Chapter Four

Achieving Energy Security That Feeds the Economic Component of National Security

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Energy has been and will remain an essential enabler of economic prosperity in the United States. Past prosperity was enabled by abundant and relatively low-cost energy and fuel. Even today, a majority of American citizens take our supply of affordable energy for granted. Without assured and secure sources of energy, our economy will be hard pressed to function normally and certainly will not be able to grow.

Having stated the obvious, the changes in the future of energy could not be more uncertain. The situation the United States faces is a critical one. The lack of a national energy policy and a robust plan for the future surety and security of our energy supply is hampering efforts to provide adequate and affordable forms of energy that fuel economic prosperity.

Why do we need a national energy policy and plan? Because after a number of false doomsday predictions regarding the eventuality of oil shortages, it is generally agreed that the combination of oil supply depletion and climate change effects will affect our economy for the next four decades. Many will say that much is being done to develop alternatives as we speak, and this is true. But the efforts are not coordinated and are not being planned with a view toward an overall long-term solution. Instead, short-term technology development and implementation are being installed without a real understanding of how they will affect the long-term goal of energy security in the 2030–2050 timeframe.

Should we not enact a robust energy scenario, the projected cost to the quality of life and overall political stability of the United States goes far beyond economic criteria. After decades of economic growth, Americans expect their quality of life, which has stalled over the last decade, to continue to improve. The political dissatisfaction we are now experiencing gives us an indication of a negative trend that could be exacerbated by an uncertain energy future. This dictates that we take

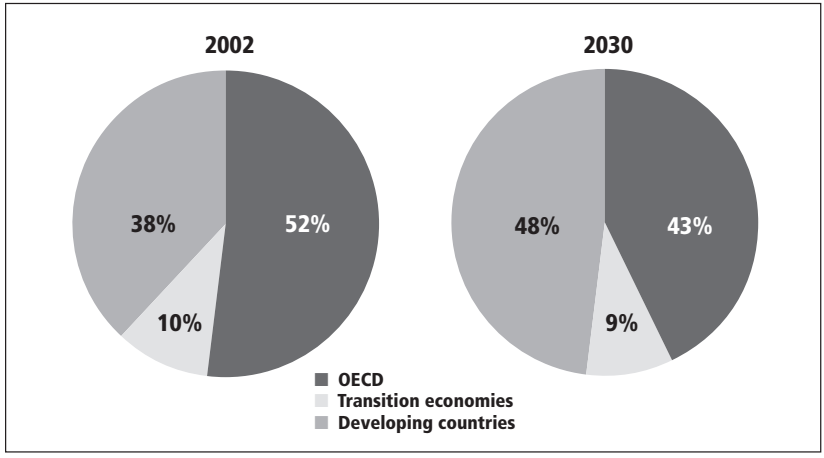
a serious look at the energy issue quantitatively and understand the scenarios that can assure success. Our leaders need to see the complexity of the problem and potential future success scenarios in a way they can understand and recognize the costs of change and/or inaction when making decisions on future investments.

What is proposed is a National Energy Security Initiative. This initiative should be administered by the Department of Energy (DOE) and joined by every government department with responsibilities that will be affected by energy—in essence, practically all departments. In this initiative, a model of current energy use in the entire country would be developed. Then, a complex systems modeling exercise would map the changing technologies, use elements, and economic factors around the future potential scenarios. Policies and plans could then be recommended to deliver affordable and assured energy to all economic sectors and regions with future technology investments defined.

Current State of Affairs

The most influential dynamic affecting global distribution of energy demand is affluent population growth over the next two to three decades, which will result in a 30 to 40 percent increase in quantitative global demand (see figure). Fossil fuel discovery and supply will be stressed, creating shortages and pricing instability.

Figure. **Regional Shares in World Primary Energy Demand**



Source: World Energy Outlook 2004.

This is not the recipe for a future of energy stability in the United States. The landscape of supply and demand in fossil fuels will become chaotic. Compounding the problem is that the structure of the U.S. stationary power system is regionalized. As a result, we have multitudes of organizations and corporate entities with which to work. And now the United States is targeting the implementation of an electrified transportation sector. When all of these changing trends are evaluated in aggregate, the complexities do not allow for an intuitive understanding of policies and plans that are possible, affordable, and socially responsible.

There is an ocean of opportunity for technology development that will fuel technology exports. So our Federal Government has decided to invest in many different and competing research and development (R&D) programs. Without a national energy policy, the United States lacks any coherence of integrated effort or criteria on which to evaluate the research that is being conducted and funded.

There is no doubt that the Federal Government should continue to invest in forward leaning research. What is required here is to take all of this research and consolidate it into one modeling and planning environment to understand how the individual developments may contribute to a defined goal.

The Endgame

The vision for energy security of the United States is actually simple to qualitatively describe. It must be totally renewable; kind to our climate and environment; affordable; employ technologies that are not independently controlled by foreign interests; and create economic growth and jobs within industries that develop, deploy, and sustain it.

