PURDUE UNIVERSITY

PURDUE AGRICULTURE

BioEnergy

Fueling America Through Renewable Resources

Biofuels, Energy Security, and Future Policy Alternatives

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Policy History

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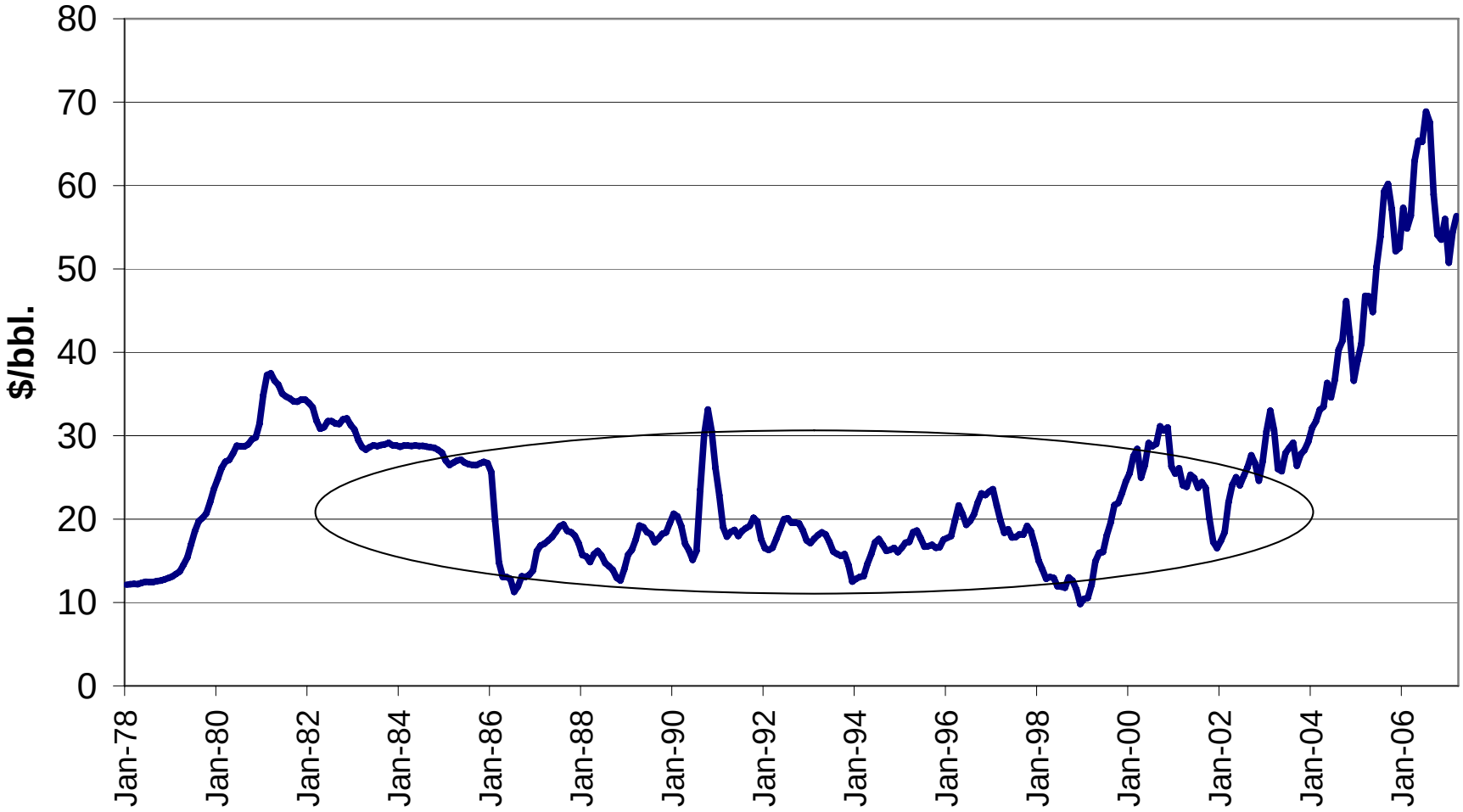
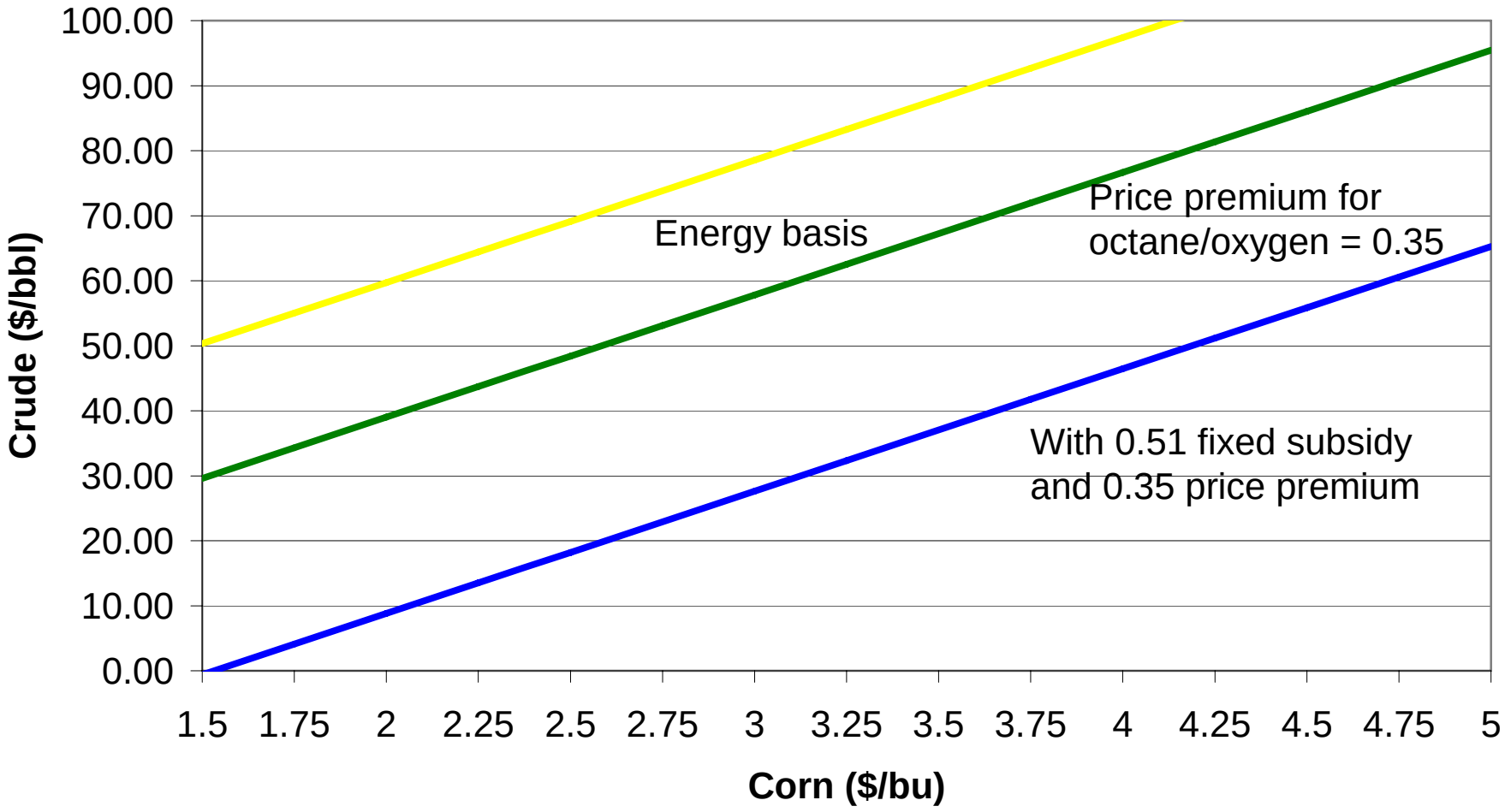
- The US has subsidized ethanol since 1978 with a subsidy ranging between 40 and 60 cents per gallon.
- The current federal subsidy is 51 cents per gallon, and there are some state subsidies as well.
- The price of crude oil ranged between $10 and $30/bbl. between 1982 and 2003
- With these crude prices, the ethanol subsidy did not put undue pressure on corn prices.

