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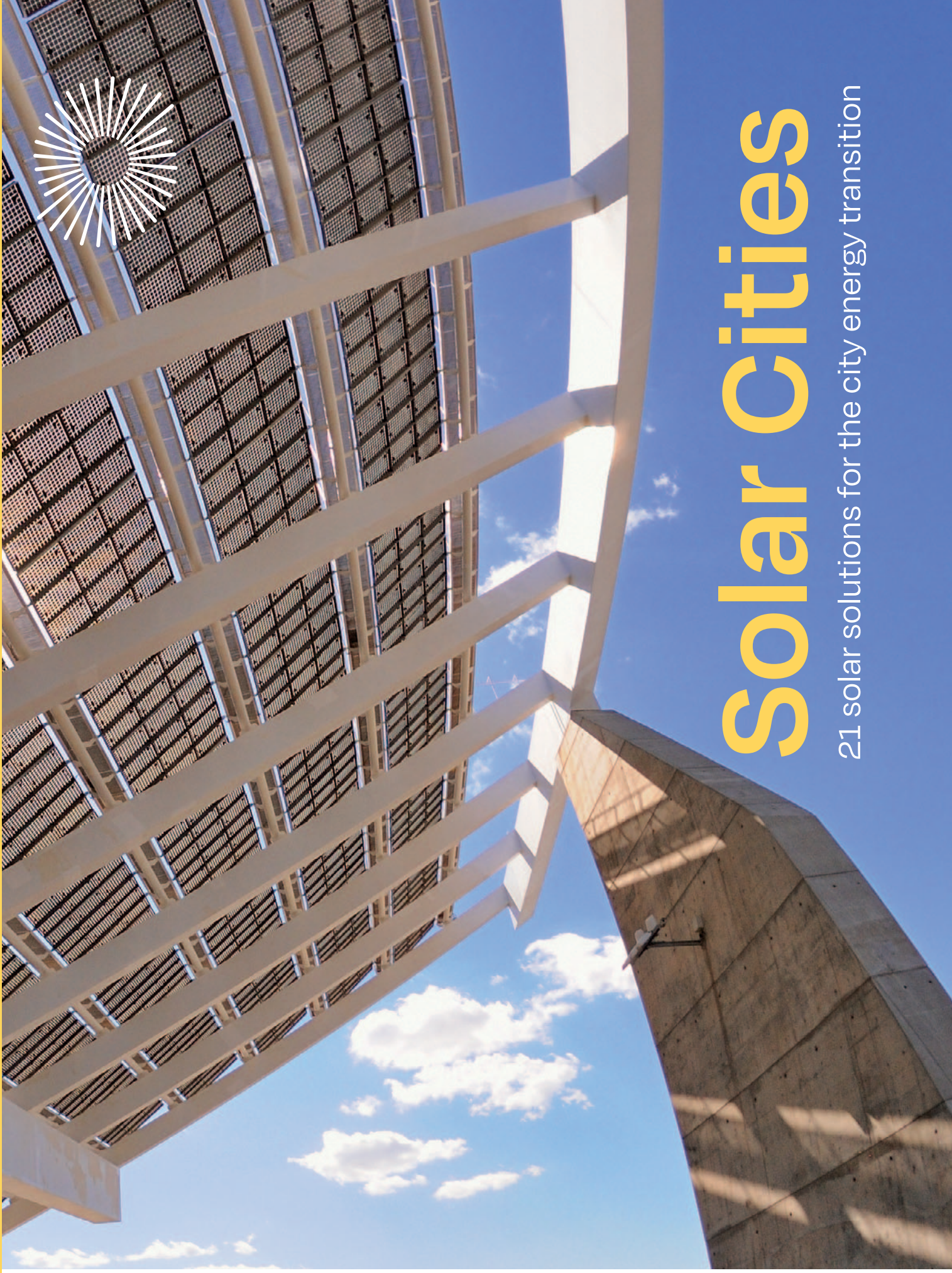

Solar Cities

21 solar solutions for the city energy transition

SolarPower Europe

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Solar Cities

21 solar solutions for the city energy transition

SolarPower Europe

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Please cite as: SolarPower Europe (2023): Solar Cities - 21 solar solutions for the city energy transition.

Published: June 2023.

ISBN:.9789464669060

Thanks to our sponser members:

Design: Onehemisphere, Sweden, contact@onehemisphere.se.

Cover image: Parc del Forum, Barcelona, Spain © Christian Bertrand/Shutterstock.com

Foreword

In Ancient Greece, the city state revolutionised governance, and brought democracy to Europe. Today, cities and local authorities are at the forefront of another profound revolution – the energy transition. Just as the people and authority intertwined in ancient city states, now the city's proximity to its citizens means rapid routes to deliver local, affordable, renewable energy.

Cities are facing important challenges, but also great opportunities. They consume the bulk of Europe's energy – and emit the bulk of the continent's greenhouse gases. However, cities are often Europe's frontrunning climate actors, with higher ambitions than their national governments.

In this context, solar power can play an important role by providing sustainable solutions for cities, and communities that want to embrace a rapid transition to a net-zero energy system.

Fundamentally, solar power is a local energy source, delivering power directly to households, industrial and commercial buildings, and public facilities. Solar directly empowers citizens to master their energy, develop energy communities, and reduce their electricity bills. Ultimately, solar has become crucial in fighting energy poverty, and fostering a just transition for all citizens.

But the road to reaching our targets is still long. To be on track for a fossil-free energy system by 2040, the European Union will need to double its installed solar capacity by 2025, and reach the terawatt level by 2030. To achieve this goal, the solar industry needs the right enabling framework, and commitment from all market players, for a fast, secure and sustainable energy transition.

Here, cities and local authorities will be key in facilitating solar deployment and guaranteeing energy sustainability and security, e.g., via integrated spatial planning or solar rooftop mandates, by helping citizens and communities access financing, or by developing industrial clusters on their territories.

We firmly believe that solar can help cities, and cities can help solar, with cities becoming the next frontier for solar deployment. We have witnessed dramatic decrease in the cost of solar technologies in the past few years, making solar accessible for all, and a perfect candidate for re-powering our cities, local communities, and citizens. Solar offers a fast, easy-to-deploy, and local solution to the energy crisis. It's unsurprisingly then, that the 33 cities and authorities in this report have chosen solar as the main renewable technology to power their citizens, administration, and businesses. Woven through 21 key technical and regulatory solutions, these vanguards can serve as a blueprint, and inspiration to other cities, and solar developers.

We have the technology and the local will to succeed in the energy transition – let's get ready for solar cities!

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Introduction

Around 80% of energy consumption in the European Union is linked to urban activity. Cities and public authorities are on the frontlines of the climate, geopolitical, and price crises facing Europe. Across the continent, city actors are driving the forefront of the energy transition, committing to ambitious climate-neutrality objectives, and investing heavily in the decarbonisation of transport, energy, and buildings through renewable electricity.

With three quarters of the European population living in urban areas, the bulk of energy consumption is happening on cities' territory. The number of people living in cities is constantly growing, and together, the city's demand for sustainable electricity, transport, heating, and cooling. The relationship between cities and their inhabitants feels more tangible than most levels of government. So, cities set the perfect stage for the energy transition. Cities have incredible potential to empower the daily of lives of citizens through the energy transition. And, it's a two-way street, cities are often committed to higher targets than their national governments in terms of renewable energy, and climate change mitigation.

Furthermore, the electrification of heat in building and districts, via large-scale heat pumps powered by solar and wind, opens significant market opportunities for solar project developers. With their proximity to citizens, cities and local authorities also play a crucial role, and can prove a positive influence on their citizens, or even other municipalities.

Ultimately, solar can support cities, and cities can support solar. On this basis, we would like to strengthen the cooperation of the solar industry with the cities and local authorities' networks. We also want to showcase best practices, and accelerate the deployment of solar at the local level.

However, cities still face challenges in deploying renewable energy, and solar PV in particular. Cities combine large electricity consumption with limited space, which impacts access to eligible solar surfaces. As public actors, cities are also subject to public procurement rules, which sometimes contradicts with the sourcing of local energy. Municipalities can also face difficulties accessing electricity markets, due to a lack of data and expertise, in addition to heavy administrative burdens. Lastly, citizens might sometimes be excluded from the energy transition for financial and geographical reasons, a lack of space, or because of an information deficit.

This report presents **21 Solar Solutions** which demonstrate how cities have tackled these challenges, and proposes concrete solutions to deploy solar - above and beyond rooftop applications.

These solutions are developed with the objective of helping cities support solar, and solar support cities.

These solutions can be used, and replicated by cities and solar developers, to facilitate the deployment of solar PV at a local level.

Solar models for cities, local authorities, and their citizens

1

© Martin Bergsma/Shutterstock.com

Deploying solar power in cities goes beyond private rooftops. When it comes to providing access to solar power to citizens, municipalities and solar projects developers have developed several business models to adapt to the size, location, and characteristic of local communities. Each model provides flexibility for citizens' involvement, both as producers and consumers of renewable energy.

One of the biggest challenges that cities are facing is the limited area to deploy solar projects, and sometimes the difficulty for citizens to engage in the energy transition. This difficulty arises from a lack of rooftop space and upfront costs.

To address these challenges, this section explores different solar models, from individual self-consumption, to energy communities, and Power Purchase Agreements. It also outlines what model is appropriate to a specific situation, with a certain technical potential, and the desired level of citizens' engagement.

Self-consumption

When it comes to solar installations, the typical example is private ownership of PV panels. These panels generate their own electricity, and sometimes, use the electricity grid to balance the excess production, or additional consumption needed. In this application, municipalities can play a role by either mandating the installations of solar panels on existing and new private buildings, or by installing PV panels on new buildings owned by the municipality, such as social housing.

