

The Political Logic of Failed Energy Programs

Peter Z. Grossman
Butler University
Indianapolis, IN

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Email: pgrossma@butler.edu

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1. Introduction

Since the first “energy crisis” of 1973, the US government has enacted numerous energy programs, costing billions of dollars. These programs have run the gamut from studies to grandiose plans to completely remake energy markets by commercializing alternatives to major conventional energy resources, notably oil and gas, or the technologies that use those resources mainly automobiles and power plants. Among the more dramatic efforts, Congress has authorized: \$88 billion (over \$200 billion 2008 dollars) to replace a large portion of conventional oil and gas with coal derived synfuels; \$20 billion (\$65 billion 2008) to replace most conventional electric generation with nuclear fusion generators; \$1.5 billion (about \$3.5 billion) to create and market an 80-mpg family-sized sedan; and most recently, a still to be determined amount to replace 36 billion gallons of transportation fuel (about 20%) with ethanol; it will cost at least \$18 billion per year (Grossman 2009).

All of these alternative energy programs have had common features: besides large budgets, they have all been programmatic, with specific timetables and benchmarks of success. They have also all (with the exception of ethanol which is only in its initial stages) failed. Benchmarks have not been met and the programs have been cancelled.

Yet, strikingly, failure has not deterred new programs. The 80-mpg “supercar” program followed the demise of both the synfuels and fusion programs. The grand ethanol project followed within a few years of the cancellation of the supercar. Moreover, politicians from both major parties have proposed new ventures. President Barack Obama has suggested that he will spend \$150 billion to commercialize various alternative energy technologies, and he pledged in his campaign to expand greatly the ethanol program despite the fact that its current goals do not seem feasible.

This paper considers the following question: why do legislators (as well as presidents), propose and pass large, expensive alternative energy programs that have virtually no chance of succeeding? My conclusion is that legislators are in fact acting rationally and indeed choose to vote for such legislation as the only way to satisfy their general constituency. Any other choice a legislator made would make him worse off—even if an alternative had a greater chance of enhancing social welfare.

Of course, there is a vast literature on legislator behavior much of it from a rational choice perspective (Buchanan & Tullock; Kau & Rubin; Peltzman; Weingast, Schepsle & Johnsen; Weingast; Noll & Fiorina, Denzau & Munger, etc.). A central question in many of these studies is on how rationally self-interested legislators adopt voting behavior to maximize their own utility—utility in the form of sufficient constituent approval for winning elections. What is the role, for example, of ideology?¹ How much is concerned with making campaign contributors better off? How important are the demands of organized interests in determining voting behavior? How much do lobbyists compete and how does this competition affect votes? How much do general constituent interests of unorganized groups affect

¹ Mitchell (1979) for example attributes ideology for most of the voting on 1970s energy policy.

legislator behavior? It is typically, and not unrealistically, assumed that legislators are most concerned with programs that directly benefit their districts, employing such strategies as vote trading and logrolling in order to get constituency benefits (Kau & Rubin).

No doubt such direct constituent interests play a role in votes on energy legislation as well as any other. This might account for the enormously bloated size of energy bills. The 2005 energy bill, for example, ran over 1700 pages (although there was no great alternative energy development program in that bill). The 2007 bill, which contained the ethanol project, but was also in part an amendment to the 2005 bill, nonetheless had hundreds of separate provisions.

Yet as important as the direct benefits may be, the fact remains that bills authorizing synfuels, fusion, and even ethanol promised these centerpiece technological programs general funding at levels far in excess of the rest of the provisions combined. Moreover, while some constituencies have stood to benefit from these striking schemes they are typically few.² But in each of these cases, authorizing votes have been overwhelming, far greater in numbers than can be easily explained by direct constituent benefits alone. Indeed, these benefits have been perceived as sufficiently weak that programs such as synfuels have been easy to reverse as conditions changed (Cohen & Noll).

