Community Renewables Toolkit Heat Pumps Module

Module Structure

This module is structured in three parts to act as a guide and reference document for Community Groups in the development of a heat pump project in England.

Project Overview
A brief introduction to the typical ways to develop a heat pump project 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.

Project overview

Overview or activities

This module describes the progression of a typical heat pump based project. 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**.

As mentioned previously, it should be recognised that a heat pump based community project may be different to a community energy project based on electrical energy generating technologies. There are several reasons for this:

- Heat pumps generate heat rather than electricity;
- They produce low grade heat which require changes to the existing heating system prior to the installation of the heat pump; and
- Heat pumps require the input of electrical energy. The payback of the system is dependent upon the efficiency of the system known as the coefficient of performance (COP) which determines how much electricity is used to provide the heat required. An installation may also require an upgrade to the electricity supply.

For this reason, the usual approach to project development based on the procurement of a single generator to produce income to pay the cost of loan finance and to make a profit may be less amenable to heat pump systems. It is more likely that a heat pump will be used to reduce the operating costs of a building.

Table 1: Overview of activities. The table below summarises a logical progression for the developing of a heat pump project

Phase 1	**Developing the idea**	
Step 1 **Develop the vision**	Agree why you want to undertake the project and define your key objectives.	
Step 2 **Seek advice**	Identify similar organisations that have developed heat pump systems and use their insight and experience to plan your project.	1 to 4 months
Step 3 **Communicate**	Communicate with the local community to explain the project to explain your plans.	
Step 4 **Technology selection**	Investigate the different heat pump technologies and determine which may be suitable for your site.	
Step 5 **Initial scoping**	High level assessment of the feasibility of a heat pump for your site. Contact suppliers to get an indication of costs and savings.	
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.	
Step 7 **Secure the site(s)**	Obtain legal agreements for the use of the site where the heat pump system is to be installed and where the heat is going to be delivered including any agreements for billing for heat.	1 to 4 months
Step 8 **Confirm grid connection**	Check if the electricity connection to your site is sufficient to supply the heat pump to be used. Use the heat pump capacity determined in initial scoping. A new or upgraded electricity connection may be required.	
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 of heat pump and what works are going to be undertaken to the existing heating system. Prepare scopes of works for each element of the project. Agree the arrangements for operating the system including who is responsible for applying for RHI payments (if applicable).	
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 Community Renewables toolkit Finance Model can be populated used with more detailed figures.	
Step 13 **Secure pre-planning funds**	Identify funding options to support ongoing development of the project through to a planning decision.	6 to 18 months
Step 14 **Planning application**	Prepare and submit a Planning Application for the project. For large or complex systems it may be necessary to use paid consultants and prepare a variety of reports, surveys and visualisations	
Step 15 **Grid notification**	Notify the Distribution Network Operator of your intention to connect a heat pump to the electricity grid.	
Step 16 **Identify funding sources**	Investigate routes to achieve capital funding. The most appropriate should be selected at this point as this will influence some future activities	
Step 17 **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 18 **Identify and contact suppliers**	With consents and agreements in place the contracts for ground loop excavation/drilling, the heat pump supply, connection to heating system, and maintenance contracts can be formalised and programmed	
Step 19 **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.	0 to 12 months
Step 20 **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 21 **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.	1 – 3 months
Step 22 **Construction**	After financial close, confirm all orders and arrangements for the delivery, installation and commissioning of the system.	
Step 23 **Apply for RHI**	Once the system has been commissioned, RHI can be applied for.	
Step 24 **Notify water authority**	Notify the water authority of any new installation which has been connected to the mains water supply.	
Step 25 **Operation**	Ensure management is in place for the life of the project for collecting and distributing income and meeting operating, financial and other liabilities.	Up to 25 years
Step 26 **Decommissioning**	Heat pump projects must plan for safe removal of the heat pump 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 heat pump 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 or facility;
- To gain income from the Government Renewable Heat Incentive (RHI) for use within the Community; and
- To reduce carbon emissions.

It is important that you fully understand and record these drivers so that project viability and outcomes can be tested against your objectives.
See the separate **Renewable Heat Incentive Module** for more details about the RHI.

