Preliminary blueprint




Renewable electricity tariffs

('Feed-in tariffs for small scale generation of electricity')

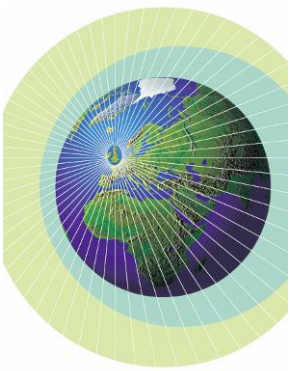
Renewable heat tariffs

('Renewable heat incentive')

Preliminary recommendations on their implementation from the renewable energy industry

Output from working groups and industry input co-ordinated by the

RENEWABLE ENERGY ASSOCIATION


Full document on the website at http://www.r-e-a.net/policy/REA-policy/RET/common/BluePrint

26th March 2009

Dear Minister

Renewable energy tariffs

Feed-in Tariffs and Renewable Heat Incentive

We strongly support the establishment of the Feed-in Tariffs and Renewable Heat Incentive to be introduced pursuant to the Energy Act 2008. The industry has established a series of working groups to participate in their timely design and we are very grateful to the many participants who have contributed to this work, including those in Annex G.

An overview of the background for the work and the basis for the establishment of these groups is given in Annex G and of the terminology used throughout this report in Annex A and identified in italics.

This preliminary report is intended to provide constructive input from the renewable energy industry and related stakeholders into the development of the *renewable energy tariff* mechanisms. We note that government has its own process, and may have constraints, that we have not reflected.

We are aware of the way tariffs have been implemented in other countries and of analysis of best practice in those tariffs[1]. We believe that the UK systems can beneficially mirror the many advantages of the best such schemes. However we have taken an open approach and come up with several new ideas in order to develop a scheme that would work best for the UK (including, for example, minimising adverse effects on the Renewables Obligation).

We do not anticipate that the *renewable energy tariff* mechanisms introduced are likely to be flawless on day one. We believe it is more important that they are 'roughly right' and introduced at the earliest opportunity. We draw attention particularly to this and other overall principles outlined in section 1.

It is not the position of the REA, its members or the wider participants that the approaches proposed herein represent the ultimate answer. We would expect to continue to engage with your officials, regulators and other stakeholders as the mechanisms evolve and help to optimise the final result.

Finally two preparatory actions are needed to ensure the tariffs start well:

- ☆ A statement of the date from when qualifying new plant would be eligible.
- ☆ Interim support to build industry capacity prior to the start date.

Yours,

Philip Wolfe

Director General

Renewable Energy Association

[1] Including "Evaluation of different feed-in tariff design options – Best practice paper for the International Feed-In Cooperation", Fraunhofer Institut, updated October 2008.

Contents

Figures

Executive summary of primary outputs

This is a preliminary report from the network of working groups involving a wide range of stakeholders in the forthcoming renewable electricity and heat tariffs.

In addition to the many recommendations on the design of the mechanisms contained herein, and our preliminary tariff level calculations given in section 5 and Annex C, we highlight a number of overarching points of principle:

- ☆ The tariffs are directed at energy users, not professionals in the energy sector. They therefore need to be simple, clear and unbureaucratic.
- ☆ The tariffs should be (internally and externally) consistent. The electricity and heat measures should mirror each other as closely as possible, especially from the user viewpoint. They should complement, not conflict with, other measures in the energy and related sectors.
- ☆ They need to be structured so that they reward only useful energy output and do not provide any incentive to waste energy, just because its production is supported. Metering should be used wherever viable.
- ☆ The tariff levels need to be set towards the 'generous' end of the spectrum initially to stimulate activity. If they are too low, not only will there be little progress but also insufficient information to adjust the level later.
- ☆ However there needs to be a balance to contain the overall cost, especially as the take-up accelerates in future years. Tariff degression is expected to be appropriate and should as soon as possible be specified in advance.
- ☆ We propose the tariffs will be most economically effective if they do not carry the additional burden of *pre-capitalisation* (consolidating future income into a single up-front payment). This means they will need to attract commercial finance, again mandating simplicity and transparency.
- ☆ The *tariffs* should be set on the basis that they are supporting sustainable low carbon technologies to provide a secure and diverse energy supply, provide employment and improve the UKs competitiveness. They should be complementary to, and not a substitute for a carbon price.
- ☆ The tariffs should support the government's energy efficiency and zero carbon buildings objectives and should not affect *beneficiaries*' ability to claim full benefit for renewable generation for CRC and carbon reporting.

The *renewable heat tariffs* in particular are novel. If existing mechanisms such as the Climate Change Levy or fuel duty could be adapted to enable them to collect funds for the heat tariffs this might prove an expedient means of implementing the policy, rather than designing a new payment mechanism from scratch.

To avoid the need for multiple tariff levels at different scales, we have derived the concept of a terraced tariff, as described in Annex B. It also has other benefits, and we commend its consideration. We have proposed tariff levels for this structure as well as the more traditional flat tariffs.

The views expressed herein reflect the consensus position of the participants. We have intentionally engaged with a wide range of stakeholders, and we would not claim that all participants share all the proposals herein. Where there have been substantial minority positions expressed, these are noted in Annex E.

1 Overview, key issues and recommendations

This work was established as described in Annex G to derive an industry input to the design of the Renewable electricity and heat tariffs (referred to herein as the *renewable energy tariffs* as defined in the glossary[2] in Annex A.

This is not intended as a full design brief for the *renewable energy tariffs*, but a review of factors to be considered and recommendations on some of the design options. In view of the time constraints we have adopted the principle that:

- ☆ It is more important to obtain outputs that are roughly right rapidly than to spend too long striving for elusive perfection.

We recommend that government adopts a similar attitude. It is inevitable that some fine-tuning of the mechanisms will be necessary after they are introduced and this will be accepted by the industry, provided that any improvements are made transparently for good reason.

We recommend below the overall principles that should apply, but note first some important actions which will assist the successful introduction of the tariffs.

1.1 Preparatory actions prior to introduction of the tariffs

The incorporation of the *renewable energy tariffs* in the 2008 Energy Act was widely welcomed, and there is expected to be a substantial latent demand which they will be able to address. However they are not due to come into effect for over a year, and it is important that, rather than face a hiatus, industry is able to ramp-up its capacity in the intervening period. We encourage government to:

- ☆ review the timetables to see if the *inception dates* can be brought forward, and ideally timed to start together, as discussed in section 1.7 below.

Two specific initiatives are needed to facilitate a rapid and effective start-up:

An early announcement on the eligibility of new installations

Energy users awaiting the tariffs may be inclined to wait until the *inception date* before ordering new *energy installations*, especially if they are unsure whether they would be eligible for the tariffs. For the reasons further described in section 2.2 below, we exhort ministers to:

- ☆ make an early statement that qualifying plant commissioned from the date of the statement would be eligible to receive the tariffs.

Because of the strong case for existing plant to be made eligible (see 2.2 below) this statement should not limit the extent to which existing plant might qualify. We believe that, as it is not practical to specify the full eligibility criteria without incurring further delay at this time, it would be acceptable to make a statement confirming that:

- All *energy installation*s commissioned from the date of the statement would be eligible for the *renewable energy tariffs*, if they meet the qualification criteria (which will be consulted on in due course).

---

[2] For clarity when terminology used throughout this report refers to a definition in this glossary, it is given in italics.

- The qualification criteria would include as a minimum all technologies covered by the Low Carbon Buildings Programme, Clear Skies and the Bioenergy Capital grants; for heat and biomethane injection at any scale; and for electricity up to the *upper limit* specified in *the Act*.
- Including and beyond the above, tariffs will be brought forward for all relevant technology classifications listed in *the Act*.
- The statement should specify any further requirements *energy installation*s commissioned during this interim period would need to meet before they are able to claim the tariffs (though not at the time of commissioning).
- Government is considering the basis on which existing plant commissioned before the date of the statement could be eligible for the tariffs.

Clearly this leaves an element of risk for prospective *beneficiaries* developing new *energy installations* prior to the *inception date*. We believe that this statement would reduce the risk to an acceptable level for many instances and therefore enable some new projects to proceed. Others might be delayed until the full tariff design is specified.

Interim industry building incentives

The Low Carbon Building Programme is scheduled to close before the tariffs begin, and is relatively restrictive. It should be opened up to enable a wider number of suppliers to scale up in advance of the introduction of the *renewable energy tariffs*. The Bioenergy Capital Grants Scheme is operating at a low level.

It is important therefore that a new interim measure is introduced or:

- ☆ The LCBP and the bioenergy grants are extended and refinanced to provide increasing demand for and capacity in the industry.
- ☆ A new grant programme for biomethane injection should be introduced as further described in section H3 of Annex E.

We are discussing these options separately, and the necessary modifications to the programmes, with appropriate government departments.

1.2 Resource, regulatory and economic efficiency

The tariffs will apply to a wide range of beneficiaries, in turn supported by many different finance providers.

- ☆ It is essential that the mechanisms are kept simple

We suggest in particular that the payments which beneficiaries will receive for the lifetime of the tariff will be clear, transparent and easy to calculate.

We do not believe it is inconsistent for this relatively extensive report to conclude 'keep it simple'. It does describe several aspects, which we believe the mechanisms should not include, and many of the suggestions herein cover aspects which need not be incorporated within the measures, but would be covered externally (such as assurance schemes), or through guidance notes.

A primary way to ensure this transparency and lack of complexity will be to:

- ☆ keep the secondary legislation as streamlined as possible.

Many requirements can better be covered in guidance notes to beneficiaries, the *regulator* and the *administrator(s)* and in the standards adopted by the *quality assurance register* and guidance to *accredited installers*.

Discouraging inefficient energy use

Tariffs should be payable only on energy produced which can be beneficially used whether consumed locally or fed into a suitable energy network. They should not incentivise wasteful production of energy (for example unnecessarily or over-heating buildings). We therefore propose the creation of a definition of *eligible energy* on which tariffs would be based.

One way in which this could be achieved, if the principle of using *accredited installers* is adopted further to 1.3 below, would be for the installer to certify the *eligible energy* of each *energy installation* (based on agreed guidelines – perhaps related to *SAP*) and this would then be used as the basis on which the output would be *metered* or *deemed*.

Working groups agreed with the principle of addressing energy efficiency before/at the same time as installing renewables. It was agreed that this should be achieved through the guidelines on *eligible energy* for *accredited installers* described in section 1.3 below, rather than formal linkage to the tariffs, which would be difficult to implement and provide an additional administrative burden on the system. Also energy efficiency measures can be installed after electricity generating equipment has been installed, resulting in greater export to the grid.

It was also agreed that promotion material connected with the tariffs should give basic consumer advice on energy efficiency. A recommendation that energy audits be done prior to heat projects being specified would be helpful.

Keeping the administrative burden to a minimum

The tariffs are intended to encourage a wide range of energy consumers (and others) to engage in sustainable energy production. It is therefore essential that they are easily understood and administered[3].

For similar reasons the measure will need to be interpreted with a degree of flexibility to ensure that it enfranchises the wider range of participants and technologies intended. The registration, metering and payment facilities (amongst others) therefore need to be established accordingly.

Cost of policy/cost to consumers

A well-designed tariff system will encourage substantial new renewable capacity and it is therefore important that the mechanism doesn't act as a blank cheque for unlimited costs to be passed on to consumers with adverse effects on fuel poverty and competitiveness.

Based on initial estimates, described in section U4 of Annex E, we have assessed that the added cost of the tariffs in the first year would be of the order of 0.7%[4]

---

[3] This means for example that it would be very substantially less complex than the RO, which is appropriate to energy companies with substantial regulatory compliance staff, but not for the range of beneficiaries likely to be involved.

of overall energy[5] bills, rising to 3.9% in 2020 when the tariffs would be delivering about 10.2% of the UK's energy[5]. This compares with an indicative 2020 cost of the Renewables Obligations of approximately 4.3%.

The government may wish to give guidance to *supply companies* as to how the *levy* is passed on to consumers (for example to alleviate fuel poverty and to encourage low energy consumption). For example energy users on social tariffs and prepayment meters could be excluded when the *levy* is apportioned between consumers. It would also be possible to set the heat levy for non-netbound fuels at a lower rate if it would otherwise have a disproportionate impact on vulnerable users.

This report does not address the wider fuel poverty issues considered by the 'users' *working group*. These are however being further reviewed by Consumer Focus and other group members, and it is important that these are studied by government and consulted on in the final design.

The mechanisms should also retain the possibility that the costs could be allocated in part to other sources and not solely a *levy* on energy users. It may for example be appropriate to allocate a part of the income from future auctioning of EUETS allowances or from the fossil fuel or climate change levies to this purpose.

The proposals under 'Tariff *degression*' in section 5.8 below allow for costs to be reduced as volumes rise, thereby controlling the overall cost of the mechanisms.

Fraud prevention

The use of *accredited installer*s as proposed in section 2.4 should make it difficult for ineligible *energy installation*s to claim the tariffs. It is assumed that the *quality assurance register* described in section 1.3 below will include disciplinary provisions against *accredited installer*s who certify installations inappropriately.

We have not addressed the issue of fraud by the *beneficiary* as we assume that government has adequate experience in minimising fraudulent support claims.

We envisage that there may be a need to instigate a system of periodic spot checks to ensure the scheme is working properly with respect to such issues as:

- The reliability of *accredited installer*s further to section 1.3
- Non-incentivisation of wasteful energy further to the comments above
- The effectiveness of *deemed* and *metered* figures further to 1.5 below

and other appropriate aspects.

1.3 Quality assurance

As these tariffs are intended for consumers who are not themselves energy experts, it is recommended that there be appropriate quality safeguards on the systems used. We recommend that consumer assurance, product certification[6]

---

4 Including our proposals for an early announcement in section 1.1 and *retroactivity* in 2.2 – see details in subsection U4 of Annex E

5 Excluding transport energy

6 For those products offered to householders and small businesses.

and installer accreditation are requirements for all *energy installation*s eligible for tariffs.

- ☆ We propose that an industry self-regulated *quality assurance register* of all eligible suppliers and relevant products is established to conform to the requirements of the European Renewable Energy Directive.

There would be a variety of approved accreditation routes onto this register. Existing RO-accredited projects and projects installed under the Microgeneration Certification Scheme (MCS) would be automatically added to the register. Other existing schemes such as the REAL code and the proposed scheme for biomass fuels, in addition to relevant competent person schemes and certification against recognised standards should also be recognised.

The register would include a list of the eligible accreditation channels. Self certification (as operates under the RO) should be the norm for the electricity installations not covered by the MCS. Certification for larger heat installations needs to be defined.

- ☆ The scheme should provide an appropriate level of control in the light of the typical customers for different types and scales of system, without incurring an undue burden.
- ☆ The industry has offered to consider this aspect further and to come up with more complete recommendations based on the outline below.

Consumer assurance

The REAL code covers the sale of renewable energy systems to consumers and is due to be accredited under the OFT's Consumer Code Approval Scheme. Any equivalent codes should also be acceptable for sales to consumers, provided that they are also accredited under this scheme.

A similar code is to be introduced shortly covering sales to non-consumer customers. Because many *beneficiaries* are not expected to be energy experts, it is recommended that all sales should also be subject to a relevant code of conduct (though for non-domestic customers it would not be subject to consumer sales legislation).

Installer accreditation

The existing Microgeneration Certification Scheme covers certification of installers for *microgeneration* (as defined). It might be helpful for this, or alternative schemes recognised hereunder, could make better use of existing certification and competent person schemes, especially those already widely used in the building services sector.

There will be a need for a new scheme to cover larger renewable heat systems as described in 2.4 below. Again this should be integrated as fully as possible with existing training and certification approaches.

Ideally this scheme should also enable competent users, especially in the land and agricultural sectors to be able to install and self-certify their own *energy installations*.

