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2.2 Scientific and technical description of the results

Strategy for market penetration of biomass cogeneration in participating European countries (Deliverable 4 under Work Package 3)

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1 The purpose of the strategy for market penetration

This paper is intended primarily for the European Commission. It should also help guide other stakeholders with perspectives and remits for the biomass cogeneration industry, particularly trade associations. The paper offers market analysis, recommendations etc. as a common basis for European Commission and other stakeholder's support for and activities with the biomass cogeneration industry.

This strategy uses information presented in the BioCogen reports plus further input from discussions and correspondence with the BioCogen team.

2 Overall mission, goals and strategy

A brief mission statement is useful to give a clearly identifiable purpose and focus.

"To contribute to European industry, energy, environment, and land management goals by expanding the use of biomass for cogeneration".

European goals and strategies provide the wide framework for biomass cogeneration. A bullet point list of the benefits that biomass cogeneration offers is provided below. Some important European policies, targets etc to which biomass cogeneration can make a significant contribution are noted below.

The benefits that biomass cogeneration offers for key sectors in Europe

Industry and other investors. • energy solutions; • solutions for waste streams; • financial returns that are matched with risk
Environment • reduce emissions of greenhouse gases and other pollutants: biomass cogeneration is near CO2 neutral on life cycle basis. • reduce impacts from waste disposal • local use of biomass has short transport distance compared to fossil fuels
Energy-economic • help enable decentralization and thus flexibility; • more players in the energy market gives competition; • improve efficiency of energy conversion; • avoid electricity transmission and distribution losses; • achieve greater use of renewable energy; • help improve local energy security; • reduce fuel import needs at national and regional level.
Agriculture and forestry • enable diversification; • create rural revenue streams; • create/maintain jobs; • help to improve land management practices such as forestry thinning and clearing
Competitiveness • stimulate development of technologies and services with worldwide applications

Selected European policies, goals, strategies – a brief summary of aspects relevant to biomass cogeneration.

The promotion of electricity from renewable energy sources. Directive 2001/77/EC • Target of 12% of gross inland energy consumption in the community to be provided from renewables by 2010, with 22.1% of electricity provided from renewable energy. Member states must set indicative targets and report on progress versus these. Guarantee of origin systems must be established for electricity from renewable energy. Various grid connection issues including priority access to electricity from renewables.
Kyoto Protocol. United Nations Framework Convention on Climate Change • The European Community and all Member States have agreed joint fulfillment of commitments under the UNFCCC Kyoto Protocol. The EC must reduce its greenhouse gas emissions by 8% below 1990 levels by 2008-2012.
Emissions Trading Scheme Directive. (draft) • Forthcoming cap and trade scheme for CO2 emissions, covering some 5000 large industrial sites in Europe (energy plant over 20MWth input; cement, pulp and paper, metals etc.). This will be an important contribution to the EC achieving its Kyoto targets.
European Community CHP Strategy 1997 • The CHP strategy from 1997 set a target to double the percentage of EU-wide electricity produced from CHP, from 9% to 18% in 2010.
CHP Directive. (draft) • The Directive is a "framework for the promotion of cogeneration". Aims to contribute to three major objectives of the EC's energy policy: fair competition in a liberalized market, environmental and climate protection, and security of energy supply.
A Sustainable Europe for a Better World: a European Union Strategy for Sustainable Development. European Commission Communication COM(2001)264 • Broad vision for a cleaner, safer and healthier environment including "major reorientation of public and private investment towards new, environmentally-friendly technologies, in order to decouple environmental degradation and resource consumption from economic and social development".
Forest Strategy for the European Union. European Commission Communication COM(1998) 649 • A broad strategy covering the economic, social and environmental aspects of forestry. The strategy states that the use of forests as a source of energy should be favoured, including use of forest residues and available low quality wood and short rotation plantations, with attention to local implications for the environment and other forest industry demands for raw material.
Reform of the Common Agricultural Policy • Ongoing debate how to reform the CAP in order to simplify, reduce the expenditure burden, make farming less production-orientated but more market-orientated, and encourage more extensive and environmentally-friendly practices.

