California Environmental Protection Agency

Air Resources Board

Agricultural Phase Carbon Intensities for the Corn Ethanol Pathway

August 21, 2012

Objectives

- Decomposition of GREET Defaults
  - Fertilizers
  - Lime
  - Pesticides
  - Fuel & Electricity Use
- Trends in Agricultural Chemical Applications
- Conclusions

Nitrogen Fertilizer Emissions

	GREET 1.8b, 2009	GREET 1, 2011
Total g/bushel N_2O	420.00	415.30
Total gCO_2e/MJ	22.28	22.30
gCO_2e/MJ From Soil Surface	6.37	6.96
gCO_2e/MJ From Below Soil Surface	15.91	15.34

Phosphate Fertilizer Emissions

	GREET 1.8b, 2009	GREET 1, 2011
Total gP_2O_5/ bushel	149.00	147.80
Total gCO_2e/MJ	0.72	0.71

Potassium Fertilizer Emissions

	GREET 1.8b, 2009	GREET 1, 2011
Total gK_2O/ bushel	174.00	172.10
Total gCO_2e/MJ	0.58	0.53

Lime Emissions

	GREET 1.8b, 2009	GREET 1, 2011
Total gCaO/ bushel	1202.00	1149.90
Total gCO_2e/MJ	6.08	7.73

Herbicide Emissions

	GREET 1.8b, 2009	GREET 1, 2011
Total g/bushel Herbicides	8.10	4.75
Total gCO_2e/MJ	0.82	0.46

Insecticide Emissions

	GREET 1.8b, 2009	GREET 1, 2011
Total g/bushel Insecticides	0.68	0.40
Total gCO_2e/MJ	0.08	0.05

Ag. Chemical Totals

	GREET 1.8b, 2009	GREET 1, 2011
gCO_2e/MJ	30.56	31.78

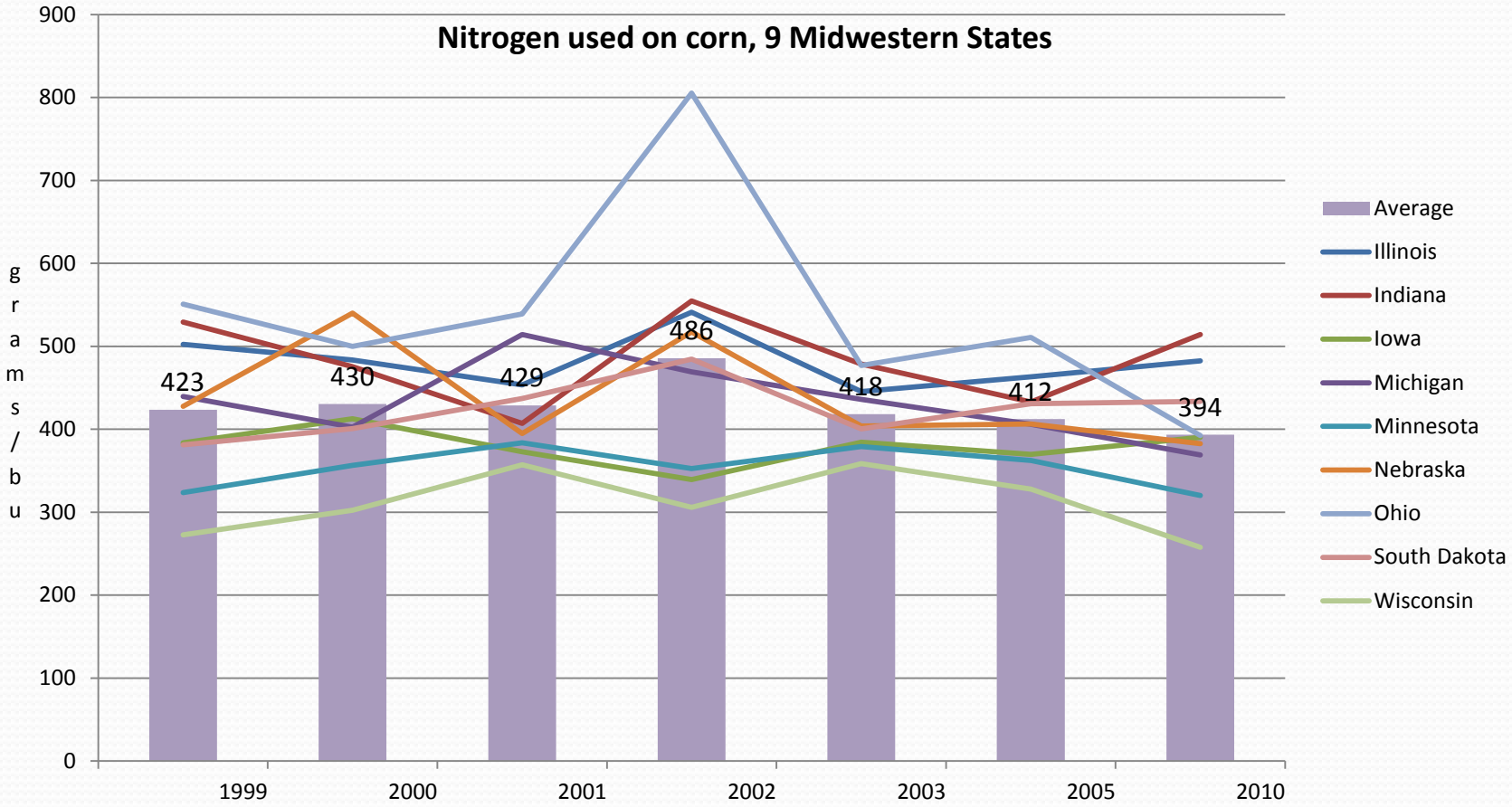
Fuel & Electricity Use (Stationary and Vehicular Equipment)

