APPA 2019 JOINT ACTION CONFERENCE

January 6-8, 2019
MEMBERS IN 14 STATES

- Arkansas
- Kansas
- Iowa
- Louisiana
- Minnesota
- Missouri
- Montana
- Nebraska
- New Mexico
- North Dakota
- Oklahoma
- South Dakota
- Texas
- Wyoming
OPERATING REGION

Miles of service territory: 546,000

Population served: 17.5M

Generating Plants: 795

EHV Transmission
- 230 kV 69 kV 16,862
- 345 kV 115 kV 15,684
- 500 kV 138 kV 9,703
- 765 kV 161 kV 5,615
- 230 kV 230 kV 7,523
- 345 kV 345 kV 11,016
2017 ENERGY PRODUCTION
BY FUEL TYPE (259,554 GWH TOTAL)

- Coal (46.3%)
- Wind (22.7%)
- Gas (19.5%)
- Nuclear (6.8%)
- Hydro (4.1%)
- Other (0.3%)
- Solar (0.2%)
GENERATING CAPACITY* BY FUEL TYPE
(87,086 MW TOTAL)

* Figures refer to nameplate capacity as of 1/1/18
MEMBERSHIP
SPP’S 96 MEMBERS:
INDEPENDENCE THROUGH DIVERSITY

96 Members

- 16 Investor-Owned Utilities
- 14 Municipal Systems
- 19 Generation and Transmission Cooperatives
- 8 State Agencies
- 14 Independent Power Producers
- 12 Power Marketers
- 11 Independent Transmission Companies
- 1 Federal Agency
- 1 Large Retail Customers
SPP’S SERVICES

What We Do
OUR MAJOR SERVICES

- Facilitation
- Reliability Coordination
- Balancing Authority
- Transmission Service/Tariff Administration
- Market Operation
- Transmission Planning
- Training
- Standards Setting

OUR APPROACH:
Regional, Independent, Cost-Effective and Focused on Reliability
INTEGRATED MARKETPLACE OVERVIEW

**Key Components**
- Day-Ahead (DA) Market
- Real-Time Balancing Market (RTBM)
- Transmission Congestion Rights (TCR) Market

**Products**
- Energy
- Operating Reserve (Regulation Up, Regulation Down, Spinning, Supplemental)
- Congestion Rights
MARKETPLACE BENEFITS

- SPP’s markets provide participants $422M in net savings annually.

- Reduce total energy costs through centralized unit commitment while maintaining reliable operations.

- Day-ahead market allows additional price assurance capability prior to real-time.

- Operating reserve products support implementation of the SPP balancing authority and facilitate reserve sharing.
FUTURE MARKET INITIATIVES

**Longer Term Ramping/Uncertainty Product**
- Builds on current short term ramping product
- With more renewables, SPP’s forecasting and uncertainty issues continue to grow past short-term into longer than 10-15 minute issues

**Distributed Energy Resources**
- Awaiting FERC Order
- Should allow for a broader spectrum of participation in SPP
- More flexibility is essential for coming changes

**Coordinated Transaction Scheduling**
- Most real time transactions in SPP are fixed transactions. Allowing transactions to be cleared by Market creates value for all participants.
- Should increase price convergence between seams with other RTOs
TRANSMISSION IN SPP

- In 2017, SPP members completed 36 transmission projects totaling more than $245 million.

- More than $9.8 billion in transmission upgrades were planned and approved from 2004-2017.

- 66,495 miles of transmission lines in SPP’s footprint would circle the earth more than twice!

- SPP’s transmission owning members have approximately $13.6B in net transmission investment.
HOW SPP MAKES TRANSMISSION DECISIONS

• Integrated Transmission Planning process

• Generation Interconnection Studies
  • Determines transmission upgrades needed to connect new generation to electric grid

• Aggregate Transmission Service Studies
  • Determines transmission upgrades needed to transmit energy from new generation to load
  • Shares costs of studies and new transmission

• Specific transmission studies
TRANSMISSION BUILD CYCLE IN SPP

Planning Study (12-18 mo.)

TO Selection (3-12 mo.)

Design, ROW Acquisition, & Construction (2-6 yr.)

Responsible Party
- SPP
- Transmission Owner

3 ¼ yr.

