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

December 14, 2016

MEMORANDUM

TO: Prospective Contractors

FROM: Steve Crow
Executive Director

SUBJECT: Request for Proposals for Generation Evaluation System (GENESYS) model software Redevelopment

Enclosed is a Request for Proposals (RFP) issued by the Northwest Power and Conservation Council. The Council is an interstate agency established under the Pacific Northwest Electric Power Planning and Conservation Act of 1980, with the responsibility for developing a regional conservation and electric power plan. GENESYS is the primary analytical tool the Council uses for understanding the impacts of changes in the hydroelectric system's operation on the regional power system and is used by the Council in developing both its regional power plan and fish and wildlife program. The Council invites proposals for the redevelopment of the GENESYS model software which simulates the operation of the region's power system and is used to assess the adequacy of the region's power supply and the impacts and costs of non-power related constraints placed on the operation of the region's hydroelectric facilities.

The RFP consists of five parts:

Part A: General Information
Part B: Proposal Instructions
Part C: Statement of Work
Part D: Proposal Review Process
Part E: Background of Council and Regional Power Plan

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Prospective respondents are invited to submit clarification questions about the RFP at the pre-bid teleconference scheduled for 2:00 pm Pacific Standard Time (PST) on Monday January 9, 2017.

Proposals must be delivered electronically to the Council no later than 5:00 pm PST on Friday January 27, 2017.

Thank you for your interest in the work of the Council.

Part A: General Information

The Northwest Power and Conservation Council is seeking proposals for software redevelopment of the GENESYS model. The software redevelopment process shall take place over an estimated 18 month period. It is anticipated the first 6-10 months of the project (March 2017-December 2017) will be focused on finalizing GENESYS specifications and algorithms and beginning code work and testing cycles. The last 9 months of the project (January 2018-September 2018) will focus on continued coding and testing. During this latter time period, the model must be sufficiently functional such that the Council can provide stakeholders with an opportunity to provide input into the redevelopment effort. The redeveloped version of GENESYS must be completed, tested, and ready for use by the Council no later than September 1, 2018.

Contracting Organization

The Northwest Power and Conservation Council (Council) was established by a compact between the states of Idaho, Montana, Oregon and Washington pursuant to the Pacific Northwest Electric Power Planning and Conservation Act, 16 U.S.C. §839, et seq. ("Northwest Power Act" or "Act") passed by Congress in 1980.

The Council consists of eight Council members. The Governors of Idaho, Montana, Oregon and Washington each appoint two persons to serve on the Council.

The Council's statutory authority and responsibilities in developing a regional power plan and assessing the adequacy of the region's power supply are summarized in Part F of this RFP.

Staff members of the Council's Power Planning Division are the primary direct users of the GENESYS model.

Part B: Proposal Instructions

Due Date for Proposals

For a proposal to be considered, it must be delivered to the Council **electronically** to:

Sharon Ossmann
Administrative Division Director
Northwest Power and Conservation Council
sossmann@nwcouncil.org

Proposals must be received by the Council no later than 5:00 pm Pacific Standard Time (PST) on Friday, January 27, 2017.

Pre-bid Conference

The Council will hold a pre-bid conference at 10:30 am PST on Monday, January 9, 2017 to respond to questions potential respondents may have concerning the bidding process, the scope of work, etc.

Web/Phone information for Pre-Bid Conference:
Please join my meeting from your computer, tablet or smartphone.
https://global.gotomeeting.com/join/987339757

You can also dial in using your phone.
United States (Toll-free) 1 877 309 2070

Access Code: 987-339-757

No questions or communications, written or oral, relative to the contents of this RFP will be responded to *prior* to the pre-bid teleconference to ensure potential bidders have equal access to information about the bid process. All questions and responses from the pre-bid conference will be summarized and posted on the Council's website for all potential bidders to review.