	GREET 1.8b, 2009	GREET 1, 2011
BTU/bu	12,635	9,608
gCO_2e/MJ	5.68	4.32

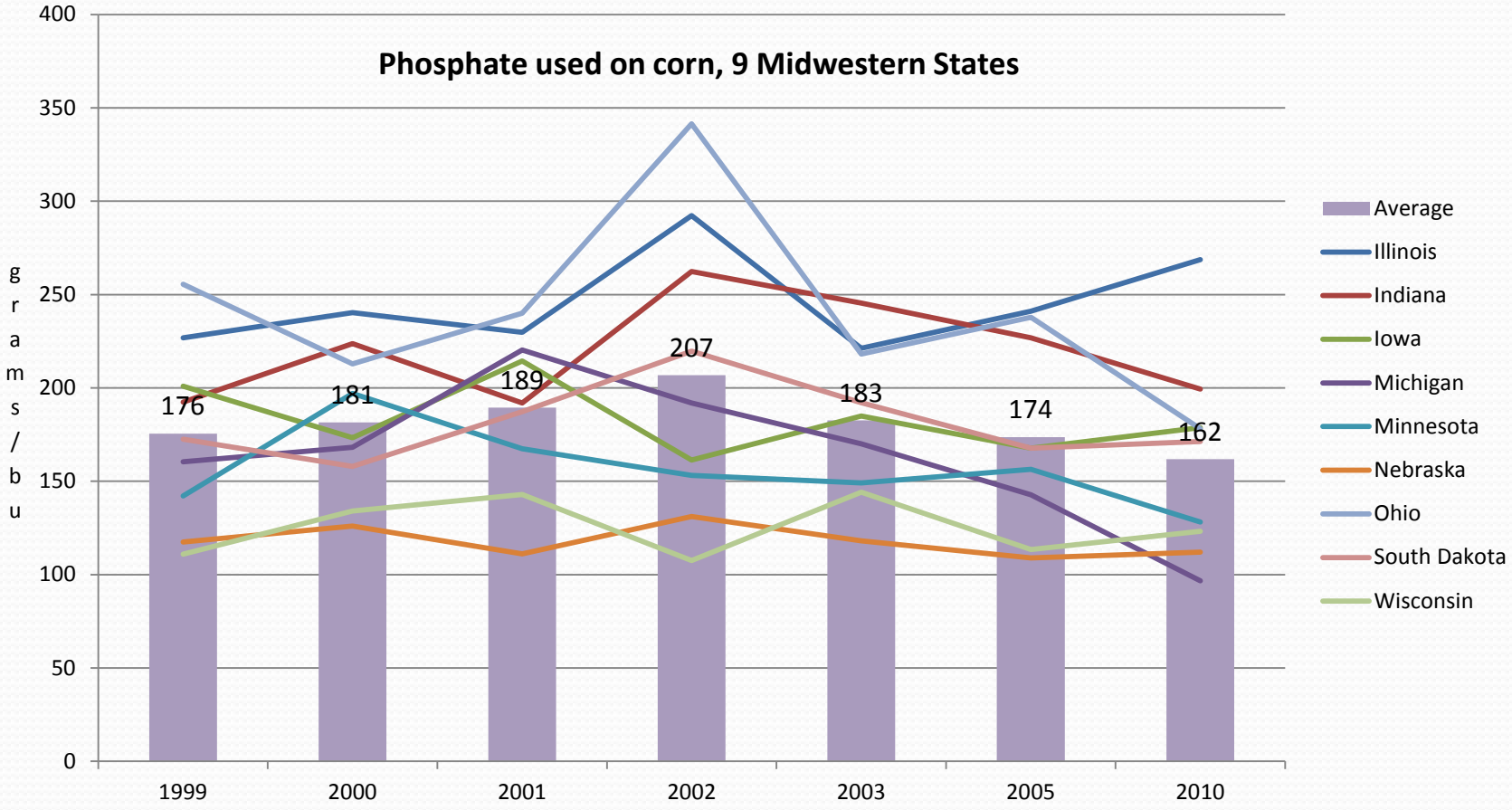
Summary of CI Values

Component	gCO_2e/MJ (GREET 1.8)	Percentage of Total CI
Nitrogen Fertilizer	22.28	61.5%
Lime	6.08	16.8%
Fuel & Electricity	5.68	15.7%
Other Fertilizers	1.30	3.6%
Pesticides	0.90	2.5%

