Federal Energy Tax Incentives and Subsidies and the Current State of Biomass Fuels:

A View from Congressional Oversight

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Comments will be based primarily on prior and currently ongoing GAO work

- (1) Study examining the inventory of major federal energy programs and status of policy recommendations
- (2) study of tax incentives for petroleum and ethanol fuels—data updated as possible
- (3) A study estimating the effects of alcohol tax incentives
- (4) An ongoing study on peak oil (when, consequences, mitigation, and federal role)

Overview

- Federal Government involvement in energy markets
  - Environmental regulation/mandates (boutique fuels)
  - Market oversight (antitrust)
  - Energy consumer
  - Revenue collection (taxes, royalties, etc)
  - Direct spending (appropriations)
  - Subsidies (tax credits, tax expenditures, tax incentives, tax preferences)

Key Facts

- Over 150 energy-related program activities identified (FY 2003)
- At least 18 different federal agencies, from the Dept. of Energy to the Department of Health and Human Services
- A minimum of about $10 billion in estimated budget authority for energy-related programs
- $4.4 billion estimated outlay equivalent for tax incentives or subsidies
- $34.6 billion in revenue mostly from fuel excise taxes (gasoline taxes)
- $10.1 billion revenue collection from energy-related fees (royalties, etc)

Petroleum and Ethanol Tax Incentives

- Federal government has granted tax incentives, direct subsidies, and other support to the petroleum industry over the years
- Tax incentives to petroleum go as far back as the early 20th Century (e.g., Tariff Act of 1913) with many changes made over time
- Ethanol tax incentives more recent (Energy Tax Act of 1978)
- Tax incentives generally decrease revenues accruing to the federal Treasury
- Tables 1 through 8 show revenue loss estimates attributable to petroleum and ethanol tax incentives.[1]
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[1] Data do not include tax incentives enacted in the Energy Policy Act of 2005.

Table 1: Summary of Tax Incentives for Petroleum and Ethanol Fuels

(Dollars in millions)

Tax incentive	Summed over years[a]	Adjusted to year 2005 dollars
Oil and gas industry		
Excess of percentage over cost depletion	1968-2005	96,119
Expensing of exploration and development costs[a]	1968-2005	41,192
Alternative (nonconventional) fuel production credit	1980-2005	16,927
Oil and gas exception from passive loss limitation[b]	1988-2005	1,311
Credit for enhanced oil recovery costs	1994-2005	2,947
Ethanol industry		
Partial exemption from the excise tax for alcohol fuels	1982-2005	18,854
Income tax credits for alcohol fuels	1981-2005	347

Source: Compiled from annual published data from Treasury.

Tables 2-5

- Tax Incentives for Petroleum

Table 2: Revenue Losses for the Excess of Percentage over Cost Depletion, Oil and Gas

(Dollars in millions)

Fiscal year	Treasury		Fiscal year	Treasury	
	Not adjusted for inflation	Adjusted to 2005 dollars [a]		Not adjusted for inflation	Adjusted to 2005 dollars [a]
1968	1,300	5,967	**1987**	725	1,116
1969	1,430	6,276	**1988**	450	671
1970	1,470	6,119	**1989**	390	560
1971	980	3,885	**1990**	650	900
1972	985	3,729	**1991**	555	741
1973	1,700	6,163	**1992**	885	1,152
1974	2,120	7,170	**1993**	995	1,267
1975	2,475	7,581	**1994**	785	978
1976	1,295	3,586	**1995**	945	1,153
1977	1,395	3,708	**1996**	1,125	1,347
1978	1,500	3,735	**1997**	830	977
1979	1,830	4,217	**1998**	250	291
1980	1,490	3,157	**1999**	265	304
1981	1,865	3,599	**2000**	275	309
1982	2,100	3,793	**2001**	250	275
1983	1,280	2,214	**2002**	610	658
1984	1,175	1,960	**2003**	640	677
1985	1,355	2,189	**2004**	1,320	1,360
1986	1,105	1,745	**2005**	590	590
			Total	**$41,385**	**$96,119**

[a] For each tax incentive, the first year in the summation is the first year that Treasury kept records of the estimated revenue loss from this tax incentive; it is not the year when the incentive was first implemented.

