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How to install solar panels on city-owned property and lead by example

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City governments have an opportunity to lead by example in the shift to clean energy by taking advantage of the physical assets that they have most control over: their own land and buildings. Installing solar photovoltaic (solar PV) panels on city-owned property employs underutilised space to reduce energy costs, and can even generate a return. It also supports local jobs and increases energy security. This article summarises the steps and options that a city must consider to lead on solar implementation.

Set a city-wide goal for 100% clean energy by 2050

A highly visible target helps to gather momentum and provides an opportunity for the city government to take the lead in meeting it. This goal should, at a minimum, encompass clean energy consumption by local government operations, and ideally by the city as a whole. It is usually set as part of a road mapping process.

To meet the Paris Agreement goal of restricting warming to 1.5°C, cities should aim for 100% city-wide clean electricity by 2035, and 100% clean energy (including electricity, heating, cooling and transport) by 2050.

Find out more about why it is worthwhile to make these bold commitments, and the local benefits that will help you win local support.



Durban and Marseille are taking action now

The city of Durban took the first step towards achieving its target of 100% clean electricity by 2050 with the Energy Office Solar project, which installed 300kW of rooftop photovoltaics on five city-owned buildings.¹ The installation will save the city an estimated US\$ 44,300 a year in energy costs.²

Marseille is taking steps towards its target of becoming carbon neutral by 2030 and has set a target of developing 15MWc of photovoltaic production on municipal assets. The city is undergoing a renovation of its 480 public schools which it has identified as ideal sites for solar panels given their intermittent energy demand. To date, solar panels have been installed in 60 schools, part of the €1.5 billion Schools Plan aimed at modernizing 470 schools over the next decade and fitting them with clean electricity infrastructure.³ The Council of Europe Development Bank (CEB) has signed a €200 million loan agreement with the City of Marseille to fund this major renovation.⁴

Create an inventory of city-owned sites and their solar potential

Santiago's Solar Public Roofs Program

Taking advantage of a \$1 million investment by the Chilean Ministry of Energy, Santiago developed 18 solar PV projects on public schools, hospitals and other symbolic buildings. These projects have a total capacity of 1.1MW and are generating 1.47GWh of electricity per year.

Solar PVs cannot be installed everywhere. The technology is best suited to large rooftops that are flat or face the sun, are not shaded, and are structurally sound. There may also be potential for installing solar PV arrays on other municipal assets such as landfill sites or covered car parks. Cities need to identify the locations where solar installations are suitable as a first step towards installing solar panels on city-owned property.

Cities should create an inventory of appropriate sites to assess the total potential for municipal solar generation, and which sites should be targeted first. Read [Solar PV on municipal buildings: a guide to feasibility and financial analysis](#) to find details of how to conduct this assessment, as well as an analysis tool and short video clips that explain how to use publicly available programmes such as Google Earth to aid this process. The National Renewable Energy Laboratory's PVWatts calculator is a publicly available tool which can be used to estimate the energy production potential of grid-connected solar PV panels around the world. The United States-focused [Guide to implementing solar PV for local governments](#) can also help with this process.

Informed by this inventory, linked to the overarching clean energy goal, cities can set  English and achievable target for installing solar PVs on municipal property. Usually, cities begin implementation by targeting large municipal office buildings and institutions, such as schools and hospitals.

Curitiba's Solar Pyramid Project utilises a deactivated landfill site to supply clean energy to public buildings

While the main source of electricity in Curitiba is hydroelectric, recent droughts have increased reliance on gas and coal to make up the shortfall. The Caximba landfill on the city's outskirts was active from 1989 to 2010, having filled 12 million tons of waste, but thereafter was a deactivated site and underutilized land. The Solar Pyramid project's 8,500 solar panels have delivered 8MW of installed energy capacity across Curitiba's bus stations and landfill sites. It is expected to reduce CO₂ emissions by 90,000 tonnes in the period until 2050 (equivalent to taking over 20,000 cars off the road for a year) and generate over US\$ 500,000 in yearly savings accrued from replacing electricity usually purchased from the grid with solar energy production.

In 2022 the national government of France passed legislation requiring all large carparks to be covered by solar panels

The law degrees that new and existing car parks with space for 80 or more vehicles must be covered by solar panels. Those car parks with between 80 and 400 spaces will have five years to implement the measures, and those with more than 400 spaces, just three years to comply. From these changes, the French government believes up to 11GW of power could be generated.

