



Nyhavn in Copenhagen



Bioenergy in Denmark

Guest Editorial by Jan Bünger, ExCo Member for Denmark

The share of renewable energy in Denmark is expected to account for about 35% of overall energy production by 2020 and more than half of this will be produced from biomass. The use of all types of biomass will increase in total from 132 PJ in 2012 to 166 PJ in 2020. Today 10% of the electricity consumption and 25% of the heat consumption is covered by bioenergy, including waste.

In the longer term it is technically possible to construct an energy system which is not based on fossil fuels. This has been confirmed by a new report issued by the Danish Energy Agency: *Energy Scenarios for 2020, 2035 and 2050* investigating the possibilities to phase out fossil fuels and replace them with renewable energy. The analyses will contribute to ensuring that the conversion of the energy system to renewable energy is as cost-effective as possible.

The report confirms that, as the conversion will take time shortly after 2020, it will be necessary to decide whether the future energy system is to be an electricity-based wind-power system or a fuel-based biomass system. A wind-based fully electrified system will have good fuel supply security, but will be challenged in terms of security of electricity supply. On the other hand, a bioenergy-based system will require large imports of biomass and it will be challenged in terms of fuel supply security and sustainability. However, major Danish energy companies have a strong focus on purchasing wood which has the potential to be advantageous to the climate while minimising the impact on the environment and biodiversity.

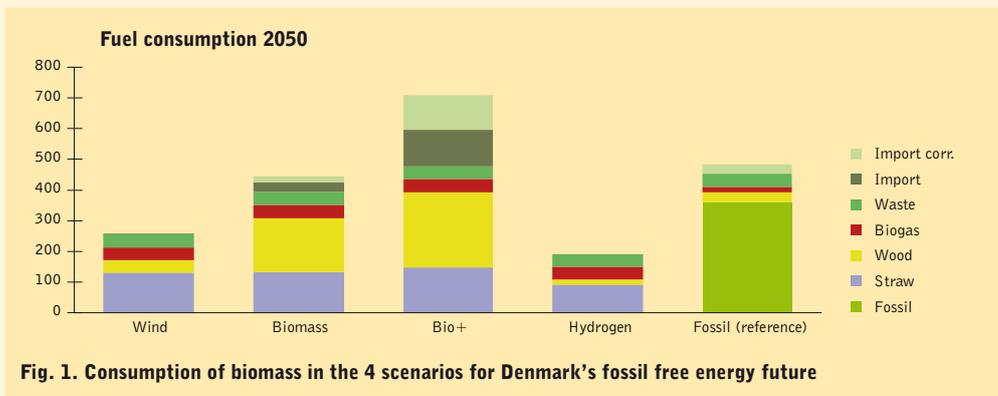


Fig. 1. Consumption of biomass in the 4 scenarios for Denmark's fossil free energy future

In the different scenarios the consumption of biomass in 2050 has been analysed, with the results showing that the consumption of biomass varies between roughly 200 and 700 PJ of which the domestic production is estimated to be in the region of 200-245 PJ. Further use has to be covered by import. In all cases bioenergy will account for a significant part of the energy mix in the energy system of the future.

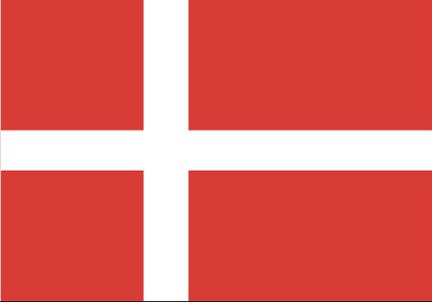
A range of political measures have recently been taken to facilitate the conversion to bioenergy. These include a framework for substituting coal with wood as fuel for the main power plants, better conditions for biogas production, a halt to the installation of oil-fired boilers, subsidies to promote the use of biomass for heat and power production in industry amongst other initiatives.

Consumption of natural gas is expected to fall dramatically from 2020, as natural gas is phased out in electricity and heat supply. Instead, it will increasingly be possible to use the gas system to distribute renewable energy gases such as upgraded biobased gases. Furthermore the gas grid has a large storage capacity that can serve to balance the fluctuating wind energy production.

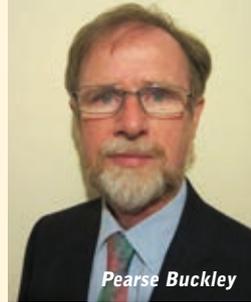
The technological challenges connected to the transition of the energy system will be addressed under the Danish Energy R&D programmes. Thus the production of green biobased gases in natural gas quality also combined with the utilisation of excess power production from wind to produce storable energy carriers, has one of the highest priorities along with new technologies for the production of 2nd generation biofuels for transportation.

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From the Secretariat



Pearse Buckley

ExCo73, Copenhagen, Denmark

The 73rd meeting of the Executive Committee was held at the Radisson Blu Royal Hotel, Copenhagen, Denmark on 21st and 22nd May 2014, with Paul Grabowski as Chair, Kees Kwant as Vice-chair and Pearse Buckley as Secretary. The meeting was hosted by the Danish Energy Agency. The Chair expressed the appreciation of the ExCo to Bünger and his colleagues for the excellent meeting and study tour arrangements. Some of the outcomes of the meeting are detailed below.

