HUB & SPOKE COST
ALLOCATION BETWEEN LOAD
AND GENERATION
Hub & Spoke Issue: Because of potential difficulties from having a large number of individual generation connections along segments of 345 kV transmission lines the MOPC commissioned the Area Generation Connection Task Force (AGCTF) to develop an approach to resolve these difficulties.

The approach developed by the AGCTF is detailed in their Hub & Spoke White Paper and Principles Paper (see attached AGCTF slides at MOPC for details). A brief overview of the AGCTF proposals is presented in these slides.
Interconnection Facilities: Includes both attachment facilities and generator leads.

Attachment Facilities: Also called substations, are the facilities required to connect a generator to SPP transmission lines that are directly attached to the transmission line.

- Stand-Alone: attachment facilities required for an individual generation to connect to the SPP transmission lines (e.g., land, 3 ring-bus plus a reactor costing $16 M).

- Hubs: attachment facilities that allow multiple generators to connect to the SPP transmission lines at a single location (e.g., land, multiple buses plus a reactor, starting at $18 M and increasing with decreasing cost per added connection).

Generator Leads

- Stand-Alone: the power lines that run from the generator to the SPP transmission lines.

- Spokes: As defined by the AGCTF, a single 345 kV power line that extends out from a single interconnection at the hub and to which multiple generators are attached.
Background – Why Hub Design

- **Engineering:**
  - Each point of interconnection may require a reactor and each added reactor reduces the capacity of the 345 kV transmission lines.
  - Allowing a large number of individual interconnections could result in the need to add additional 345 kV lines to accommodate the deliverability of energy from wind farms required to meet renewable energy targets.
  - To eliminate this problem, since a hub requires only one reactor, the AGCTF recommends hubs on all 345 kV Transmission lines and these hubs to be located at least 23 miles apart.
    - Existing interconnection substations on 345 kV lines may be designated as hubs.

- **Economics:**
  - Having multiple generators interconnect at a hub results in reduced costs associated with a reduced number of reactors and breakers compared to individual interconnections.
  - Assuming individual, stand-alone interconnections are located closer to the generators, the distances from the generators to the hub will be greater than for the sum of the individual interconnections.
CAWG requested that the AGCTF provide a cost-effectiveness study of the Hub Design. The results of this study are summarized below (details are in the Appendix).

- **Attachment Cost Savings**
  - Total = $262 M
  - Per Generator = $7.9

- **Generator Lead Cost Increases**
  - Total = $136 M
  - Per Generator = $4.1 M

- **Net Savings**
  - Total = $126 M
  - Per Generator = $3.8 M
Graphic Illustration of Cost Effectiveness

Stand-Alone
Attachment $ = $16*3 = $48 M
Leads = 11+12+9 = 32 miles
Lead $ = $0.75*32 = $24 M
Total $ = $72 M

Hub Design
Attachment $ = $21 M
Leads = 16.5+17.5+18.5 = 52.5 miles
Lead $ = $0.75*52.5 = $39.375 M
Total $ = $60.375 M

Attachment $ \downarrow \ $27 M
Lead $ \uparrow \ $15.375 M
Total $ \downarrow \ $11.625 M

Over 3 Generator gives average savings of $3.9 M per generator.
AGCTF Question to CAWG

- AGCTF recommended to the CAWG that $13 million of the cost of each Hub built by SPP be rolled into a region-wide rate.

- CAWG rejected this proposal because:
  - Having generation interconnection costs paid for by load via a region-wide rate reflects neither cost causation nor beneficiary pays ratemaking principles. Specific examples:
    - SPP loads taking greater amounts of renewable energy would be subsidized by loads taking lesser amounts of renewable energy.
    - Exports of generation (e.g., renewable energy) would not have to pay their fair share of these uplifted costs.
    - Market-based generation would not have to pay these uplifted costs.
Additional AGCTF Recommendation for CAWG Considerations

- The AGCTF also recommended that the CAWG to consider temporary funding of a portion of generation interconnection costs until those costs fall from added interconnections.
  - Such funding would most likely be accomplished via a region-wide rate and would include payback when costs subsequently decreased.

- CAWG rejected temporary funding of generation interconnection cost because of the financial risk that ratepayers may not receive the payback if:
  - Additional generators ultimately don’t attach at a hub to reduce costs;
  - or
  - Existing generators default on any payback owed to ratepayers.
CAWG recommends that the RSC accept a policy such that no generation interconnection costs associated with hub & spoke design be included in the regional transmission rates, and instead be assigned to generators.
Appendix