Proposal Requirements
Each proposal should be sufficiently comprehensive as to not *require* additional meetings or communications in order for the Council to evaluate it against other proposals.

All proposals must be organized according to the following topics and sequence:

I. Respondent's name, corporate information
II. Executive Summary of proposal
III. Respondent's qualifications and experience developing modeling software for the electric utility industry
IV. Identification of key personnel, their qualifications and roles under the proposal
V. Description of software redevelopment design and implementation approach
VI. Description of software documentation and support approach
VII. Description of how the software redevelopment will implement the GENESYS methodology
VIII. Description of method to be used for data management and integration
IX. Description of user interface functionality
X. Project schedule
XI. Pricing proposal, including any ongoing support costs after project completion
XII. Summary and examples of all past and current work for publicly-owned and investor-owned utilities, Bonneville Power Administration, direct service industries, government agencies (e.g., energy commissions) and other power-related organizations. The nature of the work as well as the initiation and completion dates of that work must be described.
XIII. References from existing or recent clients

Disclosure Notice
The Council does its work in public as required by the Northwest Power Act. Discussion of the proposals with the Council and, potentially, with the Council's System Analysis Advisory Committee will take place in meetings that are scheduled and noticed in advance and open to the public. With respect to written proposals, the Council will consider requests for non-disclosure of confidential commercial or financial information. Any such information considered by the respondent to constitute confidential

commercial or financial information should be clearly marked and separate and distinct from the rest of the proposal. Any such confidential commercial or financial information included in a proposal will not be disclosed to persons outside the Council or Council staff (i.e., will not be discussed at Council meetings open to the public or with any of the Council's advisory committees). Note also that the Council, although not a Federal agency, does comply with the Freedom of Information Act (FOIA). The Council's FOIA policy is available on the Council's website at http://www.nwcouncil.org/about/policies/freedom-of-information-act/.

Council Bears No Costs or Obligations

Prospective or actual respondents shall bear any and all costs and risks of participation in this RFP process. The Council shall not be obligated to procure any services resulting from this RFP.

Part C: Statement of Work
GENESYS Model Software Redevelopment

The GENESYS model is used by the Council, Bonneville Power Administration and some utilities, to assess resource adequacy. It does this, in part, by simulating the operation of generating resources, including the operations of the Northwest's hydroelectric facilities, over thousands of varying conditions, in order to determine the likelihood that a future year's power supply will be inadequate. The likelihood of experiencing a shortfall in any given year is referred to as the loss of load probability (LOLP). For purpose of assessing the adequacy of the region's power supply in future years, the Council has set the maximum allowed value for the LOLP at 5 percent. So long as the LOLP, remains at or below 5 percent, the region's power supply is deemed adequate for that year. It should be noted that the current adequacy standard, adopted by the Council in 2011, is under review and is likely to change. With that in mind, the redeveloped GENESYS model must be able to also assess a multitude of other potential adequacy measures, such as expected unserved load, loss of load hours and conditional value at risk.

GENESYS is also used to assess resource cost-effectiveness, to evaluate the effective load carrying capability of variable generation such as wind and solar, and to provide estimates of the power system impacts of potential climate change scenarios. In addition, GENESYS is used to assess the impacts and costs of non-power related constraints on the regional power system, such as timing and flow restrictions at the dams implemented to benefit anadromous fish.

A more comprehensive description of the GENESYS model, its background and its use by the Council can be found at http://www.nwcouncil.org/energy/saac/GENESYS.

The Council seeks redevelopment of GENESYS because it is a critical part of the Council's process of developing a regional power plan, performing regional adequacy assessments and providing other analyses that assist the Council in carrying out its obligations under the Northwest Power Act. The Council's Seventh Power Plan, adopted in February 2016, calls for redeveloping GENESYS where the existing model has components and file structures that are decades old. The software code must be brought up to current standards and the data management capabilities and graphical user interface (GUI) are in need of updating.

