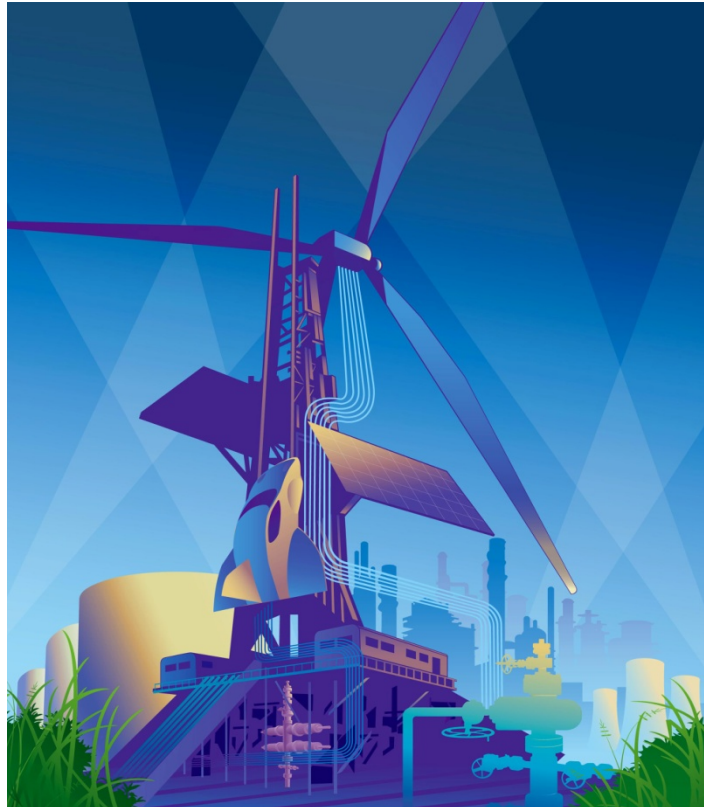


# Peak Oil Production and the Implications to the State of Connecticut Report to Legislative Leaders and the Governor

*"We've got 85 million barrels of (global) supply and 88 million barrels of demand,"  
T. Boone Pickens*



ASPO 2007

*"Demand will be going up, but it will be constrained by supply. I don't think we are going to see the supply going over 100 million barrels a day and the reason is: Where is all that going to come from?"*

James Mulva, CEO Conoco-Phillips on oil production estimates.

**Submitted by:  
The Legislative Peak Oil and Natural Gas Caucus**

**November --- 2007**

# Peak Oil Production and the Implications to the State of Connecticut November 2007

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*Representative Terry Backer*

*Senator Bob Duff*

## **Connecticut Legislative Peak Oil and Natural Gas Caucus**

### **Report to the Legislative Leadership and the Governor**

#### **PROBLEM STATEMENT**

Global oil production appears to have stagnated and may soon be headed toward terminal decline. International demand is increasing at a compounding rate yearly. Escalating oil cost is evident and supply shortage and disruption have occurred both in the US and internationally. Rising cost for oil has and will continue to affect every product, every citizen, every business and every function of Government. Contraction in the state's economy is likely at current and possible higher oil prices. The state is unprepared for this permanent shift in the international energy regimes. Our society has only once ever faced a contraction of affordable and plentiful oil—during World War II. – Today we have no simple model to remedy the rising situation. There is no short-term fix.

#### **INTRODUCTORY STATEMENT**

“Peak Oil” is the point in time when an oil well, an oil field, a state, a nation, a continent or the world hits maximum production. Thereafter production declines, perhaps after a plateau, perhaps precipitously.

It is the position of the Caucus that the extent of oil reserves, either confirmed or estimated, is not necessarily the driving issue behind the rapidly emerging Peak oil story. Rather, known or estimated reserves are only one factor, albeit an important one, limiting maximum global production. Reserves are very difficult to validate and often they are “national security secrets” of the counties that own the oil. More than 90% of the world's oil reserves are controlled by national oil companies. More than 65% of the known oil is located in countries that have a strained relationship with the United States. Additionally, current oil discoveries accessible to the US and other countries are increasingly found in deep oceans or arctic regions and will take a decade to develop, if it is possible, and decades to extract. How much oil is in the earth is somewhat irrelevant to the issues at hand: maximum production and increasing demand. Knowing there is oil is not the same as being able to extract it or to afford it.

The Caucus realizes that the current run-up of oil to above \$98.00 per barrel may in part be due to oil riding a bubble in the markets, particularly when considering the sub-prime impact and the incredible sinking dollar. Many other factors might reduce the price of oil in the short term. One factor might be a recession that would cut demand. Depending on the severity of any recession, the cure would be as bad as the illness. This however

does not change the fact that oil seems to have a technical floor of \$70.00+ per barrel with future cost being estimated to raise as much as \$10.00 to \$12.00 per barrel per year as flows flatten or fall and developing nations demand more oil.

This report is not intended to be a technical paper nor is it comprehensive. While energy use and extraction has an inherent impact on the environment, this report does not contemplate environmental issues. Rather it serves as warning, a red flag, to the complacency and ignorance regarding oil, to which we have all been party to.

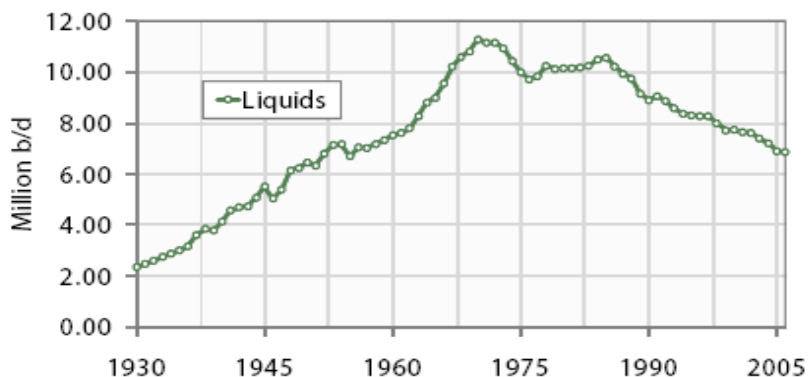
### **PEAK OIL BACKGROUND**

Peak oil refers to the point of maximum production of the finite oil resource followed by a plateau in production and then terminal decline in output. The length of the production plateau could vary, as could the rate of declining production thereafter. Once considered a theory, it is now a matter fact, since oil production in over half of the world's oil producing countries is in decline. The issue of timing—the “when” question—is all that is in dispute today... It follows that after the peak in world production, sharp price increases will occur, especially when coupled with global demand increase. The events that follow Peak oil can be imagined in a world that runs in every aspect on cheap oil.

### **WE HAVE SEEN PEAK OIL PRODUCTION BEFORE**

**M. King Hubbert** the noted geophysicist presented his theory of Peak oil to the oil industry in a speech entitled “Nuclear Energy and the Fossil Fuels” (March 6,1956). He proposed that the United States and the planet as a whole could be modeled to predict its peak rate of oil production. His theory was met with great resistance in 1956, especially by the US Geological Survey, but after he accurately predicted the US's Peak oil production in 1970 and subsequent decline, his theory ceased being theory and became the history for American oil production. Even the advent of Alaska's North Slope could not regain former production levels.