Step 2. Seek advice

Heat pump system developments have been undertaken by community groups across England. The experience of these organisations can be useful in planning your project. Community Energy England (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.

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 heat pump 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.
Heat Pump 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

Ground Source Heat pump technologies

A heat pump collects heat from one source and supplies it to another at a higher temperature. There are a number of different types of heat pumps each with their own advantages, disadvantages and costs. This module focuses on ground source heat pumps
Ground source heat pumps extract heat from the ground using a system of pipework. There are two ways in which this can be installed:

- Horizontally – pipework is installed in trenches of around 1.5m deep
- Vertically – pipework is installed in boreholes of at least 100m deep.

Drilling boreholes is usually much more expensive than digging trenches, but uses less ground and can be installed under hard surfaces such as car parks, where horizontal loops cannot.

You must find out which type of these types of ground loops you can install on your site. Further information on technology selection is available in Further Information.

Site Suitability

To find out whether you have enough space for horizontal trenches, or suitable ground for vertical boreholes you, or your installer, will need to determine:

- The peak heat load (in kWh): It is determined by calculating the heating requirement of the building.
- The total amount of heat used in a year (in kWhth). For an existing site it is possible to use fuel bills. This must take into account future increases in heat consumption due to longer operating hours or site expansion.
- The type of ground at the surface (for horizontal trenches), known as surface deposits
- For vertical boreholes the depth of surface deposits and the type of bedrock.

These are used to determine the size the ground loop system as the system large enough to extract the maximum amount of heat required at any point in time and to ensure the total amount of heat extracted by the heat pump in a year is replenished.

You can then compare the area of ground required for horizontal trenches, with the ground you have available. For vertical boreholes the limitation is more likely to be the cost of boreholes required and a discussion with a heat pump supplier would allow you to get a budget estimate with which to make this assessment. It is possible to heat domestic hot water using a heat pump.

Stage 5. Initial scoping

This step comprises the initial feasibility investigations for the project, funding for which might be available through community grants or loans.
The initial viability assessment should include:

- The savings reduced fuel cost from using a heat pump compared to a boiler or electric heating;
- An estimate of the RHI to be generated;
- The cost of installation;
- The costs of the modifications to be made to the existing heat distribution system, such as installing larger radiators or a new control system; and
- The coefficient of performance (COP) used to determine the running cost of the heat pump should be based upon the heat pump supplying the same temperature that

the heat emitters are designed to operate at. The lower the temperature that the heat pump system can deliver to the heat emitters, the higher the efficiency will be but the more the cost of alterations are likely to be.

Suppliers of heat pump systems are often happy to provide indicative costs and an initial assessment of site suitability for free, however specialist input such as geological investigations would tend to incur costs.

Coefficient of performance

Many of your financial calculations will depend upon how much heat is generated and how much electricity is used. The efficiency of a heat pump system is referred to as the Coefficient of Performance (COP). This is the ratio of:

- The units of heat pump supplies (in kWh)
  to
- The units of electricity required used by the heat pump (in kWh)

The COP should be as high as possible. COPs for systems can be between 2 (very poor) and 5 (exceptionally good). This means that a really well performing system can cost half as much to run as a poorly performing one. In order to achieve a high COP all elements of the systems must be designed and installed correctly. In particular, the lower heating flow temperature, the greater the efficiency.

The water temperature at which the heating system operates will determine the efficiency of your heat pump, which will have a very significant impact on the cost of running it.
It is likely that achieving a higher COP will be more expensive in the first instance but cheaper overall.

In scoping your project you should consider what improvements it is reasonable to make to any existing buildings in order to achieve a higher COP and as a result, what is a realistic COP. If it is unaffordable to improve a building or its heating system so that a heat pump can operate at an acceptable efficiency then the project cannot go ahead.

Break point 1 – Is there a reason to develop?

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

1. Identify potential sites for heat pump development that are:
    a. Available and can be secured for a long period (potentially 25 years).
    b. Accessible for collector installation and maintenance.
    c. Amenable to feed into the existing heating system and capable of physical connection.
    d. Likely to have a good energy yield
    e. having access to enough land
    f. Unlikely to cause unacceptable impacts on local people
    g. Potentially able to gain planning permission (where required).

