IEA Bioenergy Work Programme 2016-2018 Triennium

This publication provides an overview of the IEA Bioenergy Tasks' Work Programmes for the triennium 2016-2018.

IEA Bioenergy

IEA BIOENERGY: EXCO: 2017:01

IEA Bioenergy Work Programme 2016-2018 Triennium

Published by IEA Bioenergy

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Introduction

The IEA Bioenergy Technology Collaboration Programme (IEA Bioenergy TCP – www.ieabioenergy.com) is a global government-to-government collaboration on research in bioenergy and is the main initiative under the auspices of the International Energy Agency (IEA – www.iea.org) to develop and deploy bioenergy in a sustainable way in order to achieve a low carbon economy. While the TCP is made up mainly of OECD countries, there are also non-OECD members participating. As of the 1st January 2016, 22 countries and the European Commission are participating in IEA Bioenergy: Australia, Austria, Belgium, Brazil, Canada, Croatia, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Republic of Korea, the Netherlands, New Zealand, Norway, South Africa, Sweden, Switzerland, the United Kingdom, the USA, and the European Commission.

The mission of IEA Bioenergy is to increase knowledge and understanding of bioenergy systems in order to facilitate the commercialisation and market deployment of environmentally sound, socially acceptable, and cost-competitive bioenergy systems and technologies, and to advise policy and industrial decision makers accordingly. The TCP provides platforms for international collaboration and information exchange on bioenergy research, technology development, demonstration, and policy analysis with a focus on overcoming the environmental, institutional, technological, social, and market barriers to the near- and long-term deployment of bioenergy technologies.

The work programme of IEA Bioenergy, which is carried out through Tasks and strategic projects, covers the full value chain from biomass feedstocks to final energy product. The programme for Tasks is defined for a triennium with clear objectives and budgets. The current triennium commenced on the 1st January 2016 and will run to the end of December 2018. Special projects are treated separately, as they are designed to address specific topics and operate in a timeframe not necessarily related to the triennium of the Tasks.

This document describes the scheduled activities of the 10 Tasks of IEA Bioenergy for the triennium 2016-2018, as well as the Special projects. It includes the objective and work programme of each individual Task. The Task Leader for each Task is identified, together with the participating members of IEA Bioenergy.

Task 32 – Biomass Combustion and Co-firing

http://www.ieabcc.nl/

1. Definition and Objectives

Definition

'Biomass Combustion and Co-Firing' refers to both dedicated combustion and co-firing of biomass for the production of usable energy and includes market introduction and optimisation of biomass combustion technologies.

Objectives

The objective of this Task is to collect, analyse, share, and disseminate strategic, technical and non-technical information on biomass combustion and co-firing applications, leading to increased acceptance and performance in terms of environment, costs and reliability, and to support the existing momentum in market introduction of cost effective and clean applications of biomass combustion and co-firing systems in member countries.

2. Work programme

The Programme of Work will comprise the following focus areas:

- **Domestic heat production:** In 2016-2018, it is planned to target both manufacturers of stoves and policy makers to both support the implementation of technical innovations (in a workshop) and examine the perspectives to positively influence user behaviour and the market conditions (in a strategy study). Further, Task 32 will contribute to the Special Project on Bioenergy Hybrids.
- **Progress in biomass fired CHP applications:** a good practice report will be prepared that contains success stories for decentralised CHP plants. The report will also contain an overview of new developments in biomass fired CHP technologies.
- **Reduction of emissions:** a study is scheduled to measure and compare typical real life performance of a number of boilers with performance under the conditions of type testing approval. The work should form a good basis for development of a more realistic test method than what is currently included in national and European test methods.

