

**Impacts of renewable energy diversification**  
**Bioenergy Day**  
**Oct. 18, 2017**

Good afternoon. Thank you for having me with you today to celebrate the fifth annual National Bioenergy Day. I am excited to be with you today to discuss renewable energy diversification, both its importance and its impacts.

**Diverse renewables contribute to energy security.**

What do we mean by energy security? Many of us here today lived through and remember the oil crisis of the 1970s. Think of that as the exact opposite of energy security.

The oil crisis was a direct result of dependence on foreign production. Oil consumption in the U.S. rose while domestic oil production fell. It was a recipe for disaster, and disaster was what we experienced. We relied heavily on a power source over which we as a nation did not have control.

In 1973, an oil embargo was enacted against the U.S., severely reducing the amount of oil we were able to import from the countries that produced it. Seemingly overnight, the cost of oil quadrupled, and our profound reliance on it meant that Americans did not have another option.

Whatever we were used to spending, we were, in a flash, spending four times that amount.

Cost was not the only issue. There were also serious supply challenges. Americans faced lines of sometimes miles at each gas station. American automobile manufacturers were suddenly facing stronger competition from foreign companies, who were making smaller, more fuel-efficient vehicles.



It was a serious situation and it was not solved overnight. When Jimmy Carter took office in 1977, it was such a problem that he made the energy crisis the top priority of his new administration. The central theme of Carter's first State of the Union was how America would regain control of its energy supply and destiny.

His dedication led directly to the formation of the Department of Energy, which was created to fight the energy battle and get the country back on its feet. One of the DOE's major weapons was hydropower.

I understand the importance of energy diversification. It is literally why Western Area Power Administration exists. It is an important and valuable tool to keep the country energy secure, and to ensure we never face an energy crisis on par with what we saw in the 1970s. Diversification keeps it at bay.

### **All-of-the-above energy strategy.**

As we talk about diversification of renewables, it is important to note that when we talk about renewables today, the average person considers only wind and solar. This type of narrow thinking will not suffice in this day and age. In the energy industry we know there is so much more.

The Deputy Secretary of Energy visited WAPA headquarters earlier this month. During his visit, he reaffirmed DOE's commitment to an all-of-the-above energy strategy. All-of-the-above needs to mean ALL OF THE ABOVE. Wind. Solar. Hydro. Biomass. Biogas. Geothermal.

Bioenergy remains an untapped resource that will be so important for our future. We need to ensure it is included in all conversations and remain top of mind with leaders across the industry and in our labs. We are working—at WAPA, at DOE and in the industry—to attract the best and brightest up-and-coming leaders and researchers and visionaries to leverage the very best of all renewable options. I am excited to be a part of it.



And as we increase renewable integration, it is imperative to consider how it will affect our essential reliability services, or ancillary services. For example, PJM in the east recently did an analysis on critical services such as frequency response, voltage control and ramp capability, measuring which resource types allow for which services.

We also have to understand critical items like blackstart require more than just variable renewables in that the criticality of need is immediate. If the sun is not shining, we cannot use a solar farm to repower the system. If the wind is not blowing, how will we turn the system back on?

For example, Hoover Dam is used as the black start for Palo Verde Nuclear Generating Station.

**Diversification minimizes impacts from boom and bust cycles.**

You are likely familiar with boom and bust cycles. We have seen it in the dot-com industry. We have seen it in the economy.

Diversification in finances and diversification in renewable resources minimizes the negative impacts from these cycles of boom and bust by keeping the bottom from falling out. When we draw energy from multiple resources, we are less subject to the whims of the marketplace. Should one of those resources fail us, whether from a commercial or logistical standpoint, we still have reliable power coming from other outlets. And reliability is the cornerstone of the service we provide.

This boom and bust has affected the energy industry, too. In 2008, the Spanish government introduced a feed-in tariff, designed to encourage residents to install solar panels. It worked. Solar installations increased 40 percent. That was the “boom” part of the cycle. So, of course, the “bust” followed. The feed-in tariff went away, the solar market died, and, just like that, it was over. Italy, Germany, the Czech Republic and more have all



experienced similar cycles. It happens, and diversification braces us for it, and robs these cycles of their catastrophic impacts.

### **Easier to meet energy needs.**

America has significant energy needs. That is a fact. America is number two in the world in terms of power consumption, right behind China. In 2012, the National Renewable Energy Laboratory—right down the street from WAPA’s headquarters office—estimated that America used 4,086,838,983,051 (four trillion, eighty-six billion, eight hundred thirty-eight million, nine hundred eighty-three thousand, fifty-one) kilowatt-hours of electricity annually.

That is a huge number, and one that energy providers work very hard all over the country to meet.

NREL also found, however, that the United States has enough in the way of renewable resources to meet that need. Wind, sun, biomass, geothermal heat and, of course, hydro can generate enough power in combination to power the needs of every American citizen.

In fact, it can generate 118 times the amount of electricity NREL estimates we use. It would be foolish if we did not tap into these resources, use them in intelligent and sustainable combinations and encourage diversification in this regard. Our beautiful country is ready to generate far more energy than we will need for the foreseeable future. It would be disrespectful not to take advantage of that.

And thinking back to that huge number... we know our energy needs are only going to increase. As we continue to connect and interconnect so many aspects of our lives, as we continue toward increased electrification (think transportation, communication, smart-technologies, and things we have not yet dreamt up), we will require and consume even more energy. Where will it come from? How can we ensure its reliability?



We must stay ahead of these advances and not be TOO quick with our integration. If the goal is to reduce carbon, we have to engage the transportation sector. And converting the transportation sector to electricity will require a robust system to manage that transformation.

The need to balance our system is critical. WAPA has to worry not just about energy, but that there are sufficient resources to ensure other valuable renewables have back up in capacity somewhere. We are entering a world where, in some places, there is no value for capacity... only value in energy. This may give us a lopsided system.

Regardless of what federal action may come in the United States, carbon policy or carbon economics are coming. States, markets and individuals are moving to lower carbon options. That is the good news. And also the system challenge.

### **Diversification of renewable energy enhances national security.**

The Energy Information Administration estimates that the U.S. imports around 60 percent of its oil. This goes back to our first point about energy security, and about the importance of not putting all of our electric eggs in one basket.

It also helps us from a national security standpoint, however. The more we rely on one energy source, the more likely that source is to be targeted by those who seek to attack us and render us helpless. A successful strike on a generating station can render hundreds of thousands, if not millions, of citizens without power.

Diversification, though, means that attacks on our power generation can only be so successful. If a coal-fired powerplant goes down, hydropower can keep systems running. If a large solar farm is attacked or dismantled, a wind farm can keep emergency operations running smoothly.



Diversification means that we have the infrastructure to allow multiple resources to keep our lights on. That is a benefit we need to plan for ahead of time. The more sources from which we draw our power, the more difficult it will be for outside attackers to successfully take us offline.

We have options. Convenient options. Important options. And we should use them.

