Testimony of Richard H Jones
Deputy Executive Director of the International Energy Agency

U.S. Senate Committee on Energy and Natural Resources
February 3, 2011

Mr. Chairman, Senator Murkowski, and Members of the Committee, I am grateful for the opportunity to come before you today to discuss the views of the International Energy Agency (IEA) on the outlook for, and major trends shaping, global energy and oil markets today and over the next 25 years. I hope that my testimony will help to inform the important work of this committee as it begins crafting policies in the new Congress.

A retired American diplomat with experience on Middle Eastern and energy issues, I have served as Deputy Executive Director of the International Energy Agency since September, 2008. The IEA is an intergovernmental organization that acts as an advisor to 28 member countries, including the United States, in their effort to ensure reliable, affordable and clean energy for their citizens. Founded during the 1973-74 oil crisis, the central role of the IEA was and remains to co-ordinate response measures in times of oil supply emergencies. As energy markets have evolved, however, so has the IEA. Its mandate today also incorporates work on market reform, energy-technology collaboration, climate-change policies and outreach to the rest of the world, especially major consumers and producers of energy including China, India, Russia and OPEC countries.

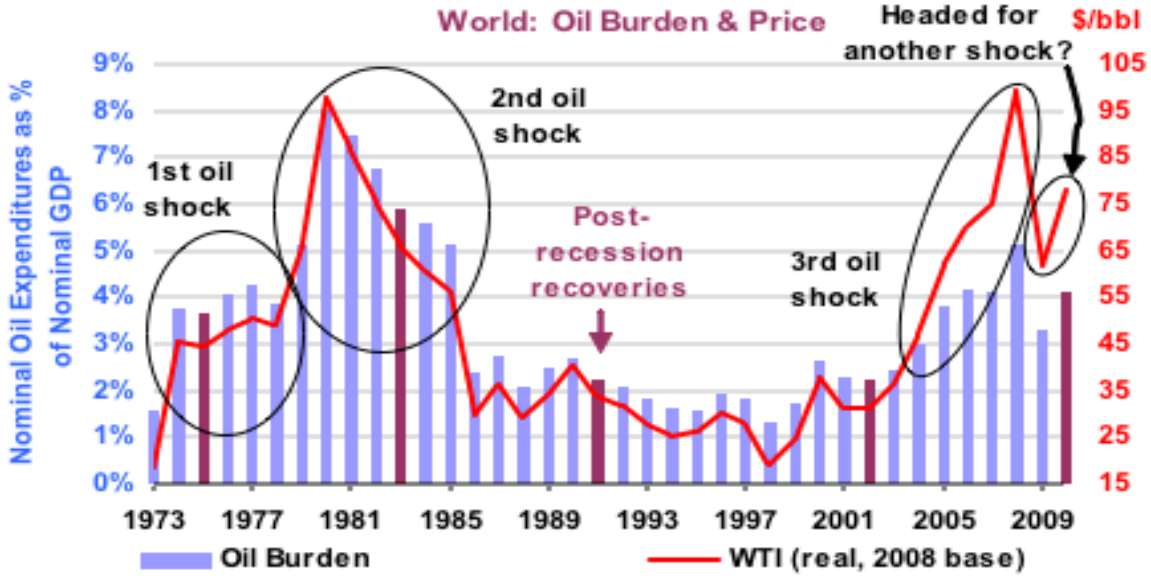
I will use my time this morning to focus on several key areas. The first is an assessment of recent oil price movements, and their potential impact on the global economy in the near term. I will follow this with a brief description of the IEA's role in responding to disruptions in the supply of oil. I then wish to touch on market movements for other sources of energy, before speaking about the long term outlook for global energy.

Recent Oil Price Movements and their Potential Impact

Since last September, international oil prices have increased by more than 25%, and reached $100 a barrel for the first time in more than two years on Monday.

It has been claimed by some that speculation on the price of oil was behind this rapid rise. However, data on supply and demand fundamentals for the fourth quarter of 2010 that has recently become available points more towards a market tightening due to stronger-than-expected demand in key consumers and a concurrent drawdown of commercial oil stocks in OECD countries. Reasons for this growth in demand include unseasonal weather patterns and better than expected global economic growth. More recently, it appears that prices were boosted by concern in the market that the ongoing demonstrations in Egypt may eventually lead to a disruption of oil shipments through that country or spread to important producer countries in the region.

Possible economic trouble ahead if recent price gains are sustained



Although some market observers have previously predicted that a combination of more and more demand, an impending scarcity of supply, and high revenue goals from producers will keep oil prices at around $100

for a sustained period of time in 2011, we do not see the current situation as a vindication of that point of view.

Were prices to remain at this level for a sustained period of time, however, oil expenditures would soon rise as a proportion of GDP, creating an 'oil burden' that could put a drag on the world economy. (This burden is calculated by analysing nominal – as opposed to inflation adjusted – oil expenditures, as a percentage of nominal GDP.) In fact, in the past, whenever the oil burden has been calculated at 5% or more, it is usually associated with an impending economic slowdown (see figure).