Product assurance

The existing Microgeneration Certification Scheme covers most *microgeneration* technologies under 45kW$_{th}$ and 50kW$_e$. The MCS should be extended, for example to better accept European product certification scheme information, data, results and be more flexible over how manufacturers manage their quality management systems and factory production control.

There will be a need for a new, more flexible scheme to cover *energy installations* above the limits of microgeneration.

Biomass fuels and sustainability

As *bioenergy technology* is expected to be a substantial contributor to the *renewable energy tariffs*, this will lead to the use of a variety of biomass fuels, which should also be quality-controlled. With assistance from the Carbon Trust, HETAS and others are investigating the possibility of establishing a biomass fuel certification scheme, which might meet some or all of the requirements here.

The sustainability of biomass fuels will also need to be controlled pursuant to EU and other regulations. This will need to be covered by a *sustainability certification scheme* either integral within the above scheme or separately. The principles that would need to be addressed are detailed in Annex F.

1.4 Heat networks and other infrastructure

The tariffs are designed primarily to encourage the production of renewable energy. However there are additional infrastructural considerations that could make this policy more effective, such as encouragement for the creation of ESCos and the installation of heat networks.

We have not taken into account in the calculations described in section 5.2 the additional cost of heat networks. However, we believe that the *Terraced Tariffs* in particular can provide a mechanism for encouraging heat networks, without adding undue complexity, as described in Annex B. Our proposals for CHP also provide additional benefits (as mentioned in section 5.6), so should encourage the installation of heat networks.

1.5 Measurement issues

As the tariffs are paid on the basis of energy produced it is in principle necessary to establish the output of the *energy installation* by *meter*ing its output. However there may be cases where this may be inappropriate and estimating the output (*deeming*) is acceptable as discussed below.

It is noted that *pre-capitalisation*, if adopted, (see 1.6 below) would require the output to be estimated in advance and therefore would require *deeming* (even for systems that are *metered*).

Metering

For electricity generating installations metering is in any case the norm. Relevant *working groups* agreed that *metering* is preferable and therefore should be used where viable because:

- It encourages systems to be configured as efficiently as possible
- It ensures systems are maintained and kept in service
- It is less open to fraud

It was accepted that there may be cases, where the practicalities or cost could make metering unviable, especially for example on systems used primarily for space heating where low cost metering options were not widely available. It is therefore proposed that *deeming* should be allowed up to a specified ceiling with *metering* obligatory beyond that.

There might be instances where proxies may offer a more convenient approach to metering. For example the amount of biomass fuel delivered, or biogas produced could be a more accessible measure than heat delivery.

It should be remembered that metering requires not only the conversion or installation of metering equipment, but also regular reading to match the tariff payment periods (see 3.3 below). We also note that smart meters offer several benefits and suggest that the government should:

- ☆ Ensure that the specification for smart meters should enable all potential requirements for the *renewable energy tariffs* to be accommodated – including the ability to meter and transmit data on heat
- ☆ Co-ordinate the roll-out of smart metering to coincide with the take-up of tariffs – in fact as smart meters will be eligible under CERT, suppliers could be required to install with tariff-eligible *energy installations*.

Deeming

As described above we consider there may be instances, especially for heat, where *deeming* could be adopted. For the reasons also described above, *metering* should be applied wherever practical and therefore limits should be placed on *deeming*:

- Metering should be required at sites where an appropriate smart meter is installed.
- There should be a size limit above which deemed output would not be eligible for a tariff. Having at first considered that the microgeneration limits might be used we now recommend this should be expressed in terms of the annual output of the system and suggest a limit in the range 2-5 MWh/year[7]. This could be adjusted downwards as technology improves and meters become cheaper.
- There is justification for setting the limit lower or excluding deeming for electricity generation where low cost metering is widely available.

[7] Thus a non-metered installation could only earn the tariff for a maximum of 2 or 5 MWh's worth of output, even if its actual output exceeded this.

- We suggest that these proposals would be a god subject for consultation.
- The *deemed* output level should be calculated (in the guidelines used by *accredited installers*) at the lower end of expected delivery – perhaps the 20-year low (*P95 level*).

We concluded on balance not to recommend a time limit, of say fifteen years, whereafter *metering* would be required if the *beneficiary* wants to continue to benefit from the *renewable energy tariff*.

Billing

Issues relating to the payment of the *renewable energy tariff*s and related aspects of the energy users' payment for the non-renewable energy they consume are discussed in 3.3 below.

For non-corporate *beneficiaries*, income from tariffs should be exempt from income tax. This is the case with ROCs from microgeneration.

1.6 Financing installations subject to the tariffs

A substantial barrier to the wider installation of on-site and small-scale renewables is the capital cost of the installations, and it is essential that the *renewable energy tariffs* are developed in a way which contributes to overcoming this issue.

We conclude that simple, clear tariffs at adequate levels will stimulate the sector and encourage finance to come forward to pay for new installations. We therefore recommend that the focus should be on setting appropriate tariff levels and administrative systems. We are of the opinion that the mechanism needs not incorporate its own *pre-capitalisation* provisions (as discussed in 2.6 below). Instead financing instruments should become available in the normal commercial market.

1.7 Interaction between renewables (and other energy) incentives

Correlation between the two mechanisms

It is anticipated that many *beneficiaries* may take advantage of both the *renewable electricity tariff* and the *renewable heat tariff*, either because one project qualifies for both, for example combined heat and power or because both heat and power installations might be installed at the same site (e.g. solar thermal and PV).

There are therefore strong arguments in favour of:

- ☆ Making the two systems administratively as similar as possible (including a common application process)
- ☆ Introducing them at the same time (notwithstanding the existing proposal that one is introduced a year before the other).

Maximising the similarity should assist in bringing forward the *renewable heat tariff* as there will be less custom design work required (mainly around the *supply company* issues (see section 3.5 and Annex D), the levels of the heat *tariffs* (sections 4.3 and 5.5) and the arrangements for biomethane (sections 4.4 and 5.7).

This report therefore draws out the many areas where the same approach can be taken for the two mechanisms, before addressing the sector-specific issues.

Interrelation between the RO and the renewable electricity tariff

The *upper limit* of 5MW defines (subject to any *technology limit* – see 4.2 below) a threshold above which projects would not be eligible for the *renewable electricity tariff*, but could operate within the RO.

Below this level *energy installations* could be eligible for either mechanism. Clearly they should not be able to participate in both. New installations between 50kW and 5MW must be given the choice of either mechanism, to allow companies familiar with the RO to use the existing mechanism. These projects should get a once-only choice which scheme to enter. There should be no ability to chop and change between mechanisms. If a scheme previously on a tariff is extended, such that it moves beyond the threshold and is no longer entitled to a tariff, it should be allowed to move into (or back into) the RO.

To assist with forecasting the size of the levy pot, a time limit of 2 years is proposed, beyond which existing RO-accredited generating stations should not be eligible to opt to move over to a tariff.

The argument to retain choice is weaker for new *microgeneration* projects. Removing microgeneration from the RO would simplify the RO legislation, and the REA believes this would be desirable[8].

It is proposed that for installations currently accredited under the RO:

- All microgeneration projects are encouraged to move to the *renewable electricity tariff*. Government might wish to consult over whether this is optional or mandatory.
- All larger projects are given a once-only opportunity to migrate to the *renewable electricity tariff*.

Interrelation between the RTFO and the renewable heat tariffs

There is unlikely to be direct interaction between the RTFO and the tariffs, beyond a general impact on biomass prices as the range of potential uses and projects widens. The tariffs could provide an additional market for liquid biofuels, although this is unlikely given the current drafting (see note in section 4.3).

Carbon Reduction Commitment and environmental reporting

In line with the principle that tariffs should not perform the role of a carbon price, we propose that *energy installations* eligible for *renewable energy tariffs* should be classified as having zero carbon emissions (where they are renewable) under the CRC and Defra's best practice GHG reporting guidelines. This is consistent with the EU emissions trading scheme which covers larger installations but does not require those installations to buy carbon allowances.

The CRC and environmental reporting guidelines do not allow projects which receive support under the RO to be counted as having zero emissions. The logic

[8] Indeed the REA had argued for addressing the needs of microgeneration through tariffs rather than make the changes to be introduced on 1st April.

is that this is double counting of a 'carbon benefit' already 'assigned' to the energy supplier. The REA fundamentally disagrees with this argument. We consider REGOs rather than ROCs should perform the function of assigning carbon benefit. In any case, because there is no supplier compliance aspect to the *renewable energy tariff*s, this argument could not be applied here.

Our modelling calculations have taken the costs of carbon into account, and tariff levels would need to be revised upwards to compensate if government takes a different view.

Carbon Emissions Reduction Target

The CERT has recently been amended to make renewable energy installations eligible. We see this as a relatively weak stimulus for the sector, as an interim measure before the introduction of the *renewable energy tariff*s.

We accept that if the *renewable energy tariffs* prove to be as successful as we hope it might be logical to take renewable energy out of the CERT after a reasonable period following the *inception date*.

Community Energy Saving Programme

There are several synergies between CESP and the *renewable energy tariff*s and we believe the two mechanisms can co-exist comfortably. We suggest that CESP expenditure should be able to be deployed on *energy installations* covered by the *renewable energy tariff* mechanisms, and indeed that these are a way of leveraging CESP expenditure to enhance its effectiveness.

Zero carbon buildings

We have concluded on balance that buildings constructed to future zero carbon standards should benefit from *renewable energy tariffs*. We accept that there may be issues of additionality, but believe that, certainly in the early days of the new standards, the benefit from the tariffs will help to mitigate the increased costs of building to improved standards and to reduce pressure to water down the definitions applied.

2 Recommendations on the user aspects

2.1 Eligible installations

It is assumed in general that all *energy installations* of technologies listed in *the Act* and defined further in sections 4.2 to 4.4 below would be eligible for the tariffs subject to the timing issues in the following sections.

There are some systems that might be construed to fall within the definition, but which we presume were not intended to be eligible and these are discussed in section H2 of Annex E.

In cases where second hand equipment is used, it is proposed that this moves directly onto the *standard tariff* of the *Terraced Tariffs*.

2.2 Effect of installation date on eligibility

Subject to the eligibility criteria defined, it is assumed that all systems installed after the tariffs come into force (the *inception date*) would qualify for tariffs. For the *biomethane tariff* the relevant date should be the commissioning of the biomethane injection plant, irrespective of the age of the plant which produces the biogas.

Projects to be installed prior to the inception date

For the reasons given in 1.1 above, it is important that new *energy installations* are eligible and an early statement is needed to clarify this.

Existing installations

Most participants believe that the tariffs should be fully *retroactive* to the extent that existing qualifying plant should receive tariffs under the scheme. There are many reasons:

- It will enable microgeneration plant and larger plant under the *upper limit* to move out of the RO (as proposed in 1.7 above and also understood to be the preference of DECC and Ofgem).
- To overcome the danger that existing heat plant could become comparatively uneconomic without receiving tariffs and would therefore cease being used – leading to inefficient use of existing capacity.
- This is particularly significant in the case of *bioenergy technology* where the ongoing cost of the fuel may make installations non-viable without tariff support.
- One instance is those plants installed to meet the requirements of planning constraints (e.g. to achieve 10% of energy from on-site renewables, which some meet through biomass boilers designed to meet 10% of the load and gas boilers for the other 90%). Today a significant proportion of such installations are seldom or never used. Without tariff support, it is likely that the biomass boilers would continue to be only marginally used, whereas tariffs would enable them to be used preferentially.
- The existence of robust renewable tariffs is likely to underwrite what has been a weak market for bio-energy fuels. This could price historical biomass plant out of the market.

- Creating an 'unlevel playing field' between existing and new plant could provide perverse incentives for wasteful approaches, e.g. decommissioning existing plant and installing new facilities in their place.
- Government has accepted that the historical exclusion of heat from active policy measures should be rectified. It would therefore be undesirable (and) to treat heat less favourably than electricity – where many installations will benefit from *retroactivity* as noted in the first point above.
- The Renewables Obligation set a precedent both for supporting existing plant and for applying to installations which benefit from grant support. It would therefore be legally and logically questionable to exclude heat installations from the *renewable energy tariffs* on such grounds.
- Promotion of the mechanisms will be an important ingredient in their success as discussed in section 2.3 below. Modest support flowing to existing systems would create a network of tens of thousands of enthusiasts promoting the tariffs.
- It will provide a 'baseload' of existing systems making the *levy* levels easier to estimate in the initial stages.
- It is undesirable that early adopters who have invested personally in the emerging renewable technologies should be penalised in comparison to the later entrants. Where these owners have benefitted from government grants, this can be mitigated as proposed below.
- Finally the costs associated with *retroactivity* are expected to be relatively insignificant, especially if the *Terraced Tariffs* is adopted in conjunction with the proposal in the following paragraph. Based on this approach an indicative estimate of the cost of making the *renewable heat tariff retroactive* would add perhaps £70m to the cost, as shown in section U4 of Annex E. We have not estimated the costs for the *renewable electricity tariff*, because that would depend on the level of migration from the RO.

A proposal on limiting the costs of *retroactivity* under the *Terraced Tariffs* (as further described in Annex B) is that existing plant that has benefited from government grants could go straight onto the standard tariff (or potentially repay the grants and then benefit from the higher thresholds).

It is envisaged that, on becoming eligible for the tariffs, existing heat *energy installation*s would be subject to certification by an *accredited installer* as described in section 2.4 below, unless they have previously been subject to eligibility checks under a previous government scheme such as the LCBP, or its predecessor schemes or a bioenergy capital grant (in all of which cases, the reduced tariff availability described in the paragraph above would apply).

2.3 Who would be the beneficiary of the tariffs?

In *the Act* the *beneficiary* is defined as the owner of the *energy installation* and we consider that this is the appropriate approach subject to the following:

- It should be possible for the *beneficiary* or a group of related *beneficiaries* to nominate a third party to act as their agent to mange receipts under the tariffs.
- The financial arrangements for the installation may lead to a lessor or mortgagor to be technically the complete or partial owner of the *energy*

installation, but we would envisage that, unless otherwise agreed, the lessee or mortgagee should be the *beneficiary*.

As this is to be a fundamentally new mechanism applying to a wide range of prospective *beneficiar*ies, many of whom will have no previous active involvement in the energy sector, the scheme will need widespread promotion. The government should ensure that the necessary resources are made available to do this, either directly, or through the arrangements with the *regulator*, *administrator(s)* or the *supply companies*.

The government may need to consider how it will ensure that the occupiers of buildings where *energy installations* are installed receive the benefit of the resultant savings in imported fossil fuels, where they are not the *beneficiary* of the tariff.

Tariffs for Escos

We believe the above proposals are appropriate for the establishment of Escos, and recommend that the government reviews this situation as more Escos become established.

2.4 How energy installations are registered for the tariffs

The promotion activities proposed above will include details of how prospective new *beneficiaries* would apply for tariffs. The application process should be brief, straightforward and non-technical, and should incorporate all prospective systems (under both the *renewable electricity tariff* and *renewable heat tariff* in a single application.

To ensure the integrity of the scheme we propose that *energy installations* become certified for eligibility for the *renewable energy tariff* by an *accredited installer* on the *quality assurance register* . At that time the details of the *energy installation*, including its *eligible energy* output would be submitted to the relevant *administrator*, so that tariff payments can be initiated.

We would see this as an automatic process requiring the minimum of effort from the *beneficiary* perhaps similar to the scheme used for electrical works undertaken pursuant to Part P of the building regulations. This could be integrated with the tariff administration procedures discussed in section 3.3 below.

We would anticipate that *energy installations* would become eligible for the tariffs on commissioning and that the level of tariff they receive would be set at that time (see also *grandfathering* and *degression* in section 5.8 below).

2.5 How beneficiaries claim the tariffs

Again in this area it is important that there is widespread promotion of the scheme by government and that independent advice should be available to prospective *beneficiaries*, including on the selection of the most suitable technology types.

Details of payments of the tariffs are covered in section 3.3 below.

