Local Government Association

LOCAL PARTNERSHIPS

Renewable energy good practice guidance

Risks and opportunities in large scale wind and solar energy generation

Report

Foreword

The UK has set a legally binding target to bring carbon emissions to net zero by 2050, and many councils have set their own ambitious targets as part of climate change action plans. Councils are significant consumers of electricity and by investing in green generation to meet their own needs, they can send a strong signal to businesses, residents and investors to help promote wider take up and investment in renewable energy sources, as well as providing a valuable income stream to support local services.

Councils have a strong track record in supporting renewable energy generation, often through solar photovoltaic (PV) systems installed on council buildings. This publication draws on this expertise and looks at the potential for innovation and local leadership in developing larger renewable energy generating assets, either solar farms or wind turbines. As councils and communities look for ways to recover COVID-19 outbreak and "build back better", this resource should prove to be a useful tool in understanding the potential for renewable energy to generate income as well as reducing harmful carbon emissions.

This guide has been commissioned to help both members and officers of councils who are considering asset ownership to understand the potential risks and benefits and how these can be managed. Case studies from West Suffolk and Cardiff provide peer learning and insights on turning aspirations into real projects.

Written to be accessible to a non-technical audience, the guide also provides practitioner insights and consideration of some of the more technical aspects, such as procurement and a comparison between self-developed schemes and the opportunities to acquire scheme from private sector developers

I'd like to thank Local Partnerships for their work on this project. I hope you find this report an interesting read and of practical use in understanding what renewable energy generation could bring to your authority and help your local economy towards a climate smart recovery.

Councillor David Renard
Chairman, LGA Environment, Economy, Housing and Transport Board

Contents

Executive summary

A number of councils already own either large solar farms or a wind turbine, and largely these benefit from financial support from previous subsidy regimes.

A significant increase in renewable energy provision in the UK will be required if legally binding targets to be carbon neutral by 2050 are to be met. This increase provides opportunities for more councils to own renewable energy generating assets, either for an income stream, or to offset their own carbon emissions.

This document focuses on wind turbines and utility scale solar PV farms.

Wind or solar?

For English councils solar PV is more likely to be a viable option due to the significant planning constraints associated with the development of new onshore wind turbines.

To work without subsidy solar farms will either need a private wire connection or to be larger than 20 MW.

Where wind turbine opportunities do exist, these will need either a private wire connection or to be larger than 10 MW.

Develop or acquire?

For councils looking to own a renewable energy asset there are four basic options:

- develop a project on owned land
- develop a project on third party land
- acquire project rights (land agreements, planning consent and grid connection offer) from a commercial developer
- acquire a fully built and commissioned project.

Aside from these options some councils may be offered opportunities as part of an approach from a developer to lease land. This type of opportunity will need to be carefully evaluated in terms of procurement options.

Table 1 below sets out the main considerations when deciding which is the best route for your authority

Table 1 – Options for project acquisition and development

Option	Potential advantages	Things to consider
Self-develop on your own land	• No rental payments • No need to acquire land rights and establish clean title • No onerous restrictions or lease end date • Likely to be within the geographical boundary of the authority	• Do you have a site which is suitable in terms of size, location and planning policy? • Will you be forgoing an existing income stream? • Do you have another use for the site? • Is a suitable grid connection available? • Reputational issues if the site is in proximity to housing or has been promised for another use • Do you have the skills and capacity for the development? • Are you prepared to risk the development costs? • Design, procurement and construction risks to be managed
Develop a site on third party land	• Identify site for its suitability (both size and location) rather than its ownership • Wider search area and therefore more chance of finding a viable grid connection or private wire	• Viability model will need to account for landowner rent • Capacity to acquire the site on appropriate terms for the development • Time constraints introduced through the land acquisition period (for example option periods) • Asset lifespan limited by lease arrangements • Do you have the skills and capacity for the development? • Are you prepared to risk the development costs? • Design, procurement and construction risks to be managed
Acquire project rights from a third party	• Removes development risk, avoiding potentially abortive costs and providing certainty • Land rights, accepted grid offer, and planning consent will be in place significantly reducing capacity required in the authority to deliver the project	• Viability model will need to account for the landowner rent and for costs of acquiring the project rights • Asset lifespan limited by lease arrangements • Design, procurement and construction risks still to be managed • Project rights are well sought after in a competitive market. A local authority can potentially lack credibility as a purchaser compared to a financial institution who has undertaken several similar transactions • Rights are unlikely to be available at a scale or location which is preferable to the authority (bear in mind for example managing construction of a project several hundred miles away) and flexibility may be required

Option	Potential advantages	Things to consider
Acquire a completed project from a third party	• Removes development and construction risks, avoiding potentially abortive costs and providing certainty • Land rights, accepted grid offer, planning consent and functioning asset will be in place significantly reducing capacity required in the authority to deliver the project • Private sector developers often prefer to sell post construction and commissioning • Private sector contractors can procure more freely and consequently often build at a price significantly lower than the public sector. Quality may also be higher due to ongoing relationships with construction companies	• Viability model will need to account for the landowner rent and for costs of acquiring the project – although this may be less than the combined cost of acquiring project rights and constructing the asset through public procurement • Asset lifespan limited by lease arrangements • Projects are well sought after in a competitive market. A local authority can potentially lack credibility as a purchaser compared to a financial institution who has undertaken several similar transactions • Authorities will only have the ability to bid on existing projects and cannot therefore drive scale or location

Risk management

Development of renewable energy projects carries a number of risks which need to be managed and mitigated. Key areas of risk are:

1. Development risks – particularly in relation to land rights, availability of grid connection, planning risks and viability. Whilst councils possess many of the necessary skills in relation to land rights and planning, they are likely to require specialist support in obtaining and managing grid connection offers and in assessing project viability.

2. Construction and procurement risks – these relate to ensuring that the asset delivers the levels of electrical production anticipated by the business case. Much of this risk can be mitigated by selection of an appropriate form of contract with suitable production guarantees, accompanied by the appointment of a competent technical advisor.

3. Operational risks – these largely relate to ensuring that revenues are as anticipated in the business case. Many of these risks can be mitigated against by appropriate forms of contract, strong technical support and contractual guarantees on availability.

4. Income risks —These are a combination of production and price. Production risks can be mitigated against by strong build and maintain contracts transferring as much production risk as possible to the contractor. Price risk is key in assessing viability. BEIS (Department for Business, Energy and Industrial Strategy) produce forecasts for wholesale electricity prices, but the information is not technology specific. Councils considering renewable

energy projects should consider the acquisition of commercially available price forecast data which is technology specific.

Income from electricity generation - subsidies and power purchase agreements
Two forms of subsidy support are potentially available to new renewable energy generating stations:

1. Contracts for Difference (CfD) is a price guarantee mechanism, providing the generator with a guaranteed price for a fixed period. The guaranteed price is secured via an auction process with generators offering their best (cheapest) price for the electricity supplied. The scheme accepts schemes (cheapest first) until a pre-set cap on capacity is reached. Once the cap is reached the highest price accepted by any of the successful bidders becomes the "strike price" which is then paid to all bidders. In March 2020 the UK Government announced its' intention to make an allocation to pot 1 (Established Technologies) for the Contracts for Difference (CfD) auction to take place in 2021. This would potentially be available to both onshore wind and solar PV projects. The Government's expectation is that successful projects will offer a strike price significantly lower than the current wholesale price of electricity. The most cost-effective projects in the auction are likely to be large onshore wind turbines located in Scotland.

2. On 1st January 2020, the Government introduced the Smart Export Guarantee (SEG) scheme, which will enable anaerobic digestion, hydro, micro-combined heat and power (with an electrical capacity of 50kW or less), onshore wind, and solar photovoltaic exporters with up to 5MW capacity to receive payment for exported electricity. The SEG scheme replaces the old Feed in Tariff (FiT) scheme that closed in Q1 2019.Under the SEG scheme, all licenced energy suppliers with 150,000 or more customers must offer at least one SEG tariff to small generators. The Government has set out that in order to provide space for the small-scale export market to develop, there will not be any specified minimum tariff rate, other than that a supplier must provide payment greater than zero at all times of export. The SEG licensees therefore decide how they want their SEG export tariff to work in terms of its rate, type and length. Storage is also eligible to receive export payments, although suppliers will be able to exclude 'brown' electricity from those payments and require the generator to put metering in place that isolates 'green' exports.

It is possible that some local authority projects will benefit from one or other of these schemes, however in order to do so the power will need to be sold and the local authority is therefore unlikely to be able to count this as an offset against its' greenhouse gas emissions.

Aside from the CfD and SEG schemes generators are free to enter into other PPA – including, amongst others, with large electricity supply companies, commercial companies, or even themselves. Where a local authority is either able to benefit from a private wire supply or purchase the electricity generated for its' own use there is the prospect of using this to reduce their greenhouse gas emissions footprint.

Conclusions
A number of councils have successfully invested in renewable energy generating assets and there are likely to be opportunities for other councils to follow suit.

Whether it is better to seek to develop an asset, or buy one from a commercial developer, will depend on the opportunities available and how each local authority responds to individual challenges.

Councils should not assume that it will be more cost effective to develop their own schemes. Solar PV and wind developers have worked hard to drive down costs in recent years and bring

considerable leverage and expertise to the market. Some of these schemes are likely to offer better value for money, and at less effort, than development of schemes from scratch.

The most likely opportunities to be successful are commercial scale solar PV, either smaller schemes with a direct private wire to a customer, or larger schemes of 20 MW or more. Opportunities to develop new wind turbines in England appear to be limited at the present time.

When considering where to sell the power the local authority will need to balance financial returns with their potential to offset the authorities' carbon emissions.

Those authorities who have developed or purchased assets advise that good quality external advice will be needed, which ever route you are taking.

Introduction

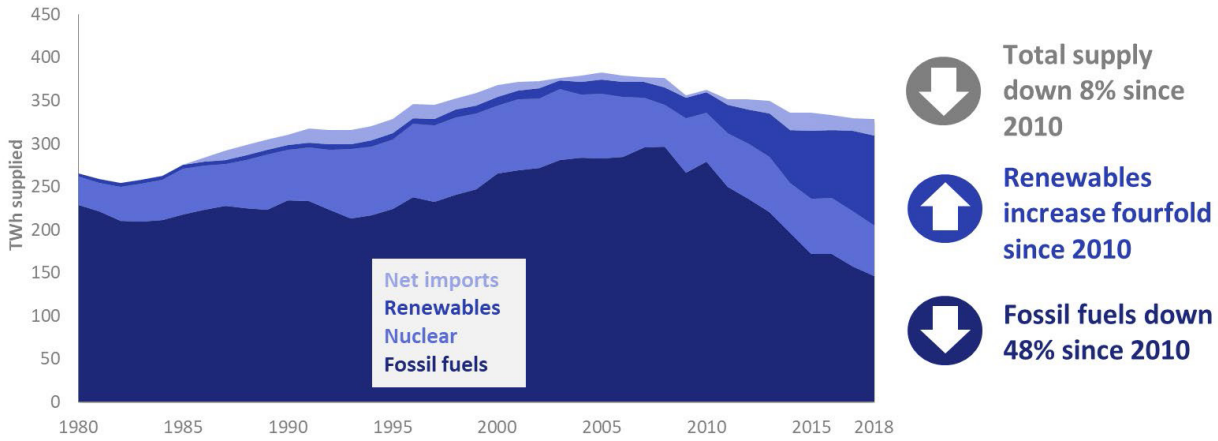
This guidance has been produced in order to help councils to understand the risks and opportunities associated with the development, purchase and ownership of large-scale renewable energy generation assets. Most councils already have some experience of renewable energy, through building mounted solar PV systems – however fewer have existing large-scale grid connected generating stations and it is these which this guidance is focused on. The most attainable technology is utility scale solar PV, although there may be opportunities for wind development for some councils. This guidance is focused on these two technologies.

The withdrawal of subsidies for energy generation through the Feed in Tariff (FiT) and Renewables Obligation Certificate (ROC) regimes means that large scale projects in the future will be delivered either without the benefit of subsidy, or with support through either the Contracts for Difference (CfD) or Small Export Guarantee (SEG) schemes. The CfD is a price guarantee mechanism that is only likely to be available to larger generators, and in particular wind schemes in Scotland. The SEG is a mechanism that guarantees that small schemes will be able to sell the electricity produced but does not set a firm price.

Background

Renewable energy deployment in the UK has increased significantly in the past decade, largely in response to government subsidies. Figure 1 below shows the overall mix of UK electricity generation from 1980 until 2018.

