

FUTURE OF BIOENERGY: POET'S PERSPECTIVE

Industry Perspectives on Bioenergy

DOE Biomass 2011

July 2011

The logo for POET, featuring the letters 'POET' in a bold, sans-serif font. The letter 'O' is stylized with a green-to-yellow gradient fill. The logo is positioned on a white rectangular background that has a thin green vertical bar on its left side and a horizontal dotted pattern at its bottom edge.

POET

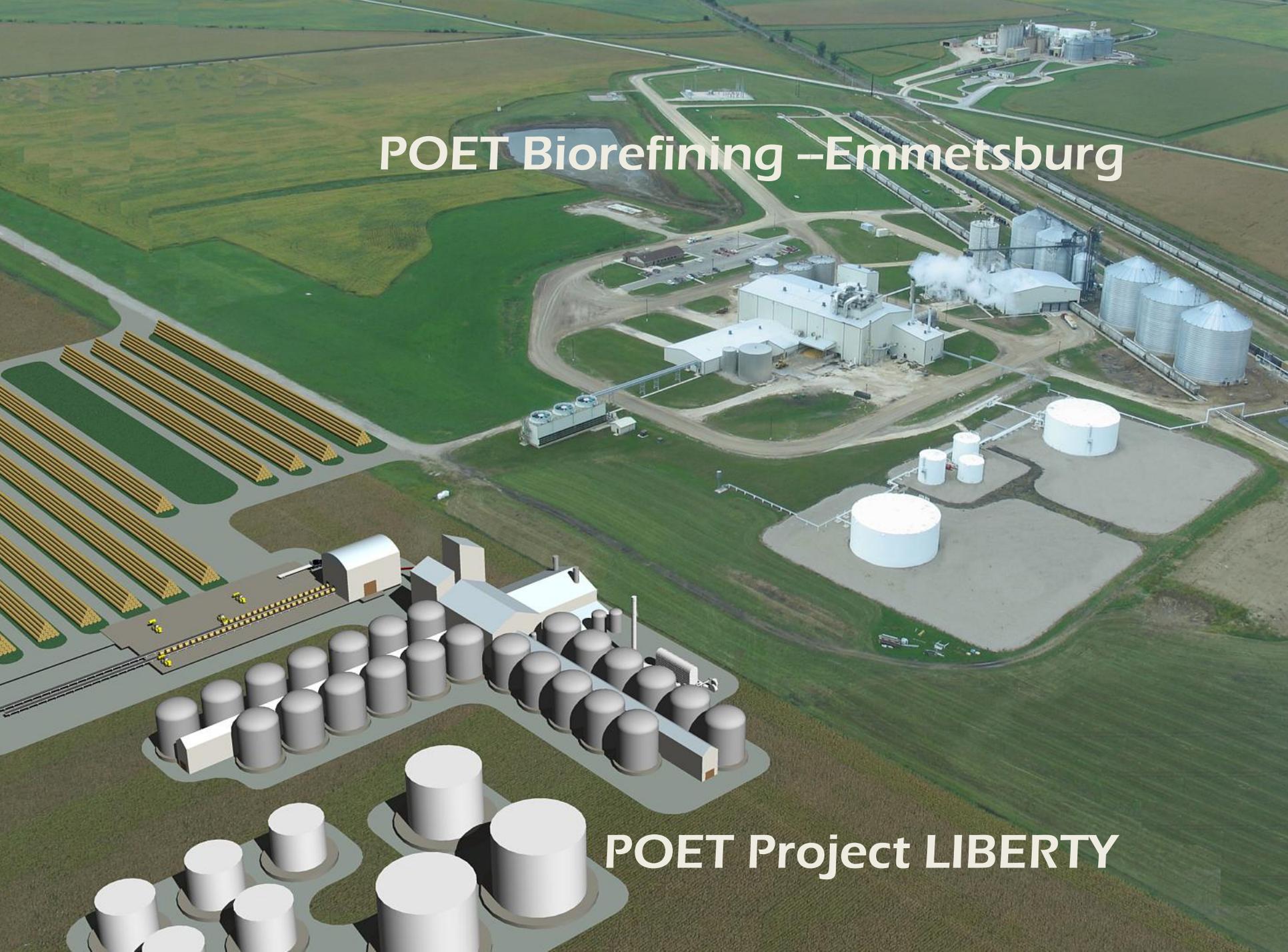
TOPICS

- **Today**
- **Reaching the Vision**

CELLULOSIC ETHANOL

- **Creates / saves jobs and provides boost to rural economies**
- **Majority of jobs cannot be outsourced**
- **Mitigates costs of imported oil**
- **Reduces environmental impacts of continued use of imported and domestic crude oil**

(DOE Biomass Program)



POET Biorefining – Emmetsburg

This aerial photograph shows the POET Biorefining facility in Emmetsburg, Iowa. The image is divided into two main sections. The upper section shows the existing facility, which includes several large white