes) for heat and power

Slide credit: Scott Singer

Made in the USA

Pocono Northeast RC&D Pelletizer
Buskirk Engineering (IN)

Bob Thomas

Made in the USA

Biomass grower with briquetter at the 2011 Farm Progress Show

BHS Energy (PA)

Made in the USA

Benton Schools Biomass Boiler

Advanced Recycling Equipment (PA)

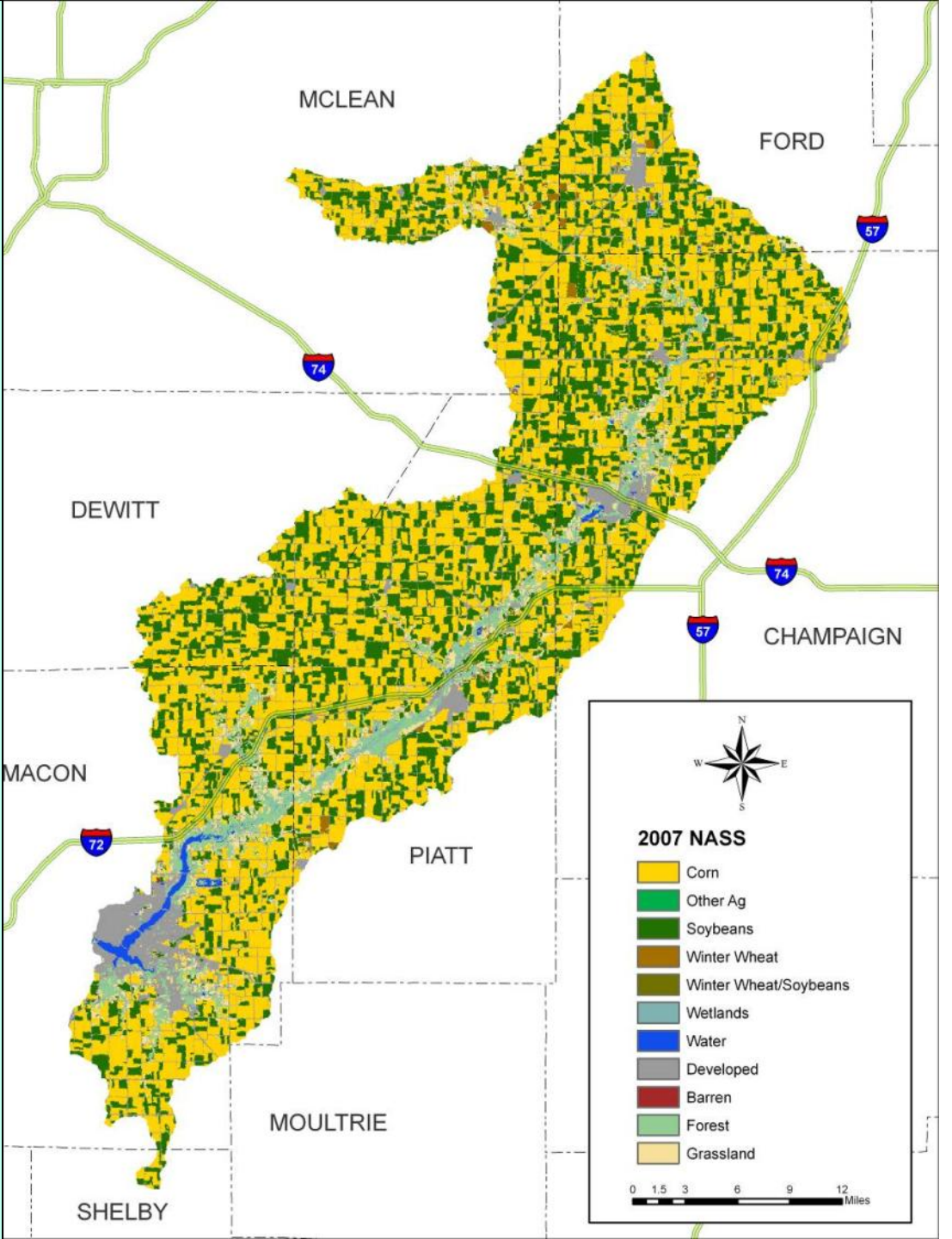
Bob Thomas

The Local Bioenergy Initiative

A collaborative project to begin growing and using perennial energy crops in Central Illinois

