With energy use accounting for around 70% of global greenhouse gas emissions, accelerating the shift towards low-carbon energy systems has never been a more pressing issue. Fortunately, cities are rising to the challenge, boosting demand in renewables by making it easier for citizens and businesses to buy low-cost, low-carbon power.
Barcelona Energía (BE) facilitates a transition towards a renewable and distributed energy model by supplying certified 100% renewable electricity to customers, teaching customers about energy efficiency, and offering personalised advice. BE has grown since it first started supplying Barcelona City Council with renewable energy in 2018, and has since begun supplying city residents as of January 2019. Currently, BE is delivering electricity to more than 5,000 consumers.

BE aims to increase the uptake of solar five-fold, employing strategies including offering an array of tools and services making it easier and more desirable for citizens to install solar on their rooftops, as well as educating them about energy savings. For example, citizens can analyse the feasibility of installing solar generation via an online solar map. Citizens who have solar panels can use an energy calculator to optimise their consumption, or learn about the benefits of self-consumption, meaning using the electricity they produce directly rather than feeding it back to the grid. BE also covers the maintenance costs of solar installations, and customers have the opportunity to receive a solar tariff. When customers receive their energy bill, they are also given energy-saving tips as well as information about their consumption compared to the average.

What has the city achieved?

Barcelona Energía (BE) is the first public electricity distributor in Spain, created with the goal of promoting local and renewable energy generation.

Its mission is to contribute to the transition towards a sustainable energy model by promoting local generation of energy and efficient energy use by citizens, as well as supplying customers with certified 100% renewable energy. BE empowers citizens via education, spurs participation via a council of users, and works to uphold its core principle of transparency.
What are the co-benefits?

Social:
Barcelona Energía says that at the core of its operations is the intention to provide transparency and empower citizens. To achieve this, they work to inform citizens about efficient energy management in their home, to help them make the choices necessary to improve their consumption habits.

Health:
By supplying certified 100% renewable energy, the equivalent energy has not been produced with conventional generation sources such as coal or natural gas. The project is therefore reducing the particulate matter produced by the burning of fossil fuels.

Economic:
Barcelona Energía’s commitment to promoting local and renewable energy development is expected to create new business opportunities and jobs. Through BE’s strategy of promoting self-consumption, the organisation creates new relationships between energy generators and consumers.

Environmental:
By providing 100% renewable energy and encouraging citizens to install their own energy systems, as well informing them on strategies to reduce their energy usage, BE promotes the transition to a fossil-free energy system.

Barcelona Energía offers a wide array of tools and services to empower citizens to become more efficient energy consumers as well as generate their own electricity with residential solar PV installations.

What can other cities learn?

Build your toolbox:
The services provided by Barcelona Energía go beyond those of a conventional power company, and are specially designed to improve energy efficiency and promote renewable, local generation, either for self-consumption or for grid injection. The tools used by BE serve as inspiration for initiatives in other municipalities that spur the transition to a renewable energy model.

Seek the counsel of your users:
To involve users in the core of the organisation’s decision-making, BE has developed a Council of Users, an advisory body of BE’s customers. The council examines new proposals and projects and provides advice and guidance to the organisation. Through participation, users’ interests and concerns are prioritised.

TONNES OF CO2e emissions are estimated to have been saved as a result of Barcelona Energía supplying renewable energy since 2018

16.5K
Cape Town’s Small-Scale Energy Generation (SSEG) programme is reducing the city’s reliance on coal energy, promoting local resale of electricity, and diversifying the energy mix. Electricity “prosumers” can connect their renewable energy systems to the city’s grid, exporting to the grid when they generate more electricity than they are using, in exchange for credit.

The city is promoting independent local power production by challenging the exclusive rights of the public utility to procure electricity for resale. The city has taken the case to the High Court to allow the city to procure electricity from independent power producers, which will make it more profitable for residents and small businesses to install small-scale renewable energy systems and feed excess electricity to the grid.

