

MAYOR OF LONDON

**DRAFT SOLAR
ACTION PLAN FOR
LONDON**

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CONTENTS

Executive summary	3
Introduction	6
Overview of solar energy in London	9
The Mayor’s actions to increase solar energy in London	14
Getting involved	24
Endnotes	25

Executive summary

The Mayor wants to make London a zero carbon city by 2050. For this to happen, London will need to be supplied by a range of efficient and clean energy sources. Energy generated from solar technologies will be part of this mix. This draft action plan, the first of its kind for London, sets out how the Mayor will seize the opportunity for solar energy in the capital and increase deployment in the coming years.

In the past decade, the UK has seen a dramatic increase in the number of solar energy installations. Despite recent setbacks, solar energy generation is set to grow further. Solar technologies are versatile and can be installed in a wide range of locations and sizes. These include domestic and commercial buildings and, where appropriate, on the ground. Solar energy projects can be developed and installed very quickly, and the fuel -solar radiation- costs nothing and is pollution-free. However, London lags behind the rest of the country in realising the benefits of both solar photovoltaics and solar thermal technologies and there is a significant opportunity for London to increase its uptake from today's low levels.

The Mayor wants London to realise its solar energy potential. This requires a buoyant and expanding solar energy industry which helps bring down the costs of solar energy technologies and ensures they become competitive with fossil fuel based generation and other low carbon energy sources in the near future. Combining solar energy generation technologies with storage technologies (like batteries) enables onsite use of heat or power to meet demand at any time of day. It is therefore important that London maximises the potential for solar storage as technology costs continue to fall.

This plan sets out a range of actions to realise the Mayor's ambitions on solar energy through the flagship Energy for Londoners programme. This aims to encourage more clean energy, and make energy bills fairer and London's buildings more energy efficient.

Box 1: What is solar energy?

Solar energy is energy obtained by capturing the radiant light and heat from the sun. A range of technologies enable this. For example, photovoltaic (PV) cells generate electricity, and solar thermal technologies collect the thermal energy from the sun and use this heat to provide hot water or space heating. Solar energy technologies provide a reliable source of renewable energy for heating and powering our buildings and infrastructure.

It is estimated that the Mayor's programmes will lead to around an extra 100 megawatts (MW) of installed solar energy generation in London by 2030, more than double London's existing solar energy generation capacity (95 MW). But the Mayor thinks London can, and should, go further than this. Meeting the Mayor's ambitious zero carbon target is estimated to require ten times more solar energy generation to be installed – 2 gigawatts (GW) by 2050, and around 1 GW by 2030. This cannot be achieved by the Mayor's programmes and leadership alone. It will need strong and supportive policy from national government and the support of local government, the private sector, charities and individuals.

Mayoral objectives and actions

1. Lead by example by maximising solar energy technologies on Greater London Authority group buildings and land
 - map the full potential for solar energy generation on the GLA group estate in 2018 and maximise installation on the GLA group's buildings and land
2. Encourage solar energy installations through the planning system
 - ensure that new developments include solar, where feasible, and work with boroughs to ensure planning policies do not unnecessarily restrict solar installation on existing properties
3. Help Londoners to retrofit solar energy technologies on their homes and workplaces through Mayoral programmes and funding
 - pilot a new solar reverse auction scheme to reduce installation costs for Londoners
 - develop a grants scheme to help community solar energy projects get off the ground
 - encourage public sector organisations and providers of social housing to retrofit solar energy technologies on buildings by promoting the use of technical assistance programmes such as the Mayor's RE:FIT programme and the introduction of a successor to the current RE:NEW programme
 - support projects that promote energy storage
4. Help Londoners to make informed decisions about investing in solar energy technologies
 - produce an interactive map for Londoners to identify solar energy generation potential and promote it through Mayoral programmes
 - provide clear guidance and information on installing solar energy technologies

Further government action

5. Call on government to set a national policy framework that unlocks London's solar energy potential
 - call on government to ensure national policy is introduced to support higher levels of solar energy deployment in London, as part of a package of national policy measures that enable London to meet its ambitious zero carbon target by 2050

This draft Solar Action Plan for London forms part of the Mayor's draft London Environment Strategy, which is out for public consultation. The Mayor welcomes feedback on this draft plan and will consider this in producing a final Solar Action Plan for London. You can give your feedback on this action plan at www.london.gov.uk/solar-action-plan until 17th November 2017.

Introduction

Solar energy technologies are mature, proven and reliable sources of renewable energy with an important role to play in both the national and London energy mix. Electricity can be directly produced from photovoltaic (PV) cells, and solar heating technologies collect the thermal energy from the sun and use this heat to provide hot water or space heating. Solar PV and solar thermal technologies are clean and renewable and will play a part in meeting the Mayor's target for a zero carbon London by 2050.

Solar energy technologies can be deployed in a variety of locations and contexts including domestic roofs, commercial and industrial properties, and on the ground on brownfield sites, for example as solar farms. Solar PV and thermal systems enable households and businesses to independently generate electricity and hot water.

Solar energy technologies are not just important because of their energy production. They can also contribute to London's economic growth, through supporting the low carbon and environmental goods and services sector. This is currently worth £30.4bn to London's economy, and is estimated to employ around 5,000 to 10,000 people in the solar industry within London¹.

Solar energy technologies installed on buildings, usually on rooftops, bring additional co-benefits. They help to engage building owners, raise energy and climate change issues up community agendas, and influence how people value and use energy. Solar PV in particular can also be installed alongside other rooftop technologies, such as green roofs. Indeed, some research shows that vegetation can help increase the operational efficiency of solar PV panels by keeping them cool.

In the decades ahead, with the need to move to the electrification of heat and transport, demand for electricity is likely to increase. This is especially in areas of large scale development (such as opportunity areas) where electricity substations may already be at or near capacity. Generating local electricity through solar PV can help meet current demand and ease stress on the national grid. Solar electricity can also help balance our demand for energy, for example by supplying buildings where peak demand aligns with solar generation – such as offices (typically used during the day). Combining electricity storage technologies, such as batteries, with solar energy generation technologies enables onsite use of solar generated electricity to meet demand at any time.

In addition to solar PV generating electricity for London, solar thermal also helps reduce gas consumption for hot water production. Although it is estimated to have a smaller potential to provide energy from London's rooftops than solar PV, solar thermal often provides a competitive return on investment even without financial support (typically around six years). In addition, solar thermal technologies can help tackle air pollution by reducing our reliance on polluting gas-fired heating systems to produce hot water.

