TERRAWATT INITIATIVE

IRENA
International Renewable Energy Agency

A GUIDE TO

OPEN SOLAR CONTRACTS

Open Innovation

The Open Solar Contracts have been developed through collaborative engagement and co-operation among core global stakeholders, and every effort has been made to ensure that the Open Solar Contracts are user-friendly, straightforward and drawn from best practices.

The Open Solar Contracts are made available to the public at large under a Creative Commons Attribution-ShareAlike 3.0 IGO licence (https://creativecommons.org/licenses/by/3.0/igo/).

IRENA and TWI, as joint leaders of the Open Solar Contracts initiative, welcome and encourage suggestions, comments and queries from all users and stakeholders, particularly including governments, power purchasers, developers, financiers and contractors.

This guide is dedicated to version 1.0 of the Open Solar Contracts, available for review on the Open Solar Contracts website (www.opensolarcontracts.org), where feedback can be given.

Based on any applicable feedback, IRENA and TWI may occasionally issue revisions of the Open Solar Contracts templates and other related materials.

About IRENA

The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity.

www.irena.org

About TWI

Terrawatt Initiative (TWI) is a non-government organisation aiming to build the digital markets needed to scale up next-generation, affordable, clean energy systems, capable of delivering on the Paris Agreement and Sustainable Development Goals at a transformative pace. Along with rallying support from industry, it helps governments and financial institutions develop a shared methodology for renewables, enabling financial markets to allocate capital more efficiently.

terrawatt.org

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1. ABOUT THE INITIATIVE

The global energy system is in an irrevocable transition to a more sustainable future, with renewables playing a central role. Driven by policy and regulatory reforms and enabled by technological innovation, renewables have become increasingly competitive, representing the world's first-choice option for expanding and modernising a power system.

The decrease in the cost of solar power has been particularly remarkable. The global weighted average levelised cost of electricity (LCOE) for utility-scale solar photovoltaics (PV) fell an estimated 77% between 2010 and 2018.[1] Solar power can now compete head-on with non-renewable power generation. As a testament to this enhanced competitiveness, 95 gigawatts (GW) of new solar capacity came online in 2018 alone, contributing to a cumulative total of more than 485 GW installed globally.[2] As signalled by recent auctions, the learning rates remain high, and the economic case for solar power is expected to become even stronger.

These are encouraging signs of a global energy transformation that makes it possible to meet universal energy needs in an increasingly affordable, reliable and sustainable manner. The pace of this transformation, however, remains slow if the world is to achieve agreed-upon energy and climate objectives. The share of renewables in total final energy consumption has to increase six times faster to meet the climate goals set out in the Paris Agreement.[3] The share of electricity in total energy use must increase to almost 50% by 2050, up from 20% today.[4] This can only be possible with a system-wide approach to innovation, covering not only technology and system operation, but also market design and project development and finance. There is a need to rethink business-as-usual practices and to develop more simple and effective solutions to accelerate the renewables uptake.

The energy sector today has a legacy of predominantly large-scale and technically complex power generation projects. Due to their highly intricate transaction structures, these projects required customised and complex legal and financial solutions, which inevitably have been inherited by renewables. This has resulted in high transaction costs and prolonged project development timelines, hindering further capacity growth, particularly in small- to medium-scale renewable energy. Therefore, redesigning prevailing market practices in project development and finance has emerged as a pressing need, and reforming the overly complicated contractual framework should be a priority.

As a response, the International Renewable Energy Agency (IRENA) and Terawatt Initiative (TWI) undertook a joint effort to simplify and streamline the contractual framework for solar power. The Open Solar Contracts initiative aims to unlock greater investments globally. To achieve this, it provides standardised contract documentation that is freely available and designed to be universally applicable.

Backed by several top-tier law firms, the initiative aims to decrease transaction costs, shorten project development timelines and facilitate balanced risk allocation. It also should ease the due-diligence processes for financiers and pave the way for project aggregation and securitisation.

1 IRENA (2019a), Renewable power generation costs in 2018, International Renewable Energy Agency, Abu Dhabi.
2 IRENA (2019b), Renewable capacity statistics 2019, International Renewable Energy Agency, Abu Dhabi.
3 IRENA (2019c), Global energy transformation: A roadmap to 2050 (2019 edition), International Renewable Energy Agency, Abu Dhabi.
4 IRENA (2019c), Global energy transformation: A roadmap to 2050 (2019 edition), International Renewable Energy Agency, Abu Dhabi.

The Open Solar Contracts approach follows four main principles: simplicity, fairness, innovation and collaboration.

Simplicity means that contracts have a lean structure. They are based on clear assumptions, making them easy to understand and implement.

Fairness means balancing risk allocation. Investment risks are allocated among stakeholders in a fair and balanced manner. Based on a well-defined risk universe, each set of risks is allocated to the party best able to manage them in a cost-effective manner.

Innovation means applying new thinking to existing practices. This helps to identify smarter, more effective solutions to produce bankable contract documentation.

Collaboration places inclusivity at the core. The initiative aims to engage with multiple stakeholders and to balance various perspectives.

The Open Solar Contracts initiative offers six core contract types spanning different transactions in the solar power supply chain. These are:

1. Implementation Agreement
2. Power Purchase Agreement
3. Supply Agreement
4. Installation Agreement
5. Operation and Maintenance (O&M) Agreement
6. Financing Term Sheet

Work on the contracts can be supported by review of specific model clauses, in order to reduce complexity and deal with cross-cutting matters in a consistent manner. Such matters include:

1. Governing Law
3. Corruption and Sanction
2. Dispute Resolution
4. Force Majeure

The present guide to Open Solar Contracts presents the overall rationale and summarises key features of each contract type. This guide also defines the risk universe for a solar power project and explains how risks are allocated among stakeholders in a balanced manner.

The resulting package of contract templates offers a consistent legal documentation solution. The templates are intended to be used in conjunction with one another to ensure that the scope of work and risks are appropriately allocated.

IRENA and TWI are pleased to offer this simplified contract solution to the global solar power community. All stakeholders are invited to review the contracts and provide their feedback, which will help with continually improving the contract templates in line with market needs. Your suggestions, comments and queries are very welcome.

2. WHY SOLAR POWER REQUIRES DIFFERENT CONTRACTS

Solar power generation assets (SPGAs) are not comparable to conventional power generation assets since they are typically smaller in scale, highly modular and intrinsically less complex. They also have a front-loaded cost profile characterised by no fuel costs and limited operation and maintenance (O&M) expenditure. Yet, the prevailing practices for developing and financing SPGAs have been largely inherited from conventional power generation. This has led to high transaction costs and prolonged project timelines, hindering further capacity growth, particularly in small- to medium-scale solar PV. Therefore, the case-by-case approach has to evolve into an industrialised process.

The relative simplicity and replicability of solar PV systems presents a great opportunity to industrialise the transactional work. This could start with contractual standardisation, which has been proven effective in other sectors. By simplifying and standardising the contractual framework and thereby reducing negotiations to a limited number of key technical and financial terms, all parties involved in a transaction can save considerable time and money.

