Wind Power and Clean Energy Policy Perspectives

Rick Dunn, General Manager

Commissioners:
Barry Bush
Jeff Hall
Lori Sanders

July 14, 2020

Executive Summary

Clean energy technology and public-policy development continue to be in the news and at the forefront of much political debate and discussion. While wind power has emerged as a popular choice for helping meet greenhouse gas emission reduction goals, reasonable questions continue to be raised regarding its ability to cost-effectively contribute to the powering of modern civilization and how the lifecycle environmental and ecological impacts compare to other types of technologies.

With Washington State's passage of the Clean Energy Transformation Act (CETA) in 2019 and the current schedule for expiration of renewable energy federal tax credits, there is a resurgence in proposed wind power development activity in the Pacific Northwest (PNW), including projects proposed for eastern Washington and Benton County specifically.

As developers and many elected officials tout the economic and environmental benefits of wind farms, Benton PUD believes it is important for our customers and the general public to hear utility perspectives. Unlike the narrower focus of some wind power interests, utilities must balance environmental benefits and concerns with costs and power grid reliability; and we will be held accountable if we fail on any of these dimensions.

While Benton PUD acknowledges wind power development in the PNW will likely continue as Washington State utilities respond to the 2025 CETA deadline for eliminating coal-fired energy and in response to nearby state and corporate clean energy mandates and goals, we do not support further development of wind power in the PNW for the following primary reasons:

1) Benton PUD's current power supply is hydro and nuclear based and is over 93% "non-emitting" by Washington State standards. While we are ahead of the clean energy curve, we do experience supply deficits during hot summer months and deeply cold winter periods. To cover these deficits, we make power market purchases from generation resources that can be counted on to run on the days and hours needed (dispatchable). Since wind power relies on natural weather conditions decoupled from electricity demand, it is not dispatchable generation and therefore will not help us resolve our seasonal energy deficit problems.

2) The PNW's hydroelectric generation resources are the foundation of a reliable and clean energy supply that has historically resulted in Washington State contributing no more than 0.5% to the nation's annual total greenhouse gas (GHG) emissions from electricity production; even with soon to be retired coal-fired power plants in the mix. Further development of wind power in the PNW will not result in consequential reductions in national or global GHG emissions attributable to Washington State utilities and will do very little to mitigate the increasing risk of northwest power grid blackouts; which could grow to a 26% probability by 2026 if utilities are unable to replace the reliable generating capacity of shuttered coal plants.

3) The low availability of wind power requires utilities to continue paying for dispatchable generation capacity that may run infrequently but is still sized to meet most of the peak energy demand on the grid. This "double paying" is why electricity rates in countries and states with high wind penetrations are rising despite the declining costs of this popular renewable energy source. Benton PUD believes further wind power development will unnecessarily contribute to increases in northwest utility retail electricity rates which could erode the economic development advantage low rates has given our region for many years.

4) Energy production from wind farms in the PNW is often high during periods of maximum hydro generation contributing to energy gluts that can drive short-term market prices to zero or even to negative values due to federal tax credits received by wind power. To minimize the net cost of hydro generation the region needs for year-round flexible and reliable electricity, the value of surplus hydro energy sales needs to be maximized. Building more wind farms in the PNW will contribute to untimely energy supply gluts and low short-term market prices which reduces surplus hydro energy sales revenues, increases net hydro power costs and puts upward pressure on retail rates Benton PUD and other utilities charge our customers.

5) Benton PUD believes the best long-term, sustainable and environmentally responsible strategy toward meeting the CETA goal of 100% clean electricity in Washington State by 2045 could be to transition coal power to natural gas and then natural gas to nuclear. It is estimated wind power requires 30 to 45 times as much land and about 10 times as much concrete and steel to produce the equivalent power of nuclear. In addition, a recent study estimates that assuming hydro and nuclear power in the PNW stay in place, meeting a theoretical 100% clean electricity goal in our region using wind (and solar) power would require a land area 20 to 100 times the area of Seattle and Portland combined.

