Cellulose Ethanol *is ready to go*

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Who is Iogen?

- Headquartered in Ottawa, Canada, Iogen Corporation is a leading industrial biotechnology company specializing in cellulose-based enzyme technology

- Iogen operates the world's largest pre-commercial cellulose ethanol facility

- Production of cellulose ethanol commenced in April 2004

The leading firm in cellulose ethanol

- A pioneer in making ethanol from “biomass”
  - Active since the late 1970’s
  - $110+ million spent in development
- A world leader in the field
  - Two $7 million cellulose ethanol pilot operations
  - World’s largest cellulose ethanol ($30 million) demonstration plant
  - Leading-edge commercial enzyme manufacturing
- Private and Public Partnerships
  - $20+ million from Petro-Canada
  - $15 million from the Government of Canada
  - January 2006 announcement with Volkswagen for cooperation in Germany
  - Major strategic partnership with Shell

Shell investment in Iogen

- Iogen identified as world leader in cellulose ethanol
- $50 million investment in Iogen announced since May, 2002
- Intended to speed development of world's first commercial plant
- Offers potential commercial plant investor and ethanol off-take customer

The Iogen Process Makes It Possible

IOGEN CORPORATION

Until recently ethanol from cellulose was impractical and costly. But through biotechnology and improved process innovations, Iogen has made cellulose ethanol a reality. In every step of our operations — from pretreatment to fermentation — we have made process improvements. We continue to demonstrate these improvements regularly in our day to day commercial operations. Iogen continues to seek further opportunities for process improvement and cost reduction as we strive to lower the cost of clean fuels.

Pretreatment

Once the fibre arrives at Iogen's plant gate, the goal is to increase the surface area or "accessibility" of the fibre so that fewer enzymes are required at the hydrolysis stage. We achieve this through a process of modified steam explosion.

Enzyme Production

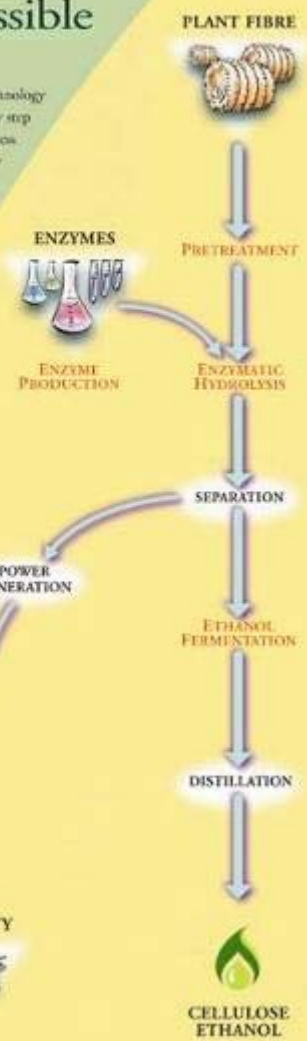
The goal here is to make high-efficiency enzymes for use in hydrolysis. We accomplish this using our proprietary enzyme manufacturing technology. Enzyme strains are optimized for biomass conversion using advanced genetic engineering technology.

Enzymatic Hydrolysis

Here the goal is to efficiently convert the cellulose portion of the fibre to glucose. We accomplish this through separate hydrolysis and fermentation using a multi-stage hydrolysis process. Iogen is also working on ways of effectively converting hemi-cellulose — also found in plant fibre — into pentose sugars.

Ethanol Fermentation

The goal in fermentation is to convert sugars to ethanol. We accomplish this using various yeasts and genetically modified microbes that are tailored to our specific process. The "beer" produced by fermentation is then distilled using conventional technology to produce ethanol for fuel grade applications.