Figure 1 – UK electricity supply, 1980-2018



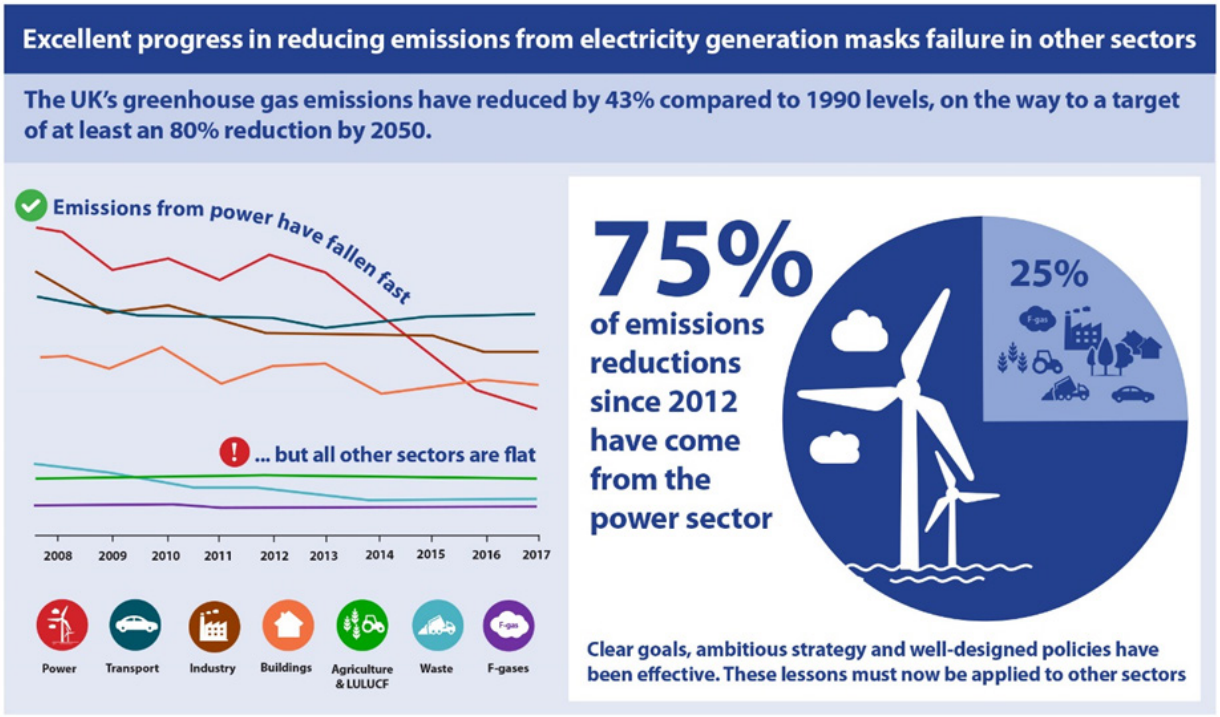
Source: Digest of UK Energy Statistics – chapter 5 – Electricity. 25 July 2019

During the period 2015-2020 the overall proportion of renewable energy has continued to rise due to increases in offshore wind, supported through the CfD price guarantee mechanism, with very little new deployment for either onshore wind or solar PV following the withdrawal of the ROC subsidies in March 2017.

Rapid increases in the fleet of gas fired power stations, alongside the deployment of renewables has seen significant progression in decarbonisation of electricity with the last remaining coal fired power stations due to be decommissioned over the next few years.

Between 2008 and 2018 around 75per cent of the UK's progress in cutting greenhouse gas emissions came from the power sector. (See Figure 2 below).

Figure 2 – Progress towards greenhouse gas reductions by sector



Source: Committee on Climate Change 2018 progress report to Parliament – June 2018

The reductions seen so far, are only the start of a longer journey to decarbonise the production of electricity. With the effective removal of coal from the network the next stages will require the removal of gas generation and its replacement with renewable energy and storage.

If we are to approach net zero emissions, more activities, such as heat and transport, will need to be electrified at the point of use, potentially increasing demand in the UK.

National Grid produce Future Energy Scenarios (FES) on an annual basis, with two of the four scenarios based around achieving 80per cent decarbonisation by 2050. This is less than the legally binding UK target to be carbon neutral by 2050. Under the '2 Degrees' scenario in the 2019 FES, solar PV grows to three or four times its current capacity by 2050. The onshore wind scenarios are much more variable with either a doubling or trebling of current capacity.

Costs of renewable energy installations

As global deployment of renewable energy technologies increases, their capital costs have seen dramatic reductions. This has enabled deployment to continue even as subsidies have fallen away in many countries.

As scale of production has increased the global prices for equipment have fallen significantly leading to much cheaper installations at all capacities. Solar PV, onshore and offshore wind now all deliver new power plants at a similar cost to fossil fuel installations. Figure 3 below shows the relative capital cost reductions of renewable energy generation sources globally over the period 2010-2016. These costs have continued to fall in the intervening period.

Figure 3 – Energy installation price comparisons (global 2010-2016)

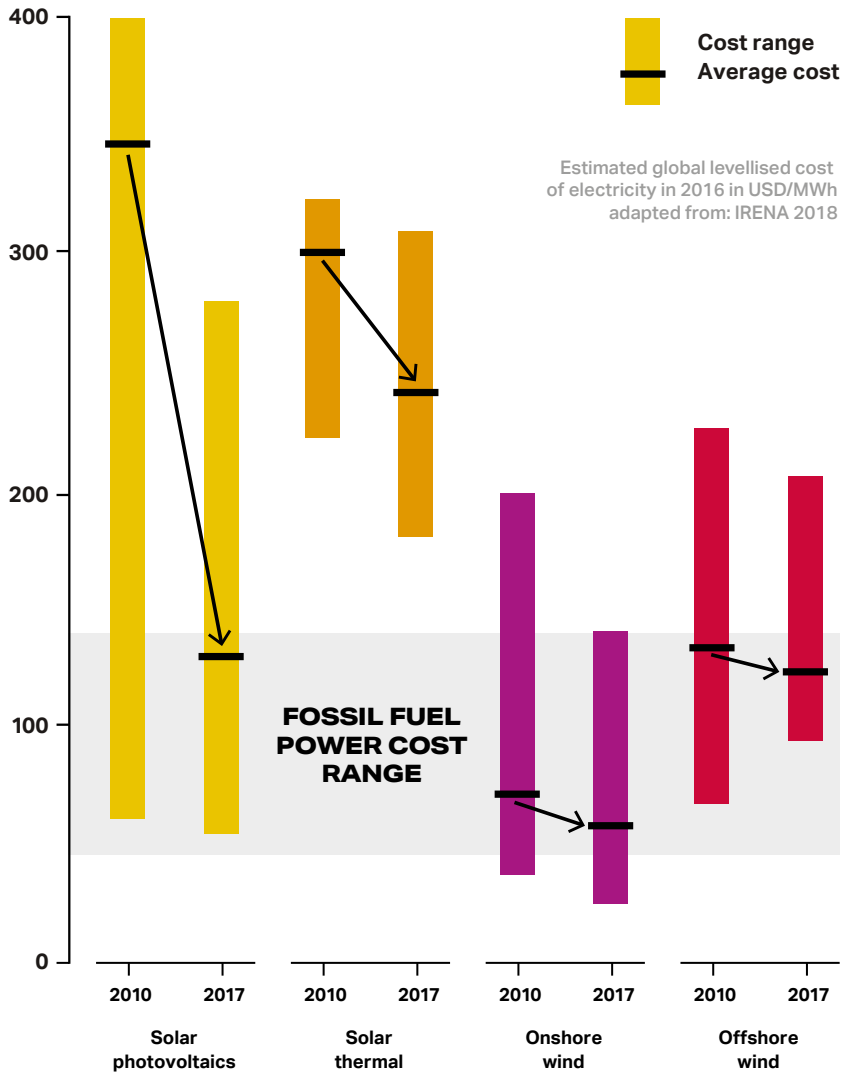


Figure 5. Price drop in solar and wind power since 2010

The dramatic fall in costs of wind and solar energy in the last decade has reached a tipping point where prices increasingly are lower than many fossil fuel alternatives. Source: Irena Renewable Cost Database.[5]

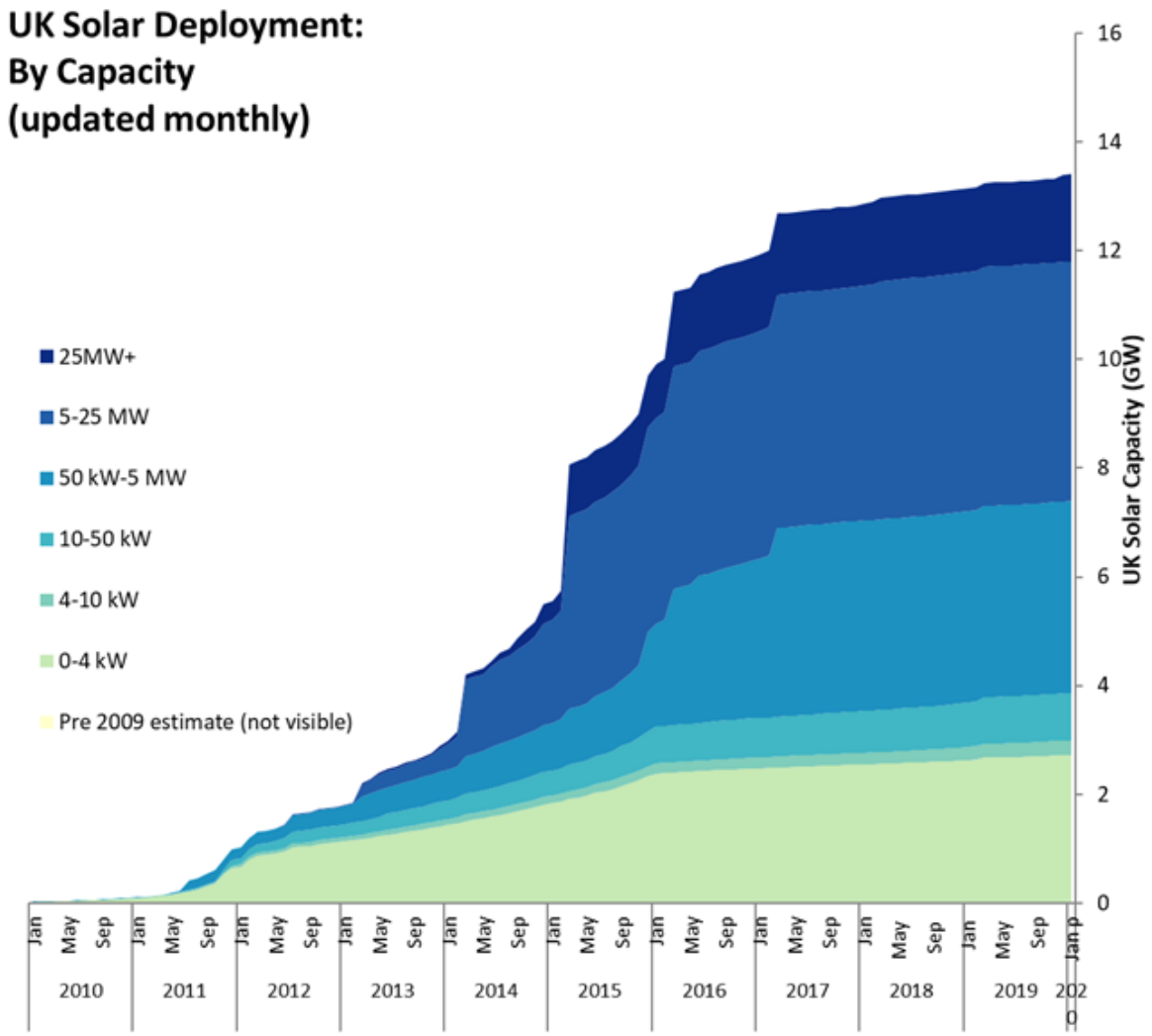
Source: Exponential Climate Action Roadmap 2019 (https://exponentialroadmap.org)

In the UK for example the cost of a Megawatt (MW) of utility scale ground mount solar (excluding grid connection costs and VAT) has fallen from around £ 2.3m to around £ 0.5m in 2020.