>> Setting Solar Rooftop Standards
Solar Solution nr. 14

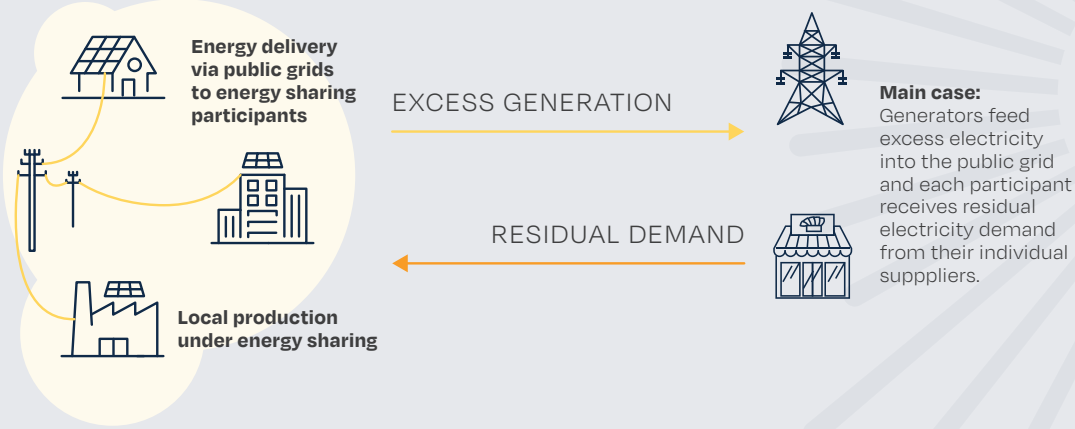
Energy sharing

In European cities, most citizens live in multiapartment buildings, and sometimes do not own their apartment or their rooftop. Even if they own the roof of their stand-alone building, it may not be suitable for solar PV. This creates difficulties for individual self-consumption. Energy sharing regimes provide a solution to this challenge. It allows PV owners to sell unneeded electricity to neighbours above wholesale market prices but below supplier rates. It's a win-win for all participants. When used locally, it can contribute to efficient load management, reducing strain on electricity grids.

The EU Renewable Energy Directive 2018/2001 introduced self-consumption, allowing customers to generate and use renewable electricity within a specific location. Energy sharing now allows consumers and generators to share renewable energy beyond building premises. Participants share energy through the public grid, while maintaining contracts with their electricity suppliers. Electricity which is not needed by all energy sharing contract holders can be sold on wholesale markets or through agreements. The proportion of energy shared, with whom, is agreed upon by participants, and communicated to the Distribution System Operator (DSO) for the calculation of the shared energy.

>> Energy Sharing
Solar Solution nr. 4

FIGURE 1 ENERGY SHARING



1 Solar models for cities, local authorities, and their citizens / continued

Energy communities

Energy communities can facilitate the active participation of people in the energy transition at the local level. Joint purchase of modules and installation services for communities could also generate economies of scale. Energy communities are legally organised entities, focused on collective decision-making and governance structures. They are controlled by local shareholders or members, and prioritise value over profit, as per the European Commission Electricity Directive 864/2[1]. In contrast, energy sharing does not specify organisational requirements.

>> Energy Communities
Solar Solution nr. 5

Co-funding of solar PV projects

Cities provide a direct interface with citizens; they are the administrative level which is often the closest to the local population. In this process of financing individual and collective projects, regions and local energy agencies can play an important role as an intermediary authority, and facilitate access to national and EU funding. When public funding is limited, municipalities and local authorities can also develop initiatives for enabling innovative funding mechanisms such as crowd-funding.

Crowd-funding refers to the practice of raising funds for a project, venture, or cause by collecting small contributions from a large number of individuals, typically via an online platform. In the context of renewable energy projects, crowd-funding involves soliciting financial support from a broad group of individuals to finance the development, installation, or operation of renewable energy initiatives.

>> Co-funding Solar
Solar Solution nr. 9

>> Facilitating Citizen Fund Access
Solar Solution nr. 11

Distant self-consumption

Individual self-consumption or energy schemes can sometimes be limited because of an availability of rooftops, or the complexity of defining such schemes. In order to respond to these challenges, some cities have chosen to locate the solar production site beyond the borders of the dwelling units, and offer schemes for distant self-consumption. This is facilitated with the installation of net-metering for PV projects, and the electricity prosumer.

Peer-to-peer trading, also known as virtual energy sharing, involves the virtual exchange of electricity between consumers, through predetermined contractual conditions. Some countries like Lithuania, Belgium, and Slovenia, have variations of energy sharing known as 'virtual net billing,' where consumers can deduct off-site generation from their on-site consumption, regardless of location. Regular grid tariffs usually apply in such cases. This allows individuals to benefit from solar installations at their vacation homes while working in the city, or own shares in a power plant located far away. The electricity generated by the power plant is credited to the consumer's balance, and any difference between their consumption and generation is settled with the supplier on an annual basis.

>> Distant Self-Consumption
Solar Solution nr. 6

Power Purchase Agreements

Large municipalities often benefit from large rooftop areas on public buildings. However, the growing demand for renewable electricity from citizens, often forces cities to look for new spaces for PV installations. Therefore, cities have developed solutions in areas beyond the city's borders, or in private spaces. To maximise the potential of PV in these areas, some municipalities are calling for Power Purchase Agreements between communities and the private sector.

A renewable Power Purchase Agreement (PPA) is a contractual agreement between an electricity generator and a power purchaser. Under a PPA, the generator agrees to sell a specified amount of electrical energy over a predetermined period, at an agreed-upon price. PPAs are commonly used in the renewable energy industry to facilitate the development and financing of renewable energy projects. They provide long-term revenue stability for the generator, and often allow the purchaser to secure a reliable, and cost-effective source of renewable energy. PPAs can be structured in various ways, including through fixed-price agreements, indexed agreements, or agreements with escalating prices over time.

>> Power Purchase Agreement
Solar Solution nr. 10

Solar Serving Cities

2

Monument to the Sun, Zadar, Croatia.

A: Solar Driving City Climate & Energy Security Goals

Cities have important energy and electricity needs. Whether its public buildings, transport, street lighting, there are many ways that municipalities could benefit from solar electricity; the production curve of solar PV often matches the electricity demand of the administration. In parallel to these growing electricity needs, an increasing number of cities are aiming to decarbonise their building stock, and their energy supply. Solar PV is the perfect solution for cities to reach their energy goals.

When it comes to deploying solar PV installations, one obvious candidate for cities and local authorities are their public building stock. On top of local governmental buildings, cities also have schools, swimming pools, libraries – all which typically benefit from large rooftop surfaces. The installation of solar PV on municipal buildings not only helps cities deliver their goals, but leads its population by example. Such schemes can be encouraged via solar rooftop mandates or by innovative tariffs schemes.

However, cities are also facing challenges to use solar energy: in historical centres of cities, solar projects risk conflicting with architecture and historical heritage conservation. The capital-intensive investment in solar technologies might also deter certain municipalities from making the necessary leap to solar energy.

Cities and solar developers have therefore developed solutions to integrate solar PV in the urban landscape – on rooftop and beyond. This section highlights projects where cities and municipal buildings can benefit from solar PV to reach their decarbonisation goal, reduce their energy bills, and protect their architectural heritage.

Solar Powering Public Buildings

Solar Solution nr. 1

BRUSSELS, Belgium - SolarClick Programme

Grand Place Brussels.

© Francisco Conde Sánchez

The SolarClick programme was launched in the Brussels region in February 2017. The programme's objective was to increase the installation of solar panels on government buildings to support its climate goals. The region wants to reduce its greenhouse gas emissions by 30% by 2025 (compared to 1990), and double the renewable energy production by 2020 to 4% (from 2% in 2013).

The programme was founded under the Climate Fund, and set up by COBRACE (the Brussels Code of Air, Climate and Energy Management). The programme has a budget of EUR 20 million over 4 years (2017-2020).

The goal is to install solar PV panels on 85,000 m2 of public rooftops (schools, hospitals, administrative buildings, etc.) by 2020. This will allow decreasing CO_2 emissions of around 5,500 tonnes. SolarClick was launched in parallel with the NRClick initiative. NRClick is an energy accounting services supported by various analysis and technical intervention service, aiming to rapidly reduce the energy (gas and electricity) consumption in buildings. This program has a budget of 7 million euros over 4 years (2017-2020).

Source: International Energy Agency

Solar Powering Public Buildings
(continued)

Solar Solution nr. 1

CASCAIS, Portugal - Greenvolt Comunidades 'Inclusive Communities program', Bicesse Kindergarten

Bicesse Kindergarten. © Greenvolt

As part of its 'Inclusive Communities program', the independent power producer Greenvolt has introduced an energy sharing scheme through a partnership with Santa Casa da Misericórdia de Cascais (SCMC), a social institution which operates a kindergarten in the municipality of Cascais.

This project includes an upfront investment made by Greenvolt for installing PV panels in the rooftop of SCMC's kindergarten (Creche de Bicesse), corresponding to **73 kW,** which covers more than 50% of the kindergarten's daytime electricity consumption. The surplus energy generated, such as on weekend days or in holiday season, will be shared for free with up to 60 households confronting energy poverty, and which are located within a 2 km radius of the kindergarten.

The benefits for the different stakeholders are multiple:

- The kindergarten has an immediate reduction in its electricity bill without any upfront investment - for the self-consumed energy, it will pay approximately 57% less than the average retail tariff.
- Certain vulnerable families within a 2km radius of the project and which are identified by SCMC will benefit for free from the surplus energy shared by SCMC. The energy company Greenvolt is expected to achieve an internal rate of return in line with its usual business.
- Finally, the society as a whole will benefit from the project, which will produce 127 MWh/year of renewable electricity and will enable annual savings of 34 tonnes/year in CO_2 emissions.

In terms of legal setup, this project involves a contract between SCMC and Greenvolt according to the responsibilities defined below. In addition, it is necessary to register the project through a permitting process with the Portuguese Directorate General for Energy and Geology.

Greenvolt supports the financing, installation, operation, and management of the PV facility. It is also responsible for carrying out the permitting process, the management of the energy sharing, paying the grid fees to the grid operator, and defining how the surplus energy should be shared with the families benefiting from the free energy.