I will argue that that the votes for major alternative energy development programs stem not from an expectation that either organized or unorganized constituent interests will be benefitted directly. Rather these programs and the overwhelming

² For example, with synfuels coal interests were staunch supporters. Ethanol perhaps has the largest constituency in that it benefits farm states.

votes to enact them, emerge from the fact that energy policy presents a conundrum, where effective policy choices would be unpopular and doing nothing would also lack general voter support. Thus, the only politically viable choice is to pick something that in theory resolves the conundrum, even if in reality it has little chance of producing positive net social (or local) benefits. However, given the nature of programmatic technology policies, a determination of the final outcome is far enough in the future that money spent today will further a political goal (winning the next election) while the ultimate cost and benefits can be ignored. Effectively any cost at the end of the program can be valued at zero by an individual legislator.

The paper is organized as follows: In the next section, I sketch out the conundrum of energy policy. In section three, I look at the possible legislative responses to this conundrum using a utility maximization model. An important assumption in this model is bounded rationality. Thus voters cannot estimate the likelihood of success of energy projects. It is argued that a simple slogan leads to gross and persistent overestimates of the prospects.

2. The energy policy conundrum

Energy policy has been a constantly recurring theme in public debate for the past 35 years. Proposals have been featured in two dozen state-of-the-union addresses in that time. And literally dozens of bills have been debated, and many have been passed, by Congress (as well as in state legislatures). Between 1980 and 2000 approximately \$13 billion had been spent on all energy research and development programs, almost all of it on major efforts at commercialization of alternative energy technologies (cite).

Many bills have provided some funding only for research of alternative energy technologies, but the demand for significant development of alternatives has coincided with energy supply disruptions and/or rising energy prices. The synfuels development program was first proposed by the Ford Administration in response to the first energy crisis (Grossman 2009). It was defeated in Congress, however, by a single vote after oil prices fell and supplies were no longer affected by the Arab embargo.

A few years later, however, after the second energy crisis of the late 1970s that saw the price of oil spike at \$37 per gallon, the effort for synfuels was renewed. The bill authorizing \$88 billion for synthetic fuel development and commercialization passed in September 1980 by a vote in the House of Representatives by almost four to one. The legislation directed that by 1987 there would be production of 500,000 barrels of synthetic oil (or natural gas equivalent) per day from coal; this amount was supposed to rise to 2 million barrels by 1992.

A month later, Congress passed by an even larger margin a \$20 billion effort to create a commercial prototype of a nuclear fusion reactor. This project called for a commercial prototype to be built by 2001. Fusion energy, potentially a superabundant resource, was expected to replace virtually all fossil fueled electric generating plants and would have produced electricity without pollution or major problems with nuclear waste. The leading proponent of fusion in the House called the legislation “[T]he most important energy bill ever passed by this or any other country” (Grossman 2009).

Rising prices of oil during the first Gulf War spurred President Clinton and Congress in 1993 to authorize the Partnership for a New Generation of Vehicles (PNGV), which was intended to create a commercially viable prototype of an 80-miles-per-gallon (mpg) “supercar” by 2003. Similarly, the 2007 ethanol mandate—36 billion gallons per year or about 20 percent of all transportation fuels by 2022—was sparked by rising gasoline prices that eventually peaked in the summer of 2008 at over \$4 per gallon. By that time, oil had reached an all time high (even adjusted for inflation) of \$147 per barrel. The 2007 ethanol bill passed the Senate by a vote of more than 10 to 1 and more than 3 to 1 in the House of Representatives.

The goal of all of these programs was essentially the same: make the US energy independent, or nearly so. But obviously there was a secondary goal: provide domestic energy supplies that are cheap or technologies (like the supercar) that will substantially reduce energy costs.

These two goals—energy independence and low prices—as national policy create a legislative conundrum. Essentially, the two goals involve an inherent contradiction. Using economically viable conventional technologies and resources, the country can achieve one of these goals only by sacrificing the other. Consider: what will produce lower-priced energy resources? Tapping the lowest cost resources and providing incentives for accelerated development of conventional energy resources. More refineries should be built; all easily accessed supplies—coastal waters, wildlife refuges—should be fully developed. But since the lowest cost resources are found outside of the US, national policy should encourage drilling and field development everywhere—providing tax and other incentives for companies drilling in all parts of

the world. Saudi Arabia and other OPEC producers have very low cost production and presumably these could be developed further with sufficient incentives. If the Saudis as OPEC members resist then efforts should be made to encourage non-OPEC producers to step up production and develop new resources. In the end, lower prices would encourage increased consumption, but at least in the short run prices would be relatively low.

