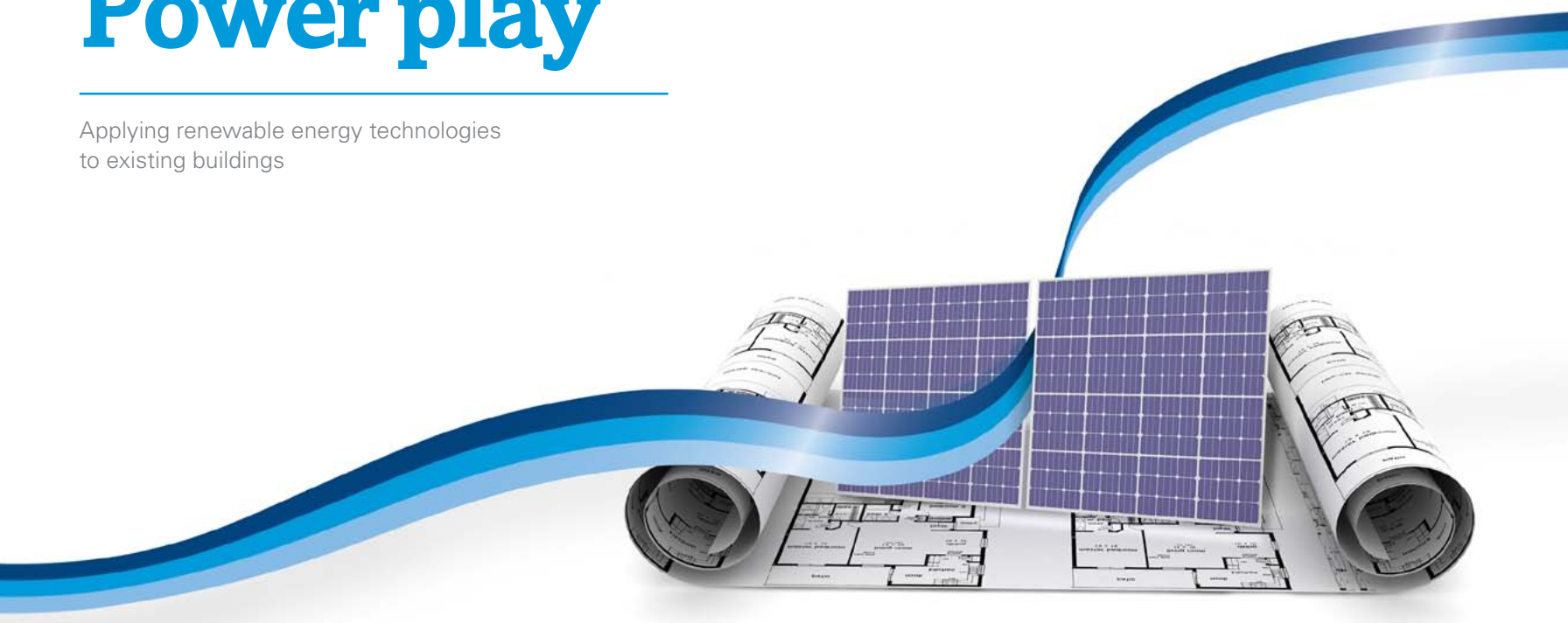
CARBON TRUST
Making business sense of climate change

Power play

Applying renewable energy technologies to existing buildings



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> Renewable energy supply can provide significant carbon savings, but it is important to be clear about your objectives and research suitable options for your building

Sharing our experience: About this booklet

Power Play is part of the 'Sharing our experience' series. These booklets provide advice and tips to help you to plan, build and manage cost-effective low carbon buildings that really work to save you money and carbon.

The insights are based on data and surveys of organisations that installed renewable energy technologies as part of the Department of Energy and Climate Change's Low Carbon Buildings Programme. The projects cover many sectors including retail, education, offices and mixed use residential buildings.

Further information

To find out how we can help with your low carbon building project, contact us on 0800 085 2005 or visit www.carbontrust.co.uk/buildings

Before you start

You need to be clear about why you want to fit renewable energy technologies and what you hope to achieve. Most early adopters we surveyed wanted to reduce carbon emissions and enhance their environmental credentials.

Learning from experience

This booklet is aimed at owners or managers of businesses who want to install renewable energy systems. It aims to:

- provide initial guidance about what you should consider at each stage
- share the lessons learned by other people who have successfully installed these systems.

Of the 15 clients we interviewed, 14 were either 'very' or 'quite' satisfied with the renewable energy systems they had installed, demonstrating that the projects have been successful.

Through these interviews, we found that the early stages of a project are critical in ensuring a successful outcome.

