USEPA's Regulatory Action under the Energy Independence and Security Act

March 2008

Bob Larson,

Transportation and Climate Div

USEPA

Recent Events

August 2005	Energy Act – requires 7.5 b gals renewable fuel by 2012
January 2007	State of the Union Address—20-in-10 goal
March 2007	Administration proposes Alternative Fuel Standard legislation
April 2007	Supreme Court Decision
May 2007	EPA adopts 7.5 b gal renewable fuel regulations
May 2007	President's Announcement and Executive Order (35 billion gallons renewable and alternative fuel)
December 2007	Energy Independence and Security Act passed by Congress and signed by President Bush, including a 36 billion gallon renewable fuel mandate

EISA has two major components related to GHG from transportation

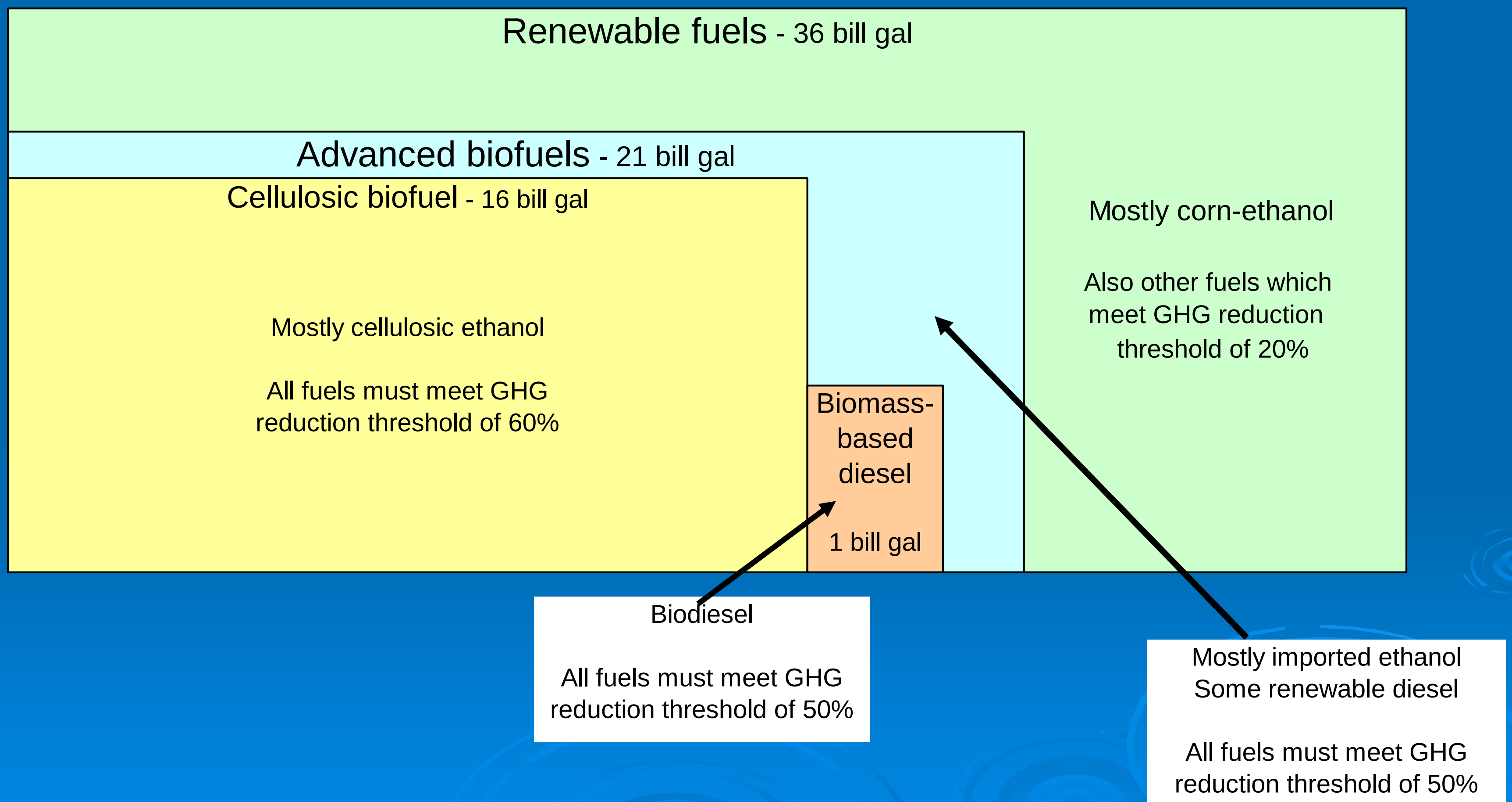
- Improvements in vehicle fuel efficiency (reaching approximately 35MPG on avg by 2022)
- Greatly increases the amount of renewable fuel compared to the 2005 energy act