The SCMC commits to pay Greenvolt an 'energy-as-a-service fee' with respect to the self-consumed energy for 25 years. It is also responsible for communicating which families are benefitting from the free surplus energy, to Greenvolt.

Source: Greenvolt / SolarPower Europe

Solar Powering Public Services

Solar Solution nr. 2

LONDON, UK - Square Mile PPA

City of London, seen from Tower Bridge.

Iconic London landmarks including Tower Bridge, Hampstead Heath, and the Barbican Centre will be powered by renewable electricity from a new solar farm in Dorset. The City of London Corporation, which owns these sites, governs the capital's Square Mile global financial centre.

The City Corporation is also a major London public services provider, running schools, social housing, open spaces, and wholesale markets across the capital. They will all receive electricity from the solar site. Its historic buildings at Guildhall, Smithfield Market, and the Old Bailey will also run on the sustainable energy supply.

In 2020, the City Corporation agreed a £40 million deal with international energy provider Voltalia to buy all the electricity produced by the new solar farm for 15 years. The facility was recently completed, and is providing over half of the City Corporation's electricity as of 1 January 2023.

The Power Purchase Agreement (PPA) is the first of its kind in the United Kingdom to be signed directly between a renewable producer and a governing authority. With over 91,000 panels, the site will have a capacity of 49.9 MW – equivalent to the annual electricity consumption of approximately 35,000 people. It will help the City Corporation reduce its fossil fuel usage, and save over £3 million in energy costs per year.

Source: City of London

Solar Powering Public Services
(continued)

Solar Solution nr. 2

AMSTERDAM, Netherlands – Flexpower EV Charging Stations

In 2019, the city of Amsterdam launched the Flexpower initiative - the largest smart charging network for electric vehicles, which maximises the use of renewable energy, lowers the burden on the electric grid, and accelerates the charging speed during off-peak periods.

The project is conducted by Vattenfall and the city of Amsterdam, together with grid owner Liander, the infrastructure competence centre Elaad, and the Amsterdam University of Applied Sciences.

The network includes a total of **456** charging stations with **912** charging points (which is a third of all in Amsterdam), operated by Vattenfall, which were upgraded (power increased by 40%) and connected to the Flexpower smart control centre.

In 2018, Flexpower was used as a test at 52 charging stations, with 104 charging points. The charging stations were located in Amsterdam neighbourhoods which host significant renewable energy capacity, especially solar power.

Flexpower can limit charging power during peak periods with centralised automated management over the charging stations, knowledge about current local renewable sources' production levels (mostly solar) and electricity demand, and forecasts. It can also increase the charging power during off-peak periods (especially when production from renewable sources is highest), to accelerate charging, and quickly make use of renewable electricity when it's available.

Amsterdam launched Flexpower to sustainably manage the increasing number of electric vehicles alongside the growth of the city, but also to better utilise the greater capacity of renewable energy coming online.

As the city of Amsterdam is growing, the load on the electricity grid during peak hours will increase. A part of this increasing load will come from charging electric vehicles. Therefore, smart charging will be needed to help mitigate power peak loads on the electricity grid.

Flexpower has been developed to make optimal use of the available grid capacity, by tailoring charging speeds to the electricity consumption, and renewable energy production. The charging stations provide slightly less electricity during the hours that households demand a lot of energy, typically between 18.00 to 21.00 hours, and catch up by charging more at night when energy consumption is low, or during the day when a lot of local solar power is being generated. As most electric cars are charged outside peak hours, electric car drivers will benefit from faster charging.

Amsterdam. © Moyan Brenn

Beyond adjusting to meet grid demand, the Flexpower charging stations also adjust with the flexible supply of renewables - they can be steered based on the daily forecast of solar energy. The use of neighbourhood energy and flexible charging helps to better distribute the growing demand for the electricity grid.

The city of Amsterdam has supported the upgrade of the more than 900 charging points financially.

Source: InsideEVs

Building-Integrated Solar PV

Solar Solution nr. 3

RENNES, France - Solar tiles integration

© Akuo Energy

The solar developer Akuo Energy is providing innovative and building-integrated solutions to the municipality of Rennes, in France. The project provides for the construction of three wooden structures located in a priority urbanisation area (zone d'aménagement concerté or ZAC de la Tremelière, in the town of Le Rheu), which use different solar PV techniques:

- A community hall roof, which is visible from the public space is covered with SunStyle[1] photovoltaic solar tiles (190 m² / 21.5 kW/h).
- A bicycle shelter with about twenty parking spaces
- A carport whose roof is not visible from the public space, is covered with conventional solar panels above the parking lot.

The innovative aspect lies in the choice of PV panels for areas which are publicly visible (the community hall and the bicycle shelter). For these facilities, the municipality of Rennes has chosen the SunStyle photovoltaic solar tiles that are directly integrated in the structure of the roof. This guarantees a better aesthetic integration into the urban environment. It also ensures the protection of the landscape and cultural heritage.

Source: Akuo Energy, SolarPower Europe

B: Solar Making Citizens the Master of their Energy

Citizens are willing to adopt solar PV solutions to lower their energy bills, and act for the climate. But they often lack information on their roof's solar potential, or on technical and financial feasibility of solar projects.

On top of it, while solar PV is the perfect candidate to reduce the energy bill and empower consumers, low-income households still face key difficulties in accessing solar solutions; they're often renters, burdened by low credit ratings, or disenfranchised from information sources.

Cities and renewable developers have therefore developed solutions to facilitate the access of citizens to solar PV, and to make sure that all households can reap the benefits of the solar transition.

This section explores the different models that solar energy can offer to foster the participation of citizens, and to allow passive consumers to become active prosumers, with a full involvement in the energy transition. It also shows how solar can help reduce energy bills, and how cities have led solar projects that allow extended citizens' participation.

1 Sunstyle International is subsidiary of Akuo Energy.

Energy Sharing

Solar Solution nr. 4

ADEJE, Spain – 'Adeje Verde' Solar Circle

Costa Adeje.

© Marc Ryckaert

Many islands rely on energy from burning fossil fuels.[2] This is the case for the Canary Islands. Despite the perfect climatic conditions for generating solar energy, it is uncommon to see solar panels across the islands.

E.ON selected Spain, in particular Tenerife as starting point for the Solar Circle project, as Spain was one of the few European countries with attractive regulations on energy sharing fully set in place. Regulations made the concept possible and financially attractive. Within a radius of 2 km, people can join a solar circle as consumers or as prosumers, depending on their financial situation and the availability of a rooftop for PV. In addition, they can benefit from reduced network fees and tax exemptions. This way, excess PV energy is no longer fed back to the grid, but instead passed on to consumers living in that 'solar circle'.

The 'Adeje Verde' community launched the first solar circle. It was created around the Municipal Music School of Adeje. The municipality of Adeje decided to install a solar project to meet the music schools' needs – but they also added extra panels to power citizens close by with no opportunity to install solar themselves. With more than 170 consumers involved, it is the biggest energy sharing solar circle in Spain.

By June 2023, 2 MWp of PV are expected to be installed in Adeje, which will further reduce the annual CO_2 emissions on Tenerife by 2,252 tonnes (according to the Canarian energy mix). This is the equivalent to planting 90,000 trees. The solar installation and maintenance contributes to the creation of local jobs, the training of dozens of local promoters and installers, and will trigger more than €2 million EUR of investment in renewable energy sources.

Source: E.ON, SolarPower Europe

2 Source: https://commission.europa.eu/news/focus-eu-islands-and-clean-energy-transition-2021-07-15_en

Energy Sharing (continued)

Solar Solution nr. 4

HUTWIL, Switzerland - Hohlen Südhan Energy Quarter

Huttwil, canton of Bern, Switzerland.

Switzerland's first permanent energy quarter is to be built in the Hohlen district of the Huttwil municipality. The energy quarter will be realised as a self-consumption community, with the aim of covering the electricity and heat demand through self-generation in the neighbourhood.

The Hohlen energy district comprises 7 multi-family houses, with 76 owner-occupied flats, 12 single-family houses and 6 semi-detached houses. All buildings in the neighbourhood will generate electrical energy using photovoltaic modules, which will distributed and used within the energy community. The first apartment houses as part of the energy quarter are already standing and have been sold. The construction of several family houses is still ongoing.

The district will include 22 photovoltaic systems designed for the individual roof surfaces, and 580m of solar balcony railings – together both produce 464,000 kWh of solar electricity annually. On top of solar electricity generation, heat pumps cover the heat demand. In addition, a 112 kWh battery storage system ensures that as much of the self-produced energy as possible can be consumed in the neighbourhood and that peaks in consumption from the grid can be balanced out. In terms of mobility, an e-car sharing system will be established to enable the residents of the neighbourhood to use environmentally friendly means of transport.

The energy that is still needed, and the surplus energy, will ultimately be drawn from or delivered to the public grid. The project is being implemented by IGD Grüter AG Architects, clevergie, Smart Energy Link, and energie360°.

Source: ICLEI

Energy Communities

Solar Solution nr. 5

SEROCK, Poland - Sunny Serock

© ZeroJeden

Serock is a small town of 4,000 inhabitants, located north of Warsaw in Poland. In February 2021, they launched 'Sunny Serock,' one of the first energy cooperatives in Poland and Central/Eastern Europe. The idea came from the municipality, who wanted to improve energy security and foster local development, while reducing emissions. But also, they wanted to address citizens' demand for more local support for renewables.

The town mobilised citizens to reclaim a former landfill for renewable energy production. They thought that a shared PV plant would have been more effective, rather than individual solar installations on private rooftops, as a way of giving all residents the possibility to benefit from locally sourced renewable energy. Solar energy was the most promising energy source for the area, and they opted to include a storage system (to be commissioned) to ensure a more stable supply.

Serock is working with citizens to make this first local cooperative a success. To use the landfill, the cooperative needed several permits that were obtained with the town's support. The municipality is renting the land to the cooperative. After a start-up period, the cooperative will pay for the lease of the site at a preferential rate. In addition, the municipality also provided them with a meeting place, and is acting as an intermediary with the grid operator. Municipal staff also has an active role in the cooperative: the president of Sunny Serock is the head of the town's infrastructure department, and the mayor of the town is also a member. In addition, the municipality owns shares in the cooperative.