"We knew our boiler was old and inefficient, so we were looking for a cheaper solution. As a charity we want to keep running costs down and reduce our impact on the environment"

David Bell, Director, Meadow Well Connected

Carbon and cost savings

The carbon and cost savings for the 146 projects show that photovoltaics have the highest installed costs. The rest of the figures are shown in *Figure 2*. However significant changes in the market for the technologies have occurred since these figures were recorded, so the figures are not considered to be representative of current costs.

First questions

Make sure you consider the following:

Are there any other low carbon measures suitable for your building that could also meet your objectives?

These may be more cost-effective than a renewable energy option, and if you have limited funds, it may be worth exploring these first.

Figure 1 ***Installed cost per kW rated output and cost effectiveness of carbon per carbon saved (median values across the 146 projects) 2006-2009***

Technology	Installed cost per kW rated output	Cost per carbon savings (£/tonne CO_2)
Photovoltaics	£5,944.66	£12,410
Solar hot water	£1,476.42	£8,581
Wind turbines	£4,025.15	£4,520
Hydro	£3,867.19	£2,353
Heat pump	£1,193.90	£7,232
Wood fuelled boiler	£462.81	£752

What is your budget likely to be for up-front capital costs?

Some systems, such as PV, are modular and you can choose the size depending on your budget. Other systems may require a minimum amount of money to pursue.

Do you own your building or lease it?

If it's the latter, you may need the landlord's permission before installing a system.

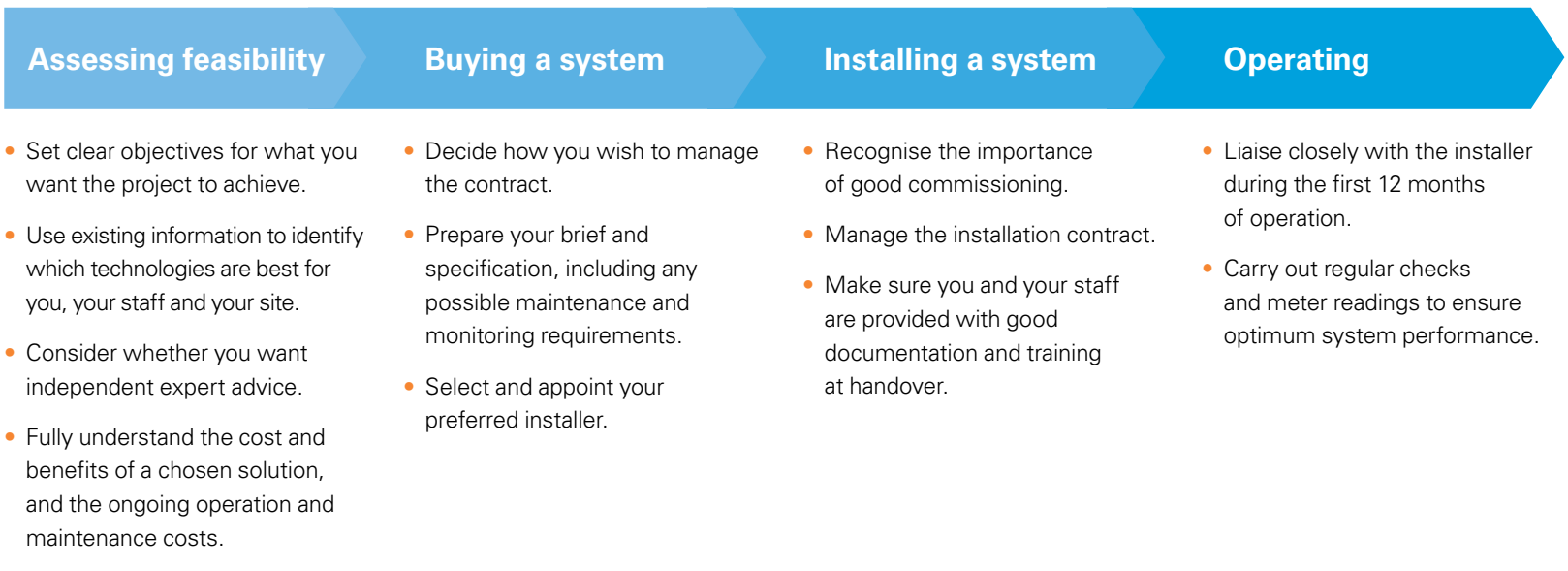
Are there any financial criteria an investment would need to meet, such as a particular payback time?

With current Government incentives most systems have a return on investment of at least 5 per cent. What initial support will you need from key individuals in your organisation (e.g. the finance or facilities team) for the project to proceed?

Key decisions at each stage

Here's a step-by-step overview of a typical retrofit project.

Figure 2 ***Key considerations for green design of products and services***



Assessing feasibility

There are a number of ways you can meet your objectives, so research your options and check your plans are practical.