The Mayor's ambition and objectives

In his manifesto, the Mayor committed to “make the most of the city’s roofs, public buildings and land owned by TfL for energy generation by producing a solar energy strategy”.

The actions set out in this draft plan will put London on track to realising the potential of solar energy and maximising its contribution to the Mayor’s zero carbon city ambition. They form part of the Mayor’s flagship Energy for Londoners programme which will help increase the energy efficiency of London’s homes, generate low carbon energy, and tackle fuel poverty.

Many of the factors that determine the speed of solar PV and solar thermal deployment in London are outside of the Mayor’s control, such as manufacturing costs for panels or national incentive schemes such as the Feed-in Tariff (FIT) or Renewable Heat Incentive (RHI)². However, the Mayor has a key role to play in promoting solar energy and encouraging Londoners to harness the benefits of solar energy technologies and associated storage.

This action plan sets out what the Mayor will do to maximise London’s solar energy generation. Given London’s limited amount of available space at ground level, rooftop solar PV is the main focus of this action plan. However, the action plan will also encourage the installation of solar PV and solar thermal technologies on vacant land or space alongside other infrastructure at ground level.

The plan has five objectives, with actions to achieve them under each:

1. Lead by example by maximising solar energy technologies on Greater London Authority group buildings and land
2. Encourage solar energy installations through the planning system
3. Help Londoners to retrofit solar energy technologies on their homes and workplaces through Mayoral programmes and funding
4. Help Londoners to make informed decisions about investing in solar energy technologies
5. Call on government to set a national policy framework that unlocks London’s solar energy potential

Global context

Solar PV is on the rise globally. Prices for solar PV panels have plummeted over the last decade and this trend is expected to continue. The International Renewable Energy Agency suggests that the global average cost for electricity generated by solar PV could decrease by as much as 59 per cent by 2025 compared to 2015 prices³. Solar PV was the largest renewable energy employer in 2015 with 2.8 million jobs worldwide, an 11 per cent increase on 2014⁴.

As of the end of 2016, there was an estimated 300 gigawatts (GW) of solar PV installed worldwide, making up more than 1.5 per cent of global electricity demand. Rapid growth since 2015 is largely due to installations in the U.S. and China. Many commentators suggest that global growth will slow in 2017, but is likely to increase once large installers such as China confirm their next FiT⁵.

National context

In the UK, there has been unprecedented growth in the number of solar panels installed on homes in recent years. Over the past decade, it is estimated that over 800,000 homes have had solar panels installed, helped by a reduction in cost of over 70 per cent⁶. Small scale domestic solar PV (systems typically <4 kilowatts (kW)) is the largest sub-sector of the UK solar PV market, for both total installations and capacity installed⁷.

However, in more recent years the solar industry has faced challenges, especially with reductions in financial support due to changes in government policies, particularly changes to the FiT in 2015. This resulted in support for domestic-scale solar tariffs reducing by 65 per cent from 12.47 to 4.39 pence per kilowatt hour (p/kWh). As a result, UK rates of solar installation have slowed. According to the Solar Trade Association (STA) domestic rooftop solar technology deployment fell by 75 per cent in the first quarter of 2017 compared to average deployment since the FiT began in 2010⁸.

Although the costs of solar PV panels have fallen significantly over the past decade, there has been a recent increase in costs for domestic solar PV installations in the UK (by approximately 10 per cent since early 2016). According to the STA this increase in costs is linked to low rates of current deployment since “cheap solar and sustaining strong cost reductions requires the high volumes of a solid market”⁹. Increasing deployment rates through further incentives could therefore provide more competitive prices, leading to a further increase in deployment.

In addition to these factors, government has recently increased business rates for buildings which have solar panels installed that generate electricity for use onsite. Some sites have faced six to eight fold increases in their business rates according to the STA¹⁰. Not only do these rates not apply to onsite fossil fuel energy generation in the UK they also do not apply to competitors in Europe. This disproportionately affects the UK and weakens the financial business case for building owners to install solar PV. In some cases higher business rates are estimated to make solar PV a burden rather than a benefit¹¹.

These factors have also had an impact on jobs. A report commissioned by the STA in 2016 estimated that at least a third of jobs in the solar energy sector have been lost as a result of the recent decline in sales¹².

However, despite changing government policy, there is reason to be optimistic about the national context. Solar PV is popular in the UK. According to the Department for Business, Energy and Industrial Strategy (BEIS) 82 per cent of respondents to their public attitudes survey supported solar PV¹³. Several energy suppliers are also now offering solar energy technologies and storage technologies as a compelling business model to generate revenue and reduce energy bills. Greater London Authority (GLA) surveys of sector experts suggest that with a supportive government regulatory framework, within two to three year battery storage is likely to be a self-sustaining market.

London will be best placed to take advantage of this market trend if there is widespread familiarity with the technology, its associated business models and the logistics of battery installation and management.

Overview of solar energy in London

Solar potential in London

London has a large amount of potential space for solar PV and solar thermal technologies. Greater London covers an area of around 1,600 km², around one third of which is comprised of building rooftops¹⁴. But rooftops are not the only suitable area for solar technologies. London has a potentially huge, but unquantified, opportunity for installing renewable technologies on vacant land and open space, building facades, and alongside thousands of kilometres of roads and railway sidings.

However, London's economic potential for solar is less strong. The GLA assessed the economic potential for solar PV and solar thermal technologies on buildings as part of its zero carbon pathways modelling to inform the draft London Environment Strategy¹⁵. This took into account the economic constraints resulting from current government policies – predominantly the reduction to FiTs – and trends in deployment between 2010 and 2016. This study estimated that under an ambitious scenario¹⁶ solar PV installations could reach around 550 MW capacity by 2025, 850 MW capacity by 2030 and 2 GW capacity by 2050. Solar thermal is expected to be the equivalent of around an additional 100 MW by 2030.