Demo plant: Cellulose ethanol production

- Cellulose ethanol production currently using wheat straw (also designed for corn stover and other agricultural residues/dedicated crops)
- Continuous operation
- April 21, 2004: First commercial shipment to Petro-Canada's Montreal refinery
- Customers to include:
  - Oil companies
  - Government vehicle fleets

Iogen enzyme and cellulose ethanol facility

Front end hammermilling of wheat straw

- **One of two 52,000 gallon enzyme fermenters**

- **Overlooking array of 33,000 gallon storage tanks**

Lignin separation filter presses

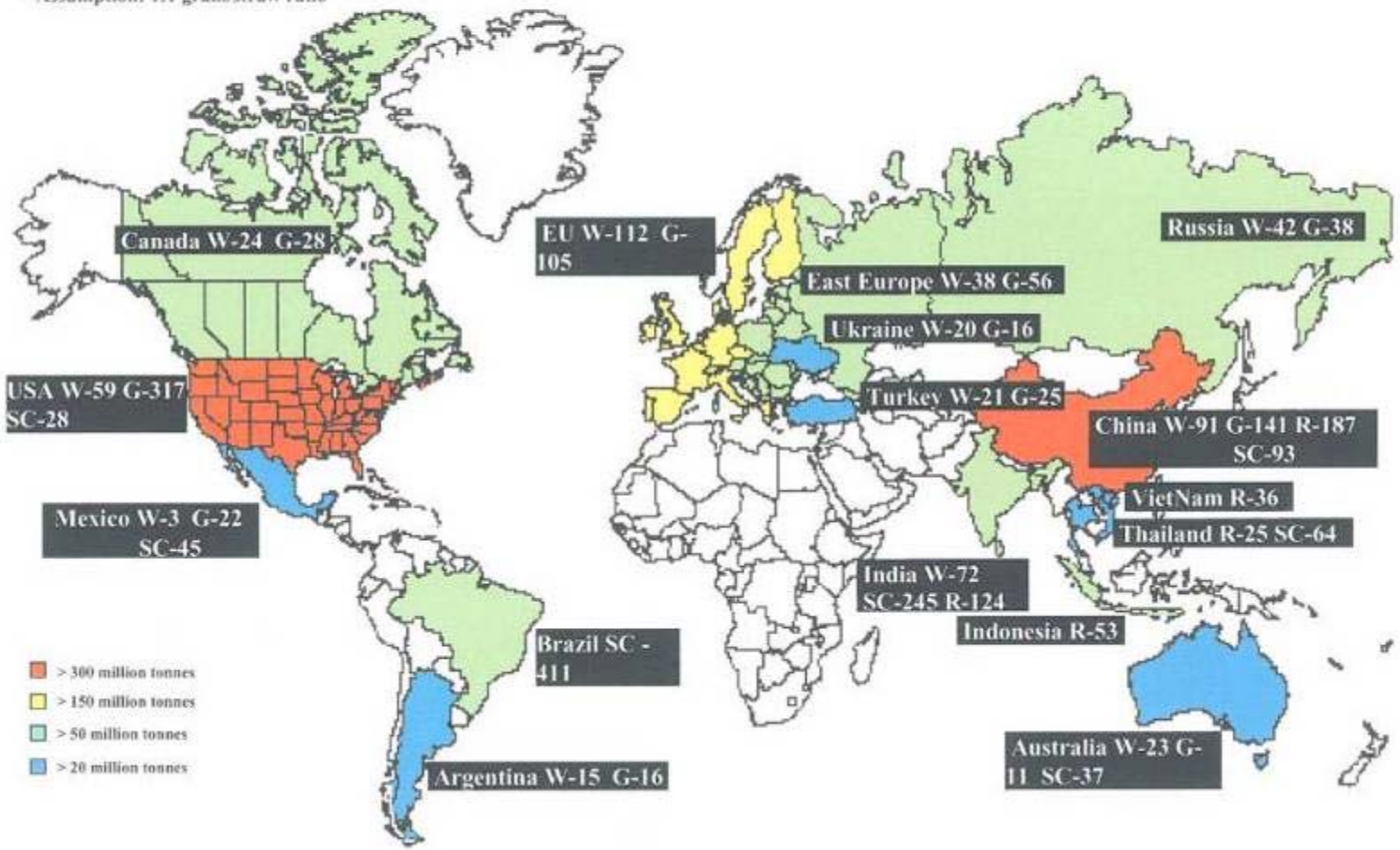
Iogen cellulose ethanol fuels G8 leaders' vehicles
Gleneagles, Scotland, July 2005

