



Promoting Solar PV on Leased Buildings Guide

Benefits, Barriers, and Strategies

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Disclaimer

This report should be viewed as a general guide to best practices and factors for consideration by end users who are planning or evaluating the installation of photovoltaics. A qualified professional engineer or firm should always be contracted to oversee any photovoltaic project.

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Introduction

To promote adoption of photovoltaics and other advanced cost-effective energy conservation measures for commercial buildings, the Better Buildings Alliance (BBA) and the U.S. Department of Energy's SunShot Initiative, are exploring strategies to support, expand, and streamline efforts to deploy solar photovoltaics (PV) on commercial buildings in the U.S. real estate market. Areas of key interest center on technical, economic, administrative, and legal barriers and opportunities to reduce costs of capital, lower operational risks, protect consumers, and increase efficient market activities. This guide outlines the benefits, barriers and strategies to installing solar on leased buildings. It incorporates information from solar industry interviews and project case studies.

The Better Building Alliance

The Better Buildings Alliance works to develop and deploy innovative, cost-effective, and energy-saving solutions for U.S. commercial buildings. The Better Building Alliance also seeks to promote adoption of advanced cost-effective technologies including photovoltaics. As of 2012, the Commercial Buildings Energy Consumption Survey (CBECS) estimates that there were 5.6 million commercial buildings in the United States comprising 87 billion square feet of floor space, and representing an increase of 14% and 21%, in the number of commercial buildings and floor space, respectively since 2003.¹

In September 2014, the Better Buildings Alliance Renewable Integration Project Team published the [On-Site Commercial Solar PV Decision Guide](#) for commercial buildings.² This team works with industry leading building owners and managers interested in integration of renewable technologies., Building on the work of the 2014 guide, this work is intended to serve as an additional resource to identify and address the specific solar PV benefits, barriers and solutions for leased commercial buildings. As such, these guides should be viewed as a complementary set of resources.

Green Leasing

The concept of a green lease has been tested and discussed for years; and while there is no distinct definition as to what constitutes a green lease, it is considered an effective mechanism for resolving legal/ownership challenges in the leased building market.³

The Institute for Market Transformation (IMT), with support from the Department of Energy's Better Buildings Alliance, has developed the Green Lease Leaders program to "move the field of green leasing forward by simultaneously setting standards for what constitutes a green lease and recognizing leaders in the green leasing field."⁴ The Green Lease Leader is a designation created to recognize companies or

¹ U.S. Energy Information Administration, A Look at the U.S. Commercial Building Stock: Results from EIA's 2012 Commercial Buildings Energy Consumption Survey, [http://www.eia.gov/consumption/commercial/reports/2012/buildstock/?src=%E2%80%B9%20Consumption%20%20%20Commercial%20Buildings%20Energy%20Consumption%20Survey%20\(CBECS\)-b1](http://www.eia.gov/consumption/commercial/reports/2012/buildstock/?src=%E2%80%B9%20Consumption%20%20%20Commercial%20Buildings%20Energy%20Consumption%20Survey%20(CBECS)-b1).

² On-Site Commercial Solar PV Decision Guide. U.S. Department of Energy Better Buildings, September 25, 2014. www4.eere.energy.gov/alliance/sites/default/files/uploaded-files/solar-decision-guide.pdf.

³ The California Sustainability Alliance has defined green leasing "as the integration of energy and water efficiency, emissions reduction, waste minimization and other sustainability objectives throughout the entire commercial leasing process." California Sustainability Alliance, Green Leases Toolkit, http://sustainca.org/green_leases_toolkit/what_green_leasing.

⁴ Green Lease Leaders, About the Program, <http://www.greenleaselibrary.com/about.html>.

brokerage teams that successfully implement green lease language into new or existing leases. This program has led to the creation of the Green Lease Library, which has been instrumental to providing green leasing resources for tenants and landlords.⁵ Although some of the resources mention the importance of renewables, none of them explain the benefits, barriers and solutions to incorporating solar PV onto a leased building.

Benefits of Installing Solar on Leased Buildings

In many cases solar PV benefits both landlords and tenants. However, the division of the economic and environmental benefits depends on the structure of the lease. In general, for commercial buildings, reducing operating expenses through the installation of a PV system can provide a hedge against escalating energy prices. Buildings may see lower costs of capital and higher market value because of this reduced risk. Additionally, when looking at all the building's revenue streams, solar helps to diversify revenue streams and can reduce the overall volatility of the property's income.