A possible future development is the development of a **Directive for the promotion of heat from renewable energy sources**. In Europe, in terms of primary energy, heat from renewable sources is some six to seven times greater than electricity from renewable sources (excluding large hydro), and the heat is virtually all from biomass. This is little-known but important fact. The idea of a Directive promoting heat from renewables has been raised under the European Climate Change Programme and would cover biomass (including cogeneration), active solar and geothermal.

3 Opportunities and capabilities

This section presents an overview analysis of future prospects of biomass cogeneration in Europe. The analysis looks ten years into the future. It is based on the BioCogen team's considered realistic views of the future: steady progress in technical terms, continued growing awareness and development of further measures favouring the environment, but also continued activity by competitors and ongoing obstacles to the wider deployment of biomass cogeneration.

The customers are the starting point. The BioCogen team considered who is currently investing in biomass cogeneration technology to deliver their site demands for heat and power and who could do so in the future given a favourable balance of drivers versus barriers. The table below lists potential sectors with new-build and retrofit opportunities, and the customers are the corresponding owners, operators and / or investors.

Customers.

Industry: mainly private sector companies and investors • Agro-industries (eg livestock and poultry farms, greenhouses, mills, canneries) • Wood processing industries • Other industries in rural or semi-rural locations • Waste management industry
Commercial and residential buildings in rural locations: mainly private sector, some government sector and some community organisations • Centers for leisure (including museums) and sport activities • Offices • Multi-residential accommodation • Hotels and resorts
Various public facilities: government sector, some private sector companies • Authorities dealing with waste including sewage • Combined power and district heating • Schools and other education facilities • Military establishments

It is also important to consider who the competitors are or may be. The list below considers both site specific competitors and those organisations that compete in more general terms such as for finite support budgets.

Competitors.

Companies that build and install **fossil-fuel cogeneration**
Existing utilities supplying electricity and gas
Companies supplying **electricity or heat only biomass energy** technologies
Developers of projects using **other renewable energy** technologies

The marketing environment comprises the external macro-forces acting on the biomass cogeneration industry. Major developments underway or foreseeable are listed below under the headings: political, legal/regulatory, economic, social,

technical. These issues are considered further under SWOT categories (strengths, weaknesses, opportunities, threats).

Major external influences across Europe in next ten years

Political	Ratification and implementation of Kyoto Protocol. Continued drive for energy sector liberalization and low energy prices Growing concern for energy supply security at European and national levels Increasing use of market-based support for renewable energy Reform of the Common Agricultural Policy (CAP).
Legal & regulatory	A suite of clean energy and energy saving – related legislation such as the Buildings Directive and the Energy Saving Directive Tighter waste regulations such as European Landfill Directive. European Emissions Trading Scheme creating significant carbon liabilities for 10-15000 industrial sites across 25 EU member states. Mandatory obligations on utilities to supply renewable energy and development of tradeable renewable energy certificates
Economic	Political/business drive for continued low prices of energy Upward pressure on electricity prices created by tightening supply of natural gas and added cost of emissions trading for power generators. Continued strong competitive and lobbying positions of energy utilities. Growing corporate liabilities and responsibility in climate change area. Growth in the renewable energy sector. In some areas there will be saturation of landscapes with wind turbines; rapid expansion of off-shore wind. Increased demand for biomass and waste fuels. CAP reform.
Social	Continued growing awareness and concern for environment Some demand for green energy by general public
Technical	Advanced and efficient technologies / concepts – gasification, pyrolysis, centralised anaerobic digestion – becoming commercially proven More widespread demonstration of trigeneration (power, heat and cooling). Various multi-fuelling technical concepts becoming proven and introduced widely. Increased standardization and trade of biomass fuels.

What are the capabilities? For example: describe and classify available technologies and their applications (commercial or near commercial); identify those that are most promising. ***TO BE COMPLETED WITH INFORMATION FROM ITEBE***

Strengths

Increased penetration of biomass cogeneration would contribute to many European and national policy prerogatives, in industry, energy, environment and land management:

Industry and other investors
- energy solutions;
- solutions for waste streams;
- financial returns matched with risk

Environment
- reduce emissions of greenhouse gases and other pollutants: biomass cogeneration is near neutral CO2 on life cycle basis
- reduce impacts from waste disposal

Energy
- help enable energy decentralization and thus flexibility;
- improve efficiency of energy conversion;
- avoid electricity transmission and distribution losses;
- achieve greater use of renewable energy;
- help improve local energy security;
- reduce fuel import needs at national and regional level.

