Wavering choices of the U.S. regarding the alternative energy to oil

Jan. 24, 2012
Kengo Tahara
Economist
Japan Center for Economic Research

Energy security (independence) has long been a central concern in the energy policy of the United States. The U.S. once was a net exporter of oil. Rising demand and declining production turned it into a net importer in around 1950. By the early 1970’s, the need for crude oil supplies from OPEC helped produce the kind of energy market that allowed for the price spikes. Overdependence on supply from OPEC (which includes Venezuela) is not a comfortable option with respect to national security. The official policy for the past few decades then, has been to develop new domestic sources (including deep sea exploration) and energy saving or efficiency.

Domestic oil production in the U.S. has been declining since the 1960’s. New crude oil supply from land-based fields has not developed, despite considerable spending on exploration. The oil industry therefore has turned to the sea. Deposits off the north coast of Alaska increased domestic supply (though at a much higher cost than that incurred from land-based production). Exploration has also turned to the Gulf of Mexico, at even higher cost because drilling has to go much deeper (up to a mile below the surface) to reach the sea bed. It is not only more expensive but enhanced risk of oil spills.

Energy conservation and efficiency allows users to stretch available supply, and in the process save money, as well as reduce exposure to potentially hostile suppliers (Iran, Venezuela, etc.). Households and businesses have saved energy relative to their expanding economic activities, and also shifted to alternative energy. Energy intensity, which shows the amount of energy consumed for a unit of economic activity (GDP), has decreased from about 0.4 in 1970 to 0.2 tons of oil equivalent per thousand 2000 US dollars of GDP in 2010 (Figure 1). Improvements include better fuel mileage for cars and trucks, better home and commercial building insulation, and an industrial shift to use other energy sources (cleaner coal, natural gas, more lately solar or wind power). Finally, the economy has been shifting away from energy-intensive heavy industrial activity to less energy-intensive service production.

Still more than half of the crude oil consumed in the United States comes from foreign sources. The good news, in terms of achieving independence from potentially hostile suppliers, is the switch to alternative energy sources. Today, 20 percent of all the energy consumed in the United States comes from coal. More efficient burning of coal
today also produces less sulfur pollution. And a quarter of total energy comes from natural gas. This is one of the success stories in achieving some degree of independence. First, large new fields have been discovered in Eastern Pennsylvania, Western North Dakota, and in Wyoming. Second, oil shale (somewhat plentiful but heretofore too expensive to use) has benefitted from technological breakthroughs, allowing efficient and economically viable usage. The rise in supply relative to demand has reduced price: Natural gas that would have cost $10 per thousand cubic feet three winters ago, this winter costs $3 per thousand cubic feet.

Since global warming is now recognized as a big issue internationally, emission reduction of CO2 has become another key component of energy policy, rivaling independence. Still, as today’s energy debate shows, republicans in general tend to prefer to increase domestic oil supply while democrats prefer to save oil consumption. And democrats in general tend to be more active on environmental issues, which is more consistent with oil conservation.

For example, there is great debate right now over a proposed pipeline to bring oil supplies down to the southern United States from Canada. Any barrel of oil from Canada that replaces a barrel from Venezuela or Iran obviously means supply is coming from less potentially hostile sources. Second, it will generate jobs. Republicans overwhelmingly like this plan.

Democrats do not dislike it so much as are very skeptical. The pipeline if built would go directly across the great Oglala aquifer in Nebraska and Kansas. Thus, there is potential to pollute this essential source of Midwestern farm irrigation. And democrats further argue that republicans greatly overstate how many jobs would be created. Finally, they argue the job gain is temporary. Damage to the aquifer is permanent.

Republicans counter that we need to build more nuclear plants since nuclear is clean energy. Democrats in general argue that nuclear isn’t safe and therefore isn’t clean. No new nuclear plant has been built in the country since the Three Mile Island accident in 1979 except those ordered before the accident. And chances are it will be at least half a century before one is built, so great is the opposition to such a proposal.

The energy policy of Obama administration has its emphasis on 1) Clean energy; 2) Alternative sources, which implies less dependence on crude oil — no matter where it comes from; 3) Conservation and efficiency. The administration started in 2009 with a stimulus package called Green New Deal, which attempted to foster clean energy investments and employment in the industry at the same time. And in his state of the union address in 2011, President Obama announced a goal of generating 80% of the
U.S. electricity from clean energy by 2035. That message very likely will be repeated in his 2012 state of the union address.

The “clean energy” includes clean coal and natural gas in addition to renewable energy (hydropower, wind, solar, biofuels, and others). While wind, solar, and other resources are often categorized in one category called renewables, they differ very considerably in costs and benefits. According to Energy Information Administration (EIA)\(^1\), the levelized cost (which includes fixed cost of plant development) of solar power in 2016 is estimated to be about 21 cents/kWh, much more expensive than hydro (9 cents), wind (10 cents) and nuclear (11 cents), although the price gap has been shrinking. The costs can vary depending on the assumptions such as commodity prices and whether the external costs like CO2 emissions and the risk of accidents are internalized (by law, the nuclear plants do not include risk of accident in their costs). EIA’s estimates shows that introducing carbon control and sequestration (CCS) raises the costs of coal and natural gas by about 3 cents/kWh. Since those changes can influence the choice of energy sources, internalizing appropriately the external costs is important.

The price of natural gas is getting cheaper compared to other fossil fuels due to the development of the new technology (hydraulic fracturing or fracking), though some point out that the new technology has a risk of causing environmental pollution and/or lung problems if seeped gases are inhaled. According to the EIA’s estimation, the levelized cost of conventional natural gas power will be 6.5 cents/kWh in 2016 and conventional coal will be 9.5 cents. Introducing CCS technology or carbon tax would increase the costs, but they would still be economically competitive. Literature\(^2\) suggests that even before internalizing the costs of nuclear accidents and storage of spent fuel, nuclear power costs more than coal and natural gas. Given the recent trends in prices of natural gas and other sources and the effect of the nuclear plant accident, there seems to be less advantage than before of opting nuclear.

Kengo Tahara is an economist in Japan Center for Economic Research (JCER). He joined JCER in 2008 after receiving a master's degree and completing the course requirement for the doctoral program in agricultural economics from the University of Tokyo. For the last three years he specialized in business forecast for Japan's economy. He has worked as an economic intern at the Conference Board in U.S. since June 2011.

---

Figure 1:
Self-sufficiency rate of primary energy (left) and energy intensity (right) in the U.S.

Note: Self-sufficiency rate equals domestic production divided by total primary energy supply.
Sources: IEA, "Energy Balances of OECD Countries"; OECD

Copyright © 2012 JCER

Japan Center for Economic Research (JCER)
Nikkei Inc. Bldg. 11F 1-3-7 Otemachi, Chiyoda-ku, Tokyo 100-8066, Japan
Phone: +81-3-6256-7710 / FAX: +81-3-6256-7924