Solar PV market overview

In Q1 2020 the UK had a total installed capacity of solar PV of 13.2 GW, of this utility scale solar PV (solar farms larger than 5 MW or approximately 25 acres) makes up around half. In addition, a significant number of the early solar farms were just under 5 MW in order to meet the qualification criteria for subsidy – these are included in the 50kW-5MW band in Figure 4 below.

Figure 4 – UK Solar Deployment by Capacity as at Q1 2020



Source: BEIS Solar Photovoltaics Deployment – March 2020.

The first UK solar farms, connected in 2010, were all under 5 MW as this was the maximum size allowable under the FiT scheme. The original FiT schemes ran for a period of 25 years, and this also came to drive both the lease periods for land and the 'temporary' periods granted for planning consent.

The rapid level of uptake of the FiT led the Government to close the scheme to larger solar generators in 2011. In order to make schemes viable developers then looked to the alternative subsidy regime used to support wind development the ROC. Unlike the FiT the ROC scheme had no upper limit on size. Subsidises under the ROC were significantly smaller than under the FiT and so to achieve the necessary economies of scale the size of solar farms increased dramatically, with the first large scale solar farm (33 MW) connecting in 2013, at Wymeswold in Leicestershire.

The rate of build out has slowed significantly since the complete closure of the subsidy regimes in early 2017. The installations post Q1 2017 are largely backed with either private wire connection directly supplying a customer, or longer-term corporate PPA. This certainty enables them to borrow money more cheaply and scheme viability is improved.

EXPLAINER

Installing a private wire directly supplying a customer provides a potentially higher price for the electricity as the customer does not have to pay the costs for using the electricity network.

Investors seek corporate PPAs to provide security of income and investment certainty over time.

The push towards longer term corporate PPAs has faltered in the last 12 months with the main market commentators reducing long term forecasts for wholesale electricity to around £ 50-60/MWh, which is around the current wholesale price. Previous forecasts had unanimously suggested prices closer to £ 70-80/MWh. Without this forecast increase in the cost of wholesale energy, index linked long term agreements are much less attractive to corporate customers.

The interest in the corporate PPA market had led developers to actively re-enter the market with Solar Power Portal currently estimating around 6 GW of new solar development in the pipeline. Much of this development is in larger scale solar farms, with the average size being around 30 MW in order to benefit from economies of scale and to cover the increasing cost of connections, which are more frequently requiring connections back to substations and on higher level networks. With significant sites coming forward and a shrinking long term PPA market there are opportunities for councils to consider investing in large scale solar farms.

The announcement from the Department for Business, Energy & Industrial Strategy (BEIS) that solar PV will be eligible to participate in the 2021 CfD auction has taken the market by surprise. The levels of development observed over the last years are not contingent on obtaining the CfD subsidy. Solar PV in the right locations in the UK may therefore be competitive in a CfD auction, although it is felt likely at this stage that onshore wind in Scotland may be a more likely beneficiary of the price certainty the CfD auction will bring.

The commercial developers are focusing on larger schemes (20 MW+) due to economies of scale. Smaller schemes can be financially attractive if they have a private wire connection which uses most of the power generated.

The most promising opportunities for solar PV development are schemes with a private wire customer and schemes of 20 MW and above

Questions for councillors: Is this project large enough to have economies of scale? Or could it supply a customer directly?

Questions for councillors: Improved financial returns can be achieved by selling to an external customer – but if we buy the electricity ourselves, we can claim the carbon benefits, which is more important?

Onshore wind market overview

The UK has around 13.6 GW of operational onshore wind capacity. The first commercial wind farm In the UK was built in 1991 at Delabole in Cornwall. From the late 1990's onshore wind saw sustained growth as the industry matured and the scale of turbines and size of developments increased.

Growth in the onshore wind sector has been supported by government revenue support mechanisms. The Non-Fossil Fuel Obligation (NFFO) was introduced in 1990 and covered renewable energy technologies, including wind energy. The NFFO was replaced by the Renewables Obligation (RO) in 2002 and the RO played an important role in stimulating growth in the onshore wind sector.

The cost of onshore wind energy has dropped significantly since the RO was introduced. In response to a reduction in the cost of onshore wind energy the level of support through the RO was reduced over time and was closed to new onshore wind power projects in April 2016.

Following the closure of the RO, the Contract for Difference (CfD) scheme was introduced. CfDs work by fixing the prices received by low carbon generation, reducing the risks they face, and ensuring that eligible technologies receive a price for power generated that supports investment.

Onshore wind was included in the first CfD allocation round in 2014 but was subsequently excluded from the second and third allocation rounds (in 2017 and 2019). In 2015, the then Business Secretary, Greg Clark made a ministerial statement setting two further tests for onshore wind development in England; firstly that new proposals should be in areas identified in local or neighbourhood plans as being suitable and secondly that following consultation applicants must be able to demonstrate that all planning impacts identified by local communities have been fully addressed and that the proposal has their backing. This was followed up in 2016 with legislation introduced under the Energy Act 2016 which provided councils with the final say for all onshore wind energy projects. These changes effectively provided local communities with a veto to block the development of wind turbines.

In 2014 (the year before the planning changes were implemented) there were 156 onshore wind planning applications in England. In contrast, just one project was submitted in 2019, with a capacity of 5 MW. No onshore wind projects were approved or submitted in Wales in 2019[1]. This therefore highlights the need for future projects to consider the influence of local communities within the proposals of onshore wind projects.

Following the closure of the RO subsidy and exclusion of onshore wind from the CfD auctions in 2017 and 2019, the industry focus has been on driving down costs in order to reach a position where projects can be delivered based on revenue from commercial PPA's. This has largely been achieved through increasing the scale of projects, increasing the size of turbines and driving out cost from the development, construction and Operations & Management (O&M) phases.

1 www.renewableuk.com/news/484564/Net-zero-emission-goal-at-risk-as-less-new-onshore-wind-capacity-built-for-second-year-in-a-row.htm

In March 2020, BEIS announced that onshore wind would be included in the fourth CfD allocation round which is due to take place in 2021. It is expected that projects will need to bid at a level below average expected wholesale electricity prices to be successful in the 2021 auction, but this will at least provide a floor price and an element of certainty for investors. Large projects or portfolios of projects in high wind speed areas in Scotland and Wales are likely to be the main beneficiaries in the fourth allocation round.

Grid costs are a major consideration for new onshore wind developments. As the UK grid network becomes fully utilised, significant reinforcement is often required to allow new capacity to connect. If the cost can be covered by a project or cluster of projects connecting to the grid, then this will often be a key consideration in assessing the viability of a project.

Whilst new grid connected projects will typically be relatively large in order to provide the required economies of scale, smaller projects can still be viable when connected to local loads via a private wire.

The levels of community support required mean that very few schemes in England are likely to be deliverable. From a financial perspective small private wire schemes and larger (10MW+) grid connected schemes are the most likely to be deliverable.

The most promising projects for onshore wind are likely to be outside England and either be <5MW with private wire connection or larger (10MW+) grid connected schemes.

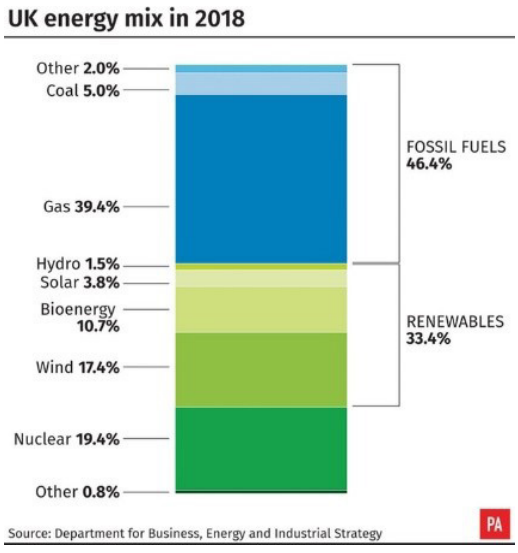
Questions for councillors: What gives us the confidence that we can obtain the level of community support necessary for wind development in England?

Questions for councillors: Should we consider investing in projects outside our geographic boundary?

Other renewable energy technologies

As Figure 5 below shows renewable energy contributes over one third of UK energy supplies.

Figure 5 – UK energy mix 2018



This guidance only covers onshore wind and solar PV. Other renewable energy technologies include hydro and bioenergy. Taken together these represent around 12per cent of the UK energy mix. These schemes are out of the scope for this guidance note.

Should you develop or acquire?

A number of councils already own solar farms and wind turbines, and these are a combination of those who have developed their own and those who have bought assets which were developed and built by private sector companies.

In this section we explore the relative merits of each approach and identify key points to consider in selecting a preferred option. Option selection will largely depend on the opportunities a local authority has on its own estate, its appetite for taking on new leasehold assets and its willingness to work outside its own geographic area.

Developing sites on your own estate

In order to establish whether an authority has any suitable sites under ownership it needs to undertake an asset review, looking for suitability. If potential sites are identified, then it will need to establish whether or not there is a viable grid connection.

Following the ministerial statement in 2015, onshore wind schemes in England remain difficult to develop successfully. For solar PV, developing sites without subsidy will generally either require sites to be of a relatively large size, or to have a private wire customer as an off-taker for the power generated. The private wire customer could be the authority itself if the site is in the right location. Key factors to look for would be sites of 25 acres or more, which are not in close proximity to housing and without particular planning designations or protections. As a rule of thumb 5 MW of solar PV will require around 25 acres of land, provided the ground is flat and unshaded.

Landfill sites can be suitable for solar PV development, provided the ground is stable. These sites are typically more complex and expensive to construct. Due to their often-overgrown nature mature landfill sites may also have complex ecology which will also need to be assessed as part of any planning application. Landfill sites are unlikely to be suitable for wind development, unless there is unfilled ground available. Where there is an existing grid export connection for generation of electricity produced from landfill gas there may be opportunities to use this as a cheap connection for a smaller scheme. Landfill schemes are likely to require a geological assessment and may also require earlier engagement of a specialist solar PV engineer.

If sites of suitable size or location are identified, then the process highlighted in section 4.3.1 of this report can be followed to establish the potential for development prior to applying for a grid connection offer.

Options for authorities with no suitable land

Where a local authority is unable to identify any suitable land on its own estate there are three further options to consider:

- find a suitable site on third party land to develop
- acquire project rights from a third party
- acquire a completed project from a third party.

Table 2 below sets out the pros and cons of each of these options.

Table 2 – Options for project acquisition and development

Option	Potential advantages	Things to consider
Self-develop on your own land	• No rental payments • No need to acquire land rights and establish clean title • No onerous restrictions or lease end date • Likely to be within the geographical boundary of the authority	• Do you have a site which is suitable in terms of size, location and planning policy? • Will you be forgoing an existing income stream? • Do you have another use for the site? • Is a suitable grid connection available? • Reputational issues if the site is in proximity to housing or has been promised for another use • Do you have the skills and capacity for the development? • Are you prepared to risk the development costs? • Design, procurement and construction risks to be managed
Develop a site on third party land	• Identify site for its suitability (both size and location) rather than its ownership • Wider search area and therefore more chance of finding a viable grid connection or private wire	• Viability model will need to account for landowner rent • Capacity to acquire the site on appropriate terms for the development • Time constraints introduced through the land acquisition period (for example option periods) • Asset lifespan limited by lease arrangements • Do you have the skills and capacity for the development? • Are you prepared to risk the development costs? • Design, procurement and construction risks to be managed

