

Review of the Renewables Obligation (Scotland) 2005/6

Response of the Scottish Environmental Services Association

The Scottish Environmental Services Association ("SESA") is the sectoral trade association representing Scotland's managers of waste and secondary resources, a sector with an annual UK turnover of around £5 billion. SESA's Members seek to align economic and environmental sustainability through delivering compliance with relevant EU waste and environmental legislation.

The Principles of the Obligation

The Renewables Obligation (Scotland) ("ROS") was introduced as a market mechanism to provide financial support to renewable technologies which replace conventionally generated power. The resulting reduction in emissions of CO₂ was meant to be rewarded by the ROS.

Unfortunately, there appears to be mission creep, with the Government instead appearing to want to use the Obligation to transition renewable technologies to market where they will then be expected to compete on level terms with conventional power generation, regardless of the environmental advantage enjoyed by one over the other. This would be perverse and would impact negatively on future investment in renewable technologies.

Support for landfill gas

SESA strongly disagrees with the proposals to reduce future support for landfill gas.

Future generating costs for landfill gas projects will increase substantially as a result of new legal and regulatory requirements: reduced support could lead to the premature closure of some projects and the failure of marginal schemes to come on stream. Much landfill gas would instead be flared.

On top of this, the diversion of biodegradable material away from landfill required by the Landfill Directive means that the potential to generate landfill gas is declining, and failure fully to exploit remaining landfill gas projects would see a more rapid decrease in the amount of energy generated from landfill gas.

Approach to EfW

SESA is disappointed that it is intended to continue to discriminate between energy from waste ("EfW") technologies. The Government has missed a major opportunity to realise the potential that energy from waste can make to meet the twin objectives of renewable energy and landfill diversion. Nevertheless we welcome the Government's commitment to introduce alternative support mechanisms for energy from waste. SESA looks forward to further dialogue with the Government on this issue.

The Government's failure adequately to support extraction of energy from waste will continue to constrain take-up of new projects: as a direct result, the UK will miss opportunities to exploit the significant potential of EfW, including the use of Refuse-Derived Fuel ("RDF"), to deliver renewable energy for the UK. The EU's draft Thematic Strategy on the prevention and recycling of waste notes that "for a number of waste flows, incineration with energy recovery will be the best option. This will also help the EU meet its targets under the Directive on the promotion of electricity produced from renewable energy sources". Support for EfW would enable the Government simultaneously to progress towards achieving both waste and renewable energy targets.

Eligibility for ROCs should be based upon fuel inputted into a generating process and should not discriminate on the basis of the technology adopted.

Allocating ROCs on the biogenic fraction of the fuel used to generate energy would be the simplest and most effective way of aligning the environmental and economic benefits associated with biomass.

Tapering of support for cheaper technologies

The tapering of support for more efficient technologies fatally undermines the original market principles of the ROS. Perverse incentives would be created as a technology would be penalised for improving its efficiency.

These proposals to taper support for cheaper technologies would reintroduce the banding of technologies and could be seen by industry as a retrograde step leading policy away from the market principles of the ROS towards a framework more similar to the previous NFFO regime.

Tapering support would undermine investor confidence, increase the costs of financing renewable energy, and reduce the number of projects brought forward. It would also increase the cost of financing new renewable energy projects as investors would demand a higher risk premium to compensate for perceived increase in political risk.

Tapering would lead to a reduction in the amount of renewable energy produced under the ROS and a corresponding reduction in the effectiveness of the Obligation.

Main points of SESA's response

In relation to the specific proposals set out in the consultation document, SESA:

- welcomes the proposal to make the ROS neutral to waste;
- supports measures to reduce the biomass threshold to 90%;
- supports extending ROC eligibility to include EfW as well as CHP plant;
- strongly objects to reducing support for cheaper technologies, particularly landfill gas;
- supports exempting Combined Heat and Power ("CHP") from the Obligation base; and
- supports all measures designed to simplify the Obligation and reduce the administrative burden on operators.

Overall, SESA stresses the need for the UK to recognise that waste is a resource that has the potential to offset a significant part of fossil-fuel energy generation. The current policy framework does not provide the necessary incentives to allow the UK to realise the full potential of this resource.

SESA's responses to the specific questions contained in the Statutory Consultation are set out below.