Lake Decatur Watershed

- 925 square miles
- 87% row crops
- Tile drainage
- Sediment & nitrates addressed by:
  - Dredging
  - IX Treatment
  - Watershed management



The Local Bioenergy Initiative

Outreach & assistance to early adopters

Some landowners like the “GYOF” idea – Grow your own fuel!

The Local Bioenergy Initiative

Develop/demonstrate landscape design concepts:

Optimize co-production of biomass & environmental benefits

- Water Quality
- Biodiversity
- Wildlife habitat
- Recreation

Prairie grass buffer separates an organic field from the adjacent conventionally-farmed field.

The Local Bioenergy Initiative

Market development

Markets for biomass

~ and ~

Markets for ecosystem services … aka Conservation incentives

Eastern Illinois University's Renewable Energy Center burns wood chips during start-up period. May shift to a grass—wood blend.

Community Supported Energy

- Grow energy grasses
- Make pellets or briquettes
- Deliver biomass fuel to participating property owners
- Collect ash and return nutrients to the soil

Caterpillar – AWI
Prairie for Bioenergy
Demonstration Plots

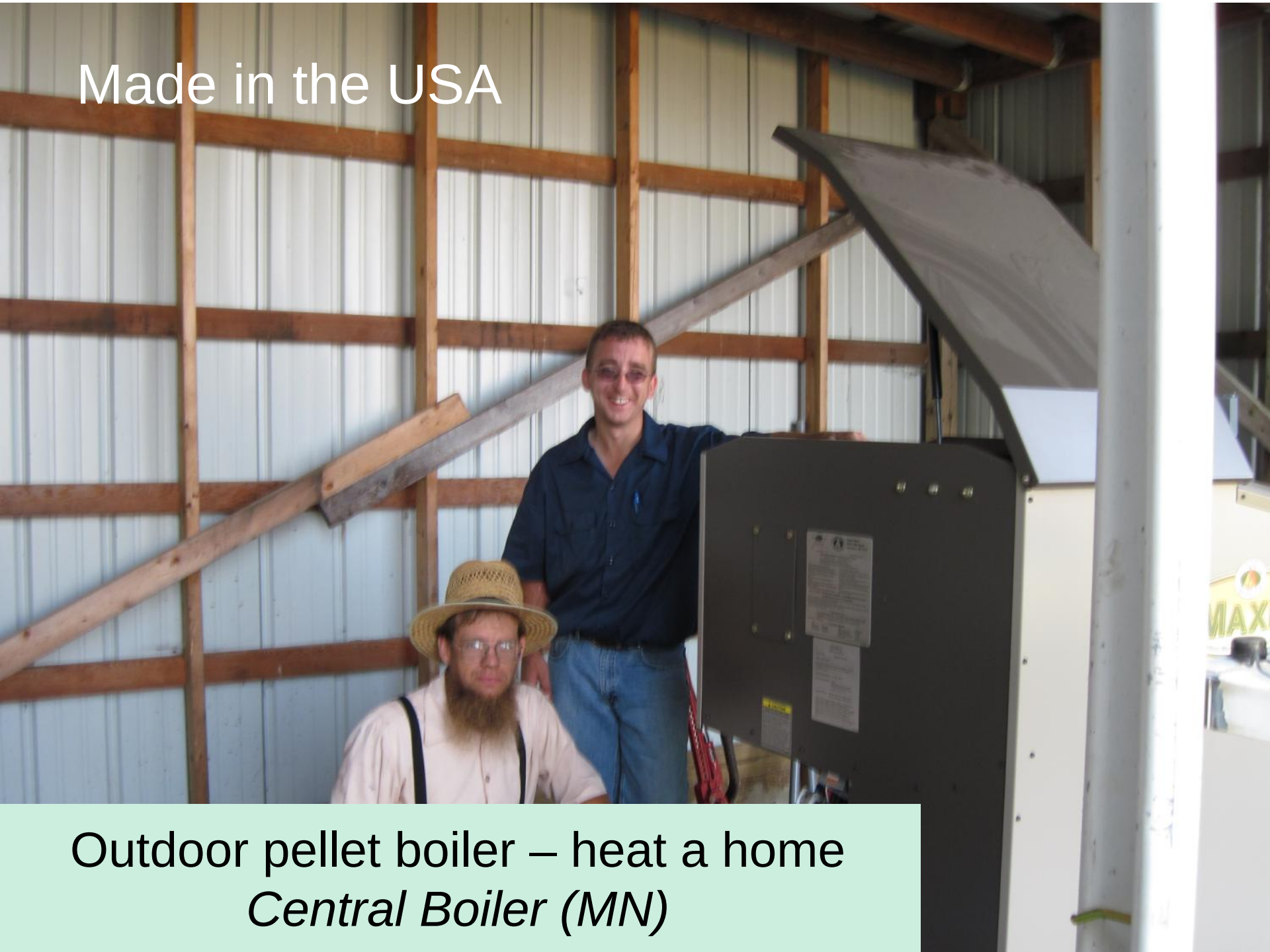
Planted Spring 2011

Prairie cordgrass *(Spartina pectinata):*

- High yielding warm season native
- Thrives in wet conditions
- Starts growing in early spring
- Promising candidate for nitrate removal.

Future site of AWI—Cat—U of I
Prairie cordgrass research plot

D. Gucker, AWI
061611



Outdoor pellet boiler – heat a home

Central Boiler (MN)

Made in the USA

Indoor pellet furnace – heat a farm shed

Big M Mfg (IL)

Madelia Model: Perennial Feedstocks to Advanced Biofuel

Goal:

Utilize Local Grown Renewable Energy as a Catalyst for Increasing Perennials on the Landscape to Reduce Pollution from Production Agriculture