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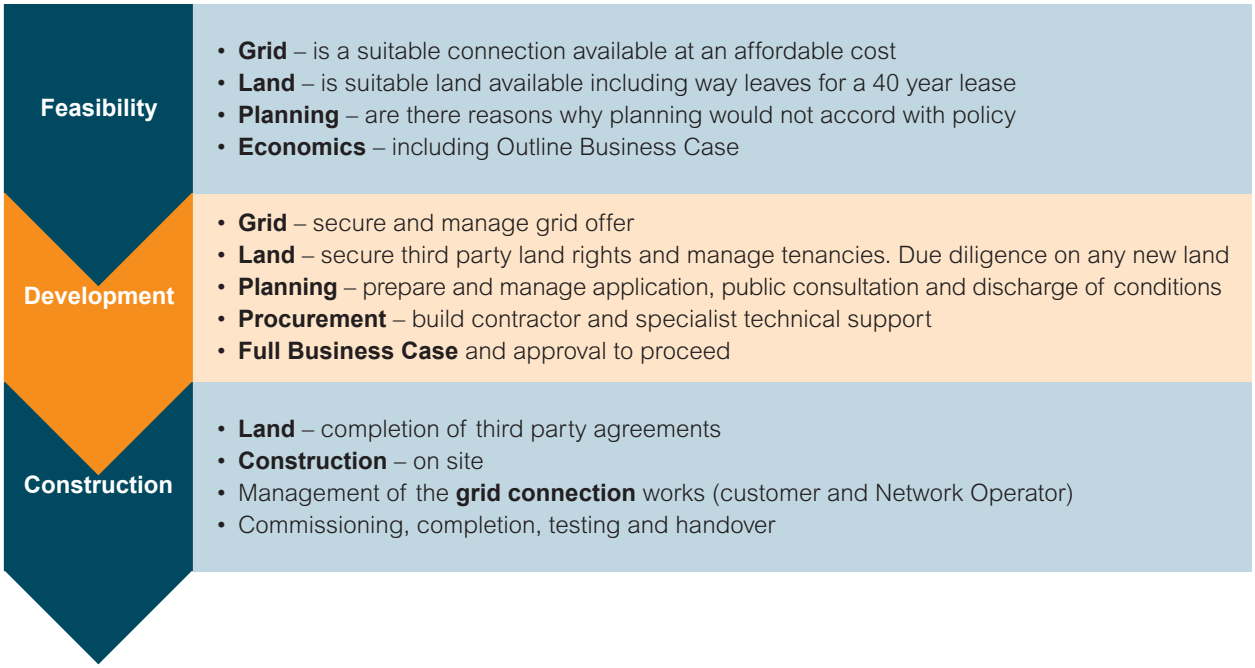
Acquire a completed project from a third party	• Removes development and construction risks, avoiding potentially abortive costs and providing certainty • Land rights, accepted grid offer, planning consent and functioning asset will be in place significantly reducing capacity required in the authority to deliver the project • Private sector developers often prefer to sell post construction and commissioning • Private sector contractors can procure more freely and as a consequence often build at a price significantly lower than the public sector. Quality may also be higher due to ongoing relationships with construction companies	• Viability model will need to account for the landowner rent and for costs of acquiring the project – although this may be less than the combined cost of acquiring project rights and constructing the asset through public procurement • Asset lifespan limited by lease arrangements • Projects are well sought after in a competitive market. A local authority can potentially lack credibility as a purchaser compared to a financial institution who has undertaken several similar transactions • Authorities will only have the ability to bid on existing projects and cannot therefore drive scale or location

Developing your own site

Whether you are developing on your own land, or on a third-party site the principles of development are very similar, albeit the scope of some of the activities in relation to land rights will differ.

Unlike the development of projects such as schools or housing which a local authority may be more familiar with, renewable energy projects carry a relatively high degree of development risk, so the attitude to the management of the process needs to be a risk based one to avoid unnecessary abortive costs in the event of project failure.

Development process



Risk management approach to development

The nature of risk changes throughout the development process, but can be broken down into three main phases;

- Development risks – which occur up until the site has planning consent
- Construction risks – which occur from the point planning consent is granted until the facility is fully commissioned
- Operational risks – risks during the lifetime of the facility

Development risks

The development phase entails bringing together the three elements of land rights, planning consent and a viable grid connection offer. The main risks during this phase are:

1. A failed scheme leading to the loss of costs spent to date
2. Reputational damage from a poorly managed process

Managing development risks –feasibility screening for Solar PV

The first step is to undertake a preliminary assessment of the potential of the site and screen for key risks. Table 3 below sets out the initial screening tests for both solar PV and onshore wind projects.

Table 3 – screening tests for potential projects – Solar PV

Risk category	Action and information sources
Viability	Viability modelling will depend on how much sun the site receives (irradiation), cost of development and construction, operating costs, the amount of power produced, and the sale price of the power produced. As a rule of thumb solar PV sites with a forecast irradiance of less than 950kwh/kwp are unlikely to be viable. The irradiance forecast is constant, the other factors vary over time and specialist advice is likely to be required to indicate overall viability at feasibility stage. Irradiance data can be found at https://re.jrc.ec.europa.eu/pvg_tools/en/tools.html
Planning	Planning designations (greenbelt, Area of Outstanding Natural Beauty (AONB) etc) – local plan Sites allocated for housing – local plan Proximity to housing – we would recommend at least 300m to the nearest residential property – Google Earth Transport and access constraints – review local network via Ordnance Survey (OS) maps and Google Earth Ecology – any local designations from local plans and OS maps.
Land	Agricultural land grade 3b or below. Where 3a or above is indicated commission an early site survey. Indicative land grade is provided by Natural England (http://publications.naturalengland.org.uk/category/5954148537204736) Land ownership including underlying interests and covenants, tenancies etc – Land Registry and deed packets Does the land have direct access to the public highway – Land Registry and deed packets
Grid	The District Network Operators (DNOs) generally have information on their websites in relation to potential to connect new generation schemes which can be reviewed. In addition to this the DNO's run a 'budget estimate' service which provides an outline price for connection (3-week turnaround). The budget estimates cannot be relied on but will generally highlight connections that are either viable or not. The budget estimate service is free to users

Provided nothing in the screening exercise rules the site out then it should be subject to a more detailed assessment, which will start to require investment.

Managing development risks –feasibility screening for onshore wind

As set out earlier in this guidance, onshore wind is one of the most established technologies and offers one of the least-cost options for renewable energy supply and delivers electricity cheaper than conventional fossil-fuel technologies. Despite the strengths of onshore wind energy, widescale deployment of the technology in England has been largely restricted since 2015 due to the local and national consent processes. Proposals often face local opposition, with visual impact, noise, site access and ecological impacts cited as reasons for objection. In the UK, 55per cent of historic onshore wind projects (between 1993 to 2019) have been refused permission or abandoned (planning application withdrawn) by the developer.

Onshore wind turbines are typically located in areas with adequate wind speeds and in exposed locations free from obstacles like trees or buildings that can interfere with turbine performance. Table 4 below sets out the screening criteria for potential wind development projects

A ARE EXAMPLE

In January 2020, construction started on Cornwall's first, smart grid-connected wind turbine (2.3MW) which will be sited on Cornwall Council land at Ventonteague, near Carland Cross, on the A30.

The rationale for the turbine is to help Cornwall better manage its energy supply and power the equivalent of around 1,180 Cornish homes, representing a significant contribution towards the Council's climate emergency agenda.

Once constructed, Cornwall Council will own and operate the wind turbine.

Table 4– Screening criteria for wind development

Key consideration	Comment
Wind resource	Required levels will ultimately depend on whether a subsidy is available, and how the power is sold. Notwithstanding a minimum average wind speed of 7m/s+ at hub height will be required to obtain a reasonable return.
Monitoring wind speed	Wind speed monitoring is advisable prior to developing a wind energy project, to obtain more accurate data on wind speeds at the height of the proposed turbine. Wind monitoring also allows energy output for the project to be estimated. For commercial developers seeking project finance, this monitoring will be undertaken for a full year. Planning permission is also likely to be required for the wind monitoring mast. As an alternative to erecting a met mast on site and measuring wind speed over a sustained period, developers are increasingly using virtual met mast reports, especially for smaller projects. These provide significant cost savings and are often accepted by banks for project finance.
Spacing	If more than one turbine is being installed, a space should be allowed between turbines to optimise power output by reducing wind shadowing and turbulence. A typical spacing is five times the rotor diameter of the turbine.

Access	Access for the installation also needs to be considered. More remote locations will typically have a better wind resource, however, access for vehicles to construct the turbine foundations and transport the turbine blades and other components to the project site may be constrained.
Grid connection	One of the main challenges wind development faces generally is the cost of procuring access to local grid infrastructure. Underground or overhead power lines can be very expensive, so the closer the site is to a suitable connection point the better.

Sites identified for planned wind farms are subject to a formal application assessment. The National Planning Policy Framework aims to protect Areas of Outstanding Natural Beauty, Sites of Special Scientific Interest and areas of high national heritage value from negative impacts of wind farm development. In addition to this, most commercial scale onshore wind turbine applications will require an Environmental Impact Assessment (EIA), which assesses the potential visual impacts and changes to landscape and biodiversity that could result. Other areas the EIA covers include:

- archaeology, hydrology and geology
- aviation and radar
- noise and shadow flicker impacts
- ecological impact.

New onshore wind projects in England cannot receive planning permission unless an area is identified as suitable for wind energy in a local or neighborhood plan. In Wales, the emerging National Development Framework (NDF) is likely to include priority area for large scale onshore wind development. This would continue the spatial planning approach to large scale wind energy development in Wales which was first introduced in Technical Advice Note 8 (TAN8) in 2005 in the form of Strategic Search Areas.

Table 5 sets out key designated areas which need to be avoided along with some typical set back distances for onshore wind projects.

Table 5– Key designated areas and set back distances for Onshore Wind Development

Key consideration	Comment
Designated nature conservation areas	Designated nature conservation areas should be avoided. Where sites are used by birds, ecologists may recommend set back distances from the boundary of designated areas.
Designated landscape	Designated landscapes may or may not be suitable for wind turbines, depending on the reason for their designation and the impact that wind turbines may have on this. Views from designated landscapes to wind turbine sites will also need to be considered.
Bats	Hedgerows and woodland areas need to be avoided to reduce the potential impact on bats. Ecologists will recommend separation distances.

Residential properties	A setback distance of at least 600 - 800 metres from residential properties for large wind turbines is recommended. However, as local communities have a veto to block the development of wind turbines, engagement with the local community should be sought on setback distances.
Infrastructure	Minimum distances from roads, power lines, gas pipelines and other infrastructure, which are required by the Highways Agency and other infrastructure operators including National Grid.
Exclusion areas	Exclusion areas around airports, airfields and MOD land exists. Depending on the nature of the project, this should be determined in advance in consultation with the relevant body.
Communication links	Communications links need to be considered in consultation with the relevant telecoms' operators such as Openreach

There are very few examples of local authority commercial scale development of onshore wind projects, with deployment being at the single or two turbine level and benefitting from niche land assets (such as ports or old collieries).

In England, we would recommend that councils look closely at their local plans and land assets to identify if any suitable areas exist that could potentially support one/two commercial size turbines, or the deployment of micro turbines as part of a wider council estate retrofitting programme, especially where there is an opportunity for a private wire connection.

In Wales, where there is a broadly supportive planning environment and the draft NDF includes priority areas for large scale development, a review of land assets in relation to priority areas should be carried out. In addition, councils should review the potential for smaller scale developments which are likely to be located outside any priority areas. Opportunities to connect projects to local energy loads should also be explored in order to increase project revenue.

Section 5 of this guidance considers private wire PPAs and other income available from subsidies that could support local authority onshore wind development.

Bearing in mind the significant challenges in developing onshore wind it is recommended that specialist advice is sought prior to proceeding with any development.

Managing risks during development

In light of the significant difficulties associated with the development of onshore wind and the requirement for specialist support we have focused the remainder of this chapter on the development of solar PV assets.

Each scheme is different, and it is necessary to understand the nature of the risks associated with a specific site. The initial screening should identify the significant risks, as well as any potential project show-stoppers. The general approach should be to manage out the risks in order of significance, whilst spending as little as possible. Table 6 below sets out the nature of the most common risks and potential mitigation measures for solar PV development.

The recommended approach is to review the project on a frequent basis to ensure that costs are incurred sequentially to remove risks and that full-scale development only commences when potential show-stoppers have been identified, quantified and if possible, eliminated. Even when a decision to proceed to development has been taken, an open mind should be maintained about whether that development should continue.

This guide is not exhaustive, and it is recommended that technology specific expertise is sought to assist in risk identification/management.