Understanding your objectives

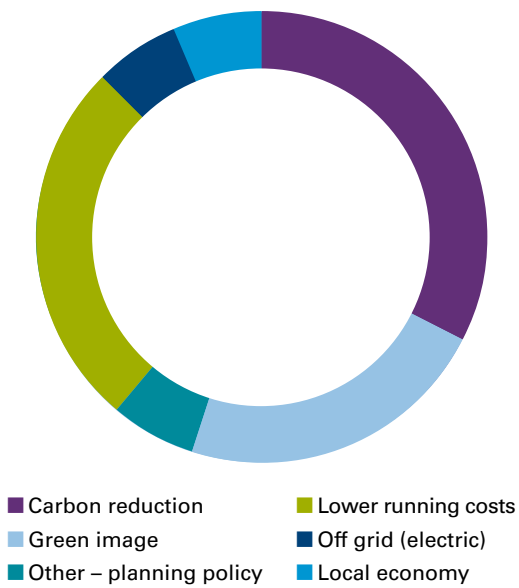
If you are clear about your objectives, the people working with you will also be clear and can help you achieve them. Different clients have different reasons for considering renewable energy, and this can influence their choice of system.

Our surveys identified that, although there was a range of objectives behind the installation of renewable energy technologies, for most people their main goals were to:

- reduce their carbon footprint
- reduce their running costs
- improve their environmental image.

Clients also wanted to meet local planning policy and support the local economy. Encouragingly, 93% of the clients we spoke to felt that all their objectives had been met, and in the majority of cases exceeded.

Figure 3 Original objectives for installing the renewable energy technology(ies)



Financial incentives

Enhanced Capital Allowances
This scheme provides businesses with enhanced tax relief for investments in energy saving products. You can find out which technologies are on the Energy Technology List (ETL) here: **www.eca.gov.uk/etl**

Renewable heat Incentive (RHI)
If you install a renewable heat technology you could get paid for the heat generated by the installation.

This RHI tariff will significantly improve the business case for renewable heat technologies and support their broader roll-out to meet the UK's 2020 renewable energy target.

For more information visit the **Department of Energy and Climate Change** website.

Feed-in tariff
The feed-in tariff (or clean energy cashback) provides an additional incentive to install renewable electricity-generating technologies (e.g. PV, wind turbines).
If you opt in you will be paid for generating renewable electricity and receive further income for exporting electricity to the National Grid.

For more information visit the **Department of Energy and Climate Change website**

Case study

Neal's Yard Remedies

The Neal's Yard Remedies company ethos has a strong emphasis on using natural ingredients and having a low impact on the environment. Five years ago, when designing a new headquarters, the company aimed to reduce its impact on the environment by using lighting controls, local materials and daylighting. Two years after moving in, the company had the opportunity to retrofit solar PV. As Jason Cook, Neal's Yard's Head of IT said: "We wanted solar PV panels to demonstrate to our customers that we are committed to lowering our carbon footprint. We often have visits to the site from customers and those interested in PV, and we show them the panels and display board. It's really helped us get our message across."

Start with good advice

Most of our clients found it hard to track down independent and accurate advice about renewable energy systems.

We recommend that you start by viewing the Carbon Trust and the Energy Saving Trust (EST) websites, given in Further information. Both provide information on the types of renewable energy technology available, how suitable they are for your site, and their advantages and disadvantages, as well as some case studies. Or you could call the Carbon Trust free helpline for small businesses on 0800 085 2005.

The EST has a UK network of sustainable energy advice centres. If you call 0800 512 012 you will be put through to your nearest centre and they may be able to give you some initial advice. The centres can also direct you to other sources of advice and support in your area, such as energy agencies and Business Link programmes.

"It pays to do your research! After reading about the technology in a magazine, we visited the site featured in the article and learned a lot about the technology being installed in a similar setting to our own."

Martin Hofman, Partner,
Wheeldon Trees Farm Holiday Cottages

Once you have a shortlist of suitable technologies you can begin contacting installers. They can provide very useful advice on different technology options.

We found that people used a wide variety of sources when researching technologies. Over half of the clients we surveyed had visited other sites where renewables had already been installed, which proved invaluable.

Feasibility study

If you're not sure which technologies you would prefer, or have a potentially large system, consider engaging an independent specialist, who'll be able to prepare you a feasibility study with more in-depth advice. There is no official list of "approved" consultants, but you could ask providers and installers who they would recommend in your area.

The consultant who carries out the initial feasibility study can also help you to procure an installer and manage the installation contract.

Someone will need to visit your premises to assess feasibility properly.

