While the U. S. economy continues to struggle, politicians, green energy advocates, and energy regulators have adopted a “green jobs” mantra. They espouse the view that policies mandating renewable resources will provide not only environmental benefits, but economic salvation as well.

The most recent example of this phenomenon is in California where, last September, the California Air Resources Board adopted a requirement that the state obtain one-third of its electricity supplies from renewable energy resources by the year 2020. California governor Arnold Schwarzenegger noted approvingly in a press release, “There is a multi-trillion dollar global market for clean energy, and I look forward to seeing even more investment and job creation happen throughout our state with today’s commitment.”

Schwarzenegger is the latest politician to fall under the spell of “green” jobs. Even New Jersey governor Chris Christie, who promised to reverse decades of growth in the burden that state’s government has heaped upon its citizens, signed the Offshore Wind Development Act in August 2010. He praised the act, which calls for at least 1,100 megawatts of wind generation to be developed off the New Jersey coast, saying it will “provide New Jersey with an opportunity to leverage our vast resources and innovative technologies to allow businesses to engage in new and emerging sectors of the energy industry.”

Economists point out that there is no such thing as a free lunch, green or otherwise. Politicians, perhaps because their lunch tabs are always paid by someone else, blithely ignore economists and continue to promote a mythical “green” economy that will soon emerge. They carry on much like the Spanish conquistadors who searched for the Seven Cities of Cibola, convinced the buildings really were made of gold. While ignoring economists may be considered a civic virtue, doing so does not invalidate basic economic principles. Forcing consumers to buy high-cost electricity from subsidized renewable energy producers will not and cannot improve overall economic well-being.

Renewable energy might reduce air pollution (although no actual evidence of this exists). It will certainly create a few construction jobs. And you can bet that government mandates and subsidies for renewable energy will benefit renewable energy developers. But when the entire economic ledger is tallied, the net impact of renewable energy subsidies will be reduced economic growth and fewer jobs overall. In effect, “green” energy mandates like those of California and New Jersey are a new version of “Gresham’s Law,” in which subsidized renewable resources will drive out competitive generators, lead to higher electric prices, and reduce economic growth.

One of the most egregious examples of the green energy fallacy is the proposed Cape Wind project, which is to be built off the coast of Nantucket Island. Cape Wind, which is ardently supported by Massachusetts governor Deval Patrick and state attorney general Martha Coakley, is expensive — more expensive, in fact, than onshore wind resources, which themselves require government subsidies. Even Cape Wind’s proponents admit to
this. So, to sidestep the high-cost problem, Cape Wind’s advocates have cobbled together all manner of arguments to justify its development, most notably how it will spur a new offshore wind industry in Massachusetts.

Several economic fallacies underlie green energy and green jobs policies. For example, some renewable energy proponents and green jobs advocates fundamentally misrepresent wealth transfers as wealth benefits. Stealing money from Peter and giving it to Paul may benefit Paul, but it hardly creates wealth. Moreover, a number of “green jobs” studies have touted renewables development as a source of unbridled economic growth. These studies all contain one striking omission: they ignore the adverse economic effects of the resulting higher electricity prices that high-cost renewable generation brings. They are cost-benefit analyses that ignore the “cost” part. No wonder the results are so encouraging.

In this article, I begin by explaining the welfare economics of subsidized green energy. For most economists, this is a standard, no-such-thing-as-a-free-lunch analysis. However, it also highlights the problems caused by one of the supposed benefits that renewable energy proponents flog: that renewable energy will help “suppress” electricity prices, thereby creating huge benefits for consumers. I then examine the Cape Wind project, which I consider to be the current poster child for green energy’s excesses, and I discuss why the billions of additional dollars that Massachusetts ratepayers will be forced to pay for the electricity it generates will not provide economic salvation but will simply hasten the exodus of business, industry, and jobs from the state.

How Renewable Energy Subsidies Reduce Economic Well-being

Ignoring, for the moment, the issue of green jobs creation, renewable energy studies often talk about “price suppression” as being a benefit of renewable resource development. The concept is straightforward: by increasing the supply of electricity, market prices decrease and consumers benefit. This is fundamentally true, but while consumers obviously benefit from lower prices in a competitive market, the “benefits” of artificial price suppression are temporary and costly.