Crude Oil Price History



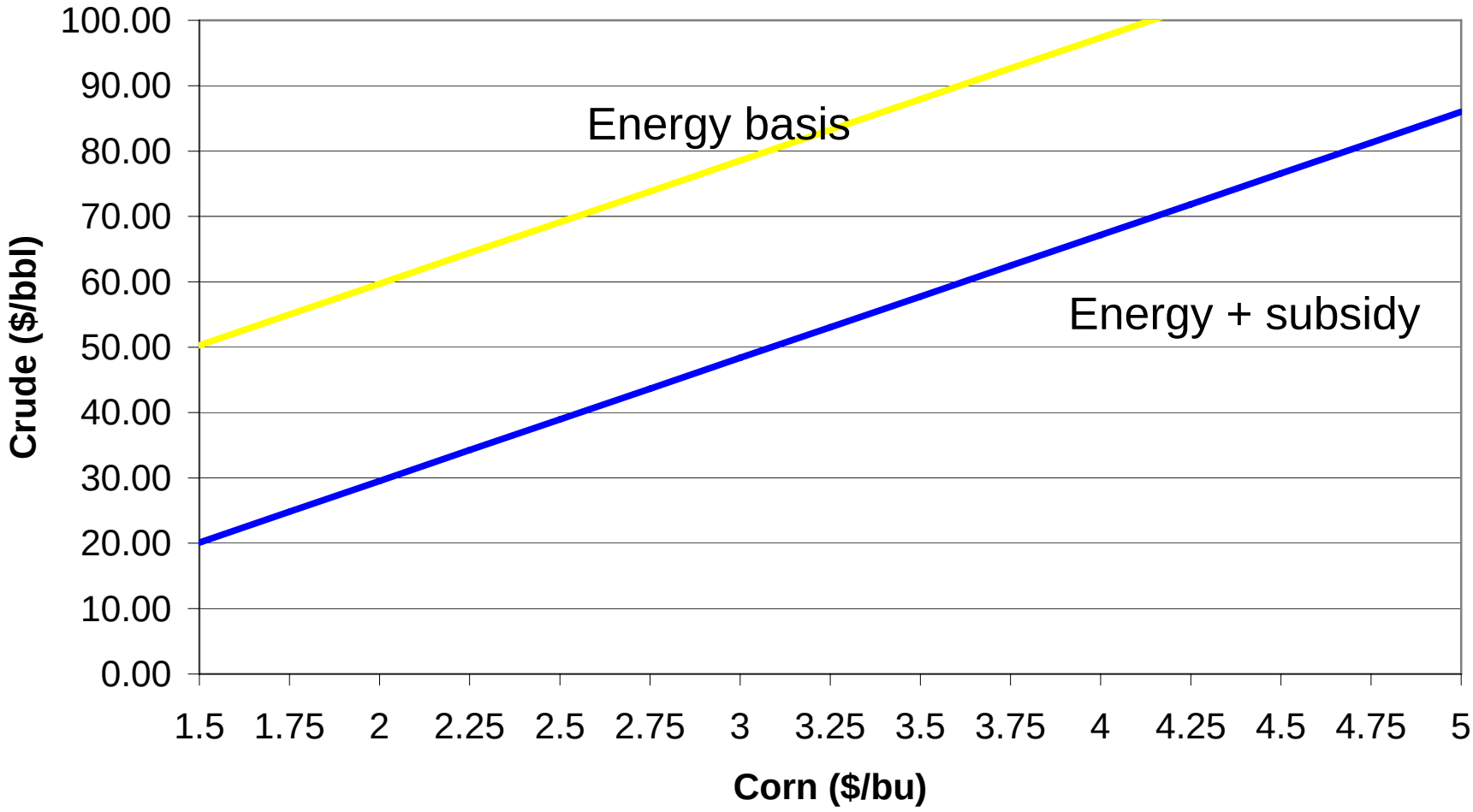
Breakeven Corn and Crude Prices with Ethanol Priced on Energy and Premium Bases Plus $0.51 Ethanol Subsidy



