

**TECHNICAL REPORTS FOR PROJECTS WITH
TOTAL ELIGIBLE PROJECT COSTS GREATER THAN \$200,000**

The Technical Report for projects with total eligible project costs greater than \$200,000 (and for any other project that must submit a Technical Report under this appendix) must demonstrate that the project design, procurement, installation, startup, operation, and maintenance of the renewable energy system or energy efficiency improvement will operate or perform as specified over its design life in a reliable and a cost-effective manner. The Technical Report must also identify all necessary project agreements, demonstrate that those agreements will be in place, and that necessary project equipment and services are available over the design life. All technical information provided must follow the format specified in Sections 1 through 10 of this appendix. Supporting information may be submitted in other formats. Design drawings and process flowcharts are encouraged as exhibits. A discussion of each topic is not necessary if the topic is not applicable to the specific project. Questions identified in the Agency's technical review of the project must be answered to the Agency's satisfaction before the application will be approved. The applicant must submit the original technical report plus one copy to the Rural Development State Office. Renewable energy projects with total eligible project costs greater than \$400,000 and for energy efficiency improvement projects with total eligible project costs greater than \$200,000 require the services of a licensed professional engineer (PE) or team of PEs. Depending on the level of engineering required for the specific project or if necessary to ensure public safety, the services of a licensed PE or a team of licensed PEs may be required for smaller projects.

SECTION 3 - GEOTHERMAL, ELECTRIC GENERATION PROJECTS

Section 3. Geothermal, Electric Generation

The technical requirements specified in this section apply to electric generation geothermal projects, which are, as defined in § 4280.103, systems that use geothermal energy to produce high pressure steam for electric power production.

- (a) Qualifications of project team. The electric generating geothermal plant project team should consist of a system designer, a project manager, an equipment supplier, a project engineer, a construction contractor, and a system operator and maintainer. One individual or entity may serve more than one role. The project team must have demonstrated expertise in geothermal electric generation systems development, engineering, installation, and maintenance. Authoritative evidence that project team service providers have the necessary professional credentials or relevant experience to perform the required services must be provided. Authoritative evidence that vendors of proprietary components can provide necessary equipment and spare parts for the system to operate over its design life must also be provided. The application must:
- (1) Discuss the proposed project delivery method. Such methods include a design, bid, build where a separate engineering firm may design the project and prepare a request for bids and the successful bidder constructs the project at the applicant's risk, and a design/build method, often referred to as turnkey, where the applicant establishes the specifications for the project and secures the services of a developer who will design and build the project at the developer's risk;
 - (2) Discuss the geothermal plant equipment manufacturers of major components being considered in terms of the length of time in business and the number of units installed at the capacity and scale being considered;
 - (3) Discuss the project manager, equipment supplier, system designer, project engineer, and construction contractor qualifications for engineering, designing, and installing geothermal electric

- generation systems, including any relevant certifications by recognized organizations. Provide a list of the same or similar projects designed, installed, or supplied and currently operating with references, if available; and
- (4) Describe the system operator's qualifications and experience for servicing, operating, and maintaining electric generating geothermal projects. Provide a list of the same or similar projects designed, installed, or supplied and currently operating with references, if available.
- (b) Agreements, permits, and certifications. Identify all necessary agreements and permits required for the project and the status and schedule for securing those agreements and permits, including the items specified in paragraphs (b)(1) through (7).
- (1) Identify zoning and code issues and required permits and the anticipated schedule for meeting those requirements and securing those permits.
 - (2) Identify any permits or agreements required for well construction and for disposal or re-injection of cooled geothermal waters and the schedule for securing those agreements and permits.
 - (3) Identify land use or access to the resource agreements required for the project and the anticipated schedule for securing the agreements and the term of those agreements.
 - (4) Identify available component warranties for the specific project location and size.
 - (5) For systems planning to interconnect with a utility, describe the utility's system interconnection requirements, power purchase arrangements, or licenses where required and the anticipated schedule for meeting those requirements and obtaining those agreements.
 - (6) Identify all environmental issues, including environmental compliance issues, associated with the project on Form RD 1940-20, "Request for Environmental Information," and in compliance with 7 CFR part 1940, subpart G, of this title.
 - (7) Submit a statement certifying that the project will be installed in accordance with applicable local, State, and national codes and regulations.
- (c) Resource assessment. Provide adequate and appropriate data to demonstrate the amount of renewable resource available. Indicate the quality of the geothermal resource, including temperature, flow, and sustainability and what conversion system is to be installed. Describe any special handling of cooled geothermal waters that may be necessary. Describe the process for determining the geothermal resource, including measurement setup for the collection of the geothermal resource data. For proposed projects with an established resource, provide a summary of the resource and the specifications of the measurement setup.
- (d) Design and engineering. Provide authoritative evidence that the system will be designed and engineered so as to meet its intended purpose, will ensure public safety, and will comply with applicable laws, regulations, agreements, permits, codes, and standards. Projects shall be engineered by a qualified party. Systems must be engineered as a complete, integrated system with matched components. The engineering must be comprehensive, including site selection, system and component selection, conversion system component and selection, design of the local collection grid, interconnection equipment selection, and system monitoring equipment. Systems must be constructed by a qualified party.
- (1) Provide a concise but complete description of the geothermal project, including location of the project, resource characteristics, thermal system specifications, electric power system interconnection equipment and project monitoring equipment. Identify possible vendors and models of major system components. Provide the expected system energy production on a monthly and annual basis.
 - (2) Describe the project site and address issues such as site access, proximity to the electrical grid, environmental concerns with