Table 3: Revenue Losses for Expensing of Exploration and Development Costs, Oil and Gas

(Dollars in millions)

Fiscal year	Treasury		Fiscal year	Treasury	
	Not adjusted for inflation	Adjusted to 2005 dollars[a]		Not adjusted for inflation	Adjusted to 2005 dollars[a]
1968	300	1,377	**1987**	-675	-1,039
1969	330	1,448	**1988**	-385	-574
1970	340	1,415	**1989**	-65	-93
1971	325	1,288	**1990**	-500	-692
1972	325	1,230	**1991**	-315	-420
1973	650	2,356	**1992**	125	163
1974	830	2,807	**1993**	185	235
1975	620	1,899	**1994**	-85	-106
1976	800	2,215	**1995**	-300	-366
1977	1,030	2,738	**1996**	-210	-251
1978	1,390	3,461	**1997**	-160	-188
1979	1,745	4,021	**1998**	-110	-128
1980	2,175	4,608	**1999**	-80	-92
1981	3,525	6,802	**2000**	20	23
1982	3,430	6,195	**2001**	60	66
1983	3,160	5,467	**2002**	150	162
1984	1,415	2,360	**2003**	210	222
1985	585	945	**2004**	260	268
1986	-510	-805	**2005**	390	390
			Total	**$20,980**	**$41,192**

Note: Estimates include negative numbers in some years. A negative number implies an increase in government revenues.

Table 4: Revenue Losses for the Alternative (Nonconventional) Fuel Production Credit

(Dollars in millions)

Fiscal year	Treasury		Fiscal year	Treasury	
	Not adjusted for inflation	Adjusted to 2005 dollars[a]		Not adjusted for inflation	Adjusted to 2005 dollars[a]
1980	5	9	**1993**	760	857
1981	25	43	**1994**	900	992
1982	15	24	**1995**	970	1,047
1983	10	15	**1996**	570	604
1984	10	15	**1997**	710	739
1985	10	14	**1998**	860	884
1986	20	28	**1999**	1,025	1,040
1987	10	14	**2000**	970	1091
1988	10	13	**2001**	900	989
1989	10	13	**2002**	1,560	1682
1990	10	12	**2003**	1,280	1353
1991	255	302	**2004**	1,040	1072
1992	680	786	**2005**	2,320	2320
			Total	**$14,935**	**$16,927**

Table 5: Revenue Losses for the Oil and Gas Exception from Passive Loss Limitation

(Dollars in millions)

Fiscal year	Treasury	
	Not adjusted for inflation	Adjusted to 2005 dollars[a]
1988	55	73
1989	135	172
1990	180	221
1991	80	95
1992	90	104
1993	50	56
1994	90	99
1995	55	59
1996	50	53
1997	45	47
1998	30	31
1999	30	30
2000	20	23
2001	20	22
2002	10	11
2003	20	21
2004	20	21
2005	40	40
Total	**$1,020**	**$ 1,311**

Table 6: Revenue Losses for the Credit for Enhanced Oil Recovery Costs

(Dollars in millions)

Fiscal year	Treasury	
	Not adjusted for inflation	Adjusted to 2005 dollars [a]
1994	85	106
1995	85	104
1996	80	96
1997	95	112
1998	140	163
1999	225	258
2000	310	349
2001	310	341
2002	330	356
2003	400	423
2004	330	340
2005	300	300
Total	**$ 2,690**	**$ 2,947**

Tables 7-8

- Tax Incentives for Alcohol Fuels

Table 7: Revenue Losses for the Partial Exemption from the Excise Tax for Alcohol Fuels

(Dollars in millions)