6) Benton PUD supports Energy Northwest (EN) in their efforts to develop small modular reactor (SMR) technology. However, we are concerned continued large-scale investments in PNW wind power projects will contribute to increases in the normally surplus annual energy supplies in the region thereby eroding the hourly energy supply opportunities needed by SMRs to achieve economic feasibility. Maintaining the existing Columbia Generating Station operations while expanding SMR technology development and possible manufacturing in the Tri-Cities represent opportunities for economic stability and growth in an area with a long history of grid-scale energy production and world class scientific research capabilities.

As some legislators and certain advocacy groups continue to call for more wind power while simultaneously calling for removal of hydro-electric dams, Benton PUD believes it is important

for our customers and citizens of Washington State to hear the utility side of the energy story. To this end, we are committed to facilitating education and outreach efforts based on the premise that all energy choices represent economic and environmental tradeoffs and that consideration of utility business models and the physics of the power grid matter when taking a position to promote one form of power generation technology over another.

Existing wind farm development in Washington State and along the northern Oregon border has already resulted in the industrialization of previously scenic hillsides, canyons and desert vistas in the region in and around Benton County. Before Benton PUD customers and citizens throughout our region accept further sacrifice of the natural beauty and open spaces that are part of our way of life, we want them to know there are other options we should be asking our legislators and utility industry leaders to urgently and seriously consider. This is the reason for this report and for our formal declaration that Benton PUD does not support further development of wind power in the PNW.

Existing Power Resources and Loads

Despite clean energy policies and trends favoring wind and solar power, continued development of wind farms in the northwest is not expected to be necessary or beneficial to serving the interests of Benton PUD customers for at least the next decade or more. This is primarily due to our hydro and nuclear rich wholesale power supply contract with the Bonneville Power Administration (BPA) which entitles Benton PUD to annual energy amounts that are normally greater than what is consumed by our customers. In addition, our BPA contract in combination with other energy purchases and contracts results in a power supply that is already over 93% "non-emitting" and clean by Washington State standards.

With this said, it is important to recognize Benton PUD does face significant power supply challenges under the terms and conditions of our current BPA contract. These challenges are rooted in the timing of BPA energy delivery which does not always align with our customer demand for electricity. Benton PUD is a "summer peaking" utility with our highest customer demand being driven by irrigated-agriculture pumping operations combined with high residential and business air conditioning; see FIGURE 1.