Details of Cost Effectiveness Study
# Hub Costs

<table>
<thead>
<tr>
<th>Hub Location</th>
<th># Gen</th>
<th>MW</th>
<th>345 kV Trans</th>
<th>Total Hub Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hub #1 – Beaver County, OK</td>
<td>3</td>
<td>900</td>
<td>2 Circuit</td>
<td>$21,000,000</td>
</tr>
<tr>
<td>Hub #2 - Texas County, OK</td>
<td>3</td>
<td>900</td>
<td>2 Circuit</td>
<td>$27,000,000</td>
</tr>
<tr>
<td>Hub #3 - Woodward County, OK</td>
<td>3</td>
<td>900</td>
<td>2 Circuit</td>
<td>$27,000,000</td>
</tr>
<tr>
<td>Hub #4 - Ford County, KS</td>
<td>5</td>
<td>1500</td>
<td>2 Circuit</td>
<td>$32,000,000</td>
</tr>
<tr>
<td>Hub #11 - Antelope County, NE</td>
<td>3</td>
<td>900</td>
<td>2 Circuit</td>
<td>$27,000,000</td>
</tr>
<tr>
<td>Hub #5 - Sherman County, TX</td>
<td>2</td>
<td>500</td>
<td>1 Circuit</td>
<td>$21,000,000</td>
</tr>
<tr>
<td>Hub #6 - Gray County, KS</td>
<td>3</td>
<td>565</td>
<td>1 Circuit</td>
<td>$18,000,000</td>
</tr>
<tr>
<td>Hub #7 - Rush County, KS</td>
<td>2</td>
<td>400</td>
<td>1 Circuit</td>
<td>$18,000,000</td>
</tr>
<tr>
<td>Hub #8 - Kingfisher, OK</td>
<td>2</td>
<td>550</td>
<td>1 Circuit</td>
<td>$18,000,000</td>
</tr>
<tr>
<td>Hub #9 - Roger Mills county, OK</td>
<td>2</td>
<td>500</td>
<td>1 Circuit</td>
<td>$18,000,000</td>
</tr>
<tr>
<td>Hub #10 - Cherry County, NE</td>
<td>2</td>
<td>500</td>
<td>1 Circuit</td>
<td>$18,000,000</td>
</tr>
<tr>
<td>Hub #12 - Nodaway County, MO</td>
<td>3</td>
<td>800</td>
<td>1 Circuit</td>
<td>$21,000,000</td>
</tr>
<tr>
<td>Total All Hubs</td>
<td>33</td>
<td>8915</td>
<td>Combined</td>
<td>$266,000,000</td>
</tr>
</tbody>
</table>
**Stand-Alone Attachment Costs**

$528 \text{ M} - $266 \text{ M} = $262 \text{ M}$ is an estimate of Attachment Cost Savings. Dividing this by 33 generators results in an average savings of $7.9 million.

<table>
<thead>
<tr>
<th>Hub Location</th>
<th># Gen</th>
<th>MW</th>
<th>345 kV Trans</th>
<th>Busbar</th>
<th>Reactors</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hub #1 - Beaver County, OK</td>
<td>3</td>
<td>900</td>
<td>2 Circuit</td>
<td>$30,000,000</td>
<td>$18,000,000</td>
<td>$48,000,000</td>
</tr>
<tr>
<td>Hub #2 - Texas County, OK</td>
<td>3</td>
<td>900</td>
<td>2 Circuit</td>
<td>$30,000,000</td>
<td>$18,000,000</td>
<td>$48,000,000</td>
</tr>
<tr>
<td>Hub #3 - Woodward County, OK</td>
<td>3</td>
<td>900</td>
<td>2 Circuit</td>
<td>$30,000,000</td>
<td>$18,000,000</td>
<td>$48,000,000</td>
</tr>
<tr>
<td>Hub #4 - Ford County, KS</td>
<td>5</td>
<td>1500</td>
<td>2 Circuit</td>
<td>$50,000,000</td>
<td>$30,000,000</td>
<td>$80,000,000</td>
</tr>
<tr>
<td>Hub #11 - Antelope County, NE</td>
<td>3</td>
<td>900</td>
<td>2 Circuit</td>
<td>$30,000,000</td>
<td>$18,000,000</td>
<td>$48,000,000</td>
</tr>
<tr>
<td>Hub #5 - Sherman County, TX</td>
<td>2</td>
<td>500</td>
<td>1 Circuit</td>
<td>$20,000,000</td>
<td>$12,000,000</td>
<td>$32,000,000</td>
</tr>
<tr>
<td>Hub #6 - Gray County, KS</td>
<td>3</td>
<td>565</td>
<td>1 Circuit</td>
<td>$30,000,000</td>
<td>$18,000,000</td>
<td>$48,000,000</td>
</tr>
<tr>
<td>Hub #7 - Rush County, KS</td>
<td>2</td>
<td>400</td>
<td>1 Circuit</td>
<td>$20,000,000</td>
<td>$12,000,000</td>
<td>$32,000,000</td>
</tr>
<tr>
<td>Hub #8 - Kingfisher, OK</td>
<td>2</td>
<td>550</td>
<td>1 Circuit</td>
<td>$20,000,000</td>
<td>$12,000,000</td>
<td>$32,000,000</td>
</tr>
<tr>
<td>Hub #9 - Roger Mills county, OK</td>
<td>2</td>
<td>500</td>
<td>1 Circuit</td>
<td>$20,000,000</td>
<td>$12,000,000</td>
<td>$32,000,000</td>
</tr>
<tr>
<td>Hub #10 - Cherry County, NE</td>
<td>2</td>
<td>500</td>
<td>1 Circuit</td>
<td>$20,000,000</td>
<td>$12,000,000</td>
<td>$32,000,000</td>
</tr>
<tr>
<td>Hub #12 - Nodaway County, MO</td>
<td>3</td>
<td>800</td>
<td>1 Circuit</td>
<td>$30,000,000</td>
<td>$18,000,000</td>
<td>$48,000,000</td>
</tr>
<tr>
<td><strong>Total All Hubs</strong></td>
<td>33</td>
<td>8915</td>
<td>Combined</td>
<td>$330,000,000</td>
<td>$198,000,000</td>
<td>$528,000,000</td>
</tr>
</tbody>
</table>
$136,000,000 is a rough estimate of Shared Spoke Costs. Dividing this by 33 generators results in an average added shared spoke cost of $4.1 million.
HUB & SPOKE COST ALLOCATION AMONG GENERATORS

Mike Proctor
Presentation to RSC, April 23, 2012
Cost Allocation Principles

- Generators should not be competitively disadvantaged relative to one another based on either:
  - the location of the hub or
  - the relative timing of the interconnections at a hub.

- At a specific hub, when the overall cost of the hub & spoke design is less than the sum of the stand-alone costs for the same number of interconnections at that hub,
  - A cost allocation among generators at that hub should not result in a higher cost to interconnect for any generator than the cost of its stand-alone interconnection.
Current Cost Allocation for GIs Does Not Meet These Principles

- **Attachment (Substation) Costs:** Currently, the first GI pays for all of the substation costs required for its interconnection.
  - If an additional generator connects at the same substation, it is only required to pay the incremental costs associated with its interconnection.
  - In this case, the first generator will be competitively disadvantaged and may end up paying more than its stand-alone costs.

