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Electricity: Generation to End-Use
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Statement of Lanny Nickell, Vice President of Engineering
Southwest Power Pool
“Transmission Development with an Evolving Generation Mix”

Good afternoon. I am Lanny Nickell, Vice President of Engineering for Southwest Power Pool and am happy to participate in this instalment of the Quadrennial Energy Review being hosted by the Department of Energy. I thank Secretary Moniz and DOE staff for providing SPP this opportunity to be here today.

SPP is a Regional Transmission Organization (RTO) approved by the Federal Energy Regulatory Commission (FERC) to independently provide open access transmission service across all or parts of 14 states located on the western edge of the Eastern Interconnection.

SPP acts as the reliability coordinator, balancing authority, transmission service provider, transmission planner, and planning coordinator for its region and must comply with applicable North American Electric Reliability Corporation (NERC) Reliability Standards. As an RTO, we perform services in accordance with our FERC-approved Open Access Transmission Tariff (OATT) and in the context of our reliability-based mission—“helping our members work together to keep the lights on...today and in the future.”

SPP is celebrating its 75th anniversary this year and has much to celebrate! In 1941, eleven power companies formed SPP when they pooled their generating resources in support of critical, national defense needs. Since then, SPP has continuously evolved, adding functions and services over time that enable us to better accomplish our mission and provide value to our members.

SPP became a NERC-authorized reliability coordinator in 1997 and implemented its first regional OATT in 1998. SPP was approved as an RTO in 2004.

We have significantly expanded our footprint twice since becoming an RTO, first with the addition of three Nebraska utilities in 2009 and most recently with the addition in 2015 of Western Upper Great Plains’ and Basin Electric Power Cooperative’s Integrated System which extended our footprint to the Canadian border.

We implemented an energy imbalance service market in 2007 and added other ancillary service, day-ahead energy, and unit commitment markets while becoming the balancing authority for our region in 2014. SPP's suite of markets is referred to as the Integrated Marketplace and it generated \$422 million of regional energy savings during 2015.

Transmission Development in SPP

SPP's regional transmission planning process identifies cost-effective transmission and non-transmission solutions to reliability, economic, and public policy needs in our region. Our Integrated Transmission Planning (ITP) cycle is repeated every three years.

A 20-year assessment is performed in the first half of the three-year ITP cycle followed by a 10-year assessment in the second half. The 20 and 10-year assessments identify reliability, economic, and public policy needs for a number of possible future scenarios and recommend a portfolio of solutions based on the expected probability of the evaluated futures.

SPP performs a near-term assessment every year that focuses solely on reliability needs. We also perform assessments and identify transmission upgrades necessary to accommodate requests for transmission service and interconnection of new generating capacity.

Our planning process relies on a high level of stakeholder engagement. Stakeholders work with SPP staff to develop each assessment's scope, which includes the models to be used, futures to be studied, metrics with which to evaluate potential solutions, and processes to consolidate solution portfolios. Stakeholders provide resource, demand, and transmission system data and projections to be used in our planning models.

SPP recently implemented processes compliant with FERC's Order 1000 that require certain upgrades to be competitively bid out for construction. At their April 2016 meeting, SPP's board of directors awarded SPP's first competitively bid transmission project.

Under the new process, 11 bidders competed to be selected. Cost estimates contained in those bids ranged from 44% to 102% of SPP's initial project cost estimate. The winning bid was 49% of SPP's initial cost estimate. This appears to be a positive outcome for the competitive process, but more work remains to improve the process and demonstrate its longer-lasting impacts and potential benefits.

Since SPP became an RTO, our regional transmission planning and cost allocation has facilitated the construction of nearly \$6 billion of transmission infrastructure with another \$4 billion in upgrades approved for construction over the next decade. We believe this investment will provide significant value to our customers as we constantly strive to modernize SPP's regional transmission grid.

Earlier this year, we completed a study that projected tremendous savings as a result of transmission upgrades placed into service in SPP between 2012 and 2014, representing \$3.4 billion of transmission investment. The net present value (NPV) of the benefits derived for these projects is expected to exceed \$16.6 billion over 40 years, with a benefit-to-cost ratio of 3.5 to 1. These projects provided actual production cost savings of approximately \$240 million during the first year of operation of our Integrated Marketplace.

Additionally, in April 2016, SPP's board approved a reduction in our regional planning reserve margin requirements that would not have been possible without SPP's nearly decade-long investment in transmission upgrades. This action alone will generate nearly \$1.4 billion of capacity cost savings over 40 years.

SPP's Evolving Generation Mix

SPP's generation mix has changed dramatically over the last decade.