Cape Town’s Small-Scale Energy Generation (SSEG) programme promotes the uptake of rooftop photovoltaic (PV) systems and small wind turbines in the commercial and residential sectors, allowing consumers to become producers and sell excess electricity generated back to the grid, fostering a more decentralised and sustainable electricity supply.
CAPE TOWN

↓ 77.9K

TONNES OF CO₂e emissions are estimated to be reduced each year via approximately 50 MW of SSEGs currently installed in Cape Town

What are the co-benefits?

Social:
As a city that suffers from frequent blackouts, the SSEG programme provides a solution by improving energy security for its residents and supporting the diversification of energy sources. Reliable access to energy enhances citizens’ quality of life, access to technology and communications, and productivity.

Health:
The programme emphasises building citizen collaboration and capacity to ensure the energy systems are installed safely and legally, thereby reducing accidents and hazards.

Economic:
Sourcing more electricity from renewable energy technologies is critical for Cape Town to build a more robust economy and create local jobs.

Environmental:
The primary environmental benefit of the SSEG programme has been the reduction in CO₂ emissions – an estimated 77,868 tonnes to date – due to the shift from coal-based electricity generation to solar and wind.

What can other cities learn?

Provide training opportunities:
To address the challenge of a limited capacity of trained installation technicians, the city partnered with a local NGO and industry association to develop a training programme for PV installers. The programme offers subsidies for male electricians (75% subsidy) and female electricians (100% subsidy). To date, 113 successful candidates have received the solar PV training, 66 of which were sponsored by the city under its SSEG programme.

Share knowledge:
When the programme started, there was no national legislation in South Africa regarding SSEG installation and tariffs, and therefore the city initiated research on the implementation of small-scale renewable energy systems within South African context. The project involved extensive collaboration with government bodies, an NGO, and a utility association. The results of which have been made open source for the benefit of other cities following in their footsteps.

Under the programme, the city aims to achieve 120 MW of electricity supplied by rooftop PV installations by 2020.
Developing smart energy systems will be integral to successfully transitioning to a carbon-neutral economy, but to date efforts have mostly been focused on smart electricity grids. Copenhagen, however, is starting to look at the whole smart energy system, integrating electricity, heat, and transport. Through a research and demonstration project, the new neighbourhood of Nordhavn has become a living lab, testing solutions for a future-proof renewable energy system.

In the new district of Nordhavn, in Copenhagen, a large-scale integrated research and demonstration project – EnergyLab Nordhavn – has been established to build the knowledge needed to operate the smart energy systems of the future.

Taking a holistic approach and testing different smart technologies is spurring low-carbon innovation in the city, and is part of Copenhagen’s goal of becoming carbon neutral by 2025.

What has the city achieved?

Developing smart energy systems will be integral to successfully transitioning to a carbon-neutral economy, but to date efforts have mostly been focused on smart electricity grids. Copenhagen, however, is starting to look at the whole smart energy system, integrating electricity, heat, and transport. Through a research and demonstration project, the new neighbourhood of Nordhavn has become a living lab, testing solutions for a future-proof renewable energy system.

With wind power supplying more than 40% of Denmark’s electricity demand, many aspects of the EnergyLab Nordhavn project address the issue of how to increase flexibility in a system increasingly powered by intermittent sources. Energy storage is one part of this puzzle, and the project is testing large batteries and EVs to reduce peak load on the grid. The project is also trialing intelligent heating of 85 apartments, shifting load on the heating network and improving indoor comfort, and has been so successful it was recently expanded to include 7,000 homes in a nearby district. Additionally, a heat pump and storage system is being used to improve flexibility and reduce required temperatures in the local district heating network, demonstrating how these technologies can be better integrated.

COPENHAGEN: New neighbourhood is a hotbed of innovation for smart energy systems
What are the co-benefits?

Social:
To be a truly living laboratory for testing energy solutions and developing neighbourhoods fit for the future, EnergyLab Nordhavn has been keen to involve local residents in the tests, who offer their data anonymously to ensure that solutions are improving living standards as well.

Health:
The layout of the Nordhavn district is designed to encourage active and public transport, allowing residents to live car-free lifestyles with great benefits for their physical fitness and air quality in the city.