For those whose familiarity with electricity markets ends at the light switch, before there were competitive wholesale electric markets, utilities built enough generating capacity to ensure that when the demand for electricity peaked (such as on a hot and humid summer’s day), there was sufficient generating capacity available. The construction costs of these resources were part of utilities’ rate base, on which they earned a regulated rate of return.

With deregulation and electric industry restructuring, regional wholesale energy markets were created to replace the old vertically integrated utility industry. Not only were wholesale markets created for electric energy, but also markets for “installed capacity” — essentially payments to generating firms to recover the fixed construction costs that were previously included in the rate base and to provide sufficient revenues for firms to construct additional generating capacity for use during peak times, though that capacity would be uneconomical in a standard wholesale market. In overseeing wholesale energy markets, the Federal Energy Regulatory Commission sought to ensure that these markets would provide sufficient revenues to generators, especially peaking generators used only sparingly, to ensure they would be economically viable and thus available on those hot summer days.

Creating a market is always a challenge, and markets for “capacity” have proved no different. The rules governing these markets are mind-numbingly complex, whether by accident or design. But one thing these markets did was provide explicit payments to generators that had been paid only implicitly before.

Outraged at having to pay for something they mistakenly thought was free, politicians in several states sought to take advantage of these markets and lower prices. As a result, a number of states introduced “price suppression” as an explicit policy goal in reaction to the creation of installed capacity markets, especially in New England. In 2007, for example, Connecticut passed legislation that required the state’s Energy Advisory Board to issue Requests for Proposals that would reduce capacity market prices in the state. Similarly, in Massachusetts, Section 105(c) of the Green Communities Act of July 2, 2008 was designed to force renewable resource generation into the New England capacity market.

Essentially, these states have required that their local utilities build new generation (paid for by ratepayers) and bid the output into the energy market at a zero price. (There is a price floor for bidding into the capacity market.) Adding additional “free” supply into a market obviously lowers, or suppresses, the market-clearing price.

In some ways, this is a good thing: if I can build a better, less-expensive mousetrap, mousetrap prices fall and consumers (although not mice) are better off. The problem with the price “suppression” practiced by these states is that the resources that were built have been subsidized by ratepayers. As such, this type of price suppression is really just another way to manipulate the market in a way that makes it less efficient. Moreover, the price suppressive effect is only temporary, because it drives out actual competitors and reduces the likelihood of new competitors entering the market. (Generators will not enter the market if they think regulators and politicians will simply drive them out at a later date. Also, investors, perceiving greater risk, will require larger expected returns.) Thus, rather than building a better mousetrap, these lawmakers are using subsidies to artificially and temporarily reduce the price of mousetraps. And, in fact, generators that compete in these markets have fought back and FERC has taken notice.

To understand the difference between artificial price suppression and true increases in competitive supplies, examine Figure 1, which shows the demand for electricity and the effect of a renewable generation subsidy. In the figure, the initial supply curve is given by the solid light red line $S_0$. The market-clearing price is $P^*$, and the quantity of electricity sold is $Q^*$. In this market, generators A and B sell all of their output, and C sells an amount $Q^* - QB$. Generator D sells nothing.

Next, we introduce a subsidized renewable generator, $R$, such...
as a wind energy plant. Without the subsidy, the wind energy plant cannot earn sufficient revenues to be competitive. With the subsidy, the plant now bids into the energy market at a zero price, reflecting its marginal cost, as shown as the solid dark red line in Figure 1. As such, it displaces the other generating resources and shifts the supply curve outward to $S_1$, shown as the dashed light red line. The market-clearing price falls to $P_{\text{SUB}}$, and the total quantity of electricity sold increases to $Q'$. As a result, generator C is knocked out of the market entirely and the economic profits earned by generators A and B decrease. This is what I call “Gresham’s Law of Green Energy”: subsidized renewable resources drive out otherwise-competitive generators.

Renewable energy advocates applaud these results, arguing that consumers win: the price of electricity has gone down. Well, in the short run consumers can benefit because the subsidy they are forced to pay may be less than the savings on electricity rates that they realize—a net savings. But does society benefit from this scheme in the long run? The answer is a resounding “no.”

