ENERGY SECURITY: TODAY AND TOMORROW

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ABSTRACT

Purpose:
To emphasize the importance of renewable and alternative energy, as nations become increasingly reliant on increasingly less available conventional energy sources. Simultaneously, the long-term and detrimental effects of such reliance is explored and quantified so as to better justify investments into renewable, widely available, and less polluting energy sources.

Design/Methodology/Approach:
Data is collected from a variety of publicly available sources and their relevance is explored through contrast and comparison. The graphs and data used primarily focus on energy and energy consumption such as fuel pricing and exporting as well as the rate of fuel exporting by various nations.

Findings:
Based on the data analyzed, through the continuous use of fossil fuels, a country faces multiple challenges: depletion of fossil fuel reserves, global warming, environmental concerns, geopolitical and military conflicts and, of late, a continued and significant fuel price rise. The authors conclude these problems create an unsustainable situation and that without converting their energy sector to at least be in part less reliant on hydrocarbons and similar fuels and more reliant on more widely available and less polluting energy sources such as sunlight or geothermal energy a nation will inevitably face a catastrophic collapse of their energy sector.

Research Limitations/Implications:
Without cooperation of the governments of leading energy consuming nations in redeveloping their energy sector based on this or similar research, little of what has been explored can be widely applied. Consequently, the conclusions of this paper represent a single step in the process of redefining worldwide energy consumption rather than giving an explicit answer. Further research will be needed in order to most fully present an effective argument to the public sector, the private sector, and the common citizen that energy habits must be changed.

Originality/value:
The conclusions reached are an essential part to understanding the wide reaching effects of the world’s current energy habits. With the ever increasing threat of global warming, emptying fuel reserves, and unnecessary polluting and waste habits of most nation’s energy sectors, this research, along with the cited data, can aid in the redirection of such energy habits before a point of no return.

Keywords: Energy security, oil, turmoil, demand, supply, sustainable, economic growth

INTRODUCTION

Energy security is a common term in the modern world, especially when we are listening to different reports about the ever dwindling world supply of oil. The best way to illustrate energy security is to relate it to the availability of natural resources used for energy consumption in a given period of time (a short or long-term period in order to estimate future energy security). Each country must think about their future energy security because this is one of the main requirements for future economic growth. India’s economy is traditionally based on fossil fuels (oil, coal, and natural gas), leading to the conclusion that only an adequate supply of fossil fuels can guarantee future energy security. The transition to renewable energy could change this but all current estimates state that the world economy will continue its dependence on fossil fuels until, at the very least, the end of the century. Under this scenario, fossil fuels will continue to determine the destiny of future global energy security with oil continuing to shape the global
economic growth. The role of renewable energy in improving energy security is not to be overlooked because more renewable energy is being obtained from domestic renewable energy sources, leading to a lower need for fossil fuels and expensive foreign fuel import. Aiming to develop more domestic energy resources instead of relying on expensive foreign fuel import is a very positive thing for a country's future energy security. A larger percentage of renewable energy sources in a country’s energy portfolio also mean improved energy independence. Energy independence and energy security are two closely connected concepts. In most cases, improved energy security means improved energy independence. There are many different threats to energy security, for instance political turmoil in rich oil producing countries, the rise of new economic giants (China and India, for example, present heavy competition over energy sources), natural disasters and accidents, etc. Energy security doesn't refer only to the amount of energy resources that are at the disposal to a certain country but also to the security of energy supply (adequate distribution network). Energy plays a key role in the national security of any given country because without energy there is no economy, and without an economy there is no progress within society. Major oil exporters today play a vital role in global energy security. Many powerful countries are looking for long-term solutions to increase energy security by reducing dependence on foreign oil import. This has not only resulted in the growth of domestic renewable energy resources but also in different measures aimed to improve energy efficiency and energy conservation.

