Ynni Lleol | Local Energy

Llywodraeth Cymru
Welsh Government

Biomass Module

Toolkit Structure

The toolkit is intended to be used as a reference by community groups of all kinds. This module is one part of a series of documents forming the Local Energy Renewables Toolkit and is designed to cover all sizes of project, although the scale and complexity of multi-MW projects may require more detailed evaluation than smaller projects.

Other modules that may also be of particular interest to those reading this module are:

- Establishing a Community Group
- Project Finance
- Procurement
- Planning
- RHI

This toolkit builds on the work completed for the Scottish Government's Community and Renewable Energy Scheme (CARES) by Local Energy Scotland and Ricardo-AEA.

Module Structure

This module is structured in four parts to act as a guide and reference document for community groups in the development of a biomass project in Wales.

Biomass heating context
Overview of biomass heating installations market

Project Overview
A brief introduction to the typical ways to develop a biomass heating projects and step by step summary.

Project Steps, Phases and Breakpoints
A more detailed look at each stage of a project, showing a logical progression with defined break points.

Further Information
Appropriate links, definitions and references to other information, collated for quick reference.

Biomass heating installations market

In order to help the user to understand the full range of tasks required to deliver a biomass energy project, the module starts with a project overview. Each step in the development of the biomass project is then considered in more detail, with a logical progression of activities up to defined break points. These break points are designed to confirm that a project has the potential to be viable and thus worth progressing to the next stage. This approach means that key areas are often revisited with more levels of detail being added as the project development progresses.

The module is also designed to cover all sizes of project and to assist community groups. Information specific to scale and particular user groups are flagged as appropriate. In the specific case of large scale biomass power or heat energy projects there are also a number of ways in which community groups can become involved in a the project, especially at the larger scale. For this reason, this biomass module also includes consideration of these options.

Markets for biomass energy

Table 1 shows a breakdown of the number and capacity of non-domestic biomass projects in the UK registered since November 2011 (the **Renewable Heat Incentive Module** provides a detailed breakdown of the RHI tariff levels). There are a significant number of small biomass heating projects. While each of these projects will be small; they represent the largest segment of the market.

Biomass boiler capacity RHI statistics (GB)	**Number**	**Total Capacity (MWth)**	**Average capacity (kWth)**
Accredited Small (0 – 199kW$_{th}$)	7,217	875	121
Medium (200 – 999kW$_{th}$)	613	359	586
Large (1MW$_{th}$+)	22	133	6,044
Total	7,852	1,367	

Table 1: Number and capacity of biomass installations claiming RHI in Great Britain (February 2015)

DECC has found take-up of large biomass to be significantly lower than the original programme forecasts. In response, DECC has doubled the tariff for large biomass projects, to 2p/kWh, from April 2014.

In contrast, take-up of small and medium-scale biomass has been higher that DECC's forecasts, this has triggered several biomass tariff degression, see **RHI module** for detail on the historical trends in tariffs for biomass.

The installation of biomass heating is significantly more cost-effective when it replaces higher cost fuels in buildings that are not connected to the gas network (oil, LPG and electric heating for example). This creates a stronger market in rural areas where gas connections may not be available or may not be affordable.

Options for the development of biomass

Biomass energy projects have developed in a number of different ways because of:

- the rural location of many biomass development projects;
- the complications of establishing a local fuel supply chain in these rural locations ;
- in the case of district heating schemes, the need to engage with the end heat users to establish a market.

Many of these development models are based on some form of partnership with the community, often as customers of heat and possibly suppliers of fuel. Such a model puts the community group firmly in the role of developer.

Many biomass boiler suppliers can offer a complete packaged solution including the supply, installation and commissioning of the biomass plant. Another option is for you to manage the process alone or with the support of a specialist project manager. These decisions are likely to be dependent on project size or complexity. Due to a quickly maturing market, this guide is may be slightly out of date on project costs, however the concepts of arranging a project especially all the various planning steps are still highly useful.

Project overview

In general, the following sequence describes the typical progression of every biomass energy project irrespective of scale and who is developing it. It assumes that your community group is already in place. Information about how to form a new community group is included in the separate **Establishing a Community Group module**.

Phase 1	**Developing the idea**	
Step 1 **Develop the vision**	Agree why you want to undertake the project and define your key objectives.	1 to 4 months
Step 2 **Seek advice**	Identify similar organisations that have developed biomass systems and use their insight and experience to plan your project.	
Step 3 **Communicate**	Communicate with the local community to explain the project to explain your plans.	
Step 4 **Technology selection**	Investigate the different biomass technologies and determine which are suitable for your organisation and your site.	
Step 5 **Initial scoping**	Contact suppliers to get an indication of costs and savings. Make an assessment of the feasibility of the project.	
Break point 1	**Is there a reason to develop?**	
Phase 2	**Evaluate the project**	
Step 6 **Establish an entity**	Establish your Community Group as a formally constituted body or legal entity.	1 to 4 months
Step 7 **Secure the site(s)**	Obtain legal agreements for the use of the site where the biomass system is to be installed and where the heat is going to be delivered including any agreements for billing for heat.	
Step 8 **Confirm fuel supply**	Confirm that your chosen fuel can be delivered to your site and the price you will have to pay for it.	

