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How cities can create demand for large-scale clean energy generation

[Clean Energy](#)[Finance and Economics](#)[Governance, Collaboration and Engagement](#)Originally Published: **March 2019**Author(s): **C40 Cities Climate Leadership Group, C40 Knowledge Hub**

While increasing building-scale, decentralised clean power generation is important for the shift to clean energy, cities will still usually rely on the electricity grid for a large portion of their energy needs. City governments do not usually have direct control over how grid power is produced, but they use a substantial amount of electricity themselves and represent a large portion of the energy companies' consumer base.

Cities can leverage this influence to increase the level of renewable power generation in the grid, which is critical for meeting an ambitious target of 100% clean electricity by 2035. This article outlines the three main approaches cities can take to do so.

Sign power purchase agreements, bilaterally or jointly with other large energy consumers

Power purchase agreements (PPAs) are long-term contracts signed between an electricity consumer, or group of consumers, and an electricity generator. The consumer can be any institution with a large electricity demand, such as a city government, university or private company.

The consumer commits to buying a certain amount of electricity produced by a planned power generation facility at a set price for the duration of the contract (usually 10-25 years). The generator then uses this guaranteed future revenue stream to raise finance for the project. PPAs are increasingly being used to

support large-scale renewable power projects, such as wind farms and solar arrays.



English

City governments have two main options for participating in a clean energy PPA: they can go it alone by signing a municipal PPA or they can work with other local institutions to arrange a joint, collective PPA.

Municipal PPAs

If your city operations has sufficient electricity demand you can consider signing a bilateral PPA with a renewable power generator. In addition to reducing emissions from electricity consumption, the PPA can improve long-term price stability and save the city money.

Washington DC to save US \$45 million over a 20-year contract

In 2015, the Washington DC Department of General Services (DGS) in the United States signed a wind PPA to cover 30-35% of the city government's electricity needs.¹ The PPA committed DGS to purchasing the entire output of a 46MW windfarm in Pennsylvania, and is expected to save the city US \$45 million over a 20-year contract.

DGS purchases Renewable Energy Certificates (RECs) to cover the rest of its electricity demand. RECs are tradable certificates available in the United States that guarantee that a megawatt-hour of electricity was generated by an approved renewable energy source.

Chicago's energy supply agreement brings renewable energy and good green jobs to the city

In 2022, the City of Chicago signed an energy supply agreement as part of its goal to transition all city operations to 100% renewable energy by 2025.² The agreement will see the city offset around 70% of the electricity use from its municipal operations with renewable energy from a new solar project under construction in Illinois, with the remaining power use sourced from procuring Renewable Energy Credits.

Now under construction, the solar project, Double Black Diamond Solar, is expected to be one of the largest solar projects in Illinois to date, with a capacity of 593MW and capable of powering 100,000 homes. From 2025, Chicago will have its power supplier purchase 300 MW of capacity from Double Black Diamond. The project is expected to create hundreds of jobs in Illinois, while the energy suppliers have also committed, as part of the agreement with the City, to fund job training and apprenticeships and ensure a minimum of 10% of the project workforce are equity-eligible individuals.

