The International Biofuels Craze: Bonanza or Boondoggle?

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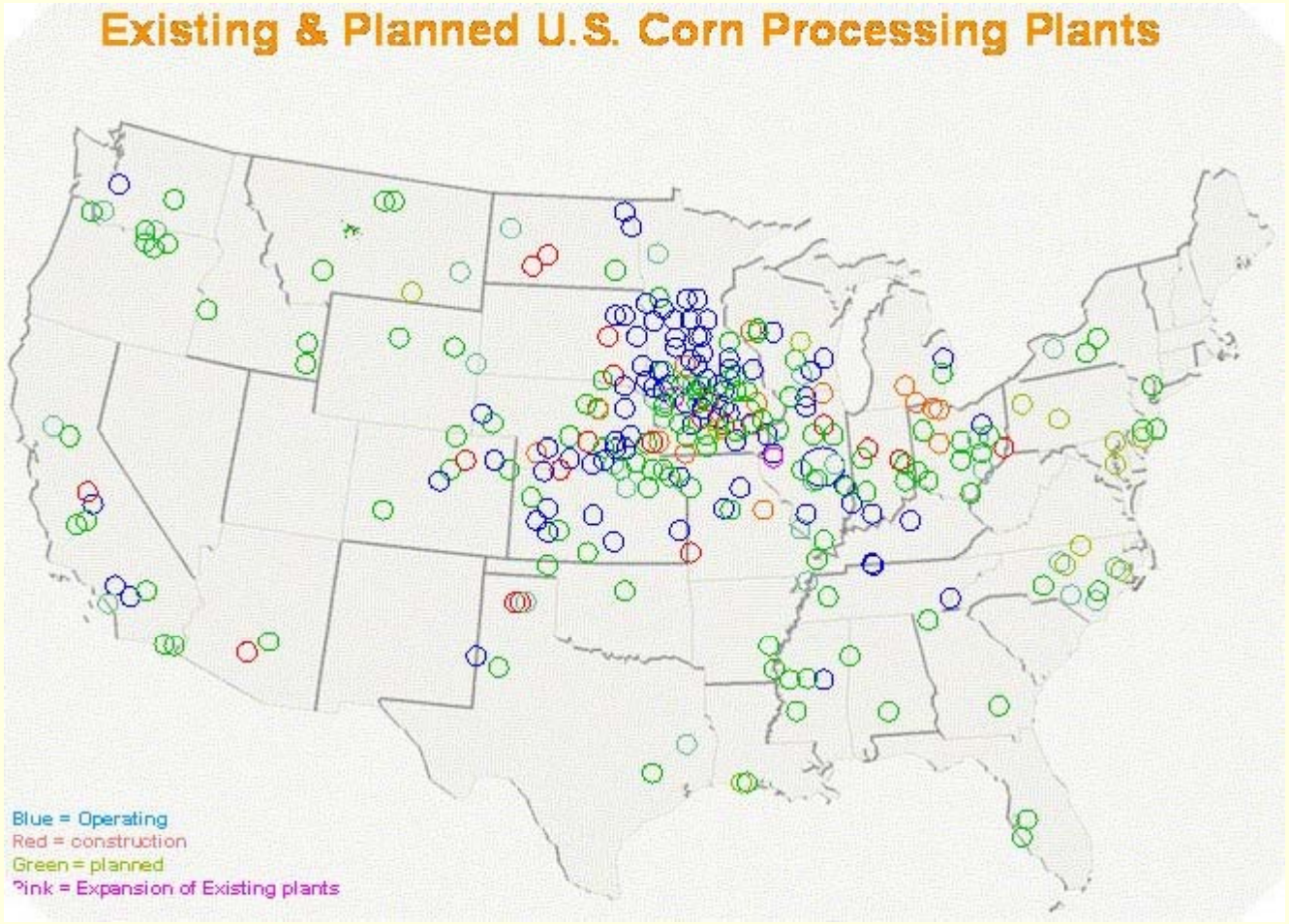
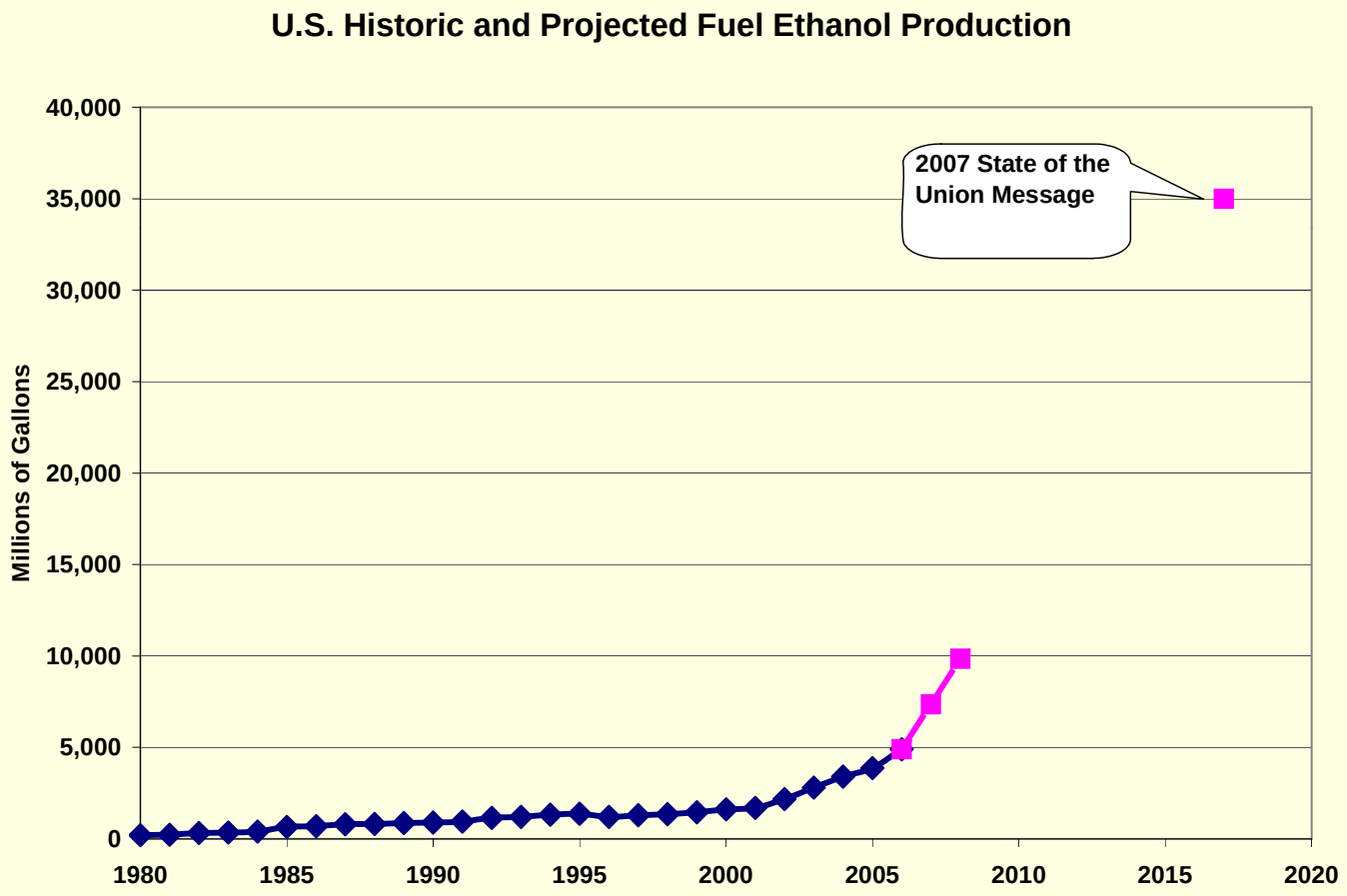
U.S. Biofuels Policy