Step 9 **Pre-Planning Consultation**	Meet with the local planning representatives and discuss your project, their relevant policies and any requirements they may place on an application.	
Break point 2	**Can the challenges be overcome?**	
Phase 3	**Develop the project**	
Step 10 **Fix the project scope**	Confirm which building or buildings are to be heated, finalise the size and location of Biomass boiler and associate plant.	
Step 11 **Confirm capital cost and income**	Obtain accurate capital costs, projections of RHI income and operating cost savings from suppliers.	
Step 12 **Financial viability check**	Confirm the project remains financially viable. The Local Energy Renewables toolkit Finance Model can be populated used with more detailed figures.	6 to 18 months
Step 13 **Secure pre-planning funds**	Identify funding options to support ongoing development of the project through to a planning decision.	
Step 14 **Planning application**	Prepare and submit a Planning Application for the project.	
Step 15 **Identify funding sources**	Investigate routes to achieve capital funding, including Local Energy Capital Grant and Capital Loan funding The most appropriate should be selected at this point as this will influence some future activities.	
Step 16 **Develop full financial model**	Complete a business plan and detailed financial appraisal with full project costs and projected project lifetime incomes to take to potential funders.	
Break Point 3	**Confirm consents, grid and financial viability**	
Phase 4	**Getting Financial Close**	
Step 17 **Identify and contact suppliers**	With consents and agreements in place the contracts for the supply and installation of the biomass can be finalised. Contracts for fuel supply and boiler maintenance contracts can be formalised and programmed.	0 to 12 months
Step 18 **Secure bridge funds**	Identify if further funding is required (usually for deposits) prior to Financial Close. Well managed projects may be able to apply for funding through UCEF or RCEF.	
Step 19 **Financial close**	This is the point at which the funder releases the money and the project can be constructed.	
Break point 4	**Can the project be funded?**	
Phase 5	**Completing the project**	
Step 20 **Repay other funds**	Secure any additional capital funding and repay development loans where required. Any UCEF or RCEF Development loans should be paid in full on reaching Financial Close.	
Step 21 **Construction**	After financial close, confirm all orders and arrangements for the delivery, installation and commissioning of the system.	1 – 3 months
Step 22 **Apply for RHI**	Once the system has been commissioned, RHI can be applied for.	
Step 23 **Notify water authority**	Notify the water authority of any new installation which has been connected to the mains water supply.	

Step 24 Operation	Ensure management is in place for the life of the project for purchasing of fuel, maintenance, collecting and distributing income and meeting operating, financial and other liabilities.	Up to 25 years
Step 25 Decommissioning	Biomass projects must plan for safe removal of the equipment at the end of the productive life (which can be up to 25 years).	

Process Guidance

Phase 1 – Initial viability assessment

Step 1. Develop the vision

The first step in developing a biomass project is to decide why it is being undertaken and identify its key objectives. Examples of such drivers include:

- To reduce the cost of heat for a building, number of buildings or facility
- To reduce carbon emissions
- To use locally sourced wood fuel supporting local jobs

It is important that you fully understand and record these drivers so that project viability and outcomes can be tested against your objectives.

Local Energy Preparatory Stage Grant provides grant funding to help towards the start-up costs of feasibility studies, community consultation and other preparatory costs. Up to £30,000 is available for community groups to fund non-capital aspects of a project.

Step 2. Seek advice

Biomass boiler systems have been developed by community groups across the UK. The experience of these organisations can be useful in planning your project. CEE and other organisations maintain case studies to assist in identifying suitable groups to approach to gain their insight.

Seeking this input from the outset can help to identify what has worked well elsewhere, what issues have been encountered and how they can be overcome through careful planning.

Guidance on how to form a community group is given in the separate **Establishing a community group** module.

How big should my project be?

From the outset it is important to understand how big you want the project to be.

For your community group this in turn links to the reason why you established the group and the objectives that you have set yourself. For instance, if the objective is to supply the whole community with affordable heat then this sets the size for the project. Ultimately the precise size of installation will be detailed by a heat load assessment that will inform the design specification.

Once the required heat output is understood, the potential boilers should be identified as this will help with the subsequent activities to assess viability. This is because different boilers may have different requirements for fuel feed, flue arrangements, control and physical connection. These can impact on installed costs and the cost of grid connection.

Other features such as flue height, the need to install new heat connections or heat distribution systems will also be important. At this stage it is also good to have an understanding of how the boiler and ancillary equipment will be delivered as the size of the vehicle and its weight may limit site availability. The suppliers can be identified by looking on http://www.microgenerationcertification.org/ and http://www.hetas.co.uk/ and by gaining advice from other groups with operational schemes about their experience with suppliers.

For schemes under 45 kW_{th} the installer must be approved under the Microgeneration Certification Scheme (MCS).