Collective PPAs

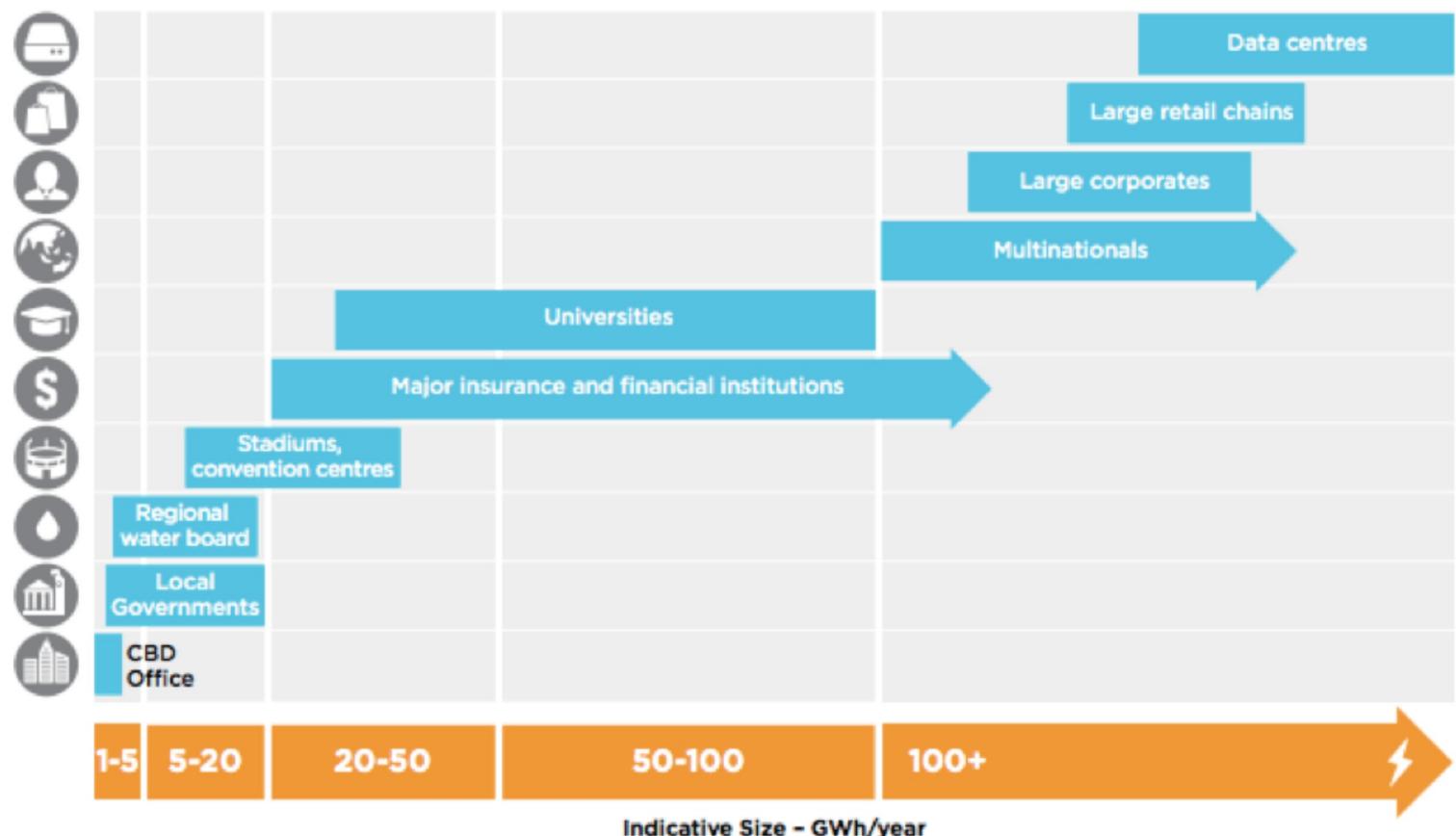
City governments that don't have a large enough electricity demand to make a bilateral PPA viable, or

simply want to aim higher, can aggregate the buying power of other local public and private organisations that are larger than their own. Working collectively allows you to achieve economies of scale, which are very considerable for renewable energy projects. The Rocky Mountain Institute's (RMI) *Procuring large-scale renewables through aggregation: A guide for local governments* provides more advice on these projects.

For more examples of collective procurement, and other forms of city-city collaboration, read *Better together: How cities can collaborate for faster, more effective climate action*.

Under collective PPAs the contract is signed between a group of local governments, institutions and corporations, and a clean energy generator. The diagram below sets out the indicative energy consumption needs of a range of large consumers and potential partners. City governments are ideally suited to act as the initiators, organisers and administrators of this kind of collective action to help drive the city toward ambitious clean energy goals.

Indicative consumption need by type of organisation³



By pursuing a collective PPA, your city and other participant organisations will benefit from:

- A guaranteed electricity price locked-in for the contract duration.
- Emissions reduction achieved at a lower cost due to economies of scale.