The rise in prices over the last few months brings the oil burden too close to this 5% mark for comfort. Fortunately, there are elements of stability in the current market, which simply weren't there in 2008. For example, OPEC has much more spare capacity than it did in 2008 and OECD member countries have ample stocks of oil. There are already signs that some OPEC producers may be feeding extra supply to the market. Refining capacity is also in better shape than it was in 2008. While it's too soon to be confident, such factors could help cap prices in 2011, by ensuring there is a sufficient supply of oil.

IEA's Role in Responding to Disruptions in the Supply of Oil

Here I would like to note that IEA member countries are well equipped to respond to a disruption in their oil supply. As a condition of membership in the Agency, each of the IEA's 28 member countries is required to hold strategic oil stocks equivalent to 90 days of its net imports. Since being established in the aftermath of the first oil crisis, a fundamental part of our work has focused and continues to focus on planning for and helping co-ordinate a collective IEA response to major disruptions in oil supply.

Our work in this area now also includes many countries outside the IEA membership, such as China and India and other countries in Asia, which are also boosting their oil stocks or taking other measures to enhance their energy security, and have sought our advice. Last November we held our fifth major Emergency Response Exercise in Paris with the active participation of 10 non-Member countries.

Emergency stocks, now growing in more and more countries, are a vital aspect of global energy security, as countries are able to add measured amounts of oil to the market in the event of large-scale disruptions to supply over an extended period. You will recall that this was last done back in 2005, when oil stocks were released after Hurricanes Katrina and Rita ripped through the Gulf of Mexico, damaging offshore oil rigs, pipelines and oil refineries.

Market Movements for other Sources of Energy

Moving on from oil, the IEA also follows the international markets for other major fossil sources of energy, where recent developments are also worth noting.

Recent success with US production of significant amounts of 'unconventional' sources of gas, mainly from shale deposits, has sparked a flurry of interest throughout the world. Australia is leading the charge, but China, India and Indonesia are also seriously investigating their own 'unconventional' gas sources. In Europe, work is proceeding in Poland and elsewhere.

Based on current rates of consumption, it is estimated that recoverable conventional gas resources will last around 130 years, but this could be doubled with 'unconventional' gas. These resources may also exist in countries which lack significant reserves of conventional gas; it is little wonder that the current scramble is now firmly underway.

Soaring production of 'unconventional' gas in the US has already led to a sharp drop in its need to import gas. This slump in US import demand is having a significant impact on global gas markets which have also been hit by the international economic crisis. Meanwhile, ample supplies, mostly from Qatar, of Liquefied Natural Gas have been arriving in the market. This has led to a 'gas glut'– and a diversion of LNG cargoes to Europe. Spot prices of gas in Europe consequently have fallen, putting downward pressure on the price of gas supplied under long-term contracts from Russia.

This is an example of why the IEA strongly urges countries to make their gas markets work as efficiently as possible, efficient markets help promote competition among suppliers. This is an important step for maintaining affordable prices.

In contrast to natural gas, coal prices have been rising, largely because of growing demand from China and India. Even though both countries are massive coal producers themselves, and are almost self sufficient in coal, their economic growth is so rapid that they must increasingly look elsewhere for additional supplies.

While their imports are small relative to their total coal use, the amount of coal they are looking to import is at such a level that it impacts heavily on the global coal trade, affecting traded coal prices sharply. Of course, in many parts of the world, because of transport costs and quality differences coal is not subject to global price pressures, and as such coal remains a competitively priced fuel, able to supply power at affordable prices.

The Long-term Outlook for Global Energy

Last November, the IEA released the 2010 edition of its *World Energy Outlook* (*WEO-2010*). There are no 'facts' about the future, but the report does provide helpful insights into the evolution of our global energy system. Perhaps most importantly it highlights that the energy outlook over the next quarter century hinges critically on government policy action, and how that action affects technology, the price of energy services and end-user behavior.

Today we will share some of the key results of our Current Polices Scenario, which is comparable to the EIA's Reference Scenario, in which we assume that government policies continue unchanged. World primary energy demand rises by 47% between today and 2035 in the Current Policies Scenario. Fossil fuels (oil, coal and natural gas) remain the dominant source of energy during that time, even as cleaner energy sources make gradual inroads. Oil demand increases by 24%, natural gas by 56% and, owing to

relative abundance and low cost, coal demand increases by 59%. Electricity demand nearly doubles by 2035.

Emerging economies are responsible for over 90% of the projected growth in primary energy demand. As a result, the OECD share of global energy demand, which declined from 61% when the IEA was set-up in 1973 to around 42% today, falls to just 35% in 2035. The surge in non-OECD energy consumption is led by brisk growth in China, where demand doubles by 2035, dwarfing increases in any other country or region. Over the past year we have witnessed an historic re-ordering of energy heavyweights, with China surpassing the United States to become the world's top energy consumer. Remarkably, energy use in China was only half that of the United States just ten years ago. This underscores that developments on the global energy landscape remain highly sensitive to the various factors that drive energy demand in China, including prospects for economic growth, changes in economic structure and developments in energy and environmental policies.