Contractual standardisation also enables the broad dissemination of best practices. By translating best practices into universally applicable templates, standardisation can disseminate market-tested solutions at the global scale. For instance, best practices in risk allocation, when replicated more broadly, can avoid cases where the risks are not allocated to the parties that are best able to manage them and hence the risks are overpriced (i.e., priced as if they are more probable or severe than they actually are).

As a response to the need to simplify and standardise the contractual framework for SPGAs, IRENA and TWI launched a multi-stakeholder initiative supported by top-tier law firms. The Open Solar Contracts initiative provides a comprehensive and open-source contractual documentation solution. The objective is to achieve the lowest-possible costs for solar PV, not only by providing simplified processes (leading to lower transaction costs), but also by proposing new substantial approaches (for example, a split approach to the conventional engineering, procurement and construction (EPC) contract structure).

The contract templates were developed through a collaborative and consultative process. The initiative has benefited from input from different stakeholders including top-tier law firms, lenders, developers and contractors using tried-and-tested principles in order to achieve a simple, high-quality and user-friendly solution for SPGAs. This document explains the thought processes that led to certain choices of structure and drafting. This is intended to provide some guidance to reviewers and end-users.

3. ABOUT THE TEMPLATES

The Open Solar Contracts require minimal amendments when they are applied for a particular project in a particular jurisdiction. Each contract template comprises:

- general terms and conditions in the main body of the agreement, which are anticipated to be acceptable in all jurisdictions where solar PV projects are to be undertaken, as well as
- a Key Information Table and a number of schedules to the agreement where project-specific and jurisdiction-specific details may be included, as well as footnotes highlighting instances where particular consideration needs to be given to particular clauses to ensure that such clauses are suitable for the specific project circumstances and jurisdiction.

The Open Solar Contracts are "neutral" as far as legal systems are concerned and can easily be used in a large number of jurisdictions. Even so, the choice of law remains an important question, for which legal advice should be sought.

In practice, some provisions may need to be tailored to the commercial specifics of a given transaction. However, one of the primary benefits of the Open Solar Contracts is that they are straightforward, include clear assumptions, use succinct language and are therefore easy to understand. The documents also include, when necessary, the appropriate options to fit most circumstances. By providing a set of standardised documents, the initiative not only assists in maintaining document consistency in the industry, but also decreases the number of issues to be negotiated. All this can help to reduce the overall cost and time required for developing and financing SPGAs.

The Open Solar Contracts provide innovative solutions in a number of respects. For example, the EPC contracting structure is split into two, whereas the project finance market ordinarily would see wrapped contracting structures. This eliminates the risk premium / margin pilling, thereby decreasing overall costs.

The Open Solar Contracts also are innovative in that a number of ordinarily heavily negotiated provisions, which generally are inconsistent in various project documents, have now been either made consistent throughout all the Open Solar Contracts (i.e., confidentiality provisions, force majeure provisions, anti-bribery and corruption provisions, dispute resolution mechanisms, and the representations and warranties) or made "back-to-back". This not only is likely to save time and effort, but also should boost efficiency and innovation as the contracting parties have to focus only on the actual project-specific issues.

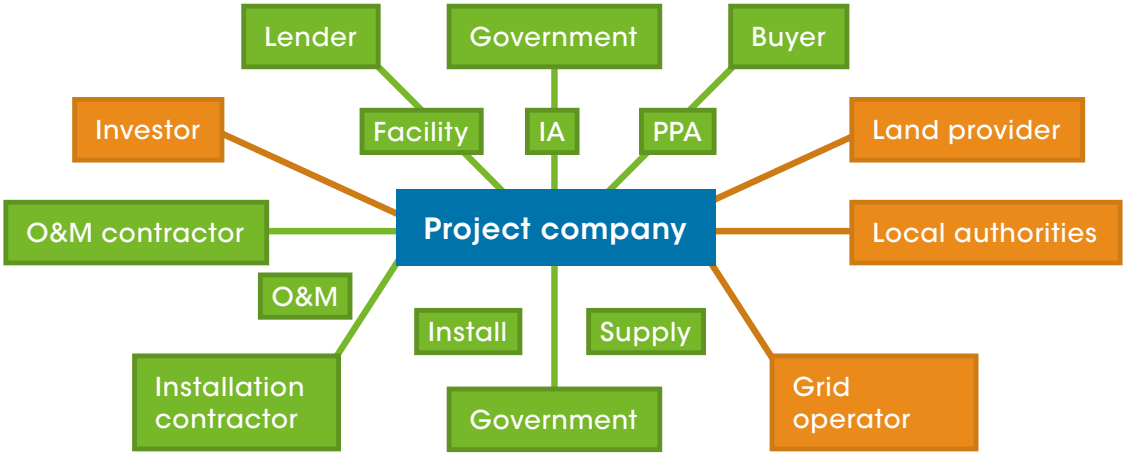
3.1 GENERAL STRUCTURE

The typical contractual structure for SPGAs connects contractually the government, the buyer (i.e., the offtaker), the project company, the investors (i.e., shareholders of the project company), the contractors and the lenders.

The Open Solar Contracts initiative provides an integrated suite of documents for structuring SPGAs worldwide. The set of templates includes:

- an Implementation Agreement between the government and the project company (and its shareholders);
- a Power Purchase Agreement (or PPA) between the project company and the buyer;
- a Supply Agreement between the project company and the supplier;
- an Installation Agreement between the project company and the installation contractor;
- an Operation and Maintenance (O&M) Agreement between the project company and the O&M contractor; and
- a Financing Term Sheet between the project company and the lenders.

