BIOMASS TASK FORCE

EMERGING CONCLUSIONS AND DRAFT RECOMMENDATIONS

1. BACKGROUND

1. This report sets out our emerging conclusions and draft recommendations, building on our two progress commentaries and interim report which can be accessed through the web address in paragraph 3. The report, its draft recommendations and targets contained in the recommendations will be discussed at a closed seminar with an invited audience in September. **You are invited to send your comments on the draft recommendations to the Task Force by 31 August 2005 irrespective of whether or not you will be attending the seminar.** We expect to publish our final report on 25 October.

2. PURPOSE OF THE TASK FORCE

2. The Biomass Task Force was launched on 15 October 2004 to assist the Government and the biomass industry in optimising the contribution of biomass energy to renewable energy targets and to sustainable farming and forestry and rural objectives. The Task Force for this one year study was led by Sir Ben Gill, working with John Roberts from United Utilities and Nick Hartley from Oxera Consulting.

3. Initial questions were posted on the Task Force web page, http://www.defra.gov.uk/farm/acu/energy/biomass-taskforce/index.htm . This began the iterative process which continued with the two progress commentaries and the interim report. The Task Force has been in touch with trade bodies, individual companies, government departments, regional representatives such as Regional Development Agencies (RDAs) and Government Offices (GOs), industry and other stakeholders. It has undertaken a large number of meetings and visits and would like to record its thanks to stakeholders for their commitment and input to the study which has been consistent and significant since October 2004.

4. In undertaking this study for Government the Task Force has defined biomass in its widest sense – literally, any biological mass derived from plant or animal matter. This includes material from forests, crop-derived biomass including timber crops, short rotation forestry, straw, chicken litter and waste material. Planning and Policy Statement 22 defines biomass as “the biodegradable fraction of products, wastes and residues from agricultural (including plant and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.”

5. This assessment of biomass for energy is intended to look at the potential development of biomass energy against a vision of where the key determinants of policy are likely to be in 2020 and beyond and with particular

interest in seeking to reduce the UK's level of CO2 emissions and hence mitigate the effects of climate change. The study is not about finding a use for redundant farmland per se but is about the strategic development of a viable biomass sector which, at the same time, delivers sustainable development for the rural and forestry sectors.

3. OUR APPROACH

Barriers to investment in biomass-fired facilities

6. We have been asked to consider the optimal contribution of the burning of biomass fuel to economic, environmental and social objectives. There is a strong expectation that our report will do something to shift the barriers which currently seem to stand in the way of the greater use of the biomass resource, including here both virgin biomass and "waste" biomass resources. We have in our past reports[1] been at pains to list the large range of barriers that have been identified to us in written submissions and during our various visits. These barriers are of at least four kinds:

- bureaucratic and other restrictions, not all of which are necessary;

- the uncertainties which are inherent in any new market, and which can be removed over time, possibly as a result of some Government intervention;

- economic constraints which will remain, unless Government decides to accept the cost of removing them (an example would be the inevitable competitive disadvantage suffered by small generators); and.

- a lack of awareness and understanding of biomass and its potential.

7. Our previous reports have set out a range of barriers to the development of biomass energy and it is not our intention to repeat all of those here. Perhaps most significant are:

- A fragmented approach within Government both nationally and regionally, linked to stop-start policies.
- An exclusive emphasis on renewable electricity within the renewable energy portfolio which has placed no carbon reduction value on, and therefore excluded, the development of biomass heating.
- Market conditions have undermined the viability of CHP projects.
- Challenges associated with planning consents, closely linked to local perceptions.
- A view that other technologies could deliver the targets, without an appreciation of the need for strategic development of biomass energy to position it to deliver in the longer term.
- The lack of an effective single voice for the industry.

[1] Interim Report of 14th June 2005 and Progress Commentaries of 14 February and 30 March 2005.

- A high degree of ignorance at all levels about the current potential and reality of biomass as an energy source
- No clear vision about what is needed and no delivery plan.

8. A firm basis for intervention by Government will always be the presence of external costs and benefits, which mean that decisions made by market participants fail to reflect the full cost of their activities. In the case of biomass, the most obvious externality surrounds the need to reflect the social cost of carbon dioxide emissions in private decision-making. But there are others, particularly the social costs and benefits associated with different ways of organising the rural economy and possibilities for using biomass to increase the security of energy supply.

9. Looking at our report as a whole:

- significant parts deal with the possibilities for removing unnecessary impediments to investment in biomass: in many cases these impediments can be removed without cost, and we would expect to see our recommendations followed up quickly;

- other parts deal with ways to generate greater confidence and greater co-operation between the different parts of an inevitably fragmented chain of supply: again these actions are, in general, not likely to be costly;

- the most difficult set of issues surrounds the ways in which policy can be adjusted to have full regard to the wider benefits of reducing carbon dioxide emissions — policy here must be pursued in relation to alternative ways of saving carbon.

4. WHAT BIOMASS COULD DELIVER

10. Good data on energy production and use are difficult to find easily and we set out here our current understanding of the energy sector and the potential of biomass. We do have background data which provided the basis for this section and would be pleased to share that data with stakeholders in order to refine and improve it.

11. Energy consumption in the UK splits approximately into equal thirds – one-third heat, one-third electricity and one-third transport. The total size of the UK market for electricity and heat are 379 TWh and 95 TWh respectively. On the basis of current policies and taking account of the full effect of the Climate Change Programme the Energy White Paper predicted UK carbon dioxide
emissions of 135 million tonnes of carbon in 2020.

12. Biomass is the only renewable energy source which, for virgin material, has a cost associated with the feedstock. And conversion efficiencies vary significantly with electricity from coal up to 35% efficient; heat from biomass up to 80%; and CHP up to 90% efficient, but at a substantial additional capital

cost. The potential for increased production or use of biomass within the UK in the future is believed to be significant, particularly with respect to the use of municipal solid waste and sewage sludge for energy generation. From Table 1 it can be seen that potential production of electricity from biomass could account for around 5% of current UK electricity demand. On the basis of present-day figures, if the currently available biomass resource was used to displace fossil-based heat generation, Table 2 shows there is the potential to save up to 21 million tonnes of CO_2 per annum, equivalent to 5.72 million tonnes of carbon.

Table 1: Summary table of Current potential (theoretical) energy generation by sources of biomass.