Step 3. Communicate

The success of any community project relies upon the support of the community and early consultation can address any questions early and demonstrate the benefits that a biomass system can offer. It also allows you to become aware of and deal with any misinformation being generated.

From the very start of the project you must establish clear communication within the whole of the community hosting the project and other stakeholders. Biomass systems tend to have relatively minimal visual intrusion once installed but experience shows that this communication must be open and honest about what is being planned and must include good opportunities to receive and respond to feedback.

Step 4. Technology selection

Location

As with other renewable heating technologies, the location of biomass boilers is dictated by the location of the heat loads they are to serve. As a result, the process of identifying the project location is expected to include:

- Confirm location and amount of heat loads. Fuel bills can be used to determine the total annual energy consumption for a site.
- Identify potential locations for boiler plant and fuel store. As an indication a pre-fabricated plant room containing the boiler fuel store is likely to take up a footprint of at least 4m x 9m, with larger systems (1MW) taking up around 4m x 12m or more.
- Identify whether the height of the flue is likely to be a problem. The flue would usually have to be taller than adjacent buildings or trees (assuming that they are very close by).
- Identify any constraints on boiler location such as space, distance over which heat must be transported, site ownership issues and potential planning issues.
- Identify the site owners, including land under which you might need to place heat distribution pipework and make an initial approach to confirm their willingness in general terms to make the site or access available for at least a 25 year period. Depending on the requirements of the funder you may need to enter into a formal lease or access agreement relating to the site to reach financial close. At this point you are then liable for any agreed payments. See the **Securing the Site** module for more information
- Initiate negotiations on securing the site or access for your project with the owners. This process will confirm the owners' willingness to let you use or access their site/land for your project based on the details of the scheme that you will provide them and what you require by way of access and what payments you are offering (if any).

Fuel

In the case of biomass fuel the following must be undertaken:

- Confirm what fuel you wish to use:
    - Pellets are offer a more consistent quality, they require less space to store and better onsite handling than woodchip but are more expensive. Larger

systems will require fuel delivery by lorry and as such you can expect cheaper fuel costs if you are within close proximity to a fuel supplier.
    - Woodchips can be significantly cheaper but the fuel quality is more variable (size of chips, moisture content). Flexibility on specifications will result in cheaper costs, it is important to consider what fuel specification you might need to place on your supplier.
    - It is possible to chip wood yourself should it be available. The costs of this (labour and tools) should be calculated and allowed for. There are opportunities to share chipping equipment costs with other projects (as chippers are moveable).
    - Records of the fuel type and quantity you use need to be recorded for the purposes of the RHI.
- The long term availability of a suitable and affordable fuel source should be considered.
- It is important to ensure that your fuel supplier will meet the RHI Biomass Sustainability requirements. Ensure that your supplier is registered on DECC's Biomass Supplier List or if self-supplying that you investigate these requirements.
- Will the material be delivered or must you collect it? If it is to be delivered the size of the vehicle should be confirmed as well as whether vehicle access to the site is suitable.
- Is your strategy to use a single or multiple suppliers? For most small biomass heating projects using a single supplier may be appropriate given the relatively small amounts of fuel being sourced.
- Once you have identified a suitable fuel source, move towards a fuel specification to share with potential boiler suppliers as this will influence the type of boiler, the fuel store and fuel delivery system. There are boilers and fuel stores that are suitable for both wood chip and wood pellets which would offer some flexibility.
- It is important also to determine what size of fuel store you will need. Wood chip are less dense and therefore need a larger fuel store than pellets. Wood Pellets can delivered using a pneumatic delivery system over a distance of up to 20m which means there is some flexibility in the type and location of the fuel store. In some cases wood chips can be blown but this needs more specialist delivery equipment and can be noisy. If this is not possible the chips need to be tipped into the store, meaning that the store must either be below ground level or a hopper and auger system needs to be installed, which adds cost.
- A larger fuel store can provide for a longer period between deliveries, an important consideration in rural locations where there may be periods when delivery is not possible. Larger stores can also accept larger fuel deliveries, which reduces the cost of fuel.

There are a number of companies who offer a contract to maintain a biomass boiler and supply all fuel required for a cost per unit of heat provided. This can be a method of ensuring that the fuel quality is consistent, any problems are dealt with quickly and that the boiler is operational for as much time as possible. This is particularly helpful for woodchip systems where the fuel quality can be more variable.

Access

The access to the site to deliver the boiler and associated equipment must be considered. The physical size of the delivery vehicle or its weight can be a problem. A pre-fabricated plant room and fuel store can weigh 50 Tonnes before filled with water or fuel. If the project

site is away from a suitable road or track then consideration must be given as to how delivery to it is to be achieved. In most cases the size of local roads will influence whether an HGV or medium sized goods vehicle can reach the site.

Step 5. Initial Scoping

This step comprises the initial feasibility study for the project, funding for which might be available through an Local Energy preparatory grant.

