Southwest Power Pool

CAWG MEETING
May 23, 2007
Hyatt Regency DFW
Dallas, TX
11:00 am – 5:00 pm

AGENDA

1.	Introductions	11:00 - 11:10
2.	GSEC view of Funding for Economic Upgrades Discussion Lead by Bob O'Neal	11:10 – 12:15
3.	Lunch Break	12:15 – 1:00
4.	Payment of Credits using Base Plan Funding Discussion Lead by John Mills	1:00 – 1:15
5.	Economic Portfolio Discussion Lead by Charles Cates	1:15 – 2:00
6.	15 minute break	2:00 – 2:15
7.	Planning Guidelines and Cost Allocation Discussions Discussion lead by Mike Proctor	2:15 – 5:00

SPP Southwest Power Pool

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

SPP Southwest Power Pool

Economic Portfolio Discussion

A discussion on a Regional Economic Portfolio and the benefits therein

What Projects are included in the Portfolio?

- It has been suggested that a project with a Benefit to Cost Ratio of less than 1.0 be excluded from the allocation
- It has also been suggested that projects with a B/C ratio of slightly less than 1.0 may be included as to diversify the portfolio across the states in the SPP footprint
- The following discussion deals only with projects from the 2006 SPP STEP Economic Screening

Projects with > 1 B/C Ratio Percentage

- The following projects have a Benefit to Cost Ratio greater than 1
- Benefit to Cost Ratio defined as:
  - Project Cost / Production Cost Savings$_{\text{Ten Year}}$
- Production Cost Savings defined as:
  - Yearly Production Cost Savings = Summer Production Cost Savings x 2

Project Ranking				
State	Project Name	Project Cost ($ Million)	Production Savings (10 Year Estimate Cost Savings)	Ratio (B/C)
MO	SWPS-Battlefield 161 kV	4.5	13.0	2.89
OK	Cleveland-Sooner 345 kV	27	41.7	1.55
MO	Monett 345/161 kV Xfer	12.0	18.2	1.52
KS/MO	Iatan - Nashua 345 kV	28.5	35.0	1.23

Economic Portfolio Limited to $100M / $250M

- **The projects outlined in blue represent a $108M E&C cut-off**
- **The projects outlined in blue & red represent a $230M E&C cut-off**

Project Ranking				
State	Project Name	Project Cost ($ Million)	Production Savings (10 Year Estimate Cost Savings)	Ratio (B/C)
MO	SWPS-Battlefield 161 kV	4.5	13.0	2.89
OK	Cleveland-Sooner 345 kV	27	41.7	1.55
MO	Monett 345/161 kV Xfer	12.0	18.2	1.52
KS/MO	Iatan - Nashua 345 kV	28.5	35.0	1.23
TX	Tuco-Tolk-Potter (Roosevelt) 345 kV	66.75	45.7	0.68
MO	Fair Port-Sibley 345 kV	48	25.4	0.53
AR	East Centerton - Beaver 345 kV	33.0	15.7	0.48
OK/AR	Pittsburg - Ft Smith 345 kV	66.8	26.4	0.40
KS	Midland - Pentagon 230 kV Rebuild	25.4	9.5	0.37

Benefits of Transmission

- **Traditionally, SPP has only looked at the Production Cost savings of a project across SPP and Tier 1**
- **This look only attempts to capture the baseline fuel savings that might be expected to occur after a project is completed**
- **What is an appropriate metric to measure benefit?**
  - **Adjusted Production Cost?**
  - **Load LMP?**
  - **Some combination?**
- **SPP believes that many other benefits are associated with the addition of new transmission on the grid that are not being captured by a production cost model**

Additional Benefits of Transmission

- **Many significant benefits of additional transmission are not captured by a production cost model. In addition to the conservative model assumptions presented at the last meeting, benefits not captured by production cost models, include but are not limited to:**
  - **Reliability Benefits**
  - **Insurance and Risk Mitigation**
  - **Operational Benefits**
  - **Capacity Benefits**
  - **Impacts on Fuel Prices**
  - **Increased Market Competitiveness and Liquidity**
  - **More……**
- **SPP does not currently attempt to capture any of these benefits**

Economic Portfolio and EHV Overlay

- **SPP will work with InfraSource to establish a working relationship between the Economic Portfolio work and the EHV Overlay study**
- **The EHV Overlay Study will cover a 20-year planning horizon and look to large backbone expansion of the grid**
- **Synergies between the Economic Portfolio and the EHV Overlay Study need to be captured in an effective manner**

Questions?