Fuel Type	Potential realised electrical energy (TWh)[2]	*Percentage of UK electricity demand (%)*[3]	Potential realised heat energy (TWh)[4]	Percentage of UK heat demand (%)[5]	Potential realised CHP energy (TWh)[6]
Municipal Solid Waste (MSW)	1.43 – 5.36	0.36 – 1.35 %	4.50 – 16.89	4.73 – 17.78 %	4.22 – 15.83
Forestry/wood	1.63 – 1.93 *(4.60)*	0.41 – 0.49 % *(1.16%)*	4.33 – 5.14 *(12.26)*	4.56 – 5.41 % *(12.91%)*	4.06 – 4.82 *(11.50)*
SRC willow	0.03 – 0.05 (*5.19*)[7]	0.01 % *(1.31%)*	0.08 – 0.14 (*13.85*)	0.08 – 0.15 % (*14.57%*)	0.07 – 0.13 (*12.98*)
Miscanthus	0.003 – 0.01	0.001 – 0.002 %	0.007 – 0.019	0.01 – 0.02	0.007 – 0.02
Straw (cereal)	10.95 – 13.39	2.77 – 3.38 %	29.21 – 35.70	30.74 – 37.57	27.38 – 33.47
Sewage Sludge	1.733 – 1.950	0.44 – 0.49 %	4.62 – 5.2	4.87 – 5.47	4.33 – 4.88
TOTAL(S)	15.8 – 22.7 TWh *(31.5)*	4.0 – 5.7 % *(8.2%)*	42.7 – 63.1TWh *(89.2)*	45.0 – 66.4 % *(93.9%)*	40.1 – 59.1 TWh *(83.6)*

[2] *Electrical energy conversion efficiency: 25.4% for MSW, 30% for other biomass*
[3] *UK electrical demand in 2003: 395.886 TWh*
[4] *Heat energy conversion efficiency: 80%*
[5] *UK heat demand in 2003(assumed 24% of electrical demand): 95.013 TWh*
[6] *CHP conversion efficiency: 75%*
[7] *Values for future potential production of SRC and woodfuel are included in italics in brackets.*

Table 2: Summary table of Current potential (theoretical) CO2 displaced through energy generation by sources of biomass.

Fuel Type	Carbon dioxide saving (million tonnes) from displaced fossil-based electricity generation (mt CO_2)[8]	Carbon dioxide saving (million tonnes) from displaced fossil-based heat generation (mt CO_2)[7]	Carbon dioxide saving (million tonnes) from displaced fossil-based CHP generation (mt CO_2)
Municipal Solid Waste (MSW)	0.61 – 2.31	1.66 – 6.25	1.47 – 5.54
Forestry/wood	0.66 – 0.83 *(1.87)*	1.56 – 1.90 *(4.44)*	1.38 – 1.69 *(3.92)*
SRC willow	0.012 – 0.021 *(2.11)*	0.028 – 0.050 (5.00)	0.02 – 0.04 (4.42)
Miscanthus	0.001 – 0.003	0.003 – 0.007	0.00 – 0.01
Straw (cereal)	4.73 – 4.09	10.83 – 11.54	9.59 – 10.04
Sewage Sludge	0.75 – 0.84	1.71 – 1.92	1.52 – 1.70
TOTAL(S)	6.76 – 8.09 *(12.07)*	15.79 – 21.68 *(31.11)*	13.98 – 19.01 *(27.34)*

5. INTERNATIONAL PERSPECTIVES

13. Our studies of other countries show that successful policies depend on a comprehensive and consistent approach over a minimum period of at least six to seven years. The commitment of financial resources and use of economic incentives have been a feature of every successful case of market development. In some cases, taxation of carbon has been used as a successful instrument to stimulate renewables.

14. Austria has successfully used capital grants to support installation of biomass heating systems with an emphasis on local sustainability in energy infrastructure. Higher rates of grant have been available for primary producers which means revenue feeds back to those producers for added

[8] *Assumes zero emissions for waste sources (ie. Takes no account of direct or indirect use of fossil energy invested in production), but includes debit for energy used in biomass production. Emissions from UK – 430t CO2/GWh for grid electricity (Carbon Trust website)*

[7] *370t CO2/GWh for heating oil (Elsayed et al. 2003* Carbon and energy balances for a range of biofuel options*, DTI report B/B6/00784.)*

Values for future potential production of SRC and woodfuel are included in italics in brackets.

value products such as heat. The use of wood-fired domestic heating was significantly boosted after wood pellets were introduced in 1994. Although there is a small energy cost (3-5%) in production, pellets are said to give better combustion and handling properties and a quality label and tracking system guarantees quality.

15. In Denmark, rises in taxation were used to maintain prices and make biomass energy financially attractive at a time when fossil fuels costs were reducing. Linked to high feed-in tariffs, this stimulated rapid development. Long-term government commitments gave confidence to the market but the election of a "tax reducing" Government introduced uncertainty about future commitments to support. The renewable energy market declined rapidly over the last two years.

16. Finland has an Action Plan for Renewable Energy which includes the doubling of renewable energy by 2050, taxation of fossil fuels and allocated €31m support for renewables and energy conservation in 2003. The development of woodchip is given priority and use was quadrupled from 1999-2003. Key supply chain issues include reliable supply (quantity, quality, price), integration with other supplies of woodfuel, good production logistics and technology development which integrates manufacturers, producer groups, contractors and researchers.

17. Canada has more biomass potential than any other country except Russia and Brazil. Its largest practical source of biomass energy is waste from pulp and paper mills and sawmills. There are initiatives to promote the development of renewables but no specific targets. In the future, co-firing is seen as a potential way to develop supply chains and infrastructure. Low energy prices mean that biomass energy finds it difficult to compete. Canada has national climate change targets but there are no provincial targets. A significant amount of policy making is devolved to the provincial level.

18. In Sweden bioenergy is seen as an important part of the transition to a long-term and sustainable energy system. District heating is extensive and the use of wood pellets in homes is growing significantly. In 2002 around 800,000 tonnes of wood pellets were used in Sweden. Since 1 May 2003 renewable electricity certificates linked to an obligation, similar to the UK system, have been used to stimulate production. The quota to be met will be increased to stimulate production and was set at 7.4% in 2003 rising to 16.9% for 2010. Alongside this, Sweden uses taxation to promote the use of bioenergy. A carbon dioxide tax, in place since 1991, has helped to make bioenergy very competitive in heat production. The carbon dioxide tax is not levied on the production of electricity. A minister in Sweden's new Sustainable Development Department champions energy efficiency and renewable energy issues.

6. OUR VISION FOR BIOMASS

19. In our interim report we set out in some detail the base assumptions we had used in our vision for biomass over the period to 2020. The key points were:

- Climate change impacts and the need to reduce carbon emissions are a key driver for developing biomass energy.
- Energy demand will at best be static and the UK will need to deploy a wide range of technologies to meet its future energy needs.
- The cost of renewables will fall as they are deployed and, by 2020, the EU Emissions Trading Scheme will be the main means by which low carbon generation is encouraged.
- Biomass will provide a growing proportion of UK energy needs, especially in rural and semi-rural locations.
- Waste will be seen as a secure and sustainable source of biomass energy.
- Climate change impacts will mean competition for land use between food and non-food production as food security becomes an issue for Europe.
- We have assumed that around 1 million hectares of land may be available for non-food uses in general.
- Plant products will increasingly be used in “Chains of Utility” which secure multiple use of the resource including, ultimately, energy use.
- Energy price rises will improve the environment for investment in biomass energy.

20. Our recommendations are to a large extent predicated on both studies and recent experience which show that in some circumstances biomass investments are starting to look economic in their own right. Biomass-fired electricity will, of course, continue to qualify for the Renewables Obligation and so will be able to draw on a significant degree of subsidy. Waste-fired power is helped by the thrust of waste policy and is, in some circumstances, already economic (hence the exclusion of most waste-fired generation from the RO). Biomass-fired heat receives much less assistance, but seems, in some circumstances, already to be a good proposition in economic terms on a revenue basis, even more so at current fossil-fuel prices. We have, however, not proceeded on the basis that current oil prices will necessarily be maintained at today’s levels of between $50 and $60 per barrel. We believe that it is likely that, for the moment at least, financiers would take the same position. That said, if oil prices were to return to the $20 per barrel level our views would need to be changed: we are, therefore, working on the assumption that the underlying price of oil has seen a significant upward shift from such levels.

