SPP Mission

Helping our members work together to keep the lights on – today and in the future.

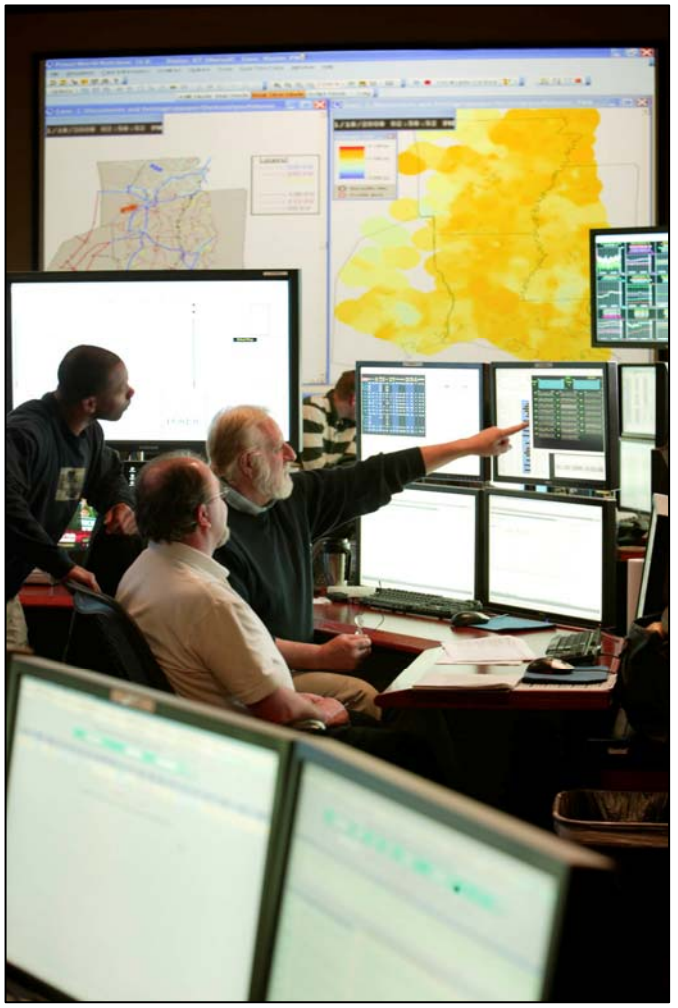
Updated 8-3-2010

The SPP Difference

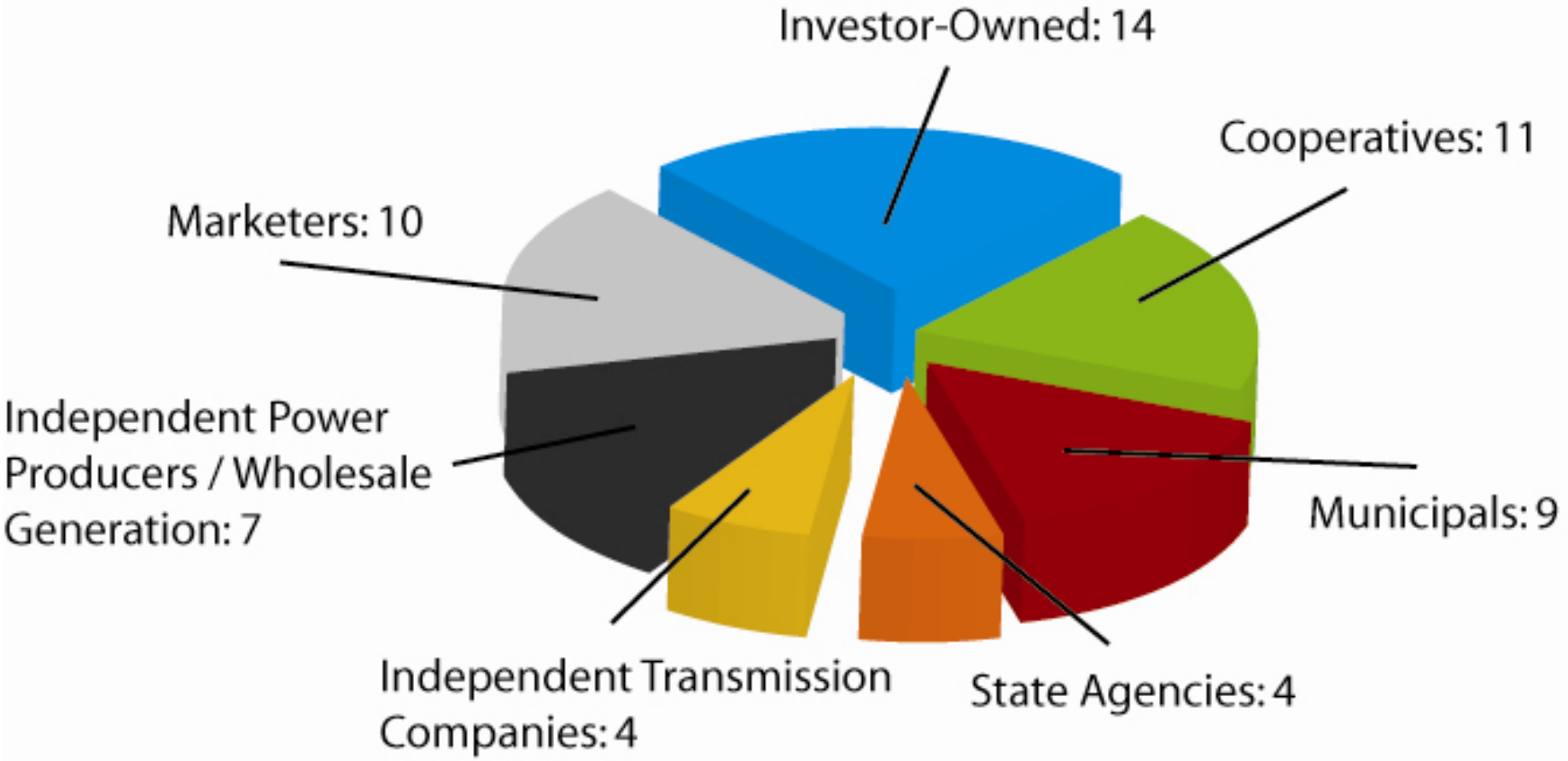
- **Relationship - Based**
- **Member - Driven**
- **Independence Through Diversity**
- **Evolutionary vs. Revolutionary**
- **Reliability and Economics Inseparable**

SPP at a Glance

- **Little Rock based**
- **Approx. 450 employees**
- **$127 million operating budget (2010)**
- **24 x 7 operation**
- **Full redundancy and backup site**



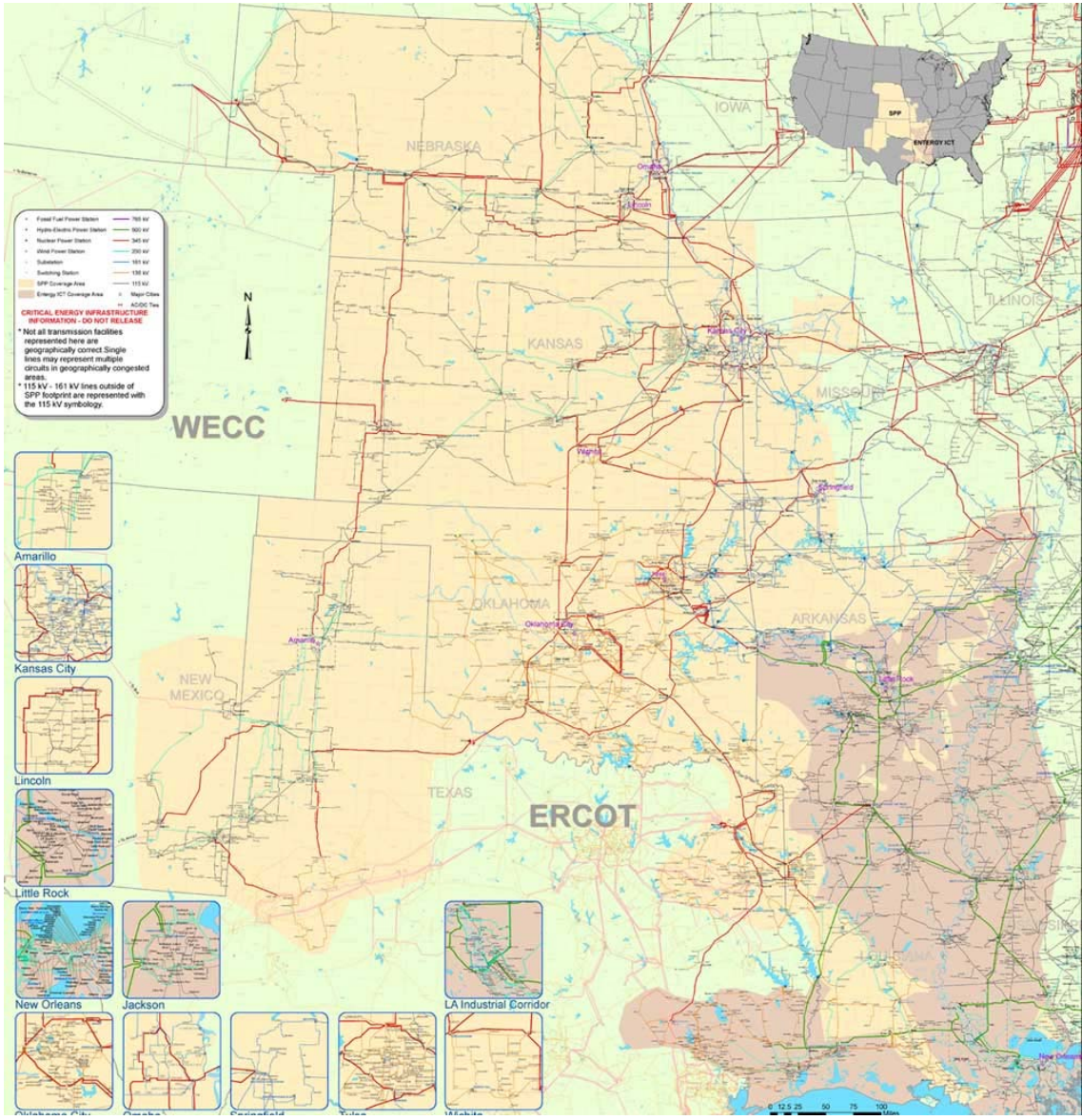
59 SPP Members



Operating Region

- **370,000 square miles service territory**
- **50,575 miles transmission lines:**

69 kV –	**16,182 miles**
115 kV –	**10,041 miles**
138 kV –	**9,284 miles**
161 kV –	**4,469 miles**
230 kV –	**3,831 miles**
345 kV –	**6,662 miles**
500 kV –	**106 miles**



Quick Statistics

- **65,796 megawatts capacity resources** (RTO footprint)
- **847 plants – 6,079 substations**

Fuel Type	Percentage Capacity
Gas/oil	42%
Coal	40%
Dual fuel	6%
Hydro	4%
Wind	4%
Nuclear	3%
Pumped storage	.5%
Biomass	.5%

Did You Know?

- **SPP's 65,796 megawatts capacity resources would power over 50 million homes.**

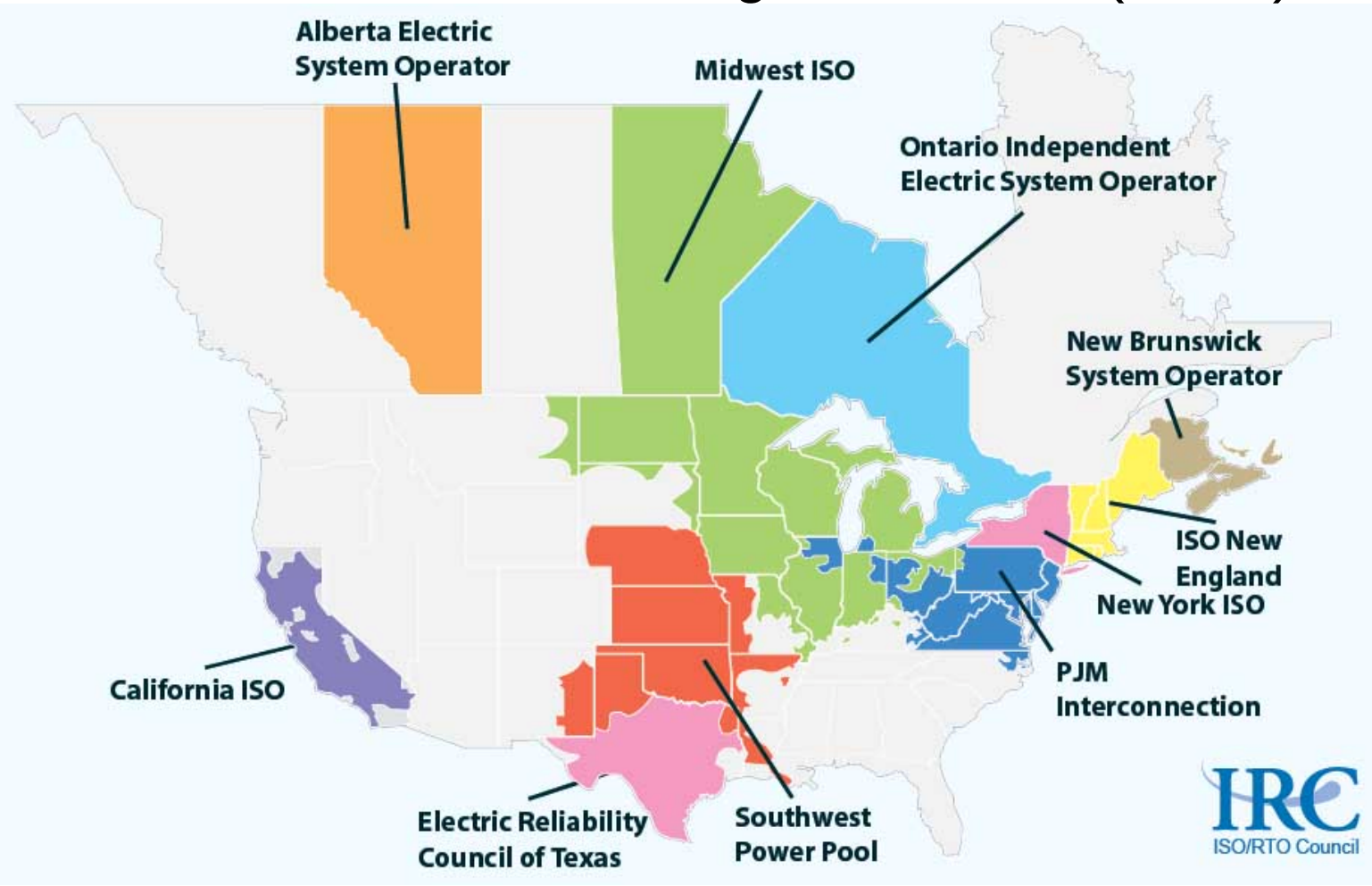
- **In 2009, SPP members completed 98 transmission projects totaling $259 million.**
- **SPP's transmission owners spend over $600 million annually to operate their electric transmission facilities.**

- **50,575 miles of transmission lines in SPP's footprint would circle the earth - almost twice!**

SPP at a Glance

- **Incorporated in Arkansas as a 501(c)(6) non-profit corporation**
- **FERC - Federal Energy Regulatory Commission**
  - **Regulated public utility**
  - **Regional Transmission Organization**
- **NERC - North American Electric Reliability Corporation**
  - **Founding member**
  - **Regional Entity**

Independent System Operator (ISO) / Regional Transmission Organization (RTO) Map



Our Major Services

- **Facilitation**
- **Reliability Coordination**
- **Tariff Administration**
- **Market Operation**
- **Standards Setting**
- **Compliance Enforcement**
- **Transmission Planning**

Key Elements of Services

Regional

Independent

Cost-Effective

Focus on Reliability

Reliability Coordination

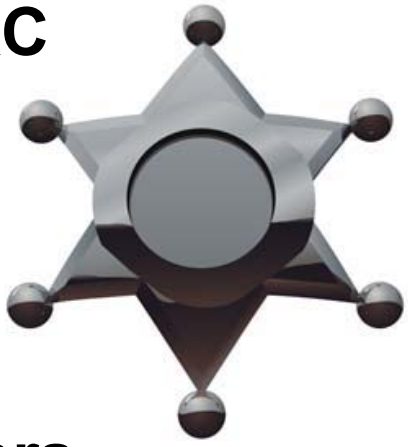
- **Monitor grid 24 x 365**
- **Anticipate problems**
- **Take preemptive action**
- **Coordinate regional response**
- **Independent**

As "Air Traffic Controllers," our operators comply with…

…over 1,300 pages of reliability standards and criteria.