In addition to maintaining and updating the model's current functionality, the Seventh Power Plan also describes the primary enhancement the Council seeks from a redevelopment effort — improving the simulation of hourly hydroelectric system operations to better reflect the time-dependent nature of hourly hydro capability. This would involve moving from representation of aggregate hydro to plant-specific hourly dispatch of multiple cascading dams. See ANLYS-22 and ANLYS-23, available at p. 27 of http://www.nwcouncil.org/media/7149934/7thplanfinal_chap04_actionplan.pdf

Other model enhancements the Council seeks in order to improve the model's accuracy include:

- Incorporation of reserves into an optimized dispatch to reflect the interaction between assignment of reserves and other system capacity obligations
- Improved market representation to reflect the trade-off between decisions made for economics and adequacy
- Inclusion of fuel accounting and forecast error to represent limitations on operators in dispatching the system

Objectives

A. Maintain Current Functionality of model
See
http://www.nwcouncil.org/media/7150653/genesys_techdocumentation_20161011.pdf
and
http://www.nwcouncil.org/media/7150654/genesys-redevelopment_20161011.pdf

There are currently many pre and post processing programs that convert data into flat files to provide input to GENESYS and to summarize output from GENESYS. The functionality of these programs will need to be incorporated into the redevelopment process, at least in the short term. In particular, data files that feed into the HYDSIM modules are not likely to change and will have to be accommodated in the redeveloped GENESYS.

B. Improve Model Functionality
See
http://www.nwcouncil.org/media/7150653/genesys_techdocumentation_20161011.pdf
and
http://www.nwcouncil.org/media/7150654/genesys-redevelopment_20161011.pdf

C. Improve Model Usability

Currently, the GENESYS model is written in FORTRAN and its input and output files are either flat (BCD) files or binary files. To the extent possible and practicable, move input and output data into one or more databases for easier processing. The new GENESYS interface, should be structured and written in a language that will facilitate easy data modification, an organized method to document studies and an intuitive process to generate reports.

D. Improve Model Transparency

Given the Council's obligation to involve stakeholders and the public in development of its regional power plans as well as the annual assessment of power system adequacy and other technical analyses related to the region's power system, the Council encourages respondents to include in their proposals opportunities to make the new GENESYS model accessible to participants in the Council's power plan process. Users of the redeveloped model are anticipated to be Council staff, BPA staff, other utility IRP planners or specialized regional stakeholders with a desire to participate in regional or utility specific adequacy assessments. Respondents should therefore describe their approach to public accessibility in their proposals.

Specific Tasks Required

1. Deliver to the Council (project manager) no later than September 1, 2018, a redeveloped version of the GENESYS software for use by Council staff.

   Included in the September 1, 2018 software delivery must be: (1) Algorithms and logic that implement the core GENESYS analysis methodology; (2) Data input and output linkages that enable GENESYS to be integrated with other Council power planning data management systems; and (3) functional user interface.

   Also included in the September 1, 2018 delivery must be: (1) a User's Guide and/or user training sufficient to enable Council staff to operate the model; (2) complete technical documentation of the model algorithms and logic; and (3) the program source code.

2. A rough, functional prototype and demonstration shall be delivered for Council staff to review and test no later than April 30, 2018.

3. Contractor shall be expected to work closely with Council staff and to keep staff apprised of progress on a regular basis. Monthly written progress reports and informal work sessions involving Council staff are anticipated throughout the term

of the contract. In addition, it is expected that contractor shall provide ongoing informal communication to staff, particularly on any important technical problems/issues which may arise relative to the specific tasks being performed.

Part D: Budget and Payments

Anticipated Project Budget: $300,000 - $450,000.

Project Payments will be tied to specific project milestones (deliverables) to be identified by the parties during contract negotiations and included in the final contract. While the Council has some flexibility in the timing of payments, it is important to note that the Council operates on a fiscal year calendar, so the timing of some payments may be determined, in part, by the critical need to complete all work prior to the end of Fiscal Year 2018.