Below is the actual curve of oil production in the US from 1930 to the end of 2005. The graph shows various sub peaks due to Alaska coming on line and technological improvements which slow the decline somewhat.

**Chart 78: United States Production 1930 - 2006**

Source: ASPO Ireland & BP Statistical Review

After US oil production peaked in 1970 OPEC was able to gain control of oil prices. That event allowed them to manipulate prices which resulted in the 1973 “oil crisis.” What we are now facing has no similarities to that short-window crisis.

The world’s 20 largest oil-producing countries supply 83% of the world’s daily flow of oil. Since 1970 about half of those countries have either peaked (US, Iran, UK, Norway, Indonesia, Mexico, Venezuela) and are in decline, or will peak soon (Russia, China). In some cases (Iran and Venezuela), their peak was heavily influenced by OPEC actions and other political decisions; in most, the driver was primarily geological limits. The United Kingdom’s North Sea fields peaked in the late 1999. China has confirmed that two of its largest producing regions are in decline. Mexico’s national oil company, Pemex, has announced that Cantarell Field, one of the world’s largest offshore fields, was expected to peak in 2006, and then decline 14% per annum. Declines from Mexico will mean is a significant loss since it provides the US with about 14% of our imports our oil. Britain’s oil was never a large component to the US; however, its loss to Europe places heavier reliance on Middle East oil and creates supply competition with the US. Britain has already become a net oil importer and Mexico may follow within a decade.

## Nation at Risk

### GOVERNMENT ACCOUNTABILITY OFFICE REPORT

*Crude Oil: Uncertainty about Future Oil Supply Makes It Important to Develop a Strategy for Addressing a Peak and Decline in Oil Production* [GAO-07-283](#) February 28, 2007 (76 pages)

The GAO report of February 2007 outlines that the United States is exceptionally vulnerable to peak and declining oil supplies. In its report the GAO stated that the United States is the most susceptible nation to oil shortages and disruptions due to the

fact it is the largest oil consumer. The report further pointed out the United States has no strategic plan to cope with Peak oil and declining global production.

According to the International Energy Agency (IEA), most countries outside the Middle East have reached their peak in conventional oil production, or will do so in the near future. This assumption however can only be based on estimates since Saudi Arabia and other producing nations view oil reserves as state secrets. There is no way to know, based on the lack of information from these of countries, what the mid-east oil reserves are. However since the release of the GAO study, statements by Sadad Al Hussein, retired VP of Production for Saudi Aramco, indicate that Saudi Arabia is very near its production plateau. While the Saudi production plateau may be sustained for some period of time, it can not supply future global demand increases or compensate for decline in other oil regions. Independent investigations by the prominent energy investment banker Matthew Simmons of Simmons & Company Int'l indicate that Saudi oil fields can not be expected to produce much additional oil over its current production level.

The following are quotes from the GAO study:

- “While the consequences of a peak would be felt globally, the United States, as the largest consumer of oil and one of the nations most heavily dependent on oil for transportation, may be particularly vulnerable.”
- “Under these circumstances, an imminent peak and sharp decline in oil production could have severe consequences, including a worldwide recession. If the peak comes later, however, these technologies have a greater potential to mitigate the consequences.”
- “In the United States, alternative transportation technologies face challenges that could impede their ability to mitigate the consequences of a peak and decline in oil production, unless sufficient time and effort are brought to bear.”
- “The timing of the peak depends on multiple, uncertain factors that will influence how quickly the remaining oil is used, including the amount of oil still in the ground, how much of the remaining oil can be ultimately produced, and future oil demand.”

The GAO studied many reports regarding oil supply and concluded that oil production could peak happen any time between now and 2040, without warning. This is a sobering thought; however, it's an optimistic when compared to the views of many geologists and major oil insiders whose projections for Peak oil range between 2006 to 2012, with 2020 as an outside date. There is a clear reason for not being able to project an exact date; the peak is only confirmable several years after it is passed. Additionally, there are too many variables to allow anyone to accurately predict precise timing of the peak.

GAO Report: <http://www.gao.gov/docdb/lite/details.php?rptno=GAO-07-283>

## PRODUCTION, CONSUMPTION AND EIA's QUESTIONABLE FORECASTS

The Energy Information Administration (EIA) is an arm of the US Department of Energy. As its name implies, it distributes information and statistics for DOE on energy supplies and consumption.

The EIA in its report released in May cited projected oil production globally, consumption numbers and price projections. Projected prices were much lower than actual prices in August of 2007 and much lower than the price we see now in early November. We are nearing a \$100.00 per barrel price; EIA had projected \$100.00 per barrel for 2030, which would indicate that 2030 has perhaps arrived sooner than expected.

Worldwide consumption of total liquids has been approximately 85 million barrels per day. EIA projects consumption will rise to 97 million in 2015 and 118 million in 2030. Much of this projected growth is due to increasing demand from China and India. These growth figures would require an additional 14 million barrels per day by 2015 and 20 million barrels per day between 2015 and 2030.

EIA states that one half of the needed additional oil for the 2015 projections, or between 7 and 8 million barrels per day, would come from OPEC. To obtain the needed additional 20 million barrels to make the 2030 figure, OPEC would need to produce 23 million barrels per day more barrels than they do today. The International Energy Agency places OPEC daily production at about 31 million barrels per day. To reach the EIA forecast, OPEC would need to nearly double their output.

It's clear OPEC can control prices by with holding oil from the market. The amounts needed to accomplish this are relatively small; a million barrel a day cut in production is more than enough over several months to affect the market. OPEC's ability to tweak the market should not be construed to mean they have enough capacity to produce oil at the level EIA would hope they do.

The EIA's projections on future oil production are considered unrealistic by many in the oil industry. Such energy experts cite a host of limiting conditions and reasons why EIA forecasts for oil production are unattainable: ;

- discoveries peaked in the 1960s;
- smaller fields are being discovered today, in more environmentally challenging locations;
- exhaustion and terminal decline of mature oil fields;
- complicated and difficult geological formations;
- aging and unavailable drilling and platform equipment;
- lack of investment by national oil companies;
- a lack of skilled personnel both in engineering and field workers;

- new fields that come into production can not compensate for decline in production of older fields (we consume three barrels of oil for every new barrel found);
- compounding increased global demand;
- geopolitical conditions, civil wars and other armed conflicts.