4 Separate Standards

Year	Advanced Biofuel			Total Renewable Fuel
	Biomass-Based Diesel	Cellulosic Biofuel	Total Advanced Biofuel	
2006				4.0
2007				4.7
2008				9.0
2009	0.5		0.6	11.1
2010	0.65	0.1	0.95	12.95
2011	0.80	0.25	1.35	13.95
2012	1.0	0.5	2.0	15.2
2013	1.0	1.0	2.75	16.55
2014	1.0	1.75	3.75	18.15
2015	1.0	3.0	5.5	20.5
2016	1.0	4.25	7.25	22.25
2017	1.0	5.5	9.0	24.0
2018	1.0	7.0	11.0	26.0
2019	1.0	8.5	13.0	28.0
2020	1.0	10.5	15.0	30.0
2021	1.0	13.5	18.0	33.0
2022	1.0	16.0	21.0	36.0

The Standards are Nested

Shown with 2022 volumes



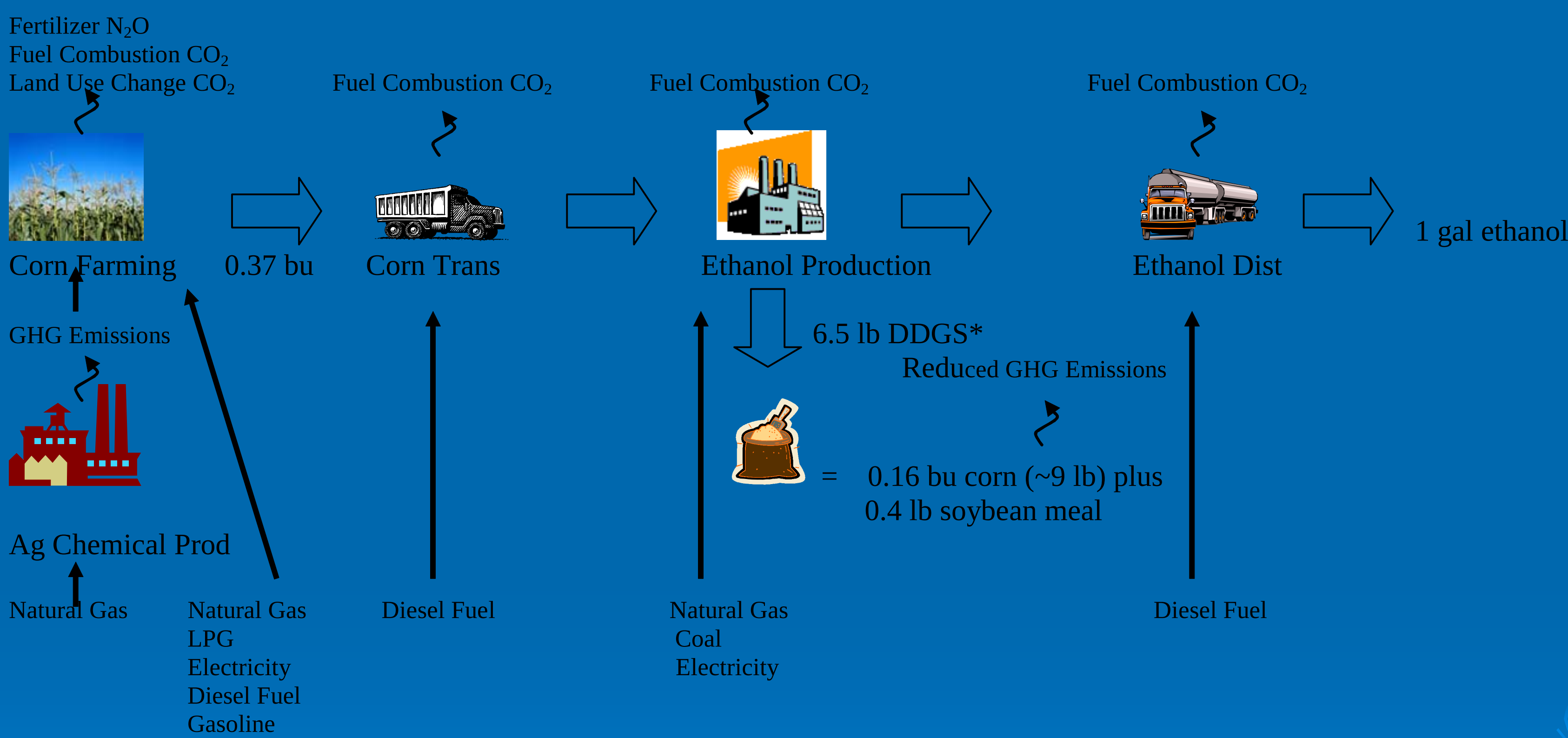
Energy Independence and Security Act Requires Lifecycle Assessment