Compliance Enforcement and Standards Setting

- **Enforce compliance with federal NERC reliability standards**
- **Create regional reliability standards with stakeholder input**
- **Provide training and education to users, owners, and operators of bulk power grid**



Training

- **World class regional restoration drills**
- **NERC certifications**
- **Train-the-trainer workshops**
- **2009 training program awarded ~17,000 continuing education hours to 444 operators from 30 member organizations**

What kind of markets does SPP have now?

- **Transmission: Participants buy and sell use of regional transmission lines that are owned by different parties**
- **Energy Imbalance Service (EIS): Participants buy and sell wholesale electricity in real-time**
  - **Market uses least expensive energy from regional resources to serve demand (load) first**
  - **Sometimes it's cheaper for a market participant to purchase power from another provider than to generate**
  - **SPP monitors resource/load balance to ensure system reliability**

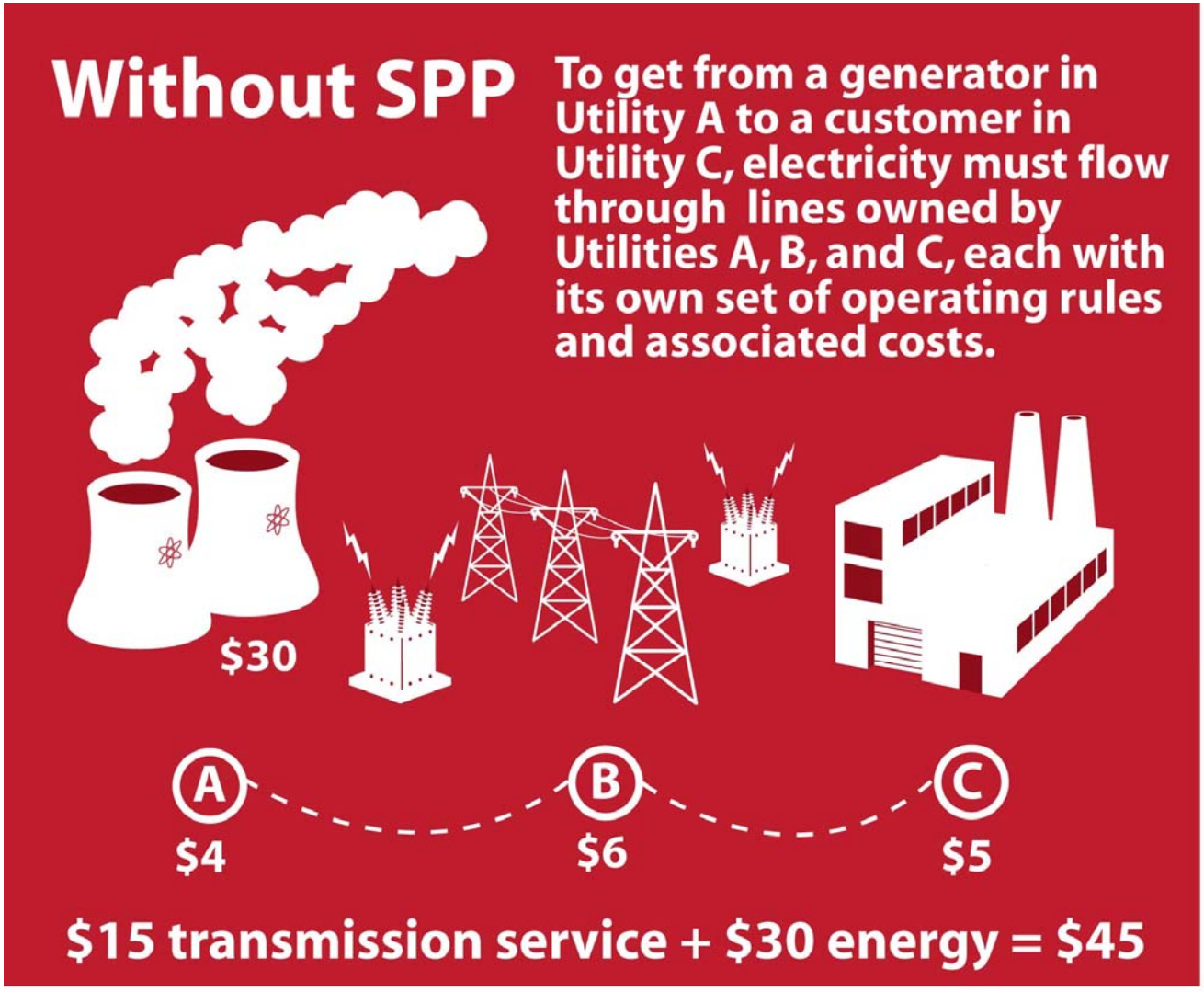
Transmission Service

- **Provides "one-stop shopping" for use of regional transmission lines**
- **Consistent rates, terms, conditions**
- **Independent**
- **Process > 12,000 transactions/month**
- **2009 transmission market transactions = $486 million**

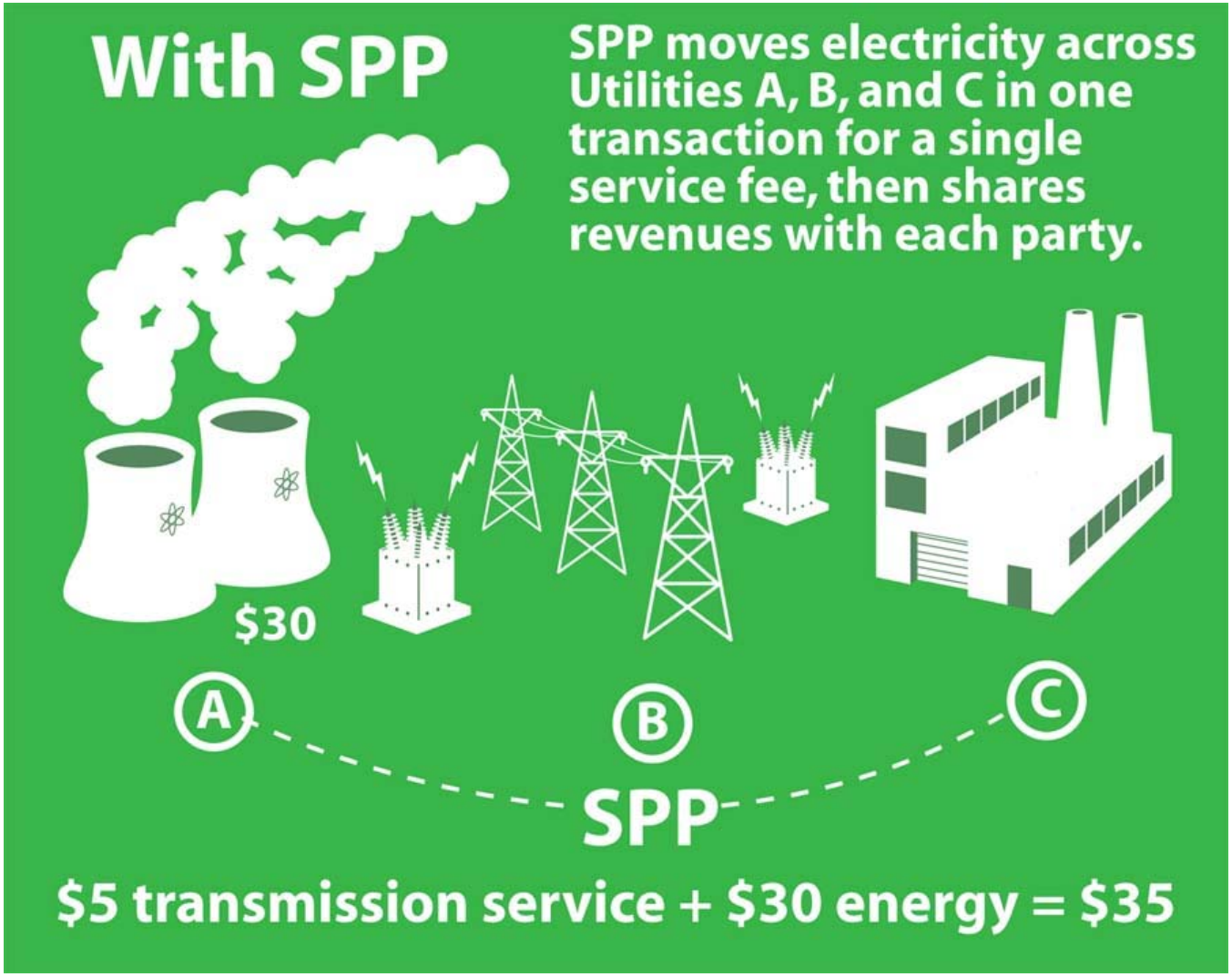
As "Sales Agents," we administer …

…a 1,900+ page transmission tariff on behalf of our members and customers.

Transmission Service



Transmission Service



How transmission service works

- **Reserving transmission service**
  - Like buying e-ticket to reserve seat on plane
  - Customer specifies priority, time, source/sink, capacity
  - Tariff Administrator approves if capacity exists
- **NERC Tag is issued**
  - Like receiving boarding pass for plane
  - Won't be approved if improper use of reservation
- **Schedule is created from Tag. When approved:**
  - Like sitting on the plane
  - Generators ramp to provide energy for transaction
  - May be curtailed if transmission system overloaded

EIS Market Operation

- **Monitors supply/demand balance**
- **Ensures economic dispatch while meeting system reliability**
- **Provides settlement data**
- **2009 wholesale market transactions = $1.14 billion**

SPP's energy market is like the "NYSE"…

…and follows over 200 pages of market protocols.

Benefits of current real-time energy market

Option 1: Self-supply

Option 2: Purchase from another provider

Option 3: Purchase from the market

A utility has three ways to serve its customers: generate its own power, buy power from another provider, or buy from the SPP market. The EIS market allows participants to compare real-time prices from many sources to make the most cost-effective decisions. Sometimes a participant can buy power for less than it would cost to generate its own energy.

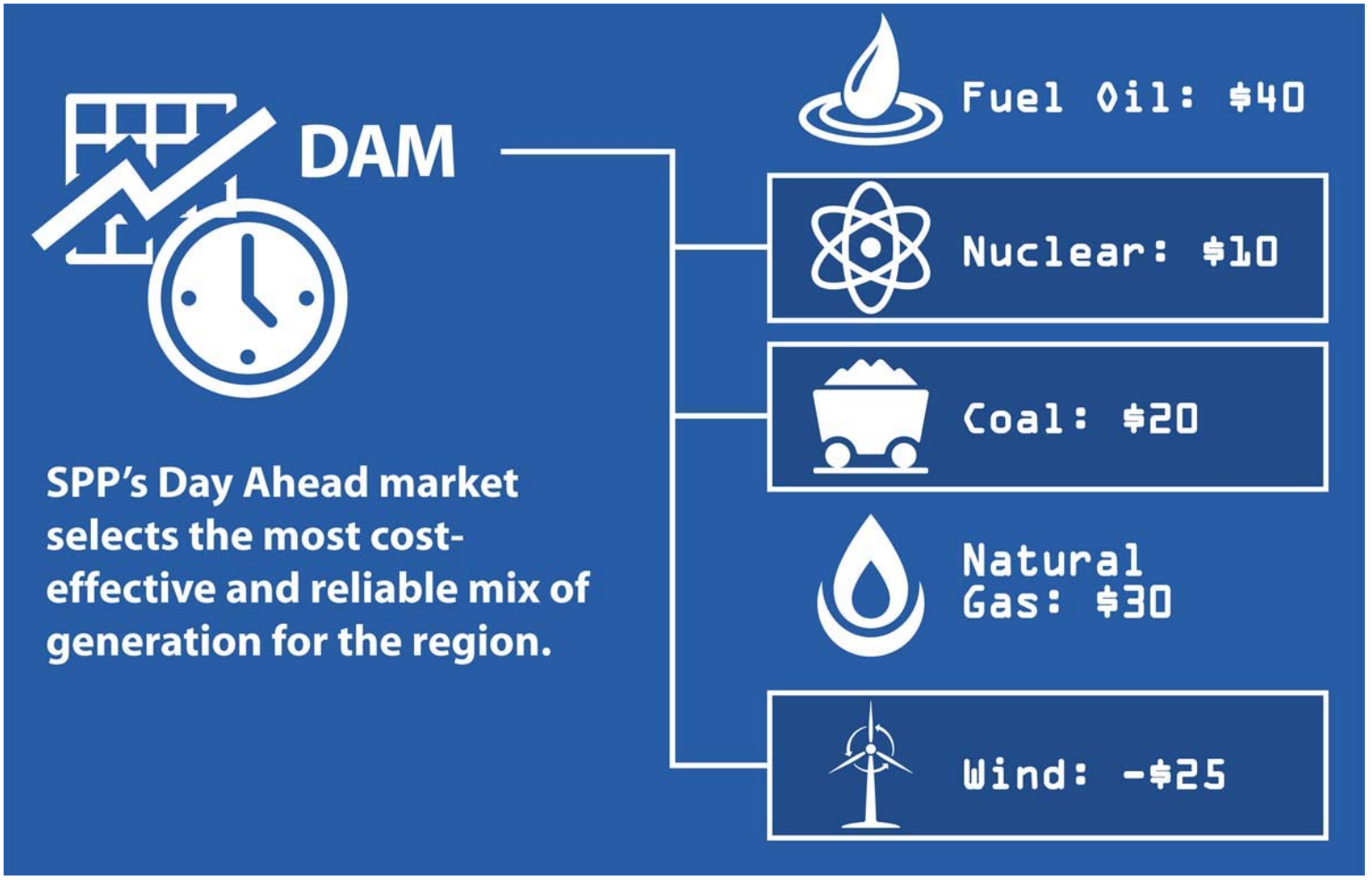
Why develop new markets?