So how does that compare to what we have today? The United States is at best 15 percent renewable in stationary and 4 to 5 percent renewable in the transportation sector. We are the largest carbon dioxide producer in the world by a 5:1 factor. We are fairly affordable but subject to fluctuations that throw chaos into our economy on short notice. Foreign interests are dominant in the supply base, causing the majority of our negative balance of payments. Jobs are available in the energy sector but due to our declining development of technical professionals, some are filled by foreign students or are exported. This is a train wreck that may have already happened.

The endgame employs the following technologies:

- water flow technologies of hydro and tidal
- solar technologies of PV and CS
- nuclear (with fuel reclaiming)
- wind (all forms)
- geothermal generation
- H_2 (primarily for transportation)
- fuels from new forms of agriculture
- new, as yet undefined, renewable technologies.

The endgame includes the following characteristics:

- the basic technologies of energy generation and fuels are controlled by U.S. or allied interests
- new technologies, when integrated, will meet all supply and economic requirements
- the agricultural system will provide fuels and food without economically affecting either
- a new energy workforce will be trained in an education system that is coordinating its offerings to a national policy and plan and regionalized for local needs and advantages
- the technologies employed will be sustainable and not adverse to climatic or environmental elements
- the system will be affordable and contribute to the economic prosperity of the nation and its citizens.

An endeavor of this magnitude has succeeded before in the United States. The technological, educational, and organizational challenge of manned space flight to the Moon is on the order of magnitude of the complexity of the future energy state. We succeeded in that challenge and developed technologies that fueled the information age. These contributions initiated some of the building blocks that will facilitate our energy quest—computers, communications, and fuel cells, to name a few. This can be repeated in the new energy age.

Plotting the Path to the Endgame

The lack of a national energy policy, even though we are investing billions into R&D, leaves the United States in a situation described by the phrase, "If you don't know where you're going, any road will get you there." U.S. leadership must overcome barriers to establishment of a national policy on energy that prescribes an endgame and the plan to achieve it. Not doing so leads to variable outcomes, many of which can cause economic distress. Recognition of the need for the population to be educated to understand the changes that they will see and to have confidence that our leadership has the problem in hand is critical to political tranquility. And with the fossil fuel supply and demand curves spreading over the next 10 to 20 years, there will come a day when coordinated action will need to be organized. Rather than waiting until events such as the embargoes of the 1970s and the subsequent reactionary actions occur again, the United States should set policy, establish a clear course of action, and properly fund it. Most important is communicating with the American people to elicit wide-ranging support for the changes that will eventually come.

The path will be one of change, and it must have a significant amount of flexibility built into it. An example is the transportation sector, which touches most Americans daily. Over coming decades, cars will be powered by an expanding number of systems, from our current liquid fuels to hybrids to gaseous fuels and eventually electricity. The earliest possible conversion to a full electric-driven U.S. vehicle fleet is projected to be in about 35 years. Components of alternative transportation will be employed. Over this time period, people's transportation lives will change 3 to 5 times. This is a much higher rate of change to our population than any we have seen in our country's existence.

There is no easy fix to this and no single silver bullet to employ. The path will include the use of a number of interim solutions. Technology developments and validations will have variability in their deployment timelines. As technology is developed, it will have to be brought into widespread use, and certain elements may well have short life spans. But with a plan in place, the opportunity for success and economic security will be visible, whereas without a plan, success will only be a dream and the population will become frustrated. The

energy world of 2030 will be a different one, and the United States is long overdue in setting adequate policy in this area.

A Way Forward

The proposal is to establish a National Energy Security Initiative. This effort should be established within DOE and include working elements from all of the Federal Departments that may be affected by or that may contain solution elements: Defense, Transportation, Agriculture, Homeland Security, and so forth.

The tasks within this initiative would be to:

- dynamically model the current energy use profile for the United States
- incorporate economic, sociological, educational, security, and political elements into the models
- develop the endgame models that incorporate all of the alternative technologies under development
- recommend to leadership a set of policies that will assure adequate energy availability as technologies mature
- monitor new and ongoing technology developments assessing their effect on the endgame and interim points
- communicate the needs, plans, and successes to the American people.

This approach can be tested and first implemented in a cross-department effort being created between the Department of Energy and Department of Defense (DOD) to provide for efficient and secure future energy usage in the latter. The modeling and planning can be exhibited to leadership within the DOD/DOE initiative. After initial investments, new systems can produce cost reduction and savings for the American people. It also sets an example by which the government itself is willing to embark on an organized planning exercise that can be tested and then expanded to include the entire country.

Conclusion

The energy profile for source and use will change drastically over the next 40 years. The next 20 years are the most critical for the United

States to position itself with assured and secure forms of energy. Considering the time needed to develop and implement significant reinvestment projects, we are already late in having policies and plans in place to forestall economic distress and all of its political consequences. The National Energy Security Initiative will provide the coordinating efforts in planning and technology R&D that can assure success in the redevelopment of the U.S. energy system. And it can start within DOD as a first application of success.