- **Generator Lead Costs:** Currently, each generator arranges and pays for the line going from its generator to the substation.
  - Because of increased distance to a single substation, generator lead costs are higher than from attaching to the nearest point on the 345 kV line. The location of the hub would result in larger cost increases for generators whose nearest point on the 345 kV line are furthest from the hub.
  - This will result in a competitive disadvantage to those generators who are paying larger cost increases for generator leads and may result in them paying more than their stand-alone costs.
Shared & Assigned Costs

To accomplish these cost allocation principles, the CAWG endorses the following cost classification:

- **Shared Cost**: Hub and Generator Lead Cost that are shared on a per connection basis among generator interconnections.

- **Assigned Costs**: Generator Lead Costs that are directly assigned to each generator based on the nearest distance of that generator to the 345 kV line to which the generator is attaching.
Hub: Shared Costs

- **Shared Cost Allocation:** The cost of the hub will be shared equally by the generators connecting to a specific hub.

- **Hub Examples:**

<table>
<thead>
<tr>
<th># Gen</th>
<th>Hub Costs</th>
<th>Cost per Gen</th>
<th>Savings per Gen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$16.0</td>
<td>$16.0</td>
<td>$0.0</td>
</tr>
<tr>
<td>2</td>
<td>$18.0</td>
<td>$9.0</td>
<td>$7.0</td>
</tr>
<tr>
<td>3</td>
<td>$24.0</td>
<td>$8.0</td>
<td>$8.0</td>
</tr>
<tr>
<td>4</td>
<td>$29.0</td>
<td>$7.3</td>
<td>$8.8</td>
</tr>
<tr>
<td>5</td>
<td>$32.0</td>
<td>$6.4</td>
<td>$9.6</td>
</tr>
</tbody>
</table>
Cost estimates for power lines estimate miles of lines as the distance between two points as the sum of the height and base of a right triangle.

The estimated miles of a generator lead is therefore the sum of the distance from the nearest point on the 345 kV Transmission line to the generator plus the distance from that point to the hub.

- Assigned Cost – costs of the generator lead from the generator to the nearest point on the 345 kV Transmission line.
- Shared Cost – costs from the nearest point on the 345 kV Transmission line to the hub.
Shared & Assigned Costs for Generator Leads: Suggested Definitions

- Only 345 kV generator leads are included in cost allocation
  - Each generator interconnection to a 345 kV line must provide its own 345 kV transformer.
  - Any lower voltage lines from the generator to the 345 kV transformer are also provided by the generator

- Shared Generator Lead Costs:
  - Contribution to Shared Cost equals the distance from the nearest point to the generator’s 345 kV transformer on the 345 kV Transmission line times the average cost per mile over all 345 kV generator leads (a Miles * (Total Line Costs ÷ Total Miles)).
  - Shared Costs are allocated equally to each generator.

- Assigned Generator Lead Costs:
  - Difference between each generators actual generator lead costs and each generators contribution to shared costs.
  - Assigned Costs are directly assigned to each generator.
Example of Cost Allocation for 345 kV Generator Leads

<table>
<thead>
<tr>
<th>Generators</th>
<th>b Miles</th>
<th>a Miles</th>
<th>Actual Miles</th>
<th>Costs $M</th>
<th>Shared Line Costs</th>
<th>Assigned Costs $M</th>
<th>Gen Lead Charges $M</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Actual Cost $M</td>
<td>Cost per Mile $M</td>
<td>Contribution to Shared $</td>
<td>Allocation of Shared $</td>
</tr>
<tr>
<td>$G_1$</td>
<td>12</td>
<td>6</td>
<td>18.5</td>
<td>$13.857</td>
<td>$0.749</td>
<td>$4.530</td>
<td>$5.033</td>
</tr>
<tr>
<td>$G_2$</td>
<td>9</td>
<td>9</td>
<td>17.5</td>
<td>$13.143</td>
<td>$0.751</td>
<td>$6.795</td>
<td>$5.033</td>
</tr>
<tr>
<td>$G_3$</td>
<td>11</td>
<td>5</td>
<td>16.5</td>
<td>$12.458</td>
<td>$0.755</td>
<td>$3.775</td>
<td>$5.033</td>
</tr>
<tr>
<td>Totals</td>
<td>32</td>
<td>20</td>
<td>52.5</td>
<td>$39.457</td>
<td>$0.752</td>
<td>$15.100</td>
<td>$15.100</td>
</tr>
</tbody>
</table>

The above table illustrates the application of shared and assigned costs for generator leads to a hub.

- The average cost per mile of $752,000 is multiplied by the miles from the nearest point on the 345 kV to the hub (a miles) for all three generators to get their contributions to shared line costs.
- This total is then allocated equally to each GI customer.
- The contribution to shared cost is subtracted from actual costs for each generator to determine the assigned costs.
- The generator lead charges are the sum of the allocated shared costs and the assigned costs.
What Is A Spoke?

- The AGCTF has defined a spoke as a 345 kV line extending out from the hub to which multiple generators are attached.

- The AGCTF has determined that attachments to a spoke will require 3 ring bus attachment facilities.

This graphic shows the first generator ($G_1$) attaching to the hub via a 345 kV generator lead.

Subsequently generators 2 and 3 attach to the initial 345 kV generator lead, and it then becomes a spoke.
Is the CAWG Endorsed Cost Allocation Applicable to Interconnections with Spokes?

- Yes, with a few minor modifications.

- First, the costs of all the 345 kV generator leads, including the spoke are pooled for generator lead costs for a given hub.

