

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

# Achieving Energy Security and Greenhouse Gas Reduction Cost-Effectively: The Biomass Crop Assistance Program

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# Biomass Crop Assistance Program

Can lead to a significant shift in the mix of biofuels to meet the Renewable Fuel Standard (RFS) to high yielding perennial feedstocks

- Transition from corn ethanol to cellulosic biofuels
- Mitigate the impact of the RFS on food prices
- Enhance the effectiveness of the RFS in reducing greenhouse gas emissions

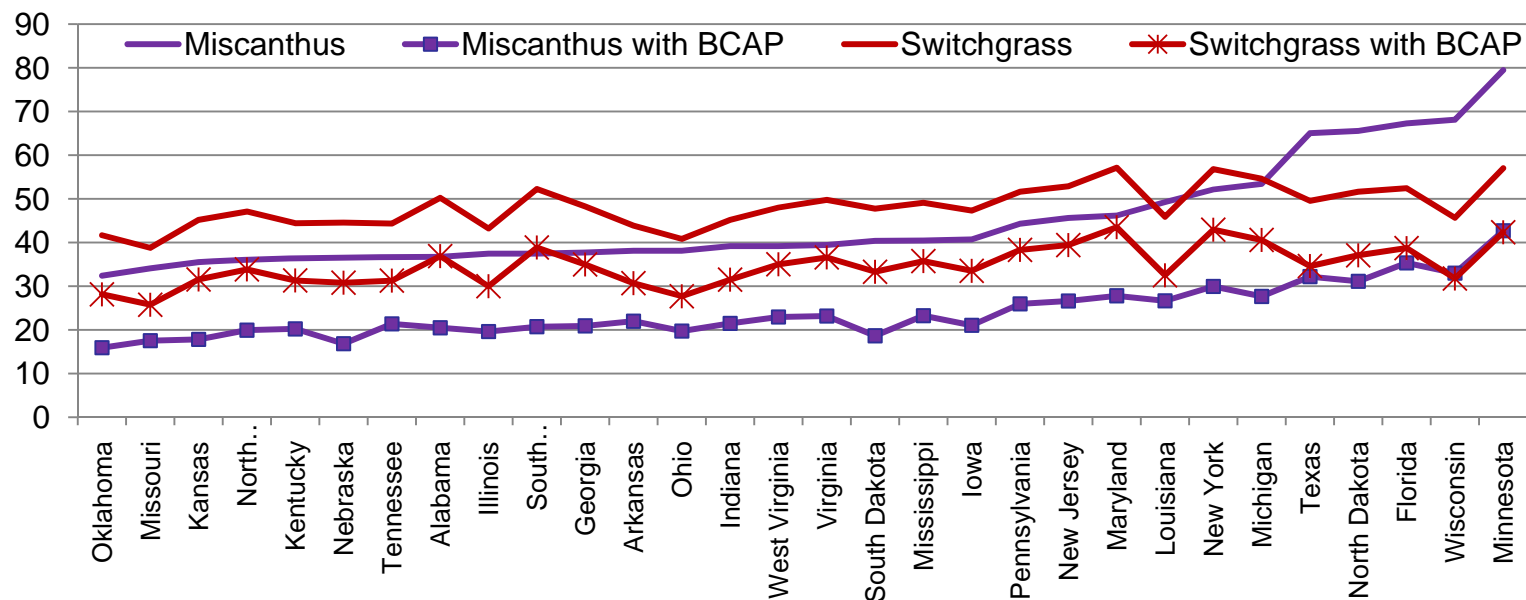
Cost-effectiveness and environmental benefits could be enhanced by

- Linking payments to carbon credits/environmental services of a feedstock relative to the fossil fuel it will replace instead of per ton matching payments that are uniform across feedstocks
- Developing a mechanism to select program participants that provide the highest benefits (bioenergy and environmental) at lowest costs

# BCAP lowers costs of cellulosic biofuels

- Perennial energy crops: High establishment and production costs
- Require long term investment; high upfront costs; uncertainty about returns
  - BCAP establishment payments reduce the option value/risk premium for investment in energy crops
- Lags in establishment and forgone income for first one or two years
  - Annual payments overcome these opportunity costs
- Matching payment (per ton) encourage high yielding feedstocks