Report #:DOE/EIA-0484(2007)

Release Date: May 2007- <http://www.eia.doe.gov/oiaf/ieo/oil.html>

## WORLD CRUDE OIL PRODUCTION IS FLAT

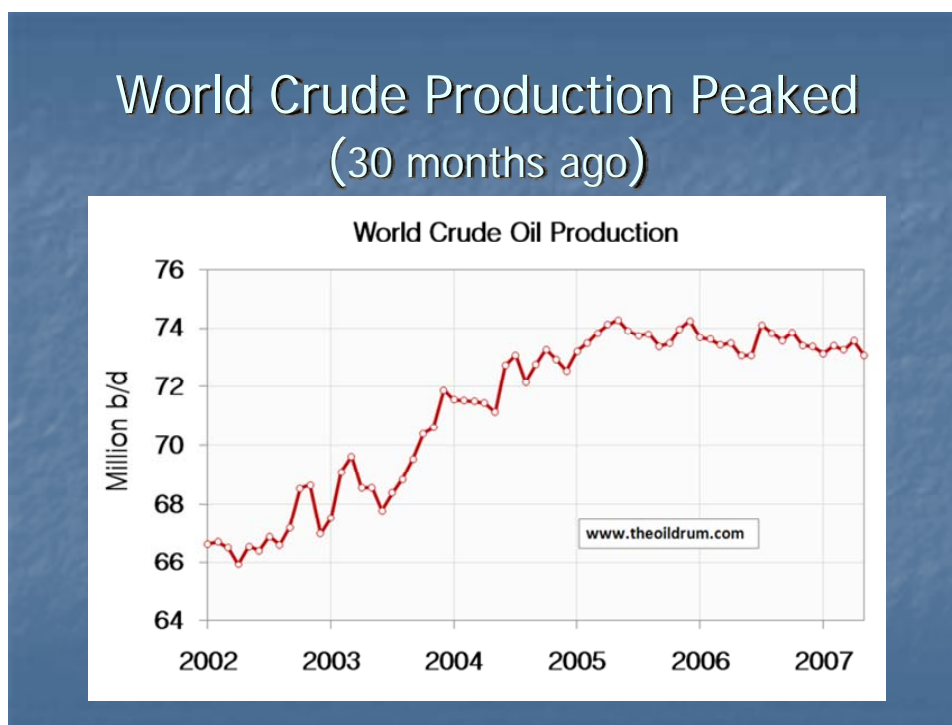


Figure 1 World crude oil production has been flat for the past 30 months



# World Liquid Fuels Peaked (Last Year)

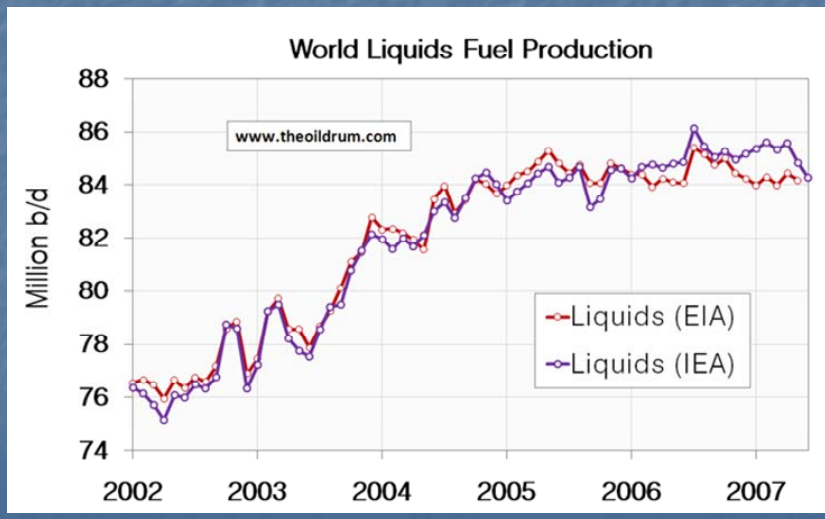


Figure 2 Total liquids = crude oil, condensate and Natural Gas to liquids

# Are we really at peak?

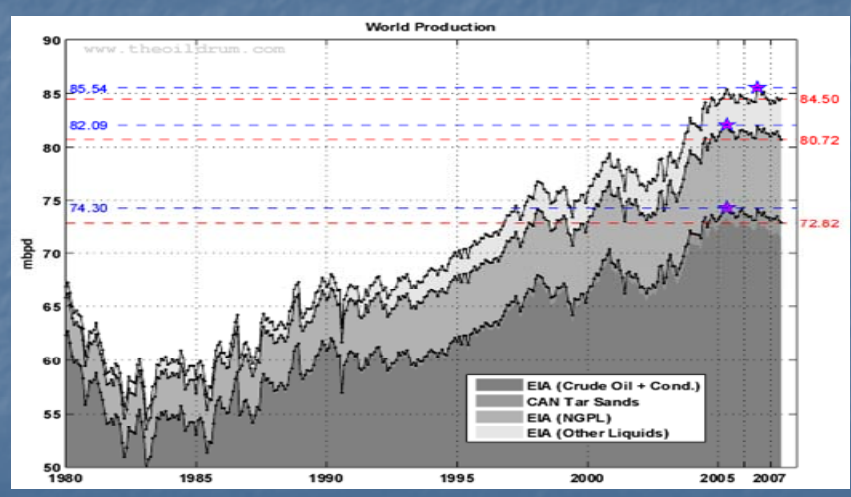


Figure 3 US EIA -Shows flat production since 2005

Peak Oil Production and the Implications to the State of Connecticut -Report of Legislative Peak Oil and Natural Gas Caucus – to Legislative Leaders and the Governor –Rep. T. Backer, Sen. B. Duff -et al.

## CRUDE AND LIQUID ARE FLAT; WHERE IS THE OIL COMING FROM ?

If oil and total liquids production have not increased, and demand is increasing by 1%-2% per year, where is the “new” supply of oil coming from? It’s a fair question. It can only be answered by saying that oil is not flowing to some countries. Smaller developing countries whose economies can not afford the cost of oil are not getting it. Countries whose current economies can afford it are getting enough oil. Additionally, to make up some of the deficits we are pulling oil from “stocks”—above-ground, short-term storage. This scenario of deficit oil production will start affecting developing large nations and developed nations in the next several years. There appears to be little that will change that emerging reality.

### LONG-TERM PRODUCTION SHORTFALL FACTORS

#### A QUICK COMMENT ABOUT OIL RESOURCE ESTIMATES

Quantity estimates of both new and potential oil discoveries often span a large range. Consider a hypothetical oil field that could have between 8 and 30 billion barrels of recoverable oil. The 8 billion barrels factor would have the highest level of confidence, perhaps a 95% certainty that extractable oil in this quantity is actually there. The 30 billion barrel number might have a very low level of confidence, perhaps as low as a 5% probability, that this quantity is actually present in the ground for eventual production.

### NORTHEAST GREENLAND: A MAJOR DOWNGRADE

The Northeast Greenland fields were believed to have great oil resource potential. The area was first estimated in the U.S. Geological Survey’s 2000 World Oil Study to contain 47 billion barrels of oil or about 18 months of global consumption. This year those estimates have been revised downward to about 9 billion barrels or less than 4 months of world oil consumption. The reduction was about 80% of the original estimate. Estimates are extremely difficult and sometimes unreliable. However, the media often only picks up on the initial announcement and not the follow-up, as in the cases of Northeast Greenland fields and the Jack 2 field in the Gulf of Mexico.