Solar PV deployment

In 2015 solar PV is estimated to have generated 70 gigawatt hours (GWh) in London, 0.2 per cent of the capital's total electricity demand, from a capacity of 82 MW¹⁷. More recent figures from Ofgem suggest London now has closer to 90 MW of solar installed through the FiT and around 5 MW through the Renewables Obligation scheme and Renewable Energy Guarantees of Origin certification¹⁸. Figure 1 shows the impact of the national solar PV FiT, introduced in April 2010, which accelerated solar PV installations in London nineteen-fold (capacity is thought to be less than 5 MW prior to 2010). Almost three quarters of solar PV capacity in London was installed on domestic buildings, with commercial buildings providing the next largest contribution (see Figure 2). Average capacity per home is estimated to be around 3.2 kW, meeting around half of a home's annual electricity demand, and around 18 kW for commercial (and community) buildings. This

increases to around 90 kW for industrial installations, of which there are far fewer (around 30) in London.

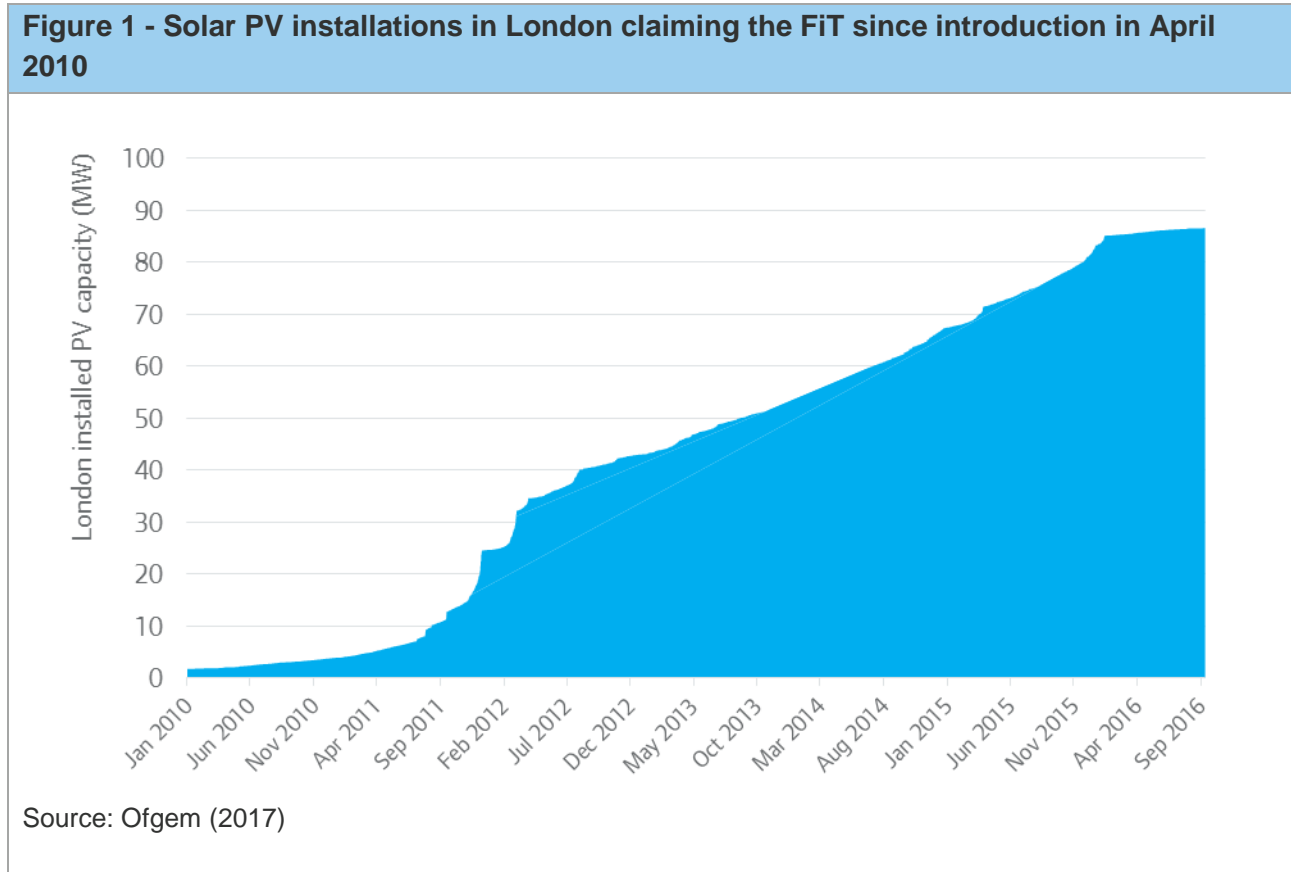
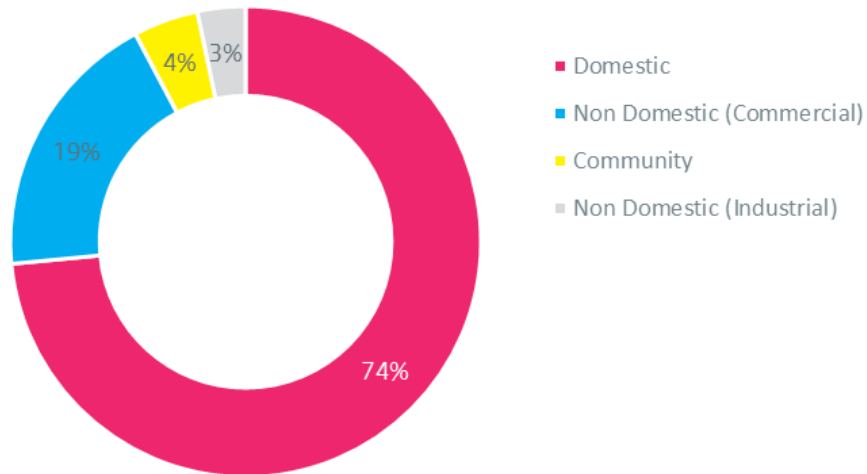