2.6 Pre-capitalisation

The primary legislation has allowed for the possibility of the payments (based on *deemed* output) being consolidated and paid in a single up-front payment. We refer to this payment approach as *pre-capitalisation*. This has led many to relate *deeming* and *pre-capitalisation* as a single issue, but we have considered them separately – it is certainly possible to have the former without the latter.

The *working groups* agreed the need for owners to be able to receive funding to support the initial capital cost (as discussed in 1.6 above). However they concluded that *pre-capitalisation* does not have to be an integral part of the *renewable energy tariff* mechanisms, because it might:

- add complexity to the mechanisms,
- make it more difficult to forecast the size of the levy pot,
- increase the risk of failure to operate the *energy installation* and of potential fraud
- represent a financial burden, which in the light of finite resources available through the *levy* might bring pressure to reduce the tariffs below levels that would be attractive for most technologies.

An effective *tariff* system *shou*ld lead to leasing, loan and/or mortgage instruments being offered to *beneficiaries* which would in effect provide *pre-capitalisation* through the normal financial markets as discussed under 1.6 above. It was therefore noted that the *renewable energy tariffs* would need to be clear, comprehensible, consistent and long-term so that the financial markets could use them as a basis for funding products.

Especially in the present economic circumstances, government needs to ensure that any measures it is taking to improve the availability of credit and financing will provide the necessary liquidity for the uptake of the tariffs. It also needs to ensure that prospective *beneficiaries*, who are ill-equipped to access standard credit provisions, are also catered for. Government may wish to consult on how this might be best delivered.

3 Recommendations on the energy supply aspects

The primary legislation implies that the *renewable energy tariffs* are intended to be *production tariffs*, i.e. to compensate the overall generation of the *energy installation*, whether or not it is exported to an external network. We support this approach as it is readily applied to heat and electricity and to stand-alone and network-connected systems, and for the reasons given in 3.2 below.

3.1 The energy delivery on which the tariffs are based

The tariff itself therefore provides no incentive for *beneficiaries*, who can export energy, to minimise their own energy consumption. It is therefore recommended that an *export price* is paid additionally to the *beneficiary* on any *metered* energy exported, as illustrated in Figure 1.

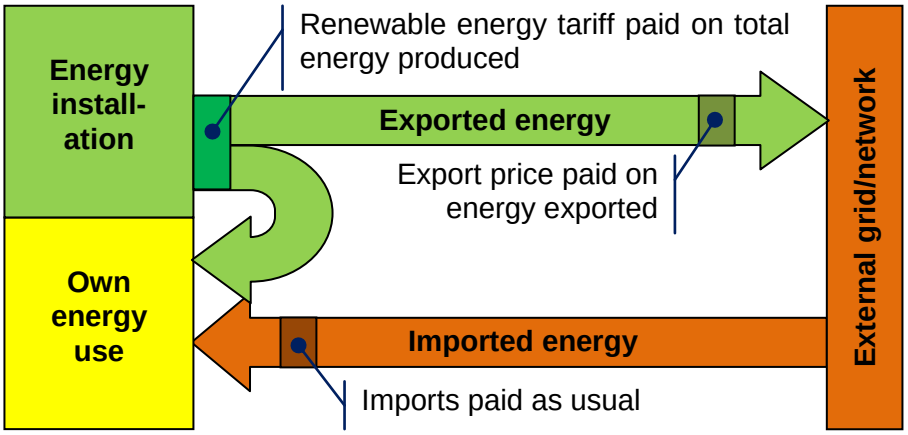


Figure 1 Energy flows and tariff payments for network-connected system

For electricity exports, the *export price* would be due from the *supply company* and for heat from the energy services company responsible for the heat network.

For installations which are not connected to a network or not configured to export, but where the output is entirely used on-site, a different model applies, as shown in Figure 2 and no *export price* applies.

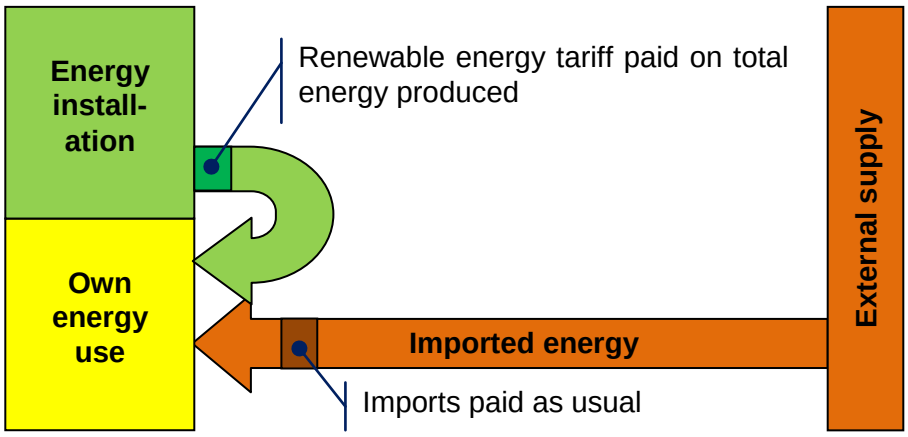


Figure 2 Energy flows and tariff payments for stand-alone system

The *export price* would be paid at the same time as the *renewable energy tariff*. We propose that this *export price* would not be passed on to consumers through the *levy* as it represents a payment by the *supply company* for energy received onto its network for resale. It would be set at a level established between the *supply company* and the *beneficiary* and subject to market competition.

For the purpose of modelling, as described in Annex C, we have set the *export price* for electricity at half the average commercial price.

For biomethane the payment is a combination of the renewable tariff and export price, and the purchaser then owns the gas. The purchaser of the gas is expected to claim the difference between the tariff and the market price for gas. This is described further under biomethane specific issues in section 3.6, below.

Absolute or relative tariffs

We propose that the *renewable energy tariff*s should in all cases be set at an *absolute* level (a published price in pence per kilowatt hour).

We have considered the possibility that the levels could alternatively be set at a *relative* level expressed as a premium over the standard grid-supplied electricity or gas, but we do not recommend this either for the *renewable energy tariffs* or for the *export price*.

3.2 Ownership of the energy produced

An implication of the production tariff proposal is that, notwithstanding the payment of the *renewable energy tariff*, the *beneficiary* retains title to the energy produced (some parties refer to this as a *premium tariff*). The title to energy exported would transfer to the *supply company* only in consideration of payment of the *export price*, except for biomethane as detailed in section 3.6 below.

We do not propose that the *renewable energy tariff*s are defined as what some parties call *purchase tariff*s, i.e. where there is no *export price* and payment of the *renewable energy tariff* itself gives the *supply compan*y title to the energy. This would then give the *supply company* the right to charge the *beneficiary* for any energy used on site. We believe that this would be confusing and demoralising for the *beneficiar*y, who would not expect, as owner of the *energy installation* to pay for energy which he has produced (even if he has received a *tariff* payment).

3.3 Cash collection, payment and administration

Collecting the levy

Subject to any exemptions, discussed in 4.5, the *levy* would be collected from energy suppliers who would pass it on to their customers.

The most straight forward way to set the levy is in terms of pence per each kWh supplied (as opposed to customer numbers, carbon intensity of the fuel mix etc).

There will be a degree of uncertainty about how much is required, which will progressively diminish as the scheme becomes more established and the installation base increases. This uncertainty would be amplified if pre-capitalisation was inherent in the scheme.

There will also be seasonal variations – winter heat demand is particularly sensitive to the severity of the winter. A shortfall in the levy could also occur as a result of a supplier going into administration.

The consequence of an insufficient levy pot is greater than the consequence of over collecting. As a result the levy should be calculated using optimistic assumptions on take-up and load factors at the higher end of the distribution[9] so that it is set at a sufficiently high level to be confident of meeting demand. The levy should be set for the whole year if possible, to mitigate concerns over accountability and predictability – but there should be provision to adjust it during the year if necessary.

There are a number of ways the amount of the levy could be estimated:

- The *administrator* could (themselves of through a consultant establishing a model to predict the likely trends as a result of the tariffs offered
- Projects electing to move from the RO to the tariff should be required to give, say, 3 months' notice

We rejected two further alternatives in line with the principle of simplicity as they would create additional administration which could be a barrier to take up:

- Installers could be asked to notify the *administrator* of expected installations over the following year
- Beneficiaries could be required to declare an intention to install a renewable energy system

In any case, there should still be some insurance against the possibility of the levy pot being insufficient. A 'float' similar to that suggested on page 119 of the Renewable Energy Consultation in relation to the heat tariff would be a welcome solution for both tariffs. An additional measure or alternative if the Government will not guarantee payments would be to stagger the introduction of the levy and the tariff – so that the levy is collected (say) a quarter before tariff payments can be claimed. Ideally in the light of seasonality for heat, the levy could apply from winter and tariffs from spring. Regular collection of the levy (monthly or weekly) will also help reduce the impact of suppliers going into administration.

The collection system should be as simple as possible.

Suppliers' cash flow

Suppliers most actively engaged in decentralised renewable energy are likely to pay out the levy to proportionally more customers. Small suppliers may also specialise to a greater extent in decentralised generation. If there is significant time lag between paying out to customers and compensation from the administrator this will impact on the suppliers' cash balances.

To avoid adverse impacts on suppliers, particularly those with a large number of customers on the tariff, payments between the administrator and suppliers will need to be made frequently. We recommend they are made on a weekly basis, but at the very least on a monthly basis.

---

[9] I.e. the load factors for hydro typical of a very wet year, for wind of a windy year, for PV and solar thermal for a sunny year etc.

An additional measure to alleviate the problem could be for suppliers to be compensated on forecasted, rather than actual generation, with reconciliation once actual generation is known.

Paying the tariffs

In general *tariff* payments should coincide with utility payments by the *beneficiary* to the *supply company*.

It is recommended therefore that the *tariff* is paid out to domestic customers on a quarterly basis in arrears, in line with billing and to non-domestic (larger installations) on a monthly basis.

Paying beneficiaries with no supplier

In some circumstances a generator may not be connected to the electricity network or a new community scheme, wishes to connect to the grid, and may not have a dedicated supplier. Biomethane injection plant is likely to be in a similar situation. There is no local supply company on which an obligation to purchase the output from such projects can be placed. It cannot be placed on the distribution network operator (electricity or gas) as the DNO licence does not allow the holder to engage in supply.

- ☆ It might be necessary to include provisions for such *beneficiaries* to claim their *tariff* payment directly from the *administrator*.

Neither electricity nor gas supply companies are obliged to offer a price for sales of energy to them. The Climate Change and Sustainable Energy Act 2006 gives enabling powers for the Secretary of State to make modifications to electricity licences to ensure they offer to acquire the export from customers with microgeneration. However this does not extend to larger projects, and furthermore these powers must be enacted within three years of the Act having received royal assent, i.e. by 21st June 2009. Consequently enabling powers under the Energy Act 2008 itself may have to be used to provide this.

However, biomethane injection plant would need to find a gas supply company to either purchase its gas at the full tariff rate or claim the tariff direct from the central fund. We envisage gas suppliers that do contract with biomethane producers will be able to reclaim the additional costs of purchasing biomethane from the central fund (i.e. the difference between the tariff and a reference price). However there may be disincentive to them purchasing smaller volumes.

It is clearly undesirable for biomethane to be being injected into the gas grid without a supplier paying for it, even if the biomethane producer is recompensed. Either the biomethane could be auctioned, in order to maximise the value realised for the underlying gas or gas supply licences could be modified in order to oblige licence holders to purchase gas from biomethane producers.

Finally, beneficiaries may also experience problems if their supplier goes out of business. Arrangements should be put in place for such events. This may be the ability to claim directly from the *administrator*, which could then be compensated by the new supplier, to avoid delays in payment.

Administration

The *administrator* would need to undertake several functions most of which are self-evident from the design of the mechanisms proposed herein.

It would retain the master register of eligible *energy installation*s including:

- Location
- Details of the *beneficiary*
- Details of relevant *supply company*
- Technology classification
- Date of entry into the scheme
- Capacity (not essential if *Terraced Tariffs* is adopted, but useful for the purposes of estimating the fund requirements and assessing the policy's success)
- Cumulative output to date (if *Terraced Tariffs* is adopted)
- Flag if only the *standard tariff* applies (in *Terraced Tariffs*) e.g. for existing plant (see 2.2 above) or the heat output of CHP plant (see 5.6 below)

When a new system is first registered these details could be provided automatically by the *accredited installer*.

The *administrator* would also oversee the *supply companies* in collecting the *levy* as described below and the distribution of the *tariffs* to *beneficiaries*.

The administration of the RO, renewable electricity tariff and heat incentive should be aligned so that CHP installations do not have to go through two separate processes to gain accreditation.

3.4 Electricity supply company issues

Levy mechanism

Various *levy* collection and administration models have been put forward. No serious objections were raised to using a version of the model explained in annex 2 of the Renewable Energy Strategy consultation. Two other models were also considered as described in section E1 of Annex E.

Two important areas of concern for suppliers are cash flow (discussed in section 3.3 above) and the title to the power (discussed in section 3.2 above). The *working group* also considered payments to *beneficiaries* with no supplier[10] (as discussed in section 3.3 above) and exemptions from paying the levy.

Exemptions from paying the levy

It is recommended all licensed electricity suppliers are required to pay the levy irrespective of size. The administration burden is not expected to be too high and mirroring the exemption thresholds of CERT and CESP could provide a perverse incentive to suppliers not to grow beyond the threshold. It may however be advisable to consult on whether special arrangements should be made for very small or local suppliers to ease their administration burden.

[10] A new connectee, such as a community wind project might not have a *supply company*.

We do not recommend that green supply be exempt. This is in line with the treatment of green electricity supply under the RO.

However this does differ from the proposed treatment under the heat tariff. Here renewable fuel suppliers will not be paying the levy as the primary legislation does not allow for the levy to be raised from renewable supplies. We note there are also differences between the heat and electricity levy, the renewable supply in this case is physical rather than contractual and the *energy installation* is the same as the installation being supplied with levy-exempt fuel.

3.5 Heat supplier issues

Scope of levy

There is a clear policy intent that the levy for the heat tariff would not apply to electricity used to generate heat. In principle, the levy should apply to all other fossil fuel suppliers, without a de minimis threshold unless a pressing case can be demonstrated.

Whilst gas is the most significant fuel, we do not recommend the levy for the *renewable heat tariff* be levied on gas alone. Clearly there is an equity issue if the *renewable heat tariff* were to be entirely raised from a levy on the least carbon intensive of the fossil fuels, especially as it is likely to be funding a higher proportion of off-gas grid installations at the domestic scale (at least initially).

Levy mechanism

The *renewable heat tariff* is a novel measure. The longer timescale proposed for its introduction is based on the expectation that the *fossil heat levy* in particular, will take longer to design. We are not convinced this is the case.

We have considered the possibility of adapting an existing mechanism, such as the Climate Change Levy (CCL) or the creation of a new collection approach. The CCL has set some useful precedents in how to deal with the dual use of fossil fuel for heat and other purposes in industrial situations. However there are some fundamental mismatches which makes it inadvisable starting place for adaptation for the purposes of the renewable heat incentive. It does not apply to domestic customers and there is also significant political uncertainty around the long-term future of the CCL, to which we would not wish to expose the new heat tariffs.

Hence we recommend a new collection mechanism for raising the levy from gas and using the existing fuel duty collection infrastructure for collecting a contribution for the non-net bound fossil fuels. The new collection mechanism, proposed in Annex D, shares some of the features of the Fossil Fuel Levy, introduced in 1990.

Calculation of levy

We do not believe there is a need to distinguish between fossil fuels supplied for space heating and cooking, as the fossil fuel is used to generate heat in both cases. In any case, attempting to differentiate between the two would risk needless complication. Whatever mechanism is used will need to interact smoothly with CHP plant and address the above issues on dual use of fuels.