Changes to Exec Committee

A new Member for Austria is Mr Theodor Zillner; a new Alternate for Austria is Dr Manfred Wörgetter; a new Alternate for Croatia is Ms Biljana Kulišić; a new Alternate for Switzerland is Mr Matthieu Buchs.

ExCo73 Workshop

A first, joint workshop was held with the Alternative Motor Fuel (AMF) Implementing Agreement on the topic of 'Infrastructure compatible transport fuels'. The workshop was very successful and well attended by IEA Bioenergy ExCo Members and Task Leaders, AMF ExCo Members and Observers from Denmark. The workshop presentations are listed below:

- Biofuels – Outlook and policy challenges – *Anselm Eisentraut, IEA Paris*
- The potential and challenges of 'drop-in' fuels – *Sergios Karatzos Steeper Energy and Task 39*
- Case Study 1: Fossil free road transport – *Olle Hadell, Swedish Transport Administration*
- Case Study 2: Deregulating the ethanol market: experience of establishing a free market – *Ricardo Dornelles, Brazil*
- Wood to green gasoline using Carbona gasification and Topsoe TIGAS processes – *Jesper Højer Jensen, Haldor Topsoe*
- Advanced fuels and chemicals from waste: waste in a circular economy – *Willemijn van der Werf, Lanzatech*
- 2G biofuels from biomass going commercial – *Simone Ferrero, Biochemtex*
- DSM Bioenergy solutions: from rocket science to bright science for biofuels – *Oliver May, DSM*
- Transport technology options – *Nils-Olof Nylund, VTT*
- Heavy duty engines – *Lennart Haraldson, Wartsilä*
- Biofuels in spark-ignition engines – *Jesper Schramm, DTU*
- Light duty vehicles – *Jukka Nuottimäki, VTT*

For more detail please visit www.ieabioenergy.com/

Progress with current Initiatives

The Strategic Project *Mobilising Sustainable Bioenergy Supply Chains* has the objective to apply an integrative framework for analysis that will inform the debate, improve governance, and contribute to mobilisation of sustainable supply chains globally. Five separate value chains are being examined. All are progressing well with each developing its final reporting format, including table of contents. In some cases chapters for the final reports are in draft format. The project is on schedule to be completed in 2015.



Attendees at the joint IEA Bioenergy AMF workshop on 'Infrastructure compatible transport fuels'

A Scientific Workshop with JRC on forests, bioenergy and climate change mitigation

This workshop brought together experts from IEA Bioenergy Tasks 38, 40 and 43, the European Commission Joint Research Centre (JRC), the European Environment Agency (EEA) and the International Institute for Sustainable Analysis and Strategy (IINAS). The aim of the workshop was to identify where consensus could be achieved, what the diverging views were and why. Research needs were identified including case studies and model interactions to ensure a scientific base for decision-making. The key messages of the workshop will be published.

Algae review

The ExCo noted the research activity on the topic of algae and considered how it should be positioned in future work of the Agreement. It was concluded that a focused review was required followed by recommendations on further research requirements. A working group was established and tasked with reporting to ExCo74.

IEA How2Guides

The rationale for the guides is to provide a step-by-step procedure on how to implement the IEA roadmaps in different countries. The focus of the Bioenergy How2Guide is on power, heat and fuels and IEA Bioenergy will be making a significant input in its preparation. It is expected that the Bioenergy How2Guide will be completed in the 1st quarter of 2015.

National Strategies

As a result of a decision taken at ExCo72, a questionnaire to gather information on national strategies relevant to bioenergy was issued by the Technical Coordinator to all ExCo members. The initial data was analysed at ExCo73 and it was decided that a revised template would be prepared for review at ExCo74. Following this, data is to be collected before the end of this year for publication.

IEA Bioenergy Database

The goal of this database is to present IEA Bioenergy data in a common format. Following discussions on the fringes of ExCo73, good progress is being made to include additional Tasks in the database.

Communication Strategy

Work on the IEA Bioenergy communication strategy is continuing with a group having been established to take the process forward. Some initial actions have been taken, particularly related to functions added to the IEA Bioenergy website.

Extension of Implementing Agreement from 2015-2020

The IEA Bioenergy Strategic Plan 2015-2020 was approved at ExCo73 and will be submitted to IEA Headquarters together with the request for renewal of the Agreement and other supporting documentation in June 2014.

End of Triennium Conference 2015

The conference will take place on the 27-28 October 2015 in the Ramada Hotel Berlin-Alexanderplatz in Berlin. Both the scientific committee and the local organising committee have been established and sponsorship is being secured.

ExCo73 Study Tour



ExCo73 Study Tour Group including IEA Bioenergy and AMF participants at Haldor Topsoe

Following the ExCo73 meeting a group of twenty-one IEA Bioenergy attendees participated in the study tour in conjunction with participants from the AMF Implementing Agreement, taking in the headquarters and research centre of Haldor Topsoe in Lyngby near Copenhagen.