- 51¢/gallon “blenders credit” passed through to producers
- 54¢/gallon tariff on imported ethanol
- 7.5 billion gallon mandate by 2012
- Bush State of Union: 35 billion gallons by 2017

Corn Belt - Centered



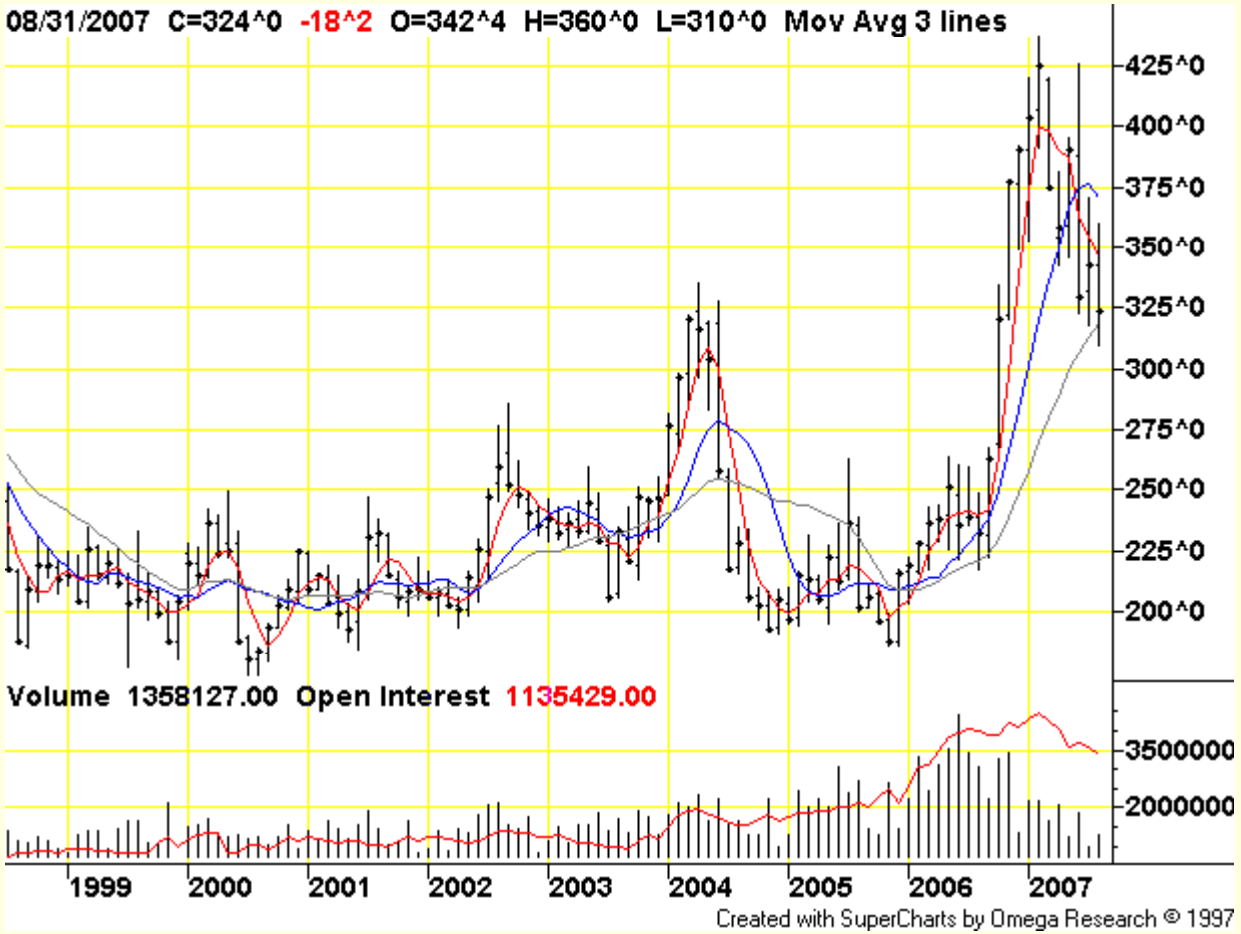
U.S. Historic and Projected Fuel Ethanol Production



Industry Expansion: Calling all Corn

- *The Economist* reported 110 U.S. ethanol plants in operation in January, 2007; 73 or more under construction, and capacity expanding at others.
- Corn supplies in 2007 at lowest levels since 1995 (drought year) despite third-largest crop in 2006.
- 2007 corn plantings up 15 percent (12 million acres); harvest projected at a record 13.1 billion bushels, up 24 percent, largest since 1933.

