THE FARELESS URBAN MASS TRANSPORTATION SYSTEM (FUMTS) AND THE WORLD OIL DEPLETION CRISIS

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1. WORLD OIL RESERVES AND CONSUMPTION

It's no secret that the world is fast running out of petroleum. In particular, there is less than 1.5 trillion barrels of petroleum reserves remaining on Earth. The main professional sources for petroleum reserves, notably the World Oil Journal and the Oil and Gas Journal, put the figure at 1.2 to 1.3 trillion barrels. The world authority on "peak oil" is ASPO (Association for the Study of Peak Oil and Gas) whose many world-renowned expert petroleum geologists (including Colin Campbell, Jean Laherrer) together with the famous geologist King Hubbert (discoverer of Hubbert's curve who correctly predicted US domestic oil reserves peaked in 1970) have long stated that peak oil in all of the petroleum producing regions on Earth occurred around 2006 (give or take a few years}. In the table below, the straightforward mathematical analysis shows that the total Earth supply of petroleum will be exhausted in 25 to 36 years.

In 2006, world consumption of petroleum was 31.029 billion barrels.		
IF the annual rate of increased consumption world-wide is:	AND the total remaining world-wide reserves in billions of barrels is:	THEN the time that it takes for complete depletion is:
1.50%	1,000	26.5 years
1.50%	1,200	30.7 years
1.50%	1,500	36.6 years
1.90%	1,000	25.4 years
1.90%	1,200	29.3 years
1.90%	1,500	34.6 years
2.00%	1,000	25.1 years
2.00%	1,200	28.9 years
2.00%	1,500	34.2 years

Annual average rate of increased petroleum consumption worlwide:
ten year period 1996-2006: 1.90%

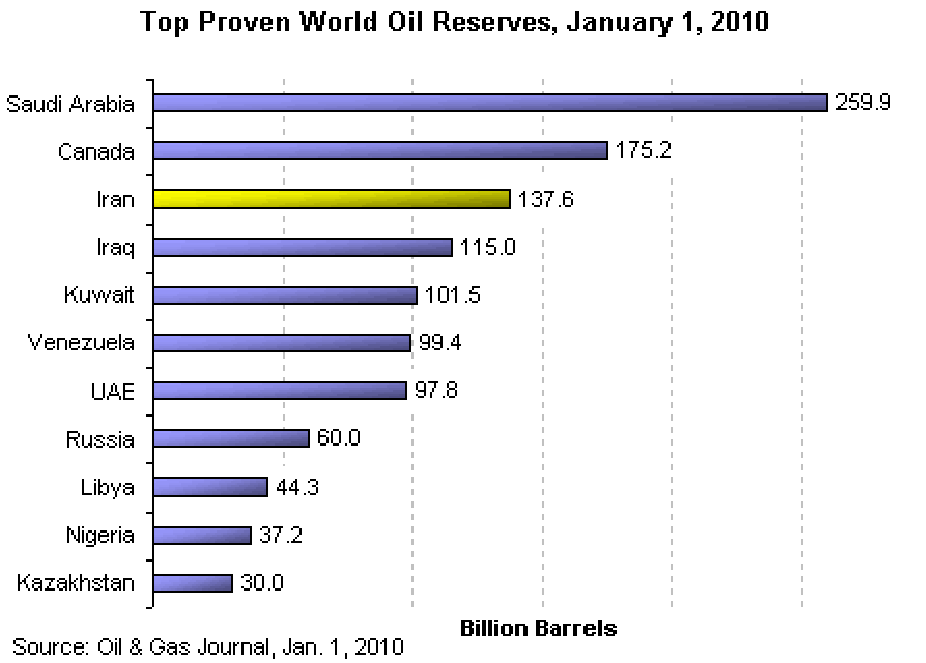
Cumulative use in t years = S = $P_0\{[(1+k)t - 1]/k\}$ (in billions of barrels)

If S is given in advance, then $t = [\ln(1+k(S/P_0))]/[\ln(1+k)]$

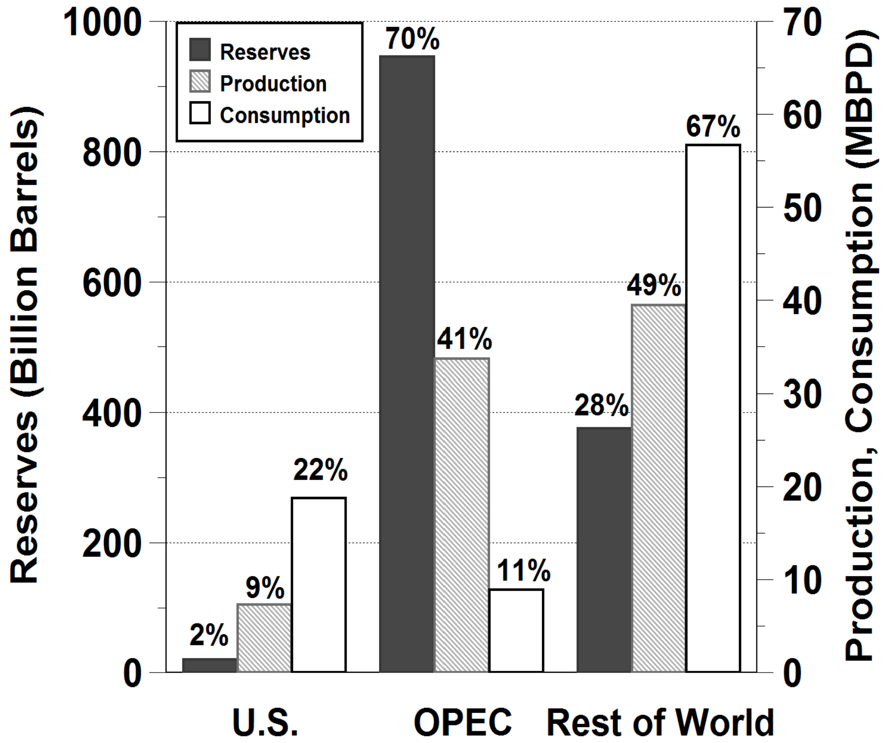
P_0 = the initial annual consumption (world-wide) of petroleum (in billions of barrels)