The solar plant should have a capacity of 0.3-0.35 MW. In Poland, cooperatives cannot sell energy, so all electricity produced must be used by the members of the cooperative. This means that members will have access to free electricity but will have to contribute to the costs of maintaining the installation – such as technical interventions, insurance, or taxes. These costs, however, will be minimal compared to price hikes seen in 2022, and offer the stability that gas volatility does not.

The cooperative aims at gathering enough members to use all the energy produced by the first installation. Then, if more residents are interested in joining, they will explore the possibility of developing additional RES projects.

Source: Energy Cities.

Energy Communities (continued)

Solar Solution nr. 5

MĀRUPE, Latvia – Jaunmārupe Energy Community

Mārupe, Latvia. © Dmitrijs Purgalvis

This community energy project has been established in the village of Jaunmārupe, within the municipality of Mārupe, the first municipality in Latvia to implement energy community pilot projects. The municipality is located on the outskirts of the capital city, Riga; it had around 21,000 residents in 2020.

The energy community covers two multi-tenant buildings, and is managed collectively by the homeowner's associations of each apartment building. The design and establishment of the energy communities have been carried out within the framework of two EU Interreg Baltic Sea Region programme (2014-2020) projects: Co2mmunity (Co-producing and co-financing renewable community energy projects); and its follow-up extension Energize Co2mmunity (Real-life implementation of renewable community energy projects). The project partners are the Riga region planning authority, and the municipal government of Mārupe. The Ministry of Economics has also actively followed the implementation of the pilot projects.

The three-storey multi-apartment building has installed 4 PV panels (1.32 kWp, expected annual production of electricity of 1.3 MWh), and 18 solar thermal panels (27 kW, expected annual production of heat energy of 20 MWh). The produced electricity is used to cover electricity consumption in the common areas of the apartment building (not for consumption in individual apartments); the produced heat energy is used for pre-heating of hot water for the needs of all residents (the building is also connected to the district heating system).

The terraces houses have installed 6 individual rooftop PV systems, each with 4 PV panels with an individual capacity of 330 Watts. Each PV panel system has its own inverter connected to the inner power grid of the house.

The total PV system comprises 24 PV panels with a total capacity of 7.92 kWp (expected annual production of electricity of 7.8 MWh). In annual terms, this installation covers around 30% of annual consumption. The produced electricity is used also for charging electrical vehicles owned by the homeowners (two vehicles by summer 2021).

The involvement of the municipal government, including its strong leadership role, was the most important success factor. This created trust, transparency and adequate communication of the energy community concept. Mārupe positions itself as a green municipality focused on smart solutions, and actively organises public campaigns regarding green energy. In 2020, Mārupe adopted its Sustainable Energy and Climate Action Plan (SECAP) under the Covenant of Mayors.

Source: ICLEI.

Energy Communities (continued)

Solar Solution nr. 5

MAGLIANO ALPI, Italy - Magliano Alpi Energy Community

© CER Magliano Alpi

The small town of Magliano Alpi in the Piedmont region was the first municipality to establish an energy community in Italy. The initiators were the mayor of the municipality, and the Energy Centre of the Technical University of Turin. Quite quickly, a 20 kW solar PV system was installed on the rooftop of the town hall. In the meantime, electricity from around 80 kW of solar power from the roofs of public and private buildings flows to the community's consumers. Digital control platforms are used to find the optimal variant, for the distribution and billing of the bonuses. The experience of the past two years has been shared with other municipalities..

The Italian principle of energy sharing is based on financial incentives. The electricity produced and consumed within the community is rewarded with 11 cents per kilowatt hour. Members who use electricity at times when it is produced are rewarded - they pay proportionately less. In this way, grid-serving consumption is stimulated. If the generation plants feed electricity into the public grid, they receive the legally stipulated remuneration for these quantities.

Source: ICLEI

Energy Communities (continued)

Solar Solution nr. 5

LA GOMERA, Spain – 100% Sustainable La Gomera

Cabildo of La Gomera intelligent PV system. © ITC

La Gomera is the third smallest island of the Canary Archipelago of Spain. It currently has 64 dispersed populational centres, a 21 MW thermal power station (diesel), and a 20 kV distribution network. Unlike other Canary Islands, the roadmap for La Gomera's transition to 100% renewable energy is based on distributed generation.

The current '100% sustainable La Gomera' plan being promoted by the public authorities, and the technological partner ITC, represents a combination of intelligent self-consumption, as well as innovative hybrid systems and microgrids, which will be integrated as 'energy communities.' The objective will be to further replicate sites like 'La Gomera.'

The challenge of integrating distributed renewable energies, especially in island systems, must be overcome by trying to generate new business models, and encourage the participation of citizens. However, there also has to be a distributed generation, which supports the operation of the electrical networks to which they are connected.

6 pilot projects are being carried out by ITC. Two of them are almost completed:

- **Intelligent PV self-consumption system with battery storage at Cabildo´s main building** (no grid injection; 80 kW / 68 kWh), with the ability to receive operation and control instructions from the network operator, which allows the dispatch of active and reactive power and voltage at the connection point. The system also allows optimising the energy cost of the building, through an energy management system based on predictions of energy generation, demand and grid prices, with the aim of optimising battery charging and discharging times. Furthermore, a demand management system is foreseen to charge the Cabildo's electric vehicles in the most economically efficient way.
- **PV system with battery storage and intelligent energy management in Alojera** (generation system for grid injection or stand-alone operation; 250 kW / 600 kWh). The technology incorporated in this plant allows different control modes (e.g. increasing the percentage of solar self-consumption or prioritising the sale of energy to the market) and provides complementary services to the distribution network operator. This generation system will be the heart of the future energy community of Alojera.

Source: FEDARENE

Energy Communities (continued)

Solar Solution nr. 5

BASQUE REGION, Spain – EKIOLA

© EVE

EKIOLA is a public-private initiative promoted by the Company KREAN and the Basque Energy Agency (EVE) that is leading the creation of prosumer power cooperatives in the Basque Country through agreements with municipalities and citizens.

EKIOLA launched in 2021, and will finish in 2024. During this time, 30 to 50 non-profit cooperative energy communities will be established, which will have a lifetime of at least 25 years. The initiative is based on the important role of citizens in driving the energy transition, and therefore helps citizens evolve into prosumers that participate in the management of solar power stations. Each power cooperative builds, and operate PV parks that produce energy according to the demand required by the cooperative members.

The new solar PV plants are installed in urban areas, and have a capacity of 1 MW to 5 MW. This means an investment between €800,000 and €4 million in each of the energy communities, depending on the land price.

Interested municipalities are responsible for selecting the appropriate site for the PV plant, implementing the building projects, managing all the administrative requirements, and supporting the citizens that wish to take part in the project. The participation of local private stakeholders such as financial institutions and banks to finance the projects is also expected.

Citizens are the priority members of each energy community, but they are also open to the participation of local administration and business. Each member of the energy community will cover 100% of their electricity demand from a local PV plant. Thus, each participant will purchase only the PV panels required to meet their demand. The minimum required number of participants to develop an energy community under the EKIOLA initiative is 400 citizens. The initiative is hoping to bring in 12,000 to 20,000 families by 2024.

Source: FEDARENE

Distant Self-Consumption

Solar Solution nr. 6

CRETE, Greece – Minoan Energy Community

© Minoan Energy Community

The Minoan Energy Community on the island of Crete has established in 2019 a PV plant with an output of 405 kW. In collaboration with the regional authority, and funded by the members of the energy community, the project will provide free electricity to 100 households and businesses in the municipality of Minoa Pediadas for the next 25 years. Members receive rebates on their electricity bill thanks to virtual net-metering which is possible in Greece. This approach allows one to benefit directly from the produced electricity even without having to live in the exact proximity of the producing installation. The project is especially relevant and valuable to low-income households, many of which lost their homes during an earthquake in 2021. The Minoan Energy Community expects to cover the needs of 100 households.

Source: ICLEI

Democratising Solar Power

Solar Solution nr. 7

PORTO, Portugal – Renewable Energy Community "Agra do Amial"

Porto, Portugal.

© Joe deSousa

The Municipality of Porto promotes a renewable energy community (REC) within its 'Agra do Amial' neighbourhood, and will perform several activities in the energy system – from generation to energy sharing and supply, as well as energy services. The REC will comprise electricity generation from PV panels installed in the roofs, which will be mostly consumed within the community, and the excess will be sold to the grid.

The REC will lead to rebates on the energy bills of the low-income households who are residents in the social housing building blocks and who will be part of the community. In the first five years of operation, the electricity generated will be distributed free-of-charge to the members of the community. The electricity produced locally will be supplied to the REC members at a rate lower than the one from traditional suppliers.

Overall, the REC implementation is estimated to lead to an average reduction of 9% in the participants' yearly energy expense.

In order to perform these activities, the REC will have two generation units of solar PV: one 13 kW installation on a school rooftop; and a large second installation of 101 kW on the rooftop of the social housing building blocks. It will also comprise two battery storage units, to support in the balance between generation and consumption: one 15kVA/21kWh second-life (previously used in electric vehicles) Li-ion storage unit in the school; and one 100kVA/133kWh Li-ion storage unit in the social housing building blocks. Finally, three electric vehicle charging stations will be installed in the neighbourhood, in a parking area dedicated to the residents from the social housing dwellings.

Source: ICLEI

Reducing Energy Bills

Solar Solution nr. 8

LARISSA, Greece – ENCOIL

PV park in Greece.

As of Spring 2023, the Municipality of Larissa is in the process of creating an energy community (civil cooperative), in partnership with other local organisations in order to produce energy from a 3 MW photovoltaic park on municipal land.

Making use of Greek national regulation on virtual net-metering, the aim of the energy community is to use the produced energy (around 546,642 kWh/y) to support vulnerable social groups – around 3,000 households – and to supply municipal buildings with renewable electricity. Beneficiaries of this project are selected in cooperation with the Municipal Social Enterprise of Larissa.

