ENERGY SECURITY CHALLENGES II –ECONOMIC SECURITY

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Presentation to the 22nd meeting of the United States-Japan Energy Policy Dialogue
Keidanren Guest House, Japan, November 16-17, 1998

For today's discussion, I will define economic security as the long-term ability to provide energy at a cost, which supports sustainable economic growth and improved quality of life for the citizens of a country. Where as many national security discussions are framed solely in terms of crisis management resulting from war or terrorism, Charles Perry appropriately placed his discussion of this topic in a longer term timeframe and provided a good lead in to this discussion.

I am not one to advocate a return to governmental intervention in free markets. In the 1970s the United States learned that price controls designed to ease the adverse pact of an oil shortage only served to worsen the dislocations and exacerbate the price spikes. However, as will become apparent, I strongly believe that governmental policies and programs have a significant role to play in ensuring long term energy economic security. Unfortunately, all too often the government's role is less than helpful. The good news is that in the long run economic forces prevail and governments shift positions.

SUMMARY:

Historically, we have tended to think of energy security in terms of national policies and actions. Economic policies to support energy tend to vary widely between countries and tend to focus on a country's particular circumstances. This was very logical in a world where supply and demand management was effective in controlling events. Today nations must act in the context of global forces rather than focus on meeting national interest in isolation. The government's role in managing and leading the nation state has been inexorably altered as events beyond its control can have as big or bigger influence on outcomes as it's own acts.

Specifically, it is now clear that policy makers must now consider economic growth, environmental (health and climate related), international trade and financial movements along with supply and demand factors if they are to secure energy economic security over the long run. Market forces will eventually cause energy resources within a nation to adjust to global conditions as knowledge based innovations, market structures and institutional reforms are developed over time. This is a process that has occurred throughout history. The problem is that many of the existing policies, regulations and institutions were designed for a simpler world and are no longer effective or appropriate.

The complexity of the process today requires an understanding of issues on a global rather than a national basis. This suggest nations will need to participate in global, or at a minimum regional, institutions setting transnational policies and regulations. Mechanisms for increasing the flexibility and adaptability of existing policies, regulations and institutions also need to be created as knowledge and innovation will continue to rapidly change the issues impacting energy economic security.

FACTORS IMPACTING ENERGY ECONOMIC SECURITY:

There are a number of economic fundamentals relevant to an understanding of the preconditions necessary to achieve economic security over the long term. One, economic growth rates are influenced by the relationship between energy availability and price. Two, energy intensity changes with per capita income growth. Three, energy policies must now consider economic growth and environmental impacts. Lastly, energy economics now have to be considered on a global, rather than national, basis. It is this latter development which requires us to rethink governmental roles in ensuring economic security.

Economic growth and energy

As we all know, energy is a key and necessary input into the production process at all levels within an economy. While it is combined with other factors of production, it is usually present. Thus, as economic growth occurs, energy demand increases. Overtime the predominant source of energy will become increasingly limited. As noted by Fouquet and Peason (1998), "this has generally been associated with periods of rising real or expected fuel prices, substitution to alternative energy sources, diffusion of technological innovations, and successive changes in the relationship between economic activity and energy use." (1) These events occur because a country's factors of production must be kept competitive to ensure growth. Failure to adjust leads to economic stagnation or decline if it persist for too long a period. Also, the current availability of cheap energy does not prevent the longer run development of resource constraints, as demand will eventually outstrip cheap supply.

A classic recent example of these principles is the outlook for oil consumption. Thirty years ago the conventional wisdom was that oil supply and demand would peak in the 1995-2000 period. This was based on oil prices higher than today's in real terms. Today oil consumption is still expected to peak, but as Charles Perry pointed out the turning point is now predicted for the 2015-2020 period. The event may be delayed by adjustments in policies, efficiencies and alternative supplies, but resource limitations will eventually affect the availability of supplies at competitive prices.

Energy Intensity and per capita income growth

The relationship between energy consumption and GDP growth is now fairly well understood. Thirty years ago forecasters use to assume a constant relationship. Today we know that the structure of fuel demand changes with economic development (Galli-1998). (2) This reflects the more efficient use of energy associated with technological progress and the substitution of alternative materials (such as plastic for glass and steel). In addition, as per capita income levels rise above the $4,500 per annum level the demand for energy intensive products declines.

Thus, it is possible to conceive of countries changing their energy consumption by encouraging shifts in their industrialization policies, for example encouraging technology based industries rather than heavy manufacturing industries. Technology itself is advancing such that it is now possible to consider facilities and products previously impractical.

Energy, the environment and economic growth

Energy economic security is no longer a matter of supply/demand and cost. The public and governments now must wrestle with the impacts of energy on the environment (health and climate) and the impact of restricting energy growth on economic growth. The impact of environmental regulations on economic growth is also hotly debated. The interactions are complex, not well understood by policy makers and still under study by economists. However, a simple example illustrates the issue.

