LEX HELIUS: THE LAW OF SOLAR ENERGY
—Solar Energy System Design, Engineering, Construction, and Installation Agreements—

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This chapter provides an overview of the contractual structures commonly applied to the construction and installation of distributed generation, on-site, solar energy projects, including design and engineering, procurement and installation of solar collection equipment, and construction of ancillary facilities.

This overview is written from the perspective of a solar energy project owner/developer; however, the information herein 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 enhance value for all parties.

I. Construction-Related Agreements. Critical to the development of any solar energy project are the various agreements a project owner must enter into for:

- Design and engineering of the solar collection and power generation system;
- Procurement of power generation equipment, such as (in a photovoltaic ("PV") system) PV panels, mounting racks, inverters, and a collection system, or (in a solar thermal system) concentrating mirrors, a mounting and tracking system, a collection tower, and turbines, as well as transformers and interconnection to the electrical grid;
- Obtaining construction services necessary to install and commission the power generation equipment and the balance of plant facilities; and
- Operation and maintenance of the completed facility.

Frequently, engineering procurement and construction tasks are combined within a single agreement, called an "EPC agreement" or a "design-build agreement" or (if substantially all project tasks are assigned to a single entity) a "full-wrap" or "turnkey" agreement. It is also common to have separate agreements for procurement and installation of major power generation equipment supplemented by a "balance of plant" agreement for the construction of ancillary facilities.

Alternatively, the project developer may enter into separate agreements with multiple suppliers of equipment, materials, design and engineering services, construction or installation services, or any combination thereof. It will be critical in such cases to coordinate these engineering, procurement, and construction agreements to make sure that they collectively produce a complete project.

Depending on the contractual structure, product or service warranties, insurance, and other matters may be addressed in the full-wrap agreement or may be addressed in individual agreements. Understanding how these issues impact each other is essential for creating a set of coordinated agreements.

II. Design and Engineering Services. Solar power projects require certain design and engineering expertise that is unique to this sector of the power generation industry. The designers and engineers must coordinate their services with the structural and electrical designers and engineers working on the structure to ensure proper integration and scheduling. Historically, relatively few companies designed, engineered, and manufactured solar energy generation equipment, PV or thin film panels, or solar thermal and concentrated solar units. Today there are a number of manufacturers in each of these areas.

With the growth and monetization of the industry and the maturation of incentives, new vendors are entering the market regularly. Currently, solar technology provides for various systems, from solar thermal hot water or

concentration systems to silicon cell or thin film PV generation panels. The needs and requirements for any particular project, however, are in part dictated by its operating parameters, which are in turn dictated by the project's purpose, energy load, and location.

For instance, the weight tolerance of a rooftop installation will be very different from the weight tolerance of a ground-mount installation. Consequently, much lighter panel designs are likely to be necessary for a rooftop installation even if the rated output is the same.

III. Construction and Installation Services. Solar systems are generally assembled from predesigned components that are aggregated and installed to suit the project's needs. Nonetheless, substantial design and engineering work must still be performed at the project site to integrate the chosen system or systems into the project, including the necessary interconnection requirements. These design and engineering services, and related procurement and construction work, may be performed by the supplier of the solar equipment and materials under one or more agreements, but are often provided by a third party contracting directly with the project owner/developer or design-builder.

IV. Typical Contractual Structure for a Distributed Generation Solar Project. Given the multiple factors influencing the development of a distributed generation solar energy project, no single contractual structure applies to all projects. However, the following example of a contractual structure used for a particular project illustrates, in a limited way, how a project owner, its design-builder or general contractor and prime architect, and a solar equipment supplier might address certain common concerns.

In this example, a project owner wants to install a PV system on its building to provide a portion of its electrical needs. The owner wants to have the same entity design, install, test, and commission the system, as well as construct the electrical interconnection facilities and ensure a minimum yearly electrical output. The owner also wants to make sure it can enforce any warranties provided by third-party subcontractors and suppliers of materials and equipment, and wants liquidated damages for any delays that might affect its business or ability to claim tax credits for the system under state and federal tax codes.