Corn Use for Ethanol

- By the end of this year about 3 bil. bu. of corn will be used to produce about 8 bil. gal. of ethanol – about 23% of the crop
- It could go to 4 bil. bu. in 2008 – over 30% of the crop
- With more corn used for ethanol, we might expect:
  - More corn to be produced and higher prices – already here
  - Less corn to be exported
  - Somewhat less corn to be fed
  - Higher price volatility

Breakeven Corn and Crude Prices with Ethanol Priced on Energy Bases



Policy Alternatives

- Stay the course with current policy
- Reduce the fixed subsidy
- Variable subsidy
- Two part subsidy designed to include energy security and GHG emission reductions
- Special incentives for cellulose ethanol
- Alternative fuel standard
- Combination of alternative fuel standard and variable subsidy

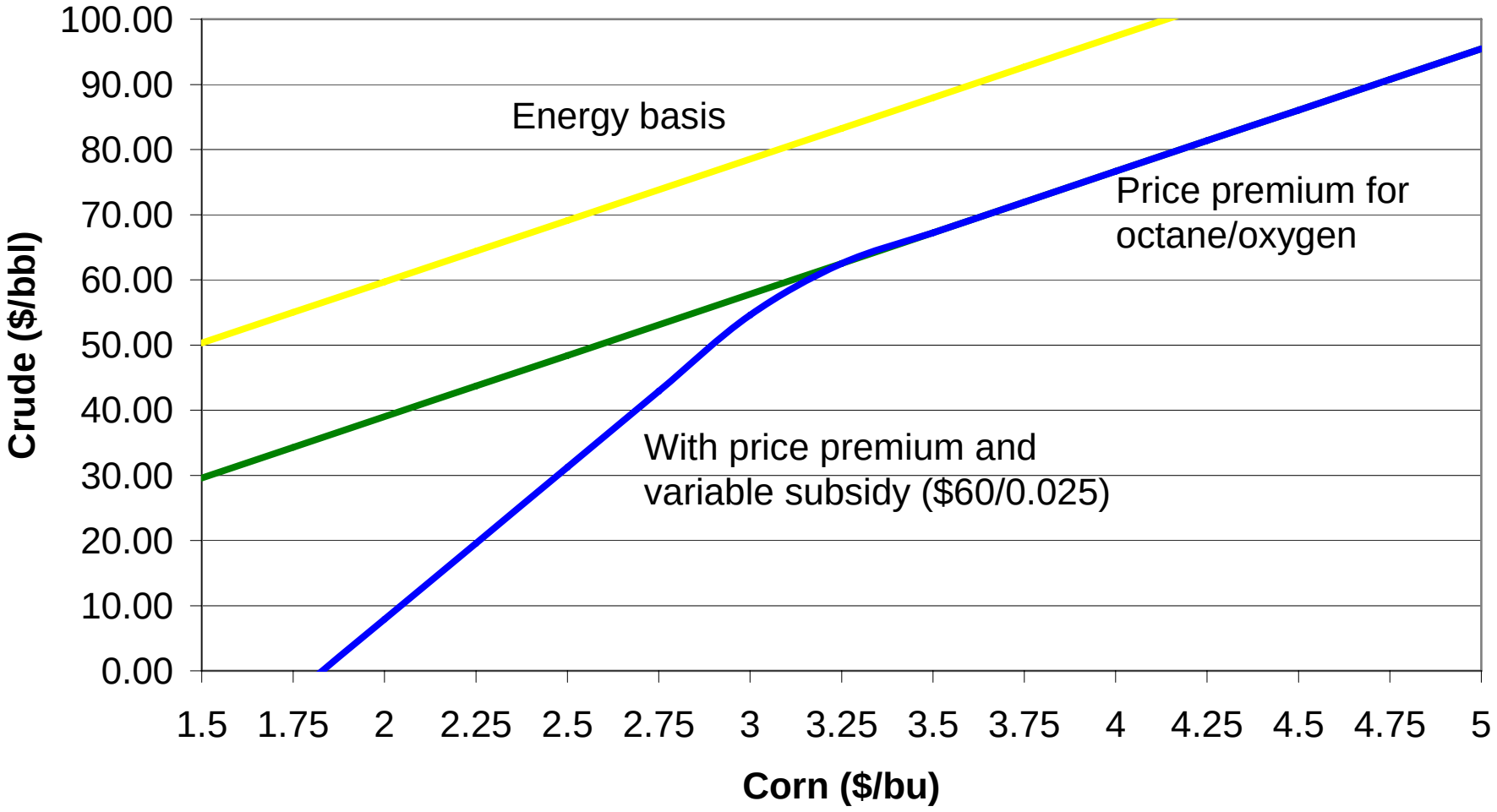
