

## Methodology for Economic Comparisons

### Resource and Transmission Scenarios

The methodology below compares the variable (production) and annual fixed costs of resource and transmission expansion scenarios. The comparison takes into account the production (fuel and other variable O&M) costs of scenarios, the initial capital investment requirements in new resources and transmission, and associated annualized fixed costs. The total annual cost for each scenario is then compared to the reference case to measure annual net savings or costs.

Annual fixed costs include resource and transmission annual capital carrying charges associated with each incremental investment and fixed O&M. (Lines 13:19 and lines 28:29). This methodology applies a 10% capital carrying charge rate to the initial investment amount to calculate annual capital carrying charges for both transmission and resource additions (lines 13 and 29). This 10% rule-of-thumb was developed by Cambridge Energy Research Associates (CERA). It is determined by:

- 1) Calculating the present value of the post-investment streams of depreciation, return on capital, property and income taxes, interest, and administrative and general costs.
- 2) Determining a real discount rate by removing the inflation component from the discount rate.
- 3) Applying this real discount rate to calculate a levelized payment from the present value of post-investment streams calculated in step 1 over the average expected service life of the assets. This levelized payment represents the real levelized annual cost of the investment.

Fixed O&M costs include routine and major maintenance, operating labor, etc. Fixed O&M amounts are calculated separately for each type of resource (Line 14). In the case of wind resources, a “wear and tear” impact on non-wind resources is included in the analysis - \$5.5/MWh of wind generation (Line 15).

In addition, fixed gas transportation cost associated with delivery of gas from regional hub to the utility plant is included in the analysis. (Line 20).

Transmission fixed O&M is assumed to be 20% of the annual capital charge based on a recent transmission study by CERA. (Line 28).

Resource and transmission capital charges and fixed O&M are combined to produce a total annual cost for each scenario (Line 32). The production costs as well as annualized fixed costs associated with each alternative are then compared the SSG-WI reference case and other alternatives to obtain annual net savings and confirm economic viability (Line 36).

Hypothetical Example		2015			
Sample Economic Comparison Table		Reference Case		Scenario Name	
		Initial Investment	Annual Costs	Initial Investment	Annual Costs
1	<b>Production Costs (Fuel &amp; Other VOM)</b>		16,121		15,923
2	Change from Reference Case				(198)
3					
4	<b>Resource Costs:</b>				
5	<b>Resource Additions Investment</b>				
6	Wind	1,957		2,246	
7	Gas thermal	444		198	
8	Coal thermal	3,453		3,985	
9	Incremental Transmission Integration Investment	159		175	
10	<b>Resource Capex Sub Total</b>	<b>6,012</b>		<b>6,604</b>	
11					
12	<b>Other Resource Costs</b>				
13	Incremental Capital Charge @ 10%		601		660
14	Incremental Fixed O&M		116		128
15	Wind "wear and tear"		39		56
16	<b>Subtotal Other Costs</b>		<b>756</b>		<b>845</b>
18	<b>Total Resource Costs</b>	<b>6,012</b>		<b>6,604</b>	<b>845</b>
19					
20	<b>Incremental Fixed Gas Transportation Costs</b>				
21					
22	<b>Transmission Costs:</b>				
23	Incremental Line Investment			777	
24	Customized Equipment Investment			193	
25	<b>Transmission Capex Sub Total</b>	-		<b>970</b>	
26					
27	<b>Other Transmission Costs</b>				
28	Incremental Fixed O&M				19
29	Incremental Capital Charge @ 10%				97
30	<b>RM Transmission Costs</b>		-	<b>970</b>	<b>116</b>
31					
32	<b>Annualized Costs</b>		<b>756</b>		<b>961</b>
33	Change from Reference Case				205
34					
35	<b>Total Initial Investment</b>	<b>6,012</b>		<b>7,574</b>	
36	<b>Annual Net (Savings)/Cost from Reference Case</b>				<b>7</b>