The project owner and the solar contractor enter into a solar installation agreement whereby the contractor agrees to design, install, test, and commission an 870-kW PV system, including necessary interconnection facilities, on the owner's property.

Under the agreement, the owner has the right to review all subcontracts for equipment and design and installation services entered into by the contractor, and any such subcontracts are required to contain certain provisions for the benefit of the owner. The agreement also provides for delay liquidated damages, whether or not federal tax credits are lost due to the delay. Finally, due to the electrical integration element of such a project, the agreement provides that final completion (whereby final payment is due to the contractor) is conditioned on approval of the project by the local utility and receipt of all appropriate electrical inspection certificates.

The slate of issues that the parties address in the installation agreement includes the scope of work, inspections and testing, liens, measures of completion, rebates and subsidies, system and work warranty obligations, coordination of activities, permitting reports, title and risk of loss, energy guarantees, and limitations of liability.

A. Scope of Work. In the example above, the parties placed great emphasis on the description of the scope of work set forth in the installation agreement. In general, except in true turnkey projects based solely on performance specifications, the parties' scope-of-work provisions should describe, in detail, the actual design, engineering, and construction obligations of the contracting parties, as well as their coordination with other

service providers on the project. The scope of work should incorporate the system's performance and design specifications by reference to either an attached annex or a specific set of separately prepared plans and specifications. Generally, whatever is not provided for in the contractor's scope of work is the project owner's responsibility to complete or to contract with third parties to complete. A solar energy system contractor's scope of work typically includes the design and engineering of the system, including its principal parts and components, as well as certain obligations relating to commissioning and performance testing of the major components of the system, and related warranty work. The contractor's scope of work may include providing operations and maintenance services for a set number of years after completion of the system. These services may also be the subject of a separate agreement. As with other aspects of such an agreement, the scope-of-work provisions will probably be heavily negotiated. Care must be taken to coordinate the scope of services being provided by the contractor with the scope and timing of services being provided by third parties on the project to minimize conflicts or gaps.

B. Measures of Completion and Start-up Obligations. The scope-of-work provisions of the relevant agreements typically determine who will be responsible for facility start-up and commissioning and when and how such activities will be accomplished. Given a solar system supplier's in-depth knowledge of its products, the supplier (or its design subcontractor) will, at a minimum, supervise system start-up and may also be engaged to commission and optimize the products and systems it supplies. However, this work can also be undertaken by the project owner/developer (with assistance from the supplier) or by a third party contracting directly with the project owner/developer. In any case, the relevant agreements must address the stages of completion, such as actual delivery of the equipment to the project site, followed by erection, installation, start-up, and testing. Once these progress milestones are established, completion is generally evidenced by certifications of, for example, "substantial completion" (or "commercial operations"), "final 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- and construction-related agreements, progress payments by the project owner/developer to the supplier/contractor (as set forth in the relevant agreement) will be based, in part, on the milestones described above. For instance, the owner/developer typically pays a certain amount toward the agreed-on contract price when the order for major equipment is submitted and then makes additional payments upon (1) the delivery of the major equipment to the project site, (2) the erection or installation of the equipment, (3) successful testing of the control and monitoring system, and (assuming the foregoing stages are executed properly) (4) the final sign-off by the parties on the project. The payment schedule can also be based on monthly applications for payment based on expenses and labor incurred in the foregoing period, with a percentage holdback (for possible repairs, claims, or liens) to be released at the time of final sign-off. Or the parties can negotiate milestones that suit the project or their desire or ability to manage certain specific risks.

C. Warranty Obligations and Performance Guarantees. Warranty obligations and performance guarantees are likely to be an issue of substantial negotiation between parties to solar energy system supply and balance of plant agreements. The nature and scope of such warranties will, however, depend on what services, materials, and equipment the party is contracted to provide. An equipment supplier's warranties 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 solar energy system or related facility), a power curve warranty (this refers to the measurement of a solar equipment component's power performance), and related matters. For a contractor providing only installation services and materials, the warranties are generally limited in scope relative to those of an equipment supplier, but would still include warranties relating to parts and materials used in installation and any engineering services provided. If both equipment and installation services are provided by the same contractor, or through subcontractors, it is

important to ensure that the owner/developer has the right to assert direct claims under warranties provided by third parties. It is also important to specify with a contracting party minimum terms that must be negotiated into third-party agreements.

