



c e r e s

the
energy

crop
company™

Biomass 2010 Advanced Energy Crops: Industry Perspectives

March 30, 2010



Overview



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- Ceres overview
- Opportunities for biomass
- Role of dedicated energy crops
- What industry is doing
- How government can help



Ceres Overview

Ceres has created a fully integrated seed company utilizing advanced breeding and biotechnology to develop dedicated energy crops for biofuel & biopower

Energy Crop Portfolio



Switchgrass

High Biomass Sorghum

Miscanthus

Sweet Sorghum



- Wide Adaptation
- Low Input
- Perennial
- Seed Establishment

- Yield
- Adaptation
- Production System
- Low Water Usage

- Yield
- Low Input
- Perennial

- High Free Sugar & Biomass yields
- Low Input
- Uses Existing Refining Systems

Collaborations with Leading Institutions



PRIFYSGOL

ABERYSTWYTH
UNIVERSITY

IBERS



THE SAMUEL ROBERTS
NOBLE
FOUNDATION





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Global Research & Seed Production





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First Energy Crop Seed Brand



BLADE™

ENERGY CROPS



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Overview

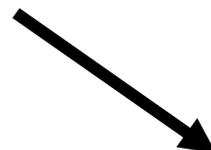
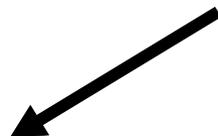


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Lignocellulosic Biomass



Cellulosic Biofuels
(& Biochemicals)

Biopower





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Cellulosic Biofuels



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- Slowed for various reasons
 - Credit crisis
 - Difficulties with loan guarantees
 - Challenges associated with scale-up

- Important recent developments
 - Significant progress in reducing enzyme costs
 - Large number of pilot and demonstration facilities operational or under construction, many with support of IBR grants
 - Several commercial scale facilities slated to be operational by 2012





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Biopower



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- Opportunity
 - Existing technology
 - Existing infrastructure
 - Small capital cost relative to CCS
 - Only proven and scalable source of **baseload** and **dispatchable** renewable power
- Why isn't it happening faster?
 - Lack of clarity on regulation (Europe ahead)
 - Need to demonstrate energy crop based biomass supply chain at scale