Predicting performance

Predicting performance during feasibility is important as it provides a benchmark to check whether the system is designed and installed correctly. Our research shows that these predictions are not always fully accurate and sometimes miss key factors. These include:

- For wind turbines: local wind conditions, including impact of nearby obstacles and terrain.
- For solar hot water and photovoltaics: overshadowing and systems losses.
- For ground source heat pumps and biomass heating: realistic average efficiencies, ground conditions (GSHP only), how the building will be used, system losses and heat load assessment.
- For small hydro: hydro resource (head of water and flow), estimated system efficiency.

Case study

G & VAM Downing
Biomass boiler suitability

Staff at G & VAM Downing converted an old cart lodge into a wood chip fuel store. This meant the company could have its fuel store next to the boiler. Although the location gave easy access for the fuel delivery truck, because the cart lodge was listed, the store had to be designed to receive blown woodchip, as opposed to a tipped delivery.

Blown woodchip delivery
[Photo courtesy of G & VAM Downing]

Key parts of a feasibility study

Typically, a feasibility study should cover the following:

- compatibility with your site, buildings and infrastructure
- space requirements
- estimated capital costs
- estimated annual energy yield, cost savings, carbon savings and simple payback
- maintenance costs and time required
- whether planning permission or any other regulatory permits are required
- funding or grant opportunities and other incentives, in particular FiTs, RHI and ECA.

Lessons learned

- If you are clear about your objectives from the beginning, you are more likely to choose technologies which will allow you to achieve them.
- Many clients have used renewable energy installations as part of their company marketing.
- Consider carefully how much time or effort you are prepared or able to put into the operation and maintenance of your renewable energy system, as this can affect the choice of technology.
- It pays to do your research. In particular: visit projects that potential installers have worked on.
- Make use of the independent advice available on the different technologies, their pros and cons and costs and benefits.
- You may wish to consider commissioning a separate feasibility study to be carried out by an independent consultant, particularly if you are not sure which type of technology would be best for your site.
- Be careful of over-optimistic predictions of performance and energy savings.

Buying renewables

How to choose your contractor, write your brief, and put it out to tender

Finding the right contractor can be a minefield, especially if this is the first time you have specified and installed a renewable energy technology. From the surveys, we found that this was the most crucial stage, as it determines the scope of what the installer will do, as well as which installer you will work with.

Choosing a buying approach

Before you approach potential installers for a quotation, consider how you want to manage the contract. We found that companies used a variety of different approaches. For example:

- a single contract between the client and a main contractor, and then one or more sub-contractors managed by the main contractor
- multiple sub-contractors managed by the client
- a single contractor managed by the client
- a client advisor (project manager) appointed by the client to liaise with single or multiple contractors.

"For some of the cottages, we split the contract between the heat pump and the underfloor heating. The heat pump installer's responsibility was up to the manifold connection into the building, and the underfloor heating engineer took it from there. But this was difficult to manage at times with responsibility being shifted between contractors"

Martin Hofman, Partner,
Wheeldon Trees Farm Holiday Cottages

Woodchip fuel. Photo courtesy of G & VAM Downing

The approach you take will depend on the complexity of the installation, how experienced and confident you are, and how much time you have to manage risks and liaise with various parties. There are always risks associated with splitting up contracts as it creates areas where roles or responsibilities may be unclear.

For simpler technologies, such as PV, there is unlikely to be any requirement for civil works, or other tradespeople on site, and therefore a single contract with an installer may be all that you need.

Preparing to tender

Surprisingly, many of the clients we spoke to had not prepared a formal written brief or outlined a specification of their requirements, but had relied on telephone discussion with potential installers and the installers visiting the sites.

As a result, some projects had items added during or after installation, increasing the costs and causing disruption.

Always prepare a written brief and specification to send to potential installers, for two reasons:

- so they are clear on your objectives and requirements
- so you can define how you want the information in the quote to be presented so you can easily compare the estimates.

We have provided a checklist at the back of this booklet on what to consider in a brief. The key points are:

- Obtain at least three quotations from reputable companies. Use Microgeneration Certification Scheme (MCS) installers for smaller projects.
- Ask for references and examples of sites you could visit.
- Specify the form you want the tender returned in. In particular, say how you would like the costs to be broken down and the estimate of performance presented.
- Think about which criteria you will use to "score" the suppliers, e.g. experience, approach, system performance, etc.
- Consider any additional help you may need, such as planning assistance, registering the systems for feed-in tariffs or renewable heat incentives.
- Think about your requirements for controls, maintenance, metering, and after-sales service.

It will help if you have a good relationship with the installers both during and after the installation. Almost half of the surveyed sites needed the installer to return and fix problems. Those surveyed felt that being able to pick up the phone to the installer was very important.