2. Confirm that the income is potentially high enough to be attractive
3. Take an option on, or otherwise secure access to sites which meet the above criteria.

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. CEE has produced a template plan which can be downloaded.**

Phase 2 – Evaluate the project

Up to this point little if any financial investment has been required to develop the project, with almost all input being that of 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.

The Urban Community Energy Fund (UCEF) and the Rural Community Energy Fund (RCEF) provide start-up grant funding to help towards the costs of feasibility studies, community consultation and other preparatory costs. Up to £20,000 is available for community groups to fund non-capital aspects of a project. These should be early-stage activities, without which the installations would not be able to go ahead.

Stage 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.

Step 7. Secure the site(s)

As the site or sites and their associated heat loads are the key to viability and is the focus for all that comes next, it is important that you secure access to them in some way. In addition, if any boreholes or excavations are required or if collectors are to be installed in bodies of water then access to install these must be secured. Depending on the site and who owns it this may require some form of legal agreement and under some circumstances may involve payment of some kind of rental fee by you to the site owner.

Once the above framework is in place then the site(s) must be secured if appropriate, or the agreement from individual community members to collaborate obtained. Commonly this requires you to enter into a binding agreement with the site owner that guarantees that the project will be viable for at least as long as any loan and ideally for the duration of the RHI agreement.

Step 8. Confirm grid connection

Prior to installing a heat pump it is necessary to notify the Distribution Network Operator (DNO). This allows them to ensure the electricity connection is capable of supporting the heat pump and that it will not affect the wider electricity grid.

In some instances it will be necessary to increase the capacity of the electricity connection or make changes to the local electricity grid such as upgrade a transformer. Notifying the electricity company at an early stage will ensure you are aware of any costs which you may incur and can take them into account in your financial plans.

Step 9. Pre-planning consultation

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. There are no guarantees, but 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 heat pump projects. Many Planning Departments also welcome early informal discussions with developers of large scale schemes about their plans. If externally located heat pump systems have been proposed or built in the area, the planning authority web site will contain details of the planning application, the objections and any restrictions on the development of heat pumps. This can be a valuable source of local information.
The **Planning Module** provides additional guidance and should also be referred to.

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

It is likely that you now have an outline of the project scope following the initial viability. The system now needs to be designed more accurately to allow costs obtained. This process should this include determining the following by calculation:

- Total annual thermal load of the building (kWhth)
- Peak load of the building (kWth)
- Size of heat pump required (kWth)
- Area of ground required for any heat collectors and their locations finalised.
- The increase in heat emitter capacity required (e.g. radiators) to achieve the desired flow temperature. This will require the calculation of the heating requirement of each room, taking into account any fabric improvements and determining the size of radiator required. It is often found in doing this process that any existing radiators are significantly oversized in which case only modest increases in size may be required.

It is important at this stage to ensure that all works required have been identified and specified so that a complete and working system will result. Particular attention should be paid to the interface between systems.
It is at this stage that design costs may be incurred, particularly on larger systems that require thermal modelling of the building or borehole systems. Input of a suitably qualified and experienced engineer may be required to ensure that your project scope is comprehensive and that all parts of the systems are compatible.

Step 11. Confirm Capital cost and income

Capital Cost

A good market for heat pumps and associated equipment and services exists. This means that the best source of estimates on capital costs is from system suppliers through a process of competitive tendering. This will certainly be possible if the size, location and operational parameters of the project are known. It is important to ensure that the tender document is drafted with sufficient technical detail to ensure that the systems quoted for are comparable, that they will interface with the building's systems and that the resulting system will be as efficient as possible the project scope developed earlier should include these details but, as stated previously, input from a suitably qualified and experienced engineer may be required. Further information on developing an Invitation to Tender is available in the **Procurement Module**.
You will need to confirm if planning permission is required, if you have not done so already. All costs associated with the application should be confirmed including all fees, costs of preparing the drawings required in the application and any planning consultation required. You should also confirm if the electrical connection is sufficient and any costs associate with it being upgraded, systems over about 15kW may require a three phase electrical supply. The DNO can tell you if grid upgrade is required for it to support the heat pump(s) proposed, provide a cost for an upgrade and inform you of the likely timescale. The **Grid Connection**

Module provides more information and information about how to contact your DNO, connection standards, etc.
At each heat pump location it is also a good idea to get an electrician to confirm that the internal wiring is suitable to supply the heat pump that will be connected to it. For example a new sub distribution board may be required beside where the heat pump is to be installed for which a quotation would need to be sought from an electrician. It is important to confirm with the supplier of the heat pump what works they include for in their quotation and what they require to be completed in advance.