7. EMERGING CONCLUSIONS AND DRAFT RECOMMENDATIONS TO GOVERNMENT

I MAIN THEMES

Developing supply chains

21. Supply chains and their infrastructure have the potential to develop as the biomass energy market develops and, in part, these can be driven forward through the public procurement option discussed in paragraphs 59 and 60. The Bio-energy Infrastructure Scheme recognised the need to kick-start the development of supply chains and was a positive step at a time when some markets were struggling to develop. But it is our view that if Government puts in place the correct mechanisms to develop markets for biomass then those markets will pull through the necessary infrastructure without the need for further grant support.

Recommendation 1

- With the correct market development mechanisms in place, in particular a clear lead from public procurement, the demand for biomass has the potential to significantly increase and RDAs should analyse the consequential infrastructure needs in their regions and seek to facilitate supply chain development. Each RDA should submit a plan on how they intend to do this by June 2006.

Short rotation forestry

22. We have received submissions about the future potential of short rotation forestry but perceive that there is a risk of a fragmented approach developing. Some have concerns about the introduction of non-native species into the UK. Others are keen to get on with planting and production. There is an urgent need for the Government and the industry to develop a planned approach to short rotation and other forestry.

Recommendation 2

- The Forestry Commission should urgently undertake and publish a full assessment and set out a strategic plan for the development and use of short rotation forestry, forestry waste, recreational woodland management and commercial forestry. This should be delivered by June 2006.

Energy crops

23. Energy crops have been a victim of the stop-start approach to biomass energy which has been in evidence in Government. This has created uncertainty in the industry and has not led to the level of progress needed to pull through the new varieties which have been in development. But there is a need to ensure that biomass energy is driven by market development and has

access to a full range of feedstocks which offer the potential to utilise the most appropriate feedstocks for the situation. And there is a need to recognise the investment which some in the industry have made in developing energy crops as feedstocks for heat, electricity and in co-firing.

24. The European Commission has consulted on the development of an EU Biomass Action Plan and discussions so far have touched on a number of issues with which the Task Force readily identifies. These include linking carbon to fiscal support, harmonising quality standards, promoting heat from biomass and promoting bioenergy through the Common Agriculture Policy. We consider this last issue to be significant in that whilst the UK has sought to develop the production of energy crops the supporting regulations, rural development in particular, have been unhelpful. For example, whilst it has been possible to support the development of producer groups for short rotation coppice growers there has been no similar provision for growers of miscanthus.

Recommendation 3

- The Energy Crops Scheme should continue in the new Rural Development Plan for England and should include planting grants and producer group support in order to build on the investment which has already taken place and to ensure the widest possible access to a range of feedstocks.

Common Agriculture Policy

25. It is important that mechanisms to promote bioenergy in the Common Agriculture Policy are well thought through. The continuation of set-aside and the bureaucracy associated with the €45/hectare energy crops payment are regarded by many as barriers rather then helpful support. There is an important need to ensure co-ordination in Brussels across the various Directorates General to facilitate the introduction of appropriate support by Member States.

Recommendation 4

- Task Force recommends that in taking forward the EU Biomass Action Plan the UK, during its Presidency of the EU, engages in a review of current regulations and discusses with the European Commission the range of feedstocks – crops, waste, forestry – and the changes needed to existing legislation to facilitate the use of those feedstocks as energy sources, as well as the need for the proper co-ordination between the various Directorates of the EU with a nominated Directorate to assume lead role.

Biomass-fired electricity generation

26. It is not easy to measure the full extent of the support given to electricity generation fired by energy crops, short rotation forestry etc, since

expenditure has varied from year to year and schemes have been switched on and off. We do know that the primary means of support, the Renewables Obligation (RO), which subsidises the use of biomass to produce electricity, carries with it an implicit value of carbon that the NAO has estimated[9] as, at the minimum, £260/tC saved (assuming the Obligation is met). Renewable projects are also supported by exemption from the climate change levy and have benefited from recent increases in electricity prices. The NAO have estimated that the three policies together produce a minimum cost per tonne of carbon of £290/tC, again assuming that the Obligation is met.

27. The figure of £290/tC does not, of course, include any allowance for the cost per tonne of carbon implicit in the various subsidies available through Defra and DTI schemes to the various parts of the biomass supply chain, most obviously subsidies to farmers and capital grants to investors in biomass-fired generation capital equipment. This compares with current prices of carbon within the EU Emissions Trading Scheme of at most €30/tC (£20/tC).

28. The RO will, of course, continue, implying that policy-makers accept any disparities in cost per tonne of carbon saved. They do so in important part because there is the strong expectation that the subsidisation of renewables today will enable the industry to drive down unit costs as the volume of activity increases. This is particularly important for those technologies where significant technical progress can be expected. One issue is, therefore, the extent to which the technology to burn biomass is not generally expected to exhibit any major technological advances.

29. Nevertheless, whatever the prospects for major technological breakthroughs, there are reasons to believe that today's assistance for biomass will pay longer-term dividends. Given the fragmented supply chain, and the current uncertainties which beset investment in any part of that chain, we believe that it is possible to justify policies, like the RO, which serve to provide market participants with greater certainty and so increase the likelihood of creating the critical mass needed to form the base of a successful biomass-fired industry. Quite how much it is worth paying to develop this future option is a matter which we have not been able to resolve satisfactorily. Nevertheless, it is clear that assistance towards biomass-fired electricity production will, for the foreseeable future, continue at the level implied by the RO.

30. As has already been mentioned assistance to the biomass industry as a whole has also included a range of specific grants and subsidies. Given the doubts that already surround assistance at the level implied by the RO, how can further assistance be justified? If there was only a carbon objective, further assistance does indeed seem problematic, even though it could be that well directed assistance to that part of the supply chain where the uncertainties and co-ordination problems are the greatest could be a better way of helping than the RO. The picture is, however, complicated by

[9] NAO Report – Renewable Energy, February 2005

consideration of other objectives, notably sustainable farming and forestry and rural objectives.

31. We conclude that, given the certain continuation of the Renewables Obligation, an attempt should be made to streamline and consolidate the amount of subsidy available to the rest of the supply chain. The RO support, the changes which we propose to enable small generators to access ROCs more effectively and the proposal to place a value on heat, when taken together constitute a package of measures which should facilitate developments, including the production of electricity. That said, it is possible that the judicious use of capital grants may help to remove barriers and we remain open to be convinced that is the case.

Comment:

- We believe that our proposals for helping small generators and our recommendation regarding capital support for heat, when taken together with the ROC, should be sufficient to stimulate the market. However, it may be felt that some further capital support is needed to provide an initial stimulus for biomass electricity.

Project finance

32. A persistent topic, put to us throughout our work, is that the requirement that generators largely sell their electricity to licensed suppliers is a barrier, in that where ROCs are involved independent generators are not able to capture their full value. As things are currently organised under the 2000 Utilities Act, it is inevitable that this will be so. Changes in the supply market since the Government re-organised the energy market in 2000 have now reduced choice and value still further. However, as Woking Council has shown (and the Mayor of London is proposing to replicate) other choices do exist outside the ROC market through local supply of power to dedicated users. We understand the Government is reviewing further the potential for such developments to occur as a result of changes in the licensing regime.