industrial buildings, numerous silver metal grain silos, and a large white storage tank. A train is visible passing through the facility. The lower section shows a new expansion project, 'Project LIBERTY', which consists of a long row of grey cylindrical storage tanks and a new processing building. To the left of the new tanks, there are several rows of harvested corn cobs. The entire facility is situated in a rural area with green fields and a small pond.

POET Project LIBERTY

FEEDSTOCK: CORN CROP RESIDUE

- Available equipment
- Harvest convenience
- Ease of transportation
- Replicable model
- Can be environmentally sustainable



SOIL SUSTAINABILITY



After the biomass harvest

- **Conservative biomass removal rates**
- **Removing 1 BDT/acre**
- **Soil carbon**
- **Corn grain yields**

Local Producer Involvement



POET

PROJECT LIBERTY 2010 BIOMASS HARVEST



CELLULOSIC PILOT PLANT

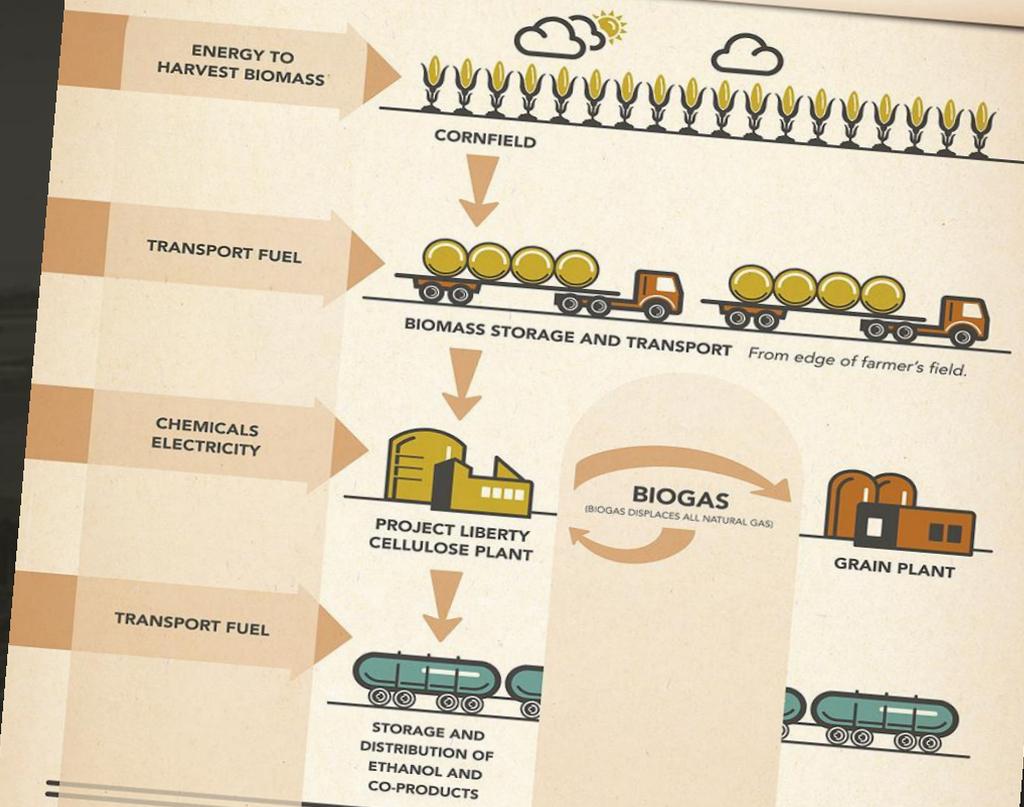
- Start-up in Nov 2008
- Integrated LIBERTY technologies
- Focus on cost reduction