Income

There are two forms of income:

1) Savings in the fuel that would have been purchased.
2) The value of the Government's RHI

The total annual heat output of the system is used to calculate both of the above. To calculate the savings in running the system the total annual heating consumption must be divided by the anticipated average COP to obtain the units of electricity that the heat pump is expected to consume. The cost of this electricity should be subtracted from the existing or alternative fuel source (e.g. fuel oil). Systems that are MCS compliant will have projections of the total annual consumption provided in the quotation.
The **Renewable Heat Incentive Module** should be referred to when assessing the income that the system will generate.

Step 12. Financial viability check

A more detailed review of project viability is recommended at this stage.
The **Community 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 heat pump development is maintained.

Step 14. Planning application

It is important to submit a planning application as soon as you have sufficient information. Is an important first step as no project will reach Financial Close without these permissions. Some planning authorities have developed local Planning Policy Guidance which describes what they expect developers of heat pump projects as part of the planning process. This will identify what is required as part of the planning application and the costs of submitting a planning application. This planning application can be submitted by the Community Group

itself, or for more complex applications through the use of a planning consultant. Further information is available in the **Community Renewables toolkit Planning Module**.

Step 15. Grid notification

The Distribution Network Operator must be notified of your intention to connect a heat pump to the electricity grid. You will require details of the heat pump system to be installed and the system which it replaces (if any). This notification can only be provided once you know exactly what model of heat pump is to be installed.

Step 16. Identify funding sources

Once the project has been confirmed to be potentially financially viable it is essential to address how it is to be funded.
The separate **Project Finance Module** gives guidance on the types of traditional finance that may be available and potential sources of that finance.
There are a range of finance options, each of which has different attributes and requirements. These include traditional bank loan finance and establishment of a co-operative (via the sales of shares). Restricting traditional funding options. The relatively modest cost of individual heat pumps may make funding by community members achievable, especially if individual 'packaged' financing options are made available.
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; and
- The potential to identify a 'packaged' finance arrangement that individual community members can access to fund their own system.

Each form of funding will have specific attributes (interest rates, 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.

Step 17. Develop full financial model

The financial viability of any project depends on comparing the cost of borrowing the money required to buy the heat pumps and associated equipment and pay the cost of installation (including changes to the hosts heating systems and controls) with the income from the system (including savings) after operating costs.
The installation costs can include:

- The purchase of the heat pump, buffer tanks and the balance of plant
- Excavation for ground loop or drilling of boreholes and their connection to the heat pump
- The installation of the heat pump and associated equipment
- Connection to the heating system or systems to be supplied by the heat pump and any alterations required, such as installing new radiators.

- Installing control systems
- Heat metering for RHI purposes or for billing
- Costs associated with any changes to electricity connection
- Civil works such as increasing size of plant rooms.
- Any other works required to form a complete and working system

The **Community Renewables toolkit Finance Model** is available to download and use to complete a detailed financial appraisal of your project and the **Community Renewables toolkit Finance Model** guidance document provides indicative costs taken from a number of different market studies.
In order to complete the financial appraisal as accurately as possible, the capital costs should be defined as accurately as possible. It is important to have quotations for all work and not simply use estimates. For ground source heat pump systems this may mean carrying out investigations of the ground conditions such as drilling of test boreholes or thermal modelling.
Operational costs such as maintenance, ground rent and insurance must be determined and other ongoing expenditure such as community benefit payments must be accounted for.
A detailed calculation of the heating requirements of the buildings to be served will determine how much heat the heat pump will 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 also necessary to calculate the Seasonal Performance Factor which is to be anticipated.
RHI income will likely offset the cost of running the heat pump, but is unlikely to provide a source of additional revenue.
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 heat pump installation with a detailed cash flow and balance sheet that includes repayment of loans provided. The **Community Renewables toolkit Finance Model** provides this facility and more detail on this is covered in the Project Finance module and the **Community Renewables toolkit Finance Model** guidance.

