

Energy, Alternative Energy, and Biofuels: Costs, Benefits, and Unintended Consequences with a Few Comments on California Agriculture

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ABSTRACT



- There is a great deal of enthusiasm these days for biofuels and for other forms of alternative energy. There is also confusion over what should be considered "feasible." In an economic sense, the notion of feasibility assumes that current levels of technology will produce energy at a price that users are willing to pay given the alternatives. But there are also issues of "emotional feasibility" and "public policy feasibility." In the former case the question asked is "is it technically possible to produce energy a certain way" (regardless of cost and alternatives).? In the latter case the question often asked is "can energy be delivered to customers at an "acceptable price" if subsidies and mandates (even hidden subsidies and mandates) are involved? In this presentation we will take a look at US energy production and consumption patterns and at the emergence of alternative energy sources including biofuels. We will also look at some of the issues surrounding current patterns of energy production/consumption including possible unintended consequences of shifting demand away from traditional energy and to alternative sources including biofuels. At the end of the presentation I will offer a few comments on California Agriculture.

WORLD PRIMARY ENERGY CONSUMPTION BY MAJOR REGION

2005	% OF WORLD	2035	% OF WORLD
US	21.3	CHINA	24.6
OECD			
EUROPE	17.4	US	15.5
		OECD	
CHINA	15.5	EUROPE	11.9
RUSSIA	6.3	INDIA	5.1
JAPAN	4.9	RUSSIA	4.8
INDIA	3.7	BRAZIL	3.3
CANADA	3.1	JAPAN	3.0
BRAZIL	2.4	CANADA	2.5

Source: US ENERGY INFORMATION ADMINISTRATION, 2010

HYDRO AND RENEWABLE ENERGY, BTU PRODUCTION

COUNTRY	2005	2035	CHANGE
● OECD—EUROPE	7.9	15.1	+191.1%
● US	6.1	12.4	+200.3
● BRAZIL	5.5	12.2	+221.8%
● CANADA	4.2	6.1	+145.2%
● CHINA	4.1	18.5	+451.2%
● INDIA	2.3	5.8	+252.2%
● RUSSIA	1.9	2.8	+147.4%
● JAPAN	1.3	1.7	+130.8%
● WORLD	46.2	99.8	+216.0%

SOURCE: US ENERGY INFORMATION ADMINISTRATION, 2010

US Total Primary Energy Consumption, 2008

- Petroleum 37%
- Natural Gas 24%
- Coal 23%
- Nuclear 9%
- Renewable 7%
- 100%

Source: Energy Information Administration, Annual Energy Review, 2008

PRIMARY ENERGY CONSUMPTION IN QUADRILLION BTU, BY SOURCE, 2008

SOURCE	QUADRILLION BTU	%
● PETROLEUM	37.1	37.4
● NATURAL GAS	23.9	24.0
● COAL	22.4	22.6
● NUCLEAR ELECT	8.5	8.5
● BIOMASS	3.9	3.9
● HYDRO ELECT	2.5	2.5
● WIND	0.5	0.5
● GEOTHERMAL	0.4	0.4
● SOLAR/PV	0.1	0.1
	99.3	

Source: Energy Information Administration, Annual Energy Review, 2008.

Renewable Energy "Origins" and Consumption by Primary Source

Source	First Year for Which US Data are Reported	% of Total Renewable Energy	
		First Year Reported	2008
Hydro	1949	47.9%	33.6%
Wood	1949	52.1%	28.0%
Geothermal	1960	3.4%	4.9%
Waste	1970	0.05%	5.9%
Biofuels	1981	0.24%	19.4%
Solar/PV	1984	0.08%	1.3%
Wind	1985	0.08%	7.0%

Source: Energy Information Administration, Annual Energy Review, 2008

US Renewable Energy Consumption by Major Source, 2008

● HYDROELECTRIC POWER (3)	34%
● WOOD	29%
● BIOFUELS (2)	19%
● WIND	7%
● WASTE (1)	6%
● GEOTHERMAL	5%
● SOLAR/PV	1%

(1) Municipal solid waste from biogenic sources, land fill gas, sludge waste, agricultural by products, other.

(2) Fuel ethanol and biodiesel.

(3) Conventional.

Source: Energy Information Administration, Annual Energy Review, 2008.