Economic:
Flexibility in the energy system, for both heat and electricity, will be crucial in reducing operating costs in the future, where intermittent renewables make up a greater proportion of the energy mix. These savings can be passed on to consumers to reduce energy bills.

Environmental:
EnergyLab Nordhavn is at the cutting edge of large-scale testing of low-carbon technologies, showing a pathway for an integrated, smart energy system, with successful solutions already being scaled into other neighbourhoods.

What can other cities learn?

Get ahead of the pack:
The Danish capital hopes that by investing in research and development of smart integrated energy systems, it will get first-mover advantage on many innovative low-carbon technologies of the future, capturing that intellectual property, growing the local green economy, and exporting that knowledge around the world.

Think holistically:
EnergyLab Nordhavn is looking at the whole energy system as one, and testing new solutions that integrate heat, power, and transport in the northern district of Copenhagen. As all three sectors transition to renewables and electrification, it will be vital to understand how they can work better together to balance loads and manage intermittent supply.

EnergyLab Nordhavn, in Copenhagen, is the city’s testing ground for developing the knowledge and technology needed for an integrated, smart energy system of the future; all part of designing a modern, liveable neighbourhood on the city’s waterfront and becoming carbon neutral by 2025.
As renewable energy becomes more affordable and feasible, Durban has set its sights on becoming carbon neutral by starting with decarbonising their energy supply. To facilitate the renewable transition, the eThekwini Municipality embarked on a strategic roadmapping process to evaluate suitable technologies and created an integrated resource plan to identify the best integrated energy mix. The process involved stakeholder engagement and public participation via a public meeting attended by more than 500 participants from academic institutions, industry, and local residents. Through the roadmapping process, solar, wind, small-scale hydropower, biomass, and waste-to-energy options were explored and found to be viable alternatives to the current fossil fuel-dominated system.

The municipality has also taken a unique approach in piloting pre-feasibility studies investigating ocean thermal energy generation, which found the possibility of 52 GW of electricity that can be harnessed in the coastal areas of Durban.

The city has achieved its ambitions of 40% electricity derived from renewable energy by 2030 and 100% by the year 2050. DURBAN: Roadmap leads the way to future powered by renewable energy

What has the city achieved?

What has the city achieved?
What are the co-benefits?

Social:
The city is working to grant citizens the ability to generate electricity at the applicable residential tariffs, and thereby providing compensation to customers who generate surplus electricity.

Health:
The increased adoption of renewable energy shifts the city from a dependence on coal, improving air quality and reducing the risk of respiratory illnesses.

Economic:
The growth of the city’s economy strongly relies on the availability of energy, and it is anticipated that an increasingly renewable power supply will improve the energy security of Durban and boost the potential for investment.

Environmental:
Addressing climate change and reducing carbon emissions is central to Durban’s motivation to transition towards a city powered by renewable energy.

What can other cities learn?

Share lessons learned:
Durban’s membership in the C40 Climate Leadership Group, as part of the Clean Energy Network, has led to the funding of the strategic roadmap and integrated resource plan. In return, the city is sharing the lessons learned with other members of the network. In addition, the city has completed other renewable energy projects using their own budget, which they are sharing knowledge from as well, including a project to install solar PV panels across municipal buildings.

Identify opportunities through strategic assessments:
With the strategic roadmap in place, Durban had the opportunity to assess the possibility for renewable energy infrastructure and project the demand for electricity by 2030. The process found an opportunity in that the cost of solar technology has dropped by 83% in South Africa since 2010. The city therefore sees this as an opportunity to scale from the proposed 720 MW to 1,800 MW of renewable energy by 2050 in order to supply affordable electricity to a growing population.

DURBAN

40%

RENEWABLE ENERGY SUPPLY is the municipality’s target to achieve by 2030 and 100% by 2050.
HONG KONG: Pioneering approach turns wastewater into renewable energy

Behind the scenes of our cities, a complex system works to provide fresh drinking water and pump away our wastewater. This requires infrastructure and consumes energy that is rarely thought of by residents. In Hong Kong, the Water Supplies Department has seen the opportunity to use their infrastructure to generate renewable electricity, installing hydropower systems within water treatment works and floating solar power systems on reservoirs.

