Solar Heating and Cooling

Contractual Best Practices for Third-Party Financed Commercial- and Industrial-Scale Projects

U.S. Environmental Protection Agency
December 2012

1. Introduction

This white paper is part of the U.S. Environmental Protection Agency (EPA) Energy Supply and Industry Branch's work to expand markets for clean energy and support cost-effective reductions in emissions of greenhouse gases (GHGs) and other pollutants. The paper complements several simultaneous efforts by EPA aimed at advancing best practices and standards for commercial- and industrial-scale (C&I) renewable heating and cooling technologies.

This white paper is being prepared in response to feedback from industry stakeholders who indicate significant interest in wider use of third-party financed contracts to improve the economic viability and flexibility of C&I solar heating and cooling (SHC) projects. Stakeholders cited a lack of standardization and transparency of contract terms as a major barrier to achieving the level of third-party finance availability that exists for C&I solar photovoltaic (PV) projects.[1]

Third-party contracts are those where a party other than the host (i.e., energy end-user) of the SHC system and the utility actually finances the system. Examples include energy services or purchase agreements (similar to the power purchase agreements (PPAs) common for PV transactions), energy savings performance contracts or other shared savings arrangements, and various forms of leases. Such third-party contracts provide opportunities for commercial, industrial, and institutional end-users to capture the significant tax-based incentives available for SHC projects and host SHC applications at attractive costs without providing the upfront capital or tax liability themselves. The third-party agreement typically relieves the host of responsibility for structuring and managing project development, SHC system construction, operations and maintenance (O&M), and de-commissioning of the SHC system. Third-party contracts have been growing in number and diversity in recent years and can provide turnkey lease and other benefits to SHC hosts for whom direct and full ownership of SHC systems is not a viable or desirable business option. The discussions in this paper are applicable to SHC technologies and are intended to be relevant to a wide range of SHC applications and end-user industries.

The goal of this white paper is to identify and build consensus around best practices for SHC third-party financed contracts that can support development of publicly-available, industry-standard, actionable contract frameworks. **This white paper is not being developed by a law firm and is not a substitute in any way for the parties to any solar heating and cooling transaction needing to seek appropriate contract advice from their counsel**, but should offer useful building blocks for the business and legal consideration of such transactions.

2. Explanation of Key Third-Party Financed Contract Elements

A first, critical step towards industry standardization and best practice is an understanding of the main contract elements in a third-party financed transaction. Due to the private nature of most third-party SHC contracts, public accountings of these elements are not widely available. Therefore, the enumeration and brief explanation of key contract elements alone should increase transparency and reduce transaction costs, while the paper's discussion of how contractual best practices may be applied to third-party financed SHC transactions should enable more well-informed decisions on contract elements.[2] This discussion of contractual best practices immediately follows the typology of key contract elements in Table 1. See Figure 1 for a description of the roles and participants in third-party financed contracts for SHC C&I system applications. This is a general description of roles and may vary by contract.

In addition to providing the name and description of each contract element, Table 1 indicates whether the element is dynamic or static and where further discussion of the element can be found in the next section of this paper. The concept of dynamic versus static elements is set forth by SolarTech in its work on PPAs and is a useful framework.[3] Dynamic refers to elements that will change for each transaction under the same system owner(e.g., rate, contract length, system configuration) that otherwise uses the same contract template, while static elements are not intended to change between transactions using the same contract (though their language may be negotiated in some cases).[4] When reviewing Table 1 and the balance of this white paper, readers should bear in mind that in practice the labeling or nomenclature for individual elements can differ from contract to contract.