- **Co-firing and full conversion:** A workshop will be organised with the IEA Clean Coal Centre to share key information on the technical opportunities and limitations of biomass cofiring and repowering cofiring projects between research, the power sector and policy makers. A common barrier for all plants cofiring biomas is the use of fly ash, as it does not comply with existing standards (e.g. the current EN450 standard). A study is proposed to investigate the options for utilisation of fly ash from high percentage biomass cofiring plants.
- **Low grade fuels and fuel treatment:** In addition to a particular joint workshop with Task 36 on solid recovered fuel (SRF), an inter-task project is scheduled to evaluate the cost effectiveness of different fuel pretreatment methods in the supply chain.
- **Bio-CCS and CCU:** Task 32 will contribute to the Special Project on this topic.
- **Dissemination and outreach event:** With the increasing demand for woody biomass (wood pellets in particular) in Asia, particularly Japan and South Korea, a workshop will be organised to provide information to Asian industries on possibilities for biomass trade and end-use and to increase the outreach of IEA Bioenergy in Asia.

3. Task leadership and participants

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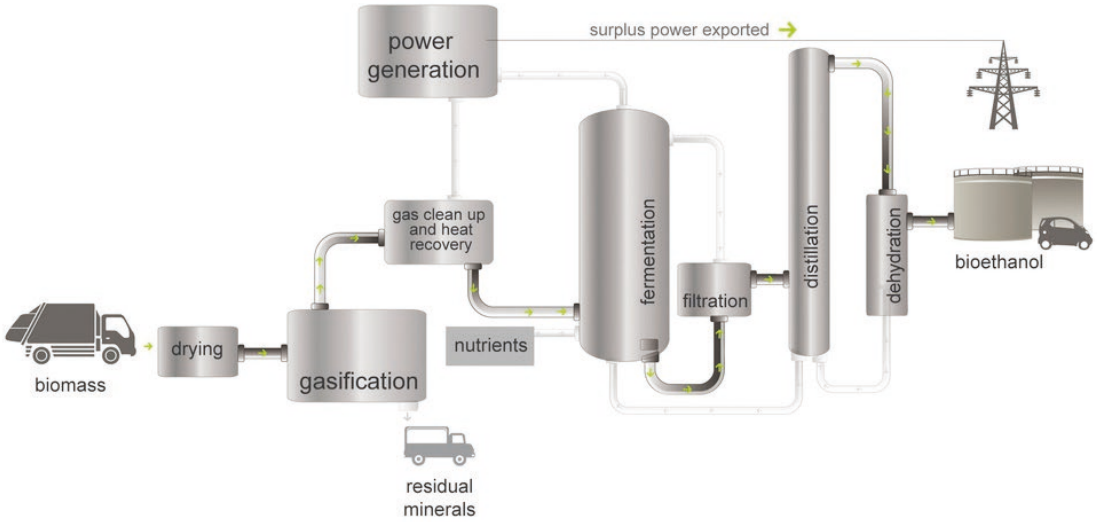
Participating countries: Austria, Belgium, Canada, Denmark, Germany, Ireland, Italy, Japan, the Netherlands, Norway, South Africa, Sweden, Switzerland

Task 33 – Gasification of Biomass and Waste



task33.ieabioenergy.com

1. Definition and Objectives

Definition

'Gasification' means the thermal destruction of biomass in a reducing atmosphere of steam or air (or both) to produce a medium- or low-calorific value gas which can subsequently be converted to other fuel forms, chemicals, hydrogen, and other products.

Objectives

The objectives of Task 33 are to monitor, review and exchange information on biomass gasification research, development and demonstration and to promote cooperation among the participating countries and industry to eliminate technological impediments to the advancement of thermal gasification of biomass. The ultimate objective is to promote commercialisation of efficient, economical, and environmentally preferable biomass gasification processes, for the production of electricity, heat, and steam, for the production of synthesis gas for subsequent conversion to chemicals, fertilisers, hydrogen and transportation fuels, and also for co-production of these products.

