The programme of work of IEA Bioenergy includes Task 34 “Pyrolysis of Biomass” and Task 37 “Energy from Biogas and Landfill Gas”. Overviews of these two programmes are provided below.

Tony Bridgwater, Leader of Task 34

Introduction
The objective of Task 34 is to resolve technical issues and barriers which impede commercial implementation of fast pyrolysis. The focus is on:

- dedicated regular meetings centered on Technical Subject Groups that will advance the state-of-the-art through critical review of each Technical Topic and commissioning of specialist material;
- collation and dissemination of relevant information through the regular PyNe newsletter, the PyNe website and direct contact between Task members and invited guests through a planned programme of meetings, workshops and conferences.

The main difference in this Task compared to the previous Task (Task 21) is that greater attention will be paid to market developments of the technology and resolution of issues that inhibit this development. This Task started in January 2001 and will finish in December 2003.

By agreement between the European Commission (EC) and IEA Bioenergy, the Task is integrated with an EC Pyrolysis Network that started in June 2001 and will finish in May 2004. These two networks together form PyNe. The different starting dates of the networks meant that no official work could be started until the EC contract was let on 1 June 2001. This particular collaboration was established in 1998 and has proved to be very successful in integrating the EC and IEA Bioenergy activities and providing more extensive opportunities for interaction between Europe and the USA.

The EC sponsored Thematic Network that forms the contribution of the EC to the Task is itself made up of two complementary Networks – PyNe that covers Pyrolysis and GasNet that covers Gasification - and together these are known as ThermoNet. One important feature of this combined Network is the opportunities to create joint activities that can benefit from the knowledge and expertise in both networks, particularly where norms and standards and common methodologies are concerned. In addition to the PyNe specific topics, there will also be a contribution to Joint Topics, all of which were defined and agreed at the kick-off meeting in Helsinki in June 2001.

In addition to the EC sponsored ThermoNet, a further contract has also been recently agreed from the Altener programme in which all the EC PyNe members will contribute to an economic and market assessment of the opportunities for pyrolysis liquid.
The relationship between all these networks is shown in Figure 1.

Figure 1: Relationship between IEA Bioenergy and EC Tasks, Networks and Contracts

Task Meetings and Workshops

The first Task meeting was held on 29 June – 2 July 2001 in Helsinki, Finland. This was the kick-off meeting where the technical contributions of the Task were defined and agreed. A study tour was made to VTT Energy where presentations were made by staff from VTT and Steven Gust from Fortum. The group also toured the VTT facilities.

The second Task meeting was held in Graz, Austria from 10-13 January 2002. The Topics discussed and reviewed at the meeting were: characterisation, norms and standards; slow pyrolysis for charcoal; technical and non-technical barriers and education and training (a joint topic with GasNet).

Work Programme

The technical contributions of the Task were agreed at the kick-off meeting. A number of groups were established under the leadership of a Topic Leader drawn from the country representatives. The Topics that have been agreed form the focus of the technical contributions of PyNe over the next three years. Some are being carried out in co-operation with the associated Network in ThermoNet – GasNet and are indicated as Joint Topics. In addition other aspects will be routinely covered such as technology developments and country reviews, and issues such as economic and financial aspects will be carried out in associated projects.

The objectives of each Topic Area include:

- a comprehensive review of the specialist area,
- identification of technical and non-technical barriers,
- provision of expert overviews for publication as required,
- recommendations for norms and standards, procedures and protocols,
- production of at least one report for distribution and publication.

The agreed list of Topic Areas is shown below.

Applications for bio-oil – Leader: S. Czernik

The objectives are to review current applications for fast pyrolysis liquids; and define research needs to enhance and develop the use of bio-oil. The scope of this topic area includes the application of bio-oil as liquid fuel for boilers, engines and turbines – e.g. performance, emissions; the potential of bio-oil as a transport fuel – e.g. upgrading, blending; and bio-oil as a source of chemicals – e.g. liquid smoke, adhesives, fertilizers, bio-lime, fine chemicals.