k = the annual rate of increase of world-wide consumption

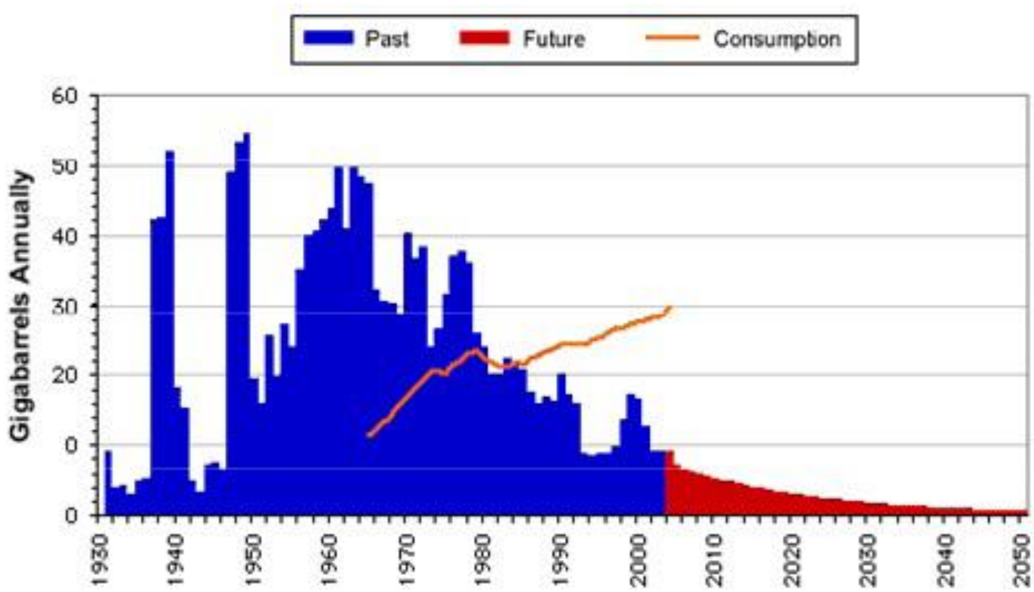
Furthermore, the global rates of discovery of new oil fields has been on a terminal decline since 1964



World Proved Reserves of Oil Estimates			
Energy Information Administration			
Table Posted: March 3, 2009			
	Oil & Gas Journal January 1, 2009		
United States		21.317	
North America		**209.91**	
Central & South America		**122.687**	
Europe		**13.657**	
Eurasia		**98.886**	
Middle East		**745.998**	
Africa		**117.064**	
Asia & Oceania		**34.006**	
World Total		**1,342.21**	



Source: EIA, 2009



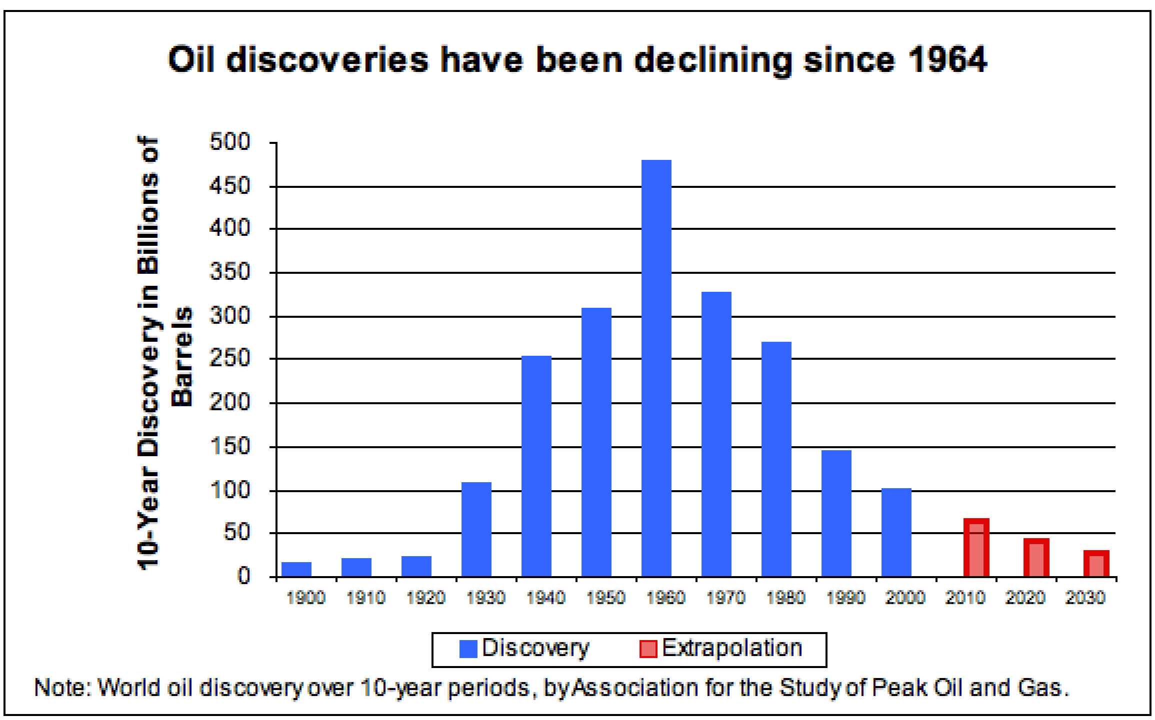
Source: Association for Peak Oil and Gas