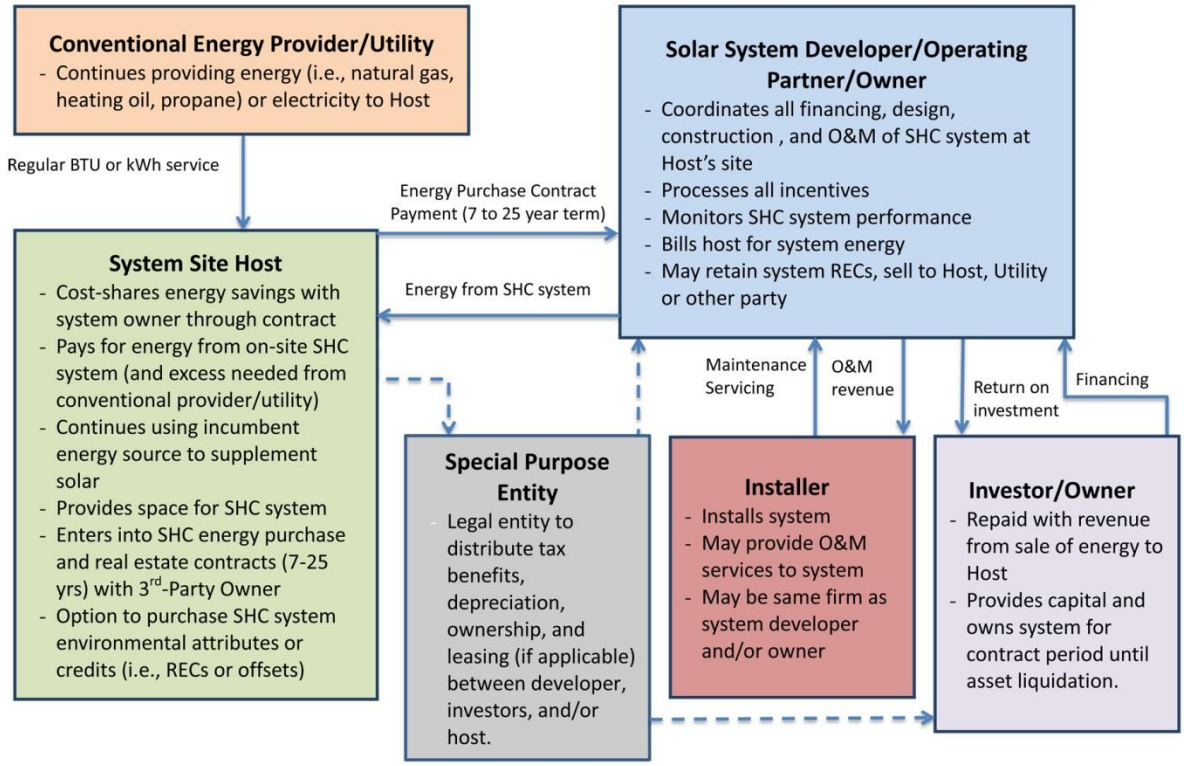
Table 1: Typology of Key Elements in Third-Party Solar Heating and Cooling Contracts for C&I Customers

Element Name	*Description*	*Static or Dynamic*	*White Paper Section*
Rate	Purchase rate (¢/kWth, ¢/therm, % savings vs. utility bill, or other unit). Often comprised of a starting rate in year 1 and a fixed annual escalator (2% to 5%) thereafter.	Dynamic	3.1
Contract Term	Length of the contract, including start date.	Dynamic	3.2
System Components	Description of system equipment components and equipment labels or certifications.	Dynamic	3.3
Configuration	Physical location and design of system on host property.	Dynamic	3.3
Permitting	Requirements for obtaining and paying for permits and approvals.	Static	3.3