Solar Benefits for Landlords

- ▶ Reduced utility electricity consumption leads to reduced operating costs, and reduced exposure to volatility of energy prices
- ▶ Enhances marketability of the building
- ▶ Lowers occupancy costs which facilitates the ability to charge higher rent
- ▶ Improves tenant retention due to lower operating expenses⁶

Tenant benefits are very similar to the landlord benefits, however, the distribution of benefits vary depending on building lease structure.

Solar Benefits for Tenants

- ▶ Lowers electricity costs
- ▶ Stabilizes electricity costs
- ▶ Supports corporate sustainability goals
- ▶ Demonstrates environmental responsibility to employees and the community

⁵ Green Lease Library, <http://www.greenleaselibrary.com/>.

⁶ "The High Performance Portfolio: Energy Issues in Underwriting Properties." BetterBricks, November 2007, http://www.betterbricks.com/graphics/assets/documents/BB_WinTactics_EnergyIssues_Final.pdf

Barriers to Installing Solar PV on Leased Buildings

Although there are a number of benefits associated with installing solar on commercial buildings, a common misconception is that the barriers outweigh the benefits. In most cases the opposite is true. Depending on the electricity rate and the federal and state incentives available, the economic, environmental and marketing benefits of solar often outweigh the barriers to project implementation.

A number of factors impact the growth of the commercial solar market. The major obstacles are the lack of project standardization, high transaction costs, and leasing terms.

- ▶ Unlike the residential sector, standardized legal documents are not widely utilized within the sector, and standard sets of technical specifications, or processes to underwrite credit, do not exist.
- ▶ Even though projects within the utility-scale sector are not standardized, the system sizes are large enough that even smaller utility contracts can support the higher transaction costs.⁷ Within the commercial real-estate market, owner-tenant facilities in particular have an added level of complexity. In addition to understanding the terms of the lease and the site-specific characteristics of the facility, obtaining early indication of the relationship between the tenant and the landlord is crucial to project success.⁸

The Split Incentive

Under most net leases energy costs are paid directly by the tenants. As a result, building owners are not driven to invest in energy efficiency measures or solar PV systems. Typically, the structure of the commercial lease requires building owners to bear the cost of building capital upgrades, while energy savings from the efficiency or PV technologies are passed through directly to the tenants.⁹ Solar firms interviewed expressed that this “split incentive” was a barrier for both motivated parties.

Short Payback Requirements

Although PV solar systems typically have favorable return on investment (ROI) over the life of operation, many commercial building owners or tenants require short payback periods for investments. Renewable energy projects often have longer paybacks than energy efficiency measures or other capital investments. The “short payback” requirement becomes a barrier to installing solar for many buildings, not just leased buildings.

⁷ Greentechsolar, Why ‘Middle Market’ Commercial Solar Hasn’t Kept Pace With Other Sectors, February 10, 2015, <http://www.greentechmedia.com/articles/read/why-commercial-scale-solar-hasnt-kept-pace-with-other-sectors>.

⁸ Boswell, Peyton and Stofega, Joe, Commercial Rooftop Success: A Little Ballast and A Lot of Business Sense, http://www.solarindustrymag.com/issues/SI1501/FEAT_01_Commercial-Rooftop-Success-A-Little-Ballast-And-A-Lot-Of-Business-Sense.html

⁹ Rocky Mountain Institute, Built Environment: Tools and Resources, http://www.rmi.org/tools_and_resources#split_incentives

Timeframe Discrepancy between Building Lease and Solar PV System Life

Leading solar engineering, procurement, and construction (EPC) firms and building owners expressed that the length of the tenant lease prevents solar projects from proceeding on leased buildings. Thus, for solar projects where electricity is sold to tenants in the building, it is important to consider the term remaining on the tenant's lease. In most cases, the longer the lease, the easier the system owner will find project financing. Financing for PV systems often require a 15-20 year term, and so the power sales contracts should try to align with that contract term to minimize "power sales risk." Since many solar projects use third-party financing, the revenue from the sale of power to tenants is expected to pay back the financiers. If the tenant lease is shorter than the power sales contract, the risk of disrupting the revenue stream increases, and may require the building owner to cover the payment to a third party PV system owner in the case of a PPA during building vacancies.

