Is the Department of Energy Worth the Money?

Jerry Taylor
Cato Institute

The U.S. Department of Energy (henceforth, the DOE) was founded in 1977 in response to public anger over soaring oil prices in the 1970s. The Department of Energy Organization Act – the legislation that established the department – listed five reasons for the establishment of the DOE:

- The United States faces an increasing shortage of nonrenewable energy resources;
- This energy shortage and our increasing dependence on foreign energy supplies present a serious threat to the national security of the United States and to the health, safety and welfare of its citizens.
- A strong national energy program is needed to meet the present and future energy needs of the Nation consistent with overall national economic, environmental and social goals.
- Responsibility for energy policy, regulation, and research, development and demonstration is fragmented in many departments and agencies and thus does not allow for the comprehensive, centralized focus necessary for effective coordination of energy supply and conservation programs; and
- Formulation and implementation of a national energy program require the integration of major Federal energy functions into a single department in the executive branch.

The first two rationales for the DOE define it's mission. The latter three simply serve to justify centralizing that mission within a single cabinet-level department.

In the course of answering the question, "Is the Department of Energy worth the Money?" I will concentrate on the two central missions of the DOE and ask three questions of each:

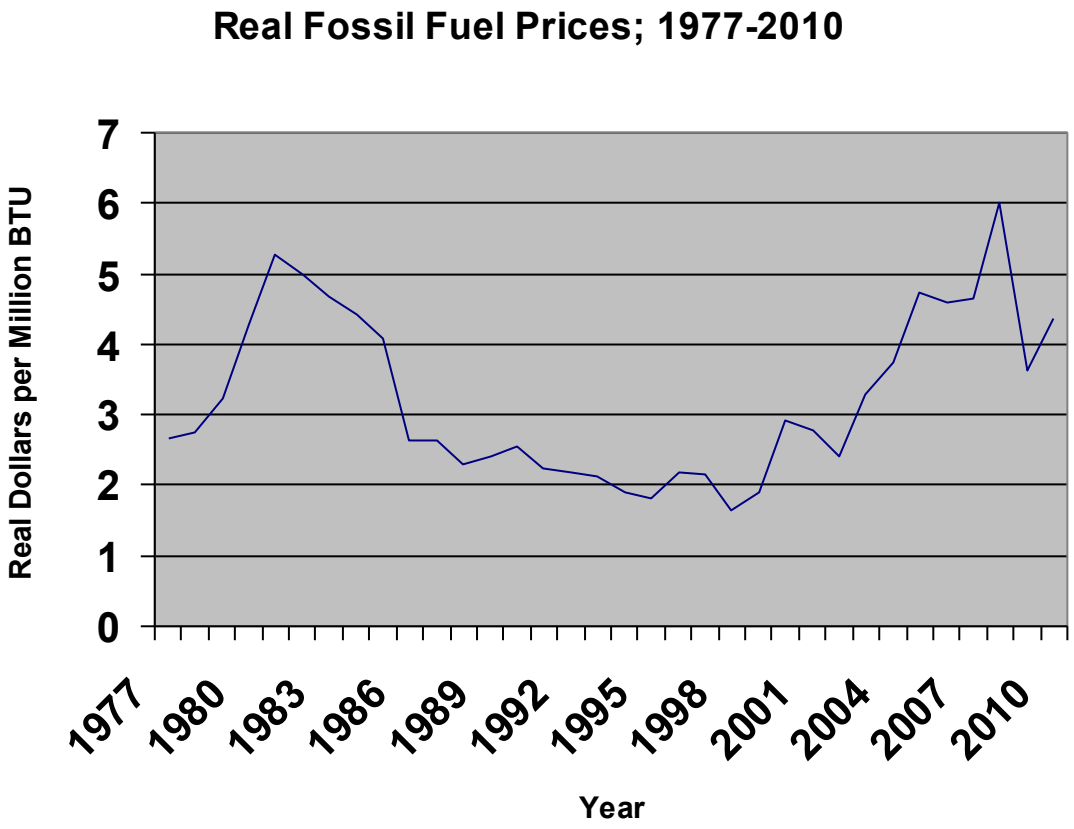
- Over the course of 34 years, has the DOE partially or fully succeeded in addressing the concerns that animated the creation of the department?
- Is the DOE or the programs it oversees the best means by which to address the concerns that were offered to justify the establishment of the department the best means to achieve the stated goals of the department under the Obama administration?
- Are the stated concerns or goals of the DOE worth worrying about?

My conclusion in the course of answering these questions will likely not surprise economists or well-informed observers of the DOE; the department is not worth the money being spent by taxpayers to fund its existence.

Increasing Shortages of Nonrenewable Energy

The best metric for scarcity is price. If prices are increasing for a good or a service, then that good or service is becoming relatively scarce over time (and visa versa).

The three most important sources of nonrenewable energy in 1977 (as well as now) are oil, coal, and natural gas. Table 1 reports the composite price per BTU for these those three energy sources from 1977 through 2010.[1]



It would appear that the DOE has failed to do much about "the increasing shortage of nonrenewable energy" since 1977. The price of fossil fuels is 64 percent greater today than when the department was established and the price booms and busts that we've subsequently experienced are the continuation of a pattern of booms and busts that have long characterized oil and gas markets.

[1] The composite price is derived by multiplying the price per BTU for oil, coal, and natural gas by the total BTU content of the production of each those fuels and dividing this accumulated value by the accumulated BTU content of those three energy sources. Source: U.S. Energy Information Administration Annual Energy Review 2010, Table 3.1 Fossil Fuel Production Prices, Selected Years, 1949-2010, p 69.