Element Name	*Description*	*Static or Dynamic*	*White Paper Section*
System Construction & Testing	Standards for and timing of construction and commissioning of system.	Both[5]	3.3
Measurement & Monitoring	How and where system output and/or host use of output will be measured for the purposes of generating invoices and assessing performance. Monitoring covers how that information will be communicated to the system owner and host.	Static	3.4
Purchase of All Energy Produced or Consumed	Requirement that host purchase all energy output or consumption from system at contract rate.	Static	3.5
Invoicing	Intervals, due dates, and information on invoices, and penalties for late payment of invoices.	Static	3.5
Minimum System Performance	Performance standard, if any, guaranteed by system owner and penalties for underperformance. Performance and assessment of whether the standard was met may be determined annually or otherwise.	Dynamic	3.6
Environmental Attributes	Ownership of system renewable energy credits and other environmental attributes, as well as each party's ability to make public claims about the system's green energy.	Dynamic	3.7
Taxes	Responsibility for paying property, sales, and other taxes associated with system and its output.	Static	3.8
Operations & Maintenance	Financial responsibility for and standards of system O&M.	Static	3.9
System Access	Conditions under which parties have physical access to the system.	Static	3.10
Damage to System/Insurance	Responsibilities of parties not to damage system and its operation and how to handle damage that occurs.	Static	3.11
Credit Requirements	Minimum credit requirements and responsibility of buyer and seller to retain, or cure, their credit standing during the term.	Dynamic	3.11

Element Name	*Description*	*Static or Dynamic*	*White Paper Section*
Default	Nature and consequences of events causing default under contract.	Static	3.11
Change in Law	Responsibilities of parties for absorbing price or performance changes resulting from future changes in law or regulation.	Static	3.12
Force Majeure	Acts beyond the control of parties for which they will not be responsible.	Static	3.13
Succession and Assignment	Requirements when considering transfers of contract rights by the original seller or buyer to legal entities taking over their business obligations.	Static	3.14
Intra-Term Purchase Options	Ability of host to buy system before end of contract and associated purchase price.	Dynamic	3.15
End-of-Contract Options	Ability of host to extends agreement, buy and/or have system removed at end of contract.	Dynamic	3.16
Site Real Estate Rights	Ability of system owner to have a lease, license, or easement for its system on host's real estate over contract length.	Static	3.17
Real Estate Mortgage/Liens	Extent to which property on which the project is sited is free of outside ownership or legal claims.	Static	3.17
Other Standard Legal Provisions (e.g., notice, severability, entirety, confidentiality, dispute resolution, indemnification, warranties, applicable law)	Variety of provisions typical for commercial transactions (renewable energy and otherwise).	Static	3.18

Figure 1. Participants in Third-Party Financed Contracts for Solar Heating and Cooling (SHC) C&I Systems



3.Suggested Best Practices

This section summarizes SHC industry and solar finance specialist input on standard and best practices for third-party financed contracts. The section emphasizes the contract elements with the greatest complexity or range of opinion with respect to best practices.

3.1 Rate

The rate section of the contract consists of both the initial rate and how the rate will change over time. The rate charged by the owner to the host for energy from the SHC system is one of the most host-specific elements of a contract. While some industry stakeholders had preferences for fixed rates (e.g., ¢/therm or ¢/kW_{th} for every unit of energy produced or consumed) and some for a percentage discount vs. utility rates, no stakeholders felt that any of the commonly proposed pricing regimes were inappropriate. In the context of fixed rates, escalators are often in the range of 2% to 5% annually, but can be shaped in different ways to meet budget (for host) and investment return (for system owner) objectives. For example, contracts could start with a lower initial price and a higher escalator, or the % escalation could flatten or change for certain contract years. What is essential is that the mechanics of the rate, for all years, are clearly spelled out in the contract, including the utility rate baseline from which a percentage is deducted.

An important and allied consideration in setting the rate or price charged per unit is how units will be measured and the host billed for those units. That topic is reviewed in subsections 3.4 and 3.5 below.

3.2 Contract Term

The length of third-party contracts is typically 7 to 20 years, but there is no one duration that is necessarily better or worse. Contracts are set to be (a) longer than the tax-recapture and accelerated depreciation periods for federal tax incentives for solar systems (six years in practice), (b) sufficiently long to allow pricing that is attractive for hosts, and (c) not longer than the useful life or warranties of major system components (about 25 years). When the economics of a SHC application are particularly strong, owners can offer shorter contracts (10 years) that can still meet the price goals of hosts. In contrast, SHC applications with lower rates of return require longer contracts for the owner to meet its investment return goals.