### JACK 2: DELAYS AND DECEPTIVE TIME FRAME

The Jack 2 field in the Gulf of Mexico holds some significant promise. The first test well was in 7000 feet of water and drilled 28 thousand feet under the earth. The test well drilled there last year struck oil but its commercial viability is yet unknown.



Additionally, a world wide shortage of oil rigs has delayed any further test drilling for a year or two.

Oil reservoirs in the Lower Tertiary layer of the Gulf of Mexico are not in one large field but rather scattered in many pocket fields. Due to the vast depths and scattered nature of the pockets, each discrete area would require separate well systems and production platforms. Compared to Mexico's highly concentrated Canterell field—probably the third-largest oil producer in the world—the Lower Tertiary will require much more time and money to surrender its oil. A production platform can cost up to \$1.5 billion dollars. The fields appear to be too far from shore to gather and transport the oil by pipeline, so the transportation of that oil would cost more. Far more testing will need to be done before this kind of investment is made.

The oil is at an extreme pressure of 20,000 psi and gases are almost 400°F. Geologists are not yet sure if the consistency of all the oil in the scattered fields is light enough to be pumped. If economical production is possible it will take between 5 and 7 years to get oil moving to market. If all the adverse conditions can be overcome the Jack 2 may produce upwards of 200,000 barrels per day some time in the next 5 to 7 years. In that time the world will have consumed another 210 billion barrels of oil or 20 times the maximum oil the Jack 2 could possibly hold.

These sample snapshots about oil resource issues demonstrate that some of the reserves are uncertain estimates and that finding oil is not the same as being able to produce it.

### THE NUMBERS DON'T ADD UP

When looking at the EIA's projected oil production for the year 2030, it is in conflict with the actual production data. Oil production should have risen over the past two years. The EIA and IEA (International Energy Agency) indicate that production has been flat for over the last two years. The EIA's oil production data are out of line with its own near- and long-term projections. It is also out of line with estimates and timing of some of the energy field's biggest names and players. Below is a list of quotes from oil insiders.

**President George W. Bush**, November 7, 2007 said, when asked if he thought \$100.00 per barrel price of oil had anything to do with his policies toward Iran, he answered, “ No. I believe prices are going up because the demand for oil outstrips the supply for oil. Oil is going up because developing countries still use a lot of oil. Oil is going up because we use too much oil, and the capacity to replace reserves is dwindling. That's why the price of oil is going up”.



**T. Boone Pickens**, legendary Texas oilman, last month at oil conference in Houston, Texas: Asked when questioned when he expects world oil output to peak, his answer was fast and firm: “We peaked last year,” said Pickens. “We are pulling about 85 million barrels per day out of the world, and that’s about as good as it is ever going to get. It is only going to go down from here on out.”

**Dr. Fatih Birol, Chief Economist, International Energy Agency (IEA):** “From here until 2015, the market and the oil industry will be put severely to the test. Starting now, and for the next five to ten years, oil production outside of OPEC will reach a maximum before starting to decline, for lack of sufficient reserves. Each day brings new evidence of this fact.”

**Sadad al Hussein**, retired head of production for Saudi Aramco, the national oil company of Saudi Arabia, said when contacted in March 2007, “the intervening turmoil and events in Iraq and Iran, the rising Russian nationalism, the Caspian complexities and delays and the cost inflation and growing limitations among international contractors, are making me even more conservative regarding the flattening of the oil production outlook. **I now find it hard to reach and sustain 90 million b/d** even allowing for condensates and EHC, but excluding NGLs.”

**Sadad al-Husseini: October 2007,** -“Some of those assumptions...assume that OPEC will go from about 30 million barrels a day, which is what it produces now, to well over 45 or 47 million barrels a day. Other oil companies have even shown as high as 60 million barrels a day. That’s what I’m calling unrealistic. Staying at 30 million barrels a day is not a small feat. That’s a lot of oil. That’s half of the exported sold oil in the markets today, and to stay there requires a sustained investment program, which is quite massive, and a lot of resources. I think that’s realistic, staying at 30. But going to some of these numbers 47, 48, 60 million barrels a day, I think that’s quite unrealistic.”

**Dave O’Reilly, CEO Chevron:** “The era of easy oil is over...Energy will be a defining issue of the coming century.”

**James Mulva, CEO ConocoPhillips:** “I question whether the supply will be developed to meet the (Department of Energy’s) 2030 demand expectations. I believe demand is going to be constrained by supply.”

**Dr. Robert L. Hirsch** et al, “The Peaking of World Oil Production—Impacts, Mitigation & Risk Management,” (Feb 2005, for the US Dept. of Energy), from the Executive Summary:

“Oil peaking will create a severe liquid fuels problem for the transportation sector, not an ‘energy crisis’ in the usual sense that term has been used.”

“Peaking will result in dramatically higher oil prices, which will cause protracted economic hardship in the United States and the world. However, the problems are not insoluble. Timely, aggressive mitigation initiatives addressing both the supply and the demand sides of the issue will be required.”

**Don Paul**, VP Technology, Chevron "The question is will there be Peak oil? Yes. But will it be the disaster [some people] expect? I don't think it has to be. We have other ways of making fuel."

**Matt Simmons: energy banker, National Petroleum Council (NPC) member, and author of *Twilight in the Desert*:** (When asked about the NPC’s suggestion that global oil production could reach 120 million barrels a day): "We don't have any idea where those reserves are going to come from or how we are going to get them out of the ground. The odds of this ever happening are zero."

**Sadad al Hussein**i, in a further follow-up note: There has been a paradigm shift in the energy world whereby *oil producers are no longer inclined to exhaust their resource for the sake of accelerating the misuse of a precious commodity.*”

**Charles T. Maxwell**, Barron’s Magazine, 2006: “Exxon has taken out advertising saying there'll be plenty of future supplies. This verges on the irresponsible because it says to the government, media, and the public that there is no problem...So we are to march with fife and drum, banners flying, into the maw of destruction... because Exxon tells us that there is no problem.”

**Jean Laherrere**, former head of exploration for a major French oil company (Total), during a presentation to the NPC in spring 2007, explaining his concern about the slow rate at which oil from very large unconventional oil resources will flow to the market: “It ain’t the size of the tank, it’s the size of the tap.” [Message: oil from unconventional resources will not flow to the market fast enough to significantly impact the Peak oil date and production flow rate; instead, they will contribute to a slowing down of the overall total decline rate of world liquid fuels production.]

## ALTERNATIVE FUEL TECHNOLOGIES

“In the United States, alternative fuels and transportation technologies face challenges that could impede their ability to mitigate the consequences of a peak and decline in oil production, unless sufficient time and effort are brought to bear.” Quote from GAO Executive Summary [GAO07-283](#)



Nearly 70% of all oil is used in transportation. There is no economical replacement for -oil. Current technology has not yet produced a realistic substitute transportation fuel that can be used in the existing US fleet of 240 million vehicles. The Connecticut Department of Transportation has cited that 70% of people in the state work in a town other than the one they live in. This means that our highly auto-dependent work force will be forced to use increasingly expensive gasoline. The impact of rising gasoline costs will contract the spending of discretionary dollars, thereby affecting our considerably service-based economy.