World oil demand experiences strong growth over the medium- and long-term. Based on preliminary data, we estimate that global oil demand in 2010 reached almost 88 million barrels per day (mb/d), the highest level on record. We project a rise to 107 mb/d in 2035, with all of the increase coming from non-OECD countries, led by China, India and the Middle East. In OECD countries, oil demand is expected to fall with improvements in vehicle efficiency; US demand, for example, is projected to drop by 1.7 mb/d, or 10%, between today and 2035.

Oil supplies will come from an increasingly concentrated group of producers that hold the majority of remaining low-cost resources. OPEC's share of global oil supply is set to expand from 40% today to 50% in 2035, as oil production in most non-OPEC countries has peaked (e.g. the United States, the North Sea), or will soon peak. These trends occur against the backdrop of an industry in flux. Opportunities for international oil

companies, which have historically dominated oil sector development, are diminishing with the growing role of national oil companies and fewer reserves in accessible basins outside OPEC countries. Oil market challenges are further exacerbated by the prospect of accelerating decline rates for individual oilfields, particularly in non-OPEC countries; this includes Mexico – a major exporter of crude oil to the United States. To meet new demand growth and offset decline in currently producing fields, gross capacity more than six times the current capacity of Saudi Arabia will have to be installed by 2035. The world's total endowment of oil is large enough to support the projected growth in output, but it will require substantial levels of investment and development of more technically challenging and unconventional resources.

The outlook for natural gas demand is particularly uncertain. The gas glut I mentioned earlier could have far-reaching consequences for the entire energy sector. It is expected to keep pressure on gas exporters to move away from oil-price indexation, particularity in Europe. Lower prices could lead to stronger demand for gas, backing out renewables and/or coal in power generation. To inform the policy debate on these issues, the IEA is currently preparing a new report on the "Golden Age of Gas" which we plan to release here in Washington in early June.

The projections in our Current Policies Scenario have profound implications for three elements vital to sound energy policy:

- First, energy security. Without policy changes, fossil-fuels continue to dominate the energy mix at the expense of the enhanced security that a more diverse set of energy sources would provide. Furthermore, international shipments of energy commodities will have to expand substantially to accommodate the growing geographic mismatch between demand and production. While energy supplies will become more flexible in some respects (e.g. growing trade of liquefied natural gas vs pipelines), expanding

international trade unavoidably increases dependence on physically vulnerable transit routes and infrastructure, which poses greater risks in tight markets.

- Second, economic development. In the absence of policy changes, few meaningful alternatives to oil are expected to be available before 2035. As prices steadily rise, importing countries without prospects for new development will continue to face higher import bills that pose a mounting and potentially unsustainable economic burden.

- Third, environmental protection. Without new initiatives to slow the growth in fossil-fuel use, energy-related air pollution will increase. Emissions of carbon-dioxide alone will jump from 29 Gt in 2008 to 43 Gt in 2035, an increase of 45%. According to analysis undertaken for the Intergovernmental Panel on Climate Change, this emissions trajectory could lead to a global average temperature increase exceeding six degrees Celsius.

These all add up to the conclusion that the global energy system, in which all countries are interdependent, faces a future that is increasingly untenable. To continue business-as-usual risks heightened insecurity, increasing economic volatility, and irreparable harm to the environment. We truly need a transformation in the world's energy system to a more secure, sustainable model, but of course this is much easier to say than it is to accomplish.

The first step is to understand the extent of the necessary transformation. To help with this, the World Energy Outlook also presents a "450 Scenario" which is essentially a roadmap of what needs to be done to move to a truly sustainable energy future. To be frank, the scale of the challenge is immense. Carbon intensity would have to fall at 2.8% per year through 2020, and then by 5.3% per year until 2035. Keep in mind the 1973 oil price shock resulted in a 2.5% improvement in carbon intensity – in one year only

– illustrating the daunting challenge of achieving those levels of improvement each and every year.

The 450 Scenario confirms that promoting energy efficiency remains the quickest, most cost-effective approach to achieving our security, economic and environmental goals. This is the lowest hanging fruit we must pick first. A fundamental change will also be needed in the power and transport sectors. The global share of renewable-based electricity generation, for example, needs to rise to more than 45% by 2035 — two-and-a-half times higher than today. The share of nuclear power in total generation needs to increase by about 50% over current levels. By 2035, electricity generation from coal plants fitted with carbon capture and storage (CCS) equipment exceeds that from coal plants without the technology. In transport, biofuels and advanced vehicles will need to play a much larger role. By 2035, about 70% of global passenger-car sales will need to be advanced vehicles (hybrids, plug-in hybrids and electric cars). The benefits of this scenario are not only environmental; it would also significantly enhance our energy security by spurring greater diversity in the global energy mix, and reducing fuel import dependence. These results will in turn have important economic benefits for the vast majority of countries.

Mr. Chairman, Senator Murkowski, and Members of the Committee this completes my testimony. I would be happy to answer any questions you may have.

Testimony on the Energy and Oil Market Outlook for the 112th Congress
Richard H Jones, Deputy Executive Director of the International Energy Agency
3 February, 2011
Washington D.C.