POET Research Center, Scotland, SD

LIFE CYCLE ANALYSIS

POET Project LIBERTY Lifecycle Analysis ETHANOL PRODUCTION, FEEDSTOCK & FUEL TRANSPORTATION



CO₂ EMISSIONS RATE
+41.8

CO₂ EMISSIONS CREDIT
-49.8

-8.0
LIBERTY PROCESS
EMISSIONS / gCO₂ eq/MJ

+ = -9.7
EPA ESTIMATES FOR
IMPACT ON LAND
USE / AGMARKETS



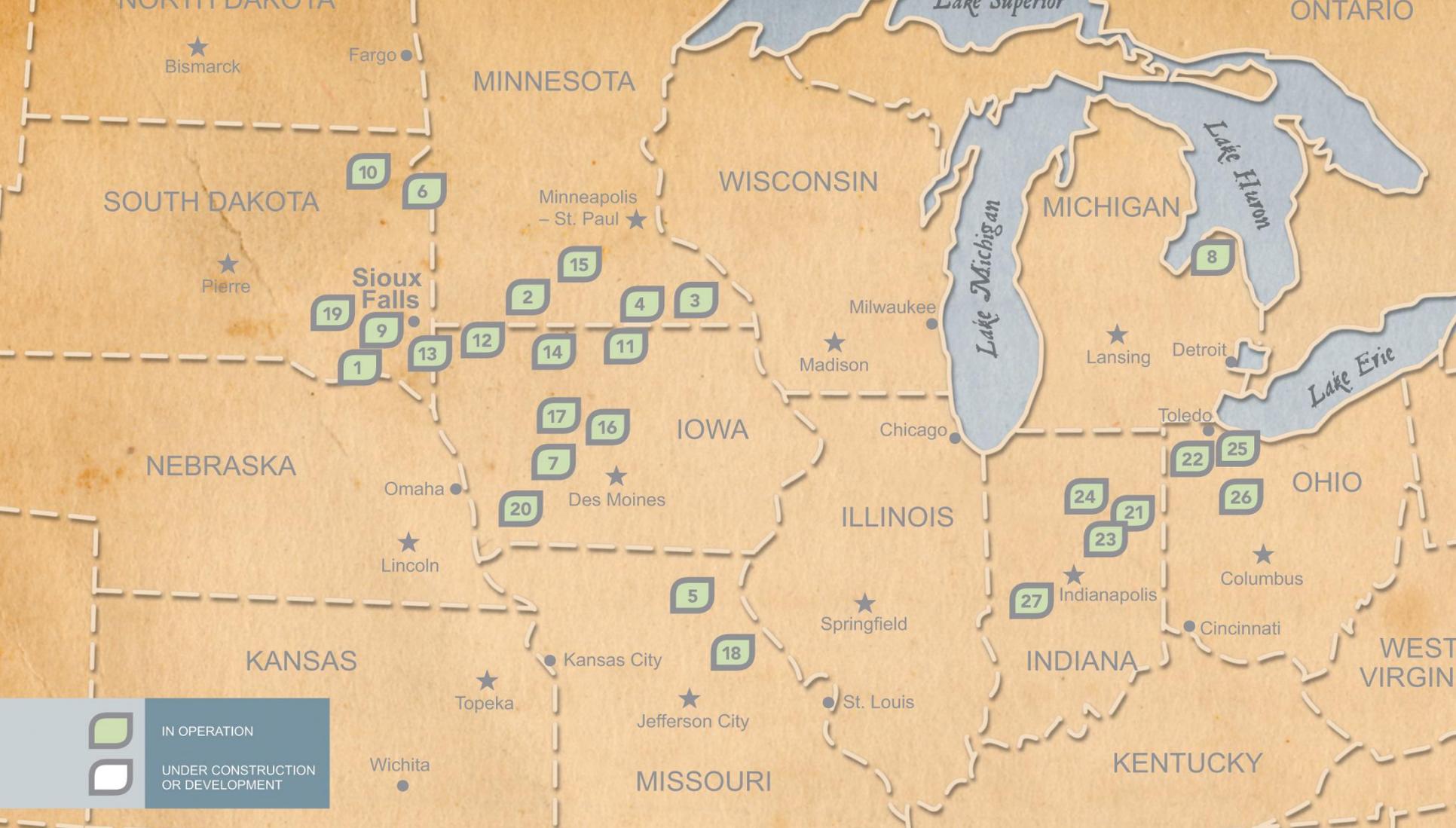
POET
Energy inspired.