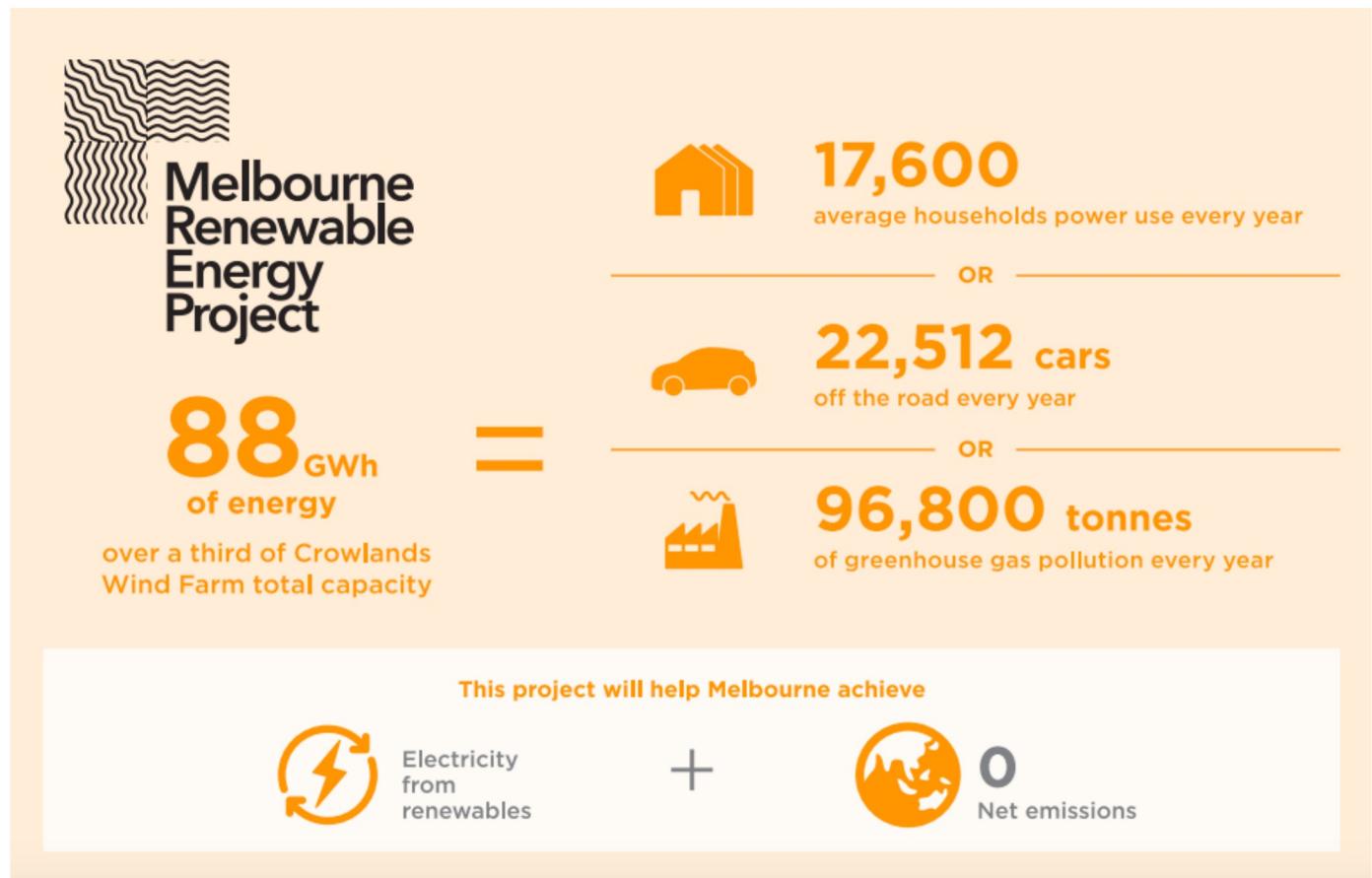
- Visible leadership on clean energy and reputational benefits through participation in a high-profile clean energy project.
- A new platform for collaboration, training and community engagement with key local institutions.

