Corn Ethanol - Viable?

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Economic viability condition:

Energy value of corn > Food value of corn

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- price of oil
- blenders credit, tariff
- mandates

- carbon foot print
- political will

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Growth in world:
- population
- income/cap

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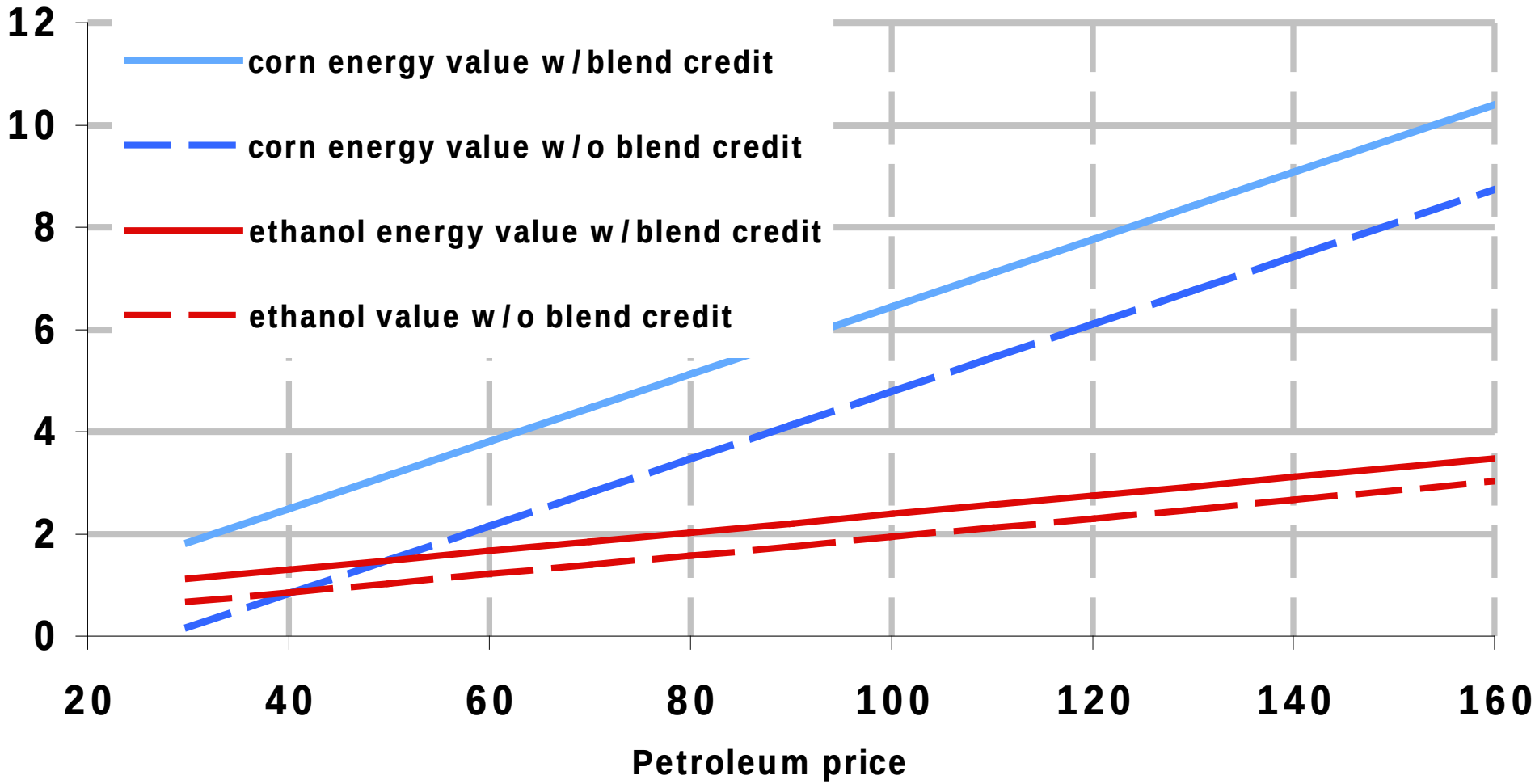
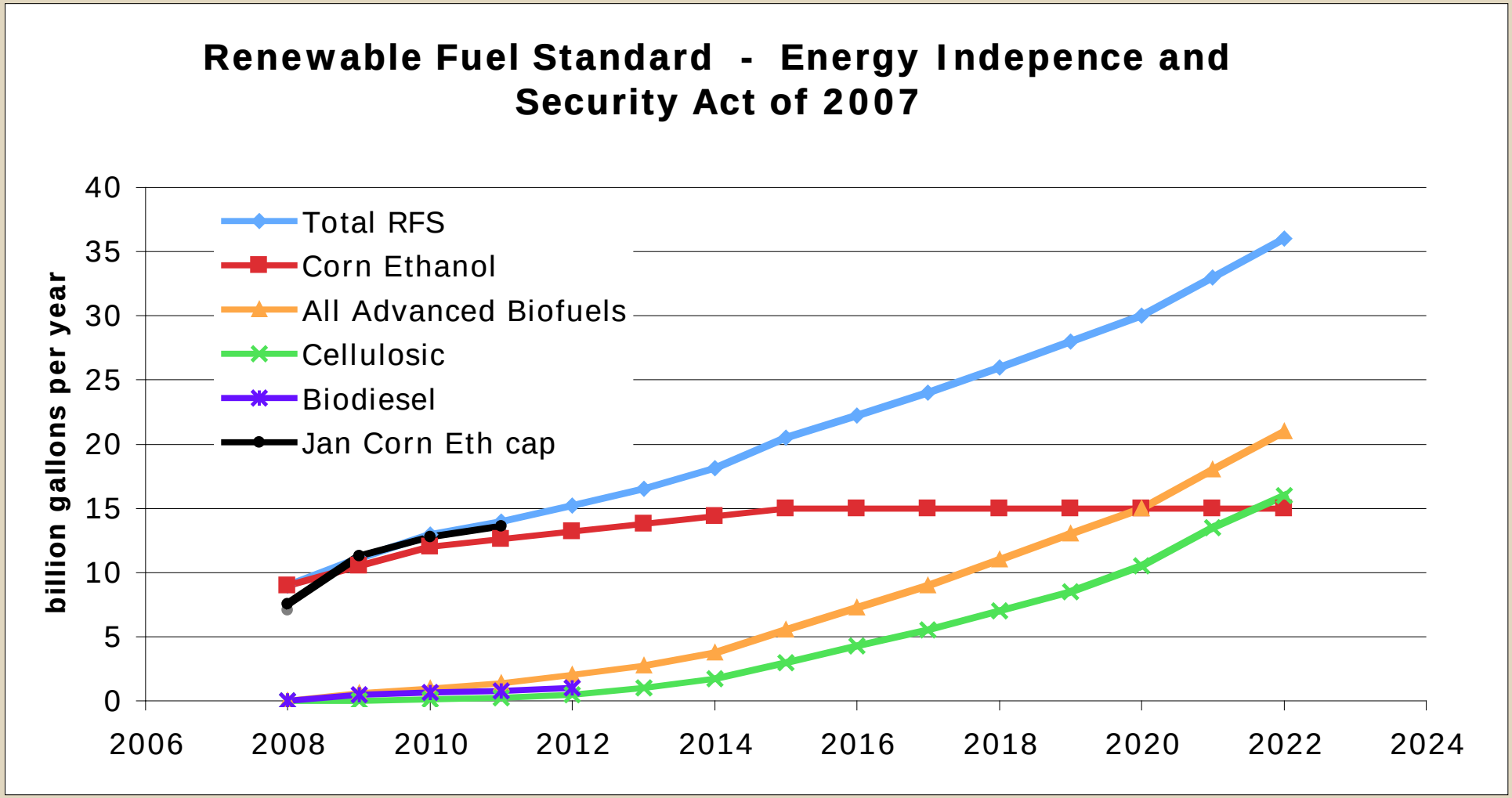
The energy value of ethanol and corn, based on petroleum



