# Output Guarantees for Renewable Energy Projects

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Most renewable energy deals are long-term. For example, power purchase agreements often have 20-year terms. Although debt financings for these projects typically have shorter lives, those too run multiple years. As a result, in order that these transactions get financed and completed, it is very useful that there be a tolerably reliable basis for believing that the projects will generate sufficient levels of energy and thus revenues for, say, at least the first 10 years and that meaningful remedies are available if energy output falls short.

One way to get at this is that one party predicts output and stands behind those predictions contractually. Ideally that party has good knowledge about probable output and also is creditworthy and accessible.

This often is accomplished by means of guarantees regarding the output of the system, these being different than equipment warranties furnished by the manufacturers or other vendors of system components. The guarantor in the first instance is often the system integrator, the contractor that designs the project, procures the equipment and constructs the system. That guarantee may, in some manner, backstop another output guarantee, such as one given by the system owner to the off-taker assuming the owner is not the off-taker.

These arrangements come in many species. This article by no means attempts to spell out the variations. Rather, it simply highlights elements that many well-thought-through output guarantees deal with in some fashion or, if any such elements are ignored, that is purposeful. It does that principally in the context of solar PV projects, even as much of what is said here applies to other types of projects as well.

## THE PREDICTIONS

Output guarantees usually begin with stated output predictions, targets of a sort. The targets are typically tied to 12-month or longer periods that begin when or shortly after the project begins commercial operation. Also, typically, these predictions reflect some degree of system degradation over time.

Developers, integrators and others who figure to be asked to furnish output guarantees as a transaction takes shape may wish to give pause to that probable contractual future when they attempt to sell their project proposals to off-takers and investors. Felicitous output figures floated during sales efforts can quickly become petards on which one is hoisted.

## THE BASIS FOR THE PREDICTIONS

I am not an engineer. But I have had enough exposure to respect, even if not entirely understand, the challenges presented by trying to predict how much energy a given combination of equipment, aligned and situated “just so” in a given location, is likely to generate during Year One or Year Five or Year Twelve. The variables and interactions are *many*.

How fine-tuned and well-researched ought the output predictions be? As one would imagine, the sensible answer often turns on how large the project is. Generally speaking, bigger projects both support and deserve more careful predictions - “support” because the funds and time for careful assessment often are available and “deserve” because, for big projects, big errors can translate into big dollars.

Short cuts of one sort or another may make sense for smaller projects. Thus, for example, as a source for solar availability, many look to the National Solar Radiation Database of the DOE’s National Renewable Energy Laboratory. They do this even as most of the data in that base were derived from satellite input, rather than presumptively more reliable measurements made on the ground. By contrast, larger projects may merit some number of months of on-site metering regarding such variables as humidity, temperature, radiation and (even for solar) wind speed. Perhaps, with time, many EPC contractors and other industry participants will establish market reputations, good or bad, for the reliability of their output predictions. Some, I believe, may have already.

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Once predictions are generated (the P50 case), are those also the guaranteed figures? The answer is sometimes. Other guarantees use lower numbers for the guarantees. When the levels guaranteed are lower than the stated predictions, the reasons may be logical, such as a reasonable deviation from the P50 case to account for uncertainty. Or they may derive more from process and optics, such as a way to bridge marketing exuberance and contractual commitment.

### DOWNWARD ADJUSTMENT RULES

Those asked to furnish output guarantees often say something like: "I know about the system. After all, I'll be building it. And I have some degree of site-specific knowledge about resource conditions. But *lots* of things can happen that are entirely out of my control. Some of those things would adversely affect output. I shouldn't have to write checks if those things happen." Fair comment. Known solutions.

The solutions typically lie in contractual rules that, when applied, lower the guarantee bogey for the sorts of events and circumstances that give rise to these concerns. The lists of events and circumstances vary. Here are common examples:

- shading or obstructions introduced after the output guarantee is signed that are not otherwise accounted for in the numbers,
- significant deterioration in solar resources apart from new shading and structural obstructions,
- certain force majeure events,
- damage, destruction, theft or government takings of all or portions of the renewable energy system, even if not caused by force majeure events,
- similar events respecting buildings or structures that support the system,
- faulty operation, maintenance, repair or replacement (though a guarantor that will perform those services should not be relieved from its guarantee for its own service lapses),
- modifications to the system that reduce capacity, and
- future changes in law that somehow constrain operations.