3.3 System Components, Configuration, Permitting, and Construction

The SHC contract will indicate in its body or in appendices the system capacity (e.g., kW_{th}), equipment to be used (make and model of major components), and where on the host land, roof, or elsewhere the system will be located. A best practice is to include system design and engineering drawings as appendices.

When reviewing major components, their bankability is worth considering. Bankability refers to the ability of a component or project to obtain bank financing on typical loan terms. Banks are often risk-averse around components or system types that are new, less common, or have weak (in coverage or manufacturer) warranties. This is a very important issue for third-party solar PV transactions, and certain components and system types are considered more bankable than others. Within the solar heating and cooling industry, stakeholders indicate that Solar Rating & Certification Corporation (SRCC)[6] certification may be increasingly important but is not compulsory for SHC project financing. SRCC is an independent, third-party certification organization that administers national certification and rating programs to ensure that solar energy equipment meets minimum standards for system durability, reliability, safety, and operation and design.

System owners generally have the responsibility for securing the permits and approvals associated with the SHC project, and hosts will be required to provide timely information to allow for the permitting and approval processes to proceed. Though not required, it may be a best practice to include schedules for system construction and ultimate commissioning into full operation in the contract with appropriate leeway for unexpected events.

3.4 Measurement and Monitoring

Measurement is an important element of a third-party contract because the cash-flow between the system owner and host can directly depend on measurement of the system's energy production and/or use of that energy by the host. Unlike solar PV systems which easily display electricity generation through an inverter or single electricity meter, SHC technologies require BTU meters (also called heat meters) to calculate the energy generated from the system or, alternatively, to calculate the conventional fuel displaced. Metering large C&I SHC systems is often complex and no single industry standard exists for where to place the meters and what measurement equipment standards[7] should be used.

Stakeholders indicate that a best practice is to install BTU meters in as many parts of the SHC system as is feasible, which can include metering the fluid flow and temperature at various points, the heat transfer loop and any related storage tanks used by the system or the host's interconnected processes. The BTU meters collect data, which are aggregated by a monitoring technology. By utilizing monitoring technology, the system owner is able to identify and remedy dips in production and maintain optimal operation of the SHC system. Because the host may be unaware of the importance of metering the system at various physical points and the complexities of monitoring, the method and equipment used for metering and monitoring may need to be detailed explicitly in contract language to protect all parties. It is also best practice to specify what access the host will have to the monitoring system data.

The calculation of system performance from data collected from the BTU meter can be executed on-site or at an off-site location. Since there can be data integrity and security issues with transmitting the data off-site, some developers find that a best practice is to have data be adequately backed up on-site so data error handling issues cannot cause billing disputes.

3.5 Purchase of All Energy Produced or Consumed and Invoicing

One fundamental question for the purposes of billing is whether to charge the host based on energy delivered by the SHC system or energy consumed by the host. Most stakeholders indicate that measuring at the point of initial production (e.g., solar thermal collectors) is not appropriate because it does not take into account losses that will occur between production and the point of energy delivery to the host's heating or cooling system. However, there is a difference in system owners' practices in whether they bill the host for the energy delivered to the host's heating system, or for the energy consumed by the host. This distinction matters because there will be solar energy lost from the host's storage tanks if the host's heating system is idle for a period of time, a common event.

Some system owners feel strongly that they should not be financially penalized for tank losses of an idle system and should, therefore, bill on energy delivered to the host's heating system. This billing mechanism may also reduce investors' uncertainty on project income. In all cases, it is important that the system is sized so that it does not routinely over-produce relative to the heating or cooling needs of the host energy systems to which it is interconnected.

Alternatively, billing based on energy consumption may be more attractive to the host, and some system owners feel the host should not pay for energy that is not consumed. However, a contract best practice is to include language protecting the system owner from unforeseen material reductions in the host's energy demands which would reduce their consumption of the heat produced by the system. The monetary difference between these two metrics will be unique for each situation.

