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# Increasing Feedstock Production for Biofuels

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# About the report

- Commissioned by the BRDi board; joint work between USDA, DOE and EPA
  - Measured the incremental effects of moving from USDA projection of 12 billion gallons of ethanol to 15 billion gallons in 2016
    - Included scenarios to assess potential impacts of research
  - Boundary of study was feedstock production on agricultural land (forests considered in 2022)
    - Transport, processing, storage, and conversion of feedstock were not considered
  - Focus of analysis was land use change, GHG implications, and sustainability
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# Modeling framework

- Used a regional agricultural sector model (REAP)
    - A partial-equilibrium, one-period model calibrated to the USDA baseline projections
    - 50 regions
    - 10 major field crops plus livestock and processed goods
    - Crop rotations, tillage regime, and fertilizer application rates are identified for each region
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# GHG implications of biofuel feedstock production

- CO<sub>2</sub> emissions related to changes in regional land use patterns
  - CO<sub>2</sub> emissions/sequestration related to changes in the regional and national mixes of tillage practices
  - GHG emissions related to nitrogen fertilizer use
  - GHG emissions related to the use of farm machinery, other chemicals and field operations in corn ethanol production
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# Results for 2015 – Land use change (Corn ethanol only)

	USDA Baseline (12 bg)	Reference (15 bg)	High Corn Productivity (15 bg + 50% yield growth)
US Total (million acres)	316.99	321.41	319.77
GHG impact (million mt CO <sub>2</sub> )		3.75	-1.30
Tillage (million acres)			
Conventional	232.09	234.81	233.13
Reduced	51.02	51.70	51.58
None	33.88	34.90	35.06
GHG emissions from tillage (million MT CO <sub>2</sub> )		-0.69	-0.04

# Results for 2015 – Corn production (Corn ethanol only)

	USDA Baseline (12 bg)	Reference (15 bg)	High Corn Productivity (15 bg + 50% yield growth)
Corn acres (million)	90.00	93.68	90.66
GHG (million MT CO <sub>2</sub> )			
Machinery	4.57	4.74	4.52
Farm operations	36.59	37.89	36.20
Other chemicals	25.16	26.05	24.89
Nitrogen fertilizers	70.90	73.42	70.14
Change from Baseline		7.95	
Change from Reference (including land use change)			-7.70

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# Conclusions

- Farm sector GHG impacts are likely to be modest
  - Changes in farm inputs are the biggest contributor to GHG reduction in the high corn productivity scenario
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