Overview



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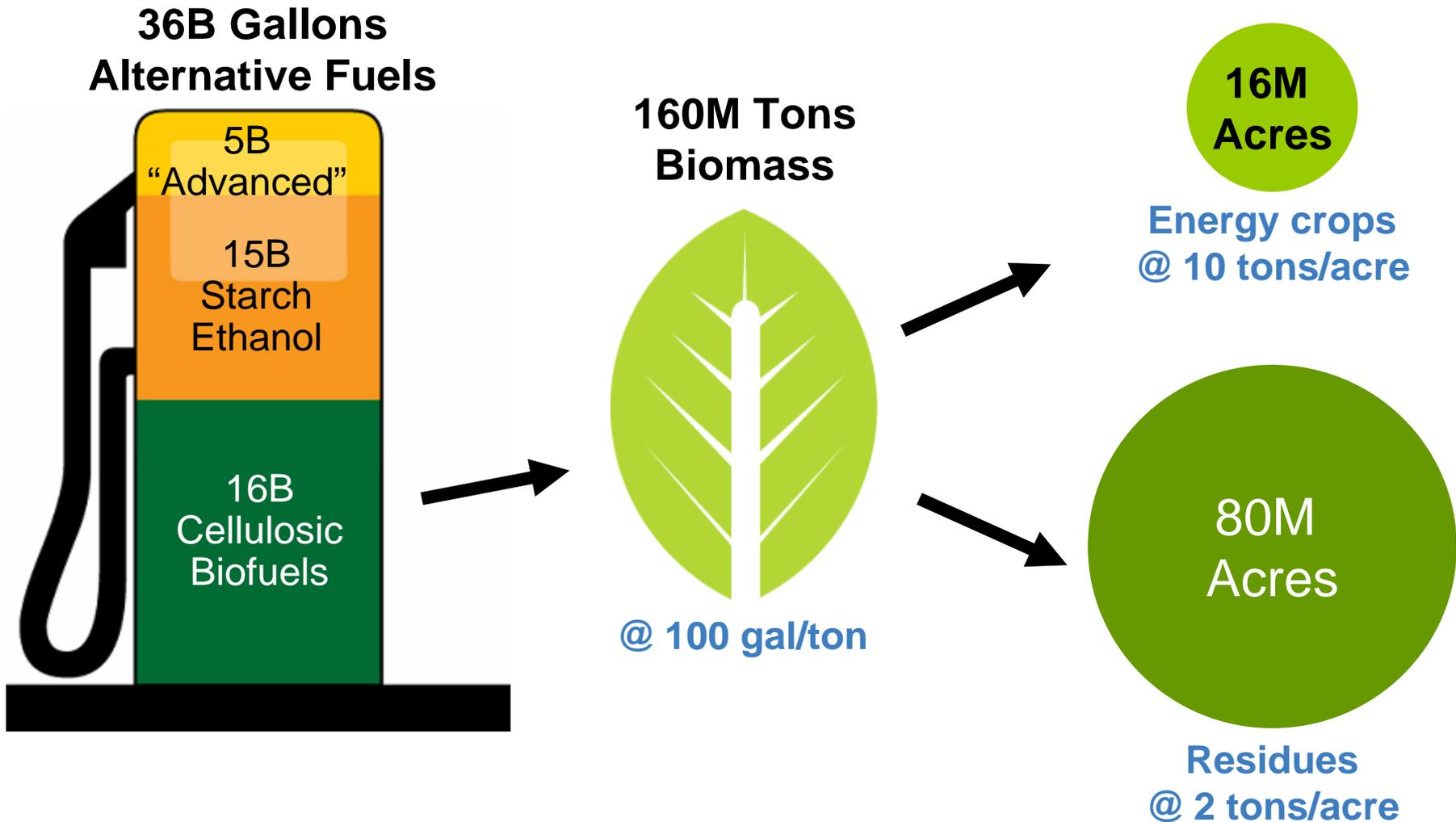
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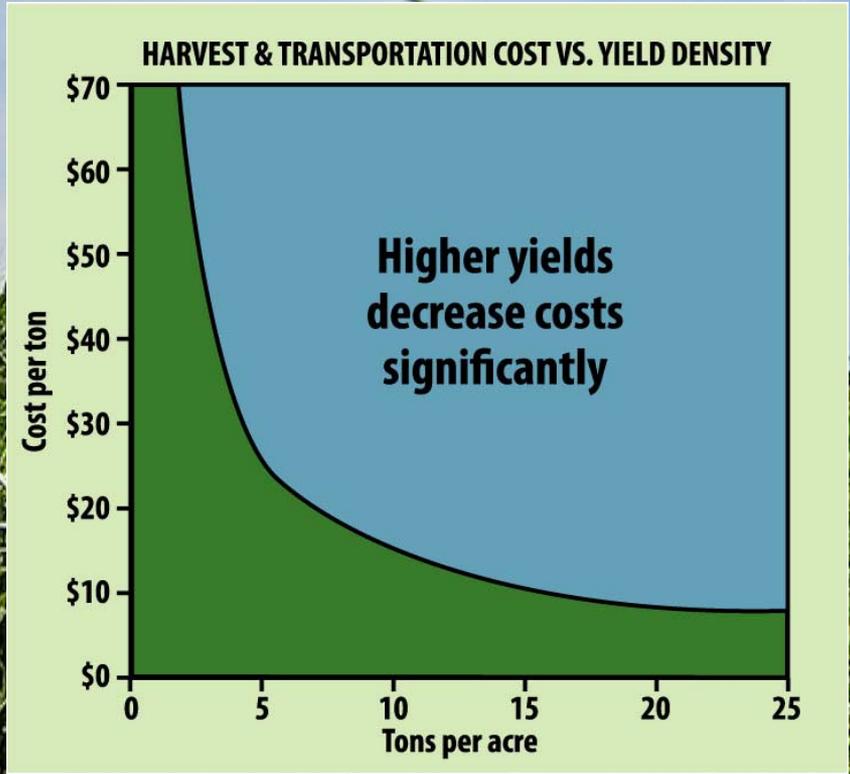
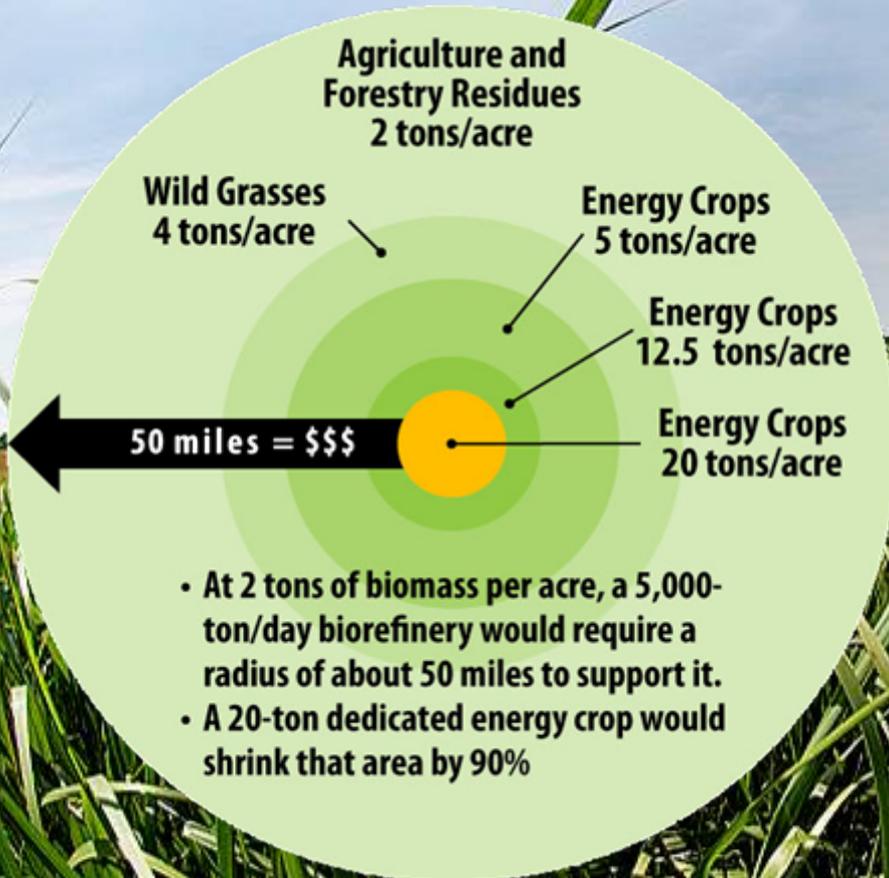
Benefits of Dedicated Energy Crops