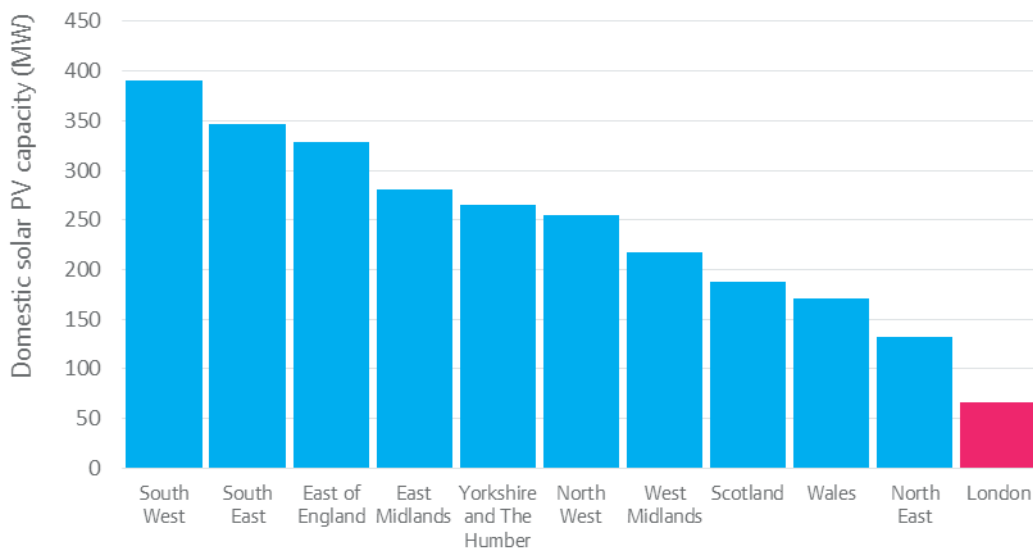
Figure 2 - Proportion of FiT registered installed solar PV capacity in London by host building type



Source: Ofgem (2017)

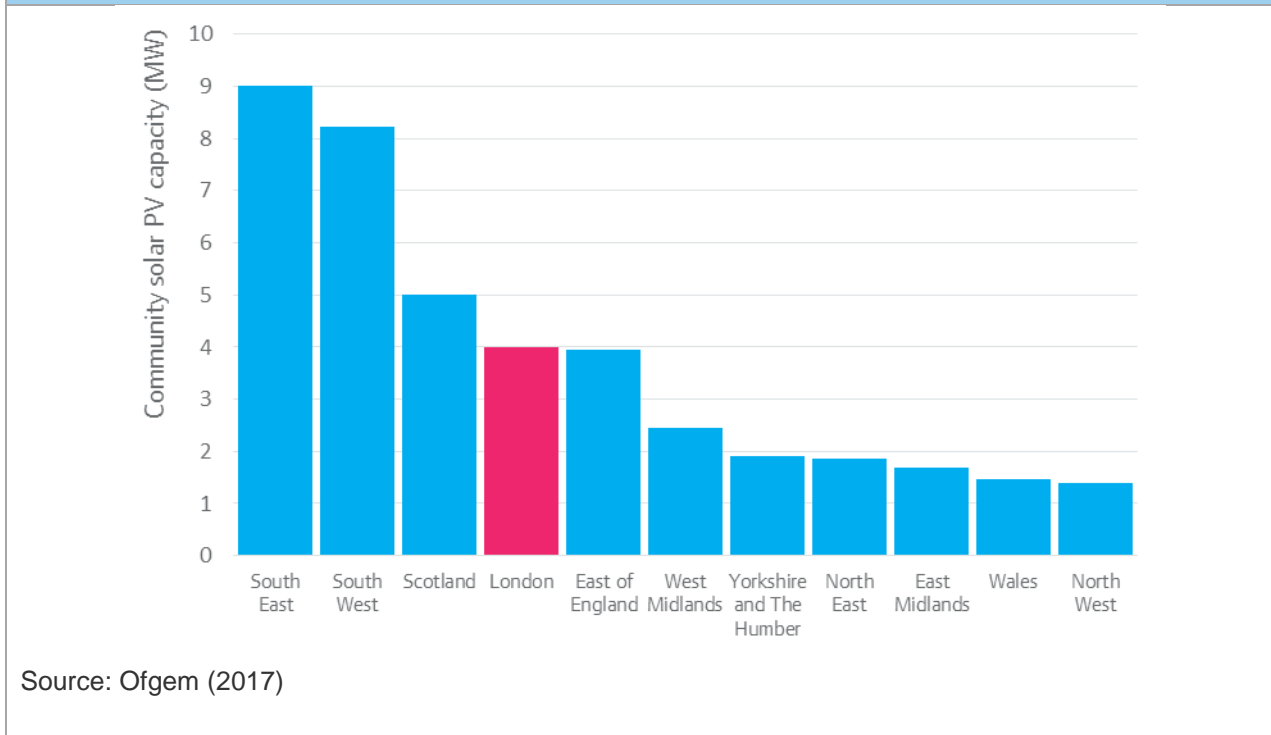
London continues to lag behind other regions in the UK in relation to solar PV installation. London has only 2.9 per cent of total domestic capacity registered through the FiT for England and the lowest of any region in the UK¹⁹ (Figure 3). However, London performs better on community installations (i.e. those on communal buildings), as shown in Figure 4.

Figure 3 - Sum of FiT registered installed solar PV capacity for domestic properties by UK region



Source: Ofgem (2017)

Figure 4 - Sum of FiT registered solar PV capacity for community properties by UK region



Solar thermal deployment

As of April 2017, London had 252 accredited domestic solar thermal schemes, out of a national total of 8,185²⁰. These largely provide hot water for buildings. From November 2011 to April 2017, although London had an additional 87 non-domestic RHI accredited installations with a capacity of 27 MW, less than 1 MW of this is thought to be solar thermal. Government has stated its intention to continue to support solar thermal technologies through the RHI, recently confirming that the solar thermal incentive should remain at a rate of 19.74p per kWh²¹. GLA modelling suggests that London has the potential for 6,800 domestic and 1,200 non-domestic solar thermal installations by 2030.

Barriers and opportunities

The upfront capital cost of installing solar PV is still fairly high (around £4,000 - £6,000 for a typical family home in the UK). This can discourage Londoners from investing in the technology. However, there are a number of other reasons for London's low uptake of solar PV. The greatest barrier is uncertain national policy. Government has reduced its financial support through the FiT for solar energy technologies, citing the fall in costs of technology. However, since the reduction in the FiT, the uptake of solar energy technologies across the country, including London, has plummeted and is unlikely to regain previous levels without a supportive policy framework to address delivery barriers.