Figure 1. Contractual structure and parties

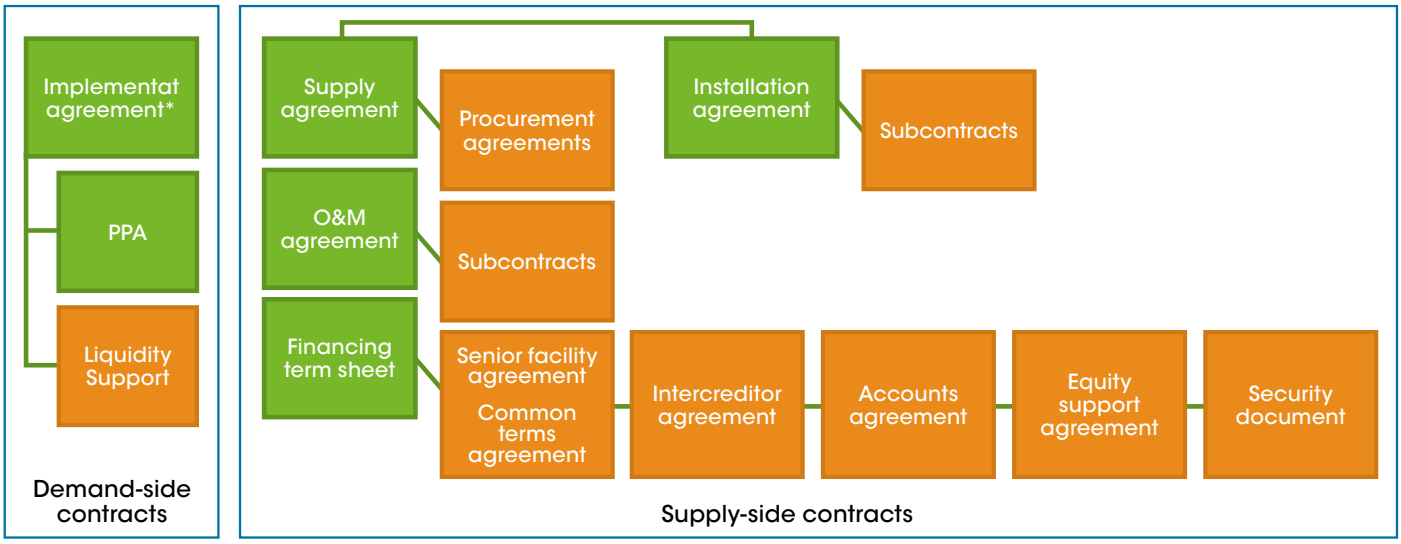


At this point, the Open Solar Contracts do not include a template governing project development, which is directly linked to authorisation regulations, land arrangements, and corporate and equity documentation, which are jurisdiction specific.

The Open Solar Contracts cover the key documentation on both the demand side and the supply side. They will help:

- governments to better structure their demand and obtain the best financial terms for the supply of solar power, and
- developers to structure key contractual relationships for equipment and service supply and debt financing, and to reduce transaction time and cost.

Figure 2. Demand- and supply-side contracts



Developing, financing, installing and operating SPGAs requires the co-operation of numerous participants, the relations among which are essentially based on contracts. The Open Solar Contracts were prepared with the objective of achieving a balanced risk allocation among the stakeholders in a manner that would be acceptable to the market. Collectively, the approach should lead to a more efficient, fluid and cost-effective contractual negotiation and performance.

The Open Solar Contracts are prepared to be used in conjunction with one another in order to, among other things, facilitate interface among the various contracting parties and ensure that the scope of work and risk is appropriately allocated. Users should treat the Open Solar Contracts as a package, and not piecemeal, as the different contracts are drafted with particular assumptions in mind and are designed to be used together. If used separately, there may be risks/issues that are not properly addressed. For instance, the Implementation Agreement and the PPA are co-terminous, and the Supply Agreement, the Installation Agreement and the O&M Agreement can be terminated in case of termination of other project agreements. Accordingly, the parties must consider whether amendments to one of the agreements in the suite necessitate consequential amendments in the other Open Solar Contracts. Parties should seek legal advice on this question.

In cases where the contractual package cannot be used as a whole, the Open Solar Contracts still can be used as a reference/benchmark; the users, however, should seek legal advice in doing so.

Beyond the purely legal dimension of the Open Solar Contracts, it is important to keep in mind that mutual understanding and trust among all parties is a key factor in the success of a project and is decisive in cost-saving and massive deployment of SPGAs. Even if the developer is a party to none of the Open Solar Contracts, its role is central as the actual conductor of the project, and as such the developer is responsible for ensuring strong co-operation and co-ordination among the project participants.

All participants should share as much information as possible with each other. The Open Solar Contracts include numerous provisions relating to information and reporting. Developers and all other participants must organise themselves to improve their communication.

3.2 ASSUMPTIONS

The Open Solar Contracts have been designed in a context that includes some or all of the following:

- Clear public policies exist for large-scale deployment of SPGAs at the national or regional level.
- A regulatory framework is absent or limited, requiring broad government support and consequently a broad-scope Implementation Agreement (the more the framework is implemented as law, the narrower the scope of the Implementation Agreement).
- SPGAs are developed on a build-own-operate (BOO) basis. This is one of the most common structures for SPGAs and one of the most efficient for achieving a lower LCOE for solar in a favourable framework. The Open Solar Contracts also can be applied (with limited amendments) to BOTs (build-operate-transfer) and BOOTs (build-own-operate-transfer), which would need to be structured in a way that is consistent with the Open Solar Contracts and require specific legal advice.
- The SPGA is legally built, owned and operated by a special purpose vehicle, the project company.
- The project company's cash flows result from a long-term PPA, which is allocated through an open and transparent process (competitive or administrative).
- The project company exists and is the bidder or applicant in the power purchase allocation process.
- The PPA is a "take or pay" type.
- Products and services generated by the SPGA – such as system services (for example, reactive power, balancing, capacity, frequency regulation, storage, demand-side management) as well as green rights or credits (for example, tax credits, carbon offsets, green certificates) – are not included in the scope of the Open Solar Contracts; they are either regulated or traded on a merchant basis).
- The buyer is a public or publicly owned entity/utility, but it also can be any kind of offtaker authorised by the government (in order to benefit from government support through the Implementation Agreement).
- SPGAs are grid connected, but the Open Solar Contracts can be adapted to off-grid and micro-grid projects provided that there is a buyer under a long-term PPA. Other business models probably will require a very different architecture where only part of the Open Solar Contracts could be used (for instance, in a community-owned SPGA, the Supply Agreement, Installation Agreement and O&M Agreement could be used, but the sale of electricity, the development process, the financing and the government support probably will be much different).
- Grid infrastructure to the SPGA (as applicable) is the responsibility of the government or its agent.

- Grid connection arrangements (as applicable) are in place.
- The government provides, or procures the provision of, the site together with all necessary rights of way, easements and other rights to enable the project company to carry out the project.
- Development is completed.
- The data room is organised, structured and complete.
- The project company is project financed but also can be fully equity financed (in this case, the Financing Term Sheet is not necessary).
- The project company is a limited liability company.

3.3 KEY PROVISIONS

Sale and purchase option mechanism (early termination procedure)

The sale and purchase option mechanism embedded in the Implementation Agreement is the cornerstone of the Open Solar Contracts and ultimately allocates the key risks of the SPGA in a simple and fair manner:

- The government assumes political, force majeure and offtake risks by buying back the SPGA.
- The investors (and the developer) assume all technical risks (but mitigate them with their contractors) and other force majeure risks within the limits of their investment but are protected from political risks, enabling a substantial reduction of the expected internal rates of return.
- The government can always take back control of the SPGA in case of project company default.
- Lenders are always protected, enabling a substantial reduction in the cost of debt.

Finally, to completely secure the scheme, a guarantee of the government's payment obligation should be put in place under the sale and purchase option mechanism.

The key purpose of the sale and purchase option mechanism is to allocate political risks – and to a lesser extent other force majeure risks – to the government. A traditional administrative approach would leave all risks relating to the project to the other partners.

Early termination events, as well as parties' respective rights to terminate and exercise their call/put options along with the purchase price formulation, are presented in the table below.

