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I am pleased to be here today to participate in this important discussion about the future of the country's transmission system. This has been an important topic in the western United States for the past decade and we have made significant progress on multiple fronts. At BPA, we operate over 15,000 miles of high voltage transmission lines and play an important role in maintaining system reliability in the Pacific Northwest. In recent years, through our experience planning, financing and building several new high voltage transmission lines and integrating over 4,500 megawatts of wind energy into our transmission system, we have learned a few lessons that I would like to share today.

First of all, transmission investments are extremely capital intensive. At BPA, we have been spending $200 million per year to sustain our existing $4.3 billion transmission asset base and another $400 million per year over the past five years on system expansion. Transmission investments must be based on a solid business case with clear cost recovery and cost allocation mechanisms. This means carefully understanding current and future demand, and identifying credit-worthy counterparties who can provide the necessary financial security to support the investment and bear the costs of construction over the long term. Regulators and policymakers who want to see the grid expanded can help support the necessary investments by providing their utilities with appropriate cost recovery assurances and mechanisms.

The siting of new transmission lines continues to be extremely difficult. At BPA, we are in the process of constructing two new 500 kilovolt transmission lines near the Columbia and Snake Rivers and permitting another in the densely populated Interstate 5 corridor. The siting and permitting challenges are very significant. It is unequivocally the responsibility of utilities to work closely with affected communities, sovereigns and stakeholders to ensure that new transmission facilities are sited with minimal impact to local resources. But we also continue to need much greater coordination between federal, state and local permitting organizations if we are going to be able to build the necessary infrastructure to maintain reliability and integrate new resources in a timely and cost-effective fashion.

The traditional transmission planning paradigm has focused on building new facilities. We have also found that non-wires solutions can be equally important in certain circumstances. The use of demand response and distributed generation to manage grid congestion can also help to make the best use of existing transmission resources - an increasingly important objective in today's operating and permitting environment.

Sub-regional and inter-regional transmission planning are very important components of building out the grid. Entities such as NTTG, ColumbiaGrid and WestConnect provide valuable coordination among and between their members to help plan the grid on a one-utility basis. WECC also provides a very important overall planning look at needs and impacts across the entire interconnection. We need to continue to improve coordination among utilities, subregional entities and WECC.

Turning to the issue of transmission operations, in 2002 we had 175 megawatts of wind energy interconnected to the BPA transmission grid. Today, we have 4,500 megawatts and our partner utilities in other parts of the West are experiencing similar growth in renewables, especially solar. While providing zero-carbon energy to the system, wind and other variable resources increase the demand for system flexibility. At BPA, we have relied primarily on our hydro resources for such flexibility, but we are now at the limits of what the hydro alone can provide. As a result, we have begun accessing additional sources of system flexibility including traditional gas generation and demand response resources. Whereas traditional resource adequacy planning has focused on capacity and energy, the third dimension of *flexibility* is now equally important to overall system reliability. Like California and other parts of the West, utilities in the Northwest must now ensure that their new capacity resources can also operate flexibly in tandem with variable energy resources.

Regional coordination among utilities is as important today as it has been in the past. Coordinated balancing authority operations helps to spread variability over a wider system footprint which over time can help reduce the overall demand for system flexibility and make best use of existing resources. At BPA we have been working closely with our colleagues at PacifiCorp and the California ISO to help them implement their new energy imbalance market while ensuring that there are not negative operational or economic impacts on Northwest customers. We are learning quite a bit through this partnership and hope to apply these learnings to our work on market design through the Northwest Power Pool. BPA and our partner utilities in the Power Pool have been coordinating our operations and developing ways to maximize reliability and lower costs since the 1940s. Building on this legacy of regional coordination, we are developing new reliability tools and also exploring a potential sub-hourly market within the Pacific Northwest that will honor longstanding concerns about governance and local decision-making.

Real-time situational awareness is another critical requirement for today's transmission system. Working with our colleagues at DOE and other partners in the West, BPA has installed the largest network of synchrophasors in the country, giving us a much-enhanced ability to anticipate and respond to grid disturbances. Our work through the Power Pool, combined with the lessons learned from the Southwest power outage in 2011, has also increased our focus on the development of new situational awareness tools. We are working closely with the West's new Reliability Coordinator, Peak Reliability, to develop new tools to forecast and respond to actual flows across the Northwest's transmission system.

Technology innovation will be an important driver as we continue to modernize the transmission system. Working with 11 utilities in a five-state region, BPA is part of the $178 million DOE-

funded Pacific Northwest Smart Grid Demonstration Project, the largest of its kind in the country. Through this collaborative effort, we have been testing distributed generation, storage and demand response technologies with the potential to increase transmission system reliability, integrate renewables and lower costs for customers. And BPA's own $17 million/year Technology Innovation Program has discovered breakthrough technologies in voltage stability and demand response.

The western United States faces significant opportunities and challenges in designing the future of its transmission system. We are pleased to be working with our colleagues at both the regional and sub-regional level to further enhance the reliability, flexibility and technical sophistication of our transmission system.