Microgeneration Certification Scheme

The Microgeneration Certification Scheme is an independent scheme that certifies microgeneration products and installers in accordance with consistent standards. These are applicable for micro and small-scale systems (less than 45kW for renewable heat, and less than 50kW for renewable electricity), so you may need to look elsewhere if your system is larger.
www.mcsdirectory.co.uk

This scheme also produces detailed Microgeneration Installation Standards (MIS) for each technology, which you may find useful to read when agreeing your contract with the installer.
www.microgenerationcertification.org/

REAL Assurance Scheme Consumer Code

The Renewable Energy Association (REA) has designed the REAL Assurance Scheme Consumer Code, or 'the Code', which sets out best practice standards for REA members. Therefore, if you choose an installer who is an REA member they should adhere to these codes.
www.realassurance.org.uk

Installed 6kW wind turbine at Breezydaze, Cornwall

"Once, there were very high winds at night and I needed to put the brake on the wind turbine. It was the first time I'd done it by myself, so I called the installer, who happily talked me through it over the phone"

Julia Sioufi, Partner, Breezydaze

Choosing an installer

Once you have received quotations, the next step is to select a preferred installer.

Make sure that each installer has clearly specified which products they will use. Take the time to understand the different products and features being offered, as installers will tend to have relationships with particular product suppliers. Therefore, you need to be happy that both the proposed products and the installer meet your requirements.

You will also need to clarify which costs are included and follow up on references provided.

Once you have selected your installer, you need to agree the precise scope of the contract and the payment terms. If your procurement rules will allow it, you may be able to make modifications to their quotation based on what you learn about different technology options during the tender process.

Your chosen installer should provide you with most of the information you need to prepare a planning application.

If you need planning permission for your installation, get this approved before signing any contracts

Lessons learned

- It is better not to split the contract, particularly for complex installations, such as ground source heat pumps.
- Use our checklist to prepare a written brief and specification.
- Selecting the right installer and developing a good relationship with them is critical for the success of your project.
- Consider whether an installer will be able to provide you with a high quality of aftercare, and make this an important factor in your choice.

Installing the system

This is where your early work should pay off in helping to prevent unexpected costs and delays.

MENU

"The installation took three days, and the business stayed in operation throughout. We have some areas of the factory we need to keep sterile, and the installer took this into consideration and did the majority of the work in the morning before the people arrived at work"

Jason Cook, Head of IT, Neal's Yard Remedies

Managing installation

During the installation phase, you'll need to oversee the installer's activities. The extent of this will depend on how you have chosen to manage the contract. Key aspects to consider are:

- Health and safety: has the installer provided you with a risk assessment for the installation, particularly where your staff or members of the public may be at risk?
- The installation programme: is it on track, and are there any critical timings for when the installation needs to integrate with other work or activity at the site? The programme needs to be realistic from the outset, with some allowance for slippages.
- Impact on utilities: does the installation affect buried services (such as electrical cables or water pipes) or is it likely to interrupt supplies?

Installing a ground loop for a ground source heat pump system

- Liaison between contractors: Is everyone clear on their responsibilities? Make sure nothing falls through the cracks.

Installers severed buried services during installation on two of the projects we surveyed, causing major disruptions to businesses. This might have been avoided had the installer contacted the local utility providers.

HELP

Checking it works

Commissioning is the process that an installer goes through after a system has been installed, to make sure it operates correctly. This involves a series of tests and checks carried out by the installer. Next, the installer must set the system controls back from the default or test settings to the specific settings you require. Several of the projects surveyed experienced problems in operation, partly due to incorrect settings at commissioning.

You should make sure that the installer has allowed enough time for commissioning. You may also want to ask to see a copy of the installer's commissioning checklist in advance.

The person responsible for the system should be present for all or part of the commissioning to make sure they fully understand how the system works.

Completing the project

Once commissioning has been carried out, the installer then hands the system over to you. They should provide some form of training and give you the relevant documents. Carry out a final check to ensure that everything has been installed to the agreed specification.

The right information

It is important that your installer provides the following:

- Training on how to operate and maintain the system.
- A copy of the commissioning sheet showing key settings and parameters.
- An operation and maintenance manual, as well as any relevant schematics.
- Ideally, you should also ask (at the procurement stage) for the installer to provide a simplified user guide based on the actual system that has been installed, rather than the generic manufacturer's manuals.
- The key elements of the system should be clearly labelled, e.g. valves, electrical isolators, cable runs, meters etc.
- Details of any warranties and guarantees.

Handing over

This information is vital to enable you or your caretaker to carry out any routine maintenance, and also to help with any specialised maintenance or replacement that may be required in the future. It is useful to keep a summary sheet of the key instructions and emergency phone numbers next to the equipment.

When the training takes place, it is important that whoever will be responsible for the day-to-day operation of the system is present. You may wish to video the training.