Agriculture and forestry
- enable diversification in agriculture and forestry;
- create rural revenue streams;
- create jobs;
- help to improve land management practices such as forestry thinning and clearing

Competitiveness
- stimulate development of technologies and services with worldwide applications

Well proven technology in many areas, such as wood combustion, landfill gas, sewage gas.

In many cases, low or no cost biomass fuels are available.

Relatively straightforward to retrofit existing fossil fuel infrastructure to use biomass fuels, in particular district heating with power generation.

Biomass fuels can be stored and transported, unlike other renewables.

Weaknesses

The multiple benefits of biomass cogeneration cannot be easily rewarded.

More advanced and efficient technologies – gasification and pyrolysis – are still commercially unproven, risky and expensive.

In many countries the establishment of biomass fuel supplies is novel and risky. Many sources of biomass are small, dispersed and seasonal. This is a "chicken and egg" problem common to countries without existing bioenergy, whereby investment in conversion will not take place until fuel supplies are in place and vice versa.

Poor data on biomass fuel availability coupled with multiple fuel sources and multiple conversion routes. Biomass energy not understood and perceived by policy makers and decision makers to be small, uncontrolled, old fashioned and financially unattractive.

High capital cost of biomass cogeneration including heat networks. This is coupled with the lack of economies of scale for most applications. The liberalized energy sector also has increasingly short term financial goals.

Lack of awareness and knowledge of biomass cogeneration including political and business decision makers.

Lack of quantified targets and coherent policies and measures for future growth of biomass cogeneration.

Many potential applications for biomass cogeneration have low heat demand. For example, many agro-industries are seasonal.

Cogeneration often falls outside companies investment criteria so alternative approaches - third party finance, ESCO, leasing etc – are used. But many sectors of the biomass cogeneration industry are as yet too undeveloped technically and too high risk for such arrangements.

Mismatch of locations for biomass cogeneration and heat demand eg landfills are distant from settlements eg. rural locations have abundant biomass fuels but limited industry with high constant heat demand.

Although biomass fuels can be transported they have low energy density (even when refined eg pellets) compared to fossil fuels.

Opportunities

Sites for readily commercial applications with low or no cost fuels – landfill gas, sewage gas, waste incineration, wood combustion in wood processing industries – in southern Europe and accession countries.

Ongoing conversion of district heating fuelled with coal or oil to biomass fuels.

Development of international standards for biomass fuels, leading to better conformance to specifications and easier contracting.

Growing international trade of biomass fuels will give better data and more widespread recognition.

Changes in Common Agricultural Policy leading to greater focus by farmers on markets and farming diversification with more extensive agriculture practices and new crops including energy crops.

Increased pressure to divert wastes from landfill is an opportunity for waste incineration and may promote the use of organic wastes and residues for fuel eg from wood from arboriculture activities in towns. This will ultimately lead to reduced opportunities for landfill gas.

Trigeneration (power, heat and cooling) becoming commercially proven.

EU emissions trading and the Kyoto flexible mechanism Joint Implementation may stimulate the use of biomass fuels in existing fossil-fuel fired power plants and CHP plants. Such developments will be characterized by their relatively large scale.

Biomass fuel supplies established in countries that currently do not have such supplies, via trading and the emissions trading and JI drivers noted above. Opportunities for further biomass cogeneration installations may ‘spin-off’.

Public sector offices, buildings such as leisure centers, hotels etc, particularly in northern Europe, where investors and operators place relatively high priority on environmental and social objectives and have lesser focus on short term financial return.

Growing awareness of the importance of heat from renewable energy and the important contribution that this makes to primary energy in Europe. Possible development of a renewable energy heat Directive.

Increased taxation of high carbon fuels: biomass fuels exempted.

Many areas becoming saturated with on-shore wind. Off-shore wind has higher costs than on-shore and, where the two options are compared (by government grant providers for example), biomass cogeneration should be more financially competitive with off-shore wind.

Threats

Ongoing static market conditions for cogeneration as a whole impacts negatively on RD&D of biomass cogeneration.

