# EXHIBIT D: PROJECT COSTS AND FINANCING

## 1 Contents and Purpose of This Exhibit

Kenai Hydro, LLC (KHL), a wholly-owned subsidiary of Homer Electric Association, Inc. (HEA), is filing this Draft License Application (DLA) for an original license for the Grant Lake Hydroelectric Project (FERC No. 13212 [Project or Grant Lake Project]) under Part I of the Federal Power Act.

Exhibit D of this DLA is a statement of costs and financing for the construction and operation of the Grant Lake Project, including estimated costs of new construction, modification, or repair, estimated annual costs of the Project, the value of the Project power, and identification of the sources and extent of financing. Because no portion of the proposed Project consists of previously constructed, unlicensed water power structures or facilities, or because KHL is not applying for a new license, 18 CFR §4.41(2) and (3), respectively, do not apply (see below).

## 2 Original Costs

The regulation 18 CFR §4.41(e)(2) does not apply to the Project because no portion of the proposed Project consists of previously constructed, unlicensed water power structures or facilities. Costs associated with the proposed new construction are summarized in Section 4 of this Exhibit.

## 3 Estimate of the Amount Payable if the Project were to be Taken Over Pursuant to Section 14 of the Federal Power Act

The regulation 18 CFR §4.41(e)(3) states that if the applicant is a licensee applying for a new license, and is not a municipality or a state, an estimate of the amount which would be payable if the project were to be taken over pursuant to Section 14 of the Federal Power Act (FPA) 16 U.S.C. 807 upon expiration of the license in effect must be provided. Given that KHL is not applying for a new license, but rather an original one, this section does not apply.

## 4 New Construction Costs

KHL would not have to purchase any lands. The Project would occupy lands of the State of Alaska and U.S. Forest Service (USFS). KHL will discuss the terms of lease agreements with these entities once a license to construct the Project has been granted by the FERC.

KHL will apply to the State of Alaska for water rights to operate the Project. There are no fees associated with the water used in hydroelectric generation because it is not classified as a consumptive use.

Estimated costs for construction of major Project works for the Grant Lake Project are summarized in Table D.4-1. It is expected that land rights will need to be acquired for the construction of the Project, but the extent and cost of these land rights is unknown at this time.

**Table D.4-1.** Summary of estimated costs associated with construction of major Project works. (All costs in 2015 dollars.)

| **Project Component** | **Total Capital Cost** |
|---|---|
| Final Engineering | $3,548,601 |
| Overhead | $447,927 |
| | |
| Construction | |
| General Conditions | $5,115,000 |
| Mobilization/Demobilization | $1,405,000 |
| Project Access | $2,498,000 |
| Tunnel and Bypass Boring | $16,001,000 |
| Steel Penstock | $769,000 |
| Intake Structure | $3,928,000 |
| Powerhouse and Substation Site Civil | $249,000 |
| Powerhouse | $3,896,000 |
| Detention Pond | $343,000 |
| Substation/Switchyard | $385,000 |
| Electrical | $3,405,000 |
| Transmission Line | $1,105,000 |
| Turbine/Generator Equipment | $4,774,000 |
| Construction Supervision and Administration | $4,175,200 |
| Owner Administration | $300,000 |
| Interest During Construction | $879,000 |
| **Subtotal Construction Costs** | **$49,227,200** |
| | |
| **Anticipated Total Project Cost** | **$53,223,728** |

In developing the budget estimates for final engineering and construction, the recent hands-on experience KHL's engineering and construction consultant (McMillen Jacobs) gained at the Allison Creek and Blue Lake Hydroelectric projects was used as the foundation for developing the Grant Lake Hydroelectric Project cost estimates. The thorough understanding gained from these projects of the environmental, regulatory, and FERC requirements for the design and construction of a hydroelectric project in the State of Alaska were applied to ensure a comprehensive and representative project cost. The site-specific challenges for construction at the Project were then incorporated into the estimate. These included the integration of site-specific environmental conditions/impacts, establishing access, short construction windows, challenging weather conditions, and manpower/equipment acquisition.