Haldor Topsoe was founded in 1940 and is 100% owned by the Topsoe family. It employs 2,700 people worldwide, 75-80% of whom are based in Denmark. There are 300 people involved in R&D covering fundamental research to pilot plant studies and process development. The annual turnover of Haldor Topsoe in 2013 was €695 million (5.18 billion DKK). The company has four business units and two production divisions.

Among the business areas are fertilisers, heavy chemicals, flue gas cleaning and renewables. Haldor Topsoe is a global supplier of catalysts and technologies. Some 60% of the ammonia produced in the world is produced over their catalysts while they have a market share of 15-25% for established products. The technology supplied by Haldor Topsoe is always developed in-house. For the catalyst supply and use, they provide complete solutions for the types of plant they supply.

The tour group viewed presentations on Automotive and Alternative Fuels areas, which were followed by a tour of the research facilities. Haldor Topsoe automotive projects are driven by emissions legislation. They have activities in automotive processes, automotive catalysts and de-NO_x production technology. Alternative Fuels is a new business area with the department only being formed in the last 2 years.

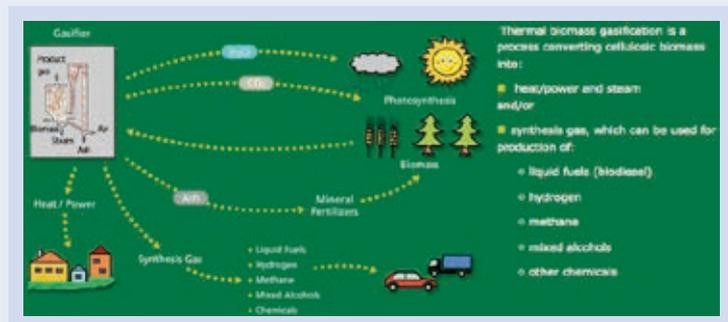
An example of a project in Alternative Fuels is bio-waste to automotive fuel using black liquor as feedstock and the processes include gasification, syngas cleaning, methanol synthesis, methanol-to-DME and separation. Catalytic syntheses processing is being developed in two ways – obate fuels and chemical recuperation. Obate fuels are based on alcohol dehydration where the resulting fuel can be used directly in a diesel engine. In chemical recuperation, waste heat is used to upgrade the fuel giving a product that has a 20% higher 'lower heating value (LHV)' compared to the reactants.

Task Focus

Task 33 Thermal Gasification of Biomass

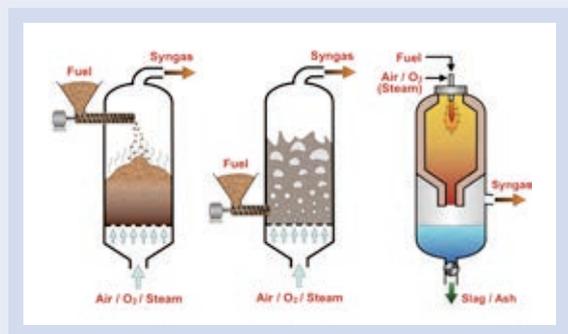
Gasification involves reactive thermal processing of solid or liquid feedstock to produce a combustible gas rich in hydrogen and carbon monoxide, thereby transferring energy in the feedstock into a form that is easily transported or stored. The product gas, known as synthesis gas (syngas), or producer gas in the case of air-based gasification, has many applications. It can be combusted alone or in combination with other fuels to provide heat; it can be burned in a reciprocating engine or gas turbine to generate electric power; the hydrogen and carbon monoxide can be used as building blocks for catalytic production of transportation fuels, substitute natural gas (methane) or chemicals, or the gas can be processed to maximise hydrogen content for fuel cell or hydrogenation processes. Thermal gasification has the unique characteristic of being able to effectively convert a wide variety of biomass fuel types or even waste (from MSW to agricultural or crop residues like coconut shells, rice husks, straw, forest residues, bagasse, etc.) to a useful and high quality energy source. Over 100 biomass gasifiers are in operation around the world today, at scales ranging from small units serving a specific company or manufacturer to large systems generating several megawatts of biomass-based power tied to a national electric grid. Despite successes in development of gasification technology, there remain technical challenges to overcome to ensure consistent, reliable operation for large-scale production of power, fuel and chemicals. Task 33 provides opportunities for participants to share knowledge and experience to further development of the technology.

Process chain for biomass gasification



Gasification technologies can be grouped into three major classifications based on reactor type: fixed bed, fluidised bed and entrained-flow. The simplest configuration, fixed bed gasification, is most common for small-scale installations and typically involves flowing air either upwards or downwards through a deep bed of fuel. Oxygen partially combusts the fuel, thus providing heat to drive off volatile matter and promote the gasification reactions responsible for production of hydrogen and carbon monoxide. In fluidised bed gasification, biomass is fed into a bed of hot particles (e.g., sand) that is maintained in a dynamically flowing state by introduction of air, oxygen and/or steam, which also serves to react the fuel to syngas. Fluidised beds are classified as low velocity bubbling beds or high velocity circulating beds. The third classification of gasifier is entrained-flow, which involves reaction of fuel with high concentrations of oxygen in a very hot environment to efficiently break down the fuel into syngas with low concentrations of nitrogen, methane and condensable hydrocarbon "tars." While most gasifiers currently operate at low pressure, there are also development efforts targeting high pressure systems well suited for integrated gasification combined cycle (IGCC) power generation or high pressure catalytic production of fuels and chemicals.