Stay with Current Policy

- Staying with the current fixed 51 cent per gallon subsidy would likely result in markets keeping the corn price high and stimulating investment in ethanol until the corn price chokes off profitability
- There would be some food cost increases due to higher corn prices
- Global impacts are very important and quite difficult to estimate

Variable Subsidy

- The energy security externality can be handled through either a fixed or variable subsidy.
- A subsidy that varies with the price of crude oil would be a means of reducing the cost of the government subsidy while still providing a safety net if crude oil prices fall significantly
- The variable subsidy has two parameters:
  - Crude price at which it begins ($60)
  - Increase in the subsidy for each $1 crude falls below that price (2.5 cents/$)

Breakeven Corn and Crude Prices with Ethanol Priced on Energy and Premium Bases plus Variable Ethanol Subsidy



Two-Part Subsidy

- To handle both the energy security and global warming issues, we could have a subsidy that incorporated both
- According to Hill and Tilman, corn ethanol reduces GHG 12.4%, soy biodiesel 40.5%, and cellulose ethanol as much as 275%, depending on production conditions.

Two-Part Subsidy

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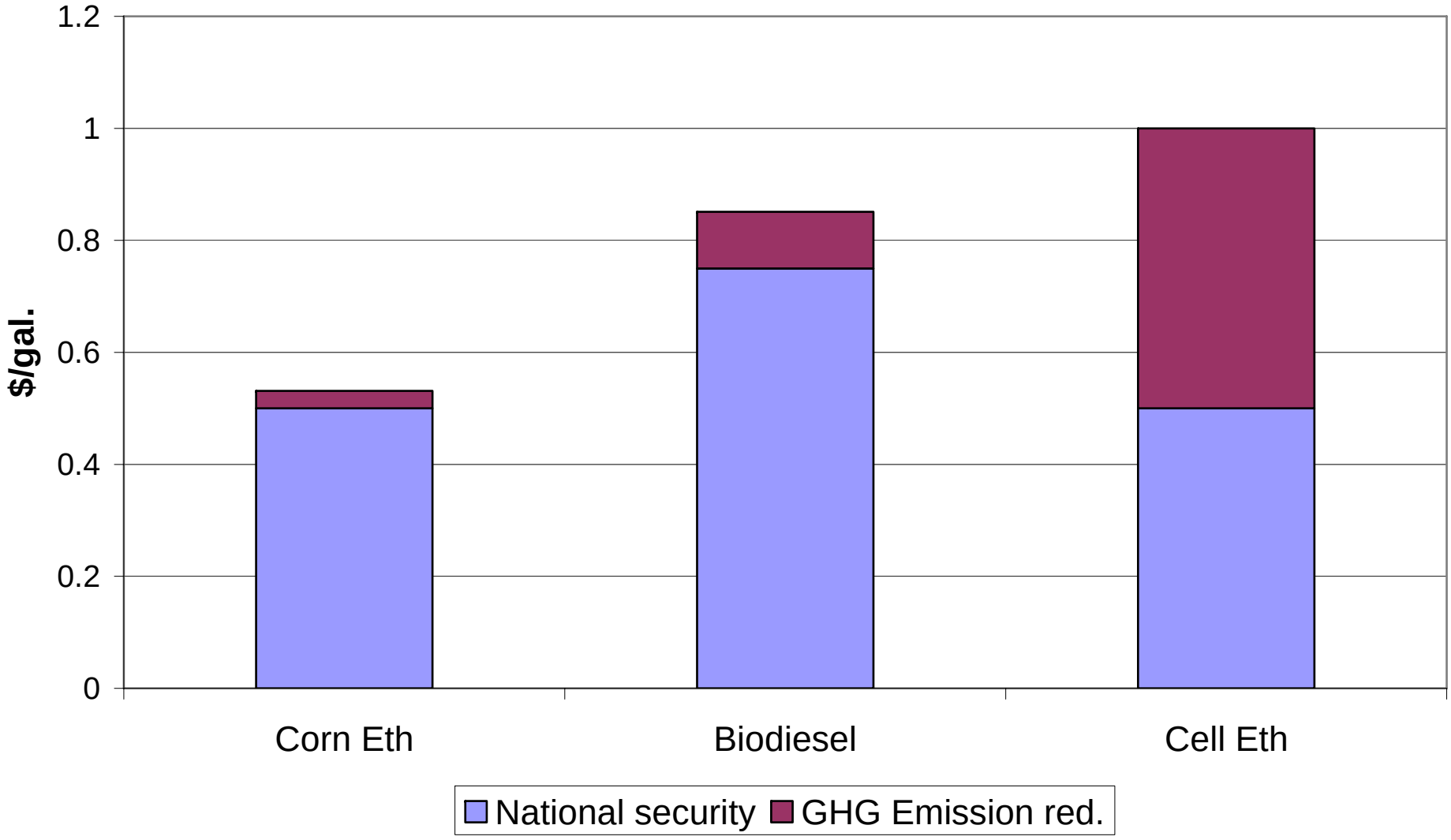
- Biodiesel contains 1.5 times the energy of ethanol, so it would receive an energy security credit 1.5 times ethanol based on imported oil displaced.
- The next chart illustrates how such a two part subsidy might work with components for each fuel for energy security and GHG reductions