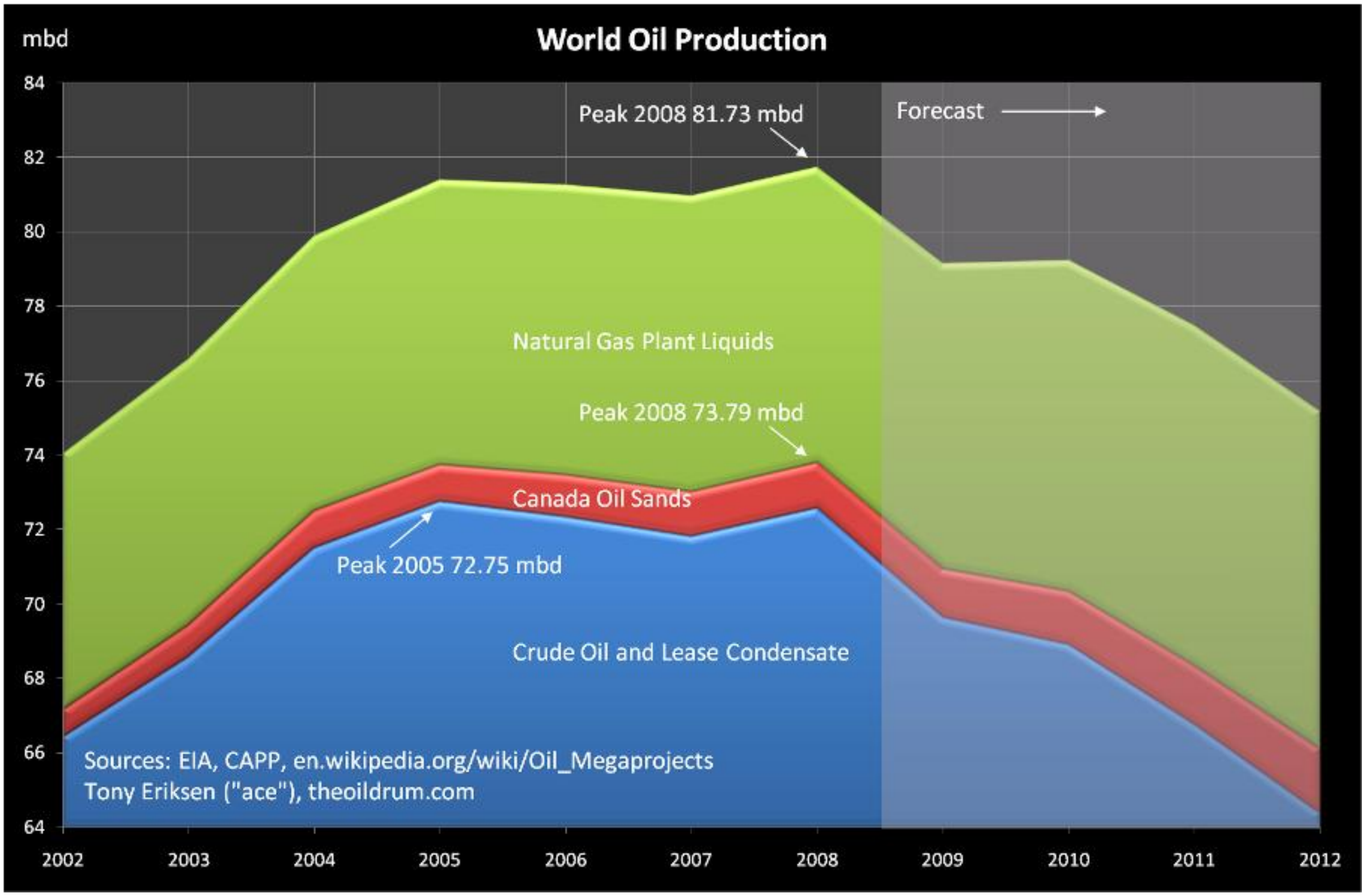
History of Giant Oilfields: Declining Discoveries and Declining Production

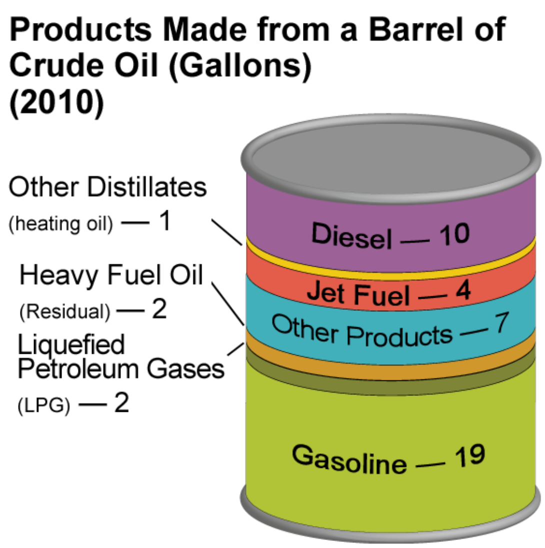
SUMMARY OF GIANT OILFIELDS PRODUCTION (Gb/Yr = Billion Barrels per Year)								
		Total	ERA DISCOVERED					
Giant Fields Production Gb/Yr	No. of Fields	Production Gb/Yr	Pre-1950's	1950s	1960s	1970s	1980s	1990s
0.365 +	4	2.8480	2	1		1		
0.1825 to 0.365-	10	2.1004	2	3	3	1	1	
0.1095 to 0.1825-	12	1.4596	3	1	6	1	1	
0.0730 to 0.1095-	29	2.2962	8	4	6	9	1	1
0.0365 to 0.0735-	61	2.8124	5	8	13	13	11	11
TOTAL	116	11.5166	20	17	28	25	14	12

	Giant Fields Production Gb/Yr							Total
Giant Fields Production Gb/Yr	Pre-1950's	1950s	1960s	1970s	1980s	1990s	%	Production Gb/Yr
0.365 +	2.0292	0.3916	0.0000	0.4272	0.0000	0.0000	24.73%	2.848
0.1825 to 0.365-	0.5340	0.6052	0.5696	0.2136	0.1780	0.0000	18.24%	2.1004
0.1095 to 0.1825-	0.3204	0.1068	0.8188	0.1068	0.1068	0.0000	12.67%	1.4596
0.0730 to 0.1095-	0.6052	0.3204	0.4984	0.7120	0.0712	0.0712	19.94%	2.2962
0.0365 to 0.0735-	0.1958	0.3916	0.6052	0.6052	0.5340	0.4984	24.42%	2.8124
TOTAL	3.6846	1.8156	2.4920	2.0648	0.8900	0.5696	100.00%	11.5166
Percentage of Total	31.99%	15.77%	21.64%	17.93%	7.73%	4.95%		100.00%

Source: Matthew Simmons, "The World's Giant Oilfields", 2009







Note: A 42-U.S. gallon barrel of crude oil provides about 45 gallons of petroleum products. ***This gain from processing the crude oil is similar to what happens to popcorn, which gets bigger after it's popped.*** The gain from processing is more than 6%.One barrel of crude oil, when refined, produces about 19 gallons of finished motor gasoline, and 10 gallons of diesel, as well as other petroleum products. Most petroleum products are used to produce energy.