Characterisation, analysis, norms & standards – Leader: D. Meier and A. Oasmaa

The objectives are to review and update physical and chemical methods; review and update properties of oils from demonstration plants; and formulate recommendations for specifications and classification of bio-oils. The scope of this topic area is methods for testing and analysis.

Environment, health & safety aspects of bio-oil – Leader: P. Girard

The objective is to improve knowledge on EHS concerns at three levels: regulations, process emissions, and bio-oil toxicity. The scope of this topic area includes collecting and reviewing data and information, and carrying out toxicity tests.
Slow pyrolysis for charcoal – Leader: M. Gronli
The objectives are to provide industry, researchers and decision makers a state of the art review of technologies for slow pyrolysis; and to identify the need for technology development and new exploitation of charcoal. The scope of this topic area is feedstock: native wood, agro residues, and solid-recovered biofuels.

Technical and non-technical barriers – Leader: W. Prins
The objectives are to identify and monitor barriers, assess routes for solution and remove the barriers where possible. The scope of this topic area includes technical barriers, such as: pyrolysis plant and environment interaction, phase stability, solids in oil – application related, water, mineral content, acidity, odour, noise, and emissions; and non-technical barriers, such as: capitalization, requirement for EHS data, alternatives: wind, solar, ethanol, fossil, feedstock cost and scarcity, public perception, and national/local legislation.

Joint Topic - Education, training, information and PR – Leaders: J. Arauzo (PyNe) and G. Neri (GasNet)
The objectives are to promote the use of thermochemical processes, pyrolysis and gasification as a source of energy; to deliver clear and comprehensive information about processes and installations; and to promote courses and exchange of students.

Joint Topic - Environment, health & safety: general aspects – Leaders: P R. Buehler (GasNet) and P. Girard (PyNe)
The objective is to review all aspects of environment, health and safety that impact on thermal biomass conversion processes.

Joint Topic - Gas processing and tar reactivity – Leaders: I. Gulyurtlu (GasNet) and K. Pedersen (PyNe)
The objective is to collect information about gas upgrading regarding: particle separation, aerosols, and tar characteristics and reactivity: process requirements and contaminants from waste.

Collaboration with Other IEA Bioenergy Tasks
As the emphasis moves more towards commercial exploitation and implementation, greater interaction with other Tasks is planned. In particular, a meeting was held in July 2001 between the Task Leader and the Leader of Task 35 ‘Techno-economic Assessments for Bioenergy Applications’ to discuss interaction and this will grow through mechanisms such as joint meetings and common projects. Close collaboration has also been established with more strategic groups such as Task 39 ‘Liquid Biofuels’ to better understand the non-technical issues that affect implementation. A member of PyNe attended the meeting of Task 39 ‘Liquid Biofuels’ in October in Brussels. Again a joint workshop with PyNe was proposed to determine common interests.

As well as joint meetings and workshops, several of which have already been successfully held within the previous Task 21, it is hoped that the detailed work programmes of these Tasks can be formulated to provide projects that can be genuinely shared between two Tasks. As an example, a joint techno-economic assessment of a fast pyrolysis case study is envisaged, or a joint group on problems with introducing novel liquid fuels to the market place.

Expert Meeting
The programme has been successful in applying to the European Commission from the Altener direct subvention programme for support for an expert meeting. The meeting will be for two days and held in Strasbourg, France on 30 September – 1 October 2002, and is titled “Pyrolysis and Gasification of Biomass and Waste”. The purpose of the meeting will be to formulate strategies for effective implementation of these emerging technologies.
Newsletter

The PyNe newsletter continues to be an important vehicle for dissemination. It is published at 6 monthly intervals and circulated to Member Countries for distribution. Information is gathered from the Task members and their contacts as well as through the extensive links maintained by the Task Leader. 3,000 copies of each issue are printed and circulated worldwide. Much of the information is included in PDF format on the PyNe website.

Website

The PyNe website has been completely revised and updated and the new version went live in October 2001 (www.thermonet.co.uk). The website will continuously evolve through the duration of the Task to satisfy the requirements of Task Members and other stakeholders in the Task.