Two Part Bioenergy Subsidy



Cellulose Ethanol Incentives

- One of the issues with our current system is that investors will continue to prefer corn ethanol over cellulose because cellulose is riskier
- We may need to consider other options for cellulose ethanol at the beginning to stimulate investment:
  - Investment guarantees or purchase contracts (reverse auction)
  - Tax credits to ethanol producers for each ton of cellulose used to produce ethanol or other liquid fuel

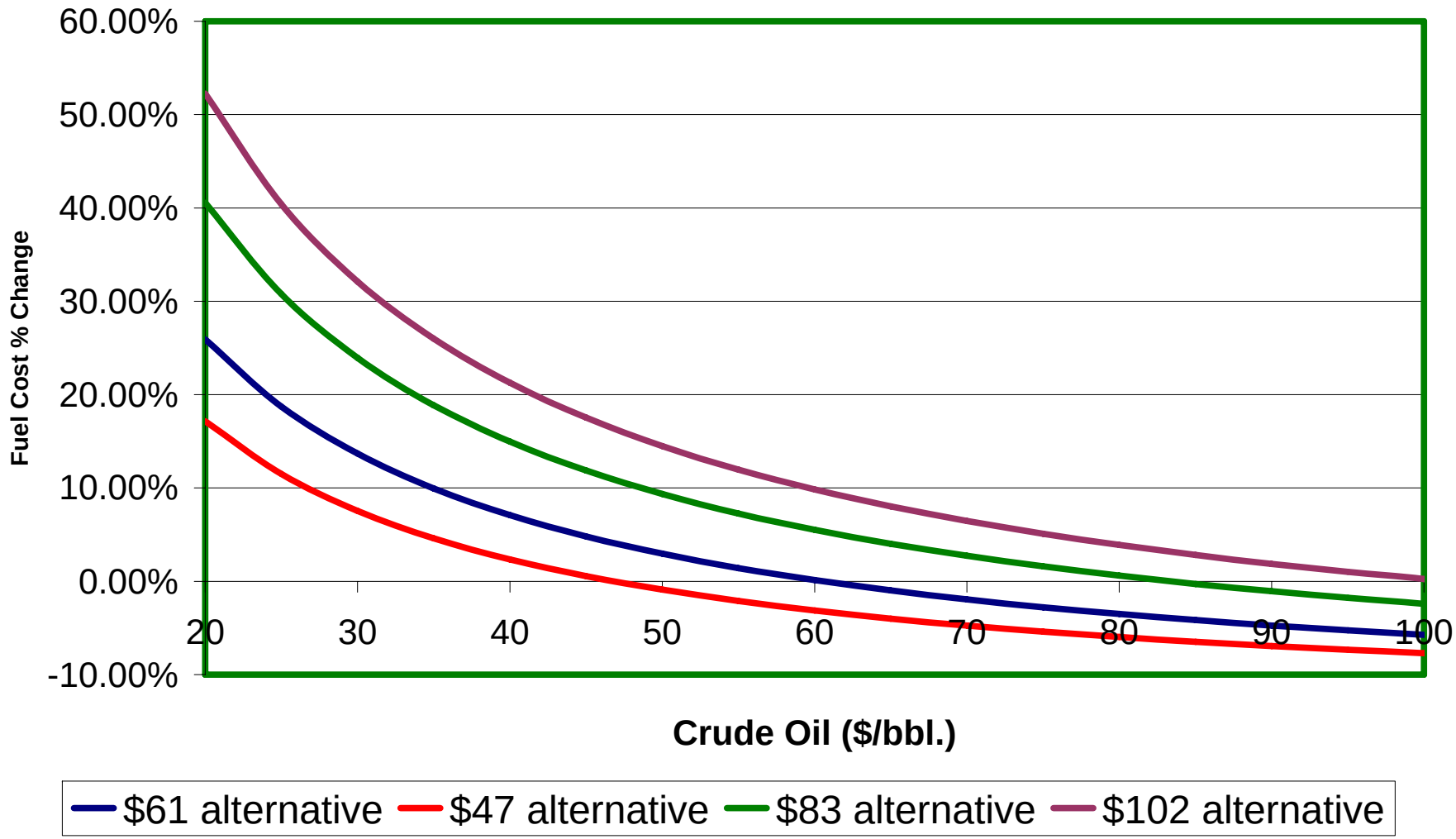
Alternative Fuel Standard

- In his State of the Union message, the President proposed a 35 billion gallon alternative fuel standard by 2017. The Senate passed 36 bil. By 2022:
  - Current production is about 5.5 billion
  - Seven fold increase in 10-15 years
- The administration estimates this would replace 15% of projected 2017 gasoline consumption
- With a binding mandate in place, it would no longer be necessary to subsidize alternative fuels

Difference Between a Fuel Standard and a Subsidy

- The fundamental difference between a fuel standard and a subsidy is who pays:
  - With a subsidy, the taxpayers pay the tax credits received by fuel blenders – it is part of the government budget
  - With a fuel standard, consumers see changes in prices at the pump depending on what the alternative fuel costs relative to gasoline from crude oil
- If we wanted to capture the higher GHG impacts of cellulose ethanol, the standard would need to be partitioned with cellulose receiving a higher proportion