Specific assumptions and sources used in developing the estimate include the following:

- Equipment costs for the turbine/generator equipment were obtained from manufacturers for the proposed two-unit powerhouse configuration. Quotes assumed a water to wire package, which included all required mechanical and electrical equipment for the powerhouse. These budget estimates were then compared to other similarly constructed projects to ensure consistency.
- Tunnel costs were based on the actual completed production rates for the Allison Creek and Blue Lake tunnels. The estimate included both the linear foot cost as well as cubic yard cost to determine average cost per linear foot. Rock projected at Grant Lake is similar to that found at Allison.
- Transmission line costs were based on actual bids received for Allison Creek, which were then adjusted to account for easier access for the line construction, as compared to the Allison where access had to be constructed.
- Substation costs were developed based on actual costs for the Allison and Blue Lake equipment and field construction at Allison, which has a similar-sized powerhouse.
- Powerhouse costs were developed based on a developed footprint of the powerhouse and unit costs developed for similar projects for concrete placement, powerhouse building, etc. The Allison Creek project provided a solid basis for production rates such as concrete placement, excavation, and building costs including electrical and balance of plant.
- General conditions and mobilization/demobilization costs were based on actual costs from the Allison and Blue Lake projects for equipment and material shipment from Seattle via barge. Housing and administrative costs were developed reflecting the short summer construction season and limited housing availability near the Project site.
- Engineering costs to complete final field investigations and prepare construction plans and specifications were developed based on a detailed scope and labor breakdown to reflect the Project. Specifically, the engineering level of detail and documentation to meet FERC expectations was incorporated into the estimate.
- Construction administration and supervision costs for the Allison Creek and Blue Lake projects were reviewed and taken into consideration when developing these site-specific costs for the Grant Lake Project. Staffing levels were developed to provide a FERC-mandated level of oversight in the field.

These costs are reflective of an imbedded contingency of approximately 15 percent.

## 5 Average Annual Costs

Based on the capital costs identified in Table D.4-1, at an interest rate of 3 percent and a term of 50 years ($2,056,421) with the annual operations and maintenance (O&M) costs identified in Table D.5-1, the annualized costs for the construction, operation, and maintenance of the Project totals $2,168,421 in 2015 dollars, resulting in an average cost of $116.58/megawatt hour (MWh).

Costs associated with proposed protection, mitigation and enhancement (PM&E) measures (both capital and O&M) are under development and will be provided in the Final License Application (FLA).

## 5.1. Cost of Capital

The cost of capital is estimated at 3.0 to 4.65 percent and assumes a 50 year financing term. For every 100 basis point reduction (1 percent) the Project cost is estimated to reduce by 1.4¢ per kilowatt hour (kWh). HEA intends to apply for low cost financing as available. As of March 1, 2015, HEA has received $2,100,000 in state grants. For every $1,000,000 in grant funds received, the Project cost is reduced 0.3¢ per kWh. In the future, HEA will be applying for any grant funds eligible for the Project.

## 5.2. Local, State and Federal Taxes

HEA pays an Electric Cooperative Tax through the State of Alaska based on the amount of kWh's sold each year. This Project would not increase kWh's sold, therefore having no tax impact.

As a non-profit corporation, HEA is exempt from federal and state income taxes under the provisions of Section 501(c)(12) of the Internal Revenue Code.

## 5.3. Depreciation and Amortization

Depreciation rates are applied on a straight-line basis. The industry average annual depreciation rate applied to hydroelectric facilities is 2 percent which equates to a 50-year life of the facilities. The annual depreciation expense is estimated at $1,064,475 per year.

## 5.4. Operations & Maintenance Expenses

Annual O&M expenses will be minimized by the use of existing HEA personnel, facilities, equipment, and tooling. Annual operation and maintenance (O&M) costs are estimated at $112,000. Table D.5-1 summarizes these costs.