The concept of energy security developed as a means to secure the physical infrastructure and sources of energy. This concept has evolved, as the markets have become more complex, into one that involves technological, economic, and geopolitical issues. The problem with the concept of energy security is a matter perspective. At the most basic level, energy security means having access to requisite volumes of energy at affordable prices. There is also an implicit assumption that access to the required energy should be impervious to disruptions—that alternative supplies should be readily available at affordable prices and be sufficient with respect to both available volume and time required for distribution. Governments, companies, and other institutions have different concerns related to energy security. For example, producing countries may be concerned about geopolitical complexity and their position in the international energy value chain, whereas consumer countries face the impact of price volatility in the energy market. Figure 1 show how three main elements of energy security. Energy, economy and policy are interrelated.

![Figure 1: Element of energy security](http://www.cambridgeinsight.com)

**NEED OF ENERGY SECURITY**

Imagine a world without secure and reliable supplies of energy. In general, we take it for granted that when we flip the light switch, the lights turn on. Many parts of the world do not have that certainty and more than 1.6 billion people currently live without access to electricity. The price of crude oil has increased exponentially; peaking in summer 2013 when it reached $147 a barrel. At that time, the impact of high-energy prices made everyone realize just how dependent upon energy services our society has become. Those record high oil prices played a role in the global economic crisis that has followed. As people paid for more petrol, heating oil, gas and electricity, they had less to spend on other things, which suppressed consumer demand. At the same time, high fuel costs were passed on
to the price of the food that we consume and the goods that we purchase. They also increased the cost of summer holidays in the form of fuel surcharges. This crisis resulted in billions of dollars being transferred from the energy importing economies to energy exporting economies. Countries’ reliance on oil and gas go beyond the obvious supply of lighting, heating, cooling, and transportation and so on. Hydrocarbons are also essential raw materials for manufacturing. Almost everything that you consume is in one way or another dependent on access to hydrocarbons. As a society, we are hooked on oil. This means that anything that disrupts the supply of oil and gas, or makes it more expensive, is a threat to our way of life.

![World Crude-Oil Price](http://www.roperld.com/science/minerals/Oil_USGasolinePricesPrediction.htm)

**Figure 2: World crude price**

(Source: http://www.roperld.com/science/minerals/Oil_USGasolinePricesPrediction.htm)

**ROLE OF ENERGY IN THE ECONOMIC SYSTEM**

Energy has always been crucial for the economic development of human societies, its importance expanding considerably after the industrial revolution, and has been largely based on an intensive use of fossil fuels. The laws of thermodynamics imply that energy is necessary, at least, in a minimum quantity for the material transformations required for the most productive processes. Energy goods are also important both as intermediate inputs for production, transport and as final output they are often necessary for basic human welfare. Indeed energy related issues are highly relevant across the economic system through investment in durables and capital that usually reduces the capacity of agents to react in this area.

Figure 2 shows that the world energy consumption has seen an important growth during the last few decades, which is largely explained by the emergence of developing countries, particularly China and India since the late 1990s. Figure 3 shows that the developed economy such as the USA/ European Union and FSU (former Soviet Union) have stabilized or even decreased their consumption in the last few years, whereas China has more than doubled its primary energy consumption in this decade, overcoming the EU and USA and thereby becoming the largest energy consumer in the world.

Energy security is and will continue to be an issue because of the ongoing relevance and interties associated with energy in contemporary economics. Furthermore, energy security is likely to keep on playing a significant role in energy policy agendas because of the ongoing importance of fossil fuels, particularly hydrocarbons. In this sense, figure 4 shows that global consumption of oil and natural gas has been around 60% of total energy demand since 1980s. This also shows that oil has lost, in comparative terms, against natural gas in the last few decades, but its importance in the transport sector guarantees a significant share of consumption in the medium and long terms.
Figure 3: Word primary energy consumption
(Source: bp statistical review and www.peakfish.com)

Figure 4: Per capita energy consumption
(Source: Our finite world 2012)
Indeed, a major problem associated with hydrocarbons is related to their heterogeneous distribution across the planet. Table 1 shows top crude oil producing countries in the world. Russia, Saudi Arabia and USA together produce more than 50% of crude oil. Though new oil discoveries in the future are assumed to take place in the next decades; it is probable that their size and geographical concentration will not alter the current situation in a significant manner.