33. Vertically integrated companies can, of course, protect themselves, since their own renewables investments help to offset their obligations as energy suppliers. In contrast, small renewable projects face the risks of uncertain ROC prices. A result of this uncertainty is, of course, to increase the required rate of return on new projects. These are all issues for the RO review, and not for us, though we have contributed to that review, and we support efforts there to find ways of simplifying access by small generators to ROC values.

Recommendation 5

- Task Force supports the Government's efforts, in the review of the RO, to find a simple and straightforward way to help facilitate the development of smaller-scale generation by simplifying access to ROC values. The Task Force has recommended to the RO review that

agents be allowed to act on behalf of small generators, that the requirement for sale and buy-back agreements be removed and that output is monitored by remote telemetry with the value of the ROC paid direct to the generator, on a monthly basis.

34. Changes to the RO which improved the competitive position of small companies, would, of course, improve their prospects for obtaining project finance from third parties. Small ventures will, even so, inevitably continue to find life difficult. The best prospects for small companies may be in places where there are niche markets that can be developed as a result of local knowledge and advantage, e.g. access to a local fuel resource. Given transport costs, some biomass projects are likely to fall into this category. Even so, many renewables projects will remain too small to interest mainstream banks: the total investment is small and the balance of risks and rewards is often perceived as unfavourable. Further, the lack of type approval of systems has an impact on risk and due diligence work.

35. One solution may be to encourage the growth of intermediate companies aiming to build up a portfolio of investments in small companies. There are already examples of such companies investing in wind energy and proposals in the biomass field. The advantage is that such companies are able to agree long-term power purchase agreements for the sale of electricity that would be unavailable to their constituent parts. It is to be hoped that such vehicles could be developed to include investment in biomass-fired plants.

Co-firing

36. Co-firing of biomass with coal has potential to significantly expand the use of biomass for energy, help develop supply chains and support the strategic development of energy crops. The Energy White Paper emphasised the importance of such approaches to establish a wide range of renewable options. There is an urgent need to resolve a number of issues concerning the practical implementation of co-firing to ensure that the rules on the use of biomass simultaneously facilitate sensible commercial practice and allow proportionate accountability. We are aware that DTI has, with industry, been looking at the off-site blending issue.

Recommendation 6

- The Government should act with urgency to remove the over bureaucratic arrangements which are applied to co-firing. Specifically, OFGEM should:
- develop monitoring arrangements to facilitate off-site blending;
- introduce sampling arrangements which are appropriate, proportionate and fit good business practice; and,
- replace the end-of-month sampling and reconciliation procedures, taking account of relevant commercial practice with end-of-year reconciliations alone.

Energy from waste

37. Waste is the overlooked resource – it has been viewed as a problem needing disposal, rather than an asset in the fight against climate change. 'Waste' is defined as 'any substance or object which the holder discards or intends or is required to discard.'[10] This definition covers a wide range of different sources of material. The Task Force has focussed on those types of biomass-based waste (or residue) which are assessed as having the potential to provide a reliable source of energy feedstock. These include municipal solid waste (MSW), refuse derived fuel (RDF), clean waste wood, animal wastes and sewage sludge. The potential for energy generation from waste materials in England is significant. At present only c.2.5mt of the residual MSW[11] is used for energy recovery annually, accounting for approximately 0.4% of the UK's current electricity consumption. In theory, by 2020, residual MSW could account for up to 17% of total UK electrical consumption[12].

38. However, a range of barriers have been reported which appear to be acting to deter any major increase in the amount of energy generated from waste. These barriers include a long and complex planning process, a lack of practical, independent, technical advice for local authority planners when assessing new technology applications, negative public perception of 'incineration' plants, a reluctance by banks to finance new technology investments following the failure of earlier, first generation, projects, and a lack of visionary technical expertise in the assessment of proposals for funding under Government support schemes. There are also reported to be inconsistencies in the interpretation and application of regulations across the country, which are causing difficulties to waste operators. In addition, the introduction of the Waste Incineration Directive (WID) is raising issues for certain wastes, such as tallow and Refuse Derived Fuel (RDF); it is being argued by some that these wastes should not be subject to the WID. Combinations of these factors have the potential to delay significantly, or deter completely, the development of the new generation of more energy efficient, sustainable, renewable energy from waste schemes.

39. In addition to utilising more of the available resource for energy generation, there is a need to maximise the amount of energy recovered from the waste. Few of the existing energy from waste schemes in England are designed to make use of the heat energy generated, instead they sell-on the electrical component alone. This approach significantly reduces the potential total energy recovered and also limits the carbon savings made. We believe that Government waste policies must continue to move away from simply viewing energy recovery as a disposal option and increasingly recognise the contribution waste residues can make to help meet renewable energy and climate change targets.

[10] Article 1(a) of EU Waste Framework Directive (Directive 75/442/EEC)

[11] Residual MSW is the remaining material once the recycled and composted elements of MSW have been removed.

[12] This assumes that the theoretical absolute maximum electrical yield for the residual MSW is fully utilised. (from '*Quantification of the Potential Energy from Residuals (EfR) in the UK'*, Oakdene Hollins Ltd, March 2005 for ICE and RPA)

Recommendation 7

- The Task Force recommends the Government provide a clear steer that waste is an asset and that efficient and safe recovery of energy from waste (post re-use and recycling) should be actively encouraged. This should be fully reflected in the Government's waste strategy. In particular, as a matter of urgency, the Government should seek to establish an EU procedure where waste products that have been suitably processed can cease to be classified as waste.

Recommendation 8

- Working with the waste industry, the Government should develop a strategic plan for the use of energy from waste based around plant types which maximise the off-take use of heat and electricity. Appropriate measures, which would actively encourage such developments, should be considered.

Recommendation 9

- The role of the Waste and Resources Action Programme (WRAP) should be extended to include the strategic development of wood waste as an energy source.

Recommendation 10

- The work of the Waste Technology Data Centre (Environment Agency), in analysing waste technology performance, should be encouraged – this work is key to ensuring that waste incineration plants can reliably meet performance, environmental impact and financial specifications, and so build confidence in the emerging industry.

Recommendation 11

- The Task Force recommends that the Environment Agency reviews the consistency of the advice issued by its regional offices on waste regulations, to address industry concerns that different legislative interpretations operate across the different regions and introduces procedures that ensure a common interpretation by June 2006 at the latest.

Recommendation 12

- The Task Force recommends that the Environment Agency uses remote telemetry for monitoring, wherever possible. This is believed to have the potential to improve the level of monitoring for individual sites, while reducing the costs to the industry and improving consumer confidence in the effective monitoring.

Anaerobic digestion

40. Anaerobic digestion (AD) is a natural process whereby any biodegradable material can efficiently be reduced to a mixture of methane and carbon dioxide. The popular belief is that AD is a very slow process but the rate is limited by the need to break down large, tough molecules of cellulose before the real process of AD can commence. In addition, the processes involved in AD proceed in a sequential manner and, after hydrolysis, a further three stages are required in the reaction. Inevitably optimum conditions for two of these stages are very different to that of the third and trying to perform all the reactions in a single-vessel digester will ensure that each of these stages run sub optimally. Nevertheless, looking ahead, the net thermal efficiency of a process will become a primary driver in determining viability, alongside waste being seen and managed as a resource.