2. HISTORY OF US CRUDE OIL PRODUCTION, IMPORTS, CONSUMPTION (EIA)

History of US Crude Oil Production, Imports, Consumption

1954 - 2009

Billions of barrels, except as otherwise noted

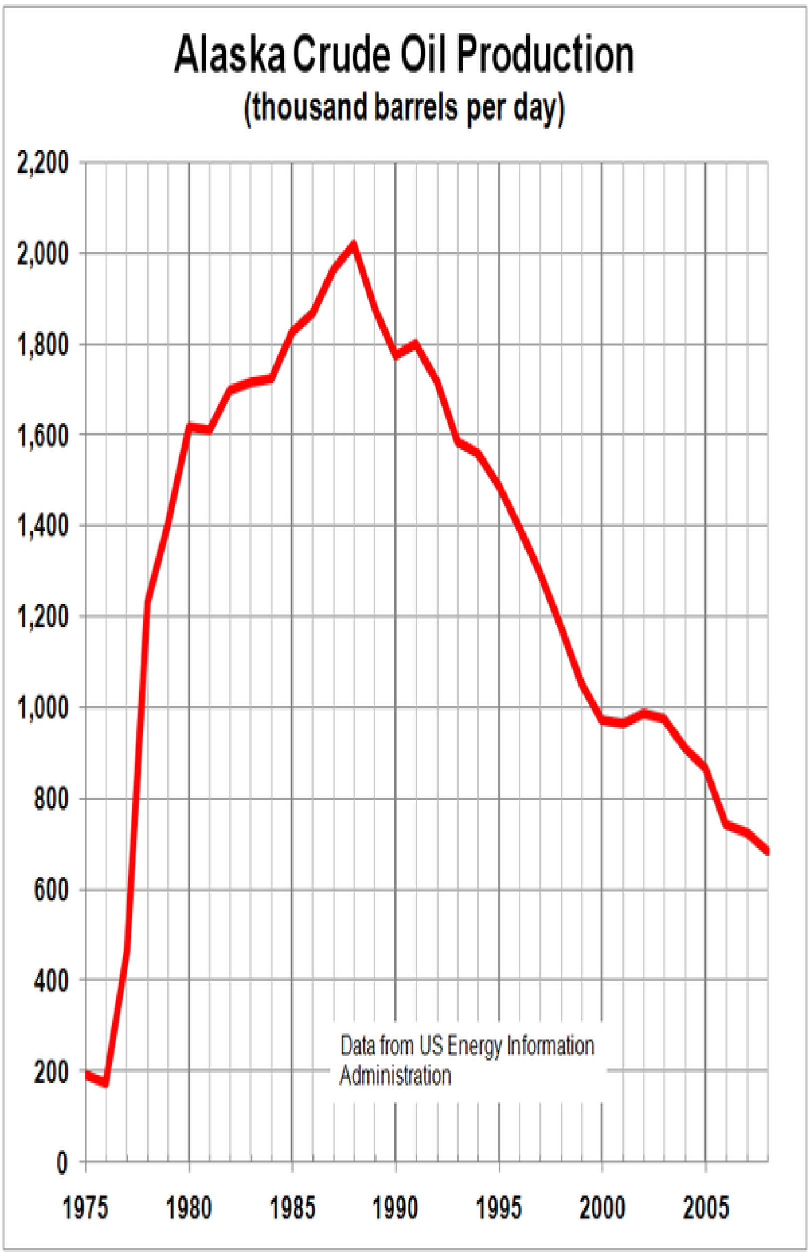
Year	Total US Crude Oil Production	Total Imports	* TOTAL *: US Crude Oil Production PLUS Imports	Percentage of of total from imports	1 Consumption	Percentage of of imports in consumption	Consumption divided by * TOTAL *
1954	2.315	0.384	2.699	14.23%	2.831	13.56%	104.89%
1955	2.484	0.456	2.940	15.51%	3.086	14.78%	104.96%
1956	2.617	0.526	3.143	16.73%	3.212	16.38%	102.18%
1957	2.617	0.575	3.192	18.01%	3.215	17.88%	100.73%
1958	2.449	0.621	3.070	20.23%	3.328	18.66%	108.40%
1959	2.575	0.650	3.225	20.16%	3.477	18.69%	107.83%
1960	2.575	0.664	3.239	20.50%	3.586	18.52%	110.71%
1961	2.622	0.700	3.322	2107%	3.641	19.22%	109.62%
1962	2.676	0.760	3.436	22.12%	3.796	20.02%	110.47%
1963	2.753	0.775	3.528	2197%	3.921	19.76%	111.16%
1964	2.787	0.827	3.614	22.88%	4.034	20.50%	111.63%
1965	2.849	0.901	3.750	24.03%	4.202	2144%	112.07%
1966	3.028	0.939	3.967	23.67%	4.411	2129%	111.19%
1967	3.216	0.926	4.142	22.36%	4.585	20.20%	110.69%
1968	3.329	1039	4.368	23.79%	4.902	2120%	112.22%
1969	3.372	1156	4.528	25.53%	5.160	22.40%	113.96%
1970	3.517	1248	4.765	26.19%	5.364	23.26%	112.57%
1971	3.454	1433	4.887	29.32%	5.553	25.81%	113.62%
1972	3.455	1735	5.190	33.43%	5.990	28.96%	115.41%
1973	3.361	2.283	5.644	40.45%	6.317	36.14%	111.93%
1974	3.203	2.231	5.434	4106%	6.078	36.70%	111.86%
1975	3.057	2.210	5.267	4196%	5.958	37.10%	113.11%
1976	2.976	2.676	5.652	47.34%	6.391	4187%	113.07%
1977	3.009	3.215	6.224	5165%	6.727	47.79%	108.08%
1978	3.178	3.053	6.231	49.00%	6.879	44.38%	110.40%
1979	3.121	3.086	6.207	49.72%	6.757	45.67%	108.86%
1980	3.146	2.529	5.675	44.56%	6.242	40.51%	109.99%
1981	3.129	2.188	5.317	41.15%	5.861	37.33%	110.24%
1982	3.157	1866	5.023	37.15%	5.583	33.42%	111.15%
1983	3.171	1844	5.015	36.77%	5.559	33.17%	110.85%
1984	3.250	1990	5.240	37.98%	5.756	34.58%	109.85%
1985	3.275	1850	5.125	36.10%	5.740	32.23%	112.01%
1986	3.168	2.272	5.440	4176%	5.942	38.23%	109.23%
1987	3.047	2.437	5.484	44.44%	6.083	40.06%	110.91%
1988	2.979	2.709	5.688	47.63%	6.326	42.83%	111.21%
1989	2.779	2.942	5.721	5143%	6.324	46.52%	110.54%
1990	2.685	2.926	5.611	52.15%	6.201	47.19%	110.52%
1991	2.707	2.784	5.491	50.70%	6.101	45.64%	111.10%
1992	2.625	2.887	5.512	52.38%	6.234	46.31%	113.11%
1993	2.499	3.146	5.645	55.73%	6.291	50.00%	111.45%
1994	2.431	3.284	5.715	57.46%	6.467	50.78%	113.15%
1995	2.394	3.225	5.619	57.39%	6.469	49.85%	115.13%
1996	2.366	3.469	5.835	59.45%	6.701	5177%	114.84%
1997	2.355	3.709	6.064	61.17%	6.796	54.57%	112.08%
1998	2.282	3.908	6.190	63.13%	6.905	56.60%	111.55%
1999	2.147	3.961	6.108	64.85%	7.125	55.60%	116.65%
2000	2.131	4.194	6.325	66.31%	7.211	58.16%	114.01%
2001	2.118	4.333	6.451	67.17%	7.172	60.42%	111.18%
2002	2.097	4.209	6.306	66.74%	7.213	58.35%	114.38%
2003	2.073	4.477	6.550	68.35%	7.312	6123%	111.63%
2004	1983	4.811	6.794	70.81%	7.588	63.41%	111.68%
2005	1890	5.006	6.896	72.59%	7.593	65.93%	110.10%
2006	1862	5.003	6.865	72.87%	7.551	66.26%	109.99%
2007	1848	4.916	6.764	72.67%	7.548	65.13%	111.59%
2008	1812	4.727	6.539	72.29%	7.136	66.24%	109.14%
2009	1938	4.280	6.218	68.83%	6.852	62.47%	110.19%
	151.938	**136.951**	**288.889**		**321.283**		