Melbourne's Renewable Energy collective PPA

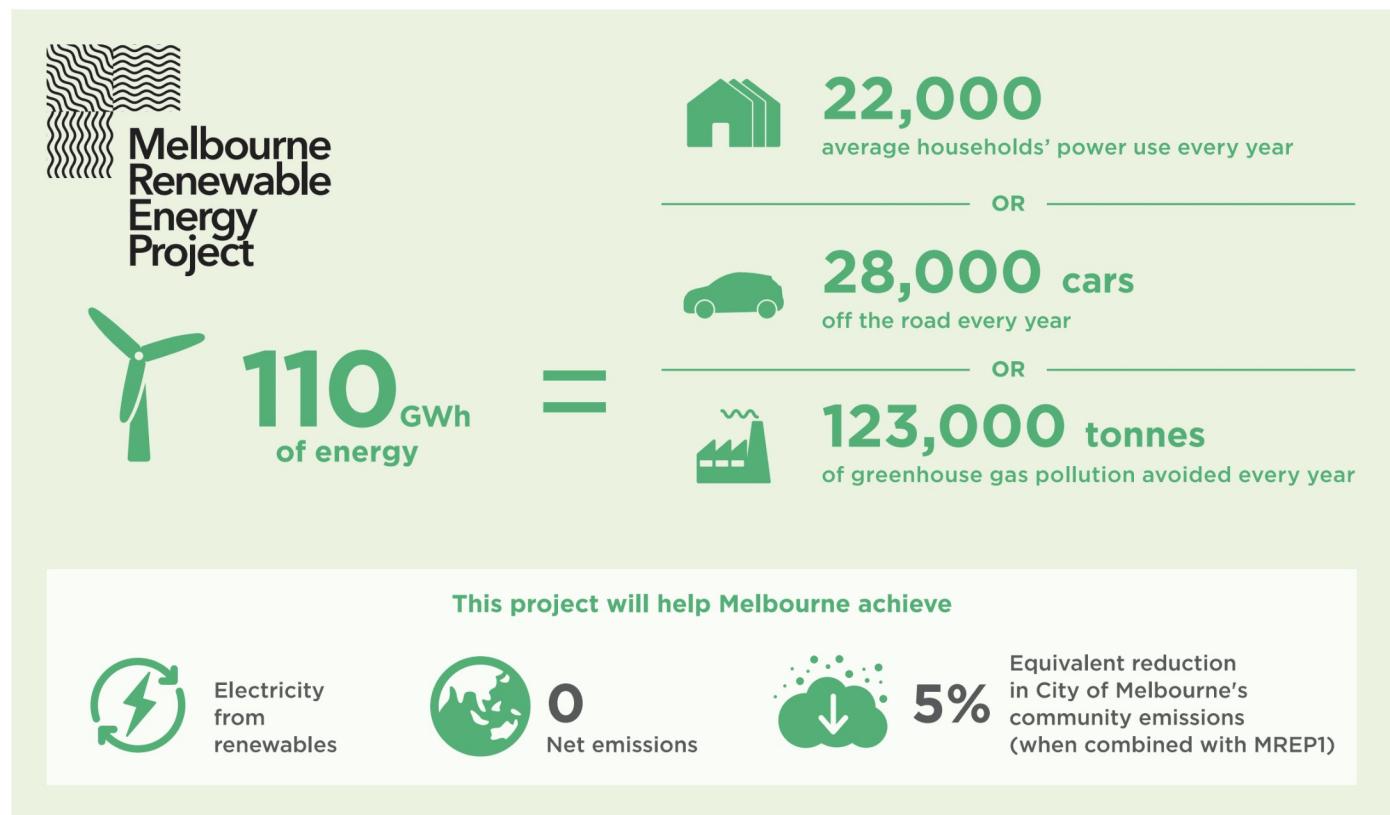
In November 2017, the City of Melbourne in Australia led the creation of the [Melbourne Renewable Energy Project](#), a collective PPA which enabled the construction of the 80MW Crowlands Wind Farm in Western Victoria in 2018.⁴

The PPA was signed by 14 public and private institutions, including universities, banks and local councils, who collectively committed to purchasing 88GWh of electricity per year – over a third of the wind farm's total capacity. The expected impact of 'MREP1' is illustrated in the first infographic below.⁵

It created over 140 regional jobs in construction, and eight ongoing maintenance jobs. The city of Melbourne switched all its operations to energy from Crowlands on 1 January 2019, becoming the first city in Australia to have all council-owned buildings and infrastructure – including street lights, municipal buildings, libraries and other service centres – entirely powered by renewable energy.⁶ The other partners also switched on the same day. Melbourne produced the [Renewable Energy Procurement Guide](#) to share this project's experience and support other cities implement collective PPAs.