**Table D.5-1.** Annual operation and maintenance costs.

| **O&M Item** | **Cost** |
|---|---:|
| Operations | $22,000 |
| Administrative & General | $10,000 |
| Insurance | $50,000 |
| Land Lease Fees | TBD |
| Interim Replacements | $30,000 |
| Total O&M Cost | $112,000 |

The facility will be remotely operated and monitored from the existing HEA Dispatch Center which is manned 24 hours a day, 7 days a week, 365 days a year. Scheduled monthly site inspection, planned and unplanned maintenance will be conducted by HEA's exiting roving Operations & Maintenance crew that currently maintains and operates HEA's unmanned thermal generation plants in Nikiski, Soldotna and Seldovia, Alaska. Existing personnel will provide the labor needed to operate and maintain the facility. Existing company vehicles, tooling and equipment currently utilized by the roving operations and maintenance crew will be utilized to conduct onsite work.

The Project will occupy federal lands, therefore it is anticipated that an annual land use fee would be assessed by the FERC. The fee will be approximated and inserted into the Table D.5-1 prior to finalization of the FLA.

### 5.5. Protection, Mitigation, and Enhancement Expenses (PM&E)

Costs associated with proposed PM&E measures (capital and O&M) will be provided in the FLA. Annualized costs of KHL's proposed PM&E measures, by resource area are being developed concurrent with its efforts to develop the Draft BE and management/monitoring plans which will explicitly detail all proposed PM&Es to be implemented in association with construction and operation of the Project. KHL will distribute for comment the Draft BE and management/monitoring plans between the end of April and mid-May. KHL intends to refine those plans and the associated proposed measures per comments received from stakeholders. Once the comment period is complete, KHL will revise the DLA, BE and management/monitoring plans and synthesize all documents into a comprehensive package prior to filing in which, the final BE and management/monitoring plans are appended to the FLA. Concurrent with this exercise and with the intent of developing a comprehensive and complete FLA for FERC review a breakdown of costs for each resource area will be developed and incorporated into Exhibit D.

## 6 Value of Project Power

### 6.1. Contingency Spinning Reserve

The contingency spinning reserve capacity that the Project provides is a valuable ancillary asset to HEA. Using the methods described in the National Renewable Energy Laboratory's (NREL) report on the "Fundamental Drivers of the Cost and Price of Operating Reserves", HEA calculated the value of spin at $11.77/MWh. This value is calculated by determining the difference in cost between operating HEA's most efficient unit at a level that could provide the necessary spin and operating two optimized thermal units in order to cover spin. The two unit configuration is what would be required if the distributed load increased beyond the point in which the one most efficient unit could adequately provide the necessary spinning reserves. The $11.77/MWh value is higher than the 2011 range of $2.80 to $7.40/MWh reported in the 2013 NREL Report for lower 48 spin values. However the cost of natural gas, which is the primary driver for spinning reserve costs, in the lower 48 at the time of the calculation averaged between $4.40 and $5.43/MMBtu while HEA's is currently paying between $7.1378 and $7.3182/delivered MMBtu. Additionally, there is no formal energy market for the

interconnected Southcentral Alaskan electric utilities ("Railbelt Grid") and therefore no means of reliably purchasing spinning reserve.

To estimate the annual value of the contingency spinning reserve, a model was developed to determine the amount of spin that the Project would produce. A summary of those results appear in Table D.6-1. Using the average value of 730 hours per month the Project would produce between 8,322 to 14,559 MWh/year of spin capacity. Based upon HEA's historical load data, the value of the system demand plus the operating reserve plus the contingency spin; exceeded the capacity of the most efficient unit 41 percent of the time. Applying this percentage to the spin capacity and the calculated spin value results in an estimated annual value of contingency spin in the range of $40,159 to $70,257 in 2015 dollars.