1Petroleum products supplied is used as an approximation for consumption

Note: Total consumption is higher than total production due to refinery gains including alcohol and liquid products produced from coal and other sources. OPEC countries include Venezuela, Iran, Iraq, Kuwait, Qatar, Saudi Arabia, Angola, United Arab Emir

ALASKA PIPELINE

In just two years (between March 27, 1975, and May 31, 1977) the 800-mi.-long (1,287 km), 4-ft. diameter (1.2 m) steel pipeline from Prudhoe Bay on Alaska's North Slope, through Fairbanks, to Valdez, the state's northernmost ice-free port, on Prince William Sound, was built. A total of 15.8 billion barrels of crude have been pumped through the pipeline from the North Slope from 1977 to 2008. **That is less than one-half of the world annual consumption of 32 billion barrels.**



Amounts in barrels			
	Daily	Yearly	Cumulative
Year	Average	Total	Total
1977	575,897	112,300,000	112,300,000
1978	1,087,695	397,008,750	509,308,750
1979	1,281,580	467,777,848	977,086,598
1980	1,516,213	554,934,043	1,532,020,641
1981	1,523,472	556,067,441	2,088,088,082
1982	1,619,566	591,141,545	2,679,229,267
1983	1,646,188	600,858,560	3,280,088,187
1984	1,663,487	608,836,116	3,888,924,303
1985	1,780,512	649,886,953	4,538,811,256
1986	1,823,110	665,434,992	5,204,246,248
1987	1,963,458	716,662,005	5,920,908,253
1988	2,033,082	744,107,885	6,665,016,108
1989	1,885,102	688,062,255	7,353,078,363
1990	1,793,292	654,551,673	8,007,630,036
1991	1,822,396	665,174,678	8,672,804,714
1992	1,746,893	639,363,127	9,312,167,841
1993	1,619,787	591,222,326	9,903,390,167
1994	1,587,177	579,319,503	10,482,709,670
1995	1,523,120	555,938,859	11,038,648,529
1996	1,435,810	525,506,504	11,564,155,033
1997	1,334,507	487,094,963	12,051,249,996
1998	1,206,839	440,496,271	12,491,746,267
1999	1,078,146	393,523,457	12,885,269,724
2000	999,202	365,707,875	13,250,977,599
2001	992,000	362,131,000	13,613,108,362
2002	1,000,916	365,334,233	13,980,609,456
2003	993,000	362,554,000	14,323,163,156
2004	935,134	342,249,701	14,685,413,157
2005	891,104	325,252,788	15,008,657,831
2006	759,081	277,064,405	15,377,064,405
2007	740,170	270,161,990	15,555,884,226
2008	703,551	257,499,836	15,813,384,062

USA GULF OF MEXICO

The USA Gulf of Mexico (GoM) oil production using the most recent EIA data peaked in June 2002 at the rate of 0.63145 Billion Barrels per year and is forecast to continue declining. **The maximum estimate of total reserves left is about 16 billion barrels, less than half the annual world consumption.**

SEE 5 BELOW FOR: US ENERGY CONSUMPTION BY TYPE OF ENERGY AND BY SECTOR, GLOBAL ENERGY PRODUCTION BY SOURCE, AND GLOBAL OIL USE.

3. ALGAE TO BIODIESEL

Years of research at many leading universities and private research companies demonstrates that algae could supply enough fuel to meet all of America's transportation needs in the form of biodiesel. The vast body of results shows that the annual biodiesel yield per acre of land (not required to be arable or crop land!) is between 33,000 to 100,000 gallons! Now one gallon of corn-derived ethanol has less than 60% of the energy content that biodiesel has. IT FOLLOWS THAT FROM THIS AND OTHER FACTORS (SEE ELOW), THE NUMBER OF ACRES REQUIRED TO PRODUCE BIODIESEL TO FULFILL ALL OF THE ANNUAL US TRANSPORTATION ENERGY NEEDS IS BETWEEN 1.5 TO 4.6 MILLION ACRES OF LAND, WHICH COMES TO BETWEEN 0.07% TO 0.2% OF ALL THE US LAND AREA, ARABLE OR NOT! By contrast, the number of acres of corn needed to satisfy annual US transportation energy needs with ethanol is 1.8 times the entire acreage of US arable land (=470 million acres)!!! Of course, this is totally absurd, and yet there still exists plans to produce more and more ethanol!