Source: ICLEI

Cities Powering Solar

3

Matinkyla neighborhood of Espoo, Finland.

A: Cities Financing Solar

Cities provide a direct interface with the citizens, and they are also the administrative level which is often the closest to the local population. In this process of financing individual and collective projects, regions and local energy agencies can play, an important role as an intermediary authority, and facilitating access to national and EU funding. When public funding is limited, municipalities and local authorities can also develop initiatives for enabling innovative funding mechanisms such as crowd-funding.

However, while large municipalities often benefit from large rooftop areas on public buildings, the growing demand for renewable electricity from citizens often urges cities to look for funding PV projects beyond their public buildings stock for PV installations.

This chapter explores solutions that cities have developed to fund renewables and solar in particular, from direct funding to power purchase agreement, and how they used public procurement to support these initiatives.

Co-funding Solar

Solar Solution nr. 9

AUVERGNE RHÔNE-ALPES, France – Centrales Villageoises

© Centrales Villageoises

'Centrales Villageoises' are local companies whose shareholders are mainly citizens, local municipalities, and local companies. Centrales Villageoises contribute to energy objectives by incorporating cross-cutting territorial issues, such as local economic development, landscape integration, and social links, amongst others. The 'Centrales Villageoises' share a common model based on a four-point Charter:

1. Territorial approach

2. Shared citizen governance

3. Local economic benefits

4. Quality approach

This model is now implemented in several French regions.

The concept was born in 2010 and originates from a project supported by European and regional funds. The agency Auvergne-Rhône-Alpes Energie Environnement (AURA-EE), and 5 natural regional parks, launched the project. From 2010 to 2014, there were 8 pilot sites, which progressively led to the development of local citizen-owned companies that financed the first photovoltaic plants. The entire technical and legal framework was then consolidated, resulting in other sites replicating the model. The 'Centrales Villageoises' model quickly spread all over the AURA region, and in other French regions.

In 2018 a national association was created to continue expanding the network. The network's objectives were to:

- Raise awareness of the specific, integrated, territorial approach of the 'Centrales Villageoises,' its citizen governance, and bottom-up operation.
- Continue the pooling of resources (development of shared tools and services) for the benefit of local companies, and continue to capitalise on the experience, in particular through solidarity between villages.
- Reinforce the professionalisation of projects, by maintaining a high-quality standard in their implementation, and by working to create local jobs.
- Pursue innovative experiments, the development of new legal and financial models, and the diversification of renewable energy and energy management projects.

In 2021, the 'Centrales Villageoises' represented:

- 5,150 shareholders
- 350 solar PV plants in operation
- 55 territories
- €9 million EUR investment

Source: FEDARENE (https://fedarene.org/best-practice/local-citizen-owned-energy-communities-in-france/)

Co-funding Solar (continued)

Solar Solution nr. 9

WEXFORD, Ireland – South-East Ireland Energy Agency

© Rufus O'Dea

Kehoe's Ketripack is a family-owned, local agri-business, involved in packing and selling animal feed to agriculture sectors based in Lacken New Ross, Co. Wexford. Before the conversion to solar energy and energy efficiency improvements, Kehoe's Ketripack was spending upwards of €2,443 a month on electricity alone.

The South-East Ireland Energy Agency (SEAI) Better Energy Communities (BEC) programme provided the business with 30% of the funding towards energy efficiency improvements. To meet the challenge, SEAI installed 40KWp solar PV modules, and upgraded 103 energy-efficient light fittings.

The results:

- 28.688 tonnes of CO_2 emissions avoided – equivalent to 6 cars driven annually
- €11,340 annual savings
- 86,566 kWh energy savings – equivalent to 20 households annual energy use

The SEAI team coordinated the entire BEC application from the initial energy audit, procurement to warranty checks, and all required paperwork.

Source: FEDARENE (https://fedarene.org/best-practice/kehoe-ketripack-case-study-seai-bec-programme/)

Co-funding Solar (continued)

Solar Solution nr. 9

KRIŽEVCI, Croatia – Križevci Solar Plant

Greek Catholic Cathedral in Krizevci, Croatia.

© Fraxinus

Crowd investing for renewable energy has become quite common in recent years, with many available platforms managing projects and communicating with investors. Alongside the decreasing cost of technology, the platforms have now made these projects interesting for small municipalities, who can now see the possibility to obtain a good return on investment.

In 2018, the municipality of Križevci started the first pilot project in Croatia for citizens crowd investing in renewable energies, aiming to install solar PV on the rooftop of the municipality's Development Centre and Technology Park's administrative building. This initiative was led by the Green Energy Cooperative ZEZ with its partners: the municipality of Križevci, Regional Energy Agency North, Greenpeace Croatia, Solvis and ACT Group.

The financing of the PV system began with a fundraising campaign, which included 53 investors with an average investment of around €500, raising a total of €31,000 for a 30 kW PV plant. The campaign managed to collect the total amount of money required in only 10 days. A follow-up campaign was launched for a second solar PV SYSTE, (production capacity of 33,000 kWh/a.). The €23,000 target budget was raised for the second PV system in only 48 hours after the crowdfunding started, with the final amount raised four times higher than the target. Local citizens were in mobilising financing for the project.

The municipality of Križevci provided administrative and financial support in the preparation phase, and grants an energy-saving fee for 10 years to investors. In addition, the Green Energy Cooperative has provided the solar equipment on lease to the city for 10 years, and the Regional Energy Agency North developed a cost-effectiveness analysis and the general design documentation. Solvis, a PV module producer from Croatia, installed the PV plant on the rooftop.

The project was so successful among residents that in 2019, Križevci's municipality decided to build another solar PV system on public library rooftop. Furthermore, inspired by the successful cooperation with ZEZ, in 2020, Križevci created KLIK, its own energy cooperative.

Source: Energy Cities

Co-funding Solar (continued)

Solar Solution nr. 9

ZAGREB, Croatia - Solar Roofs Programme

© Jeremy Bezanger

In October 2021, the city of Zagreb started the Solar Roofs Programme, with the aim to significantly increase its share of renewable energy production through building-integrated PV installations. The programme set the following goals to be achieved in three years:

The results:

- Installation of at least 50 MW of building-integrated PV systems;
- Investment of at least 300 million kuna (app. €40 million);
- Production of electricity of 50,000 MWh;
- Reduce CO_2 emissions by 100,000 tonnes per year.

The programme has been officially adopted by the Zagreb City Assembly, and the North-West Croatia Regional Energy Agency – REGEA has been nominated as the implementing coordinator of all activities.

The Project Development Services financed by ELENA (European Local Energy Assistance) will provide support for implementing a Renewable Energy and Energy Efficiency Investment Programme in Croatia.

REGEA will provide technical and expert support to the implementation of the Zagreb Solar Roofs Programme through its ELENA PVMax project which started on 1 July 2021, and has the main objective to implement over €80 million in investments in building-integrated PV systems in Croatia. REGEA will work in close collaboration with other regional energy agencies to provide a full geographical cover of the programme.

Source: FEDARENE

Power Purchase Agreement

Solar Solution nr. 10

GHENT, Belgium – Beauvent Co-operative

© Solar Energy/Shutterstock.com

The city of Ghent aims to make its municipal buildings climate neutral by 2050, and to drastically increase the share of locally produced renewable electricity. The municipality is already investing into its own PV installations on its public land and rooftops. However, in order to achieve the target of generating 30% of its electricity needs from local renewable sources, other space is required.

The municipality decided to start a public procurement procedure for a PV installation, coupled with a Power Purchasing Agreement (PPA). Supported by 'Vlaams Energiebedrijf' (VEB), Ghent published its procurement procedure stipulating that the offer:

- Needs to include a virtual PPA for electricity from renewable sources;
- Have a minimum volume of 500 MWh per year for a period of between 1 and 15 years;
- Needs to ensure that the production facility has to be in the hands of a citizen cooperative;
- Needs to ensure that the citizens of Ghent get the possibility to participate in the citizen cooperative which owns parts of the production facility.

At the end of 2021, the contract was granted to the citizen cooperative 'Beauvent,' and a PPA was signed for a period of 15 years.

Starting in 2030, the cooperative will provide the municipality with 7,000 MWh of electricity per year (which is equal electricity from 2,000 households). The installation is located on industrial rooftops and includes 15,000 solar panels. The produced electricity is bought by Ghent, and the project was financed through a call for investment of € 700,000 EUR organised by Beauvent in which local citizens were given priority access to the investment opportunity. The entire amount was raised is just a day and a half.

While there are generally two different types of PPA, a physical and virtual one, in this case the City opted for the latter option as it allows for a decoupling of the physical electricity and the financial flow. This means that the city continues to receive the electricity from its usual supplies, and Beauvent feeds the produced electricity into the grid. The exact financial flow is then dependent on the relation between the long-term agreed PPA price, and the market price of electricity which the city keeps paying to its general supplier. If the market price is higher than the fixed price, then Beauvent reimburses the city. If it is the other way around, the city pays Beauvent.

Ghent chose a virtual PPA because it is convenient (no need to change retailer), low-risk (the city is hedged against the volatility in electricity prices), and facilitates the energy transition (the long-term 15-year contract provides certainty to the supplier and his investment). In October 2022, the city of Ghent received ICLEI's Procura+ Award for its forward-looking procurement strategy on renewable electricity.

Source: ICLEI

Facilitating Citizen Fund Access

Solar Solution nr. 11

BRISTOL, UK - Bristol Energy Fund

Main Street in Bristol, England .

Due to the typically small size of the projects, the administrative complexity and the lack of financial expertise, citizens and small project promoters sometimes have difficulties to access support for renewables. On top of it, tenants might have difficulties accessing funding and expertise, since they do not own the rooftop. Complementary to providing access to information on the economics of solar PV projects through one-stop-shops, cities can assist their citizens and local companies in channelling funding to solar projects.

The City of Bristol's Council provides a dedicated funding scheme for community-led energy projects: the Bristol Community Energy Fund. Establish in 2015, it helps to support local people to deliver energy-efficiency projects, increase Bristol's renewable energy supply, and help change people's energy behaviour. To date, 39 projects have been funded, around £224,000 GBP has been granted to community projects and around £128,000 GBP dispensed as loans.