This should not surprise. The DOE can only address scarcity by increasing the supply or decreasing the demand for nonrenewable energy. The only means by which the DOE can enhance fossil fuel supply is to subsidize R&D associated with upstream production capacity.[2] Likewise, the only means by which the DOE can reduce fossil fuel demand is to subsidize R&D that might produce consumption efficiency, subsidize or mandate the efficient use of fossil fuels, or subsidize or mandate the use of renewable energy as a substitute for nonrenewable energy. While the DOE has overseen programs to do all of the above,[3] those programs have clearly failed to have much effect on the decried "increasing shortage" of nonrenewable energy sources.

While there are a number of conflicting academic studies and grey-literature reports regarding the effectiveness of the DOE's energy R&D programs, a few conclusions are clear. First, the large-scale demonstration projects and big-budget R&D programs overseen by the DOE have been miserable failures.[4] Second, the DOE R&D success stories marshaled by proponents of federally funded energy R&D are poorly documented anecdotes and, accordingly, of little use to policy analysts.[5] Third, there is no correlation between publicly funded energy R&D and improvements in energy efficiency or reductions in the carbon intensity of the energy sector.[6]

Nor have the energy efficiency standards promulgated by the DOE had much impact on energy consumption. As Table 2 illustrates, there is no obvious correlation between trends in the amount of energy necessary to produce a unit of GDP and energy efficiency mandates from the DOE.[7] On the contrary, improvements in energy efficiently appear to

---

[2] The federal government can also – and has – subsidized fossil fuel production, as well as the production of renewable energy sources. The DOE, however, has nothing to do with those subsidies in that they were promulgated directly by Congress through the tax code and are regulated by the IRS. The federal government can also increase the production of fossil fuels – along with renewable energy – on federal lands, but the regulation of energy production on federal lands is the responsibility of the U.S. Department of the Interior, not the DOE.

[3] Renewable energy production mandates in the electricity sector have been proposed in Congress but have yet to be enacted. The federal government, however, indirectly mandated the use of renewable energy when warranted by market conditions (as defined by the federal government) via the 1978 Public Utility Regulatory Policies Act (PURPA). For a brief discussion, see Severin Borenstein and James Bushnell, "Electricity Restructuring: Deregulation or Reregulation?" *Regulation* 23:2, Summer 2000, pp. 46-52. Renewable energy mandates in the transportation sector were established in the 2005 Energy Policy Act. The "Renewable Fuels Standard" in that Act requires U.S. refiners to consume a certain amount of ethanol each year (9 billion gallons, for instance, in 2008, rising to 36 billion gallons by 2022).

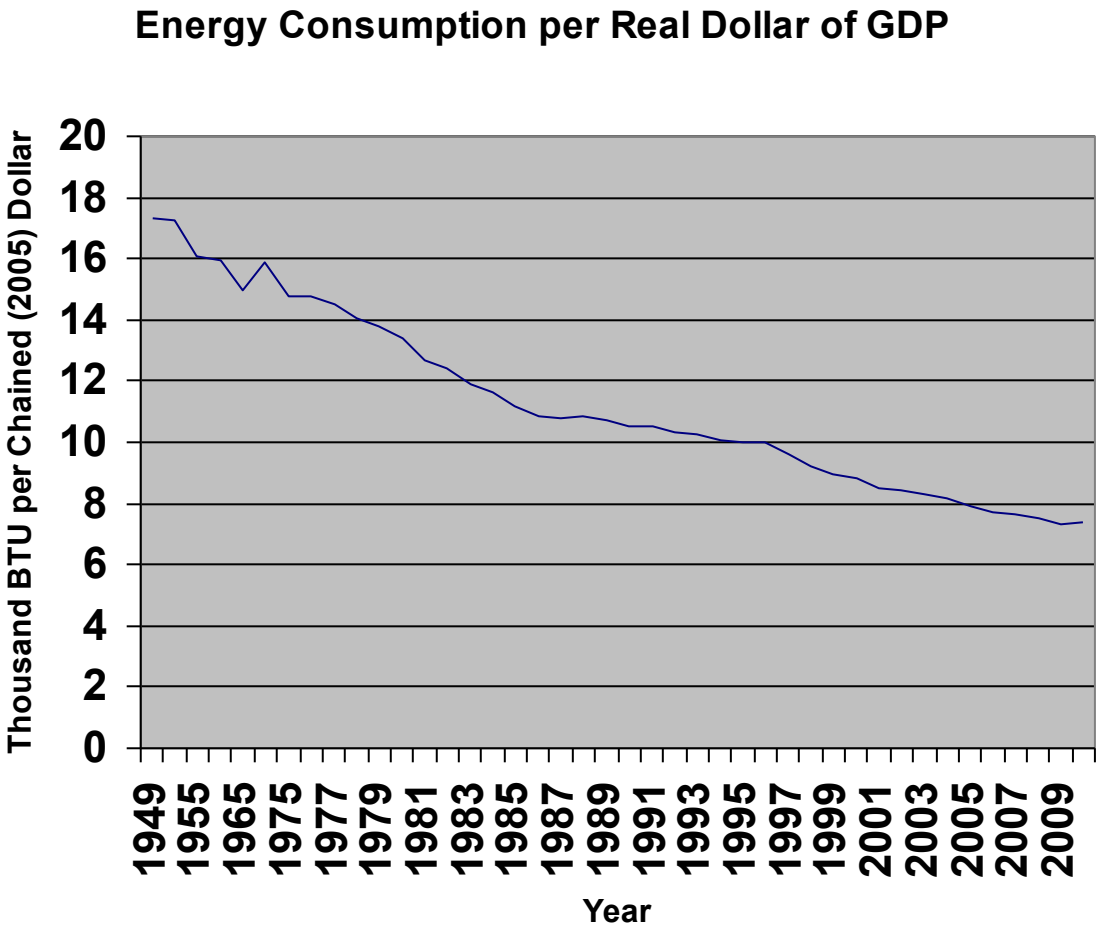
[4] An excellent summary of those large-budget energy R&D failures – which occurred for the most part during the early days of the DOE – can be found in Linda Cohen and Roger Noll, *The Technology Porkbarrel* (Brookings Institution, 1991). For a discussion of the shift in the DOE away from these sorts of projects, see J.J. Dooley, "U.S. Federal Investments in Energy R&D: 1961-2008," PNNL-17952, Pacific Northwest National Laboratory, 2008.