Renewable energy incentives focus on electricity and exclude heat.

In increasingly liberalized energy markets, direct subsidies become less available and there is a move to market-based mechanisms. The impact of these mechanisms depends on the detailed rules ('small print') and their interpretation. Biomass cogeneration is disadvantaged because of the strong lobbying and economic power of existing utilities. An important example of this is the forthcoming European emissions trading scheme which, contrary to its fundamental goals, threatens the competiveness of CHP in Europe.

Ongoing changes in legislation and regulations causing uncertain economic conditions for investors.

Negative public perceptions in some countries, particularly energy from waste. The use of wood for energy may also be negatively perceived. Environmentalists may oppose international trading of biomass fuels.

Overcapacity of old power plants and newly privatized utilities supplying very low priced electricity.

Electricity network access systems complex and inhibit cogeneration investment.

Increased demand for biomass and waste fuels. New supply chains, trade etc will develop. But overall price increases likely.

Concern by woodpulp industry regarding competition by bioenergy industry for supply of raw materials. Possible interventions by governments.

Decline in new build district heating, because of the very high upfront capital costs and long term view required. Private companies, who have taken over the energy sector from government, are unwilling to make such investments.

Changes in Common Agricultural Policy leading to uncertainties and greater financial demands for farmers and agro-industries. Thus, greater focus on core food businesses and more risk-adverse approach to long-term investments such as biomass cogeneration.

Reliance of bioenergy on tax benefits that can be rapidly withdrawn.

4 Strategic objectives

This area covers two issues:

- Which opportunities, identified above, promise most growth?
- Quantitative growth targets.

There are several relevant stated EU targets including:

- 26 Mtoe of cogeneration installations by 2010 (5^{th} Framework Strategic Priority)
- 6 Mtoe of biomass fuels used in co-firing plants by 2010 (White Paper: Energy for the future: Renewable Sources of Energy, COM (97) 599).
- cogeneration to contribute 18% of EU electricity generation by 2010 (CHP Strategy 1997)
- Increase biomass contribution from 3%, some 45 Mtoe, of the energy needs of the EU by further 90 Mtoe by the year 2010 (White Paper: Energy for the future: Renewable Sources of Energy, COM (97) 599).

There are no explicit strategy or targets for heat from renewable energy including biomass. As noted above, heat from biomass is the largest source of primary renewable energy in the EU. Much of this is traditional use of firewood in individual homes across the EU. There is growing awareness that continuation of the decades-long trend of reduced traditional firewood use threatens EC targets for renewable energy. Heat energy in general has been neglected by policy makers, but there is a realization that it may require attention. A report to DG Environment and DG TREN dated September 2002 reviewed the issue from heat from renewable energy sources and recommendations included the preparation of a Communication or a Directive.

The BioCogen team considered that the following hierarchy of priorities, presented by COGEN Europe, is an appropriate guide for policy makers:

1) Avoid energy demands where possible ie maximise efficiency
2) Expand the supply of renewable energy as much as possible, taking economic and technical feasibility into account
3) Ensure the maximum use of combined heat and power in the supply balance
4) Use fossil fuels to generate power or heat only for remaining needs

Stated targets by national governments, trade associations etc also need to be considered.

Stakeholder's must consider how the above can best be integrated with one-another.

The following section considers which sectors offer most growth ie additional installed capacity.

5 Target markets

This section reconsiders the customers listed above, with some additional sub-sectors, and identifies which are the most promising for growing the installed capacity of biomass cogeneration over the next ten years. Some notes are provided on the competitive edges offered by biomass cogeneration in each of these segments.

The most promising market segments for growing the installed capacity of biomass cogeneration, by country.

	Austria	Bulgaria	Denmark	Finland	France	Greece	Slovenia	Sweden	Turkey	United Kingdom
Agro-industry	✓					✓	✓		✓	
Wood processing industry	✓					✓	✓	✓	✓	(✓)
Pulp and paper industry	✓							✓		
Other industry in rural / semi rural locations			✓			✓			✓	✓
Centres for leisure and sports							✓			✓
Offices including local authority buildings										
Multi housing developments			✓							✓
Schools and other education								(✓)		✓
Hotels and resorts			✓			✓	✓			
Sewage treatment plant	✓					✓			✓	✓
Landfill sites						✓	✓		✓	✓
Conversion of existing district heat & power*	✓							✓	✓	
New build district heat (cooling?) & power										

(✓) = limited or uncertain potential
*the conversion of existing plants generating power and delivering district heat from fossil fuels to biomass or waste fuels.

