A Step-by-step Guide to Local Energy

Contents

1. Introduction

This guide assumes that you already have a site in mind for an energy project, and an idea of what sort of technology you'd like to implement. This could include energy generation by renewables, energy efficiency, and low-carbon heat and transportation projects. This guide is written with local authorities or community energy groups undertaking their first foray into energy projects in mind. We therefore consider relatively simple, single-single projects using one or a simple combination of technologies.

In the rest of the guide, we will look over the development process and identify what you will need to do at each stage, as well as posing some simple questions which may help you to consider further options and important variable which will maximise the financial and carbon-saving benefits of the project.

While the guide is technology agnostic, we've highlighted points at which certain technologies will have to follow different processes for your attention.

Through the rest of this step-by-step guide:

- Section 2 looks at some initial questions you should consider. These concepts will help you understand if the project will be worth taking forwards and spending more time and money on developing
- Section 3 sets out tasks to help quantify the size of technologies selected for the project, based on the conditions existing on the ground
- Section 4 introduces some considerations to help quantify the costs and economic benefits of the project. This will allow the production of a business case, which will provide a holistic picture of the potential net project value
- Section 5 provides a short introduction to financing questions and how to take a final decision on whether the project should be implemented. We also here consider the contracts which may be required in order to complete the project

2. Initial Questions

Once you have identified your site and decided on a technology, there are several things to consider before proceeding with project development. Many of these points will be considered in greater detail later, but some "rules of thumb" can be used to take an early view on whether the project is worth taking forwards.

- Is the site suitable to host the proposed technology?
  - For example, wind turbines cannot be located in built-up areas. Biomass units are restricted from clear air zones
  - 7 EV charging hubs should be sited where vehicles travel or where they are parked to maximise usage
- Should the site host the proposed technology?
  - For example, siting a bank of EV fast chargers on a small road far from major transport routes may result in little use and therefore income
  - Rooftop solar is economically best where the host building consumes most of the output
- Is the site interested in hosting the proposed project?
  - If the host is uninterested or unwilling, a project is unlikely to get underway. The rest of the guide assumes that the site owner is a willing host to the project. Local authorities may wish to target their own estate for their first projects, to gain experience and build capacity working with a willing partner
- Will costs be prohibitive?
  - It is often possible to get an early view on grid connection costs by talking to the DNO
  - Speaking to equipment installers will also give you a good insight into potential technology costs. Installation of solar generation on top of tower blocks, for example, may be much more expensive than normal roof-mounts
- If installing behind a consumer's meter, will they remain in situ for the duration of the project?
  - If a company has poor credit, or conversely is growing fast, it many not remain in place, give rise to a rise of stranded assets. More broadly, if the way in which they use energy changes significantly then this could have the same effect – or it could create new opportunities
- Is data available?
  - Smart meters are becoming the norm in the GB market, but where they are not yet installed, or have been installed only recently, there will be a serious deficit in data available. Establishing data sources early on can pay dividends later
  - Building energy management systems, energy bills and other records may also provide useful sources of data on how much energy is being consumed, and it what way – but for generation do not provide a substitute to half-hourly consumption data
- Is subsidy or funding available?

    - While the main accessible small-scale generation subsidy schemes have closed, subsidy is still available for low-carbon heat producing projects through the Renewable Heat Incentive
    - Grant funding is also available for projects, though there is generally a requirement that these be innovative rather than business as usual, so a partnership exercise should be considered before attempting to secure this funding
- Is this the right time?
    - Technology costs for many renewable and electrification assets are falling fast. Is installation in the short term the right move, or would it be more beneficial in the long run to wait for costs to fall and technologies to enter the mainstream?
    - Energy bills are forecast to rise over the coming years. This will increase the viability of energy efficiency and behind the meter generation projects
    - Changes to network costs are coming in the next few years. Waiting until the impact of these is known would allow greater certainty in business cases
        - Similarly the future of the Capacity Market (CM) is presently uncertain with a European Commission investigation presently underway. If your business model is dependent on CM funding, it may be prudent to await the outcome of the investigation
- Can similar benefit be achieved in a simpler way?
    - For example, when looking to reduce energy bills or carbon emissions, it may be simpler to switch tariff rather that undertake a complex project installing solar, batteries, and EV chargers, to deliver the same benefits. Simple steps should be considered and undertaken first, with other projects reviewed later
- Is the project too complex for your current capabilities?
    - It is often best to incrementally improve capability and experience – our Cambridgeshire case study demonstrates the benefit of undertaking some straightforward investment projects with limited number of participants and established business practices to build capacity and knowledge before undertaking some complex projects
    - Alternatively, many development companies look to work with local authorities to jointly bring forward projects. Our Warrington case study demonstrates this in action. In the this example, Warrington provided finance while Gridserve did the heavy lifting of project development
- Can the project be broadened?
    - For example, are there other similar buildings in an area which could also benefit from energy efficiency or generation installations, which could be targeted through the same project?
- Are there better opportunities available?
    - A viable opportunity isn't necessarily the best available. A full scoping exercise should consider a range of potential projects and broaden the opportunities being considered