True energy independence on the other hand is likely infeasible and almost certainly would be undesirable (Bryce 2008), but there is an effective policy that would reduce consumption: make energy prices much, much higher. Although estimates of the long run price elasticity of demand for gasoline vary, more than doubling the price of gasoline to \$7 per gallon would reduce consumption significantly, making fuel efficient cars far more cost effective and desirable than they are at present in the US.³ Gasoline at \$15 per gallon would have an even more profound effect on consumption.

But policies either to make the US more dependent on imports or to increase gasoline taxes are both unpopular. During the 2007 debate, representatives did not consider the possibility of making higher prices permanent through taxes, even though there was clear evidence of reduced consumption as a result of high prices. No doubt a vote that either made us more import-dependent or raised prices would be attacked either as making less energy secure or as imposing hardships on average families—votes that might cost some legislators elections.⁴

³ There are various estimates for the long run price elasticity of demand. Income elasticity must also be factored in. However, studies suggest elasticities ranging from less than 0.1 to as much 0.6 (citations)

⁴ It is not insignificant that the two large 1980 bills preceded the 1980 elections by only a couple months, and the ethanol bill in late 2007 passed just prior to the start of the presidential primary season.

But there is in theory a solution to the conundrum of energy policy: a new technology that simultaneously reduces dependence on foreign energy supplies and lowers prices. I call this the “panacea” technology (Grossman 2008, 2009). The synfuels program, for example, would have utilized US abundant coal resources instead of foreign petroleum. The cost of synfuels to the consumer was projected to be lower than that of conventional gasoline or heating oil because the price of oil was expected, according to the Carter Administration, to top \$120 per barrel (inflation adjusted \$240) by the late 1990s. The actual price by 1999 was one-twelfth that amount but by then the synfuels program had been shuttered for more than a decade.

Similar expectations have been expressed with regard to the economic viability of ethanol. It might seem at first glance that ethanol is different from other alternative energy programs. The US already produces several billion gallons of it from corn. That means, first, that it has already been proven technologically feasible even on a large scale and, second, it is unlikely to be killed later because it will have the staunch support of farm state legislators. The second point may be true to the extent that it is unlikely that the ethanol program will be totally eliminated. But in fact less than half of the 36 billion gallons called for in the 2007 bill are to be distilled from corn.⁵ The rest are to be produced from cellulosic plant sources (such as switch grass or wood chips). To achieve this will require the same kind of technological breakthroughs that were mandated in synfuels, supercar and fusion programs. Though President Bush in a State-of-the-Union address claimed that such breakthroughs were immanent, there is no reason to believe that this is the case and the 20 billion gallon cellulosic ethanol

⁵ It is highly doubtful that even the corn-base component of the mandate will be met. To do so would require the use of over 40% of the US corn crop putting probably intolerable upward pressure on food and animal feed prices.

goal will not be achieved by 2022 as called for in the legislation and may, in fact, never be achieved (Ferguson). But the ethanol bill as conceived and passed is intended to provide a domestic resource (corn and then a cellulosic plant) that will be cheap relative to gasoline because the price of latter will be rising while our domestic resource, something like switch grass, will, through Congressional direction of our technological prowess, cost very little to produce and process.

The likelihood of success from any of these programs is extremely low, arguably close to zero. Indeed, a good case can be made that the future stream of *gross* benefits from alternative energy development programs is zero. The main problem is in the very process by which a legislature is arrogating for itself the claim that it can pick technological winners—winners presumably in a competitive marketplace where, the legislation assumes, rational consumers will choose these new products over conventional ones. There is ample evidence that government is not able to do this and in fact attempts to do so lead only to increased rent seeking not competitive products (Grossman 2009). Yet legislators are not punished for voting to institute any of these programs. Indeed, history suggests that the response of legislators is to promise new initiatives at least as costly as those that have gone before, even though these will have as little chance of success as earlier efforts.

Now it can be assumed that if voters actually valued alternative energy development programs at zero—if they accepted that Congress cannot authorize technological miracles—then legislators would lose votes, and if we assumed fully rational voters with complete information none of these initiative would pass and none of them would even be proposed. However, if we assume boundedly rational

voters then there might be reason why they would overestimate the benefits from new energy technology programs. Of course there must be some at least remote feasibility of success; no voter would reward a legislator for spending billions of dollars on a device that defied the laws of physics, for example a perpetual motion machine. But as the next section argues legislators can influence boundedly rational voters to overestimate the probability of success through a simple heuristic.

