

**LAVA LAW**  
**SETTING UP SHOP:**  
**—Design, Engineering, Construction,**  
**and Turbine Purchase Agreements—**

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This chapter provides an overview of the contractual structures that often apply to the construction of geothermal energy projects, including design and engineering, procurement and installation of steam turbine generators and related heat exchange equipment, and construction of ancillary facilities. This overview is written from the perspective of a geothermal energy project developer; however, the information set forth below should interest design and engineering, construction, operations and maintenance, and financing entities as well. As with any complex negotiated transaction, there is significant value to be won or lost by all parties, and the potential for creative legal strategies to meet or exceed everyone's expectations and interests.

## Construction-Related Agreements

Critical to the actual development of any geothermal energy project are the various agreements a project developer must enter into in relation to:

- design and engineering;
- procurement of necessary equipment (steam turbine generators and related heat exchange components) and materials to construct “balance-of-plant” facilities such as cooling systems, extraction and injection wells, piping systems, foundations, roads, transformers, and maintenance facilities;
- obtaining construction, installation, and balance-of-plant services necessary to install the steam turbine generators and construct the ancillary facilities; and
- operations and maintenance.

Performance guarantees, warranty and insurance arrangements are critical elements in the agreements at each of these stages. Contracts for the first three stages—engineering, procurement, and construction—are often collectively referred to as “EPC agreements.” Often, these agreements also provide for, or anticipate, other services such as warranty services or operations and maintenance services for the steam turbine generators and related facilities.

There are occasions when the design and engineering, procurement, and construction/erection services are addressed in a single agreement (a “full-wrap” or “turnkey” agreement), usually when there is a single general contractor for the project. However, it is also common to have separate agreements such as design and engineering agreements, procurement/sale agreements, and construction/erection agreements (“balance-of-plant agreements”), using one or more contractors for each of the various services. Depending on the contractual structure, warranties, insurance, and other matters may be addressed in a single master agreement or in each individual agreement.

## Design and Engineering Services

Geothermal energy projects require design and engineering expertise that is unique to this sector of the power generation industry. For instance, relatively few firms (a) design, engineer, and manufacture geothermal-specific steam turbine generators and (b) design, engineer, and construct the related project facilities. Project design expertise requires understanding the complexities of the geothermal resource that the project will utilize, including volumes of extracted and injected liquids and wastes (toxic and otherwise) generated from such liquids.

These and other factors will determine the type of system the project will use, such as flash or double-flash steam systems or a binary-cycle system.

## **Typical EPC Contractual Structure for a Geothermal Project**

Given the multiple factors influencing the development of a geothermal energy project, no single contractual structure applies to all such projects. Common contractual structures include turnkey EPC agreements and separate turbine procurement and balance-of-plant agreements.

Using a turnkey EPC agreement, the project developer would contract with a contractor who would undertake the development of the entire project, including the procurement of suitable steam turbines and the design and engineering of the extraction and injection well system and related pipeline system, cooling system, waste management system, and connected facilities. Such a contractor is often responsible for the commissioning, start-up, and performance testing of the steam turbine generators and the balance-of-plant.

Alternatively, the project developer may elect to contract separately with a steam turbine vendor for the procurement of the desired steam turbines and with a balance-of-plant contractor for the (a) installation of the steam turbines and (b) design, engineering, and construction of the other necessary facilities for the project, such as foundations, roads, warehouses, transformers, security systems, and maintenance facilities. In this instance, care must be taken in both sets of agreements to avoid interference, duplication, or omission between the scopes of work of the steam turbine supplier and the balance-of-plant contractor, and to ensure that, collectively, the agreements result in a fully constructed, integrated, and operational project.

In either a turnkey agreement or separate turbine supply/balance-of-plant agreements, the parties must focus on the scope of work, measures of completion, warranty obligations, limitations of liability, time of completion (with particular focus on key dates set by power purchase commitments and tax credit deadlines, if any), and other issues that are discussed below.

### **Scope of Work**

Except in a true design-build project based solely on performance specifications, the parties should place great emphasis on the description of the scope of work set forth in the agreements. The scope of work should describe, in detail, the actual design, engineering, and construction obligations of the contracting parties. Generally, whatever is not provided for in the steam turbine supplier's and contractor's scope of work is the project developer's responsibility to complete or to contract with third parties to complete. A steam turbine supplier's scope of work typically includes the design and engineering of the steam turbine generators, including their principal parts and components, as well as certain obligations relating to the commissioning, start-up, and performance testing of the steam turbine generators. The turbine supplier's services may also include control systems, weather mitigation packages, and related warranty work. The balance-of-plant contractor's scope of work is typically more limited, as it usually excludes steam turbine commissioning-related services, and focuses on related infrastructure and facilities design, engineering and construction, extraction and injection well and piping system design and construction, earthworks, and related work. As with other aspects of such an agreement, the scope-of-work provisions are usually heavily negotiated.