A further issue is the treatment of blends of fossil and renewable fuels. For example, trials are currently being conducted of blends of kerosene and biofuels and this is the most likely route for deployment of renewable liquid fuels for heat.[11] Our provisional view is that the portion that is fossil should pay the levy and that which is renewable should be eligible for the tariff.

3.6 Biomethane issues

For biomethane installations, we anticipate that payment would only be made for biomethane which is exported to the grid as shown in the figure below

If the biomethane is used locally, for example to fuel vehicle fleets, it would be eligible to claim Renewable Transport Fuel Certificates. If it were to be used for heat production it would be eligible for the *renewable heat tariff*, or for the Renewables Obligation or *renewable electricity tariff* if used for electricity production.

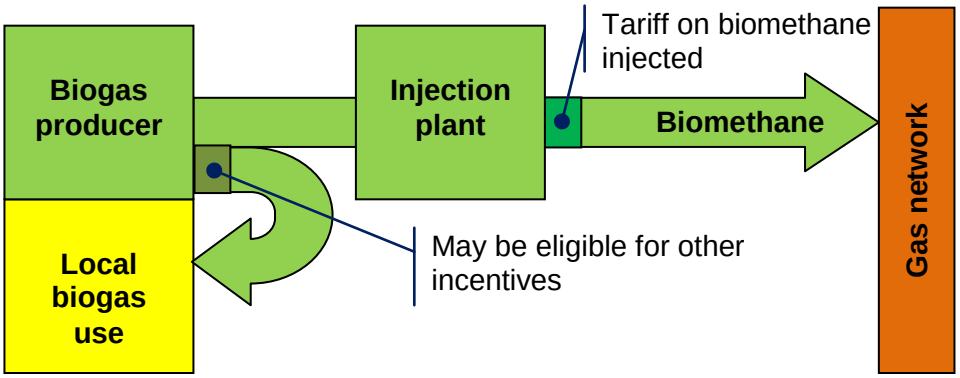


Figure 3 Gas flows and tariff payments for biomethane injection system

We recommend that the tariff paid for biomethane injected onto the grid entitles the purchaser to the gas. The tariff level would therefore be set to effectively incorporate also the *export price* as discussed in sections 0 and 3.2 above.

Again we propose that the *tariff* should be *absolute* (related to the production costs of biomethane) and not *relative* to natural gas prices.

This policy has a natural exit strategy. If gas prices increase to the point at which it becomes more profitable to sell biomethane without the tariff, biomethane producers will simply not claim the tariff.

The tariff is paid by the purchaser of the gas. As discussed in 4.4, this cannot be the gas distribution network operator as, like electricity, distribution and supply licences are separate. Gas DNOs cannot supply gas.

Therefore either gas supply companies or a central purchasing agency acting on behalf of suppliers will need to purchase the biomethane. If the supplier model

[11] See also our comment on page 30 on the eligibility of biodiesel for support under the Renewable Heat Tariff.

is used, then suppliers claim the difference between the tariff and the market price for gas. This would need to be a reference price, to ensure that all gas suppliers are impacted to the same extent.

If a central purchasing agency is used, it could act as an aggregator, buying from biomethane producers and selling it on to suppliers at a market price. The costs of the purchasing agency could be met from the levy, and if in the future gas prices are high, it could make a net profit which could be channelled back into the levy pot.

4 Recommendations on tariff classifications

4.1 Common issues

The primary classifications for each tariff are listed in sections 4.2 and 4.3 below.

We envisage that whatever heat or electricity tariffs are awarded, would also apply respectively to the heat and electricity output from CHP plant.

Sub-classification by size, user type or location

We do not believe it would be appropriate to band according to the size or type of user, (e.g. domestic, community or commercial consumer).

It is anticipated that the *Terraced Tariffs* described in Annex B could potentially provide any necessary variation for installations of different sizes.

It was noted that most *elemental technologies* perform differently in different locations, because of the resource available. While we have modelled these variations, we do not after consideration propose that they should be recognised by different classifications for different regions. A nationwide tariff level should lead to *energy installations* being adopted first in the most beneficial locations, and thus enhance the effectiveness of the *renewable energy tariffs*.

Sub-classification by fuel type

Fuel consuming technologies (*bioenergy technologies*) might appear to justify further classification in relation to the fuel type. It was agreed that sub-classifications for different fuel types could be problematic (e.g. because some types of equipment could use several fuels).

If it proves necessary to provide specific incentives for individual fuel streams, this is probably best done by supporting the supply chain. Consideration should also be given to a 'fuel support' payment beyond the period of the main tariff to maximise the productive life of these installations.

Energy crops

We do not propose a different band for energy crops. This is problematic under the RO and has not proved particularly successful. It also aligns with the conclusions on the *renewable heat tariff* as described in 4.3 below.

Partially renewable fuels

Some of the fuels used in the bio-energy and biomass technologies proposed for tariffs could be partly renewable, e.g. municipal solid waste, synthetic diesels or oils from second generation processes, biomethane made from mixed wastes. Some could also be co-fired with fossil fuels, e.g. CHP units fuelled by biogas and natural gas, or renewable heating systems fuelled by a blend of mineral and bio-oils.

Wherever it is the case that an energy installation's output is partly renewable, the qualifying percentage of the output should receive the relevant tariff.

The rules setting out how that percentage is determined should be pragmatic and workable, and not embedded within legislation but guidance, as suggested in 1.2 above.

Co-firing

We propose that the *renewable heat tariff* level applied to dedicated biomass should also apply to co-fired biomass. There are several reasons for this:

- The co-firing band within the RO is aimed at large fossil fuel power stations that burn a small amount of biomass. The equivalent doesn't exist for heat, so it makes little sense to include this as a separate band.
- Any large CHP station will either be a new installation or require significant investment in modifications to a large power station.
- This will avoid the incentive of separate fossil fuel and biomass installations being built to get the benefit of the dedicated biomass band.

To avoid incentivising separate fossil fuel and biomass installations we recommend that CHP installations are allowed to allocate the proportion of biomass used to the heat output rather than splitting it between the heat and electricity mechanisms in relation to the heat to power ratio. Unlike dedicated biomass, it is recognised that in co-firing the biomass is attributed either to the heat output or the electricity output but not both.

Energy from waste

Energy from waste is currently only eligible under the Renewables Obligation if it is a CHP plant.

- ☆ Given there will now be an incentive to utilise the heat we recommend that energy from waste remains in the Renewables Obligation, but without the CHP constraints, albeit, probably at a lower band, as well as being rewarded through the heat incentive.

Supporting both the electricity and heat output is important – utilising the heat output is likely to be the most environmentally attractive outcome, but the practicalities of heat export means that power generation is likely to remain an important aspect of the output for many projects.

This will then not prevent the building of plant that may not have an immediate heat load but would be incentivised to provide heat in the future if a local heat load were developed.

For the reasons identified under 'Co-firing' above we recommend that CHP installations are allowed to allocate all the biomass used to the heat output rather than splitting it between the heat and electricity mechanisms in relation to the heat to power ratio.

Tariff premiums for specified cases

There could be higher tariffs for systems connected to district heat networks (to make a contribution to the capital cost). The *working group* subsequently considered that this could be incentivised (without additional measures) through the *Terraced Tariffs*, where each customer is metered separately. In this case the system owner could claim the tier thresholds for each metered consumer.

Nevertheless it was agreed that there may be a need for other sub-classifications or for specific tariff premiums in defined circumstances. Such cases are likely to include:

- Building-integrated technologies.

4.2 Proposed electricity classifications

The following primary classifications are proposed:

- Anaerobic digestion
- Bio-fuel generation
- Dedicated biomass
- Energy from waste
- Fuel cells [12]
- Gasification and pyrolysis (these will need to be properly defined)
- Geothermal
- Hydro
- Landfill gas
- Micro-CHP (non renewable) [12]
- Sewage gas
- Solar photovoltaics
- Tidal
- Wave
- Wind

We have not included solar thermal electricity generation, although listed in *the Act*, since it seems unlikely to be adopted in this country in the near future.

4.3 Proposed heat classifications

The following primary classifications are proposed:

- Anaerobic digestion
- Bio-fuel heating (but see note below)
- Dedicated biomass [13]
- Energy from waste
- Fuel cells [12]
- Gasification and pyrolysis (these will need to be properly defined)
- Geothermal
- Heat pumps
- Landfill gas
- Micro-CHP (non renewable) [12]
- Sewage gas
- Solar thermal

We have not included 'water, including waves and tides', although listed in *the Act*, since we believe they are unlikely to be adopted for heat production in this country in the near future.

---

[12] These technologies are included because they are listed in the primary legislation but are not renewable, so we have not sought to recommend tariff levels for them.

[13] Including biomass co-fired in fossil-fuelled power stations

In contrast to the definition of 'biomass' in the Renewables Obligation, the definition in the 2008 Energy Act does not explicitly include the biomass content of mixed wastes. Furthermore the definitions of 'biofuel' and 'biomass' in the primary legislation appear to exclude biodiesel made from fossil-derived methanol. This is unfortunate as it is the only renewable liquid likely to be placed on the heat market in the short-medium term.

- ☆ We advise amending the definition of 'biomass' by including the biodegradable fraction of industrial and municipal waste and "biodiesel, within the meaning of the Hydrocarbon Oil Duties Act 1979".

The list above follows the banding in the RO for the bioenergy technologies, for reasons discussed in section 4.4 below. The only exceptions being:-

- we do not differentiate between energy crops and non-energy crops,
- there are no separate bands for CHP (as these become redundant under our proposals in section 4.4 below),
- there is just one band for gasification and pyrolysis (although in the RO there are two).

Sub-classifications

We propose separate sub-classifications for ground-, air- and water source heat pumps. The way in which the Renewable Energy Directive assesses the renewable element of the energy delivered by heat pumps was noted. We have calculated the tariffs proposed for heat pumps using the approach adopted in 5.1 below, taking account of their electrical input, but assuming the tariff is payable on the total heat output.

Paying the tariff for systems in cooling mode

There is a case for the *renewable heat tariff* also applying to coolth delivered by systems provided that they meet a minimum standard, such as the European requirement of a coefficient of performance above 2.83.

However there was no consensus on including coolth, as some participants believe that the market for cooling does not need additional stimulus. This should be consulted on.

4.4 Combined heat and power

CHP is unique because both the *renewable heat tariff* and electricity incentive (RO or *renewable electricity tariff*) apply to the same installation. This raises the issue of how best to incentivise CHP under the mechanisms and what the technology bands should be, to avoid perverse incentives with the RO, and some important discussion on these issues is shown in section E3 of Annex E.

The recommendations in section 4.1 above on co-firing, energy from waste and other *bioenergy technologies* apply particularly to CHP.

4.5 Biomethane classifications

The recommendation is that there should be two bands for biomethane, as indicated below.

- Biomethane from biogas

- Biomethane from renewable syngas

It is not recommended that these mirror the technology bands in the RO. The reasoning is given in section H3 of Annex E.

Biomethane from syngas

Thermal gasification of biomass results in a syngas rich in carbon monoxide and hydrogen. These two components can be catalytically combined, to produce methane.

However, bio-methane produced from syngas is not enabled by the current wording in the RHI clauses – as biomethane is defined as being produced from biogas, whose definition specifies anaerobic digestion without encompassing gasification. Whilst there is flexibility to change the definition of biomass and biogas, it would be more logical to change the definition of biomethane:

- ☆ Biomethane is "gas produced from renewables sources, which is suitable for conveyance through pipes to premises in accordance with a licence under section 7 of the Gas Act 1986 (c. 44) (gas transporter licences)"

In order to support this source of biomethane, the regulations should also take into account that biomethane can be partially renewable. In just the same way as the RO awards ROCs for only the biomass content of mixed wastes, the *renewable energy tariffs* should do this with bio-methane (and energy from waste generally).

The end result needs to be a *workable* means of determining either the biomass content of the input feedstock, or the biomethane itself.

Sub-classification by size

Smaller biomethane injection plant has higher capital costs / metre cubed of capacity than larger plant. It would be beneficial to encourage biomethane production at sites which produce relatively modest amounts of biogas, so we propose the *Terraced Tariffs* here too. If this is not adopted, we would at this stage keep the tariff simple at a single level. However the legislation should then allow for future tailoring to create differential tariff rates.

5 Recommendations on tariff levels

The principle indicated in *the Act* is that *renewable energy tariff*s compensate the total output of the *energy installation*. They are thus strictly *production tariffs* not *feed-in tariffs*.

We have proposed below tariff levels on this basis.

5.1 Basis for setting the levels

The *working groups* agreed to recommend levels which would seek to give each technology what it needs to make a meaningful contribution, in the expectation that DECC would then take a political decision based on its objectives.

As the legislation allows for tariff levels to be adjusted (presumably normally downwards as volumes increase and costs reduce) with time, it was suggested that:

- ☆ The initial levels need to be set high enough to prompt activity in all technologies. If this proved 'over-successful', there would be a basis for calculating the lower level of tariff that would be adequate.
- ☆ If conversely the tariff levels were to be set too low to stimulate any meaningful activity, not only would the tariffs fail to deliver their objectives, but also there would be no data on which to calculate how the tariff levels should be adjusted.

The Terraced Tariffs

The *Terraced Tariffs* structure is an innovative approach to establishing tariffs which are flexible enough to accommodate a wide range of different applications and sizes without having a huge number of sub-classifications.

Because of its several advantages (described with an explanation of the structure in Annex B), we suggest it is considered for the *renewable energy tariff*s[14], and we have calculated indicative levels of tariff for each classification on this basis.

5.2 Modelling approach used

Based on the principle above, and the supply issues described in section 3, we have modelled how the tariffs might operate for the technologies listed in sections 4.2 and 4.3 above.

Further details of the modelling approach and the assumptions used are given in Annex C. A substantial volume of input data for the different technologies was obtained from published reference documents, members of the *working groups* and from a survey of REA and REAL members. The tariff levels listed below are derived from this modelling work.

5.3 Initial calculations of tariff levels

The tariffs have been calculated on the assumption that they are the primary driver for installation, i.e. that they replace grants and CERT, etc as previously discussed in section 1.7 above.

[14] Though some companies favour the flat tariff approach as noted in E2 in Annex E.

We have calculated the tariffs to deliver typically a return on investment to commercial users no less than 12-13%[15] and a payback period (excluding finance) for domestic users less than 7 years[15], which we believe achieves the broad objectives described in 5.1 above.

The above ratios were not universally endorsed, with some feeling that a three-year payback is needed for widespread householder take-up. Conversely there was felt to be a danger in using too short a payback as the payments might be so high as to give the impression that the equipment has no intrinsic value. Sensitivity analysis described in Annex B shows that achieving average payback of 3 years would require tariffs typically 75% higher than calculated here.

We have worked with a wide range of input data from many sources and considered geographic variations and other differences including on- and off-grid locations, consumer and commercial users. As the recommendations are based on average outcomes, these tariff levels will lead to a wide range of returns and paybacks for actual users in practice. In particular we have defined mains gas as the default heat supply, so off-gas-grid users would see better returns, hopefully leading to the constructive outcome that these would be addressed early.

We have modelled using the *Terraced Tariffs* and more standard uniform tariffs, for which the results are shown in Annex C.

Please note that:

The results are entirely dependent on the assumptions and input data, which we have not had the opportunity to validate thoroughly (beyond excluding results that seem clearly inconsistent). We have not manually adjusted these results and there are some results, which we believe might change as more data becomes available[16].

Some results are based on relatively few data references and we would like to review these as more information becomes available. These include:

- Geothermal heat and power
- Air- and water- source heat pumps
- Bio-fuelled heat, power and CHP
- Gasification and pyrolysis
- The thermal output of landfill gas, sewage gas and waste-to-energy plants

If the final design of the mechanism differs in substantive respects, we would wish to update our proposed tariff levels. Terraced Tariffs give smaller installations a higher average tariff than the *standard tariff*.