Part E: Proposal Review Process

All proposals meeting the requirements set forth in Part B shall be evaluated by a Proposal Review Panel. The Proposal Review Panel (Review Panel) will evaluate the proposals in accordance with the evaluation criteria set forth below.

Following the due date for proposals, the Review Panel may initiate additional communications and/or meetings with proposers.

Members of the Review Panel may also seek technical advice from members of the Council's Resource Adequacy Advisory Committee (see http://www.nwcouncil.org/energy/resource/home/) and the Council's System Analysis Advisory Committee (see http://www.nwcouncil.org/energy/saac/home/) when reviewing proposals.

The Review Panel will make recommendations to the Council. The Council will select the winning bid, if any.

Evaluation Criteria

The Proposal Review Panel shall use a defined, quantitative procedure to evaluate respondents' proposals. Proposals will be assigned point scores (0-100) based on criteria which include the following (not necessarily listed in order of importance).

- Price
- Proposer's capabilities, experience and qualifications, including development of other modeling software for the electric utility industry
- GENESYS software redevelopment approach
- GENESYS software accessibility approach
- Demonstrated understanding of the requirements of the RFP and the problems/difficulties involved in accomplishing the objective.
- Ability and commitment to complete the project on-time.

Selection of winning proposal

The final decision as to which proposal, if any, will be selected is anticipated to be made by the Council in February 2017 at a regularly-scheduled Council meeting and based on a recommendation from the Review Panel.

The Council reserves the right to reject any or all proposals. This RFP does not give rise to any obligation for the Council to select any proposal or to contract with any respondents.

Part F: Background on the Council and Regional Power Plan and Annual Adequacy Assessment

The Council's authority and responsibilities are set forth in the Northwest Power Act.

Congress declared several purposes for the Northwest Power Act including:

- To encourage conservation and efficiency in the use of electric power and the development of renewable resources within the Pacific Northwest;
- To assure the Pacific Northwest of an adequate, efficient, economical, and reliable power supply;
- To protect, mitigate and enhance the fish and wildlife, including related spawning grounds and habitat, of the Columbia River and its tributaries; and
- To provide for the participation and consultation of the Pacific Northwest states, local governments, consumers, customers, users of the Columbia River system and the public at large within the region in the development of plans and programs related to energy conservation, renewable resources, other resources, and protecting and enhancing fish and wildlife resources.

The Act authorizes the formation of the Council as an interstate compact agency and charges the Council with three primary responsibilities:

1) Developing a regional power plan for meeting the electric energy needs of the Pacific Northwest for the next 20 years and which includes an examination of conservation, renewable, and conventional energy sources available to meet those needs;
2) Developing a regional program for the protection, mitigation and enhancement of fish and wildlife affected by the development and operation of hydroelectric facilities in the Columbia River Basin; and
3) Involving the public and regional stakeholders in the development of both the power plan and the fish and wildlife program.

Regional Power Plan

The Northwest Power Act directs the Council to develop a "regional conservation and electric power plan" and to review the plan not less than every five years. The Council adopted its first regional power plan in 1983. The most recent plan, the Seventh Power Plan, was adopted in 2016 (http://www.nwcouncil.org/energy/powerplan/7/plan/).

The power plan represents the Council's blueprint for meeting the region's future electrical energy needs. The plan adopted by the Council, becomes the basis for the Bonneville Power Administration's actions in meeting the loads of its customers in the Pacific Northwest. Bonneville must acquire conservation and power supply resources consistent with the Council's plan. Although not legally binding, the plan also influences the actions taken by regional public and private utilities that rely on Bonneville for wholesale power. State utility regulators also review and, in some instances, use the analysis supporting the Council's power plan in regulatory proceedings.