2. Work programme

The Programme of Work includes several projects focused on technical and commercialisation aspects of gasification and delivers reports targeted towards policy makers, technology developers, industrial end users, researchers and the general public. Reports are scheduled on:

- Gasification of waste
- Fuel pretreatment for gasification
- Biomass gasification for carbon capture, utilisation and sequestration (CCUS)
- Biomass gasification success stories
- Gasification-based renewable energy hybrid systems
- Hydrogen production through biomass gasification
- Status of biomass gasification

Semi-annual workshops organised by the Task will target researchers and industrial end users and will help promote information dissemination and discussion among technology experts. Significant interaction with other tasks, annexes and associated international bodies is planned, and will include joint studies and workshops targeting common interest areas and barriers to successful commercialisation of gasification and associated bioenergy technologies. Technical workshops will be held on:

- production of aviation fuels through biomass gasification
- analytical methods and online measurements for gasification systems
- gasification of waste (joint with Task 36)
- fluidised bed biomass and waste gasification systems (joint with IEA-FBC)

General activities to facilitate information exchange within and outside IEA Bioenergy will continue through the triennium, including semi-annual Task meetings to exchange and review country and global RD&D programmes and projects, updates of the gasification database, and publication of Task newsletters.

3. Task leadership and participants

Task Leader: Kevin Whitty,
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Participants: Austria, Denmark, Germany, Italy, the Netherlands, Norway, Sweden, Switzerland, United States

Task 34 – Direct Thermochemical Liquefaction

http://task34.ieabioenergy.com/

1. Definition and Objectives

Definition

'Thermochemical liquefaction' is the controlled thermal degradation of biomass in any form in the absence of oxygen, with a focus on bio-oil as the main product.

Objectives

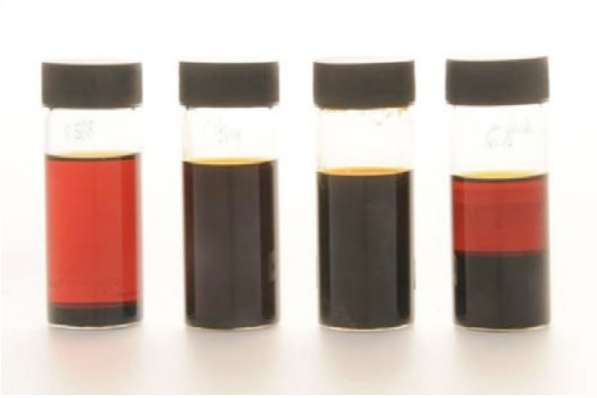
The objective of Task 34 will be to consider the field of direct thermo-chemical liquefaction technologies for biomass (both *fast pyrolysis* and *hydrothermal liquefaction*) and the upgrading of the products to liquid fuels or chemical products in order to identify both technical and non-technical barriers to more rapid and widespread implementation of the technologies. The activities of the Task will focus on information exchange, technology review and technology implementation issues and opportunities.

2. Work programme

While the previous work focused on pyrolysis, hydrothermal liquefaction of biomass is now also included, with a focus on implementation and market opportunities. The scope of the Task will include production and utilisation of liquid fuels derived from biomass for heat and power; upgrading of bio-oil and biocrude to liquid transportation fuels and chemical products, where there is an energetic or economic contribution. In order to meet these objectives every effort will be made to actively involve industry and decision-makers in the Task, and interactions with other Tasks will continue to be exploited.

Topic priorities included in the new work programme are:

- **Support commercialisation through standards development –** Specific efforts will include the establishment of CEN standards as required for use of bio-oil. An effort will be made to facilitate transfer of the EU developed standards to the ASTM process in order to coordinate standards. Technical assistance will be provided to companies in the bio-oil market through data collection/processing and drafting a new MSDS and chemical safety report



- **Validate applicable analytical methods for product evaluation –** A round robin has been proposed, a seminar on advanced analytical methods also, and expansion of the analytical methods developed for bio-oil to the biocrude product from hydrothermal liquefaction and the upgraded products from each.
- **Facilitate information exchange with stakeholders –** The Task will work with pyrolysis technology developers and providers to help identify and define their problems and help to provide solutions both from within the group and externally. Similarly the Task will co-operate with applications developers and equipment manufacturers to help them understand more about bio-oil and its properties and requirements.
- **Support techno-economic assessment of liquefaction technologies –** This activity could include a comparative technology assessment.
- **Collaboration with other Tasks –** Topic areas have been identified for cooperation with Tasks 32, 33, 36, 40, 42 and 43 with the details to be further developed.
- **Seminars/workshops –** In connection with 6-monthly Task meetings, seminars/workshops will feature invited speakers with an emphasis on industrial and commercial organisations.