Equivalent tariff levels from Germany and under the RO are also shown for reference, but it should be noted that these cannot be compared 'like-for-like', especially as those are both in effect *purchase tariffs* (see section 3.2).

Notwithstanding these provisos we consider that these tariffs represent a reasonable first approximation and are encouraged by how the relative levels

[15] To mitigate the higher tariff levels for solar technologies, an IRR of 10% and simple payback of 9 years were used.

[16] For example we would have expected there to be a closer correlation between the tariffs and RO for hydro.

correlate to the proposals received from members and, for example, the tariffs established in Germany (notwithstanding the note above).

We find the ratios between tariffs for technologies broadly credible based on the approach outlined in section 5.1 above. An initial appraisal from the financial sector indicates that tariffs around these indicative levels should prove 'bankable' for most technologies listed

5.4 Electricity tariffs

Initial suggested standard tariff levels based on the *Terraced Tariffs* and parameters specified in Annex B are shown in the 'Standard' column.

Classification	**Tariff per kWh$_e$** *NB the comments in section 5.3 above*			
- Sub-classifications	**Standard**[17]	**Members**[18]	**RO**[19]	**Germany**[20]
Anaerobic digestion	12.5 p		*14.6-20.0*	16.79-20.67 ¢
Bio-fuel generation			*12.2–15.4*	
Dedicated biomass	11.0 p		*12.2–15.4*	11.79-17.67 ¢
Energy from waste	4.5 p		5.9-10.0	7.79-11.67 ¢
Fuel cells	n/r [12]			
Gasification and pyrolysis	6.0 p		*14.6-20.0*	9.79-13.67 ¢
Geothermal	10.0 p			10.50-16.00 ¢
Hydro	8.5 p	13 p	9.1-14.3 (16.6 – 20.0)[21]	7.65-12.67 ¢
Landfill gas	0		5.5-10.9	6.16-9.00 ¢
Micro-CHP (fossil fuelled)	n/r [12]			
Sewage gas	0		*6.8-12.2*	6.16-7.11 ¢
Solar photovoltaics	42.5 p	46.9 p	*14.4-18.9*	31.94-43.01 ¢
- BiPV premium	+7.5 p		*0*	0.05 ¢
Tidal	20 p	20 p	*14.4-18.9*	
Wave	20 p		*14.4-18.9*	
Wind	11.5 p	26.5 p	9.2-13.7 (14.4 – 18.9)[21]	5.02-9.20 ¢

[17] As shown in Annex B, the average tariff for small systems would be higher

[18] Average level proposed by the members' survey described in section 5.2 above based on a flat rate, so would be expected to be higher than proposed for the *Terraced Tariffs*

[19] Rewards under the RO are estimated based on the ROC multiples applicable from 2009/10, and the latest ROC price (£51.81) and power prices from the last two NFPA auctions. Where prices for that technology are not available, estimates in italics are based on landfill gas for *bioenergy technologies*, and wind for *elemental technologies*.

[20] Nearest equivalent levels used in the 2009 revision of the feed-in tariffs in Germany. When first introduced, the PV tariffs, for example, were substantially higher – 49.8 ¢/kWh in 2000.

[21] Numbers in brackets are for projects under 50kW, which would benefit from 2ROCs/MWh.

As described in 5.6 below, we propose that these tariffs would also apply to the electrical output of CHP plant (where they qualify).

The flat tariff rates proposed for different system sizes if the *Terraced Tariffs* were not adopted are illustrated in Annex C.

5.5 Heat tariffs

Initial suggested standard tariff levels based on the *Terraced Tariffs* and parameters specified in Annex B are shown in the 'Standard' column.

Classification	**Tariff per kWh$_{th}$** *NB the conditions in section 5.3 above*	
- Sub-classifications & premiums	**Standard**	**Members** [18]
Anaerobic digestion	5.33 p	
Bio-fuel heating		
Dedicated biomass [22] (incl. co-firing)	3.0 p	7.7 p
Energy from waste	0.5 p	
Fuel cells	n/r [12]	
Gasification and pyrolysis	4.5 p	
Geothermal	4.0 p	
Heat pumps[23]:		
- Air source	6.0 p	6.0 p
- Ground source	9.0 p	8.0 p
- Water source	9.0 p	
Landfill gas	0.5 p	
Micro-CHP (non renewable)	n/r [12]	
Sewage gas	0.5 p	
Solar thermal	16 p	17.8 p

Except as described in 5.6 below, we propose that these tariffs would also apply to the heat output of CHP plant.

The flat tariff rates proposed for different system sizes if the *Terraced Tariffs* were not adopted are illustrated in Annex C.

5.6 Combined heat and power

Based on the discussion in section E3 of Annex E, we propose paying the appropriate RO or *renewable electricity tariff* rate for the electrical output of CHP installations and rewarding their heat output with the *standard tariff* for

[22] Our modelling suggests a higher tariff is needed for pellet boilers, but we have not proposed a separate tariff for the reasons given in section 4.3

[23] Because not all of the output of a heat pump is considered renewable under the RED (as noted in 4.3) the payment for each renewable kWh is relatively higher.

renewable heat (i.e. without the heat output being rewarded at the higher levels of the *Terraced Tariffs*).

Our modelling shows that this would provide a better return for such plants operating in CHP mode than optimised for electricity or heat alone, and this seems appropriate, and should provide the returns to fund the installation of networks to enable the heat to be utilised.

To ensure the balance for CHP is and remains correct it may be sensible to retain the ability to apply a multiplication factor (greater or less than one) to the heat tariff where it is applied to CHP plants.

Rewarding high temperature heat

We did consider differentiating higher temperature heat from lower grade heat, and note that the CHPQA scheme does perform this function. However in the interests of pragmatism and simplicity this was decided against.

5.7 Biomethane tariffs

The methodology for setting the tariff was adapted from that used for electricity and heat tariffs as described in sections 5.1 and 5.2 above as follows:

- Calculate the fuel value of biogas, by evaluating what it would earn under the RO if used to generate electricity and ensure that this is consistent with its value under the *renewable energy tariff*s further to sections 5.4 and 5.5 above
- Charge the capital and operating costs of the plant required to convert this gas into biomethane and inject it into the grid
- Using the capital, fuel and operating costs derived thereby, and the methodology described in Annex C evaluate the tariff required to achieve the same threshold level in terms of IRR (i.e. 12-13% – see 0 above)

We have not proposed tariff levels for biomethane from syngas, as there is little cost data available.

The tariff levels proposed are:

Classification	**Tariff per kWh**		
	Standard	**NGT** [24]	**Members** [18]
Biomethane from biogas	5.6 p	10p	5.1 – 6.8p [25]
Biomethane from renewable syngas	[tba]		

5.8 Duration of tariffs, index linking, changing tariff levels

It was agreed that the duration of payment should be related to the anticipated life of typical systems. The figure of 20 years, widely used for tariffs elsewhere, seems an appropriate recommendation.

- ☆ All tariffs should be index linked to the retail price index.

---

[24] National Grid The potential for Renewable Gas in the UK, January 2009.

[25] 150p to 200p per therm

Updating tariff levels

It is anticipated that government may adjust tariffs periodically to ensure that the scheme continues to maintain the necessary progress towards national renewable energy targets as equipment and fuel costs change, and that all relevant technologies are appropriately represented within the scheme.

The recommendation that initial tariff levels are at the 'generous' end of the scale (see 5.1 above) would, if successful, lead to the possibility of some downward *tariff* adjustments in due course.

Grandfathering

It was agreed that the tariff levels set at the time an *energy installation* enters the scheme could not be reduced retrospectively for that system (i.e. *grandfathering* should be adopted throughout the scheme).

Frequency of review

After extensive discussion it was agreed that there needs to be substantial flexibility to adjust tariff levels to achieve the desired outcomes, so a one year review period is recommended. A notice period of six months should apply to any changes in tariff levels.

In order to maximise investor certainty, however, such reviews should not lead to substantial changes to the mechanism itself including eligibility for example. It is recommended that aspects apart from the tariff levels and aspects relating to the effective operation of the RETs should be reviewed on the same as the timescale as the RO – where the reviews of bands corresponds to the timetable for the different phases of the EU ETS. Phase 2 of the EU ETS scheme will run from 2008 to 2012 and it is anticipated that Phase 3 will run from 2013 to 2020

Tariff degression

The *working group*s accepted the transparency of the pre-determined *degression* incorporated in the German tariff and believe there may be a case for introducing this sometime in the future.

In the short term, however, while the proposed annual review regime is in force, this is not considered necessary.

A. Glossary of terminology and definitions

To facilitate clarity the following terminology is used throughout. This glossary also cover acronyms from related areas used in this report.

renewable energy tariff (RET)		Collective term for the *renewable electricity tariffs* and the *renewable heat tariffs*
renewable electricity tariff		The payment to a *beneficiary* for each kWh_e of renewable and low carbon electricity generation pursuant to Sections 41 to 43 of *the Act* 'Feed-in tariffs for small-scale generation of electricity'
renewable heat tariff		The payment to a *beneficiary* for each kWh_{th} of renewable and low carbon heat production pursuant to Section 100 of *the Act* 'Renewable heat incentives'
biomethane tariff		The payment to a *beneficiary* for the production of biomethane pursuant to Section 100(2)(a)(ii) of *the Act*
absolute tariffs or prices		Prices set an at absolute level for each kWh of energy delivered (by contrast with *premium tariff* tariffs or prices)
accredited installer		The organisation responsible for the commissioning of an *energy installation*, accredited under the *quality assurance register*
the Act		The Energy Act 2008
administrator(s)		The party or parties nominated to disburse payments from the *levy* to *beneficiaries* of the tariffs as further described in section 3.
beneficiary		The owner or user of an *energy installation*, who is the recipient of a *renewable energy tariff*, i.e. a 'small-scale low carbon generator' as described in section 41(3) of *the Act* or an 'owner' or 'producer' as described in section 100(2)(a) of *the Act*
bioenergy technology		Any *electricity technology* or *heat technology* which consumes a source of fuel, including sources described in *the Act* as 'biomass', 'biofuels', 'fuel cells' and 'combined heat and power systems' (insofar as they use biomass-derived fuels)
biofuel		liquid or gaseous fuel which is produced wholly from biomass [see Section 100(3) of *the Act*] ☆ Because of anomalies in the existing definitions, an improved definition of *biomass* is proposed in section 4.3 hereof.
biogas		Gas produced by the anaerobic conversion of organic matter [see Section 100(3) of *the Act*]

biomass		material, other than fossil fuel, which is, or is derived directly or indirectly from, plant matter, animal matter, fungi or algae [see Clause 100(3)(a) of *the Act*]
biomethane		Biogas which is suitable for conveyance through pipes to premises in accordance with a licence under section 7 of the Gas Act 1986 [see Clause 100(3)(a) of *the Act*]. ☆ An improved definition of *biomethane* is proposed in section 4.5 hereof.
BiPV		Building integrated photovoltaics
capitalisation		See *pre-capitalisation*
CCL		The Climate Change Levy
CERT		The Carbon Emissions Reduction Target
certification scheme		There are various relevant schemes separately: ○ *quality assurance register* ○ *sustainability certification scheme*
CESP		The Community Energy Saving Programme
CHP		Combined heat and power
coalition		The consortium of parties that campaigned for the introduction of *renewable energy tariffs*, as described at http://www.r-e-a.net/policy/REA-policy/RET/coalition
coordination group		The group established to coordinate the activities of the *working group*s; see Annex G and http://www.r-e-a.net/policy/REA-policy/RET/RETa0
CRC		The Carbon Reduction Commitment
DECC		The Department of Energy and Climate Change
deem, deeming		To estimate the output of an *energy installation* without *metering* it
degression		The setting of tariffs at lower (or different) levels at various intervals as the scheme progresses. The changes in level would apply only to new *energy installations* entering the scheme, not to tariff levels paid to existing installations (provided the principle of *grandfathering* is adopted).
electricity technology		Any of the eligible sources and technologies listed in section 41(5) of *the Act*
elemental technology		Any *electricity technology* or *heat technology* which is not a *bioenergy technolog* (i.e. uses an elemental energy source rather than consuming fuel)
energy installation		A system to produce renewable or low carbon energy prospectively eligible for a *renewable energy tariff*
eligible energy		Each kilowatt hour of electricity and heat eligible for payment of a *renewable energy tariff*

ESCo		An energy service company – one which is involved in the customers' use of energy more broadly than simply selling electricity, oil or gas
export price		An additional payment per kWh for the energy exported by an *energy installation* to the electricity network or external heat network
feed-in		Delivery of electricity into the national electricity network (or gas into the gas network)
feed-in tariff (FIT)		A tariff paid for electricity fed into the grid. Because of its widespread use (including in the Act), this term is often used to refer to *renewable electricity tariffs*, which we use as a more accurate description for electricity, which may be used locally or fed into the grid. This term could also apply to a tariff for heat fed into a heat network or biomethane fed into the gas grid.
final tier		The final period of the *Terraced Tariffs* (after the *transition tier threshold*)
fossil heat levy		The *levy* raised on heating fuel suppliers to fund the *renewable heat tariff* as discussed in section 3.5
grandfathering		The principle that any changes to the level of *renewable energy tariffs* will not apply to existing *energy installations*. Accordingly the economic regime at the time a project is accepted will apply for its lifetime.
HETAS		Heating Equipment Testing and Approval Scheme
heat technology		Any of the eligible sources and technologies listed in section 100(4) of *the Act*
inception date		The date at which the respective tariffs come into effect
initial tariff		The tariff payable for the *initial tier* of the *Terraced Tariffs*
initial tier		The first period of the *Terraced Tariffs* (before the *transition tier threshold*)
initial tier threshold		The output from the *energy installation* at which the *initial tier* ends as illustrated in Annex B
IRR		Internal rate of return
LCBP		The Low Carbon Building Programme of DECC
levy		The funds provided by a *supply company* for the payment of *tariffs*
meter		To take measurement of the energy delivered by an *energy installation*

microgeneration		Is defined in section 82 of the Energy Act 2004 and covers: (a) the generation of electricity up to 50 kilowatts; (b) the production of heat up to 45 kilowatts thermal The technologies are generally consistent with those applicable to the *renewable energy tariffs*, but these are not restricted to the capacity limits of *microgeneration*
Microgeneration Certification Scheme (MCS)		The UKAS-accredited scheme sponsored by DECC covering the certification of microgeneration products and the accreditation of their installers, and any subsequent developments of that Scheme
obligation		A requirement on designated parties to achieve a particular output (as in, for example, the Renewables Obligation). By this definition, the *renewable energy tariffs* are not *obligations* and we do not refer to them as such.
P95 level		The level of output which an *energy installation* would be expected to exceed 99% of the time (i.e. for 19 years in 20)
pre-capitalisation		Consolidating some or all of the future *tariffs* into a single 'upfront' payment to the *beneficiary* (whether as part of the mechanism or separately) based on the *deemed* output expected from the system
premium tariff		The terminology used by some to denote a tariff basis, which would does not give the *supply company* title to the energy produced (unlike the *purchase tariff*). We recommend this tariff approach as discussed under 'Absolute or relative tariffs' in section 3.1, but do not use this terminology as it is potentially confusing.
production tariff		A tariff mechanism which compensates the total output of an *energy installation* (contrast with a *feed-in tariff*)
purchase tariff		The terminology used by some to denote a tariff basis, which would also give the *supply company* title to the energy produced (and therefore the right to charge the *beneficiary* for any energy he consumes on site). We do not recommend this sort of tariff for the reasons given in section 3.2.
PV		Photovoltaics - solar electric power generation through direct conversion of light to electricity