- Lifecycle assessment required to determine which fuels meet mandated GHG performance thresholds compared to petroleum fuel replaced
  - 20% reduction for new facility renewable fuel
  - 50% reduction for biomass-based diesel
  - 60% reduction for cellulosic biofuel
- Lifecycle assessment must include impacts on land use

Fuel Life Cycle GHG Assessment

- Also called fuel cycle or well-to-wheel analysis, compilation of the GHG impacts of a fuel throughout its life cycle
  - Production / extraction of feedstock
  - Feedstock transportation
  - Fuel production
  - Fuel distribution
  - Tailpipe emissions
- Can be used to compare one or more fuels performing the same function (e.g., miles driven)

Corn Ethanol Example



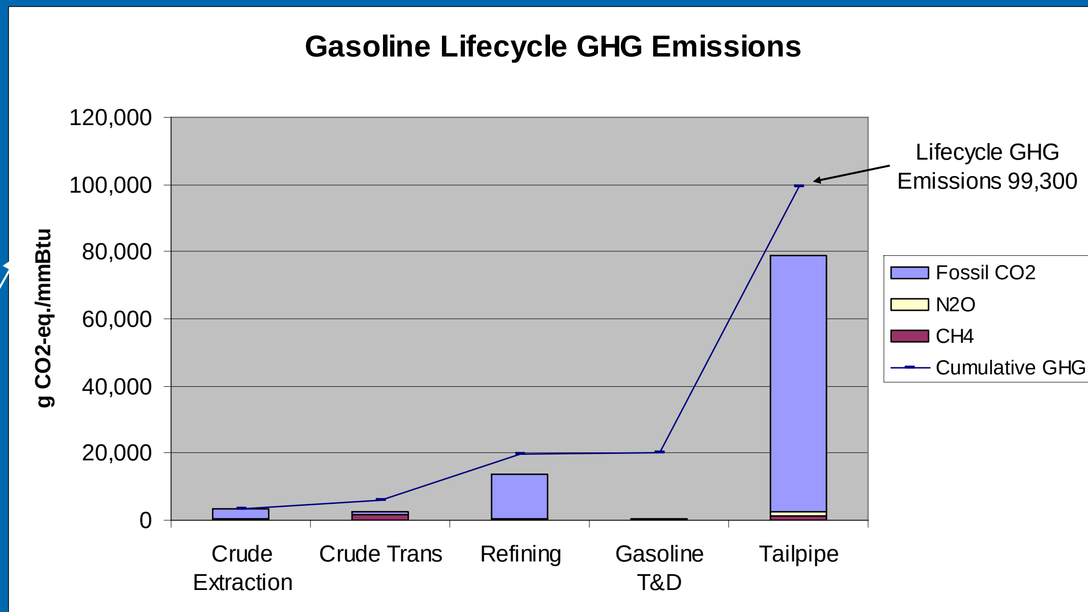
* Displacement allocation used, so for entire system new corn production = 0.21 bu and results in 0.4 less soybean meal produced

