Competitive Enterprise Institute
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Advancing Liberty – From the Economy to Ecology
October 26, 2010 **No. 170**

Is Wind the Next Ethanol?

One "Renewable" Energy Source Follows another's History of Failure

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Repeating past mistakes seems to be a recurring theme in federal policy, and nowhere more so than on energy issues. Much of the Obama administration's "clean energy economy" and "energy independence" agenda is a virtual repeat of the follies of the 1970s. Back then, failed attempts by Washington to pick winners and losers among alternative energy sources and energy-using technologies led to taxes, regulations, and subsidies that exacerbated the very concerns they were supposed to address.

Indeed, one of the Reagan administration's greater—though lesser-remembered—economic successes was the repeal of much of this government meddling beginning in 1981. Reagan's turn away from energy central planning and toward free markets brought down energy costs and helped launch a long period of economic growth.

This decades-old lesson may be lost on younger politicians, bureaucrats, and activists who may be unaware that their energy policy ideas are proven failures from the age of disco. But the same cannot be said of efforts to enact a federal renewable electricity standard (RES), which would be a near-exact repeat of a blunder that was launched just a few short years ago—the renewable fuels mandate. The requirement that ethanol be added to the nation's gasoline supply has quickly proven to be an economic and environmental failure. Congressional proposals mandating wind and other renewable sources of electricity show all the signs of becoming a similar flop, but with far more serious implications.

The True Cost of Ethanol. It should come as no surprise that the renewable fuels mandate has raised the cost of driving. After all, if ethanol were cost-competitive with petroleum-derived gasoline, it would have caught on without government intervention. In the 2005 energy bill, Congress mandated refiners to add 4 billion gallons of biofuels to the gasoline supply in 2006—mostly ethanol derived from corn, with the rest from non-corn renewables like cellulosic ethanol

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and biodiesel. The 2007 energy bill increased the mandate to 13 billion gallons in 2010, more than tripling mandated biofuels use over the last five years. The new mandate increases each year and will reach 36 billion gallons by 2022, with 15 billion gallons coming from corn and 21 billion from non-corn renewables.

The mandate comes on top of several tax breaks and subsidies for ethanol, including a 45-cents-per-gallon tax credit. This tax credit expires at the end of 2010 and Congress is currently debating whether to extend it. According to the Congressional Budget Office, these measures cost $1.78 for each additional gallon of gasoline displaced[1]—on top of the higher cost to drivers. The government assistance is so generous that ethanol production has actually exceeded the mandated levels in recent years. Domestic corn growers and ethanol producers also benefit from protectionist tariffs that limit the amount foreign ethanol—mostly sugar-based ethanol from Brazil—that can compete in the American market.

The mandate took effect on January 1, 2006, and has boosted the cost of driving ever since. Over this period, ethanol has been both more and less expensive than gasoline, but per-gallon price comparisons tell only part of the story. Ethanol contains a third less energy per unit volume than petroleum-derived fuels. In other words, you cannot go as far on ethanol as you can on the same amount of gasoline. Therefore, using ethanol lowers fuel economy. In addition, the logistical costs of mixing ethanol into the fuel supply are considerable. Ethanol cannot be transported via pipeline and must be shipped by more expensive means from the Midwest to the rest of the country.

The costs also hit us at the supermarket checkout. The diversion of a third of the nation's corn supply from food to fuel use raised the price of corn and related items like corn-fed meat and dairy.[2]

Ethanol proponents have long claimed that technological breakthroughs and economies of scale would bring down the costs over time, but there is scant evidence that this is happening. On the contrary, the above-mentioned logistical challenges and food-versus-fuel tradeoff show no signs of resolution and will likely worsen as the mandate ratchets up.

In addition, there may be new problems using ethanol beyond the current limit of 10 percent of the fuel mix. The EPA recently announced that motor vehicles built since 2007 can safely use E15 (fuel blends containing up to 15 percent ethanol) but the Department of Energy has not yet ruled out the possibility that E15 may adversely impact engine performance or damage older cars and trucks as well as motorcycles, watercraft, and gasoline-powered equipment.[3] The federal government is currently receiving pushback from manufacturers and owners of affected equipment.[4]

The prospects for other non-corn biofuels do not look any better. Cellulosic ethanol made from grasses or crop waste is not becoming available except in very small and very expensive quantities. The target in the 2007 energy bill was 100 million gallons of cellulosic ethanol by 2010, but the Environmental Protection Agency (EPA) has had to scale that back to 6.5 million. The agency has proposed lowering the 2011 target, originally set at 250 million gallons, to a range of 6.5 to 25 million gallons.[5]

All things considered, corn ethanol has proven to be an economic failure, and the other renewable fuels are even worse. The problems are likely to grow along with the mandate.