First, the majority of the benefits received by consumers are simply forced wealth transfers from existing producers. Generator C, for example, having invested in what he thought was a competitive market, is now forced out. Second, because the profits earned by generators A and B have decreased, other potential suppliers will be less likely to enter the market as demand increases, thus driving up prices higher than they would otherwise be. After all, why invest scarce capital in a market that politicians are manipulating? Third, the consumers who do benefit in the short run from the suppressed prices may not be the same consumers who are paying the subsidies.

The short-run economic welfare implications are also shown in Figure 1. The large light red rectangle is the economic value transferred from producers to consumers. The small dark gray trapezoid is the actual gain in consumer surplus. When renewables and green jobs advocates talk about price “suppression,” they are referring to these changes in consumer surplus. It is important to note, however, that the vast majority of the “benefits” of price suppression are not benefits in any economic sense. Rather, they represent an income transfer—and an economically inefficient one at that—from producers to consumers. Green jobs studies often conflate such economic transfers with “benefits.”

A key question, therefore, is whether the real gain in consumer surplus shown in Figure 1 can ever be greater than the cost of the subsidy. In other words, can a subsidy increase the overall economic value of a market? The answer is no. To convince yourself of this, consider the following: If the renewable generator R cannot compete in the market without a subsidy, then it requires a price greater than $P^*$ to be economically viable. Thus, to be economically viable with a subsidy and a market-clearing price of $P_{\text{SUB}}$, the subsidy must be greater than $(P^* - P_{\text{SUB}})$ per MWh produced by the generator. If the renewable generator produces R MWh, then the total cost of the subsidy is greater than $R \times (P^* - P_{\text{SUB}})$. That amount is always greater than the actual gain in consumer surplus shown in the figure. Thus, the subsidy reduces the overall economic value of the market.

Subsidies for thee and me | To support renewable portfolio standards such as California’s 33 percent mandate by the year 2020, consumers must subsidize renewable resources. These subsidies come in several forms. First, consumers may be required to pay a specific renewable energy charge on their electric bill. Second, they may be required to pay for above-market price contracts with renewable generators. Third, as taxpayers, they must offset tax expenditures to alternative energy companies, such as investment tax credits or grants in lieu of tax credits, federal production tax credits, federal loan guarantees, and accelerated depreciation allowances that reduce tax payments.

To counter the need to provide renewable generation with all manner of subsidies, renewable advocates generally resort to three types of arguments. First, they argue that fossil fuel generation and nuclear generation are subsidized; therefore, it is only “fair” that renewable generation be subsidized, too. Second, renewable generation reduces air pollution, including greenhouse gas emissions, but markets fail to value those emissions reductions. Third, by reducing fossil fuel use, renewable energy reduces price volatility and increases energy “independence.” Fourth, because of its high up-front capital costs, renewable generation faces “market barriers” that can only be overcome with subsidies.

None of those arguments are sound. The first argument, that subsidies for fossil fuels and nuclear energy should be countered with subsidies for green energy, is simply to argue that two wrongs make a right. One can certainly argue that fossil fuel extraction has benefited from favorable tax treatment. However, fossil fuel resources are not directly subsidized in electricity markets. Renewable energy advocates often point to the liability limits on nuclear power plants courtesy of the Price-Anderson Act (see “Determining the Price of Price-Anderson,” Winter 2002–2003), as a subsidy, which they are. But the appropriate policy solution is to remove those subsidies, not lend energy markets with more of them.

The second argument, that green energy produces no air pollution negative externality, may be true, although the reduction...
in emissions wrought by green energy sources is far smaller than advertised because of the need for back-up generation. Moreover, one would be hard-pressed to find a more expensive way to internalize the air pollution externality. A properly set emissions tax would achieve the same result at a far lower cost and would not distort the competitive market as renewable subsidies do.

The third argument, that green energy improves American “energy independence” and reduces supply volatility, has no basis in empirical evidence. Reducing the demand for a commodity does not imply that price volatility will be reduced, unless the demand is reduced to zero. However, even if the argument were true, the need for additional back-up electric generation to “firm” the changing output of wind and solar power is likely to lead to greater volatility of natural gas demand and, hence, to greater natural gas price volatility. A far more efficient way to reduce price volatility is to use standard hedging tools, which contribute far greater flexibility to the design of a customer’s preferred hedging strategy. As for the energy independence canard, not only does renewable energy provide an insignificant percentage of total energy consumption in the United States, but its ability to displace crude oil consumption is de minimus.