Table 1. Early termination procedure

Implementation Agreement	Government's right to terminate	Project company's right to terminate	Government call option	Project company (or shareholder) put option	Purchase price
Project company event of default	**Yes**	**No**	**Yes**	**No**	Outstanding debt **+** Termination costs **–** Outstanding shareholder commitments **–** Relevant insurance proceeds
Government event of default – non expropriation (before COD* or deemed COD)	**No**	**Yes**	**No**	**Yes**	Outstanding debt **+** Shareholder contribution outstanding **+** Termination costs **–** Relevant insurance proceeds
Government event of default – non expropriation (after COD or deemed COD)	**No**	**Yes**	**No**	**Yes**	Outstanding debt **+** Shareholder contribution outstanding **+** Equity return **+** Termination costs **–** Relevant insurance proceeds
Government event of default – expropriation	**No**	**Yes** (project company or shareholder)	**No**	**Yes** (shareholder)	Outstanding debt **+** Shareholder contribution outstanding **+** Equity return **+** Termination costs **–** Relevant insurance proceeds **–** Other expropriation proceeds
Prolonged governmental force majeure event	**No**	**Yes**	**No**	**Yes**	Outstanding debt **+** Termination costs **+** Shareholder contribution outstanding **+** Equity return **–** Relevant insurance proceeds
Prolonged other force majeure event	**Yes**	**Yes**	**No**	**Yes**	Outstanding debt **+** Termination costs **–** Relevant insurance proceeds

* COD = commercial operation date

Users should note the following:

- Except in the case of early termination due to a project company event of default, the outstanding debt is always included in the project asset valuation method, enabling its repayment.
- In case of termination due to prolonged force majeure, only the project company benefits from a put option on the project assets.
- The valuation of the project assets is the same in the cases of a government event of default and of governmental force majeure (after the commercial operation date).
- Termination costs include the costs resulting from consecutive termination of other project agreements, in particular the Supply Agreement, the Installation Agreement and/or the O&M Agreement; hence it is important for the parties and in particular for the government that the entire suite of Open Solar Contracts is used in the contracting process.

Force majeure

The Open Solar Contracts include a consistent approach to force majeure events.

The affected party will be excused from performing its obligations to the extent that this performance is impeded or prevented due to a force majeure event, and it will not be liable for the non-performance of these obligations during the period of force majeure.[5] The affected party must, however, continue to perform all of its obligations under the agreement that are not affected by a force majeure event.

In circumstances where a governmental force majeure event prevents the project company's performance, the buyer will be liable for deemed energy payments under the PPA.

In the Implementation Agreement and in the PPA, force majeure is divided into governmental force majeure and "other" force majeure, which, if prolonged, leads to termination of the PPA and of the Implementation Agreement and triggers put and call options with different valuation methods under the sale and purchase option mechanism.

5 Termination for prolonged force majeure and extension of time is to be included in the relevant documents.

Change in law and economic stabilisation

The initiative makes a distinction between two types of change in law: frustrating change in law that prevents performance of the contracts, and change in law that impacts the economics of the contracts. Frustrating change in law is a governmental force majeure that can, if prolonged, lead to early termination and to a fair valuation of the project assets, including indemnification of the equity return.

In all other cases, the Open Solar Contracts contain provisions allowing (beyond de minimis) a modification of their financial terms in order to restore the initial equilibrium. This enables the government to change the law and to guarantee the initial economic equilibrium. This mechanism contributes, in the private parties' risk matrix, to reducing the probability of revenue volatility and is a strong factor in reducing the LCOE.

Effectiveness and commencement

The Open Solar Contracts provide a consistent effectiveness and commencement scheme based on the Implementation Agreement.

The root contract is the Implementation Agreement, whereby the government gives to the project company the concessionary right to develop, build and operate the SPGA and secures the buyer to purchase the power from the project company under the PPA.

The initiative assumes that the templates for both of these contracts are part of the process for selecting the project company. The stage of development of the project at the time of the awarding will depend on the requirements of the selection process. The more developed the project needs to be, the more at risk the developer is before the award, which can impact the LCOE.

During the second phase of development, between execution of the Implementation Agreement and the PPA and the financial close, the project company will gather all the conditions precedent, in particular the execution of all the other project agreements, before the condition precedent long-stop date. The initiative discussed at length the need to provide for delay liquidated damages for this part of the development process and considered that this was not necessary and would be detrimental to the LCOE. This is because, at this stage, fast development is the result of a joint effort of the project company and the government, as reflected in the Implementation Agreement, which consequently does not provide liquidated damages.

The choice of the condition precedent long-stop date by the government will be essential. The government should provide for a reasonable delay to enable the project company to reach financial close in good conditions. This delay will depend both on the quality of the developer and on the effectiveness of the regulatory framework. This is why governments should put in place tools to measure and eventually improve their (development) regulatory framework and not just their selection process. This is to accelerate the development process and above all to make it predictable.

The obligations of the project company to build and operate the SPGA under the Implementation Agreement and the PPA, as well as the effectiveness of all the other project agreements, need to be subject to financial close. The financing documentation as reflected in the Financing Term Sheet needs to provide that all conditions precedent to all other project documents are satisfied except for the financial close condition precedent.

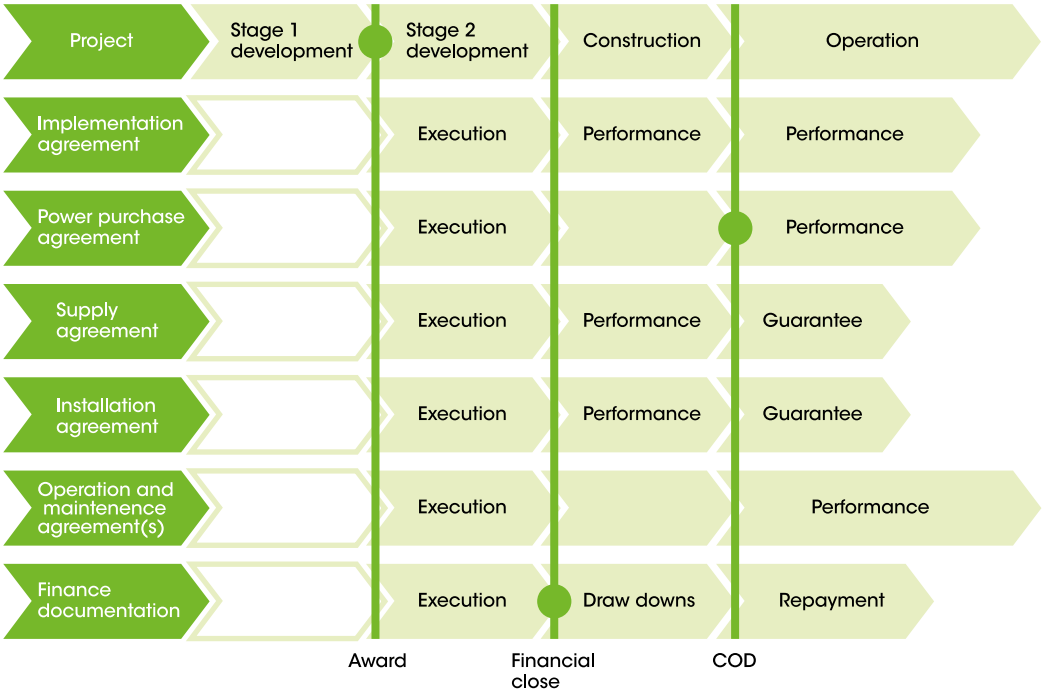
At financial close, the Supply Agreement and the Installation Agreement become effective, and the project company has an obligation to build and commission the facility (and the meter). The initiative discussed the need for liquidated damages at this stage and, unlike in the development stage prior to financial close, determined that providing for reasonable liquidated damages was good business practice.