- 
- Industry scale
 - Project scale
 - Lower delivered cost
 - More CO₂ sequestered
 - Greater reliability
 - Greater consistency

Enabling Industry Scale



Enabling Project Scale





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Increasing Yield



Public Variety

Ceres Variety



Wild-type Transgenic



SKYSCRAPERTM HIGH BIOMASS

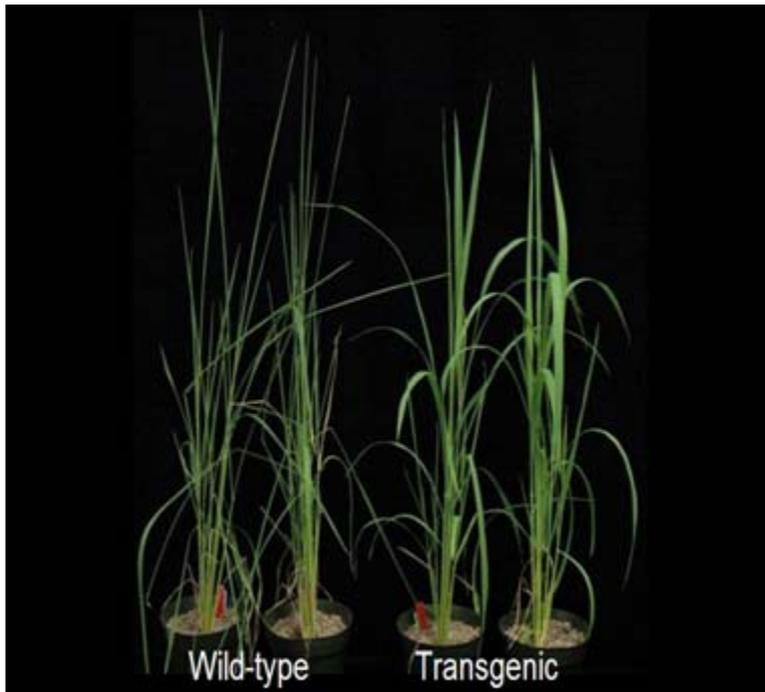




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Enhancing Yield Stability and Reducing Input Requirements