3. Task leadership and participants

Task Leader: Alan Zacher,
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Task 36 – Integrating Energy Recovery into Solid Waste Management Systems

http://task36.ieabioenergy.com/

1. Definition and Objectives

Definition

Waste is the one biomass resource that is routinely produced in urban environments. It can be used to provide bioenergy that is integrated into the lives of the population. Its management and use is very relevant to growing cities; and its management changes as the needs of the local population evolve. In addition waste is generally regarded as a sustainable biomass source. It can therefore play an integral role in security of sustainable energy supply.

Objectives

The core role of Task 36 is as a forum for discussion, information dissemination and knowledge flow on the integration of energy into solid waste management and on the challenges facing policy makers involved in solid waste management decisions.

The main objectives of Task 36 are to collect, analyse, share, and disseminate best practice technical and strategic non-technical information on integration of energy recovery into solid waste management, leading to improved availability of information to decision makers and to increased acceptance and performance in terms of environment, costs, and reliability.

2. Work programme

The work programme addresses key challenges in the integration of energy into solid waste management solutions and decisions. The structure of work will generally consist of a workshop exploring each theme, associated summary reports and technical site tours. Key issues of interest include:

- Trends in different waste streams as feedstock for Waste-to-Energy plants, including (1) the processing of waste into waste derived fuels ('solid recovered fuels' and/or 'refuse derived fuels'), and (2) the use of industrial and commercial waste for energy recovery
- Developments in the circular economy and smart waste management and the way these impact energy recovery from waste, including the recovery of materials and by-products from waste.
- Trends on the advanced thermal conversion of waste into chemicals or liquid fuels.

- Trends in transboundary shipment of waste
- Pre-treatment of biomass residues in the supply chain for thermal conversion.
- Review of international policy, legislative and fiscal drivers impacting energy recovery in solid waste management.
- Energy from waste in developing economies

The key audience for this information will be policy and decision makers involved in waste, energy, and environmental areas at Government and local/regional level.

3. Task leadership and participants

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Participants: France, Germany, Italy, Sweden

Task 37 – Energy from Biogas

task37.ieabioenergy.com

1. Definition and Objectives

Definition

'Energy from biogas' refers to recovering energy from anaerobic digestion (AD) of agricultural residues, (e.g. manure and crop residues), energy crops, organic rich waste waters, the organic fraction of municipal solid waste (MSW) and industrial organic wastes. Anaerobic digestion is carried out in facilities specially adapted for each particular feedstock, or mixture of feedstocks in the case of co-digestion. The main interests are the production of biogas for use directly for heat and power, upgrading of biogas to biomethane, utilisation of biogas/biomethane for electricity grid balancing and high quality digestate that can be used as biofertiliser. Task 37 addresses the whole biogas production chain from feedstock collection and pretreatment to biogas upgrading, biofertiliser application and process chain sustainability.

Objectives

The main objective of the Task 37 work programme is to address the challenges related to the economic and environmental sustainability of biogas production and utilisation.

2. Work programme

In 2016-2018 the Task will continue to examine substrates, process optimisation and sustainability. Prominence will be given to wastes as substrate, in particular food wastes. Investigation of the role of biogas in smart energy grids will be continued through investigation of greening the gas grid. The practice and the potential for biogas in developing countries and in countries outside Europe will be assessed. AD systems that can minimise or remove requirements for financial subsidy will be investigated. Environmental performance of biogas production and utilisation will be included in a study, which will include externalities of biogas systems. Advice will be given on best practice. Information will be disseminated to industry, standardisation bodies and licensing authorities, through dedicated technical reports, seminars and workshops. Key topics and activities will include the following:

- food waste digestion systems and application to other residues
- International approaches for local sustainable anaerobic digestion
- Grid injection, smart grids, greening of the gas grid and local grids
- Externalities of biogas systems
- Best Practice Guidelines for biogas industries
- Success stories from the commercial application of biogas/biomethane
- Country reports

3. Task leadership and participants

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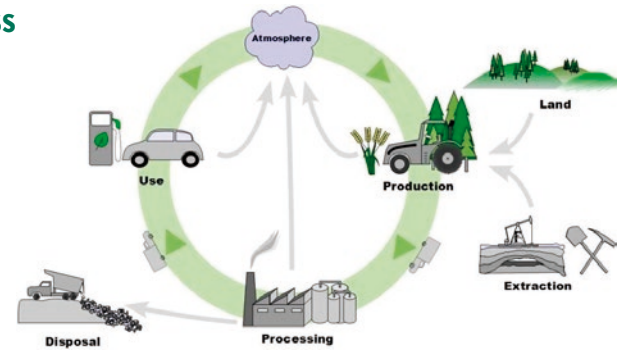
Task 38 – Climate Change Effects of Biomass and Bioenergy Systems

task38.ieabioenergy.com/



1. Definition and Objectives

Definition

Ever increasing evidence of climate change and its impacts, together with the adoption of the Kyoto Protocol and other regional, national, bilateral and multilateral agreements, have greatly increased interest in reducing greenhouse gas (GHG) emissions and enhancing sequestration by natural systems. Task 38 investigates the climate effects of bioenergy and land-based carbon sequestration systems to support development of climate change mitigation strategies.

Objectives

The primary goal of Task 38 is to develop, demonstrate and promote methods to assess the net climate effects of bioenergy, to support greenhouse gas accounting for bioenergy, and to inform decision-makers in the selection of GHG mitigation strategies. To promote understanding of the role of bioenergy in climate change mitigation Task 38 will continue to update and improve the "Task 38 standard methodology" for the calculation of climate change effects of bioenergy, based on life cycle perspective, by incorporating new issues, technologies and topics as they arise; interact with researchers and policy-makers to improve understanding of the standard methodology; work with other IEA Bioenergy Tasks to assess climate change effects of emerging bioenergy technologies and aid decision makers in selecting mitigation strategies that optimise climate outcomes by disseminating the results of the above-mentioned activities.

2. Work programme

The Task will focus on quantifying the climate change effects of current and emerging biomass and bioenergy systems. In addition, the Task will expand knowledge of the climate change benefits of bioenergy by including (where possible) the following current and emerging issues in its standard approach to assessment: GHG accounting for carbon in wood products and use of post-consumer wood products for energy, the timing of GHG emissions and removals, non-CO_2 climate forcers such as albedo and black carbon. The scope of work of Task 38 in 2016-2018 will include:

- Development of guidance to policymakers and researchers on the application of the improved "Task 38 standard methodology" for estimating the climate change effects of bioenergy, based on a holistic life-cycle perspective
- Development of guidance on appropriate application of the so-called attributional and consequential approaches to life cycle assessment (LCA)
- Assessment of the relevance of timing of climate forcers to the climate effects of bioenergy
- Harmonisation of input and output data of biomass and bioenergy systems
- A joint study with Task 40 and 43 on how to mobilise sustainable biomass for trade and demonstrate benefits of bioenergy in the biobased economy
- A joint study with T43 on comparing the various forest growth and bioenergy models and studies
- Assessment of GHG effects of emerging technologies relating to algal biofuels;
- Joint special project on Bio-CCUS.

3. Task leadership and participants

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Participants: Australia, Finland, France, Germany, Sweden, United States

Task 39 – Commercialising Conventional and Advanced Liquid Biofuels from Biomass

task39.ieabioenergy.com/

1. Definitions and Objectives

Definitions

'Liquid Biofuels' are liquid fuels derived from biomass, such as ethanol and biodiesel, used primarily in the transportation sector. Conventional biofuels have reached technological and market maturity and are commercially available; they are derived primarily from food- or food-related feedstocks, including sugar, starch, and oilseeds. Advanced biofuels use pre-commercial technologies using non-food crops, agricultural and forest residues. Many advanced biofuels are under development including cellulosic ethanol, biomethanol, DMF, Bio-DME, Fischer-Tropsch diesel, mixed alcohols and wood diesel.