Charles Cates
Planning Engineer
501-614-3551
ccates@spp.org

Planning Guidelines and Cost Allocation Discussions

CAWG

May 23, 2007

Outline

I. Planning Design
   A. Time Value Measures
   B. Timing of Projects
   C. ERP vs. IRP

II. Cost Allocation
   A. Postage Stamp vs. Beneficiaries Pay
   B. Intermediate Examples

2

I. Planning Design Topics

A. Time value measures of costs and benefits.
- NPV over 10 years of
  benefits – costs (revenue requirements)

B. Timing of projects in the portfolio
- Determinants of project timing
- Treatment of project timing differences in portfolio
- Impact of timing differences on metrics

C. ERP vs. IRP aspects of benefit analysis
  ERP = Enhanced Resource Planning
  IRP = Integrated Resource Planning

3

A. Time Value Metrics

- Present value over ten-year period of
  - Benefits from decreases in adjusted production cost (Production Cost Savings)
  - Annual fixed charges associated with the costs of the transmission upgrades.
- What is the payback from this metric? $100 M

Years	Project Cost LFC Rate 20% $ Millions	NPV at 8% Discount Rate $ Millions	Cumulative Present Value $ Millions
1	$20	$18.52	$18.52
2	$20	$17.15	$35.67
3	$20	$15.88	$51.54
4	$20	$14.70	$66.24
5	$20	$13.61	$79.85
6	$20	$12.60	$92.46
7	$20	$11.67	**$104.13**
8	$20	$10.81	
9	$20	$10.00	
10	$20	$9.26	

Years	Project Cost LFC Rate 20% $ Millions	NPV at 10% Discount Rate $ Millions	Cumulative Present Value $ Millions
1	$20	$18.18	$18.18
2	$20	$16.53	$34.71
3	$20	$15.03	$49.74
4	$20	$13.66	$63.40
5	$20	$12.42	$75.82
6	$20	$11.29	$87.11
7	$20	$10.26	**$97.37**
8	$20	$9.33	
9	$20	$8.48	
10	$20	$7.71	

Benefits = Costs

The payback concept is that a project must produce sufficient benefits to pay back the investment over a specified period of time.

4

Discussion

Is 10 Years PV of Benefits and Revenue Requirements Sufficient?

• YES	• OTHER - Payback

5

B. Timing of Projects In the Portfolio

- A **Project** is a grouping of interdependent transmission upgrades that interact to provide joint benefits.
  - Example of interdependence: Lower voltage upgrades needed to ***fully*** provide the benefits from a new EHV line.
  - All upgrades in the project must be completed before that project fully provides the joint benefits.
  - Projects can still interact to impact the benefits of the portfolio.
- A **Portfolio** is a grouping of projects.
- The Portfolio can extend over a **multi-year** time horizon. What does this mean?
  - The projects in the portfolio need not be implemented all at the same time.
    - Implementation schedule (time from commitment to on-line) can vary by project.
    - Capital budgets may impact annual expenditures available each year for transmission upgrades.

6

Simple Example: Projects On-line by Implementation Schedule

Levelized Net Benefits

Year	Project 1	Project 2	Project 3	Project 4	Portfolio
1					
2					
3	0.95				0.9500
4	0.95	0.95			1.9000
5	0.95	0.95	0.95		2.8500
6	0.95	0.95	0.95	0.95	3.8000
7	0.95	0.95	0.95	0.95	3.8000
8	0.95	0.95	0.95	0.95	3.8000
9	0.95	0.95	0.95	0.95	3.8000
10	0.95	0.95	0.95	0.95	3.8000
11	0.95	0.95	0.95	0.95	3.8000
12	0.95	0.95	0.95	0.95	3.8000
13	?	0.95	0.95	0.95	2.8500
14	?	?	0.95	0.95	1.9000
15	?	?	?	0.95	0.9500

Q1: Should benefits be calculated on an implementation timed, portfolio basis? If so, what should be used to determine project timing? Role of implementation schedules? Role of capital budgets? Role of EHV project?

Q2. Should benefits be calculated for all projects 10 years past the last project included in the portfolio? For example, through period 15?