Property Owner Creditworthiness

The solar developer providing the PPA will need assurance that the building owner is unlikely to default on the contract leaving the developer without a buyer of electricity. Ideally, property owners would have investment-grade credit ratings to minimize the risk for default for the PPA providers. However, many properties are owned by limited liability corporations (LLC), so only a few property owners aside from the largest companies can offer that level of publicly rated investment quality. For the project to secure financing, the parent company of the LLC will often need to be on the agreement.

Property Ownership Entity

The property ownership entity determines eligibility for the 30 percent Business Energy Investment Tax Credit (ITC).¹⁰ The ITC has no value to a company without income tax liability and many LLCs that own leased buildings do not have the liability to monetize the tax credit.

¹⁰ Department of Energy, Business Energy Investment Tax Credit (ITC), <http://energy.gov/savings/business-energy-investment-tax-credit-itc>.

The Tower Companies

Location: Washington DC

Portfolio Size: 23 kW DC

Energy Production: 37,500 kWh per year

Expected Payback: 5 years

Project Completion: December 2014

- ▶ The project aligns with the Tower Companies goal of being an environmental leader in the real estate industry. This solar project is the first private commercial multi-tenant office building in the District of Columbia to install PV. The office building is LEED Gold Certified Existing Buildings: Operations and Maintenance ("EBOM") and Energy Star certified with a current score of 86.
- ▶ The system was installed through a cash purchase using incentives such as rebates from SREC sales, accelerated depreciation and the 30% Federal tax credit. 75% of the initial project cost will be recovered in the first two years. The building is on a gross lease with a base amount of electricity included in the annual lease price.
- ▶ The Tower Company suggests installing a dashboard in the lobby to educate the public and offer scheduled project tours to landlords, tenants and others who wish to pursue this type of energy saving and successful investment.



Photo Credit: The Tower Companies

Additionally, for property held by a joint venture, obtaining partner approval can add complexity to the project. Solar PPA companies want building owners to backstop and guarantee the agreement in order to protect the Solar PPA company from building vacancy.

Strategies to Install PV on Leased Buildings

While many barriers to installing solar PV on leased buildings exist, companies are developing innovative solutions to address or overcome these challenges.

When solar is installed on a leased commercial rooftop, either the building owner or a third party owns the solar PV system. In most cases, the building tenant never directly owns the solar PV system. Although lifetime savings are often greatest with landlord PV system ownership, installing a system through third party ownership can eliminate some of the barriers to installing solar on a leased building. Under either ownership structure, a number of installation strategies exist and determining the approach that best meets your project needs is important to implementing a successful project.

Property Owner Owns PV System

Property owners that have the capital available to invest in a solar array can reap substantial financial and reputational benefits under a direct ownership model. Under this structure, several options exist for recouping the cost of the solar PV system.

► Include Electricity in Lease

Under a gross lease, a building owner can structure the agreement so that in addition to paying for building property taxes, insurance and maintenance, the building owner is also responsible for operating expenses, including utility bills. The lease can be structured to cover a certain amount of the annual electricity consumption (kWh/year), or all electricity consumed under a specified building occupancy density (# of people/ 1000 sq. ft.), as was the case for the retrofitted commercial office space project in Sunnyvale, California. A property owner can then invest in a solar PV array and receive the full benefits of the electricity cost savings. Reducing the owner's share of operating expenses raises the property's net operating income and supports higher appraised property value. Additionally, unlike energy efficiency measures, solar PV production is not dependent on tenant behavior.

Retrofitted Commercial Office Space

Location: Sunnyvale, California

Portfolio Size: 138 kW DC

Energy Production: 175,000 kWh per year

Expected Payback: Unknown, rolled into building retrofit cost

Project Completion: August 2014

- The retrofit building has an energy use intensity (EUI) of 22.5 and was fully leased before project completion. The 138 kW solar PV system was installed by Cobalt Power Systems Inc. and generates ~80% of the energy consumed by the building. It was installed as a cash purchase financed through a bank loan which funded the entire retrofit. The office space is leased out through a gross lease that includes a fixed amount of electricity each month and the cost of the PV system is recouped through increased rent.



Photo Credit: Sharp Development Company

► Sell Electricity to Utility through Feed-in Tariff (FIT)

If the building has a large roof, ideally situated for a solar PV installation but no electricity off taker, the opportunity exists in some markets to sell electricity directly to the utility through a Feed-in Tariff. In January 2015, Prologis announced the completion of four new solar projects totaling 4.2 MW and feeding directly into the Los Angeles Department of Water and Power electric grid as part of the utility's Feed-in Tariff program. Prologis developed and built the solar installation, which was then acquired by a renewable energy investment firm. Prologis has developed more than 110 MW of renewable energy across 25 million sq. ft. of real estate.¹¹ It is important to evaluate whether the local utility offers a FIT program before structuring a project in this way. If a FIT program does not exist, building owners can also sell electricity directly to the utility via a negotiated PPA.

