ENERGY SECURITY AFTER SEPTEMBER 11: A GLOBAL CALL TO ACTION

Christopher Flavin
Worldwatch Institute
November 1, 2001

The events of the past two months have graphically shown the vulnerability and instability of today's global energy economy. Dependence on oil has continued to expand in the last decade, and with that growth has come even greater reliance on the enormous petroleum reserves in the Persian Gulf. Any near-term disruption in Middle Eastern oil supplies as a result of local terrorism, warfare, or the overthrow of governments by radical fundamentalists would lead to dramatic oil price increases that would severely disrupt the global economy.

Reliance on oil and other fossil fuels has created three kinds of energy insecurity: the political insecurity that results from the uneven distribution of oil reserves around the globe, the economic insecurity that comes from dependence on a fuel whose price swings wildly in the spot market as a result of global events, and ecological instability in the form of potentially catastrophic climate change stemming from the buildup of carbon dioxide in the atmosphere. The roots of these problems are intertwined, and the solution is ultimately the same: an overhaul of today's energy system.

Current instability in the Middle East and Central Asia has dramatically raised the stakes for energy planners, and shown that the world is in urgent need of a new energy strategy aimed at reducing dependence on oil. To achieve this goal, decades of complacency about energy trends must be replaced by a new consensus about the need for, practicality of, and advantages of a new energy system. The same kind of vision and effort that went into creating the oil economy a century ago must now go into creating a post fossil fuel age for the 21st century. A near-term energy transition is now central to achieving the Secretary-General's Millennium Declaration call for "freedom from want and freedom from fear."

THE PROBLEM

The world is now consuming 74 million barrels of oil daily—providing 40 percent of the world's energy. Due to its geographic concentration, 57 percent of the world's oil now moves across international borders, with nearly half of that total coming from the Middle East and North Africa. Despite the global oil shocks of the 1973 Arab oil embargo, the 1980 Iranian Revolution, and the 1990 Gulf War, world oil use increased at an accelerating pace in the 1990s, up 13 percent during the decade.

Heavy dependence on oil is found throughout most of the industrial and developing world. Transportation in particular—from automobiles to jet aircraft—is almost completely dependent on oil. Industrial countries account for 60 percent of world oil consumption, but many developing countries are already more economically dependent on oil—using it for industry and power generation as well as transportation. In many cases, oil imports absorb as much as one-third of foreign exchange earnings and any sudden rise in oil prices would threaten and almost immediate recession.

The United States, with less than 5 percent of the world's population, is the world's largest oil consumer, burning 19 million barrels per day, 25 percent of the world total. Despite a once abundant endowment of domestic oil resources, U.S. energy needs long ago outstripped that capacity, and imports now account for close to two-thirds of its oil use. Japan uses just 5.5 million barrels per day, but imports virtually all of that amount. China, by contrast, consumes just 4.8 million barrels per day, India 2.0 million barrels per day, and Brazil 1.8 million barrels per day. However, over three-quarters of the future growth in global oil imports is projected to come from developing countries, most of it in Asia, which already accounts for one-third of world oil imports.
The Middle East contains a remarkable two-thirds of the world's remaining proven oil reserves. As a result, projections by international agencies, national governments, and private companies all show the Middle East providing an ever-growing share of the world's oil in coming decades. Other areas of potential growth include the adjacent regions of Central Asia and North Africa, which are plagued by some of the same social and political instabilities found in the Persian Gulf.

In many countries, from the Middle East to Nigeria and Venezuela, the oil extraction industry has frequently led to social instability and delayed the transition to democratic political systems. Petroleum development has concentrated wealth and power, and has contributed to the emergence of corrupt regimes and huge gaps between the rich and poor—the ingredients of unrest and terrorism.

The vulnerability of today's global economy to instability in the Persian Gulf is demonstrated by what happened when Iran's authoritarian monarchy fell to a homegrown revolution in 1979. Production by the world's fourth largest oil producer dropped precipitously—from 5.6 million barrels a day to 1.6 million barrels a day. The resulting tripling of world oil prices sent the global economy into one of the worst recessions of the last half-century. Two decades later, Iran's oil production has never fully recovered, in part because a generation of petroleum engineers and workers fled the country and did not return.

Saudi Arabia is the world's largest oil producer and exporter today, and a collapse in the current regime there would have far more catastrophic global consequences. Osama bin Laden's overriding goal according to analysts is overthrow of the Saudi monarchy. Mr. bin Laden has stated publicly that the appropriate price for oil is $144 per barrel—six times the current level.

THE SOLUTION

In recent decades, oil has become a truly global commodity, traded around the world, with prices moving in unison on international spot markets. When supply shortfalls occur, prices rise everywhere simultaneously—whether it is for 'Arabian Light,' 'Brent Crude' or 'West Texas Intermediate.' U.S. dependence on Venezuelan oil or even on Alaskan oil provides virtually no insulation from an oil price shock than is afforded Japan, which gets much of its oil from the Persian Gulf.

