



BRIEFLY

In the face of technological, market and political uncertainty, hard mandates are not a wise way to introduce important new infrastructure. Initiative 937, well meaning as it is, will likely raise the cost of electricity without providing real solutions to our energy problems.

Initiative 937: Tilting Towards Windmills

In November, voters in Washington will decide whether to require electric utilities in the state to ramp up their use of electricity from “renewable” sources to 15 percent of their portfolio by 2020. The industry is already moving toward renewable resources – almost exclusively wind power at this point – but the mandates of I-937 threaten to distort a still-evolving marketplace, leading to poor investment decisions that will drive up power rates and cost jobs across the state.

For economic and political reasons, the electric power industry nationwide has begun to move into renewable energy sources. Uncertainty about natural gas and oil prices, and the probability of future regulation of carbon-dioxide emitting power plants is leading utilities to seek new, “green” sources of power. To date, however, these investments remain a very small part of the overall power infrastructure in the U.S., and a whole host of technological and economic factors make it challenging to scale up from the low single-digit percentages. In the face of technological, market and political uncertainty, hard mandates are not a wise way to introduce important new infrastructure.

This brief outlines the issues that make a continued reliance on market forces a prudent way to expand the state’s use of renewable energy sources.

THE INITIATIVE: THREE STANDARDS TO MEET

Initiative 937 would require all utilities with over 25,000 customers to meet standards for conservation and use of renewable energy sources or face monetary penalties.

Conservation. Each utility would be required to undertake “cost-effective, reliable and feasible” conservation measures, and work toward a rolling ten-year target for acquisition of power from conservation. The conservation plans would be based on standards set by the Pacific Northwest Electric Power and Conservation Council (PNWEPC). The state Utilities and Transportation Commission would have the authority to determine if a utility’s conservation plan is sufficiently aggressive.

Renewable energy acquisition – percentage target. Under the initiative, utilities would need to have at least 3 percent of their power coming from renewable sources after January 1, 2012. That increases to 9 percent in 2016 and to 15 percent by 2020. The initiative defines “renewable resources” to include not only wind power, but also solar, geothermal and tidal energy, as well as combustion of landfill and sewer gas, biodiesel



and various kinds of biomass. Traditionally, hydro has been the predominant source of renewable energy in the state. However, hydro power would not count toward I-937's renewable mandate, except to the extent that it stems from efficiency improvements to existing hydro projects or irrigation pipes and canals.

Renewable energy acquisition – spending target. Utilities that do not meet the percentage targets can come into compliance by spending at least 4 percent of their annual power acquisition budget on the incremental cost of renewable resources. This added cost is defined as the difference between the price of electricity from renewable sources and the price of electricity from non-renewable sources.

These targets and standards, once in place, must be met forever. The only exception is granted to very slow-growing utilities, which would not need to comply with the renewable energy targets, although they would still need to have conservation plans in place.

GOING WITH THE WIND

The initiative names a wide range of possible renewable sources of energy, but most of them have significant problems. Large scale solar power has proved elusive even in very sunny climates, so would seem to have little applicability in cloudy western Washington. Tides and waves are intriguing sources of energy, but the technology remains in its infancy and any large scale generating facility will face formidable environmental hurdles. Biomass and methane combustion would seem to contradict efforts to reduce greenhouse gasses.

The reality is, only wind power has the potential to provide significant quantities of electric power over the next 15 years. The technology has proven itself and is being deployed, often on a voluntary basis, around the world. Wind power does, however, come with some very real challenges that call into question its ability to provide 15 percent of the state's energy needs in a cost effective way by 2020. Among the difficulties with wind power are:

The wind does not always blow. Demand for electricity follows very predictable patterns, and most power generation facilities – hydroelectric or thermal – can be adjusted to meet demand. Production of electricity with wind, however, is very unpredictable. Some days the wind blows hard, and some days it does not blow at all. All the while, the power grid must get enough juice to keep the lights on.

This raises the challenge of integrating wind power into the generating system so that it can contribute meaningfully to the supply of electricity while not putting reliability of the system at risk on calm days. When wind power constitutes a low percentage of generating capacity, integration is not a big problem. A well-run power system has surplus capacity in case of emergency shutdowns, and this surplus can also be used to supplement wind power.