Types of gasifiers. Updraft fixed bed (left), bubbling fluidised bed (middle) and entrained flow (right)



Task 33 Objectives and Activities

The overarching objective of Task 33 is to promote commercialisation of efficient, economical, and environmentally responsible biomass gasification processes for the production of electricity, heat, and steam, and for the production of synthesis gas for subsequent conversion to chemicals, hydrogen and transportation fuels or the co-production of these products. The specific objectives are to monitor, review and exchange information on biomass gasification research, development, and demonstration; and to promote cooperation among the participating countries and



Task 33 participants at the May 2014 task meeting in Ischia, Italy.

industry to eliminate technological impediments to the advancement of thermal gasification of biomass.

In the Triennium 2013-15 the twelve countries that have participated in Task 33 are Austria, Denmark, Finland, Germany, Italy, the Netherlands, New Zealand (only in 2013), Norway, Sweden, Switzerland, Turkey (only in 2013) and the USA. Six Task meetings are being held this triennium, each of which has an associated workshop. Workshop topics include:

1. Gasification research and technoeconomics (May 2013)
2. System and integration aspects of biomass-based gasification (Nov 2013, held jointly with IEA Industrial Energy-Related Technologies and Systems (IETS) Implementing Agreement)
3. Small scale gasification systems (May 2014)
4. Gasification of bio-derived liquids (Nov 2014)
5. Bed materials in fluidised bed gasification (tentative)
6. Product gas analysis, cleaning and usage (tentative)

In addition to the workshops and meetings there are also several special and joint projects for this Triennium. Descriptions of some of these projects are given below.

Fact sheets on biomass gasification. Eight brief fact sheets have been prepared as an information carrier for the general public, and contribute to Task 33's objectives of information dissemination and promotion of biomass gasification technology. The fact sheets are targeted at a non-technical audience and describe biomass gasification technologies, challenges, and end uses. The following eight fact sheets are available on the Task 33 web page (www.ieabioenergytask33.org):

- What is gasification?
- Gasification in numbers
- Gasification technologies
- Biomass as gasification feedstock
- Gas cleaning and tars
- Producer gas as engine fuel
- Indirect co-firing of biomass via gasification
- Novel processes and advanced biofuel production

Gasification facilities database, map and status report. Task 33 maintains a database of gasification facilities in member countries, which is accessible through a map-based interface on the task website. There are currently more than 140 facilities included, and detailed information such as feedstock type, gasification technology, products and plant size are available. This triennium a special status report is being prepared, which will provide an overview of the status of biomass gasification as well as a detailed list of actual thermal biomass gasification facilities worldwide.

Advances in biomass characterisation (collaborative with Tasks 32 and 34). Biomass characterisation and understanding of physical and chemical properties of biomass is important for pyrolysis, gasification and combustion of biomass. This task aims to survey new methodologies and techniques for characterisation of physical and chemical properties of biomass, and to consider how this information can be used to improve operation and performance of technologies for thermochemical energy production from biomass.

Gasification of pyrolysis oil (collaborative with Task 34). Gasification of pyrolysis oil, with or without addition of biochar to make a slurry, offers an interesting alternative to overcome some of the challenges of physical and chemical properties of biomass, including low energy density and challenges feeding low density solid material to pressurised systems. This project is being developed in conjunction with Task 34 (pyrolysis), and aims to better understand the potential of this form of biomass gasification as well as to identify practical considerations for successful application of the technology.

Biomass combustion and syngas co-firing (collaborative with Task 32). Gasification can integrate well with biomass combustion or co-firing through production of combustible syngas that is more easily handled than solid fuel and contains no ash. Task 33 has already developed a fact sheet describing this form of indirect biomass combustion, and will continue to promote this as an interesting alternative for incorporating biomass into conventionally non-biomass based processes such as large scale power generation and cement kilns.

Techno-economic assessment (TEA – collaborative with Tasks 32 and 34). This project is one of many within IEA Bioenergy that involves economic assessment of processes for production of biomass-based energy. Several recent techno-economic assessments have been performed by groups outside of Task 33, including national laboratories and independent research organisations in member countries. Under this task, this information is being distilled and complemented with new analyses. In the interest of having a comprehensive evaluation of alternatives for thermochemical processing of biomass, Task 33 will work with Tasks 32 (biomass combustion and co-firing) and 34 (pyrolysis of biomass), which are also performing TEA studies.

This article was prepared by Jitka Hrbek and Kevin Whitty
For more information please visit <http://www.ieatask33.org>

Task 43 – Biomass Feedstocks for Energy Markets

In February 2014, Task 43 organised a workshop – Bioenergy and Water: Developing strategic priorities for sustainable outcomes – together with UNEP, IINAS and Winrock International in Paris. It was the 5th event arranged in collaboration with different organisations exploring the inter-linkages between bioenergy and water and ways to address related risks and harness opportunities, and builds on the workshop “Spotlight on Energy and Water” organised by the Task together with Oeko Institute and UNEP in July 2010.