This simple fact of the fungibility of oil in today's global economy means that the only way individual nations can reduce their vulnerability to oil price shocks is by reducing their total dependence on oil. Expanding U.S. oil production in the Arctic National Wildlife Refuge, for example, would at most add 1 million barrels per day to world oil production and take a decade to develop. Saudi Arabia can raise or lower its production by double that amount in a matter of days.

President Bush has said that "National security depends on energy security." But national security can only be advanced if oil dependency is reduced. Lowering that dependence is now a global imperative, and those countries that reduce their dependence the most will enjoy a clear economic and political advantage in the years ahead.

Reducing dependence on petroleum requires an immediate focus on transportation—the part of the economy that uses most of the oil, and the only sector that does not have other fuel alternatives available. What is needed is a transition to a new transportation system that is dramatically more energy efficient and based on low-carbon and zero-carbon fuels. Technological developments in the last decade provide a clear path to such a system—via a transition in engine technology and automotive design that is as profound and rapid as the introduction of the early automobile a century ago.

The key technology for moving beyond oil is the fuel cell—the chief power source in the U.S. space shuttle and which has attracted billions of dollars of private investment in the last few years. Fuel cells combine hydrogen and oxygen to produce electricity that can be used to power homes, industrial equipment, and virtually any kind of motor vehicle. Fuel cells have been described as analogous to the
silicon chip in their potential to open the way for a 21st century energy economy and to become ubiquitous in that economy.

Hydrogen—the most abundant element in the universe and found on earth in ordinary seawater—is the primary fuel for fuel cells. As Jules Verne first recognized 150 years ago, hydrogen is the logical long-term fuel for the world; in the short term it can be derived from natural gas, biofuels, and hydropower. In the long run, it can be produced in endless abundance from wind power, solar energy, and ocean power. Unlike oil, sources of hydrogen are broadly spread, allowing most nations to meet the bulk of their own needs.

Scores of companies are now developing fuel cells for use in everything from automobiles to homes, industry, and mobile phones. Just as Pulitzer Prize winner Daniel Yergin described oil as "The Prize" of the 20th century, the fuel cell may take on that role in the 21st. There is now broad agreement among a wide swath of scientists, engineers, and auto executives that fuel cells will one day replace the internal combustion engine that has dominated transportation since horses were phased out in the early 20th century.

Fuel cells are now available in limited quantity—hand built by PhD's. Several cities have pilot bus fleets running on fuel cells. Companies are now racing to take the next step—commercial introduction of mass-produced fuel cell cars. Several auto manufacturers, including Daimler Chrysler and Toyota have plans to introduce limited numbers of fuel cell cars in 2004.

THE POLICY CHALLENGE

Despite the business interest and technological momentum behind fuel cells, their market entrance will be gradual—unless there is government leadership. The challenge for world leaders today is to do for the fuel cell what the U.S. government did for the silicon chip in the 1950s and 1960s: use government procurement and financial incentives to spur market growth and private investment. This kind of effort could move the world decisively toward the age of hydrogen in the next ten years.

Potential policy initiatives:

1. Introduce major new tax incentives for domestic renewable fuels and for fuel cell/hybrid cars—sliding scale, beginning at equivalent of 30 mpg; add progressive tax for vehicles under 25 mpg.

2. Accelerate government and international investment in necessary infrastructure, including hydrogen pipelines, storage, and new transport infrastructure.

3. Introduce gradually rising oil import tariff, increasing by $5 per barrel annually.

4. Establish large-scale funding mechanism to allow developing countries to keep pace in the coming energy transition, and meeting the energy service needs of hundreds of millions who currently lack access to reliable power and fuels.

5. Provide seed money for energy-related venture capital, to support new technology produced by small companies.

6. Introduce cap-and-trade systems that cover carbon dioxide and other major air pollutants, encouraging companies to invest in the least expensive, most effective means of reducing emissions, including investing in efficiency or shifting to cleaner fuels. Reduce emissions at existing coal-fired power plants that are not currently covered by the latest emissions standards is a particular priority.
Provide responsible and carefully regulated access to public lands for development of additional natural gas, renewable resources, and associated pipeline and electrical infrastructure.

Open up electric power market access for businesses and consumers that invest in on-site generation, as well as for renewable power suppliers, coupled with encouragement of green power markets.

How quickly the world's energy economy is transformed will depend on how successful we are in marshalling a common vision of a new energy system, and in mobilizing the economic and political commitments needed to make the transition. There is an urgent need for international cooperation and the establishment of appropriate new institutions in order to spur the transformation. Opinion leaders from across society will need to take the lead in mobilizing a coalition for change.

We propose that a relatively small number of leading oil dependent countries take the lead in committing jointly to the cooperative development of a new energy system. A group of countries that might include Brazil, China, India, and the United States plays a sufficiently central role in the world energy market that it could decisively shift the world in a new direction.

The goal of this effort should be nothing less than a transformation of the global economy that is as profound and rapid as the emergence of the oil age was a century ago. The effort should be based on the latest technology, strategic reliance on global markets, and an overriding commitment to a more secure world—one that is free of want and of fear.