But as wind power becomes a larger percentage of the power portfolio, utilities have fewer surplus resources to call upon during the doldrums. Once the power requirements for “firming” and “shaping” of power from wind generating facilities outstrip the surplus in the systems, new supplemental capacity must be added. In all likelihood, that new capac-



ity would come in the form of natural gas fired turbines. So, although wind power should lower exposure to volatility in gas prices, the need to add supplemental gas turbines reintroduces that risk right back into the system.

The wind power industry lacks capacity. Over the past couple of years, the cost of purchasing wind generating equipment and building wind farms has increased by 50 to 70 percent. And right now, the backlog at wind turbine manufacturers stands at over 18 months (King). This strain on the capacity of the wind power industry comes from two sources. First, the federal production tax credit is about to expire, leading utilities to rush new plants into place while still eligible for a tax credit that makes a huge difference in the economics of wind. Second, mandates in other states have compelled utilities elsewhere in the country to rush wind power plants into production.

Meanwhile, on Vashon Island

While Initiative 937 aims to have 15 percent of the state’s electricity come from renewable sources, one local utility is aiming much higher. A group of citizens on Vashon Island have proposed a program to make the island 100 percent energy-independent.

The first step in the Vashon program is an aggressive pursuit of conservation, which proponents claim will reduce energy consumption by a whopping 70 percent. This would be followed by investment in a series of renewable energy generation facilities, including wind, tidal and biomass.

The Citizens for Vashon Public Utilities have submitted petitions for a November vote to create a new public utility district on Vashon to pursue conservation and renewable energy. The PUD would not compete with Puget Sound Energy, which would remain the provider of conventional gas and electric service.

Once formed, the PUD will likely find that actual conservation on a house-by-house basis is complicated and expensive.

The PUD will also find that “green” power is in the eye of the beholder, as each renewable source has its own environmental drawbacks. Wind, which is not nearly as steady on Puget Sound as in Eastern Washington, requires huge towers visible from expensive vacation homes. Tidal power is harnessed by underwater turbines that will interfere with marine life. Biomass combustion contributes to carbon emissions.

Vashon’s citizens may be surprised at the costs they incur by being the guinea pigs in a quixotic environmental and political experiment.

Ordinarily, a strong spike in demand like this would lead the industry to expand its capacity to produce equipment and build wind farms. But since both sources of demand pressure – tax credits and state mandates – derive from public policy rather than market economics, they cannot be relied on to produce any certain level of demand for products and services in the future. Thus, the wind power industry will be wary of expanding, knowing that the public policy climate could change at any time.

If the wind power industry cannot settle into a stable pattern of demand for its products and services based on natural market forces, utilities will have difficulty planning for new wind facilities, since the cost could move rapidly. The already shaky economics of wind power become really difficult with an equipment and construction industry that is small, fragmented and unstable. And because much of the equipment is manufactured overseas, wind power is subject to exchange rate risk.

Sites and views. Reliable wind blows in many areas of the state, some remote and unseen, and others quite visible. While many may view a wind farm on a distant ridge as an interesting curiosity while driving down the highway, they may take an entirely different view when the huge structures are proposed in scenic vistas.

Public objection to development happens all the time, but wind farms present some unique problems. “Visual pollution” is an almost entirely subjective

concept, and although we all agree it exists, there is no standard for what constitutes an unacceptable sight. And it will be a moving target, as awareness builds and the public begins to perceive a visual saturation point.

Public reaction to wind generating structures raises two concerns. First, because of the subjectivity of visual impacts, it is impossible to know



how many of the windy locations in the state that would be appropriate for wind generating stations will pass muster with the public. It is, therefore impossible to know how much of the potential wind energy in the state can actually be tapped. Second, utilities and regulators will come under pressure to mitigate the visual impact of wind generating structures, resulting in inefficient placement, higher costs, or both.

Thus, the initiative mandates erection of a very large number of wind generating structures, but provides no mechanism to ensure that they can be sited in the face of public opposition. The entire state is supposed to use renewable energy, but there will be no “fair share” provision to ensure that all windy areas of the state will host wind farms.