The issues that contracting parties consider in respect of warranties include (1) the period or term of a particular warranty and whether the term can be extended (it is common for a supplier to offer certain extended warranty services for an agreed-on price), (2) the definition of a defect and a serial defect (important in projects in which solar energy equipment uses identical parts and components; serial defects are those that appear in multiple components), (3) limitations on warranty arising from acts of third parties such as operation and maintenance contractors or the system operator, and (4) the remedial measures a contractor may take to repair or cure any defect. Additionally, a project owner/developer may require that any third-party or subcontractor warranties that the supplier or contractor possesses in respect of any parts or components used in the system are "passed through" to the project owner/developer.

The issues that the parties consider relating to performance guarantees include (1) what are appropriate measurements of performance both for project components and for fully assembled systems, (2) when performance testing is to be done, under what external conditions, and by whom, (3) the consequences if performance testing is not successful (possibilities include allowing the relevant contract or to make repairs and charging damages measured by the degree to which the test was not successful), and (4) the extent to which the owner/developer has a right to the benefit of the supplier's improvements in technology.

D. Limitation of Liability. Like other contractors and vendors, solar project suppliers and contractors may seek to limit their liability to a project owner/developer. A common request is for a waiver of consequential, indirect, incidental, and special damages. Such clauses should be negotiated carefully because what qualifies as a "consequential" as opposed to a "direct" damage may be unclear. A contractor may also seek to limit its liability for late performance to liquidated damages of a certain value, usually an agreed-on percentage of the value of the relevant agreement, and may seek to establish an aggregate liability limit. The project owner/developer should consider bargaining for exclusions to such contractor liability limitations. For instance, the contractor could agree that its limitation of liability provision would not apply if the owner/developer were unable to satisfy its contractual commitments under a power purchase agreement or to obtain certain time-sensitive benefits or credits, such as a tax credit due to events in the contractor's control or a risk assumed by the contractor.

E. Solar Tax Credits. The economics of a solar energy system, and an overall project budget, often depends on obtaining certain benefits provided under state and federal law for renewable energy projects, including the federal solar tax credit ("STC") found in Internal Revenue Code section 48. The STC is a tax credit equal to 30 percent of the tax basis of any energy property, including certain solar energy equipment. This same equipment can qualify for greatly accelerated depreciation deductions that can be taken over five years using the double declining balance method. The property must be placed in service or substantial costs incur before December 31, 2010. States such as Oregon and California offer additional state tax credits applicable to the installation of solar energy equipment. The loss of the STC, or of similar state and federal benefits, can be very serious because the benefit, once lost, may never again apply to the project (unlike damages for failure to achieve an operational status for purposes of net metering, which would likely be limited to the actual period of delay), and thus could have long-term economic consequences. STC-related damages are usually the subject of much negotiation between the supplier or contractor and the owner/developer. Insurance coverage may be available for certain delay-related risks, including failure to qualify for an STC.

V. Other Issues.

A. Project Financing. A solar project owner/developer often requires some form of substantial debt financing or joint venture financing to pay for the design, engineering, procurement, construction, and initial operations of the project. Financial institutions and potential investors will demand the opportunity to review and comment on a project's design and engineering, procurement, and construction agreements (as well as related operations and maintenance and warranty agreements, if separate) before committing funds. Of special interest to prospective lenders and investors are the provisions in the agreements that provide the lender or investor with the ability to take over the project if the project owner/developer (the borrower) defaults, and the provisions that specify the extent and nature of any damages available to a project owner/developer from a contractor for late completion or failure of the project to generate expected amounts of power. Also, 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 owner/developer should be prepared to present a consistent and cogent set of project agreements to lenders and investors, and to listen to their suggestions for such agreements. Further, the owner/developer should be prepared for the possibility that lenders and 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 owner/developer's rights 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. Lenders will also want to know whether the various agreements are entered into on an "arm's-length" basis, meaning (among other things) that the terms and conditions of such agreements are based on typical commercial terms and standards.