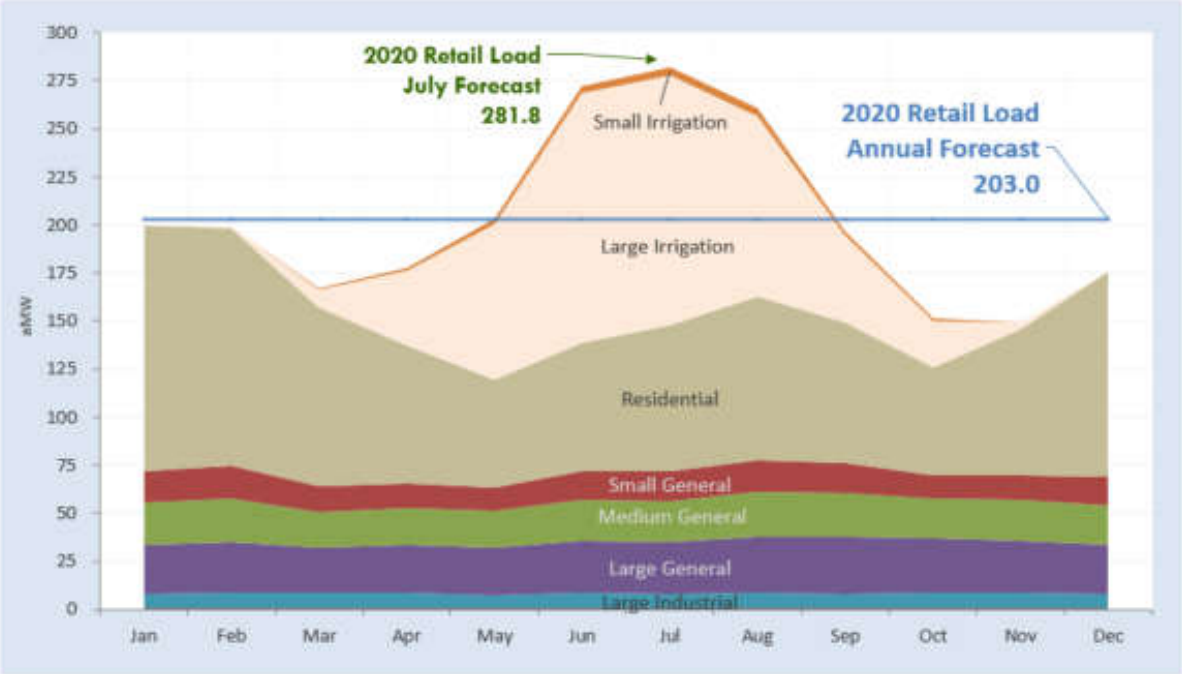

FIGURE 1

As a "Slice" customer of BPA, Benton PUD has rights to a fixed percentage of the electricity generated by BPA resources for any given hour of the year which can be highly variable. As BPA resources are predominantly hydro-electric, the variability is driven by the timing and quantity

of runoff from snowpack as well as short term precipitation events which must be managed to serve interests that compete with power generation; including fish and wildlife, flood control, river navigation and recreation.

To gain further perspective, it is instructive to know that Benton PUD's annual allocation of BPA wholesale energy in typical water years delivers about 225 average megawatts (aMW) which is more than our total annual customer retail energy consumption forecast beyond the year 2030. On average, our BPA supply is currently 11 aMW more than our customers consume on an annual basis. However, while Benton PUD currently has a "long" annual energy supply position, we do experience regular seasonal energy supply deficits in the summer and on occasion can come up short during deep cold periods in the winter. These seasonal energy supply shortfalls, referred to as capacity deficits, are a function of Benton PUD's dependence on the availability of "fuel" (river flows) for BPA's hydro resources which can vary significantly from year-to-year and month-to-month; see FIGURE 2.

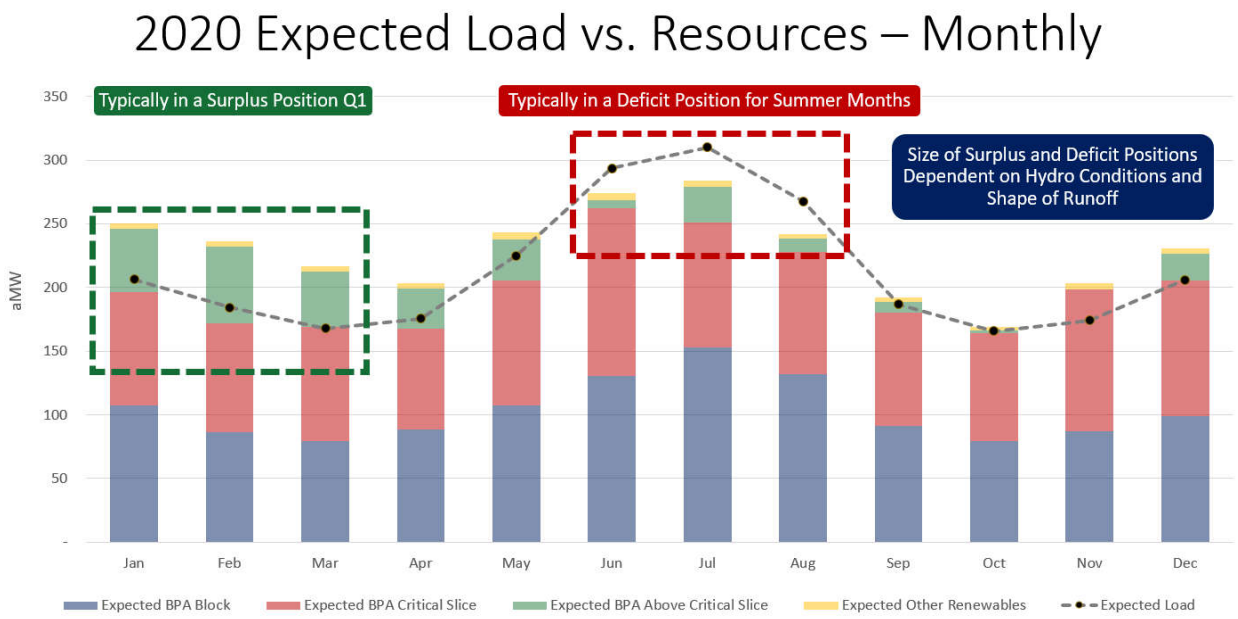

FIGURE 2

Under Benton PUD's Slice contract with BPA, they are required to guarantee delivery of firm monthly energy represented by the combined total of a "Block" and "Critical Slice" amount. The "Above Critical Slice" is the amount of energy BPA is forecasting will be available to Benton PUD but not guaranteed. Slice customers can re-sell surplus energy received from BPA when supply exceeds what is required to serve customer loads but in return must accept and independently manage the risk that loads may be higher than the available BPA supply.