Table 6 – Common development risks and mitigation – solar PV

Risk	Significance	Mitigation	Indicative Cost*
Grid – either costs are too high, or connection is not available	Major – show stopper	Apply for grid connection offer as soon as is possible. If a viable offer is received this should be accepted as quickly as possible. The DNOs will immediately cancel any offers which are not accepted within the acceptance period.	£ 5-20k
Viability	Major – show stopper	Produce a proper financial model complete with suitable energy price forecasts. This will need updating between Outline Business Case (OBC) and Full Business Case (FBC)	Vary depending on model and income forecast sophistication
Agricultural land grade	Major – potential showstopper	Step 1 – commission an agricultural land report of the specific site based on site sampling. If the report shows the site is 3b or below safe to proceed. Sites of grade 1-3a – the only potential mitigation is via a sequential test to demonstrate there is no better alternative site – usually recommend not to proceed	< £ 5k
Ecology	Occasionally significant – potential showstopper	Ecology can often be dealt with through design, although some measures are expensive, and mitigation is not always possible. Ecology studies are seasonal, and it is important to establish at an early stage what further study-based work will be required. Recommend type 1 habitat survey as soon as grid and agricultural land issues are resolved. An ecologist should be able to advise whether there are any potential showstoppers and next steps	£ 5-10k (for type 1 survey)

Risk	Significance	Mitigation	Indicative Cost*
Land	Significant – potential showstopper	When the grid offer is received it will provide details of the connection – both location and any other design features. The offer does not include the acquisition of any necessary rights over third party land to reach the point of connection. Any third-party land rights should be explored as soon as the need for them is identified as acquisition costs can be significant.	Cost to investigate <£ 5k
Sundry planning risks	Medium – most can be mitigated	Pre-application discussion with the local planning authority to identify both potential showstoppers and specific requirements for the planning application The grid offer may also introduce potential planning risks that need to be considered including the need for any new overhead lines, or the need for a communications tower. EIA screening opinion (note this will put the scheme in the public domain and should only be requested once local member and community consultation activities have commenced).	<£ 5k
Community consultation and engagement	Medium	Good sites should be manageable provided there are no major planning policy issues Early and structured community consultation, ideally where there is still some flexibility around selection of the final parcel of land The Building Research Establishment good practice guide is a useful structure (www.bre.co.uk/filelibrary/pdf/Brochures/BRE-NSC_Good-Practice-Guide.pdf)	£ 5-10k

*Indicative costs are provided only to give an idea of the relative scale of costs, they will vary considerably site to site

The Solar Trade Association has developed Ten Commitments that demonstrate good practice (see table below) these are available at https://www.solar-trade.org.uk/solar-farms/ and will help to mitigate development risk. The Ten Commitments are set out in table 7 below.

Table 7 Solar Trade Association – Ten Commitments for Solar PV Development

SOLAR TRADE ASSOCIATION - TEN COMMITMENTS FOR SOLAR PV DEVELOPMENT
1. We will focus on non-agricultural land or land which is of lower agricultural quality.
2. We will be sensitive to nationally and locally protected landscapes and nature conservation areas, and we welcome opportunities to enhance the ecological value of the land.
3. We will minimise visual impact where possible and maintain appropriate screening throughout the lifetime of the project managed through a Land Management and/or Ecology plan.
4. We will engage with the community in advance of submitting a planning application, including seeking the support of the local community and listening to their views and suggestions.
5. We will encourage land diversification by proposing continued agricultural use or incorporating biodiversity measures within our projects.
6. We will do as much buying and employing locally as possible.
7. We will act considerately during construction and demonstrate solar stewardship of the land for the lifetime of the project.
8. We will offer investment opportunities to communities in their local solar farms where there is local appetite and where it is commercially viable.
9. We commit to using the solar farm as an educational opportunity, where appropriate.
10. At the end of the project life we will return the land to its former use.

Further guidance on good practice in solar development can be found at https://www.solar-trade.org.uk/solar-farms/

Managing grid connections

Summary

Obtaining cost effective grid offers and managing them through to the completion of a scheme is of critical importance. The purpose of this section is to set out the processes used and important points to watch out for. We would recommend that you employ a specialist to manage this on your behalf, but this section should provide you with sufficient information to ask the right questions of that specialist along the way.

Key points to note include:

1. Understand what part of the network you will be connected to and the basis for charging.
2. Grid offers are a very formal and competitive process, you need to adhere to the terms of the offer, or it will be taken away. Once a grid offer is rescinded it is unlikely you would be able to obtain another on the same terms.
3. Most offers offer you the opportunity to appoint a third-party contractor to undertake some of the work. This will involve additional procurement but may give you more control or a

better price.

4. Other consents may be needed, and you will be responsible for obtaining them. These include land consents to lay cables and host a substation, planning consent (in some instances), highways consent and potentially consents under the Electricity Act 1989.

5. The network operators use a lot of technical language and will require technical information to even consider an application for grid connection, you are likely to need a specialist, so consider engaging one early in the process.

Different types of grid connection

Connections for renewable energy generation can be made at either distribution or transmission network level. Until now most renewables projects have had connections on to the distribution network via the local network operator (DSO). Increasingly large schemes are connecting at transmission level with offers from National Grid (NG).

For the purpose of this guidance we are concentrating on offers from the DSO. It is worth noting that NG offers are materially different and an authority considering this route or considering purchasing projects or project rights with an NG offer should seek specialist advice.

Making a grid connection application and accepting an offer

Grid connection offers are made through an application to the DSO. Grid specific expertise should be sought to make the application to ensure that sufficient technical information is provided for the work to be assessed. Once an application has been made it cannot be changed without making a new application. As such, before making an application, a decision is needed on the technology to be used along with the import/export capacity required. Increasingly renewable energy applications have a larger requirement for electrical import to allow sites to accommodate battery technology as well as the base renewable technology.

Fees are charged by the DSO for evaluation of the application, whether or not a suitable connection is ultimately available. A schedule of the fees should be available on the DSO website.

Making a formal grid application is the only way you can secure a connection. Grid connections at an affordable price are highly sought after and are the main constraint on the development of renewable energy projects.

Once a valid application is submitted the DSO has up to 65 working days to issue an offer. The offer is a formal contract document and should be read carefully prior to acceptance. The DSO will not vary the terms of the offer.

Generally, the applicant has up to 65 working days to accept the offer and to make the first payment. There is no flexibility on this and failure to return the correct paperwork or make the payment will result in the offer being cancelled.

Capacity on all networks is scarce. Some indication of availability can be obtained by looking at ‘heat maps’ on the DSO websites or by applying for a ‘budget estimate’ – however these processes take time and do not provide any degree of certainty.

Options exist to pay the DSO to undertake a network study to ascertain connection options, but again this does not reserve capacity. If other parties apply for capacity whilst the study is being undertaken, then they will be at the top of the queue when capacity is assigned.

Where there are competing requests for a connection in an area the DSOs run a strict queueing system (i.e. first come first served). Queue place is determined by when you applied

for the connection. Sometimes the DSOs issue “interactive” offers. This is where an offer to connect is made to several competing parties at the same time. In this instance the timescales to accept are much shorter (often as little as ten days) and the capacity will be awarded to those who accepted and paid based on their place in the original queue until all available capacity is used when all other offers will be rescinded.

EXPLAINER - COMPETITION IN CONNECTIONS

DSO offers usually come in two parts, one is for the DSO to undertake all connection works i.e. from the project site on to their network (usually known as ‘all works’ offer). The second offer is for the DSO to undertake only those works on the network which others are not allowed to undertake (for example upgrading their transformers to facilitate the connection).

This second type of offer is known as a Competition in Connections (CIC) offer. This form of offer is likely to be cheaper but will require the procurement of an Independent Connection Provider (ICP) to undertake the remainder of the works.

Once the ICP has completed their element of works the DSO will formally adopt it and the connection becomes part of their network.

Another point to note is that all works offers generally do not need to be included in the planning application as they fall under the statutory powers of the DSO. ICP connections on the other hand may require planning consent. Specialist advice should be sought in relation to this and which type of offer to accept, which needs to be confirmed at the point of offer acceptance.

Planning and other consents

As part of managing a grid offer the local authority will be responsible for obtaining any additional consents required under the Competition in Connections (CIC) offer. This could include planning consent (for either underground or overhead cable), s37 consent[2] for any new overhead lines including arrangements at the point of connection and highway consents associated with cable laying.

Managing a grid offer

The DSOs are keen to avoid people applying for and holding grid capacity they are unable to use. For this reason, grid offers usually have a long stop date for connection and milestones. Sometimes these milestones are not entirely achievable (e.g. applying for planning consent within 2 months of accepting the grid offer).

It is important to start a dialogue with the DSO as soon as the grid connection offer is accepted. The DSO engineers will want to understand how progress on the project is being made and the anticipated connection date. The DSO will then build their own programme to try to ensure the connection is ready for when the project is ready to be energised. There will be milestone payments to be made and the DSO will not order key elements of equipment until these have been paid.

Where a CIC offer has been accepted, the local authority will need to procure an ICP with suitable qualifications on the Lloyds Register to deliver the connection. This ICP will then manage the process of design and design approval with the DSO. This element of the works should be procured as early in the process as possible as the grid connection works often take longer than the build of the renewable energy generating station itself. Even under a full works offer it is likely to be helpful to engage a suitably qualified high voltage (HV) engineer to liaise between the DSO, the contracting authority, and the build contractor.

2 section 37 of the Electricity Act 1989

Private wire connections
Private wire connections make a direct connection between a generating station and a customer's premises, without the need to use the local electricity grid. Financially these are very rewarding, however a local authority will not be able to claim the generating station as a carbon offset for the authority if the electricity generated is sold to an external customer. Any local authority contemplating a private wire connection should engage with a suitably qualified HV engineer as early as possible as this will need to be properly developed from the outset and included in the grid application.

Construction risks

The construction phase entails bringing together the following:

1. Detailed design or output specification – sufficient for both procurement and discharge of pre-commencement planning conditions.
2. Procurement of a suitable construction contract.
3. Sundry consents including Sustainable Drainage, s37 and necessary highway consents.
4. Completion of full business case.
5. On site construction
6. Management of grid connection offer and interim payments.
7. Connection, commissioning and handover tests.

The key risks in the construction phase, other than normal construction risks, relate to the quality of the design and construction and ensuring that the plant will ultimately deliver the output anticipated in the business case.

Managing production risks
Solar PV is normally designed and built by specialist solar Engineering, Procurement, Construction (EPC) contractors. Key to the transfer of risk are bespoke EPC contracts, which are constructed to ensure that all design and construction risks pass to the contractor. The contracts have provision for guaranteed levels of energy production, with financial penalties being applied after the first two years of operation if they fail to meet the specified guarantee. The contracts also contain detailed testing and handover regimes.

Tender assessments should be undertaken based on a levelised cost of energy. Different contractors follow different design ethos and the evaluation therefore needs to assess the overall cost against the overall guaranteed performance over the lifetime of the project.

Utility scale PV normally has a two-year hand over and testing regime. During this time, it will be necessary to let a separate Operation and Maintenance (O&M) contract. The initial two-year O&M contract should be procured alongside the EPC build contract as a single package let to a single contractor. Appointing a separate O&M contractor for this period is likely to result in loss of all production guarantees.

If an authority wants to work with a standard form of construction contract, then careful consideration should be given to ensuring that production levels are guaranteed and a detailed testing and handover process (in line with solar industry practice) is adopted.

A suitable budget should be allowed in the business case for specialist legal support where this cannot be provided by in house teams.

Managing quality in design and construction

Prior to procurement it will be necessary to set detailed output specifications for the asset. This will require significant specialist technical input. Ideally this input will come from a suitably qualified solar PV engineer or technical advisor. This specialist can provide the technical documents for the specification, assist with tender evaluation, monitor quality of works on site and administer the handover tests on behalf of the authority.

The technical advisor should also be able to provide cost information for incorporation into the full business case (for example maintenance costs and requirements) where the maintenance contract is not procured alongside the EPC contract and provide a detailed energy yield prediction.

The business case for the project should budget for this advisor as it is very unlikely the authority will have the specialist technical skills to do this in house.

Procurement

Normal procurement rules apply. There are some framework options available including:

Crown Commercial Services HELGA[3] or

- GLA/Local Partnerships owned ReFit[4]
- smaller solar specific frameworks or dynamic purchasing systems hosted by some councils

Specialist procurement advice will need to be sought as to the most appropriate form of procurement for your project.

Full business case

Prior to accepting a tender, authorities will need to complete their Full Business Case process. This should include an updated financial model incorporating the capital costs from the tender together with the guaranteed production.

Valuing the long-term income is important and budget should be allowed to obtain suitable forward price forecasts for electricity. BEIS do produce wholesale electricity price forecasts, but these are generic and not time specific. The commercial forecasters such as Aurora Energy Research, Baringa, Bloomberg and Poyry provide information which is significantly more technology specific and granular. If required, these organisations can also be commissioned to produce suitable investment grade financial models.

The site in operation

At the end of the construction phase the asset should be capable of generating a reliable supply of electricity for a significant period. This section considers how to ensure that best value for money is obtained during the operation period.