BIOFUELS=ETHANOL/BIODIESEL + BIOMASS

- ETHANOL FROM CORN OR SUGAR CANE
- BIODIESEL FROM VEGETABLE OIL
- BIOMASS FROM TREES OR PLANT WASTE

ETHANOL/BIODIESEL: COSTS

- MANDATES (INDUSTRY/CONSUMER SUBSIDIES)
 - "RENEWABLE PORTFOLIO STANDARD"
 - US PROPOSED--15%OF STATES ENERGY FROM GREEN ENERGY
 - CA PROPOSED--20% OF STATE'S ENERGY FROM RENEWABLE SOURCES BY 2011
- MANDATES (INDUSTRY/CONSUMER SUBSIDIES)
- GRANTS (PUBLIC SUBSIDIES)
- TAX CREDITS (PUBLIC SUBSIDIES)
- WATER POLLUTION (FERTILIZERS, PESTICIDES)
- WATER CONSUMPTION (IRRIGATION, COOLING)
- ENERGY CROPS REPLACE FOOD CROPS
- DESTRUCTION OF NATURAL LANDSCAPES (RAIN FOREST)
- CAN CORRODE CONVENTIONAL CAR ENGINES

ETHANOL/BIODIESEL: BENEFITS

- PLANTS ABSORB CARBON DIOXIDE FROM BURNING (CARBON NEUTRAL??)
- PLANT WASTE CAN BE USED
- RENEWABLE
- DOMESTIC MATERIALS (NOT IMPORTED PETROLEUM)
- NEW MARKET FOR FARM PRODUCTS (A PLUS FOR THE POLITICAL CLASS)

ETHANOL/BIODIESEL: THREATS

- LOW PETROLEUM PRICES
- LACK OF VC
- LACK OF (LONG TERM) FINANCING FOR PRODUCTION, DISTRIBUTION, RETAIL
- PLUG-IN CARS

BIOMASS: COSTS



- MANDATES
- GRANTS
- TAX CREDITS
- DESTROY NATURAL FOREST LANDSCAPES (RAPACIOUS INDUSTRY)

BIOMASS: BENEFITS



- PLANTS ABSORB CARBON DIOXIDE (CARBON NEUTRAL OR BETTER??)
- LANDSCAPE MAINTENANCE (SMALL DIAMETER TIMBER)
- PLANT WASTE (MILL WASTE) CAN BE USED
- DOMESTIC MATERIALS (NOT IMPORTS)

BIOMASS: THREATS



- LOW PETROLEUM PRICES
- NATURAL GAS, NUCLEAR
- BETTER COAL-USING TECHNOLOGIES
- LACK OF VC
- LACK OF (LONG TERM) FINANCING FOR PRODUCTION, DISTRIBUTION, RETAIL OUTLETS

A FEW COMMENTS ON CALIFORNIA AGRICULTURE--MONTEREY COUNTY



MONTEREY COUNTY, GROSS PRODUCTION VALUES, 2008

● VEGETABLE CROPS	\$2,503,876,000
● FRUITS AND NUTS	\$906,717,000
● NURSERY CROPS	\$326,105,000
● LIVESTOCK AND POULTRY	\$40,235,000
● FIELD CROPS	\$14,456,000
● SEED CROPS	\$8,363,000
● APIARY	\$38,000
● TOTAL	\$3,826,791,000

Source: Monterey County Agricultural Commissioner's 2009 Crop Report.

MONTEREY COUNTY HAS 42 MILLION DOLLAR CROPS IN 2008 INCLUDING:

● LEAF LETTUCE	\$651,503,000
● STRAWBERRIES	\$619,267,000
● HEAD LETTUCE	\$460,605,000
● NURSERY	\$326,105,000
● BROCCOLI	\$276,110,000
● GRAPES	\$238,366,000
● SPRING MIX	\$172,386,000
● SPINACH	\$131,004,000
● MISC. VEGETABLES	\$123,560,000
● CELERY	\$121,343,000
● SALAD PRODUCTS	\$104,734,000
● CAULIFLOWER	\$101,467,000
● MUSHROOMS	\$71,857,000
● ARTICHOKEs	\$66,642,000

Source: Monterey County Agricultural Commissioner's 2009 Crop Report.

GRAPE PRODUCTION BY VARIETY AND VALUE, 2008

● WHITE GRAPE VARIETIES

○ CHARDONNAY	\$91,798,000
○ RIESLING	\$12,066,000
○ SAUVIGNON BLANC	\$ 7,940,000

● RED GRAPE VARIETIES

○ PINOT NOIR	\$48,063,000
○ CABERNET SAUVIGNON	\$25,211,000
○ MERLOT	\$24,681,000
○ SYRAH/SHIRAZ	\$5,169,000