Value due to mandates?



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Political Viability – Greenhouse gas emissions?

Carbon footprint estimates	
Fuel	gCO_2e/MJ
Gasoline	92-94
Corn ethanol estimates	
Normal life cycle analysis	38-80
Searchinger - add ILU	104
Total	140-180
BESS - dry mill, wet byproduct	*38*
Old California life cycle est.	*76*
Cellulosic ethanol	*5-15*
EISA corn eth. standard	*74*
EISA adv biofuel standard	*46*

Political Viability – Use food for fuel?

A silly argument in today's US:

- U.S. ethanol accounts for 40% of the *increase* in world grain consumption in the last 5 years
- Grain prices have risen by something close to 100% in that time
- So *maybe* ethanol is 40% responsible - .4x100= a 40% price increase
- The *farm value of all grains* in the US = 3¢ per $1 of food expenditures
- Therefore, ethanol *may* have caused that 3¢ to go to 4.2¢ - - about a 1.2% increase in US food cost
- Food is 10% of consumer income, so this represents 0.12% of income

Political Viability – Use food for fuel?

But in *poor* countries today:
- grain may be 30% of food expenditures
- food may be 70% of income
- so a 100% price increase might = 20% of income

And in the next 40 years:
- world population will rise about 50%
- per capita incomes will probably (hopefully?) rise
- thus increasing demand for grains by more than 50%

World grain yields increase 50+%? not at all likely
Water supplies for agriculture diminish? very likely
Quantity and/or quality of land increase? not likely
Will grain be too valuable to burn? *Absolutely*

So, *is* corn ethanol viable?

Yes, for 20+ years, because of oil prices and policies:

- w/o ethanol, corn is now worth perhaps $3.00 for food
- Therefore energy can buy more corn if oil is $60 or more
- Or, w/o VEETC or mandates, if oil is $85 or more
- Therefore, we *will* see more corn ethanol expansion, with or without subsidies and mandates
- But the expansion will be cautious and is unlikely to continue beyond 10 years or so:
  - research will produce cheaper low-carbon fuels(cellulosic?)
  - food and sequestered carbon will be too valuable

END

…..what do *you* think?

Economic Viability – Budget basis

Average costs per gallon of denatured ethanol for seven Midwest dry-mill plants, 2006-2007

Item	units	price	quantity	cost
Electricity	kwh	0.044	0.570	0.025
Natural gas	MMBTU	7.2	0.0263	0.190
Chemicals and denaturant				0.133
Labor & mgt				0.051
Other				0.056
Total processing costs				0.455
Feedstock cost (corn)	bu	3.04	1/2.86	1.063
Byproduct (distillers grains)	lbs DM	0.044	5.210	-0.229
Net feedstock costs				0.834
Net operating costs				1.288
Ethanol revenue				1.951
Return over operating cost				0.663