Gasoline's emissions = +92.9 gCO₂ eq/MJ

Total **111%** Reduction Over Gasoline

DOE LOAN GUARANTEE

- **Section 1705 Program , ARRA**
- **Conditional Commitment for LIBERTY**
- **Closing anticipated in September**
- **<24 month construction period**
- **Opportunity for rapid replication**

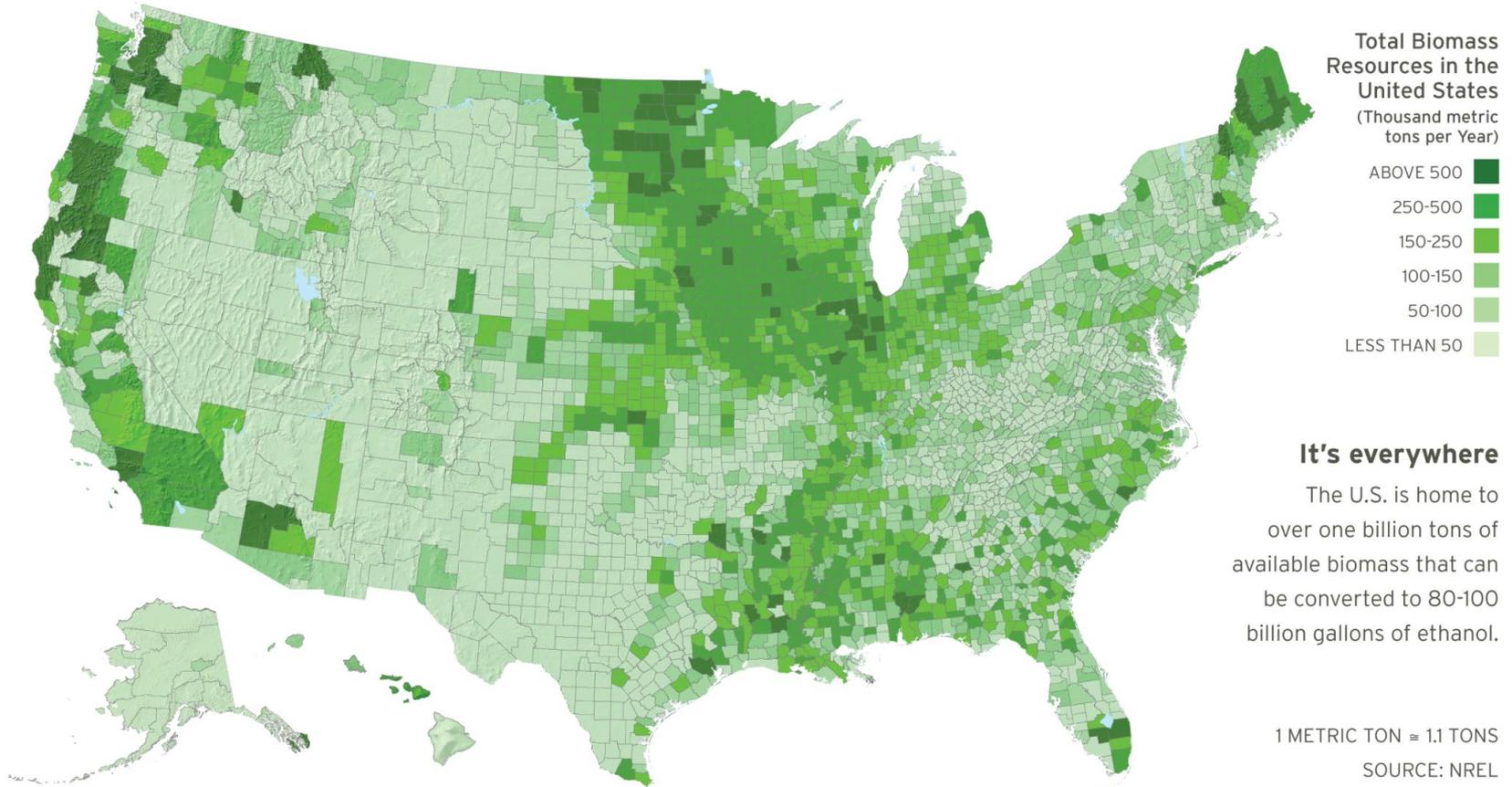


	IN OPERATION
	UNDER CONSTRUCTION OR DEVELOPMENT

POET BIOREFINERY LOCATIONS **TOTAL GALLONS REPRESENTED: 1.7 BILLION**

1 Scotland, SD	7 Coon Rapids, IA	13 Hudson, SD	19 Mitchell, SD	25 Fostoria, OH
2 Bingham Lake, MN	8 Caro, MI	14 Emmetsburg, IA	20 Corning, IA	26 Marion, OH
3 Preston, MN	9 Chancellor, SD	15 Lake Crystal, MN	21 Portland, IN	27 Cloverdale, IN
4 Glenville, MN	10 Groton, SD	16 Jewell, IA	22 Leipsic, OH	
5 Macon, MO	11 Hanlontown, IA	17 Gowrie, IA	23 Alexandria, IN	
6 Big Stone, SD	12 Ashton, IA	18 Laddonia, MO	24 North Manchester, IN	

The '50-State' Solution



Rolling it Out in Iowa

- Biomass at \$50/ton = farm revenue >\$14M annually for one plant
- Biomass for all Iowa plants >\$420M annually
- Over 100 direct and hundreds of indirect jobs for one biorefinery
- Over 3,000 direct and thousands of indirect jobs for all Iowa plants