The suitability of the heat load for the biomass boiler should be assessed. Biomass boilers take longer to heat up than gas boilers (it can take hours to heat up from a cold start) and are able to reduce their output to 30% of peak capacity (gas boilers are able to modulate down to 10% to 20%). This means that they are most efficient when allowed to run at a consistent level for a long period of time. They are therefore best suited to sites with a consistent base load and less suited to sites with very short periods of high heating requirement. Oversizing a biomass boiler is also likely to have a very negative impact on its efficiency and reliability.

As described in the biomass handbook, fuel availability at an acceptable price is a major determinant of viability, irrespective of scale. The investigations completed at Step 8 outline how this risk can be understood and reduced.

Finally, there must be a way to connect the boiler to the heat load. In most cases this is straightforward based on traditional 'wet' distribution systems. For larger schemes that involve community or district heating the physical installation of this system and associated means for heat off take and metering must be installed. A method of monitoring and billing for heat must be identified, the contractual arrangements outlined and a decision made on how the risk of non-payment is handled within your business model. It should be noted that these issues are common to district heating systems rather than biomass specific issues.

If after consideration of the above issues you think that your proposed project looks viable, then the development can go ahead. However, up until now no costs have been involved with the only real investment being that of time. From this point on, you will start to incur development costs.

Break point 1 – Is there a reason to develop?

As a result the development process in Phase 1 is to:

1. Identify a potential location biomass development that:
    - Is close to a stable, long term heat load.
    - Has a suitable location for the boiler or has access to a site that is available to purchase, or where access can be secured on a long lease (at least 25 years).
    - Is accessible for boiler installation and maintenance.
    - Is capable of being integrated with a heat network (if applicable).
    - Sufficient fuel has been identified as available at a reasonable price.
    - Is unlikely to cause unacceptable impacts on local people
    - Is likely to be able to gain planning permission.
    - Secure any site and/or access that is required.

If these criteria cannot be met then the project should be stopped at this stage.
There are two actions that are useful throughout the entire ongoing project development, which you may choose to start now.

1) Investment Ready preparation - as you develop your project, it is important to store all the supporting documentation in a secure and ordered format for regular

updating and reviewing. As the project nears financial close, this information will be scrutinised by potential lenders.

2) **Project Development plan – a project development plan detailing key tasks, responsibilities and schedule for completion can help you meet the important deadlines that influence the success of your project.**

Phase 2 – Confirm viability

Up to this point little if any financial investment has been required to develop the project, with almost all input being that of volunteer time. From this point on costs may be incurred in advance of any capital draw down from a finance provider ('financial close'). This makes it essential that you are confident that the project you propose is viable.

Step 6. Establish an entity

In order for the project to progress, your community group must be constituted within an appropriate formally constituted body or legal framework. This is to ensure that from the outset you have the capacity to raise finance, receive grants, apply for RHI, receive and distribute income from the operating project, pay bills and take out insurance. It is also important that the form of the formally constituted body or legal entity protects individual members of the community group from personal liabilities for any financial shortfall or other redress.

The **Establishing a Community Group Module** contains more information on establishing the legal entity.

At this point you will also need to develop a proper project plan and allocate responsibilities to individuals. The **Establishing a Community Group Module** contains more information on establishing the legal entity.

Step 7. Secure the site

Once the above legal framework is in place then any sites that are essential to your project can be secured. Commonly this requires you to enter into a legal agreement with the site owner that guarantees you tenure over the site for at least some years more than the RHI payment contract. It is likely that this will involve some kind of payment to be made to the owner.

Step 8. Confirm fuel supply

Of equal importance is to secure the fuel and depending upon the scale for this to be done in such a way that supply can be guaranteed, irrespective of weather, seasonal variation in harvest and competing markets for wood products.

For wood pellet systems this involves finalising what suppliers will deliver to your site, the cost of the fuel and what types of contract they offer. There are two ways in which the size of your fuel store can affect the pellet price:

1) The size of the delivery that you can accept, e.g. the delivery of a full load will be cheaper than always accepting a part load
2) The notice that you can give a supplier.

For medium and large systems, the fuel store should be sufficient to receive a full delivery at least 10 tonnes when still having sufficient fuel to run the system for no less than 3 days to allow some notice to the suppliers.

If wood chips are to be used then there must be the option of securing:

- Chips to a standard specification or

- Logs that can be stored and chipped as required (by the group itself or a forestry contractor)
- Buying brash (residues from tree harvesting) for chipping where they lie by the group or a forestry contractor.
- Clean waste wood (clean waste wood i.e. not painted wood or with resins such as MDF). If you have access to treated wood you want to use you will need to seek an Environmental Permit and ensure that your boiler is compatible with contamination levels.

Each of these options has implications in terms of cost and reliability of supply. While major national suppliers are available for chip supply, these may be used to balance supply from smaller, local suppliers and at the same time provide supply certainty. The Biomass Energy Centre runs a useful resource listing UK wood fuel suppliers which should be referred to for the availability of local suppliers. This source also includes a searchable map of fuel suppliers.

It is important to realise throughout this process that the specification of wood chip will have an impact on boiler choice and cost. For instance, boilers designed to use wet (more than 35% moisture by weight) may be more expensive and less efficient. On the other hand, less processing needs to be done to the wood chips before combustion which will result in a cost saving on the fuel supply as a result.