Objectives

The core activities of Task 39 in 2016-2018 remain focused on commercialisation of liquid biofuels, both conventional and advanced biofuels in transportation but with increased emphasis on aviation/maritime applications and encouraging participation by additional rapidly emerging economies (China, India, Russia, etc.).

2. Work programme

The Programme of Work will build on the already established strong and active participating network of experts from industry, academia and government research institutions developed over the past triennia. The programme will focus on three main topic areas:

- Technology and Commercialisation: Ongoing assessment of demonstration plants and commercialisation progress will be carried out, while the success of cellulosic ethanol and other advanced biofuel technologies will be specifically assessed. Continued analyses will be carried out on those key issues that limit the integration of conventional and advanced biofuels into existing infrastructure and engines. Developments in algal technologies for biofuels will remain an ongoing area of investigation, with the increased likelihood that it will require a co-product approach (fish feed, nutraceuticals, cosmetics, etc.). The potential of so-called "generation 1.5" feedstocks for biofuel production to act as a bridge between conventional ("1st generation") and advanced ("2nd generation") biofuels and their feedstock processing requirements will be assessed.

- Policy, Markets, Implementation and Sustainability: The Task will continue to update the comparison of so-called implementation agendas (a compare-and-contrast of biofuels policies used by member countries and regions, including emerging markets such as China and India, to encourage the development, deployment and use of biofuels). The Task will also review progress in the commercialisation of conventional and advanced biofuels (i.e., sugar/starch-based ethanol, oilseed-based biodiesel, cellulosic ethanol and so called "drop-in" hydrocarbons). A cost/benefit analysis and comparison of drop-in (less commercialised, more fungible) versus conventional ethanol/biodiesel biofuels (more commercialised, less fungible) will be carried out to better understand feedstock versus infrastructure integration challenges. Sustainability aspects will entail ongoing review and assessment of LCA tools and models (such as GHGenius, GREET, etc.) to evaluate the sustainability of different biofuels options, as well as review of biofuels policies to assess how much they incorporate social and environmental aspects of sustainability.
- Multifaceted Communication Strategy: This will take place through various interactions, e.g., at workshops and conferences, via personnel exchanges, and using websites/electronic media.

3. Task leadership and participants

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Participants: Australia, Austria, Brazil, Canada, Denmark, Germany, Japan, Korea, the Netherlands, New Zealand, South Africa, Sweden, United States, European Commission

Task 40 – Sustainable biomass markets and international bioenergy trade to support the biobased economy

http://task40.ieabioenergy.com/

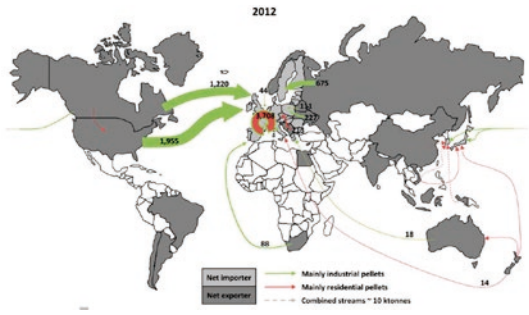
1. Definition and Objectives

Definition

Policy targets in various regions have already become drivers of significant trade flows (e.g. wood pellets from North America to North-Western Europe and ethanol-trade between the US and Brazil). The production and trade of high value biomass commodities such as vegetable oils, biodiesel, ethanol and wood pellets is reasonably documented. Trade of lower value streams such as waste wood, low-quality wood chips, waste vegetable oils and agricultural residues for energy purposes – while (most likely) constituting significant volumes – however are not properly mapped. With an increasing focus on the biobased economy it remains important to showcase that biomass can be a sustainable option to produce both materials and energy (either through biorefineries or stand-alone options) that substitute fossil feedstocks.