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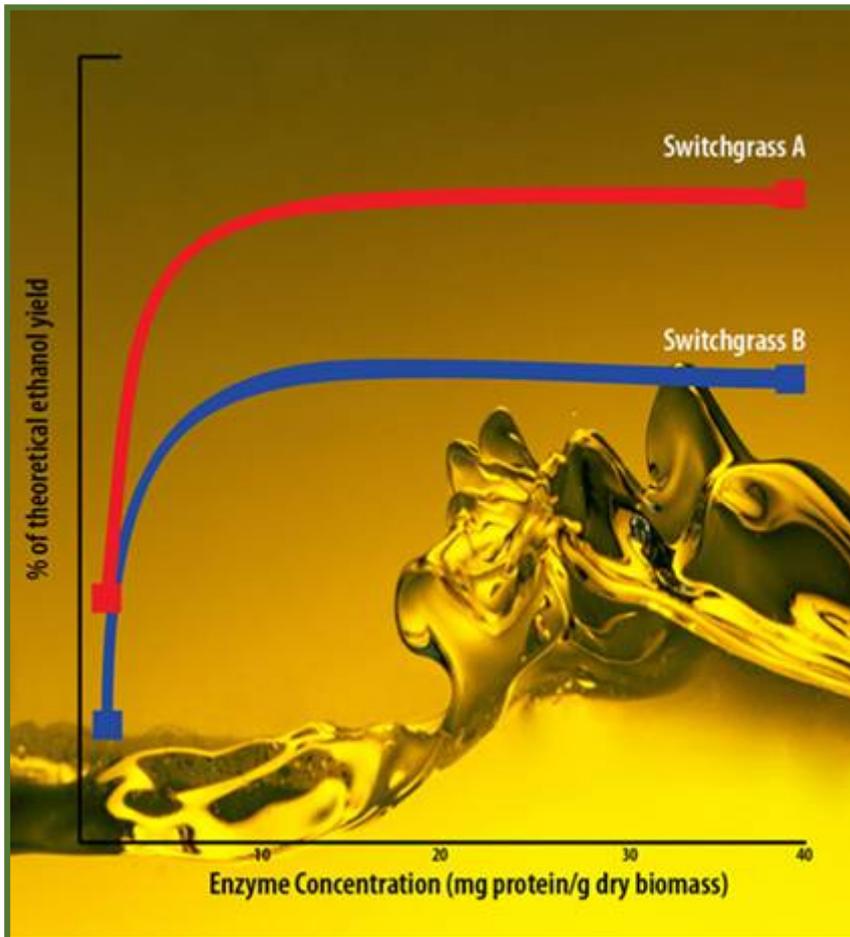