Determine the most suitable ownership and financing model

Despite the rapidly falling cost of solar technology, financing is often the biggest challenge to implementing a municipal solar plan. Cities have a range of business model options to overcome this barrier, distinguished by who owns the asset: the city itself or a third-party investor. These are summarised below.

Cities must weigh up these financing and ownership options, taking into account upfront capital costs and expected payback over the lifetime of the installation. National and local regulations, including on whether third-party ownership is permissible at all, will determine the type of possible financing structures. You can find more detail and advice on the models outlined below in the C40 Clean Energy Business Model Manual.⁵



Direct ownership

The city purchases the solar system using its own funds, grants from national or regional government, or by borrowing money using municipal bonds. This was the approach taken by the Brazilian city of Boa Vista, and the English city council of Berkshire for example.

Direct ownership allows the city full control over the benefits of solar, but is dependent on the upfront capital being available, or the financial, legal, and political ability to issue bonds. In most cases, the city also shoulders the full risk of constructing and operating the solar system.

Direct ownership may be a city government's only option if the regulatory framework necessary to enable more elaborate business models is not in place.

Third-party ownership using a power purchase agreement or lease

The city government enters into a contractual agreement with a private developer, who provides the upfront investment for the solar system.

These models can allow the city to install solar power with no upfront capital costs and no impact on their balance sheets.⁶ In some jurisdictions, third-party ownership models also allow the project to benefit from tax incentives only available to private investors, bringing the cost down for all parties. Third-party ownership models are better suited to larger scale projects because the legal and due diligence costs for investors can be high. City governments should consider projects across multiple sites to increase the project scale.

Power purchase agreement for solar energy in Washington DC

The Washington DC District Government in the United States entered into a 20-year agreement to purchase energy produced by 10.9MW of solar projects across 35 municipal sites. The solar arrays are financed, owned and operated by a private developer, Sol Systems.

Lease arrangement brings solar arrays to Kansas

In 2013, the city of Kansas, Missouri, in the United States installed 1.45MW of solar arrays across more than 60 municipal buildings. These included office buildings, fire and police stations, and community centres. These arrays were financed through a lease, so the city had no upfront costs to pay. The systems saved the government a combined US \$40,000 in electricity costs in their first year of operation.

The two core models of third-party ownership are power purchase agreements, or arrangements. Local governments considering third-party ownership should consult with experts on what is viable in their regulatory setting.

In **power purchase agreements (PPAs)**, the municipality signs a long-term contract committing to purchase power produced by a solar installation owned by a third party. This contractual commitment allows the private developer to raise finance from investors for the upfront installation costs. The investors own the solar system, while the municipality benefits from cheaper, cleaner and locally-produced renewable electricity.

In **lease arrangements**, a third-party developer finances and installs the solar system on a public site and leases it to the municipality for a fixed fee. The municipality is either responsible for operating and maintaining the system, or signs a contract with the developer or a third party to provide these services. Leasing can be a good option where PPAs are not permitted by local regulations because the whole system is leased, rather than power being sold.

Develop a stakeholder engagement plan and release a request for proposals to solar vendors

Before beginning procurement, develop a strategy for identifying and partnering with important local stakeholders, such as utility providers or environmental non-profits. These partners can be extremely helpful in marketing the initiative so that it receives maximum public exposure, local support and builds momentum to encourage other parties to invest too.

Suppliers or installers of solar technology should be vetted and selected through a transparent request for proposals process. By including a strong preference for local firms, you can increase the benefits of solar projects by promoting local job creation. Read *How to win support for local clean energy* for more details. Consider whether the city would prefer to be responsible itself for ongoing operations and maintenance of the solar systems; if not, this should be included in the contract for external providers.

Monitor system performance and promote benefits with the public

Once the solar systems are installed, measure how much electricity is being generated, how much money is being saved, and the carbon emissions avoided. These indicators are essential for evaluating the programme's success and for justifying further investment in city-owned clean energy.

Clear indicators are also valuable tools for communicating the benefits of solar energy to the public, encouraging individuals, businesses and institutions to install or access energy produced by solar projects. Read further guidance for incentivising and facilitating the installation of solar PV by residents and businesses.



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