- **SPP conducts complex cost-benefit studies before beginning any new market development**
  - **Under Regional State Committee oversight**
  - **2005 Charles River Associates analysis of the EIS market:**
    1. **Estimated benefit of $86 million for first year**
    2. **Actual benefit of $103 million for first year**
- **New markets will bring estimated average additional net benefits of $100 million**
  - **According to 2009 Ventyx analysis**

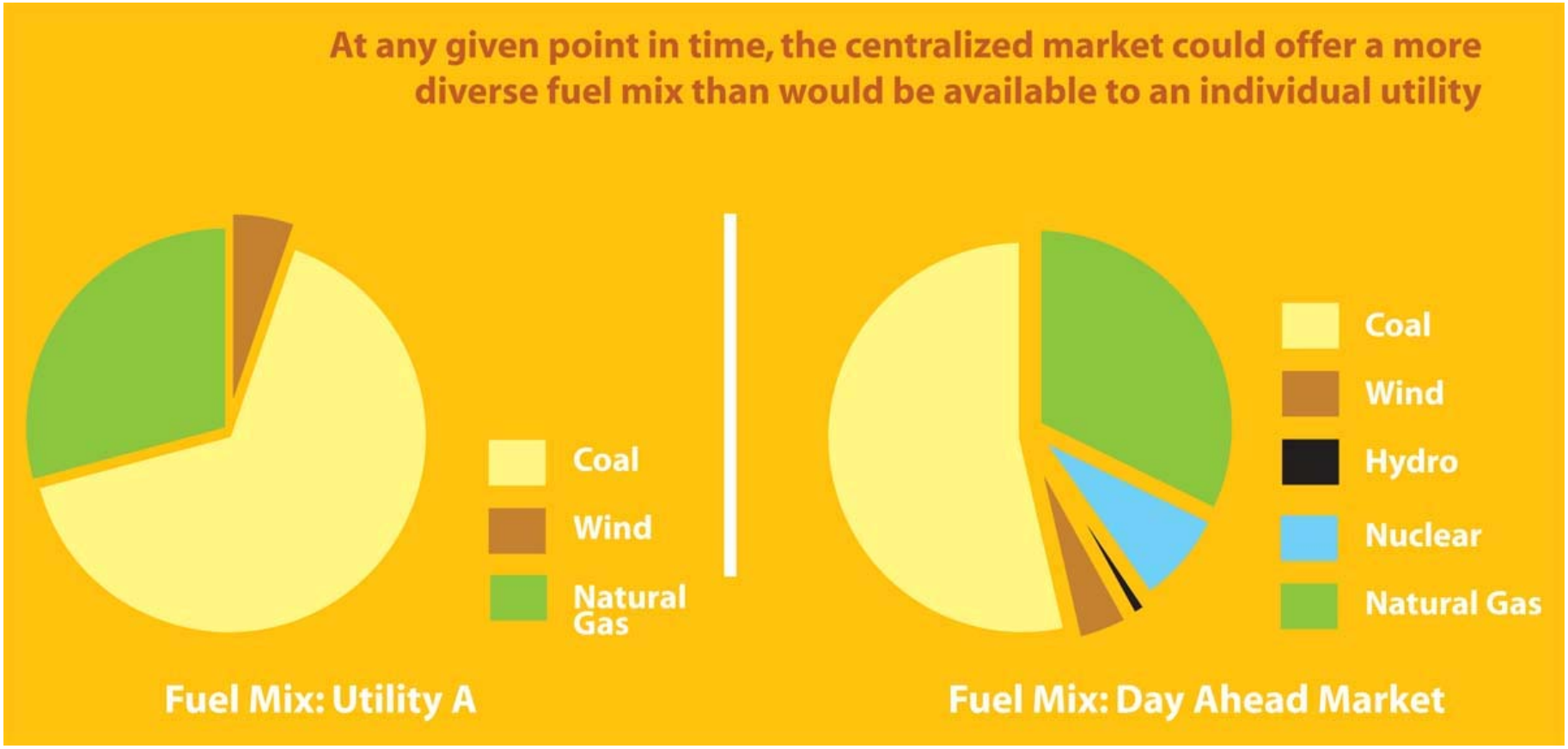
What type of new markets is SPP implementing?

- **Day Ahead: SPP determines what generating units should run the next day for maximum cost-effectiveness**
- **Operating Reserves: Market to buy and sell reserve energy that:**
  - **Meets emergency needs**
  - **Regulates instantaneous load and generation changes**
  - **Maintain electricity quality (keeping voltage up, etc.)**

Day Ahead market makes regional generation choices

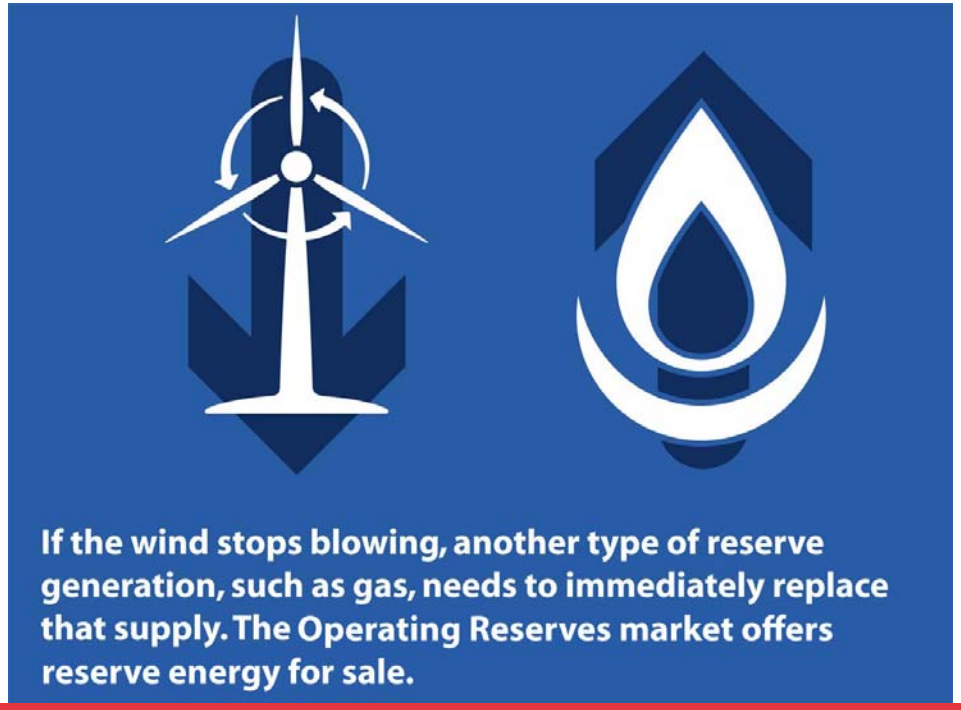


Day Ahead market offers regional diversity

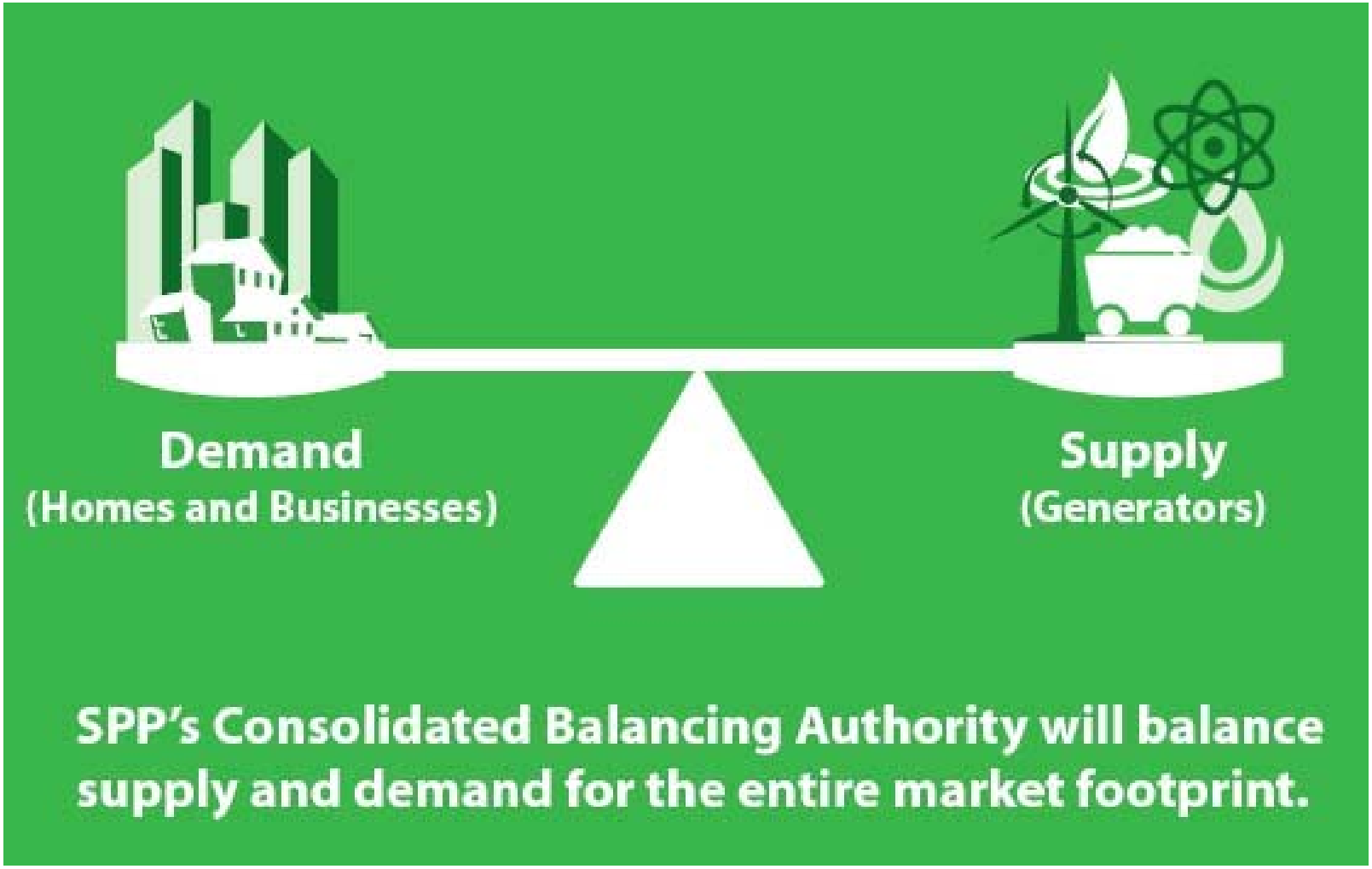


Benefits of Operating Reserves market

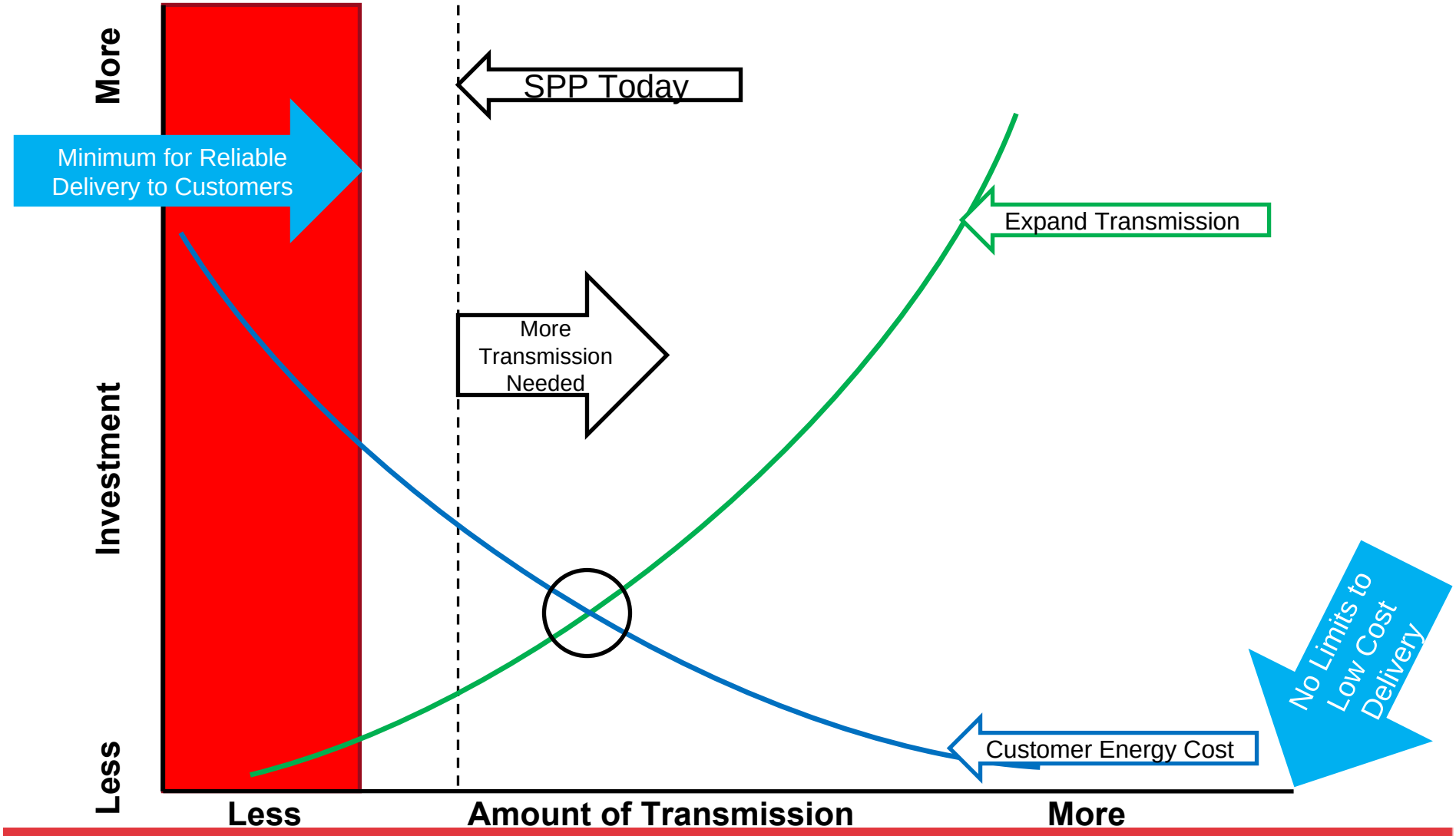
- **Greater access to reserve electricity**
- **Improve regional balancing of supply and demand**
- **Facilitate the integration of renewable resources**



SPP will balance load/supply for region

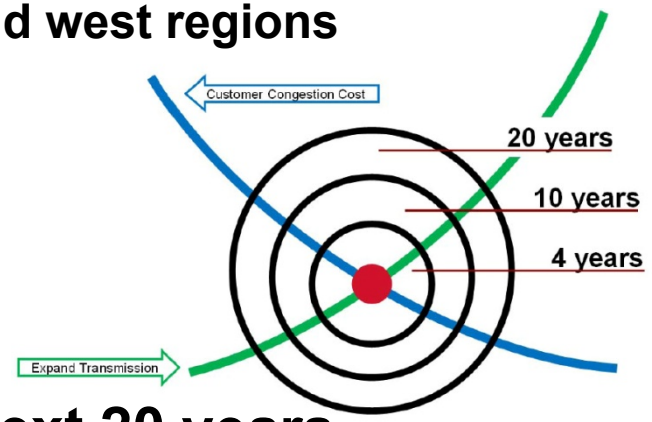


Why expand the transmission system?