3 https://assets.crowncommercial.gov.uk/wp-content/uploads/RM3824%20HELGA%20DPS%20customer%20guidance%20v2.1_0.pdf

4 Re:fit | Local Partnerships outside London) or (What is Retrofit Accelerator - Workplaces? | London City Hall in London

Costs in operation
The fuel source is free, however there are still a number of operating costs to be considered and contracts to be put in place. The ongoing costs are as follows:

- operation and maintenance contract (including real time monitoring and security monitoring)
- cyclical replacement costs of key components when they reach end of life
- business rates
- insurance
- asset management.

Operation and maintenance contracts
O&M contracts can last from a couple of years to the full lifetime of the project. When procuring these types of contracts, a balance needs to be struck between the resource required to re-procure the contract and ensuring the contractor is performing a value for money service.

Specialist advice (legal and technical) should be sought on the content of the operation and maintenance contact. It is normal to have a single O&M provider who is responsible for a range of services including security, grounds maintenance, system monitoring and reactive and planned maintenance.

The O&M contract should include a minimum availability clause, which for solar PV should be at least 98.5per cent or above. A separate maintenance contract will also be required for a private wire connection.

Cyclical replacements
Key components such as turbines, PV panels, inverters and transformers will all be provided with an initial warranty period. Depending on the nature of the component this will be somewhere between 2 (e.g. transformers and switchgear) and 25 years (solar panels).

An engineer or technical advisor will be able to advise as to the likely lifespan of key components which can then be factored into the projects' financial modelling.

Business rates
Business rates for solar PV are subject to a Memorandum of Agreement (MOA) between the Solar Trade Association and the Valuation Office dated 18 August 2016. Please note the levels vary depending on the size of the installation and whether it is in England or Wales. A copy of the memorandum can be downloaded at https://www.solar-trade.org.uk/business-rates-memorandum-agreement/

An important note to remember is that building integrated systems are subject to an entirely different (and substantially higher) rateable value. This applies to systems where the power generator is owned by the same entity as the user of the electricity. Where power is bought and sold the values in the MOA are used. Where a local authority is planning to supply power to its operations through a direct wire, then arms-length arrangements should be considered to achieve value for money.

Insurance
It is recommended that insurance (Operational All Risks cover) is sought for the operational phase of the project and quotations for this can be obtained from many commercial sources.

Asset management
Not all schemes will choose to engage an asset manager. Asset managers can be used to optimise performance by both pushing the O&M contractor to exceed their minimum service commitments and through proactive recommendation to optimise the use of the equipment.

Asset managers can act as an intelligent client and should ensure the increased earnings from the plant more than exceed their fees.

Decommissioning and re-powering

A typical solar PV installation should have a working life of around 35 years. During this time inverters will require replacement and efficiency will fall by up to 0.7per cent per annum. This reduction in power produced should be factored into your business case. For the first 25 years your solar panels should have a warranty that supports this level of production.

There will reach a point where it becomes necessary either to decommission and remove the solar farm or to replace key components.

Where decommissioning is the preferred option this should be a relatively straightforward operation as the construction methods are simple and most of the materials will have value in recycling.

Where the preferred option is re-powering and continued operation the solar farm will require either wholesale or partial rebuilding through replacement of end of life components including panels, mounting structure etc. There is also likely to be a need to renew the planning consent and any underlying land agreements.

CASE STUDY 1

Solar farm development

Solar PV Development on Landfill – Lamby Way, Cardiff

Development of the Lamby Way solar farm has not been without its challenges for Cardiff City Council (Cardiff). Cardiff have acted as developers for the project, bringing together the land, grid connection and planning consent for the development.

The initial proposal was for a 5 MW grid connected solar farm, however land was available for a larger scheme and during the development a further opportunity was identified to supply the local water treatment works electricity baseload. In total this, along with rapid advances in solar technology and efficiency, brought the size of the development to 9 MW.

Complexity

The site itself is capped landfill which has been left to settle for around 20 years and has previously been used for translocation of slow worms. The location is immediately adjacent to a coastal footpath and an estuary with the area providing valuable habitat for numerous species. The solar site itself has areas of woodland and an attenuation pond in the centre. The solar site forms around half of the land available at the Lamby Way site. This area was selected as it has been capped for the longest period and the ground is relatively stable.

The combination of landfill, complex ecology and two separate high voltage connections make this one of the most challenging solar projects in the UK. So much so that even prior to construction it had won the Best in Show Solar Design Award at the UK Solar and Storage Awards in 2019.

The business case

Development of the business case was supported by Local Partnerships through the Green Growth Wales programme. Local Partnerships supplied industry expertise to help Cardiff understand both the financial business case and the management of risk.

The private wire PPA agreement improves the commercial case for the project, however the smaller 5MW scheme would have also met investment criteria.

Cardiff are using PWLB to fund the investment. The business case for the solar farm is modelled over a 30-year period, with the private wire PPA spanning the first 20 years.

Planning consent

Cardiff project managed the planning consent through their in-house energy team, appointing planning and ecological consultants from local frameworks to support the development.

Cardiff also appointed a specialist solar designer and engineer who worked closely with the waste team to establish which areas of the site could be used for development, accommodating the existing landfill gas management system requirements within the design. The system installed cannot penetrate the 1m landfill cap across the site and has been designed as a ballasted solar mounting system and surface mounted cable trays.

The design and construction management processes also needed to work around the ecology on and around the site including surveying for reptiles and invertebrates and seasonal restrictions on working patterns to protect over wintering birds.

The development obtained planning consent in May 2019 and construction is due to be completed in 2020

Private wire

In order to supply the private wire customer there is a need to construct a complex private wire of around 3000m in length. The wire passes beneath a tidal estuary, past a primary electrical substation and over a substantial waste water main.

Development of the on-site high voltage switching and protection and the private wire connection itself are the most challenging parts of the entire programme.

Looking to the future

Once installed the solar farm will present an opportunity for Cardiff to provide electric vehicle charging for a significant part of its vehicle fleet, many of which are based at Lamby Way.

Top tips for would be developers

1. Engage proper specialist advice at an early stage, you are likely to need it, these projects are harder to deliver than you might think.
2. Don't be over optimistic around the costs.
3. Private wires can be difficult, especially with complex engineering issues to overcome, find a good expert to design it and start early.

4. Lots of ecology can be overcome, but you need to do the homework and properly understand the individual issues.
5. Don't underestimate the workload and timelines for good procurement. A sound set of tender specification documents and smart performance-based evaluation criteria are essential.
6. Getting the contracts right is critical both for the 'design and build', and the 'operate and maintain'. You can't easily use an off the shelf contract, especially when there will be complex performance based operational measures to manage, so find someone with appropriate experience.

Working with third parties and acquiring assets

Background

In this chapter we consider working with third parties to develop or acquire solar or wind projects. This might be as a result of a local authority seeking a development partner or a project to purchase, or as a result of a third party approaching an authority to lease part of its land holding to build a renewable energy project.

We consider the potential procurement issues likely to be faced by authorities working with third parties. Each individual situation is likely to be different and specific advice should be sought in each case. Notwithstanding, table 7 should provide a local authority with sufficient information to seek more detailed advice and also allow negotiations to be suitably structured.

When procurement rules might apply

Table 8 below sets out various scenarios and provides commentary on whether procurement rules (either the Public Contract Regulations 2015 (PCR) or the Concession Contract Regulations 2016 (CCR)) might apply. This is not legal advice and is provided for preliminary guidance only.

Table 8 – When procurement rules might apply

Scenario	Comments
Scenario 1 - A local authority is approached by a third party wanting to **lease** its land for a solar farm or wind turbine AND the local authority does not want to end up owning the asset	Should be no procurement implications provided arrangements are structured as a pure land transaction and the following are **avoided**: • Option to purchase or buy back • Option to retain equipment at the end of the lease • Obligations on the developer to install and operate the equipment • Rents based on turnover or portion of earnings • The local authority should exercise care in recording the basis for its decisions. • Normal rules to ensure best value is obtained under s123 of the Local Government Act 1972 will apply.

Scenario	Comments
Scenario 2 – A local authority is approached by a third party wanting to lease its land for a solar farm or wind turbine, BUT the local authority wants to end up owning the asset	This option is complex, and advice should be sought from the outset. The PCR would normally apply, the question being whether any specific exclusions may be available. It is likely to make little difference at what stage in the process the local authority seeks to acquire. Material considerations might include the developer having exclusive access to an affordable grid connection in the locality.
Scenario 3 – acquiring project rights at 'shovel ready'[5]. In this instance the local authority would be acquiring as a minimum the following rights: • Option for lease or lease on the land where planning consent has been granted for the erection of the generating station • Wayleaves and other rights required along the cable route • Accepted grid export connection offer	This is a site on land not owned or controlled by the local authority and rights over the site need to be acquired as part of the transaction. Advice should be sought in this instance. However, provided all project rights are in place at the time of the transaction and there is no option agreement prior to purchase then this should be a land acquisition, which would normally be outside the scope of the PCR.
Scenario 4 – joint venture agreements – either to develop sites in local authority ownership or to develop sites on third party land	Assuming any potential partner does not come with project rights (eg grid export connection offer) it is highly likely that the PCR will apply and unlikely any exclusions will be available.[6]
Scenario 5 – acquisition of a constructed asset. This can be achieved either through the acquisition of the asset owner (possibly a Special Purpose Vehicle (SPV)) or through taking assignment of the lease and novation of the grid connection offer (whichever is easier)	Provided the local authority has (either now or historically) had no interests in the asset or its outputs then this would normally be outside the scope of the PCR. If any ongoing maintenance contract is acquired at the same time the local authority should take care to ensure that this falls below the relevant works/services threshold.

5 A shovel ready site is one where all development rights are in place and construction can commence once the build contractor has been procured

6 Where a potential partner (or partners) come with critical project rights, there may be an argument that these constitute "exclusive rights" allowing for use of the negotiated procedure without prior publication under PCR regulation 32. Reliance on relevant PCR provisions should only ever be undertaken with extreme care and after taking legal advice.

Purchasing Power from a third-party scheme (either on authority or third-party land)

In this instance it is highly likely the PCR would be engaged and there is unlikely to be an available exclusion.

It is also worth noting here that if a local authority owns a scheme and wants to sell the power produced to another public sector body, that public sector body will be obliged to undertake a suitable procurement. Being a public sector vendor imparts no favourable position over other suppliers.

Financial case

Introduction

The Lamby Way case study demonstrates local authority investment in renewable energy can optimise existing assets, generate new income streams whilst also delivering on climate emergency targets. In this section of the guidance we explore the financial rationale behind such investments and provide information on currently available subsidies and other income related information that is available to support local authority investment in renewables.

Investment rationale

Background for investment
Over recent years the main rationale cited by councils for investment in renewable energy is to provide an income stream to support service provision.

Increasingly authorities are also looking to renewable energy projects to support their decarbonisation agendas and may be prepared to tolerate lower returns on investment as a consequence. A local authority can buy the power the generating asset produces for their own use under a formal PPA agreement, this potentially lowers the authority's greenhouse gas emissions and speeds the journey to net zero emissions. This may also require a parallel "sleeving and balancing" contract from the authority's usual supplier to match time of day demand and supply.

Most councils are relatively large purchasers of electricity. Owning a large-scale renewable energy generator provides a natural hedge for councils against any ongoing rise in the price of wholesale electricity. This can be achieved either through a direct PPA,Power purchase or simply by buying and selling into the same market.

West Suffolk Council own a 12.4 MW solar farm which has historically sold the power produced directly to the grid. The Council are now investigating a formal sleeving contract to purchase the power produced for their own use.

CASE STUDY 2

Solar farm ownership

West Suffolk Council – 12.4MW Toggam solar farm

In 2016 Forest Heath District Council (now West Suffolk Council) became one of the first councils in the UK to own a utility scale solar farm when it invested close to £14.5 million to acquire the 12.4MW solar farm at Toggam Farm in Lakenheath. The purchase was supported by independent legal, financial and technical advice and was backed unanimously by members of the Council. The purchase took around eighteen months from identification of the opportunity to completion of the contracts.

The solar farm was purchased post construction and electrical connection, but before the end of the two-year period to Final Acceptance. The council therefore took novation of both the EPC contract and a three-year O&M contract from the original owners.

Does Generation meet the forecast?

Toggam receives income under the ROC scheme as well as income from sales of electricity generated. As new schemes are unlikely to benefit from a similar subsidy it is important to look at the electrical production data for the first three years of operation. The table below sets out the predicted and actual generation for each of the last four years.