Fiscal year	Treasury		Fiscal year	Treasury	
	Not adjusted for inflation	Adjusted to 2005 dollars [a]		Not adjusted for inflation	Adjusted to 2005 dollars [a]
1982	55	99	**1994**	575	717
1983	160	277	**1995**	615	751
1984	215	359	**1996**	670	802
1985	375	606	**1997**	675	794
1986	400	632	**1998**	680	791
1987	475	731	**1999**	760	872
1988	480	716	**2000**	840	945
1989	485	697	**2001**	990	1,088
1990	445	616	**2002**	1,070	1,154
1991	465	621	**2003**	1,100	1,163
1992	544	708	**2004**	1,450	1,494
1993	567	722	**2005**	1,500	1,500
			Total	**$15,591**	**$18,854**

Table 8: Revenue Losses for the Income Tax Credits for Alcohol Fuels

(Dollars in millions)

Fiscal year	Treasury		Fiscal year	Treasury	
	Not adjusted for inflation	Adjusted to 2005 dollars [a]		Not adjusted for inflation	Adjusted to 2005 dollars [a]
1981	5	9	**1994**	15	17
1982	5	8	**1995**	10	11
1983	1	2	**1996**	10	11
1984	2	3	**1997**	20	21
1985	11	16	**1998**	15	15
1986	6	8	**1999**	15	15
1987	6	8	**2000**	20	17
1988	5	7	**2001**	30	22
1989	1	1	**2002**	30	32
1990	1	1	**2003**	30	32
1991	1	1	**2004**	30	31
1992	10	12	**2005**	40	30
1993	15	17			
			Total	**$294**	**$347**

Link to Table 20

Arguments for Continued Ethanol Tax Incentives (Proponents)

- Infant industry
- Level the playing field
- Economic development/Job creation
- Cleaner environment
- Energy Security
  (“energy independence”)

Estimated Effects of Biomass-derived Alcohol Fuels Tax Policy (part 1)

- Economic Beneficiaries
- Value of ethanol tax incentives shared, directly or indirectly, among different groups in the economy
    - Alcohol fuel blenders
    - Ethanol producers
    - Corn farmers
    - Support ethanol price competitiveness with gasoline, so consumers of ethanol-blended fuel benefit from lower prices overall

Estimated Effects of Biomass-derived Alcohol Fuels Tax Policy (part 2)

- Environmental benefits
  - Available evidence does not support much positive impact on global warming (corn ethanol), Cellulosic ethanol?
  - Currently used as an oxygenate in place of MTBE
  - Estimate impact on human health and life saved?

Estimated Effects of Biomass-derived Alcohol Fuels Tax Policy (part 3)

Impact on energy security ("energy independence")

- Incentives/mandates support increased production and use of ethanol
- Current production about 4 billion gallons per year (but still about 3% of U.S. motor vehicle fuel consumption)
- Oil import ratio still high and rising significantly
- Not produced in enough quantity to mitigate oil supply disruptions and price shocks and their economic consequences

Estimated Effects of Biomass-derived Alcohol Fuels Tax Policy (part 4)

- Impact on government revenue
  - Net revenue loss (table 8)

Current State of Biomass-based Fuels (Ethanol, Biodiesel, and Biomass GTL)

Ethanol

Key Financial Costs

- At $0.90 to $1.25/gal, cost of ethanol production from a corn dry mill (at the plant) appears currently favorable vis-à-vis gasoline (roughly $1.50/gal based on $60/barrel of crude oil, ex-refinery gate).
- BUT,
    - Government subsidies play a role (e.g., USDA's bioenergy program in FY '04 equivalent to about 24 cents/gal.)
    - Energy content not equivalent (75,700 Btu/gal. ethanol; 115,000 Btu/gal. gasoline
    - Production cost of ethanol from biomass not cost-competitive, but by 2012 it is projected to be about $1.07 per gallon.