Any forecasted capacity deficits require Benton PUD to make purchases from wholesale electricity markets in order to augment our long-term power supply contracts. Consequently, we have people, processes and contracts in place to be sure our customer electricity demand is completely supplied on an hourly and around the clock basis. Benton PUD's wholesale electricity purchases are typically made in short-term monthly, weekly, day-ahead and hourly markets from generation resources that can be counted on to run on the days and hours needed (dispatchable). These dispatchable generation resources provide needed capacity to cover energy supply deficits that occur on the hottest and coldest days of the year.

Since wind power relies on natural weather conditions decoupled from electricity demand, it is not a dispatchable generation resource and therefore development of more wind power will not help Benton PUD resolve our seasonal capacity deficit problems; particularly our most acute deficits which occur in summer months with very low levels of wind. We are also concerned that preferences for wind power risk under investment in dependable and dispatchable natural-gas generation plants most utilities believe will be essential for replacing the capacity of coal-fired plants being rapidly retired and shut down in the Pacific Northwest and throughout the western United States.

While wind energy developed on a large scale can be a substitute for much of the annual energy produced by fossil-fueled power plants, it cannot provide the equivalent capacity required for balancing electricity supply and demand on an around the clock basis, and under a wide variety of weather conditions. Because the northwest is so dependent on the availability of water for hydro-electric generation, the coldest and hottest days of a year in which water resources are at a critically low level are of particular concern for electric utilities and is why other reliable and dispatchable generation must be standing by and ready to run on demand. When power grid supply does not meet demand on a moment-by-moment basis, blackouts can occur. Benton PUD is concerned that a deepening dependence on wind power as a replacement for energy produced by coal plants in the northwest could have serious consequences in the not-too-distant future if grid operators are faced with the simultaneous occurrence of drought conditions (low hydro power production), extreme temperatures, low wind and not enough dispatchable electricity generators to meet peak customer demands.

To gain further perspective, it is also instructive to consider Benton PUD's 11 aMW "long" BPA annual energy position in the context of customer growth which is currently forecasted to result in an increase of about 0.4 aMW of energy consumption per year. This relatively low growth rate is driven by our continued investments in effective conservation measures as well as improvements in the energy efficiency of new homes and businesses. In the simplest analysis, Benton PUD's expected annual supply of BPA power represents over 27 years of

customer growth which means we are not currently looking to add substantial amounts of "baseload" annual energy to our power supply portfolio from wind power or other resources.

With this said, new large loads associated with electricity intensive businesses or industry locating in Benton PUD's service territory are a wild card that could require acquisition of new generation resources. Another resource acquisition driver could be preferences for wind and solar power which are often used to brand businesses as sustainable. In either case, given the requirements of Washington State's Clean Energy Transformation Act (CETA) and other clean energy policies and preferences in adjacent states and regions, wind and solar power may be the only significant energy resources available to meet a future Benton PUD need. While not ideal, we would choose solar power over wind given that solar energy production curves are better aligned with our summer peaking load profile and would contribute to reducing our regular summer capacity deficits on most days.

Existing Wind Power Resources

Currently, Benton PUD's power supply portfolio includes wind energy through direct contracts from the Nine Canyon (9 MW) and White Creek (9.1 MW) projects delivering about 5.7 aMW of total energy on an annual basis. These contracts were initiated by Benton PUD in response to the qualifying renewable energy requirements of Washington State's Energy Independence Act (EIA) which initially did not include energy from existing hydro generation.