Integrated Transmission Planning

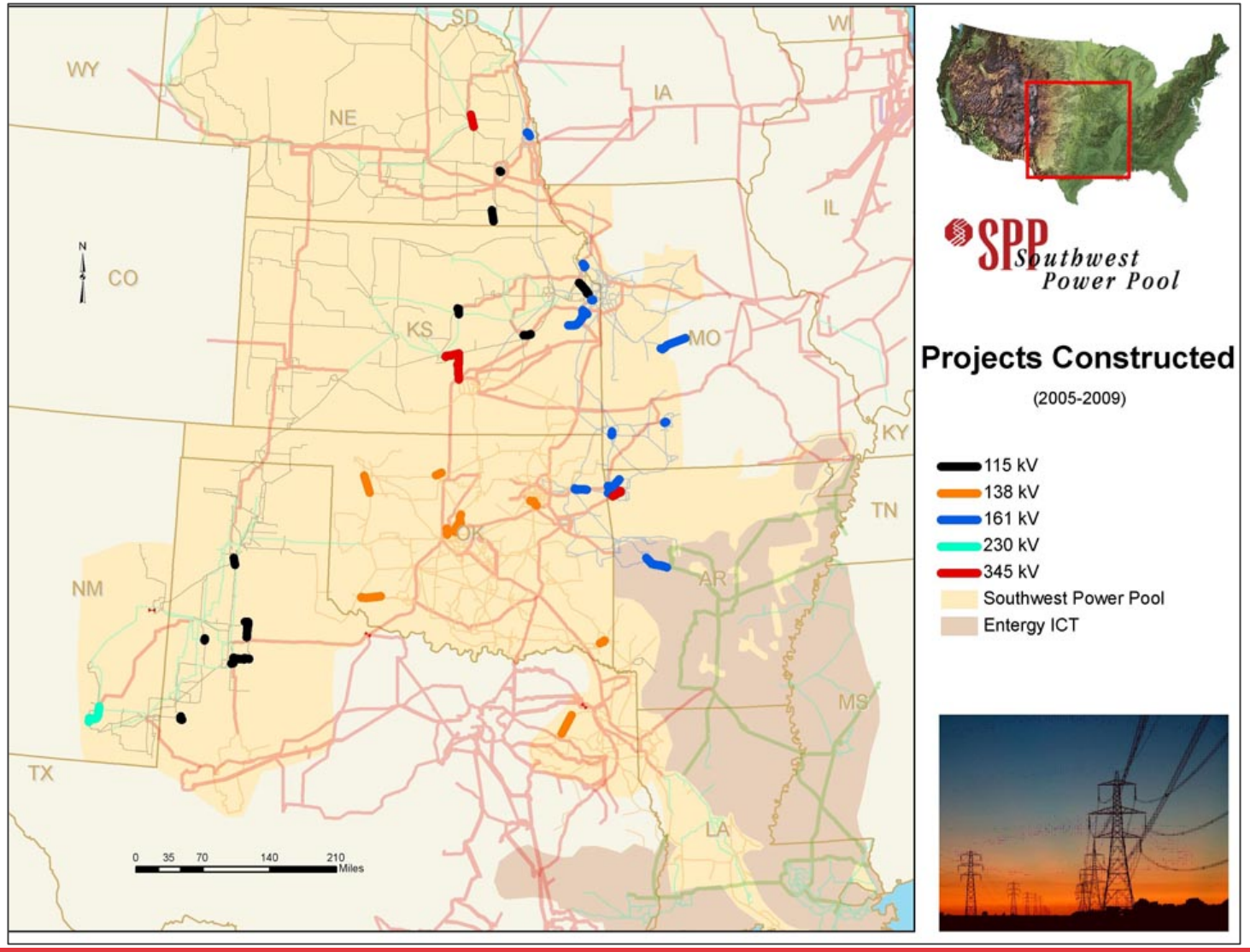
- **Goal: Design transmission backbone to connect load to most reasonable generation alternatives**
  - **Strengthen ties to Eastern and Western Interconnections**
  - **Improve connections between SPP's east and west regions**
- **Horizons: 20, 10, and 4 year**
- **Focus: Regional, integrated with local**
- **Resulting in: Comprehensive list of needed projects for SPP region over next 20 years**
  - **With 40 year financial/economic analysis**
- **Underlying Value: Reliability and Economics are inseparable**



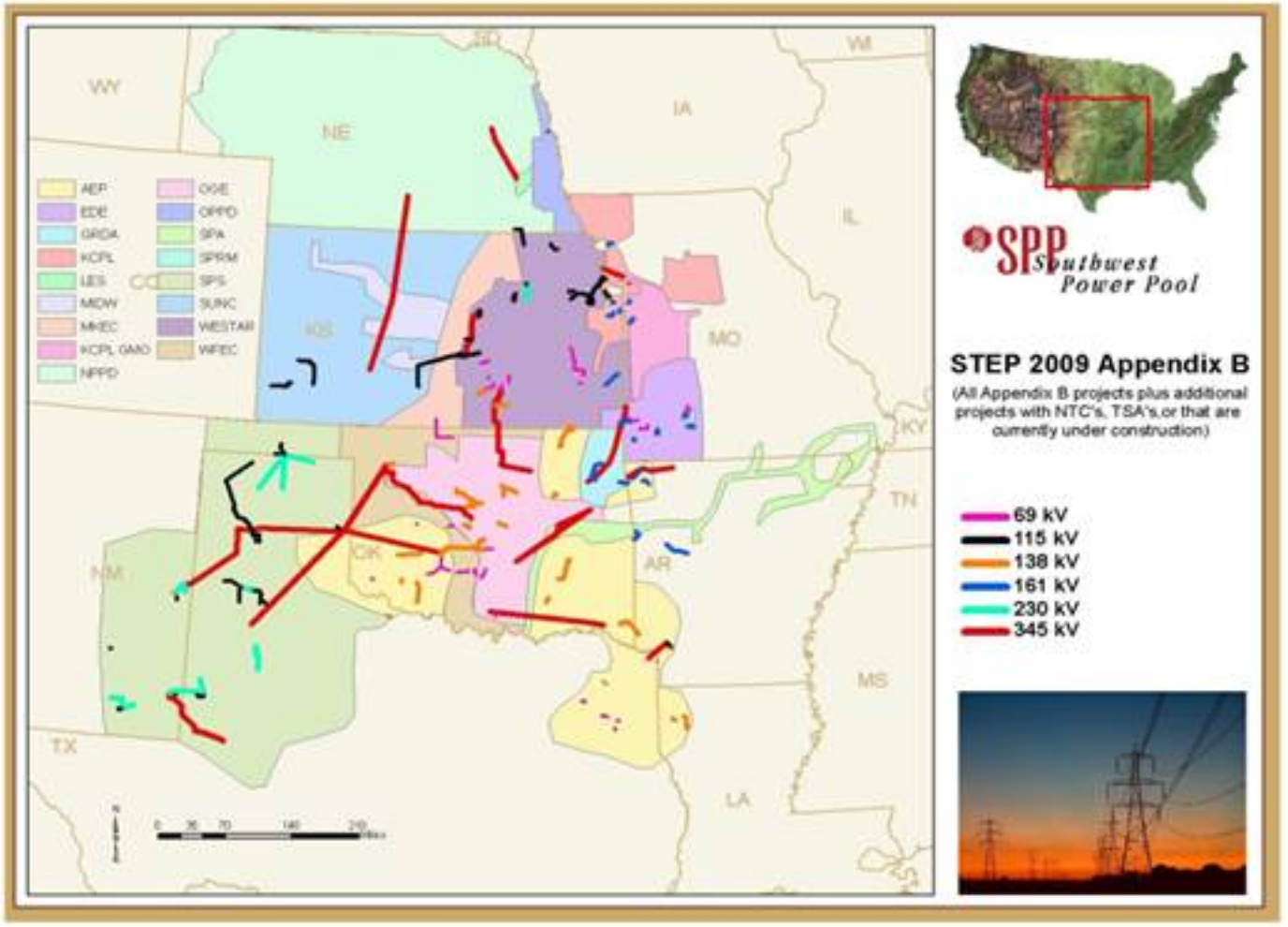
Transmission Planning

- **Generation Interconnection**
  - Connects new resources to grid
  - Doesn't include transmission service
- **Aggregate Study**
  - Meet current requests for transmission service
  - Share costs of studies and new transmission

Projects Constructed 2005-2009



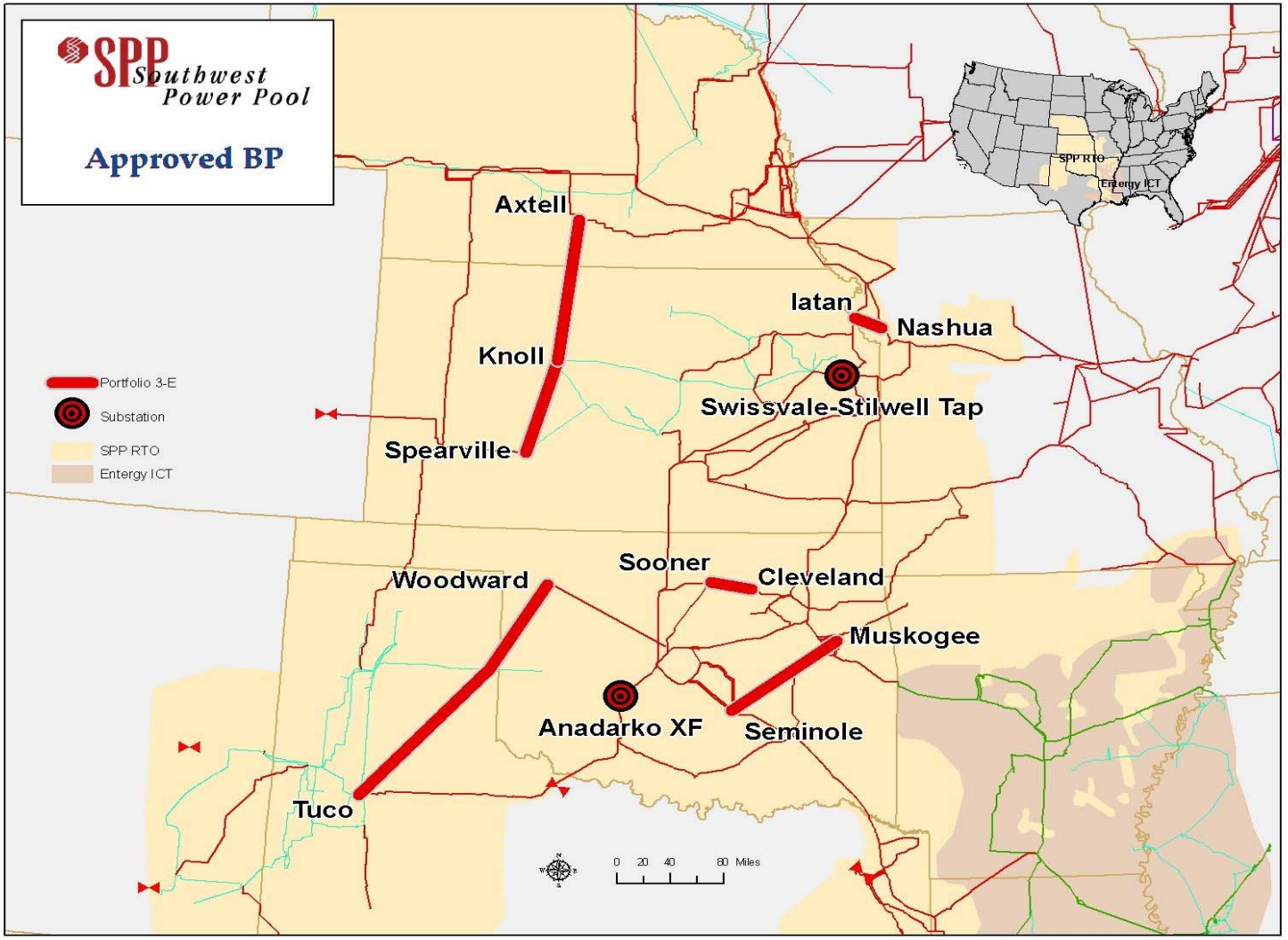
Projects Identified in 2009 SPP Transmission Expansion Plan or Approved/ Under Construction



Balanced Portfolio

- **Economic transmission upgrades (cost) to lower generation production costs (benefit)**
- **Balance costs and benefits in each zone**
- **Transmission expansion costs shared regionally based on historic use of region's energy**

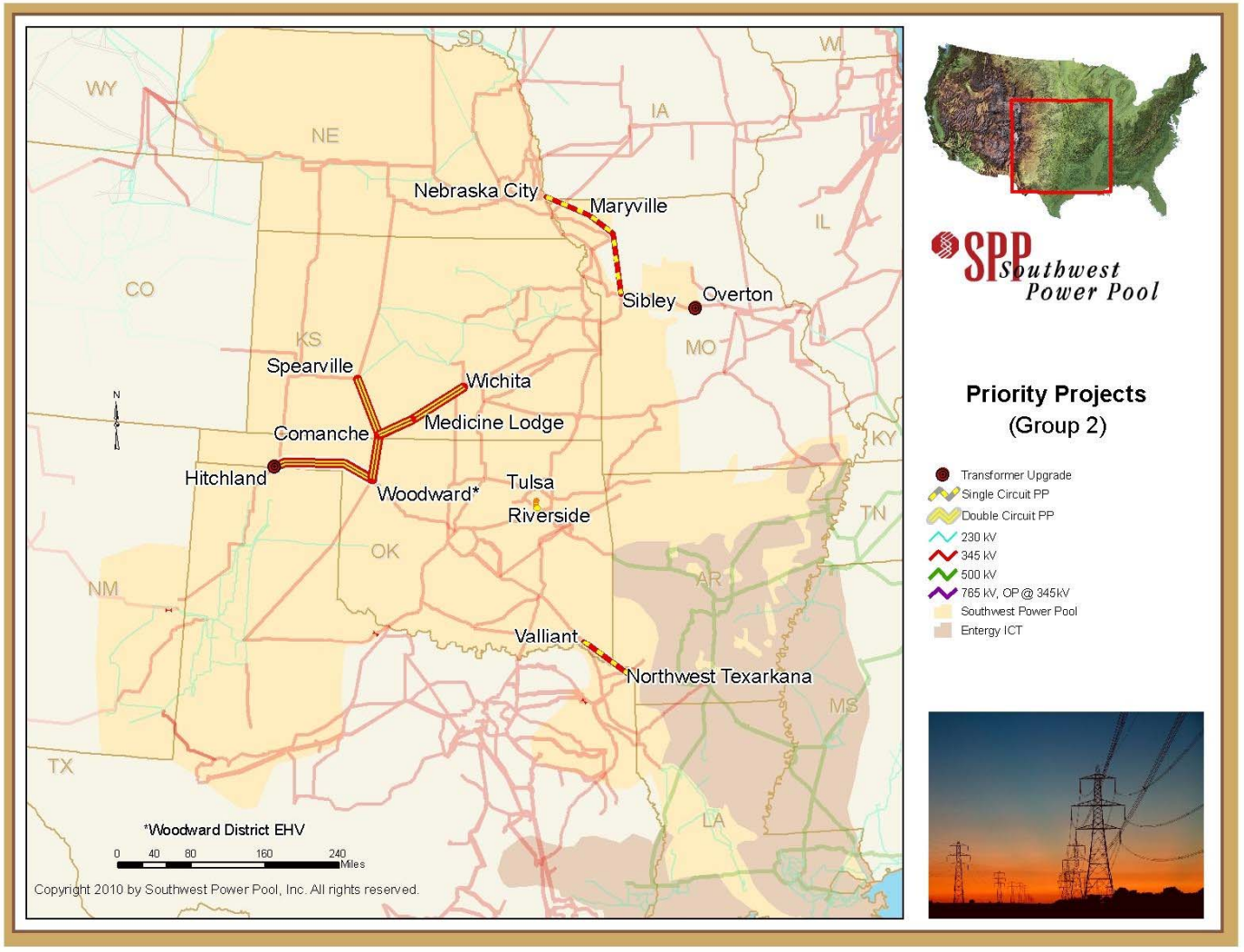
Balanced Portfolio



Priority Projects

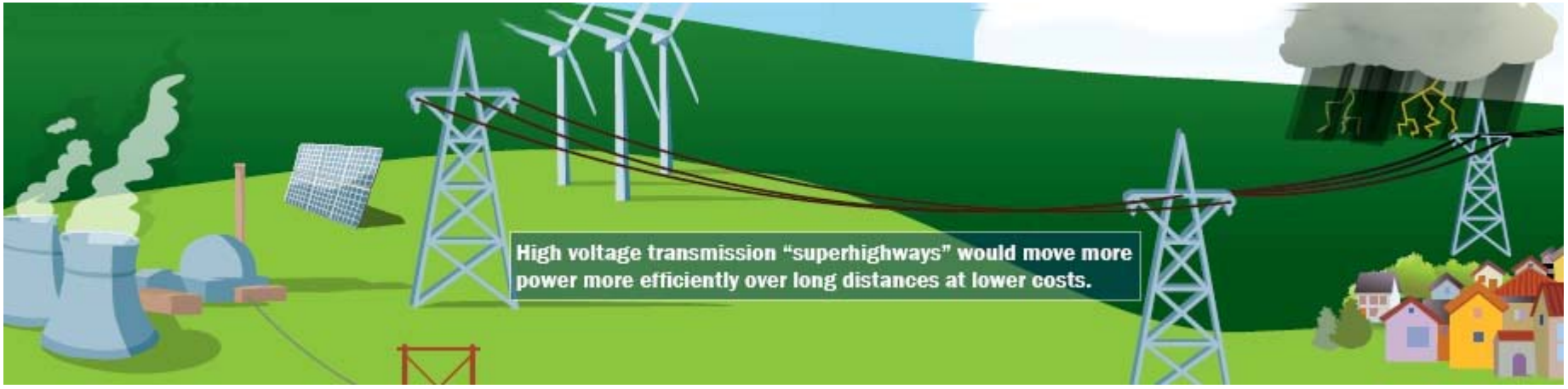
- **Benefit to cost ratio of 1.78 - Estimated to bring benefits of at least $3.7 billion to the SPP region over 40 years**
- **Have been previously identified in SPP planning studies**
- **Help us "jump start" the ITP**
- **Relieve grid congestion**
- **Improve SPP members' ability to deliver power to customers (by improving Aggregate Study process)**
- **Improve transfers between SPP's east and west regions**
- **Facilitate adding new generation to the grid (by improving Generation Interconnection process)**