**Break-Even Cost of Production (\$ per dry metric ton)**



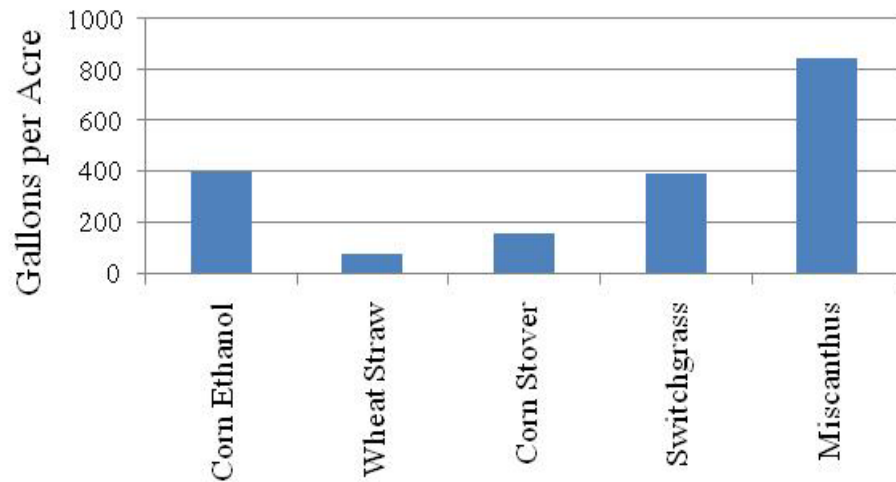
# High Yielding, Low Carbon Perennials: Key to Achieving Energy Security, GHG Reduction and Other Environmental Services

- Less adverse impact on food prices
- Lower costs of production; more returns for producers
- More likely to be competitive with fossil fuels
- Greater greenhouse gas reduction per ton of biomass

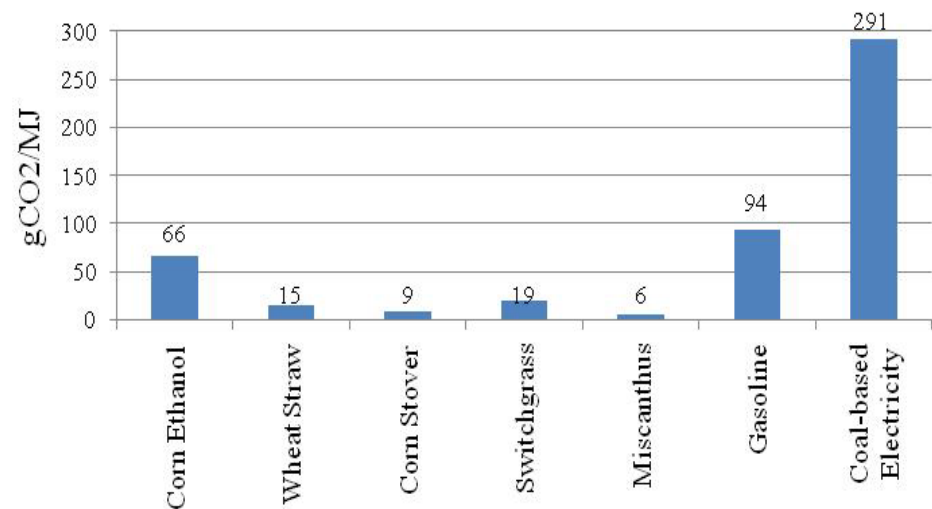
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Biomass feedstocks differ in their yields per acre and environmental services : Proposed BCAP does not adequately reward environmental services