**Table D.6-1.** Contingency spinning reserve.

| | Unit 1 Lead Unit | | | Load Sharing Between Units 1 and 2 | | |
|---|---|---|---|---|---|---|
| Month | Avg Output - Unit 1 Lead (kW) | Total Generation - Unit 1 Lead (kWh) | Avg Spinning Res - Unit 1 (kW) | Avg Output - Load Share (kW) | Total Generation - Load Share (kWh) | Avg Spinning Res - Load Share (kW) |
| January | 1062 | 789,918 | 1431 | 1062 | 789,918 | 1431 |
| February | 821 | 551,829 | 1672 | 821 | 551,829 | 1672 |
| March | 597 | 444,523 | 1896 | 597 | 444,523 | 1896 |
| April | 661 | 476,072 | 1832 | 661 | 476,072 | 1832 |
| May | 1903 | 1,415,812 | 751 | 1513 | 1,125,711 | 3071 |
| June | 3360 | 2,419,164 | 878 | 3373 | 2,428,809 | 1613 |
| July | 4720 | 3,509,972 | 266 | 4719 | 3,510,733 | 267 |
| August | 4738 | 3,524,932 | 248 | 4751 | 3,534,680 | 235 |
| September | 4761 | 3,428,026 | 225 | 4783 | 3,443,745 | 203 |
| October | 2791 | 2,076,283 | 828 | 2749 | 2,064,976 | 2237 |
| November | 2188 | 1,575,264 | 305 | 1611 | 1,159,684 | 3375 |
| December | 1421 | 1,057,574 | 1072 | 1107 | 823,912 | 2109 |
| Annual | **2419** | **21,269,369** | **950** | **2312** | **20,354,594** | **1662** |

## 6.2. Estimated Average Annual Value of Power

HEA's 2014 blended cost of power was $118/MWh. Adjusting for the increase in fuel costs the 2015 blended cost of power is estimated at $122/MWh. Total average energy output from the Project is projected to be 18,600 MWh (see Exhibit B, Section 3.3 of this DLA). Purchasing an equivalent quantity of energy from natural gas generation ($2,269,200) and accounting for the benefit or the capacity spinning reserve ($40,159, low estimate) identified in Section 6.1, would cost HEA approximately $2,309,359, based on 2015 dollars. With annualized costs for the construction, operation, and maintenance of the Project totaling $2,168,421 in 2015 dollars, this represents a cost savings of $140,938 per year in 2015 dollars. That calculated annual savings will continue to escalate as the cost to produce thermally generated power continues to increase as a result of the escalating Cook Inlet natural gas cost. As noted above, this does not yet include the cost of proposed PM&E measures.

To assist in evaluating renewable energy grant applications, the Alaska Energy Authority (AEA) developed a model to complete a cost benefit analysis of renewable energy projects. The model is region specific in order to determine the fuel type that the proposed project will offset. The Kenai Peninsula falls within the "Railbelt" south region, which utilizes natural gas as the offset fuel. The natural gas price projections utilized in the model were provided by the Alaska Center for Energy and Power. The model incorporates a carbon pricing mechanism and models the proposed renewable energy against the alternative fossil fuel generation taking into account, avoided generation costs, O&M costs and fuel use costs. When the values from Table D.4-1 at a discount rate of 3 percent and a term of 50 years, with the O&M costs identified in Table D.5-1 are input into the model, the model predicts a net present value (NPV) benefit for the Project of $64,392,399, a NPV capital cost of $50,281,481 with a NPV benefit of $16,997,281 and a benefit to cost ratio of 1.28 which are exclusive of the spin benefit that the Project provides.

None of these estimated and modeled values account for the potential grant funds and Legislative appropriations mentioned in Section 10. As noted in Section 5.1, for every $1,000,000 in grant funds or Legislative (State) appropriations received, the Project's cost of power is reduced by 0.3¢ per kWh.

The incremental cost of energy for the Project drops dramatically following the payoff of debt service in the initial 50 years. The incremental cost post year 50 drops to about $17/MWh.

## 7 On-peak and Off-peak Values of Project Power

There is no formal energy market for the interconnected Southcentral Alaskan electric utilities ("Railbelt Grid") and therefore no on-peak and off-peak power values. However, HEA's load does fluctuate between day and night and seasonally as well. The power generated by the Project would be dispatched as a part of the entire HEA generation system. The Project generation would be pooled with other HEA generation resources and shared among retail and wholesale purchasers. As with all generation resources available to HEA, the Project would be dispatched economically to minimize total generation costs while meeting, licensing requirements, reliability requirements and contractual service obligations. KHL's objective in operating the Project is to optimize HEA's ability to meet load throughout the integrated system, balancing its hydro and thermal energy sources. Within the constraints of the licensed operating levels, KHL would operate the Project in the temporal mode most advantageous to the system.