Priority Projects

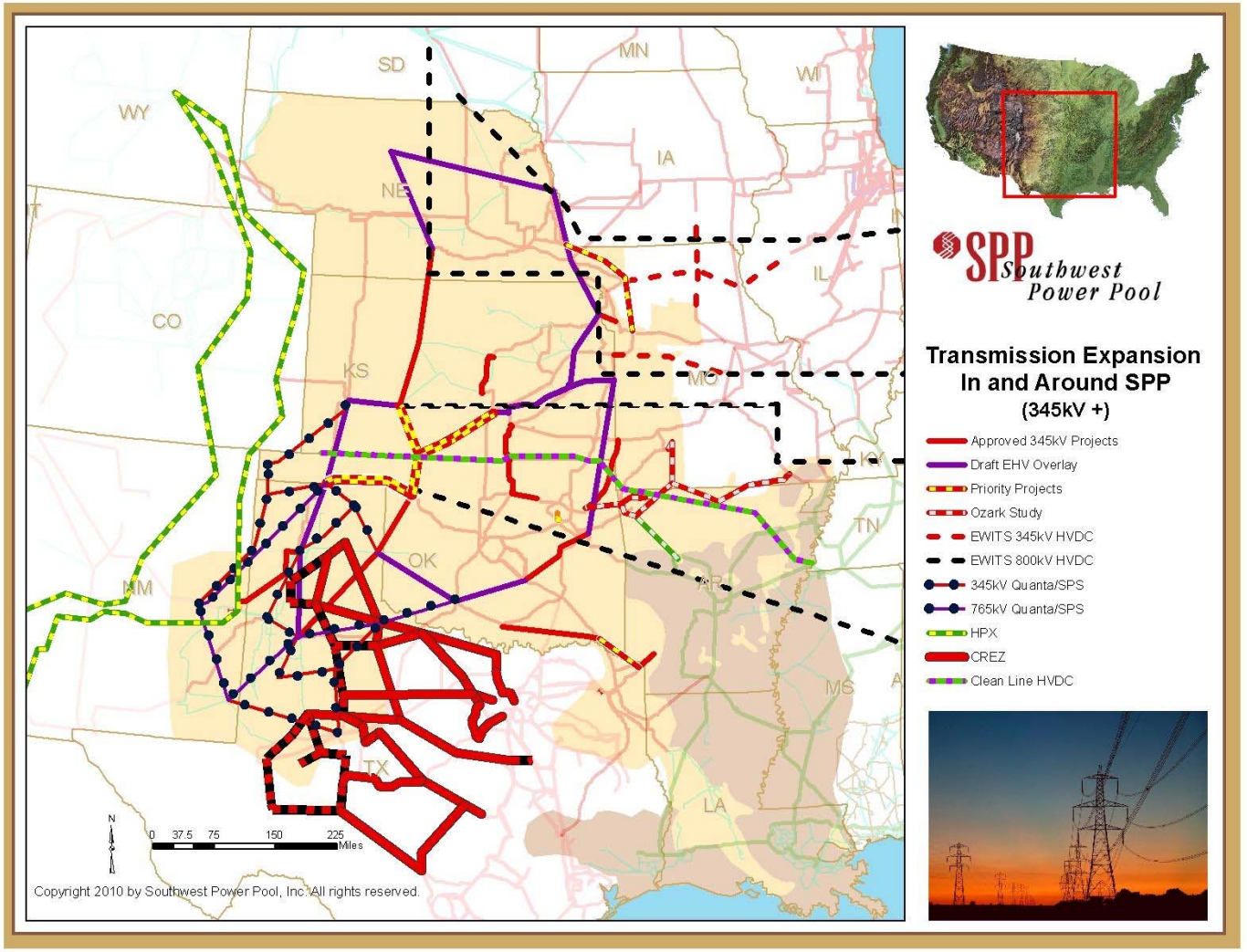


"Transmission Superhighway"

- **Facilitate addition of renewable energy to grid**
- **Improve reliability by reducing chance of high-cost outages**
- **Improve access to lower-cost generation and diverse mix of generation**
- **Create economic opportunities beyond electric industry**



Regional Plans



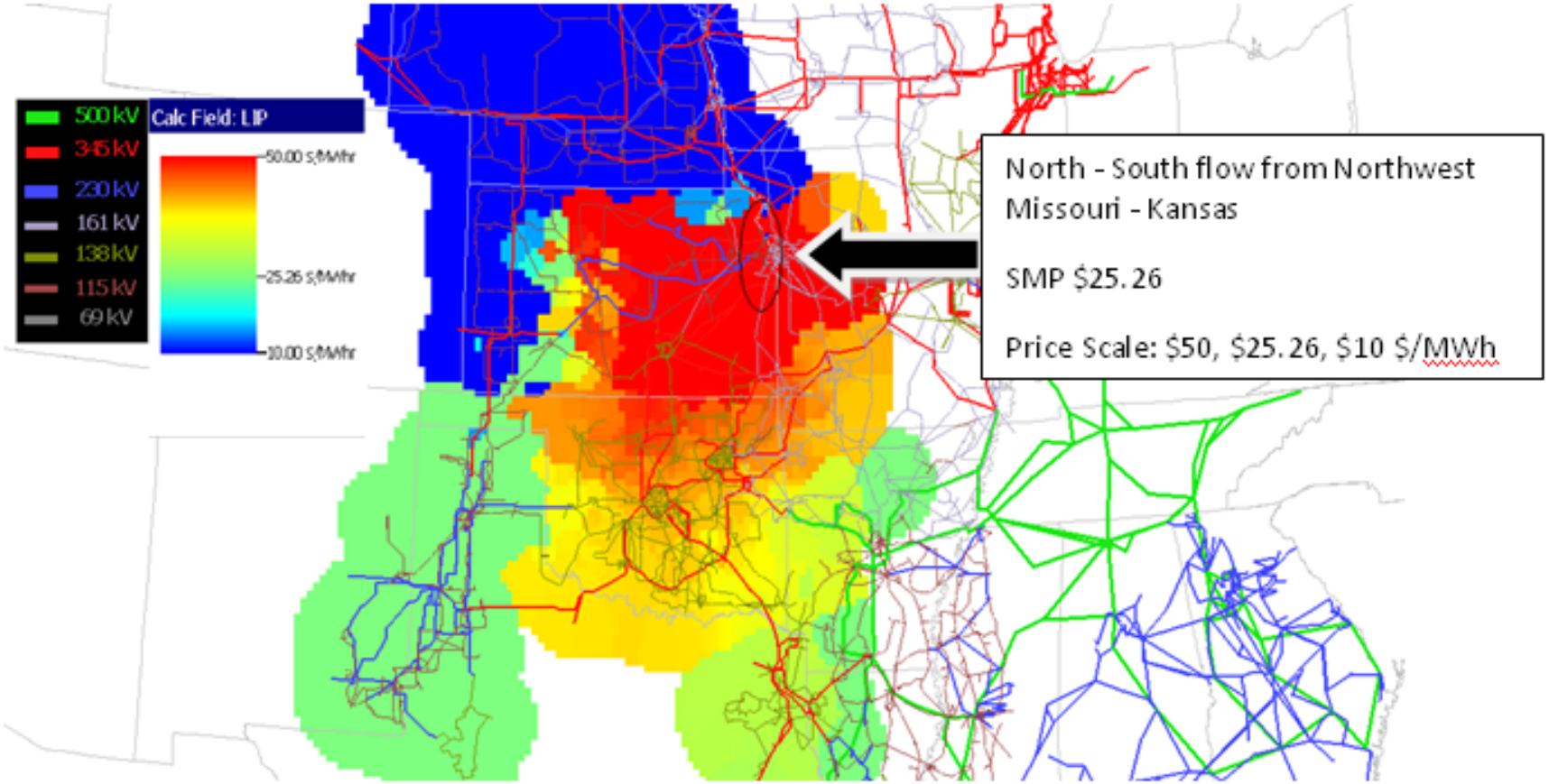
What is congestion?

- **Congestion or "bottlenecks" happen when you can't get energy to customers along a certain path**
  - **Desired electricity flows exceed physical capability**
- **Congestion caused by:**
  - **Lack of transmission, often due to load growth**
  - **Line and generator maintenance outages**
  - **Unplanned outages such as storms or trees on lines**
  - **Too much generation pushed to grid in a particular location**
  - **Preferred energy source located far from customers**
- **Results in inability to use least-cost electricity to meet demand**

Congestion's Impact on Wholesale Market Prices

January 26, 2010 Interval Ending 12:15 PM

LAKALAIATSTR : Lake Road – Alabama 161kV (MPS) ftlo Iatan – Stranger Creek 345kV (KCPL)



Historical Cost Allocation in SPP

Type	Reliability	Economic
Purpose	Keep lights on	Reduce congestion with benefit/cost ≥ 1
Also Called	Base Plan Funding	Balanced Portfolio
Funded By	Region - 33% Impacted zone- 67%	Shared regionally (postage stamp)
Voltage	All	345 kV+
Implemented	2005	2009

Who Pays for Transmission Today?

- **High-voltage "highway" funded with regional rate**
- **Lower-voltage "byway" funded with local rate**

Voltage	Regional	Zonal
300 kV and above	100%	0%
Above 100 kV and below 300 kV	33%	67%
100 kV and below	0%	100%

Regional State Committee

- **Retail regulatory commissioners – Arkansas, Kansas, Missouri, Nebraska, New Mexico, Oklahoma, Texas**
  - **Louisiana maintains active observer status**
- **Functions**
  - **Cost allocation**
  - **Ensure adequate supply**
  - **Market cost/benefit analyses**

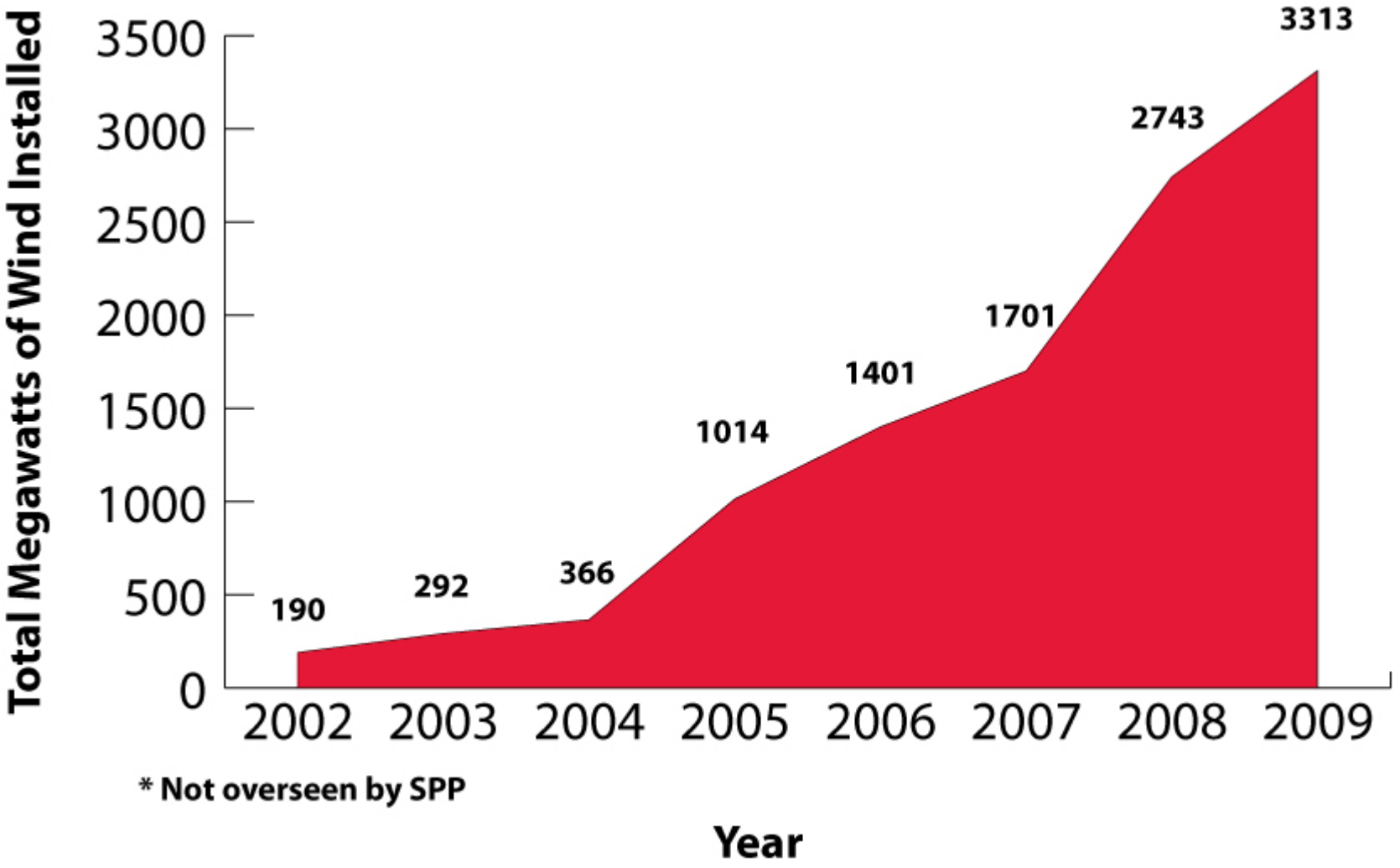
Wind Development

- **Kansas, Oklahoma, Texas Panhandle, New Mexico, Nebraska - wind "Saudi Arabia"**
  - **60,000 – 95,000 MW potential**
  - **More wind than SPP uses during peak demand**
- **~4,000 MW wind in-service / under construction**
  - **Over 37,000 MW in generation interconnection queue**