If the commercial operation date (or deemed commercial operation date, if any) does not occur prior to the scheduled commercial operation date, liquidated damages will be payable by the project company to the buyer at the delay liquidated damages rate for each day that the commercial operation date is delayed beyond such date. The liquidated damages rate and the liquidated damages cap should take into account the economy of an SPGA project (margins are not comparable to oil and gas projects) as well as the nature of the project (there are very limited technical issues for supply and installation).

Financial close also will trigger the commencement date of the Supply Agreement and the Installation Agreement. Both contracts provide for delay liquidated damages, but with different milestones. The supplier is committed to delivering the supply work by a certain date to enable the installation contractor to install and commission the facility at a later date. These delay liquidated damages should be kept reasonable and be set as a function of the delay liquidated damages incurred by the project company under the PPA.

The commercial operation date will trigger commencement of the O&M Agreement.

Figure 3. Project phases



Defect and warranties

One of the key risks to be effectively allocated is the technology risk – in other words, the ability of the facility to generate the necessary quantity of power.

In a "take or pay" PPA, the project company does not commit to selling a minimum amount of power, and the buyer will purchase all power that is generated by the facility. Considering the (solar) resource conditions, there is a correlation (on a multi-year basis) between the installed capacity and the quantity of power that can be expected to be produced by the project company and purchased by the buyer.

The government and the buyer are not exposed to the technology risk, except for planning or procurement issues that need to be considered but that can be mitigated by simple measures. The PPA outlines a minimum capacity to be achieved by the commercial operation date, and there is no obligation for the buyer to purchase electricity in excess of the contracted capacity (although, considering the way capacity is measured, electricity resulting from excess capacity is difficult to identify).

Lenders are mainly exposed to the technology risk because they have no other source of cash to be repaid than that resulting from the power generation of the facility over the tenure of the loan, which can extend 15 years and more.

The expected generation is the result of the following:

Generation (kilowatt-hours (kWh)/year)
= Solar panel area (m^2) x Solar radiation ($kWh/m^2.year$)
x Solar panel efficiency x Performance ratio (excl. technical availability)
x Technical availability

The lender will make all necessary due diligence to ensure that these parameters are as certain as possible, over the tenure of the loan.

The Open Solar Contracts provide a consistent defect and warranties scheme.

Capacity and performance are the key characteristics of the facility and are the responsibility of the supplier, subject to the damages caused by the installation contractor, the project company and third parties.

The capacity can be measured at commissioning, but the performance ratio can only be measured over time. The key issue of the contracts is to enable an economic adaptation to the actual capacity and the actual performance ratio in a manner that remains in line with financial terms.

This is why the Supply Agreement provides:

- capacity and performance ratio warranties
- limited defect warranty and
- pass-through of the main equipment guarantees supplied by the supplier.

The Installation Agreement only provides:

- pass-through of the main equipment guarantees supplied by the installation contractor.

Finally, the initiative discussed the scope of warranties of the O&M contractor and decided that the O&M contractor could be liable only for the technical availability and not for the performance ratio, which is intrinsically linked to the electricity generation plant supplied (with the exception of module cleaning).

Sanctions

The initiative initially intended to include sanction language in the documentation. After informal external consultation, the sanction language was removed from the Implementation Agreement and the PPA. The initiative will be attentive to overall market opinion on this issue.

Anti-corruption

The initiative initially intended to include international anti-corruption language as a means to implement extra-territorial anti-corruption laws. After informal external consultation, it appeared that most countries have their own anti-corruption legislation, which generally would be a sufficient reference. The initiative will be attentive to overall market opinion on this issue.

Transfer of title

The supply and the installation provide general transfer of title rules considering their specific scope and timeline. However, these rules should be adapted (to the extent of applicable law) to securities taken by the lenders on the works and equipment, and legal advice is required based on jurisdiction/technology specifics.

Insurance

The insurance scheme is one of the key points in the structuring of an SPGA, at both the project and operation phases. The Open Solar Contracts provide for a standard insurance package, but national regulations can have a very significant impact on the scheme to be implemented, with high cost consequences. The standardisation of insurance schemes is a key factor of bankability and risk management cost mitigation. An industry-led initiative is needed to achieve these aims.

Governing law and dispute resolution

To reduce complexity and to allow for joinder of related disputes, the Open Solar Contracts all incorporate the same dispute resolution mechanism – that is, arbitration under International Criminal Court rules in one of the established international arbitration jurisdictions (Amman, Dubai, Geneva, The Hague, Hong Kong, London, Mauritius, Miami, New York, Paris, Singapore, Stockholm, Vienna and Zurich).

Dispute resolution through arbitration is also proposed for the main finance documents, where it is less customary. Besides reducing the risk of conflicting decisions on the same subject matter, arbitral awards benefit from the almost universal enforcement regime of the 1958 New York Convention, which typically outweighs the advantages of court proceedings for projects in jurisdictions outside the Organisation for Economic Co-operation and Development (OECD).

In the interest of efficient dispute resolution, the Open Solar Contracts also provide for expert determination and, where customary, mandatory discussion with senior managers and optional mediation.

No equivalent project relief

In public-private partnerships, the "subcontracts" between the project company and its contractors commonly include equivalent project relief (EPR) clauses. The purpose of these is to limit the exposure of the project company to contractors' claims (especially at the end of construction), regarding what the project company could itself claim (and obtain from the buyer and/or the government) if the concept is applied to our defined terms. Extended to all claims and/or to "pay when paid" concepts, such clauses would raise serious questions of enforceability in a number of jurisdictions.

The purpose of EPR clauses is to avoid or at least limit the cash risk to the project company, which is a newly created special purpose vehicle with no recourse beyond its initial equity and its debt. Admittedly, when the contractor is likely to finalise its claim (around the end of construction), the project company will be cash neutral (debt and equity having been depleted to pay all project costs) and unable to pay any further debt. Yet, as in any sound business model, such situations are only temporary, as cash generation will start at that time. From that time, the project company will be able to set aside a portion of those revenues to pay (or at least start paying) amounts due to its contractor under the claims, and, at the end of the day, EPR clauses essentially protect the investors.

The Supply Agreement and Installation Agreement (and to a lesser extent the O&M Agreement) delineate the responsibilities between the contractors and the project company. If the delineation leaves no responsibilities to the project company, and if all obligations under the project agreements (including the PPA, the Implementation Agreement, land rights agreements, grid connection agreement, etc.) are passed through to both the Supply Agreement and the Installation Agreement (as applicable), remedies available under these contracts could be limited to what may be recovered by the project company under the project agreements.