## 8 Alternative Energy Sources

South-Central Alaska has benefited from a surplus of natural gas discovered primarily in the 1960s as a byproduct of oil exploration in the Cook Inlet area. As a result of abundant and affordable natural gas, the heating and electrical infrastructure for South-Central Alaska was developed around this resource. Approximately 90 percent of the electrical needs of South-Central Alaska are met with natural gas fired turbines. However, gas production has dropped considerably since 2002 with a decline in annual production of 210 (billion cubic feet) Bcf to 103 Bcf in 2012. As a consequence of this precipitous production decline, the price of natural gas has gone from $2.50 to over $6.00/thousand cubic feet (Mcf) in that same time period. The

current cost of gas in the region is about $6.90/Mcf in 2015, with the cost as high as $9.25/Mcf for contracted gas in 2019.

The Alaska Division of Oil and Gas estimates that there are still proven and conventionally recoverable gas reserves in the Cook Inlet Region. Additionally, Alaska continues to work on ways to get North Slope gas to South-Central Alaska but none of the potential solutions indicate a shrinking natural gas price for the region. HEA, like the rest of the electric utilities, will continue to generate a majority of its electricity from natural gas. That said, HEA has a strong desire to diversify its energy mix, reduce its dependence on fossil fuels and develop responsible renewable energy resources.

HEA's power supply portfolio primarily consists of natural gas-fired generation and some hydroelectric power. The generation facilities are summarized in Table D.8-1.

**Table D.8-1.** HEA generation facilities.

| Generation Facility | Capacity | No Units/Age |
|---|---|---|
| Nikiski Combined Cycle Plant (Steam/Gas) | 80 MW | CT 1984, ST 2014 |
| Soldotna Combustion Turbine Plant (Gas0 | 48 MW | 2014 |
| Bernice Lake Combustion Turbine (Gas) | 80 MW | 3 Units 1971, 1978, 1981 |
| Bradley Lake Hydroelectric Project (hydro) | 14 MW | 1991 |

HEA's gas-fired generation makes up 91 percent of its current generation portfolio, strongly influences HEA's rates and is subject to significant price volatility. HEA is seeking to diversify its generation portfolio. Part of this diversification is to develop renewable generation. The proposed Grant Lake Project would represent approximately 4 percent of HEA's energy needs, and would represent a 45 percent increase in its renewable energy portfolio.

## 9 Consequence of License Application Denial

Denial of the license application for the Grant Lake Project would mean that the Project could not be constructed as proposed by KHL. This would mean a continued reliance on an increasingly scarce and expensive Cook Inlet (Alaska) natural gas supply. Denial of the license application would result in the continued release of approximately 10,000 tons of $CO_2$ annually to produce the equivalent amount of carbon-based energy.

Denial of the license application would be a significant setback in the Cooperatives goal of generating 22 percent of its power from renewable energy resources. It would also result in a setback to the State of Alaska's renewable energy goal of 50 percent renewable energy by 2025.

Denial of the license application would mean the loss of approximately $5,100,000 to HEA ($3,000,000) and the State of Alaska ($2,100,000) in funds associated with the development of the Project.

Lastly, it would mean that this low impact hydroelectric resource would remain undeveloped and of no benefit to the citizens of the State of Alaska.

## 10 Sources and Extent of Financing

KHL intends to utilize available grant funds, legislative appropriations, and long term, low interest financing for the Project. KHL intends to apply for $4 million in grant funding through the AEA's Renewable Energy Fund program, which limits individual project construction funding to $4 million. Additionally, KHL anticipates exploring other grant opportunities.

The State of Alaska has historically supported the construction of hydroelectric projects by non-profit entities in the State through various levels of Legislative appropriations. KHL through HEA would explore this option. Any capital costs not covered by grant or Legislative appropriations would be financed through long-term, low interest loans. HEA has recently worked with both the USDA's Rural Utilities Service (RUS) and the National Rural Utilities Cooperative Finance Corporation (CFC) to secure low interest loans for generation projects.

Annual revenues received from the sale of energy on the HEA system will be used to repay the debt service as well as the ongoing operations and maintenance fees.

## 11 Cost to Develop the License Application

KHL has received $2,100,000 in AEA renewable energy grant funds for Project development. KHL has spent $3,000,000 of additional funds to develop the license application for a total estimated license application expense of $5,100,000.

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