Iogen Cellulose Ethanol Plant

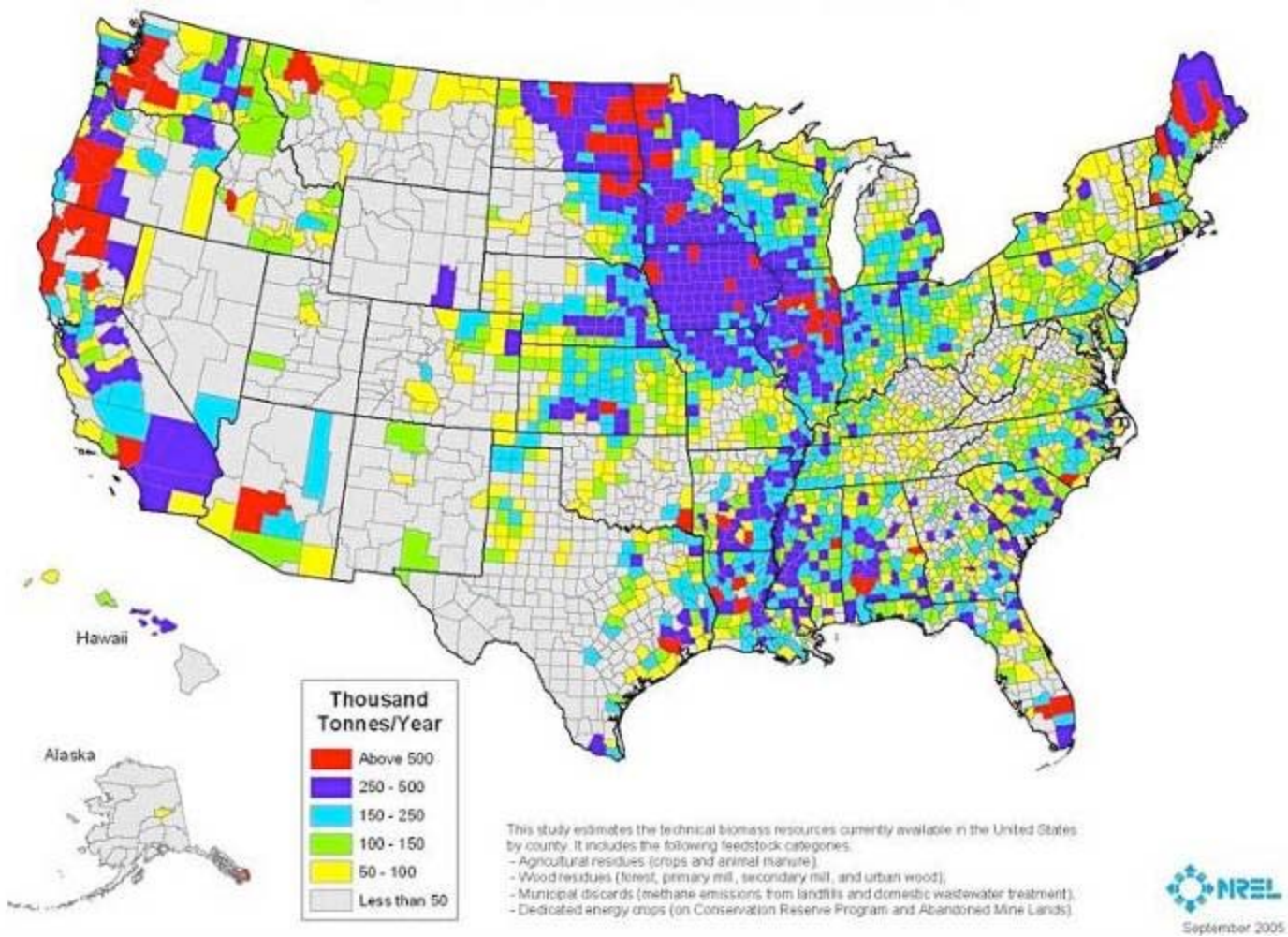
Preliminary Global Feedstock Availability Assessment

Total wheat, coarse grains (corn, barley, oats, rye, sorghum) and sugar cane production* highlights for 2004 (million Mt) from FAOSTAT
Rice straw – country estimates.