Stakeholders did agree that the fuel type being displaced (e.g., electricity, natural has, heating oil) by the solar energy should not affect the measurement methodology.

Invoicing is another area with wide variation and no single best practice. Monthly invoicing based on energy production or consumption (multiplied by the contract rate for the period) seems to be the most common arrangement. The invoicing section of the contract is also where penalties for late payment of invoices and methods for disputing invoices are established. In practice, some energy contracts can put the host into default if its payments are late by only one or two months. The best practice is for contracts to balance the owner's need for prompt payment with avoidance of default risks for minor errors or short-term delays in payment by the host.

3.6 Minimum System Performance

There is wide industry disagreement as to whether minimum performance guarantees, with financial penalties as the consequence for underperformance, should be applied. Positive attributes of performance guarantees include helping ensure that hosts obtain the economic and environmental benefits that motivated them to pursue the SHC transaction and protecting the SHC industry from potentially damaging publicity about unreliable systems. System owners and financiers, though, can be reluctant to agree to guarantees, as they add financial risk to the transactions. Such guarantees may be less important in markets that have a high penetration of SHC and customers with high confidence in system performance. However, setting minimum performance requirements at 70% to 90% of rated performance (system output) and calculating performance based on full years of operation should dampen the effects of short-term weather variations and may be an acceptable best practice to balance the interests of the parties. Solutions of this type have been applied in solar PV PPAs. For SHC transactions in which billing is based on the energy consumed by the host, and not on energy delivered by the SHC system, the issue of the owner's minimum system output may be less relevant because hosts are charged only for what energy they use.

3.7 Environmental Attributes

SHC contracts specify which party owns the environmental attributes created when the system generates energy. These attributes can include renewable energy credits (RECs), green tags, carbon offsets, and carbon credits (potentially established under future policy). Common practice is for the owner to retain all environmental attributes. This is beneficial because the owner, with experience in environmental markets and with the ability to aggregate credits from across its projects, would likely be better able to capture full value for the attributes if it chose to sell them, therefore allowing it to offer more attractive pricing to the host. Of course, hosts may purchase some percentage of, or all, environmental attributes from the system as part of their sustainability programs in exchange for a higher rate in the contract.

Importantly, the nature of the renewable energy claims that the parties can make about the SHC system are directly affected by ownership of the environmental attributes. If the host does not purchase the attributes, it cannot claim that it is buying green energy from the on-site system or fueling its operations with its green energy – only the buyer of the attributes can make that claim. The host can, however, indicate that it is hosting a SHC system that would not have existed otherwise and may purchase substitute renewable energy credits (RECs) from off-site projects, or include the purchase of substitute RECs in its Request for Proposal (RFP).[8]

3.8 Taxes

It is important for the parties to understand what taxes, and tax exemptions, may apply to the SHC system under state and local law. Property taxes may be applied to the value of the SHC system itself (often the obligation of the system owner) and/or to the increased value of the land or other real property on which the system is sited (which poses a more complicated allocation of responsibility). If sales taxes are applied to system energy output, determining the point of transfer of legal ownership of the energy from owner to host will be important to establish. A best practice is to make sure that all current and potential future tax obligations are clearly allocated between the parties.

3.9 Operations & Maintenance (O&M)

O&M for the system is the legal responsibility of the owner in many output-based, third-party transactions. For such transactions, there is a strong consensus among third-party installers that hosts should not provide any system O&M and that the contract should establish a clear separation between the exact components to be maintained by the SHC system owner and those to be maintained by the host. This can be even more critical and complex than in solar PV transactions due to the inter-related nature of some SHC systems and the host's water heating or industrial processes.[9] This O&M best practice may not apply to certain non-performance-based transaction types.

3.10 System Access

While the SHC system will be located on the property (e.g., ground or roof) of the host and attached to the host's energy-consuming equipment and processes, the system itself is the property of the third-party owner. Therefore, the best practice is to severely restrict or disallow independent access to the system by the host, except in cases of emergency. This prevents non-owners from accidentally damaging the system or modifying its performance. Moreover, contracts should allow the owner to enter the host's premises under specific conditions in order to perform operations and maintenance. These practices help avoid legal disputes about system under-performance that could result if access was not tightly controlled.