41. The UK has significant AD capacity, reflecting the long history of sewage sludge digestion and landfill gas, both of which were primarily focussed on waste disposal. Some development and demonstrator plants have progressed over the past 20 years, these have used either MSW or biomass as a feed but little return has been seen for this investment in the UK. In the EU a slow and unstructured emergence of what is termed second generation plants has started. These use two-stage fermentation or a pre-fermentation stage to increase the proportion of biodegradable feed actually being digested into gas. Although the economics of harder material digestion, such as straw and paper are enhanced by the use of second generation technology, a third generation is likely to be needed to make them truly economically viable. The third generation would use a chemical or thermal first stage hydrolyser followed by two fermentation stages. The components for this third generation exist but have not been integrated into a single process.

42. The biology of the AD process gives a maximum efficiency of around 89%. An engine generator set using the biogas will have a maximum gross efficiency of around 40%. This gives a maximum combined efficiency of 35.6%. This figure matches the efficiency of a coal-fired power station and is substantially better than a municipal incinerator. So with a dry fuel AD can theoretically match the performance of a power station, as the fuel gets wetter the potential benefits increase. The scale needed for the energy plant must be sized to match the local heat needs. Alternatively the gas must be cleaned, an extra inefficiency, and either back-injected into the gas distribution mains, this option has not found favour with the industry or the regulator, or compressed or liquefied and used as a vehicle fuel. The above scenario describes a plant where its sole or majority income arises from the sale of gas or energy. Consequently the emphasis needs to be shifted from waste handling to the yield of gas per tonne of biodegradable material.

43. Small-scale high conversion digesters linked to a CHP systems with gas cleaning and compression or liquefaction, used to supply vehicle fuel and managed to allow modulation of the CHP, could offer maximum efficiency and return. This would mean that the UK's needs in economic, environmental and

industry terms would best be served by supporting the rapid development of a third generation process and the design of a small-scale modular plant suitable for UK production and operational support.

Comment

- This approach set out above would seem to offer the potential for high conversion efficiencies and the development of a UK industry supplying equipment as well as energy production from AD. Stakeholders' views on whether this is correct and how such development should be taken forward would be welcome.

Biomass-fired heat production

44. A major theme of this report is the lack of a well thought out incentive to use biomass to produce heat. Subsequent sections will discuss some of the difficulties of putting such an incentive in place. Our view is that any arrangements must be:

- administratively simple;
- flexible to changing circumstances;
- simple to understand;
- focussed on the issue;
- the distribution of any burden must be equitable; and
- the delivery mechanism must be economically efficient.

The initial issue is to establish whether we can determine broadly the right level of support. There are two obvious approaches.

45. One is to take this issue in isolation and to use the estimates of the social cost of carbon current within Whitehall – i.e. a range of £35/tC to £140/tC, with central value of £70/tC (at 2000 prices). Another is to aim to achieve a level playing field between the Renewables Obligation and assistance to renewable heat and to provide a subsidy broadly equal to the value of the RO. Given that the RO has the central objective of securing technical change in the renewables industry, and given the maturity of heat producing renewable technologies, we believe that the former approach is more appropriate. In this case, the central number for the value of carbon saved is £70/tC (at 2000 prices), and we take this as our guidepost for the broad level of support which should be made available to renewable heat.

46. A key concern is that whilst the use of biomass for the production of electricity is already encouraged by way of the Renewables Obligation, incentives for the production of renewable heat are much weaker. This lack of recognition of the value of renewable heat has led to a failure to harness the carbon benefits from the replacement of fossil-fired boilers with biomass-fired systems. It has also led to a failure to recognise that heat-only systems can deliver efficiencies far in excess of those designed to produce electricity alone.

47. In encouraging the development of the biomass heat sector the objectives would be:

- in the case of existing heat systems (both single systems and networks), to encourage the replacement of fossil-fuelled boilers with biomass-fuelled boilers or, where it is possible, the substitution of biofuel for fossil fuel in existing boilers;
- in the case of investments in new heat networks, to encourage the fitting of biomass-fuelled boilers;
- to incentivise the investment in more heat networks – as opposed to standalone boilers – than would otherwise be the case, and then to encourage the use of biomass-fuelled boilers in those networks.

48. Some studies suggest that in the industrial and commercial sectors biomass-fuelled heat is already more-or-less competitive with conventional fuel sources at current oil price levels. This is, however, not generally recognised by investors, so that current uncertainties mean that some, albeit relatively small, level of subsidy is needed to tip the balance. A subsidy equivalent to the current valuation of the social cost of carbon seems to be sufficient to make the necessary difference.

49. How then should this be achieved? One option we have considered, alongside the public sector actions set out below, is the possibility of using a voluntary agreement with the house building sector to fit a certain proportion of biomass-fuelled heat systems in new developments. However, we find no enthusiasm to pursue this option amongst stakeholders. We therefore focus our attention on two main options which could, in principle, have the effect of rewarding the carbon benefits. The options are the introduction of a renewable heat obligation (RHO) and the development of a capital grant scheme.

50. The option of a renewable heat obligation was raised by the Royal Commission on Environmental Pollution[13]. As a counterpart to the obligation in the electricity market it has obvious attractions given that it does not require the use of public money and it would encourage innovation and involvement by a variety of different players. A heat obligation would inevitably be complicated since most heat is not supplied by commercial companies but is manufactured by end-users, both domestic and industrial/commercial, by using purchased fuel in boilers which they themselves own. There do not, therefore, seem to be possibilities to impose an obligation on "heat suppliers" in the way that an obligation has been placed on electricity suppliers.

51. One suggestion is that an obligation be placed on the suppliers of the fossil fuels from which heat is produced. Those companies would be required to provide, either directly or indirectly, a given proportion of that base year supply from renewable, i.e. biomass, sources. There is no doubt that a RHO would be more complicated that the RO. If substantially more biomass-fired

[13] Biomass as a Renewable Energy Source, Royal Commission on Environmental Pollution, 2004

heat is to be used, then there will generally be the need for new investment in biomass-fired boilers to support the increase in the demand for biomass fuel. In contrast, in the case of electricity this investment is not essential, since electricity-using devices make no distinction between ordinary and “green” electrons.

52. The core of the scheme would be Renewables Heat Certificates (RHCs) which would be granted to heat users/producers who could demonstrate that that had substituted renewable heat for fossil-fired heat. The relationship between the provider of the RHC and the company with the obligation would be for negotiation. The company with the obligation might meet the requirements *via* its own energy service company, supplying both fuel and conversion equipment. But most obviously it would do so by buying certificates from other companies. At the extreme, the company with the obligation would make no effort to meet the obligation either directly or indirectly, but would, as with the RO, simply pay the “buy-out” price. The buy-out fund would then be available to those people who had directly provided biomass-fired heat supplies, i.e. it would, in effect, provide an industry levy which would be used by others to finance biomass-related activities. It may be that an obligation could be linked to a requirement that all industrial and commercial uses of heat should be metered, though this would require additional change over and above compliance with an obligation. It would also involve significant cost.