[5] U.S. General Accounting Office, "DOE's Success Stories Report," GAO/RCED-96-120R, April 15, 1996; http://archive.gao.gov/paprpdf1/156595.pdf. While the GAO report initially received harsh criticism from DOE supporters, a subsequent internal review by senior officials at the GAO concluded that the report's findings were sound; U.S. General Accounting Office, "Success Stories Response," GAO/RCED-96-3R, May 13, 1996; http://archive.gao.gov/paprpdf1/156793.pdf.

[6] A.D. Sagar and B. van der Zwaan. "Technological Innovation in the Energy Sector: R&D, Deployment, and Learning-By-Doing," *Energy Policy* 34, 2006, pp. 2601–8.

[7] U.S. Energy Information Administration Annual Energy Review 2010, Table 1.5 Energy Consumption, Expenditures, and Emissions Indicators Estimates, Selected Years, 1949-2010, p 13.

occur steadily regardless of changes in government policy or even, surprisingly, of market price signals. Nor is there empirical evidence to suggest that federal energy efficiency mandates for residential appliances has reduced energy consumption beyond what would otherwise have been the case.[8]



The lesson that many proponents of federal intervention in energy markets draw from these observations is that the DOE must spend more money on R&D, target the public R&D more intelligently, and promulgate even more demanding energy efficiency standards on a wider range of products.[9] But virtually every economist, if given a truth serum, would concede that the best way for the government to reduce shortages of nonrenewable energy resources – if it is to be given that charge – is to facilitate to the greatest extent possible the production of nonrenewable energy on public lands while simultaneously reducing demand for the same by imposing heavy taxes on the consumption of nonrenewable energy. More supply and less demand equals increased abundance and lower prices.

[8] Ronald Sutherland, "The High Cost of Federal Energy Efficiency Standards for Residential Appliances," Policy Analysis 504, Cato Institute, December 23, 2003.
[9] See, for instance, Sagar and van der Zwann regarding the case for more R&D in the face of existing failure.

Accomplishing this end through market-friendly interventions is more efficient than through targeted federal energy R&D and/or heavy-handed production or consumption mandates because it allows market actors the choice of how best to respond to scarcity. Market actors are generally better informed regarding how to best to do so given their particular circumstances than are governmental agents who make sweeping edicts for all parties in the economy. Moreover, market actors are influenced by price signals that, in turn, encourage efficient action. Governmental agents are less sensitive to those price signals and thus less likely to act efficiently.

Market failures in the private provision of energy R&D (which are thought to occur because producers of new energy technologies and innovations cannot completely capture the benefits associated with those breakthroughs, which in turn produces suboptimal expenditures on R&D) are best addressed – if they are significant enough to demand governmental attention – by making R&D expenditures generally more attractive to market actors, perhaps through a robust R&D tax credit. That's because the market failure at issue is not that market actors are less apt to pick "winners" than are better informed governmental bureaucrats.[10] Nor is it grounded in some story about how market actors have shorter time horizons than is optimal and that the time horizons demonstrated by governmental officials are closer to optimal.[11] It is instead grounded in the observation that market actors have insufficient incentives to invest optimally in R&D.

Government directed R&D, moreover, is of dubious value. There is strong evidence that publicly funded R&D crowds out private R&D, although to what extent is unclear.[12] Publicly funded R&D is also subject to politicized decision making regarding who and what gets funded.[13] Finally, there is also strong evidence to suggest that government

---

[10] The Solyndra episode is a good example of poor governmental investment practice, but it is unfortunately typical. For a parade of similar bracing examples of poor governmental investment practices in the technology sector, see Cohen and Noll, 1991. The best one can say is that forecasting our energy future and the project of "picking winners" are both dubious enterprises that neither private nor public actors are very good at doing. Vaclav Smil, *Energy at the Crossroad*s (MIT Press, 2005), particularly chapter 4 ("Against Forecasting").

[11] Market actors are more likely to exhibit long-term time horizons than are governmental actors because democratically elected governments – and the regulatory agencies established by them – have a tendency to reflect the interests of swing voters in swing voting districts. Accordingly, it's unreasonable to expect governments to be more interested in the well-being of future generations than swing voters in swing districts who have demonstrably short time horizons and political preferences. Politicians who cater to swing voters rarely have time horizons that span beyond the next election. Markets actors, on the other hand, are more frequently rewarded for longer time horizons because the market value of assets is determined by expectations about what others might pay for them in the future.

[12] For a literature review, see P.A. David, B.H. Hall, and A.A. Toole, "Is Public R&D a Complement or Substitute for Private R&D? A Review of the Econometric Evidence", *Research Policy* 29:4-5, 2000, pp. 479-529. For a particularly vigorous argument for the proposition that publicly-funded R&D crowds out privately-funded R&D, see Terrance Kealey, *Economic Laws of Scientific Research* (Macmillan, 1996).

[13] For a review of the arguments against government-directed scientific endeavor, see A.M. Squires, *The Tender Ship: Government Management of Technological Change* (Birkenhäuser, 1986), J.P. Martino, *Science Funding: Politics and Porkbarrel* (Transaction, 1992), A.M. Diamond, Jr., "The Economics of Science," *Knowledge and Policy* 9:2, 1996, pp. 6–49, Kealey 1996, D.S.Greenberg, *Science, Money, and Politics* (University of Chicago Press, 2001), and W.N. Butos and T.J. McQuade, "Government and Science: A Dangerous Liaison?" *Independent Review* 11:2, 2006, pp. 177-208.