Madelia Model
Renewable Energy and Sustainable Rural Communities

Madelia slldes: Linda Meschke, Rural Advantage

Prairie Skies Bio-Energy Project
Phase I

Madelia Model
Renewable Energy and Sustainable Rural Communities

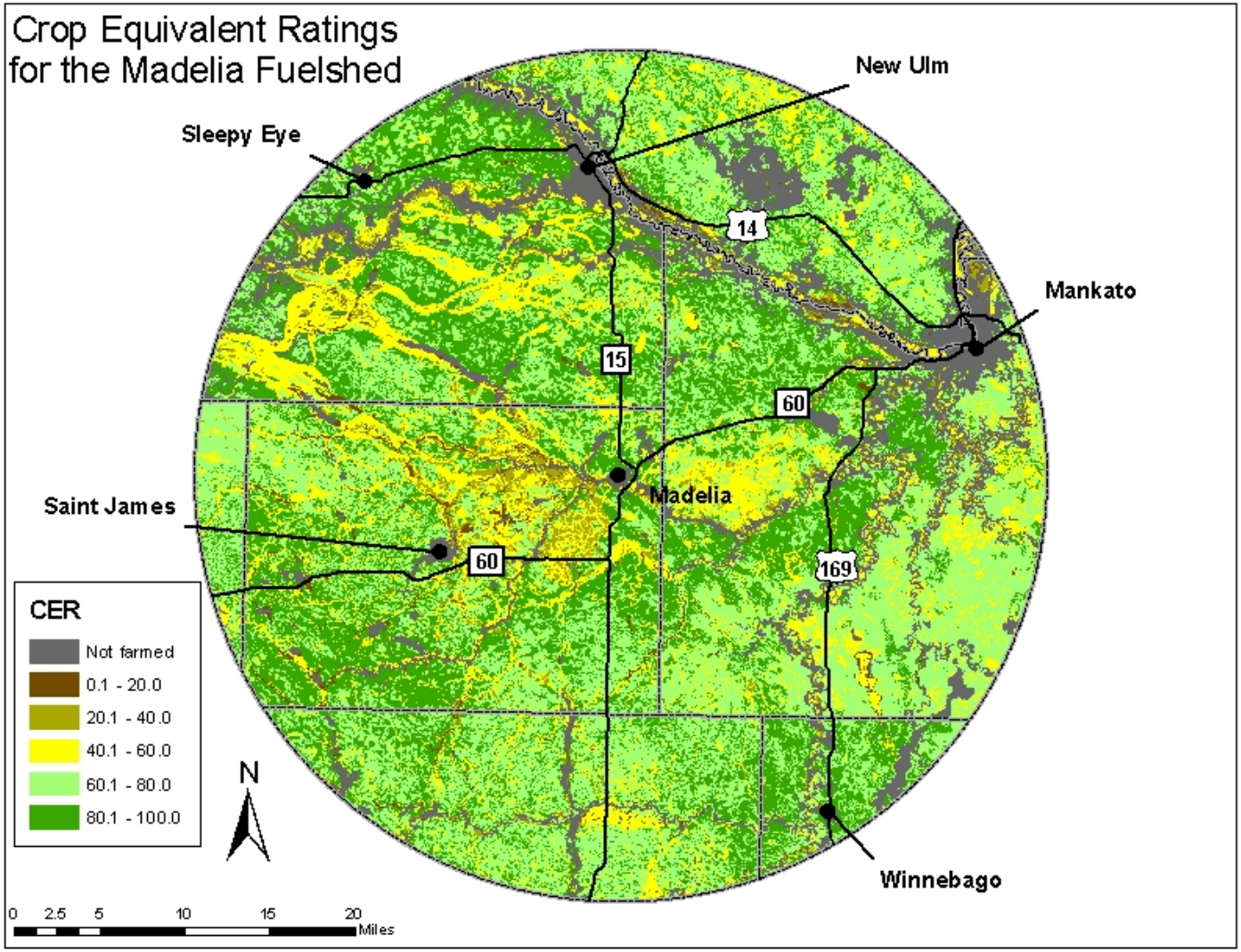
Feedstocks

- Multiple Feedstocks Grown Locally
- Perennials Targeted to Priority Sites

Torrefaction

- Produces an Advanced Biofuel
- Similar to Wyoming Coal in BTU's [8,600/lb]

Targeting Acres



Potential Ecological Uplifts:

- Sediment, N & P Reduction
- Water Storage Increased
- Wildlife & Pollinator Habitat
- Carbon Sequestered
- GHG Reduced

Payment at least as good as Corn/Soybeans

Targeted to Marginal Lands*

Less Production/ Input Costs

Biomass Production Payment from the Energy Facility

Ecological Uplift Payment

* Compare economics of corn production on ***marginal lands*** to dedicated energy crop economics.