In cities where space is often at a premium, large reservoirs represent an under-utilised area, which Hong Kong is beginning to make better use of via floating solar power systems. The photovoltaic systems afloat on the reservoir can achieve better efficiency than rooftop systems thanks to low shadowing and cooling from the water, with additional benefits of reducing evaporation and algae growth.

Hong Kong’s utilisation of wastewater flows for hydropower generation is a pioneering approach, and thus far the technology has been fitted to two plants in the city, generating more than 3 GWh of renewable power each year. These installations feed into the grid, powering operations at the wastewater treatment plants and reducing Hong Kong’s reliance on fossil fuels.

What has the city achieved?

In the low-carbon transition in our cities, it’s important to maximise on all opportunities to generate renewable energy wherever possible.

In Hong Kong, the Water Supplies Department is looking to their own reservoirs and flows of wastewater as renewable energy resources, installing hydropower and floating solar power systems. The various installations should generate 3.5 GWh of clean electricity, and abate 2,368 tonnes of CO₂ emissions, each year.
What are the co-benefits?

Social:
Reducing the carbon intensity of Hong Kong’s energy supply is a key piece of the city’s plans to create a more liveable, equal city for its residents.

Health:
In compact cities such as Hong Kong, air pollution from fossil fuel-powered electricity generation can cause significant health risks, so projects such as these that help in the low-carbon transition also improve public health.

Economic:
Once the required infrastructure is in place, Hong Kong’s Water Supplies Department receives free, renewable energy to power its processes, saving an estimated $500,000 annually. These savings can be passed on to consumers or used to invest in further efficiency and low-carbon improvements.

Environmental:
The combination of hydro and solar power installations is responsible for an estimated emissions reductions of 2,368 tonnes per year, thanks to lower reliance on fossil fuels in the city’s energy mix.

What can other cities learn?

Ownership in every city department:
Action to encourage renewable energy generation and shift to a low-carbon future cannot be limited only to energy departments within city governments, but must be owned by all. Hong Kong’s Water Supplies Department is taking matters into its own hands to generate renewables from their existing assets, cutting their energy costs and carbon emissions simultaneously.

Public bodies taking leadership:
While the city government’s role in setting goals for renewable energy generation is key, it is important that public bodies also get their own house in order. This project demonstrates how a public body can show leadership and generate a ripple effect into the private sector.

Hong Kong's Water Supplies Department has used existing assets to generate renewable electricity, fitting hydropower to wastewater flows and floating solar panels atop reservoirs. With 21 water treatment plants and 24 km² of reservoir under their management, there is good potential to scale up now that the concept has been proved successful.

24 KM² IS TAKEN UP BY RESERVOIRS
in Hong Kong, indicating the scaling potential of floating solar power

HONG KONG
The programme helps residents by taking away the “hassle factor” for households that want to play their part in London’s green energy transition but are unsure who to trust with so many options available. The installer that can create the most efficiencies can offer the best price to registrants, with quality of materials and labour being guaranteed under the pre-approval process. Solar Together London offers residents the opportunity to buy high-quality solar panels at a competitive price, with support to help them to make an informed choice. The involvement of the Mayor of London and the boroughs lends assurance and credibility to the scheme.

To date, the scheme has been run with 14 boroughs over 2018 and 2019. The winning suppliers offered discounts up to an average of 35% below market prices, which is a savings of around $1,800 for a common-sized system. The scheme resulted in 624 solar installations across London – reversing the decline in installation rates seen in recent years due to a watering down of national incentives. The new PV panels have installed clean energy capacity of nearly 1.5 MW, resulting in an estimated annual CO₂ reduction of 423 tonnes.
LONDON

10.6K
TONNES OF CO₂ emissions are expected to be reduced over the lifetime of the 624 newly installed solar PV projects

What are the co-benefits?

Social:
Participant households are now benefiting from generating their own clean electricity and the associated protection from energy price increases. Depending on household consumption, an average-sized PV system in London can offer between $100-300 a year in energy bills savings.