emphasis on land use, air quality, water quality, habitat fragmentation, visibility, noise, construction, and installation issues. Identify any unique construction and installation issues.

- (e) Project development schedule. Identify each significant task, its beginning and end, and its relationship to the time needed to initiate and carry the project through startup and shakedown. Provide a detailed description of the project timeline, including resource assessment, system and site design, permits and agreements, equipment procurement, and system installation from excavation through startup and shakedown.
- (f) Project economic assessment. Provide a study that describes the costs and revenues of the proposed project to demonstrate the financial performance of the project, including the calculation of simple payback. Provide a detailed analysis and description of project costs, including project management, resource assessment, project design, project permitting, land agreements, equipment, site preparation, system installation, startup and shakedown, warranties, insurance, financing, professional services, and operations and maintenance costs. Provide a detailed analysis and description of annual project revenues, including electricity sales, production tax credits, revenues from green tags, and any other production incentive programs throughout the life of the project. Provide a detailed description of applicable investment incentives, productivity incentives, loans, and grants. In addition, provide other information necessary to assess the project's cost effectiveness.
- (g) Equipment procurement. Demonstrate that equipment required by the system is available and can be procured and delivered within the proposed project development schedule. Geothermal systems may be constructed of components manufactured in more than one location. Provide a description of any unique equipment procurement issues such as scheduling and timing of component manufacture and delivery, ordering, warranties, shipping, receiving, and on-site storage or inventory. Identify all the major equipment that is proprietary and justify how this unique equipment is needed to meet the requirements of the proposed design. Include a statement from the applicant certifying that "open and free" competition will be used for the procurement of project components in a manner consistent with the requirements of 7 CFR part 3015 of this title.
- (h) Equipment installation. Describe fully the management of and plan for site development and system installation, provide details regarding the scheduling of major installation equipment needed for project construction, and provide a description of the startup and shakedown specifications and process and the conditions required for startup or shakedown for each equipment item individually and for the system as a whole. Include a statement from the applicant certifying that equipment installation will be made in accordance with all applicable safety and work rules.
- (i) Operations and maintenance. Identify the operations and maintenance requirements of the system necessary for the system to operate as designed over the design life. The application must:
 - (1) Ensure that systems must have at least a 3-year warranty for equipment. Provide information regarding turbine warranties and availability of spare parts;
 - (2) Describe the routine operations and maintenance requirements of the proposed project, including maintenance for the mechanical and electrical systems and system monitoring and control requirements;
 - (3) Provide information that supports expected design life of the system and timing of major component replacement or rebuilds;
 - (4) Provide and discuss the risk management plan for handling large, potential failures of major components such as the turbine. Include in the discussion, costs and labor associated with the operation and maintenance of the system, and plans for in-sourcing or out-sourcing;and
 - (5) Describe opportunities for technology transfer for long-term project operations and maintenance by a local entity or owner/operator.

- (j) Dismantling and disposal of project components. Describe a plan for dismantling and disposing of project components and associated wastes at the end of their useful lives. Describe the budget for and any unique concerns associated with the dismantling and disposal of project components and their wastes.