Despite this, the Mayor is committed to providing leadership to stimulate the market in London and overcome some of the capital's specific barriers and challenges including:

- fifty per cent of London's homes are flats, compared with sixteen per cent in the rest of England²². Flats are logistically harder to retrofit than a single dwelling and often require agreement from tenants, leaseholders and freeholders. The Mayor currently has limited powers to require freeholders to consider solar PV, for example if more than half of leaseholders are in favour of installation. Blocks of flats also have significantly less roof space per home compared to houses
- 28 per cent of all London's homes are privately rented, compared with 18 per cent in the rest of England²³. Landlords often have little incentive to install solar PV as they do not receive any benefit from the savings on energy bills but have to pay the upfront cost. Likewise tenants have little incentive to invest in a property they do not own
- a high number of rented commercial buildings²⁴. As with privately rented homes, the landlord-tenant split means there is often little incentive for solar energy technologies to be installed
- difficulty in accessing suitable homes and workplaces. This could, for example, be due to narrow roads and little space for grounding the scaffolding needed to install rooftop panels. These challenges also have the potential to increase installation costs
- unsuitable locations, and over 1,000 conservation areas, which are half of England's total. Dense development and tall buildings can lead to sub-optimal conditions for electricity generation from solar PV due to shading. In addition, GLA analysis indicates that solar PV installations are 50 per cent less likely to be installed in conservation areas in the built environment, mainly due to heritage considerations
- competition for roof space, and lack of suitable space for large ground level solar installations, like solar farms. Roof space is often used for other building service equipment, or has unsuitable structures. In addition, competing use for land limits the deployment of solar PV on the ground (such as solar farms, which are more prevalent outside of London)

The Mayor's actions to increase solar energy in London

To contribute to London's zero carbon target by 2050, it is estimated that London will need to install up to 2 GW of solar energy by 2050 and around 1 GW by 2030. Working together with Londoners, building and estate managers and owners, businesses and community groups, this ambition is achievable. But it will require government to provide consistent and long term policy certainty to enable the UK solar industry to grow with confidence, and achieve cost reductions through greater deployment rates.

The Mayor proposes to undertake actions within his powers to increase the level of solar energy technologies installed in London. It is estimated that these proposed actions could deliver around an extra 100 MW of installed solar energy generation in London by 2030, more than double London's existing solar energy capacity (95 MW).

This will be achieved through the following actions:

- 1. Lead by example by maximising solar energy technologies on Greater London Authority group buildings and land*

The GLA group has already installed solar PV on a number of its buildings, including:

- City Hall – 67 kW of panels installed through an energy efficiency retrofit that took place in 2008
- Transport for London (TfL) – 167 solar panels installed at a number of sites including TfL's 55 Broadway HQ, Paddington Underground station and Vauxhall bus station. The latter provides a third of the bus station's electricity
- London Fire Brigade (LFB) – 43 PV arrays installed on fire brigade buildings with a further ten underway. It also has fifteen solar thermal installations. In 2015 the LFB met around six per cent of its energy demand from renewable sources including solar energy technologies and has a target to achieve 12 per cent by 2020/21
- Metropolitan Police Service (MPS) – operates and maintains 21 solar arrays. During 2015/16 the PV arrays generated around 400 MWh of electricity. The MPS benefited from £54,300 in FiT payments and £48,000 in avoided electricity costs
- London Legacy Development Corporation (LLDC) - PV arrays generate around 350 MWh of electricity per year

These projects have provided the GLA group and its building and estate managers with invaluable experience in progressing solar PV installations. However, the installations to date represent a small fraction of the buildings and property owned or managed by the GLA group.

The Mayor will therefore call on the GLA group to map the full potential for solar energy generation on their estates in 2018 and maximise the potential to install solar energy generation. This will include identifying and prioritising potential sites and infrastructure, setting a solar energy target, making finance available, and utilising the Mayor's delivery programmes, such as the Decentralised Energy Enabling Project (see page 20) and RE:FIT (see box 8) where appropriate, to install solar PV. The Mayor will support this by developing mapping tools and sharing best practice.

Several GLA group members have already started this process. For example, TfL has prioritised rolling out solar PV on its property as part of its recent business plan. In June 2017 it launched an invitation to tender to the RE:FIT delivery framework to initiate the first phase of delivering solar PV on identified TfL properties. TfL has identified 24 buildings for this first phase with a strong potential business case for energy efficiency retrofit combined with solar PV generation. Should the first phase be successful, further projects may be undertaken on TfL's portfolio of over 1,000 buildings.

Railway sidings and other vacant land and infrastructure owned by the GLA group also provide a vast area of currently underutilised space (especially where not used for wildlife habitat) for solar PV installation. However, installation and maintenance of solar PV panels can be complicated by difficult access and meeting the necessarily strict safety precautions.

Box 2: Transport for London's solar mapping

In 2010 Transport for London undertook a high level study of the potential to retrofit solar energy technologies on London Underground stations and depots, office buildings, bus stations and garages. Those which had no roof space or were significantly overshadowed were eliminated. This was followed by a detailed analysis of the challenges surrounding the use of renewables to take a typical station 'off grid', which found the costs to be prohibitive. In 2016 it completed a more detailed analysis of the majority of its building stock (over 1,000 buildings including offices, depots and stations) to determine the suitability and potential generation of solar PV.

As part of maximising solar generation, the Mayor will work with the GLA group to investigate delivering solar energy projects on challenging sites to determine how greater barriers to deployment can be overcome. This may include working with community energy groups and others to install solar energy technologies on GLA group land. Sites will be selected where the business case for investment is uncertain due to a lack of evidence on constraints. By managing projects from initial scoping through to installation the lessons that are learnt will provide more robust evidence to inform the business case for future installations. To overcome site-specific challenges the projects may require the use of technologies that are relatively new to the market, helping to incentivise innovation and also providing evidence for the performance of new products. Dependent on the success of these projects, the Mayor will consider encouraging other public sector land owners and managers to install solar PV on vacant land or make it available to community energy groups.

2. *Encourage solar energy installations through the planning system*

New developments

The London Plan is the Mayor's regional strategic development plan. Under current energy policies the London Plan and local borough plans are delivering solar PV on major developments. Most planning applications referred to the Mayor for his final decision incorporate solar PV and in recent years these developments have committed to an estimated 6 MW of solar PV per annum. In his review of the London Plan, the Mayor will continue to expect solar to be considered by boroughs and developers to help achieve carbon targets.

As part of the current London Plan, the Mayor encourages major developments to use onsite renewable energy technologies (such as solar PV and solar thermal) where feasible to help meet carbon reduction targets. Where energy assessment targets are not achievable onsite, the London Plan allows developers to meet carbon targets through delivering installations offsite or through the payment of offsetting funds. The Mayor will continue to support boroughs to collect and utilise carbon offset contributions from new developments to retrofit solar energy technologies on existing buildings. It is intended that the new mapping tools described later in this plan will help identify locations that may be suitable for solar PV. This will need to be balanced against other competing uses for offset funds, such as energy efficiency measures.

