

## Memorandum

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**Date:** 4/9/2021  
**To:** Christian Johanningmeier  
**CC:** Marcelo Saenz, Ismail Sahin  
**From:** Nelson Bacalao  
**RE:** **Review of Transmission Options and increased distribution work**

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This memo summarizes the scope of work and associated costs to review CWL Transmission Reinforcements options as well as our request for consideration of additional budget for the unexpected increase in the efforts required to conduct the distribution system analysis work.

### Review CWL Transmission Reinforcements Options

Siemens transmission system analysis identified a that under certain double contingencies where two elements would be out of service (overlapping single contingencies or P6 under NERC standards), there would be overloads in the system if these were to happen under peak load conditions.

NERC standards would allow load shedding for these rare events and Siemens assessed the required level of load shedding and quantified the risk by determining: a) the expected number of hours and days at risk (i.e. the days when at least one hour required load shedding) and b) the frequency (i.e. once every how many years). Additionally, Siemens evaluated the option of having a combination of Solar PV and BESS to address the overloads and eliminate the need for load shedding. However, CWL has identified 5 other options to reinforce the system and asked Siemens support by:

- A. Reviewing the estimated cost for the options
- B. Assess the reliability effectiveness of the solutions.
- C. Assessing the level in which the solution helps achieving the 100% renewable goal

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D. Assess if the solution would allow providing adequate power to University of Missouri

To provide the support above Siemens will:

1. Use our planning level unit cost to produce an independent assessment of the cost of each of the options. This will address objective “A”
2. Conduct a N-1-1 contingency analysis for each of the options under:
  - i. The summer peak conditions that resulted in load shedding and/or need to redispatch the CEC to address overloads. In as much as the Option eliminates the need to load shed and/or the need to redispatch of the CEC, it will provide information with respect of the level objective “B” and/or “C” above are achieved.
  - ii. The April conditions that resulted in heavy loadings / overloads in the system. In as much as the Option addresses these heavy loadings / overloads it will provide further information on the achievement of objective “B”
  - iii. Summer peak conditions with 40 MW of load at the University of Missouri. This will provide information on the level that the Option supports the objective “D”
3. Prepare a presentation report with the results above.

The budget for carrying out the study above is \$26,605 as detailed in the table below.

**Table 1: Budget Transmission Work**

Tasks	Base Budget	
	Total HOURS	USD (\$)
<b>Review of transmission options</b>	<b>93</b>	<b>\$26,605.00</b>
Options review	4	1,220.
Capital Expenditure review	21	4,517
PSS Modeling and reliability assessment	55	16,791
Reporting	13	4,077
<b>Technical Project Management</b>		
<b>Commercial Project Management</b>		
<b>TOTAL LABOR</b>	<b>93</b>	<b>\$26,605</b>
<b>REIMBURSIBLE EXPENSES</b>		
<b>TOTAL ESTIMATE (HOURS, \$ US)</b>	<b>93</b>	<b>\$26,605</b>

### Additional Distribution Work

When Siemens started the distribution system analysis we requested loading information by substation and by feeder head as well as information on any temporary or permanent load transfers between feeders/substations (see for example item 1-11 of Siemens information request). However, it was not only to the moment that the results of the study were being presented and we were discussing some heavy loadings that it was realized that the data contained temporary load transfers. This fact required us to review the entire data set to identify when transferred occurred by assessing rapid changes in loading up in one feeder and down in an adjacent feeder, to detect when this

transfers occurred and produce a new load data set that could be used for the study. With this new load dataset, the studies were repeated, and the results presented recently to the task force.

This additional work was substantial, but we are not seeking at this moment full recovery, but only the costs associated with some of the direct engineering work that is estimated to be US\$ 26,250 and does not include for example any of the time provided by senior management and all of the engineering required. The cost of this is \$ 26,250 as detailed in the table below.

**Table 2: Distribution Work Cost**

	Base Budget	
	Total	USD
Tasks	HOURS	(\$)
<b>Distribution Analysis Update.</b>	<b>210</b>	<b>\$26,250</b>
Update models to account for loading information change	40	5,000
Repeat analysis with new loading information	140	17,500
Update reporting spreadsheet and presentations	30	3,750
<b>Technical Project Management</b>		
<b>Commercial Project Management</b>		
<b>TOTAL LABOR</b>	<b>210</b>	<b>\$26,250</b>
<b>REIMBURSIBLE EXPENSES</b>		
<b>TOTAL ESTIMATE (HOURS, \$ US)</b>	<b>210</b>	<b>\$26,250</b>