R&D produces no net increase in innovation; it simply increases the salary of scientists and engineers and makes all R&D more expensive because the supply of those engaged in such research is relatively fixed in the short-to-mid-term.[14]

Regardless, there is no good reason to believe that the market needs any help responding to "an increasing shortage of nonrenewable resources." When shortages occur, prices go up, which, in turn, provides adequate incentives for consumers to reduce energy consumption, producers to supply more energy for the market, and researchers to investigate ways to deliver additional energy to consumers. The lust for profit ensures that consumers will respond efficiently to price signals.[15] Producers – if left alone by government – have strong incentives to smooth out production so that no sudden shortages will occur.[16] More abundant (i.e., less expensive) fuel sources will take market

[14] Alan Goolsbee, "Does Government R&D Policy Mainly Benefit Scientists and Engineers?" *American Economic Review* 88:2, 1998, pp. 298-302, Paul Romer, "Should the Government Subsidize Supply or Demand in the Market for Scientists and Engineers?" NBER Working Paper 7723, JEL O38, 2000, P.A. David and BH. Hall, "Heart of Darkness, Public-Private Interactions inside the R&D Black Box," Research Policy 29:9, 2000, pp. 1165-1183, and V. Grossmann, "How to Promote R&D-based Growth? Public Education Expenditure on Scientists and Engineers versus R&D Subsidies," *Journal of Macroeconomics* 29, December 2007, 891-911. For a counter-argument, V. Reinthaler and G. Wolff, "The Effectiveness of Subsidies Revisited: Accounting for Wage and Employment Effects in Business R&D," Working Paper, 2005, University of Bonn.

[15] Empirical investigations find that consumers do indeed respond efficiently to energy price signals. See Molly Espy, "Do Consumers Value Fuel Economy?" *Regulation* 28:4, Winter 2005-2006, pp. 8-10, 2005, Sutherland 2003, Kevin Hassett and Gilbert Metcalf, "Energy Conservation Investment: Do Consumers Discount the Future Correctly?" *Energy Policy*, 21:6, 1993, pp. 710-716, Gilbert Metcalf and Donald Rosenthal, "The 'New' View of Investment Decisions and Public policy Analysis: An Application of Green Lights and Cold Refrigerators" *Journal of Policy Analysis and Management* 14:4, 1995, pp. 517-531, Gilbert Metcalf, "Economics and Rational Conservation Policy," *Energy Policy* 22, 1994, pp. 819-825, Avinash Dixit and Robert Pindyck, *Investment under Uncertainty* (Princeton University Press, 1994), Albert Nichols, "How Well Do Market Failures Support the Need for Demand Side Management?" National Economic Research Associates, 1992, pp. 22-25. 1992, and Ruth Johnson and David Kaserman, "Housing Market Capitalization of Energy-Saving Durable Good Investments," *Economic Inquiry* 21, 1983, pp. 374-386. The premier example of gross corporate inefficiency marshaled by critics of efficient market response to price signals is the reluctance of businesses to install high efficiency lighting ballasts. Although proponents argue that returns from such investments ranged from 37-199 percent, closer analysis finds that the returns are wildly exaggerated and that businesses are acting efficiently by largely ignoring this technology. Paul Ballonoff, "On the Failure of Market Failure," *Regulation* 22:2, 1999, pp. 17-19. Many studies have been published that estimate how much energy might be saved from the full adoption of cost-effective energy efficient technology that is commercially available at any given time, suggesting that businesses are suboptimally investing in energy efficiency. The only careful test of this proposition that I am aware of, however, was performed by the Denmark Institute for Local Government, which had calculated that corporate energy efficiency could be improved by 42 percent if only businesses would fully employ the profitable efficiency technologies available to them. After several years of extensive, on-site analysis, the institute concluded that only a 3.1 percent gain in energy efficiency could be realized through profitable energy efficiency investments – a figure so small that "the cost of finding electricity conservation projects is higher than the savings due to the realized investment." The authors concluded that although "the background is experience from Danish industry; we judge the results as general for most industry." Mikael Togeby and Anders Larsen, "The Potential for Electricity Conservation in Industry: From Theory to Practice," in *Into the 21st Century: Harmonizing Energy Policy, Environment, and Sustainable Economic Growth*, International Association for Energy Economics, 1995, pp. 48-55.

[16] This observation is grounded in the famous "Hotelling Principle," which is orthodoxy within resource economics. For a brief overview, see Richard Gordon, "The Case against Government Intervention in Energy Markets," Policy Analysis 628, Cato Institute, December 1, 2008, pp. 13-15.

share from more scarce (i.e., more expensive) fuel sources without need of any governmentally-directed transition. There is simply no market failure in this arena that might suggest a role for government.[17]

Of course, one might well argue that the concern over the alleged "increasing shortage of nonrenewable energy sources" was a chimera when first forwarded as a rationale for the DOE in 1977 and is similarly unwarranted today. Although fossil fuel prices have increased since 1977 (as illustrated in Table 1) , it is unclear whether there is a long term trend suggesting increased scarcity.