- Second, the definition of the shared cost
  - for the generator leads remains the same using the average costs per mile for the pooled generator lead costs; and
  - includes the costs of the added 3 ring buses.

- Third, the assigned generator lead cost are the pooled generator lead costs minus the shared generator lead cost.
  - Assigned costs are allocated in proportion to the nearest distance to the 345 kV Transmission line from the 345 kV transformers for each generator.
## Example of Cost Allocation for 345 kV Generator Leads Involving A Spoke

The above table illustrates the application of shared and assigned costs to a hub involving a spoke as illustrated in the diagram on slide 19.

- $30 M is the pooled cost for all the 345 kV generator leads including the spoke. The average cost per mile is $750,000 per mile.
- This is multiplied by the miles from the nearest point on the 345 kV to the hub (a miles) for each of the three generators to get their contributions to shared line costs. This total is then allocated equally to each GI customer.
- The remaining line costs are assigned to each generator in proportion to the distance from their 345 kV transformers to the nearest point on the 345 kV transmission line.

<table>
<thead>
<tr>
<th>Generators</th>
<th>b Miles</th>
<th>a Miles</th>
<th>Actual Miles</th>
<th>Actual Line Cost</th>
<th>Cost per Mile $M</th>
<th>Contribution to Shared $</th>
<th>Allocation of Shared $</th>
<th>% of b Miles</th>
<th>Assigned Costs</th>
<th>Assigned Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>12</td>
<td>6</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>$4.500</td>
<td>$5.000</td>
<td>37.50%</td>
<td>$5.625</td>
<td>$10.625</td>
</tr>
<tr>
<td>G2</td>
<td>9</td>
<td>9</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>$6.750</td>
<td>$5.000</td>
<td>28.13%</td>
<td>$4.219</td>
<td>$9.219</td>
</tr>
<tr>
<td>G3</td>
<td>11</td>
<td>5</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>$3.750</td>
<td>$5.000</td>
<td>34.38%</td>
<td>$5.156</td>
<td>$10.156</td>
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<tr>
<td>Totals</td>
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<td>20</td>
<td>40</td>
<td>$30.000</td>
<td>$0.750</td>
<td>$15.000</td>
<td>$15.000</td>
<td>100.00%</td>
<td>$15.000</td>
<td>$30.000</td>
</tr>
</tbody>
</table>
When Will SPP Use A Spoke Design?

- Economic: Whenever it is most cost-effective to add a spoke.
  - Added costs from 3 ring buses attaching to a spoke
  - Reduced costs from fewer connections at the hub
  - Reduced costs from shorter generator leads

- Land Use Congestion at a Hub: Whenever it is determined that there would otherwise be too many generator leads connecting to a single hub.
How Do Shared Costs Work?

- The first generator interconnecting pays SPP the full cost for the attachment facilities and generator lead.
- The next generator that attaches pays SPP its assigned costs plus one half of the shared costs, which in total are more than the incremental costs.
  - SPP pays back to the first generator the difference between what the second generator pays and the incremental costs.
  - This payback will make the second generators net payment equal to its assigned and shared costs.
  - Interest cost may be added to the assigned cost for the second generator.
- As additional generators are added to a hub, the above process is reapplied.
Conclusions

- The CAWG endorses the method for SPP allocation to generators of the Hub & Spoke interconnection costs described herein and proposes that the RSC consider recommending this method to the SPP Board of Directors.
AGCTF Update to MOPC

April 11, 2012

Area Generation Connection Task Force

- AGCTF Charter from the MOPC:
  - The Area Generation Connection Task Force (AGCTF) is responsible for developing and recommending policy to guide SPP Staff and/or recommendations for Tariff modifications or business practices to determine the optimum methods and locations for interconnecting generation to the transmission system given the complex situations generally prevalent.

- AGCTF has developed a number of Whitepapers and Principle documents describing many of these issues and proposed solutions.
The Generation Interconnection Issue

- Current practice is that each GI customer independently interconnects, and directly pays for all costs, associated with its request for interconnection
- SPP has received multiple requests for interconnection in the same geographical area on the same line
  - May result in multiple substations in very close proximity to each other
  - May result in operational issues on the power line
  - Increase impedance on a line if line reactors are required
  - Increased capital and operations and maintenance cost associated with multiple substations

The Generation Interconnection Issue

- Currently GI customers appear to be reluctant to jointly share the same interconnection facilities
  - Ownership issues and lease agreements can make this difficult
Definitions

- Generation Hub (Hub) shall mean the interconnection substation designated by the Transmission Provider for interconnecting generation in a given area.
- Generation Collector Spoke (Spoke) shall mean the transmission line that ultimately connects multiple generators to the Hub.
- Spoke Collector Station shall mean the substation built on a Spoke to accommodate the interconnection of a Generating Facility to the Transmission System.

AGCTF Recommendation on Generation Hubs (Previously Approved by MOPC in April 2011)

- May be established in areas where multiple generators wish to interconnect on the same line
  - Generators would be required to interconnect at Hub
  - This will minimize the number of interconnections on the same line
- Existing Substations may qualify as a Hub
  - Minimize costs
  - Consistent with current Tariff (Attachment V. Section 4.2.3).
Generation Hubs

- Hubs can be identified by:
  - ITP process by identifying significant areas of generation potential
  - GI Cluster Study process when multiple generators request interconnection in the same geographical area
- Designation of Hubs must be approved by MOPC and Board of Directors
**Generation Hubs**

- Criteria for proposing new Hubs
  - Only on lines operating at 300kV or greater
  - Must have at least two GI Customers in close proximity to each other (or one additional generator to an existing substation that interconnects generation).
  - No Hub should be proposed within 23 miles of another Hub or existing or planned substation capable of being designated as a Hub.
  - Two different analysis go into decisions to site Hubs
    - Switching Transients – determine if switching transients need to be controlled
    - Economic – if switching transients are not an issue, determine the additional cost of adding substation