53. We are aware that some argue that the existing renewables obligation for electricity and the prospect of a similar obligation for transport fuel adds weight to the argument for a similar regulatory approach on renewable heat. We recognise that a particular merit of a tradable obligation would be that it would, in principle, cover existing as well as new uses, and also that it has greater potential to encourage innovation than either regulatory solutions or capital grants, which inevitably tend to encourage what is already known. We do not rule out that it may be possible to introduce an obligation for renewable heat but we do conclude that it would be both complicated and administratively burdensome. For example, certificates would need to be issued against objective and verifiable criteria which, given the wide range of different ways in which a switch to biofuels could be made, would be hard to police, and there would be complex issues of equivalence to be settled, and a continuing need to demonstrate additionally.

54. A central criterion should be that any scheme should be sustainable and kept in place for a significant period of time. In this case, we do not believe that it would be right to commit to the considerable effort involved in creating a RHO at precisely the time when so many of the underlying features of the energy market are moving in favour of biomass. We would, therefore, prefer to proceed by making structural changes in the regulatory framework, notably to planning requirements (see paragraphs 62-64), and by the introduction of a streamlined capital grants scheme to assist new investment in biomass-fired boilers. A capital grants scheme would be more flexible than an obligation since it could be adjusted to allow for changing circumstances. It will also be time limited. Both are, in our view, significant merits.

55. There is no doubt that an important barrier to the development of biomass heating systems is the high capital cost of equipment. One way to overcome this and place a value on the carbon savings arising from biomass heat would be to offer capital grants on investments in order to alter the behaviour of purchasers by encouraging the switch to biomass-fuelled systems. Such capital grants could be set at a level which just tips the buyer's preferences towards a biomass-fuelled boiler or, alternatively, at a level which capitalises the value of the flow of carbon benefits from the project. A complication is that in the case of biomass CHP the carbon savings associated with the electricity output are already rewarded through the Renewables Obligation and so it is only the carbon benefits associated with the use of heat which should be rewarded.

56. Our conclusion is that it would be feasible to support the development of domestic, industrial and commercial investment in biomass heating and CHP through a streamlined capital grant support. A scheme established on the basis that the flow of carbon savings associated with the use of heat should be valued at £70/tC (see paragraph 41) should, we believe, provide a sufficient flow of funds to produce a significant change in investment behaviour. This scheme would cover:

- Domestic heating systems.
- Industrial and commercial systems.
- Community applications – such as schools, hospitals, leisure centres.
- Other public sector investments.
- The heat element of electricity generation projects – recognising that if electricity projects already get capital grants at the state aids limit there would be no practical benefit.

57. In the longer term we would hope that incentives for the use of renewable heat can be provided by the EC Emissions Trading System. We are aware of the potential for a domestic UK greenhouse gas reduction project mechanism known as a Joint Implementation or JI where the capture of emission reductions can be turned into a credit. This approach would build on existing structures rather than create new ones and provide an additional revenue stream for heat. It would link directly to the value of the carbon dioxide saved and give an incentive to maximise emission reductions. Our own hope would be that it would, in due course, also be possible to reflect the carbon advantages of biomass in the price which domestic consumers pay for this fuel, as opposed to fossil fuel.

58. The potential for biomass district heating systems needs to be better understood. Such systems have wide acceptance in other parts of Europe as seen during visits to Finland and Sweden. They have the potential to offer reduced installation costs and easier maintenance coupled with the delivery of carbon dioxide emission reductions. Their potential as a green development opportunity needs to be highlighted with planners and developers.

Recommendation 13

- We recommend the Government introduce a single capital grant scheme to grant aid all biomass heating boilers and CHP biomass-fuelled plants up to [ ]MW capacity. We propose grant be fixed at 50% of capital expenditure of the boiler or CHP equipment for [ ] years, declining in annual steps to zero over [ ] years. For CHP this grant aid could be further tailored to other capacity bands i.e. 50% up to [ ] MW and 0% over [ ]MW.

Recommendation 14

- In considering changes to the EU Emissions Trading Scheme, Defra should consider and report on the introduction of a Joint Implementation mechanism for long-term support for the development of biomass heat. This work will need to be considered alongside the review of the potential for a renewable heat obligation.

Public procurement

59. The Energy White Paper showed that the Government recognised it has a vital role to play in leading by example[14]. It has established a Sustainable Procurement Task Force to bring about a step change in sustainable public procurement. We see considerable possibilities for the public sector to increase the amount of investment both in heat networks and in standalone biomass-fuelled boilers for heating. These possibilities are greatest where public sector facilities – schools, Ministry of Defence buildings, hospitals – are off the gas grid, but confining investments to off-grid cases would be very limiting. Substantial progress can only be made if biomass investments are made in mainstream circumstances, though equally due recognition of the particularities of biomass is needed — the needs for storage and waste disposal mean that biomass-firing may not be the preferred method in inner city applications."

60. It would be easy to suggest that the way forward would be for public sector investments to include a notional stream of returns based on assumptions about the value of carbon savings. And yet it is inevitable that public sector investments will be viewed through the filter of the analysis of "value-for-money". Moreover, many important investments are now made as part of public/private partnerships, and so will be required to meet rigorous standards of cost effectiveness. We understand that HM Treasury guidance on investment decisions shows that it is possible to take account of whole life cycle costs, both capital and operational, and non-market factors such as delivering environmental benefit. It does therefore seem that PFI rules do not stand in the way of developing biomass projects, though they are still perceived to be a problem by many in the design and construction industry.

[14] Energy White Paper, Chapter 3, paragraph 42

Recommendation 15

- Government should aim to deliver higher standards of sustainability through maximising environmental benefits with a programme of positive preference which requires all new build and refurbishment in the public estate to fully consider the use of biomass.

Recommendation 16

- Each Department, RDA and GO should, within 6 months of this report, set and publish ambitious targets, not less that [ ]%, for 2010 and 2020 for the use of renewable heat, electricity and CHP in its buildings with the direct use of renewable energy being preferred to the indirect use of renewable energy by way of contracts with electricity suppliers. This must take account of the potential in schools, hospitals, MOD establishments and other buildings in public ownership.

Regulatory issues

61. There are a number of regulatory issues which are barriers to the development of biomass energy and which the Government could remove at no or low cost. The recommendations below are self-contained and self-explanatory.

Recommendation 17

- The domestic market provides a significant potential for the development of biomass heating. VAT on biomass equipment is levied at 17.5% whilst gas-fired boilers benefit from a reduced rate of 5%. Given the environmental and other benefit biomass heating can deliver the rate of VAT should be reduce to 5%

Recommendation 18

- Building Regulations, Part J does not recognise that biomass systems are not radiant heat devices. The regulations require unnecessary measures – extending flues, fitting heat pads for heaters to stand on. Building regulations should be updated to take full account of the specifications of biomass systems.

Recommendation 19

- The Clean Air Act requires approval for heat boilers used in smoke free zones. Each model has to be tested, which is expensive and can take several weeks, for exemption under the Act even though the European standards which appliances have passed are said to be more stringent than the Act. Government should review this requirement and develop a simplified approvals system which removes the need for individual testing of boilers.

Recommendation 20

- Part L of the Building Regulations on conservation of fuel and power deals with boiler technologies. Biomass systems are included with solid fuels installations but it is essential that the guide to heating systems which is being produced by Heating Equipment Testing and Approvals Scheme (HETAS) must deal with biomass heating systems in detail. We recommend the Government ensure the biomass industry is represented on the working party producing the guide.