What, then, should the adjustment rules be? This much is clear, or so in my view: The required adjustments should be no greater in amount or duration than the problems they respond to. Thus contract rules that might be read to obliterate the output guarantee if any of these events or circumstances occur make little sense when, as is often the case, the problem is confined. Yet I have seen contract language that would appear to do that. Three smashed or stolen panels do not a system ruin. Moreover, the smashed or stolen panels figure to be replaced relatively quickly.

That said, some adjustments may be trickier. For example, if the expected life of an inverter is shorter than the period for which the system's output is guaranteed, should the late years of the guarantee be conditioned on replacement of the inverter at the expense of a party other than the guarantor? Nonetheless system components may outlive their life expectancy. So that sort of condition may be overkill. As with most issues, answers are out there.

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### UPWARD ADJUSTMENT RULES

Often the discussion (above) is solely about circumstances that should dictate downward adjustments in the guaranteed output. Although one sees this less frequently, upward adjustments may make sense too. Thus, what if resource availability *increases* during the life of the guarantee relative to the resource assumptions used to establish the guaranteed figures? That can happen. For example, weather patterns can change for the better. And existing shading and obstructions can become less severe. The building next door that now blocks two hours of morning sunlight might get knocked down five years from now.

So some output guarantees adjust the bogeys upwards in these circumstances. That requires periodic re-measurement of resource availability or at least a contractual right to require re-measurement. Also, one needs to consider equipment capacity, if not also off-taker usage, even as those usually are not constraints in this context.

### RELATIONSHIP TO EQUIPMENT WARRANTIES

The party asked to furnish the output guarantee may also say: "You (the beneficiary of the requested guarantee) are already protected. Equipment vendors are furnishing warranties for the items they are supplying. Accordingly, you don't need an output guarantee. An output guarantee would confer a windfall."

The fair response, in my view, often is: "Not so." I say that for several reasons. Here are the principal ones:

- Equipment warranties typically speak to the performance (sometimes not well articulated) of items of equipment that comprise only portions of the renewable energy system. By contrast, output guarantees assure the output of the entire system comprised of all the items of equipment as they work together. As discussed, output warranties also speak to system output at a specific site with a specific energy resource profile. So, although quality components (the focus of vendor warranties) are an important part of the system story, they only are part of that story.

- Equipment warranties normally require the warranting party to repair or replace items that flunk the warranty. That often is stated as the sole remedy for breach. But repair or replacement happens only after some period of delay. The system owner or user may be slow to recognize a non-transitory output problem. And once persuaded, more time may pass before the owner or user becomes convinced that the problem lies with a particular system component, as contrasted with other components or some other cause altogether. Once convinced that the fault lies with a warranted item, the owner or user then complains - perhaps to the right vendor, perhaps to the wrong vendor, or perhaps to vendors fitting both descriptions. Next, often, are discussions with vendors about whether a given warranty has really been breached and, if so, to what extent. Eventually, but only maybe, useful action follows - i.e., repair or replacement. Yet system output is impaired throughout the delay. And as said, many equipment warranties seek to step away from all monetary remedies. "We repair or replace, but nothing more." So vendor warranties often fail to compensate for delays.

- Issues regarding who can or must enforce the equipment warranties and who benefits from their performance can also play a role. For example, the output guarantor may benefit from the warranties as a contractual matter, a real world matter or both. For example, if the equipment vendor replaces defective equipment, that should mitigate the output guarantor's future exposure to the beneficiary of its guarantee. Meantime, if the party that warrants a failed component fails to repair or replace it, who, as between the output guarantor and the beneficiary of that guarantee, should bear the economic consequences? There is no single answer to that question.

To attempt to reconcile these sorts of issues, some output guarantees provide a credit of one sort or another against the output guarantee for equipment warranties. In my experience, most of those provisions fail to work very well without some thoughtful fussing. But again, answers are out there.

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For more on renewable energy equipment warranties, see the article my Luce Forward colleague Roger Haerr wrote about that subject ("Who Pays When Solar Modules Fail?" - www.luce.com/solarmodules). It was also posted electronically during December 2010 in Solar Industry.

### REMEDIES (THE LAWYERS' PUNCH LINE)

Being the beneficiary of an output guarantee is certainly nice. But the critical question is: "What happens if the guarantee is breached? What's the remedy?"

To be sure, the law of damages should fill in most gaps if the guarantee fails to address remedies. But the parties may wish to modify those rules by contract. And even if not, it sometimes is useful to state the residual legal rules, or at least the principal ones, in the contract itself. Parties confronted with claims of breach tend to be more easily moved to action if told that Section X of the agreement they signed requires them to write a check in an amount calculated as prescribed in that section. By contrast, references to case law about damages dictating pretty much the same result may be less persuasive.

