Northwest **Power** and **Conservation** Council

September 5, 2018

DECISION MEMORANDUM

TO: Council members

FROM: Massoud Jourabchi, Manager, Economic Analysis

SUBJECT: Approval of Budget for long-term load forecasting model in FY 2019.

PROPOSED ACTION: Modifications and updates to Council's Long-Term Load Forecasting Model

SIGNIFICANCE: The proposed Council action is needed to enable the staff to evaluate and enhance the model that would be used for load forecast in the 8th Power Plan.

BUDGETARY/ECONOMIC IMPACTS

Funds for this contract are available within FY 2019 Power Planning Division budget. Work on this project will begin in October 2018 and will be completed by end of September 2019. The contract is not to exceed $50,238 per statement of work below.

BACKGROUND

Over the past two plans the Council staff has used Energy2020 to produce a wide range of load forecasts and measure future impact of a variety of scenarios. This system has served the Council well. It has produced reasonable forecasts of the electricity demands of the region. However, as the regional electricity industry has evolved, so have the requirements for the load forecasting. Energy2020, was reviewed, evaluated, and selected to meet long-term load forecasting requirements. Energy2020 has been used throughout the country by many states and utilities. It can produce electricity energy and load forecasts for a wide range of business sectors.

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ANALYSIS
The contractor will perform the tasks identified in scope of work, attached.

ALTERNATIVES
One alternative is for the staff to proceed on its own to enhance the model and make the necessary changes. This alternative would delay the date when an enhanced version of this model would be available.

ATTACHMENTS
Scope of work and budget.

Statement of Work for NWPCC
ENERGY 2020 Scenarios and Model Update for 2019
September 5, 2018

The following tasks will be completed in the 2018/2019 fiscal year by Systematic Solutions, Inc. in support of NWPCC's update and enhancement of ENERGY 2020.

1. Provide ENERGY 2020 support for developing scenarios for the 8th plan.

SSI will provide support to NWPCC staff in developing and analyzing scenarios to be published in NPWCCs 8th Power Plan. There are seven specific scenario-related tasks that will be included as listed below. Additional scenario tasks may be added to this list depending on time and budget constraints.

- ***Impact of Codes and Standards***: This scenario involves executing ENERGY 2020 with and without the codes and standards to determine the impacts. SSI will provide support in modifying scenario file definitions, reviewing results, providing model explanation of results, and/or revising model code as required.
- ***Natural Gas Peak Load Estimation (in Relation to Electrification Scenario):*** This task involves incorporating natural gas data in order to enhance NWPCC's electrification scenario that was executed in 2018.
- ***Simulation of Full Electrification, including Feedback and Emissions Impact:*** SSI will provide support to NWPCC in enhancing their electrification scenario to incorporate a feedback loop sending the impact of full electrification on rates (both natural gas and electric) and the impact of rates on fuel choice. SSI will review and revise the GHG emissions-related code in NWPCC's version of ENERGY 2020 to ensure historical emissions and emission coefficients (tonnes of pollutant per Btu) are aligned with published inventories. SSI will also provide support in reviewing and revising model calculations, if required, to ensure reasonable impacts on emissions from electrification policies.
- ***Retrofit fuel-switching between electric and natural gas for water-heating***: In its default setting, ENERGY 2020 assumes consumers only replace devices, such as water heaters, at the end of their useful lives. In order to allow consumers to replace water heaters before the end of useful lifetime, ENERGY 2020's retrofit code needs to be turned on and assigned desired parameters (decision-making parameters to that impact when/whether consumers will decide to retrofit). SSI will test the retrofit code within ENERGY 2020 to ensure it is working properly. SSI will also review and communicate default parameters to NWPCC staff and revise if needed.

- ***Solar plus battery scenarios, including market share calculations***: SSI will provide support to NWPCC staff in executing solar battery scenarios that include market share calculations, either exogenously or endogenously set. SSI will meet with NWPCC staff to determine the priority of including endogenous calculations of market shares. If determined a priority, SSI will add code to simulate endogenous consumer decisions of solar battery market share.
- ***Carbon Tax Scenarios***: SSI will provide support in executing, reviewing impacts, and explaining model relationships in implementing carbon tax scenarios. SSI will work with NWPCC to verify the model produces expected impacts, such as on fuel costs for transportation, natural gas load, etc., and modify model structures if required.
- ***Climate change modeling*****:** SSI will provide support to NWPCC staff to develop, review, and revise results as required related to testing the impacts of alternative temperature scenarios on 8760 hourly loads. Specific tasks include inputting alternative temperature scenarios (as multipliers) to the model as Promula variables; writing code to apply multipliers to 8760 reference case temperature-sensitive load forecast (space and water heating); developing output files to review impacts on 8760 load by enduse; executing the model, reviewing, and revising as required; documenting changes made to model files and new variables.