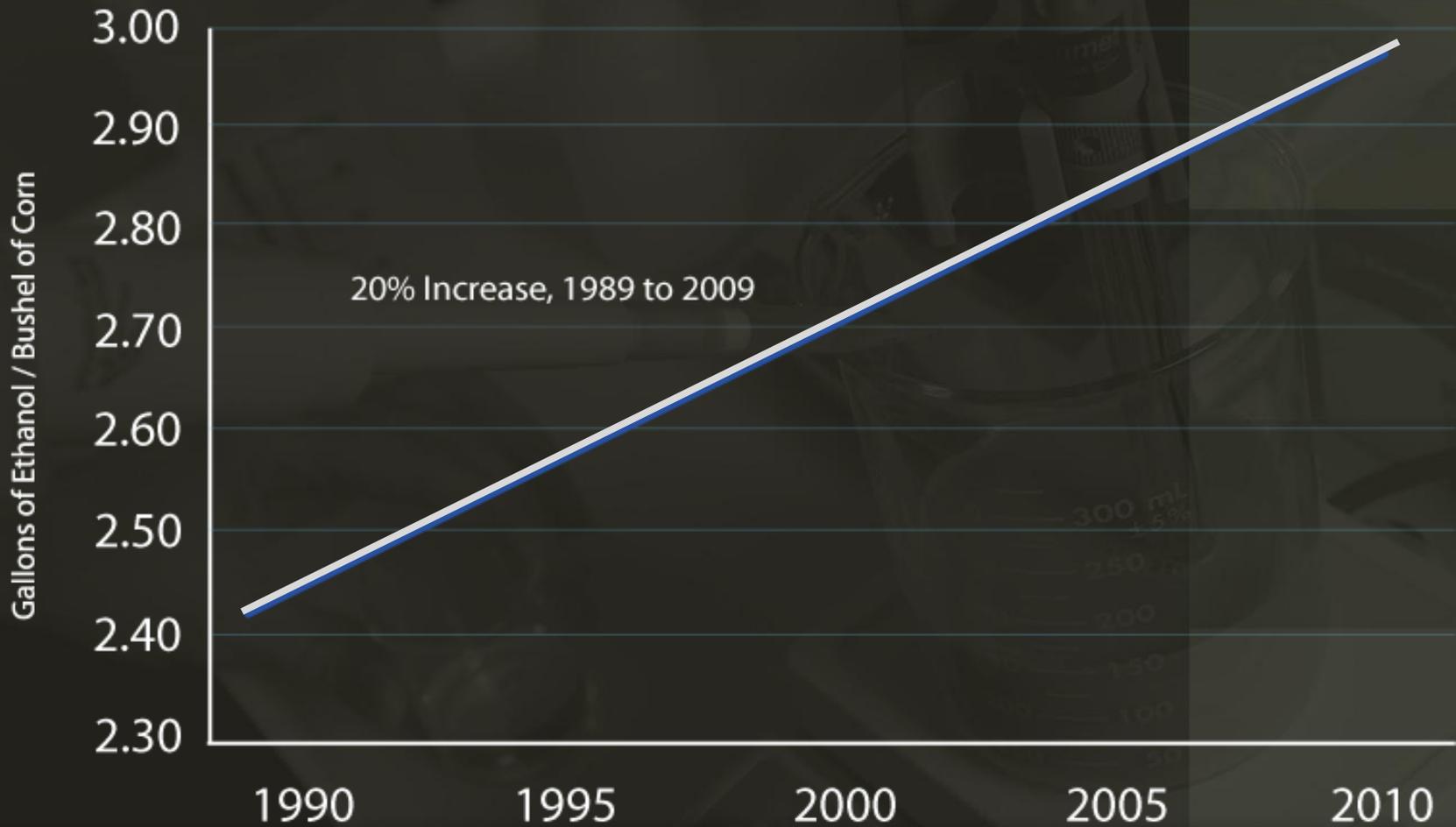
Cellulosic Ethanol: National Impacts

U.S. has over 1 Billion tons of available biomass

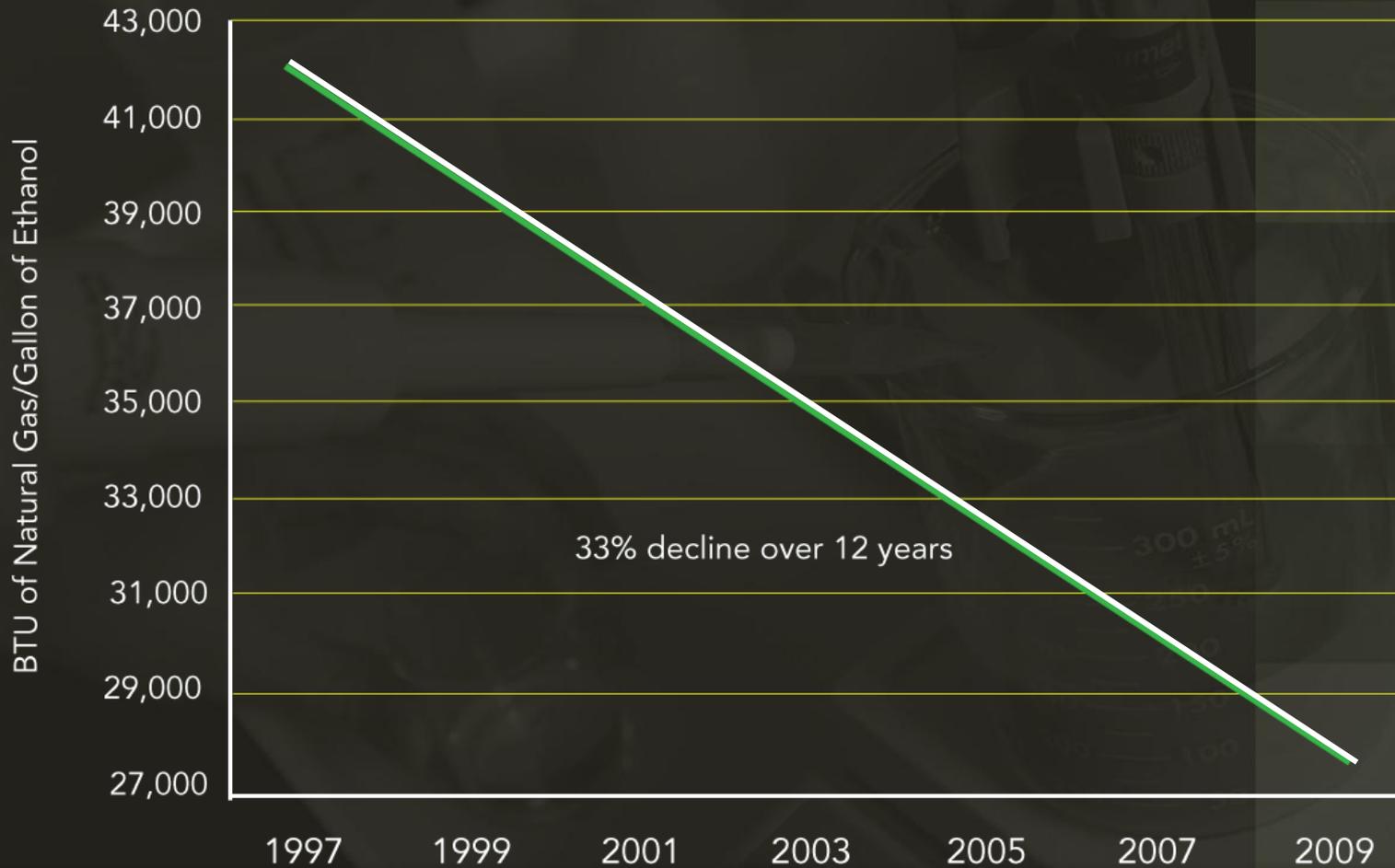
- That's up to 90 billion gallons annually**
- Equal to 60% of U.S. transportation fuel supply**
- And...America imports 60% of its petroleum!**