When you agree an initial payment schedule with the installer, you may want to delay the full payment, retaining, for example 10 per cent, until you are satisfied that all of the above has been provided.

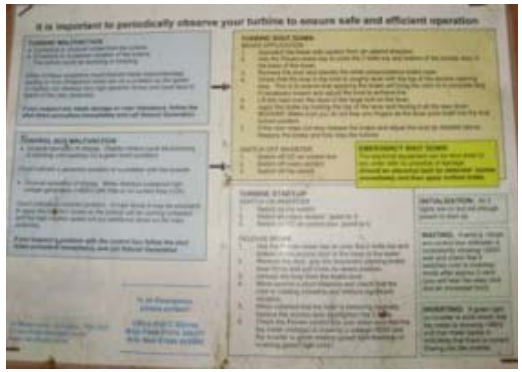
Training

Several of the clients we interviewed felt that training at the point of handover was not necessarily that useful, as it is generally only after a few months of operation that they begin to understand the questions they needed to ask.

Therefore, you may wish to agree with your installer that they provide a further follow-up training visit within the first year of operation, or that they be available to provide telephone support when you need it.

Fewer than half of our interviewees said they had formal training from the installer

Example of good labelling for valves at Trafalgar Nominees site



Example of an information sheet in the controls room at Breezydaze

Lessons learned

- Be clear about any critical timings in your installation programme.
- If there are any ground works involved, check that the installer knows about any buried services, and, if required, has carried out the standard checks with local utility companies.
- Thorough commissioning of any system is crucial. Allow adequate time and budget for this.
- Be clear who will operate the system on a daily basis so that the installer can give them appropriate information and training.
- Additional training and other support after installation and during the first 12 months of operation can be useful.
- For renewable heating systems, you may wish to improve performance by re-commissioning the system during the first 12 months as the seasons change.

Ensuring best performance

Teach building occupants how to use the systems, check they are working efficiently and measure your carbon reduction

Operation

You may need to change the way you operate your building after you have installed the renewable energy system.

Of the projects surveyed, almost 90 per cent are operating as expected

Short information note on underfloor heating controls for guests at Wheeldon Trees Farm holiday cottages

Where renewable heating technologies have been used in combination with underfloor heating, clients have had to learn how to use the systems in a different way. They cannot expect instant heat from the systems, but need time to allow the temperature of a room to rise or fall. At Wheeldon Trees holiday cottages, the client, Martin Hoffman, also had to communicate this to his guests. However, he felt that this was a positive talking point, and something that customers found interesting and innovative, rather than something negative.

"It's been a refreshing change of mindset as we've learnt to use the biomass boiler. It's not like oil or gas heating, which you might turn on for a few hours and then turn off again; it's much happier running for long periods on a lower setting"

Graham Downing, Partner, G & VAM Downing

Metering and monitoring

To get best value for money , or to claim RHI or FiTs, it is important to monitor how your system is performing. During the first 12 months of operation when the system is 'bedding in', monitor it weekly or monthly to pick up any issues during the installer's warranty period. You will also start to understand how the system performs at different times of the year and to recognise any drop in performance, which may mean the system needs maintenance.

"Our installer has fitted remote monitoring, so if something goes wrong with our system, he can look at it on his computer and he can talk me through what I need to do over the telephone"

Graham Downing, Partner, G & VAM Downing

A simple way to monitor performance is through regularly reading meters. Electricity-generating renewables, such as wind turbines or PV, will have an electricity meter measuring how much they have generated in kilowatt hours (kWh). This will make it a simple process to take monthly readings of output. If you have specified a live monitoring display as part of your system, this will be even more straightforward.

However, measuring the performance of renewable heating technologies is less straightforward, because it requires heat meters to be installed. These are unlikely to be cost-effective for smaller systems, though they may be more feasible for larger ones. For these, annual servicing and maintenance health checks are critical to ensure the system is operating at its optimum.

The latest announcement for the Renewable Heat Incentive (RHI) indicates that in order to claim for the RHI, you will need to use a compliant heat meter to measure the amount of usable heat.

Access to manual brake on Breezydaze wind turbine

Example of labelling for maintenance on Trafalgar Nominees' solar thermal system

MENU
HELP

"The students' own elected 'E-team' take weekly readings from in-school displays showing energy produced and CO_2 saved, which are then incorporated into the curriculum. This eco-enthusiasm is taken home and hopefully influences parental behaviour too!"

John Stanford, Environment Governor, Eastchurch Church of England Primary School

Maintenance

Always ensure maintenance is carried out as per the installer and manufacturer's recommendations and by a suitably qualified person. This will prolong the life of your system, ensuring best performance while improving safety.

In some cases, this may only involve annual inspection of key connections and sensors, as well as cleaning. In others it may involve more extensive maintenance, such as topping-up antifreeze.