First, let's consider the big threat; oil scarcity. Econometrician James Hamilton examined quarterly oil price data from the first quarter of 1970 through the first quarter of 2008 and found that:

- Although prices increased by 172% (logarithmically) over the sample period (an average of 1.12% per quarter), Hamilton could not reject the null hypothesis that there was no trend in the data;
- The data is most consistent with the observation that oil prices move akin to "a random walk without drift"; and
- The best predictor of future oil prices is the present oil price.[18]

Natural gas was once thought to be increasingly scarce, but the advent of hydraulic fracking has radically reduced gas prices and altered expectations about future supply. Natural gas futures markets – one of the better predictors of future price (and thus, scarcity) trends – point towards stable supply and commodity price forecasters expect gas to increase only modestly in price through 2021.[19] Those same forecasts project that coal prices will decrease somewhat through 2021 and oil prices to remain, on average, where they are today.[20] Although it's certainly true that forecasters have lousy track records when it comes to predictions such as these, they at least illustrate the fact that there is very good reason to be skeptical of the proposition that energy scarcity is something worth having the government worry about.

Dependence on Foreign Energy

From 1977 to 2010, the gap between total annual U.S. imports and export of crude oil increased by more than 933 million barrels (nearly 39 percent).[21] Here too, the DOE has failed to effectively address the concerns that were marshaled to justify the creation of the department.

One might argue that the market share for imported energy would be even greater were it not the DOE, but that's difficult to believe. The primary energy import of

[17] Gordon, 2008.
[18] James Hamilton, "Understanding Crude Oil Prices," Energy Policy and Economics 023, University of California Energy Institute, June 2008.
[19] *Energy & Metals Consensus Forecasts*, Consensus Economics, London, July 2011, p. 5.
[20] Ibid.
[21] U.S. Department of Energy, *Strategic Plan*, DOE/CF-0067, May 2011, p. 9.

consequence is crude oil; America imports only a very small percentage of the natural gas or coal that it consumes.[22] Crude oil is imported because it is cheaper at the margin that producing oil from domestic deposits. The DOE has done nothing to reduce the cost of domestic oil production [23]

The most efficient means of reducing the market share of foreign oil in the United States is the straight-forward imposition of a tax on imported crude oil.[24] This does not required the existence of the DOE; it only requires the IRS.

It's worth noting in passing, however, that the goal of reducing dependence on foreign energy is in direct opposition to the goal of alleviating the alleged shortage of nonrenewable energy. Reducing energy imports via government policy will invariably make energy more scarce – and hence, more expensive – because energy is imported only when it is cheaper than equivalent forms of energy from domestic suppliers.

Although policy analysts have long been concerned about reliance on foreign energy, "energy independence" or moves to increase the market share for domestic energy suppliers will do nothing to improve "national security and the health, safety, and welfare" of American citizens.[25] This is a policy concern that is at best unwarranted; at worse, counterproductive.

Many believe that reliance on foreign oil requires consumers to militarily defend friendly exporting states and to ensure the safety of oil supply facilities and shipping lanes. Those marching under banners declaring "No Blood for Oil" seem to believe that's the case, as do most mainstream foreign policy analysts.[26]

Simple economics suggests otherwise. Oil producers will provide for their own security needs as long as the cost of doing so results in greater profits than equivalent investments could yield. Because Middle-Eastern governments typically have little of value to trade except oil, they must secure and sell oil to remain viable.[27] Given that their economies are so heavily dependent upon oil revenues, Middle-Eastern governments

---

[22] The United States has a surplus in coal and only imports 11 percent of its natural gas. See Energy Information Administration, "Country Analysis Brief" at http://www.eia.gov/countries/country-data-cfm?fips=US accessed November 10, 2011.

[23] The DOE's defenders sometimes argue that oil imports would be even larger were we to abandon the mandates and subsidies for energy efficiency and renewable energy. As noted earlier, this is no correlation between subsidies for energy efficiency and gains in economy-wide energy efficiency. Also as noted earlier, the production subsidies for renewable energy were established and are administered by non-DOE actors.

[24] Some economists have proposed oil import quota auctions as an equally efficient means of reducing reliance on foreign oil, but Gordon 2008 (p. 11) convincingly argues that there are practical problems that render quotas or optimal tariffs impractical.

[25] Many economists that specialize in oil economics doubt that there are significant national security externalities associated with gasoline consumption. See Douglas Bohi and Michael Toman, *The Economics of Energy Security* (Norwell, MA: Kluwer Academic Publishers, 1996) and Gordon, 2008.

[26] See, for instance, Steven Mufson, "A Crude Case for War?" *Washington Post*, March 16, 2008, p. B1, and Andrew Bacevich, "The Real World War IV," *Wilson Quarterly* 29:1, Winter 2005.

[27] Oil revenues, for instance, are approximately half of Iranian government revenues and 80-90 percent of Saudi government revenues. See Energy Information Administration, "Country Analysis Briefs," available at http://www.eia.gov/countries/ accessed November 10, 2011.

have even *more* incentive than do consuming states to worry about the security of oil production facilities, ports, and shipping lanes.[28]

In short, whatever security our presence provides (and many analysts think that our presence actually *reduces* security[29]) could be provided by incumbent producers were the United States to withdraw. The fact that the Saudi Arabia and Kuwait paid for 55 percent of the cost of Operation Desert Storm suggests that keeping the Straits of Hormuz free of trouble is certainly within their means.[30]

The same argument applies to al Qaeda threats to oil production facilities. Producer states have such strong incentives to protect their oil infrastructure that additional Western assistance to do the same is probably unnecessary. While terrorists do indeed plot to disrupt oil production in Saudi Arabia and elsewhere, there is no evidence to suggest that producer-state security investments are insufficient for the job.[31]

The U.S. "oil mission" is thus best thought of as a taxpayer-financed gift to oil regimes and, perhaps, the Israeli government that has little, if any, effect on the security of oil production facilities. One may support or oppose such a gift, but our military expenditures in the Middle East are not necessary to remedy a market failure.

