Alaska Energy Authority

The following checklist contains detail items that are critical to the success of a Renewable Energy Fund application. The intent of the checklist is to aid applicants in the submission of a comprehensive project proposal.

Existing Electrical System Overview (this should be the same or similar across all technologies for RE electrical projects)
- Current configuration and condition (gensets, switchgear, controls, heat recovery, transmission and distribution)
- 15 minute interval load profile for one year
- Load analysis and growth projections
- Upgrades needed before RE project

Hydroelectric Resource Assessment
- Detailed mapping of all boundaries, features, and topographic data covering river, reservoir, proposed project and alternate project extents using LIDAR or similar surveying and 1 meter or better aerial imagery collected within last 3 years, and a reservoir area-volume based on topographic and bathymetric data.
- Understanding of basin hydrological and climate characteristics with a minimum of 3 years of 15 minute interval or daily average, median, and peak flows reported by qualified hydrologist or civil engineer along with other pertinent hydrological analysis data (comparative analysis, flow duration curves and exceedance tables (10% increments) at dam, powerhouse, and other critical locations.
- Geomorphological considerations including Probable Maximum Precipitation, Probable Maximum Flood, flood hazards, estimated sediment loads, and snow and ice considerations and impacts.
- Environmental and aquatic investigations including spatial and temporal distribution of resident and anadromous fish by species and life stage, wildlife investigations as required, recreational and socioeconomic descriptions, analysis including visual impact studies, and opportunities for enhancement.
- Preliminary permitting analysis, consultations including agency and public reviews and meetings, permit applications and processes started including completion of a license application for FERC as required.
- Geotechnical evaluations as appropriate:
  - surficial geology, stratigraphy to competent bedrock and along tunnels and dam locations,
  - slide or rock stability analysis, bedding characteristics and fracture locations,
  - tunnel boring, finishing, and rock bolting recommendations,
  - packer testing with recommendations for grouting,
  - cut and fill recommendations, locally sourced structural fill analysis and recommendations,
  - material testing including analysis and recommendations for strength and use of local materials for locally batched concrete.
- Project parameters – design flow, detailed 3D location and materials description of all proposed and existing features in maps, drawings, tables, and text, detailed concept designs for all project features including temporary diversions or coffer dams, construction extents and work areas, proposed project boundary with legal and all existing land rights and restrictions, proposed turbine and generator configuration, operational efficiency over full range of flows, proposed design criteria for all project features, quantities for proposed features and work
- Detailed and validated project modeling of existing and proposed configurations utilizing variable inputs for reservoir, existing and proposed electric generation capacity, efficiencies, and cost, and secondary energy (heat or interruptible electric) utilization, in a daily timestep model.
- Annual modeling including variables of demand and fuel price growth, financing and O&M projections, and climate projections for both the existing/alternate and proposed generation system.
- A draft and final report stamped by an Alaska licensed Professional Civil Engineer presenting all of the above information and results of assessment. Content of report to include least cost alternative and
detailed discussion of the analysis (including sensitivity) and results of all investigations and modeling with a conclusion and recommendations section.

Design Considerations
Design best practices include preparing logical, readable, and professional drawings and specifications and other documents for construction and operation and maintenance phases of the project. General goals of the design are as follows.

- That the project is designed and constructed in a safe manner that minimizes the danger to human life and harm to the environment
- The design results in a low project cost while serving the project purpose and need for its useful life.
- The design is sufficiently detailed and adequate to minimize change orders, cost deviation, and reasonably minimizes risk of major repairs or modifications following construction.
- The design appropriately balances cost of construction with lowered operation and maintenance costs and the potential for expansion is considered.
- The design incorporates energy efficiency and arctic design best practices.

Design review checklist

- Project overview map(s) and general information
  - At least one map showing full project extents (including reservoir area, property boundaries, and bypassed reach of reach of water body (if run of river) and a vicinity map
  - General project information such as capacities (hydraulic and power), general quantities (length, area, volumes), monthly average streamflow at point of intake, annual energy production, project owner
  - A sheet index for all drawings

- Site control drawing including
  - Recorded document list for properties, leases, easements.
  - Horizontal and vertical control basis and monuments.
  - Complete legal description
  - Plat references

- Design Criteria and information
  - Design codes and standards used along with a code analysis
  - Design loadings and hydraulic levels
  - Geotechnical investigations and reports
  - Design analysis, calculations/report

- One line electrical and communication drawing.

- Drawings showing horizontal and vertical design sufficient for layout and construction of infrastructure.
  - Typical methods include plan and profile drawings with stationing for alignments, standard road cross sections, limits of grading, grades or slopes, and general topography, drawing scale bars and north arrows, point or dimensional data, structural sections showing embedment’s, equipment layout drawings, electrical and mechanical schematics, and equipment lists, size, and locations

- Submittal requirements including drawings and basic design data for contractor design build items, fabrications, and procured equipment with requirement for submittal and review of the electrical switchgear engineered and shop drawings.

- Technical specifications for materials and methods

- General specifications governing execution of work

- Specifications for the control and operation of the project including requirement to operate standalone, load following, or base loaded with the existing generation assets and any secondary energy equipment.

- Engineers cost estimate, updated feasibility report, owner’s business development and operational plan, and schedule.

- Power purchase/sales agreement

- Land use authorizations and all permits obtained
Common Pitfalls

- Not having a plan should costs exceed estimates
- Not engaging agency stakeholders early-on and throughout project development
- Making major changes without consulting agency stakeholders
- Assuming project will not have flow reservations without consulting agency stakeholders
- Not receiving support and authorization from land owners prior to project development
- Not including all infrastructure required during economic analysis