Drought Tolerance



Nitrogen Use Efficiency

Impact of switchgrass genetics on conversion



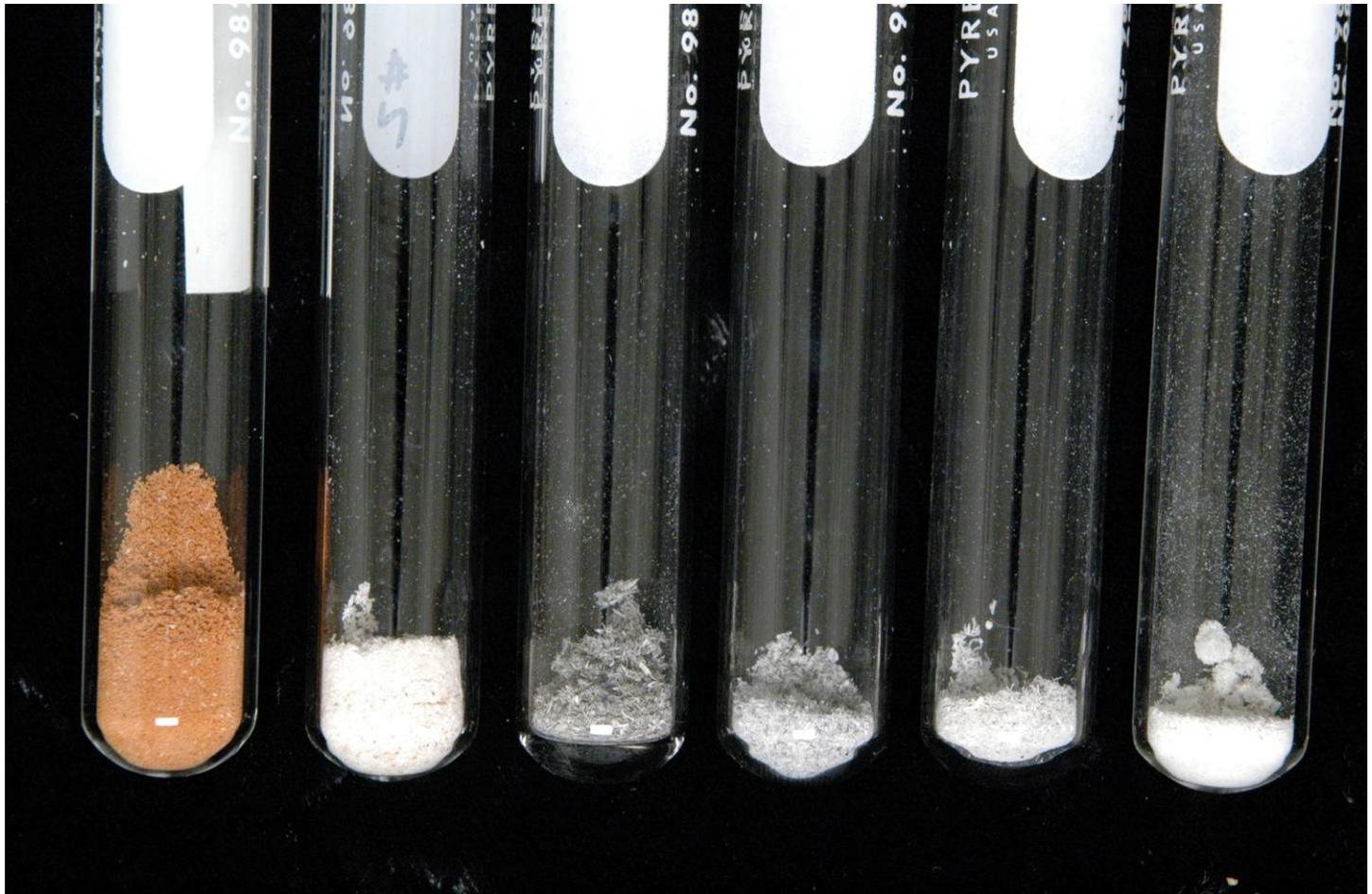
- **Sources of Variability**
 - Genetics
 - Environment
 - Management practices
- **Impact**
 - Increased process yield
 - Reduced enzyme cost
 - Reduced capital costs



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Reducing Undesirable Components

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grown in the same soil

Optimizing Management Practices



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Creating an Energy Crop Biomass Supply Chain



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Providing Seed for Commercial Scale Projects

The screenshot shows the BLADE Energy Crops website. At the top right, there is a shopping cart icon with '0 items', and links for 'Contact Us' and 'Login'. The BLADE logo is on the left, with 'ENERGY CROPS' underneath. A search bar is on the right. A navigation menu includes 'Home', 'About Blade', 'Switchgrass', 'Sorghum', 'Product News', and 'Order/Book Seed'. The main banner features a farm scene with a world map overlay and the text 'Think Big Reach New Heights With A New Name In Seed'. Below the banner are two sections: 'Specialized Seeds They Grow Where Other Crops Can't.' with an image of sorghum seeds, and two product cards for 'Switchgrass' and 'Sorghum', each with a 'Learn more' link and a 'Management Guide' icon.



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Conducting Grower Outreach Programs





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How the Government Can Help

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- Assist growers with transition to new crops (**e.g. BCAP**)
- Put dedicated energy crops on equal footing with traditional crops (**e.g. crop assistance**)
- Help with market development for cellulosic biofuels and biopower (**e.g. RFS II / RES / carbon legislation**)
- Support commercialization of and migration to new technologies (**e.g. grants / loan guarantees / production tax credits**)





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