3.11 Damage to System, Insurance, Credit Requirements, and Default

There are many events that can generate a default under third-party contracts, including failures to make invoice payments, acts of commission or omission that lead to system damage or underperformance, failure to maintain adequate insurance coverage, and a deterioration of a party's credit standing (e.g., bankruptcy in the most extreme case). Because the consequences of default can be extreme, especially in the early years of the transaction when the owner and host have received only a small share of the lifecycle financial and environmental benefits of the system, the best practice is to make sure that parties (a) have a reasonable opportunity to cure possible defaults, and (b) ensure that activities that have a trivial impact on the system do not trigger default.

On the topic of insurance itself, the owner would typically maintain property and liability insurance on its system, and the host would make sure that its existing property and liability insurance can accommodate the introduction of the owner's system and its interconnection with the host's heating or cooling applications. Industry stakeholders indicate that best practice is to explicitly state the necessary insurance coverage and minimum amounts in the SHC contract.

3.12 Change in Law

These provisions specify how the parties' responsibilities will or will not change if there is a future change in a law or regulation affecting SHC system operation, ownership, sale of energy, taxation, or other factors. Third-party system owners often set up contracts so that they are financially insulated from changes in law.

3.13 Force Majeure

The force majeure provision describes occurrences outside of either party's control and for which their performance under the contract may be excused. There may not be a SHC industry standard list of force

majeure events. What is classified as force majeure may differ from SHC contract to contract, and often the definitions are based on financier preferences or requirements.

3.14 Succession and Assignment

While succession and assignment provisions are common to commercial contracts, they hold particular importance for special purpose entity (SPE) financings like those that may be used for larger third-party solar heating and cooling transactions. The entire holdings of the SPE may be limited to the contract and assets of one (or more) SHC or other energy systems. Due to the ability of SPEs to be readily pooled with other similar assets and resold and to offer liability protection to organizations setting up the SPE, system owners often find it critical to have flexibility to assign the contract to successor owners. It is important for hosts to understand this issue, and the best practice is for succession and assignment provisions to have some mutuality (e.g., a successor to the host or owner must meet some standard of financial or operational capability).

3.15 Intra-Term Purchase Options

To avoid tax recapture penalties, the owner would not typically give the host the opportunity to purchase the system until at least year seven of the contract. Beyond that time, hosts may be able to purchase the system at the higher of a scheduled value (e.g., on a schedule appended to the contract, with scheduled values declining annually as the system depreciates) or the fair market value of the system. The scheduled value is often one that returns all projected profits to the owner. The reason for the "higher of" stipulation is compliance with tax accounting regulations. The best practice is to give the host the opportunity for system purchase at least once annually after year seven, which provides flexibility in case the host's operations are changing or it simply wishes to be the system owner. Industry stakeholders differ on whether hosts should be given more frequent chances to purchase the system (e.g., several times per year).

3.16 End-of-Contract Options

Standard practice for solar PV PPAs is to allow the host to have three options at the end of a contract – extend the contract (e.g., for another 1-5 years), buy the system, or require that the owner remove the system and return the site to as near to original condition as is feasible. For solar PV PPAs, contract extension rates can be established in the original contract or left open and negotiated near contract end. As is the case for intra-term purchases, the purchase of the system at contract end may need to be at least at fair market value for tax-compliance reasons.

Interviews with SHC industry stakeholders indicate that SHC agreements often do not contain all three end-of-contract options described above. The agreements almost universally include system purchase by the host, and may include the option for renewal with revised rates. The omission of the third option is likely because removing the SHC system can very expensive due to the customized and integrated components of the hosts' water heating systems. Some stakeholders suggest that system components that could support the heating and cooling system (such as an absorption chiller-heater that can be fired by both natural gas and a solar heat transfer fluid) could remain upon removal of the solar energy collection and delivery system at the end of the contract to reduce removal costs.