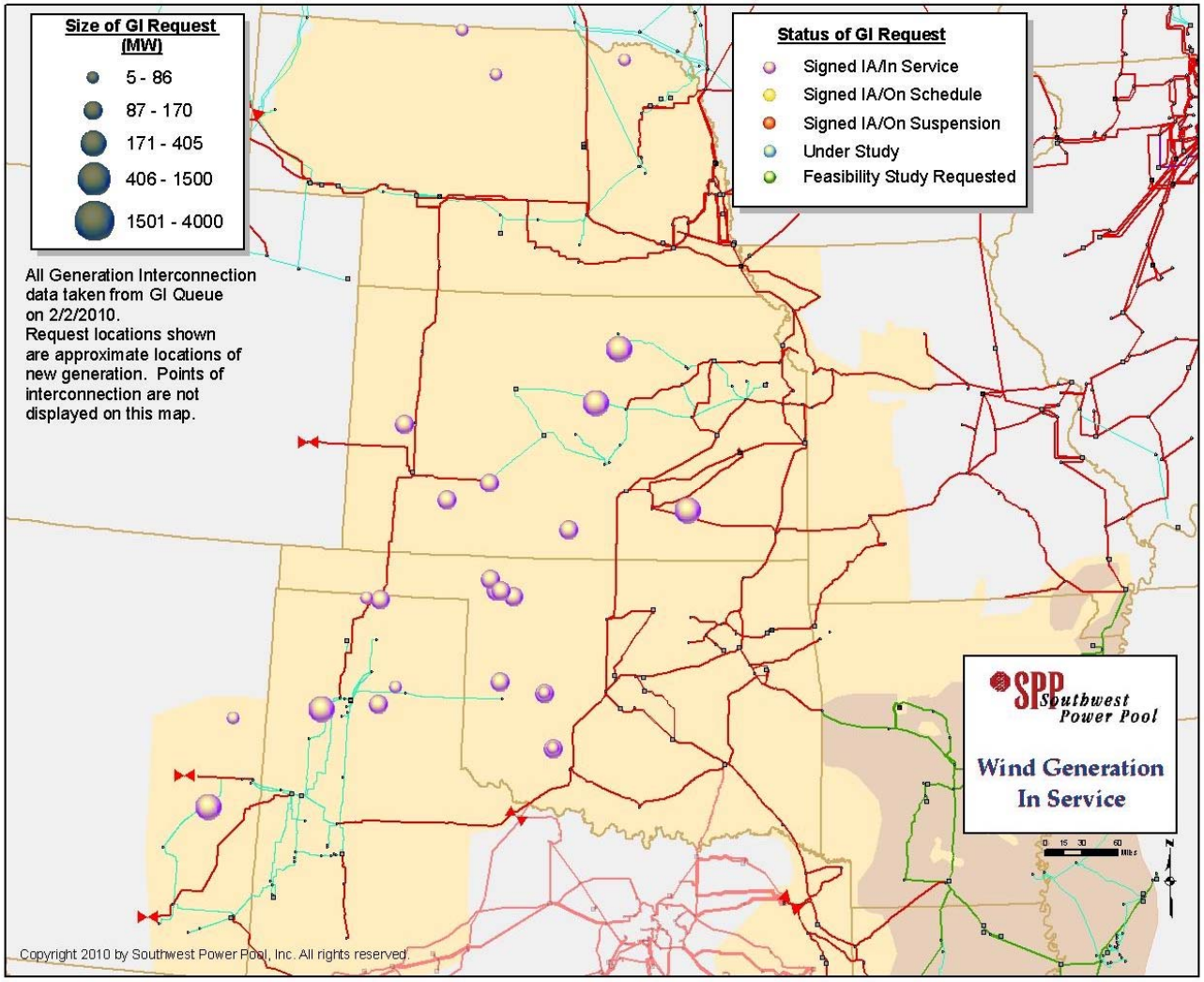
Challenges with wind development

- **Intermittent**
  - **Must be supplemented with constant sources**
- **Wind in remote areas**
  - **Expensive new transmission needed**
- **“Not in my backyard” siting issues**
- **Seams agreements**
- **Renewable Electricity Standards (RES)**

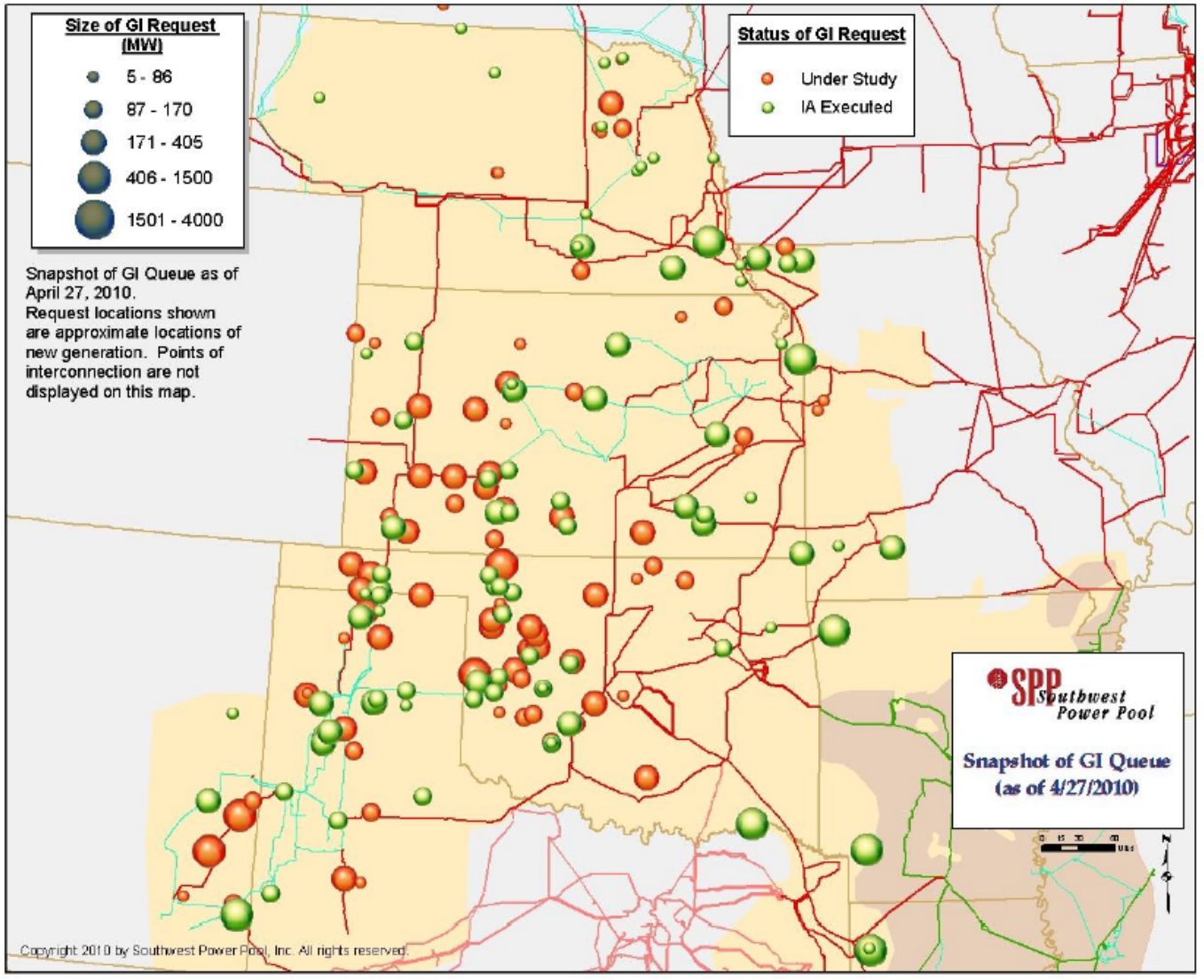
Wind Installed 2002-2009



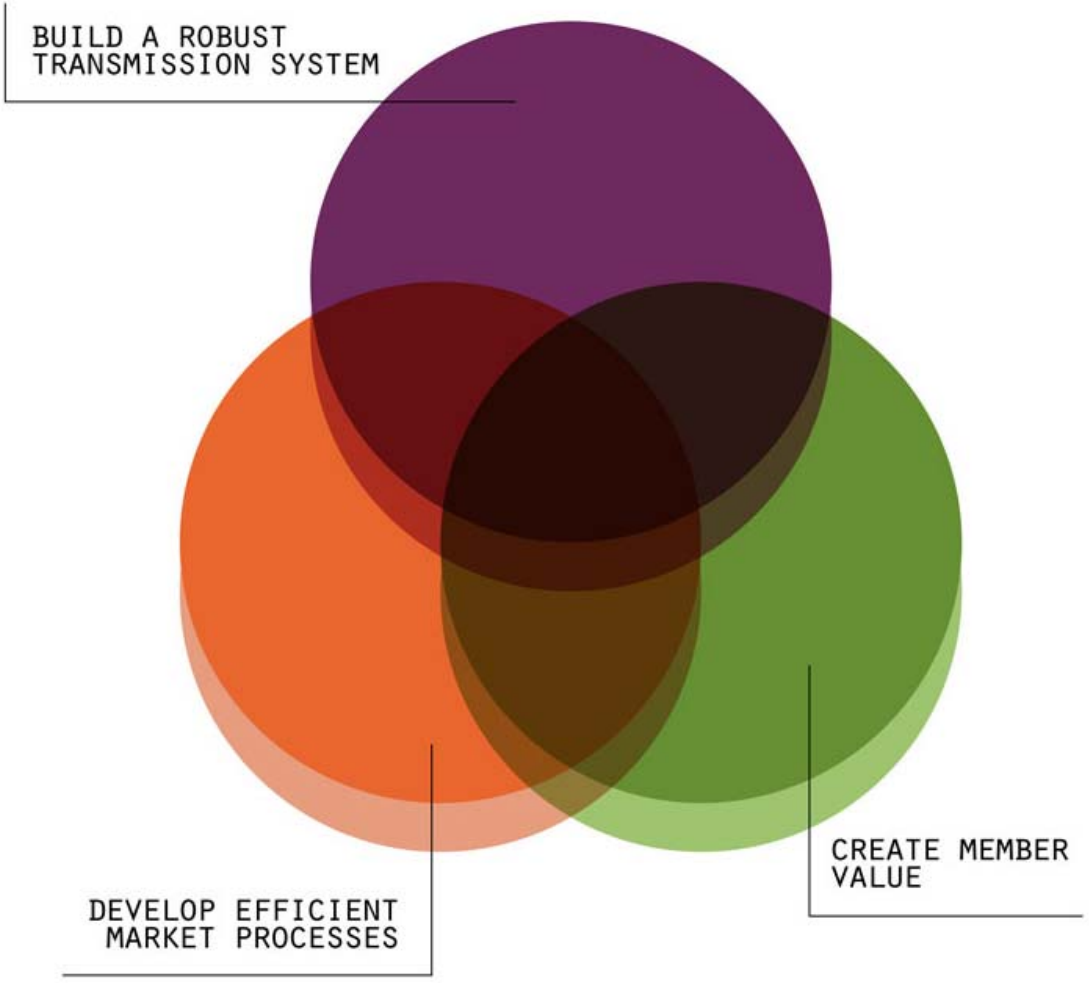
Wind In Service



Generation Interconnection Requests



SPP Strategically



How does SPP impact you?

- **Transmission typically represents 10% of residential customer's bill**
- **SPP cost = 30¢ of $100 residential bill**
- **2005 independent analysis by Charles River Associates:**
  - **$500,000 cost-benefit study**
  - **On behalf of state regulatory commissions**
  - **270% ROI for SPP services over the next 10 years**

SPP Southwest Power Pool

ITP20

Why are we here?

- **Aging infrastructure**
- **Growing need for transmission**
- **Markets**
- **Seams**
- **Dynamic policy climate**
  - **Demand response**
  - **Renewable mandates**
  - **Smart grid**

ITP20 Performance Goals

- **Integrate west to east**
- **Support queues**
  - **Aggregate Transmission Service**
  - **Generator Interconnection**
- **Relieve known congestion**

Inter-Regional Participation

- **MISO, WECC/WAPA, ERCOT**
  - **Shared plans with MISO, sending to ERCOT and WECC**
- **AECI – Coordination through WG involvement**
  - **Engaged in SPP activities and providing input in WGs**
- **WAPA (Basin) – Coordinating plans via calls**
  - **WAPA has seen the plans & will use for future inter-regional planning.**
- **Entergy – Coordinating plans via calls**

ITP20 Expectations

- **Robust EHV expansion plan for the SPP region**
- **Identified through analysis of multiple futures.**
- **What it is:**
  - **Long-term, robust EHV expansion plan**
  - **Value-based, cost-effective solution**
  - **Considers both economics and reliability**
  - **A piece of the ITP pie**

ITP20 Expectations (continued)

- **What it isn't:**
  - **Covers all potential reliability issues**
    1. **Covered in ITP10 and ITPNT**
  - **Ensures total deliverability of wind**
    1. **Covered through GI and TSR studies**
  - **Solution to local area reliability issues**
    1. **Covered in ITPNT**

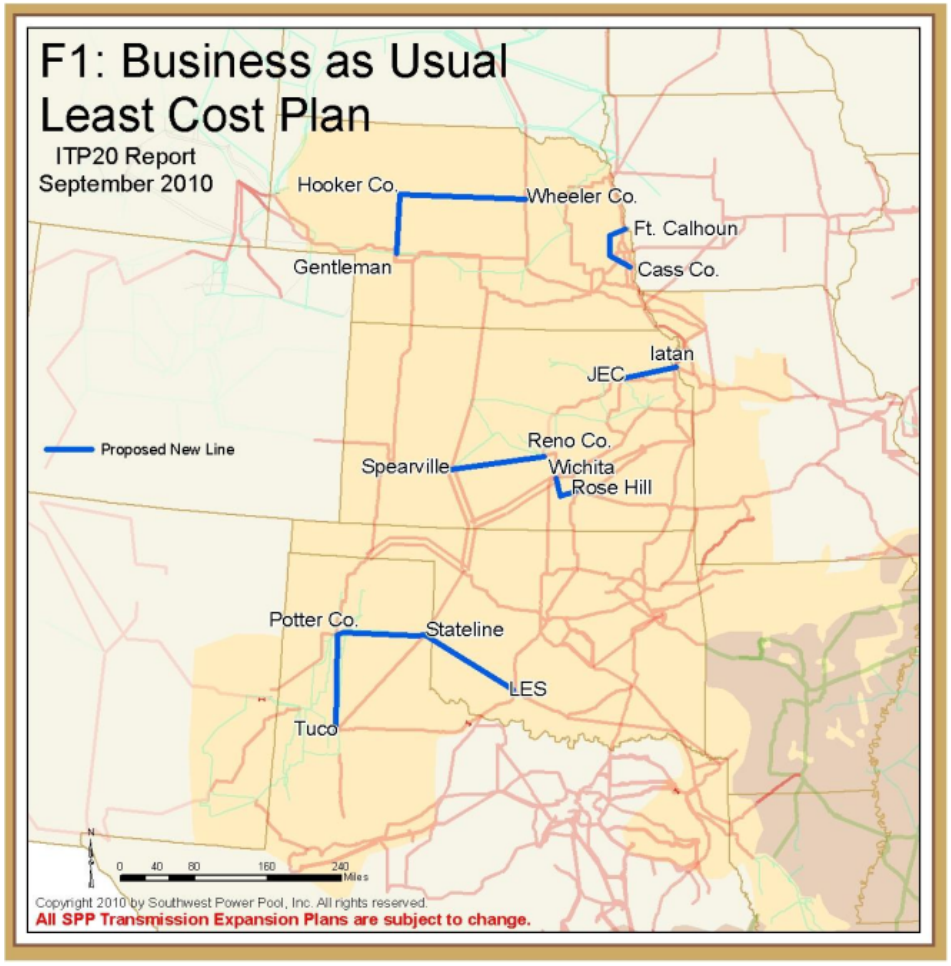
ITP20 Futures Scenarios

- **Four futures (SPC)**

1. **Business as usual**
2. **RES**
3. **Carbon Mandate**
4. **Carbon Mandate + RES**