- Additional questions where working with an energy consumer as host of the installations include:
    - What tariff is the potential host organisation on? A complex tariff may offer lower value for solar generation, but greater potential for cost-savings through storage and flexibility
    - Does the host own the property, or will an additional relationship need to be created with the landlord as well?
    - Will the host remain in situ for the duration of the project? If a company has poor credit, or conversely is growing fast, it may not remain in place. More broadly, if the way in which they use energy changes significantly then this could have the same effect – or it could create new opportunities

3. Scoping Your Scheme

The first stage in the scoping phase is to gather information. This will include information on the site in question, any occupants in terms of consumers, and the views of the local community. You may also want to consider whether other elements can be sensibly introduced to the scheme in order to produce greater overall value.

Once information has been gathered, this can be used to size the assets that will be installed. This can be a delicate calculation, and it may be necessary to seek professional assistance from installers or consultants. Many energy asset installers now have in-house capabilities to help size assets, which they may provide free of charge or for a small fee.

Finally, you may wish to consider if further assets should be included in the project. These can increase complexity, but also increase economic benefits. We provide two examples of technologies which could be rolled into projects and explain how complexity can be minimised.

Information gathering

The site and host organisations

- How large is the site, in terms of available area for installing energy assets?
    - This may include ground or rooftops, and adjacent areas which may be available for development
    - It may also include space within buildings for installation of batteries, energy and heat management systems
    - You should also consider ease of access on site and transport links, especially where installing large assets or in built-up areas
- If looking at rooftops for solar PV, ascertain the angle of the slope and orientation; an ideal rooftop points directly south with a 30 degree slant, though flat roofs can also be useful. Also consider shading, both now and in the future, from trees and buildings
- If looking at wind turbines, consider the wind speed and localised effects from buildings and trees. Also consider the noise and visual impacts on neighbours and the landscape. A larger turbine will be more efficient and profitable, but will impact more on the landscape
- If working with a consumer, you should seek half-hourly metered consumption data to quantify the on-site electricity load profile throughout the day
    - You should also seek information on the user’s current tariff, and an understanding about whether they have actively switched to the cheapest available tariff
    - You should also try to understand the consumer’s ambitions in terms of green power, and whether they are willing to pay a premium for low-carbon power and/or heat
- You should quantify any existing generation, including back-up facilities, and the associated metering data

- Many commercial sites will already have half hourly metering and be able to provide historic consumption data. Data loggers can also be used, but be cautious in using less than a full year's data when making a decision on asset size, as consumption patterns can change significantly across the year

- You should quantify on site heat demand, if considering thermal efficiency or heat production
    - It may be advisable to contract a professional assessor to provide the precise calculations which will be require to appropriately size a system. A SAP assessment may also prove useful – further information on the SAP process is here
- You should consider whether there are opportunities for inclusion of other sites to generation or incorporate additional local demand, especially where these are or could be connected by private wires

Community engagement

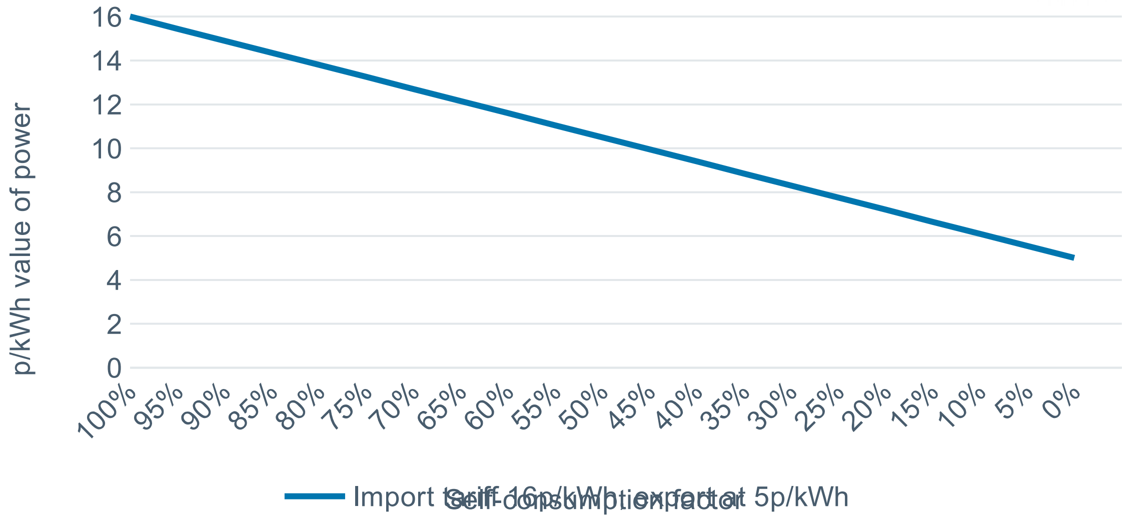
Consider early engagement with communities on the ground to build support for your project, which will help with any required consultations to seek public approval of plans. This is very important when considering wind turbines, as these tend to polarise opinion even in communities which broadly approve of community and green generation.