Since the 2010 workshop, several organisations have undertaken related work and some gaps identified at the first workshop have been closed, but others remain. The 2014 workshop was organised to develop a coordinated and common approach to addressing and communicating water-related issues for bioenergy. The common vision derived at the workshop was that an efficient management of resources could provide food, bioenergy and biomaterials and improve the state of water. The workshop specifically explored how integration of bioenergy systems into forest and agricultural landscapes could deliver positive outcomes for the environment and socio-economy. The workshop drilled deeper into assessment, policy and implementation issues, as well as data gaps. The participants identified strategic priorities to enable the benefits of bioenergy to be captured and delivered. A set of common goals was agreed and possible contributions from the represented organisations were identified. Based on this, a work plan and a group communication strategy will be developed.

Task 40 – Sustainable International Bioenergy Trade: Securing Supply & Demand

On June 4th, IEA Bioenergy Task 40 organised a workshop on biomass trade and supply system opportunities in a world-wide bio-based economy, in Jönköping, Sweden. With the growing worldwide interest to transition from fossil energy resources to renewable energy, including bioenergy, regional biomass resource availability, logistics, and distribution infrastructures become increasingly important. In order for biorefineries to achieve economies of scale, a consistent supply of densified, on-spec feedstock is a prerequisite. Achieving volume and price targets and a respective fungibility of the biomass, i.e. to create a global commodity, will be vital for the bio-based economy. During the workshop (chaired by Dr. Patrick Lamers from the Idaho National Laboratory) four speakers from industry and academia provided their vision on the pros and cons of trading different types of preprocessed biomass (wood chips, wood pellets, torrefied pellets and pyrolysis oil) amongst others in relation to end-user requirements and existing logistic infrastructure, and how these may be utilised more effectively, e.g., by combining roundwood and wood chip transport or by combining coal and (torrefied) biomass transport in large sea vessels.

Task 39 – Commercialising Conventional and Advanced Liquid Biofuels from Biomass

Task 39 commissioned a report on “The potential and challenges of drop-in biofuels” with the goal to provide a background on the topic, an assessment of technical approaches being developed and an overview of anticipated challenges in large scale commercialisation of so called “drop-in” biofuels.

Bioethanol and biodiesel are the main commercially available biofuels, but these fuels are chemically and functionally different from petroleum-derived fuels and thus they do not make full use of the existing petroleum processing and distribution infrastructure. It is recognised that it would be preferable if biofuels could be readily “dropped-into” the existing infrastructure (petroleum distribution and refining, fuel specifications, etc.) and be functionally equivalent to current petroleum-derived fuels. In some cases such as aviation fuels, drop-in fuels offer the only renewable alternative to fossil fuels.

While tremendous technical progress and commercialisation activity have taken place over the past several years, only relatively small amounts of drop-in biofuels functionally equivalent to petroleum-derived transportation fuels are commercially available today. The report evaluates the main technological routes to produce drop-in fuels: oleochemical, thermochemical, biochemical and hybrid technologies which combine elements of more than one of these. Accessing cheap/renewable hydrogen to deoxygenate biomass to produce drop-in fuels remains one of the key challenges and will play a major role in future commercialisation of drop-in biofuel platforms.

Tasks 38, 40, and 43 Joint Workshop

IEA Bioenergy Tasks 38, 40 and 43 organised a workshop in conjunction with the Joint Research Centre of the European Commission, the European Environment Agency and the International Institute for Sustainability Analysis and Strategy, in Copenhagen on 19-20 May, on the topic “Forests, bioenergy and climate change mitigation”. The 60 participants engaged in two days of structured discussion, intended to advance scientific understanding of the climate effects of forest-based bioenergy. The workshop was successful in developing a shared understanding of appropriate approaches for assessment of climate effects of bioenergy, and clarifying the basis for alternative viewpoints on the role of forest-based bioenergy in climate change mitigation.

Task 37 – Energy from Biogas

The Brazilian member of Task 37, Itaipu Binacional, has set up a new biogas mirror group. The new mirror group, CIBiogas, pulls together biogas organisations across South America and the Caribbean in order to share knowledge and best practices in the development and deployment of biogas in the region. The work programme of CIBiogas will be closely integrated with that of Task 37 in terms of biogas technologies and policy support activities. Itaipu Binacional has set up the first biogas research laboratory, CIBiogas-ER, which will act as secretariat for the biogas mirror group. The new geographically extensive mirror group should facilitate efficient and effective data collection; fine tuning of the work programme of Task 37 and dissemination of the Task’s output.



Representatives of the FAO, OLADE, and CIBiogas after signing their Memorandum of Understanding for future collaboration on exploitation of biogas in the region

Task 36 – Integrating Energy Recovery into Solid Waste Management

In March 2014 Task 36 organised a workshop on Efficiency of Energy from Waste together with the Karlsruhe Institute of Technology and the German BREF working group connected with the Umweltbundesamt (German EPA). The workshop was held in association with the start of the process to consider the German contribution to the re-vision of the BREF guides in Europe, which will include best available technology guidance for energy from waste plant. The workshop discussed the potential to improve the efficiency of energy from waste plants and the costs of doing so. It discussed the need to balance both the capital and operating costs with the current trend of decreasing gate fees for waste in central European plants.