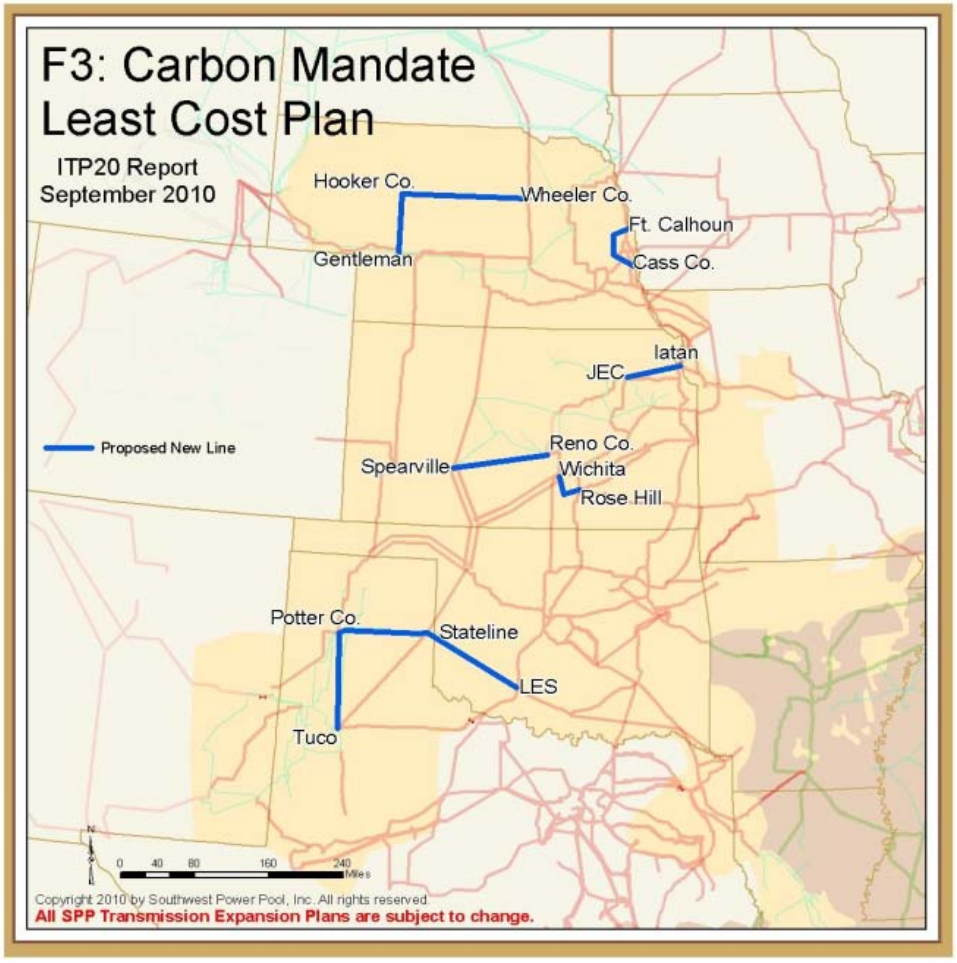
- **Developed one least cost plan (LCP) for each future**

LCP: Business As Usual



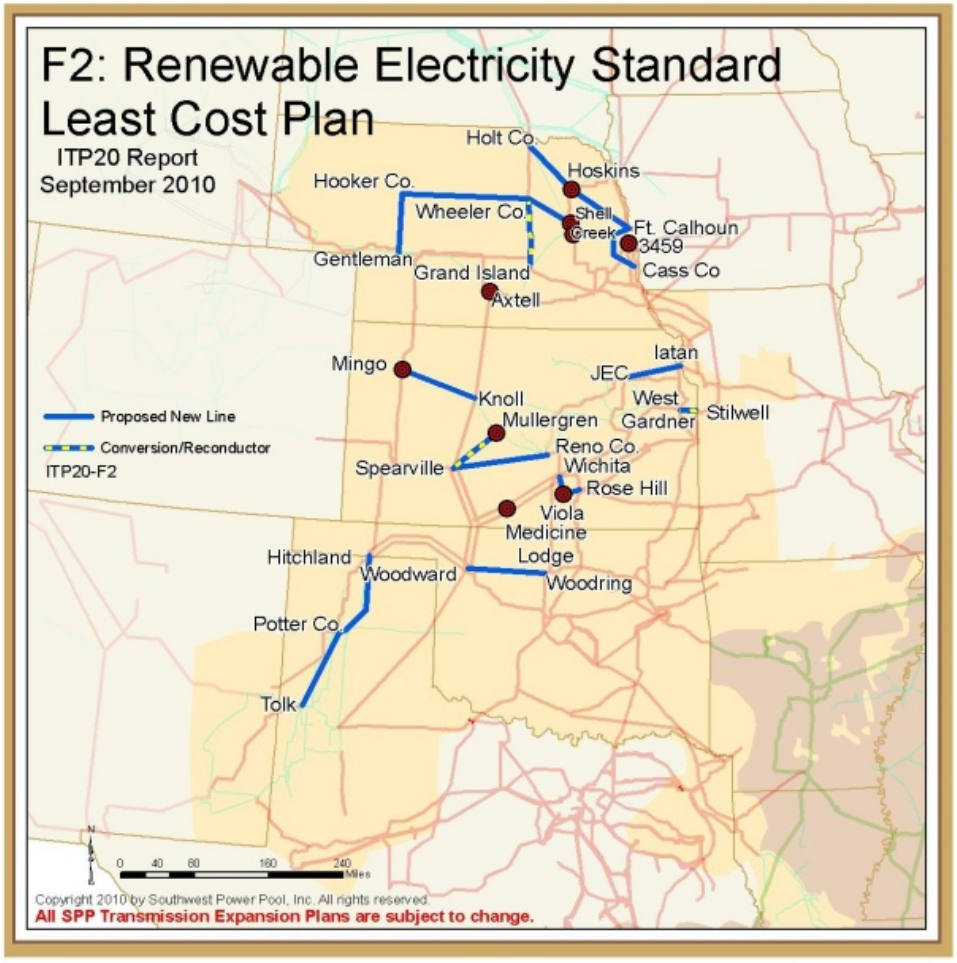
- **No Carbon Tax**
- **No Federal RES**
- **CAWG Survey**
- **Same transmission development as Carbon Mandate Future**

LCP: Carbon Mandate



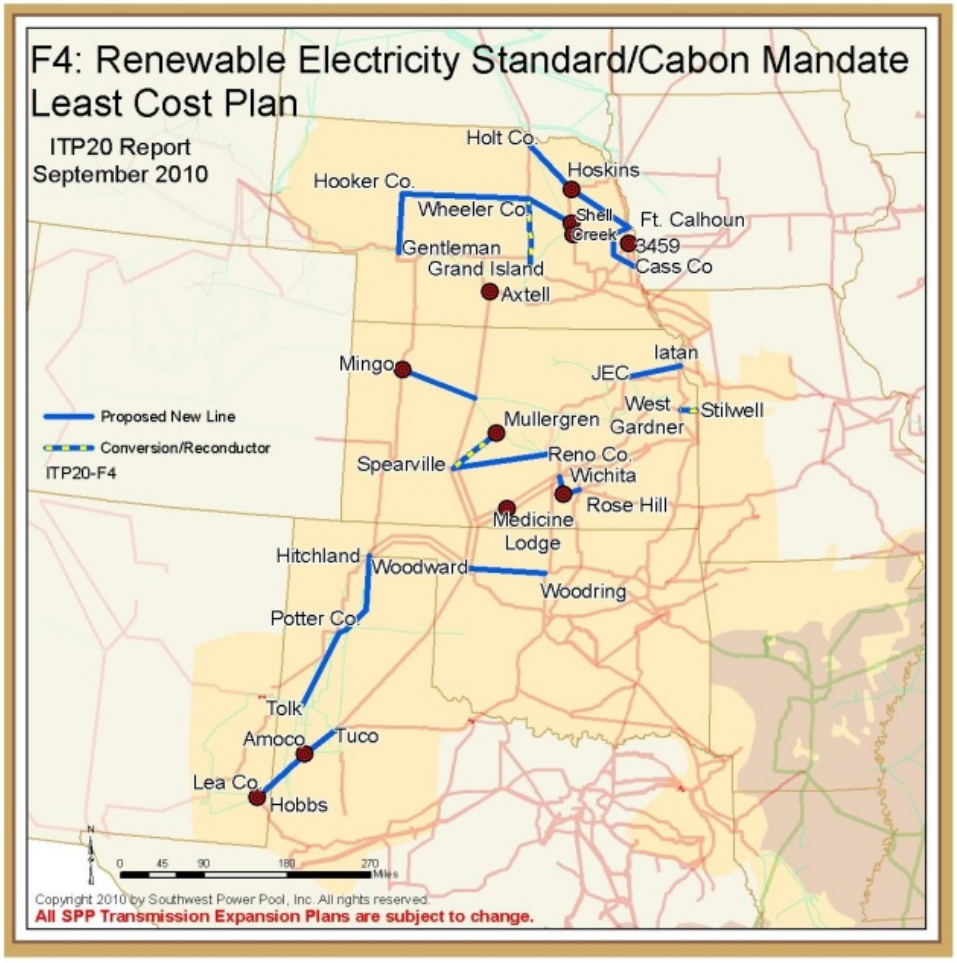
- **Carbon Price of $73**
- **No Federal RES**
- **CAWG Survey**
- **Same transmission development as Business As Usual**

LCP: RES



- **20% Federal RES**
- **No Carbon Tax**
- **Similar transmission development to RES/Carbon Mandate Future**

Least Cost Plan: RES/Carbon Mandate



- **20% Federal RES**
- **Carbon Price of $73**
- **Similar transmission development to RES Future**

Cost Effective Plan Development

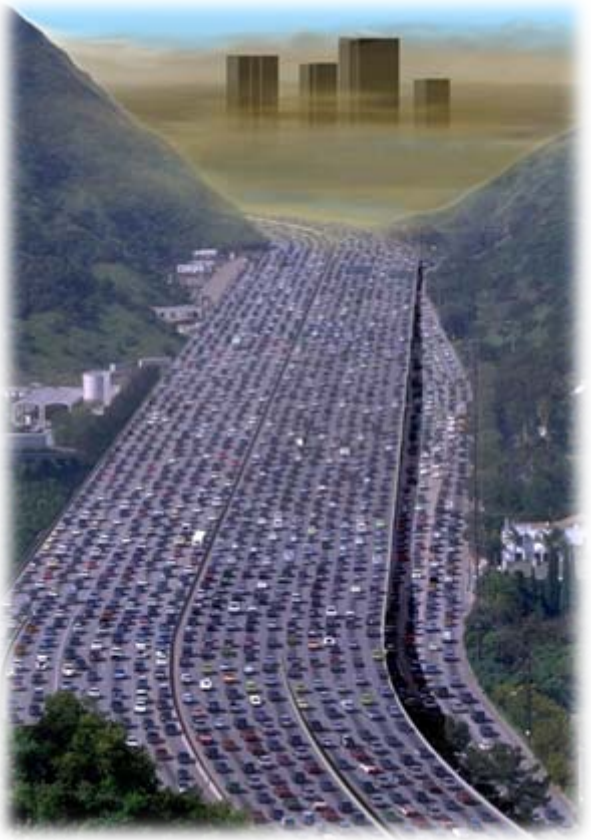
- **Projects common to all four plans**
- **Evaluated remaining least-cost projects**
  - **Weighed the economic benefit against the estimated transmission cost of each project**
- **Cost-Effective Plan: B/C > 1**
  - **All four futures**
- **Meets SPPT Goals**

Cost Effective Plan

Robustness Assessment

- **Metrics**
  - **10 Robustness**
  - **APC**
- **Cost-Effective Plan**
  - **All 4 futures**
- **New projects**
  - **Incremental value**

Robustness Metrics

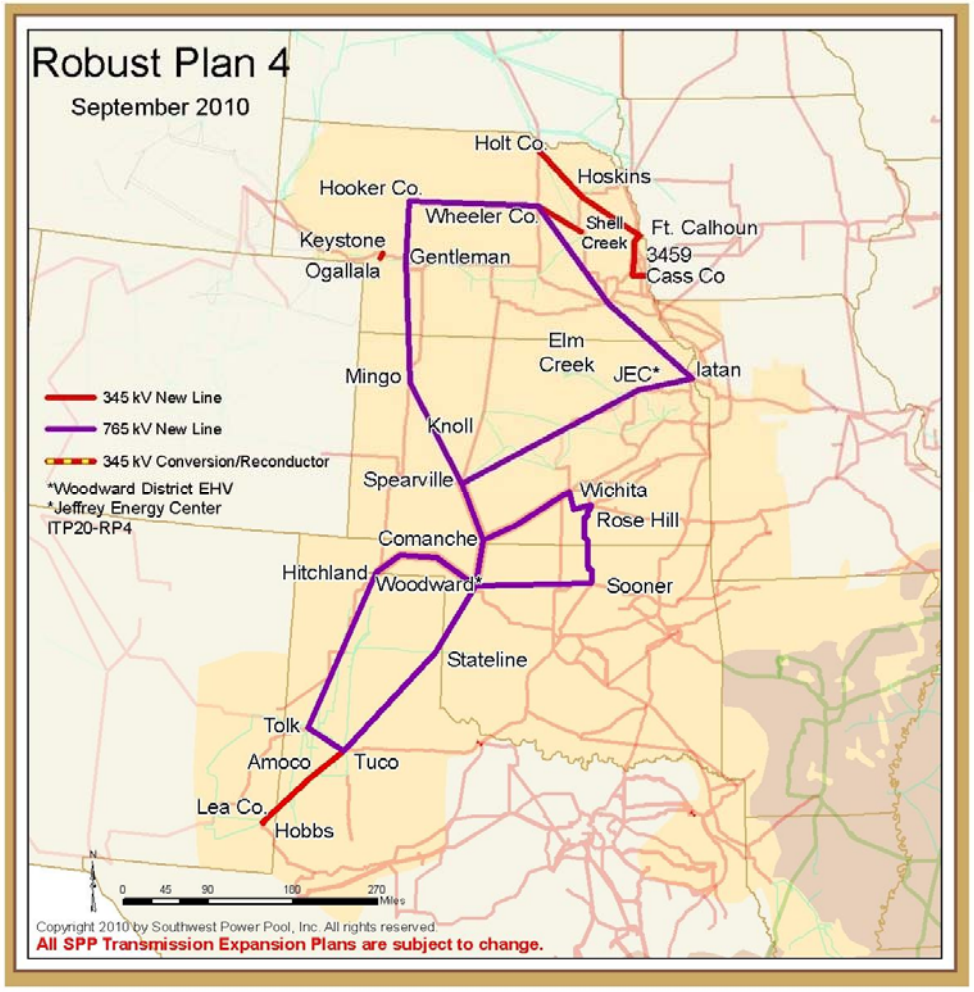


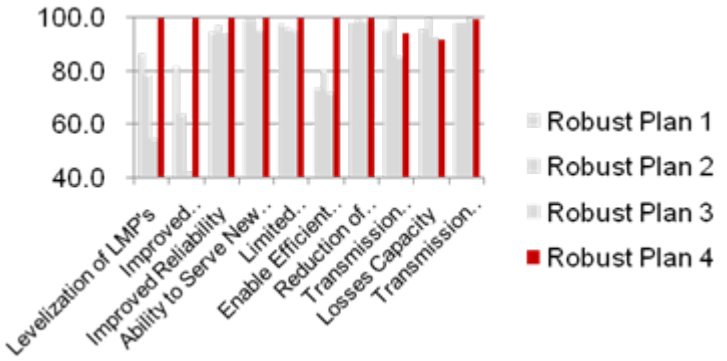
- Levelization of LMP's
- Improved Competition in SPP Markets
- Improved Reliability
- Ability to Serve New Load
- Limited Export/Import Improvements
- Enable Efficient Location of Gen Capacity
- Reduction of Emissions Rates and Values
- Transmission Corridor Utilization (ROW)
- Losses Capacity
- Transmission Corridor Utilization (Environmentally Sensitive Areas)

Robustness Metric Scoring

- **Normalized**
  - **100 scale**
- **Top Plan**
  - **Score of 100**
- **Other plans**
  - **Compared to top performing plan**