Year	Predicted Generation (MWh)	Actual Generation (MWh)	Variance on Forecast
2016/17*	6,942	7,482	+7.7%
2017/18	11,682	11,687	0%
2018/19	11,623	13,194	+13.5%
2019/20	11,565	11,974	+3.5%

*Part year only

The business case for investing in the solar farm was based on an independent assessment and data on how the asset was likely to perform. The advice from external specialists provided councillors, of all political persuasion, with the confidence to vote in favour of the investment. The table above demonstrates that their confidence was well placed.

The capital investment has provided an important revenue income to support service provision. The scheme is providing a net return of around five per cent after running costs and the repayment of capital. That money in turn will help towards funding everyday public services.

Selling the electricity

West Suffolk use the E-Power auction to secure an annual PPA (PPA), the process of which is very transparent and easy to use. Each PPA to date has increased in value, but the new one for 1st April 2020 is lower than predicted due to lower wholesale electricity prices. This PPA is only for 6 months as West Suffolk are looking at a sleeving contract which allows them to buy the power for their own use. Sleeving the power (i.e. selling it to themselves as green energy) would also reduce the authority's carbon footprint.

Does it take much resource to run?

The solar farm requires some monthly administration and management of the Operation and Maintenance (O&M) contract. Re-procurement of the O&M contract has been cited as the busiest administrative time resource.

West Suffolk have not had a lot of technical issues, and most of these have been dealt with well by the O&M provider. Toggam Solar Farm has provided availability of around 98per cent during its first four years of operation.

Looking to the future

Currently the project life is 25 years, but the Council can look to extend that nearer the time. The income generated comes from a mix of selling electricity into the National Grid and

income guaranteed from the Government for a 20-year-period though Renewable Obligation Certificates.

What advice would West Suffolk offer to other councils?

"The main thing is getting a good design and build quality and then investing in a good O&M contract- it sounds obvious but keeping the grass cut is very important and staying on top of preventive maintenance. We are actively looking to build a new subsidy free solar farm."

Low cost of borrowing

Councils have access to considerable project financing resource, which is generally cheaper and more straightforward than private sector organisations. In addition to being able to borrow at favourable rates through the Public Works Loan Board to invest, some councils hold significant reserves so they can invest directly in projects. There is also growing, proven potential for innovative sources of financing, such as bond or share offers to the local community.

These financial arrangements combined with an ability to take long project time horizons, relatively easy access to council-owned land, and secure markets to consume the power generated all mean that councils have the ability to structure attractive renewable energy generation projects, in a fashion that cannot be replicated by most commercial investors.

Risk management

Whether a local authority is considering a renewable energy asset as a means to offset carbon or a financial investment, it is vital that they fully appreciate the pros and cons of their proposal and the capacity required to bring it forward. It is key that this is understood in order to determine whether a project represents a viable and deliverable proposition. Good quality external advice should be sought to avoid any tendency towards optimism bias.

Managing risks during development, construction and operation is covered in section 3. In this section we consider the financial risks. Project finances are a combination of capital costs from either development and construction or acquisition and project revenues. Project revenues depend on the amount of electricity generated (production risks) and the price achieved for selling that electricity. Production risks are covered in section 3.5.1. Price forecasting is a complex business and it is strongly recommended that councils consider a number of indices before deciding on a suitable electricity price scenario.

In the paragraphs below we provide some general comments on the main costs that a local authority considering a renewable energy investment should capture in the financial model for the project.

Capital expenditure assumptions

Table 9 below sets out the assumptions for both procurement and financial modelling in relation to capital.

Table 9 – Capital expenditure assumptions

Capital Expenditure	Comment
Solar panels/ Turbines	Solar panels or turbine costs are likely to be the most significant element of capital expenditure. Solar EPC contractors buy significantly more volume than any individual project and without the leverage of a pipeline of projects it is likely that best value for money on solar equipment will be achieved through the EPC contractor. With turbines in order to increase the level of certainty surrounding capital expenditure we would recommend binding offer price quotes are obtained from suppliers.
Balance of Plant/ Civils	These costs are very much project specific and typically cover the following works: Site clearance, site and health and safety management, access works, tracks, hardstanding, turbine foundations (design and construction), civil and electrical infrastructure, solar panel mounting system (design and construction), fencing and security.
Grid	One of the main challenges wind and solar development faces generally is the cost of procuring access to local grid infrastructure. The cost will depend on the complexities of connection to the grid e.g. at what cost, what distance from the site and the need for any third-party wayleaves etc.
Development costs	Development costs including planning consultants and specialist reports, topographical surveys, outline designs, land agents, and lawyers' fees and the cost of the planning application itself. Solar PV applications are generally cheaper and quicker than wind applications to the point of planning submission, however the planning application fees for solar PV are considerably higher than for equivalent wind generation capacity.
Project management	These costs are very much project specific and largely driven by the complexity of the development process and the length of the project construction programme. Typical costs include site management, owners engineer and principal designer costs.
Pre-construction costs	Pre- construction costs typically cover the following costs: Local authority acquisition/development costs, insurance during construction, miscellaneous property costs, planning obligation fulfilment costs, due diligence costs and legal costs.
Contingency	A contingency allowance will give the project more protection from risks such as adverse foreign exchange rate movements. Wind turbine and solar panels are typically purchased from the Euro zone for example. In setting contingency, it is important to have a view on current pricing for components and whether they are rising or falling.

Operating cost assumptions

Table 10 below sets out the assumptions for both procurement and financial modelling in relation to capital.

Table 10– Revenue Expenditure Assumptions

Operating Cost	Comment
Lease and access lease costs (where the local authority is not the landowner)	Solar leases are generally relatively straightforward with payments either based on the number of acres occupied index linked to CPI or RPI, or a per cent of gross turnover. Landowner lease payments typically follow a stepped approach with a reduced percentage payable in the first ten years, with a higher percentage payable thereafter. Percentages, however can vary significantly and are often driven by a combination of landowner demands and affordability. The concept of stepped percentages has its origins in bank funded projects where high debt costs in the early years meant reduced cash flow for funding operating costs. Should it be the case that private land must be trafficked in order to reach the site, an access lease will be required, and an annual cost incurred. Access lease costs vary significantly between sites and are often driven by landowner demands and the location of the site.
Turbine O&M maintenance	Specific rates will be provided by the turbine supplier. A maintenance cost profile typically increases at five-year intervals.
Civil and electrical maintenance	Allowance should be made for costs associated with maintaining the site roads, foundations and site generally.
Solar PV O&M	Solar PV O&M contracts generally wrap all associated maintenance and monitoring work with the customer being responsible for the additional costs of equipment replacement (e.g. inverters). The O&M costs are flat, and the cyclical replacement can be dealt with through the development of a sinking fund if necessary.
Grid charges	Following receipt of a grid connection offer it will be possible to determine charges associated with using the National Grid network. Balancing Services Use of System (BSUoS) or Transmission Network Use of System (TNUoS) charges will apply depending whether the grid connection is at distribution or at transmission level, with rates varying by location. Allowance should also be made for importing power, metering, wayleaves and other associated grid connection costs.
Business Rates	For wind an allowance for business rates will be required, with rates varying by location. An early indication of business rates can be obtained through liaising with the local business rates valuation office. Solar PV rateable values are as set out in a Memorandum of Agreement between the Solar Trade Association and the Valuation as described in section 3.6.4 of the report.

Communication systems	Allowance should be made for costs associated with communicating with or monitoring the performance of the renewable energy asset which falls outside of the O&M contract scope. An example will be the provision of broadband.
Operating Cost	Comment
Other operating costs	Allowance should be made for other applicable operating costs such as: habitat enhancement, community fund payments, insurance, tax and accounting, local authority asset management costs and decommissioning provision costs.
Contingency	An operating cost contingency (or a sinking fund) is recommended to cover unexpected outages and cyclical equipment replacement.

Sensitivities

Local Partnerships recommends that any local authority looking to invest in renewable energy carries out a range of sensitivity analysis at both OBC and FBC stages to show the potential upside/downside scenarios around the proposed project on the project cash flow projections.

Changes to the inflation assumption is likely to result in the largest deviation from the base case. Whilst a higher level of inflation impacts on the operating costs for the project, project cash flows will also increase due to the impact on electricity revenue.

Typical sensitivity analysis would include:

1. Inflation
2. Electricity price
3. Year on year production (i.e. variance from base case) as a result of both weather conditions and plant availability
4. Exchange rate impact on build cost
5. Delay costs (during the development phase)
6. Interest rates

Tax treatment for schemes is important and authorities will need to take specialist advice in relation to all forms of taxation. This advice may influence the ownership model the authority chooses to pursue.

Income from electricity sales

Power purchase agreements

All schemes will require some form of PPA to sell the electricity produced. It is unlikely that any scheme will secure a PPA at the outset for the life of the project. Different arrangements may apply during the lifespan of the project. This is particularly true under a private wire arrangement when you need to consider when designing the infrastructure how you will export power to the grid if the arrangement subsequently changes.

Grid export PPAs come in two main forms, either relatively short-term arrangements generally with the major energy suppliers, or longer-term arrangements with a single (or small group) customer. Shorter term arrangements often offer a better spot price than the longer-term ones – but there is more exposure to general price volatility.

Longer term PPA agreements are generally with commercial third parties and seek to fix prices over a set period which helps protect those entering into the PPA (both buyer and seller) from market volatility. Large corporates, such as Google and Amazon have used corporate PPAs for their energy needs. There are currently 229 RE100 companies which have made a commitment to go 100per cent renewable and are taking actions such as entering into corporate PPA's to deliver on their RE100 and wider sustainability commitments.

Where power is sold as renewable energy the Renewable Energy Guarantees of Origin certificates (REGOs) will be sold with the electricity and therefore any greenhouse gas emissions savings will normally benefit the purchaser of the power rather than the owner of the renewable energy generator.

PPA's also have a lot to offer councils and other public bodes taking action on reducing their direct and indirect climate impacts. Key benefits gained from public bodies entering into a PPA with a third-party generator (or their own arm- length generator) are as follows:

Secure energy price - as part of any prudent risk management approach, entering into PPAs provides some insulation against volatile wholesale power markets;

Long term hedge – utilising a PPA gives access to longer date prices;

Additionality/provenance – purchasing directly from a new incremental green generator demonstrates commitment to reducing demand on carbon emitting fuel;

Support UK climate change policy – the UK has made a legal commitment to net zero emissions by 2050. Many local councils have declared climate emergencies and have set targets to achieve carbon neutrality as early as 2030.

PPA structures

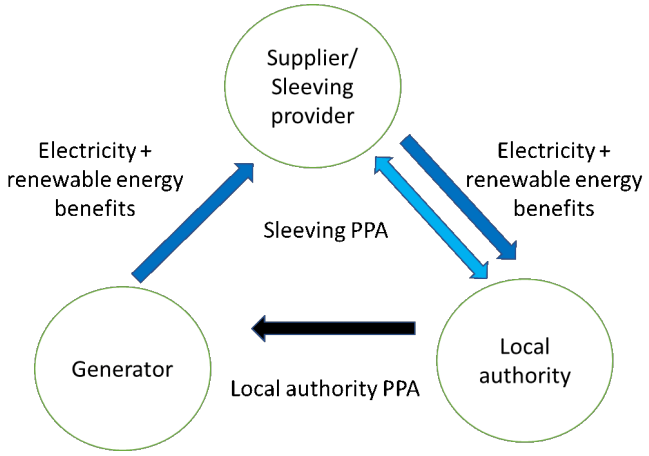
Whilst PPA structures continue to evolve there are typically three contract structures:

- Physical (also referred to as a 'sleeving' arrangement)
- Synthetic (or virtual)
- Private Wire
- Physical PPA

A physical PPA is between a customer and a generator who are remote from one another. The public electricity network provides the connection and network charges apply. This form of contract provides a direct and verifiable connection between the electricity produced and the electricity consumed.

An overview of the contractual arrangement is shown in Figure 6 below:

Figure 6 – contractual arrangements for a physical PPA with local authority as the off-taker



- Under this structure the off-taker enters into a long-term PPA with a renewable energy generator to take some or all of the energy generated by its plant (or portfolio of plants) with a defined amount of power sold at a fixed price per MWh. Typically, the PPA will contain provisions for the sale and purchase of electricity and the allocation of any applicable renewable energy benefits, and the provisions governing that sale and purchase.
- The PPA will also include obligations to provide or procure certain metering and regulatory activities that can only be undertaken by licensed electricity suppliers (such as npower, Centrica etc). As such, the off-taker will need to enter into a back-to-back agreement with its licensed supplier under which the licensed supplier commits to undertake these obligations.
- In parallel to this arrangement the off-taker will have an electricity supply agreement with its licensed supplier under which electricity may be supplied to meet the off-taker's energy demands from time to time. The terms of supply under this supply agreement will take into account the electricity purchased under the PPA and passed through to the licensed supplier under the licensed supplier agreement. This ensures that the off-taker has the benefit of the fixed pricing for renewable energy under the PPA but the reliability of a supply agreement with a licensed electricity supplier to meet its day-to-day energy demands.
- There is generally a charge for the sleeving PPA with the sleeving provider which amounts to around 5per cent of the value of the wholesale electricity traded.