Key Financial Costs

- Two key types of infrastructure costs associated with ethanol:

  (1) retrofitting refueling stations to accommodate E85, which has been estimated to cost $30,000-$100,000

  (2) constructing or modifying pipelines to transport ethanol, which would be very expensive.

- Energy Cost
  - Intense debate and controversy (depending on what assumptions are used about a variety of factors, e.g., agricultural practices and yields, fuel conversions, technical feasibility).
  - We’re not attempting to estimate this.

Ethanol: Production

- Current annual U.S. production:
  approximately four billion gallons
- Corn ethanol production expected to peak at approximately 9-17 billion gallons per year in about 10 years.
- Assuming success with cellulosic ethanol technologies, cellulosic ethanol production levels of over 60 billion gallons could be achieved.

Ethanol: Key Challenges

- For corn ethanol, key challenges include the necessary infrastructure changes to support E85, cultural adjustments by consumers, and the cost of corn feedstock.
- For cellulosic ethanol, several technical challenges still exist, including improving the enzymatic pretreatment, fermentation, and process integration steps.
- For cellulosic ethanol, economic challenges include the cost of feedstock and the initial capital investment for cellulosic conversion.

Ethanol: Federal Government Role

- 51 cents/gal. tax exemption and 54 cents/gal import tariff
- Mandate of 7.5 billion gallons by 2012 (RFS)
- Federal government currently involved in numerous efforts to develop ethanol. Several federal agencies collaborate with industry to accelerate the technologies, reduce the cost of the technologies, and assist in developing necessary infrastructure.
- Federal government supporting research for the development of cellulosic ethanol
- President's Biofuels Initiative

Current State of Biomass-based Fuels (Ethanol, Biodiesel, and Biomass GTL)

Biodiesel

Key Financial Costs

- Current wholesale cost ranges from about $290-$3.20/gal. (pure biodiesel or B100)
- Current wholesale cost of low-level blend (B20) significantly less
- Production cost significantly falling as industry growth accelerates
- Limited analysis of projected infrastructure costs, but significant modifications to existing pipelines and refining stations required to accommodate some B20 and all B100
- Energy Cost:
  - Estimates vary considerably and based on assumptions made

Biodiesel: Production & Key Challenges

- **Production**
  - 75 million gallons in 2005
  - Projections of 1-3.5 billion gallons /year by 2015
  - Under speculative scenario, 10 billion gallons/year possible but requires major changes in land use and price support

- **Key Challenges**
  - Significant initial capital cost
  - Steep technical learning curve
  - Many potential investors are reluctant

Federal Government Role

- Tax credit of $1/gal.making substantial contribution to industry growth
- Without the tax credit, biodiesel will not be cost competitive
- The DOE is collaborating with biodiesel and automobile industries in R&D efforts on biodiesel utilization
- The USDA is conducting research on feedstocks.

Current State of Biomass-based Fuels (Ethanol, Biodiesel, and Biomass GTL)

Biomass GTL

Biomass GTL: Costs

- Key Financial Costs
  - Costs are uncertain because technology is in early stage
  - Infrastructure costs expected to be substantial (driven by modifications to pipelines, refueling centers, and storage facilities necessary)
- Energy Cost (Energy profit)
  - Considered favorable, overall, but specific estimates vary substantially

Biomass GTL: Production, Challenges, and Federal Government Role

- Production
  - No U.S. production of biomass GTL currently
  - Still in R&D stage
  - First generation biomass GTL production possible for commercialization by 2012
- Key Challenges
  - Technical challenges (improving cleanliness of syngas and process integration)
- Federal Government Role
  - Federal funding of biomass conversion research at the U.S. Department of Energy (DOE)

Biofuels: Concluding Remarks

- Energy independence is an illusion.
- Biofuels, including ethanol, may supplant—not substitute

- Government involvement in energy markets is always to be expected
  - Politics and market failure (externalities)
- Sustainable energy requires “sustainable” policy
  - Supply and demand incentives