quality assurance register		A register of accredited organisations, products or processes with regards to any or all the following aspects of the provision of an *energy installation*: ○ Certification of the system or products incorporated ○ Certification of the process used in the installation ○ Accreditation of the installer ○ The conduct of the seller before, during and after the supply contract ○ Certification of the fuel source Some of the schemes that would be eligible for the register are shown in section 1.3.
REA		Renewable Energy Association
RED		The Renewable Energy Directive of the European Union
regulator		The energy regulator Ofgem (acting through the Gas and Electricity Markets Authority) and defined as the 'Authority' in sections 40(4) and 100(3) of *the Act*
relative		The basis whereby a tariff or export price might be set in relation to the standard price of electricity or gas. For example a *renewable electricity tariff* could be expressed as the standard electricity price plus 5p per kWh. We are not recommending this approach for the reasons described in section 3.1
renewable heat incentive (RHI)		The terminology used in *the Act* for what is here defined as the *renewable heat tariffs*
RES		The Renewable Energy Strategy being evolved by DECC as described in the consultation document issued in June 2008
RETa0, RETe1, RETe2, RETe3, RETh1, RETh2, RETh3, RETu4		The *working groups*, as further described in Annex G, of which the first listed is the *coordination group* and the last is the group established by the *coalition* to consider user aspects of the *tariffs*
retroactive, retroactivity		The degree to which the tariffs would apply to *energy installations* in existence at the *inception date*
RO *RTFO*		The Renewables Obligation and the Renewable Transport Fuels Obligation on electricity and fuels suppliers respectively
SAP		The standard assessment procedure for energy rating of buildings as used by building regulations, for example
small scale		(with respect to electricity generation) any *energy installation* with a capacity below the relevant *technology limit*
standard tariff		The tariff payable for the *final tier* of the *Terraced Tariffs*
supply company		An electricity or fossil fuel heating fuel supplier responsible for paying tariffs, pursuant to Section 41(1) or 100(2)(a) of *the Act*

sustainability certification scheme		The national or international scheme adopted to ensure that biomass for energy use is derived from sustainable sources
syngas		Gas produced by a thermal (as opposed to a biological – see *biogas*) process of gasification. The renewable proportion of *syngas* which may be eligible for the *tariffs* will vary depending on the feedstock
tariff		The payment to a *beneficiary* for each kWh of *eligible energy*
tariff classification		A classification of the type of *energy installations* for which a separate *tariff level* would be set. These might be for example classified by *electricity* or *heat technology*, by size, by usage or any combination thereof
tariff level		The *tariff* payment level set for any *tariff classification*
technology limit		The "specified maximum capacity" for any *renewable electricity tariff* set by the Secretary of State, pursuant to section 41(4) of *the Act*
Terraced Tariffs		A proposed approach whereby the tariffs payable start at higher levels until a specified output is achieved as described in Annex B
transition tariff		The tariff payable for the *transition tier* of the *Terraced Tariffs*
transition tier		The intermediate period of the *Terraced Tariffs* (between the *initial tier threshold* and the *transition tier threshold*)
transition tier threshold		The output from the *energy installation* at which the *transition tier* ends as illustrated in Annex B
upper limit		The highest figure which *technology limits* may not exceed; defined in section 41(4) of *the Act* as 5 MW_e
working groups		The working groups established by the REA and others to assist in the development of the *renewable energy tariffs* as described at http://www.r-e-a.net/policy/REA-policy/RET

B. Terraced tariffs

This proposed approach sets a standard tariff and provides for two limited higher levels to be payable in the early stages of the life of the *energy installation*, as illustrated schematically in Figure 4:

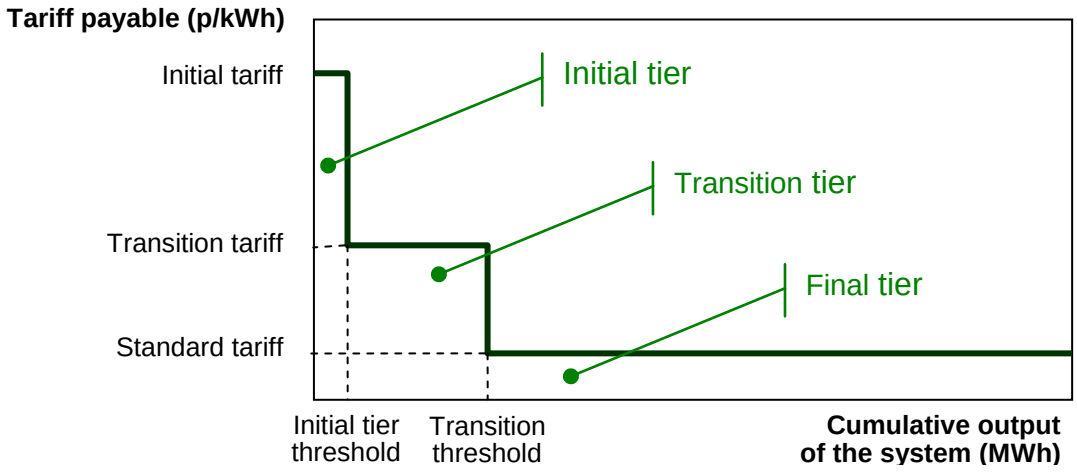


Figure 4 Terraced tariff structure

The tariffs paid for any *energy installation* would be at the *initial tariff* for the first few megawatt hours of output. For a large system, this high tariff would apply for only a few days, but for a very small system it could last a few years. The *transition tariff* would then come into force on a similar basis before the payments return to the enduring basis of the *standard tariff*.

This provides a way of establishing an effective sliding scale of tariffs for different system sizes without any step changes at specific sizes.

This is illustrated in Figure 5 for a sample hydro project where the *standard tariff* is 8.5p per kWh (so the *transition tariff* is 17p and the *initial tariff* is 34p). The *initial tier threshold* is 200Mwh and the *transition tier threshold* is 8,000MWh.

In this example for systems below 3.2kW the initial tier threshold of 200MWh lasts for the life of the tariffs, so the *initial tariff* applies.

For a 500kW system, the *initial tier* lasts for just six weeks and the *transition tier* a further 5 years, so the average tariff over the life averages 10.88p/kWh.

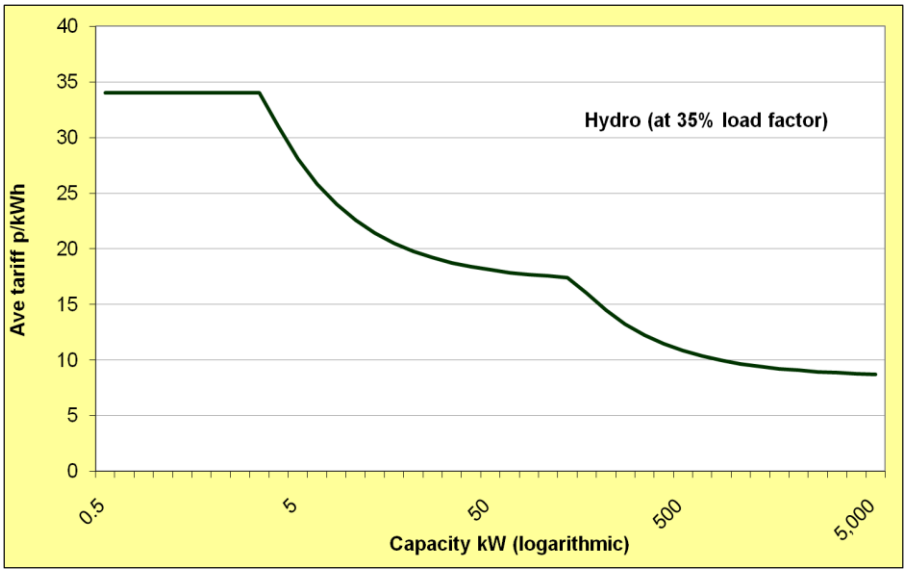


Figure 5 Average tariff vs. size for terraced tariffs

For much larger systems, the higher tariffs are used up within a very short period, and the average tariff approached the *standard tariff* level of 8.5p.

Tariff basis

For the initial calculations the following parameters have been used:

	initial tariff	***transition tariff***
Tariff multiples (of the *standard tariff* – for which the multiple is 1) for all *tariff classifications*	4	2
Tier thresholds	***initial tier threshold***	***transition tier threshold***
Default thresholds (except below)		
Hydro and *bioenergy technologies*	200 MWh	8,000 MWh
Other *elemental technologies*	200 MWh	2,000 MWh
Biomethane injection	2,000 MWh	8,000 MWh
Higher tariff technologies:		
Heat pumps	6 MWh	50 MWh
Solar PV and solar thermal	3 MWh	12 MWh

These thresholds provide the ability to levelise the returns achieved for each technology and scale band. Although we have used only five different combinations above, it would be prudent to reserve the ability to change them for each *tariff classification*.

Advantages and disadvantages

This structure offers a number of benefits:

- It enables both small and larger systems to achieve adequate tariffs without the need to define a multitude of size-related tariff classifications and avoids step-changes and threshold issues.
- The number of tariff classifications is substantially reduced. The flat tariff structure would need a total of over 80 different tariff bands as shown in annex C. The *Terraced Tariffs* needs only 15/16 bands each for heat and electricity as shown in sections 5.4 and 5.5.
- It provides a degree of 'front-loading' of the tariff contributing to the effective *pre-capitalisation* of the benefit, without the legislation having to incorporate a specific mechanism to do this.
- The overall cost is lower because the smooth transition with size is more efficient than quantum steps. In our modelled data, the total paid is on average 18.6% lower.
- The avoidance of multiple size-related tariff classifications avoids the need to set size thresholds and thus the associated complexity of defining system capacity. It furthermore reduces the potential for 'gaming' where a *beneficiary* might be tempted to limit or understate the capacity of his system to fall below a defined threshold, or seek to divide a single installation into several smaller entities.

- It can be configured to support heat networks as further discussed below.
- It provides a mechanism for limiting the additionality implications for related support measures and costs of *retroactivity*, also discussed below.
- The sensitivity analysis below shows that it is more adaptable in delivering to *beneficiaries* the returns they will need than a flat tariff approach.

The disadvantages are that:

- While it reduces substantially the number of classifications, the 3-stage tariff is less simple than a flat (straight line) tariff
- The administrator(s) would need to maintain a record of the cumulative output (though would not need to record capacity – see section 3.3).

Neither of these is considered unduly onerous, and it is anticipated that the latter in particularly would need to be an audit requirement of the system in any case.

Additionality and retroactivity

The *Terraced Tariffs* offers the potential to facilitate transitional and interface arrangements with other measures.

Where there may be additionality issues with other mechanisms, such as the zero carbon homes initiative for example (see section 1.7), it would be possible to limit the benefit from the *renewable energy tariff* by specifying that the *initial tier* and perhaps the *transition tier* would not apply, so the tariff would sooner reach the lower *standard tariff*.

Similarly where *renewable energy tariffs* are applied *retroactively* to existing systems, it could be specified that *energy installations*, which have already benefitted from government grants, should go straight to the *standard tariff* (or perhaps repay those grants to take full benefit of the *Terraced Tariffs*).

This approach should presumably not apply to RO-registered systems, because the full tariff might be needed to compensate for the loss of the ROC income.

Incentivising heat networks

The *Terraced Tariffs* can also be used to provide an effective premium for *energy installations* connected to heat networks. In this case the respective tariff tiers would apply to each *metered* user connected to the network (thereby multiplying the tier premium by the number of *metered* users). Further analysis is needed based on the tariff levels proposed to investigate whether this benefit is sufficient to cover the added costs of heat networks.

Sensitivity analysis

As indicated in section 5.3 we have taken a view on how to calculate the required tariffs based on IRR's and payback times. In the light of the differing views about the paybacks consumers might be looking for (including for example the view expressed by Element Energy's study for DECC that consumers would need a three year payback), we analysed for the two prime consumer technologies, solar thermal and PV the impact of adopting various figures from 2 to 10 years.

The results show these would need a tariff level 70 to 84% higher under the *Terraced Tariffs* (and 136 to 143% higher for flat tariffs). Moving from 7 to 5 years required changes of 22-28% (42-43%).

C. Modelling approach used to recommend tariff levels

The *renewable energy tariffs* are expected to stimulate installations in the consumer, community and commercial sectors. We have therefore sought to model how each would evaluate the financial return. Our model thus includes relevant parameters for the costs and benefits (differentiated where appropriate between commercial and consumer users).

The primary inputs for each system type and technology modelled were:

- Capacity (kW)
- Annual output (kWh)
- Installed cost
- Lifetime (Years)
- Annual service (Cost or Man hours)
- Annual fuel usage (ton or kWh / Year)
- Fuel cost (£/ton or kWh)

Inputs were taken from a variety of independent reference sources and from members of *working groups*. REA also surveyed its members inviting them to submit sample data and to suggest the tariff levels they believe are appropriate.

For any set of input data the shows the payback time (expected to be the primary measure for consumers) and the rate of return (industrial measure).

The default figures currently used in the model are as follows:

	Unit	Consumer	Commercial
Financial data			
Inflation rate	%	2.0%	2.0%
Cost of capital	%	6.0%	6.0%
Financing period	Years	0	7.5
Maintenance cost	£/manHr	£20.00	£10.00
Carbon data			
Cost of carbon	€/ton	0	10
Carbon intensity - Electric	ton/MWh	0.480	0.480
Carbon intensity - Off-grid	ton/MWh	0.321	0.321
Carbon intensity - Gas	ton/MWh	0.224	0.224
Energy prices			
Electric cost	£/kWh	£0.122	£0.075
Off-grid cost	£/kWh	£0.079	£0.053
Gas cost	£/kWh	£0.035	£0.025
Exchange rates			
Euro	€/£	€1.10	€1.10
Tariff duration	Years		20

The model assesses installations at various scales, which it classifies as follows:

Scale groupings	Unit	Up to
Household scale	MWh/year	10
Large house / farm / hamlet	MWh/year	100
Community scale	MWh/year	1,000
Factory / retail outlet / warehouse	MWh/year	10,000
Industrial scale	MWh/year	>10,000

The assumed average export levels (eligible for the *export price* as described in sections 0 and 3.2) and premium for each installation was modelled based on the above scale bands as follows:

	Unit	Heat	Electricity
Export premium	£/kWh	£0.0125	£0.0375
Export percentage			
Household scale	%	0%	10%
Large house / farm / hamlet	%	0%	25%
Community scale	%	50%	75%
Commercial scale	%	75%	90%
Industrial scale	%	100%	100%

Outputs based on the Terraced Tariffs

The results for the *Terraced Tariffs* based the parameters shown in Annex B are shown in the body of the report in sections 5.4 and 5.5.

Outputs based on traditional 'flat' tariffs

If the *Terraced Tariffs* were not adopted, more classifications would be required to meet the various sizes of *energy installation*s.

We have not assessed in detail where the borderlines should be set, so more work would be required, if this approach were to be adopted. The levels below are expressed in terms of the annual output of the system, because this measure would be harder to 'game' than setting capacity thresholds. It means however that it would be possible for an *energy installation* might fall into different bands in different years, which may be considered undesirable.

If this approach is to be pursued therefore, consideration would also need to be given as to how the thresholds are set. The output figures proposed below could relatively simply be converted to capacity levels, but further work would be needed to define where the thresholds between tariffs would best be set.

The following levels are not recommendations, they are the levels indicated by the modelling and listed here subject to the same provisos indicated in section 5.3 on page 33.