Competitive advantages and some key observations and trends in target markets

Segment (country)	Competitive advantage	Observations and trends
Conversion of existing plants generating power and delivering district heat from fossil fuels to biomass or waste fuels (several countries)	It is technically straightforward to retrofit existing fossil-fuel plants to use biomass fuels. This is becoming increasingly financially attractive, with more carbon / energy taxes and carbon finance (emissions trading, JI etc)	70-90% of district heat in the EU is produced in combination with power generation. Euro Heat and Power statistics for the 5 year period 1994 to 1999 for district heat with power generation show switch from coal and oil to gas, biomass and waste. In 1999, waste and biomass accounted for around 20% of primary energy used (20TWh from total 250TWh). There are a growing number of examples of conversion of oil or gas fuelled district heating to biomass fuels in central and eastern Europe, many with carbon finance elements.

		District heating extensive in many accession countries and environmental performance of many plants is poor.
Agro-industry	Many Cheap biomass fuels available e.g. manure, straw, maize silage, organic waste	Electricity production from digestion of manure becomes attractive because of high feed-in tariffs and improvement of the digested manure for fertilisation
Wood processing (Austria)	Cheap industrial residues available, process heat demand for wood/timber drying	Increasing knowledge of CHP technologies, some few trendsetters already installed CHP sysetems
Pulp and paper (Austria)	Experience with wood logistic, further reduction of fossil energy use necessary to reduce CO2 emissions, high process heat demand, selling of green electricity might become attractive	Increasing conscious to reduce fossil energy consumption, concepts for substituting coal, oil and gas with recovered biomass fuels and waste fractions are discussed
MSW incineration (Austria)	Successful experiences in the last few years, avoiding landfill of organic material with carbon content above 5%, potential to substitute fossil energy	Strong trends from landfilling to incineration with energy generation are detected
Sewage gas (Austria)	Strong increasing of waste water tratment systems, state of the art, process heat demand for sewage drying	Even for smaller waste water treatment systems the production of biogas becomes more and more attractive
District heat with power (Austria)	Many district heating systems installed in Austria with average heat demand between 0.25 MW up to 10MW;	Increasing interest to co-produce electricity in existing heating plants, Stirling and ORC cycle are of biggest interested, because of their easy additional implementation in existing boilers
Mixed development – retail, commercial, industrial, domestic (UK)	It is financially attractive to include biomass CHP as part of such developments rather than as an add-on feature after the completion of the development. Carbon savings, CCL and ROC's all add benefits both financial, environmental and social.	With targets set in the UK for electricity from renewable energy and also for CHP, local and regional government are encouraging the inclusion of biomass CHP within such developments. At the moment gas CHP still receives more attention however more projects are emerging for biomass CHP.
Sewage treatment (Denmark)	Sewage treatment it´s part of the treatment to use digestion tanks, taking off organic compounds and lowering the COD level before pumping the residue to the recipient.	More treatment plants are using this step instead of the energy costly aerobic treatment. Energy (power) produced can be used for processing, of often a surplus can be sold to the grid.
Landfill gas (Denmark)	Using landfill gas for power generation, and where possible for DH too.	Many places landfill gas is collected, but just burned in flares, instead of using it to power generation.