As a result, a process of iteration may be required between the setting of a fuel and boiler specification.

There are risks associated with the storage of wood fuels with a high moisture content fuel. If fuel of a high moisture content is stored for long periods (e.g. during drying) it can start to compost which, in some cases, has led to it self combusting.

Step 9. Pre-planning application

Early engagement with the local planning department is essential to minimise planning risk and wasted costs. An open discussion with the planning authority will give a clearer picture as to the potential to gain consent. Whilst there is no way of providing absolute certainty, projects taken through to the next phase of development should be reasonably confident that there is a prospect of planning consent for the project, at the scale intended.

Conservation areas, Sites of Special Scientific Interest (SSSIs), Areas of Outstanding Natural Beauty (AONBs) and National Parks all have specific planning restrictions associated with them which must be investigated and taken into account.

Most planning authorities have published Planning Policy Guidance covering biomass projects. Many planning departments also welcome early informal discussions with developers of large scale schemes about their plans. If biomass systems have been proposed or built in the area, the planning authority web site will contain details of the planning application. This may give an early indication of the likelihood of planning permission being granted at a specific location.

Air Quality

The emissions from biomass boilers are different from those of fossil fuels and the flue for a biomass boiler needs to be different. In the course of considering the application for an alteration to a flue, most planning departments will make an assessment of whether the flue height is sufficient to prevent problems with local air quality. It is important to consider what height of the flue is required from the outset and it should not be assumed that the flue will be the same height as an existing flue for an oil or gas boiler. In Air Quality Management Areas (AQMAs) it a biomass boiler system may not be allowed. AQMAs tend to be limited to urban areas. Outside of large cities obtaining air quality permission is normally a straight forward

step, however it is important to notify your local authority of your proposed system design and ensure that your boiler choice and flue design is approved before you start construction.

Transportation of biomass is also a consideration as this can result in an increase in local traffic movements. The overall implications of transport only tend to be significant for large scale heating projects (>1MWth) but local factors (e.g. schools) must be considered.

Other issues

Biomass systems have the potential to generate noise above background levels, with this being a particular issue if the combustion plant or fuel handling equipment is located close to houses in quiet rural locations. However, noise damping using sound insulation can usually overcome most issues. The timing of fuel deliveries must be considered to minimise disruption. Lorries and pneumatic fuel delivery can both generate enough noise to be disruptive.

The delivery of wood chip can also generate dust. Stores of wood chip must therefore be located where this will not cause disruption and may be considered in any planning application.

Break Point 2 – Can the challenges be overcome?

A frank and impartial assessment of the project should be carried out against the main challenges:

- Is the site tenure secure?
- Is it a viable project?
- Are the local residents aware of the development?
- Is there potential to get planning consent at the scale anticipated?

If the potential remains, then the project can be taken to Phase 3.

Phase 3 - Develop the project

Step 10. Fix the project scope

An assessment is required of heat loads that will be connected to the project to refine the size and overall economic potential of the project. For small scale projects this will be relatively simple as heat users will have a good idea of their heat loads from energy bills or fuel records. Biomass heating installers will also be able to determine the most suitable boiler size to suit the connected heat loads. For medium (above 500kWth) to large scale projects it would be advisable to commission an assessment of the heat loads and profiles of heat loads. For example, commercial offices and residential housing are an ideal mix as one generally requires heat during the day and the other in the evening.

The size and type of the fuel store must also be finalised at this stage, if it has not been already.

For many biomass heating projects biomass boiler suppliers will specify the size of the system they believe to be appropriate for your project. It is useful to understand how different size systems can suit specific sites.

Step 11. Confirm capital cost and income

The financial viability of any project depends on the cost of borrowing the money required to buy the boiler and associated equipment and installation (including heat networks where appropriate), plus the cost of fuel and the cost of plant operation relative to the income after operating costs. There may also be other operating costs associated with ash disposal

unless a zero cost route of disposal has been secured. Additional operating costs may be associated with land rent for the site (if appropriate), maintenance, insurance and rates.

Capital cost

At this point you should be clear on the proposed scale of your project, the form of fuel that you will use (chip or pellet), location and the potential requirements to install a heating network.

The costs from all suppliers should be confirmed and in the case of smaller systems it may be that a single installer is providing the whole system. For larger systems there are likely to be a number of contractors required and the interface between the systems needs to be addressed in some detail which is likely to require specialist input.

Other costs

Clearly, fuel costs are significant for a biomass project and these need to be properly understood at this point in order to develop the business plan and confirm project viability. Equally important is to understand whether your proposed fuel supplier uses a fuel price escalator and these terms. This will allow future cash flows to be modelled.

Other costs specific to biomass are around the physical operation of the plant and any activities associated with fuel supply and the disposal of the ash. While ash does have potential fertiliser value as a 'potash', unless a guaranteed no-cost disposal routes has been secured then your business plan should assume a cost for ash disposal.