**Cellulosic ethanol represents thousands of
good, green jobs at home**

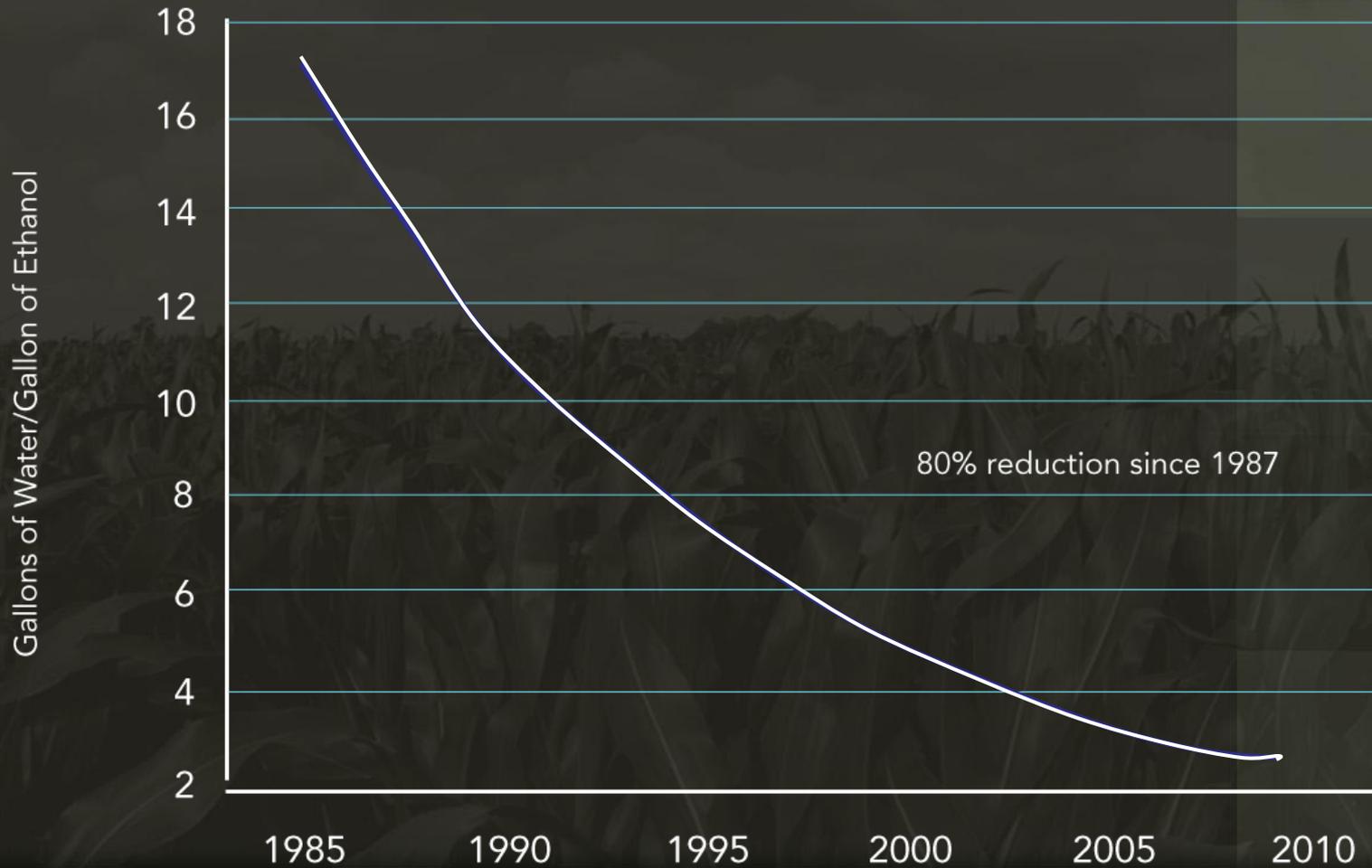
ETHANOL YIELD IMPROVEMENTS



ENERGY USE



WATER USE



REACHING THE VISION

- **Government—recognize the crisis**
- **Corn and cellulose—work together**
- **Feedstock incentives**
- **Ethanol market access**

DEMAND SIDE OPPORTUNITIES

Key Drivers:

- E15, E30
- Flex Fuel Vehicles
- Blender pumps
- Dedicated ethanol pipelines to population centers

FUEL CHOICE

Let consumers decide

THANK YOU!

FOET