		Collecting the methane helps to the green house gas discussion, and producing power further saves (can save) fossil fuels for power generation.
MSW incineration (Denmark)	Reduces landfill needs and leakage problems	Incineration reduces the waste by 90 percent at the same time as producing power and where possible CHP EC landfill directive to be full filled before 2010. Emissions by fluegas is low due to filters, and the EU dioxine directive lowers the emission to a very low level, less than other energy producing techniques.
Wood processing industry (Greece)	Dated wood fuelled heat only equipment ready for replacement	Some 20-30 sites in Greece with >1MWth heat only plant could be retrofitted with cogeneration
Hotels and resorts (Greece)	Offers green credentials to hotel or resort operators, may be financially competitive in remote locations.	Winter/autumn/spring tourism is growing in several Greek mountain locations. Some 'agro' and ecotourism' developments. Hotels have extensive heat requirements. These locations have extensive forests and wood industries generating residues.
District heat with power (Greece)	Offers local authorities and communities green credentials and, most importantly, contributes to local economy. Improvement of comfort to local households, schools, local authority buildings.	Mountain villages throughout Greece have extensive forests and wood industries generating residues. Conversion of existing traditional wood fires / stoves plus some household oil fired central heating systems.
Waste management (Greece)	Use of landfill gas for energy offers electricity revenues for operators. In some locations, may be able to use heat eg for greenhouses.	Around 50% of waste produced in Greece is unmanaged. This breaks EU legislation and some Greek authorities are paying financial penalties. Great need for improved waste management to international standards. Several new landfill sites near to Athens are proposed but there are huge public protests. Incinerators might avoid new landfill capacity, although will also cause NIMBY protests.

6 Recommendations

The recommendations below are not in order of priority.

Establish European heat policy, including biomass cogeneration

A Directive for the production of heat from renewable energy sources should be developed, so this important area is no longer ignored. This would build on the three main pillars of European Community energy policy, namely: fair competition in a functioning liberalized energy market; environmental and climate protection; and security of energy supply. The Directive would have an overall explicit aim of expansion of heat from renewables and should:

- Establish a strategy for promoting and growing heat from renewables. This will include heat from biomass, solar and geothermal. Cogeneration of heat and power from biomass should be included as an important sector.

- Include targets for expansion of heat from renewables for the EU and for individual Member States. Targets should be ambitious but realistic, based upon known potentials. There should be sector-specific targets, including biomass cogeneration.

- Determine how other ongoing future planned policies, legislation etc. will impact on heat from renewables, and ensure the aims of this Directive are not impeded by other policies etc.

Support the competitivity of biomass cogeneration

All types of national and international initiatives to support the competitivity of biomass cogeneration versus conventional cogeneration or heat and power-only applications should be encouraged. These include subsidies; tax allowances and accelerated depreciation; taxation on conventional fuels; emissions trading; tradeable 'green' certificates; utility portfolio standards / obligations, buy-in tariffs etc. It is recognised that, in liberalized markets, direct subsidies are less available and there is a move to market-based mechanisms. The impact of these mechanisms depends on the detailed rules ('small print') and their interpretation. Biomass cogeneration is disadvantaged because of the strong political lobbying and economic power of existing utilities. An important example of this is the forthcoming European emissions trading scheme which, contrary to its fundamental goals, threatens the competiveness of cogeneration in Europe. It is important that the bioenergy industry has a common voice to counteract such a threat.

Biomass cogeneration falls outside the alternative financing approaches - third party finance, ESCO, leasing etc – that are used by companies supplying conventional fuelled cogeneration plant and technology. The reason is that many sectors of the industry are as yet too undeveloped technically and too high risk for such arrangements. There is a need for work with technology providers and financial services to develop appropriate packages, perhaps some forms of public-private partnership, that are commercially attractive to investment decision makers.

Promote the benefits of biomass cogeneration

Biomass cogeneration offers significant, varied benefits, but information on these is scant. There is a need to bring these benefits to stakeholder's attention. Existing information needs to be reviewed and collated. New studies may be required, and these should include quantitative analysis where possible, eg how many jobs would be created in the agriculture and forestry sector and at what cost? eg comparitive analysis of economic multiplier effect of biomass cogeneration versus conventional energy systems. These benefits need to be brought to the attention of the media, policy makers and industry analysts as frequently as possible. This will require appropriate communications – briefings / statements / presentations – which convey these benefits in readily interpretable, user friendly, multi-lingual ways. This material should be made readily available on-line to promoters and practitioners of biomass cogeneration.

Benefits offered by bioenergy, such as farm diversification, rural revenue streams, environmentally-benign production etc., should fit well with ongoing changes in the Common Agriculture Policy. It is important to engage with agriculture policy makers to ensure that they become aware of the opportunities offered by bioenergy. For example, tobacco is socially important in some locations in Southern Europe because it is highly labour-intensive. Tobacco is heavily subsidised (up to 80%?) and such support is being questioned. Bioenergy could provide an alternative eg an energy crop based cogeneration entrepreneur approach with former tobacco farmers as partners.