For large 'strategic' developments (i.e. large developments referred to the Mayor) where estimated demand for power exceeds current grid capacity, developers will need to work with the District Network Operator to determine the most cost-effective way to provide a reliable and affordable electricity supply. A local micro grid powered by solar, combined with storage may be able to contribute to this.

Where there is potential for larger scale solar installations at ground level within the GLA boundary, applications referred to the Mayor will be judged on a case by case basis, in line with London Plan policy and considering the impacts in the local area and the wider benefits for London.

Existing buildings

Opportunities to install solar energy technologies on existing buildings in London are currently being missed. In principle, permitted development rights (set at a national level) enable the installation of solar panels without planning permission, even within conservation areas. Installations on listed buildings require planning permission wherever they are located.

The experience of the Mayor's RE:NEW programme (see box 3) suggests some inconsistency in the approach by boroughs to the application and interpretation of permitted development rights. This is particularly prevalent in conservation areas. Within conservation (or heritage) areas local authorities can remove permitted development rights through an Article 4 Direction, thereby requiring planning permission to be granted before work can start. This can potentially result in planning permission being refused or the imposition of conditions that make the PV installation unfeasible.

The Mayor will therefore work with boroughs to map the variance of planning approaches across London. Findings from previous studies will be used to inform guidance to aid a more consistent application of solar PV, solar thermal technologies and other energy efficiency retrofit measures on properties in conservation areas, while respecting heritage considerations. Whilst there has been innovation in the design of solar energy technologies that has made them more sympathetic to their surroundings, it is important that this continues and these technologies are brought to mass market soon.

3. Help Londoners to retrofit solar energy technologies on their homes and workplaces through Mayoral programmes and funding

Solar PV on housing

Different housing tenures in London have differing levels of solar PV installations, and require different approaches and incentives to encourage further uptake.

To support an increase in the installation of solar PV on London's social housing (and privately rented homes where possible), the Mayor will introduce a successor to the current RE:NEW programme. Social housing represents approximately a quarter of London's total homes and is an important and growing market for solar PV. As multiple homes are owned by a smaller group of boroughs and social landlords, it provides an opportunity to aggregate demand for solar PV across housing stock as part of whole-house energy efficiency retrofit.

Although some boroughs and housing providers are already retrofitting solar on their housing stock, some lack the capacity and resources to take the same action. As part of the Mayor's Energy for Londoners programme, RE:NEW provides technical assistance to boroughs and social housing providers to help overcome these challenges. Since 2009, the RE:NEW programme has supported delivery of around £23m of solar PV projects in 8,900 homes, reducing carbon emissions by an estimated 1,700 tCO₂ each year. The Mayor will seek match funding to continue delivery of a successor to RE:NEW from 2018.

Box 3: RE:NEW Programme

RE:NEW gives technical advice and support to London boroughs and social housing providers on the measures, technologies and funding they can use to make their housing stock more energy efficient and low carbon. Solar PV, where appropriate and feasible, is one of the measures that RE:NEW encourages. Since 2009 the RE:NEW programme has helped improve over 130,200 of London's homes, saving around 46,000 tonnes of CO₂ a year and cutting energy bills by almost £8.85m annually. Coupled with wider market delivery, around 603,000 homes in London have been retrofitted.

In addition to RE:NEW, to support an increase in the installation of solar PV on owner occupied and privately rented homes, the Mayor will pilot a 'solar reverse auction' (see box 4). This will aim to reduce the costs of solar PV to Londoners through bulk buying solar panels. Another similar scheme in Norfolk has successfully aggregated demand for solar PV installations and driven down costs through economies of scale. The scheme is estimated to have increased installation rates by 83 per cent, and saved households an average of 16 per cent on the installation cost of solar PV²⁵. This is a similar model to Solarize NYC, a citywide initiative to drive solar uptake and reduce costs through multiple group purchasing campaigns in New York. If successful, the Mayor will investigate expanding this programme to households across London, as well as to the social housing sector.

The Mayor will also trial new payment mechanisms to support the increased uptake of solar energy technologies. Through his Energy Leap project he will deliver some of the first zero energy retrofits in London and the UK, and will trial payment mechanisms including the ability to recoup some or all of the capital cost of the refurbishment work, and energy performance guarantees. As evidence is unclear on the value that solar energy technologies and energy efficiency measures can add to a property, Energy Leap will also undertake post-retrofit valuations. If successful, Energy Leap will lead to a larger demonstrator project which will seek to overcome other key challenges including more complex building types and mixed-tenure properties.

Finally, the Mayor will support pilots to test how energy storage solutions can be delivered alongside solar PV. The installation of rooftop solar PV coupled with batteries is a key part of the Energy Leap project and the Mayor is also supporting the Sharing Cities demonstrator project in Greenwich (see box 5). This project is assessing feasible sites for using solar PV combined with batteries to store electricity for use later in the day. The Mayor will also consider promoting battery storage through offers and marketing in the solar reverse auction, and providing information on the solar mapping tool (see page 21).

Box 4: Solar reverse auctions

In a solar reverse auction the roles of seller and buyer are reversed compared to a usual auction. Multiple buyers state their intention to purchase solar panels, and their demand is pooled together, or aggregated, typically by one organisation so they become a single buyer. The sellers of solar panels need to compete to sell the solar panels to the aggregated buyers, typically at increasingly lower prices. This form of bulk buying helps to lower the cost of solar panels for individual homes compared to buying separately.

Box 5: Sharing Cities demonstrator

Sharing Cities is a €25m smart city demonstrator programme run in partnership with Greenwich, Milan, Lisbon, Bordeaux, Burgas and Warsaw. The programme aims to use data and digital approaches to connect existing and new buildings, transport and energy infrastructure to reduce energy demand, bills and emissions. The Mayor will work with Greenwich to retrofit five residential housing blocks, including integrating low carbon measures such as renewable heat, solar panels, battery storage and the installation of smart digital heating and electricity controls in individual apartments.

Community solar

Community energy groups are usually local residents that come together to generate, own, manage, or reduce consumption of energy. In London these groups currently own and operate at least 750 kW of solar PV situated on churches, social housing blocks and schools. These have been financed through the purchase of shares by members of the community. Other than generating clean renewable energy, community energy projects bring additional benefits to local areas. For example, profits from many schemes are re-invested into the community and are used to deliver energy efficiency advice and energy management audits to help local homeowners or businesses reduce their energy use.