Fuel Type	BTU's per gallon
Ethanol (M-100)	76,100
Gasoline, regular unleaded, (typical)	114,100
Bio Diesel (B-20)	129,500

4. FARELESS URBAN MASS TRANSPORTATION SYSTEM (FUMTS)

The establishment of a mass transit, fare-free, system for urban regions can be financed easily by a method that literally involves no cost to 99% of the citizens. The proposed method for financing a FUMTS for SCR (Southern California Region, consisting of Los Angeles, Ventura, Orange, San Bernardino and Riverside counties) and, indeed, for all large urban regions in California and the USA, is simple and effective. The source of income is to come from a minuscule annual tax on the net wealth of the wealthiest one percent of the appropriate adult population. In California, the wealthiest one percent of the California adult population has over $2.5 trillion in net wealth. An annual tax of only 0.48% on this amount would yield over $11.94 billion annually; this is more than enough to finance FUMTS and would easily take care of the annual California passenger miles traveled for all urban regions in the state! For the entire USA, the wealthiest one percent has over $25 trillion in net wealth! An annual tax of only 0.35% on this amount would yield $86.6 billion annually; this is more than enough to finance FUMTS which would easily take care of the annual passenger miles traveled for all urban regions in the USA!

Summary of benefits from creating FUMTS for SCR, California and USA:
1). The annual cost of FUMTS is only 8.47% to 9.01% of the annual cost from using the current all-auto mode! For every $1 spent for FUMTS, the average motorist spends $11.10 to $11.86!
2). The annual fuel consumption for FUMTS is only 9.43% to 9.60% of that from using the current all-auto mode! For every one gallon of fuel used for a bus in the FUMTS mode, the average car in the all-auto mode requires 10.42 to 10.60 gallons!
3). For SCR, California and the USA, respectively, the annual fuel savings that accrue from using FUMTS are 5.68 billion, 10.35 billion, and 70.08 billion gallons, respectively; the annual savings in equivalent barrels of crude petroleum are 298 million, 545 million, and 3.69 billion barrels, respectively; the 10 year savings are 2.76 billion, 4.76 billion, and 30.5 billion barrels, respectively! The last figure for the USA far exceeds the wildest, most optimistic estimation of petroleum reserves in the Arctic National Wildlife Refuge!!
4). The annual pollutants issued from using FUMTS are 10.09% to 10.26% of those issued from the current all-auto mode! If natural gas buses are used instead of diesel, then the ratio drops to near zero!
5) High accident occurrences, resulting in death and injury and extensive, expensive property damage and medical costs for tens of thousands will be greatly reduced.
6) Enormous road/street maintenance costs and waste of fossil energy for road construction and maintenance will be greatly reduced.
7) Parking space costs and parking lot congestion and expense for millions will be greatly reduced.
8) Its use eliminates the nuisance and unnecessary bureaucracy of fare transactions.

THIS IS ABSOLUTE: ***Ever-increasing gridlock is ever-increasing gridlock, enormous petroleum waste is enormous petroleum waste, enfeebling wasted time is enfeebling wasted time, and staggeringly expensive costs are staggeringly expensive costs by any other euphemisms. If we rigorously use our human reason both to discover and acknowledge the facts about our critical world petroleum depletion crisis and our current transportation quagmire, and if we follow the logical implications for effective human action that such knowledge entails, then we can free ourselves of our plight. Failing this, we are doomed by mindless apathy, irrationality, ignorance and the stranglehold of the powerfully entrenched corporate interests to suffer our ever worsening petroleum extinction plight and transportation afflictions.***

The tables immediately following show all the details.

Comparison of Modes of Urban Transportation: All auto* versus all fare-free bus modes						
	Annual cost					
Urban region(s)	All auto mode	All fare-free bus mode	Ratio: bus cost to auto cost	For every $1 of bus cost, auto cost is:	Annual Cost Savings: annual auto cost minus annual bus cost	
SCR	$ 52,815,967,200	$ 5,562,309,692	10.53%	$9.50	$ 47,253,657,508	
California	$ 99,833,340,000	$ 10,531,553,253	10.55%	$9.48	$ 89,301,786,747	
USA	$ 640,696,740,000	$ 70,936,082,388	11.07%	$9.03	$ 569,760,657,612	
	Annual fuel concumption (gallons)					
Urban region(s)	All auto mode	All fare-free bus mode	Ratio: bus fuel use to auto fuel use	For every gallon of bus fuel use, auto fuel use is:	Annual Fuel Savings: annual bus use minus auto use	Equivalent savings in barrels of crude***
SCR	5,740,866,00	500,764,04	8.72%	11.464	5,240,101,95	275,794,84
California	9,983,334,00	946,197,93	9.48%	10.551	9,037,136,06	475,638,74
USA	64,069,674,00	6,109,602,29	9.54%	10.487	57,960,071,70	3,050,530,09
*Here, "auto" means "non-commercial vehicle"						***1 barrel crude yields 19 gals gasoline

Annual pollution comparison			
Urban region(s)	Annual bus miles	Annual auto miles	Ratio**
SCR	2,328,052,03	114,817,320,00	10.14%
California	4,398,874,21	217,029,000,00	10.13%
USA	28,403,541,07	1,392,819,000,00	10.20%

**Assumes a bus pollutes 5 times as much as an auto per mile; the ratio of the annual bus pollution to the annual auto pollution is 5 x #annual bus miles traveled / #annual auto miles trav