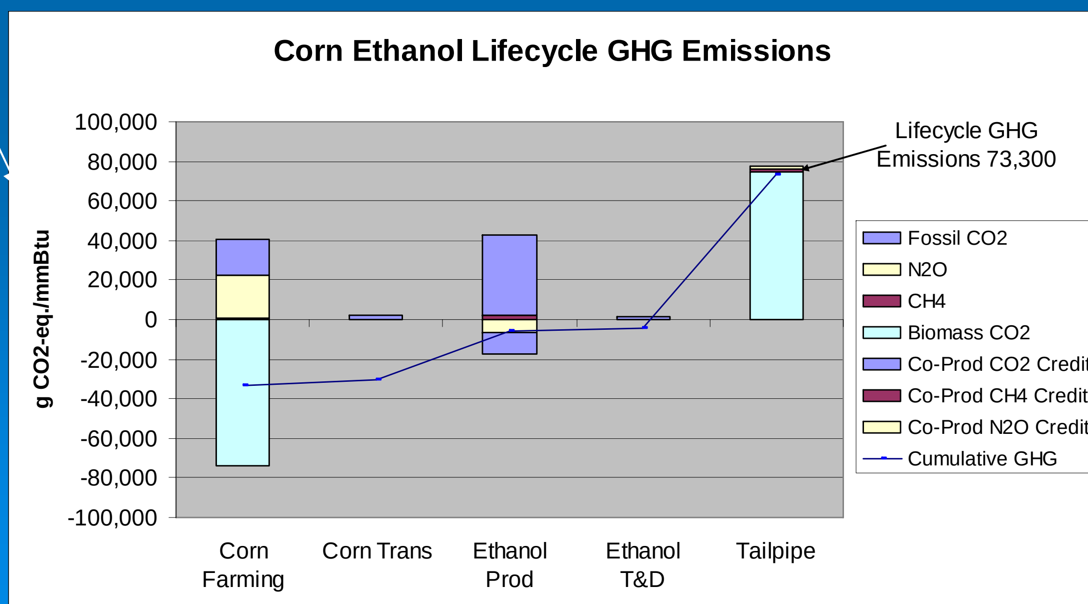
DDGS = Distiller Dried Grains, substitute animal feed

Can compare to producing an equivalent amount of petroleum gasoline

Example: Gasoline vs. Corn Ethanol Lifecycle Comparison From RFS 1

Comparing energy equivalent amounts of fuel





26% reduction in GHG emissions

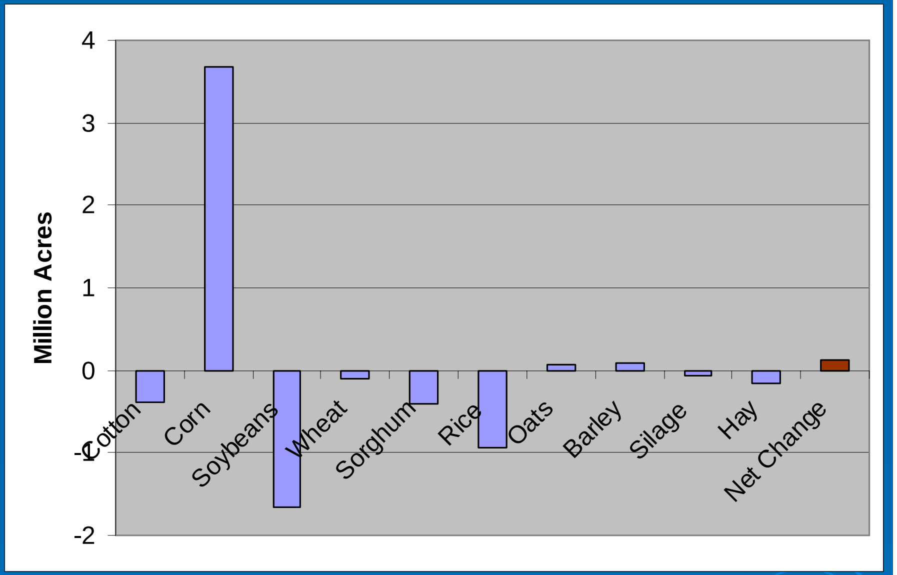
Assumptions: 7.5 Bgal scenario used in the Renewable Fuel Standard Rulemaking, corn ethanol dry milling using natural gas