Robust Plan 4

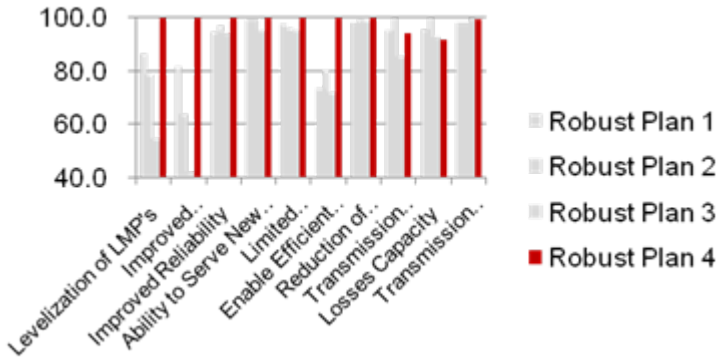




- **Similar corridors to Cost-Effective Plan**
- **Total ITP20 E&C = $7.3B**

Robust Plan 4

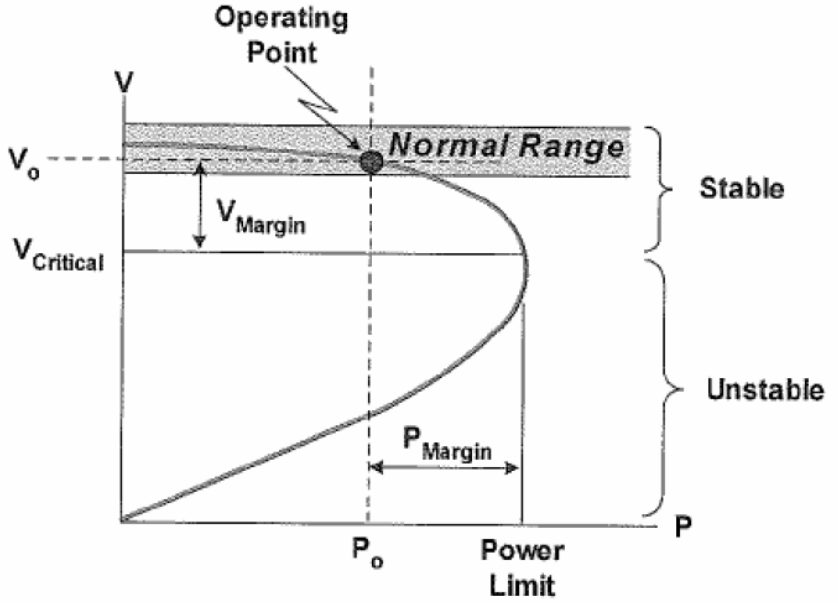
- **B/C of .47**
  - **Lowest**
- **Top performer**
  - ➢ **7 out of 10**
- **Highest E&C cost**



	Robust Plan 4
Cost (millions)	**$7,348**
APC B/C	**0.47**
Levelization of LMP's	100.0
Improved Competition in SPP Markets	100.0
Improved Reliability	100.0
Ability to Serve New Load	100.0
Limited Export/Import Improvements	100.0
Enable Efficient Location of New Gen Capacity	100.0
Reduction of Emissions Rates and Values	100.0
Transmission Corridor Utilization (ROW)	94.1
Losses Capacity	91.9
Transmission Corridor Utilization	99.5
Robustness Metric Average	**98.6**

765kV Considerations

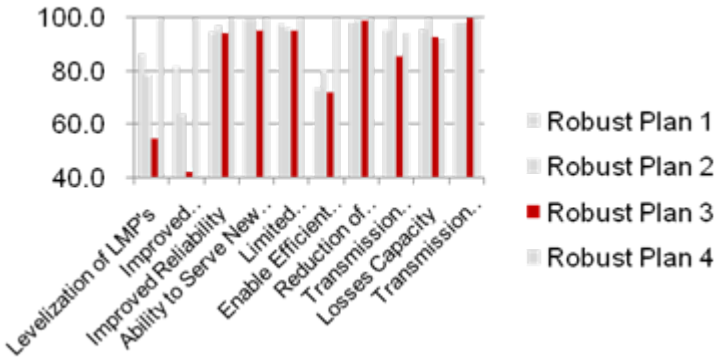
- **Robustness Measures**
  - **High performance**
  - **High Cost**
- **Remaining Analysis**
  - **Loadability**
  - **Voltage Stability**
  - **Dynamic Stability**
  - **Life of Line**



765kV Considerations

- **Advantages**
  - **Most robust**
  - **Operational flexibility**
  - **Lower losses**
  - **Reduces capacity margin requirements**
  - **Greater asset versatility**
- **Challenges**
  - **Greatest impact on rate payers**
  - **New spare equipment**
  - **Limited construction, operation, and maintenance skills**
  - **Additional third party impacts and cost allocation**

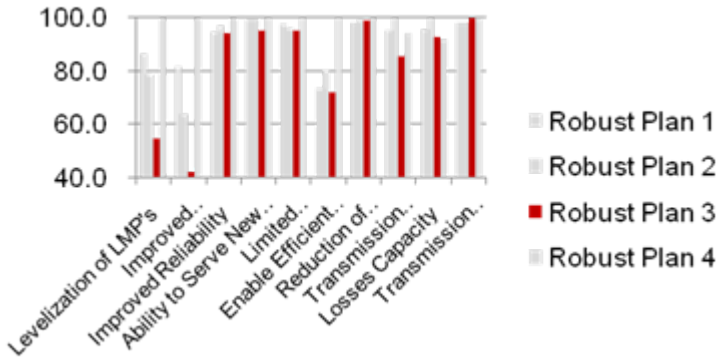
Robust Plan 3



- **Cost-Effective Plan = $1.7B**
- **Robust project additions = $108M**
- **Total ITP20 E&C = $1.8B**

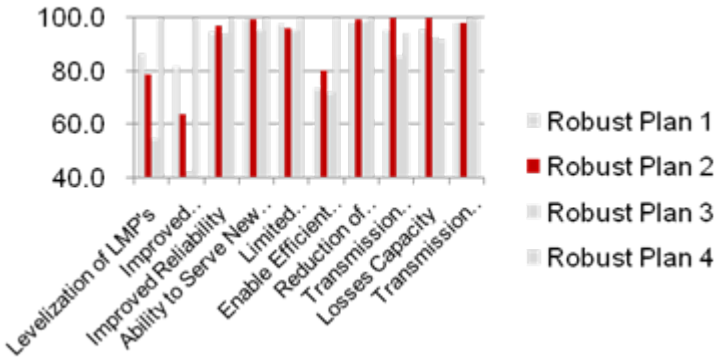
Robust Plan 3

- **B/C of 2.01**
  - **Highest**
- **Lowest performer**
- **Least E&C cost**



	Robust Plan 3
Cost (millions)	**$1,808**
APC B/C	**2.01**
Levelization of LMP's	54.5
Improved Competition in SPP Markets	42.0
Improved Reliability	94.2
Ability to Serve New Load	95.0
Limited Export/Import Improvements	95.2
Enable Efficient Location of New Gen Capacity	72.2
Reduction of Emissions Rates and Values	99.1
Transmission Corridor Utilization (ROW)	85.4
Losses Capacity	92.8
Transmission Corridor Utilization	100.0
Robustness Metric Average	**83.0**

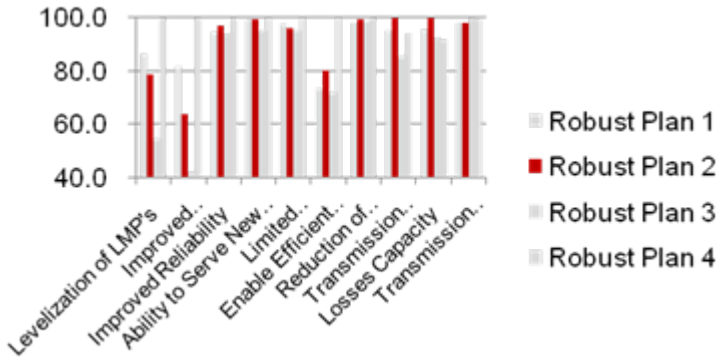
Robust Plan 2



- **Cost-Effective Plan = $1.7B**
- **Robust project additions = $1.4B**
- **Total ITP20 E&C = $3.1B**

Robust Plan 2

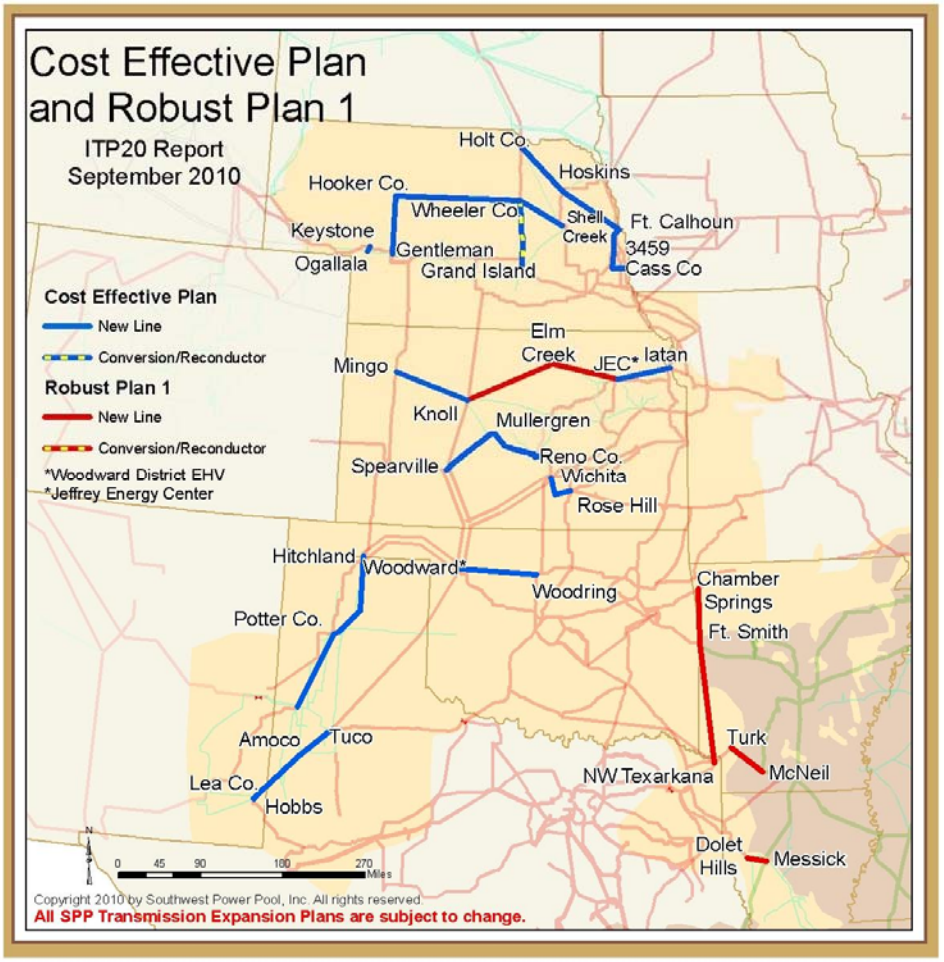
- **B/C of 1.2**
  - **2nd lowest**
- **2nd highest E&C cost**
- **Average robustness performance**

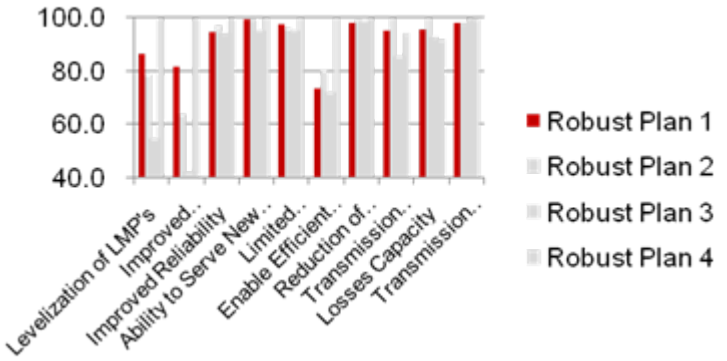


	Robust Plan 2
Cost (millions)	**$3,147**
APC B/C	**1.20**
Levelization of LMP's	78.8
Improved Competition in SPP Markets	64.1
Improved Reliability	97.1
Ability to Serve New Load	99.4
Limited Export/Import Improvements	96.2
Enable Efficient Location of New Gen Capacity	80.2
Reduction of Emissions Rates and Values	99.6
Transmission Corridor Utilization (ROW)	100.0
Losses Capacity	100.0
Transmission Corridor Utilization	98.1
Robustness Metric Average	**91.3**

STAFF RECOMMENDED PLAN

Robust Plan 1

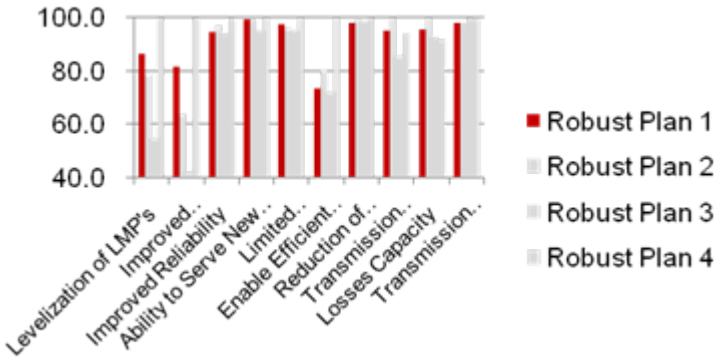




- **Cost-Effective Plan = $1.7B**
- **Robust project additions = $681M**
- **Total ITP20 E&C = $2.4B**
- **B/C = 1.6**

Robust Plan 1

- **B/C of 1.6**
- **Project in every state**
  - **SPP TO states**
- **Low E&C cost**
- **Performs well in every metric**
- **Best 345 kV plan**
  - **Leveling LMPs**
  - **Improving Competition**



	Robust Plan 1
Cost (millions)	**$2,381**
APC B/C	**1.59**
Levelization of LMP's	86.5
Improved Competition in SPP Markets	81.7
Improved Reliability	94.9
Ability to Serve New Load	99.3
Limited Export/Import Improvements	97.4
Enable Efficient Location of New Gen Capacity	73.6
Reduction of Emissions Rates and Values	97.8
Transmission Corridor Utilization (ROW)	95.0
Losses Capacity	95.8
Transmission Corridor Utilization	98.1
Robustness Metric Average	**92.0**

Robust Plan 1

- **Accomplishes performance goals**
  - **Integrate west to east**
  - **Support Aggregate Transmission Service Study Queue**
  - **Support Generation Interconnection Queue**
  - **Relieve known congestion**

Top Performing 345 kV Plan

	Robust Plan 1
Cost (millions)	**$2,381**
APC B/C	**1.59**
Levelization of LMP's	86.5
Improved Competition in SPP Markets	81.7
Improved Reliability	94.9
Ability to Serve New Load	99.3
Limited Export/Import Improvements	97.4
Enable Efficient Location of New Gen Capacity	73.6
Reduction of Emissions Rates and Values	97.8
Transmission Corridor Utilization (ROW)	95.0
Losses Capacity	95.8
Transmission Corridor Utilization	98.1
Robustness Metric Average	**92.0**

Robust Plan 1

	Robust Plan 1	Robust Plan 2	Robust Plan 3	Robust Plan 4
Cost (billions)	$2.4	$3.1	$1.8	$7.3
B/C	1.6	1.2	2.0	0.5
Robust Metric Score	92	91	83	99

Next Steps for Staff

- **Limited Reliability Assessment**
- **40-Year Financial Analysis**
- **Stability Loadability Studies**
- **Zonal and State benefit calculation**
- **Plan refinement**
  - **Stakeholder feedback**
- **Additional metric calculation**
- **Rate Impacts**
- **Unintended consequences**

Schedule & Next Steps

- **MOPC review of ITP20 Report**
  - **Comments back to SPP Staff by Oct 29th**
- **November 5th – TWG review of reliability impact**
- **SPP Staff refinements to ITP20 plan via MOPC feedback**
  - **Final Review for January**
- **Mid-December – TWG/ESWG Final Review**
- **January 11th – MOPC Final Review**
- **January 25th – BOD Review of MOPC Recommendation**

SPP Southwest Power Pool

Heather Starnes
Manager, Regulatory Policy
501-614-3380
hstarnes@spp.org