For each of the scenarios, SSI will perform the following subtasks:

1a. Translate scenario definitions into ENERGY 2020 code 1b. Revise model code, structure, or data as required 1c. Modify output files, review results, identify and resolve issues 1d. Provide general support, attend meetings, provide methodology explanations and write-ups as requested

2. Develop scenarios for aggressive electrification of transportation

During the 2017/2018 fiscal year, SSI worked with NWPCC to add electric vehicles to the forecast and match the model's electric vehicles sales to NWPCC's expectations. Over the next year, NWPCC would like to conduct more aggressive scenarios to electrify the transportation sector. These scenarios will include the following features:

- Rapid EV market share increases in light duty
- Mechanisms for early retirements/turnovers from gas ICEs to EVs
- Full electrification of transit busses
- Full electrification of long haul freight
- Pollution (both air and GHG) effects

The electrification of transportation will require developing and testing policy files to decrease the non-price factors for gasoline vehicles; decrease vehicle lifespan/increase conversions; increase market share for electric buses and phase out other types; and shift the market share from gasoline/diesel to electric trucks.

Additionally, a couple modifications to ENERGY 2020's model structure will need to be made – for the electrification of freight and for the simulation of CAC air pollutants. For the electrification of freight, SSI will add a new technology (to the Tech set) to represent electric trucks. To analyze impacts on air pollutants (CACs), SSI will need to add representation of the CAC air pollutants as well as assign emission coefficients to each of the CACs. NWPCC's version of ENERGY 2020 currently has representation of greenhouse gas (GHG) pollutants; however, CAC pollutants are not yet represented.

To aggressively simulate electrification of the transportation sector, SSI will perform the following subtasks:

2a. Translate scenario definitions into ENERGY 2020 code
2b. Revise model code, structure, or data as required
2c. Modify output files, review results, identify and resolve issues
2d. Provide general support, attend meetings, provide methodology explanations and write-ups as requested

3. Maintenance, data update, and calibration through 2017 ($20K)

SSI will provide support to NWPCC staff in updating and calibrating the model to 2017 and developing a forecast for publication in the 8th Power Plan. The tasks include updating historical energy demands and prices through SEDS, incorporating and other data updates as provided by NWPCC staff (DEE, DST, XDMD, for various enduse and sectors for 2012-2017), calibrating the model through 2017 given the new historical data, updating input data in the transportation sector (efficiencies from SSI, other data from NWPCC), calibrating the model through 2017 historical data, and reviewing/revising forecast results per NWPCC direction.

SSI will perform the following subtasks for model update and calibration:

3a. Update ENERGY 2020 with SEDS data through 2017
3b. Provide support to update other ENERGY 2020 input data
3c. Update transportation data and forecast
3d. Calibrate model through 2017
3e. Review forecast, revise code and/or output files

Budget

The total budget for 2018/2019 ENERGY 2020 scenario and data update support tasks is $50,238 with the estimated hours in Table 1. Hourly rates for SSI staff are listed in Table 2.

Table 1. Budget by Task and Resource

Task Description	Dollars Total	Estimated Hours Principal	Consultant	Analyst
Total	**$50,238**	**44**	**210**	**70**
1. Provide support to NWPCC staff in developing scenarios for the 8th Plan	**$22,996**	**34**	**74**	**22**
1a. Translate scenario definitions into ENERGY 2020 code	$2,708	4	10	0
1b. Revise model code, structure, or data required	$9,608	16	28	8
1c. Modify output files, review results, identify/resolve issues	$3,454	4	8	14
1d. General support, meetings, methodology discussions	$7,226	10	28	0
2. Develop scenarios and revise model structure as needed for aggressive electrification of transportation	**$6,652**	**4**	**32**	**8**
2a. Translate scenario definitions into ENERGY 2020 code	$1,513	1	8	0
2b. Revise model code, structure, or data required	$1,516	0	8	4
2c. Modify output files, review results, identify/resolve issues	$2,110	2	8	4
2d. General support, meetings, methodology discussions	$1,513	1	8	0
3. Maintenance, data update, and calibration through 2017	**$20,590**	**6**	**104**	**40**
3a. Update ENERGY 2020 with SEDS data through 2017	$3,032	0	16	8
3b. Update transportation data and forecast	$2,432	0	16	0
3c. Provide support to update other ENERGY 2020 input data	$4,248	0	24	8
3d. Calibrate model through 2017	$4,242	2	24	0
3e. Review forecast, revise code and/or output files	$6,636	4	24	24
Rates		$297	$152	$75

Tasks are charged based on the hourly rates listed below by staff category.

Table 2. SSI Hourly Rates by Staff

Staff Member	Staff Category	Rates (US$)
Jeff Amlin	Principal	$297.00
Randy Levesque	Consultant	$152.00
Ben Amlin	Consultant	$152.00
Ian Beitenhaus	Consultant	$152.00
Luke Davulis	Analyst	$75.00
Tom Harger	Analyst	$75.00