In addition to direct wind power purchases, Benton PUD's contract with BPA includes an allocation of about 1.4 aMW of their wind portfolio's annual energy production. All the wind resources in Benton PUD's portfolio along with BPA's hydro generation resulting from incremental improvements to turbine-generator efficiency (incremental hydro) are considered EIA qualifying renewable energy. This means energy from these resources provide a renewable energy credit (REC) for every megawatt-hour of electricity generated.

REC allocations and purchases are how Benton PUD meets the renewable portfolio standard (RPS) currently required by EIA mandates. In 2020 Benton PUD will need a total of about 30 aMW of REC allocations and purchases each year to meet the current 15% RPS requirement. We plan to meet our compliance requirement with 7.1 aMW of total wind power RECs from Nine Canyon, White Creek and BPA; 2.6 aMW of BPA incremental hydro REC allocations; and 20.4 aMW of REC purchases from other entities, including wind farms.

It is important to emphasize that a REC is a certificate corresponding to the environmental attributes of energy produced from qualifying renewable resources and does not necessarily

represent purchases of physical electricity. While Benton PUD has contractual rights to the electricity produced by the Nine Canyon and White Creek projects, it is usually surplus to our annual customer energy requirements except under a worst-case low hydro generation scenario.

With that said, Benton PUD's share of Nine Canyon's physical electricity is always scheduled to supply our load with the net effect during low customer load periods of increasing our BPA hydro surplus which we sell in regional wholesale electricity markets. Due to power scheduling complexities, Benton PUD's share of the White Creek project's physical electricity is bundled with other utility shares and sold to another counterparty at a price currently well below the relevant market power index. This below index pricing is an indicator of the reduced value of wind energy compared to other more dependable generation resources.

Revenues from the sales of physical electricity attributed to Nine Canyon and White Creek are considered as offsets to the total annual cost of Benton PUD's EIA renewable-energy compliance which is budgeted to be $3.8 million in 2020. We expect to continue to rely on REC purchases as the primary means for meeting EIA mandates with some relief possible in 2030, depending on CETA rules which are currently under development.

Benton PUD considers the incremental cost and dependence we have on continued operation and development of wind and solar power for REC purchases as a perverse outcome of EIA mandates given our extraordinarily clean power supply and surplus annual hydro and nuclear-based energy position.

Surplus Energy and Market Sales

With respect to Benton PUD's net annual surplus of energy, it is important to understand the timing of when most surplus hydro generation occurs. For Benton PUD, the best combination of market price and volume of surpluses occurs in January through March with the highest volume and lowest prices occurring in April and May. When our hydro supply exceeds customer demand, our BPA contract allows us to sell the surplus energy into wholesale electricity markets. The revenues generated by our sales have the effect of buying down our annual wholesale power costs.

Energy production from wind farms in the northwest can also be high during periods of maximum hydro generation contributing to energy gluts that can drive market prices to zero or even to negative values due to federal tax credits received by wind power. The wholesale electricity market distortions created by wind power tax credits combined with the availability

of abundant and low-priced natural gas has driven market prices to very low levels in recent years. Consequently, the value of Benton PUD surplus hydro energy sales has been significantly reduced from over $50 million in 2008 to under $20 million today.

While there are efforts underway centered on possible expansion of the Western Energy Imbalance Market (EIM) to an extended day ahead market (EDAM) that could increase the economic value of BPA hydro flexibility and capacity, Benton PUD believes further development of wind power in existing "energy only" wholesale markets will continue to contribute to the devaluation of hydro. To be clear, Benton PUD believes abundant and low-cost natural gas has been the major driver of wholesale electricity price reductions but building more wind farms will contribute to downward pressure on prices.

Overall, the erosion of the market value of hydro energy has resulted in upward pressure on the prices BPA charges Benton PUD and consequently on the retail rates we charge our customers. Since 2007, BPA's revenues derived from market sales have dropped from over $400 million to under $200 million in some years which leaves them looking to their ratepayers to make up the difference. Benton PUD's net power supply costs are budgeted to be $84 million in 2020 which is up 40% since 2010 when actual costs were $60 million.