Objectives

The core objective of the Task is to support the development of sustainable biomass markets and international trade of biomass, recognising the diversity in biomass resources and applications for bioenergy and bio-materials in the biobased economy. Similar to previous years, the desired impacts and results of the Task emphasis will rest on the support of emerging biomass markets for energy and material applications and further development of existing markets, the stimulation of investments in sustainable trade and development of pilot and demonstration projects, with a global perspective, including developing countries. An important element is outreach to industry, strategic policy-makers and the general public to increase public awareness and understanding of perceptions of international bioenergy markets and sustainable development, since this is a vital issue for societal support of using biomass resources from other (world) regions.



2. Work programme

The work programme for the period 2016-2018 consists of the following topics:

- Dedicated market studies, both focusing on existing markets (e.g. pellets, wood chips, waste streams) and markets for new bioenergy products (e.g. torrefied material & pyrolysis oil etc.), but also on regions which have not been charted before (e.g. the Pacific rim).
- Continued (case) studies on how to mobilise sustainable biomass for trade and demonstrate benefits (of bioenergy) in the biobased economy (a.o. critically assess the role of sustainability certification vs. risk-based approaches, binding legislation vs. BMPs etc.) – what can the biobased economy learn from bioenergy?
- Making things happen/stimulate (investments in) trade – this needs to increase dramatically over the next decade;
- Need for high-quality biofuels/feedstocks and advanced/smart logistics (dedicated infrastructure) to achieve cost price reductions – logistics typically are 30-50% of final costs of bioenergy. While advanced logistics and better feedstock may even increase cost at first, they are likely to reduce cost once deployed on a larger scale, and allow for system cost reductions when taking the advantages at the end user, e.g. a biorefinery, into account.
- Various workshops, including an outreach event with Task 32 on Biomass trade & co-firing across the Pacific Rim

3. Task leadership and participants

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Task 42 – Biorefining in a future BioEconomy

http://www.iea-bioenergy.task42-biorefineries.com/en/ieabiorefinery.htm

1. Definitions and Objectives

Definitions

Biorefining is the sustainable processing of biomass into a spectrum of bio-based products (food, feed, chemicals, and/or materials) and bioenergy (biofuels, power and/or heat). Both energy-driven biorefineries and product-driven biorefineries can be distinguished. In energy-driven biorefineries the biomass is primarily used for the production of secondary energy carriers (biofuels, power and/or heat); process residues are sold as feed (current situation), or even better, are upgraded to added-value bio-based products, to optimise economics and environmental benefits of the full biomass supply chain. In product-driven biorefineries the biomass is fractionated into a portfolio of bio-based products with maximal added-value and overall environmental benefits, after which the process residues are used for power and/or heat production, for both internal use and selling of the surplus to national grids.

Objectives

The aim of Task 42 is to contribute to the development and implementation of sustainable biorefineries – as part of highly efficient, preferably zero waste, value chains – synergistically producing biobased food and non-food products as key elements for a global circular bioeconomy. The focus in the 2016-2018 triennium will be on international and national networking activities, standardisation and certification of biobased products, policy advice, the role of industrial and SME stakeholders from the bioenergy and biofuel sectors in the transition to a BioEconomy, and increased co-operation with other IEA Bioenergy Tasks, IEA-IETS, FAO, OECD and EBA. Synergetic international co-operation within the IEA Bioenergy framework will potentially decrease the time-to-market for highly-efficient integrated biorefineries by tackling major non-technical critical success factors at the right international level.