► Sell Electricity to Community Members

Similar to selling electricity to the utility through a FIT or PPA, in some areas the building owner can make an arrangement with the utility to provide solar electricity for a community solar program¹². Under

BJ's Wholesale Club

Location: MA, MD, NJ

Portfolio Size: 5.5 MW DC

Energy Offset: 23% of portfolio consumption

Expected Payback: Cash Positive

Project Completion: 2013 and 2014

- SolarCity and Direct Energy partnered to provide nearly 20 solar PV installations for BJ's Wholesale Club facilities in Massachusetts, Maryland and New Jersey. Several locations also have solar powered batter storage, further reducing energy costs through demand charge savings.
- The installations were financed under a PPA in which BJ's buys the solar electricity produced by the solar arrays from SolarCity for an agreed upon price over the term of the agreement. The solar incentives, such as the Federal 30% Investment Tax Credit, were monetized by SolarCity and are reflected in a lower PPA price. Because the lower PPA price is less than current utility retail electricity prices, BJ's began saving money immediately and SolarCity expects BJ's to pay more than 10% below current utility rates for solar electricity.
- The building landlord required that the solar contract needed to either closely match the timeline of the building leases or include terms to mitigate any impact a timeline mismatch might cause
- BJ's recommends that other companies interested in solar PV that are involved in a lease determine the potential long-term increase in building equity. While there will always be some negotiation between landlord and tenant regarding shared risks, having a building with lower operating costs provides a competitive advantage to both parties.



Photo Credit: SolarCity

¹¹ Prologis Completes 4.2 Megawatt Solar Project with Los Angeles Department of Water and Power, http://www.solardaily.com/reports/Prologis_Completes_4_2_Megawatt_Solar_Project_with_Los_Angeles_Department_of_Water_and_Power_999.html

¹² U.S. Department of Energy, A Guide to Community Solar: Utility, Private, and Non-profit Project Development.

this type of agreement the PV system provides power and/or financial benefits to multiple community members by allowing utility customers to buy into a pool of energy from the facility. Some states have also created virtual net metering (VNM) policies, whereby customers can buy shares of community solar projects and use the portion of the project output that they purchased to offset their energy usage. As of 2014, VNM was available in 11 states (CA, CO, CT, IL, MN, MD, MA, NH, RI, and VT) and the Washington DC.¹³

► **Use Electricity to Serve Common Building Load**

Multi-tenant buildings across the country have common utility meters designated to common building loads, including electricity uses like shared corridor cooling and parking lot lighting. The property owner can invest in a solar PV array and receive the full benefits of the electricity cost savings by net metering the solar system to the common electricity meter and reducing the buildings operating expenses.

► **Sell Electricity to Tenants**

Under a net lease in which utility costs cannot be incorporated into the lease, the building owner installs a system on their building and sells electricity directly to their tenants (\$/kWh) through a landlord-tenant PPA. Theoretically this strategy could work, however, research did not indicate any projects that implement this kind of arrangement.

Third Party Owns PV System

Third party PV system ownership is a very common way to install solar on leased buildings. Having a third party that owns a portfolio of projects own the system can eliminate the short system payback requirement and introduces an entity that can definitely monetize the 30 percent Federal Tax Credit.

► **Sell Electricity to Building Tenant**

Under this structure, the third party sells electricity directly to the building tenant at a fixed or escalating electricity rate for a predetermined period of time. The agreement is often structured to match the

SunEdison Portfolio

Location: 13 States

Portfolio Size: 50+ MW across 160+ locations

Expected Payback: Cash Positive

Project Completion: 2007 - Present

- SunEdison partnered with a multi-national client who wanted to go solar on a portfolio of stores across the country. Over the last seven years, SunEdison has negotiated with numerous landlords (Kimco, Simon Properties, Prologis, Vernado, etc.) on their client's behalf, to install solar on over 160 sites.
- All PV systems have been installed on the roof. The client purchases the electricity from SunEdison through a PPA and all sites are cash flow positive from day one. A project requirement is that PPA prices beat utility rates by 10% for all electricity the PV displaces. At some sites, the PV meets 50-60% of load.
- A couple of project development barriers that are important to address upfront include maintaining the roof warranty and insurance requirements. SunEdison stressed the importance of educating the property owner about the benefits of solar so that they can become comfortable with the installation before construction begins.