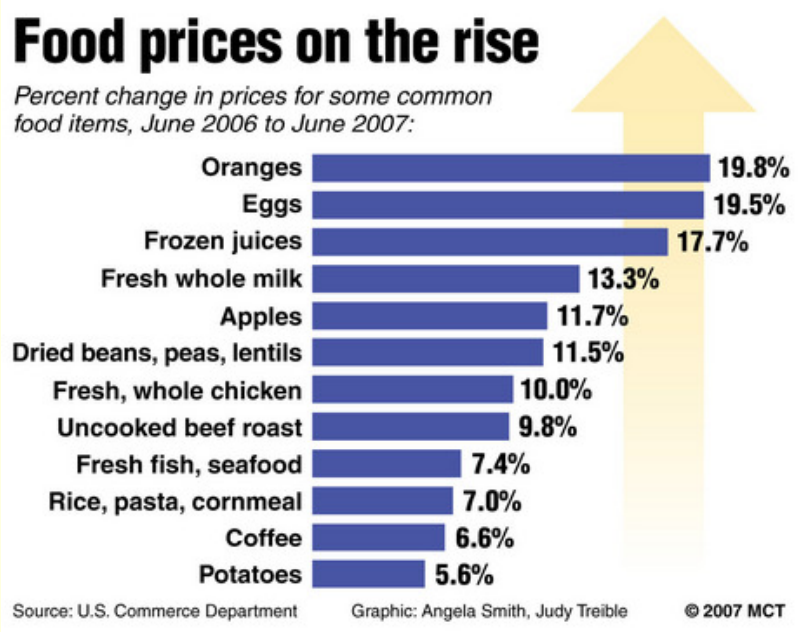
Corn Prices (CBOT)



Food Prices Up

- Food-at-home prices are forecast by USDA to increase 3.5 – 4.5 percent in 2007, and by 7.5 percent by the Labor Department, compared with an average annual rate of 2.4 percent from 1997-2006.

- From June 2006 to June 2007:



OECD Projections

- OECD 2007-2016 Outlook in July 2007 indicated ethanol will create structural shifts in world food prices for next 10 years.

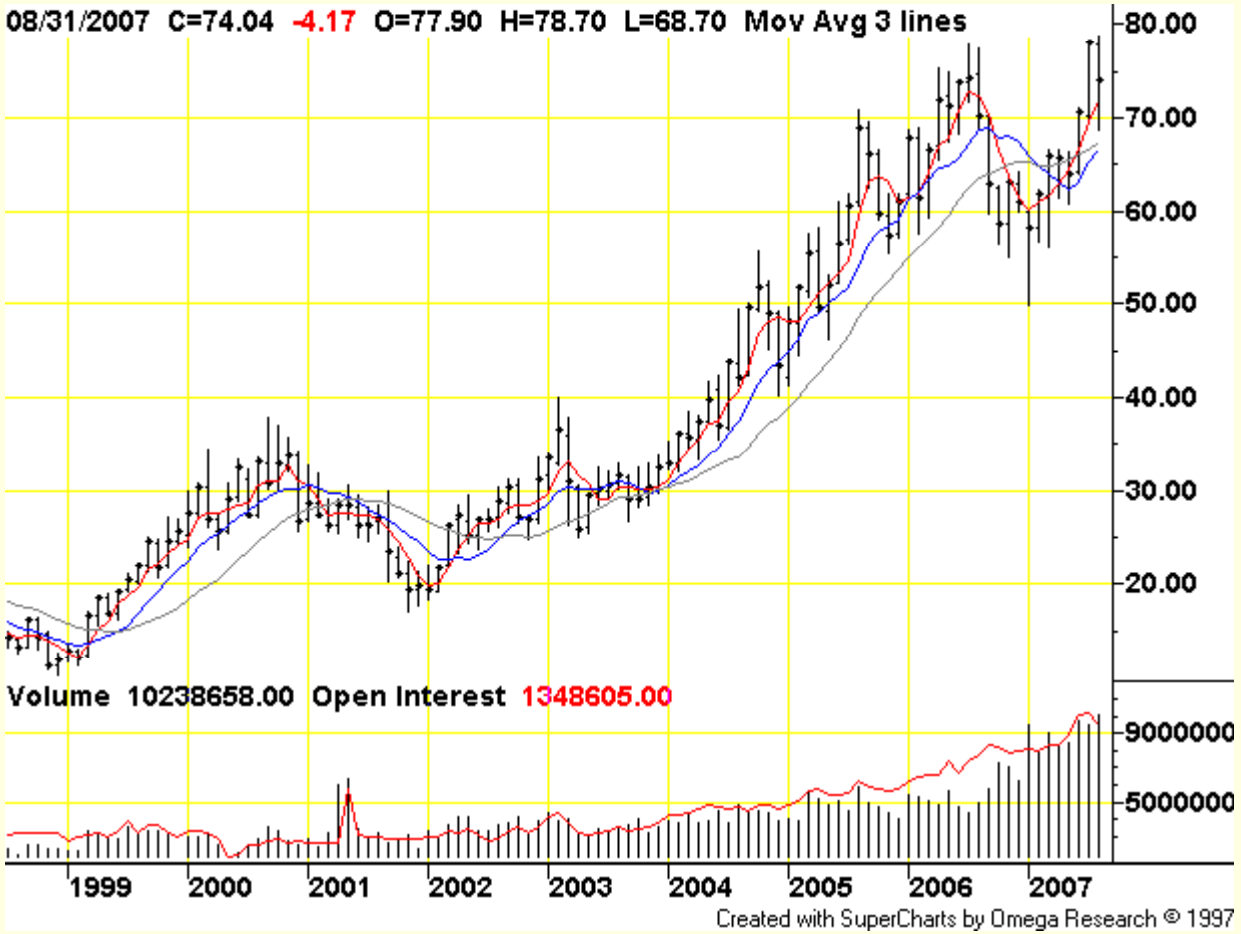
  "Over the outlook period, substantial amounts of maize in the U.S., wheat and rapeseed in the EU and sugar in Brazil will be used for ethanol and bio-diesel production. This is underpinning crop prices and, indirectly through higher feed costs, the prices for livestock products as well."