- Existing substations may be designated as Hubs if proposed through the process and approved by the BOD
- No NTC’s will be issued to build a new Hub until SPP has an executed an approved GIA
  - The “in service date” of the Hub will coincide with the in service date of the first generator interconnecting at the Hub
- Hubs preferably located and spaced for future transmission expansion
Requirements to Interconnect to a Hub

• When a Hub is approved, a GI customer must connect to the Hub if directed to do so through the GI process
• GI customer may ask for an exception
  – Reasons for Granting: Access to Hub, costs, etc.
  – Customer request lies in a “gray area” – can Hub be built 20 miles from another?
  – Must independently fund all related studies
  – May have its GI request delayed to complete the studies
  – If granted, the GI customer is responsible for all interconnection costs pursuant to Attachment V

Cost Allocation for Generation Hubs

• Being examined by CAWG and RSC
Collector System - Spokes

• To ease potential land pressures at a Hub, a Spoke that terminates at the Hub and extends to multiple generator facilities may be built at the discretion of SPP.

AGCTF Motion from February 24th

• AGCTF approved the following motion at its February 24th meeting

• “The AGCTF is supportive of moving forward with policy development for the development of Spokes. Such policy would apply for the interconnection (300kV +) of multiple generators assuming that the SPP region would support the cost of the Spoke development until such time that generator developers complete their connection through a subscription process. This policy assumes that SPP would be the entity to identify the need for and specifications of the Spoke and that generation developers would provide some level of initial financial support.”
Collector System - Spokes

- Spokes may be requested by Generator needing to interconnect to an existing or planned Hub.
- If approved, SPP will direct Transmission Owner to build the Spoke.
- Spokes are radial lines
- Spokes to be built with “minimum” 345kV construction (approx 800-1000MVA)
  - Allows spoke to not be “overbuilt”. Construction would be the same for either a 100MW or a 1000MW generator.
  - Additional Generators may request to interconnect into the Spoke.

Collector System - Spokes

- To accomplish an interconnection on a Spoke, a substation, minimum of 3 breaker ring bus or Transmission Owner minimum configuration, must be built on the Spoke. (Station @ D)
Collector System – Spoke Configurations

• Daisy Chain Configuration – Allows multiple interconnections on Spoke (less of concern on radial line)

Collector System – Spoke Configuration

• Common Collector Station – Station connects multiple generators
Spokes – Additional Principles

• Number of Spoke Collector Stations will be self-limiting due to Spokes being built for 800-1000MW.

• Number of Spokes per Hub will be self limiting in accordance with how much interconnection capacity is available on the interconnecting transmission line

• Connecting one Spoke to another Spoke (Closing the Loop) is considered by the AGCTF to be an exception to normal practice. If a situation should occur, the issue to be handled by SPP Staff on a case by case basis.

Spokes – Cost Allocation

• Being examined by CAWG and RSC
AGCTF Recommendation – Voting Item

• AGCTF recommends that MOPC approve AGCTF Principles for Hubs and Spokes as Policy.
  – CAWG and RSC will address cost allocation in their April meeting cycle.
• AGCTF recommends for MOPC to request RTWG to draft appropriate Tariff language and BPWG to develop any necessary Business Practice.

Carl Huslig
ITC Transco
SPCTF on Order 1000
Report Summary

April 23, 2012
Mel Perkins
<table>
<thead>
<tr>
<th>SPCTF Order 1000 Member</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mel Perkins, Chairman</td>
<td>Oklahoma Gas &amp; Electric, Co.</td>
</tr>
<tr>
<td>Noman Williams, Member</td>
<td>Sunflower Electric Power Corporation</td>
</tr>
<tr>
<td>Brian Thumm, Member</td>
<td>ITC Holdings</td>
</tr>
<tr>
<td>Dennis Reed, Member</td>
<td>Westar Energy, Inc</td>
</tr>
<tr>
<td>Ricky Bittle, Member</td>
<td>Arkansas Electric Cooperatives</td>
</tr>
<tr>
<td>Todd Fridley, Member</td>
<td>Kansas City Power &amp; Light Company</td>
</tr>
<tr>
<td>Paul Malone, Member</td>
<td>Nebraska Public Power District</td>
</tr>
<tr>
<td>Terri Gallup, Member</td>
<td>America Electric Power</td>
</tr>
<tr>
<td>Mitch Elmore, Member</td>
<td>Xcel Energy</td>
</tr>
<tr>
<td>Michael Desselle, Staff Secretary</td>
<td>SPP Staff</td>
</tr>
</tbody>
</table>
8 Recommendations

I. Recommendation as to the Transmission Upgrades for which SPP Should Seek to Retain the Federal ROFR.

II. Recommendation as to What Model SPP Should Use to Select Transmission Owners for Projects Without a Federal ROFR.

III. Recommendation as to Transmission Owner Qualification Criteria.

IV. Recommendation as to Changes to SPP’s Membership Agreement and OATT to Remove the Federal ROFR.

V. Recommendation as to Application of Order 1000 to Future SPP Projects.

VI. Recommendation as to Consideration of Transmission Needs Driven by Public Policy.

VII. Recommendation as to Information and Data from Merchant Transmission Developers.

VIII. Timeline for Compliance Filing.
## I. Recommendation as to the Transmission Upgrades for which SPP Should Seek to Retain the Federal ROFR.