Transmission costs. Generating facilities themselves are just the beginning of the energy infrastructure. The second component is the transmission lines that move electricity to the grid. Wind power raises some challenges for the transmission network.

First, many windy areas are not near existing transmission lines, so new lines must be built. But because wind farms will not always be generating power, that new transmission capacity will be cold for periods of time, raising the overall average cost of transmission. Second, when wind farms do get their power to transmission lines, those lines may not have capacity at the time the wind is blowing. The costs to transmission systems of significantly increasing the use of wind power are not known and significantly more data is needed to know how to cost effectively expand transmission for wind (Bolinger and Wiser).

None of the issues raised here – consistency, industry structure, public opposition, transmission – is insurmountable. All are, in fact, being dealt with all the time. These challenges do, however, introduce costs to the energy system, especially as wind becomes a larger part of the portfolio. Although the initiative allows utilities – both public and investor-owned – to recover the reasonable costs of using renewable energy, the rate-paying public may not appreciate the added tab on their monthly bills.

Adding to the concern about costs is the impending expiration of the federal production tax credit at the end of 2007. This tax credit reduces the cost of wind power by as much as one third, making it competitive with more traditional sources of electricity (Bolinger and Wiser). Expiration of the tax credit exacerbates the cost problems that have arisen in the past few years.

MANDATE MADNESS

Renewable energy is nothing new – hydropower has been around since the dawn of the electric age – and the electric power industry is increasing its investment in it, primarily in wind. Fuel price risk and political risk make this necessary. Mandating a schedule for investment and a level of penetration of renewables is, however, a very unwise way to shift the portfolio. Mandates distort the market, placing utilities at a distinct disadvantage and burdening them with unnecessary added costs. With mandates, utilities lose leverage over:

Equipment and construction prices. As noted above, the wind power industry is small and lacks sufficient capacity to provide a strongly competitive marketplace. State mandates for renewables in California



and Nevada have increased demand for wind power facilities, driving up prices (Bolinger and Wiser). Mandates in Washington would have the same impact, forcing utilities to spend far more for wind power than they would in a truly competitive market.

Acquiring sites for wind farms. In a voluntary environment for wind power installation, utilities can negotiate with the owners of land in appropriately windy places for the right to install turbines. With no mandate and lots of sites still unused, utilities have a favorable bargaining position vis-à-vis land owners.

All this changes with a mandate, since utilities will have hard targets for new capacity. In its Fifth Power Plan, the PNWEPCC notes that only a few areas of the Northwest have had their wind potential measured, and of those, not all will have readily available transmission capacity and a favorable climate of public opinion. Thus, the owners of sites that can be developed in the near term to meet the initiative's mandates will have a very strong bargaining position. Utilities can expect to pay a high price for permission to locate their turbines.

Environmental mitigation. Siting large scale energy facilities is never without controversy, and those controversies are usually settled with some level of mitigation of environmental impacts. In a voluntary and competitive environment, utilities can factor in reasonable mitigation costs and, if those prove insufficient politically, walk away from a project.

But with a limited number of sites for wind farms, utilities will have less ability to walk away from a potential site, giving local citizen opponents a high degree of leverage over mitigation. Given the difficulty of mitigating the actual impact of a wind farm – hiding the towers would be self-defeating – we can expect demands for unrelated, off-site mitigation. And with the impossibility of placing a dollar value on visual pollution, the mitigation process would be open-ended.

Wind power is on its way, and mandates are not necessarily the driving force. A review of plans by utilities across the Western U.S. shows that as much renewable energy is being planned by utilities not under mandates as is being planned by utilities facing mandates (Bolinger and Wiser). The big difference between utilities under mandates and those not under them is that the latter have much more control over costs of site acquisition and development, equipment and construction. With mandates, the holders of monopoly resources – windy sites and technologies – have the upper hand, with predictable results.

The larger problem with mandates is that they force rigidity on a process that is highly fluid and unpredictable. If we have learned anything about the development of technologies over the past couple of decades it is that no one can accurately anticipate their direction. The timelines and processes of turning scientific discoveries into marketable, economically feasible products vary widely. Rigid timelines create a strong likelihood of driving utilities toward suboptimal investments in technologies that are not mature or that will be supplanted in the near future.

