An Alternative U.S. Energy Policy

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During the Reagan Administration, I worked as a mechanical engineer in a curious building with solar energy panels on the roof, all pointing downward. The contractor I was working for had received a Department of Energy grant so that they could collect solar energy data, but then turned the collectors downward to protect them from the elements such as hailstorms, monsoons, heavy snowfall and blowing dust. In the mean time, the military defense contractor I worked for had me researching and developing military technology, some of which was used in the Middle East to help stabilize the region and keep the oil fields safe. The company also worked on a few nuclear power projects.

Thus, United States energy policy over the last 30 years has had three pillars: defending Middle Eastern oil and activating domestic oil; researching and subsidizing renewables; and developing nuclear power. But now there are two challenges on the energy horizon: global warming and peak oil. My job here is not to address these controversies, as global climate change may occur no matter what we do, and peak oil may not occur no matter what we do. They both may hurt mine and future generations. Still, these two concerns should be taken into account, since we already have laws and policies in place to reduce carbon emissions and since the U.S. has already spent billions of military dollars defending and stabilizing Middle Eastern oil countries, which suggests that oil scarcity is evident.

Therefore, I consider three energy policies: oil supply, oil demand and electric utilities. On the oil supply side, it is important to keep all options open so that if oil production is constrained from one region, other regions will still be available to provide output to help assuage any oil price shocks. On the oil demand side, we should have a gasoline tax and deregulate some of our transportation markets to allow for alternative modes of transport particularly private mini-buses. Finally, in regard to electric utilities, we need to increase nuclear research, development and the placement of more reactors even as we place an emissions fee on carbon releases. One way we can create incentives for more effective electric utility management, though, is not by instituting competition in power generation, but by instituting a stock-option like incentive mechanism for utility managers.

Start with oil. On the oil supply side, the story is that there is plenty of shale oil around the world, even though, only the U.S. has developed it robustly to date. Poland, for example, found it quite difficult to develop its shale gas because clay is co-located with the shale, thereby reducing the effectiveness of the fracturing. So, even though the Poles were highly motivated to make it work, it has yet to be feasible. In addition, shale oil is often light-weight, so that as shale oil becomes a larger percent of U.S. production, we will see bottlenecks in refining the C3 to C7 hydrocarbon liquids into high octane gasoline and heavier jet fuel and diesel fuel. Considering that conventional oil may be constrained, and shale oil may have refinery bottlenecks, then it's a good idea to have multiple back-up strategies to stabilize the oil market.

One can always debate the merits of the 2003 Iraqi invasion, but one aspect was stabilizing oil-producing regions in the area. Rightly or wrongly, oil supply is important enough that American lives have been repeatedly put at risk. The way to reduce tensions in the Middle East, then, would be to allow greater oil and gas exploration in the U.S. Arctic, and on U.S. off-shore continental shelves. Already, major oil fields in the Middle East, Africa and Western Siberia, are quite mature and could decline all at once. If on top of that, Middle Eastern politics become more volatile, we will see another jolt in the oil market. Therefore, it is prudent to allow oil exploration in the Arctic National Wildlife Refuge (ANWR), the National Petroleum Reserve Alaska (NPRA), the Arctic off-shore, as well as the Atlantic and Gulf Coast off-shore regions. In the 1960s, North Slope prospecting, which discovered Prudhoe Bay, allowed the U.S. to be well positioned in the 1970s to withstand the oil price shocks. Alaskan oil didn't solve the problem; it just mitigated it. Nevertheless, we might see history repeat.

Furthermore, when the Trans-Alaska oil pipeline was first envisioned, there were dire forecasts in its environmental impact statement. Ironically, though, caribou numbers actually increased rather than decreased, as was predicted, after the pipeline was built. Still, it seems inconceivable that saving a few caribou in Alaska is really worth as much as a potential oil war putting American lives at risk in the Middle East. Even such adverse environmental events as the Exxon Valdez oil spill and the BP, Deepwater Horizon oil spill killed or hurt very few people and caused limited environmental damage in comparison to the first and second Persian Gulf wars. Oil leasing should then be allowed to go forward

if the industry believes there are good prospects, with reasonable—but not overly zealous—permitting processes to protect the environment. Open up ANWR, NPR-A and all U.S. off-shore regions.

After all, much of the economic value of oil production goes to local people, and each oil prospect is vetted by those most affected. In fact, oil development also gives native villages funding to help acclimate their homes to permafrost reductions and build Dutch-like dikes to protect against storm surges caused by less sea ice. So, far from ruining Arctic livelihoods, oil development can enhance economies of the north and the environment. Oil and gas activity can give funding for polar bear artificial islands to sustain long swims from the floating sea ice to the mainland. Such islands can provide a natural bear hunting base.

On the oil demand side of the market, electric car development is moving along and can help reduce the need for liquid petroleum fuels, as can high mileage, propane or natural gas vehicles. However, instead of regulating and deciding the kinds of cars that should be built; thereby pushing technologies that may eventually fail, it would be better to simply put a tax on gasoline and let the market decide its own strategy for reducing oil use as a demand side back-up strategy.