Community energy groups can provide highly effective skills, experience and local knowledge to help raise funding for the delivery of solar projects. However, with little dedicated funding, and London's residents working on projects in their spare time, such groups are sometimes limited in their ability to deliver solar PV projects. In addition to this, key financial support has ended. For example, these groups are no longer supported through tax relief offered by government's (Seed) Enterprise Investment Schemes. Government's Urban Community Energy Fund²⁶, which provided a valuable source of funding to help the development of hundreds of community energy projects in the critical early stages, has also now closed.

Research by Community Energy London (CEL) - a new hub for London's community energy groups - suggests that a cost effective way to support community energy groups is through providing funds to help scope and develop a detailed business case for projects.

To support community energy in London, the Mayor will develop a new London grants scheme to help community energy groups get solar projects off the ground. He will also continue to work with CEL (see box 6) to help community energy projects overcome the main barriers they face.

Box 6: Supporting Community Energy London (CEL)

The Mayor has supported the development of CEL by providing free meeting space at City Hall and co-funding research into the current state of the sector and what support it requires. CEL is closely aligned with Community Energy England, which represents the sector nationally. CEL is in its infancy but aims to facilitate networking amongst groups, acting as a forum to share learning and expertise, and supporting the development of projects within London's unique built environment.

In addition to this support, the Mayor will link any potential community grant scheme to the Decentralised Energy Enabling Project (DEEP) where suitable. DEEP will provide technical, commercial, financial and other advisory and support services to help public and private energy suppliers to develop, procure and bring into operation larger-scale renewable and local energy schemes. It aims to take energy projects through an end-to-end process from feasibility and business case, to procurement and delivery. DEEP has a target to directly support the delivery of 3 MW of renewable energy capacity, installed by September 2019.

Box 7: Licence Lite

The Licence Lite project will see the GLA acquire an Ofgem junior electricity supply licence. The GLA will buy clean energy generated across the city, using it to power GLA and TfL facilities. This project aims to help stimulate more local low carbon generation as it pays a higher price to the generator than they would otherwise receive from the wholesale market.

Finally, in order to stimulate demand for community energy, the Mayor will investigate the use of Licence Lite (a junior electricity supply licence) to enable smaller suppliers such as community groups to sell electricity to the public sector (see box 7).

Solar PV on non-domestic buildings

Solar PV systems for non-domestic buildings have similar benefits to those of domestic systems including lower electricity bills. However, they generally tend to be larger installations so have the added advantage of generating larger amounts of electricity and being better able to match onsite generation with onsite demand (including through the use of energy management systems).

The Mayor wants to see more public buildings like schools, hospitals, universities and government buildings at the forefront of the move to solar energy generation. His RE:FIT programme offers free support to public sector organisations to develop low carbon energy projects including the installation of PV (see box 8). The Mayor will continue to support the public sector to retrofit their buildings with solar generation measures through an improved RE:FIT programme.

Box 8: The RE:FIT programme

RE:FIT provides free-of-charge technical expertise and advice to public-sector organisations on reducing energy demand and carbon emissions from their buildings and estates. It also has a framework of 16 suppliers, enabling public sector organisations to procure suppliers quickly, efficiently and economically to deliver energy saving measures, and guarantee energy savings. It has supported London boroughs, NHS bodies, schools, universities and colleges, central government departments and cultural and heritage organisations to deliver large reductions in emissions, energy and costs. By the end of 2019 the programme aims to have retrofitted over 400 buildings, reduced emissions by nearly 25,000 tCO₂e per annum, and saved at least 68 GWh of energy per annum.

Box 9: Installing solar PV on the Western International Market through RE:FIT

The London Borough of Hounslow used RE:FIT to install a large solar PV array on the Western International Market. This was a two million pound project including 8,500m² of solar panels alongside battery storage. This project has an estimated payback period of around seven years, and is delivering annual carbon savings of almost 800 tonnes.

Box 10: Higher education and solar projects

London's higher education establishments contain not only large buildings that often have good potential for solar energy measures, but also students who have the ability to deliver community solar projects. In 2016, students from SOAS University of London used crowdfunding to install 114 solar panels on the university building. This is believed to be the first student-led community energy project in the UK.

Where appropriate and possible RE:FIT will aggregate solar projects to help achieve the most cost effective installations. The Mayor will also work with universities and other higher education institutions to identify solar projects and utilise the lessons learnt from successful projects such as SolarSOAS (see box 10).

Within the commercial sector, some of the barriers to the deployment of solar PV are thought to be similar to those that prevent building owners and tenants from taking up energy efficiency measures. These include the ability to access capital, suitability of the building stock, and split incentives, primarily around ownership between the freeholder/landlord and tenant. The Mayor will investigate how these barriers can be overcome as part of a review of ways to reduce emissions from London's small and large businesses. For larger commercial landlords in particular the Mayor will consider working with networks and organisations of businesses to increase the installation of solar energy technologies as part of refurbishment projects. There may also be opportunities to combine new solar installations alongside cooling technologies, such as air conditioning.