3.17 Real Estate: Site Rights and Mortgages/Liens

It is important to understand that third-party SHC transactions are often combinations of energy purchase and sale transactions and real estate transactions. The real estate transaction – allowing a SHC system owned by an outside party to be located on and interconnected with the host's property for a specific contract length and identifying the limitations and real estate responsibilities of the parties – is essential to the energy transaction. The real estate agreement may be a separate document from the energy agreement or combined and may be labeled a site lease, site easement, or other name. Industry stakeholders had little input on best practices around the real estate components of third-party transactions, and it is unclear whether work on standardization of this element is merited. Industry participants, though, should plan for added complexity in the real estate element when the host's facility or heating and cooling equipment is itself leased.

3.18 Other Standard Legal Provisions

There are a number of other legal provisions common to most commercial transactions that are also found in third-party financed SHC contracts. These include notice, severability, entirety, confidentiality, dispute resolution, indemnification, warranties, and state of applicable law. While these elements are important to understanding and negotiating the risks and obligations of the contract, their content should not be specific to SHC transactions, and they are not discussed in any detail for that reason.

4. Application of Best Practices to Different Financing Types and Under Different State Laws

The discussion in this white paper is intentionally structured around contract elements, to facilitate the direct creation of industry-standard contracts or contract frameworks. While most of the contract elements discussed here should be common to third-party financed SHC transactions for C&I customers, there may be certain distinctions depending on the type of financing applied to the transaction.[10]

The baseline contract type used in the preceding discussion is an energy purchase agreement because it (a) appears to be the fastest-growing model for C&I SHC transactions, (b) is present across several regions, (c) does not require special utility programs to be established for it to work in a market, and (d) the similarly constructed PV PPA has become the dominant model for C&I PV.

However, some important distinctions for contract elements in non-energy purchase agreement transactions are briefly described below. If the transaction is an equipment lease, a fixed monthly rate may be charged, irrespective of system energy deliveries or consumption. SHC leases may be rare[11], but they can involve a different allocation of risks and responsibilities than energy purchase agreements. In non-output based leases, the host, not the lessor, is often responsible for securing an O&M contract (with the SHC installer or another firm) and for system performance. In that case, the best practice may include inserting the same types of measurement standards and performance guarantees that the system owner would have in an energy purchase agreement into the services contract with the O&M provider.

Within energy savings performance contracts or other energy services company (ESCO) contracts, SHC may be blended with other energy efficiency or renewable energy investments. In that case, many of the same principles and best practices described in Section 3 may still apply in order to establish a clear

cost baseline against which SHC system savings would be measured. It is also critical as a best practice in any ESCO transaction to be able to isolate the effects of the SHC system on total contract savings so that the financial wisdom and environmental benefits of that system can be accurately determined.

Certain contract provisions may be affected by state law. While these distinctions are not the focus of this paper, one policy which varies by state is tax credits available for installation or purchase of solar systems. The contract should clearly specify which party owns any tax credits.

5. Conclusion and Next Steps

This white paper is meant to advance understanding and consensus around best practices in third-party financed solar heating and cooling contracts, so that the industry can move closer to publicly-available contract standards that lower uncertainty and increase the deployment of SHC technologies for commercial- and industrial-scale applications. This aim requires the illumination of the main elements of such contracts, identification of best practices in constructing such elements, and generation of industry discussion about how to formalize consensus around both straightforward and more complex elements.

There are several future steps that may be taken to help achieve industry-standard contracts or contract frameworks. These steps include:

(1) The industry convening a formal or informal working group to advance contract standards, potentially including representatives from end-users/hosts, developers, installers, financiers, and attorneys, as well as regulatory and policy-making officials and SHC manufacturers and advisers.

(2) Scheduling a webinar and/or meeting to discuss how to move towards greater contract transparency and standardization.

(3) Engaging a law firm, or knowledgeable non-profit with legal expertise, to help formalize the contract standards.