Break point 3 – Confirm consents, grid and financial viability

The outcome from Phase 3 of the development process should show that all the following are in place:

- Planning consent granted;
- Energy yield predicted;
- Income predicted;
- Permission to connect the heat pump to the electricity grid;
- Financial viability confirmed; and
- Funding options investigated.

If consents are in place and the project appears financially viable, then the project can progress to Phase 4. If at this stage the scheme looks unviable it should be stopped, or re-designed.

Phase 4 Getting Financial Close

Step 18. Identify and contact suppliers

The process of finalising suppliers of equipment and services will need to be completed. It is good practice to seek competitive tenders for all services, and it is recommended a construction phase project manager be appointed in the same way if not already in place.
A heat pump project may be completed by one contractor or made up of several contractors, typically the installation of the heat pump and the balance of plant within the plant room, such as buffer tanks, hot water cylinders, pumps and heat pump controls would all be completed by one contractor. It is sometimes necessary to employ a separate contractor to complete borehole drilling or excavations for ground loops as well as any civil works required such as construction of a new plant room or base for a pre-fabricated energy centre.
It is important to consider not only the capital cost of the heat pump but also the cost of collectors, modifications to existing heating systems, warranty provided, projected operating performance (including COP), annual maintenance costs and any manual intervention required such as manual readings of heat meters for billing purposes.

Step 19. Secure bridge funds

Suppliers of key pieces of equipment such as the heat pumps 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 Community Renewables toolkit Project Plan** is a good place to start.

Step 20. Financial close

More detail on financing projects is given in the **Project Finance module**.
It should now be possible to secure your chosen finance. You will need to satisfy the finance providers' process of due diligence and provide more detailed analysis of estimated system performance. However you should have gathered this by now by following the process outlined in this Toolkit.

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 21. 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 22. Construction

Once all the permissions and agreements that you need are in place then financial close can be achieved. At this point installation can commence and the thermal collectors 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 heat pump 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 heat pump is properly commissioned in line with the manufacturers' guidance documents. It is particularly important to be aware of:

- That the flow temperature of the heating system matches in the performance estimates provided by the manufacturer;
- That the ground loop system is correctly flushed and pressure tested in line with the MCS requirements;
- That the antifreeze level in the ground loop has been tested and found to be sufficient for your site;
- That all pipework in the plant room and in the building has been flushed then pressure tested and found to be free from leaks;
- The frequency and duration of legionella cycles is in line with your organisations procedures.

Step 23. Apply for RHI

After the system has been commissioned the RHI application can be completed. Your equipment supplier will be able to guide you through this process and will often complete the application for you. More information is available in the **Renewable Heat Incentive Module.**

Step 24. Notify water authority

If you have connected new fittings to the mains water system, such as a new pressurised hot water cylinder or plate heat exchanger, then it will be necessary to inform the local water authority.

Step 25. Operation

It is important to ensure that proper management is in place for the operating life of the heat pump system to oversee the process of collecting RHI payments, that the system is correctly maintained and that all on-going operating costs and financial and other liabilities are met (where appropriate).

A responsible person also needs to be appointed who will be responsible for who is training in how to use the HP and how to avoid abusing it. It is important that the performance of the heat pumps are regularly monitored as large fluctuations or low output might indicate a technical problems and this in turn will reduce income, leading to reduced financial returns.

The income from the project will need to be managed carefully. Any provider of loan finance may expect there to be cash held to cover fixed costs such as interest and loan repayments and O&M contracts. Only after these costs have been met can the project distribute any remaining income.

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

Depending on how your project is constituted, you may be responsible for decommissioning at the end of the project, however that is defined. This may also include the removal of collectors and reinstate the site. The costs of these works should be identified at an early stage so that adequate financial provision can be made.

Step 26. Decommissioning

The removal and disposal of the heat pump system will need to be allowed for. The heat pump may contain refrigerant gases which are covered by F Gas regulations governing how the heat pump must be disposed of.