You may wish to consider engaging with existing community energy groups, or establishing a community group if none exists. You may also wish to consider if it would be suitable to share part of the income from a project, for example by setting up a community benefit fund for the local area.

Plan Local have published several videos on community engagement here, and the Community Planning Toolkit here was funded by the National Lottery to help drive good quality community engagement efforts. Climate Xchange's guide to good practice in community engagement for wind projects focuses on larger projects, but the lessons are important for all sizes of scheme. It is found here.

Sizing the assets

- If considering behind the meter generation assets, consider when power will be generated and look at the host's consumption over these times. For the highest economic benefits, you will want to try to closely match generation to consumption
    - The economic benefits can be several times higher for on-site consumption compared to export; the below chart illustrates based on typical import and export prices



- If considering energy efficiency measures or heat production, it is important to remember than some measures will not be cost effective in terms of the amount of energy saved. Some installations, like LED lighting, are generally beneficial, others like boiler replacement and solid wall insulation will be setting dependent. You may find that you require specialist assistance to understand the economic benefits of energy efficiency, and to design installations; the same will be true of heat production installations
    - If you are also considering the installation of energy efficiency measures, be sure to make changes to consumption profiles to model the effect of these, or you may overestimate self-consumption and therefore economic benefits
    - The Open University provides a simple guide to understanding heat loss in buildings here
- If considering installing assets behind the meter to manage peak electricity consumption, revenue streams are complex and change regularly. Partnership with an aggregator or battery provider will help you to understand and access these revenues, as well as offering an option to manage the assets in the most effective way going forwards
- If considering grid-connected generation assets, you will again likely require specialist technical assistance to understand further wholesale power prices and potential revenues from embedded benefits and grid services

It is not always most economically advantageous to install the largest generator or highest level of energy efficiency. This could provide other benefits like carbon-saving but may lead to longer payback periods on the installation and a lower rate of return on the investment.

Introducing other technologies

At this stage you may also wish to think about how your scheme could be expanded to include other elements. This will be especially important when considering generation schemes which will sometimes produce more power than is currently consumed as part of a behind the meter generation project.

Suitable battery storage conditions

Sunshine hours are consistently greatest during the period 10.00-16.00, and solar PV sites have generation which they cannot consume on-site at the times it is produced. The same is true for wind turbines. This creates opportunities to deploy batteries to store some of the excess power.

Time of use pricing is a key enabler of incentivising demand response and use of flexibility through deployment of batteries. You may wish to review the terms of the site's electricity supply deal and when it is due to expire. Most suppliers are amenable to renegotiating contracts with non-domestic customers and offering more sculpted terms based on more differentiated time of use tariffs, which can give rise to a greater business case for batteries.

There are also revenues available for consumers on complex tariffs where they are exposed to different time of use pricing and pass-through network costs. This can provide an economic case for batteries even where there is no generation.

An active market is developing in which an electricity supplier or an aggregator can take operational decisions on customers' behalf to optimise the use of storage. This can allow investment in the battery asset while alleviating the burden of managing the asset on a day-to-day basis to deliver revenues.

It is also worth noting that the revenue streams from batteries have thus-far been volatile and there is not a simple proven business case yet. Furthermore, technology costs are forecast to fall rapidly over the next few years. It may be prudent to delay investment in batteries until costs have fallen and the market is more apparent.

Appropriate EV charging conditions

Adding EV charge-points is a good way of increasing on-site consumption of electricity, and smart chargers can be integrated with energy management systems to act as a soak for surplus power generation. EV chargers are best installed where cars will be parked for extended periods, for example an existing office or residential car park, or at a location like a gym or supermarket.