Major Publication

The Final Report of Task 21 was produced as the second in the series of hardbound books “Fast Pyrolysis of Biomass: A Handbook Volume 2” in May 2002. Copies of this publication and the previous volume can be purchased from the CPL Press Online Bookshop – see www.cplbookshop.com or email press@cplsci.demon.co.uk

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Energy from Biogas and Landfill Gas

Arthur Wellinger, Leader of Task 37

Introduction

The objectives of Task 37 are to review and exchange information on biogas production, upgrading and utilisation in research, development, full-scale application and legal frameworks.

The scope of the work focuses on adoption of appropriate waste management practices; promotion of the commercialisation of biogas installations; improvement of the quality of the products and improving environmental standards. Through the work of the Task communication between RD&D programmes, the industry and governmental bodies should be initiated and/or further stimulated.

To achieve the goals, the Task maintains strong relationships with the governments of Member Countries, R&D institutions and industry. Partners are plant providers, producers of gas upgrading and gas utilising utilities, actual and future operators and potential clients interested in the products of anaerobic digestion, ie. fertiliser (digestate) and biogas.

Task Meetings and Workshops

Two major Task meetings and one shorter business meeting were held in 2001. The kick-off meeting was held on 29-31 March in Vienna, Austria with a site visit to the VITIS digester treating the wastewater from a slaughterhouse. The meeting included a workshop on ‘BSE & Anaerobic Digestion’, which was attended by 12 visitors from engineering offices, associations and governmental bodies.

The second meeting was held on 20-23 October in Malmö, Sweden with site visits to the Anaerobic Digestion (AD) co-digestion plants in Kristianstad and Grinsted (DK) as well as to the on-farm research facility of the University of Lund. A workshop was held with presentations of outstanding Swedish projects on source separation, gas upgrading and pilot scale experiments on solid digestion of energy crop in a variety of different digester designs.

In between these two major Task meetings a short business meeting was held along side the 9th World Congress on ‘Anaerobic Digestion’ in Antwerp, Belgium.

Work Programme

During the first meeting of the Task, Activity Leader and Co-leaders of the core work programme topics were assigned as follows:
In 2001 the focus was on the topics listed below. Progress made is summarised under each heading.

**Quality management**
A common position paper was formulated on a new proposal for an EU regulation on health rules concerning animal by-products not intended for human consumption. This dealt in large part with AD of slaughterhouse waste as well as meat and bone meal. A letter with our concerns and suggestions for new formulations was sent to the EU parliament. The letter was co-ordinated with the president of IEA Bioenergy, the project team of AD-Nett and the German Biogas association.

**Potential of co-digestion**
A second draft of the report was completed. Except for a few details of country specific information which has to be provided by the participants, the report is close to final form. It will be completed in 2002.

**Feedstock separation**
A first report will be completed by the end of the year. It will be upgraded and extended in early 2003.

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**Figure 1** Development of AD plants which are digesting more than 2500 tons per year of separated MSW and/or organic industrial waste
Homepage: plant and providers list
The plant list cites all the AD plants digesting among other waste materials at least 2500 tons of MSW per year, mostly source separated. See Figure 1. The addresses of all providers or engineers who have been involved in the construction of the listed plants are given in a separate overview. Both lists have been updated.

Communication and Promotion
Communication of the goals, activities and deliverables of the Task is one of the central elements of the work. Much effort is brought to the layout and language of the brochures to make them both attractive and easily understandable. They are widely announced through e-mails and at international seminars.

An important promotional element is the workshops organised as part of the Task meetings. The number and the interest of local authorities and engineers proves the success of this instrument. Reports on the development and deployment of the technology are written by the participants and published in journals and newspapers.

Website
The Task 37 website www.novaenergie.ch/iea-bioenergy-task37 was launched at the end of November. Major elements are the newer brochures and the plant list. Case studies are being added.

Deliverables
The deliverables from the Task included the following publications: ‘Good Practice in Quality Management of AD Residues from Biogas Production’, ‘Biogas and More: Systems and Markets Overview of Anaerobic Digestion’ and ‘Biogas Flares: State of the Art and Market Review’. These were initiated during the previous Task. They are very popular with engineers, researchers and potential plant owners in the participating countries and also in the USA.

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