Q1: Views are invited on this option and its consequences for the Obligation and the development of biomass and energy from waste projects.

SESA supports the Government's proposal to make the Renewables Obligation neutral to waste.

This option would correct the anomaly of a plant losing ROC income on the incineration of ROC-eligible biomass fuel after having burned some mixed waste. Environmental standards

are protected by extraction of energy from waste always being subject to the Waste Incineration Directive.

As the Biomass Task Force recently recognised, biomass has the potential to make an important contribution towards the UK's renewable energy and CO₂ reduction targets. Such a contribution will only be realised if the industry is provided with the necessary support. Even so, the impact of this policy is likely to be limited in terms of contributing towards the UK's renewable energy targets.

The introduction of improved support for conventional energy from waste projects would be a better way in which the Government could improve its prospects of meeting targets. Recent comments made by the Minister for Energy in relation to future policy instruments targeting support for low carbon energy sources are therefore welcome. SESA would hope that the carbon benefits of using EfW to offset fossil-fuel generation (while at the same time helping the UK to meet its targets arising from the Landfill Directive to divert BMW from landfill) would be duly incorporated into any such scheme.

Q2: Does the option give rise to any new issues, difficulties or impacts on the Obligation not considered above?

Any plant wishing to benefit from the proposed amendment to the ROS would have several practical difficulties to overcome. If such a plant were to accept mixed waste as a fuel, this would have to be separated from the pure biomass fuel which would be eligible for ROCs. The measurement and monitoring of these two different input streams would present a number of technical and logistic complications.

In accordance with the principles of better regulation the measurement process for biomass content must be simple, practical and robust. This is below discussed in detail.

Q3: Views are invited on this option, its potential impact and an appropriate percentage figure for the definition of biomass within the Obligation. We would also invite evidence to support a particular percentage figure, such as 90% or 95%.

SESA supports the proposal to lower the biomass threshold to 90%.

Lowering the qualifying threshold for pure biomass to 90% would increase the potential of biomass to provide a meaningful contribution towards the UK's renewable energy and carbon dioxide reduction targets.

The current 98% threshold for pure biomass significantly constrains the range of materials eligible for ROCs. The high threshold was originally conceived to prevent the creation of perverse incentives by preventing highly refined Refuse-Derived Fuel (RDF) from qualifying for ROC eligibility. However, by setting the threshold at such a high level, many materials, such as waste wood and some types of chipboard, are failing to meet the biomass criteria. Lowering the percentage figure to 90% would allow some, but not all, of these biomass materials to be captured by the legislation and to qualify for ROCs.

Autoclave technologies that separate a "pure" biomass stream are another example of a biomass fuel which is unable to reach the 98% threshold. The mean biomass content of a biomass stream produced as the natural output from an autoclave process is approximately 93%. The variability of the fuel produced by the process means that a 90% threshold would therefore be required to enable all fuel produced by an autoclave technology to qualify for ROC support. This would further increase the bankability of such projects.

At the same time, a limit of 90% limit is too high to encourage the refining of mixed wastes.

SESA also notes that under NFFO contracts some projects were allowed to use up to 10% fossil fuel and still retain eligibility for support. If the Renewables Obligation (Scotland) were to adopt a 90% threshold for biomass, this would ensure consistency in the level of contamination allowed under the two regimes.

Q4: Views are invited on ILEX's analysis and the option of granting ROC eligibility to energy from waste plants utilising CHP.

SESA would welcome granting of ROCs to energy from waste plants utilising Combined Heat and Power ("CHP").

EfW schemes that incorporate CHP compare favourably with other renewable technologies such as onshore wind. Even with as little as 22% of the CHP plant's energy being used for heat generation rather than electricity¹, this type of project has the potential to make a significant contribution towards the UK's carbon abatement targets.

This proposal, as recognised by ILEX, would however-by itself-be unlikely to lead to a large amount of new CHP development. Successful implementation of EfW with CHP projects in other countries has largely been achieved through the exploitation of central district heating schemes and the cost of retrofitting such schemes in the UK would be prohibitive.

ILEX recognises that extending eligibility to EFw CHP schemes would have minimal impact on the working of the ROS (as the uptake for this type of project would be so low) and therefore would not impact on investor confidence.

The granting of ROCs would help to reduce the significant non-economic barriers constraining the uptake of EfW with CHP.