The True Cost of Wind. The story is much the same with wind power, the most common renewable source of electricity, as well as lesser-used ones like solar. Wind has long been a beneficiary of generous and overlapping tax breaks and subsidies, especially a production tax credit created under the Energy Policy Act of 1992 and currently set at 2.1 cents per kilowatt hour. Overall, subsidies for wind and other renewable electricity sources are more than 10 times higher per unit energy output than coal, which provides nearly half the nation's electricity, and natural gas and nuclear power, which provide most of the rest.[6] Without this tilting of the playing field, wind would be significantly more expensive than coal, $149.30 per megawatt hour versus $100.40, according to conservative estimates from the Energy Information Administration.[7]

Despite all this help, wind and other renewables comprise only about 3 percent of the electricity supply (excluding hydroelectric which provides 6 percent).[8] This low market penetration explains the current push by wind proponents for a federal mandate. Congressional proposals vary, but they typically require ramping up the non-hydroelectric renewables requirement to 15 to 25 percent of electric generation over the span of a decade or so. Most recently, the Renewable Electricity Promotion Act of 2010 (S. 3813), introduced in the Sentate by Jeff Bingaman (D-N.M.) and Sam Brownback (R-Kan.), is pegged at 15 percent renewable electricity by 2021.

With ethanol, direct cost comparisons of wind energy with its conventional counterparts tell only a part of the story.[9] Just as integrating ethanol into the overall motor fuel supply creates many logistical problems, so does integrating renewable electricity into the grid. For one thing, the most desirable sites for wind are often remote mountain ridges or sparsely populated plains, thus requiring thousands of miles of new transmission lines to bring the electricity into metropolitan areas where it is needed. One study estimates that a 20-percent renewable electricity standard would require $80 billion in transmission line investments,[10] with ratepayers likely picking up the tab. And that assumes such transmission line projects could overcome the many regulatory and legal challenges to them and actually get built.

Even more significant are the costs that stem from wind energy's intermittent and unreliable nature. Simply put, the wind does not always blow, and when it does is difficult to predict and impossible to control. Given the constant need for electricity and the fact that peak demand—hot summer days—is often a time when the wind is still, a mandate for increased renewable electricity is, for all practical purposes, also a mandate for additional non-renewable backup capacity, chiefly natural gas. Not only must the non-wind part of the system be sufficient to carry the entire load, it must be operated in an inefficient manner—ready to ramp up whenever the wind dies down, then throttled back when it picks up—in order to accommodate wind. This intermittent use is far less efficient than constant use of those same non-renewable sources.

Thus, even beyond the direct cost of manufacturing and operating the wind turbines that produce renewable electricity, integrating it into the system raises the cost of nearly everything else that affects our electric bills.

As with ethanol, there is little reason to think that wind's difficulties will recede with greater usage over time. Most likely, the problems would accelerate as the mandate increases, since the low hanging fruit of ideally suited wind sites is giving way to less desirable ones, and the challenge of integrating a source of electricity that can kick out at any time only intensifies with the percentage that must be accommodated.

In early 2010, the Heritage Foundation conducted one of the few studies attempting to take all of these costs into account. It concludes that a renewable electricity standard starting at 3 percent in 2012 and increasing by 1.5 percent each year thereafter would raise residential electric rates 36 percent by 2035, destroy over 1 million net jobs, and reduce GDP by a cumulative $5.2 trillion.[11]

Is Ethanol Green? The negative environmental externalities associated with petroleum-derived fuels – particularly oil spills, air pollution, and greenhouse gas emissions—have long been a major focus of the environmental movement and federal regulators. Thus, many simply assumed that ethanol, by supplanting some of the gasoline supply, would be an improvement. Yet ethanol has plenty of its own environmental negatives.