Example Lifecycle Analysis

- Prior Renewable Fuel Standard analysis assessed first order impacts
  - GHG impacts of corn and soybean acres in US
- New analysis more complete assessment of domestic impacts and added international
  - Corn and soybeans plus other crops
  - Land use changes
  - International impact of decreased US exports
    - Increased crop production in other countries adds GHG
    - Land use impacts critical

Domestic Impact Discussion

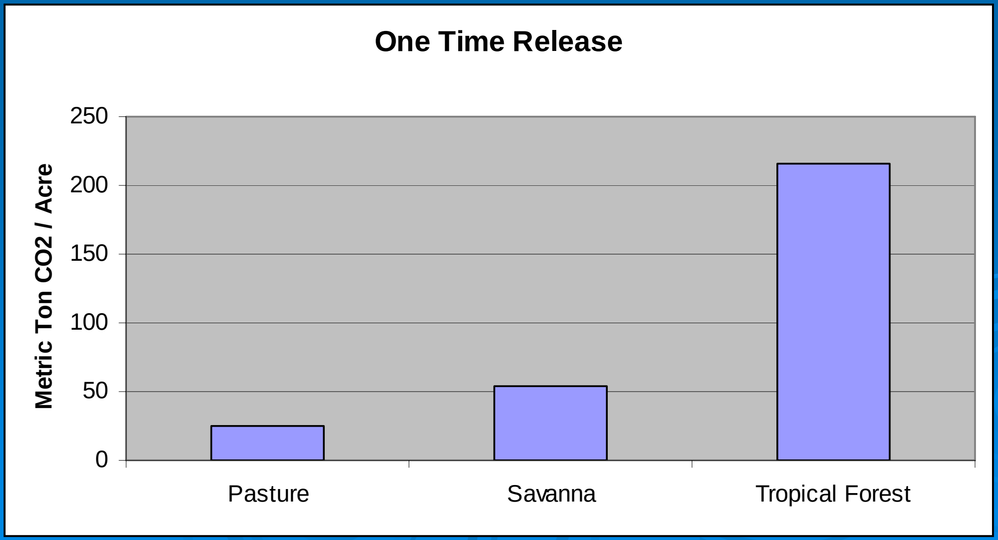
- Looking at domestic impacts only of increased ethanol production results in a net decrease in total GHG emissions
  - Shift in crop production results in little net crop acreage increase in US
  - Decrease in rice acres and livestock production (due to increased feed prices) results in GHG emission reductions