Whilst this proposed extension to the ROS would provide a welcome signal of support for EfW with CHP projects, if the Government wishes to promote significant levels of investment in such projects it is vital that the most effective possible support is granted to the industry. The extension of the Obligation to include the electricity generated by these projects would be a welcome first step to be followed by a Renewables Heat Obligation to help secure a future for CHP.

SESA includes below a supplementary appendix outlining one approach to the provision of heat ROCs that would provide an appropriate means of support for EfW with CHP schemes under the ROS.

SESA also believes that Ilex's reasoning should also apply equally to all extraction of energy from waste using conventional technologies. Granting ROCs could help overcome the same barriers which also apply to conventional EfW projects.

Q5: Views are invited on what would be an appropriate minimum threshold of operational efficiency in order to allow projects of this kind to benefit from ROC eligibility.

Whilst the general thrust of ILEX's analysis is correct there is no need for an "eligibility threshold" for EfW CHP projects.

ILEX proposes that EfW with CHP plant should satisfy a minimum threshold of heat output in order to qualify for ROC eligibility. ROCs would then be allocated to the electricity output of a qualifying scheme. However this proposal does not recognise the true environmental benefit of CHP EFw and fails to incentivise the heat output of a CHP scheme.

¹ Dr K Riley – "2005 Renewable Obligation proposals: eligibility criteria for EfW CHP ROCs"

Instead, ROC eligibility for EfW with CHP projects should be based on existing criteria specified in the Combined Heat and Power Quality Assurance ("CHPQA") scheme in order to maintain consistency between Government policy instruments.

In addition to removing the need for an "eligibility threshold" this would eliminate the creation of a "cliff edge" in support, as would occur under ILEX's proposal. The "cliff edge" would exist as a project that missed the threshold by a small margin would receive no ROC income, whereas a project that only just achieved the threshold for heat output would then receive the maximum ROC benefit on its electricity output.

As ROCs would only be allocated to the biodegradable fraction of the inputs, this option of extending the Obligation to include EfW with CHP would only be of practical benefit provided that it was accompanied by a robust and simple mechanism for establishing the biodegradable fraction of mixed waste.

Q6: Views are invited on the approach of tapering support for lower cost technologies by time or output limiting ROC eligibility rights for future projects in certain technology areas.

SESA strongly disagrees with the proposal to taper support for lower cost technologies for future projects.

The principle behind the ROS was, again, to allow the market to correct the failure associated with the environmental externalities of conventional power generation. On the basis of the consultation, this principle would be abandoned, with the ROS instead appearing to be a means to transition different technologies to market. This latter approach would ignore the significant ongoing environmental benefit associated with renewable energy and act as a further disincentive to the development of marginal schemes using these technologies.

The ROS has been successful because it has created a stable investment climate in which the most efficient technologies are brought to market first.

If the principle of the Obligation is undermined through the introduction of tapered support, this would increase perceived political risk and lead to a corresponding rise in financing costs for future renewable energy projects, reducing the effectiveness of the ROS and diminishing further the Government's ability to meet renewable energy targets.

Perversely, the introduction of tapered support would also incentivise investors in renewable technologies not to improve their relative efficiency for fear of having support removed.

If the Government did press ahead with this proposal to taper ROS support for technologies as they become successful, then the pace of development of renewable energy in the UK would be severely undermined and efficiency improvements reduced.

Q7: Would it be better to provide future support to lower cost technologies for a fixed number of years or for a fixed volume of output?

SESA opposes the proposals to taper support for different technologies.

However, if the Government were to insist on introducing a fixed level of support for future projects based on a fixed number of years then it would be vital that any time limit would only commence from commissioning of a project.

Q8: Views are invited on the appropriate level of future support for landfill gas projects post 2009. Would you prefer the Government to adopt the approach of providing all landfill gas projects with ROC eligibility for a period of around 8-10 years or for an equivalent amount of

output or the approach of offering differential support for projects with an installed capacity of less than 1MW?

A choice of landfill gas as a candidate for reduced support under the ROS would be fundamentally flawed. Costs of managing landfill gas are anticipated to rise steeply in order to meet new regulatory and legislative requirements in 2007, and ROC income from the generation of electricity is vital to the ongoing viability of such projects.