A second PPA called MREP2 was signed in 2020. MREP2 brings together a second purchasing group of English energy users including shopping centres, office buildings, educational campuses and manufacturing facilities in a 10-year deal that further expands wind energy production in the region. The expected benefits of this 110GWh supply are illustrated below.⁷



Assess risks and benefits before signing a PPA

Before signing a PPA, cities must first conduct an assessment of the risks and benefits for the city, and develop a strategy for managing those risks. The most important factors to consider are:

- **Energy demand characteristics.** Risks will be lowest for institutions with a clear picture of their current and future energy needs, as well as those whose energy demands don't fluctuate significantly. Consider whether there are planned changes (such as to the amount of space or buildings the city uses) that will affect how much energy you need. Any planned investments in energy efficiency improvements, on-site renewables or energy storage will also need to be integrated into your future energy demand projections.
- **Energy project type.** The scale of electricity demand you need to meet under the PPA will determine the type and size of the project you sign an agreement for. For instance, wind power is usually commercially viable only at larger sizes (10MW-100MW), while solar projects can be developed at much smaller scales (less than 1MW).



English This is

- **Project governance.** Establishing a project governance structure should be an early priority. This is especially important if working with a consortium of institutions. You will need extensive consultation with all partners to understand their needs, develop common objectives and decide on an appropriate structure. All parties will need to agree in advance how they will split advisory and legal costs, make decisions, share information, and negotiate with the renewable power generator(s), through mechanisms such as a memorandum of understanding.
- **Resourcing.** Cities may need to build internal project management capacity, and will usually draw upon external energy market advisors, procurement brokers and legal advisors.
- **Risk assessment.** A long-term PPA contract exposes the consumer to risks that they would not normally take on, such as future energy costs falling below what the consumer is committed to under their PPA contract. These risks can usually be mitigated by careful contract design, due diligence and procurement, but first you need to identify them through a risk assessment. You should conduct separate assessments for the procurement, contract negotiation and renewable project development stages, which each have their own set of risks. If you do not have a strong internal capacity for risk assessment, consider hiring a consultant.

For a more extensive explanation of risks involved in signing PPAs and how to manage them, read RMI's *A Local Government's Guide to Off-Site Renewable PPA Risk Mitigation*. More detail on these factors and considerations can also be found in the Melbourne Renewable Energy Project's *Renewable Energy Procurement Guide*.

Aggregate community demand for clean energy

Cities can use their position to aggregate community demand and procure sustainably-produced electricity at competitive rates. This can be achieved using a variety of models, depending on the local regulatory context. Focusing on solar and the United States context, *City Renewables Procurement Guidance* provides practical advice on community models, as well as on PPAs and other issues.

Publicly-owned energy suppliers

The city can establish a new energy supplier to provide a higher proportion of renewably-sourced electricity than is available through existing suppliers. In 2020, for example, London launched a new 100% renewable energy company called London Power, in partnership with supplier Octopus Energy, aiming to reduce energy prices while increasing the city's clean energy supply.⁸

Stadtwerke München is one of the largest energy and infrastructure companies in Germany and English owned by the city of Munich. Since 2016, the company has supplied enough renewable energy for the needs of every household, by 2025 it aims to supply renewables for local industry too.