Health:
Increasing the electricity produced by solar PV contributes to the phasing out of the fossil fuel industry, resulting in healthier and cleaner air for all.

Economic:
The UK’s domestic solar industry has suffered a downturn in recent years from reductions in the government’s feed-in tariff. The project sought to boost the industry, yielding an investment of $2.9 million from London residents via the installation of household solar PV.

Environmental:
The Mayor has set the overarching ambition of becoming a zero-carbon city by 2050. This includes increasing solar capacity ten-fold by 2030, compared to 2018 levels. Solar Together London is one of many initiatives that will be needed to decarbonise the city.

What can other cities learn?

Political leadership earns residents’ trust:
The participation of the Mayor and local leaders was key to the success of the project. Customer surveys demonstrated that the backing of these leaders was a large factor in their willingness to take part. While many Londoners reported a favourable view of solar, many had not acted previously due to a lack of trust in the market and confusion over the variety and reliability of installers. The Mayor set the goal of transitioning London to a zero-carbon city by 2050, and empowered Londoners to personally buy into achieving the goal.

Engage local leaders to build support:
Stakeholder engagement was also key to the scheme’s success. Without gaining the support of leaders within London boroughs, such as elected councillors, senior directors, and officers to co-promote the scheme more locally to their residents, it is likely it would have been less successful. Similarly, engaging local NGOs to spread the word proved fruitful in furthering the reach of the project.

Solar Together London has made it easier and more affordable for residents to invest in solar PV, while also providing a more effective avenue for installers to bid for contracts. The win-win approach boosted local investment in solar and helps put the city on the path to a renewable-powered future.
SAN FRANCISCO: Green energy programme fuels the transition towards a renewables-powered city

Through the CleanPowerSF programme, the City and County of San Francisco is providing its residents and businesses a new option to purchase their electricity from renewable and low-carbon sources of energy at competitive rates.

By launching CleanPowerSF, the city is making progress toward its goal of reducing its greenhouse gas emissions by 40% by 2025 compared to 1990, as well as having 100% renewable energy by 2030. The programme was created with extensive public input, and revenues are reinvested back into the community.

What has the city achieved?

CleanPowerSF is a financially independent, self-funded community choice aggregation programme operated by the San Francisco Public Utilities Commission (SFPUC). CleanPowerSF is unique in that it was formed to serve San Francisco exclusively, and benefits from being nested within a public utility, which allows it to leverage the utility’s staff and infrastructure to further its programme’s goals. With CleanPowerSF, the city now has more control over its ability to increase the scale and cost-effectiveness of renewable energy and demand-side energy management, and will exercise more local control over electricity prices, resources, and reliability. Since its launch in 2016, CleanPowerSF has saved San Francisco ratepayers more than $3.5 million in reduced electricity costs while reducing city-wide electricity supply-related greenhouse gas emissions by more than 60 tonnes a day. CleanPowerSF estimates that it reduced CO₂ emissions relative to 1990 levels by approximately 258,000 tonnes in 2018, and through the growth of the programme, a doubling of CO₂ reductions is anticipated in 2019. Revenues generated by CleanPowerSF will be reinvested into the community to lower rates, offer customer programmes designed to further decrease greenhouse gas emissions in the city, and spur the development of renewable energy projects and the creation of local jobs.
What are the co-benefits?

Social:
CleanPowerSF increasingly aims to make participation accessible to all San Franciscans, regardless of income level. It plans to consider the obstacles individuals in low-income and underserved communities may face to join energy efficiency, demand response, and renewable generation programmes, and minimise the barriers to entry.

Health:
The programme primarily sources its power from renewable and greenhouse gas emissions-free energy sources that do not contribute negatively to air quality, thereby preventing air quality-related health impacts.

Economic:
CleanPowerSF plans to invest revenues in reducing residents’ electricity bills and the development of new clean energy infrastructure. Analyses have shown these efforts have the potential to create 8,000 to 9,000 jobs between 2018 and 2030.

