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Energy Independence: Can We Really Do It?

On December 19, 2007, President Bush signed into law the “Energy Independence and Security Act of 2007”. The act legislated changes in three major areas.

The first part is Energy Security through Improved Vehicle Fuel Economy which is a fancy title for increasing automobile fuel economy. The second part is Energy Security through increased Production of Biofuels. This part of the act mandates increasing use of renewable fuels such as ethanol and biodiesel that will replace some of the products made from petroleum. The third part of the act deals with Energy Savings Through Improved Standards for Appliances and Lighting which is another fancy way of saying we will improve efficiency.

Rather than get into a discussion of the merits of each of these pieces, Lipow Oil Associates has put together some numbers to illustrate really how far the country has to go to really reach Energy Independence Nirvana. I’ll give some editorial comments at the end.

One must recognize that the Energy Independence and Security Act of 2007 was the result of a grand compromise among many different interests. Frankly it would be very difficult to pass the kind of legislation needed to truly reduce energy consumption; the ultimate solution contains many different parts with something for everyone to hate.

Energy Consumption

I am going to focus on energy independence from the standpoint of petroleum and natural gas production and consumption in the USA. Clearly this is part of the picture; one could get very complex and try to figure out how much energy is consumed abroad in making all those consumer products that we import. I am going to try and keep it simple. Most of the data cited in the discussion is from the EIA/DOE website.

Global Petroleum Demand

According to the US Census Bureau, today’s world population is estimated at 6.6 billion people of whom 303 million or 4.6% reside in the USA China is the most populous country with an estimated 1.3 billion residents or nearly 20% of the worlds’ population.

World petroleum product demand is about 85 million barrels per day of which the USA consumes just over 20 million barrels per day or 24%. The oil demand in China is estimated at 7.7 million barrels per day or about 9% of the total.

The Petroleum Picture in the USA

The USA is beset with declining crude oil production and increasing petroleum product demand. USA Crude oil production peaked in 1970 at 9.6 million barrels per day. Here is a table showing the decline in oil production in millions of barrels per day over the last 20 years or so:

	USA Oil Production Millions of barrels per day		
	1985	1997	2006
Total USA Production (peaked in 1970 at 9.6)	9.0	6.4	5.1
Texas (peaked in 1981 at 2.5)	2.4	1.5	1.1
Alaska (peaked in 1988 at 2.0)	1.8	1.3	0.7
California (peaked in 1985 at 1.1)	1.1	0.8	0.6
Off Shore US Gulf Coast (peaked in 2003 at 1.55)	0.9	1.1	1.3

Bottom line is that over the last twenty or so years, oil production has declined by nearly 4 million barrels per day or 45%. Meanwhile demand continues to increase:

	USA Oil Demand Millions of barrels per day		
	1985	1997	2006
All Petroleum Products	15.7	18.6	20.7
Gasoline	6.8	8.0	9.2
Distillate	2.9	3.4	4.2
Jet Fuel	1.0	1.6	1.6

The bottom line here is that demand has gone up 5 million barrels per day or roughly 33% since 1985.

With domestic supply decreasing and domestic demand increasing, the difference must be made up by imports. We traditionally focus on crude oil imports, but the USA must also import gasoline, distillate fuel and jet fuel to meet demand. This table illustrates the growth in imports since 1985.

	USA Oil Imports Millions of barrels per day		
	1985	1997	2006
Crude Oil	3.2	8.2	10.1
All Petroleum Products	1.9	1.9	3.6
Gasoline	0.4	0.5	1.1
Distillate	0.2	0.2	0.4
Jet Fuel	0.0	0.1	0.2

We would have to construct approximately 2 million barrels per day of new refinery capacity and process a like amount of oil to eliminate gasoline, distillate and jet fuel imports. That additional crude would have to be imported which does not lead to an improvement in energy independence.

Of the 10 million barrels per day crude oil imports, Canada supplies about 19%, Saudi Arabia and Mexico about 14% each, Venezuela 11%, Nigeria 10%, Algeria, Iraq and Angola are next at about 5% each. Oil imports from the volatile Persian Gulf region account for only about 21% of the total and one can that Saudi Arabia and Iraq provide the bulk of it.

The Sobering Reality of the Situation

The USA produces 5 million barrels per day of crude and imports 10 million barrels per day of the stuff. Of the 15 million barrels per day of crude that we process, imports are 66% of the total!! After we refine the crude oil, we still have to import 3.6 million barrels per day of additional products because we consume 20.7 million barrels per day. Two thirds of our petroleum demand is met with imports. Energy independence is a long way off.

With less than 5% of the world's population the USA uses nearly 25% of the world's oil. Like it or not, the world is becoming more prosperous and energy demand outside of the USA is increasing. In the future, the USA will have more competition for oil resources

and oil products. China's oil demand is growing at about 10% annually or 700,000 barrels per day each year.

If we want to be energy independent, it will take some combination of finding more oil, using less oil products, finding substitutes for oil products and more efficiently using them. The great debate is how the nation can achieve this goal.