U of Maryland, Wye Research Center

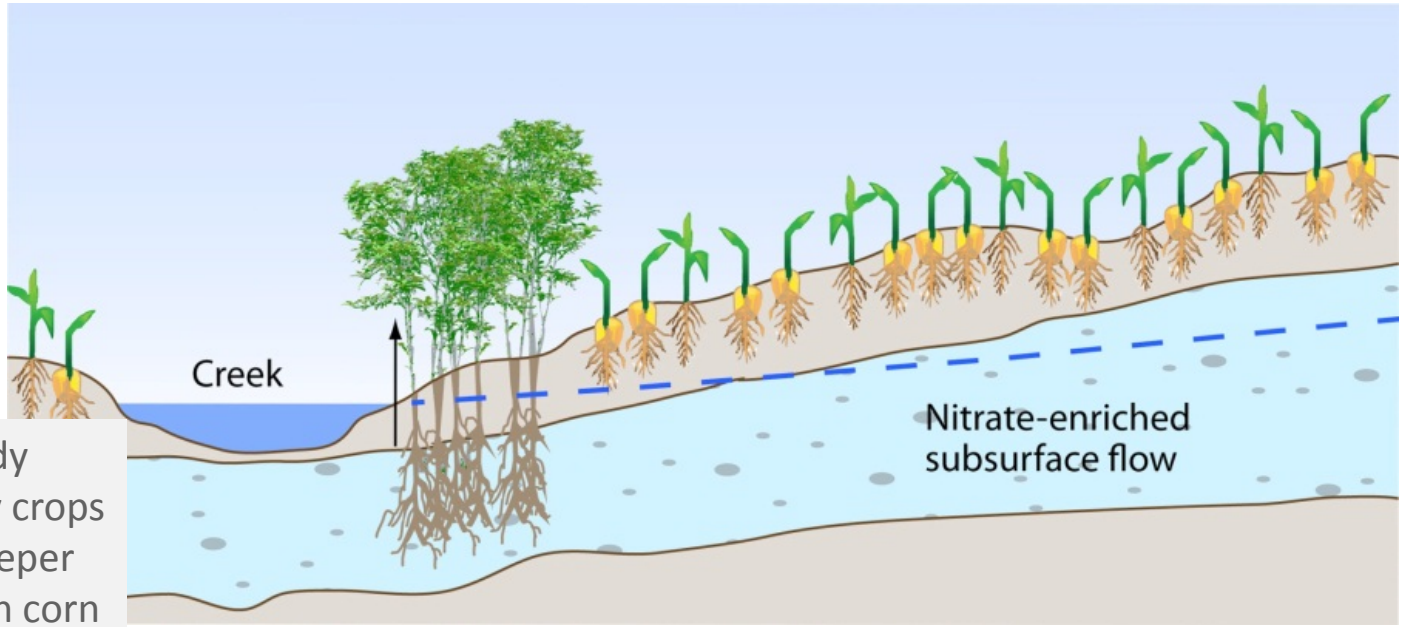
Cordgrass grown to reduce nitrates in Chesapeake Bay & provide biomass

Made in the UK

(But US-Made “bale burners” are now available)

Dr. Ken Staver with hydronic boiler at Wye Research Center

Potential Environmental benefits and crop yields in bioenergy buffers



Woody bioenergy crops have deeper roots than corn

Model Results:

- Nitrate leached reduced by 60-70% in buffer zones
- Nitrous oxide emissions reduced in buffer zones by 65% - 93%.
- Yields of energy crops comparable to yields with fertilizer application.
- → supports Biomass program goals and RFSII mandates

Argonne National Laboratory's Fairbury project is funded by the U.S. DOE, Office of the Biomass Program
Contact: M. Cristina Negri negri@anl.gov

Testing Biomass production and Nitrate recovery in the Indian Creek MRBI watershed, Fairbury IL

- Producing bioenergy crops without competing with food and feed crops
- Woody crops would be productive where corn is not
- This approach could save on crop insurance and provide clean water, reduce greenhouse gas emissions.

Short rotation willows will be planted and harvested with modified farming implements

Photo credit: Dr. Tim Volk, SUNY ESF.