<table>
<thead>
<tr>
<th>Voltage/Type of Facility/Exclusion</th>
<th>Should SPP Seek to Retain ROFR?</th>
<th>Justification of Maintaining Federal ROFR?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Zonal Upgrades: 100 kV &amp; below</strong></td>
<td>Yes</td>
<td><strong>Funded by the Zone:</strong> Under SPP’s Highway/Byway Cost Allocation Methodology ITP projects that are 100 kV and below are funded exclusively by the zone in which they are located. In this manner, they are akin to “local transmission facilities” as defined in Order 1000 and therefore are not subject to the requirement to eliminate Federal ROFR.</td>
</tr>
<tr>
<td><strong>Byway Upgrades: 100 kV – 300 kV</strong></td>
<td>Yes</td>
<td><strong>Multiple Reasons:</strong> (1) 2/3 of these upgrades are funded by zone; (2) SPP is the only RTO in which all load serving entities are vertically integrated, thus there is a close nexus between load and a duty to serve; and (3) the reliability nature of upgrades.</td>
</tr>
<tr>
<td><strong>Highway Upgrades: 300 kV &amp; above</strong></td>
<td>No</td>
<td>Federal ROFR to be Eliminated</td>
</tr>
</tbody>
</table>
I. Recommendation as to the Transmission Upgrades for which SPP Should Seek to Retain the Federal ROFR.

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<tbody>
<tr>
<td>Generation Interconnection Upgrades</td>
<td>Yes</td>
<td>Order 1000 expressly excludes Generation interconnection upgrades: Order 1000 indicates that “issues related to the generator interconnection process and to interconnection cost recovery are outside the scope of this rulemaking. . . . This Final Rule does not set forth any new requirements with respect to such procedures for interconnecting large, small, or wind or other generation facilities.” See Order 1000 at P. 760.</td>
</tr>
<tr>
<td>Sponsored Upgrades</td>
<td>Yes, with modifications as discussed below in § 1.2</td>
<td>Order 1000 appears to exclude SPP’s Sponsored Upgrades: Sponsored Upgrades do not fall within the definition of “transmission facilities selected in a regional transmission plan for purposes of cost allocation” and therefore, the requirement to eliminate the Federal ROFR does not apply. First, Sponsored Upgrades are not in the STEP for cost allocation, because the costs associated with Sponsored Upgrades are paid by the Project Sponsor. Thus, at the time that a Sponsored Project is included in the STEP, it is not included for purposes of cost allocation. Additionally, Sponsored Upgrades are built at the request of a Project Sponsor; they are not “selected pursuant to a transmission planning region’s Commission-approved regional transmission process for inclusion in a regional transmission plan for purposes of cost allocation because they are more efficient or cost-effective solutions to regional transmission needs.” The Order 1000 Federal ROFR mandate, therefore, should not apply. See Order 1000 at P. 63.</td>
</tr>
<tr>
<td>Transmission Service Upgrades</td>
<td>Yes</td>
<td>Order 1000 appears to exclude Transmission Service Upgrades: Service Upgrades identified through the SPP Aggregate Transmission Service Study process do not appear to be subject to the requirement to eliminate the Federal ROFR. While Service Upgrades are included in the STEP, and all or a portion of the costs of some Service Upgrades may be eligible for allocation under SPP’s Base Plan funding (i.e., Service Upgrades associated with a Designated Resource that meet the conditions in Section III.B of Attachment J or have obtained a waiver of the requirements), such upgrades do not appear to fall within the description of “transmission facilities selected in a regional transmission plan for purposes of cost allocation.” See SPP OATT at Attachment O § III.7.a. and Attachment J §§ III.B – III.C.</td>
</tr>
</tbody>
</table>
I. Recommendation as to the Transmission Upgrades for which SPP Should Seek to Retain the Federal ROFR.

<table>
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<tr>
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<th>Justification of Maintaining Federal ROFR?</th>
</tr>
</thead>
</table>
| Upgrades to Existing Transmission Facilities (Tower Change outs; Re-conductoring) | Yes                             | **FERC limitation on Federal ROFR Removal Requirement:**
|                                                                        |                                 | “This Final Rule does not remove or limit any right an incumbent may have to build, own and recover costs for upgrades to the facilities owned by an incumbent . . .” *See Order 1000 at P. 319.* |
| Upgrades when state or local laws or regulations limit who can site or be permitted to build transmission facilities | Yes                             | **FERC limitation on Federal ROFR Removal Requirement:**
|                                                                        |                                 | “Nothing in this Final Rule is intended to limit, preempt, or otherwise affect state or local laws or regulations with respect to construction of transmission facilities, including but not limited to authority over siting or permitting of transmission facilities.” *See Order 1000 at P. 227 & Footnote 231.* |
| Upgrades along existing incumbent Transmission Owner Rights-of-Way     | Yes                             | **FERC limitation on Federal ROFR Removal Requirement:**
|                                                                        |                                 | “Nor does this Final Rule grant or deny transmission developers the ability to use rights-of-way held by other entities, even if transmission facilities associated with such upgrades or uses of existing rights-of-way are selected in the regional transmission plan for purposes of cost allocation.” |
II. Recommendation as to What Model SPP Should Use to Select Transmission Owners for Projects Without a Federal ROFR.

2.3 Recommended Competitive Solicitation Process to Select Transmission Owners

The SPCTF recommends that SPP propose to FERC a Competitive Solicitation Model to select Transmission Owners to construct, own and operate projects that do not have a Federal ROFR. The SPCTF recommends that SPP use a process similar to the process outlined in the Draft Transmission Owner Selection Process which is attached hereto as “Attachment A”. Additionally, a flow chart of the Competitive Solicitation Process recommended by the SPCTF is attached hereto as “Attachment B”.

2.4 Recommendation on Development of Detailed Transmission Owner Selection Criteria

The SPCTF recommends the SPCTF develop in detail the evaluation criteria and associated scoring needed to evaluate/compare Qualified Transmission Owners (“QTOs”) that are competing to build transmission projects within SPP’s footprint. The general process, criteria and scoring is found in Attachment A and B which the SPCTF recommends be further vetted and developed by the SPCTF by June 2012.
II. Recommendation as to What Model SPP Should Use to Select Transmission Owners for Projects Without a Federal ROFR.