Including an EPR clause would be economically detrimental overall. The margins and the potential litigation costs that such a clause would imply would affect the LCOE to an extent that is not consistent with the risks. The risk of cost overruns is very limited in an SPGA project and is managed through:

- a lump-sum price in the Supply Agreement (no cost overrun possible for the supply of the PV system, which is by far the largest share of the capital expenditure);
- a lump-sum price in the Installation Agreement, with very limited cost overrun potential in the agreement due to the simplicity of the work (provided that a good site survey was done);
- potential extra capital expenditure resulting from a change in law being covered by appropriate mechanisms and economic stabilisation provisions.

Debt financiers' rights

Non-recourse lenders need step-in rights in relation to the project company and all contracts it may enter into, in order to benefit from the same rights but also to avoid the risk of termination of such contract without the possibility of avoiding a detrimental termination. This is usually done by way of direct agreements with the counterparts of the project company. The Open Solar Contracts integrate upfront the need for direct agreements and provide an obligation for the various counterparts to enter into such agreement.

3.4 DEMAND-SIDE CONTRACTS

Implementation Agreement

In many cases, the absence or insufficiency of a legal framework adapted to SPGAs makes it necessary to set up an Implementation Agreement between the power producer and the government of the country where the project is to take place. The economic purpose of this contract is to establish, in a conventional form, the minimum legal framework necessary to carry out a particular project. However, the focus should be on setting up a solid legal and regulatory framework for renewable energy, and the Implementation Agreement should be treated only as a temporary solution.

Purpose

The main purpose of the Implementation Agreement is to set out the details of the basic government support to be given to solar projects in all jurisdictions, to facilitate the development and continued operation and maintenance of solar PV projects. The Implementation Agreement includes both "hard" and "soft" government support, with a focus on appropriate de-risking of the development of solar PV projects and decreasing the cost of development in accordance with the general aims of the Open Solar Contracts initiative.

In the context of the initiative, the Implementation Agreement and the PPA should be seen as constituting a proposal for structuring the legal framework on the demand side. It assumes a high level of co-operation between the government and the electricity buyer. The initiative postulates that procuring entities are public entities controlled by the government. However, for greater flexibility, it may be possible to consider that these may be private entities approved by the government.

The Implementation Agreement and the PPA together constitute the contractual "package" offered to power producers as part of the PPA allocation processes.

Substantial reduction in the LCOE will result from better risk knowledge, understanding and management. There are two important ways to accelerate such a decrease. The first is to build the knowledge and capacity of all participants in the project, especially for projects in developing and emerging countries, where risks may be overestimated (and hence overpriced) by foreign players due to a lack of or limited understanding of local contexts. Second, actual performance data, both technical and financial, should be largely shared (subject to appropriate anonymisation and trade secret protection rules) so as to benefit from the largest possible performance database, which will be key to financial and risk modelling.

These two matters should be part of the government policy and represent a clearly defined counter-party to the government support. Reducing information asymmetries between the public and private parties and enhancing market transparency would serve to lower higher-than-actual risk perceptions.

Structure

The Implementation Agreement is the root contract whereby the government concessions to the project company the right to develop, build and operate the SPGA and procures the buyer to purchase the power from the project company under the PPA.

The parties to the Implementation Agreement include the investors (i.e., shareholders of the project company). The initiative assumes a single shareholder in order to avoid managing split payments of the project company to ensure that, in an expropriation of shares scenario, there is someone to whom relevant payments can be made.

The main body of the agreement sets out the basic principles and support arrangements that generally will be available in all jurisdictions where SPGAs are to be undertaken. It is not intended to be an all-encompassing document that includes the needs of every jurisdiction. Instead, a number of schedules to the Implementation Agreement are provided, where jurisdiction-specific and project-specific details may be included.

The Implementation Agreement template also includes footnotes highlighting instances where particular consideration needs to be given to particular clauses to ensure that such clauses are suitable for the specific project circumstances and jurisdiction.

Power Purchase Agreement (PPA)

Purpose

The PPA governs the relationship between the buyer and the project company. It is an agreement that secures the revenue generation of the project's business plan by defining the terms and conditions for selling a specific amount of electricity generated by the SPGA for a specified period of time. The Open Solar Contracts are drafted on the assumption that the buyer is a national or local government-owned or government-controlled utility (but this also can be extended to private buyers authorised by the government). Furthermore, the offtake is assumed to be guaranteed in some form. Should offtake not be guaranteed by an acceptable counter-party, the risk allocation contemplated in the Open Solar Contracts PPA template will not be acceptable, in which case a more traditional PPA will be required.

PPAs are appropriate when a project developer is looking to:

- guarantee the projected revenues of the project and agree on the purchased quantities and price paid required to make the project viable,
- shield the project from less-expensive or subsidised domestic or international competition and
- reduce the volatility of energy costs of a given buyer by providing a fixed price during a determined period.

Structure

The PPA defines important parameters between the project company (as seller) and the buyer. The PPA is drafted as an exclusive supply agreement between the project company and the buyer on a take or pay basis. "Deemed energy payments" will be payable by the buyer if at any time the seller has the ability to produce power but the buyer is unable to or does not take such power.

In the past, many PPAs contained provisions that were not part of the act of buying and selling electricity, but rather were part of the Implementation Agreement or even regulation.

The initiative considered a power purchase and sale transaction between the project company that acts as an independent power producer (IPP) and a buyer (generally a utility) that is assumed to have or be able to procure power management capability to take all the electricity produced, as it is produced. This type of take or pay contract is by far the simplest and also achieves the lowest power price per unit, since the project company takes no risk of non-sales of its production (outside the contractually agreed curtailments). The parties (the buyer in particular) must understand that any risk of non-sale is, from an economic point of view, considered to be a certainty by the project company, and its cost is directly integrated into the price offered.

The initiative focused on more-rationally redistributing the rights and obligations of the parties between the Implementation Agreement, the PPA and regulation.

For instance, the decommissioning provisions, which often appear in the PPA and/or in the Implementation Agreement, should be dealt with via regulation rather than through any of these agreements because their duration may be shorter than the life of the asset. However, apart from the case where the buyer or the government take back the asset at the end of the PPA at its market value, there is often still a residual economic value which – if considered by the investor from the beginning in its return on equity – will allow a reduction of the bid price (assuming that the regulation allows the project entity to sell electricity freely at the end of the PPA).

The government and the buyer therefore would have no interest in forcing the project company to dismantle the SPGA at the end of the PPA before the end of the asset's life. However, after the term of the Implementation Agreement and the PPA, there is no longer any contractual leverage to force decommissioning, dismantling and recycling. This is therefore an effective regulation that is needed.