The last argument, that subsidies are needed to overcome “market barriers,” is perhaps the most disingenuous. High cost is not a market barrier. For example, not everyone can afford to purchase a Rolls-Royce, but that does not mean Rolls-Royce faces market barriers that necessitate policies specifying that a minimum percentage of Rolls-Royce cars must comprise the entire automobile stock. Although illustrative, one may object to this analogy because Rolls-Royce motorcars do not provide various external social benefits as public goods do. One may assume that renewable energy is a public good and it has attributes that society values, but that not all of those attributes are priced in the market. One economic solution, which already has been instituted, is to establish a market for the non-market attributes. This is the entire purpose of renewable energy certificates, which, like emissions allowances, can be bought and sold publicly.

Jobs: Green and Otherwise
With the U.S. economy struggling, politicians are promoting renewable energy as a (clean) engine of unlimited growth. A number of studies have been published touting the job creation potential of renewable generation. But like a one-eyed accountant, those studies consider only one side of the economic ledger.

For example, in November 2009, a report published by the College of Natural Resources at the University of California at Berkeley recommends a comprehensive policy of aggressive energy efficiency improvements and renewable generation. Those policies would, theoretically, create between 900,000 and 1.9 million new jobs and increase per-household income between about $500 and $1,200 per year. The report concludes that “the stronger the federal climate policy, the greater the economic reward.” This is a stunning example of free-lunch economics. The study notes that from 1972 to 2006, energy efficiency programs in California “created 1.5 million additional jobs.” However, the authors fail to provide the most important component of such an assertion: compared to what? The study never considers the effects on businesses and households from higher electricity prices and taxes to fund those energy efficiency programs.

Another study, released in February 2010 by Navigant Consulting, was prepared for the RES Alliance for Jobs, a group whose members primarily include renewable generation manufacturers. The study examines the economic effects of adopting a mandatory national renewable portfolio standard of 25 percent of total generation by the year 2025. The report concluded that such a standard would “lead to job growth in all states, especially those currently without state-level renewable electricity standards,” and that it would create 274,000 new jobs in the renewables industry.

Most recently, a September 2010 report issued by the National Renewable Energy Laboratory concludes that building 54,000 MW of offshore wind generation under a “30 percent by 2030” renewables requirement would “revitalize our domestic manufacturing sector and create high-paying, stable jobs while increasing the nation’s competitiveness in 21st century energy technologies, and “create approximately 20.7 direct jobs per annual megawatt in the United States. That is over one million jobs.”

But left unanalyzed in all of those studies is the number of jobs that the scenarios would eliminate because of the resulting higher prices for electricity. The “25 percent by 2025” and “30 percent by 2030” goals might indeed create hundreds of thousands of new jobs in the renewables industry, but higher-cost electricity would necessarily reduce available income for other goods and services and for investment, and reduce overall economic growth. Ironically, the Navigant report noted that nearer-term renewable standards are required to “mitigate a flattening or decline in industry-supported jobs that will otherwise occur across industries with the expiration of tax incentives and stimulus-related policies.” In other words, without continued subsidies and renewable portfolio mandates, the renewables energy industry would contract.

The U.S. economy is immensely complex, and accurately predicting how specific policies would change output and employment in every industry is probably impossible. Therefore, most economic impact studies rely on so-called static models that are based on a “snapshot” of the economy at one time. When the models are used to estimate the economic effect of renewable generation construction, they allocate the expenditures for that construction in different sectors of the economy (e.g., cement, turbine manufacturing, wire, wages, etc.) and determine how those expenditures would ripple through the economy. For example, increased demand for wind turbines would mean more purchases of cement for foundations and increases in demand for sand and gravel, and so forth. Similarly, wages paid to construction workers would be spent on goods and services; this would increase the demand for those goods and services and cause further increases in employment, and so forth.

Renewable resource advocacy studies always ignore the economic effects caused by higher electricity prices. Households
whose electric bills increase because of renewable energy mandates have less money to spend on everything else. At the same time, goods and services whose production requires electricity increase in cost. So, consumers have less money to spend on goods and services that cost more to produce. That is no different than imposing a tax on consumers and producers. Higher taxes reduce economic growth. This is why subsidizing industry — green, red, or tutti-frutti — reduces economic well-being. A study I performed to examine the economic effects of a proposed renewables requirement in Pennsylvania, for example, found that for each $100 million increase in electricity costs from renewables, 640 jobs would be lost. No wonder renewable energy advocates tout the job impacts of building renewable resources but fail to mention the long-term job-killing impacts of higher electricity prices.