7

Role of Capital Budgeting

- In an “optimal” portfolio approach, capital budgeting plays a role when the implementation of a project is delayed by insufficient capital funds available to construct the project.
  - A capital budget constraint results in those projects having the highest paybacks being implemented first.
- However, in a “balanced” portfolio approach, a capital budget could be set for each sub-region and projects having the highest paybacks within each sub-region are implemented first.
  - Since projects within sub-regions can have shared benefits, additional balancing may be required.

8

A Capital Budgeting Approach To Portfolio Design

1. SPP is divided into sub-regions
2. Capital budgets (5 years?) are set for each sub-region based on load ratio share.
3. Cost beneficial projects are developed for each sub-region taking into account interdependence with other sub-regions.
4. Portfolio is designed to meet capital budgets within each sub-region.

9

Role of the EHV Study

- Does the EHV Study include recommendations with respect to the timing of transmission upgrades?
- If there are significant interactions among EHV projects, is ten years sufficiently long enough to reflect the joint benefits from EHV projects that are not planned for simultaneous implementation?

10

Discussion

- Determinants of Project Timing
  - Implementation Schedule
  - Capital Budgets
  - EHV Study
  - Other?

- Calculation of Portfolio Benefits
  - Ten years only by project
  - Ten years past last project on line

11

Timing Can Impact the Distribution of Benefits Throughout the Region

Levelized Benefits - Costs | **Allocation of Benefits to Zones**

Year	1	2	3	4	Total	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F	Zone G	Total
1													
2													
3	0.95				0.95	0.4275	0.1900	0.3325	0.0000	0.0000	0.0000	0.0000	0.9500
4	0.95	0.95			1.90	0.4275	0.1900	0.3325	0.3325	0.1900	0.4275	0.0000	1.9000
5	0.95	0.95	0.95		2.85	0.5361	0.5361	0.3461	0.3461	0.5361	0.5361	0.0136	2.8500
6	0.95	0.95	0.95	0.95	3.80	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	3.8000
7	0.95	0.95	0.95	0.95	3.80	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	3.8000
8	0.95	0.95	0.95	0.95	3.80	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	3.8000
9	0.95	0.95	0.95	0.95	3.80	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	3.8000
10	0.95	0.95	0.95	0.95	3.80	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	3.8000
11	0.95	0.95	0.95	0.95	3.80	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	3.8000
12	0.95	0.95	0.95	0.95	3.80	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	0.5429	3.8000
13	?	0.95	0.95	0.95	2.85	0.1154	0.3529	0.2104	0.5429	0.5429	0.5429	0.5429	2.8500
14	?	?	0.95	0.95	1.90	0.1154	0.3529	0.2104	0.2104	0.3529	0.1154	0.5429	1.9000
15	?	?	?	0.95	0.95	0.0068	0.0068	0.1968	0.1968	0.0068	0.0068	0.5293	0.9500
					Total	5.4286	5.4286	5.4286	5.4286	5.4286	5.4286	5.4286	38.0000
					% Total	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%	100.0%
Discount Rate 10%					NPV	3.2095	2.9562	3.0204	2.8347	2.8501	2.9707	2.5124	20.3539
					% NPV	15.8%	14.5%	14.8%	13.9%	14.0%	14.6%	12.3%	100.0%

Notice that zone A has a significant share of Project 1 (starting in year 3), while zone G has a significant share of Project 4 (starting in year 6). While the portfolio is balanced in terms of ten-year benefits to both zone A and zone G, the timing of the benefits impacts the NPV received by each zone.

12

Discussion

Should timing differences matter in evaluation of a balanced portfolio?

• YES – HOW?	• NO

13

C. Two Modeling Approaches: Inclusion of Future Generation

1. **ERP**: SPP only includes generators that have interconnection agreements, but performs a sensitivity analysis on New Generation Resources.
2. **IRP**: SPP designs an "optimal" regional resource plan that includes sufficient generation and demand response to meet the SPP 13% capacity margin.

14

ERP

- Assume that additional peak load growth would be met by either IPPs already on line but w/o contracts or by demand response.
  - Would indicate how transmission additions would enable better utilization of existing generation.
  - Would also indicate how transmission upgrades would alleviate modeled energy shortages.
    - How does the SPP model price of unserved energy?
  - Would perform various sensitivities on adding new generation resources to alleviate energy shortages.
    - Does the EHV project provide info that can help this step?