Note that EV chargers will be a requirement for new and refurbished buildings, under the EU Energy Efficiency in Buildings regulations, when these are implemented in UK law (by March 2020). Under other new legislation, chargers must also be smart (that is, have the ability to be remotely turned on and off by the operator) allowing you to achieve maximisation of value.

Before these rules come into effect, making the economic case for EV chargers at a site will require consideration of whether staff currently drive EVs, or if there are company vehicles which will be replaced by EVs. However, mass adoption is not predicted until the mid-2020s. A University of California study on workplace charging (here) found that workplace charging would result in around 35kWh of extra demand per day, for four 3.5kW charging stations.

This means that each charging station can be expected to output around 2,000kWh a year, if well used. The p/kWh income can be used to calculate a return based on this. There are also grants available to defray some of the cost of chargers, from OLEV. See more details here.

Rapid and fleet chargers may have very different use and value profiles, however.

EV charging is a rapidly growing field and many EV charging point providers are willing to enter partnerships to install smart chargers and share revenues. The provider will install the points and manage charging and billing duties, freeing the host from this responsibility.

4. Building a Business Case

In order to create a viable business case, you will need to consider the costs of implementing the project, compared to potential revenue streams.

Costs are very site-specific and we do not provide a full guide to them here; however you should be able to get an idea of approximate project costs by talking to local energy solution providers and the DNO. This will enable you to take a high level view on whether a project will be viable at an early stage. Benefits are also very site specific, but ways to maximise these are also considered in this section.

Once you have ascertained costs and benefits, you can create your business case.

Establishing costs

There are three principle sets of costs to consider:

- Project development costs – the staff time you are devoting to developing the project, along with any expenses incurred in partner engagement, consultancy services, consultations and running procurement exercises or establishing frameworks
- Installation costs – the price of installing equipment, whether that be generators, energy efficiency measures, charging apparatus or other equipment
- Operation and maintenance costs – this includes the cost of running and maintaining equipment, paying for ongoing services and staff time, purchase of fuel, over the lifetime of the project. With the expiry of exemptions, you should also consider the effect of business rates, and factor in VAT and other taxes

In addition to the raw cost of these activities, there is also the cost of financing – ie how much you are paying to borrow money. Local authorities may have access to finance through the Public Works Loan Board, at rates as low as 3%; however, you should take a realistic view of the cost of finance based on the sources available to you – interest rates for commercial finance in particular are likely to be closer to 7% or even more.

Grid connection permission

You should obtain a quote for grid connection from the local DNO, if a new connection is required. You may want to ensure there is unrestricted access to the wider electricity system for any surplus power that you intend to export to the public system. However, this will be less important where all power generated will be consumed on site, or where considering projects other than electricity generation.

If installing assets behind the meter, you will be starting from a position of having an existing connection to the local distribution system. A necessary step is therefore understanding the existing connection terms, and whether you might need to seek variation to them. Most business sites with a demand in excess of 100kW and connected at voltages above 1,000 volts are likely to have their own connection agreement. A key issue here is understanding whether you may need to change the site’s maximum import capacity (MIC).

If you are considering a project which will connect directly to the grid, you will need to obtain a new connection from the local DNO. Obtaining a quote for connection charges is now chargeable, so it may be sensible to make use of the resources which DNOs make available to see if your site is feasible at an early juncture. You should speak directly to the connection team to discuss your options with them.

There are two main routes to obtaining a generation connection, the G98 (for very small generators) and G99 (for larger generators) processes. The ENA provides guides to connection here.

You can find more information about the application process for the English DNOs at the below links:

- Electricity Northwest
- Northern Powergrid.
  - NPG also provides a useful set of guide prices and timelines for new connections here
- Scottish and Southern Electricity Networks
- Scottish Power Electricity Networks
- UK Power Networks
- Western Power Distribution

The first step to obtaining a grid connection offer is to contact the connections team at your local DNO to discuss your project and location. They will then be able to advise you on the process to follow and paperwork to complete. There are guaranteed standards for how long it should take to produce a connection offer from submission of paperwork. The longest it should take is 65 working days, but most offers will take less time than this.

This connection offer will include details of how much the connection will cost and how long the DNO will take to deliver the work. Generally, larger connections take longer to build and cost more, but this is highly variable depending on local network conditions.

Installation and partnerships

Procuring installation of energy assets is not as simple as obtaining quotes and selecting the cheapest. Different providers and technologies will offer different long-term value, both in terms of ongoing costs and ongoing generation. For example, higher cost solar panels will often degrade more slowly than cheaper ones, offering better overall value; similarly warranties on equipment and installation will vary.

You may also wish to consider using consultants in order to provide third-party understanding and validation of installation quotes, system design, and contracts. Consultancy services can also be procured competitively.