Many foreign policy analysts likewise think that U.S. oil imports are dependent upon friendly relationships with oil producing states.[32] The fear is that unfriendly regimes might not sell us oil – a fear that explains why former Federal Reserve Chairman Alan Greenspan supported the two Gulf Wars against Iraq.[33] Maintaining good relations with oil producers, however, is said to interfere with other foreign policy objectives – such as the defense of Israel and the pursuit of Islamic terrorists – and increases anti-American

[28] J. Robinson West, "Saudi Arabia, Iraq, and the Gulf," in *Energy Security*, Jan Kalicki and David Goldwyn, eds. (Washington: Woodrow Wilson Center Press, 2005), pp. 197-218.
[29] Robert Jervis, "Why the Bush Doctrine Cannot Be Sustained," *Political Science Quarterly* 120: 3 (Fall 2005), pp. 351-377
[30] Saudi Arabia and Kuwait paid approximately $33 billion (55 percent) toward the total cost of Desert Storm and Desert Shield, which was $60 billion. The U.S. share was only $6 billion (10 percent). Defense Department press release 125-M, May 5, 1992. It's also worth emphasizing that the military risk of a closure of the Strait of Hormuz to oil shipping is greatly exaggerated. Eugene Gholz and the LBJ School Hormuz Working Group, "Threats to Oil Flows through the Strait of Hormuz," Robert S. Strauss Center on International Security and Law, University of Texas at Austin, December 2009.
[31] The Saudi government is responsible for the security of intrastate pipelines, oil processing facilities, and shipping terminals. Despite the potential vulnerability of their oil production and export network, repeated and determined terrorist attacks against the same have had no consequential impact to-date.
[32] For the long and desultory history of this belief, which has guided foreign policy in both Republican and Democratic administrations without exception since 1970, see M.A Adelman, *Genie Out of the Bottle: World Oil Since 1970* (MIT Press, 1995). To cite just one of many striking examples, the Bush administration in 1990 sought "a rapprochement" with Persian Gulf countries, particularly Saudi Arabia and Iraq, which the administration believed "will be crucial to the USA's economic viability in the 1990s." Adelman 1995, p. 291.
[33] Bob Woodward, "Greenspan: Ouster Of Hussein Crucial For Oil Security," *Washington Post*, September 17, 2007, p. A3.

sentiment in producer states with unpopular regimes.[34] And of course, it could lead to war.[35]

The problem with this argument, however, is that its fundamental premise is incorrect. Friendly relations with producer states neither enhance access to imported oil nor lower its price.

Selective embargoes by producer nations on some consuming nations are unenforceable unless (i) all other nations on Earth refuse to ship oil to the embargoed state, or (ii) a naval blockade were to prevent oil shipments into the ports of the embargoed state. That's because, once oil leaves the territory of a producer, market agents dictate where the oil goes, not agents of the producer, and anyone willing to pay the prevailing world crude oil price can have all he wants.[36]

The 1973 Arab oil embargo is a perfect case in point. U.S. crude oil imports actually increased from 1.7 million barrels per day (mbd) in 1971 to 2.2 mbd in 1972, 3.2 mbd in 1973, and 3.5 mbd in 1974.[37] Instead of buying from Arab members of OPEC, the United States bought from non-Arab oil producers. The customers that were displaced by the United States bought from Arab members of OPEC. Beyond the modest increase in transportation costs that followed from this game of musical chairs, the embargo had no impact on the United States.[38]

In short, it does not matter to consumers to whom the oil is initially sold. All that matters to consumers is how much oil is produced for world markets.

Do oil producing nations allow their feelings towards oil consuming nations to affect their production decisions? Historically, the answer has been "no." The record strongly indicates that oil producing states, regardless of their feelings toward the industrialized West, are rational economic actors.[39] After a detailed survey of the world oil market since the rise of OPEC, oil economist M.A. Adelman concluded, "[w]e look in vain for an example of a government that deliberately avoids a higher income. The self-serving declaration of an interested party is not evidence."[40] Prof. Philip Auerswald of George Mason University agrees, stating "For the past quarter century, the oil output decisions of

---

[34] See, for instance, Michael Scheuer, *Imperial Hubris: Why the West is Losing the War on Terror* (Potomac Books: 2007) and *Marching Toward Hell: America and Islam After Iraq* (Free Press: 2008).
[35] Ibid.
[36] This is such an obvious point that energy economists rarely bother to explore the issue in detail. To understand how the world crude oil market works is to understand that embargoes are unenforceable. See Philip Verleger, *Adjusting to Volatile Energy Prices* (Washington: Institute for International Economics, 1993) and Adelman, 1995.
[37] Energy Information Administration*, Annual Energy Review 2004*, Table 5.3.
[38] For an overview of the impact of the embargo on the United States, see Edward Fried, "Oil Security: An Economic Phenomenon," in *Oil and America's Security,* ed. Edward Fried and Nanette Blandin (Brookings Institution, 1988), pp. 56–59, Francisco Parra, *Oil Politics: A Modern History of Petroleum* (I. B. Tauris, 2004), pp. 184–85, and Adelman 1995, pp. 112-113.
[39] James Smith, "Market or Mayhem?" *Journal of Economic Perspectives* 23:3, Summer 2009, pp. 145-164.
[40] Adelman 1995, p. 31. Former OPEC Secretary-General Francisco Parra makes the same point. Parra, 2004.