15

IRP

- Integrates resource (Gen and DR) and transmission planning as well as reliability and economic upgrades.
- Requires SPP to gather individual IRP type information from its members, and requires members to willingly provide that information.
  - SPP takes inputs from all the members and performs a regional IRP analysis to determine a best regional plan.
  - The best regional plan may differ from the individual resource plans.
- Individual members and states review the results of the Regional IRP and make a decision on which plan appears to be best for their customers.
- Individual feedback to SPP results in a basis for its recommendation on transmission upgrades needed for both reliability and economics.
  - Transmission needed for new DRs must also be included as reliability upgrades.
  - Would allow for economic projects to replace projects needed for reliability upgrades.

16

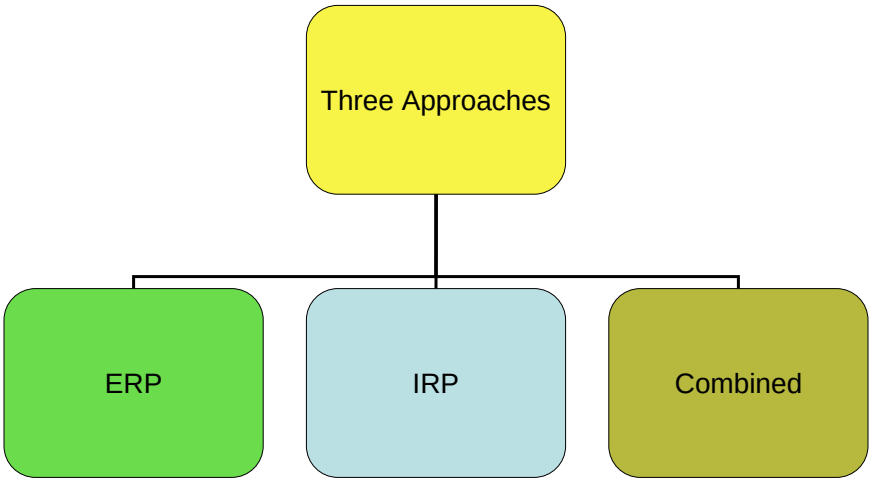
Is A Combined Approach Viable

1. SPP performs ERP analysis, putting in its “best estimates” for new generation.
2. Results are sent to Members and States involved to receive feedback and to make potential changes.
   - Supply-side resource may differ from the new generation in the SPP ERP.
   - Demand-side resources planned could be used to delay the timing of new generation.
3. SPP reruns ERP analysis based on feedback and presents results at stakeholder meeting.

17

Discussion

Which Approach is Preferred & Why?



18

II. Cost Allocation

This presentation is meant to "prime the pump" for the June CAWG meeting.

A. Boundaries
   1. Postage Stamp Rate
   2. Beneficiaries Pay

B. Intermediate
   1. Voltage Split (Highway/Byway)
   2. Phase In (Economic $\Rightarrow$ Reliability)

19

A. Boundaries

- Postage Stamp (PS):
  - In the **long-run** all Transmission Customer benefit equally from the proposed Portfolio of Upgrades
- Beneficiaries Pay (BP):
  - For Economic Upgrades: Adjusted Production Cost (APC) Savings measure the **near-term** benefits to load $\rightarrow$ cost are allocated in proportion to APC Savings.

Note: The Cost Allocation was a combination of these boundaries where MW-mile impact was used for BP.

20

B. Intermediate: Voltage Split Highway/ Byway

X% PS and 100% - X% BP for 345 kV and above

Y% PS and 100% - Y% BP for below 345 kV

Where X > Y; for example X = 50% & Y = 25%.

For this type of proposal, please provide a rationale for specification of X and Y.

21

B. Intermediate: Phase In Economic ⇒ Reliability

EB = Economic Benefit (Near-Term)

RB = Reliability Benefit (Long-Term)

Year		Year	
1.	100% EB and 0% RB	1.	100% EB and 0% RB
2.	90% EB and 10% RB	2.	80% EB and 20% RB
	* * *		* * *
10.	10% EB and 90% RB	5.	20% EB and 80% RB
11.	0% EB and 100% RB	6.	0% EB and 100% RB

For example: EB uses APC Savings and RB uses the SPP allocation for reliability upgrades.

For this type of proposal, the allocation factors used for EB and RB should be specified and reasons for these given.

22

Next CAWG Meeting
June 27, Dallas

- Please come with cost allocation proposals and with the reasons that you believe your proposal should be given consideration by the RSC.
  - Please send your proposals to John Mill by June 25.
  - Should we plan to start the June 27 meeting before 11 a.m.?
- If we cannot get through all of the proposals in the June meeting, we will have to meet in July prior to the July 23 RSC Board meeting.