Typical costs for technology change rapidly, so we have not included costs which would soon become out of date.

Operations and maintenance

Most energy installations will require maintenance over their lifetimes, and may require monitoring, for example billing host organisations for their use of energy generated. Some of this work may be carried out in-house and some will be outsourced. You should think about how much each of these options will cost. Many installation companies will offer to maintain assets, and you should compare the cost of these offers with the cost of insourcing this activity, or contracting a third party.

Establishing revenue streams

There are also three main revenue streams to consider.

- Reduction in a consumer's energy import bill (either through energy generation or through energy efficiency) – while domestic and non-domestic energy tariffs are variable, they are more stable than either of the other revenue streams and forecast to increase over time; as long as the consumer continues to take power, these revenues are investable
- Sales of wholesale power and embedded benefits from a generation asset – wholesale power prices are highly variable, over the time of day and year as well as over longer periods. Many developers struggle to commission projects based solely on these revenues due to fears over long-term changes
- Provision of flexibility services to National Grid or the DNOs – what services are being procured and what prices paid depends on the time of year and these change frequently as new services are introduced and new players enter the market to provide these. It is hard even for experts to base projects on these revenues

There may also be subsidies available for heat production through the RHI.

We now address how you can quantify these benefits.

Reduction in import bills

This calculation will be based on the amount of energy your proposed installation will save a host consumer. For energy generation assets, you should calculate the amount of generation which your proposed asset will produce by half-hour, comparing this to the host's half-hourly consumption profile. This will tell you how much energy per annum your host organisation will buy from you rather than from the grid.

This is a relatively easy for a controllable generation asset (like a biomass CHP) or a forecastable asset (like a solar array). For a wind generator it can be more difficult, as generation can be highly variable. You should consider baseload consumption at the site (ie the consistent minimum level of power demand) in order to take a prudent view on consumption. Remember that wind turbines tend to generate more power overnight than during the day, and the most power during the autumn.

You should also factor in expected changes to the host's consumption, for example if new machinery or technology is expected to be deployed on-site.

Where your project includes energy efficiency installations, you should use a methodology like the Re:fit or BREEAM standards to assess and quantify energy savings. Your design partner will be able to help quantify these savings.

Once you know how much power demand will be offset per annum, you can convert this to a value per year. This value per kWh will depend on the consumer's cost of importing power, and will likely have to be costed at a discount to the retail import cost.

Some consumers will be willing to pay over the odds for green power, which brings corporate social responsibility (CSR) benefits, but you should not assume that this will be an important factor for your partner.

Once you have an understanding over the year one benefit, this can be factored out over the project lifetime to give a total benefit. You will probably want to increase the charge to the host for power by an index (CPI is often used although in the near term retail price increases may well exceed this). Remember to include a factor for decreasing returns as power generation equipment degrades and energy efficiency measures wear out.

Wholesale power and embedded benefits

While the specific details of a long-term power purchase agreement (PPA) to sell power produced will be set later, you can make some assumptions about future wholesale power prices. These could be based on current prices, for example. This may be sufficient to ascertain the benefits of a small amount of power to be spilled from a behind the meter generator.

However, these will not be reliable forecasts and you may find it hard to secure financing for a grid-connected generator without a reputable forecast of value to be achieved. Several energy markets consultancies do produce forward power curves for 15-20 year periods and many consultancies can provide support in creating bespoke evidence of future wholesale value which can be achieved by a generator.

Flexibility services

For small assets to access and deliver flexibility services to a consumer, they will likely need to partner with an energy supplier or aggregator. This partner will help you and the host organisation to understand the potential values available. They will also be able to help you to operate the installed technology in order to deliver benefits. This applies both to behind the meter and grid connected flexibility assets.

It is sensible to discuss the project with several potential partners in order to get the best arrangement in place; you may wish to run a procurement exercise if the project is of sufficient size to warrant this.

Renewable Heat Incentive

The RHI is a UK Government financial incentive to promote the generation and use of renewable heat. The non-domestic incentive provides subsidy to 11 technology categories: solid biomass boilers (small, medium and large), solar thermal panels, water or ground source heat pumps (small and large), biomethane, biogas, air course heat pumps, CHPs, and deep geothermal heat sources. Incentives are paid for the amount of heat generated, in p/kWh.

Accrediting to the scheme will provide an additional revenue stream, depending on the technology which is being deployed. If you are considering deploying low-carbon heating, more information on the subsidies available can be found on Ofgem's website here.

Criteria for maximising benefits

We have outlined below some detailed points to think about when trying to maximise these revenue streams.