Islamic Iran have been no more menacing or unpredictable than Canada's or Norway's."[41]

What if a radical new actor were to emerge on the global stage? For example, if the House of Saud were to fall and the new government consisted of Islamic extremists friendly to Osama bin Laden, the new regime might reduce production and increase prices.[42] But that scenario is by no means certain given that Iran – despite all its anti-western rhetoric – has not reduced oil output out of hostility towards the West.[43]

Regardless, the departure of Saudi Arabia from world crude oil market would probably have about the same effect on domestic oil prices as the departure of Iran from world crude oil markets in 1978. The Iranian revolution reduced oil production by 8.9 percent, whereas Saudi Arabia accounts for about 13 percent of global oil production today.[44] Oil prices increased dramatically after the 1978 revolution, but those higher prices set in motion market supply and demand responses that undermined the supply reduction and collapsed world prices eight years later.[45] The short term macroeconomic impacts of such a supply disruption would actually be less today than they were then given the absence of price controls on the U.S. economy and our reduced reliance on oil as an input for each unit of GDP.[46]

So while it is possible that a radical oil-producing regime might play a game of chicken with consuming countries, producing countries are very dependent on oil revenue and have fewer degrees of freedom to maneuver than consuming countries.[47] Catastrophic supply disruptions would harm producers more than consumers, which is

---

[41] Philip Auerswald, "The Irrelevance of the Middle East," *The American Interest*, May/June 2007, p. 22.
[42] Bin Laden has said on many occasions that he thinks the Saudi monarchy keeps oil prices below true market value in order to maintain friendly relations with the West.
[43] While it is true that oil production in Iran was about twice as high under the Shah than it has been under the Islamic Republic, almost all analysts agree that this reflects the damage down to the oil infrastructure during the 1980-88 war with Iraq, the "brain drain" that has occurred in response to the revolution, and poor state management of Iranian oil assets – not the intentional result of state policy.
[44] Data on Iranian production in 1978 and Saudi production in 2006 from the Energy Information Administration; http://tonto.eia.doe.gov/merquery/mer_data.asp?table=T11.01a and http://tonto.eia.doe.gov/merquery/mer_data.asp?table=T11.01b.
[45] Adelman, 1995, pp. 187-242.
[46] In 1978 the U.S. used 12,322 BTUs per (2010) dollar of GDP but only 6,642 BTUs per (2010) dollar of GDP in 2010, a reduction of 46 percent. And the BTUs used in 2010 came less from petroleum than in 1978 (47.5 percent of 1978 energy consumption was petroleum versus only 36.7 percent in 2010). Energy Information Administration, *Annual Energy Review 2010* Tables 1.3 and 1.5 pp. 9 and 13. For discussions of the macroeconomic effect of oil price increases, see Lutz Kilian, "Not All Oil Price Shocks Are Alike: Disentangling Demand and Supply Shocks in the Crude Oil Market," *American Economic Review* 99:3, pp. 1053-1069, June 2009. Also see Rajeev Dhawan and Karsten Jeske, "How Resilient Is the Modern Economy to Energy Price Shocks?" *Economic Review*, Federal Reserve Bank of Atlanta 91:3, Third Quarter, 2006, pp. 21-32, David Walton, "Has Oil Lost the Capacity to Shock?," *Bank of England Quarterly Bulletin* 46:1, Spring 2006, pp. 105-114, available at http://www.bankofengland.co.uk/publications/quarterlybulletin/qb060109.pdf, and Eric Fisher and Kathryn Marshall, "The Anatomy of an Oil Price Shock," Economic Commentary, Federal Reserve Bank of Cleveland, November 2006.
[47] For an excellent discussion of why a purposeful oil production cutback would dangerously imperil the regime in question, see Bruce Bueno de Mesquita and Alastair Smith, *The Dictator's Handbook: Why Bad Behavior is Almost Always Good Politics* (New York: Public Affairs, 2011).

why they are extremely unlikely. The best insurance against such a low-probability event is to maintain a relatively free economy where wages and prices are left unregulated by government. That would do more to protect the West against an extreme production disruption than anything else in government's policy arsenal.

Does Western reliance on oil put money in the pocket of Islamic terrorists? To some degree, yes. Does that harm western security? Probably not – at least, probably not very much.

It's worth noting at the outset that only 6 percent of the oil in the world market is produced by nation-states on the Department of State's list of state sponsors of terrorism.[48] Hence, the vast majority of the dollars we spend on gasoline do not end up on this purported economic conveyer belt to terrorist bank accounts.

Regardless, terrorism is a relatively low-cost endeavor and oil revenues are unnecessary for terrorist activity. The fact that a few hundred thousand dollars paid for the 9/11 attacks suggests that the limiting factor for terrorism is expertise and manpower, not money.

That observation is strengthened by the fact that there is no correlation between oil profits and Islamic terrorism. Several years ago, My colleague Peter Van Doren and I estimated two regressions using annual data from 1983 to 2005: the first between fatalities resulting from Islamic terrorist attacks and Saudi oil prices and the second between the number of Islamic terrorist incidents and Saudi oil prices. In neither regression was the estimated coefficient on oil prices at all close to being significantly different from zero.[49]

Consider: Inflation-adjusted oil prices and profits during the 1990s were low.[50] But the 1990s also witnessed the worldwide spread of Wahabbi fundamentalism, the build-up of Hezbollah, and the coming of age of al Qaeda. Note too that al Qaeda terrorists in the 1990s relied upon help from state sponsors such as Sudan and Afghanistan – nations that aren't exactly known for their oil wealth or robust economies.

---

[48] Calculation based on figures from CIA World Fact Book "Country Comparison Guides" available at https://www.cia.gov/library/publications/the-world-factbook/rankorder/2173rank.html#, accessed November 10, 2011. Information on state sponsors of terrorism from Department of State, "State Sponsors of Terrorism" available at http://www.state.gov/s/ct/c14151.htm, accessed November 10, 2011.