Clarify the likely maintenance requirements with your installer at the feasibility stage. You may also wish to get a quote for an annual maintenance contract, to give you some certainty about costs.

Lessons learned

- To get the most out of your systems, you may need to change the way you use heating or electricity in your buildings.
- To get the best performance from your systems, monitor them regularly to check that they are performing as they should.
- For renewable heating technologies, it can be difficult to assess performance directly unless you specify appropriate metering at the procurement stage. Metering may not be cost-effective unless you're claiming for the Renewable Heat Incentive.
- It is important to to maintain systems regularly (at least annually) to ensure best performance, keep them safe and prolong their life.

Example projects

Project Name	Brief description	Renewable technology installed (kW rating)	Unit rating (kW)	Estimated output (kWh/yr)	Capital cost per kW rating
Veronica Downing	Full refurbishment of Grade II listed Suffolk timber-framed farm buildings to office and product show room. Off gas grid	Biomass boiler (woodchip) with underfloor heating	45	108,300	£489
EAE	Installed renewables as part of moving to new office/warehouse premises on city outskirts	Wind turbine	6	10,000	£3,837
Holywood Old School	Complete restoration project of an 1845 school building to community hall and offices	SHW (flat plate) with underfloor heating	2	4,500	£3,425
Meadow Well Connected	Community centre in North Shields as part of heating system upgrade and refurbishment	GSHP with underfloor heating	45	84,060	£1,822
Newcastle City Council	New extension of Cyrenians building for bedsits and communal areas	GSHP with underfloor heating	5	29,988	£5,623
Neal's Yard	Retrofitted to existing warehouse building which was originally designed for PV	Thin film PV	12	10,800	£5,616
Bayfield Locations	Early 20th century house off gas grid	Biomass boiler with original iron radiators	120	201,600	£192

Example projects (continued)

Project Name	Brief description	Renewable technology installed (kW rating)	Unit rating (kW)	Estimated output (kWh/yr)	Capital cost per kW rating
Wheeldon Trees Farm	18th century stone barns converted into seven holiday cottages, off gas grid	GSHP with underfloor heating	28	90,000	£1,056
Trafalgar Nominees Ltd	Full refurbishment of agricultural barn, to new church/ community hall, off gas grid	SHW (flat plate) for hot water only	6.8	3,260	£1,494
		GSHP with underfloor heating	32	26,000	£327
Asheston House Farm & Barns	Refurbishment of farm buildings to holiday homes, off gas grid	SHW (evac tubes)	14	125,000	£1,644
		GSHP with underfloor heating	34	118,131	£1,282
		Wind turbine	6	10,000	£3,503
South West Carnivorous plants	Office at plant nursery, off electricity grid	PV	2	1,900	£6,429
Breezydaze	Refurbishment of farm buildings to holiday cottages, off gas grid	Wind turbine	6	10,000	£3,936
Cypex Ltd	Office relocation to a five-year-old building	Wind turbine	80	150,000	£2,028
Deane Public works limited	Existing office building	Wind turbine	20	20,000	£1,975
Eastchurch CE Primary School	Existing school building	Wind turbine	6	12,000	£4,353

Checklist for preparing a brief

This checklist is for you to use as a prompt when preparing a brief or specification for prospective installers.

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Description of your site

Provide the installer with sufficient information to make an initial assessment of your site, or invite them to attend your site to ensure an accurate quotation.

Make sure you include the following:

- **Project description** A description of your objectives for the project, as well as what your organisation does and how the site and buildings are used.
- **Site description** Include any relevant drawings, such as the roof layout (for solar panels) and the space available for plant and equipment. Even basic photos can help the installer.
- **Site constraints** Provide details of any particular constraints you are aware of, such as planning constraints, buried services and so on.
- **Access to site and building.**
- **Energy demands.**
- **For heating technologies**, an estimate of your annual demand for hot water, heating and cooling energy, or what it's likely to be (in kWh), as well as an estimate of the floor area of the buildings to be heated.
- **For electricity generation technologies**, an estimate of your current (or proposed) annual electricity demand (in kWh).
- **Energy infrastructure**, details of the size (in Amps) and location of your existing electricity supply as well as whether you have a single or three-phase supply or any back-up generators.

HELP

Design intent

In this section you can set out the functionality you want the system to provide. This could cover the following:

For heating technologies:

- Do you want the system to provide just hot water, just heating or both?
- Do you want the system to provide cooling?
- Do you want the system to provide an alarm to tell you if it has stopped working?
- Do you want the system to provide a back-up form of heating, such as an immersion heater or gas boiler?
- Do you have any particular requirements in terms of the temperature?