Environmental organizations have raised concerns about the increased inputs of energy, pesticides, and fertilizer to grow the additional corn now needed to meet fuel as well as food demand.[12] The same is true for the stress on water supplies, especially now that corn production has been expanded into locales where rainfall is insufficient and irrigation is needed.[13] Land previously in its natural state has been converted to cropland.[14] The facilities that distill the corn into ethanol also require significant energy and water inputs and produce industrial emissions.

The use of ethanol in motor fuel has had a mixed impact on air quality. It lowers some types of pollutants, such as carbon monoxide, but increases others, such as the evaporative emissions that contribute to smog.[15] In fact, certain high-volatility components of gasoline must be removed before adding ethanol in order to prevent the overall blend from violating Clean Air Act requirements in high smog areas.

Ethanol's biggest environmental disappointment has been its impact on greenhouse gas emissions. Proponents of the mandate insisted that ethanol would be responsible for significantly lower carbon dioxide emissions than the gasoline displaced, but researchers have challenged this assertion and found the emissions reductions fairly modest.[16] Other studies conclude that ethanol and other biofuels actually increase emissions once the impacts of converting carbon-storing forests and grasslands into additional farmland are taken into account.[17]

Even giving ethanol the benefit of the doubt regarding carbon dioxide emissions reductions, the Environmental Protection Agency estimates an impact on temperatures from the mandate at less than 0.01 degrees Celsius by 2200, which is essentially meaningless.[18] The Congressional Budget Office puts the cost to taxpayers of each ton of carbon dioxide reduced at $750 per ton, making it one of the most expensive ways of reducing emissions.[19]

It is worth noting that many of the same reasons why ethanol is a bad deal for consumers—especially the corn and other resource inputs that make large-scale ethanol production uneconomic absent federal assistance—also undercut the supposed environmental benefits.

Is Wind Green? Like ethanol, increased use of wind would also fall well short of the environmental hype, and for similar reasons.

A renewable electricity standard would require vast expanses of land to be dotted with wind turbines, and the environmental impacts—and the effects on nearby residents—are far from trivial.[20] The same is true of the many new transmission line routes that would be needed. Though most environmental organizations still support a RES in principle, several are now trying to block many, if not most, proposed wind farms and new transmission lines. [21]

As with ethanol, the primary green selling point with wind has been the promise of greenhouse gas emissions reductions. And, as with ethanol, the reality should be a major letdown for anyone seriously worried about global warming.

The simplistic notion that the addition of wind means the subtraction of carbon dioxide-emitting coal and natural gas generation has failed to take into account wind's limitations. As discussed above, in order to integrate wind, the rest of the system must be operated in an inefficient—and thus higher-emitting—manner to compensate for the on-again off-again nature of wind power generation. This is particularly problematic for coal-fired generation, which is ill-suited to be cycled, but also to an extent for natural gas.

Such system-wide accommodations for wind not only add to the cost of a RES, but also undercut or eliminate the promised reductions in carbon dioxide emissions—as well as nitrous oxdide and sulphuric oxide emissions that contribute to air pollution. This is proving to be the case in Colorado and Texas, where state renewable standards have resulted in little or no reductions in carbon emissions as coal and natural gas plants are inefficiently cycled to accommodate wind.[22]

Thus, as with ethanol, the very problems that make wind more expensive also make it less environmentally beneficial than proponents claimed. The fact that wind needs a mandate in the first place should be a sign of its economic and environmental inadequacy.

Conclusion. The only good news with the nation's current ethanol policy is that it has proven to be so problematic that it has garnered a broad base of opposition. The current debate over extending the ethanol tax credits—in past years a slam dunk given the power of the corn lobby and big ethanol producers like Archer Daniels Midland—has bogged down in Congress. Likewise, EPA's proposal to allow up to 15 percent ethanol in fuel has also proven to be contentious.

Corn growers may love the current policy, but it has split the agricultural community—livestock and poultry producers who purchase corn as feed face higher prices thanks to the mandate. The food industryhas also been hit by higher costs, and anti-hunger activists have expressed concerns about the mandate. Millions of boat and motorcycle owners and others worried about fuel quality issues have also become active. Many environmental activists, including some who once

supported expanded ethanol use, have changed their position and are becoming vocal about it. And the American public—who have gotten a bad deal at the pump, the supermarket, and as taxpayers—are no longer solidly behind Washington's ethanol largesse. The ethanol lobby is still very powerful, but the battle has been joined.

The same should be true of wind. Perhaps this time the opposition can come together in time to prevent another regrettable mandate.

Notes

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