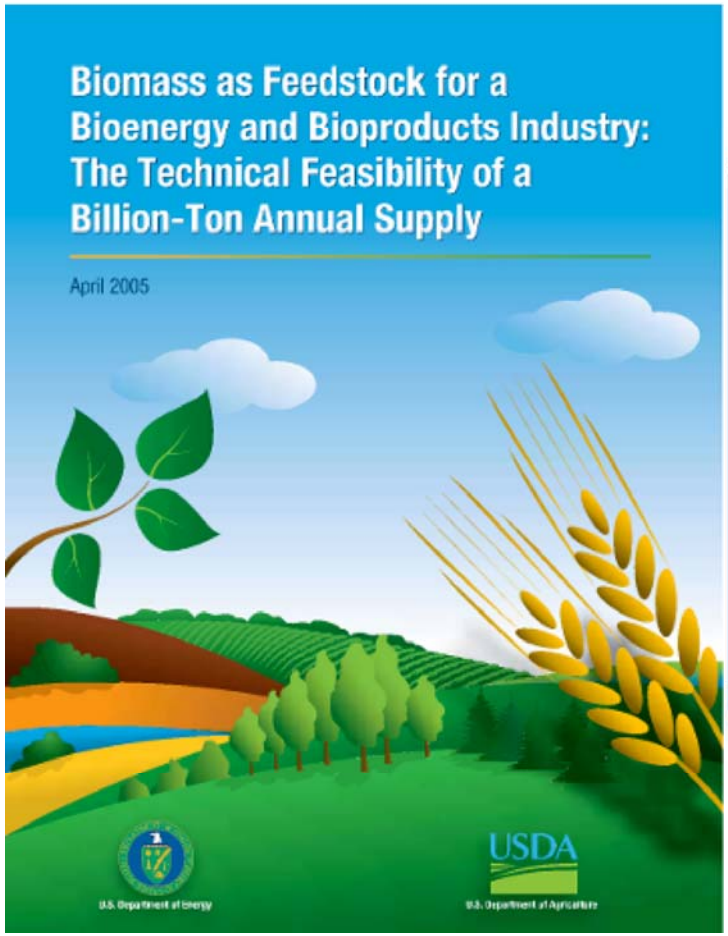
* Assumption: 1:1 grain/straw ratio



States capable of supporting a cellulose ethanol industry



DOE & USDA – Biomass availability



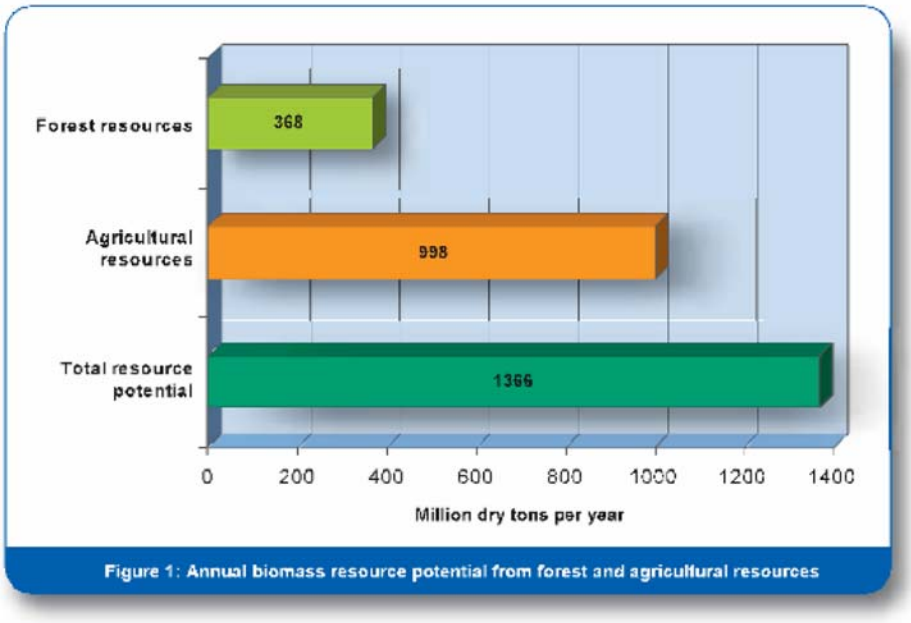


Figure 1: Annual biomass resource potential from forest and agricultural resources

DOE & USDA - Resolving energy security

From the DOE/USDA April 2005 Billion Ton Study

"The purpose of this report is to determine whether the land resources of the United States are capable of producing a sustainable supply of biomass sufficient to displace 30% of the country's present petroleum consumption (*i.e. 60 billion gallons per year*) … 1 billion dry tons of biomass feedstock per year

The short answer to the question … is yes."

Resolving energy security

- "Keeping America competitive requires affordable energy. Here we have a serious problem: America is addicted to oil, which is often imported from unstable parts of the world.

- We will also fund additional research in cutting-edge methods of producing ethanol, not just from corn but from wood chips, stalks, or switch grass.

- Our goal is to make this new kind of ethanol practical and competitive within six years. Breakthroughs on this and other new technologies will help us reach another great goal: to replace more than 75 percent of our oil imports from the Middle East by 2025."

    - President Bush, Jan. 31 State of the Union Address

Benefits to agriculture

Puts $ in farmer's pockets

- Sixty billion gallons of cellulose ethanol would be produced by one thousand – sixty million gallon plants.
- Anticipated agriculture revenue per plant is $24 million for a total of $24 billion additional farm income.
- By comparison, both corn and soybean have a total annual crop value of $20 million each.
- Makes agriculture a major energy player.

Switchgrass Today

- Field yield = 5 tons of dry matter per acre
- Cellulose ethanol yield = 80 gallons per ton
- Value of switchgrass in the windrow = $15 per ton (based on straw price)
- Yield to farmer = $75 per acre in the windrow