2.5 Majority/Minority Position

Proponents of the Competitive Solicitation Process, while acknowledging some weaknesses, believe the proposal: preserves the current ITP process recently approved by FERC maintaining the open, transparent and collaborative planning process; keeps the “need” component separated from the “construction” component thereby facilitating that the most cost-effective solutions are built; establishes only one competitive process for SPP staff to manage; and, has the least amount of Tariff work of all the options considered by the Task Force.

Opponents believe that the Competitive Solicitation approach is complex and potentially creates unintended drivers; relies on SPP planning staff and incumbent transmission owner for ideas and solutions to problems consequently not incenting stakeholders solutions and providing an unfair advantage for incumbents; imposes construction bidding expertise on SPP staff and processes contributing to increased SPP staffing and to delays in construction; and is incompatible with current NTC-C process.

For the comprehensive comparisons, see the following link: http://www.spp.org/publications/SPCTFOrder1000-030812.pdf.
III. Recommendation as to Transmission Owner Qualification Criteria.

3.1 Recommended Transmission Owner Qualification Criteria

The SPCTF recommends that SPP’s compliance filing for Order 1000 contain Transmission Owner qualification criteria that must be met before a potential transmission owner can participate in SPP’s Competitive Solicitation Process described in Sections 2.2 and 2.3 above. The Transmission Owner qualification criteria would apply only to those entities seeking to construct, own, and operate transmission projects that are subject to the SPP Competitive Solicitation Process. The general basis upon which the SPCTF make its recommendation for Transmission Owner qualification criteria is the existing process outlined in Attachment O § VI.6 of the SPP OATT. These are:

(1) Threshold eligibility criteria: The recommended threshold eligibility criteria would include, at a minimum, some level of proof by an Applicant Transmission Owner (“ATO”) that the ATO has the legal authority under state law to construct facilities within a state in which a project will be built and some level of assurance that the ATO is or will be a member of SPP.

(2) Financial criteria: The recommended financial eligibility criteria would include certain creditworthiness requirements.

(3) Managerial criteria: The recommended managerial eligibility criteria would require an ATO to demonstrate certain managerial expertise.
IV. Recommendation as to Changes to SPP’s Membership Agreement and OATT to Remove the Federal ROFR.

4.2 Recommended Change to SPP’s OATT

The SPCTF recommends that the following sections of SPP’s OATT be amended to remove the Federal ROFR as stated below.

A. SPP OATT, Attachment O – Section VI(1) & (4)

As a result, the SPCTF recommends that SPP modify these sections to comply with Order 1000 in a manner that is consistent with this Report.

The SPCTF recommends that the RTWG draft the specific language for approval by the SPP Board of Directors during SPP’s current meeting cycle by June 30, 2012.
V. Recommendation as to Application of Order 1000 to Future SPP Projects.

5.1 Recommendation as to Which Facilities Will Be Subject to Order 1000 Requirements

The SPCTF recommends that SPP propose that the effective date of its Order 1000 compliance filing be the date FERC issues an order accepting the compliance filing, with the first developer qualification process beginning in the summer (June) thereafter. The SPCTF therefore recommends that the requirements of Order 1000 apply to all transmission facilities subject to Federal ROFR elimination that are approved for construction in the first STEP Report that is issued following the first developer qualification process, and for all facilities approved thereafter for which Federal ROFR has been eliminated.
VI. Recommendation as to Consideration of Transmission Needs Driven by Public Policy.

6.3 Recommendation as to How SPP Should Handle Public Policy under Order 1000.

The SPCTF recommends that SPP rely primarily on its existing OATT language regarding transmission needs driven by public policy requirements as discussed above. Rather than revising the OATT to provide explicitly for the consideration of transmission needs driven by public policy goals, the SPCTF recommends that SPP remain open to considering public policy goals through the language in Attachment O that allows for “Other input requirements identified during the stakeholder process” (see Attachment O § III.6.o).

The SPCTF recommends that the RTWG, in consultation with the TWG and the Economic Studies Working Group (“ESWG”), examine the existing OATT language to determine if any minor revisions are required to ensure that SPP complies with the requirements in paragraphs 205-211 of Order 1000 to establish procedures to: (1) identify transmission needs driven by public policy; (2) identify potential solutions to meet those needs; and (3) post information on the SPP website relating to public policy transmission planning.
VII. Recommendation as to Information and Data from Merchant Transmission Developers.

7.1 Recommended Information and Data that Merchant Transmission Developers that Do Not Participate in SPP Planning and Cost Allocation Should Be Required to Provide to SPP.

The SPCTF recommends that SPP seek FERC’s approval to require that merchant developers provide certain information and data to SPP. While Order 1000 does not expressly define "merchant developers", the Order states that merchant facilities are facilities that are not subject to the evaluation and selection processes that apply to transmission facilities for which regional cost allocation is sought and that merchant transmission developers assume all financial risk for developing and constructing the transmission project. [PP. 163-165] The SPCTF recommends that SPP consider any transmission facility within and/or interconnecting to the SPP Region that the builder does not intend to place under SPP's control under the SPP OATT to be "merchant facilities" for the purposes of the information and data requirements. While the language of Order 1000 could be read to include Sponsored Upgrades as defined in the SPP OATT (i.e., sponsor assumes financial risk and is not part of the evaluation process), because “Sponsored Upgrades” will be placed under SPP’s control under the SPP OATT, the SPCTF recommends that entities proposing to construct "Sponsored Upgrades" as defined in the SPP OATT will be subject to all of the requirements applicable to other Transmission Owners participating in the SPP transmission planning process. The SPCTF recommends that SPP’s TWG review existing SPP practices and policies in order to recommend the specific information and data SPP should require merchant transmission developers to provide to SPP.
## VIII. Timeline for Compliance Filing