The PNWEPCC, while placing a high reliance on wind power in its future planning, acknowledges the many unknowns. The Fifth Plan calls for an incremental approach to wind power development, with a great deal of



data gathering and analysis needed before future commitments can be firmed up. The mandates of I-937 fly in the face of this sensible approach.

PAYING THE PRICE FOR RIGIDITY

Estimating the potential cost to the state of the renewable power mandates in I-937 turns out to be fairly easy. It is highly unlikely that utilities will be able to meet the 9 or 15 percent acquisition standards at a price they deem reasonable. That means that it is probable that utilities will fall back on the 4 percent spending standard to meet I-937’s requirements, and the impact of that standard can be anticipated.

As noted above, all the renewable sources named in the initiative, except wind, have significant problems and will at best produce very small amounts of power. So the question is, can the Northwest produce enough wind power to meet the 3, 9 and 15 percent targets in the initiative?

According to the NWPCC Fifth Plan, there are about 5,000 megawatts of potential wind capacity west of the continental divide. This is gross capacity, and must be reduced by a “capacity factor” that acknowledges the fact that the wind only blows some of the time. The Plan assigns capacity factors between 28 and 30 percent to this potential, meaning that the entire Northwest can count on less than 1,500 megawatts of new power from wind. The Plan’s development schedule anticipates this capacity will not be fully on-line until 2017.

The plan also projects that the total power needed by the Northwest will be 22,000 megawatts in 2015 and 25,400 megawatts by 2025. Thus, the Northwest’s entire known wind capacity could only supply 8 percent of the load in 2015 and 7 percent in 2025. Washington could get closer to its 15 percent target by buying up all the wind-generated power in the entire Northwest, but that seems unlikely.

So, although the Initiative calls for an ambitious 15 percent target, utilities will probably not be able to meet it. They will then need to fall back on the spending standard, dedicating at least 4 percent of their power expenditures to the

higher cost of renewable energy. In order to avoid the substantial penalties called for in the initiative, many utilities will opt to spend more than the 4 percent minimum, perhaps as much as 8 percent.

This extra spending on electricity purchases amounts to real dollars. According to the Department of Energy, Washington customers spent \$4.64 billion for electricity in 2004, for which they would have had to spend an additional \$185 million to meet a 4 percent standard, or \$370 million to reach 8 percent .

Using the WRC-REMI model of the Washington state economy, we project that these 4 to 8 percent higher electricity prices would cost the state 2,100 to 5,100 jobs in 2016 and 3,600 to 7,100 jobs in 2020. The model takes into account jobs that might be created in the energy industry, so there is no real economic upside to this higher spending on electricity. The spending standard simply reflects money wasted on less efficient electricity production.

The WRC-REMI Model

Economic impacts of I-937 were estimated using a model of the Washington State economy constructed specifically for the Washington Research Council by Regional Economic Models, Inc. (REMI). Because it allows supply and demand responses to changes in prices and wages, and permits substitution among factors of production, the WRC-REMI model is more elaborate than the standard input-output models commonly employed to estimate regional economic impacts.



CONCLUSION: CHANGE IS COMING – DON'T FORCE IT

Ever since the energy crises of the early 1970s, industrialized societies have been struggling to develop clean, reliable, economic alternatives to traditional sources of electricity. The results have been spotty, but continue, especially in the face of concerns about greenhouse gasses and instability in petroleum and natural gas markets. Energy is a very complex business, and progress has been slow. Although alternatives such as wind power have come into the mainstream lately, they still constitute a very small portion of the world's generating capacity.

Utilities will continue to experiment with new approaches to delivering reliable, cost effective power to their customers, knowing that change in generation technology is inevitable. Given the slow progress over the past 30 years, however, it seems doubtful that utilities will find magic solutions to renewable energy in the next 15 years that will enable them to meet the ambitious targets of I-937 in a cost effective way. The initiative, well meaning as it is, will likely result in a "tax" on ratepayers to pay for uneconomic power from sources that do not necessarily lead to real solutions.

There are enough forces in the market and political world right now to compel utilities to move into renewables. They should be able to do so on a timeline and with bargaining leverage that protects ratepayers.

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