Typically the public does not like taxes, such as a gasoline tax, but doesn't mind automotive regulations, such as fleet mileage regulations, even though regulations can be more costly than any given tax. To say that all taxes are bad and all regulations are good loses the nuance of costs and benefits of each. Specific regulations on cars to increase mileage can add costs, can create odd designs for cars and can reduce social benefits. Letting the market decide the kinds of cars to produce is a better choice. A gasoline and diesel fuel tax forces consumers to choose how to reduce their use of gasoline and diesel with either high mileage or alternative vehicles, whichever works better for them. Nevertheless, the need for large vehicles, farming vehicles and aircraft are still going to be strong, so heavy liquid petroleum fuels, not just electric batteries, propane or natural gas, are always going to be needed.

Still, justification for a gasoline tax is needed. You can argue that a gasoline tax would help reduce carbon emissions and reduce the need for gasoline in the event of a peak oil occurrence. However, a more immediate need for the tax is to pay for the billions of dollars spent on military stabilization in the Middle East, where much of the world's oil resides. Plus, you might want some of the gasoline tax money used to maintain American infrastructure, which also adds efficiency to the U.S. economy by better connecting businesses to each other and to consumers. Electric and alternative vehicles can have an electronic chip placed inside to measure mileage so that alternative vehicles can pay a mileage tax for their fair share of infrastructure. Also, a tax on gasoline should not necessarily pay for mass-transit, as each city can fund mass-transit with an inner-city congestion tax, where each vehicle driving on a congested highway can have an on-board electronic chip and be charged a fee for rush-hour driving.

Going further into oil demand, while there is much ado about Uber, self driving cars and working from a distance, another interesting oil demand side policy is to institute some experiments with free markets for alternative mass transit. Poland has a number of private mini-buses, as an alternative to city buses and metro systems, and which allow people to use less oil for commuting purposes. The mini-buses are run by private companies in and around the cities, and the companies are allowed to put route schedules on the side of roads and to pick people up at those locations. This is a kind of de-regulation of metro–bus systems that could be a middle road between taxis and government run mass-transit systems in order to provide a way for commuters to travel that is cheaper than Uber but more flexible than a city bus. It might induce people to use their cars less and save oil. Prototype cities, with mini-bus de-regulation, should be set up. Other cities will then try such de-regulation as they see fit. Ride sharing is also common and useful, but private mini–buses can follow a schedule which helps commuters to better plan their rides.

Besides oil, we need to improve electric utilities where a multitude of energy sources from renewables, to coal, to natural gas, to nuclear power are necessary. Currently, electric utility regulators are much concerned with global warming, but as with the automotive market, regulators tend to reduce carbon emissions using regulations and subsides, such as subsidizing solar and wind power and regulating the use of coal, rather than using markets to get the job done. It is easier for the general public to swallow regulations, rather than carbon taxes, to reduce greenhouse gases (GHG), even though a carbon tax might allow utilities to find more effective, universal solutions. Specific subsidies and specific regulations mean that politicians are picking winners and losers in carbon reduction technologies, rather than letting the markets decide. An alternative policy would be to just choose an appropriate carbon tax and let the utilities decide for themselves the lowest cost method to deal with that climate change cost. In that case, if coal is a cheaper, more reliable generating option even with a carbon tax, so be it.

Policy should not be so much a question of finding the correct carbon tax per ton of carbon emitted, which may never be found; rather, it should be about deciding the best options for reducing carbon and running a utility, given the costs and risks of each strategy. The carbon tax revenues can then be used for research, particularly on nuclear power.

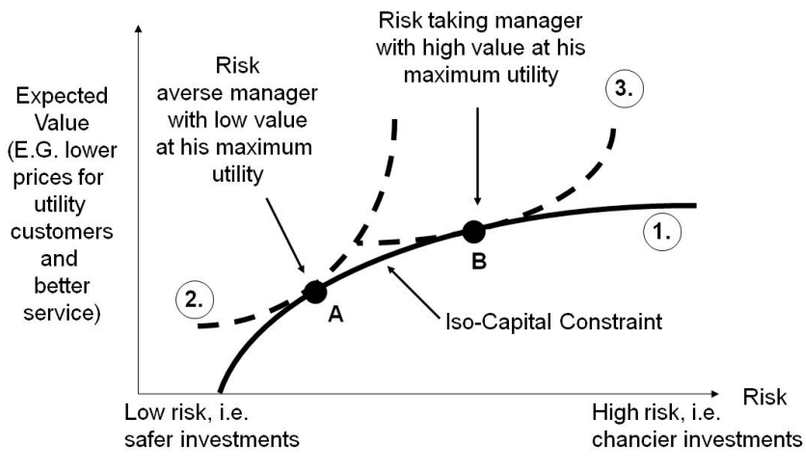
Speaking of nuclear power, the Fukushima disaster should not have happened given the data on Japanese earthquakes and engineering solutions available. Therefore, it would be sensible not to throw out the nuclear option, but to continue to have more pure research surrounding nuclear power, including small modular reactors (SMRs) and thorium reactors. Prototypes can be built and tested at safe test sites in order to see how they work and then eventually put in place. Small nuclear generators, if successful, can be placed close to electric consumers in order to reduce power line losses, and carbon emissions. They can make the management of power markets easier since they will have fewer swings in the power production side than many renewables have. Plus, they can be used for small towns as well as big cities.