For electricity technologies

- Do you already have a size/power output of the system in mind, to suit your budget?
- Do you want the system to provide standalone power via a battery bank, or do you want it to synchronise with the grid?

Set out any other particular requirements that you may have such as:

- metering
- live monitoring displays
- training and after sales support.

Design and performance

To help you assess the different quotations, installers should provide you with basic details of the estimated performance of their systems at your site. Ask the installers to provide the following information:

- Proposed equipment (make, power output) and layout, including details of the control system, electronic displays and metering.
- Performance warranties for equipment and installation.
- Space requirements.
- Availability/lead time for all components and timetable for installation.
- Estimated annual energy output (kWh/yr) for the system at your site, based on your energy demands.
- Estimated annual fuel consumption and running costs for the system under typical operation (£/yr), including future replacement of major components.
- Estimated annual maintenance cost for the system (£/yr), as well as a description of maintenance requirements.
- Estimated annual revenue, or avoided cost, from schemes such as the feed-in tariff or renewable heat incentive.

There is more guidance on how installers should present estimates of the performance of systems in the technology guides for installers on the Microgeneration Certification Scheme website www.mcsdirectory.co.uk

Contract management

Be clear how you would like to manage the contract and sub-contractors.

- Do you want the installer to be the main contractor and have them manage other subcontractors if required?
- Will you have a client advisor or project manager working for you? If so, make the division in roles and responsibilities clear.
- Provide details of any third parties you would expect the contractor to liaise with, such as planners, or utility companies.

Professional experience and policies

Ask for:

- details of previous similar projects
- references
- training and aftercare support
- details of relevant accreditation, both for the installer and the equipment they propose to use
- membership of any relevant trade organisations.

You should also ask for copies of the following professional documents:

- health and safety policy
- risk assessment procedures
- insurance details.

We would recommend that installers should have at least third-party liability insurance (also called public liability insurance) of £1 million.

Depending on your own procurement procedures, you may also ask to see copies of other policy documents, such as an environmental policy or quality procedures.

Cost

Providing guidance to the installer on how you wish the quotation to be broken down will ensure the quote is transparent and help differentiate costs for equipment from labour and design costs. It will also make it easier for you to compare quotes. Use the checklist below as a starting point to create your own cost breakdown relevant to your project:

- All equipment costs, itemised by type of equipment.
- Any survey and design costs.
- Itemised installation costs, including civil works, consumables, delivery costs, travel and accommodation and wiring.
- Commissioning.
- Liaison with utilities, third parties, etc.
- Handover documentation and training.
- Maintenance contract/after-sales service package (if requested).
- Additional warranties (if requested).
- Any other items.

The quotation should also clearly set out:

- any costs that are excluded, but may still need to be covered by the client
- the installer's terms and conditions
- VAT and the rate.

Finally, you should ask the installer to provide a payment schedule, clearly stating when they expect payment. Alternatively, you should set out the payment schedule with them before signing a contract.

- Avoid paying in full immediately after installation. We recommend that you should retain a proportion of the payment (e.g. 10 per cent) until you are satisfied that commissioning has been completed, as well as any training, and relevant documentation.
- You should never be expected to make an up-front payment of more than 25 per cent on signing a contract – and it should ideally be less than this.

Further information

Links to specific technology information

Biomass

The Carbon Trust has produced a range of tools and guides relating to biomass heating.

Ground source heat pumps (GSHP)

The Carbon Trust has produced an overview of GSHP technology. The Energy Saving Trust has also produced one, as well as a design and installation guide for closed-loop systems and heat pump field trials of both air and ground source domestic installations.

Solar hot water (SHW)

The Carbon Trust has produced an overview of SHW technology and more information on installers and grants can be found on the Solar Trade Association website.

Solar photovoltaics (PV)

The Carbon Trust has produced an overview of PV technology and more information on installers and grants can be found on the Solar Trade Association website.

BRE have helped to produce this installation guide, which you may find useful to read when agreeing the specification with your installer.

Wind

The Carbon Trust has an overview of wind technology as well as a wind estimator tool which is a downloadable Excel tool (requires free Carbon Trust login) to help you assess if your site is suitable.

The Carbon Trust is a not-for-profit company with the mission to accelerate the move to a low carbon economy. We provide specialist support to business and the public sector to help cut carbon emissions, save energy and commercialise low carbon technologies. By stimulating low carbon action we contribute to key UK goals of lower carbon emissions, the development of low carbon businesses, increased energy security and associated jobs.

We help to cut carbon emissions now by:

- providing specialist advice and finance to help organisations cut carbon
- setting standards for carbon reduction.

We reduce potential future carbon emissions by:

- opening markets for low carbon technologies
- leading industry collaborations to commercialise technologies
- investing in early-stage low carbon companies.

www.carbontrust.co.uk
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