Oxera and Enviros note that the increasingly stringent regulation of the management of landfill gas will lead to increasing costs for operators. They then suggest that as landfill projects will face this cost burden in any case, additional costs for power generation from landfill gas will not increase significantly. This fails to recognise that the new regulations do not introduce a requirement for landfill projects to utilise gas for power generation, only to manage that gas through collection and flaring. As the new regulations will lead to significant increases in the additional costs associated with power generation from landfill gas, an inevitable practical consequence of reducing ROC support for landfill gas would be a reduction in electricity generation and an increase in flaring. This would lead to a further reduction in landfill gas utilisation over time and decrease the likelihood of the UK meeting its renewable energy targets.

Oxera and Enviros have also failed to consider that closed landfill sites will not be required to be retro-fitted with new gas collection infrastructure under the new regulations. Without continued full support under the ROS, some potential landfill gas projects on closed sites would not be exploited due to the extra cost burden associated with complying with the new regulations.

Oxera and Enviros also fail to address in their analysis either rising business rates for landfill projects or that grid connection costs are likely to increase as the easiest landfill sites to exploit have already been developed.

Landfill gas has been one of the most successful renewable energy technologies and has made a significant contribution towards the UK's renewable energy targets. However the diversion of biodegradable waste from landfill will result in the declining landfill gas resources during the next 10-15 years. The negative impact on investment in other renewable technologies from the precedent set by tapering support for landfill gas would be a large cost to pay for little obvious benefit.

A survey carried out by the Renewable Power Association has estimated that by 2017 179MW of existing landfill gas capacity will have been decommissioned and during the same period a total of 175MW of new landfill gas capacity would be commissioned of which 90% would be provided under the ROS, assuming that the ROS continued to provide full support for all landfill gas projects.

However if a five year time limit for ROC support was introduced, then only 35% of this capacity would be commissioned, while a 35GWh volume cap would result in only 10% of capacity going ahead.

The above figures demonstrate that a reduction of ROS support for landfill gas would have a significant adverse impact on the already declining contribution made by landfill gas towards the UK's renewable energy targets.

Time-based support

However if the Government is determined to press ahead with tapering support for landfill gas, then it would be overwhelmingly preferable for a time-based approach to be adopted, with the time of commission of the power generation project being the starting point for the limiting period.

The uncertain nature of the pre-commissioning process would undermine the necessity of having as stable an investment climate as possible.

Under the assumptions made by Oxera and Enviros, all landfill gas sites under 1MW would continue to be uneconomic without ongoing ROC support. While SESA challenges the conclusions that larger sites would still be economic without ROS support, at the very least it would be prudent for the Government to maintain full ROC support for all landfill gas projects exporting up to 1MW of output for the full duration of the project. Similarly, once the output from larger schemes fell below 1MW, they too should also be granted ROC support for the remaining output for the duration of the project.

If support levels for different landfill gas projects are to vary, then clarification of the definition of what exactly constitutes a landfill gas generating station is required in order to determine the grandfathering rights for landfill gas projects post 2009. This is addressed in the supplementary notes below.

Q9: What would be the potential impact of rule changes on levels of landfill gas generation from smaller sites/projects?

Landfill gas is a key contributor to the UK's generation of renewable energy. Undermining this contribution at a time when the UK is struggling to meet its targets for renewable energy delivery would be to create a rod for the Government's own back.

The proposed rule changes would undoubtedly lead to a reduction in output of landfill gas generation, particularly for smaller sites. As stated above, the costs for the industry are rising as increasingly stringent environmental legislation is implemented and as business rates and grid connection costs increase.

Q10: Views are invited on Oxera and Enviros' analysis of the economics and available resource for onshore wind projects. Would an output or time based approach to tapering support for future onshore wind projects be viable and what would be the implications of such approaches?

SESA again notes that tapering support for different technologies undermines the original principle of the ROS. Much finance has been invested in onshore wind projects and proposed tapering of support would undermine confidence in future investment.

Q11: Views are invited on the Cambridge Econometrics analysis of the impact of exemption of CHP from the Obligation base.

Cambridge Econometrics demonstrates that the proposal to exempt CHP from the Obligation base and introduce a corresponding pro rata increase in the amount of ROCs required to be submitted would under a range of scenarios lead to an increase in the cost to consumers of the Obligation. Proposals to increase the size of the Obligation in order to facilitate the incorporation of EfW into the ROS were dismissed by the Government on the grounds that costs to consumers should not be increased. The current proposal is therefore inconsistent with the Government's previous position.