8 ½ yr.
WHO PAYS FOR TRANSMISSION PROJECTS?

- **Sponsored**: Project owner builds and receives credit for use of transmission lines.

- **Directly-assigned**: Project owner builds and is responsible for cost recovery and receives credit for use of transmission lines.

- **Highway/Byway**: Most SPP projects paid for under this methodology.

### Voltage Region Pays Local Zone Pays

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Region Pays</th>
<th>Local Zone Pays</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 kV and above</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>above 100 kV and below</td>
<td>33%</td>
<td>67%</td>
</tr>
<tr>
<td>300 kV</td>
<td>33%</td>
<td>67%</td>
</tr>
<tr>
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SPP developed the Transmission Owner Selection Process (TOSP) to allow competitive bidding on certain transmission projects.

Transmission Facilities that meet the criteria in the SPP Tariff and are approved for construction (or are endorsed by the SPP Board of Directors) are known as Competitive Upgrades.

SPP will solicit proposals for Competitive Upgrades from Qualified RFP Participants (QRP) utilizing the TOSP.
THE VALUE OF SPP
• SPP’s Integrated Marketplace paid for itself in less than one year.

• Cumulative marketplace benefits exceed $2.08B as of Aug. 1, 2018.
TRANSMISSION INVESTMENT DIRECTED BY SPP

$6.9 B in completed projects
$3.0 B in scheduled projects
SPP’S 2015 VALUE OF TRANSMISSION STUDY

Study Scope:

• Assessed 348 projects from 2012-14, representing $3.4B of transmission investment

• Based on the first year of operation of Integrated Marketplace from March 2014 through February 2015

• APC Savings calculated at more than $660k/day, or $240M/year.

• Overall NPV of all benefits for considered projects are expected to exceed $16.6B over 40 years.

BENEFIT-COST RATIO OF 3.5 TO 1
### PRM REDUCTION COST SAVINGS

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Current Reserve Margin</th>
<th>13.6%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Proposed Reserve Margin*</td>
<td>12.0%</td>
</tr>
<tr>
<td>Net CONE (CT)</td>
<td></td>
<td>$109.6 ($/kW-yr)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Results</th>
<th>Annual Capacity Cost Savings (2015 $)</th>
<th>$86.14 $M</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40-yr Capacity Cost Savings (2015 $)</td>
<td>$1,347.22 $M</td>
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</table>

* Reducing reserve margin requirement from 13.6% to 12.0% results in approximately 900 MW of capacity reduction.
THE VALUE OF SPP:
$1.7B ANNUAL SAVINGS TO SPP MEMBERS
SPP TODAY

The Opportunities, Challenges, and Other Circumstances Facing Southwest Power Pool
WIND IN SPP’S SYSTEM

- Wind installed today: 19,716 MW
  - 10,600 turbines on 192 windfarms (most are 80m hub height)
  - Largest windfarm: 400 MW (Grand Prairie in Holt County, NE)

- Unbuilt wind w/signed interconnection agreements: ~10 GW

- Wind in all stages of study and development: ~37 GW

- Forecast wind installation in 2020: >20 GW (more than SPP’s current minimum load)

- Forecast wind installation in 2025: 25-31 GW
INSTALLED WIND CAPACITY BY YEAR
As of December 1, 2018
ENERGY PRODUCTION
BY GENERATION TYPE OVER TIME

Energy Production (MWh)

- Coal
- Gas
- Wind
- Nuclear
- Hydro
- Other
ELECTRIFICATION

Electricity's Share of Total Energy Consumption, by Sector 1949-2015 (Source: EIA AER 2016)
THE FUTURE
RC SERVICES IN THE WEST

- Transition of RC services from Peak to SPP RC by Dec. 2019.
- 14 entities representing approx. 100 TWh of NEL.
- Transition will be coordinated among SPP, WECC, Peak, CAISO, and other western BAs and TOPs.
HOLISTIC INTEGRATED TARIFF TEAM (HITT)

• A holistic look at the many issues challenging the SPP region, and specifically:
  • Transmission planning and resource adequacy
  • Cost allocation methodologies
  • SPP’s Integrated Marketplace and essential reliability services
  • Potential load-growth opportunities

• Report expected April 2019