Environmental:
The programme’s policies also prohibit the sourcing of power from coal, therefore preventing the emissions of damaging particulate matter and NOx emissions associated with this resource.

What can other cities learn?

Listen to the citizens:
Citizen engagement prior to the launch of CleanPowerSF directly informed the product offerings. Based on customer feedback, CleanPowerSF provides two options: electricity priced equal to or less than the local utility’s standard offering that includes approximately 50% renewable energy, as well as 100% emissions-free renewable energy at a slight premium of $4 per month.

Investing in clean energy pays off:
San Francisco spent approximately 10 years developing and implementing CleanPowerSF, investing approximately $10 million. In three years of operation, CleanPowerSF has already generated net revenue in excess of the city’s initial funding, and is expected to generate net revenue in excess of 200% of the city’s initial financial investment by the end of 2019. This net revenue is being used to fund programme financial reserves and repay start-up loans. Once this has been achieved, savings generated by the programme will go back to ratepayers in the form of reduced rates and fund the development of new local clean energy infrastructure.

To celebrate the end of the CleanPowerSF enrollment, and the fact that the SFPUC provides clean power for nearly 80% of the electricity consumed in San Francisco, approximately 60 residents dressed up as Carbon Busters and carbon molecules to illustrate how the city is reducing greenhouse gas emissions thanks to its clean power programmes.
Making solar more affordable for citizens is one way Seoul is speeding solar adoption. The city provides subsidies for solar panel installations on balconies and rooftops of apartment buildings. Despite the state government abolishing feed-in-tariffs in 2012, Seoul stepped up and launched their own feed-in-tariff, providing $2.4 million to 228 power generators by the end of 2018. Seoul also provides low-interest loans to citizens that cover up to 80% of the cost of solar PV systems. Between 2012 to 2018, 99 loans were taken out to fund $4.4 million of installation costs. Seoul also offers the unique option of leasing solar panels, lowering installation costs, and thereby increasing public interest in the technology. Citizens can get informed via five Solar PV Support Centers, which provide one-stop service from general information to panel maintenance.

Seoul is thinking outside the box to increase solar capacity, such as renting unused municipal land to private power generators and cooperatives for larger-scale PV power generation. For institutional improvements, solar is no longer an option, as Seoul can make installation of solar PV systems mandatory in the Seoul Environmental Assessment Standards and Green Building Code.

The project has even greater goals to deploy domestic solar PV panels to 1 million households, install solar PV systems on all municipal sites, and foster growth in the solar industry to achieve 1 GW installed solar PV capacity by 2022.
What are the co-benefits?

Social:
Solar City Seoul worked in partnership with solar PV panel manufacturers to donate panels to households living on public pensions. Between 2015 and 2018, 13,125 households received solar panels, cutting their monthly electricity bills by $8 on average.

Health:
Seoul is preventing air pollution and thereby improving public health by providing an alternative to coal-generated electricity. In 2018, Seoul’s solar panels generated 252,969 MWh of electricity, cutting PM2.5 levels by 6.7 tonnes.

Economic:
Seoul foresees economic benefits, including promotion of the city’s renewable energy industry and job creation, as a result of the project. Seoul expects $1.4 billion in investment in Solar City Seoul, which the city has estimated will create 4,500 jobs from 2018 to 2022.

Environmental:
Solar City Seoul was launched to prevent the need to build centralised coal-fired and nuclear power plants, and the associated environmental consequences, by increasingly meeting the city’s own electricity demand with renewable power generated within the city.

What can other cities learn?

Make the most out of publicly owned sites:
From schools to parking lots, Seoul is working with every division related to municipal infrastructure to install solar PV systems on all available municipal sites. By the end of 2018, 98 MW of solar capacity was installed on public buildings, with a goal of 244 MW by 2022. Seoul is the first city in South Korea to develop standards in an ordinance on rents of municipal sites to private solar power generators. Seoul is also planning to expand community-scale solar power generation by renting municipal sites, providing low-interest loans to lower installation costs, and offering municipal feed-in-tariffs. Already, 14 cooperatives are running 29 solar power plants (1.3 MW total capacity) on municipal sites.