There are negative perceptions regarding energy from waste and, in some countries, the use of wood for energy. For example, environmentalists may oppose the emerging international trade of biomass fuels. Such opposition may be an important barrier to the development of new cogeneration plant in some countries: the general public has a strong position through planning law and influence on local politicians. Well-presented statements and advice such as good practice guides should be based upon appropriate information. This may require some new studies. Statements, advice etc. must be produced not only to respond to opposition but, most importantly, should anticipate important negative perceptions.

Establish a focal point for the biomass cogeneration industry

There is need for an independent organisation to act as focal point for effort to grow the bioenergy industry in Europe. Such an organisation should have both political and commercial acumen and must liase with both policy makers and industry. Necessary actions are to: take a strategic overview for the bioenergy industry; collate and exchange information; engage with policy makers and other influencers; work with existing associations and networks; help ensure that the industry's voice is heard and that its multiple benefits and solutions are promoted.

Communicate information

Cogeneration technologies are generally well understood. However, biomass cogeneration technologies are generally not well known - exceptions include the pulp

and paper industry and Scandinavian countries. Targeted promotional campaigns would be beneficial.

In Europe, in terms of primary energy, heat from renewable sources is some six to seven times greater than electricity from renewable sources (excluding large hydro), and the heat is virtually all from biomass. With exceptions, such as Scandinavian countries, biomass is considered to be of minor importance, low technology, with limited capacity for future expansion. However, studies of renewable energy potential invariably show very sizeable biomass fuel potentials throughout Europe – but such studies are limited, give little attention to the actual final cost/price of such energy from such biomass, and comparisons are difficult.

Biocogen has made a notable start in gathering and analysing information. But there is a need for establishing ways of collecting standarised data coupled with appropriate analysis and presentation of the data, to inform policy makers, media and industry analysts. Information should include fuel supply and potential end use, and consider technical, financial, environmental and other constraints. For example, the emerging international trade in biomass fuels offers an opportunity for some market transparency, especially price. It would be helpful if data for such trade is disaggregated from other data, ie the trade in timber generally, and collected and analysed.

Transfer technology and know-how

There are considerable opportunities for investment in proven technologies offering commercially attractive returns. For example, sewage gas, landfill gas and biocogeneration in wood industry. This generally involves international transfer of technology and know-how. Some initiatives are required to lobby policy makers and regulators to make the environment more enabling for such investments. Market promotion activities, such as trade fairs and ‘missions’ or visits, may be very beneficial.

Programmes to stimulate “innovators’ and “early adopters”

In marketing technology, “innovators” are the few organisations or individuals that first use new services/products and, following their success, “early adopters” copy and expand the use of such services/products. It is necessary to establish routes to get innovators firstly and, subsequently, early adopters, to install new biomass cogeneration technologies or existing technologies in new situations. For example, cogeneration or trigeneration in local government buildings, hotels, leisure centers etc. This will necessitate identification of investors whose focus includes social, local economic, and environmental goals and not just short-term financial return. Demonstration programmes for identified innovators could be designed, and these should include committed industry partners, plus planned commercial exit via early adopters.

7 References

Dibb, S. Lyndon, S. Pride, W. Ferrell, OC. Marketing Concepts and Strategies, Houghton Mifflin

Green Paper. Towards a European strategy for the security of energy supply. European Commission COM (2000) 769

COGEN Europe 2000. National strategies to develop cogeneration. Briefing 15.

COGEN Europe 2003. Position of COGEN Europe on emissions trading and CHP. 21st May 2003.

Promotion of Small Cogeneration (PROSMACO). Summary of the Project, April 2002. Pilot action for DG TREN 4.1031/P/99-115

Communication from the Commission to the Council and the European Parliament on a Forestry Strategy for the European Union. COM(1998) 649

Common Agriculture Policy: Why reform is necessary. Speech by Franz Fischler, Commissioner Agriculture, Rural Development and Fisheries. Athens, 19th May 2003

Heat from Renewable Energy Sources: The RES-H Initiative and related Directives. Report by VHK for DG Env and DG TREN. September 2002.

Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity from renewable energy sources in the internal electricity market