  OECD Outlook

Long-term Pressure on Oil Prices

- U.S. Energy Information Administration predicts global energy consumption will rise by 71 percent by 2030, with developing countries (India and China) surpassing OECD by 2015.
- Oil prices have risen from $30.00 in 2004 to $85 in October, 2007.

Light Crude Oil Prices (NYMEX)



Ethanol: Environmental Benefits Oversold

- As substitute for oil: if all of 2006 corn used to make ethanol, it would substitute for only 12 percent of U.S. vehicular fuel needs.

- As user of land: a 10 percent substitution of biofuel for oil would require 43 percent of cropland in U.S. and 38 percent in Europe, according to the International Energy Authority.

- Increased corn acres in U.S. projected to increase nitrogen fertilizer use and expand the “dead zone” in the Gulf of Mexico to 8,543 square miles, bigger than Rhode Island and Connecticut combined and the largest since measurement began in 1985.

Environmental Benefits Oversold (cont.)

- Corn-ethanol uses 0.74 million BTUs of fossil fuels for each 1 million BTUs of ethanol, but ethanol has one-third fewer BTUs per gallon.

- Ethanol has higher volatile organic compound (VOC) emissions (ozone) than gasoline, and an increased acetaldehyde level (carcinogen).

Global Warming

- Paul Crutzen, Chemistry Nobel Prize winner, recently calculated that “the extra N_2O entering the atmosphere as a result of using N to produce crops for biofuels . . . such as biodiesel from rapeseed and bioethanol from corn (maize), can contribute as much or more to global warming by N_2 O emissions than cooling by fossil fuel savings.”