An issue currently facing German waste to energy operators is over-capacity resulting in competition for waste and decreasing gate fees. Although the workshop heard that theoretical efficiencies of up to 37% could be reached, the cost of doing so might make the plant uncompetitive. In addition, while the development of heat and power would make the plants more efficient, the availability of heat loads remained a problem. The workshop agreed that there were strategies that could be used to overcome these challenges, but the fundamental issue of increased costs needed to be faced. One option was increased policy incentives provided to plants that achieved 30% efficiency or greater, as was happening at the Amsterdam plant in the Netherlands.

Task 34 – Pyrolysis of Biomass

The recent Task 34 meeting was held in Birmingham, UK on May 16-17. All participating countries were represented. The agenda included an exchange of information on the latest developments in each country and an update on several activity areas: round robin, standards development, bio-oil applications publication and newsletter input. The attendees also had the chance to tour the new laboratories at the host Aston University which now housed the European Bioenergy Research Institute (EBRI). Many of the members remained in country for the following week to participate in the 20th International Symposium on Analytical and Applied Pyrolysis – PYRO2014, also held in Birmingham.

Publications

Consequences of an increased extraction of forest biofuel in Sweden – summary of the synthesis report

This Task 43 report presents a summary of the conclusions reached in a research synthesis report (Swedish Energy Agency report number ER2012:08 in Swedish) on environmental effects of forest biofuel extraction in Sweden. This publication can be downloaded from <http://www.ieabioenergy.com/wp-content/uploads/2014/06/Consequences-of-an-increased-extraction-of-forest-biofuel-in-Sweden-IEA-BIOENERGY-TR2014-1.pdf>



ExCo71 – Waste to Energy – Summary and Conclusions

This publication provides the summary and conclusions from the workshop 'Waste to Energy' held in conjunction with the meeting of the Executive Committee of IEA Bioenergy in Cape Town, South Africa on 21 May 2013. The purpose of the workshop was to provide the Executive Committee with an overview of waste to energy both at a global level and in the context of an emerging economy. The aim was to stimulate discussion between the Executive Committee, Task Leaders, invited experts and various stakeholders and thereby enhance the policy-oriented work within IEA Bioenergy. This publication can be downloaded from <http://www.ieabioenergy.com/wp-content/uploads/2014/03/ExCo71-Waste-to-Energy-Summary-and-Conclusions-28.03.14.pdf>



Monitoring Sustainability Certification of Bioenergy – Short summary

To support sustainable bioenergy deployment and overcome some of the challenges associated with the current status of sustainability certification, this IEA Bioenergy strategic study examined what is actually known and what can be learned from the current development and implementation of voluntary certification systems, about the role of voluntary certification schemes in the governance of biomass/bioenergy/biofuels sustainability and how this has affected actors along the supply chains and trade. This publication can be downloaded from <http://www.ieabioenergy.com/wp-content/uploads/2013/10/Monitoring-Sustainability-Certification-of-Bioenergy-Short-summary.pdf>



2013 IEA Bioenergy Annual Report

The IEA Bioenergy Annual Report 2013 includes a special feature article 'Integration of Thermal Energy Recovery into Solid Waste Management' prepared by Task 36. The Annual Report also includes a report from the Executive Committee and a detailed progress report on each of the Tasks. Also included is key information such as Task participation, Contracting Parties, budget tables and substantial contact information plus lists of reports and papers produced by the Implementing Agreement. The publication can be downloaded from <http://www.ieabioenergy.com/wp-content/uploads/2014/03/IEA-Bioenergy-Annual-Report-2013.pdf>



On the Timing of Greenhouse Gas Mitigation Benefits of Forest-Based Bioenergy

This statement addresses a much debated issue – the timing of greenhouse gas (GHG) emissions and carbon sequestration when biomass from existing managed forests is used for energy to displace fossil fuels. The purpose of the statement, which is aimed at policy advisors and policy makers, is to explain the essence of the debate and propose a perspective that considers the broader context of forest management and the role of bioenergy in climate change mitigation. <http://www.ieabioenergy.com/publications/on-the-timing-of-greenhouse-gas-mitigation-benefits-of-forest-based-bioenergy/>



Health and Safety Aspects of Solid Biomass Storage, Transportation and Feeding

This publication has been compiled as a joint effort by experts active in Tasks 32, 36, 37 and 40 of the IEA Bioenergy Agreement. It focuses on the health and safety issues of the supply chain of solid biofuels with the objective to highlight commonly used mitigation methodologies to promote a better working environment when dealing with solid biofuels. With the growth of the bioenergy sector, it is important not only that opportunities for bioenergy are implemented in an efficient and economic manner, but also safely. This publication can be downloaded from <http://www.ieabioenergy.com/wp-content/uploads/2013/10/Health-and-Safety-Aspects-of-Solid-Biomass-Storage-Transportation-and-Feeding.pdf>



The Science-Policy Interface on the Environmental Sustainability of Forest Bioenergy

