ROOFTOP ROI:

Solar panels can add more cash flow to industrial square footage

By **Brian Leavitt**

Director of Electrical Engineering

The operational success of any warehouse or industrial real estate requires the leverage of every square foot. The initial planning of structural columns, product racking, aisle spacing, and product circulation are vital. Creative strategies that leverage more cashflow from the same square footage can provide a business advantage.

Roof-mounted solar photovoltaic systems offer the best opportunity to leverage your roof's square footage to generate passive cashflow.

The spacious, low-slope, uninterrupted expanse characteristic of industrial and warehouse roof area offer an ideal investment opportunity for renewable energy systems, while also offering environmental solutions.

Adding a solar photovoltaic system can reduce or eliminate electrical utility expense and demand rate costs, and are eligible for public support incentives. Depending on the situation, they can also be installed with little or no initial capital costs for the property owner and may generate lease revenue.

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The finances of a project can be structured in different ways. The following finance and partnership structures are popular:

Direct Renewable Energy System Investment

With direct investment, the property owner directly invests in the cost of the system—design, permitting, installation, and maintenance. The owner also reaps the benefits, which include:

- Reducing or eliminating utility energy use costs
- Reducing or eliminating demand rates
- Taking depreciation of the capital assets
- Tapping into public support incentives (as eligible)

Power Purchase Agreement (PPA)

A power purchase agreement, or PPA, is a financial agreement between a developer and the property owner. The developer typically provides for the design, permitting, financing, installation, and maintenance of the renewable energy system with little or no cost to the property owner. In exchange, the property owner buys electricity from the developer at a predetermined cost, typically less than local utilities rates, for the term of the agreement—typically 20 to 25 years. At the end of the term, there is an option to renew, remove the system, or buy it from the developer. Examples of PPA investors include utility companies, renewable energy developers, insurance companies, and venture capital. The benefits:

- Limited or no initial capital costs for the property owner
- Reduces or eliminates dependency from the local utility
- Reduces or eliminates utility demand rates
- Fixed utility rates from developer

Lease agreements

In a financial agreement between a developer and the property owner, the developer typically supplies design, installation, and maintenance of the renewable energy system like a PPA agreement. The property owner receives rent revenue for the roof space from the developer. The developer sells power and carbon credits to the property owner, utility company, or third-party customers. The benefits:

- Limited or no initial capital costs for the property owner
- Lease revenue (lease rates approximately $1 to $3 per square foot)

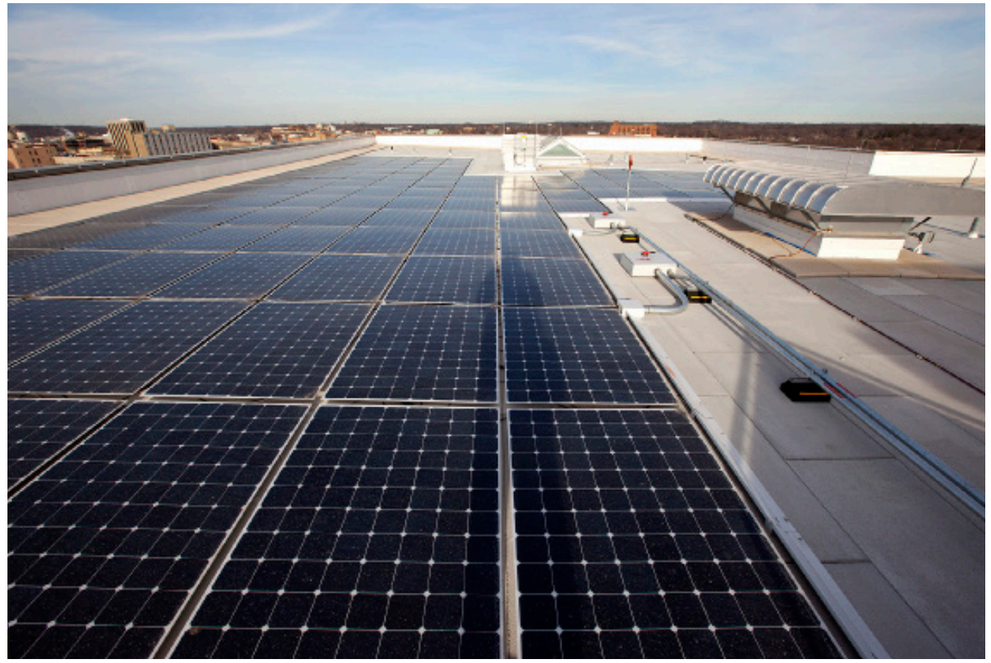
An introduction to Public Support Incentive

Businesses are eligible for Federal Solar Tax Credits if the solar energy system installation begins between 2023 and the end of 2033.