23

Transmission Planning

Putting the Horse Before the Cart

Robert O'Neil

May 23, 2007

Preliminary Comments

- The opinions expressed herein are not offered as a response to the SPP May 4 Strawman
- The focus of my comments is limited to long term backbone transmission planning

Evolution of Backbone Transmission Requirements

- Historic: The Vertically Integrated Utility
  - Internal transmission planned to connect major utility owned generating plants and maintain control area reliability
  - Interconnections with adjoining utilities undertaken for reliability or to foster purchases or sales
  - Utility could choose to forego transmission upgrades requiring incremental capital investment that might not be accounted for in rates in favor or out of merit dispatch where higher fuel costs could be passed on to customers
- Future: The Competitive/Emissions Sensitive Market
  - Transmission must be planned of accommodating large inter-system flows
    - Including renewable energy
  - Backbone planning should have a minimum 20 year horizon
  - Backbone routing should be “friendly” to new generation resources
  - Rights of way should be acquired as soon as possible

Transmission Must Lead Generation

- Construction lead times for generation capacity generally are shorter than transmission lead times
  - Peaking: 12-18 months
  - Combined cycle: 24 months
  - Coal: 48-54 months
  - Nuclear: ?
  - Little economic incentive to add capacity before it is needed
- Backbone transmission permitting, acquisition of rights of way, construction etc.: 60+ months
  - Increased development will make acquisition of rights of way more difficult

Extended Planning Process

- Traditional participants focus on near term (5 years)
  - Generators
  - TOs
  - LDCs
  - Reliability organizations
  - Regulators
- Other participants may have a longer term focus
  - Economic development organizations
    - Economic well being of communities will require reliable energy
  - Demographers
    - E.g., where will the baby boomers go?
  - Economists
    - Can economic modeling provide useful long term energy projections?
  - Energy conservationists
    - To what extent can growth in energy consumption be held in check through conservation?

Considerations in Planning Process

- Design backbone plan to meet forecast energy needs of the geographic “study” area (e.g., the SPP)
- Seek transmission routing that intersects or is near to favorable generating sites
  - Rail, water, natural gas pipelines, favorable wind areas, etc.
  - If feasible, planning organization should publish expected ability to accept generation injections without further upgrade costs
- Initiate two part regulatory approval process
  - Phase 1: Approval of transmission routing and acquisition of rights of way
    - Planning process may engender support of community leaders
  - Phase 2: Release for construction and provision for cost recovery (only needed if regulators are reluctant to grant long term pre-approval and automatic cost recovery not allowed

Beneficial Effect of Long Term Transmission Planning on Generation Markets

- Prior regulatory approval and acquisition of rights of way assures that transmission lines can be built when the timing is appropriate
- Developers can proceed to acquire/obtain options on plant sites, water rights, etc., near acquired transmission rights of way with comfort that transmission can be constructed in a timely manner and that it can accept planned generation
- Robust transmission offers access to broader markets, encouraging plant investment

The Need For Transmission to Integrate Renewable Energy

- 45,000 MW of wind generation forecast by 2015
  - Intermittent nature of wind poses great challenges to reliability and operational economics
    - Regulation of wind adversely affects heat rates
    - Increases in spinning reserves may be needed to hedge against loss of wind energy
    - Additional “line pack” may be needed so gas units can respond to loss of wind energy
- Wind energy requires massive transmission investment
  - To move wind energy to load centers
  - To integrate wind generation with resources (supply side and demand side) that can manage wind generation output swings
- Broad political support to unleash wind energy must not undermine sound transmission planning
  - CREZ docket featured less than “fully developed” proposals

Cost Recovery

- New transmission will not be built without adequate provision for recovery of costs
  - Long lead time costs (e.g., early planning costs, regulatory approval costs, and cost of acquisition of backbone transmission right of way) should be recovered currently through a surcharge applied on an area wide basis
  - Actual cost to build, own and operate line segments should be recovered through a formula rate
  - Right to build own and operate should be obtained through a bidding process that is open to all qualifying transmission owner/operators
    - Bidders could structure offers creatively (e.g., participation rights could be included for market participants)

Conclusion

- Backbone Transmission planning should precede, not follow, generation planning
- Backbone Transmission routing should seek to accommodate new generation
- Regulatory approval and transmission rights of way should be acquired early in the process