Source: ICLEI

B: Cities Facilitating Deployment

Cities and local authorities are important partners for solar PV deployment. These actors not only own an important stock of public buildings, they define the rules for urban planning and permitting – they are the first contact point when it comes to authorising solar PV projects.

Beyond deploying solar technology on public buildings, cities can also choose to facilitate the integration of solar in urban environments, e.g. by mandating the architectural integration of solar PV, defining rules of urban planning and permitting that would ease the procedures for solar PV, or simply by supporting local citizens and companies to install solar PV while going through major renovations. Since cities are also involved in the permitting of solar PV projects, they also have leverage in staffing and skilling the administration to facilitate permitting and legal advice.

In some cities, citizens and project developers lack data on solar potential and constraints, which make it difficult to assess the economic viability of solar projects and might deter from investing in solar PV solutions. The incorporation of solar potential in urban planning, and the compilation of clear, accessible information on solar potential might help citizens and companies make the decision for solar PV. Also, good rooftops are scarce in cities and urban areas, therefore there is often a conflict of use for solar energy, green rooftops, and recreational space. Cities and solar developers are therefore exploring combinations where rooftops can be used for different purposes simultaneously.

While public authorities are at the forefront of the energy transition, the solar revolution will happen only if the private sector also follows the trends. However, it is sometimes challenging for newcomers to understand how to build a sustainable business model on solar. Public-private partnerships allow for the public sector to become the interface for local companies that want to invest in solar energy.

Lastly, small and medium-sized enterprises (SMEs) are key when it comes to deploying solar at local level, since they can become both solar power producer and consumer. One of the challenges is to ensure that, when the renovation of the SME rooftop occurs, that it is possible to upgrade the rooftop with solar.

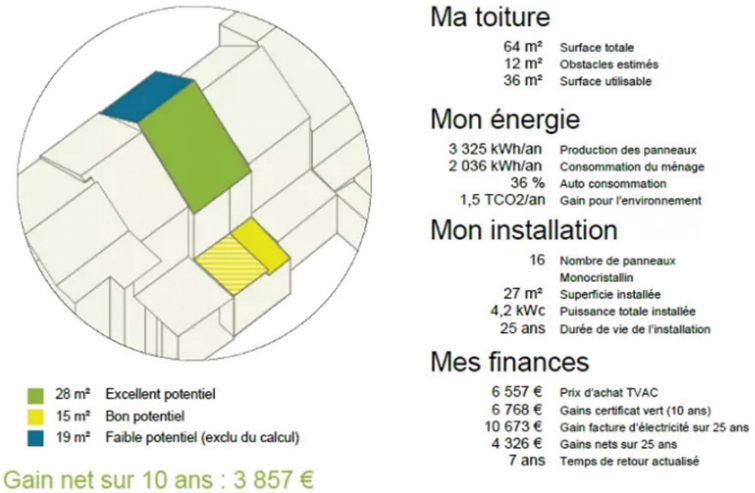
This chapter explores the solutions developed by cities and local authorities to empower citizens and local companies to deploy solar solutions, to promote best-in-class projects, and to reinforce the partnership between cities and local companies.

Bringing Information to Citizens

Solar Solution nr. 12

Belgium - Solar Map

Mont des Arts, City of Brussels. ©Jean-Pol Grandmont



In order to reinforce information to local citizens about their solar potential, the city of Brussels has created a 'solar map' that provides a first estimation of the solar rooftop potential for all rooftops in the Brussels region. This solar map showcases the environmental, energy and financial opportunities available, to install solar PV on specific rooftops. It is accessible for all citizens and private companies within the limits of 12 kWp per installation – above which, additional grid network connection investment is necessary.

The solar map is based on the local land register, and uses 3D data from the Brussels Data Centre. It calculates the absolute yearly solar radiation, by integrating the inclination and the orientation of the rooftop, and taking into account potential shading from other buildings. It also calculates the PV panel's potential surface, taking into account potential obstacles such as windows or chimneys.

Furthermore, the solar map calculates an estimation of greenhouse gas emissions savings, due to the installation of solar PV panels. This is information is integral for any citizen who wishes to reduce its carbon footprint. It also provides a whole financial simulation within a 10-years period, including:

- The cost of the panels and electrical equipment
- The network charges
- The cost of capital, where relevant
- The green certificates
- The compensation for self-consumption
- The potential feed-in tariffs

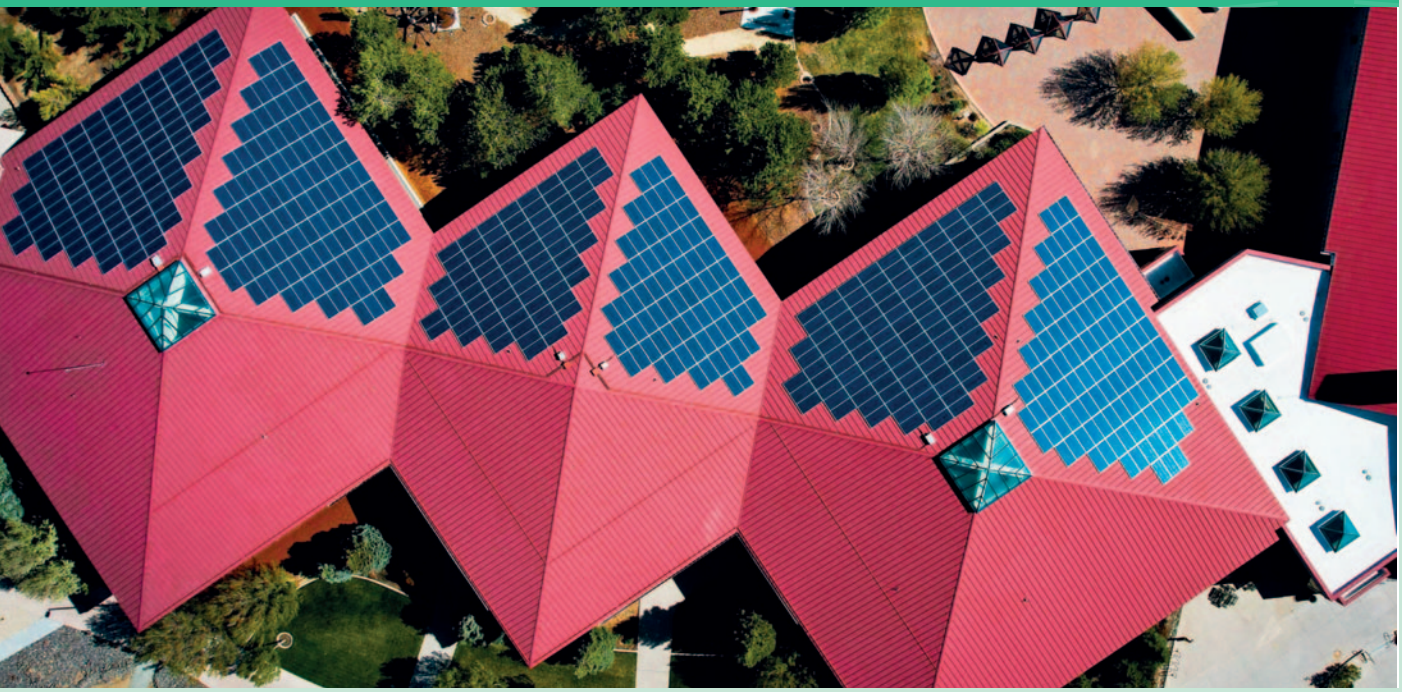
The tool also enables users to choose between different solar PV technologies to facilitate the choice of the consumer. It also allows the optimisation of self-consumption.

Source: Bruxelles Environnement

Bringing Information to Citizens
(continued)

Solar Solution nr. 12

ZAGREB, Croatia - Zagreb Energy Info Centre



© Manny Becerra - Unsplash

In 2022, the city of Zagreb together with the North-West Croatia Regional Energy and Climate Agency (REGEA), developed a number of energy-related IT tools aimed at citizens, including:

1. **Solar PV Potential** tool, which enables the calculation of relevant parameters for installation of PV systems on buildings;
2. **Zagreb Energy Atlas**, which includes data on energy consumption for all buildings (public, residential, commercial) in Zagreb, and affords citizens the visualisation and analysis of aggregated data;
3. **Public Building Renovation Monitor**, which presents relevant data and photo documentation, regarding the renovation of public buildings in Zagreb.

The tools are available online at the Zagreb Energy Info Centre.

The main goal of the **Solar PV Potential** tool, is to support citizens investing in PV systems on their own buildings. The tool provides all relevant data for a preliminary feasibility estimation. Every residential building (both multi-apartment and family houses, located within Zagreb, can be selected directly by clicking on the city map or by searching its address. Then, the tool automatically calculates the available roof area, inclination, orientation, and finally the total insolation, taking into account the shadowing from nearby buildings, chimneys, and other built structures.

The calculation is based on a detailed 3D building model of the city of Zagreb. However, it has been developed to become highly user-friendly, and requires a minimum amount of input from the user. Citizens merely have to type in their electricity consumption on a monthly or yearly basis, and select the proper electricity tariff. Afterward, the tool calculates the optimal PV system capacity. Main financial parameters are also presented, including monthly and yearly savings, total investment costs, and a simple payback period.

The Solar PV Potential tool was launched in July 2022, and is currently undergoing an extensive revision and upgrade, which will allow citizens to calculate PV parameters in case of the replacement of natural gas, with electricity as a source of heating. The tool will also automatically generate the documentation necessary to obtain the permits necessary for the PV installation from the electricity distribution company, which will considerably speed up the process, and reduce preparation costs for citizens. The upgrade is planned to be launched in January 2023.