Flat tariffs for electricity

Indicatively the following tariffs would be required for electricity:

Electricity classification	**Tariff per kWh$_e$** *NB the conditions in section 5.3*		
- Sub-classifications	**Flat**	**RO**[26]	**Germany**[27]
Anaerobic digestion			
- Up to 100 MWh/year	45.0 p	14.6 – 20.0	18.67 ¢
- 100 to 1,000 MWh/year	20.0 p	14.6 – 20.0	18.67 ¢
- 1,000 to 10,000 MWh/year	16.0 p	14.6 – 20.0	8.25 – 16.18 ¢
- Over 10,000 MWh/year	15.0 p	14.6 – 20.0	7.79 ¢
Dedicated biomass			
- Up to 1,000 MWh/year	[tba]	14.6 – 20.0 [28]	11.67 ¢
- 1,000 to 10,000 MWh/year	20.0 p	12.2-15.4	8.25 – 9.18 ¢
- Over 10,000 MWh/year	12.0 p	12.2-15.4	7.79 ¢
Energy from waste			
- Up to 10,000 MWh/year	12.0 p	5.9 – 10.0	8.25 – 11.67 ¢
- over 10,000 MWh/year	3.0 p	5.9 – 10.0	7.79 ¢
Gasification and pyrolysis			
- Up to 10,000 MWh/year	[tba]	14.6 – 20.0	8.25 – 11.67 ¢
- Over 10,000 MWh/year	6.0 p	14.6 – 20.0	7.79 ¢
Geothermal			
- Under 1,000 MWh/year	[tba]		16.00 ¢
- 1,000-10,000 MWh/year	[tba]		16.00 ¢
- Over 10,000 MWh/year	10 p		10.50 ¢
Hydro			
- Under 10 MWh/year	35.0 p	16.6 – 20.0 [28]	12.67 ¢
- 10 to 100 MWh/year	20.0 p	16.6 – 20.0 [28]	12.67 ¢
- 100 to 1,000 MWh/year	16.0 p	9.1 – 14.3	12.67 ¢
- 1,000 to 10,000 MWh/year	10.0 p	9.1 – 14.3	8.65 ¢
- Over 10,000 MWh/year	6.75 p	9.1 – 14.3	7.65 ¢
Landfill gas			
- Up to 10,000 MWh/year	n/a [29]	5.5 – 10.9	9.0 ¢

[26] For calculation basis, see footnote 19 on page 34

[27] Nearest equivalent levels used in the 2009 revision of the feed-in tariffs in Germany (thresholds not precisely aligned).

[28] These rates apply to systems under 50kW capacity (so thresholds not precisely aligned)

[29] Model indicates these technologies are viable without a *renewable electricity tariff*

Electricity classification	**Tariff per kWh$_e$** *NB the conditions in section 5.3*		
- Sub-classifications	**Flat**	**RO[26]**	**Germany[27]**
- Over 10,000 MWh/year	n/a [29]	5.5 – 10.9	6.16 ¢
Sewage gas			
- Up to 10,000 MWh/year	n/a [29]	*6.8-12.2*	7.11 ¢
- Over 10,000 MWh/year	n/a [29]	*6.8-12.2*	6.16 ¢
Solar photovoltaics			
- Under 10 MWh/year	72.0 p	14.4 – 18.9	43.01 ¢
- 10-100 MWh/year	55.0 p	14.4 – 18.9	40.91 ¢
- 100-1,000 MWh/year	45.0 p	14.4 – 18.9	39.58 ¢
- Over 1,000 MWh/year	40.0 p	14.4 – 18.9	31.94 ¢
Building-integrated PV			
- Under 10 MWh/year	72.0 p	14.4 – 18.9	48.01 ¢
- 10-100 MWh/year	65.0 p	14.4 – 18.9	45.91 ¢
- 100-1,000 MWh/year	50.0 p	14.4 – 18.9	44.58 ¢
- Over 1,000 MWh/year	45.0 p	14.4 – 18.9	36.94 ¢
Tidal			
- Up to 1,000 MWh/year	40.0 p	14.4 – 18.9	
- 1,000 to 10,000 MWh/year	24.0 p	14.4 – 18.9	
- Over 10,000 MWh/year	21.0 p	14.4 – 18.9	
Wave			
- Up to 100 MWh/year	[tba]	14.4 – 18.9	
- 100 to 1,000 MWh/year	[tba]	14.4 – 18.9	
- 1,000 to 10,000 MWh/year	24.0 p	14.4 – 18.9	
- Over 10,000 MWh/year	21.0 p	14.4 – 18.9	
Wind			
- Under 10 MWh/year	40.0 p	14.4 – 18.9	5.02-9.2 ¢
- 10-100 MWh/year	40.0 p	14.4 – 18.9	5.02-9.2 ¢
- 100-1,000 MWh/year	25.0 p	9.2-13.7	5.02-9.2 ¢
- Over 1,000 MWh/year	10.0 p	9.2-13.7	5.02-9.2 ¢
- Over 1,000 MWh/year	9.0 p	9.2-13.7	5.02-9.2 ¢

Flat tariffs for heat

The following tariffs would be required for heat:

Heat classification	**Tariff per kWh** *NB the conditions in section 5.3*	
- Sub-classifications	**Flat**	**Members** [30]
Anaerobic digestion		
- Under 1,000 MWh/year	13.0 p	
- 1,000-10,000 MWh/year	7.0 p	
- Over 10,000 MWh/year	6.0 p	
Dedicated biomass (incl. co-firing)		7.7 p
- Under 10 MWh/year	12.0 p	
- 10-100 MWh/year	11.0 p	
- 100-1,000 MWh/year	5.0 p	
- 1,000 to 10,000 MWh/year	3.2 p	
- Over 10,000 MWh/year	3.2 p	
Energy from waste		
- Under 10,000 MWh/year	[tba]	
- Over 10,000 MWh/year	0.5 p	
Fuel cells		
- Under 10 MWh/year	n/r [12]	
- 10-100 MWh/year	n/r [12]	
- 100-1,000 MWh/year	n/r [12]	
- Under 10,000 MWh/year	n/r [12]	
- Over 10,000 MWh/year	n/r [12]	
Gasification and pyrolysis		
- Under 10,000 MWh/year	[tba]	
- Over 10,000 MWh/year	4.6 p	
Geothermal		
- Under 1,000 MWh/year	[tba]	
- 1,000-10,000 MWh/year	[tba]	
- Over 10,000 MWh/year	4.5 p	
Heat pumps:		
o Air source		6.0 p
- Under 10 MWh/year	15.0 p	
- 10-100 MWh/year	7.0 p	

[30] Average level proposed by the members' survey described in section 5.2 above

Heat classification	**Tariff per kWh** *NB the conditions in section 5.3*	
- Sub-classifications	**Flat**	**Members** [30]
- 100-1,000 MWh/year	[tba]	
- Over 1,000 MWh/year	[tba]	
o Ground source		8.0 p
- Under 10 MWh/year	24.0 p	
- 10-100 MWh/year	[tba]	
- 100-1,000 MWh/year	16.0 p	
- Over 1,000 MWh/year	12.0 p	
o Water source		
- Under 10 MWh/year	24.0 p	
- 10-100 MWh/year	[tba]	
- 100-1,000 MWh/year	16.0 p	
- Over 1,000 MWh/year	12.0 p	
Landfill gas		
- Under 10,000 MWh/year	0.75 p	
- Over 10,000 MWh/year	0.25 p	
Micro-CHP (non renewable)	n/r [12]	
Sewage gas		
- Under 10,000 MWh/year	0.75 p	
- Over 10,000 MWh/year	0.25 p	
Solar thermal		17.8 p
- Under 10 MWh/year	30.0 p	
- 10-100 MWh/year	18.0 p	
- Over 100 MWh/year	[tba]	

D. Proposed *fossil heat levy* mechanism

The model proposed for heat is that renewable heat producers are paid from a central fund. The key functions of the mechanism are that

- money is raised in a non-discriminatory manner from within each type of fossil fuel supplier, and ideally
- money is raised from different types of fossil fuel supplier equitably, and as safeguard in addition to the suggestions of payment in advance or the provision of a float would be that
- payment levels should be capable of being increased (possibly at relatively short notice) in response to the demands on the fund.

The Fossil Fuel Levy was put in place to fund the privatisation of the Electricity Supply Industry and fulfil the function of reimbursing Regional Electricity Companies[31] the extra costs incurred from purchasing the output from renewable generators with Non-Fossil Fuel Obligation contracts. The Fossil Fuel Levy (FFL) shares similarities with the functions required of the *fossil heat levy*, in that it:

- was a percentage of the sales price,
- was raised from Regional Electricity Companies only, and
- had to fund the difference between a reference price (electricity pool price) and the NFFO contract price

The enabling powers for the FFL levy were given under the Electricity Act 1989, the relevant regulations being the Fossil Fuel Levy Regulations 1990. These required the Director General of the Office of Electricity Regulation (i.e. what is now Ofgem) to calculate, from time to time, the rate at which the levy should be paid and notify each licensed supplier not less than three months in advance of the period to which it applied.

The means by which the levy rate was announced was via a press release, stating the percentage level of the levy and the date from which it would become effective. All Regional Electricity Companies then uniformly increased (or decreased) their bills using by appropriate levy amount from that date.

Similar regulations will be needed for the heat levy, except that it:

- falls on fossil fuel suppliers not Regional Electricity Companies or electricity supply companies, and
- is an absolute amount not requiring calculation of a reference price.

The first difference is significant as fossil fuel suppliers comprise both licensed entities (i.e. gas supply companies) and non-licensed entities (i.e. suppliers of non-netbound fossil fuels).

We therefore recommend that new legislation which mirrors the relevant aspects of the FFL be introduced for licensed gas suppliers and, for administrative simplicity since a mechanism already exists - fuel duties are used as a means of collecting a levy contribution from other fossil fuel suppliers.

[31] These have now been superseded by Licenced Electricity Suppliers and Distribution Network Operators, but the logic remains intact.

Fuel duty

There are particular challenges to collecting a levy from suppliers of non-net bound fossil fuels as the market is more fragmented than that for electricity. Many heat suppliers of non-netbound fuels are small-scale and the Government will need to ensure that the administrative burden that falls on them is appropriate.

One option available in the case of those fuels within the scope of the Hydrocarbon Oil Duties Act 1979 is collection via fuel duty. For example, kerosene does not pay duty when used for heat purposes, and it would be an option to raise the funds required via duty collected by HMRC – and then make this available to the administrator of the Renewable Heat Tariff.

This would certainly make administration simpler for distributors of these fuels as the levy would be raised further upstream. Set against this, the duty would not cover all liquid fuels used for heating as it would not fall on gasoil. We would not recommend raising duty on gasoil for this purpose as gasoil is used for both heating and off-road vehicles. Attempting to differentiate between the two would require additional information from distributors and might cancel out any of the benefits intended from taking this approach. It might also be argued that it was unfair that such an option was not available for suppliers of solid non-netbound fuels, such as coal

If the Government is satisfied on the above concerns, it may wish to explore this further, as a duty on kerosene would be broadly right, administratively simple and easy to implement.

Other considerations

Many heat suppliers of non-netbound fuels are small-scale and the Government will need to ensure that the administrative burden that falls on them is appropriate.

We do not believe there is a need to distinguish between fossil fuels supplied for space heating and cooking, as the fossil fuel is used to generate heat in both cases. In any case, attempting to differentiate between the two would risk needless complication. Whatever mechanism is used will need to interact smoothly with CHP plant and address the issues raised above around dual use of fuels.

A further issue is the treatment of blends of fossil and renewable fuels. For example, trials are currently being conducted of blends of kerosene and biofuels and this is the most likely route for deployment of renewable liquid fuels for heat[32]. Our provisional view is that the portion that is fossil should pay the levy and that which is renewable should be eligible for the tariff.

[32] See also our comment on page 30 on the eligibility of biodiesel for support under the Renewable Heat Tariff.

E. Additional outputs of working groups

Some of the rationale that led to the approaches shown in the main body of this report is given in this annex and relates to the *working groups* listed in Annex G.

E1 Additional outputs of working group RETe1

Other levy administration models

In addition to the model for collecting and distributing funds given in the RES annex other models were considered.

- A central administration model – where a central administrator pays generators, rather than suppliers paying generators. A central purchasing model – which involved a central body paying the tariff and selling on exported electricity.

The merits of the central administration model are that it would get round suppliers' cash flow concerns, there would be no difficulties if a beneficiary were to switch suppliers and there would be no problem for beneficiaries if the supplier went out of business. The disadvantages are that the supplier would not build a relationship with the customer and the beneficiaries would have two points of contact - the supplier and the administrator, rather than simply the supplier.

Two variations on the central administration model were also discussed, these were:

- the DNOs acting as a central administrator in their region
- A hybrid between the central administrator model and the RES model, where agents could distribute funds, allowing suppliers to opt out of involvement if they wished

The DNO model has the advantage of being able to predict the amount of generation expected as microgenerators would have to inform the DNO of their connection through the G59 or G83 application.

E2 Additional outputs of working group RETe2

Marine renewables

The 5MW maximum threshold is a significant disadvantage for wave and tidal technologies, as costs such as environmental permitting and installation do not vary linearly with the size of installation. Thus they can represent a very large part of the costs of smaller projects.

The REA's wave and tidal stream members are very supportive of the introduction of these tariffs, but unless the size threshold were to be 10MW or above, anticipate that relatively few wave or tidal projects are likely to be commissioned.

Photovoltaics

Some PV developers felt that it was reasonable to have a longer payback period for domestic installations, in order to keep the tariff level lower. Some also recommend the flat tariff structure for PV.

E3 Additional outputs of working group RETe3

How to incentivise CHP

Currently biomass heat from a CHP is rewarded under the RO with an extra half a ROC. With the introduction of the heat incentive we propose that heat generated by a CHP station has the option of being rewarded separately through the *renewable heat tariff* and the electricity from the same generator should continue to be rewarded through the RO. This is the ideal situation because it will incentivise each additional MWh_e of electricity and each additional MWh_{th} of heat rather than meet the full CHPQA qualifying output but go no further than that.

Optimising CHP

To make the encouragement of CHP effective the benefits under the different mechanisms need to be balanced so that CHP is encouraged to work at high efficiency, without unduly favouring either heat or electricity.

If the heat incentive is set relatively high compared to the electricity incentive, this will incentivise heat-only installations, if set too low relative to the electricity incentive it will incentivise electricity only installations. Both situations miss out on the benefit of primary energy savings that can be achieved by using CHP.

There would be a prima facie case for flexing the tariffs to increase the reward for heat vs. electricity to maximise the carbon savings. However we have not adopted this approach, to maintain simplicity and to adhere to the principles described in section 5.1.

The level of reward

It is estimated the level of reward for heat to incentivise CHP for steam turbine technologies needs to be equivalent to the value of 0.5-0.6 of a ROC. This is the result of cross-checking using three different calculations:

- The CHPQA system operated under the RO
- The power to heat ratio
- The efficiency assumed under the Cogeneration Directive

The numbers produced by REA's model for the likely amount of support needed for different technologies appears to fit reasonably well with the 0.5-0.6 ROC needed for CHP. However, the tariff levels are not yet known and may change over time. To ensure the appropriate balance remains for CHP there will need to be some provision to allow the flexibility to fine tune the heat tariff for CHP installations e.g. multiply the standard tariff up or down.

Getting an exact balance is less of a problem where engines are used. For simplicity and to avoid perverse incentives we suggest that CHP engine technologies are also awarded the same tariff level as heat-only installations using the same technology.

It is also important to note that if heat from CHP were not able to access the *renewable heat tariff*, it could inappropriately incentivise heat-only or electricity-only installations over CHP.

H1 Additional outputs of working group RETh1

Treatment of liquid fossil fuels for heat

An alternative route for raising funds from liquid fossil fuels would be via hydrocarbon oil duties. Kerosene for heating pays zero duty, so it would be open to the Government to increase this and make a matching sum available to the Renewable Heat Tariff. This would be a simple option, and would also be easily done if the Climate Change Levy mechanism is used as described above. [33]

The disadvantage would be that the levy would not fall on all liquid fossil fuels supplied for heat. Gas oil is used for heating in non-domestic settings (and currently pays duty at 10.07 pence per litre), but it would not be simple to raise the level of duty on heat use of gasoil as the end-use of the product is not known at the duty point.

Although we do not have a fixed recommendation to the Government on this point, the option outlined above may be the best route as it is broadly right, administratively simple and easy to implement.

H2 Additional outputs of working group RETh2

Exclusions

The group agreed that the following technologies referred by Group RETu4 should not be eligible for tariffs:

- Passive solar design and passive solar heating of buildings
- Open fireplaces in buildings

If tighter definition becomes necessary, this could be by reference to a de minimis energy rating or by excluding certain devices capable of using non-renewable fuels or by giving eligibility guidelines to *accredited installers*.