4. Help Londoners to make informed decisions about investing in solar energy technologies

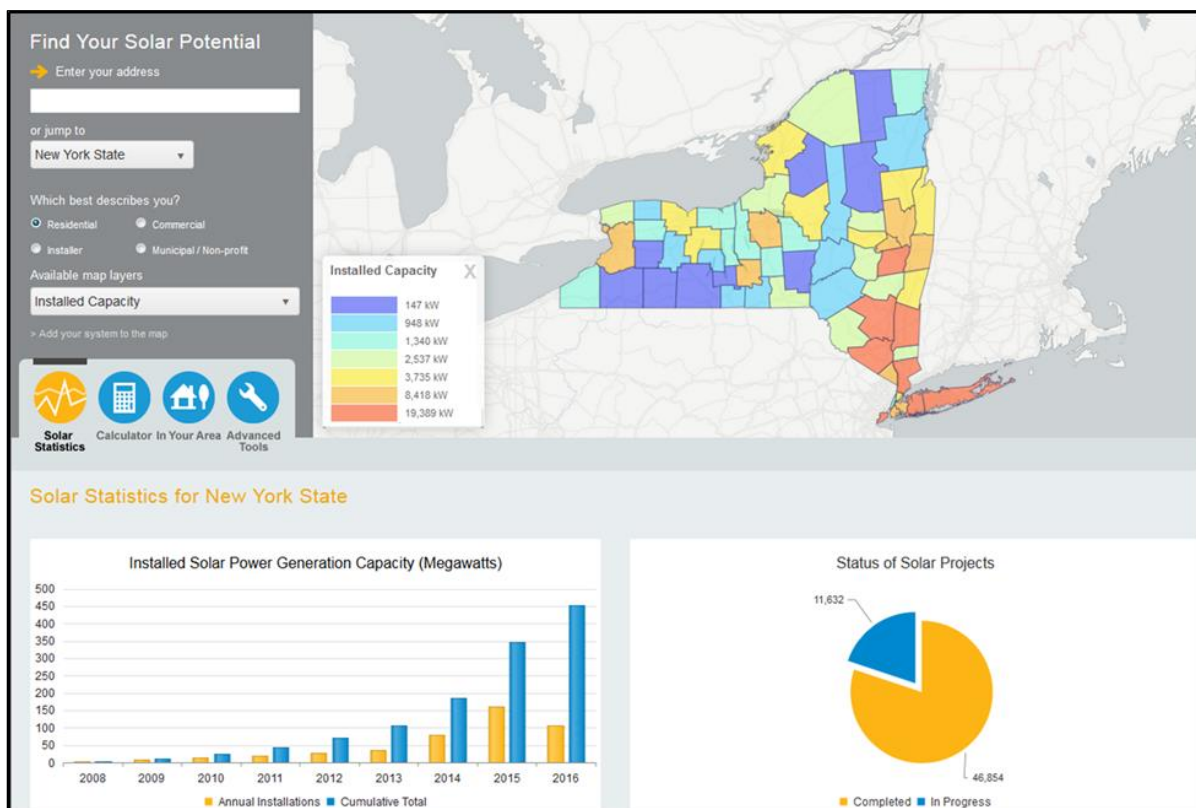
Discussions with the solar industry in London have identified that one of the key roles the Mayor can play is promoting the potential of solar energy and the multiple benefits it can bring to Londoners. Other large cities including Tokyo and New York have developed interactive maps to demonstrate opportunities for solar energy at a building level (see Figure 5). They have also used these platforms to provide a 'one-stop shop' for information on solar programmes, rebates, tax credits, and information on installing and interconnecting solar PV and solar thermal systems. Such platforms provide a focal point for raising interest, awareness and developing new projects.

The Mayor will produce an interactive map and tool for Londoners to assess solar energy generation potential across the capital in 2018. Although every building will require a more detailed assessment of suitability, it will provide an invaluable first estimate of potential opportunities. This could help Londoners to save them time and money ahead of site-specific suitability studies taking place.

The tool will allow Londoners to access clear information on how to install solar PV and solar thermal technologies, details of available support mechanisms and signposts to further information including trusted certification schemes. It will include information for landlords, tenants and home owners alike to increase knowledge of the potential for solar panels in both the private rented sector and in owner-occupied homes. This may be particularly useful for outer London boroughs where there are many homes with unutilised potential for solar panels.

The Mayor will also use the mapping tool to support the delivery of solar energy technologies through his Energy for Londoners programmes and to identify suitable sites for temporary solar installations across London, for example on vacant land and the GLA group estate. The Mayor will map sites of known solar installations in London and ask Londoners to add locations where they have installed solar energy technologies.

Figure 5 – New York solar map (www.nysolarmap.com)



Source: www.nysolarmap.com

5. *Call on government to set a national policy framework that unlocks London's solar energy potential*

National government policy on solar energy currently favours large scale solar farms. With limited vacant land compared to other regions, this places London at a distinct disadvantage. As part of the Mayor's advocacy to government to ensure that London achieves its ambition and trajectory to be zero carbon by 2050, the Mayor will advocate that consistent and long term national policy is in place to support higher levels of small-scale solar deployment in London. This will enable the London solar industry to grow with confidence, and achieve cost efficiencies through greater deployment rates. He will call on government to:

- provide a clear plan for the FiT and other financial support mechanisms to provide long-term confidence to businesses and homeowners to invest in solar energy technologies. This should include a 'post-parity' plan to ensure that solar energy technologies do not reach a cliff edge once they reach grid parity
- work with energy companies to investigate the benefits of net energy metering to incentivise solar. Net metering is a billing system that pays energy system owners for the electricity they add to the grid, and is enabled through the adoption of smart meters
- overcome regulatory barriers to support battery deployment as a key technology to make the most of solar PV power generation

Getting involved

This plan sets out what the Mayor will do to increase solar energy generation in London. But London's true solar potential will only be realised if action is taken by London's residents, businesses, community groups, the public sector and others. This plan is therefore a call to action to people from across London to make the most of the capital's solar opportunity.

The Mayor wants to hear Londoners' views on this draft Solar Action Plan for London. The plan forms part of the Mayor's draft London Environment Strategy, which is also out for public consultation. You can give your feedback on this draft Solar Action Plan for London at www.london.gov.uk/solar-action-plan until 17th November 2017.

Endnotes

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³IRENA (2016) The Power to Change: Solar and Wind Cost Reduction Potential to 2025

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⁶KPMG (2015). UK solar beyond subsidy: the transition

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¹²PwC (2016). Seeing through the gloom: UK solar seeks stability after subsidy cuts

¹³BEIS (2016). Energy and Climate Change Public Attitude Tracker (Wave 19)

¹⁴GLA analysis (2017)

¹⁵GLA (2017). Mayor's draft London Environment Strategy

¹⁶This scenario assumes that centralised funding supports some projects, local authorities and housing associations de-risk schemes and undertake direct investment, leading to greater investor confidence and acceptance of a lower rate of return.

¹⁷BEIS (2016). Regional Renewable Statistics. Available at <https://www.gov.uk/government/statistics/regional-renewable-statistics>

¹⁸See footnote 2 for definitions, available at <https://www.ofgem.gov.uk/environmental-programmes>

¹⁹Please note this data does not include Northern Ireland

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²¹Solar Trade Association (2017) Webpage available at <http://www.solar-trade.org.uk/sta-solar-thermal-win/>

²²GLA (2017). Housing in London: 2017

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²⁵<http://www.councils.coop/case-studies/norfolk-collective-solar-scheme-norwich-city-council>

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