Planning regulations and local authorities

62. Planning Policy Statement 22 on Renewable Energy sets out national policy for different aspects of land use. With its accompanying guide PPS 22 is intended to encourage the appropriate development of further renewable energy schemes. Regional Spatial Strategies and local planning documents are intended to promote rather than restrict such developments. There is scope to assess wider environmental and economic benefit. Small-scale projects and community involvement are positively encouraged.

63. The implementation of national policy at regional and sub-regional level will always be challenging. Local authorities can feel vulnerable to legal challenge (and associated costs) if they are too prescriptive with developers. But there is the potential that greater engagement at the local level would focus thinking and help the development of local solutions. And there is potential to use planning gain through Section 106 of the Town and country Planning Act 1990. For example, a housing development using biomass-based district heating would be viewed more favourably that a proposal based on individual gas central heating boilers.

64. This is not an area where we would expect national Government to be prescriptive. Planning is devolved to local authorities for good reasons and we would not seek to interfere in the principles which underlie current arrangements. Having said that, delivery of national targets depends on action at the local level. In respect of the development of renewables London has set an excellent example for the rest of the country by requiring that new developments achieve a target of 10% renewables. Given that this process has withstood legal challenge and that PPS 22 enables local planning authorities to set such targets in new residential, commercial or industrial developments we propose that the local authorities each set such targets for renewables, including biomass.

Recommendation 21

- Local authorities should review local plans and policies and incorporate positive sustainability measures. In line with paragraph 8 of Planning Policy Statement 22, the Government should invite each local planning authority to set and report to Government a target for a percentage of on-site renewable energy development to be used in new residential, commercial or industrial development.

Recommendation 22

- Government should encourage local authorities to use the planning gain principle to establish district heating systems, based on biomass and other renewables, which are underdeveloped in the UK and have potential in new build.

II DELIVERING THE POLICY

Ownership of biomass in Government

65. The potential of biomass (paragraphs 10-12, tables 1 and 2) means that it should be given a higher profile in sustainable energy policy.

66. Our view is that the rationale for renewables policy in relation to biomass lacks clarity, given that different Government departments have different agendas and different understandings of the potential and use of biomass.

67. The current fragmentation of responsibility for the various aspects of energy policy leads to a lack of ownership and this needs to be addressed. We have already noted that this issue has been recently addressed in Sweden with the establishment of a single Department for Sustainable Development. There is a logic which says that DTI, as custodians of most of energy policy, should take the lead on biomass. But, at this stage, we leave open the option that, for example, Defra would be a better vehicle for delivery.

Recommendation 23

- The Government should establish [a cross-departmental team with appropriate secondment or secondments from the private sector] to lead on the implementation of Task Force recommendations within the life of this Parliament and, within 6 months of publication of the report, an implementation plan to take forward Task Force recommendations should be published. The Team should use the Sustainable Energy Policy Network to deliver the implementation plan to Government and should report progress on a three-monthly basis both to a [Defra/DTI] minister who should take ownership of biomass energy in Government and also to the Energy and Environment Cabinet Committee.

Delivering the policy

68. In our Interim report we commented that for national policy to be successful it is essential to have focussed regional delivery. Developers, at any scale of project, need to be able readily to access general information, advice, technical data, promotional material and information on grant funding and available capital. There is currently a lack of clarity about where to go for these services, making the situation confusing for those who wish to develop projects.

69. Delivery of the policy recommendations in this report would involve Regional Development Agencies, Government Offices, local government and incorporate activities such as the Community Renewables Initiative and any other spin-off initiatives. Project development will inevitably need to link to Natural England and the delivery of land-based support. We have been impressed by the Energy Saving Trust's plans for a Sustainable Energy Network at the local level and the aim to create a one stop shop network where developers and their clients can access good quality information in this area.

70. Clearly there are a number of sound players in the field and it is extremely difficult to suggest that one is the lead organisation. RDAs are well positioned to lead this activity in the regions. At the national level both the Carbon Trust and the Energy Saving Trust play a key role in linking local delivery into central Government policy. Carbon Trust helps business and the public sector cut carbon emissions and supports the development of low carbon technologies. It helps develop strategies to address climate change and provides energy savings advice for small companies and carbon management strategies for larger companies. Energy Saving Trust promotes the sustainable use of energy and reductions in carbon emissions. It targets households, small businesses and the public sector and addresses energy efficiency, small-scale renewables and issues about vehicles. It seems that either or both could lead delivery of this activity and we intend to discuss this with stakeholders at the September seminar.

Recommendation 24

- Government should establish one stop shops as a focal points for biomass energy with [ ] leading on the delivery, providing annual reports on progress and working through the RDAs as the regional delivery partners.

Recommendation 25

- To give focus to the development of biomass energy Regional Development Agencies should, with regional partners and within 9 months of publication of this report, set targets for delivery of biomass energy in their region. [RDAs should consider delivery through a limited company based on the model developed by EEDA and SWRDA and must embrace all renewables groups in the regions and maximise use of public funds by minimising duplication.]

Getting the message clear

71. There have been regular and repeated statements of the Government's long-term commitments to the use of biomass as a renewable energy source and some development funding has been in place since the days of the Non-Fossil Fuel Obligation. But the biomass industry considers that this has not been underpinned with action to achieve strategic development. This

mismatch has led to the view in the biomass industry that there is no clear, long-term message about what the Government wants to deliver.

72. A stop-start approach to development has been in evidence through a multiplicity of biomass grant schemes, some put in place opportunistically rather than strategically, and this is taken as evidence of a lack of a clear strategic approach.

73. Future energy scenarios suggest that it will be necessary to harness and develop all renewables options. As targets become more challenging the cost of delivering carbon savings will inevitably rise and action taken now will position biomass strategically for further development. To secure industry confidence it is essential that the Government sets out a clear strategic message on the future role of biomass energy.

Recommendation 26

- The Minister given responsibility for biomass energy should publish a response to this report by June 2006 detailing the percentage of energy supply the Government expects will be developed from biomass by 2010 and 2020 and for each detail the proportion that should come from the public and from the private sectors.

Awareness raising

74. Biomass energy has a low profile amongst the renewables mix and is seldom referred to when renewable options feature in the media. Installing biomass heating in schools through the public procurement route is the best educational tool available to Government and it will provide a source of good exemplars for use in other publicity.

75. The lack of awareness has been evidence during our information gathering work when we have at times found it difficult to get stakeholders to respond to requests for meetings. In most cases, but not all, it has proved possible to overcome initial reluctance.

76. There are other important target groups including project developers, energy managers, planners, architects, quantity surveyors and engineers. All of these groups need access to technical information, supply chain economic data, data on fuel supply quality standards and information and best practice information on exemplars. There is also a need for the general public to better understand the potential of waste as a resource, rather than simply see waste as a problem.

Recommendation 27

- Task Force recommends that this information be brought together in CD and downloadable web formats by [June 2006] and made available and sent to the key stakeholders described above. The Carbon Trust, Energy Saving Trust, RDAs and Regional Assemblies should include

biomass energy awareness raising amongst current publicity and promotional work. The development of biomass heating in schools should be used as an opportunity. Awareness raising should include information on biomass from waste.