Behind the meter

It is almost always economically superior to site new generation assets behind the meter of a consumer. Energy efficiency assets are by their nature also sited behind consumption meters. Exporting wholesale power is likely to deliver only around 40% of the value compared to reducing a consumer's energy bill. In addition, many of the costs which would be incurred in obtaining a grid connection will already have been paid by the existing consumer.

In order to take greatest advantage of the onsite generation, having a consumer which uses power at the same times you will generate it is important. For solar generation, this means using power during the middle of the day, especially in the summer. Wind generation is less predictable, but a consistent minimum level of demand is a good sign.

Remember that consumers will use power differently at different times of the day or year. For example, an office will tend to use much less power at weekends, when most staff are not present. Most schools will use much less power over the summer holidays. Ideally, you will have access to half-hourly consumption data for several years to see how power use changes over time.

Also remember that energy projects tend to have payback periods in the 10-15 year range, with most projects coming after this. You should choose a site where you are confident that there will be a consumer for the full lifetime of the project, around 20 years.

High generation potential

A successful generation project should look to site its assets to maximise output. Key considerations differ for solar and wind assets. For solar:

- The level and duration of solar irradiation. The chosen site for panels should have the highest possible solar irradiation for as much of the year as possible. The European Joint Research Centre produces comprehensive irradiation maps, which are a good place to start
  - Generally, an unshaded, rent-free roof with a southerly (or, to a more limited extent, south-easterly or south-westerly) aspect is critical for optimal deployment of PV
  - East-West panels are becoming more popular, but are usually deployed ground-mounted or on flat roofs
  - Tracking panels are also becoming available; these follow the sun as it moves across the horizon and while more expensive, produce more power
- Size of available installation area is a limiting factor. As a rule of thumb, 10kWp of panels will occupy around 60-70m^2
- If installing on a sloping roof, the level of slope is also important. It is addressed more fully in Local Energy Scotland's CARES PV Module Toolkit here. Ideally, your roof should be at an angle of around 30 degrees from the horizontal to give the best annual performance
- Solar panels last for 20 years or more. You may wish to take account of the fact that trees will grow and other buildings may be developed that might shade the site
- Most renewable energy installers will be able to provide a shading, radiation and solar panel angle assessment

For wind, the key consideration is a good prevailing wind speed. Wind speed is a crucial element in projecting turbine performance, and a site's wind speed is measured through wind resource assessment. Generally, annual average wind speeds greater than four meters per second (m/s) (9mph) are required for small wind electric turbines. Utility-scale wind turbines require minimum average wind speeds of 6m/s (13mph).

Wind speeds can vary widely over a small area, especially where there are buildings close by. Turbines also create a "wake" in the air, which inhibits the performance of neighbouring turbines. If plans include more than one turbine, they should take account of this.

The power available in the wind is proportional to the cube of its speed, which means that doubling the wind speed increases the available power by a factor of eight. Thus, a turbine operating at a site with an average wind speed of 12mph will generate about 29% more electricity than one at an 11mph site.

Other tools to evaluate the opportunity and determine the feasible levels of generation are also available online, for example the Energy Saving Trust calculator here.

Appropriate network access

- An unconstrained grid connection would allow your project the opportunity to generate to its maximum capacity and export any surplus energy. However, many areas of the network are constrained and you will have to pay high fees to connect to the network there, or accept strict restrictions on when you can export power. Knowing this early in development will allow you to consider developing your project elsewhere or implementing smart aspects to your project to manage the constraint.
- However, this also creates an opportunity, as companies in constrained areas which need more power than is available to them may be keen to partner to develop localised smart grids, with generation and storage to help them manage their power needs.

Cost and time to secure consents

With rooftop solar PV and micro-scale wind turbines, arrangements tend to be relatively straightforward because of the small scale and the proximity to consumption. If you are under 50kW, you will be able to benefit from the "permitted developments" regime. Larger generators might incur significant consenting costs.

Planning permission will take at least 2-3 months to secure. It will be required for many energy efficiency projects as well as generation, especially where external changes to a building are being implemented (for example, solid wall insulation). For generators over 500kW, it can take much longer, especially where there is community dissent.

Many developers do not consider wind generation projects, as obtaining planning permission can be prohibitively difficult. Local authorities should have good engagement with planning departments and be able to ascertain requirements early in the project consideration process. They are also a trusted body in the local community which can act to build public support.

However, where there is significant public opposition to a particular project, it may be unwise to continue developing that project as the cost and time investment of swaying public opinion can be high.

Building a business case

Once you have considered the costs and benefits, you should use a template to assemble your business case. Local Energy Scotland's CARES Investment Ready Tool provides a template, which can be used to set out the business case for a project. Various other similar templates exist such as Community Energy England's finance models for renewables.