MT = miles travelled; V = vehicle; P = passenger; D = daily; A = annual

BUS CARRYING CAPACITY AND COST FOR SCR URBAN ROADS EXCLUDING LOCAL (50 PASSENGERS PER BUS) 18 HOUR OPERATING PERIOD: 5AM TO 11PM Hourly capacity (i.e., passenger miles per hour), C, at v mph (each bus), b buses per mile: C = 50 x b x # bi-directional road miles x v	Int	OFE	OPA	MA	Col	TOTALS
Total miles	525.915	451.325	3,196.137	5,226.955	4,553.461	13,953.793
Bi-directional road miles	1,051.830	902.650	6,392.274	10,453.910	9,106.922	27,907.586
v (mph)	55	55	40	30	30	
b	1.75	1.36	0.37	0.23	0.069	
C	5,061,932	3,375,911	4,730,283	3,606,599	942,566	
18 hour (=daily) capacit	91,114,774	60,766,398	85,145,090	64,918,781	16,966,196	318,911,238
Wait time between buses in minute	0.62	0.80	4.05	8.70	28.99	
#buses operating for 18 hr	1,841	1,228	2,365	2,404	628	8,466
#buses operating in 6 hou segments (three shifts	5,522	3,683	7,095	7,213	1,885	25,399
#bus hours over 18 hour peric	33,133	22,097	42,573	43,279	11,311	152,392
18 hour cost at $100/	$ 3,313,264	$ 2,209,687	$ 4,257,254	$ 4,327,919	$ 1,131,080	$ 15,239,205
Annual cost	$ 1,209,341,542	$ 806,535,828	$ 1,553,897,887	$ 1,579,690,340	$ 412,844,095	$ 5,562,309,692
1998 URBAN SCR ALL VEHICLE DATA						
DVMT = DPMT (approximately)	90,876,300	60,419,100	83,945,800	62,603,000	16,723,800	314,568,000
AVMT = APMT (approximately)	33,169,849,500	22,052,971,500	30,640,217,000	22,850,095,000	6,104,187,000	114,817,320,000
Annual bus travel =365 x v x #buses operating 18 hrs x 1	665,137,848	443,594,705	621,559,155	473,907,102	123,853,229	2,328,052,039
Annual bus fuel concumption (gallons =annual bus travel/4.649mpg	143,071,165	95,417,231	133,697,388	101,937,428	26,640,832	500,764,044

92% of all-vehicle URBAN VMT is from non-commercial vehicles;
$0.50 per mile is average cost for non-commercial vehicle;
Annual non-commercial vehicle cost = 0.92xAVMTx$0.50
= $52,815,967,200

Urban non-commercial vehicles average 20 miles per gallon;
Annual urban non-commercial fuel consumption=0.92xAVMT/20
=5,740,866,000 gallons

Fare-free bus system costs:	
Average annual cost per SCR capita (16.84 million):	$330.30
Average daily cost per capita:	$0.90
Annual cost as a percentage of the $2.5 trillion of net wealth held by the richest 1% of Californians	0.22%

BUS CARRYING CAPACITY AND COST FOR CA URBAN ROADS EXCLUDING LOCAL (50 PASSENGERS PER BUS)						
18 HOUR OPERATING PERIOD: 5AM TO 11PM						
Hourly capacity (i.e., passenger miles per hour), C, at v mph (each bus), b buses per mile:						
C = 50 x b x # bi-directional road miles x v						TOTALS
	Int	OFE	OPA	MA	Col	
Total centerline miles (1998)	1,069.184	1,397.345	5,843.989	10,235.916	9,973.415	28,519.849
Bi-directional road miles	2,138.368	2,794.690	11,687.978	20,471.832	19,946.830	57,039.698
v (mph)	55	55	40	30	30	
b	1.57	0.93	0.34	0.22	0.08	
C	9,232,404	7,147,420	7,947,825	6,755,705	2,393,620	
18 hour capacity (=daily capacity)	166,183,269	128,653,554	143,060,851	121,602,682	43,085,153	602,585,509
Wait time between buses						
in minutes	0.69	1.17	4.41	9.09	25.00	
#buses operating for 18 hrs	3,357	2,599	3,974	4,504	1,596	16,030
#buses operating in 6 hour						
segments (three shifts)	10,072	7,797	11,922	13,511	4,787	48,089
#bus hours over 18 hour period	60,430	46,783	71,530	81,068	28,723	288,536
18 hour cost (=daily cost) at $100/hr	$ 6,043,028	$ 4,678,311	$ 7,153,043	$ 8,106,845	$ 2,872,344	$ 28,853,571
Annual cost	$ 2,205,705,208	$ 1,707,583,537	$ 2,610,860,526	$ 2,958,998,597	$ 1,048,405,385	$ 10,531,553,253
1999 URBAN CALIFORNIA ALL VEHICLE DATA:						
DVMT = DPMT (approximately)	165,575,342	127,517,808	141,920,548	120,057,534	39,528,767	594,600,000
AVMT = APMT (approximately)	60,435,000,000	46,544,000,000	51,801,000,000	43,821,000,000	14,428,000,000	217,029,000,000
Annual bus travel						
=365 x v x #buses operating 18 hrs x 18	1,213,137,865	939,170,945	1,044,344,210	887,699,579	314,521,615	4,398,874,215
Annual bus fuel concumption (gallons)						
=annual bus travel/4.649mpg	260,945,981	202,015,691	224,638,462	190,944,199	67,653,606	946,197,938
92% of all-vehicle URBAN VMT is from non-commercial vehicles;			Fare-free bus	Average annual cost		
$0.50 per mile is average cost for a non-commercial vehicle;			system costs:	per capita (34 million):		$309.75
Annual urban non-commercial vehicle cost = 0.92xAVMTx$0.50				Average daily cost per capita:		$0.85
= $99,833,340,000				Annual cost as a percentage of the		
Urban non-commercial vehicles average 20 miles per gallon;				$2.5 trillion of net wealth held by the		
Annual urban non-commercial fuel consumption=0.92xAVMT/20				richest 1% of Californians		0.42%
=9,983,334,000 gallons						