The initiative considered the effectiveness of late penalties in PPAs. Traditionally, the fixed date of commissioning of the production facility marks the beginning of the purchase of electricity. Compliance with this date is accompanied by penalties that can be very high. The risk of penalty is embedded in the margins of manufacturers and in the return of the investor (and makes for a more complex and therefore more expensive funding structure). The initiative questioned the relevance of these penalties for SPGAs 1) whose unit size is such that the delay in commissioning does not pose a priori a major supply problem, 2) for which one of the main causes of delay (except "other" force majeure) is the customs clearance of imported equipment that does not depend on the project company or its agents, and 3) for which the installation of the equipment is a simple operation that can be carried out in a few weeks.

It appeared that the benefit for the buyer and the government of the penalty clause was much lower than its cost, since the uncertain risk, which essentially depends on the government itself, was integrated in the margins. However, the initiative also considered the risk for the buyer, and for the government, to avoid opportunism on the project company side. This is why the initiative finally prescribed that if the commercial operation date (or the deemed commercial operation date, if any) does not occur prior to the scheduled commercial operation date, then the project company will pay liquidated damages to the buyer at the delay liquidated damages rate for each day that the commercial operation date is delayed beyond such date. The liquidated damages rate and the liquidated damages cap should be reasonable and take into account the economy of a SPGA project (margins are not comparable to oil and gas projects) as well as the nature of the project (there are very limited technical issues for supply and installation). Any form of punitive liquidated damages would be detrimental to the LCOE.

This is all the more reason that a commercial operation long-stop date should also be provided for. If commissioning is not achieved by the specified long-stop date, this will trigger a project company event of default, which enables the buyer to terminate the PPA and consequently trigger the termination of the Implementation Agreement for the project company default. This opens the option for the government to take over the project and eventually to entrust a third party to finalise the project.

3.5 SUPPLY-SIDE CONTRACTS

Split contracts EPC

The Open Solar Contracts are drafted on the assumption that there will be a split engineering, procurement and construction (EPC) arrangement rather than a single turnkey arrangement. The primary reason for proposing the split contracting structure is to further the objective of decreasing procurement costs.

One of the major savings lies in the split of the traditional EPC contract into two separate contracts, a "supply" contract for the design and supply of the complete PV system ready to mount, and an "installation" contract relating to the installation of the PV system, the supply of the balance of plant and the commissioning. This contractual arrangement corresponds better to the physical nature of a PV production asset, which is essentially made up of equipment manufactured in the factory and whose assembly does not require heavy work.

This arrangement requires strong pre-contractual co-operation between the supplier, the installation contractor and the project company for designing and agreeing on the design of the PV system, with the installation point of view (the PV system assembly time on-site greatly depending on its design), the responsibility matrix (an essential schedule for both agreements) and the schedule (programme). This is in accordance with the general objective of de-risking the deployment of SPGAs while decreasing the cost of development.

Supply Agreement

The supplier is the main contractor that is responsible for the engineering, design, procurement, supply and delivery of the PV system and for the performance of ancillary work to complete the facility.

Purpose

The main purpose of the Supply Agreement is to set out details of the engineering, design, procurement, supply and delivery of the PV system and of the performance of ancillary work for completing the facility. It defines and guarantees a minimum installed capacity and a minimum performance ratio, which are the key drivers of this contract.

Structure

In addition to setting out the obligations of the supplier and the project company with respect to the PV system, the Supply Agreement includes a clear delineation of the responsibilities of the project company, the supplier and the installation contractor for the investigation, survey, design, engineering, procurement, construction, installation, testing and commissioning of the facility. This is shown in the matrix in Schedule 4 (Responsibility for the Works) Part 1 (Scope of Works) to the Supply Agreement (an equivalent schedule is included in the Installation Agreement).

Participants must share information as much as possible. Even if the developer is a party to none of the Open Solar Contracts, its role as the actual conductor of the project is central, and as such the developer should ensure strong co-operation and co-ordination among project participants.

The main body of the Supply Agreement sets out general conditions that are expected to be acceptable in all jurisdictions where SPGAs are to be undertaken. It is not intended to be an all-encompassing document that addresses the needs of every jurisdiction. Instead, a Key Information Table and various schedules to the agreement are provided, where jurisdiction- and project-specific details are to be included.

The Supply Agreement template also includes footnotes highlighting instances where particular consideration needs to be given to particular provisions to ensure that such clauses are suitable for the specific project circumstances and jurisdiction.

Installation Agreement

The Installation Agreement is a lump-sum agreement between the project company, as owner of the project, and the installation contractor, the contractor that will be responsible for installing the PV system, providing the balance of plant and commissioning the plant.

Purpose

The main purpose of the Installation Agreement is to set out the details of installation of the PV system, provision of the balance of plant and commissioning the facility.

Structure

In addition to setting out the obligations of the installation contractor and the project company with respect to the PV system, the Installation Agreement includes a clear delineation of the responsibilities of the project company, the supplier and the installation contractor for the investigation, survey, design, engineering, procurement, construction, installation, testing and commissioning of the facility. This is shown in the matrix in Schedule 4 (Responsibility for the Works) Part 1 (Scope of Works) to the Installation Agreement (an equivalent schedule is included in the Supply Agreement).

Operation & Maintenance Agreement

Purpose

In the operational phase, the project company is essentially a shell. It is managed by a management company that provides services, and the operation is essentially delegated to an O&M provider, the scope of which is determined by the financial risk profile that the investor intends to support. The more the investor is averse to the risk, the more the mission will be broad and will include the supply of spare parts in a lump-sum manner in particular. In the same way, the duration of the contract will depend on the investor's choice to secure a price over the calculation period of returns on investment or, on the contrary, whether the investor hopes to benefit from productivity gains and future cost reductions.

The key driver of this contract is the technical availability of the SPGA. The O&M contractor guarantees that the measured availability during each availability test period will meet or exceed the minimum guaranteed availability (Clause 9). The definitions of availability, minimum guaranteed availability and measured availability are set out in Schedule 3.

If, for any availability test period, the average measured plant availability is less than the minimum guaranteed availability, the O&M contractor is to pay availability liquidated damages, up to the liquidated damages cap. The level and calculation of availability liquidated damages is to be agreed between the parties.

The project company has the option under the O&M Agreement to also pay an availability bonus if, for any availability test period, the average measured availability is more than the minimum guaranteed availability up to the availability bonus cap (Clause 9.3).

Contrary to certain practices, the O&M provider cannot be responsible for the PV system's performance ratio but only for the technical availability and the intervention times in case of failure. The system's performance is a fundamental technical characteristic of the system, which depends on the equipment that makes it up, and not on the way it is used (unlike conventional production assets where operation is decisive for system performance). This explains why a performance defect noted at the end of the performance tests leads to a reduction in the price of the system under the supply contract. On the other hand, making the maintenance provider assume a risk of underperformance would be inefficient. With no influence on this risk, maintenance providers would still be obliged to charge a margin to cover it.

Nevertheless, the performance ratio is a key indicator that must be monitored throughout the life of the asset in order to be able to implement any corrective actions and to put into play the performance guarantees given by suppliers of components (particularly modules).