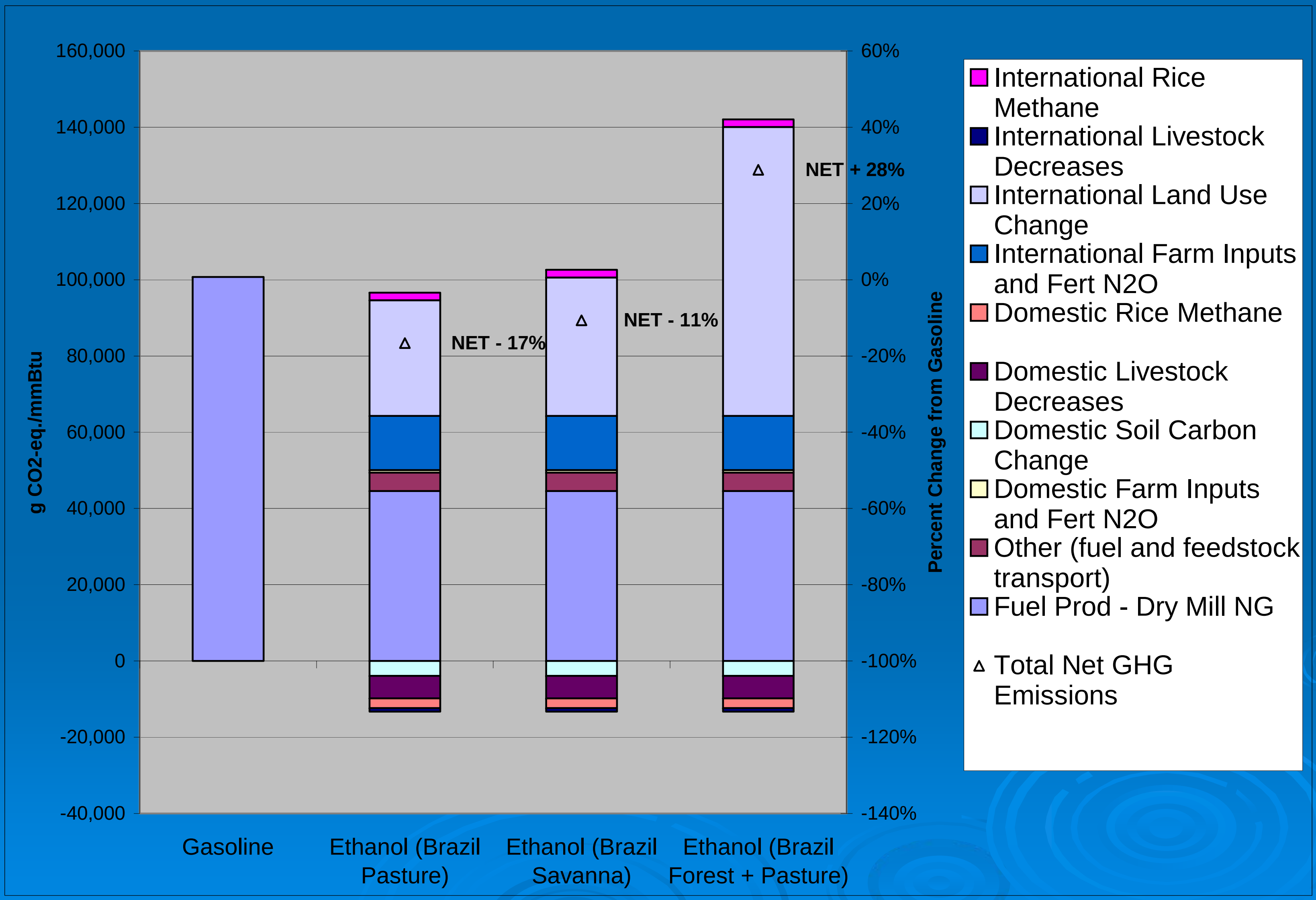
- 40% of corn used for ethanol comes from reductions in exports (highlighting need to include international impacts)

Land Use Change Assumptions

- Need to consider carbon per acre for different land types
- What type of land is converted in different countries, for example:
  - Argentina (Savanna)
  - Brazil Case 1 (Pasture)
  - Brazil Case 2 (Savanna)
  - Brazil Case 3 (Pasture + Tropical Forest)
  - Indonesia (Tropical Forest)



Impact of Land Use Change Assumptions
(Dry Mill, Natural Gas, Dry and Pelletized DDGS)



Further Work on Life Cycle Modeling

- **Specific areas of improvement that we are working on include:**
  - Building a consistent modeling framework that captures both domestic and international agricultural sector changes and GHG impacts
  - Working with experts to improve understanding of agricultural N2O emissions
  - Developing country specific GHG emissions factors associated with land use change and agricultural practices
  - Updating petroleum baseline
- **Updating other biofuel life cycle GHG factors with this approach**
  - Biodiesel
  - Imported ethanol
  - Cellulosic ethanol
- **We continue to have discussions with**
  - Industry groups
  - Academics and other experts