In 2015, SPP's energy mix consisted primarily of coal generation (55%), gas generation (22%), and wind generation (14%). A decade ago, SPP's mix was very different: wind generation was virtually non-existent, and coal generation was more than 10 percentage points higher than it was in 2015.

Approximately 18.1 GW of new generation in SPP has been added under our generator interconnection (GI) processes since 2005, with nearly 57% (10.3 GW) of those new resources consisting of wind generation and nearly 27% (4.8 GW) consisting of gas generation.

With our recent membership expansion and the tremendous growth in wind resources within our region, nearly 15% (approx. 13 GW), of SPP's capacity mix now consists of wind generation.

Earlier this year, we saw nearly 50% of SPP's load being served by wind generation at certain points, setting numerous wind penetration records. We have reliably accommodated this kind of growth thus far because of: 1) our ability to anticipate it in prior planning efforts, and 2) the expansion of SPP's regional transmission system that enables us to deliver clean, affordable energy from the parts of the system with high wind potential to the population centers that need it.

SPP expects continued growth in new generation, and particularly renewables, on our SPP system. The region we serve is home to some of the highest on-shore wind and solar potential in the Eastern Interconnection. Currently, nearly 9.5 GW of new generation is on schedule to be added by the end of 2018. Wind generation accounts for 7.9 GW, or more than 80%, of that new generation. Another 26.2 GW of new generation is in our GI queue in various stages of study and/or development, with 21.3 GW of that being prospective wind generators.

We are starting to see interest in utility-scale solar generation development on the SPP transmission system as well. We have nearly 2 GW of prospective solar farms currently being studied in our GI queue.

Public interest in clean energy is expected to continue to grow. Public interest and policies like the Clean Power Plan and production tax credits combined with SPP's rich renewable fuel availability will further accelerate growth in renewables on SPP's system.

Finally, we have observed the retirement of nearly 4 GW of fossil-fueled generation over the last decade and expect to see another 2.2 GW retired by 2020. With continued aging of existing fossil-fueled resources and continued promulgation of environmental policies that impose operating restrictions on those resources, we expect to see a growing number of retirements in the future. Our studies have revealed that up to 14 GW of additional fossil-fueled generation retirements could occur in SPP with imposition of the Clean Power Plan.

Challenges Ahead

Although we have successfully planned for the reliable integration of our evolving generation resource mix, much of our success is due to the resource mix evolving to meet our regional needs.

As renewable resources are added to our system, SPP will eventually reach a point at which we can no longer reliably utilize this generation for SPP's own internal demand needs, even with additional transmission infrastructure. At that point, those future renewables will have to be delivered to other regions.

Historically, similar to other regions, SPP has not been successful with regard to large-scale interregional transmission development. Developing the grid needed to reliably and cost-effectively accommodate expected future resource mixes will require regions to more effectively work together to jointly plan and share costs of interregional transmission expansion.

Additionally, new technologies like topology control and dynamic line ratings can improve asset utilization/value as well as grid performance and operations.

In SPP, it has taken up to 8½ years to plan, design, and build transmission infrastructure, whereas new generating units can now be built much quicker than that. In our competitive transmission development process, and with growing opposition in some parts of our region to transmission construction, we anticipate that some upgrades could take longer to complete in the future. This, combined with increasing uncertainty around future generation planning performed by our stakeholders, makes it increasingly challenging to anticipate in an adequate and timely fashion where and what transmission infrastructure will be needed.

We have noted a growing opposition by landowners, ratepayers and other public interests to transmission expansion. To maximize efficiency and minimize threats to needed siting approvals, SPP and other regions must find creative ways to utilize existing transmission right-of-way as much as possible and to plan future expansion in a way that can accommodate growth without requiring additional land usage.

Additionally, a public promotional campaign regarding the value of transmission could prove useful in helping the general public understand and appreciate the tremendous value that transmission expansion, when done right, can provide.

Summary

We have seen and proven that transmission expansion done right can be a value-added enabler that increases reliability and reduces cost impacts to customers and ratepayers. In order to develop the best transmission system needed to accommodate an evolving resource mix, we need time, certainty, and acceptance.

Having sufficient time to anticipate future needs, better certainty regarding policies that shape our future power grid, and consumer acceptance of the value transmission investment can provide will enable SPP's and other planners' ability to develop a transmission grid that maintains proper reliability at the lowest possible cost and generates myriad other benefits for the country.

Again, SPP appreciates the opportunity afforded it to participate in today's meeting. I look forward to further dialogue with my colleagues participating on this panel.