### **Completion and Start-up Obligations**

The scope-of-work provisions of the relevant agreement typically determine who shall be responsible for and when, and how the facility will be started up and commissioned. Given a turbine supplier's in-depth knowledge

of its products, the turbine supplier will, at a minimum, provide startup supervision and may also be engaged to commission the steam turbine generators it supplies. However, this work may be the responsibility of the project developer (with assistance from the turbine supplier) or a third-party contractor on behalf of the project developer. In either case, the agreement must address the stages of completion, such as actual delivery of the steam turbines to the project site, installation of the steam turbine generators, and commissioning, start-up, and performance testing of the turbines. Once these progress milestones are established, completion is generally evidenced by the turbine supplier's or the turnkey contractor's certifications of, for example, "substantial mechanical completion," "final mechanical completion," and "final sign-off"; each such certification is considered an incremental measure that the project must satisfy in order to progress to the next measure. As with other supply/construction-related agreements, progress payments by the project developer to the turbine supplier/contractor (as set forth in the relevant agreement) would be based, in part, on the milestones described above. For instance, the project developer would typically pay the steam turbine supplier a certain amount toward the agreed-upon contract price when its order is submitted and then make additional payments upon (a) the delivery of the steam turbine generators and related components to the project site, (b) the installation of the steam turbine generators, (c) the related testing of the control and monitoring system, and (d) assuming the foregoing stages are executed properly, the final sign-off by the parties.

### **Component Performance Guarantees and Warranty Obligations**

Performance guarantees and warranty-related obligations are likely to be an issue of substantial negotiation between parties to the steam turbine supply and the balance-of-plant agreements. The nature and scope of a contractor's warranty obligations usually depend on what services, materials, and equipment the contractor is contracted to provide. A turbine supplier's obligations generally include such things as a general parts warranty (the definition of a defect can be important when determining what is included or excluded as a defective or nonconforming part or component in a steam turbine or related facility), heat rate and output guarantees (this refers to the energy output measurement of a steam turbine generator), and related matters. For a contractor providing non-turbine services and materials, such as balance-of-plant services, the warranties and guarantees may be limited in scope relative to those of a steam turbine supplier, but would still include warranties relating to parts and materials used in construction and any balance of plant design services provided.

The issues that contracting parties should consider with respect to warranties include (a) the period or term of a particular warranty and whether the term can be extended (a turbine supplier may offer certain extended warranty services for an agreed price), (b) the definition of a defect, (c) limitations on a warranty due to acts of third parties such as operation and maintenance personnel, and (d) the remedial measures a contractor may take to cure any defect. Additionally, a project developer may desire that any third-party contractor or subcontractor warranties that the steam turbine supplier and/or balance-of-plant contractor possesses in respect of any parts or components used in its steam turbine generators are "passed through" so that the project developer can enforce them directly.

### **Limitation of Liability**

The turbine supplier and other contractors may seek to limit their liability to a project developer. It is not uncommon to exclude liability for consequential, indirect, incidental, or special damages, though such clauses should be scrutinized because what qualifies as a "consequential" as opposed to a "direct" damage is often unclear. A contractor may seek to limit its liability to liquidated damages of a certain value, usually an agreed-on percentage of the value of the relevant agreement, or may seek to establish a maximum aggregate liability limit. The project developer should consider bargaining for exclusions to such contractor liability limitations. For

instance, the contractor could agree that it would be liable, without limit, for delay-related damages if the project developer is unable to satisfy its contractual commitments under a power purchase agreement or to obtain time-sensitive benefits such as tax credit or bonus depreciation due to an event in the contractor's control or a risk assumed by the contractor.

### **Production Tax Credits**

Historically, geothermal energy projects have not been dependent on benefits derived from state or federal law for renewable-resources energy projects, such as the federal production tax credit ("PTC") under Section 45 of the federal Internal Revenue Code.<sup>1</sup> However, the Energy Policy Act of 2005 provided PTCs for projects completed by a date certain (as of this writing, December 31, 2008), and these PTCs have contributed to promote geothermal energy development. PTC-related damages are usually the subject of much negotiation between a contractor and the project developer. Insurance coverage may be available for certain delay-related risks, including failure to qualify for a PTC.

### **Project Financing**

The high capital costs associated with geothermal energy projects mean that such projects will likely require some form of substantial debt financing or joint venture financing to fund the design, engineering, procurement, construction, and initial operations of the project. Financial institutions and other potential investors (including those investing to obtain the benefit of PTCs) will demand the opportunity to review and comment on a project's design and engineering, procurement, and construction agreements (and related operations and maintenance and warranty agreements, if separate) before committing funds. Of special interest to prospective lenders and/or investors are the provisions in the agreements that provide the lender/investor with the ability to step into the project if the project developer (as the borrower) defaults, and provisions that specify the extent and nature of any damages available to a project developer from a contractor. Additionally, financial institutions will want to comment on the payment plans and security, warranty, and inspection provisions set forth in the project agreements.