[49] Data on international Islamic terrorism incidents and fatalities were taken from the MIPT Terrorism Knowledge Base, an interactive website maintained by the Memorial Institute for the Prevention of Terrorism; http://www.tkb.org/. Data on that website comes from the RAND Terrorism Chronology and RAND-MIPT Terrorism Incident databases; the Terrorism Indictment database; and DFI International's research on terrorist organizations. Nominal Saudi oil prices were obtained from Energy Information Administration, *Annual Energy Review 2005* p. 169 Table 5.19 "Landed Costs of Crude Imports From Selected Countries" and deflated with the GDP deflator. Unit root tests suggested that fatalities and Saudi oil prices had unit roots but terrorist incidents did not, so the former were first differenced before the regressions. Even after first differencing, auto correlation existed so autoregressive terms were added to each regression, which further weakened the insignificant relationships.

[50] OPEC oil price data available at the interactive online "Petroleum Navigator" dataset maintained by the U.S. Energy Information Administration; http://tonto.eia.doe.gov/dnav/pet/hist/wtotopecw.htm.

Producer states do use oil revenues to fund ideological extremism, and Saudi financing of *madrassas* and Iranian financing of Hezbollah are good examples. But given the importance of those undertakings to the Saudi and Iranian governments, it's unlikely that they would cease and desist simply because profits were down. They certainly weren't deterred by meager oil profits in the 1990s.[51]

A related concern is that padding the coffers of oil-rich regimes empowers "bad actors" on the world stage. Even if those profits do not find their way to international terrorists, they serve to prop up many regimes we find distasteful. Oil producers in the Second and Third worlds often use their robust flow of petrodollars to squelch human rights at home and to menace neighbors abroad.[52] Many foreign policy elites argue that oil consumption thus harms national security by strengthening these bad international actors.[53]

It is unclear to what extent oil profits are associated with human rights abuses or militaristic activity. There are plenty examples, after all, of relatively long-lived regimes with terrible human rights records – such as North Korea – with no oil revenues to speak of, and this is the case even within the same socio-economic regions. Denuding Iran of oil revenues might produce a government that looks a lot like Syria; denuding Venezuela of oil revenues might produce a government that looks a lot like Cuba; and denuding Russia of oil revenues might produce a government that looks a lot like Russia used to be. After all, all of these "bad-acting" petro-states yielded unsavory regimes even when oil revenues were a small fraction of what they are today.

The claim that oil revenues increase the threat those regimes pose to their neighbors seems reasonable enough, but here again, it is unclear to what extent this is true. Pakistan is a relatively poor country with no oil revenues to speak of, but it has still managed to build a nuclear arsenal and is constantly on the precipice of war with India. Impoverished, oil-poor Egypt and Syria have at various times been the most aggressive anti-Israeli states in the Middle East. Russia launched its war with Chechnya before oil revenues engorged its Treasury.

While I have no doubt that – all other things being a equal – a rich bad actor is more dangerous than a poor bad actor, the marginal impact that oil revenues have on "bad acting" might well be rather small. The fact that unsavory petro-states have been fully

---

[51] Although little is known about funding trends associated with Iranian support for Hezbollah, the Iranian government probably spends no more than $25-50 million on Hezbollah a year. Anthony Cordesman, "Iran's Support for Hezbolla in Lebanon," Center for Strategic and International Studies, July 15, 2006, p. 3. Even less is known about Saudi contributions to Islamic extremism. See Alfred Prados and Christopher Blanchard, "Saudi Arabia: Terrorist Financing Issues," RL32499, CRS Report for Congress, Congressional Research Service, Updated December 8, 2004.

[52] For a brief review of the academic literature on this subject, which is somewhat mixed, see Paul Stevens, "Resource Impact: Curse or Blessing? A Literature Survey," *The Journal of Energy Literature* 9:1, June, 2003, pp. 22-24.

[53] Representative arguments include Richard Lugar and R. James Woolsey, "The New Petroleum," *Foreign Affairs*, January/February 1999, pp. , as well as any of a number of columns written on this topic by Thomas Friedman for the *New York Times*. Those arguments are embraced by most foreign policy elites, as evidenced by *National Security Consequences of U.S. Oil Dependency*, Task Force Report 58, Council on Foreign Relations (Council on Foreign Relations Press: October 2006),

capable of holding on to power, oppressing their people, and menacing their neighbors during a decade associated with the lowest inflation-adjusted oil prices in history (the 1990s) suggests that nothing short of rendering oil nearly valueless will have any real effect on regime behavior.

For the sake of argument, however, let's assume that there is some incremental benefit associated with reducing oil revenues to bad-acting oil producers. Unfortunately, we have only very blunt and imperfect instruments at hand to achieve that end. Policies that might reduce oil consumption would reduce oil demand – and thus, reduce revenues – for *all* oil producers, whether they are bad actors or not. Producers in the North Sea, Canada, Mexico, and the United States (which collectively supplied 20.07 million barrels of oil per day in 2010, or 23.1 percent of the world's crude oil needs that year) would be harmed just as producers in Venezuela, Iran, Russia, and Libya (which collectively supplied 18.54 million barrels per day in 2010).[54]

Given there was plenty of "bad acting" in 1998 when we saw the lowest real oil prices in world history, it's unlikely that even the most ambitious set of policies to reduce oil consumption would have much effect on bad acting. Accordingly, I doubt that the foreign policy benefits that might accrue from anti-oil policies would outweigh the very real costs that such policies would impose on both consumers and innocent producers. There are better remedies available to curtail bad behavior abroad.

Conclusion

The DOE as it is presently constituted serves no good public purpose and has no prospect of ever serving any good public purpose. It has demonstrably failed to achieve its objectives over the course of 34 years. There are far better means of achieving its public policy objectives and none of those "better means" require a cabinet level energy department. Even so, its goals are unworthy of public concern.

[54] Energy Information Administration, International Energy Statistics, http://www.eia.gov/cfapps/ipdbproject/IEDindex3.cfm?tid=5&aid=1 accessed November 10, 2011.