This publication reports on the discussions and opinions expressed during and expert workshop on the environmental sustainability of forest bioenergy in Canada, held in Quebec on the 3-5 October 2012. The workshop was organised by the International Energy Agency Bioenergy, Task 40 (International Sustainable Bioenergy Trade) and Task 43 (Biomass Feedstocks for Energy Markets), the IEA Bioenergy Executive Committee, the Faculty of Forestry, Geomatics and Geography of Laval University (Quebec, Canada) and Natural Resources Canada, with the collaboration from the Global Bioenergy Partnership and the Canadian Council of Forest Ministers. Participants engaged in dialogue critical for the formulation of rational policy to achieve sustainable forest bioenergy production systems. This publication can be downloaded from <http://www.ieabioenergy.com/wp-content/uploads/2013/10/The-Science-Policy-Interface-on-the-Environmental-Sustainability-of-Forest-Bioenergy-a-Strategic-Discussion-Paper.pdf>



ExCo68 – Environmental Sustainability of Biomass – Summary and Conclusions

This publication provides the summary and conclusions from the workshop 'Environmental Sustainability of Biomass' held in conjunction with the meeting of the Executive Committee of IEA Bioenergy in Twin Waters, Queensland, Australia on 24 November 2011. The purpose of the workshop was to provide the Executive Committee with perspectives on sustainability aspects such as GHG emissions, feedstock production, certification, soil conservation and governance. The aim was to stimulate discussion between the Executive Committee, Task Leaders and invited experts and thereby enhance the policy-oriented work within IEA Bioenergy. This publication can be downloaded from <http://www.ieabioenergy.com/wp-content/uploads/2013/10/ExCo68-Workshop-Environmental-Sustainability-of-Biomass.pdf>



Future Biomass-based Transport Fuels

The summary and conclusions publication from the workshop held in conjunction with ExCo67 in Helsinki, Finland, on May 10th has been published and can be downloaded from <http://www.ieabioenergy.com/publications/ws14-future-biomass-based-transport-fuels/>



Using a LCA Approach to Estimate the Net GHG Emissions of Bioenergy

This strategic report was prepared by Mr Neil Bird, Joanneum Research, Austria; Professor Annette Cowie, The National Centre for Rural Greenhouse Gas Research, Australia; Dr Francesco Cherubini, Norwegian University of Science and Technology, Norway; and Dr Gerfried Jungmeier, Joanneum Research, Austria. The report addresses the key methodological aspects of life cycle assessment with respect to greenhouse gas balances of bioenergy systems. It includes results via case studies, for some important bioenergy supply chains in comparison to fossil energy systems. The purpose of the report was to produce an unbiased, authoritative statement aimed especially at practitioners, policy advisors, and policy makers. This publication can be downloaded from <http://www.ieabioenergy.com/wp-content/uploads/2013/10/Using-a-LCA-approach-to-estimate-the-net-GHG-emissions-of-bioenergy.pdf>



Thermal Pre-treatment of Biomass for Large-scale Applications

The summary and conclusions publication from the workshop held in conjunction with ExCo66 in York, United Kingdom, on 12 October 2010 has been published and can be downloaded from <http://www.ieabioenergy.com/publications/ws13-thermal-pre-treatment-of-biomass/>



Developing Sustainable Trade in Bioenergy

The 'summary and conclusions' publication from the workshop held in conjunction with ExCo65 in Nara City, Japan in May 2010 has been published and is available to download from <http://www.ieabioenergy.com/publications/ws12-developing-sustainable-trade-in-bioenergy/>



IEA Bioenergy Events

Executive Committee

- ExCo74** will be held in Brussels, Belgium on 21-23 October 2014.
- ExCo75** will be held in Dublin, Ireland on 19-21 May 2015.
- ExCo76** will be held in Berlin, Germany on 26 October 2015
- ExCo77** will be held in Italy in May 2016
- ExCo78** will be held in New Zealand in October/November 2016

Task Events

- Task 34's** schedule of upcoming events is
- 7th–9th October 2014, Joensuu, Finland.
Task 34 regular meeting. In addition there will be a one-day symposium with Finnish stakeholders, including the industrial partners in the pyrolysis commercial plant recently started in Joensuu, and the chance to tour the Joensuu plant.
- Task 37's** schedule of upcoming events is
- 15th–17th October 2014, Angers, France.
Task 37 meeting hosted by ADEME
 - 25th–27th March 2015, Stockholm, Sweden.
Task 37 business meeting and technical visit to biorefinery. Swedish Green Gas Research Conference and Technical visit in Örsnökölvik in the 2 days before the Task 37 meeting

- Task 39's** schedule of upcoming events is
- September 2014, Munich, Germany.
Task 39 meeting in conjunction with the 4th International Conference on Cellulosic Ethanol.
 - 23rd–25th March 2015, Gwangju, Korea.
Task 39 meeting.

- Task 40's** schedule of upcoming events is
- 24th October 2014, Brussels, Belgium.
Task 40 is organising a one day workshop in conjunction with Biotrade2020+.

- Task 43's** schedule of upcoming events is
- October 2014, Brussels, Belgium.
Task 43 business meeting and workshop to be held back to back with ExCo74.