The aim of the business case is to outline the information collected during the development of your renewable project, providing a mechanism for recording that information and passing it on to a potential lender or investor. This can include internal capital providers, for bodies like local authorities.

Various ways of considering the business case exist. This could be in terms of payback period (ie how long until the project will turn a profit), internal rate of return (IRR, which is the annualised profit over the project lifetime), hurdle rate (the maximum cost of capital to allow project viability) and others.

Ideally, you are looking for your projects to have the shortest possible payback periods, and high IRRs. However, the level of returns you are seeking will depend on your own goals; while many investors look for returns at or over 10%, local authorities may consider much lower returns. Some, especially community groups, will only want projects to break even due to the wider benefits which are being generated by the project.

5. Final Steps

The next steps are to secure planning permissions, set up agreements with relevant parties and then take a Final Investment Decision (FID). The FID is the final stage in developing a project.

Planning permission

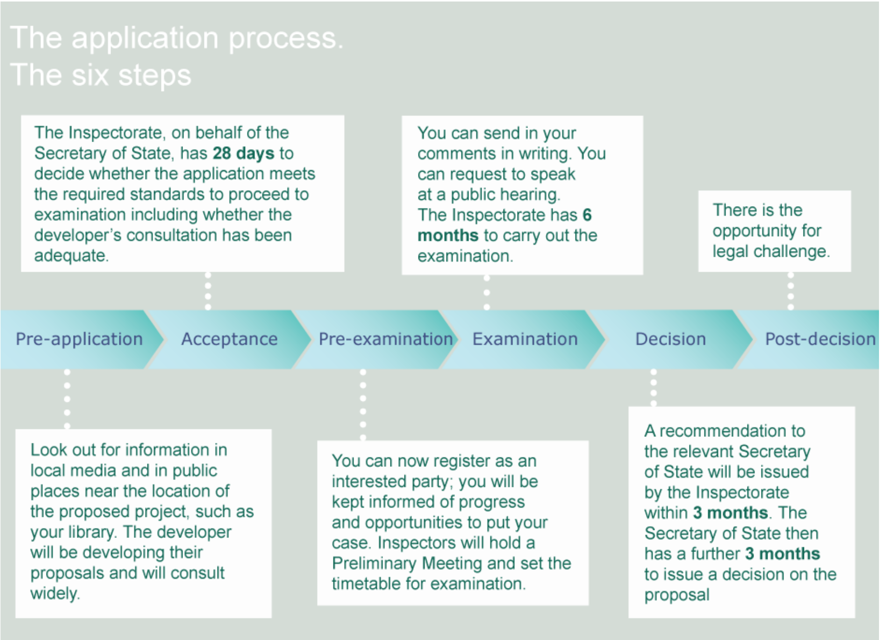
Various specific considerations for the planning process are set out in our main report. A broader guide to the planning process in England from the Government can be found here; a simpler guide from Planning Portal can be found here. Note that these are not focused on energy matters. Key points to remember are than local authorities set planning policy in their regions, so it is important to check local rules with the responsible local planning authority.

Typical timelines include a 21 day consultation and between eight and 13 weeks for a decision to be made. Once planning permission has been granted, development should start within three years, or you will need to re-apply for planning permission.

The process is set out in Figure XX.

Very large developments may go through the Nationally Significant Infrastructure process. The process is explained here, but key points to note are that this process can be much longer than the usual local authority process, and the process can be applied to the following installations: biomass over 50MW and offshore wind over 100MW. Figure XX (overleaf) sets out the process.

It may be helpful where planning permission would otherwise be required from multiple local planning authorities, to streamline the process.



Source: National Planning Inspectorate

As previously indicated, early engagement with both the planning authority and the local community with often pay dividends in easing the process of obtaining planning permission.

Useful guidance from Community Energy England can be found here.

Contractual arrangements

There are several potential arrangements to set up. We have listed these below and explain the most important of these further in the following sections. The exact contractual relationships will depend on your specific project.

- Space or roof rental agreement with a host consumer
- Power sale agreement with a host consumer
- Energy efficiency delivery agreement with a host consumer
- Power purchase agreement with an offtaker
- Financing agreements
- Operations and maintenance agreements
- Fuel purchasing agreements

Many of these contracts will be lengthy and complex legal documents, and you may wish to seek specialist energy markets and legal assistance to deliver them. The other parties who will be signatories will likely wish to do the same.

Pure Leapfrog provides a legal toolkit free of charge to community energy groups and local authorities here through its Local Energy Accelerator Platform (LEAP). It includes documents which may be of use during project development, including memorandums of understanding, exclusivity and confidentiality agreements, an option to lease, and heads of terms.