Source: FEDARENE (https://fedarene.org/best-practice/zagrebs-smart-energy-solutions-for-citizens/)

Multiple Use Rooftops

Solar Solution nr. 13

OSLO, Norway - Solar + Green Roof

Pilot installation of vertical bifacial solar panels on green rooftop in Oslo. © Over Easy Solar

In 2022, a pilot project with vertical bifacial solar panels on a green roof (biosolar roof) was installed on a school in Oslo. The pilot project of approximately 5 kWp had successful results, and in 2023, the installation will be expanded to 50 kWp to cover the entire rooftop.

The solution is developed by the Norwegian startup Over Easy Solar, winner of SolarPower Europe's Startup Award 2022. This shows how we can get the most out of green urban rooftops, and solar energy generation.

Source: Solar Power Europe

Full-scale installation planned for June 2023 in Oslo. © Over Easy Solar

Setting Solar Rooftop Standards

Solar Solution nr. 14

BERLIN, Germany - Berlin Solar Act

Aerial view of Berlin .

© Dronepicr

In Berlin, from January 1, 2023, new and existing buildings that undergo a fundamental roof renovation and are in private use, must be equipped with solar PV on their building rooftop.

Alternatively, the system can be installed on the building façade. New buildings must cover at least 30% of their gross roof area, while existing buildings must cover at least 30% of their net roof area with photovoltaic systems. However, for existing buildings, instead of the roof surface percentage, the following capacities may be installed:

- For residential buildings with a maximum of two apartments: 2 kW
- For residential buildings with 3-5 apartments: 3 kW
- For residential buildings with 6-10 apartments: 6 kW

Owners of the buildings must prove the PV installation to the construction supervision authority. If no PV system has been installed, the authority may ask the owners to retroactively fulfil their duties within one year.

The Berlin Solar Act provides for exceptions if the obligation to install and operate would contradict other regulations under public law, e.g., the law on the protection of historical monuments, or it is technically impossible in individual cases, or not justifiable. For example, the obligation might not apply if the building is 100% oriented to the North.

Source: SolarPower Europe

Cities as a single Contact Point

Solar Solution nr. 15

POREČ, Croatia - Poreč Sunny Office

Poreč, Croatia.

As early signatories of the Covenant of Mayors, Poreč-Parenzo committed to a 40% emission reduction by 2030.

More recently, the town has been encouraging citizens to play a part in the energy transition, and develop their energy community, Parentium. This energy community is creating new and viable financing models for energy retrofits in historic public buildings, by means of integrating community-owned renewable energies. In addition, at the beginning of 2023, Porec launched its 'Sunny Office', a place where anyone interested in deploying solar energy installations can receive support free of charge.

By opening the 'Sunny Office,' Porec-Parenzo has provided all its citizens with a place where they can receive an answer to questions such as: What is a solar power plant and how does it work? What documents and steps are needed for the installation of a solar power plant and where to start? What prerequisites must be met for someone to be able to install their own solar power plant? How to determine the required power of the power plant? And which national bodies and institutions publish tenders for co-financing solar power plants?

The office will also host workshops and trainings, thanks to the town's collaboration with the Croatian energy cooperative, ZEZ.

Source: Energy Cities

Cities as a single Contact Point
(continued)

Solar Solution nr. 15

VALENCIA, Spain - Castellar L'Oliveral Energy Offices

© Valencia Clima y Energia

Valencia aims to cover the energy needs of its neighbourhoods with renewable energy - mostly solar - by 2030. The main instruments to achieve this target are one-stop-shops for the energy transition, i.e., energy offices.

These offices provide information and training on renewables (among other topics), and encourage citizens to organise and promote community energy projects in their neighbourhoods. By listening to citizens and providing them with high quality support and training, they have the capacity to lead renewable energy projects. Valencia's first energy community in Castellar L'Oliveral, launched at the beginning of 2023, demonstrates that.

The Valencia Climate and Energy Foundation also have a big role: they run communication campaigns; workshops with citizens; but also facilitate dialogues. These dialogues are between different energy communities, and with other strategic partners from public to private sector, academia, and civil society. They support the deployment of RES projects through all the different steps of the implementation.

Source: Energy Cities https://energy-cities.eu/how-to-make-sure-energy-communities-thrive-in-your-city/

Staffing Local Authorities

Solar Solution nr. 16

Example: Local staff to future-proof municipalities, Energy Cities

The installed capacity of solar PV is expected to double by 2025, and quintuple (X5) by 2030.[3] This unprecedented deployment is made possible by a substantial cost reduction, enabling policies as well as an increasing demand from citizens for affordable, secure, and sustainable energy. But the growth of solar PV projects goes together with the growth of administrative authorisation files, which are often managed by cities and local authorities.

The permit-granting process requires time, technical, financial, and human resources from local and regional governments and their related public bodies. They map renewable sources, plan the transition, and implement projects. They involve local economic actors and civil society groups, assess the needs and context of each neighbourhood, and bring support to residents and local businesses. By mobilising society and providing decarbonisation strategies, local governments can unlock billions in investments, and create millions of jobs.

However, local and regional governments and their related public bodies are struggling to recruit the necessary staff, as highlighted in the Covenant of Mayors Board's open letter. They face three main challenges. First, local authorities' operating budgets are too limited, this prevents them from opening new long-term positions. Second, workforce investments for the climate and energy transition are not exempt from the strict rules governing local government expenses. Third, employment positions with local governments are less attractive than those in other economic sectors (especially in terms of salary).

With this acknowledgment, Energy Cities conducted its own study, focusing on the staffing needs of administrations to decarbonise the built environment, and provided key figures: local administrations would need 214,000 new positions between 2022 and 2030, at the EU level. This represents around 2.5 additional full-time positions in each European municipality, per year.

The aim of this initiative, of which SolarPower Europe is among the signatories, is the recognition of the need for staffing and skilling of local authorities at European and national level, through:

- Real budgetary solutions for municipalities;
- A replication of the study in each Member State, extended to all sectors of climate mitigation and adaptation;
- A strategy to boost the attractiveness of employment in local governments, through reform tools such as the European Technical Support Instrument (TSI) for instance;
- Aligning climate objectives, particularly at human resources level. The National Energy and Climate Plans (NECPs), for example, must be based on local needs to operate properly. All Member States will need to submit their updated NECPs in June 2023.

Source: Energy Cities

3 SolarPower Europe, European Market Outlook, 2022, https://www.solarpowereurope.org/insights/webinars/eu-market-outlook-for-solar-power-2022-2026

Promoting Best Practices

Solar Solution nr. 17

UPPER AUSTRIA REGION, Austria - Solar Champions

© ESV

There are already 35,000 PV systems in Upper Austria. Together, they supply 15% of the annual residential electricity demand, and save annually 100,000 tonnes of CO2. 85% of new single-family houses are built with a PV system.

Stepping up ambition, in its new solar PV strategy, the region of Upper Austria set itself the goal of 200,000 rooftop PV systems by 2030, increasing existing solar capacity tenfold. To drive this goal, the regional government and OÖ Energiesparverband (ESV), launched a large-scale solar campaign 'Solar.Sonnenklar.'

The campaign 'Solar.Sonnenklar' targets buildings in all sectors, and reaches out to a range of stakeholder groups. Its key messages are:

- Solar strengthens energy security;
- Solar will reliably supply your building with clean energy for at least 20 years;
- Solar supports the local economy. Half of the added value stays in Austria, where the PV sector already offers more than 3,000 jobs.

A first activity of the campaign was a competition to find the region's 'Solar Champions.' Individuals, companies, municipalities, and organisations were invited to submit their PV projects and share why they are proud of their solar energy contribution. There was a great response – over 300 submissions were received. This included churches, businesses, families, and manufacturers.

With this new PV strategy and campaign – combined with the development of renewable energy communities – Upper Austria and the ESV aim to make full use of the rooftop PV potential.

Source: FEDARENE

Supporting Solar SMEs

Solar Solution nr. 18

Région AUVERGNE-RHÔNE-ALPES, France - Asbestos removal

© evoenergy

Launched as part of the solar committee co-sponsored by the region, the Auvergne Rhône-Alpes Energie Environnement association, and the Aura Digital Solaire trade association, the 'Solar Asbestos Removal,' call for projects has three objectives.

These objectives are: responding to a public health issue; protecting the environment by preventing uncontrolled asbestos removal; and supporting the energy transition. As a reminder, the development of solar thermal planned in the regional plan for planning, sustainable development, and equality of territories (Schéma Régional d'Aménagement, de Développement Durable et d'Egalité des Territoires), by 2030 aims to reach 1,250 GWh, five times more than in 2018.

To respond to this call for projects (which is targeted to commercial buildings), rooftop owners will have to engage in total asbestos removal work carried out by an approved company, and install, on at least 35% of the surface of their roof, a photovoltaic, solar thermal, or mixed installation.

The subsidy, whose total amount is not yet specified, will cover up to 50% (excluding tax) of the asbestos removal/reinforcement work on the roof (40 euros per m^2), and even thermal insulation (50 euros per m^2). It will be increased if solar panels produced in Europe are used (+ 20 euros per m^2). Its minimum amount is set at 5,000 EUR within the limit of 250,000 EUR of aid per project owner and per year.

Source: Le Moniteur

Developing Public-Private Partnerships

Solar Solution nr. 19

EASTERN CENTRAL SWEDEN, Sweden - Framtidens Solel

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The Örebro County Energy Agency, the Mälardalen Energy Agency, and other energy Swedish agencies aim to significantly increase the rate of investment in solar energy in SMEs in Eastern Central Sweden, thereby contributing to reduced carbon emissions, and increased competitiveness of the region's economy.

The Örebro County Energy Agency, the Mälardalen Energy Agency, and other energy agencies are involved in the project, 'The Future of Solar' (Framtidens Solel).

The project aims to promote investment in solar energy among SMEs by breaking down knowledge barriers around regulations and market intelligence. It influences structures around the target group to enable investments in solar energy. The project disseminates information on solar energy, for example on how a company can realise a business idea linked to solar energy.

The project organisation works on a needs-driven basis to closely follow new needs, and trends in the market. The operational activities of the project will be mainly carried out by the county coordinators. Their tasks include: studies, surveys, information activities, knowledge transfer, and more. This means concrete actions towards companies to demonstrate the possibilities of investing in solar energy, either as a business idea, or as an aspect to be used in marketing and branding efforts. Other target groups for the project's actions include municipal officials and politicians, banks, and business promotion organisations.