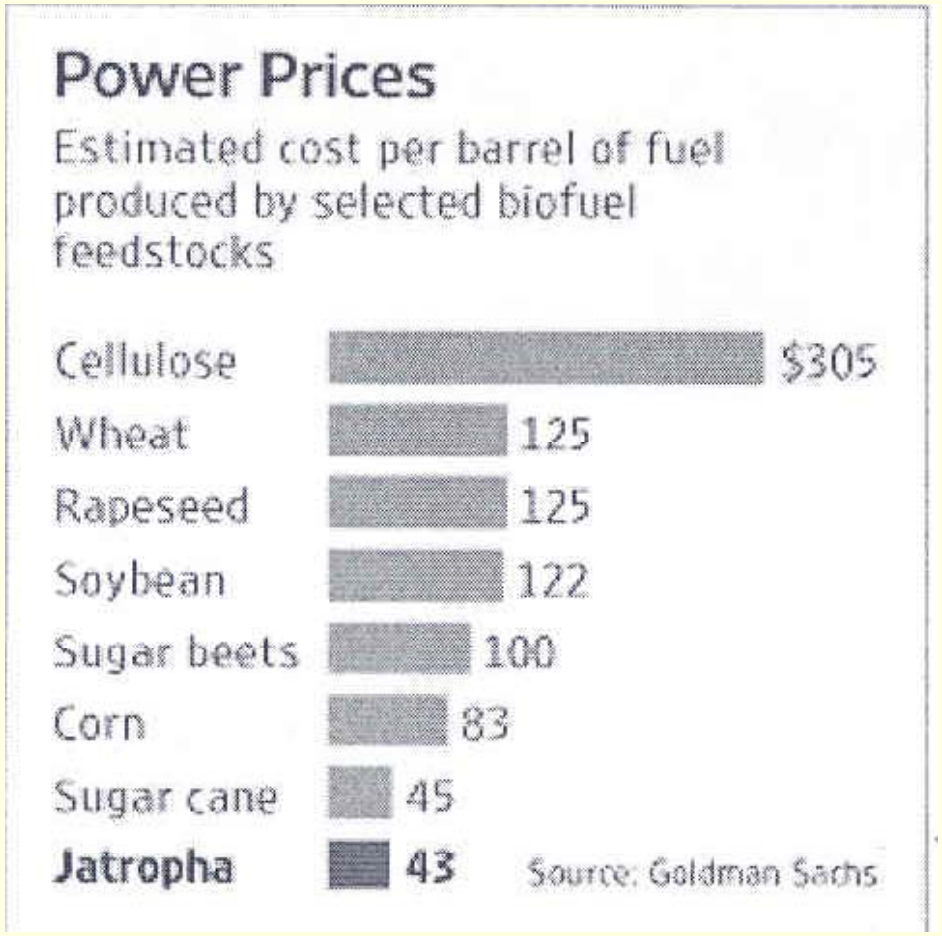
Atmospheric Chemistry and Physics

October 2007

Alternatives to Corn

- So what about cellulose (switchgrass, woodchips, etc.)?

Cellulose is Far Away Solution



International Food Policy Research Institute (IFPRI)

- With existing technologies and growth in ethanol demand:

World Corn Prices
+ 20 percent (2010)
+ 41 percent (2020)

World Oilseed Prices
+ 26 percent (2010)
+ 76 percent (2020)

World Wheat Prices
+ 11 percent (2010)
+ 30 percent (2020)

World Cassava Prices
+ 33 percent (2010)
+ 135 percent (2020)

These now appear underestimates.

The Poor Go Hungry

- For each 1% increase in primary staple food prices, poor people reduce consumption ½%.
- If only one staple rises in price, people substitute others. But if *all* go up, hunger deepens, as food spending accounts from 50-80% of poor household's budgets.

Magnitude of Humanitarian Crisis

- IFPRI estimates suggest an increase in global food insecure to rise by 600 million by 2020 with price increases projected for staple foods, and perhaps more. Many would be forced into starvation, succumbing to disease and malnutrition.

Food and Oil Together

- Food and Agriculture Organization of the U.N. reports in 2005 that of 82 food deficit countries, most are oil importers (exceptions are Angola, Nigeria).

Conclusion: Biofuels are a Bonanza to a few (producers) and a Boondoggle to many (consumers, poor people). They pose challenges:

- To market stability.
- To grain flows and patterns of consumption.
- To livestock feeders.
- To land markets.
- To consumers of corn and soybean-based processed foods, vegetables, starches and sugars.
- To the environment as row cropping expands and water pollution is aggravated, together with groundwater depletion for irrigation.
- Finally, to the world's food insecure, who will pay both for food and oil, in a deepening cycle of hunger and malnutrition.

Policy Responses

(1) Replace fixed 51¢/gallon blender's credit with variable subsidy varying inversely with price of corn (e.g., at $3.00/bushel, credit would be 51¢; at $3.51, it would be zero).

(2) Phase-out 54¢/gallon tariff on imported ethanol.

Policy Responses (cont.)

(3) Introduce conservation-inducing “negative pollution taxes” and credits (e.g., rising taxes on horsepower, hybrid vehicle rebates, fees on housing spaces greater than 3,500 square feet).

(4) Shift subsidies from cellulose plants to cellulosic R&D.