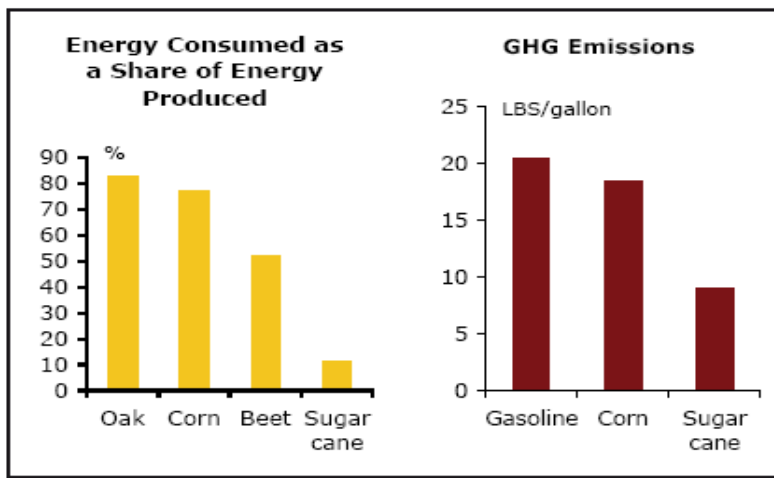
Ethanol and bio fuels can not adequately fill the void. Last year approximately 20% of our corn crop went to ethanol production; it offset about 400,000 barrels of the US’s 20,000,000 barrel/day habit (2% of our liquid fuel diet).

“Although corn ethanol production is technically feasible, it is more expensive to produce than gasoline and will require costly investments in infrastructure, such as pipelines and storage tanks, before it can become widely available as a primary fuel. Key alternative technologies currently supply the equivalent of only about 1 percent of U.S. consumption of petroleum products, and the Department of Energy (DOE) projects that even by 2015, they could displace only the equivalent of 4 percent of projected U.S. annual consumption.” Quote from GAO Executive Summary [GAO-07-283](#)

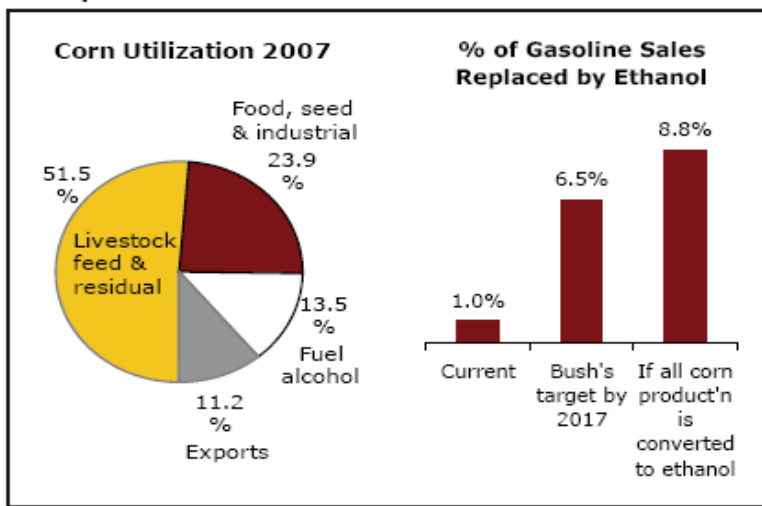
If we used 100% of our corn crop we might produce 8% of the nation’s 14,000,000 barrel/day transportation fuel requirement. Corn and corn ethanol are energy intense processes requiring large amounts of petrochemical fertilizers, diesel fuel, heat energy for processing, plus energy to transport both the corn and the ethanol. It is unlikely that there is a useful net-energy benefit from ethanol production. President Bush has called for an increase in ethanol production to 35 billion gallons/yr by 2017; that’s an additional 30 billion gallons, which would require approximately 300% increase in nation’s corn production among other things. This non-starter would affect food costs dramatically.



**Chart 3  
Corn Based Ethanol: Limited Energy and GHG  
Emission Benefits**



**Chart 4  
Negligible Contribution to Energy  
Independence**



Source: USDA, CIBCWM



There are few other technologies that can power our existing fleet and those technologies are experimental. Hybrid cars such as the Toyota Prius and other makes can help stretch current reserves if their numbers grow vastly larger such that hybrids were the only vehicles sold into the market going forward. The next generation of hybrids—the plug-in hybrid electric—would allow us to displace gasoline consumption with electricity; however, since today’s hybrids constitute less than 1% of the on-road fleet seven years after they were introduced, this type of fleet transformation will take decades.

## GEOPOLITICAL REALITIES AND GLOBAL UNREST

**“The real lesson here [is that] it only requires a relatively small amount of oil to be taken out of the system to have huge economic and security implications.”**

**Robert M. Gates, Oil Shockwave National Security Advisor  
US Secretary of Defense Robert M. Gates**



Geopolitical conditions and global unrest are a reality we can not ignore. The members of the Organization of the Petroleum Exporting Countries (OPEC) owns about three-quarters of the world's oil reserves. OPEC consists of the countries of Algeria, Angola, Ecuador, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela. The relationship is considerably strained between some of these countries and the US. In an era when oil demand has risen dramatically in Asia and South Asia, production contracts can be steered away from the major international oil companies who sell to the world market and directed to the national interest of other countries. China and Russia are among the countries that have been very aggressive and have filled the void created by deteriorating relationships between some oil producers and the US.

Many of the world’s oil producing countries are Muslim countries whose citizens, in the wake of the Iraq war, have less than friendly sentiments about America. This stress places considerable pressure on those governments trying to maintain relationships with the US. Additionally, producing countries are located in areas of the world with ongoing turmoil affected with terrorism, civil wars, and sporadic sabotage, such as in Nigeria and Iraq. Those violent conflicts reduce oil production and cause problems with transportation of oil via pipelines.



It is unreasonable to suspect global turmoil will relent since much of the unrest is related to the oil resource.

## RUSSIA AND EUROPE

Russia is another country with declining but strong oil reserves. The advent of oil over \$50.00 per barrel has increased wealth in Russia and added to its global political clout due to its control of substantial oil and natural gas flows. Russia recently wrested controlling interest from Shell Oil in the Sakhalin oil fields.



Russia has 50% of the world's natural gas reserves. Its former republics and neighbors who also have large reserves this brings the control of nearly 75% of the natural gas reserves in the world under the sphere of Moscow's influence.