The aim of these actions are to improve the ability of stakeholders to meet the needs of businesses in relation to sustainability issues – in this case, solar energy – and thereby stimulate increased use of solar energy in businesses.

Source: FEDARENE (https://fedarene.org/best-practice/solar-power-in-smes-in-eastern-central-sweden/)

C: Cities Boosting Industry

Solar PV is a local technology by nature: from the design of the project to the installation, the operation, the maintenance, and recycling. Most of the value chain remains European. 80% of solar jobs are in the installation phase. Nevertheless, most of the PV panels are currently built outside Europe, and rebuilding the European solar manufacturing industry is a priority for the European Commission, and for the solar PV sector. In this context, local and regional authorities, can act as catalysts to support innovation, and facilitate the establishment of manufacturers on their territory.

Also, the solar industry is rapidly expanding, and there is a growing need for skilled professionals. To address this need, various training programs and initiatives have been proposed to equip people with the necessary skills and knowledge to enter the industry. On such initiatives, cities have developed solar schools which offer innovative teachings, and access to recognised diplomas, such as certified electricians and professionals in maintenance and energy efficiency. In addition, there are training programs for solar installers to reinforce the market and develop sustainable energy practices. These initiatives demonstrate the commitment of various cities, regions and stakeholders to fostering a skilled workforce in the renewable energy industry.

This section tackles both the question of the workforce, and the support to the industrial development of solar PV at the local level.

Training Solar Installers

Solar Solution nr. 20

MARSEILLE, France – Solar Schools

Marseille. © Velvet

As a Mediterranean city particularly vulnerable to the effects of climate change, Marseille - selected in the EU Mission 100 Climate Neutral Cities by 2030 - has prioritised renewable deployment.

For example, 61 municipal rooftops are already equipped with solar panels, providing 7.7 GWh every year, with 60 more roofs to be installed soon. Marseille also hosts La Friche Belle de Mai, one of the largest citizen solar power plants in France.

In meeting the solar skills challenge, Marseille has facilitated a key training initiative:

The first French solar school; the Ecole de Production des Energies au Sud trains young people, both in technical and human fields, from the age of 15, in solar professions. The complete school curriculum offers young people access to become a certified Electrician, a Professional Baccalaureate in Maintenance and Energy Efficiency, and a CQP Installer and Maintainer of photovoltaic and thermal solar panels. These diplomas are recognised by the state and the professional world.

Source: Eurocities

Building Solar Manufacturing Clusters

Solar Solution nr. 21

SAXONY, Germany – Solar Industry Regions Europe (SIRE)

Overview of module production in Freiberg, Saxony. © Meyer Burger

Saxony has a long legacy of innovation, cutting-edge industry, and developing regional industrial clusters, especially in the field of solar PV manufacturing, with an ambition to become a leader in this area. Saxony's State Ministry for Energy, Climate, Environment and Agriculture has also initiated a 'Solar Industry Regions Europe (SIRE)' network, to work towards a sovereign and climate-friendly European energy supply, by strengthening the European solar manufacturing industry.

The regions in the network are uniting their voice to be heard louder at the EU level. Saxony is working to intensify the exchange between associations, companies, and state administrations, bundle their competences, identify best practice examples in the regions, and create synergies between the regions. Currently (as of March 2023), the following European regions are part of the network:

- Andalusia (Spain)
- Grand Est (France)
- Carinthia (Austria)
- Liberec (Czech Republic)
- Saxony (Germany)
- Saxony-Anhalt (Germany)
- Sicily (Italy)

In terms of concrete projects, the Saxony region has been working as an interface between the solar PV industry, the Federal State, and the European Union. In particular, the region has channelled EU funding to support Meyer Burger, a solar PV manufacturer. At its industrialisation facility in Hohenstein-Ernstthal, Germany, the company develops the latest machines for solar cell and module production, tests them, and ensures they are ready for the market.

On top of direct support to innovative industries, Saxony's government has founded the Saxony Trade & Invest Corporation, as a service provider on behalf of companies which consider making a business commitment in Saxony, or which seek to expand an existing commitment in the region. In cooperation with local and (inter)national economic development agencies, interest groups of Saxony's business community, Saxony's State Government as well as many other stakeholders, the Corporation assists commercial enterprises from their initial idea, to the implementation of their business setup, or expansion project. In line with the investor's specific needs and requirements. This is in corporation with local and (inter)national economic development agencies, interest groups of Saxony's business community, Saxony's State Government as well as many other stakeholders. Saxony Trade & Invest Corporation creates individual information packages on the requisite locations, industry sectors, markets, employees, funding programs, suppliers, research landscape, and much more.

Source: Region of Saxony (https://www.energie.sachsen.de/solarindustrie-5099.html#a-5105; https://www.meyerburger.com/de/newsroom/artikel/meyer-burger-zeigt-wie-eu-gelder-zu-innovationen-werden; https://business-saxony.com/en/investors/our-service)

Building Solar Manufacturing Clusters (continued)

Solar Solution nr. 21

BASQUE REGION, Spain - Clean Energy Cluster

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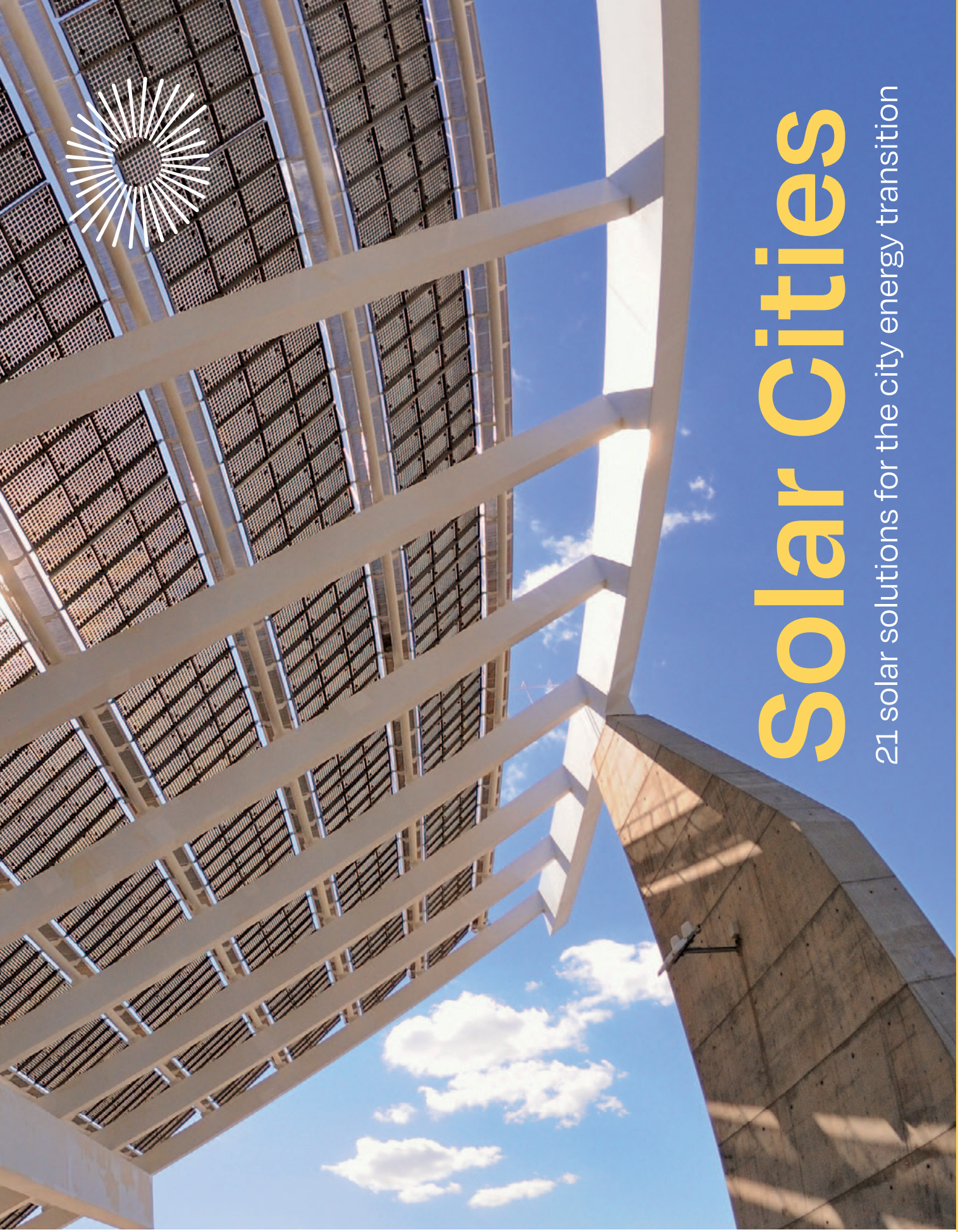
The Basque Energy Cluster is a non-profit organisation set up in late 1996, within the framework of the Basque Government's policy to foster competitiveness in the industrial sector.

The cluster currently comprises of 200 businesses and agencies including: energy sector operators, equipment and component manufacturers, engineering firms, service companies, Basque Science, Technology and Innovation Network agents, and Basque Government public agencies.

Solar PV has been selected as part of the strategic areas identified by the Basque Energy Agency. The Basque value chain must prepare itself for the major growth that the photovoltaic sector will experience in the energy transition process in the coming years by promoting technological innovation, improving its competitiveness, and exploring new business models that will help to consolidate its international positioning.

To achieve these goals, the Agency has chosen to use the private sector as a coordinator of the solar PV ecosystem. The Basque Energy Agency's objectives are to serve as an instrument for sector revitalisation, facilitate networking and mutual knowledge of associates, and facilitate the identification of collaboration opportunities through technological and market competitive intelligence activities.

Source: FEDARENE



Solar Cities

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9 789464 669060
ISBN NUMBER 9789464669060