



Future American Food Systems: Incorporating Bio-based Energy Production into Existing Systems

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Agricultural System Competitiveness & Sustainability
NP-213 Bioenergy Planning and Coordinating Meeting
Beltsville, MD, 30 November 2006



Agriculture and Natural Resources

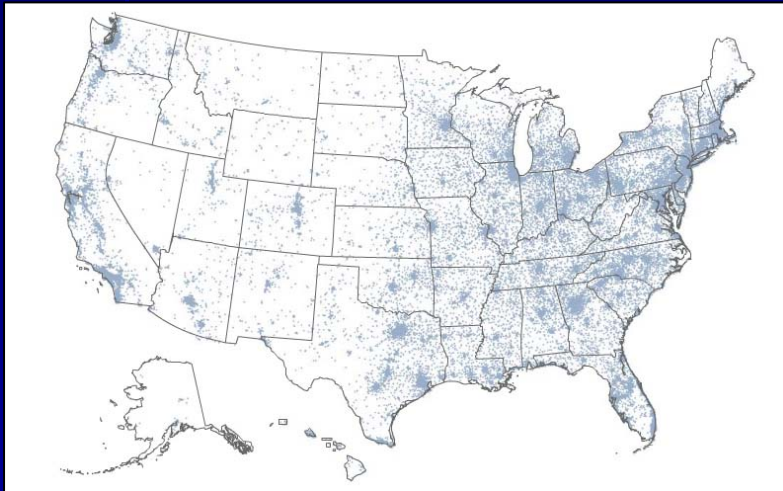


National Program - 216 Agricultural System Competitiveness & Sustainability

Help producers develop integrated solutions that solve their problems related to productivity, profitability, energy efficiency, and natural resource stewardship.

Future American Food Systems: Incorporating Bio-based Energy Production into Existing Systems

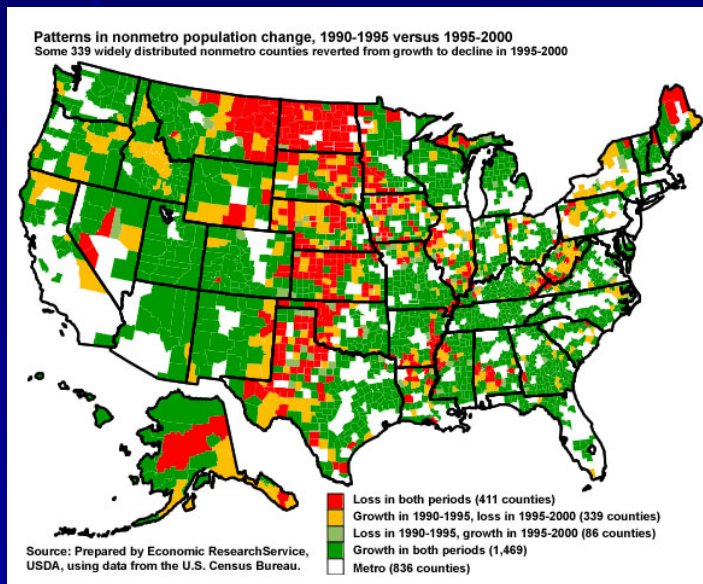
U.S. Population Distribution



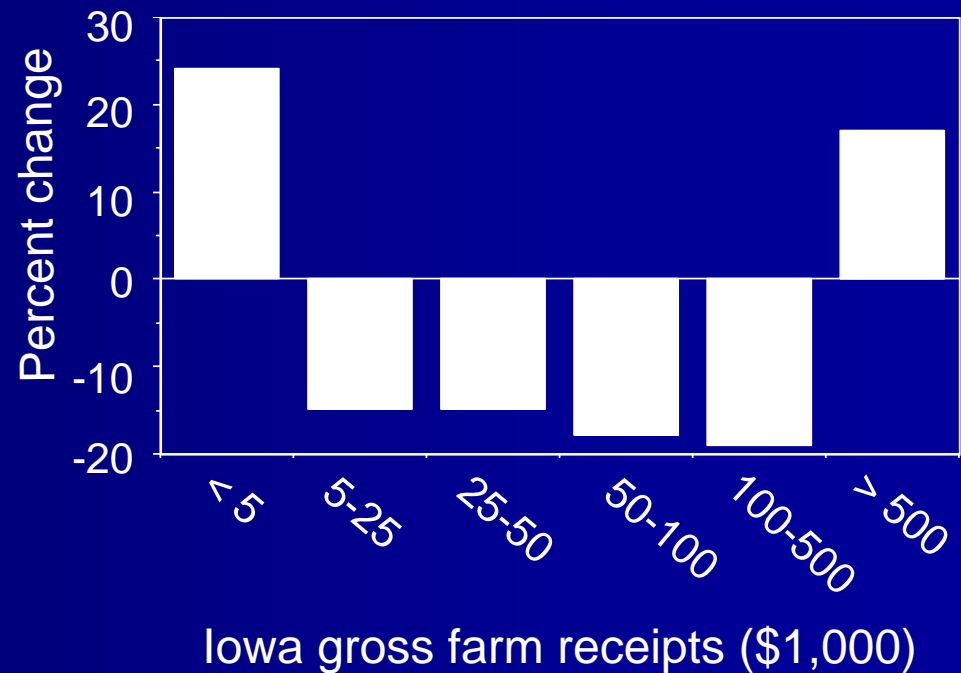
- 300-million people.
- 50% of population along coastlines.
- Urban-suburbanization: 1.7 acres developed per person added.
- Greater limitations on water availability in arid western regions.
- Projected increased costs of transportation fuels.