Barcelona Energia

The Barcelona City Council in Spain approved the creation of a public electricity distributor in March 2017. Barcelona Energia is publicly-owned and was established with the intention of promoting 100% renewable and locally-produced electricity, particularly solar. Barcelona Energia supplies electricity to the municipal buildings and facilities of Barcelona City Council and serves 4,675 points and 21 bodies and entities of the municipal group of companies. In 2019, it started to offer services to the facilities of the metropolitan area and to city residents, up to a maximum of 20,000 homes.⁹

Austin Energy

Austin Energy is a community-owned energy enterprise of the City of Austin which has been established for over 100 years. The company is targeting carbon-free energy generation by 2035. One strategy towards that goal is the Solar Standard Offer. The programme, launched in 2024, will allow rooftop solar development without the need for property owners to spend thousands or take a loan to install solar panels on their roof. Solar companies will instead lease a property owner's roof space to host solar arrays, with the clean energy produced to be sold to city-owned utility Austin Energy at a fixed price. The owner of the solar system will be compensated by Austin Energy for the solar power generated, and the energy supports the Community Solar Program, which offers renewable energy to residential customers, including low-income customers who participate in the Customer Assistance Program (CAP). The scheme will save Austin Energy and energy consumers money through the avoidance of other energy, transmission and grid operating costs and contributes to the community's climate, affordability, and energy sustainability goals.

Community choice aggregation

Cities can choose to purchase energy collectively for their entire community from a supplier other than the normal utility provider if: (a) the city's electricity is provided by a regulated utility company (where regulations determine the utility provider) and (b) legislation is in place at the national or state level that allows the city to make this decision.

This kind of municipal energy procurement is called community choice aggregation (CCA). Usually, the regulated utility company still provides transmission and distribution services, but the electricity is generated by a third-party supplier.



English

CCAs enable energy to be procured from providers specifically offering electricity from **renewable** sources. This can result in lower electricity prices, though not always. A key design feature is that CCA programmes are ‘opt-out’ – this means that customers are automatically enrolled in the programme but can choose to opt out if they wish. In the United States, opt-out programmes for renewable energy have achieved a resident participation rate of between 85% and 95%, compared to less than 20% for opt-in green tariffs offered by utility providers.¹⁰

Massachusetts community programmes

More than 150 cities and towns in Massachusetts, United States, have created municipal aggregation programmes, mostly to achieve a higher percentage of renewables than is set out by state regulations. As part of its plans to become carbon neutral by 2050, in 2021 Boston launched the largest such programme, Boston Community Choice Electricity (BCCE), which buys electricity for the city’s residents and businesses.¹¹ In January 2021, Boston households were put onto a default energy plan for 28% of electricity from renewable sources, 10% higher than the state’s mandated minimum for the year. Residents can opt out, either to a marginally cheaper 18% renewable plan according to the state minimum, or upgrade to a 100% renewable plan.¹² In the first six months of 2023, Boston residents on BCCE saved nearly \$60 million, with an average household savings of \$340 compared to local utility company rates.¹³

In 2024, the City of Boston again increased the renewable energy content in BCCE’s standard product by an additional 15% beyond the state’s required renewable portfolio standard.¹⁴ This increased the total renewable energy content in the default product to 39%, as part of the City’s commitment to its Green New Deal.

Facilitate community investment in energy projects

Cities can help residents to invest in large-scale renewable projects, which can be ‘top-down’ or ‘bottom-up’. A ‘top-down’ structure enables residents to buy shares of renewable energy projects established by energy utility providers or other actors. ‘Bottom-up’ projects are developed by the community, who form a legal structure and take on full ownership. In both cases, shareholders receive a split of the profits achieved from selling electricity to the grid. Cities can play an active role in facilitating community energy projects and coordinating investment from local residents, which also helps to increase public acceptance and support for large, local renewable energy projects.¹⁵

Middelgrunden Offshore Wind Farm

The Middelgrunden Offshore Wind Farm was developed in the waters outside Copenhagen Harbour, Denmark, in 2000.¹⁶ The 40MW, 20-turbine wind farm is 50% owned by Copenhagen Energy, the city’s municipal utility company. The other 50% is owned by the 10,000 shareholders of Middelgrunden



Limited to English

Vindmølleaug (Wind Turbine Cooperative), a general partnership cooperative that was initially limited to residents of Copenhagen but has since been opened to wider participation. Every shareholder has one vote in decision-making, irrespective of the number of shares owned. Their investment risk is reduced by a rule preventing the partnership from taking on debt.

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