3. Voting on alternative energy programs

Assume a rational self-interested legislator i who seeks to maximize her utility, which is defined exclusively as winning the next election. Her utility function can be given by:

$$U_i = U(E(m(v),v))$$

Where utility is a function of election, which is in turn determined by her ability to raise money (m) as well as by her choices (v) on issues of public concern. These two variables (m and v) are likely to be related in that any vote (v) may well induce or discourage donations needed to gain election; thus m is a function of v . But I assume here for simplicity that m is a constant, thus making the marginal change in m from any choice of v , equal to 0. The point here is that while huge alternative energy development programs may induce donations especially from companies that might benefit from the legislation, for many of the overwhelmingly large majority of legislators that vote for these development programs, there is no clear indication that such a vote is instrumental in gaining campaign resources. The legislator's choice of how to address such policy issues, on the other hand, is assumed to produce some

positive and some negative responses from constituents, which in turn might raise or lower her election prospects. That is, no matter what the legislator does, there will be those who disapprove and those who approve. Thus, a given vote gains importance in the legislator's maximization problem based on the sign of the first derivative of the second term: that is, whether the marginal effect ($U_E E_V$) of a given choice is positive or negative, as well as the magnitude of this effect. Votes on some, perhaps most, legislation might in fact have a net positive effect but that effect will so small as to have little ultimate impact on her re-election prospects. But it is assumed that the effect will be pronounced on issues of the day that are particularly salient with the general voting public. Put more formally, the legislator will always choose among voting options ($1 \dots n$), first, one that results in positive marginal gains, and second, that is perceived to have a larger personal utility benefits (greatest impact on her electoral prospects) than any alternative. That is, given $U_{V_1} > U_{V_2} \dots > U_{V_n} > 0$, the legislator always chooses v_1 .

Consider now energy policy, at a time when it is one of the leading public concerns (e.g. fall 1980). A legislator is given the choice in theory to vote for two different energy proposals: The first (Policy A) would be effective but would produce either greater dependence on imported energy or higher prices (through taxes). Policy B on the other hand would be to expend money on a panacea technology that has little real chance of success. The legislator has a third choice: Vote against all energy legislation and advocate no government role in solving society's perceived energy dilemma.

How would these fit into the legislator's maximization problem? A vote either for greater dependence or higher prices would likely be negative in that calculation; such a vote would be seen as exacerbating our energy problems rather than solving them. Voting against all legislation and denying that a governmental solution exists also appears likely to have as negative impact on her election prospects. As an issue of great national concern, indifference could well be portrayed by opponents as lacking both empathy and imagination. This would likely be characterized by electoral opponents as a case of a legislator out of touch with her constituents (Cohen & Noll; Riker) and would make the seat more competitive in the next election.

It should be noted that either of these choices—a vote for taxes/imports or a vote for no energy policy—would have the greatest probability for actually producing net social benefits. They would certainly produce gross benefits. A tax on oil, for example, which would reduce consumption, arguably would produce other benefits such as less pollution and less concern about supply disruption; of course it would also increase revenues for government. Whether this is on balance reason enough to institute higher gasoline taxes is not clear, however, since the opportunity cost of diverting resources from the private sector to the public might be high. Arguably government inaction to solve energy dilemmas may be the most efficient solution of all. That is, it is not obvious that when energy prices rise there is a problem that needs solving (Grossman 2009).⁶ These outcomes are illustrated in Table 1.

Policy B, the panacea technology, on the other hand, offers a chance to “do something” that potentially solves the larger energy conundrum. But as has been suggested such technological efforts have very little chance of success, and indeed all

⁶ This may not be the case if an externality problem such as climate change is taken into account.

of the government's alternative technology development programs have overwhelmingly produced net social costs. A realistic appraisal of the probability of success would make expected *gross* benefits nearly zero, and if understood in that context would probably not lead to large majorities in favor of them.

But the prospects for success of these ventures appears to be greatly overestimated. In fairness, it is next to impossible for voters (or for that matter the legislators themselves) to have a good way to make informed judgments with respect to the success of a new technology.⁷ Technological-commercial success is in principle complex and involves both engineering breakthroughs and marketability and the interaction of these factors is often imperfectly understood even by those with expertise in the science or the economics involved.