Incorporating Bio-based Energy Production into Existing Systems

Losses in Rural Population



Loss of Mid-sized Farms



Incorporating Bio-based Energy Production into Existing Systems

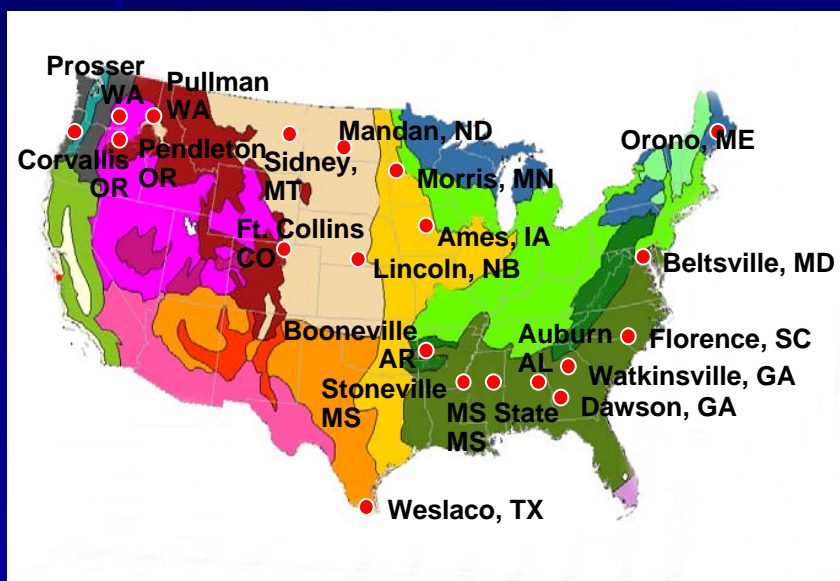
Adding Value to Existing Production Systems



- Emerging scalable technologies to compliment existing strategies.
- Turn agricultural biomass into energy products.
- New source of value-added income...
... behind the farm gate.
- Bio-based energy, as a part of future sustainable food systems.

Energy from Sustainable Feedstock Enterprises (E-SAFE)

Optimal Incorporation of Bio-based Energy into Existing Agricultural Systems



- Similar objectives as REAP.
- Twenty-one cooperating ARS units.
- Regional crop & livestock biomass resources.
- Whole-farm simulations for net farm income.
- Natural resource stewardship also assessed.

Incorporating Bio-based Energy Production into Existing Systems

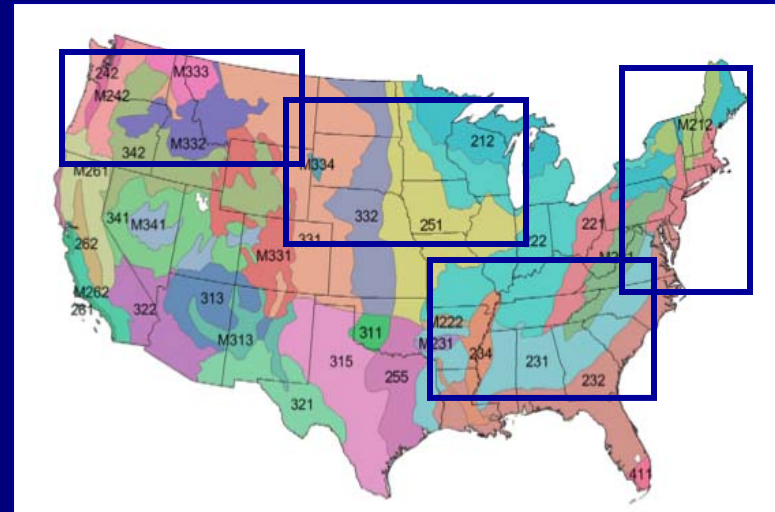
Crop Production



Grazed Livestock



Confined Feeding



*Diversity of
Environments,
Commodities, and
Production Problems*

Incorporating Bio-based Energy Production into Existing Systems

Range of Conversion Scales Needed



Large-scale



Local-scale



Farm-scale

One scale is not suitable for all situations

Incorporating Bio-based Energy Production into Existing Systems

Alternative Biomass Conversion Technologies



Dry and wet biomass gasification reactors



Microchannel Fischer-Tropsch reactor

- *Gasification or pyrolysis conversion.*
- *Liquid fuels by Fischer-Tropsch reaction.*

Incorporating Bio-based Energy Production into Existing Systems

Pacific Northwest Straw Residues



- *Over 7-million tons of straw available, beyond the conservation requirement.*
- *60-80 gallon per ton at \$1.90 per gallon equals \$800-million; 8.8% of region fuel needs.*

Incorporating Bio-based Energy Production into Existing Systems

North Carolina Confined Hog Operations



- *Ten-million head per year.*
- *Over 560,000 tons of manure.*
- *Conversion equivalent of 33-M gallons @ \$1.90 per gallon equals \$63-million.*

Also: Six gallons of fat per slaughtered hog, carcass profit \$4 to 6.

Incorporating Bio-based Energy Production into Existing Systems

Georgia Cotton Production



- *Two-million acres producing 1.25 bales per acre.*
- *Over 125,000 tons of gin waste available each year.*
- *Conversion equivalent of 7.5-M gallons @ \$1.90 per gallon equals \$14-million.*
- *Cotton seed oil available.*

Also: Georgia peanut hulls could produce 12-M gallons.

Incorporating Bio-based Energy Production into Existing Systems



- Producer
- Economist
- Hydrologist
- Banker
- Environmentalist
- Policy maker

Capacity emerging to estimate the effects of agricultural practices and policy decisions on the economic and environmental returns to communities.