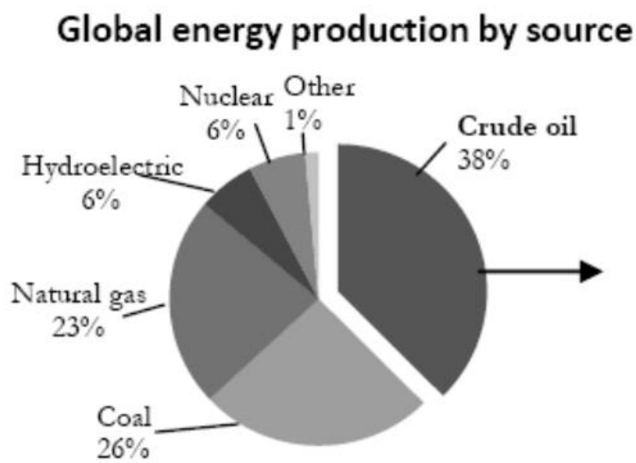
BUS CARRYING CAPACITY AND COST FOR USA URBAN ROADS EXCLUDING LOCAL (50 PASSENGERS PER BUS)						
18 HOUR OPERATING PERIOD: 5AM TO 11PM						
Hourly capacity (i.e., passenger miles per hour), C, at v mph (each bus), b buses per mile:						
C = 50 x b x # bi-directional road miles x v						TOTALS
	Int	OFE	OPA	MA	Col	
Total miles	13,343.000	9,125.000	53,206.000	89,399.000	88,008.000	253,081.000
Bi-directional road miles	26,686.000	18,250.000	106,412.000	178,798.000	176,016.000	506,162.000
v (mph)	55	55	40	30	30	
b	0.8	0.53	0.29	0.18	0.079	
C	58,709,200	26,599,375	61,718,960	48,275,460	20,857,896	
18 hour (=daily) capacit	1,056,765,600	478,788,750	1,110,941,280	868,958,280	375,442,128	3,890,896,038
Wait time between buses						
in minute	1.36	2.06	5.17	11.11	25.32	
#buses operating for 18 hr	21,349	9,673	30,859	32,184	13,905	107,970
#buses operating in 6 hou						
segments (three shifts	64,046	29,018	92,578	96,551	41,716	323,909
#bus hours over 18 hour perio	384,278	174,105	555,471	579,306	250,295	1,943,454
18 hour cost at $100/h	$ 38,427,840	$ 17,410,500	$ 55,547,064	$ 57,930,552	$ 25,029,475	$ 194,345,431
Annual cost	$ 14,026,161,600	$ 6,354,832,500	$ 20,274,678,360	$ 21,144,651,480	$ 9,135,758,448	$ 70,936,082,388
1998 URBAN USA ALL VEHICLE DATA						
DVMT = DPMT (approximately)	1,049,276,712	470,035,616	1,075,947,945	860,098,630	360,583,562	3,815,942,466
AVMT = APMT (approximately)	382,986,000,000	171,563,000,000	392,721,000,000	313,936,000,000	131,613,000,000	1,392,819,000,000
Annual bus travel						
=365 x v x #buses operating 18 hrs x 1	7,714,388,880	3,495,157,875	8,109,871,344	6,343,395,444	2,740,727,534	28,403,541,077
Annual bus fuel concumption (gallons						
=annual bus travel/4.649mpg	1,659,365,214	751,808,534	1,744,433,501	1,364,464,496	589,530,552	6,109,602,297
92% of all-vehicle URBAN VMT is from non-commercial vehicles;			Fare-free bus	Average annual cost		
$0.50 per mile is average cost for non-commercial vehicle;			system costs:	per USA capita (285 million):		$248.90
Annual non-commercial vehicle cost = 0.92xAVMTx$0.50				Average daily cost per capita:		$0.68
= $640,696,740,000				Annual cost as a percentage of the		
Urban non-commercial vehicles average 20 miles per gallon;				$25 trillion of net wealth held by the		
Annual urban non-commercial fuel consumption=0.92xAVMT/20				richest 1% of the US population:		0.28%
=64,069,674,000 gallons						

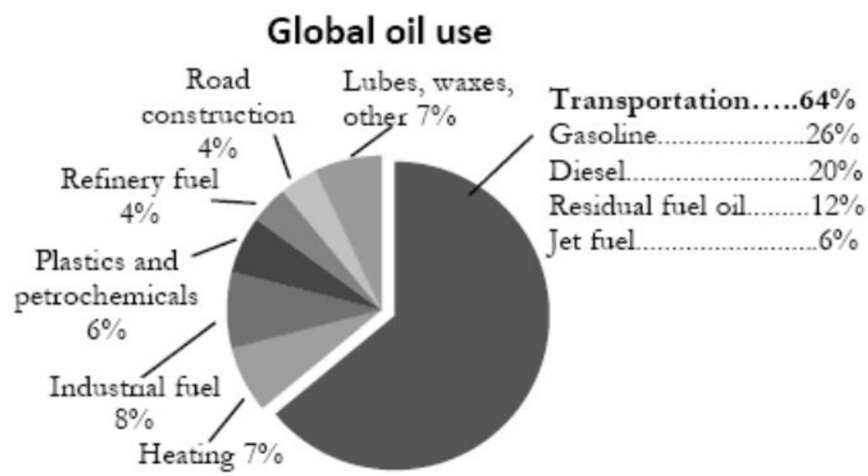
8. APPENDIX

US ENERGY CONSUMPTION BY TYPE OF ENERGY AND BY SECTOR

Consumption Summary

Supply Sources	Percent of Source	Demand Sectors	Percent of Sector
Petroleum 37.1%	71% Transportation 23% Industrial 5% Residential and Commercial 1% Electric Power	**Transportation 27.8%**	95% Petroleum 2% Natural Gas 3% Renewable Energy
Natural Gas 23.8%	3% Transportation 34% Industrial 34% Residential and Commercial 29% Electric Power	**Industrial 20.6%**	42% Petroleum 40% Natural Gas 9% Coal 10% Renewable Energy
Coal 22.5%	8% Industrial <1% Residential and Commercial 91% Electric Power	**Residential and Commercial 10.8%**	16% Petroleum 76% Natural Gas 1% Coal 1% Renewable Energy
Renewable Energy 7.3%	11% Transportation 28% Industrial 10% Residential and Commercial 51% Electric Power	**Electric Power 40.1%**	1% Petroleum 17% Natural Gas 51% Coal 9% Renewable Energy 21% Nuclear Electric Power
Nuclear Electric Power 8.5% (30%)	100% Electric Power		





Charts are based on 2007 data. Chart source: Page 7 of Oil 101. Data from EIA and IEA.