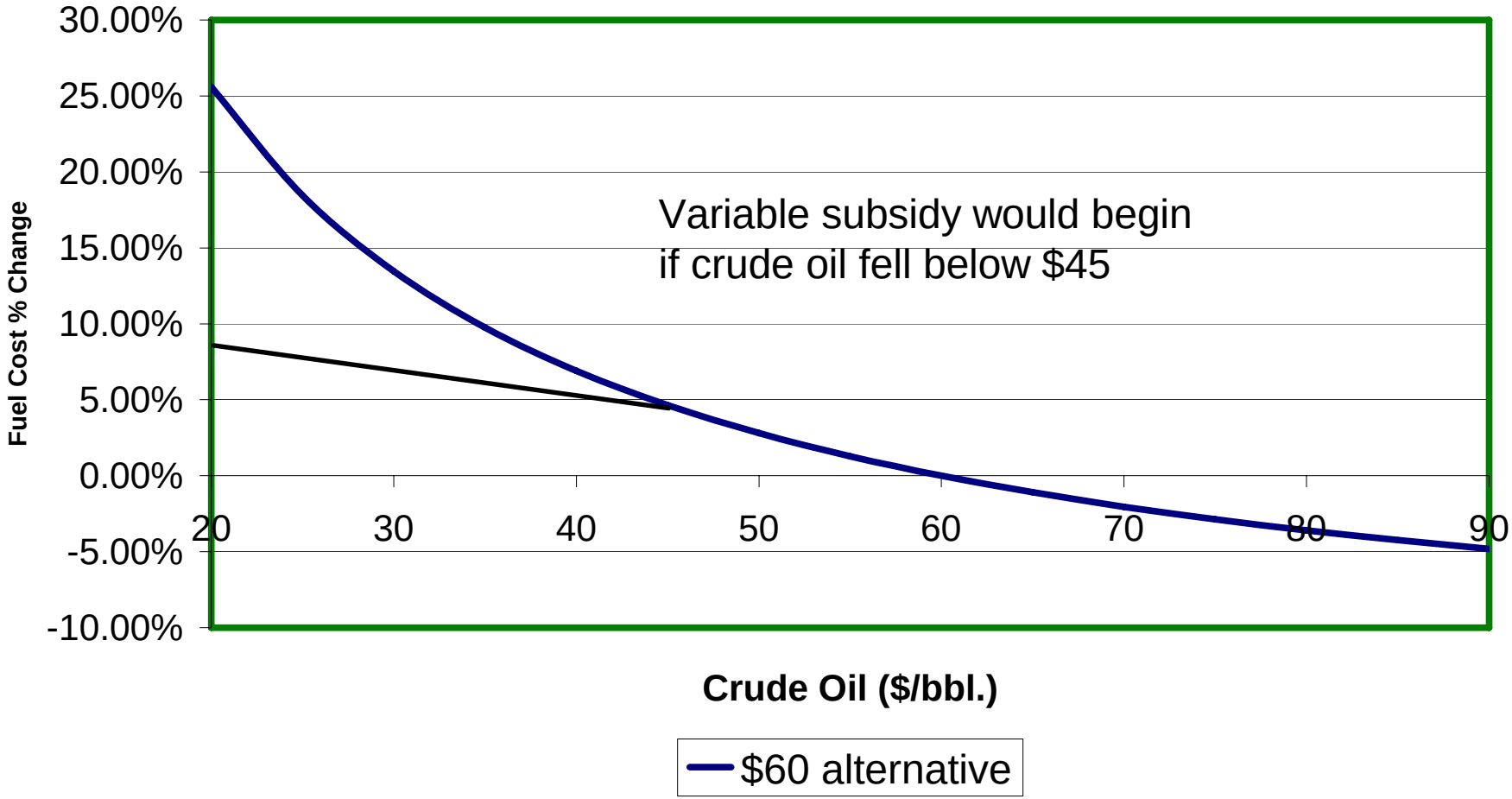
Fuel Cost Change from a Fuel Standard



Combination of Fuel Standard and Variable Subsidy

- An iron-clad fuel standard may be difficult to legislate, yet potential investors need some assurance the standard will hold
- The fuel standard combined with a variable subsidy might be a viable option

Cost of A Fuel Standard with a Variable Subsidy



Policy Impacts

- The current subsidy can lead to very high corn prices – beneficial to corn farmers but not to livestock producers or consumers
- With this year's ethanol production at 8 bil. gal., the subsidy will cost $4 bil., but CBO estimated in January that commodity payments will fall $4 bil. in 2007
- The variable subsidy, two-part subsidy, targeted cellulosic subsidies, or alternative fuel mandates are options
- Various combinations of these options could be evaluated

Summing Up

- Today's high oil prices are largely demand driven
- Global recession could lead to significant oil price drops
- Investments in alternative energy sources are risky in the face of future potential price falls without policy measures that insure against major price drops
- If we want to reduce dependence on foreign oil, we must develop **policy pathways** that will lead us towards greater reliance on alternative energy
- **The policy choices we make will be critical**

Thanks very much!

Questions and Comments

For more information:

http://www.ces.purdue.edu/bioenergy

http://www.agecon.purdue.edu/papers/