Space or roof rental agreements

While the payment for a space or roof rental agreement may be nominal, this contract will underpin the installation of assets. It will contain provisions for accessing the installation for routine maintenance, requirements for insurance, and what should happen if the installation is damaged or damage is caused to other buildings and equipment. It will also describe rights to access the building for the purposes of installation and maintenance of the installation.

This contract will be set with the landlord or owner of the building, rather than the tenant.

The agreement will also set out the term of the agreement, and what will happen if one party wishes to end the agreement early.

Power sale and energy efficiency agreements

This contract will set out how the host consumer will purchase power from the assets installed, or alternatively how it will pay for the energy efficiency work done. In either case, a price for energy not purchased from the usual energy retailer should be agreed. The contract will also contain provisions for escalating this cost (perhaps annual by an index like CPI, or by a flat percentage). It may contain provisions for maintenance.

This contract will be set with the occupant of the building, though it may also include the landlord as well.

The agreement will set out how energy will be measured as well. In the case of energy generation, this might be by metering generation and export (with the difference being that consumed on-site). In the case of energy efficiency, it will set out the methodology used to ascertain savings.

It will also set billing and payment terms.

PPA

The first step to quantifying wholesale power and embedded benefits is to identify to offtaker for power. This is likely to be an energy supplier for small generating assets, with whom you can sign a PPA. It can be difficult to secure a PPA without having constructed the asset, especially where this is behind the meter and how much export there will be is not yet known. It can also be difficult to secure a PPA for small amounts of export (generators under 300kW or so).

You can get an idea of the values available from publicly available documents. For example, NFPA publishes a bi-annual report on the values delivered in its ePOWER auction on its newsfeed here, which sets out how much value has been achieved by different types of generator.

Many large companies are now looking to sign Corporate PPAs (CPPAs) for the long term (10-15 years or more). These companies are typically looking to attract large volumes of power to their portfolios and may be reluctant to contract with many small generators to deliver this. They also may be reluctant to contract with behind the meter generators; all existing CPPAs have been signed with large grid-connected assets.

The short term PPA market, for deals lasting 6-12 months, is much more liquid. However, you should note that it may be difficult to secure financing for a project which relies heavily on wholesale power revenues unless you can provide evidence that you have secured value for your power exports over the long term, for example by agreeing a PPA.

Key points for negotiations in a PPA are the obligations of each party (for example forecasting, imbalance, metering and metering costs), conditions under force majeure and changes of law, credit requirements, rights to assignment, and the pricing schedule – how much you will be paid both for wholesale power and your share of embedded benefits.

Operations and maintenance agreements

Several different types of contracts fall under this category. It could include warranties on installation and components, guarantees of savings to be made, and arrangements for cleaning and servicing of installations.

Contracts should set out how often these activities are undertaken, how much they will cost, and who is responsible for delivering.

The Final Investment Decision

Once planning permission, financing and contracts are set, you can take a final decision on whether to invest in the project. If you decide to proceed, then you will execute the planned contracts, accept the grid connection offer, and commence delivery of the installation, and operate the project for its lifetime.

ENERGY HUB

6. Summary of Stages

Stage	Element	Key tasks	Purpose
Pre-development	Feasibility check	High-level consideration of the elements of the project and early engagement with potential partners and the local community	Ensure that the project is sensible and fit for purpose
Scoping	Information gathering	Information on the host site, generation and energy efficiency technologies, and the local community	Understanding the existing conditions, to efficiently size installations
	Sizing assets	Comparing energy generation, consumption and efficiency, and future plans, to set an economically sensible scheme	Calculating the economically efficient scheme to install
	Other tech	Looking at other technologies which could be introduced to the project, and	Thinking about advanced options
Building a business case	Costs	Quantifying the three main sets of costs: project development, installation costs, and operations and maintenance costs	To understand the outlay which the project will incur over its lifetime
	Revenues	Quantifying the three main sets of revenues which might be available: avoided energy import to a site, wholesale power sales, and flexibility revenues. Also considering the subsidy available: the RHI	To understand the income which the project could achieve over its lifetime
	Maximising revenues	Considering how to flex the project to deliver the maximum possible revenues	To help avoid common problems which could increase costs or reduce benefits
	Building the case	Comparing costs to revenues and understanding the value over time of the project	Creating the argument to present to financiers to secure funding for the installation
Final steps	Planning	A brief look at the planning process	To set out the steps and timelines for securing planning permission
	Contracts	The types of contracts, and key contents, which may need to signed with various participants in the project	To explain the contractual relationships which will underpin the project
	FID	The final decision on proceeding with the project	A final check that the project is viable and should proceed