Both wind and solar developers have built up extensive pipelines of renewable energy projects which can give off-takers flexibility around choosing a PPA start date and the ability to dovetail into their long-term energy buying/risk management strategies. Options also exist for individual public bodies to aggregate smaller volumes to benefit from pricing.

Synthetic PPA

In a synthetic PPA structure no power is physically traded. Instead it is a purely financial structure where the off-taker and generator agree a defined 'strike price' to fix the cost of power between themselves for the power generated by a renewable energy facility. Each party will then enter into separate agreements with their electricity/licenced supplier to sell/acquire electricity at the spot price.

A synthetic PPA works as a financial hedge in that if the spot price in a settlement period exceeds the PPA defined strike price, the generator pays the excess amount to the off-taker for power generated in that period. Where the market price for power is less than the strike price in a settlement period, then the off-taker pays the shortfall amount to the generator for power

generated in that period.

A synthetic PPA is relatively simple to enact and provides price certainty to both parties. It can be harder to demonstrate a direct connection, but this should still constitute a valid carbon reduction for an authority participating as an off-taker, provided the contracts also secure the associated renewable energy accreditations.

Private wire PPA
Private wire PPAs are concerned with the sale of electricity from a generator to an off-taker. Under this PPA agreement, power will normally be sold directly from the generator's facility to the off-taker, rather than being notionally passed through a national power grid. Typically, the generating facility only supplies power to the off-taker and will be located at, or close to the off-takers assets. Private wire PPAs are often utilised in conditions where the off-taker wishes to secure its own source of power. In the case of a local authority for example, an energy intensive depot or industrial estate owned by the local authority. Cardiff Council will be entering into a private wire PPA as part of their arrangements for Lamby Way (see case study 1).

Income from subsidies

Subsidy income is highly prized for its certainty, albeit that guaranteed levels of payment may be lower than those in the prevailing market. This is potentially less critical for a public sector owner than a private sector one, as interest rates and debt service cover ratios in the private sector are significantly improved for assets with a certain income as opposed to those relying on merchant income streams. A local authority on the other hand is also a major purchaser of electricity and is therefore able to hedge the income stream against its liabilities.

Contracts for Difference (CfD)
The Contracts for Difference (CfD) scheme is the government's main mechanism for supporting new, low carbon electricity generation projects in the UK.

EXPLAINER

Contracts for Difference (CfD) is a price guarantee mechanism, providing the generator with a guaranteed price for a fixed period. The guaranteed price is secured via an auction process with generators offering their best (cheapest) price for the electricity supplied. The scheme accepts schemes (cheapest first) until a pre-set cap on capacity is reached. Once the cap is reached the highest price accepted by any of the successful bidders becomes the "strike price" which is then paid to all bidders.

On 2nd March 2020 BEIS released a consultation on the CfD scheme considering various changes to ensure the CfD scheme can support the increase in ambition needed to deliver the Government's 2050 net zero target, while minimising costs to bill payers.

Under CfDs generators pay money back when wholesale electricity prices are higher than the strike price and are provided with a top up to the strike price when the wholesale electricity prices are lower.

Part of the Governments proposals in the 2020 consultation is to bring back the 'Pot 1' auction for onshore wind and solar for the next auction in 2021. This is in recognition of the risk that solely relying on merchant deployment of solar and wind may not see the rate and scale of new project deployment needed to support the Government's net zero commitment. The consultation makes clear the government expects 'Pot 1' auction bids to be below the

wholesale price of power.

For the 2021 auction the consultation is also looking at separating offshore wind into a third pot with two options proposed. Solar and wind regardless will compete in 'Pot 1', established technologies which is as follows: Onshore wind (>5MW), solar photovoltaic (PV) (>5MW), energy from waste with CHP, hydro (>5MW and <50MW), landfill gas, sewage gas.

Price competition between solar and wind in the 2021 auction, as well those for other technologies is likely to be highly competitive. The most competitive projects in the auction will benefit from being able to use the latest, most powerful, technology as well as having a good energy resource and a low-cost grid connection.

Scotland is the windiest country in Europe and based on data from Scottish Renewables there are around 4GW of onshore wind projects with planning consent[7]. Scotland has a healthy pipeline of new projects with 556MW (26 projects) consented in 2019, and 1,969MW (35 projects) submitted into the planning system. By comparison just two onshore wind projects (totalling 1.9 MW), received planning approval in England in 2019 and only one planning application (5 MW) was submitted. No onshore wind projects were approved or submitted in Wales in 2019[8].

Nothing in the consultation addresses the difficult planning environment for onshore wind in England which could mean proposals favour onshore wind in Scotland and Wales. 180m tip height turbines have already been consented in Scotland, with projects at 200m+ also in the planning system. In comparison, historic planning consents in England have been at 125m which will prevent the use of the latest, most cost-effective turbines and so hindering projects' ability to compete in auctions.

Within the consultation there is also a strong emphasis on working with local communities with a proposal to update the best practice guidance for onshore wind that DECC (now BEIS) originally commissioned back in 2014 along with a proposal for a register of community benefits.

Even where CfDs are available it is likely there will be pre-qualification requirements which will include land ownership, a valid grid connection and planning consent. The application process and calculating the value to bid in the auction are complex and therefore specialist advice should be sought before CfD income is considered in any business case.

Smart Export Guarantee Scheme

On 1st January 2020, the Government introduced the Smart Export Guarantee (SEG) scheme, which will enable anaerobic digestion, hydro, micro-combined heat and power (with an electrical capacity of 50kW or less), onshore wind, and solar photovoltaic exporters with up to 5MW capacity to receive payment for exported electricity. The SEG scheme replaces the FiT scheme that closed in Q1 2019.

Under the SEG scheme, all licenced energy suppliers with 150,000 or more customers must provide at least one Smart Export Guarantee tariff. The Government has set out that in order to provide space for the small-scale export market to develop, there will not be any specified minimum tariff rate, other than that a supplier must provide payment greater than zero at all times of export. The SEG licensees therefore decide how they want their SEG export tariff to work in terms of its rate, type and length. Storage is also eligible to receive export payments, although suppliers will be able to exclude 'brown' electricity from those payments and require

7 www.scottishrenewables.com/our-industry/statistics

8 www.renewableuk.com/news/484564/Net-zero-emission-goal-at-risk-as-less-new-onshore-wind-capacity-built-for-second-year-in-a-row.htm

the generator to put metering in place that isolates 'green' exports. Table 11 below summarises the six highest SEG export tariffs that are currently available:

Table 11– Example SEG export tariffs – Q1 2020

Supplier	Tariff Name	Tariff Type (Fixed, Currently Fixed*)	Tariff length	Tariff rate	Payment Cycle	Includes Battery Storage	Requirement to be on the suppliers' import tariff?
Social Energy	Smarter Export	Currently Fixed	No Fixed End Date	5.6p	3 months	Yes (must be SE battery)	Yes
Octopus Energy	Outgoing Fixed	Fixed	12-month fixed term	5.5p	Monthly	Yes	Yes
E.ON Energy	Fix & Export Exclusive	Fixed	12-month fixed term	5.5p	Unknown	Unknown	Unknown
Bulb Energy	Export Payments	Fixed	No Fixed End Date	5.38p	3 Months	Yes	No
Ovo Energy	OVO SEG Tariff	Fixed	12-month fixed term	4.0p	3 Months	Case by case basis	No
Scottish Power	Smart Export Variable Tariff	Currently Fixed	No Fixed End Date	4.0p	6 months	Unknown	No

*Currently Fixed means that the supplier has specified a fixed rate but has not fixed this for a specific timeframe / the supplier has caveated that the current fixed price might change in the future

Under the scheme, exported power must be metered, with a meter capable of reporting exports on a half-hourly basis, and meters must also be registered for settlement – though the SEG design is flexible and does not necessarily require half-hourly readings.

For PV, wind and micro-CHP installations up to 50kW, generators will be asked to demonstrate that their installation and installer are suitably certified. OFGEM have indicated that an installation certificate such as a Microgeneration Certification Scheme (MCS) certificate (or equivalent) is sufficient to demonstrate this. For all other installations, generators will be asked to demonstrate that the installation is suitably certified. The government does not plan to require a central register of SEG installations.

Full details of the OFGEM SEG guidance can be found at the following link www.ofgem.gov.uk/system/files/docs/2020/02/seg_generator_guidance_-_final_for_publication.pdf

Conclusions

A number of councils have successfully invested in renewable energy generating assets and there are likely to be opportunities for other councils to follow suit.

Whether it is better to seek to develop an asset, or buy one from a commercial developer, will depend on the opportunities available and how each local authority responds to individual challenges.

Councils should not assume that it will be more cost effective to develop their own schemes. Solar PV and wind developers have worked hard to drive down costs in recent years and bring considerable leverage and expertise to the market. Some of these schemes are likely to offer better value for money, and at less effort, than development of schemes from scratch.

The most likely opportunities to be successful are commercial scale solar PV, either smaller schemes with a direct private wire to a customer, or larger schemes of 20 MW or more. Opportunities to develop new wind turbines in England appear to be limited at the present time.

When considering where to sell the power the local authority will need to balance financial returns with their potential to offset the authorities' carbon emissions.

Those councilswho have developed or purchased assets advise that good quality external advice will be needed, which ever route you are taking.

Glossary of terms

Any engagement with the renewables industry will involve a degree of technical language and common terms. It is not necessary to have a detailed technical vocabulary, however an understanding of some of the basic terms and concepts will aid understanding in the preceding sections of this document.

ANOB	Area of Outstanding Natural Beauty
BEIS	Department for Business, Energy and Industrial Strategy
CCC	Committee on Climate Change
CCR	Concession Contract Regulations 2016
CfD	Contract for Difference – current large-scale subsidy regime
CIC	Competition in Connections (for grid offers)
DECC	Department of Energy and Climate Change (fore runner to BEIS for as the ministry for energy)
DNO	Distribution Network Operator. These have mostly become DSOs, however the term DNO is still in use
DSO	Distribution System Operator. These organisations run the local electricity distribution networks. There are seven of them across the UK (only one in any location) e.g. UKPN, Western Power Distribution, Scottish and Southern
EIA	Environmental Impact Assessment
EPC	Engineering, procurement, construction contractors
EUR	Euro (European currency)
FBC	Full Business Case
FES	Future Energy Scenarios – produced annually by the National Grid to forecast future energy needs
FiT	Feed in Tariff – previous subsidy regime
GBP	Pounds sterling (UK currency)
GW/ GWh	Gigawatt or Gigawatt hour. Measurement of electricity equivalent to 1,000 MW or MWh

HELGA	Heat Networks and Electricity Generation Framework – owned by Crown Commercial Services
HV	High voltage
ICP	Independent Connection Provider
KW/KWh	Kilowatt or kilowatt hour. Standard measurement of electricity (used on electricity bills)
MCS	Microgeneration Certification Scheme
MOA	Memorandum of Agreement
MW/MWh	Megawatt or megawatt hour. Measurement of electricity equivalent to 1,000 kW or kWh
NFFO	Non-Fossil Fuel Obligation – previous subsidy regime
NG	National Grid – operator of the transmission system for electricity
O & M	Operation and maintenance
OBC	Outline Business Case
OFGEM	Electricity industry regulator
PCR	Public Contract Regulations 2015
PPA	Power Purchase Agreement – contract for the buying and selling of electricity
PV	Photovoltaic i.e. turning light energy into electricity
RE100	Global scheme for companies to declare their intention to use only 100per cent renewable electricity
ReFit	National Energy Performance Contract framework – owned by Local Partnerships and the GLA
REGO	Renewable Energy Guarantees of Origin – scheme administered by OFGEM to provide transparency to customer about the source of their electricity
RO	Renewable Obligation – previous subsidy regime
ROC	Renewable Obligations Certificates issued under the RO
SEG	Smart Export Guarantee Scheme
SPV	Special Purpose Vehicle – term for a company set up to own a specific asset – largely to define its boundaries of operation and make it easier to trade.

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