(4) Incorporating this contract effort into broader, complementary SHC industry activities.

6. Acknowledgements

EPA and one of its contractors formally contacted solar heating and cooling industry stakeholders for input into this process. These stakeholders represented solar heating and cooling end-users (system hosts), installers, developers, attorneys, and regulatory officials. To preserve confidentiality, individual and organizational names of stakeholders are not be listed here, but EPA wishes to thank all of those participating for helping to develop industry best practices and information that can be widely and freely shared in the market. The authors also acknowledge the individuals and organizations producing written materials that were helpful in the development of this draft white paper. Some of those materials are cited in endnotes and others in the accompanying bibliography.

Endnotes and Bibliography

Endnotes

[1] Third-party contracts, especially power purchase agreements (PPAs), are now the dominant structure for distributed C&I solar photovoltaic (PV) projects and have been widely used for several years. There have been efforts at standardization of PPA (and associated site lease) contracts for solar PV (e.g., Tioga Energy's annotated power purchase agreement (see endnote 2 below) and SolarTech's project finance templates (see endnote 3 below)), which are widely-known in the C&I PV industry, have likely reduced transaction costs and project uncertainty for PV, and do not yet appear to have been replicated for C&I SHC applications.

[2] For a representative contract for third--party financed solar photovoltaic (PV) transactions, see Tioga Energy's annotated model *SurePath™ Solar Power Purchase Agreement* at http://www.tiogaenergy.com/tioga-energy-resource/annotated-ppa (accessed August 4, 2012).

[3] See McFeely, David, SolarTech, *SolarTech Project Finance Contract Templates: SolarTech Guidelines for Power Purchase Agreement and Site Lease Agreement*, November 2009, http://www.solartech.org/index.php?option=com_st_document&view=general&Itemid=58 (accessed August 5, 2012). SolarTech provided EPA with permission to apply its dynamic and static concept for contract elements to this white paper, and its permission is gratefully acknowledged by the EPA.

[4] Parties should be aware that projects of $1,000,000 or less in capital costs are less likely than larger projects to allow for heavily-tailored contract negotiations because there is not enough project profit to justify the legal expense.

[5] Standards for construction and system testing should be static, but any construction schedule specific to a given SHC project would be dynamic.

[6] For information on the ratings, certifications, and standards of the non-profit SRCC for solar heating and cooling products, see http://www.solar-rating.org/ (accessed August 4, 2012).

[7] ASTM International and the International Association of Plumbing and Mechanical Officials with support from the U.S. Environmental Protection Agency are developing U.S. heat metering standards that could be used in certification of BTU meters for use in solar heating and cooling projects and other thermal energy generation technologies. See http://www.astm.org/standardization-news/outreach/epa-presents-heat-metering-framework-to-astmiapmo-partnership-ma12.html (accessed August 6, 2012).

[8] The EPA's Green Power Partnership has guidelines for end-users hosting on-site green electricity systems and purchasing off-site renewable energy credits that may be helpful in more fully understanding how ownership of environmental attributes intersects with end-user sustainability programs and public communications about such programs. See http://www.epa.gov/greenpower/buygp/solarpower.htm (accessed August 5, 2012), and http://www.epa.gov/greenpower/ (accessed August 4, 2012).

[9] However, O&M is often not the responsibility of the system owner in cases of non-output based leases, which are described in section 4 of the white paper. In such cases, O&M responsibilities can vary widely – from full owner responsibility to the lessor entering into a separate O&M agreement with the lessee to the host performing the system maintenance itself. This variation does not allow for a single O&M best practice for these transaction types.

[10] See Cliburn, Jill, Solar Electric Power Association, *Heating Up: The Impact of Third-Party Business Models on the U.S. Market for Solar Water and Space Heating*, January 2012, http://www.solarelectricpower.org/resources/publications.aspx#SWH_3rd_Party_Financing_January2012 (accessed August 5, 2012).

[11] See Cliburn, page 11.

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