Given this change in the Government's position, SESA would welcome the re-examination of a similar approach to conventional EfW.

Q12: Do you agree with the proposals to enable Ofgem to pre-accredit generating plant?

SESA welcomes the proposal to enable Ofgem to pre-accredit plant.

Currently the accreditation procedure is slow and a project may be fully operational for a prolonged period before accreditation occurs. This creates a significant burden on both project planning and administration.

The proposal would provide a stronger guarantee of future ROS support to projects for investors when they conduct due diligence, and reduce financing costs.

Without the introduction of pre-accreditation, a significant number of marginal renewable energy projects would continue to struggle to secure financing. This proposal would therefore increase the likelihood of the UK being able to meet its renewable energy targets.

Q13: Do you agree that late applications for ROCs should be allowed up to the end of the third month following the relevant month for which the ROCs are being applied?

Yes: this would allow an extended grace period for the late application of ROCs and would provide applicants with greater flexibility.

Ofgem would need to provide sufficient advance notice of applications that had failed to be submitted if this proposal were to have the desired effect in assisting operators.

Q14: Do you agree that the article 4(10)(c) declaration should be required on an annual basis?

Yes: this would reduce administrative costs, while allowing Ofgem to continue to monitor declarations on an ongoing basis.

Q15: Do you agree that generating stations should be required to notify Ofgem only where input electricity exceeds 0.5% of gross output or exported electricity?

Yes: this would simplify the working of the ROS and reduce administrative costs.

Q16: Views are invited on the proposed changes – in particular views are invited on the level and detail of information on biomass fuels which would allow Ofgem to exercise their discretion to accept a reduced level of sampling information in relation to ROC claims.

SESA welcomes proposals designed to reduce the administrative burden of the ROS. In accordance with the principles of better regulation, any system of biomass sampling and measurement needs to be robust and consistent while also allowing operators to maintain activity free from excessive administrative burdens. Unfortunately this is not currently the case and proposals which improve regulation in this area are welcome.

Q17: Views are also invited on the appropriate use of declarations in this area and their form and content. Are there other desirable changes in this area?

The use of declarations of test results for biomass purity would be welcome. Operators should be required to gather supporting information and retain such information on file in case of audit. Frequent and excessive submissions of evidence should be avoided.

Any declaration made by operators should consist of a statement of adherence to an agreed quality assurance scheme. This would again be in accordance with the principles of better regulation.

Q18: Views are invited on the potential measurement, sampling or other approaches which may be available for the determination of the biomass fraction of mixed wastes, and for

contaminated biomass fuels, and which would provide an appropriate balance between rigour and practicality.

The DTI should adopt a consistent approach with that of DEFRA and the Environment Agency, both of which accept that mixed waste contains 68% biodegradable material by weight. This figure was established by the EA following an extensive testing programme. If the DTI was minded to implement its own testing regime then it should contact the EA to establish appropriate and robust methodology.

SESA believes that it is vital that any approach adopted by the DTI is consistent with the LATS tests measuring the reduction in the biodegradable content of waste material. The Environment Agency expects the introduction of these tests to add a significant cost burden to waste management operators and any further cost impacts should therefore be minimised.

Q19: Do you agree with the proposals in relation to off-site measurement of fuels? We would welcome detailed suggestions as to how best to establish the circumstances in which off-site measurement of biomass fuels would and would not be acceptable as the basis for ROC claims.

SESA welcomes the Government's clarification on this issue but notes that despite such clarification it may still prove difficult for partners to satisfy the regulator sufficiently for it to accept the results of offsite tests, particularly given the potential for fraud.

A strong audit trail would be required to make these proposals workable.

Q20: Do you agree with the proposals for a revised timetable for supplier compliance as set out above? Would it preferable for the changes to have immediate effect and to apply for the 2005/06 Obligation period as well?

Yes: this reduces the potential for default. This could be achieved through a quarterly submission for suppliers.

SESA notes that Ofgem must be prepared for the increased pressure the proposed changes would place on its own response period. For the proposed changes to be workable Ofgem must possess sufficient resources to cope with the new timetable. If the proposed changes were to be effectively introduced then the ensuing simplified system would have the potential to improve cashflow for operators and would therefore be welcome.