The Northwest Power Act directs the Council to develop a power plan that gives priority to resources the Council determines to be cost-effective in the following order: first, to conservation; second to renewable resources; third, to generating resources using waste heat or generating resources of high fuel-conversion efficiency; and fourth, to all other resources. The Act requires conservation be provided a 10 percent premium over conventional resources when comparing resource costs. The plan must also set forth a general scheme for implementing conservation measures and developing generating resources with due consideration by the Council for (A) environmental quality; (B) compatibility with the existing regional power system; (C) protection, mitigation, and enhancement of fish and wildlife and related spawning grounds and habitat, including sufficient quality and quantity of flows for successful migration, survival, and propagation of anadromous fish; and (D) other criteria that may be set forth in the plan.

The Act also requires the plan to include the following elements:

- An energy conservation program, including model conservation standards
- Recommendations for research and development
- A methodology for determining quantifiable environmental costs and benefits
- An electricity demand forecast of at least 20 years
- A forecast of power resources estimated by the Council to meet the obligations of the Bonneville Power Administration and the amounts that can be met by resources in each of the priority categories. The power resource forecast shall (i) include regional reliability and reserve requirements; (ii) take into account the

effect, if any, of the requirements of the fish and wildlife program on the availability of resources to Bonneville; and (iii) include the approximate amounts of power the Council recommends Bonneville acquire on a long-term basis and may include, to the extent practicable, an estimate of the types of resources to be acquired

- An analysis of electricity reserve and reliability requirements and cost-effective methods of providing reserves designed to insure adequate electric power at the lowest probable cost
- The fish and wildlife program promulgated earlier by the Council under Section 4(h) of the Act to protect, mitigate, and enhance fish and wildlife and related spawning grounds and habitat affected by the development and operation of any hydroelectric project on the Columbia River and its tributaries

The Power Act also requires public involvement in developing the Regional Power Plan. The Act requires that the public be given opportunities to present information and views to the Council before any major decisions thus the Council develops the plan in a public process over the period of several years to ensure widespread public involvement. Council meetings and Council advisory committee meetings are open to the public, public comment on all aspects of the Council's work is encouraged and received, and the Council regularly reports on its activities on its website and to the U.S. Congress. Pursuant to the Act, the Council also solicits input from Bonneville, utilities, state agencies, regulatory commissions and others on the development of the power plan and holds public hearings in Washington, Oregon, Idaho and Montana before adopting the power plan.

Additional information about the Council and the regional power plan are available on the Council's website at www.nwcouncil.org.

Annual Adequacy Assessment and Other Uses for GENESYS

The GENESYS model is one of the major quantitative tools used to develop the Council's regional power plan. GENESYS provides hydroelectric system data to both the AURORAxmp model and the Council's Regional Portfolio Model (RPM). And, because GENESYS is the primarily tool used to assess the adequacy of the power supply, it also provides adequacy reserve margin targets to the RPM. Once the power plan's resource strategy has been developed, GENESYS is used to test that potential resource build-outs based on that strategy will also produce adequate supplies.

The Council's annual assessment of power supply adequacy is developed using the GENESYS model. It has also become one of Bonneville Power Administration's major tools for assessing federal system adequacy and is being used to a lesser degree by several other regional entities.

GENESYS is also used to aid the Council in the development of its Fish and Wildlife program by providing estimates of how operations to protect various species will affect the power supply (e.g. cost, changes to reservoir elevations and outflows). GENESYS has been used to assess the load-carrying capability (or system value) of various resources, (e.g. wind, solar, demand response and energy efficiency measures). It has

been used to assess short-term impacts of extreme weather events, such as low river runoff conditions. It can be used to study the effects of climate change by examining how climate-affected river flows and climate-affected demand change adequacy and power production from the hydroelectric system. GENESYS is also currently the best tool to assess the effects of changes to flood control operations and alternative operations due to potential changes to the Columbia River Treaty. And, with the proposed enhancements to the model, GENESYS will also be able to assess the relative value of alternative balancing-reserve strategies.