Oversupply and Curtailments

Additional concerns regarding the development of more wind power are oversupply and curtailments which are well described in a report developed by Harvard University for the Bonneville Power Administration in May 2018.[1]

> *…As more intermittent renewable energy is added to the grid it creates oversupply, particularly during low demand hours, when generation exceeds load. Oversupply causes low or negative prices for wholesale energy during periods of overgeneration. When scheduled generation exceeds scheduled demand in the hour-ahead market, the price of energy falls below zero in an attempt to balance supply and demand. After accounting for changes in generation and load between the hour-ahead and real-time markets, if generation still exceeds load and there are no more generators willing to receive payments to reduce their output, then balancing authorities must order generators to curtail output to maintain system frequency. Negative bids often represent the lost opportunities for the generator to take advantage of tax credits for renewable energy production.*

[1] Patricia Florescu and Jack Pead, "*Realizing the Value of Bonneville Power Administration's Flexible Hydroelectric Assets*", 12, 13, 14, Mossavar-Rahmani Center for Business & Government, Harvard University, May 2018.

> *…Due to the Pacific Northwest's reliance on hydroelectricity, oversupply becomes more problematic in the springtime when both river flows and wind generation are high. Under those circumstances, extra water can be spilled from the dams so that it does not contribute to oversupply, but too much spill exceeds water quality standards and can harm fish and other aquatic species. If water cannot be spilled, it must be passed through the hydropower turbines, thus generating electricity.*
>
> *For conditions like these, BPA implemented the Oversupply Management Protocol, under which non-hydrogeneration is displaced to protect aquatic life and maintain system reliability. Displacement decisions are made according to a least-cost displacement cost curve that lists generation in order of cost, from the least cost facility to the highest-cost facility, until the required displacement quantity is achieved.[53] After a federal court case concluded in 2011, BPA enacted a new protocol that compensated wind generators for lost revenues from curtailment and assigned the costs of curtailing generation during oversupply events to BPA transmission customers.[54]*

While Oversupply Management Protocol costs have not been extremely high[2] relative to other costs incurred by Benton PUD through our BPA transmission contract, we are concerned more wind power on the grid will contribute to increases in BPA costs and will add more complexity to the already difficult balancing act of managing river flows to meet the competing interests of power generation, environmental stewardship, barging operations, flood control and recreation.

Pacific Northwest Resource Adequacy Challenges

The Pacific Northwest's clean hydroelectric generation resources are unmatched anywhere in the United States and are the primary reason Washington State contributed on average no more than 0.5% to the nation's annual total greenhouse gas emissions from electricity production each year between 1980 and 2017[3]; even with coal plants in the mix.

While our already clean electricity sector is the envy of the nation, policy makers in Washington State have set the course for 100% clean by 2045 through passage of the Clean Energy Transformation Act (CETA). While a long-term goal like this is clearly aspirational at this point,

[2] BPA's displacement costs of OMP were around $4.87 million in 2018 and $2.2 million in 2017 https://www.bpa.gov/Projects/Initiatives/Oversupply/Pages/Annual-Oversupply-Review.aspx.
[3] U.S. Energy Information Administration, "*State Carbon Dioxide Emissions Data*" https://www.eia.gov/environment/emissions/state/.

the near-term consequences of CETA's underlying requirements are significant and very concerning when it comes to maintaining power grid reliability. The most consequential requirements are the explicit removal of coal power from utility portfolios by 2025 and the "social cost of carbon" which must be used as a cost adder when utilities evaluate investments in new generation resources. As intended by legislators, this cost adder will have a chilling effect on investments to construct new natural-gas power plants which utilities would normally consider to be the logical replacement for dispatchable capacity associated with retiring coal plants.

Unfortunately, CETA along with other anti-fossil-fuel sentiment in Oregon and California energy policies has put northwest utilities in a position where it appears only wind and solar power along with batteries, pumped hydro and customer load curtailments (demand response) will be allowed to try and solve utility capacity deficits. The problem is that science, economics and project development cycle times indicate the politically preferred technologies are not ready to provide solutions at the scale needed to mitigate the already unacceptable increase in the risk of blackouts projected for the Pacific Northwest beginning in 2021[4]. In their most recent assessment, the Northwest Power and Conservation Council (NWPCC) estimates that accelerated coal-plant retirements could increase the likelihood that generating capacity will not be adequate for meeting demand to a level of 26% by 2026. This is well above the 5% threshold established as the limit for an adequate regional power supply.