Include citizens for effective public policy:
Solar City Seoul’s target and action plan were jointly developed by the city government and the Citizens Committee on One Less Nuclear Power Plant, which consists of the Seoul Mayor, scholars, researchers, civic groups, businesses, and other experts who participate in Seoul’s energy policy development and implementation. The committee and the city government has organised a Seoul Energy Forum seven or more times every year between 2012 and 2018, where 3,200 citizens participated to discuss the direction and the implementation of Seoul’s energy transition policies.

The success of Solar City Seoul is largely thanks to the strong support of citizens, as they generate most of the solar power by installing PV panels on their balconies and rooftops. From the launch of the programme until the end of 2018, 69,000 households have installed solar panels.
Harnessing the power of ocean waves is an idea dating back to 1799, but despite the technology’s potential to meet up to 10% of global energy demand¹, installed capacity worldwide is only around 25 MW², the equivalent of three large wind turbines. In a bid to better exploit this renewable energy resource, Tel Aviv is starting to put some of its 14 km coastline to use to generate green energy from the Mediterranean’s waves.

In 2014, the city established a public-private partnership to install a 10 kW pilot wave power project on the breakwater at Jaffa Port. After five years of testing and R&D, the project is expanding 10-fold and connecting into the grid to contribute to Israel’s shift towards renewables.

Wave power has benefits over other renewables as it is less intermittent, generating electricity both day and night. However, as this project was the first application of the technology in Israel, there were several regulatory hurdles to overcome, and new frameworks were established for permits and feed-in tariffs for wave power, allowing the technology to scale more easily in the future. Additionally, by building the system on an existing breakwater, it limits disruption to the marine environment and structural erosion to the breakwater, as well as reducing costs.

In Tel Aviv-Yafo, the city has established a public-private partnership to develop wave power technology on the city’s shores.

After a successful pilot, the project is scaling up from 10 to 100 kW this year, and is planned to eventually be integrated into a 20 MW wave power system that can provide 2% of the country’s electricity needs. The project demonstrates how cities can power innovation in the energy sector and help new green technologies overcome barriers to market entry.

What has the city achieved?

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Sources: ¹Living with the oceans, Word Ocean Review (2010)
What are the co-benefits?

Social:
As the home to many tech startups, Tel Aviv is an excellent location to spur innovation in the wave power sector. The next expansion of the project will create 10 new jobs, with a ripple effect on skills in the low-carbon power sector amongst the city’s workforce.

Health:
As the majority of Tel Aviv’s power system is derived from fossil fuels, steps to shift towards green resources will improve air quality in the city, leading to reduced risk of respiratory health problems.

Economic:
The project is playing into the national blue economy strategy, to create smart and sustainable value from the oceans. Funding for the project came from a combination of innovation grants and private funding, with the city providing technical assistance and infrastructure.

Environmental:
The project has taken care to limit intrusion on the marine environment, using biodegradable lubricants to remove risks of contamination. The system will contribute to shifting from the city’s reliance on fossil fuels, and by operating day and night can balance out intermittent solar power.

What can other cities learn?

Partner up to innovate:
To harness the power of the seas, Tel Aviv has partnered to harness the power of business to scale new innovations in the power sector. To scale the project, collaboration was required between the city government, the national energy ministry, Eco Wave Power, and EDF Energy.

Share to scale:
To help new renewable technologies scale, sharing results from R&D and pilot projects is key. Learnings from the project at Jaffa Port have been shared through numerous site visits and forums, with a great interest shown by other coastal cities and states from around the world.

YEARS IS THE EXPECTED RETURN ON INVESTMENT, which will come down as the project scales up
The Cities100 report features 100 leading climate action projects from cities around the world. The report demonstrates that cities' leadership on the climate crisis provides the added benefit of creating safe, liveable, and equitable cities for all citizens.

The 2019 digital report is the fourth edition of Cities100 and features 12 different categories of climate action.

Cities100 is a collaboration between C40 Cities and Nordic Sustainability, and is funded by the Danish philanthropic association Realdania.

Read them all by visiting: cities100report.com