### Biofuel Yield per Acre

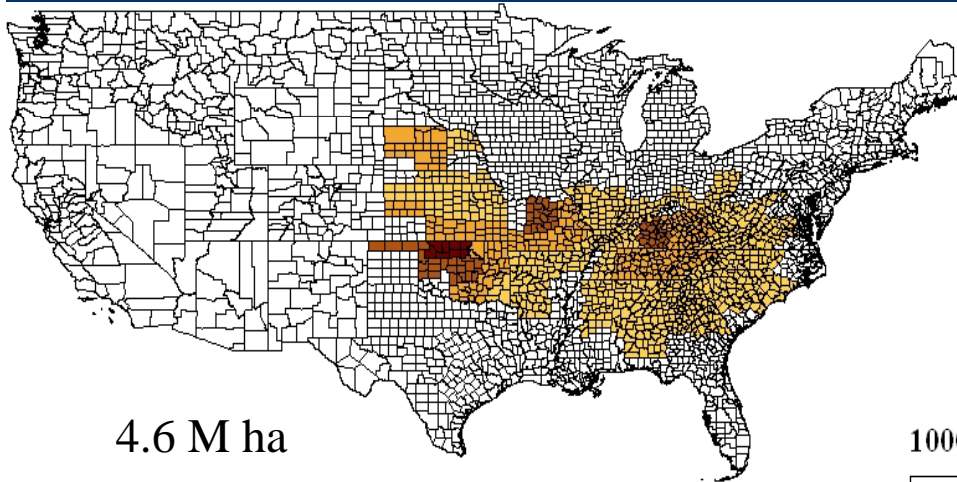


### Direct Life-Cycle GHG Emissions

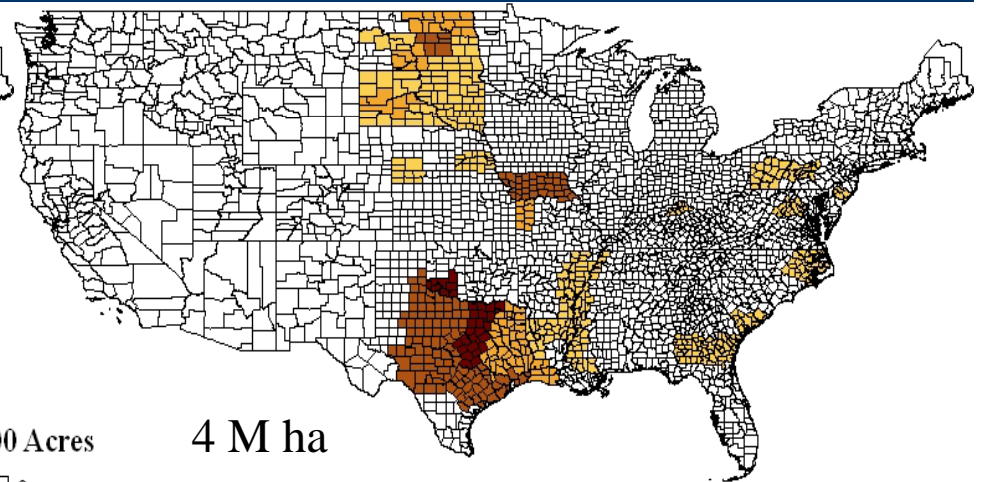


# Effect of BCAP on Land Use in 2022: Expands Land Under High-Yielding Perennials

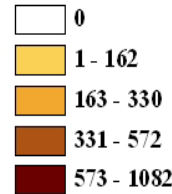
## Miscanthus under RFS



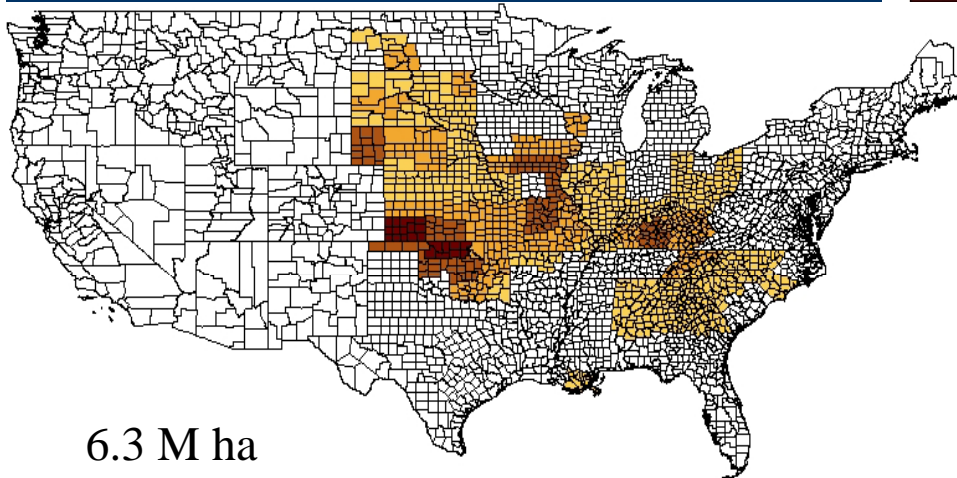
## Switchgrass under RFS



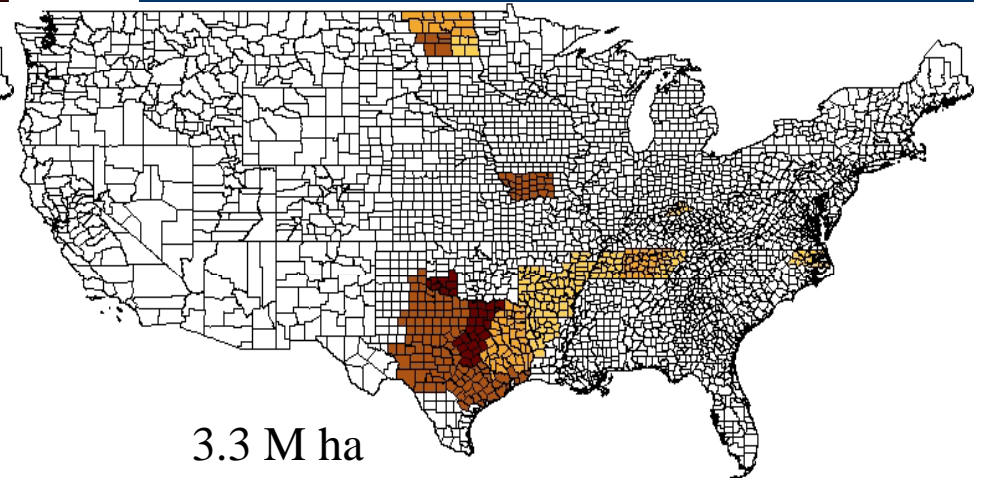
1000 Acres



## Miscanthus under RFS with BCAP

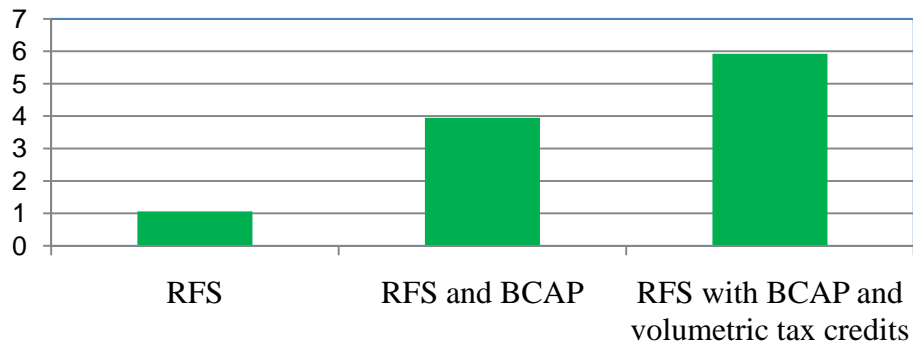


## Switchgrass under RFS with BCAP

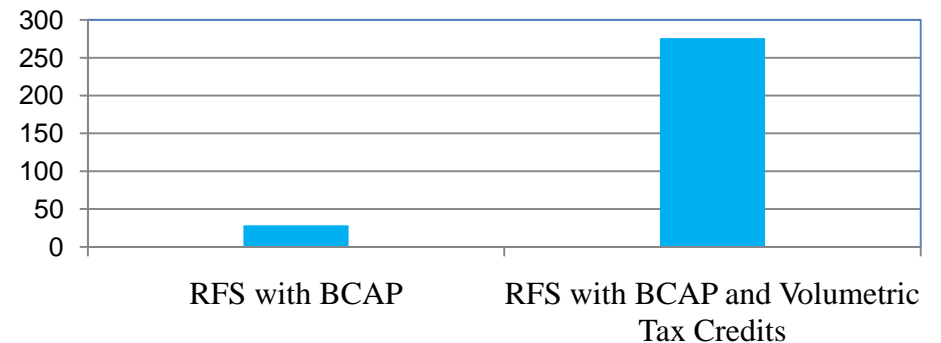


# BCAP supplements volumetric tax credits for biofuels: Both encourage high yielding biomass feedstocks and increase the competitiveness of cellulosic