Lastly, the development of installed volumes will allow the development of networks of maintenance operating companies, an improvement in the quality of services and significant gains in productivity. Hence the development of standards, such as the SolarPower Europe Best Practice Guidelines, is encouraged.

Structure

The O&M Agreement is entered into between the project company, as owner of the project, and the contractor that will be responsible for the operation and maintenance of the facility for the duration of the term. The O&M Agreement commences once the commercial operation date has been achieved under the Installation Agreement.

The O&M Agreement has been drafted so that it is "stand alone" and works in the same way regardless of whether the supplier or installation contractor and the O&M contractor are the same corporate entity, and also notwithstanding whether the O&M Agreement is running concurrently with a defect warranty period under the Supply Agreement or the Installation Agreement.

The O&M Agreement contemplates two term options:

- Option A: a short initial term with automatic extension but with the ability to terminate at the expiry of the initial term and at each anniversary of the initial term thereafter; or
- Option B: a long term, which may match the tenor of the debt under the finance agreement.

Financing

Considering the central role of financing in the build-own-operate (BOO) scheme, the initiative has prepared a Financing Term Sheet template, which was drafted in consistency with the contractual scheme developed in the other Open Solar Contracts.

Financing is central because it connects a local SPGA project to the global financial market, directly or indirectly. One of the key benefits of standardisation of the finance documentation, starting with the Financing Term Sheet, is to facilitate the aggregation of different project debt in larger portfolios that can be financed or refinanced on the domestic (preferably) or international financial markets.

The possibility of aggregating the debt of relatively small SPGAs into larger pools is one of the most critical issues to bring financing at scale and to crowd-in large investors (such as institutional investors) to renewable energy finance.

Project finance lenders typically have fixed internal processes and procedures, which translate into fixed transaction costs regardless of transaction size. These fixed transaction costs need to be spread over at least a minimum loan amount to make economic sense. This has been exacerbated by the welcome "problem" of reductions in solar PV costs: as the cost per installed megawatt has fallen, the minimum project size at which project finance makes sense has increased by equal measure.

In addition, the time between the project award and signing finance agreements typically takes too long: even under well-structured programmes, a two-year gap between these two milestones is not unusual. The issue is exacerbated by another welcome "problem": that solar PV typically has a much shorter construction period than other generation technologies.

The twin issues of transaction costs and transaction preparation time have led some parts of the market to question whether project finance is the right tool for construction finance, especially for smaller SPGAs.

The Financing Term Sheet essentially supports an emerging trend where the commercial banks show growing interest in standardising their project financing.

Assumptions

The Financing Term Sheet was prepared based on the following assumptions:

- The project will be owned by an incorporated joint venture (the project company or "borrower" under the Financing Term Sheet), which will own the SPGA and enter into a PPA with a government-owned or -controlled buyer for 100% of the project's forecast power capacity, and that the buyer's obligations under the PPA will be guaranteed by (or otherwise be subject to credit support provided by) one or more suitably rated entities.
- Where applicable and unless otherwise stated in the Financing Term Sheet, the provisions of the full common terms' agreement will be based on the Loan Market Association's (LMA) Senior Multicurrency Term and Revolving Facilities Agreement for Leveraged Acquisition Finance Transactions ("LMA standard provisions").
- The Financing Term Sheet does not contain detailed inter-creditor provisions but refers to a separate inter-creditor agreement. The form of the intercreditor agreement, if required, will be consistent with the LMA's applicable form and will set out customary provisions relating to 1) the appointment of the intercreditor agent, and 2) voting among the senior creditors and the sponsor senior lenders.

Financing (limited recourse or other)

In parallel to equity raising, developers should consider the sources and amount of debt financing required, for example from commercial banks, development finance institutions or export credit agencies; local institutions or offshore institutions (consider the liquidity/availability of local currency if revenues produced by the project will be denominated in the local currency); a single lender or a group of lenders. The lenders will require a financial model.

The amount and ratio of debt to equity funding needs to be determined based on the debt capacity of the project and taking into consideration any requirements of the legal and regulatory framework, procurement processes and debt financiers. The ratio between the principal amount outstanding under the senior debt and the aggregate amount of the equity contributions made shall not at any time be more than an agreed ratio. The Financing Term Sheet assumes that shareholders will be required to fund equity at a level proportionate to senior debt drawdowns in accordance with the agreed debt-to-equity ratio. However, lenders may require shareholders to fund 100% of equity upfront depending on the credit strength of the sponsors. Where equity bridge loans are used to fund equity, these may be drawn first as a cheaper source of funding.

Lenders will evaluate the feasibility activities undertaken to date and will consider their requirements, including:

- key terms
- nature of facility
- project risk flow through from project company to its contractors
- undertakings/covenants
- events of default
- environmental and social requirements
- reporting and information requirements
- corruption and sanctions requirements
- change in control requirements
- equity requirements
- prepayment triggers
- process to financial close and drawdown
- direct agreements
- lender protection provisions in transaction documents
- hedging
- security structuring in jurisdiction (for example, parallel debt structure or security special purpose vehicle structure)
- taking of security and security enforcement
- bankruptcy/insolvency law
- interest rate restrictions and
- liquidity restrictions.

The Open Solar Contracts assume that offtake is guaranteed in some form. The PPA provides for a liquidity support and, ultimately, the termination of the PPA triggering a government event of default. The project company can then sell the project assets at a price that covers the debt repayment.

Financing facility agreement

When funding involves multiple lenders and/or more than one credit facility, the parties typically agree on common terms that will apply to all senior debt facility agreements, which are set out in a common terms agreement and that address, among other things: 1) the purpose of each senior debt facility agreement; 2) the availability period; 3) the repayment and prepayment terms; 4) tax provisions; 5) undertakings, representations and warranties; and 6) events of default.

The Open Solar Contracts include a term sheet for such a common terms agreement. In addition, the borrower will be permitted to issue senior secured notes either directly or through an affiliated special purpose vehicle issuer, which may be issued in an international capital markets transaction pursuant to an indenture. The loans under the senior debt facility agreements, together with the senior notes, will constitute the "senior debt", and the creditors under and with respect to the senior debt facility agreements, the senior notes and any senior hedging documents will be the "senior creditors". All senior debt will rank on equal footing in right of payment, and will share equally and rateably in the project collateral and any proceeds of enforcement.

Finance agreements

The Financing Term Sheet anticipates that the financing be documented by way of the following finance agreements:

- senior facility agreements
- a common terms agreement
- an intercreditor agreement
- an accounts agreement
- an equity support agreement
- various security documents
- senior hedging agreements (if applicable)
- direct agreements, with respect to project documents
- fee letters and
- other documents to be agreed.

If the financing for the project is to be obtained through a single facility (for example, a commercial bank facility), which will be the case for smaller SPGAs, then there will be no need for a common terms agreement, and the applicable terms set out in the Financing Term Sheet can be reflected in the senior facility agreement. Similarly, an intercreditor agreement may not be required if there is a single set of secured creditors, with no senior hedging agreements.

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