So what, then, are typical (including contractually-articulated) remedies for breaches of output guarantees? The simplest and most frequent is a so-called make whole provision. These typically declare that, in the event of an output shortfall, the guarantor pays the counterparty the amount of that shortfall, measured in KwH or MwH, multiplied by a prescribed price. That price will often be the energy price in the power purchase agreement applicable to the period during which the shortfall occurs. Because the output guarantee will sometimes reside in a document other than the PPA (such as in an EPC agreement), the guarantor presumably will want to know what the PPA says about price. The guarantor may also want to protect itself from future amendments to a PPA, to which the guarantor is not a party, that increase the energy price. As for the impact, on make whole remedies, of amendments to such PPAs that decrease the off-taker price . . . well, the devil may lie in the guarantee language.

Make whole and other monetary remedies may fly in the face of certain disclaimers. An example is a disclaimer of so-called "consequential damages" set forth in the very agreement in which the guarantee appears. A make whole provision based on the revenues the beneficiary of the guarantee would otherwise receive from the off-taker may, in the language of law, be a consequential damage remedy. That and other monetary remedies might also exceed stated contractual caps on the guarantor's total liability. So, if the agreement in which the guarantee resides also contains disclaimers, caps or other limitations on the guarantor's liability, the guarantee may need to be carved out of the disclaimers, caps or other limitations to be fully effective.

Other remedies, whether in lieu of or in addition to make whole provisions, include an off-taker's a right to terminate the PPA if output falls below the guaranteed figure. If the renewable energy system is situated on the off-taker's premises and the off-taker exercises that right, the agreement may also requires the system-owning guarantor to remove the system and tidy up the premises at the latter's expense. In turn, the system owner may have secured a right to pass the economic consequences of all this on to the EPC contractor.

Where there is no make whole obligation, the arrangements might also include a rescue clause - an option of the system-owning guarantor to avert termination of the PPA by paying the off-taker a make whole (or other) amount. Further still, some PPAs give the guarantor itself a right to terminate the PPA and remove the system if output falls below prescribed amounts.

As one would imagine, standing alone these sorts of termination and removal rights tend not to be very satisfying solutions for a party that does not have great alternatives for (as relevant) its site or system. Accordingly and as one would imagine, their typical real world function is to tilt the leverage for a renegotiation about energy prices, contract duration or other key features of the parties' relationship.

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### SMOOTING RULES

Production varies with time. The variations may prove modest, subject to a gentle downward curve due to equipment degradation. In the alternative, variations may be more dramatic. Also, variations may not be due to the sort of events and circumstances discussed previously under "Downward Adjustment Rules". Or in all events, the guarantor may be concerned about the prospect of such big variations. The guarantor may thus say: "I should get the benefit of any overproduction - i.e., energy produced in excess of the guaranteed bogey for any period. Overages should be applied to any shortfalls, both prior shortfalls and future shortfalls, through dollar credits and refunds." To draw from the language of income tax, the guarantor may request that the guarantee include carry backs and carry forwards.

That sounds fair and logical. But would such rules undercut purpose? To the extent output guarantees are intended to assure reliable revenue streams to support debt payments, carry backs and carry forwards may not make best sense. That is especially so of carry backs, since the lower revenues for the periods to which excesses are carried back may be insufficient to support required debt payments for those periods. And carry forwards may present a similar issue if, for example, revenues generated from production overages are distributed to the guarantor's equity holders rather than held in reserve or used to prepay debt. So beneficiaries of output guarantees or their prospective financing sources sometimes resist these sorts of period-shifting rules.

To be sure, there sometimes are sensible ways to compromise this. One among several is back-end settle up rules intended to give the guarantor the benefit of at least some output spikes, yet assure steady revenues through make whole provisions that are applied during periods of shortfall. Alas, those sorts of solutions tend to be complex.

### ACTUAL EXPERIENCE

What, generally, is the experience with output guarantees? My anecdotal sense is that many projects outperform the guarantees. But reliable data are hard to come by. Those who furnish output guarantees figure not to want to talk much about failures. And some guarantors may purposely set modest hurdles, hurdles they figure they can meet relatively easily. So "outperform" is sometimes not something to write home about.

My colleagues and I invite anyone with useful data about this or any other aspect of this article to share what they know. My email address is dtitelbaum@luce.com.