Benton PUD is a relatively small player in the northwest grid, but our seasonal capacity deficits are significant. This is why we joined forces with other members of the Public Generating Pool (PGP) and several investor owned utilities to co-fund a study by E3 Consulting[5] of what will be required to maintain power grid reliability in the Pacific Northwest while further de-carbonizing the electricity sector. This study found that deep de-carbonization is possible but that natural gas fired generation will be needed to maintain power grid reliability; it would just run infrequently.

While development of wind farms may be politically fashionable and appeal to many in the general public as a harmonization of nature with electricity production, the science and economics indicate powering modern civilization with intermittent generation resources like wind and solar power comes at a high financial and environmental cost. E3's study concludes that increasing the Pacific Northwest's inventory of wind power from the 2018 level of 7

[4] Northwest Power and Conservation Council, "*Pacific Northwest Power Supply Adequacy Assessment for 2024*": October 2019.
[5] Energy+Environmental Economics, "*Resource Adequacy in the Pacific Northwest"*: Public Generating Pool, March 2019.

gigawatts to a level of 38 gigawatts by 2050[6] would only result in an effective capacity contribution from wind of 19%. In other words, a more than fivefold investment in wind power which E3 estimates would cover an area as much as 37 times the combined areas of Seattle and Portland, would only allow regional utilities to count on 19% of the capital investment to produce electricity when it is most critically needed. The E3 study also estimates the area required to achieve a theoretical 100% clean electricity sector in the northwest using only wind and solar power (assuming existing hydro and nuclear stay in place) would require a land area as much 100 times the combined areas of Seattle and Portland.

On November 12, 2019 Benton PUD Commissioners adopted Resolution 2523 in support of actions to ensure electric sector resource adequacy in the Pacific Northwest. This resolution provides a sound argument for why northwest utilities have serious concerns regarding the reliability of the northwest power grid and why Benton PUD questions the wisdom of continued development of large numbers of wind farms in our region when we are facing potentially serious consequences associated with power grid blackouts.

Other Considerations

The "fuel" for wind power is dilute and intermittent requiring additional investments in backup generation technologies to meet the always-on requirements of power grids. While developers and advocates often tout continued reductions in the cost of wind energy, the low availability of wind power requires utilities to continue paying for dispatchable generation capacity that may run infrequently but is sized to meet most of the peak energy demand on the grid. This "double paying" is why electricity rates in countries and states with high wind penetrations have risen significantly amid claims of low-cost renewable energy.

CETA together with the Energy Independence Act (EIA) appears to have established an undefined increase in Washington State's renewable portfolio standard (RPS) which will undoubtedly lead to some level of double paying in Washington State. Establishing preferences for wind and solar energy with no accompanying targets for greenhouse gas (GHG) emission reductions in the electricity sector has been shown through comprehensive study to result in unnecessary increases in the cost of electricity while not reducing GHG emissions in the most cost-effective manner possible[7].

[6] 38 gigawatts of nameplate wind power capacity is what E3 determined would be required in an optimal scenario to reduce greenhouse gas emissions from electricity production by 80% below 1990 levels; an often-quoted goal from the Intergovernmental Panel on Climate Change (IPCC).

[7] Energy+Environmental Economics, "*Pacific Northwest Low Carbon Scenario Analysis - Achieving Least-Cost Carbon Emissions Reductions in the Electricity Sector*": Public Generating Pool, December 2017.

Additionally, the land area required for wind turbine construction and transmission lines needed for grid interconnections can be immense and the negative ecological and environmental impacts of this "energy sprawl" may outweigh the perceived or real benefits. Benton PUD believes lifecycle economic and environmental impacts expected to result from further development of wind power need to be scrutinized to a much higher degree with greater recognition of issues like the global impacts of raw materials mining and the disposal of wind turbine blades which are currently destined for landfills.

Benton PUD acknowledges every source of energy production takes a toll on the environment but believes wind power is often given a pass due to its popularity with policy makers and many in the general public. One source estimates wind power requires about 30 to 45 times as much land to produce a comparable amount of power as nuclear and that concrete and steel requirements for wind are about 10 times greater[8]. We believe these are important and relevant considerations as investments are made in power generation projects that will have long lasting environmental and financial impacts.