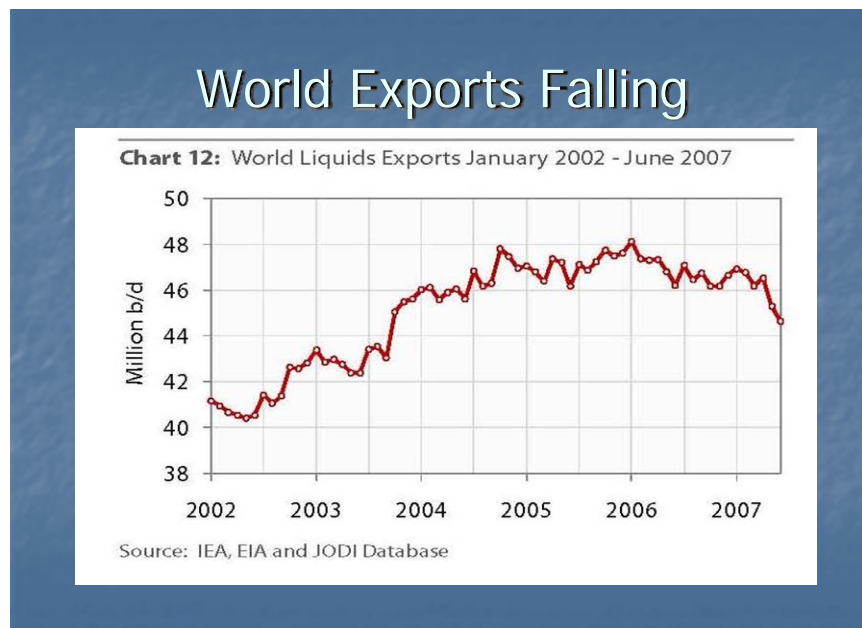
Russia recently signed a declaration with the Caspian Sea littoral countries which includes; Iran, Russia, Kazakhstan, Turkmenistan, and Azerbaijan. These countries contain very large proven reserves of natural gas and oil. The declaration includes a non-aggression pact and an agreement to bar any non-Caspian nation access to the Caspian Sea which also has known reserves.

Russia's President Putin has made overtures about creating a natural gas cartel similar to OPEC's oil cartel. There are any number of reasons this has not yet happened, but the Caspian Sea Countries' declaration is a solid step toward conditions more favorable to such a gas cartel.

Europe is dependent on Russia for 40% of all natural gas imported into European Union, with the balance of coming from Algeria and Norway. By 2030 over 60% of the EU's gas is expected to come from Russia with an additional 30% imported from elsewhere.

These facts can not be over looked; eventually, this emerging reality may have substantial political influence on the European Union. The EU imports 45% of its oil from the Middle East. It is expected that by the year 2030, 90% of the EU's oil will come from imports.

## PEAK EXPORTS



**Figure 4 Liquids Export were flat for mid 2004 and in decline since 2006 to the late 2007**

As producing countries have reached Peak Oil production, many of them have already become net importers of oil. This new demand from former exporting countries results in lost global export capacity. Major economic development is occurring in exporting countries such as Venezuela, Iran, Russia, the United Arab Emirates and others. As domestic demand increases in these countries, it limits and eventually contracts their ability to export to the global market. The competition for oil by importing countries with growing dependency on external oil, such as the EU noted above, coupled with the domestic demand in exporting countries, will drive prices higher and limit export supply to the market.



Figure 5. Countries that import to the US

### IMPACTS ON CONNECTICUT

*Lower employment prospects and the higher inflation rate will lower the purchasing power of the poor who have fewer (if any) instruments to hedge against the oil price increase. The biggest impact will be through higher price of kerosene which is used for cooking and lighting. The poor will also be affected by higher transportation costs. Clearly, higher petroleum costs will increase commuting costs and, especially in the case of agricultural economies, the cost of getting the crops to the markets.*

African Development Bank document on the effects of high oil prices on



With a few word changes the scenario quoted above defines the impact of high oil prices and diminishing supply on Connecticut. Of course our state is not Africa; we are far more dependent on oil for our economy and life style than the people in the poorest countries in Africa.

Connecticut has no native hydrocarbon resources. The state and the region sit at the end of the pipe line for natural gas from the Gulf of Mexico and from western Canada. Our oil imports are from the mid east and South America. About 92% of our energy comes from foreign countries or other states. We depend on natural gas for 30% of our electric generation and a substantial portion of our home heating fuel. As oil becomes even more expensive in the coming years, the natural gas price will increase and availability will become less reliable.

Natural gas prices are likely to trend upward over the long term because: natural gas production in North America peaked in 2001-2002; despite an enormous increase in drilling during the period 2002-2006, supplies of natural gas did not increase; the 2007 declines in drilling for natural gas in Canada caused by rising costs for drilling, a declining US dollar, and other factors will likely reignite the decline of North America's natural gas production; imported LNG (liquefied natural gas) may step into the breach to help fill the longer-term gap in supply, though the entire LNG supply chain is becoming less predictable over time.

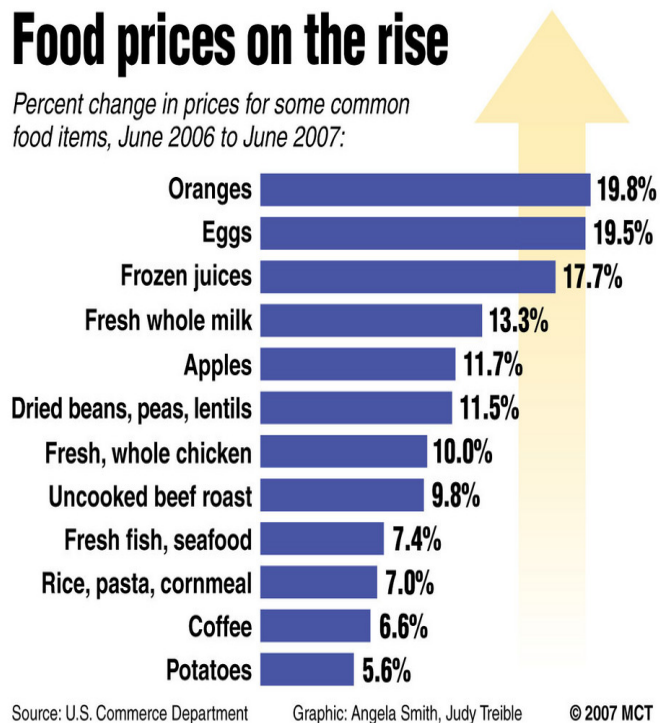
The National Energy Board of Canada reported in October of 2007 that Canadian exports of natural gas would be decreased due to falling production in western Canada. Canada has ramped-up drilling in its Western Sedimentary Basin in more geological difficult areas in hopes of bringing more natural gas on line in the future. The current shortage can be problematic for natural gas supplies to the US. The impact of double, triple or higher natural gas prices, which could be due to many factors, will place high burdens on the bulk of our population. Higher electric costs for homeowners, higher food prices to the public and restaurants, higher operational cost for industry and manufacturing and higher government cost both to municipalities and the state.

New England is somewhat unique in the nation as we have a much larger percentage of homes using home heating oil. Connecticut has a high percentage of homes using heating oil. The cost estimates for heating oil this winter were 22% higher than last winter. In the next several years we can expect much higher cost. Of note, this year the state has had difficulty getting home heating oil companies to participate in the low income heating programs. It is clear with oil escalating by the day they can not deliver oil at reduced prices. Low income families and fixed income seniors are already at risk. The prospects for this population, at any higher prices, are disconcerting.