Table 1: Top oil producing countries in the world 2012

<table>
<thead>
<tr>
<th>Country</th>
<th>Production (Thousand barrels per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saudi Arabia</td>
<td>11,726</td>
</tr>
<tr>
<td>United States</td>
<td>11,110</td>
</tr>
<tr>
<td>Russia</td>
<td>10,397</td>
</tr>
<tr>
<td>China</td>
<td>4,372</td>
</tr>
<tr>
<td>Canada</td>
<td>3,856</td>
</tr>
<tr>
<td>Iran</td>
<td>3,589</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>3,213</td>
</tr>
<tr>
<td>Iraq</td>
<td>2,987</td>
</tr>
<tr>
<td>Mexico</td>
<td>2,936</td>
</tr>
<tr>
<td>Kuwait</td>
<td>2,797</td>
</tr>
<tr>
<td>Brazil</td>
<td>2,652</td>
</tr>
<tr>
<td>Nigeria</td>
<td>2,524</td>
</tr>
<tr>
<td>Venezuela</td>
<td>2,489</td>
</tr>
</tbody>
</table>

(Source: http://www.eia.gov/countries/index.cfm)

Of course, such geographical concentration of hydrocarbons has effects on the balances of payments between countries. Figure 5 provides information on this, showing that the EU needs to import almost all the oil used in the energy domain, thus clearly affecting its balance of payments. Despite being one of the major oil producers, the US is also a net importer of oil, with obvious negative effects on the balance of payments. Opposite to this, countries such as Saudi Arabia or Russia show levels of oil production that are well over their consumption.

All the preceding facts and information indicate the relevance of energy security. Growing energy demands, the significant share of fossil fuels in energy system, and the significant geographical concentration of hydrocarbons, all reinforcing the concerns on energy dependence. Energy security, as a tool to tackle the preceding problems and challenges, has thus become one of the priorities and guiding objectives, together with the environmental and wide economic effects associated to energy, of energy policies across the globe. Therefore, it is crucial to have a precise definition of energy security.
WHAT WOULD HAPPEN IF WE DID NOTHING TO PROTECT OUR ENERGY SUPPLIES AND CONTINUED TO USE IT AT THE CURRENT RATE?

In their 2008 World Outlook, the International Energy Agency concluded that: "The world’s energy system is at a crossroads. Current global trends in energy supply and consumption are patently unsustainable—environmentally, economically, socially." Put simply, ‘business as usual’ is not an option. If we continue to rely on fossil fuels and continue to consume them at ever-increasing rates, well before we run out of reserves, we will pay more and more for our energy, which will trigger economic collapse, social unrest and conflict. However, such a future could also trigger catastrophic climate change that would also bring about the same negative results. Therefore, something has to change; we need to change the way we obtain our energy services to reduce our reliance on non-renewable fossil fuels and to avoid catastrophic climate change. The energy revolution that we need will be expensive but the cost will be even higher if we delay. Many are now calling for a Green New Deal or a Green Recovery Plan that would target government funding on projects that will promote the transition to a low carbon future.

WHO ARE THE KEY PLAYERS INVOLVED WITH ENERGY SECURITY?

One of the problems facing us is that there is no international organization responsible for coordinating global energy policies. The interests of the energy importing developed world are represented by the International Energy Agency, which was created by the OECD (Organization for Economic Co-operation and Development) in 1974 as a result the actions of OPEC, and which represents the interests of some oil exporting states oil. The European Union has an energy strategy but energy security is the responsibility of the 27 member states. There is an Energy Charter Treaty that aims: “to strengthen the rule of law on energy issues, by creating a level playing field of rules to be observed by all participating governments, thereby mitigating risks associated with energy-related investment and trade.” But membership is voluntary and it has no real powers. The World Trade Organization is not involved in the energy sector. In the absence of an effective international organization, energy security is the business of individual states and their state and privately owned energy companies. In some countries the state owns the energy companies and energy infrastructure and in others there is a mixture of state-owned, state-controlled and private companies. The UK is unusual in that the government no longer owns any of our energy sectors, yet it still sees energy security as something it needs to deliver.