But to simplify the estimation process, proponents and politicians rely on a heuristic—a rule of thumb that raises expectations far above what is actually warranted. It is roughly: “If we can put a man on the moon, we [through governmental action] can solve our energy problems.” (Sometimes “If we can build an atom bomb...” is substituted.) This heuristic has been voiced with respect to every alternative energy program since the first energy crisis in 1973. President Nixon explicitly referred to the Apollo moon program in launching Project [Energy] Independence that year. It was invoked by President Carter, President Clinton and both Presidents Bush. The key sponsor of the fusion bill, Representative Mike McCormack, invoked in repeatedly with respect to that technology. President Obama has referred to these programs (the Apollo Program and Manhattan Project) as

⁷ It's not clear that they even want to try (Downs, Caplan).

exemplars to inform choices on energy policy; writers, pundits, NGOs, and the general public invoke these images in calling for alternative energy development.

It *seems* to make sense. Through a great governmental undertaking—both the Apollo and Manhattan projects—the US was able to produce extraordinary scientific and engineering feats. Why not with alternative energy technology?

In fact, there is a vast difference between a cost-is-no-object demonstration and a marketable product. Yes, we produced an atomic bomb, but when did an average consumer have to make a purchase decision between an atomic bomb and a conventional bomb of similar yield? A choice between an ethanol-fueled vehicle and a conventional vehicle is not one that will be made simply on the basis of the fact that the former can be produced (it already can be) or even that it can be brilliantly engineered. How do the two vehicles perform over time? What are the short and long run operating costs? These are determined in the marketplace apart from whether or not government sponsored one technology and not another.⁸

Yet the heuristic apparently is taken as a realistic appraisal and induces large overestimates of net benefits. A politician that invokes Apollo is considered forward thinking, bold and innovative, and, furthermore, patriotic. Americans can do anything we set our minds to do, after all. The more rhetorical linkages between great technological demonstrations and proposed technological solution the better. Thus, a vote for a panacea technology alone, as Table 1 suggests, produces unambiguously positive increments to the legislator's election prospects. But at the same time it is the choice that unambiguously reduces social welfare. No panacea technology has ever

⁸ Obviously if technologies are not chosen but are mandated and applied coercively then they will be utilized but will represent an inefficient use of societal resources.

solved the conundrum but in appearing to address it, the legislator gains. Any alternative course will be worse for the individual's election prospects, even as they would be better for social welfare generally.

It should be noted that the failure of alternative energy programs is mitigated by the programmatic element, borrowed also from the Apollo Program, Just as President Kennedy promised early in the 1960s to put men on the moon before the end of the decade, so each of these alternative energy programs projects a date for achievement, always well into the future, certainly beyond the current election cycle. As originally passed, the fusion program, for example, could not have been fully evaluated for 20 years. The PNGV program, on the other hand, was deemed a failure but not until eight years (2001) after it was passed. By that time, the price of gasoline was low was exceptionally low and scant interest was paid to the project's demise. Thus votes for such programs, extraordinary in their wastefulness, rarely if ever cost a legislator an election. In effect, legislators can have very high discount rates on the outcomes and can value future costs and benefits effectively at zero with respect to their election prospects. By the time some accounting is actually done, some other issue is likely to have greater salience and past energy votes will be rendered politically meaningless.

Table 1

Vote	Policy	Legislator's Payoff	Net Social Benefit
Yes on A; no on B	Tax/Import Incentives	$U_E E_V < 0$	May be + or -
Yes on B; no on A	Panacea technology	$U_E E_V > 0$	< 0
No on both A & B	Market solution	$U_E E_V < 0$	> 0

4. Conclusion

Why does Congress vote repeatedly and overwhelmingly for wasteful alternative energy technology programs that are almost certain to fail? Because it is in the interests of legislators to do so. There is no political gain to be achieved from a realistic appraisal of such programs, or an effective approach to energy policy. Indeed, any legislator who did either would likely be punished for it. But then, confronted with contradictory demands from the general constituency, only a "solution," however unlikely can gain political traction. Whether this same kind of phenomenon applies to other issues of general national concern would need to be determined by further research.