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

Heat Pump context

The Shared Community Ownership of Renewable Energy Systems provides information to support local communities through the community benefit process. It publishes the benefits that local communities have received through renewable energy projects– see http://www.sco-res.uk/

Step 1. Develop the Vision

- The Energy Saving Trust has published results from heat pump field trials that includes useful information that may help you when developing your project: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48327/5045-heat-pump-field-trials.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

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
- Community Energy England – see http://communityenergyengland.org/publications/Development Trust Association

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 following selection of guides provides additional information on selecting an appropriate heat pump.

- Local Energy Scotland heat pump handbook: See http://www.localenergyscotland.org/media/1011/heat_pumps.pdf
- The Ground Source Heat Pump Association provides guidance, FAQs and lists installers: http://www.gshp.org.uk/
- The European Ground Source Heat Pump association: http://www.egshpa.com/
- Carbon trust guide on implementing ground source heat pumps: http://www.carbontrust.com/media/147462/j8057_ctl150_how_to_implement_guide_on_ground_source_heat_pumps_aw__interactive.pdf
- Carbon trust guidance on learning from previous ground source heat pump installations: http://www.carbontrust.com/media/81349/ctg036-down-to-earth-ground-source-heat-pumps.pdf
- The MCS Heat Emitter tool gives guidance on how flow temperatures and a building's heating requirement relate to the size of radiators required and The MCS Heat Emitter Guide describes the relationship between COP and the design of radiator systems. This can be used to determine the possible efficiency of a heat pump in your building. http://www.microgenerationcertification.org/admin/documents/MIS%203005%20Supplementary%20Information%202%20-%20Heat%20Emitter%20Guide%20v2.0.pdf
- British Geological Survey onshore Geoscart provides mapping of ground for both surface deposits and bedrock geology. http://www.bgs.ac.uk/geoindex/
- Data from the BGS map above can be used with the MCS Ground Lookup tables as a guide on how much ground is required for a heat pump: http://www.microgenerationcertification.org/images/MIS_3005_Supplementary_Information_1_-_MCS_022_-_Ground_loop_sizing_tables_2011-09-02_v1.0.pdf

Stage 5. Initial scoping

- Heat pump calculators are available online which will provide an initial indication of how much heat will be generated: http://www.heatpumps.co.uk/heatpumpcalculator.html
- The Ground Source Heat Pump Association provides lists of installers and guidance documents: http://www.gshp.org.uk/
- The Microgeneration Certification scheme installer guidance can be a useful resource in what needs to be considered when designing heat pump system: http://www.microgenerationcertification.org/admin/documents/MIS%203005%20Issue%203%200%20Heat%20Pump%20Systems%202011.09.05.pdf
- The MCS Ground Lookup tables can be used as a guide on how much ground is required for a heat pump: http://www.microgenerationcertification.org/images/MIS_3005_Supplementary_Information_1_-_MCS_022_-_Ground_loop_sizing_tables_2011-09-02_v1.0.pdf
- Guidance on preventing spread of legionella: http://www.hse.gov.uk/legionnaires/
- "Design of low-temperature domestic heating systems – a guide for system designers and installers", 2013, BRE Trust publication FB59: www.brebookshop.com

- Environmental good practice guide for ground source heating and cooling. GEHO0311BTPA-E-E. Published by Environment Agency 2011: www.environment-agency.gov.uk
- MCS 001- MCS – Installer certification scheme document. Available from: http://www.microgenerationcertification.org/images/MCS%20001%20-%20Issue%202.4%20Installer%20Certification%20Scheme%20Requirements.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

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
- **Community Renewables Renewable Heat Incentive Module**

Stage 6. Establish an entity

The **Community Renewables toolkit** establishing a Community Group module contains more information on establishing the legal entity. It is important that legal advice from a solicitor who has experience of completing this work is obtained at this stage. This solicitor will be required at various stages throughout the project to support all legal and contractual activities, of which there will be many.

Step 11. Financial viability check

- **Community Renewables Procurement Module**
- **Community Renewables Grid Connection Module**

Step 18: Identify funding sources

- **Project Finance Module**

Step 20: Financial close

- **Project Finance Module**

Step 24. Notify water authority

- Information on water regulations: https://www.wras.co.uk/consumers/advice_for_consumers/what_are_the_water_regulations_/

Step 25: Operation

- **Establishing a community group module**

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