Benton PUD supports provisions of CETA that count hydro and nuclear energy toward the 100% clean by 2045 objective. However, we believe a more cost-effective and potentially less risky trajectory toward this goal would have been to allow for the transition from coal to natural gas and to promote an increase in the development of nuclear energy as the best long-term and sustainable strategy. We believe it is reasonable to suggest the most balanced and environmentally responsible actions you can take to "clean up" the electricity sector is to produce as much low or non-emitting electricity as possible in the smallest area possible. This seems to be best accomplished with energy dense fuels like natural gas and uranium.

Benton PUD supports EN in their efforts to develop small modular reactor (SMR) technology. However, we are concerned continued large-scale investments in wind power will substantially increase the normally surplus annual energy supplies in the Pacific Northwest (PNW) thereby eroding the hourly energy supply opportunities needed by SMRs to achieve economic feasibility. According to the Bonneville Power Administration (BPA)[9] the generating potential from federal and non-federal hydro projects in the PNW can vary by almost 7,000 aMW annually and by almost 14,000 aMW in some months, depending on project operations and the availability of water. But even in the worst water years, the PNW region is projected to have annual firm energy surpluses for the next ten years, assuming the region's 4,000 MW of uncommitted independent power producer (IPP) generation capacity is available to serve regional loads. Adding to this "long" regional energy position with continued development of

[8] Robert Bryce, "*Power Hungry – The Myths of "Green" Energy and the Real Fuels of the Future"*: Pages 84, 91.
[9] Bonneville Power Administration, "*2018 Pacific Northwest Loads and Resources Study*": April 2019, Section 3.

large-scale wind farms does not bode well for the development of SMR based generating projects given their relatively high capital costs and the need for lots of run time in order to reduce energy production costs to levels that will make them competitive with other technologies.

Conclusions

It appears additional wind farm development in the Pacific Northwest (PNW) is gaining momentum and is a foregone conclusion in the minds of many legislators, members of the general public and even some utilities. Benton PUD believes it is reasonable to question whether continuing to favor investments in intermittent wind power and putting up roadblocks to the development of dispatchable natural-gas power plants is more about environmental virtue signaling than it is about serving the best interests of the citizens of Washington State.

There is no denying the fact that thanks to abundant PNW hydro energy, Washington State has historically been one of the lowest contributors to electricity sector greenhouse gas (GHG) emissions in the United States and that electricity sector contributions to total statewide GHG emissions have been only 16 to 19%[10], even with coal plants in the mix. Put another way, what urgent "dirty energy" problem are we attempting to solve through the aggressive timelines and technology restrictions of the Clean Energy Transformation Act (CETA) that is worth sacrificing vast amounts of our natural landscapes and risking blackouts that jeopardize the health, safety and wellbeing of northwest electricity customers?

While language exists within CETA requiring future reporting to the governor's office to address concerns with power grid reliability, it appears legislators do not believe the risk of blackouts is real. If they did, they would accept the results of already existing utility studies and immediately begin to work on modifications to CETA to remove disincentivizes for the development of dispatchable natural gas plants needed for replacing retiring coal-plant capacity. So, at this point, investor owned utilities are announcing plans for new wind power projects to meet CETA deadlines, and along with all northwest utilities, are hoping the efforts of the Northwest Power Pool (NWPP) to develop power-generation resource adequacy standards can be completed and implemented in time to avoid blackouts[11].

Benton PUD strongly supports the efforts of the NWPP, but we do not support further development of wind power in the PNW. We believe continued investments in large-scale wind farm development in the PNW will: (1) contribute very little to keeping the regional power grid

[10] Department of Ecology State of Washington, "*Washington State Greenhouse Gas Emissions Inventory: 1990-2015 Report to the Legislature*,": December 2018, Publication 18-02-043, Pg. 6, Table 2.
[11]Northwest Power Pool Resource Adequacy: https://www.nwpp.org/about/workgroups/12

reliable and will not help Benton PUD solve our seasonal energy deficit problems; (2) contribute to the devaluation of hydro-generation assets and put upward pressure on retail rates Benton PUD and other utilities charge our customers; (3) risk underinvestment in needed dispatchable capacity today and future investments in visionary advancements in nuclear energy technology; (4) further sacrifice scenic hillsides, canyons and desert vistas in our region for little if any net environmental benefit.