III OTHER ISSUES

Quality standards and certification

77. It is important to have feedstocks which are fit for purpose and delivered to a quality standard and specification. This is essential to creating and underpinning consumer confidence. International comparisons in particular have emphasised the need for supply chains to develop which ensure that feedstocks of appropriate quality are used in conversion technology. Clear technical specifications are needed which can be incorporated into supply contracts. We are aware of work in place to develop specifications and standards – CEN TC335 for solid biofuels and CEN TC343 for solid recovered fuels – and the British Standards Institute committee engaged on this. We are also aware that BRE and the British Pellet Club are seeking to develop a Wood Pellet Accreditation Scheme based on the CEN technical specifications.

Recommendation 28

- The Task Force recommends that the European standards which are being developed – CEN TC 335 and 343 - are adopted as the basis for the UK standard for these fuels.

Recommendation 29

- It is important that the detail of these standards are disseminated as fully as possible and this needs to be incorporated into the activities we identify in paragraphs 74 – 76 dealing with awareness raising.

78. The assessment of the net energy benefits and the environmental impacts of the use of crops for fuel is key to the development of both public and private sector policies. Approaches based on Life-cycle assessment (LCA) are widely used. Life cycle assessment is an established technique for quantifying the total environmental impacts of the provision of a product or service from original resources to final disposal, or so-called "cradle-to-grave". Its background can be traced back at least as far as the development of energy analysis in the 1970's. Many of the approaches and conventions incorporated into life cycle assessment have their roots in the principles of energy analysis. Its practical use in informing energy policy has been enhanced by the creation of an official framework for life cycle assessment in the form of the International Standard ISO 14040 series (Refs. 10 to 13). This framework establishes the definitions and conventions of life cycle assessment, and provides practical advice on methods of calculation.

79. Life cycle assessment focuses on a "functional unit" which provides a clear and definitive description of the product or service which enables subsequent results to be interpreted correctly and compared with other results in a meaningful manner. In the energy area, the functional unit could be a kilogram or litre of a transport fuel, a unit of primary energy (GJ or tonnes of oil equivalent) delivered to a power station, or a unit of electricity. LCA is based on the life cycle inventory analysis (LCI) which quantifies relevant inputs and outputs of the life cycle of a product or service. Various life cycle inputs and outputs must be quantified, including energy resources, such as fossil fuels, and emissions to atmosphere, such as CO_2 and other GHG.

80. Product or service life-cycles are complex so LCA and LCI studies of crop based products involve, for example, the analysis of data on energy used in fertiliser production and nitrogen emissions from soils. The calculations are affected by assumptions about the crop yields achieved, the crop management and processing inputs, and the fossil fuel replaced. The use of LCA in the study of bioenergy systems is now well developed and a number of studies have applied LCA methodology rigorously to compare bioenergy supply chains. They show a clear advantage for perennial woody crops grown for electricity and heat in terms of per hectare net energy yields, energy balances, and greenhouse gas abatement effects compared with the use of annual crops for liquid biofuels based on vegetable oil for biodiesel, or starch and sugar for bioethanol.

Recommendation 30

- LCA work is taking place, in the Strategy for Non-Food Crops and Uses, to develop a central life cycle inventory database to support the sustainable development of the sector. The Task Force recommends this be expanded to incorporate biomass energy issues. In implementing the recommendation thought should be given to the development of wider international partnerships, for example, with Canada and other work in bodies, such as the International Energy Agency, to establish the base assumptions in any evaluation process.

Biodiversity and other impacts

81. The long-term development of biomass needs a strategic approach on biodiversity and other impacts. We understand that discussions are taking place between Government and the environmental agencies about the possibility of making some information available for strategic environmental impact assessment. This could complement the Environment Agency's biomass assessment tool (BEAT) which looks at the very high-level energy crop requirements and impacts for new biomass plant. It would give indicative information on issues such as soils, designated and historical sites and weather.

Recommendation 31

- The Government should continue to make a priority of work to develop the information needed to undertake strategic environmental impact assessments for biomass and should consult fully with environmental and other groups with an interest. Any such work must be based on established fact alone and not be subject to other opinions.

Research and Development

82. Government investment in R&D in the biomass, including forestry and energy crops sectors, has been at a significant level for a number of years. But it is extremely difficult to establish precisely what resource is allocated to this activity. There is additional funding from the RDAs as well as the European Commission. Work covers the spectrum from basic research to near-market commercial activity and includes issues affecting feedstocks as well as technology development.

83. The Renewables Innovation Review raised concerns about the complexity of these arrangements and for the need for all of the bodies operating in the sector to understand their roles better. Currently R&D is funded and/or undertaken by the Research Councils, universities, Government departments, research organisations, RDAs, the Forestry Commission and industry. We have seen no evidence that there has, in general, been any attempt to better co-ordinate research across these bodies. We are unclear what role the Energy Research Centre might have. It was established to provide a focus for energy research in the UK and to bring cohesion to diverse R&D activities through a National Energy Research Network and, on the face of it, should have a part to play.

84. The Task Force was impressed by the structure of biomass research in Finland where work was carefully co-ordinated through Tekes and VTT in order to link academia with industry and avoid duplication and secure value for money. We are aware of the work of the Interdepartmental Funders' Group on Bioenergy Research Committee which has sought to bring similar discipline to biomass R&D funded directly by Government.

85. The Task Force has identified conversion efficiencies as an important issue. For electricity generation there has been a degree of emphasis on new technologies with potential to deliver more efficient conversion. But the Arbre experience has a real and serious impact on confidence. At this early stage in the development of a new industry there is a need to use the sound foundation of proven technology to establish supply chains and proceed by evolution rather than by trying to provoke revolution. At the same time it is important, in parallel, to put in place the R&D which will help demonstrate and deliver the new technologies.

86. In any developing industry there is a need to keep up to date on progress with technology. This is adequately illustrated by the legacy of Project Arbre in the UK which has left a perception that gasification

technology is not at the stage of commercial development. In contrast, we saw in Finland good example of working gasifiers and were told that gasification is regarded as today's technology there. A good awareness of the stage technology development has reached will also prevent R&D resources being spent unnecessarily in fruitless studies.

Recommendation 32

- The Government's Chief Scientist should lead a fundamental review of research linked to biomass energy and develop a strategic plan for research and development from basic through strategic to applied research and including technology development. The review should assess whether current activity is well focussed and well co-ordinated, put in place procedures to avoid duplication and ensure the programme delivers value for money.

Recommendation 33

- In considering the value for money issue, the Government should assess whether any section of the funding for R&D can be sensibly reduced, reallocating any resource released to project development.

Recommendation 34

- In the energy crops sector the performance of new varieties is crucial to delivering economic viability. Defra should make proposals for the development of arrangements which will ensure such performance data is readily available and published and that the government funded variety development work is taken forward by industry.

Training and skills

87. With any infant industry there is likely to be a lack of skilled operatives able to install and maintain equipment. This lack of trained engineers for the installation, commissioning and servicing of biomass systems needs to be addressed in order to underpin growth in the sector. There is a need to consider both qualifications and competence schemes for engineers.

Recommendation 35

- The Task Force recommends that DTI arrange for the relevant Sector Skills Councils to identify the skills and training needed for the entire biomass sector from production to the final delivery of the energy. This should lead to the preparation of a sector skills agreement which will fully define the need and set out how training and skills development will be delivered.

8. COMMENTS

88. Stakeholders are invited to send comments on this report by 31 August to:

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Biomass Task Force
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