As a solid fuel, wear on boiler and fuel feed components will lead to higher maintenance costs relative to gas or oil boilers. In addition, if your fuel supply strategy involves work by the group to undertake chipping and screening storage/drying activities then there will be capital, maintenance and depreciation costs associated with this equipment to consider as well.

Generation income

There are three forms of potential generation income:

1) Savings in the heating fuel that would have been purchased (in the case of own use).
2) The value of the heat sold to a customer (Note – heat value is based on the avoided cost of fuel plus the avoided cost of the heat customer operating their own boiler).
3) The value of the Government Renewable Heat Incentive (see the **Renewable Heat Incentive** module).

Biomass fuel supply also offers the opportunity to source fuel from the local community; this would result in wider socio-economic benefits in terms of local job creation.

Step 12. Financial viability check

A more detailed review of project viability is recommended at this stage.

The **Local Energy Renewables Toolkit Finance Model** can be populated with capital costs, RHI income and fuel cost savings.

This viability check should be considered along with any other key constraints from your discussions with suppliers and the planning department.

Step 13. Secure pre-planning funds

Funding will now need to be sought for taking the project through the next stages of development. It should be noted that progression through this phase with grant funding can put income from government incentives at risk. Most developers secure funding through loans or private finance to ensure the income potential from the biomass development is maintained.

Step 14. Planning application

Most planning authorities have developed local planning policy guidance which describes what they expect developers of biomass projects at all scales to deliver as part of the planning process. This will identify what reports are required to accompany the planning application. This information must either be provided by the community group itself, or for more complex applications through the use of a planning consultant. This step should also seek relevant approvals from the Local Authority under Air Quality.

As finance is unlikely to be secured until all planning consents and any access or grid connection agreements are in place it is important that the planning application is made no later than at this point in the process. This application process is made easier if you have had an initial discussion with the planning department at Step 9.

RHI Preliminary Accreditation

Systems of 200kWth or more are eligible to apply for preliminary accreditation. This involves sending plans of the proposed system and evidence that the system you are proposing to build will meet the conditions of the RHI. This preliminary accreditation is an approval in principal to allow you to move forward. You will still need to apply for RHI once the system has been commissioned and should the regulations change between receipt of preliminary accreditation and the system being commissioned, the design would need to conform to the newest regulations.

Other permissions

Permits will be required to dig trenches in public places (especially roads, pavements and across public spaces) to install a heating network.

Biomass projects with an output of greater than 200kW are very likely to require a three phase electricity connection. This should be checked and, assuming the cost is not prohibitive, arranged with the local network provider.

Step 15. Identify funding sources

Once the project has been identified as being financially viable the means by which it is to be funded must be addressed.

The separate Project Finance module gives guidance on the types of finance that may be available and potential sources of that finance.

There are a range of finance options, such as a capital grant or loan of up to £300,000 through the Local Energy programme, traditional bank loan finance, establishment of a co-operative (via the sales of shares), or by partnership with a biomass developer.

Considerations that will influence the choice of finance route include:

- The appetite for risk and reward.
- The ability to find a share of the capital cost.
- The ability to manage the development and operation of the project.

Each form of funding will have specific attributes including interest rates, borrowing term, target investment types and loan conditions. Early discussion with the funders will establish if your project matches the funder's criteria. Changing a project to meet funding criteria may be justifiable, but care should be taken not to impair the core reasons for developing the project.

Biomass combustion is well established leading to lower perceived technology risk. Should loan finance not be available to the project under acceptable terms, then at this point you may like to consider partnering with a developer as a route to getting your project built. This

may also be the best route to get larger schemes and power generation projects funded. However, the returns to your group will be considerably lower using this route.

Step 16. Develop full financial model

The **Local Energy Renewables toolkit Finance** Model is available to download and use to complete a detailed financial appraisal of your project and the **Local Energy Renewables toolkit Finance Model** guidance document provides indicative costs taken from a number of different market studies.

In order to complete the financial appraisal, the capital costs should be defined as accurately as possible. It is important to have detailed quotations for all work and not simply use estimates.

Operational costs such as maintenance, ground rent and insurance must be determined and other ongoing expenditure such as community benefit payments must be factored in.

A detailed calculation of the heating requirements of the buildings to be served will determine how much heat the biomass boiler will need to produce. This must be calculated in order that the potential income from RHI can be determined, however this cannot be determined with total accuracy and is always subject to weather fluctuations or changes to how the buildings are operated. It is important to base your calculations of fuel consumption on a realistic efficiency. Discussions with other groups at step 2 can assist in this.

From such an assessment the long term energy yield and electricity consumption can be predicted.

A potential lender will also want to see a full business plan for the duration of operation of the biomass boiler installation with a detailed cash flow and balance sheet that includes repayment of loans provided. The **Local Energy Renewables toolkit Finance Model** provides this facility and more detail on this is covered in the Project Finance module and the **Local Energy Renewables toolkit Finance Model** guidance.