Switchgrass Future

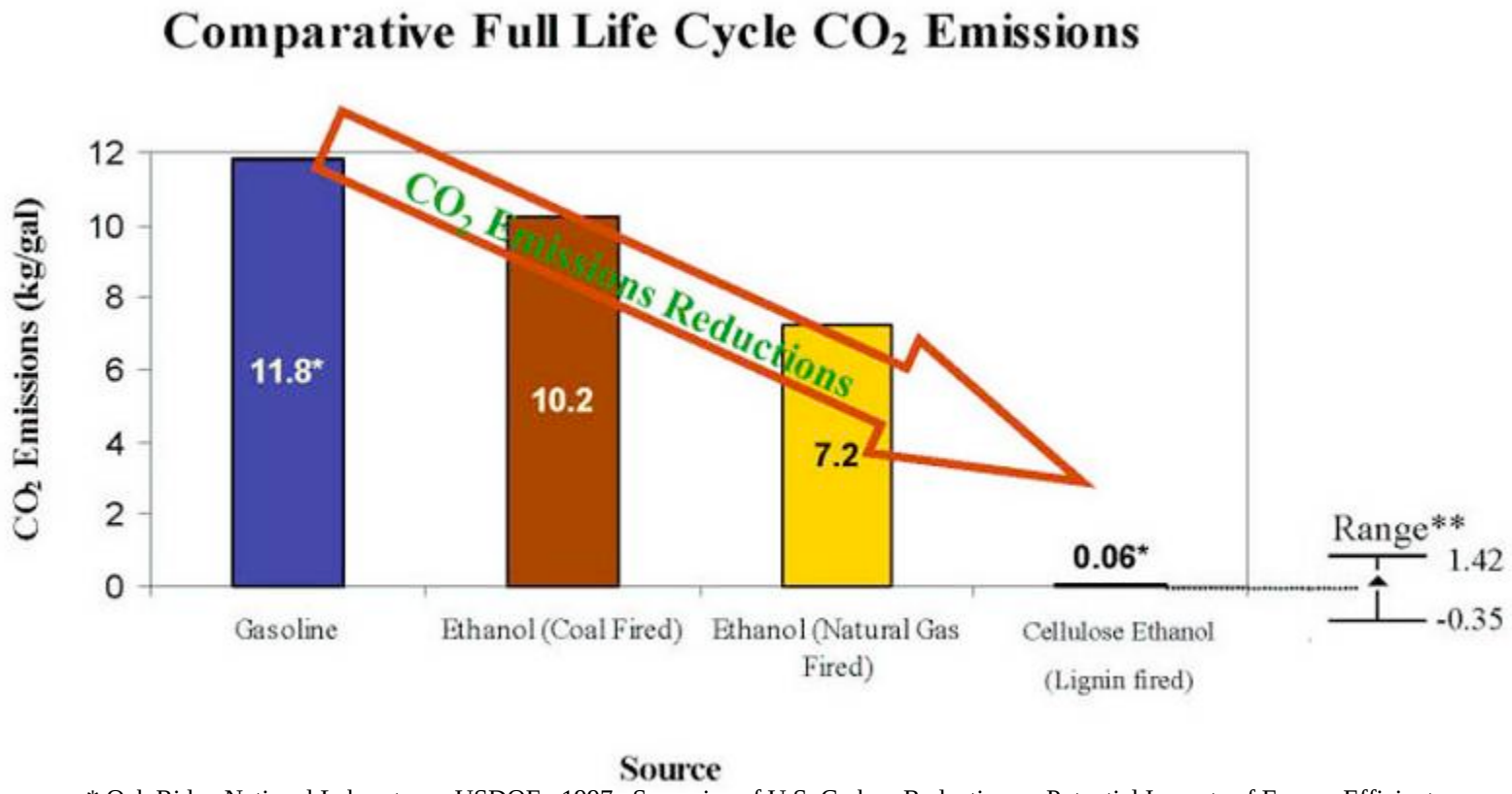
- Field yield = 10 tons of dry matter per acre
- Cellulose ethanol yield = 100 gallons per ton
- Value of switchgrass in the windrow = $25 per ton
  - Extra 20 gallon yield returns $0.50 per gallon to the farmer
- Yield to farmer = $250 per acre in the windrow

Benefits to rural communities

Keeps jobs on the farm and in the community

- Each plant creates 180 direct jobs from skilled labour through technicians to scientists and engineers.
- Each plant also creates 1,000 construction jobs over two years, and an estimated 450 permanent spin-off jobs.
- Total increased rural employment is approximately 600,000 permanent jobs, plus one million construction jobs over the next few decades.

Benefits to the environment - cellulose ethanol is unique



Sources: * Oak Ridge National Laboratory. USDOE. 1997. Scenarios of U.S. Carbon Reductions – Potential Impacts of Energy Efficient and Low-Carbon Technologies by 2010 and Beyond. ** Source: Agriculture and Agri-Food Canada. 1999. Assessment of Net Emissions of Greenhouse Gases from Ethanol-Blended Gasolines in Canada: Lignocellulosic Feedstocks. Estimate computed assuming a 39% reduction in GHG emissions compared to petrol.

Benefits to the environment – The global picture

- This private sector driven initiative could place the US ahead of Kyoto signatories on CO_2 reduction.

The US Energy Bill has aggressive targets for cellulose ethanol

- A 7.5 billion gallon “renewable fuels standard” with a 2.5:1 trading ratio for cellulose ethanol
- A 250 million gallon minimum annual required volume of cellulose ethanol beginning in 2013
- A one billion gallon per year target for cellulose ethanol production in 2015, backed by:
  - A $1 billion loan guarantee program.
    - 80% non-recourse loan guarantee for first four plants
    - Maximum $250 million per plant
- **GOAL: To move the EP Act/05 authorization forward quickly by partnering with the US government.**