Other Events

3rd European Biorefining Training School

July 7-10 2014, Budapest, Hungary
Email: biorefineryschool@climatekic.hu
Website: <http://www.klimainnovacio.hu/en/biorefineryschool>

Woody Crops: Production Alternatives for Multiple Uses – 10th Biennial Conference

July 17-19 2014, Seattle WA, USA
Website: <http://www.woodycrops.org/upcomingMeetings/>

Lignin 2014 – Biosynthesis and Utilization

August 24-28, 2014, Umeå, Sweden
Email: marlene.karlsson@umu.se
Website: <http://www.lignin2014.se>

China (Guangzhou) International Biomass Energy Exhibition 2014 (CNIBEE2014)

August 26-28, 2014, Guangzhou Pazhou, China
Email: grand3@grahw.com

Nordic Biogas Conference

August 27-29, 2014, Reykjavik, Iceland
Website: <http://www.sorpa.is/nbc/>

BIT's 4th Annual World Congress of Agriculture-2014

August 29-31, 2014, Changchun, China
Email: hedy@bitconferences.com
Website: <http://www.bitcongress.com/WCA2014/default.asp>

TCS 2014: Symposium on Thermal and Catalytic Sciences for Biofuels and Biobased Products

September 2-5, 2014, Denver, Colorado
Email: jeuken@iastate.edu
Website: <http://www.tcs2014.org/>

iSGA-4 4th International Symposium on Gasification and its Applications

September 2-4, 2014, Vienna, Austria
Email: office@i-sga.info
Website: <http://www.i-sga.info/>

The 14th International Symposium on District Heating and Cooling

September 7-9 2014, Stockholm, Sweden
Email: dhc14@svenskfjarrvarme.se
Website: <http://svenskfjarrvarme.se/DHC14>

Progress in Biogas III

September 10-12, 2014, Stuttgart, Germany
Email: j.aragundy@biogas-zentrum.de
Website: <http://www.progress-in-biogas.com/#!>

Bioenergy from Forest – 2014

September 15-18 2014, Helsinki, Finland
Email: bioenergy@benet.fi
Website: <http://www.bioenergyevents.fi/Conference>

The 4th Annual World Congress of Bioenergy – Theme: Roadmap toward 2020

September 21-23, 2014, Qingdao, China
Email: darcy@wcbce-congress.com
Website: <http://www.bitcongress.com/WCBCE2014/default.asp>

7th Biofuels International Conference

September 24-25, 2014, Ghent, Belgium
Website: <http://www.biofuels-news.com/conference/>

7th European Forum for Industrial Biotechnology and the Biobased Economy

September 30 – October 2, 2014, Reims, France.
Website: <http://www.efibforum.com/home.aspx>

Conference of European Biogas Association

September 30 – October 2, 2014, Egmond aan Zee, The Netherlands
Email: przadka@european-biogas.eu
Website: <http://www.biogasconference.eu/>

XXIV IUFRRO World Congress 2014 – “Sustaining Forests, Sustaining People: The Role of Research”

October 5-11, 2014, Salt Lake City, UT, USA
Website: www.iufrro2014.com

SGC International Seminar on Gasification

October 15-16, 2014, Malmö, Sweden
Email: anna-karin.jannasch@sgc.se
Website: <http://conference.sgc.se/?pg=1445785>

Lignobiotech III Symposium

October 26-29, 2014, Concepción, Chile
Website: <http://www.lignobiotech.cl/>

5th BioMarine International Business Convention

October 30-31, 2014, Cascais, Portugal
Email: contact@biomarine.org
Website: <http://www.biomarine.org/>

4th IEA Clean Coal Centre Workshop on Cofiring Biomass with Coal

November 5-6, 2014, State College, PA, USA
Website: <http://cofiring4.coalconferences.org>

Biofuels to Bioeconomy

December 1, 2014, Toronto, Canada
Website: <http://www.cvent.com/events/canadian-bioeconomy-conference/event-summary-850dc62258a74f5b932b3746e2358911.aspx?i=a0792fee-848b-4297-a683-90b700e075b3>

Bioenergy Australia 2014

December 1-2, 2014, Adelaide, Australia
Email: bioenergyconf@theassociationsofspecialists.com.au
Website: <http://www.bioenergyaustralia.org/pages/bioenergy-australia-conference.html>

3rd Conference on Carbon Dioxide as Feedstock for Chemistry and Polymers

December 2-3, 2014, Essen, Germany
Email: achim.raschka@nova-institut.de
Website: <http://www.co2-chemistry.eu/>

Objectives of IEA Bioenergy

IEA Bioenergy is an international collaborative agreement set up in 1978 by the International Energy Agency (IEA) to improve international cooperation and information exchange between national bioenergy RD&D programmes. IEA Bioenergy aims to achieve a substantial bioenergy contribution to future global energy demands by accelerating the production and use of environmentally sound, socially accepted and cost-competitive bioenergy on a sustainable basis, thus providing increased security of supply whilst reducing greenhouse gas emissions from energy use.

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Task 32: Biomass Combustion and Co-firing

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Task 36: Integrating Energy Recovery into Solid Waste Management

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Task 39: Commercialising Conventional and Advanced Liquid Biofuels from Biomass

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Task 40: Sustainable International Bioenergy Trade – Securing Supply and Demand

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