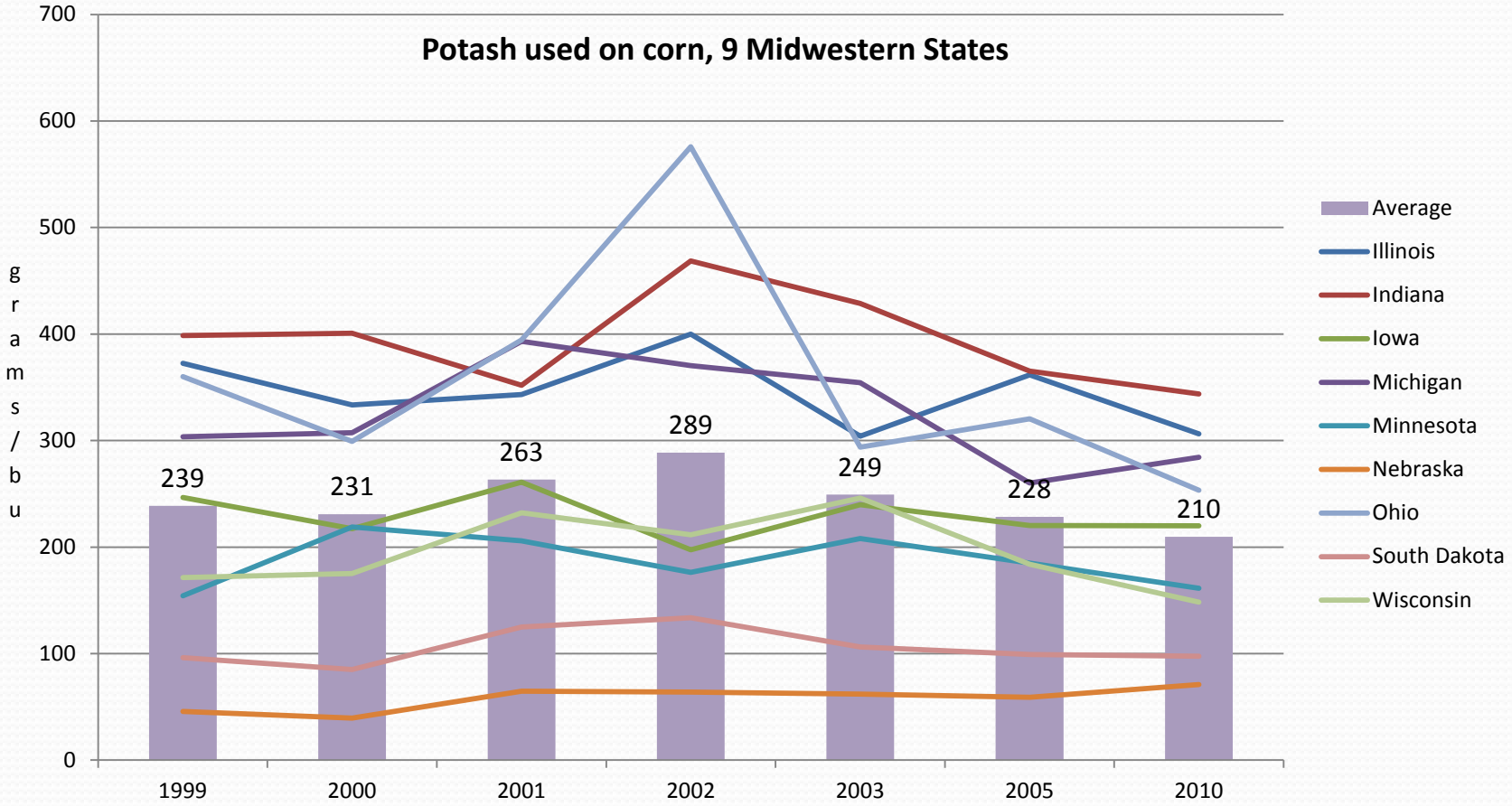
Trends in Nitrogen Fertilizer Use



Trends in Phosphate Fertilizer Use



Trends in Potassium Use



Conclusions

- Aggregate industry trends are moderately downward.
- Opportunity for CI reduction by individual farms or groups of farms lies primarily with Nitrogen reductions.
- Other promising reductions
  - Lime reductions, if possible.
  - Fuel and electricity use reductions

Conclusions (Cont.)

- Discussion Question: Should sustainability certification assure a degree of CI reduction?

Contact

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