The Investment Tax Credit (ITC) reduces federal income liability based on a percentage of the system cost. A base credit of 30% is available when prevailing labor requirements are satisfied. A 10% bonus is available for domestically sourced project materials. An added 10% bonus is available for development in brownfield sites.

The Production Tax Credit (PTC) reduces federal income liability based on the electrical energy generated by the solar renewable systems for the first 10 years of system operation. The incentive includes $0.0275 cents per KWH produced and is adjusted annually for inflation.

Other potential incentives include state or local incentives, accelerated depreciation, bonus depreciation, and revenue from the sale of renewable energy certificates. Refer to guidelines from the U.S. Department of Energy's Office of Energy Efficiency & Renewable Energy for more information.



Initial self-assessment for direct investment

An initial self-assessment can offer insights before you decide if a complete evaluation is right for you. The National Renewable Energy Laboratory has online tools to help with initial feasibility. IMEG also hosts a rapid analysis tool to assess rooftop potential and payback. For example, by aligning competitive bidding and incentive structures, 100,000-sf of rooftop solar PV can generate over $200,000 income each year with a 10%+ return on investment.

Conduct a complete evaluation if potential exists

If your self-assessment shows potential for your project and you wish to proceed with a full evaluation, a professional engineering consultant can perform a complete, non-biased, site-specific feasibility study, evaluate other incentives, and eventually design the system.

The engineer can positively impact the interests of the entire project, and should operate independent from any potential vendors.

Example of rooftop potential and payback*

Roof Area: Total area of roof in square feet

Roof Coverage Ratio: The typical net usable roof area considering equipment setbacks from the building edge, roof mounted obstructions, and maintenance service spaces between solar panels

KW/SF Roof: Determine the size of the solar array based on typical panel performance per square foot

KWH/KW: Determine the typical annual KWH production of energy based on the system size in KW

Example: St. Louis-based facility with 50,000-sf roof space

System Energy Cost Savings = Roof Area (square feet) **x 0.75** (Roof Coverage Ratio) **x 0.0154** (KW/SF of roof) **x #### KWH/KW** (Source: U.S. Department of Energy) **x utility rate $/KWH**

Calculations:

50,000-sf roof **x 0.75 x .0154 x 1700** (St. Louis DOE chart) **x $0.11/ KWH = $107,992 energy savings per year**

System size: Roof area (square feet) **x 0.75** (Roof Coverage Ratio) **x 0.0154** (KW/SF of roof)
Example: 50,000-sf roof x 0.75 X .0154 = 577 KW (system size KW)

System installation costs: $2,750 per KW x system size KW (1000 Watts = 1KW, using a cost of $2.75 per watt)
Example: $2,750 x 577KW = $1,586,750

Simple Payback: $1,586,750 / $107,992 = 14.7 years

Simple Payback with 30% ITC program incentive: $1,586,750 X 0.7 / $107,992 = 10.3 years

Simple Payback with 50% ITC program incentive: $1,586,750 X 0.5 / $107,992 = 7.3 years

* Potential savings not included in self-assessment: Utility demand charges, state and local incentives, accelerated depreciation, bonus depreciation, renewable energy credits, etc.

Courtesy: U.S. Department of Energy Consumer's Guide: Get your Power from the Sun

A consulting engineer should also be able to review and offer recommendations on:

- Utility energy rates, demand charges, and fees
- Implications to incoming electricity service
- Federal, state, and local incentives
- Building envelopes and shading by solar panels to reduce facility cooling loads

Ask if they can also provide additional technical expertise including:

- Structural analysis
- System performance maximization, panel orientation, shading evaluation, and FAA glare evaluation near airports and heliports
- Design, code compliance, best practice guidelines, and project specific solutions
- Life cycle analysis
- Energy storage evaluation
- Project bidding and bid evaluation
- Construction oversight of contractor installation, system setup, and commissioning
- Aligning the project design with owner objectives

All these considerations can empower decision-making and positively affect the project outcome.

Learn how a solar photovoltaic analysis helped Cummins, Inc., in Columbus, IN, take its first step toward a goal of installed 75 MW of solar PV in the U.S. by 2030.

Contact the author

Brian Leavitt
IMEG Director of Electrical Engineering
Technical Operations
309.793.3369
brian.j.leavitt@imegcorp.com

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