The added financial burden of higher oil and natural gas prices will force citizens to prioritize their spending. Family budgets will be focused by increased requisite cost: increased cost of private transportation to work, heating cost, higher electricity and added embedded food cost to reduce their discretionary spending. We should expect to see dollars diverted from the service industry on things such as restaurants, lower skilled services such as landscaping, cleaning, painting and large new purchases such as automobiles. The impact of reduced spending will place great pressure on the work

force and businesses currently providing these services. We can expect lower sales and service tax revenues and greater demand for social services.

We have already seen increased cost of food, between June of 2006 and June of 2007.



<b>Town of Stratford Residents Income/Expenses</b>			
	<b>2000</b>	<b>2006</b>	<b>2000-2006</b>
<b>Median Income</b>	<b>\$ 53,494</b>	<b>\$ 59,750</b>	<b>12 %</b>
private vehicles	\$ 50,866,400	\$ 121,940,000	140%
comm/combi vehicles	\$ 27,256,320	\$ 56,784,000	108%
vehicle fuel <b>SubTotal</b> \$/yr	<b>\$ 78,122,720</b>	<b>\$ 178,724,000</b>	<b>129%</b>
housing units (20596) <b>electricity</b>	\$ 37,072,800	\$ 63,023,760	70%
housing units (16476) <b>heating oil</b>	\$ 15,157,920	\$ 33,611,040	122%
housing units (4120) <b>natural gas</b>	\$ 2,575,000	\$ 8,755,000	240%
<b>Energy Cost Sub-Total</b>	<b>\$ 211,051,160</b>	<b>\$ 462,837,800</b>	<b>119%</b>
<b>Other Costs</b>			
Annual food cost	\$ 154,518,000	\$ 228,686,640	48%
Annual Healthcare cost	\$ 83,571,600	\$ 128,700,264	54%
Town Taxes	\$ 118,000,000	\$ 167,000,000	42%
<b>Other Costs Sub-Total</b>	<b>\$ 356,089,600</b>	<b>\$ 524,386,904</b>	<b>47%</b>

Figure 6 Stratford is used as a model for the state. Increased consumer cost due to rising energy prices 2000 to 2006

We can expect that municipalities will be affected seriously. The cost of heating municipal public buildings--predominantly school buildings in most communities--will strain budgets. Likewise, the cost of maintaining other energy intensive municipal operations such as sewage treatment plants and vehicle fleets will become more difficult. The municipalities will be forced to turn to the property tax base or sacrifice other services or both to raise sufficient money for their energy budget.

Both municipal and state government will be pressed to afford their normal schedule of repaving and maintaining black-top roads. The cost of asphalt for paving closely follows the rising price of oil.

The state of Connecticut is the largest user of energy in the state. The state operates large scale housing units such as the prison system, colleges and the university system. The implications of providing heat at vastly inflated cost to these institutions can only be imagined at this point. The state also maintains and operates a very large fleet of large trucks and cars, most of which run on gasoline and diesel. Lastly, the state has many office buildings that need heating and cooling. As fuel prices rise and additional oil and gas cost is incurred, our problems will be compounded by falling tax revenues on transportation fuels.

The impact of rising or sustained high cost of oil will impact the state government at every level in numerous ways, not all of which can be listed here. If the increasing cost of oil continues over the next two years, the states economy has a high likelihood of contracting to problematic levels.

## **Conclusions**

### **Connecticut is at risk**

***The state is unprepared to address the problems that will arise due to high and increasing oil prices. There is abundant evidence that oil prices will rise over the near term and into the foreseeable future; long term, supplies will diminish. Connecticut is at risk of economic contraction beyond anything we have experienced since the 1930s. Immediate planning and action is needed to secure the best possible outcome to changes in the global oil market.***

It is the Caucus's position that oil will become considerably more expensive over the coming 5 to 10 years. We believe oil prices could well retreat to the \$80.00 dollar range within the coming year as speculation cools. Yet when looking at the slowing production of conventional oil against global demand and increasingly difficult oil extraction, oil will rise in cost again over the next 5 years and continue to do so into the future. We can not hazard a guess at a ceiling for oil in the coming years.

### **Possible mitigating factors are painful or decades away**

How much the price of oil will increase is an unknown. Yet during any sustained run-up in the price of oil, conventional economic theory would dictate that at least two factors should unfold to mitigate oil price and supply.

### **Demand destruction**

Demand destruction means that as prices rise, some consumers are priced out of the market and forego oil and other purchases. This reduction in demand then adds some oil back into the market and oil prices may level off. Of course those priced out of the market will be our constituents and communities that rely on oil for everything. Additionally, we can't expect people to accept the threat of freezing to death or being forced to be homeless without major social unrest. It's not as if they are being forced out of the market for a new boat or car.

As noted before, we are seeing demand destruction in poorer countries already substantially priced out of the market. Indeed, there would be wider shortages and higher prices in the developed world had this not happened.

### **Demand creates supply and innovation**

Another economic assumption would dictate that if strong price signals and increasing demand are in place, more oil or oil-substitute products will appear. Oil has doubled in price 4 fold since 2005 while supply has remained flat; more product is not appearing. Strong demand and high price will surely promote more exploration and innovation; however the lead-time for bringing more oil to market and for upgrading the efficiency of our transportation system is decades away and the ability to overcome existing technical challenges is an extreme unknown.

Oil, because of its vital nature to our society, has eluded these economic assumptions to date. Given that new energy efficient products or the sufficient distribution of them are decades away and global demand increases as oil supply remains flat, demand destruction for oil will manifest itself in our economy. This however will not happen before consumers make other sacrifices in their spending to stretch their indispensable oil dollar. This will help to deflate of our economy before demand destruction will lower oil prices

### **Has Peak oil happened already?**

Some oil insiders say we have already reached conventional Peak oil production, back in 2005-2006, because crude oil production is flat and exports are declining. Other estimates range from 2012 to 2015, still others believe 2020-2030 will see Peak oil production. In any of these events except the most optimistic, the prospective time horizon is closer than any one of us would like. Given the long lead time it takes to institute systemic change through planning and implementation, these time frames are extremely short. Consider that we have been trying to get “Project 100” renewable energy projects started for almost 5 years and it’s still at the DPUC. This short window of time makes the debate over exactly when oil production will peak somewhat academic. The economic impact of rising oil prices is already being felt in our communities. The economic stress on individuals and institutions is accumulating and may erupt suddenly.



## Transportation

Oil means mobility. Given that oil is embedded in every product and service, high-priced oil and intermittent supply problems will affect every thing. We are however especially vulnerable in the transportation sector. There is no current substitute that can take the place of oil in large volumes. Connecticut is highly dependent on oil to move our workers and goods and services. Our current mass transportation system mostly provides intra-city transportation services in our largest cities, and the Shoreline and Metro North rail lines are aging and designed for east-west commuters. Our current mass transport system will be wholly inadequate and overwhelmed as high-cost oil prices consumers out of the market. Most will have no viable transportation options.