Due to such involvement, and to avoid issues arising from any potential inconsistencies, the project developer should be prepared to present a consistent and cogent set of project agreements to lenders/investors and to listen to their suggestions for such agreements. Further, a project developer should be prepared for the possibility that lenders/investors may want to make substantial changes in the negotiated agreements. For instance, lenders will often be interested in the project's financial and operational viability (as may be reflected in a feasibility study), and much of that interest will necessarily focus on the project developer's rights and recourse under the relevant agreements. In particular, lenders will be interested in the extent, limitation, and operation of any contractor warranties, contractor indemnities, insurance policies, progress or performance-test milestones and payments, and performance and payment guarantees (if any). Lenders will also want to know whether the various agreements are entered into on an "arm's-length" basis, meaning that the terms and conditions of such agreements are based on typical commercial terms and standards.

### **Performance and Payment Guarantees**

A project developer should cause the various contractors to procure, for the benefit of the project developer, performance and payment guarantees, or bonds, to ensure (a) the timely performance of contractors (whether engineers, constructors, or procurement contractors), (b) that such performance on the project has been

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<sup>1</sup> A PTC is a tax credit for a percentage of the taxable income generated by a project that qualifies for such credit.

completed pursuant to the terms of the relevant agreements, and (c) that no liens or other encumbrances are lodged against the project property or improvements. Typical guarantees are described below.

- *Performance Guarantee.* A performance guarantee is usually issued by a parent company or other creditworthy entity, such as a bonding company, selected or approved by the project developer, for an agreed sum. The issuer of the guarantee is available to satisfy the project developer's damages if the contractor has failed to perform its contractual obligations as specified in the relevant agreement. For instance, when the contractor defaults or cannot complete the project, the project developer may call on this bond or guarantee to pay another contractor to complete the project. The project developer will want to reserve its other rights against a defaulting contractor if the performance bond does not fully cover (i) the project developer's costs of completing the project or (ii) damages the project developer may owe to a third party if project delays cause the project developer to default on its obligations to third parties.
- *Payment Guarantee/Bond.* A payment guarantee or bond is intended to ensure that, in case the contractor defaults on the project, no liens or other security interests will attach to the project developer's property or the project improvements. A lien claim, normally filed against the project developer's property, may be "bonded-over" so that it attaches instead to the payment guarantee or bond. Lenders, upon their review of the agreements, may demand or require such payment guarantees to enhance the lenders' security interests in the project.

The project developer or the lenders may require other security from contractors, such as parent guarantees, standby letters of credit, and other forms of assurance that the contractors will perform. The contractors will seek ample opportunity to cure any default or delay and will try to limit a project developer's ability to call on their security without clear proof of a failure of performance by the contractor. In turn, contractors will usually demand some form of reciprocal security issued by the project developer or its parent company, including parent guarantees, payment guarantees, and the like to ensure prompt and full payment for work performed.

### **Liens and Releases Issues**

When the project developer makes periodic payments to contractors, the developer should obtain a lien release from each contractor and subcontractor. A lien release will help protect the project developer from liens being filed on the project by subcontractors who have not been paid by a primary contractor (and its subcontractors). Such liens are undesirable because (among other things) once filed, they can delay or interfere with the project's financing. Worse still, if a lien claimant is successful, such a lien could be used to force the sale of the project, or part of it, or could interfere with the sale of the project by the project developer.

### **Insurance and Indemnity Issues**

A project developer should obtain appropriate indemnities and insurance coverage from the various parties with whom it contracts, and should require those parties to obtain similar protections from their subcontractors and material suppliers for the benefit of the project developer. Relevant indemnities include a general indemnity for personal injury, death, and property damage claims, contractor and subcontractor lien indemnities, an indemnity for taxes (other than those payable by the developer), an indemnity for violation of applicable laws, and an indemnity for intellectual property infringement claims. Appropriate insurance policies include commercial general liability, workers' compensation and employer's liability, automobile, errors and omissions (for design and engineering services), and builder's all risk (for the project improvements). Such policies should name the developer and its financing party (if any) as additional insureds and contain appropriate waivers of subrogation. Appropriate policy limits will vary with respect to the nature of the work being performed by the insured and the

scope of the project. It is advisable for project developers to consult with an insurance or risk management specialist to ensure that appropriate types and levels of coverage are obtained.

## **Relationship to Other Project Development Steps**

EPC agreements are closely tied to power purchase agreements and project financing. A power purchaser, usually a utility, expects assurances that the project will become operational, and therefore sometimes takes a strong interest in the necessary EPC agreements and financing documents. If financing is required, as it almost always is, financial institutions expect to see that the project will generate revenues – which requires a purchase agreement and EPC agreements. Recently, developers with a well developed risk appetite, have developed some projects on a pure merchant basis, that is without a long term power purchase agreement in place. However, long term off-take agreements are still the norm for most project financed developments. And finally, EPC contractors want assurances that they will be paid for their work, including evidence that the project developer has secured financing and can sell the power to be generated. This circular relationship of contractors, financial institutions, and power purchasers often forces the developer to establish the contracts in incremental contractual steps, tied to incremental steps taken with the other parties.