It Is Easy to Be Green — When Someone Else Pays the Bill

Cape Wind is a proposed offshore wind energy development to be built in Nantucket Sound, off Cape Cod. Consisting of 130 individual wind turbines, each capable of producing 3.6 MW of power, the entire project will provide 468 MW of generating capacity. Although the project has been the subject of much environmental wrangling — specifically its potential impacts on the Cape Cod area — I focus here on the project’s dubious economics.

On June 4, 2010, National Grid, an international electric and gas company, submitted to the Massachusetts Department of Public Utilities its application and proposed a 15-year contract that would require National Grid to purchase one-half of Cape Wind’s total output. The contract was signed under the auspices of Section 83 of the state’s Green Communities Act, which was signed into law by Governor Patrick in 2008. The act requires electric utilities in Massachusetts to purchase up to 3 percent of their total projected electric energy needs from renewable resources if — and this is an important “if” — those resources are “cost effective to Massachusetts electric ratepayers over the term of the contract,” and “where feasible, create additional employment in the commonwealth.”

The initial purchase price under the contract was set at $207 per megawatt-hour in 2013, increasing 3.5 percent each year. Thus, by the end of the contract, the price would be just under 35 cents per kilowatt-hour. However, National Grid’s ratepayers would pay an even higher price because the Green Communities Act also includes a 4 percent “adder” that accrues to the utility signing the long-term contract, raising the price paid by ratepayers to $215 per MWh. The contract also included provisions to increase the price in the event that Cape Wind did not qualify for either the federal investment tax credit or the federal production tax credit. Without either of those, the initial price would increase to $235 per MWh and, adding in the 4 percent adder, ratepayers would pay $244 per MWh.

One of the key questions for the developer was the project’s estimated cost — information that the developer fought to keep from being released. Although Attorney General Coakley was on record in November 2009 as supporting Cape Wind, her office entered into negotiations for the information to be made public. What came out of the negotiations, however, was not cost information, but a revised contract agreement signed on August 4, 2010 that, in theory, reduced the initial price by about 10 percent, to $187 per MWh, excluding the 4 percent adder to be received by National Grid. However, the price would not really be that low. Because Cape Wind stated it would apply for a grant in lieu of the investment tax credit, under the terms of the revised contract the price would increase by just over 10 percent. If one adds the 4 percent adder received by National Grid, the base price jumps from $187 per MWh to just over $214 per MWh, again escalating 3.5 percent per year.

Figure 2 illustrates the additional amount that National Grid ratepayers would pay for their half of the project. The figure shows the annual contract price that would be paid by National Grid’s ratepayers (the black line) under the revised contract and the estimated market price for electricity based on two independent market price forecasts prepared for National Grid.

The forecast market price (the red line) increases from around $110 per MWh in 2013 to just over $150 per MWh by the year 2020, then hovers around that value through the remainder of the contract term, ending in 2027. In contrast, by the last year of the contract, the price paid by National Grid ratepayers would be almost $350 per MWh. The estimated above-market cost for electricity (the gray vertical bars) that would be paid by ratepayers is just over $75 million in the first year of the contract, increasing to over $140 million in the last year of the contract.

From an economic standpoint, the key question is whether National Grid ratepayers benefit from paying those above-market costs, which over the 15-year contract would total almost $1.5 billion. Specifically, is this contract “cost-effective to Massachusetts..."
electric ratepayers over the term of the contract,” and does it “create additional employment in the commonwealth”?

According to National Grid and Cape Wind, the answer to both is yes. They assert the project is cost-effective, at least when compared to other offshore wind projects; that it would reduce fossil fuel emissions; that it would help Massachusetts reduce its greenhouse gas emissions; and that it would create between 600 and 1,000 jobs while under construction and around 150 jobs during operations.

However, those claims do not address the cost side of the economic ledger. For example, as shown in Figure 2, by 2015 (the third year of the contract), the above-market cost would be around $80 million. Thus, a reasonable question is whether ratepayers would receive benefits equal to or greater than the above-market cost in that or any other year.