Break point 3 – Confirm consents, fuel and financial viability

As a result the outcome from phase 3 of the development process is to:

1. Identify capital costs in as much detail as is possible based on quotations.
2. Estimate the additional costs involved (e.g. heat connection, controls and planning permission.)
3. Use the size of the heat demand to be met to calculate the amount of energy you will supply.
4. Use the current displaced fuel cost and relevant RHI rates to estimate potential income.
5. Gain an estimate of annual fuel and operating costs and how these will change over time to subtract from the income.
6. Use the data above to estimate potential project financial performance.
7. Investigate funding options.

If the predicted yield is sufficient, then the project can progress. If at this stage the scheme is not financially viable then it must be stopped, or re-designed to reduce cost or increase income. This can be done in several ways including changing the size of the boiler and changing the type of fuel being used.

At this point, the scale of the project should be confirmed and potential suppliers and installers of biomass technology identified. You should also progress with financing the project using whatever model you have selected.

Phase 4 Getting Financial Close

Step 17. Identify and contact suppliers

At this point the process of finalising suppliers of equipment and services will need to be completed. It is good practice, and usually a financier requirement, to seek competitive tenders and the process of seeking competitive tenders from suppliers should now be completed and a supplier selected. Factors to consider here are not just the capital cost of the equipment, also but the relative cost of connection and controls, spare parts and maintenance schedules warranty and projected operating life and annual maintenance costs.

Some suppliers may also undertake installation and commissioning as part of the boiler price. To identify the financial value of this work, quotations from alternative suppliers of these services should be sought. However, it must be recognised that not using the supplier to install the boiler and associated equipment may impact on technology warranties.

The timing, process and completion of the procurement process will be dictated by the route to capital drawdown which in turn is linked to the means by which the project will be funded.

More guidance on procurement issues are provided in the **Procurement Module**.

Step 18. Secure bridge funds

Suppliers of key pieces of equipment such as the biomass boilers or buffer tanks may require deposits to secure their delivery. The long lead time on these items needs to be considered, often requiring further funds to be secured, prior to Financial Close. It is important to develop a cash flow, to anticipate the need for funding. **The Local Energy Renewables toolkit Project Plan** is a good place to start.

Step 19. Financial close

More detail on financing projects is given in the Project Finance module.

Using the financial appraisal undertaken during the previous phase of work, it should be possible to secure finance through your chosen route. Prior to this there will undoubtedly be the need for more work, not least to satisfy the finance providers' process of due diligence and more detailed analysis of potential project performance. However, most (if not all) of this information will be available to you if the toolkit has been used to get to this point.

Break point 4 – Can the project be funded?

This phase of work is about making the required applications to achieve the required permits and permissions to move the project to financial close, when the capital needed to construct the project is made available.

Phase 5 - Completing the project

Step 20. Repay other funds

Any debt that is due for repayment should be paid back (with interest) at this point. Development loans (where applicable) are set up to be repaid at Financial Close. The debt provided by the funders should include provision for this repayment.

Step 21. Construction

At this point construction can commence and the boiler installed and connected. It is good practice to appoint an appropriately qualified person to oversee installation and commissioning to ensure that the project performs to specification. This is especially important for larger projects.

CDM application

If your project is longer than 30 days or involves more than 500 person days of construction work, the Health and Safety Executive (HSE) have to be notified.
Your appointed project manager, civil contractor or biomass boiler supplier may manage this for you, but as the client, you need to:

- Check competence and resources of all appointees;
- Ensure there are suitable management arrangements for the project welfare facilities;
- Allow sufficient time and resources for all stages; and
- Provide pre-construction information to designers and contractors.

This is ultimately your responsibility under the CDM regulations.

Commissioning

It is essential that a biomass system is properly commissioned in line with the manufacturers' guidance documents. It is particularly important to be aware:

- Where a backup boiler is present, the control system to switch between boilers must be set up to maximise running of the biomass boiler as well as ensuring continuity of heat.
- That all safety equipment, such as carbon monoxide alarms in the plant room, fire alarms, pressure relief valves and fire extinguishing equipment are present and operational. You must know where this equipment is and how to use it.
- That you know what maintenance is required for the boiler, heat meters and fuel delivery equipment such as augurs, chains, gearboxes. You must know when this maintenance is required. Any work such as ash removal or boiler cleaning that members of your community group are going to undertake must be fully described by your installer so that they are understood.
- That you are aware of any ongoing interventions required to control legionella.

Step 22. Apply for Renewable Heat Incentive accreditation

Once your installation has been fully commissioned and the boiler is providing heat to the heat network then you are in the position to apply for RHI accreditation. This will require providing Ofgem with relevant details about the technology used, what the heat loads on site and other details such as the heat metering arrangement. See **Renewable Heat Incentive Module** for further details on this step. It is important to note that you cannot become fully accredited under the RHI until you have fully commissioned your installation. A nominated individual will have to act as the 'participant' for the project. They will be responsible for ensuring compliance and meeting the on-going obligations of the RHI. They will also be receiving the RHI payments from Ofgem. How the project finances are managed will need to be agreed at the project outset. A typical option would be to subsidise the cost heat to the community by the RHI payments.