But that's not all: Our Addiction to Natural Gas

While a lot of the focus has been on crude oil and petroleum products, most people don't realize that the USA imports about 15% of its natural gas needs:

	Natural Gas Consumption Millions of Cubic Feet per Day	
	1997	2006
Total USA Consumption	62000	59000
Total Net Imports	7600 (12%)	9000 (15%)

In 1997, Canada supplied 97% of our imported natural gas. In 2007, that figure dropped to 86%.

Natural gas consumption is divided into four categories: Residential, Commercial, Industrial and Electric Power. Here is some information regarding the change over the last 10 years:

	Natural Gas Consumption Usage by Sector	
	1997	2006
Residential	22%	20%
Commercial	14%	13%
Industrial	37%	30%
Electrical Power	18%	29%

Total natural gas usage is remaining fairly constant, it is how it's being used that is changing. As the economy has migrated to a service industry from an industrial base, natural gas has found a growing market in the electrical generating sector at the expense of coal and hydroelectric power.

Electricity Generation

How we choose to generate electricity affects our use of petroleum and natural gas. Electrical power can be made from several sources and the next table shows the percentage of electricity produced in the USA from these sources:

	Electricity Generation By Fuel Source	
	1997	2006
Coal	53%	49%
Natural Gas	14%	20%
Nuclear	18%	19%
Hydroelectric	10%	7%
Oil	2.6 %	1.6%

The use of oil to make electricity is very small, only 1.6% of the electricity generated in 2006 was made from oil. This translates into about 200,000 barrels per day of oil representing less than 1% of our total petroleum product demand of 20.7 million barrels per day.

Increasing the amount of nuclear power plants by 50% supplies enough electricity to eliminate natural gas imports. Even going 100% nuclear won't eliminate oil from electrical generation; no one will build a nuclear power plant in Hawaii where oil is burned to produce electricity.

Conclusion and Comment

If anything, the “Energy Independence and Security Act of 2007” is really a misnomer and at its worst some might claim false advertising. But...

The fact of the matter is that the numbers don't lie. The USA produces 5 million barrels per day of oil and consumes over four times that – 20.7 million barrels per day. Total crude oil and product imports represent 66% of the total. The USA consumes 59000 million cubic feet per day of natural gas, and we import 11000 of it—about 15%.

I like to think we can reduce our energy dependence and become more efficient. I also believe that new technology will play a big part. One need only look at the continued price decline of computers and Plasma TV's to see that technology can lead to better

efficiency. This can be achieved in a number of ways and I look at the Energy Independence and Security Act of 2007 as a starting point.

Towards Energy Independence

The road to complete energy independence is under construction, filled with many potholes and detours along the way. There is something for everyone to hate in this plan.

On the increasing supply side:

Increase oil drilling in Alaska, California, US Gulf Coast and Atlantic Coast. That's where the oil is. Oil companies are not drilling in Iowa, Minnesota or Georgia for a reason— little to any crude oil. I don't think at \$90 oil that government needs to provide subsidies and tax credits as investment incentives to drill for oil.

Build more refinery capacity: By constructing and processing 2 million barrels per day more crude oil in a high conversion refinery, we could eliminate product imports. Unfortunately this additional crude oil would have to be imported.

Increase use of renewable fuels: The energy act mandated increased use of renewable fuels that will displace the use of petroleum based products. In 2007, ethanol will make up an estimated 4.6% of the gasoline supply rising to about 6.5% in 2008. This increase will cost the government several billion dollars in tax credits and producer subsidies. Since ethanol must be transported by truck and rail which consumes diesel, it makes more sense to consume it close to the production source. Higher usage should be encouraged in states like Iowa, Nebraska, North and South Dakota. This also would reduce the amount of gasoline that must be pumped from the gulf coast into the Midwest markets at least saving some electricity from pumping product hundreds of miles.

Nuclear Power: Increasing electrical generation by 50% would provide enough electricity to eliminate natural gas imports. As utopian as this might seem, natural gas will still be used in some area as it is impractical to build nuclear power plants and then carry electricity over long distances. In some locations, smaller natural gas plants will continue to be used.

On the decreasing demand side:

The low cost solution is conservation. How about plain old car pooling to work and play? Few want to do this option since it can be "inconvenient". Mandatory recycling of many plastic products reduces petrochemical feedstock consumption, but in some geographic locations, recycling just won't be cost effective

Increase vehicle fuel economy which the act has addressed, perhaps with loopholes. Now we need to increase diesel engine mileage and efficiency.

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Increase appliance efficiency which the act has begun to address. But with new solutions are new problems. The new light bulbs contain mercury so they must be recycled to avoid contaminating landfills and subsequently water supplies..

Increase gasoline, diesel and electricity taxes to curb demand. Change the income tax brackets at the low end to be revenue neutral. If one thinks they are not contributing to increased energy consumption take the following test: How many clocks and/or appliances do you have to reset after a power outage?

Unfortunately due to the intense opposition that each of these items engenders from some constituency, it is hard to imagine a comprehensive solution that involves a multitude of compromises and choices. Given the worldwide growth in energy consumption, the consumer is certain to face higher prices in the foreseeable future.