One answer, according to its proponents, is that Cape Wind is needed to meet a growing renewable resource “gap” in Massachusetts and New England. However, this “gap” — to the extent it will exist — is an entirely artificial legislative creation. State legislatures in New York and New England enacted requirements that growing percentages of electric generation be obtained from renewable resources. (That they do not all define “renewable resource” in the same way is another matter.) Concluding that a resource — any resource — is cost-effective because it is “needed” to fill an artificial “gap” is circular reasoning at its finest.

Moreover, this reasoning fails to consider protections enacted in Massachusetts to prevent the cost burden of achieving these artificial renewable energy goals from falling excessively upon Massachusetts ratepayers. Specifically, Massachusetts, like many states with renewable energy mandates, includes an “alternative clearing price” that establishes a ceiling price on renewable energy certificates that utilities must have in order to meet the legislatively set mandates. A utility that cannot obtain sufficient certificates at a reasonable price can instead pay the alternative clearing price to meet its obligation.

One test of cost-effectiveness, therefore, is whether the cost of a renewable resource is greater than the sum of the forecast market price of electricity plus the alternative clearing price, because the sum can be thought of as the maximum price ratepayers should be required to pay for renewable generation. This sum, for each year, is also shown in Figure 2.

As the figure shows, the forecast market price plus the alternative clearing price is still below the contract cost. That means that National Grid ratepayers will be forced to pay more for the Cape Wind power and its renewable energy certificates than they would otherwise be forced to pay for an equivalent amount of certificates. Under such a “bright-line” test, Cape Wind is not cost-effective.

National Grid and Cape Wind argue that the subsidy will create a new offshore wind industry and deliver other non-monetary benefits that cannot be quantified. For example, in a brief it filed on October 7, 2010, attorneys for Cape Wind argue that “Cape Wind represents the first offshore wind-energy facility proposed in the United States and its approval and ultimate construction will inspire a burgeoning new industry that will offer new jobs, innovation, research, and possibilities on how electricity is generated in this country.”

Cape Wind likely will inspire a “burgeoning new industry” if the subsidies it has requested are granted. Whether that industry is located in Massachusetts and employs Massachusetts workers is unclear. However, even if such an industry is created in Massachusetts, those are not benefits per se. Moreover, the funds ratepayers will be required to pay to Cape Wind are funds that cannot be invested elsewhere. The higher price for electricity that ratepayers will pay for Cape Wind’s output means fewer dollars available for investment and fewer dollars to spend on other goods and services that those ratepayers would otherwise choose to purchase. If one applies to Massachusetts the Pennsylvania job impact estimate of 640 jobs lost for every $100 million increase in electric costs, then Cape Wind, while creating construction jobs, would cause the net loss of hundreds of jobs in Massachusetts over the long term. That was one reason cited by the Rhode Island Public Utilities Commission when it rejected a similar contract between Deepwater Wind LLC and National Grid on April 2, 2010. According to the commission:

> It is basic economics to know that the more money a business spends on energy, whether it is renewable or fossil based, the less Rhode Island businesses can spend or invest, and the more likely existing jobs will be lost to pay for these higher costs.

Like the proverbial vampire who fears daylight, basic economics is the last thing Cape Wind’s proponents wish to see applied to the project.

Conclusion

Industries that require never-ending subsidies simply cannot increase overall economic welfare. To conclude otherwise is to believe in “free-lunch” economics of the worst kind. Yet, free-lunch economics are driving the push for renewable energy. The subsidies paid by ratepayers transfer wealth from existing generators to a chosen few renewable resource owners. One may like to rail against the existing generators — as many politicians have — but the long-run implications of such subsidies will be to destroy competitive wholesale electric markets and drive out existing competitors. This course of action will cost jobs because businesses, forced to pay higher electricity prices, will either relocate, contract, or disappear altogether. It will reduce the disposable income of consumers, who will forever be forced to subsidize renewable resources (just as they must now subsidize corn ethanol producers) — all in the name of “green energy.”

Cape Wind stands at the forefront of this new renewable energy push, one that is based on long-discredited — and, alas, long-believed — promises. Unfortunately, it is politicians who are selecting the winners and losers in the renewables game, and the select few are benefiting at the expense of the many, i.e., the ratepayers. This is hardly a recipe for economic growth.