biofuels with corn ethanol

**% Reduction in Cumulative GHG Emissions Relative to BAU, 2007-2022**

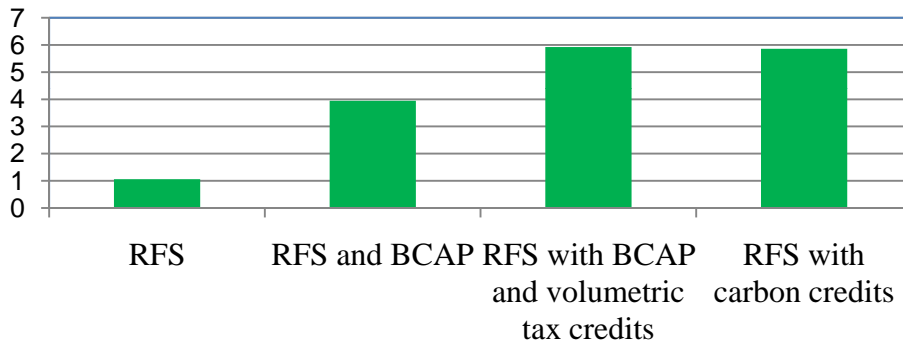


**Cumulative Government Payments 2007-2022 (Present Value in 2007 in Billion Dollars)**



# BCAP and Volumetric Tax Credits Encourage High Yielding Feedstocks but do not Adequately Reward their Environmental Services

**% Reduction in Cumulative GHG Emissions Relative to BAU, 2007-2022**

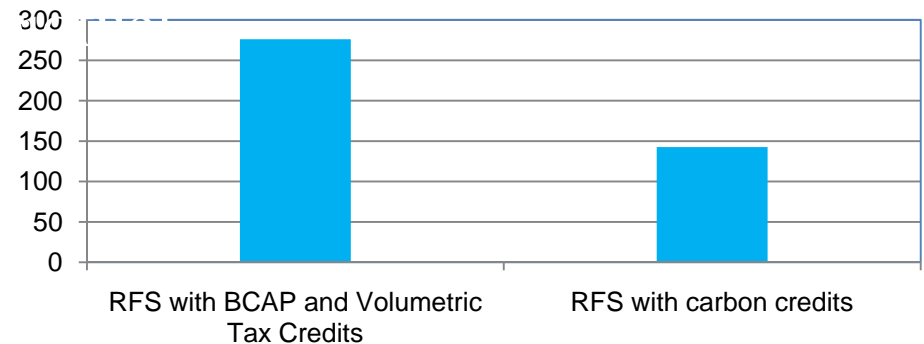


Alternative Policy: Instead of matching payments and volumetric tax credits

Payments per ton of biomass based on carbon credit relative to fossil fuel displaced

Achieve similar GHG reduction and production as BCAP but at half the cost

**Cumulative Government Payments 2007-2022 (Billion dollars)**



# Achieving Energy Security and Greenhouse Gas Reduction Cost-Effectively with BCAP

## Recommendations for design of BCAP

- Limit annual payments to establishment years only
- Replace the matching payments per ton under BCAP and volumetric subsidies with a carbon credit relative to fossil fuel displaced
  - Potential links in the future to a national cap-and-trade policy that would price greenhouse gas emissions
- Select program participants using a mechanism similar to the Conservation Reserve Program: scoring applicants based on GHG reduction benefits/other environmental benefits and low costs
  - Accept those meeting a threshold criteria based on budget/acreage constraints