In China, coal is abundant and used extensively. If there is to be continuing economic growth, coals use will increase. The Chinese will face growing health problems unless there are very large investments in scrubbing technology, and the world will face growing CO2 emissions. China's policy makers may choose to ignore their own health problems for the near term, but eventually economic growth will raise income levels to the point where people will demand cleaner air. China faces many other classic economic issues associated with coal including the huge cost incurred hauling coal on a rail system that has been said to consume half of the coal carried. The point is that for China's energy policies to remain viable over the long run all cost associated with health and climate issues will also have to be considered along with the cost of production and transportation. Energy economic security will not exist unless the solution is acceptable to China's citizens.

Globalization

Energy, especially petroleum, has been considered an international subject for many decades. Hence, it was no surprise to anyone in the industry when Adleman (1984) declared that "the world oil market, like the world ocean, is one great pool". (3) Some may conclude from this that oil will always be readily available if one is willing to pay the market price. However, others have found that establishing long term supply arrangements with strategic partners leaves them in a more secure position in a time of

tight supply and provides them a more consistent crude mix into their refineries, thereby lowering cost. In either case, it is clear that "prices for same quality crude oils from different regions of the world do not deviate from each other" Gulen (1997). (3)

If the above was all that needed to be considered regarding globalization, the implications for energy economic security would be relatively easy to understand. It is the interaction between energy, economic growth and environmental issues that makes the impact of globalization so difficult to analyze. The world has long understood that global trading could affect the economic well being of countries. What is now clear to most policy makers is that information flows and financial markets have increased the interactions between countries to the point where a country's policies can no longer be made in isolation if one is interested in economic security.

Energy economic security has likewise been affected by these trends. A recent paper entitled "CO2 Emissions Limits: Economic Adjustments and the Distribution of Burdens" by the Joint Program on the Science and Policy of Global Change (4) covers many of the complex interactions policy makers must now consider. The article points out that a policy to reduce CO2 in the developed world with no restrictions in the Developing world would lead to major shifts in economic consumption between regions.

These shifts will adversely affect many of the developing worlds because changing economic growth in the developed countries will impact the developing countries international trade. Those countries that are not constrained in CO2 emissions will "become more competitive in the development of highly carbon-emitting energy sources, and in the production and export of energy-intensive goods". (4) It can be noted that those developing countries not possessing indigenous energy sources will be hurt the most. The adverse impact on a country can be mitigated by the existence or creation of alternative technologies, such as a substitute for refined oil or a non-carbon electricity source. However, alternative technologies are more likely to be created in the developed world. If this occurs, the developing countries thinking they will avoid the costs of CO2 controls will eventually find their economic growth slowing relative to the rest of the world and their currencies will ultimately be adversely impacted.

MEETING THE ENERGY SECURITY CHALLENGE:

The above discussion of fundamentals provides a limited, but I hope useful, insight into the growing complexities policy makers will face in trying to provide long term energy economic security in the twenty first century. Supply /demand and cost concerns must now be accompanied by economic growth, environmental, international trading and financial concerns. While the challenge has grown more complex with globalization and environmental issues, some of the basic factors critical to success have remained the same as observed by Fouquet and Pearson in their study "A Thousand Years of Energy Use in the United Kingdom". (1) These include:

1) Knowledge –based innovation, including the introduction of new technologies for using and discovering resources, and the diffusion of related information to the producers, consumers and regulators:
2) Market developments, such as the creation of new and the integration of separate markets:
3) Institutional reforms, including regulations on new technologies, the management of energy markets and the willingness to encourage or support new technology.

What is new is the level of knowledge necessary to understand the issues and the extent to which global events rather than national priorities will influence the outcome. Together, these new factors ensure great difficulty in reaching agreements across national boundaries. It is becoming increasing apparent that energy economic security in the long run will depend upon the creation of transnational understandings and institutions to ensure the appropriate development of innovation, markets and institutions around the world.

Long term energy economic security requires countries to ensure they have adequate supplies of competitively priced energy that is in a form that is acceptable to a nation's citizens. It is no longer sufficient that energy is available at the right price to meet GDP growth requirements. The forms and external cost of energy usage and production must meet environmental (health and climate) criteria on a national and international basis.

The speed of change has also increased with the globalization of trade, markets and factors of production. This suggests a need for more flexible and resilient policies, regulations and institutions to meet rapidly changing conditions.

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(1) Roger Fouquet and Peter Pearson , "A Thousand Years of Energy Use in the United Kingdom", The Energy Journal, Vol.19,No. 4, 1998

(2) Rossana Galli, "The Relationship Between Energy Intensity and Income Levels: Forecasting Long Term Energy Demand in Asian Emerging Countries", The Energy Journal, Vol. 19, No. 4, 1998

(3) S.Gurcan Gulen, "Regionalization in the World Oil Market", The Energy Journal, Vol. 18, No. 2, 1997

(4) Henry Jacoby, Richard Eckaus, Denny Ellerman, Ronald Prinn, David Reiner and Zili Yang, "CO2 Emissions Limits: Economic Adjustments and the Distribution of Burdens", The Energy Journal, Vol. 18, No. 3, 1997