Moving forward, the conventional philosophy surrounding electric utilities is that of having a regional distributor, which dispatches power from solar rooftop producers, wholesale generators and interties, and can also ask for smart grid, flex-user reductions. Theoretically, in such a scenario competition should drive prices down and induce innovative technology. However, competition doesn't always work. In the, so-called, competitive automotive industry, pickup trucks cost ten percent more every year despite better technology, multiple competitors and low headline inflation. If competition doesn't work there, it is doubtful it works in the highly constrained, complex and regulated power generation markets. Given all the regulations in the utility sector; the difficulties in managing, dispatching and purchasing electricity; the potential for market power, and the need for long-range planning, the hodge podge of forces can induce high costs. On the other hand, if a regional power market were under a single roof, i.e., a regulated monopoly utility, which generated, distributed and managed all of its own electric power, then you can be sure there would be no incentive to innovate, to cut costs or to reduce customer prices as the rewards to do so are low with a regulated rate of return.

Nevertheless, a monopoly should theoretically be cost effective to manage, to find expense cutting generating options, and to integrate new technologies. For example, if the monopoly utility finds solar energy to be cost competitive given a carbon tax, it can set up its own solar and wind energy projects, contract for them, or manage a set of home rooftop solar and wind projects. If the utility finds a large nuclear reactor to be cost effective, it can build one as part of a suite of alternative generators and back-up power options. All these options are better planned and managed by a regional authority that can gauge how best to fit in the various options considering economies of scale, risk, long term needs and intertie options. But, then, add one wrinkle.

According to Markowitz's (1952a 1952b and 1959) portfolio theory and Friedman and Savage's (1948) risk theory, there is a financial/economic relationship between risk and reward, where investors can choose between less risky bonds, with a low return (low value), and more risky equities, with a high return (high value), or some combination, as shown in curve 1 of Figure 1. An investor with only one investment option would normally have a more risk averse investment utility at point A of Curve 1 and 2. However, if that same investor can diversify his portfolio, his risk averse investment utility moves to point B of Curve 1 and 3. However, a CEO of a single corporation relies on one paycheck and so tends towards a low-risk, safe strategy resembling point A of curve 2, even though investors want the CEO to take more risk and be at Point B of Curve 3, because the investors have nothing to lose as they are diversified.

Therefore, in corporate management theory, investors have found a way to



1. Typical company Iso-capital constraint curve
2. Iso-Utility Curve for more risk averse manager
3. Iso-Utility Curve for less risk averse (more risk taking) manager

Figure 1. Manager Utility Maximization with an Iso-Capital Constraint

move CEOs from the low risk taking point A of curve 2 to the high risk taking point B of curve 3 using stock options. If the CEO's risk taking is successful and company profits expand, then the CEO can sell his stock options for a high price and gain a bonus for his risk taking. If, on the other hand, his risk taking is unsuccessful and there is a company loss, he still receives the lower bound of the option, that way he doesn't lose much, just as investors don't lose much, as they are hedged. We may want to take a page out of finance theory and do the same with electric utility presidents and CEOs, i.e., give each utility manager a stock option–like bonus for reducing rate payer costs, mitigating power disruptions, and increasing market share (which would entail a growing local economy), but guarantee them a lower bound if their efforts are unsuccessful and they raise costs. That is, instead of using competition in electric utilities to force innovative cost cutting, just use a stock-option like bonus.

Many will criticize such a strategy because of the way the 2008 financial crisis played out with too much risk taking for the benefit of investor short run gains, even while society suffered a huge financial crisis. Indeed, this type of utility management strategy could create a California, utility, 2000/2001, style energy crisis. The problem is, based on our energy structure, we may be facing many physical risks from global climate change to peak oil related economic recessions. So, in order to be prepared for these other risk dimensions, we may need more risk taking within each regional electric utility to adapt to change. Therefore, by giving monopoly utilities complete control, by taxing carbon emissions and by giving the utility managers a stock-option like incentive to take more risks, then social value can increase.

In conclusion, the U.S. needs to open up all regions for oil and gas exploration development, particularly the Alaskan Arctic and U.S. off-shore regions, in the event there is another oil price shock. Such development can actually enhance efforts to save the local people and environments. On the demand side, a gasoline tax can induce more oil conservation. Plus, deregulation of city bus systems may give more ways to reduce oil use and still give commuters better ways to move around. Finally electric utility policy needs to impose a carbon emissions fee and use the revenue to continue with researching, developing and using nuclear power, particularly small modular reactors and thorium reactors. However, another innovation that can enhance utility effectiveness is giving managers of utilities stock option like bonuses for optimizing power customer prices and service.

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