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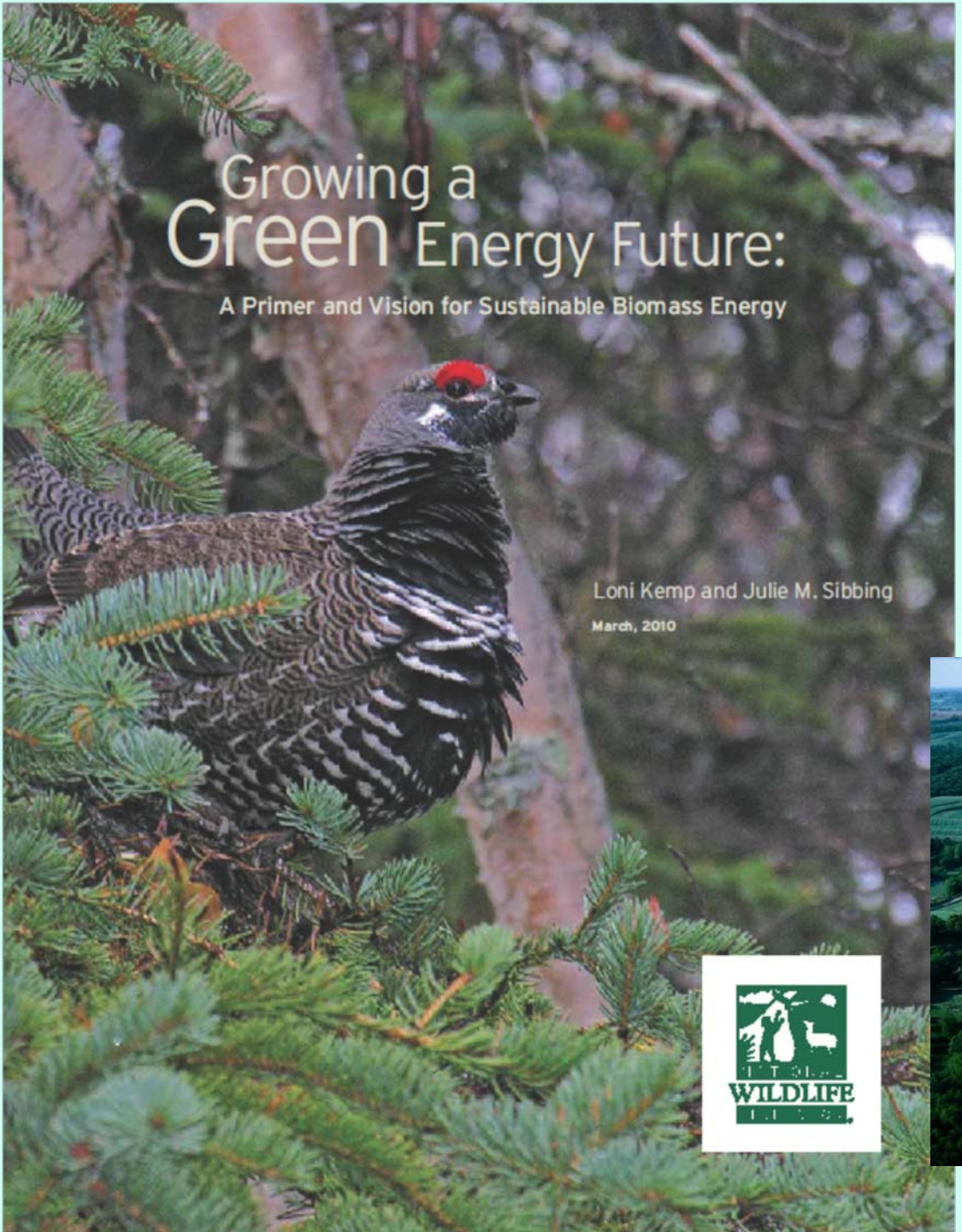

A Primer and Vision for Sustainable Biomass Energy

www.nwf.org/~/media/PDFs/Global-Warming/Reports/Growing-a-green-energy-future.ashx

Photo: Tim McCabe

Final thoughts …

Biomass crops can be used for thermal energy without waiting for large biorefineries.

Hay producers, including small farms, can be "multifunctional agriculture" pioneers.

Small U.S. manufacturers are finding a niche in the emerging Green Energy industry.

Stakeholder-led projects can be laboratories for R&D on biomass—conservation synergies.