B. Performance and Payment Guarantees. A project owner/developer should cause the various contractors to procure, for the benefit of the owner/developer, performance and payment bonds (or other guarantees) to secure the obligations of the various contractors (whether engineers, contractors, or other parties) to complete their work on time and in accordance with the requirements of their various agreements, and to protect against liens and claims from unpaid contractors and subcontractors. Typical guarantees are described below.

- *Performance Bond:* A performance bond is usually issued by a bank or bonding company, is selected or approved by the project owner/developer, and states an agreed-on "penal sum." This sum is payable upon the owner/developer's demand in the event that the contractor fails to perform its contractual obligations in a proper and timely manner. For instance, when the contractor defaults or cannot complete the project, the owner/developer may call on this bond to pay another contractor to complete the project. The owner/developer will want to reserve its other rights against a defaulting contractor in the event that the performance bond does not fully cover the owner/developer's costs of completing the project or associated with damages the owner/developer may owe to a third party as a result of any default by the owner/developer.

- *Payment Bond:* A payment bond is intended to ensure that if the contractor defaults on the project, its subcontractors and suppliers will be paid without the necessity of filing liens or other security interests against the project owner/developer's property. If a lien

claim is asserted, it may be "bonded-over" so that it attaches to the payment bond or other security instead of the property. Lenders, upon their review of the agreements, may demand or require payment bonds or other guarantees to enhance their security interests in the project. Methods of substituting bonds for lien claims vary from state to state, so careful attention to the laws of the project state is important.

The project owner/developer or the lenders may require other security from contractors, such as parent guarantees, standby letters of credit, and other forms of assurance. The contractors will seek ample opportunity to cure any default or delay, and will try to limit the project owner/developer's ability to call in performance or payment bonds or other security without clear proof of a failure of performance by the contractor. In turn, contractors may demand some form of reciprocal security issued by the owner/developer or its parent company, including parent guarantees, payment guarantees, and the like, particularly if the owner/developer's only substantial asset is the project itself.

C. Lien Release Issues. When the project owner/developer makes periodic payments to contractors (and thus also to subcontractors and suppliers), the owner/developer should obtain lien releases. A lien release will help protect the owner/developer from liens being filed on the project by subcontractors that have not been paid by the primary contractor. Such liens are undesirable because, once filed, they can delay or interfere with the project's financing or sale. They also generate litigation, in which a successful lien claimant is often entitled to recover its attorneys' fees in addition to the contractual amount due. 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, which would further interfere with the owner/developer's plans for the sale or refinancing of the project. Many financing agreements will also consider a lien a breach of the agreement.

D. Insurance and Indemnity Issues. A project owner/developer should obtain appropriate indemnities and insurance coverage from the various parties with which it contracts, and should require those parties to obtain similar protections from their subcontractors and material suppliers for the benefit of the owner/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 to the owner/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 (property insurance for the project improvements). Such policies should name the owner/developer and its financing parties as additional insureds and contain appropriate waivers of subrogation. Appropriate policy limits will vary with respect to the nature of the work being performed and the scope of the project. It is advisable for an owner/developer to consult with an insurance or risk management specialist to ensure that appropriate types and levels of coverage are obtained.

VI. Current Developments. As the industry has matured and market demands have accelerated because of public interest in climate change, greenhouse gas emissions, and energy efficiency, relative bargaining positions have changed significantly. A few short years ago, solar energy was prohibitively expensive technology for the average commercial developer and for all but the environmentally committed individual home builder. Now, with the combination of incentives, the influx of research and development aimed at making solar energy financially feasible in all markets (including potential third-party financing and solar energy system leasing programs), and robust expansion in solar energy technologies, the on-site solar energy market has expanded dramatically. Now creative and experienced developers are working with new players and creative strategies to implement on-site solar energy technologies in their developments—with great success.