The global energy system that enables the production, trade, transportation and delivery of energy resources and services is very complex. In the oil industry there is a global market for crude oil and oil products and supply and demand are matched via that market, though a lot of oil is now subject to longer-term contracts. In the gas industry, which is dependent upon pipelines and liquefied natural gas that requires lots of capital investment, long-term contracts are the norm. Traditionally, the gas market has been segmented into regional markets in Europe, Asia and North America, though there is a trend toward globalization and the creation of a single gas market.
ARE THERE CURRENT CONFLICTS OVER ENERGY SECURITY?

Many would argue that the continuing instability in the Middle East is a direct result of the fact that it is the world’s most important oil producing region. Because of their reliance on imported oil, the US and its allies, have a vested interest in ensuring the supply of Middle Eastern oil to world markets. Any developments in the region that threaten US interests are seen as a direct threat to US security (this is known as the Carter Doctrine after US President Jimmy Carter). In 1990-91, when Saddam Hussein invaded Kuwait, the US led a military coalition that defeated him. Had he succeeded, Iraq would have controlled 20 percent of OPEC oil production and 20 of global oil reserves. The current conflict in Iraq was triggered by different concerns and both President Bush and then Prime Minister Blair denied that it had anything to do with oil, but many maintain that the conflict was, more or less, ‘all about oil.’ More generally, there is a school of thought that oil is the cause of many conflicts around the world today (see, for example, a recent book by Michael Klare: Rising Powers: Shrinking Planet: The New Geopolitics of Energy). There is an unhappy coincidence between oil wealth and conflict. This is part of the so-called “resource curse” and civil war and unrest in oil exporting states such as Iraq, Nigeria and Sudan add to concerns about global energy security. Conflict over gas is less common, but geopolitics often gets in the way of developing gas fields and building transcontinental pipelines. The recent gas dispute between Russia and Ukraine is about the price of gas and the ability of the Ukraine to pay for its gas but it also has geopolitical undertones as Ukraine maintains that it is being punished by Moscow for being too pro-western. As 80% of the Russian gas that is delivered to Europe passes through Ukraine, disagreement between the two states threatens the security of the European gas supply. This has led Russia to start building pipelines that will bypass Ukraine, causing the EU to look for alternative sources of gas supply. The recent 2014 Crimean crisis, which became an international crisis, can be seen in this context. Until February 2014, Crimea was administered by Ukraine and now it is controlled by the Russian Federation (a status which is not recognized by the United Nations).

CONCLUSION

Each country must think about its future energy security because this is one of the main prerequisites for the future economic growth. Our economy is traditionally based on fossil fuels (oil, coal and natural gas), and this fact leads to the conclusion that only the adequate supply of fossil fuels can guarantee future energy security. The transition to renewable energy could change this but all current estimates say that our economy will continue its dependence on fossil fuels until at least the end of the century. Under this scenario fossil fuels will continue to determine the destiny of future global energy security and oil will likely continue to shape global economic growth. The role of renewable energy in improving energy security is not to be overlooked because more renewable energy coming from domestic renewable energy sources means less need for fossil fuels and expensive foreign fuel import. Going for more domestic energy resources instead of relying on expensive foreign fuel import is a very positive thing for the of future energy security. The bigger percentage of renewable energy sources in a country’s energy portfolio also means improved energy independence. Energy independence and energy security are two closely connected terms. In most cases improved energy security means also improved energy independence. Also, energy security does not refer just to the amount of energy resources that are at the disposal to certain country but also to the security of a nation’s energy supply (meaning an adequate distribution network). Energy plays a key role in the national security of any given country because without energy there is no economy, and without an economy there is no progress of society in general. Major oil exporters today play a key role in global energy security. Many powerful countries are looking for long-term solutions to increase energy security by reducing dependence on foreign oil import. This has not only resulted in the growth of domestic renewable energy resources but also in different measures aimed to improve energy efficiency and energy conservation.

REFERENCES