Q21: Do you agree that this proposal would be workable?

The proposal to remove forced sale and buy back arrangements for generators would remove a constraint on generators and could therefore be expected to encourage greater investment in the industry. The proposal is therefore welcome.

The proposal would be of great benefit provided it leads to a simplification in the relationship between generators and suppliers. A clarification on whether generators would be able to sell on the ROC benefit for power used would also be welcomed by industry.

Q22: Views are also invited on whether the requirement for a sale and buyback agreement should be removed for all generators (i.e. large as well as small) who consume their "own" electricity or only for generators below 50kW?

The benefits associated with the removal of this requirement would be applicable to all generators and should therefore be granted to all generators.

Q23: Do you agree that the definition of input electricity should be amended to effect this clarification?

The clarification to prevent the double counting of hydrogen produced from renewable sources is welcome.

Other issues

Definition of generating station

The current definition of generating station is inappropriate for landfill gas and is likely to lead to confusion, particularly if the Government were to decide to differentiate levels of support dedicated to different projects. The issue of grandfathered rights would become crucial to landfill gas generators post 2009 if the proposals for tapering support for landfill gas were to be implemented.

Ofgem accountability

SESA believes that it is vital that the principles of better regulation are adopted in relation to the workings of Ofgem and the ROS. Much of the work required of Ofgem is becoming increasingly technical and it will increasingly become the case that a more flexible approach is needed.

SESA is disappointed to see that the proposals for an appeals process have been ruled out by the Government. An intermediate stage for operators to appeal prior to judicial review would hold the regulator to account, while preventing the spending of excessive private and public sector funds on prolonged judicial review procedures.

Industry should be more closely involved in the development of Ofgem guidance: current levels of consultation are insufficient to enable Ofgem fully to appreciate the impacts of its approach on the industry directly affected.

SESA looks forward to seeing a marked improvement in Ofgem's approach to regulating the ROS.

Scottish Environmental Services Association, December 2005

Appendix

RESPONSE TO THE ROC CONSULTATION WITH REFERENCE TO WASTE TO ENERGY CHP PLANTS

Paul Woods

PB Power

11th November 2005

The Consultation document issued by the DTI (September 2005) regarding the Review of the Renewables Obligation includes some discussion about the potential to extend the ROC arrangements to waste incineration plants that operate as Combined Heat and Power (CHP) plants (paras 3.20 to 3.25).

The ROCs are currently not available to waste incinerator operators as the technology is considered sufficient established and economic in the market to not need additional support even though the carbon savings are significant. The same could be said for landfill gas, which still obtains ROCs but is also an established technology, however support for landfill gas may be reduced in future.

Typically a waste incineration plant will convert 20% of the energy in the waste fuel to useful electricity. This conversion rate could be increased to 60% to 70% through CHP giving very significant carbon reductions. This approach is well established in Denmark for example where heat from waste CHP plants provide the base-load heat for district heating schemes.

The use of waste incineration for CHP is however less well established in the UK, the schemes in Sheffield and Nottingham being the main examples. Waste to Energy CHP plants were supported as a specific category under the earlier NFFO.

The SELCHP plant in south London was originally designed as a CHP plant but one of the reasons heat supply has not been established yet is the way the previous regulations to support such plant operated. The NFFO arrangement paid a premium price for the electricity. When heat is extracted from a steam turbine generating set the electrical output falls slightly. With a high value of electricity this meant that the heat was more expensive to produce, even though overall there would be a significant energy efficiency gain. It will be important therefore to construct any support mechanism so that such disincentives to improve energy efficiency do not arise and the plants are positively supported to produce heat.