<table>
<thead>
<tr>
<th></th>
<th>SPCTF Report Implementation Requirement</th>
<th>Responsible Stakeholder Group(s)</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Endorsement of SPCTF on Order 1000 Report</td>
<td>SPC &amp; BOD</td>
<td>April 2012</td>
</tr>
<tr>
<td>2</td>
<td>Development of Transmission Owner Selection Criteria for a Competitive Solicitation Process (See §§ 2.3 &amp; 2.4)</td>
<td>SPCTF</td>
<td>June 30, 2012</td>
</tr>
<tr>
<td>3</td>
<td>Development of Transmission Owner Qualification Criteria &amp; TO Managerial Experience Criteria (See §§ 3.1 &amp; 3.2)</td>
<td>SPCTF</td>
<td>June 30, 2012</td>
</tr>
<tr>
<td>4</td>
<td>Development of Transmission Owner Creditworthiness Criteria (See § 3.1)</td>
<td>Finance Committee</td>
<td>June 30, 2012</td>
</tr>
<tr>
<td>5</td>
<td>Drafting &amp; Approval of Language to Remove ROFR in Membership Agreement (See § 4.1)</td>
<td>SPCTF, CGC, MOPC, &amp; BOD</td>
<td>SPCTF – April 30, 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CGC – May 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MOPC &amp; BOD – July 2012</td>
</tr>
<tr>
<td>6</td>
<td>Drafting &amp; Approval of Language to Remove ROFR in OATT (See § 4.2)</td>
<td>RTWG, MOPC, &amp; SPP BOD</td>
<td>RTWG – June 30, 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MOPC &amp; BOD - July 2012</td>
</tr>
<tr>
<td>7</td>
<td>Review and Drafting of Recommended Language on Public Policy Requirements of Order 1000 (See § 6.3)</td>
<td>RTWG, MOPC, &amp; SPP BOD</td>
<td>RTWG – June 30, 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MOPC &amp; BOD - July 2012</td>
</tr>
<tr>
<td>8</td>
<td>Review and Draft Information and Data SPP Will Propose to Require Merchant Transmission Developers to Provide to SPP (See § 7.1)</td>
<td>TWG</td>
<td>June 30, 2012</td>
</tr>
<tr>
<td>9</td>
<td>Drafting and Endorsement/Approval of Tariff Language for SPP’s Order 1000 Regional Compliance Filing</td>
<td>RTWG</td>
<td>RTWG – August 31, 2012</td>
</tr>
<tr>
<td>10</td>
<td>Review and Approval of RTWG’s Language for SPP’s Order 1000 Regional Compliance Filing</td>
<td>MOPC &amp; BOD</td>
<td>September 31, 2012</td>
</tr>
<tr>
<td>11</td>
<td>Parallel Work of Drafting SPP’s Order 1000 Compliance Filing Letter for Regional Requirements</td>
<td>SPP Staff</td>
<td>October 11, 2012</td>
</tr>
</tbody>
</table>
Questions?
Southwest Power Pool - Regional State Committee
Task Force on Order 1000 Cost Allocation Requirements
DRAFT Charter
April XX, 2012

PURPOSE
Under Southwest Power Pool’s (SPP) governance structure the Regional State Committee (RSC) has
primarily responsibility for cost allocation of transmission upgrades. As a result, the RSC is forming a
Task Force on FERC’s Order 1000 Interregional Cost Allocation Requirements. Order 1000 requires RTOs
to submit compliance filings on the Interregional aspects of Order 1000 by April 2013.

The purpose of the RSC Task Force on Order 1000 is to explore SPP’s compliance options related to
Order 1000’s Interregional Cost Allocation Requirements. The RSC has engaged the Brattle Group as a
consultant on Interregional Cost Allocation issues with a report expected in April 2012. The Brattle
Report can serve as a foundation to explore Interregional Cost Allocation options. Due to the April 2013
compliance filing deadline for SPP, completion of the task forces work will be critical by the end of 2012.
This will allow the task force’s recommended option to be presented to the RSC and SPP Board of
Directors in January 2013 for an April filing at FERC.

REPRESENTATION
The RSC Task force on Order 1000 (“RSCTF on Order 1000”) Interregional Cost Allocation Requirements
will be a seven (7) member task force composed of three (3) representatives of the RSC, three (3) SPP Members
and one (1) member of the SPP Board of Directors.

A RSC Member shall serve as Chair and a SPP Member shall serve as Vice-Chair. The RSC and SPP Members
representatives shall be appointed by the RSC President and MOPC Chairman and shall represent diverse members. Selection of such representatives shall consider, among other factors,
geography, member type and expertise. The Board of Directors Member of the Task Force will be
appointed by the SPP Board of Directors.

DURATION
The RSCTF on Order 1000 will be a temporary task force. It is anticipated that its work will be completed
by December 31, 2012, though the task force will continue its work until it is completed.

SPP Staff Support
The SPP Staff shall have at least one individual in attendance for all meetings of the task force to serve
as a Staff Liaison and Secretary for the task force who will be responsible for keeping and issuing
minutes for the meetings. Other members of the SPP Staff may be requested to assist in particular
endeavors of the task force.

REPORTING
The RSCTF on Order 1000 will provide status reports to the RSC and the BOD at least on a quarterly
basis at the regularly scheduled meetings. The task force may make additional status reports as it
deems necessary or as requested by the RSC, the MOPC or the BOD.
The RSCTF on Order 1000 will make final recommendations to the RSC and the SPP BOD on what SPP should submit in SPP’s compliance filing in on FERC Order 1000’s Interregional Cost Allocation requirements.

The Task Force shall prepare and issue the report by December 31, 2012.