Step 23. Operation

Most biomass boilers require regular operator intervention and de-ashing. You will need to ensure that proper maintenance plan is in place for the life of the project and that someone is responsible for overseeing the process of operation. Responsibility will also need to be assigned for applying for the RHI (following commissioning) and how the overall financial running of the project will take place. For example will the heating bills be subsidised by RHI income. In addition you need to make sure that all other on-going operating costs, meeting ongoing RHI obligations, financial and liabilities are met.

The income from the project will need to be managed carefully. The funder may expect there to be cash held to cover fixed costs such as interest and loan repayments, fuel purchase,

O&M contracts and land rent. Only after these costs have been met can the project distribute the remaining income.

The Establishing a Community Group module provides further guidance on dispersing any income generated for the community group.

Step 24. Decommissioning

The removal and disposal of the biomass system will need to be allowed for.

There may be some scrap value in the equipment, but this is unlikely to cover the entire cost of decommissioning. So the project should set aside income to build up a fund to cover decommissioning costs.

Further Information

Step 1. Develop the vision

- The Biomass Energy Centre is also an extremely useful impartial resource for those looking to understand characteristics of the biomass heating sector: http://www.biomassenergycentre.org.uk/
- **https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/204450/Tariffs_and_technologies_affected_by_the_2013_Tariff_Review_3.pdf**

Example community actions plans can be found on the following organisation websites:

- http://www.dudley.gov.uk/resident/planning/planning-policy/local-development-framework/st-aap/
- http://www.cheshireaction.org.uk/our-services/community-led-planning/
- http://www3.hants.gov.uk/community-support-service/community-led-planning.htm
- To find out if you are eligible for the Local Energy Preparatory Stage Grant, see here the EST website: http://www.energysavingtrust.org.uk/organisations/content/ynnir-fro-community-programme
-

Step 2. Seek advice

SE^2 and other organisations maintain case studies to facilitate the identification of suitable groups to approach to gain their insight:

- SE^2 – see http://www.se-2.co.uk/case-studies

The Carbon Trust has produced a useful guide on the different approaches that can be taken to project development and this is a good place to start when planning your project. It will help you to decide which approach to take to project development and to identify at the outset what assistance you might need. The Carbon Trust has produced a tool to help with project size selection (see http://www.carbontrust.com/resources/guides/renewable-energy-technologies/biomass-heating-tools-and-guidance)

Ofgem RHI statistics:
https://rhi.ofgem.gov.uk/Public/ExternalReportDetail.aspx?RP=RHIPublicReport

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/204450/Tariffs_and_technologies_affected_by_the_2013_Tariff_Review_3.pdf

See: http://www.microgenerationcertification.org/consumers/product-search

There are two searchable lists available:

- MCS list of approved installers (see http://www.microgenerationcertification.org/consumers/installer-search)

Step 3. Communicate

There are a range of guidance documents available for engaging with the community including:

- Planning Aid have developed a useful guide to support community development and communication – see http://www.rtpi.org.uk/media/6312/Good-Practice-Guide-to-Public-Engagement-in-Development-Scheme-High-Res.pdf
- The Home and Communities Agency (HCA) has also developed a Community Engagement Toolkit – see http://www.homesandcommunities.co.uk/community-engagement-toolkit?page_id=&page=1

Step 4. Technology selection

- The Biomass Energy Centre provides a useful high level guide to viability and a very useful tool for assessing the high level financial viability of a biomass heating project, see RHI calculator tool (v6) on their website. http://www.biomassenergycentre.org.uk/portal/page?_pageid=77,15128&_dad=portal&_schema=PORTAL
- The Carbon Trust Guide can be found at http://www.carbontrust.com/media/31667/ctg012_biomass_heating.pdf
- MCS Biomass installer standard: http://www.microgenerationcertification.org/images/MIS%203004%20Issue%204.0%20Biomass%202013.12.16%20FINAL.pdf
- MCS guidance on systems of up to 70kWth: http://www.microgenerationcertification.org/images/MCS%2070kWth%20Application%20Guidance%20v1.0%20-%202014.05.14%20-%20FINAL.pdf
- Guidance on preventing spread of legionella: http://www.hse.gov.uk/legionnaires/

Fuel

- Guidance on handling and storage of wood fuels: http://www.ieabioenergy.com/publications/health-and-safety-aspects-of-solid-biomass-storage-transportation-and-feeding/
- Avoiding fires when storing combustible materials: http://www.cfoa.org.uk/16192

Stage 5. Initial scoping

RHI Income

- Ofgem RHI website has details of tariffs, regulations and how to apply and : https://www.ofgem.gov.uk/environmental-programmes/non-domestic-renewable-heat-incentive-rhi
- **Local Energy Renewables Renewable Heat Incentive Module**

Step 22. Apply to Renewable Heat Incentive

See **Renewable Heat Incentive module**

More information can be found in the Ofgem guidance:

https://www.ofgem.gov.uk/ofgem-publications/83036/rhiguidancedocumentvolonesept2013edits-consultationver.pdf

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