<http://www.nrel.gov/docs/fy11osti/49930.pdf>.

¹³ Institute for Local Self-Reliance, Virtual Net Metering, 2014, <http://ilsr.org/virtual-net-metering/>

length of the building lease to eliminate the risk that the PV system wouldn't have a power off taker. Two of the solar companies that were interviewed for this guide described the establishment of national account clients using this strategy. In all cases, the building owner was involved in the process and gave approval to install equipment on their building. The solar PPA rate was lower than the building tenant's utility electricity rate, so the tenant saved money immediately.

► **Sell Electricity to Utility through Feed-in Tariff**

Under this structure the solar project developer funds, constructs, owns and operates the solar array and pays the property owner to use the space for the array. The property owner is ultimately renting out their roof but doesn't put any of their capital at risk and has no power purchase obligations. This strategy enables solar PV development on properties that contain a desirable resource such as a large rooftop area or open ground space, but cannot readily use solar energy on-site due to operational or constructional limitations. This strategy can also apply to buildings that have a roof area large enough to support solar production well in excess of an amount that could be used on-site. A property owner that is interested in a PPA but not eligible due to limited creditworthiness may also find the lease structure attractive as an alternative way to generate revenue.¹⁴

This strategy is very similar to the FIT strategy proposed in the "Property Owner Owns the PV System" section of the report, however, in this case a third party owns the system.

► **Sell Electricity to Tenant - Leases Roof from Property Owner**

Under a hybrid structure, from the property owner's perspective they enter into a roof lease, and from the tenant's perspective they enter into a PPA for electricity. This structure often occurs when the property owner controls the roof or ground space where the tenant wants to install their solar PV system and the property owner wants to receive compensation in exchange for giving up that control.

Next Steps

This is an evolving topic and the Better Buildings Alliance will continue address it. This guide will be updated periodically with new information. In addition, the Better Buildings Alliance will be collecting market data on the issues, publishing case studies and pursuing template lease language. Please check energy.gov/betterbuildingsalliance/renewables for updates

¹⁴ Binkley, Andrew. "The Real Estate Solar Investment Handbook: A Commercial Property Guide to Managing Risks and Maximizing Returns." First edition. New York: Routledge, 2014. Print.

Glossary

Community Solar: A solar installation that accepts capital from and provides output credit (kWh) and tax benefits to multiple investors. This can be an attractive option for many customers who want to go solar but do not have a good site for PV.

Double Net Lease: Tenant pays rent plus property taxes and insurance.

Feed in Tariff (FIT): A FIT offers a guarantee of payments to renewable energy developers for the electricity they produce. Payments can be composed of electricity alone or of electricity bundled with renewable energy certificates. These payments are generally awarded as long-term contracts set over a period of 15-20 years.¹⁵

Green Lease: Integration of energy and water efficiency, emissions reduction, waste minimization and other sustainability objectives throughout the entire commercial leasing process. Green leasing dictates that building performance become transparent to all parties involved in the lease transaction.¹⁶

Gross Lease: A type of commercial lease where the landlord pays for the building's property taxes, insurance and maintenance. A gross lease can be modified in a number of ways to best meet the needs of a particular building's tenants. A gross lease may or may not require the tenant to pay utility bills.

Single Net Lease: Tenant pays rent plus property taxes.

Solar Power Purchase Agreement (PPA): Financial arrangement in which a third-party developer owns, operates, and maintains the photovoltaic system, and a host customer agrees to site the system on its roof or elsewhere on its property and purchases the system's electric output from the solar services provider for a predetermined period.¹⁷

Triple Net Lease: A lease agreement that designates the tenant as being solely responsible for all of the costs relating to the asset being leased in addition to the rent fee applied under the lease. The structure of this type of lease requires the lessee to pay for net real estate taxes on the leased asset, net building insurance, net common area maintenance and all building operating expenses.

¹⁵ National Renewable Energy Laboratory, Feed-In Tariffs, http://www.nrel.gov/tech_deployment/state_local_governments/basics_tariffs.html

¹⁶ California Sustainability Alliance, What Is Green Leasing? http://sustainca.org/green_leases_toolkit/what_green_leasing.

¹⁷ United States Environmental Protection Agency, Solar Power Purchase Agreements, <http://www.epa.gov/greenpower/buygp/solarpower.htm>

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