The suggestion is that if support was given the ROC benefit could be claimed on the electricity output provided a certain minimum heat provision was made. In fact even a small supply of heat from a plant would result in a positive CO₂ benefit, provided the heat is used to displace fossil fuel boilers or electric heating. There is no need to reference the CHPQA to determine whether there is a positive energy and CO₂ benefit. A CHPQA score of 93 is equivalent to a supply of heat that would bring a plant operating at 20% electrical efficiency up to about 33% efficiency - typically 18% electrical efficiency and 15% heat efficiency on an annual basis. However, the main hurdle to encourage heat supply is making the first few connections, i.e. to justify the conversion works for the turbine and installation of DH pumps. So it is unlikely in any case that a CHP plant would start operating without a reasonable level of heat provision. A CHPQA Quality Index (QI) score of 93 would represent a significant heat supply and yet it is important to note that a QI score *less* than 93 would still result in a net energy saving and CO₂ benefit. The extraction of *any* heat from the steam turbine and

supplied to displace boilers will result in a CO₂ saving and it is overcoming the initial hurdle of starting to supply energy that is important. The regulations should then be designed to encourage further expansion of the district heating network. The CHPQA system was primarily designed for gas-fired CHP systems where the Quality Index indicates the energy efficiency of CHP in relation to the alternative of separate heat and power production.

The pitfall outlined above that occurred under the NFFO arrangement (which effectively increased the value of electricity and thus made incremental supply of heat relatively costly) should be avoided. The mechanism needs to be related to the amount of heat produced. A ROC should be payable for each unit of heat supplied. Heat can be measured sufficiently accurately for this purpose and would allow an immediate additional income to be paid whenever a unit of heat is supplied, thus encouraging further expansion of heat supply.

It would not be appropriate however for this heat supply ROC to have the same value as the electricity ROC. Whereas electricity produced by renewable energy sources displaces fossil fuel power stations, heat displaces typically gas-fired boilers. In addition there is a small loss of electricity from the CHP plant when heat is produced which needs to be taken into account.

The calculation of the relative value of ROCs for heat and ROCs for electricity depends on:

The z-factor – the ratio of heat supplied divided by electricity lost

The efficiency of the boilers displaced and the fuel used

The District Heating (DH) network loss

The emissions factor assumed for the electricity displaced by the plant

With the following assumptions:

Z= 10

Boiler efficiency 80%

Gas fuel with carbon content 194kg/MWh

DH network losses: 8%

And taking the emissions factor for electricity (CEF) as a variable, the graph below shows the ratio of the value of a ROC for heat to a ROC for electricity.

The calculation is:

For 1MWh of heat supplied at the CHP plant:

Lost electricity = 0.1MWh

CO₂ increase from fossil fuel stations = CEF x 0.1 kg

Gas fuel displaced from boilers = $1 \times (1-0.08)/0.8 = 1.15\text{MWh}$

CO₂ displaced from boilers = $1.15 \times 194 = 223.1\text{kg}$

Net CO₂ benefit per MWh of heat produced = $223.1 - 0.1 \times \text{CEF kg}$

CO₂ benefit per MWh of electricity produced = CEF kg

Hence ratio of ROC values (heat:electricity) = $223.1/\text{CEF} - 0.1$

If this principle is accepted then it is proposed that it is extended to cover biomass CHP plant for the same reasons. A biomass electricity only plant could also supply heat to a district heating system, improving the energy recovery rate significantly but ROC support would enhance the prospects for such schemes. Such schemes have been proposed in the London Borough of Tower Hamlets and the London Borough of Barking and Dagenham.

In fact the above calculation holds for a CHP plant employing extraction of steam from a steam turbine for any fuel including fossil fuel and thus justifies the case for a CHP heat obligation.

Conclusions

Given that the provision of heat from a waste to energy (or biomass) plant will result in additional CO₂ savings and that the capital costs of district heating are a barrier, the extension of the ROC scheme to CHP would be logical. However, to pay additional income for electricity production above a certain threshold of heat supply may not be the best way forward as it would not help embryonic DH schemes get established which is the most critical issue. The amount of ROC support should be related to the amount of heat supplied and hence there is a need for a ROC for heat. The value of the heat ROC can be calculated in relation to the ROC for electricity and the amount of heat supplied can be easily measured.

There appears to be a misunderstanding by Government of the energy benefits of heat supply from waste to energy plants as it is not the case that if the CHPQA Quality Index (QI) is less than a threshold value there will be no net reduction in CO₂. Indeed even a small amount of energy supplied from the extraction of steam from the turbine will result in a CO₂ saving. The same is not the case for gas-engine or gas turbine CHP systems.

However, the principle of encouraging the development of CHP through the Renewables Obligation is strongly supported as operating a waste to energy or biomass plant with only 20% to 30% energy recovery is clearly inefficient and does not realise the full potential for CO₂ reductions.