Solar thermal

deeming was felt by many to be a preferred approach for solar thermal systems, at least at the household level.

H3 Additional outputs of working group RETh3

Tariff levels

It could be argued that biomethane should be rewarded at similar levels to the different forms of biogas supported under the Renewables Obligation (i.e. a higher rate for AD, lower for sewage gas and lower still for landfill gas-derived biomethane).

However, we do not recommend attempting to mirror the RO support levels. Instead we recommend that the tariff be set at the level that would stimulate the building of new AD plant for biomethane injection. Whilst this may encourage the conversion of existing biogas producing plant from electricity generation to biomethane injection, this may be desirable at sites where there is no use for the waste heat.

[33] As currently written, the CCL does not apply to commodities dutiable under the Hydrocarbon Oil Duties Act 1979.

The conversion of existing plant would entail forgoing the income from ROCs, which would vary between the different forms of biogas. This would therefore be at grandfathered rates shown in the table below, where the difference is less material. There is a vanishingly small amount of un-contracted landfill capacity which will come forward under the 0.25ROC/MWh level, and sewage gas capacity has only grown by 30MW in total, since the RO began.

RO technology bands	ROCs per MWh of electrical output	
	Grandfathered plant	New plant
Landfill gas	1	0.25
Sewage gas	1	0.5
AD	2	2

There would in theory therefore be a greater incentive to convert landfill or sewage gas than dedicated AD facilities. However set against this are the following arguments

- Biomethane conversion from landfill gas will be more expensive, due to the presence of nitrogen, and more challenging trace components
- Sewage treatment works may wish to boost biogas production by co-firing with energy crops[34] (a more expensive feedstock) and separating the energy input from the sewage sludge and energy crop would be difficult.

Interim measures

Given that biomethane tariffs will not be available until April 2011, the only means of gaining a financial reward for the production of biogas is to use it for electricity generation, or directly as a vehicle fuel. The RTFO is not currently a strong driver for the use of biogas in road transport following the decision to reduce targets from 09/10 and the current oversupply of Renewable Transport Fuel Certificates.

It may well be that sites which could have beneficially installed biomethane injection equipment would opt to invest in generation equipment instead – in order to benefit from reward sooner than April 2011.

A system of capital grants to demonstrate biomethane injection should be introduced to help fill this gap.

U4 Additional outputs of working group RETu4

Cost to consumers

In order to estimate the potential cost of the tariffs the model described in section 5.2 and Annex C was used.

[34] It is unlikely that waste food would be used for this purpose, as the resulting solids would not be eligible for land spreading under the safe sludge matrix.

The total energy mix and renewables contribution in 2020 are taken from the Renewable Energy Strategy. It is assumed that renewable energy contribution is delivered through the RO and the tariffs.

It was assumed that:

- The RO would be enhanced to deliver a 27.5% contribution to electricity.
- The effect of banding of the RO and the contribution of technologies like offshore wind would result in an average of 1.2 ROCs being issued for every MWh delivered and 2020 average ROC price would be £40.
- The average annual rise in fossil fuel prices (including carbon pricing) would be 5% compound
- There will be a compound annual growth rate of 35% in systems installed under the *renewable energy tariffs* to reach the levels required by 2020.

The following technology assumptions were superimposed on the tariff calculation model:

- Heat will achieve higher penetration than electric technologies due to its lower average cost. One third of this will be from biomethane into the grid. Take up will be fairly uniform across the tariff classifications except as follows:
- Those technologies have that proved popular under the LCBP and the zero carbon buildings initiatives and will achieve higher penetration, notably biomass heat and CHP, solar thermal and photovoltaics
- Some classifications listed in the legislation are not expected to be widely adopted for heat and CHP applications, notably co-firing, energy from waste, landfill and sewage gas
- After starting at the more 'generous' levels proposed in section 5.1, the tariff levels will revert to slightly lower levels related to an average IRR of about 7%.
- Tariff *degression* will average the levels adopted in Germany (8% for PV and 1% for other electrical technologies). The higher cost thermal technologies will average 2%
- There will be more small systems installed than large ones, but overall the capacity will be fairly evenly distributed between the scale bands described in Annex B.

The overall delivery from the tariffs was flexed to meet the overall *RES* target as described above. Fortuitously, this led to the combined contribution of the RO and the *renewable energy tariffs* achieving 14% of heat and 32% of electricity – the ratios proposed in the *RES*.

This analysis leads to an indicative cost of the tariffs in 2020 of £4.4bn (and £5bn for the RO). These would represent respectively 3.9% and 4.3% of the combined value of the heat and electricity market to which they would each contribute just over 10%.

The cost in the first full year of operation of the two tariffs together would be about £450m, of which just under £200m is allowed to cover systems installed from now until the *inception date* of the tariffs, and £70m relates to *retroactivity* for existing heat systems. These figures exclude existing electricity systems, because it is hard to judge at this stage how many will transfer from the RO.

F. Biomass sustainability requirements

Short term

The Renewable Energy Directive (RED) deadline for implementation is likely to be November 2010 It will apply the same criteria to transport biofuels and 'bioliquids' (biofuels for non-transport energy use). These include:

- Minimum GHG saving relative to fossil fuel (some big questions around the appropriate fossil fuel comparator).
- They must not be produced from land of high carbon stock or biodiversity.
- Companies will be obliged to gather (and provide to member states) data on a wide range of environmental and social impacts.

Medium term

By December 2009, the European Commission will produce proposals for a sustainability scheme for bioenergy use of solids and gases. The details will be up for debate, but it is likely they will amount to a similar level of requirements to those already in the RED.

Longer term – indirect effects

The Commission may produce proposals for dealing with indirect effects from land use change as early as March 2010.

Wastes and residues are not necessarily excluded from scrutiny if their use for energy could result in changes in behaviour elsewhere (not necessarily limited to the energy sector).

These issues have been a key concern around transport biofuels, and would be likely to be included in any European legislation on bioenergy in general.

Outcomes

The RET mechanism needs to meet the demands that will be placed on it immediately and that are anticipated. It must be able to meet the public's legitimate concerns without making the system so demanding that biomass potential is not developed. The approach outlined below should comply.

Recommended mechanism

- The scheme uses a third-party sustainability standard.
- The distributor of the fuel self-certifies that it meets the standard, and supplies information on the sustainability of the fuel to the consumer at the point of supply.
- A certification body checks on the distributor – to the standards required by UKAS. In the case of locally-sourced biomass and simple supply chains this should be relatively simple.
- The user claiming the Renewable Electricity Tariff or Renewable Heat Tariff provides evidence of the statements made by the fuel distributor but does not need further evidence of sustainability to benefit from the tariff.

G. Background and terms of reference

Background

Energy Act 2008 became law on 26th November, it includes enabling powers for:

- A feed-in tariff for small scale electricity
- A Renewable Heat Incentive
- An incentive for biomethane fed into the gas mains

For convenience we refer to these as **renewable energy tariffs**. The introduction of these tariffs followed a year of lobbying alongside Friends of the Earth and 'the *coalition*' made up of 35 interested organisations.

To work up the policy recommendations the REA launched a substantial cross-industry initiative. This annex explains how that initiative was designed to work. The timing is tight, with the small-scale electricity tariff due to be implemented in April 2010, and industry's desire for the RHI introduced on that timescale too.

Cross industry involvement

REA is in a unique position of having member companies with interests across all areas of the tariffs - from manufacturers to installers to fuel suppliers - and involved in installations of all sizes and across all technologies.

Having worked with the *coalition* as part of the tariff campaign, REA has a ready group of prospective beneficiaries to consult with too. We intend to take full advantage of this and aim to ensure all relevant parties are consulted through this process. We are doing this through a number of working groups each focused on different areas of the design of the renewable energy tariffs.

This document outlines the approach the REA has taken to participating actively and collaboratively in the development of the tariffs. It shows the initial intentions for the work, but the rate of progress is very high and readers should use the REA website to keep informed of the latest status.

The working groups

REA set up groups to cover the separate areas of the tariff design. In addition to the co-ordination group and the sub-group of the *coalition* dealing with user- and beneficiary-specific issues, the REA members' working groups are:

- RETe1 – supplier interface for the small-scale electricity tariffs
- RETe2 – tariff levels and threshold issues for the electricity tariffs
- RETe3 – CHP and interactions between the tariffs and with RO
- RETh1 – supplier interface for the heat incentive
- RETh2 – tariff levels for the renewable heat incentive
- RETh3 - Biomethane injected into the gas mains

Each group has representation from across the different types of industry affected by the issues covered by that group. Representatives from other trade associations were also invited to sit on relevant groups. The participants are listed in Annex F.

By keeping the working groups small we were able to focus on the detail of different areas of designing the tariffs e.g. the collection and distribution of funds, tariff levels or the treatment of CHP. Whilst some organisations may be better placed to feed into one or the other of the groups it is likely most will have some interest in all areas. There will also be some genuinely cross-cutting issues. To bring together the output of the working groups, discuss cross cutting issues and ensure any gaps are filled, REA will be setting up a co-ordinating group (see below).

In addition a co-ordination group and a workgroup of coalition members have also been established as further described below and referred to as:

- RETa0 – the co-ordination group
- RETu4 – selected members of the *coalition* considering user aspects

The co-ordinating group

A co-ordinating group brought together the outputs of the working groups to provide a coherent set of policy recommendations to put forward. The group was made up of one nominated representative from each working group, including the *coalition*, representatives from DECC and Ofgem and REA executives.

The coalition

As a result of its lobbying efforts REA is engaged with a wider consortium of organisations interested in the establishment of effective tariffs. This *coalition* was extremely effective in promoting the need for tariffs and engaging political support. Its members are largely representative bodies of potential beneficiaries of the tariffs (i.e. potential owners of on-site renewable projects) along with environmental NGOs.

It is anticipated that the coalition will feed into the REA's work giving input on the users' perspective.

A selection of *coalition* members is listed below[35].

British Retail Consortium
Co-op
Country Land & Business Association
Energy Savings Trust
Energywatch
Federation of Master Builders
Friends of the Earth
Greenpeace
Ground Source Heat Pump Association
House Builders Federation
Institution of Civil Engineers
Institution of Mechanical Engineers
National Energy Action
National Farmers Union
New Economics Foundation
Public and Commercial Services Union
Renewable Energy Association
RSPB
Scientists for Global Responsibility
Solar Trade Association
TUC
UK Green Building Council
UNISON
World Future Council
WWF

[35] But refer to the website for the latest list

Cross-cutting issues

We identified a number of cross-cutting issues which might need to be considered by the co-ordinating group, and these are covered in section 1 (and some aspects of section 2) hereof.

Indicative scope of feed-in tariff groups[36]

Supplier interface - small scale electricity tariffs (RETe1)	Tariff levels and thresholds - electricity tariffs (RETe2)	CHP – and the interaction between measures (RETe3)
Which fossil fuel suppliers encompassed How the levy should be calculated, collected and distributed Insuring against a shortfall in the levy payments Information requirements and minimising the admin burden Fraud prevention	technology classifications and definitions Principles used in setting the levels Recommendations on applicable tariff levels Approach to changing (or tapering) tariff levels with time Any technology-specific considerations in the application of tariffs	The interaction of the Renewables Obligation and a heat incentive The interaction of a small scale electricity feed-in tariff and a heat incentive The transition from the existing incentives for CHP under the RO to a new regime The interaction with CHPQA

Supplier interface – Heat incentive (RETh1)	Tariff levels – Heat incentive (RETh2)	Biomethane – Heat incentive (RETh3)
Which fossil fuel suppliers should pay the levy How the levy should be calculated, collected and distributed Information requirements and minimising the admin burden Fraud prevention	The measurement of heat delivery technology classifications and definitions Principles used in setting the level of tariff for each classification Recommendations on applicable tariff levels Approach to changing (or tapering) tariff levels with time Any technology-specific considerations in the application of tariffs	To suggest an appropriate tariff level for biomethane To consider cost implications for different sources (e.g. LFG, Sewage gas, AD or renewably-derived syngas) To suggest how definitions of biogas or biomass might be amended To consider the implications of determining the renewable content of syngas from mixed wastes To consider whether any additional qualifying criteria are required.

[36] But the groups were free to evolve these terms of reference as their work progressed

H. Acknowledgements

We are very grateful to all those who have participated in the various *working groups* including:

Jon Andrews, Dulas
John Baldwin, CNG Services
Andrew Barnard, Blue-NG
Anthony Battersby, Mendip Power Group
Peter Baynham, E.ON UK
Paul Bedford, E.ON UK
Seb Berry, solarcentury
Robert Bland, Midland Wood Fuel
Ian Calvert, npower Cogen
Mark Candlish, Renewable Energy Systems
Max Carcas, Pelamis Wave Power Limited
Michael Chesshire, Biogen Greenfinch
Dave Clubb, Rural Development Initiatives
David Collins, Renewable Energy Association
Hugh Constable, INEOS Enterprises Limited
Bob Coombes, Green Generation
Martin Cornes, Smart Eco Power Systems
Robin Curtis, EarthEnergy
José Davila, Centrica
Nick Day, Biomass Power Projects
Stephen de Souza, Department of Energy and Climate Change
Nicholas Doyle, Places for People
Janine Freeman, National Grid Transco
Paul Gardiner, Combined Heat & Power Association
Bob Gordon, British Retail Consortium
Leonie Greene, Renewable Energy Association
Nick Hall-Stride, the Carbon Trust
Susan Hancock, Federation of Petroleum Suppliers
Gaynor Hartnell, Renewable Energy Association
Oliver Harwood, Country Land and Business Association
Howard Johns, Solar Trade Association & Southern Solar
Brian Kennelly, Ground Source Heat Pump Association & EarthEnergy
Kevin Knapp, Ecolution
Anna Kulhavy, Ofgem
Liz Lainé, Consumer Focus
Jim Lambeth, Solid Fuel Association
Andrew Leach, National Home Improvement Council
Rob Lewis, Energy Saving Trust
Ali Lloyd, SembCorp Utilities (UK)
Chris Manson-Whitton, Progressive Energy
Chris Matthews, Co-operative Financial Services
Sarah Merrick, Renewable Energy Systems
Chris Miles, Econergy
Phil Moore, Danfoss Heat Pumps UK
Hayley Myles, Black & Veatch
Martin Orrill, Centrica
Susan Pelmore, Renewable Energy Association
John Pietryszak, Scottish Power UK
Lisa Poole, Centrica
Bruno Prior, Summerleaze
Philip Redfern, Chesterfield Biogas
Gideon Richards, Renewable Energy Association
Ben Sang, Black & Veatch
Neil Schofield, Bosch Thermotechnology
Joe Schwager, Juniper Consultancy Services
Chris Shearlock, Co-operative Group
Rob Shuttleworth, UKLPG

John Slaughter, Home Builders Federation
Julian Sowerbutts, Ecovision Systems
Dave Timms, Friends of the Earth
Paul Thompson, Renewable Energy Association
Neil Turner, Renewable Energy Systems
Simon Vesely, Colmworth Golf Club
Ian Waller, FiveBarGate Consultants
Khamun Ward, E.ON UK
Chris Welby, Good Energy
Joanne Wheeler, UK Green Building Council
Chris Wilcox, Solar Twin
Christopher Williams, Eco2
Frances Williamson, Energy Retail Association
Philip Wolfe, Renewable Energy Association
Andrew Wood, Non-Fossil Purchasing Agency
Paul Yiannouzis, London Climate Change Agency
Annika Yule, E.ON U K Renewables

We also thank over seventy REA and REAL members who provided data and input for the modelling work and suggestions on the tariffs.

Thanks also to other groups working on their proposals on the tariffs with which we have collaborated and compared views, including in particular the Micropower Council, Beama Energy and the UK Business Council for Sustainable Energy.