### Intelligent Responses to Peak Oil

Since our society has never before been challenged with a reduction in cheap and plentiful oil on a permanent basis, there is no existing template for action. It will take our collective minds and personal energy to develop intelligent responses to this challenge. Ultimately, fossil fuel use will be replaced by a combination of renewable energy and a LOT OF CONSERVATION.

First, we need to reduce our exposure by reducing consumption of petroleum liquids. To make this more specific, we could set a target for reduced consumption: government sector saves X%, private sector saves Y%. Second, we need to strengthen our communities with a host of specific policies.

Market forces are very efficient. However the market is not able to discern what level of service and duty the government has to its people – it operates on different principles. Therefore, without government first defining the direction that is the best public policy, the market will not create comprehensive, societally-oriented intelligent responses to this challenge. It will, however--given solid direction and guidelines on what needs to be accomplished--help efficiently implement various projects. The market will not take care of this matter in a satisfactory manner on its own.

We have listed a few ideas as a starter. It is by no means an exhaustive list. All of these ideas are not endorsed by all the Caucus members but we have presented all of them for your consideration.

- Create a Peak Oil Task Force on a state level and develop incentive legislation for municipalities to begin this type of planning on a local basis. There are several templates for this, especially the City of Portland's Peak Oil Task Force (Portland, OR), etc.

- Initiate a Public Education Campaign: We need plain talk that tells the whole story and connects the dots to lay the groundwork for any broad policy package.
- Create a State Department of Energy with overall responsibility to oversee the transition.

Top priority: develop and coordinate State and local emergency plans to deal with the impacts of sudden fuel reductions. (Fuel allocation, food distribution, transportation, health services, emergency response, etc.)

- Conduct scenarios planning
- Lead long-range sustainability planning: 50 years versus 5.
- Promote Conservation/Efficiency in transportation and buildings - Government fleets at all levels should lead the way here. First, review the net energy benefit of bio-fuels for state fleets. Also develop a full suite of efficiency options for buildings.
- Review and update building codes with energy efficiency in mind. Change bond structure to municipalities to include alternative energy at 100% for solar, geothermal etc. Ramp up and reorient state programs such as the Clean Energy Fund and others.
- FeeBates on new cars – An expansion on the incentive to buy ultra fuel efficient cars. Create a concrete strategy to achieve the fuel efficiency goals. Buyers of new efficient cars earn a rebate; buyers of gas guzzlers pay a fee on the showroom floor to be used in mass transit development.
- Plug-in Hybrids - Hybrid vehicles work, electric power plants work, wall sockets work.
- Renewables – Power the plug-ins with electricity generated by renewable energy systems: solar, wind, waves, geothermal. Recycle the batteries. Ethanol from corn will not bail us out.
- Future Energy Costs Must Guide Planning –Use pre World War II cities design to help with urban planning as a design guide for public transport and walkability. Low density sprawl and massive highway building must end. We need to move away from thinking that the future will be just like the present...only more so. The assumption of low energy costs is over.

- Inter and intra city trams and trolleys - Task CTDOT to intensify their work on light rail and reduce its development of new highways. Revisit the concept of inter- and intra-city tram lines. Trolleys once crisscrossed Connecticut; The Connecticut Company alone had 800 miles of track and 1600 cars in 1924. Cars must share the road with trams. This works in several of America's biggest cities and in most of Europe.
- Electrify transport - See above. Start with city busses.
- Localize—sooner than expected, the energy savings from “made down the street” will matter again, from goods manufacturing to food production to power supply (distributed generation) Prioritize the protection of more agricultural land in Connecticut. Protect the working water front lands and industrial use property
- Implement a ban on the sale of certain incandescent light bulbs, with appropriate lead time.
- Require all illuminated signage used for the purpose of advertising to be “shut off” when ever the establishment is not open for business.
- Revisit Street lighting fixtures, placement and codes.
- Improve conditions for foot traffic and human powered vehicles
- Incrementally implement improvements to existing rail and bus timetables and routes, build remote parking along rail and bus lines, charge a reduced fee at remote lots, and an increased Rail Road Station parking fee
- Enforce a no “turf war” policy between agencies, everyone on the same page
- Promote sustainable business opportunities (e.g., provide incentives and support training for individuals switching to working in the efficiency sector). New opportunities, products and businesses will emerge that can help to compensate for those lost in this global energy transition.
- Use telecommuting for certain state workers, modernized digital communication, don't throw away the paper records. Increase work day to 10 hours providing for one less day of commuting.
- Don't look for the silver bullet – it aint there. Instead look for silver BBs –lots of small diverse ways to adjust our society to a world with a lot less petroleum energy.

The Caucus does not use the word “solution” when talking about responses to Peak oil production and its implications to our society. Solution implies that things can be arranged somehow to maintain the status quo, business as usual. Oil is an incredibly energy dense substance and we know of no substitute for it. Rather we chose the term intelligent response because we will find ways to rearrange our society to be much less energy dependent. Provided we engage our intellect and take the best of our not so distant past and develop a future that will require much less energy. One way or another we will have much less energy for far into the foreseeable future. We will either design for not having to use oil and make an easier transition or just let it happen and that won't be pretty.

We are well aware of the cost implications of transforming and realigning our infrastructure and priorities. Many other projects in the pipe line will need to be foregone if we are to respond to the ever encroaching problem of Peak oil production. We know that this will be politically challenging. The well being of the people of Connecticut is at risk. It is at times like these that the best leader in all of us needs to rise to the occasion.

### **Closing Statement**

While oil production will continue and new discoveries will be found and make headlines, the Caucus believes these events will not be timely nor sufficient to avert the problems contemplated in this report. There will be an extended gap between peak oil production and the advent of new technologies and substitutes for oil. This gap may last for decades.

Predictions as to the severity of impacts to local and global economy due to Peak Oil range from the “Mad Max” scenario to recession and Depression-era problems. However, early intervention can and will mitigate the severity of impacts on the state and our people. We still have choices as to how contracting global oil production will affect us. If we decide to wait for political reasons or for yet stronger signals, our options will shrink. At a minimum, we should quickly engage the public and all government entities in a broad educational effort so that our joint responses to this looming paradigm shift are more informed and more intelligent.

Since we won't be able to clearly see a peak in oil production until it has passed by several years, we lack the ability to predict with complete clarity the “when,” whether it's in the recent past or the near future. Waiting for clarity on this matter is a prescription for disaster. It will be too late to implement mitigation efforts on the down side of the curve, and will be far more expensive. We have explained many of the complicating and limiting factors to oil production in this report which should help you understand the complexities of the issue. There is every indication that reduced oil production will

continue into the future. The Caucus stands ready to discuss mitigation efforts going forward. This is the clarion call to action.

Respectfully submitted,

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Co-Founder

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Rep. Carlo Leone

Rep. Steve Fontana

Rep. Linda Schofield

Rep. Diana Urban

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Rep. Bruce (Zeke) Zalinsky

Rep. Mary Mushinsky