2. Work programme

The activities of Task 42 for the 2016-2018 triennium all have the goal to further contribute to the market deployment of sustainable biorefineries, and are mainly based on successful developments started in former triennia, viz. the classification and factsheet activities, the sustainability assessment work and methodology, the assessment of BioEconomy policy developments in IEA Bioenergy member countries, the preparation of biorefinery-related reports, and knowledge exchange activities (thematic and stakeholder workshops, excursions, training of students/stakeholders).
The activities are subdivided into four activity areas:

- **Biorefinery systems –** Analysis and assessment of biorefining in the whole value chain. This includes the development of a biorefinery expert system, the further processing of Biorefinery Fact Sheets according to the Task 42 methodology and a study on how existing industrial infrastructures can be upgraded to integrated biorefineries.
- **Product Quality –** Reporting on related biobased products/bioenergy standardisation and certification activities at national, European and global levels. This includes the Task 42 contribution to the InterTask project on Sustainable Supply Chains.
- **Evolving bioeconomy –** Analysing and advising on perspectives of biorefining in a circular bioeconomy, reporting on bioeconomy strategies/drivers and contributing to the InterTask project on Bioenergy Success Stories.

- **Communication, dissemination and training –** Knowledge exchange by stakeholder consultation, reporting and lecturing. This includes the preparation of biorefinery country reports, reports on added-value biobased products (Biobased Chemicals, Proteins for Food, Feed and Industrial Applications, Biobased Fibrous Materials) and contributions to biorefining training activities. Thematic stakeholder workshops are scheduled on:
  - Upgrading industrial infrastructures to integrated biorefineries
  - International developments standardisation/ certification current/future biomass use
  - Sustainable Biomass Valorisation within the BioEconomy

3. Task leadership and participants

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Task 43 – Biomass Feedstocks for Energy Markets

http://www.ieabioenergytask43.org/

1. Definition and Objectives

Definition

Biomass production in agriculture and forestry will have to increase tremendously in order to provide feedstock for a bioenergy sector of a size reported by studies that model global energy system pathways towards meeting existing energy and climate targets. In recent years there was continuous animated scientific, societal and political discussion concerning potential impacts of bioenergy on sustainable development. Opponents have continuously raised concerns over multiple risks, e.g., potential disruption to food security, raw material markets and rural livelihoods, greenhouse gas (GHG) emissions and ecological impacts associated with land use change (LUC), and displacement of small-scale farmers. Proponents on the other hand have pointed to opportunities for new land use options and benefits such as employment creation, climate change mitigation, and reduced dependency on fossil fuels. Task 43 aims to continuously offer science-based information and alternative perspectives to balance polarised assertions (negative and positive) about bioenergy systems, in general, and feedstock production in agriculture and forestry, in particular.

Objectives

The overarching objective of Task 43 is to support sound bioenergy development that is driven by well-informed decisions in the forestry, agriculture and energy sectors as well as in investment institutions, government agencies and elsewhere. It will address critical issues regarding deployment of sustainable biomass and bioenergy supply chains, including social, economic and environmental outcomes of feedstock production and supply.

2. Work programme

The Task has a global scope and includes commercial, near-commercial and promising feedstock production systems in agriculture and forestry. The primary focus is on land use and land management of biomass production systems. The work program builds upon the work done in the 2013-2015 triennium where the Task has established several activities that address key questions of high relevance to the land use and energy sectors. The Task will seek new opportunities for collaboration with other Tasks as well as organisations outside IEA Bioenergy. The Task will also interact with other research networks and programmes that have work plans in the same areas.

Studies integrating several disciplines will be conducted to analyse trade-offs, compatibility and synergies between food, fibre and energy production systems and the bio-economy. The Work Programme is organised in three work packages (WPs) that are each organised in a set of Task Activities. Research priorities include:

- **Landscape management and design** for bioenergy and the bio-economy (WP1);
  - **i.** State-of-the-art in sustainable landscape management and design
  - **ii.** Atlas of attractive systems for bioenergy feedstock production in sustainably managed landscapes
  - **iii.** Application of landscape management and design approach to assess and promote sustainability of established and promising bioenergy systems
- **Developing effective supply chains** for sustainable bioenergy deployment (WP2);
  - **i.** EU-RED influence on international biomass supply chains
  - **ii.** Challenges and benefits of supply chain integration across agriculture and forestry
  - **iii.** Learning from the best supply chains and making them better
  - **iv.** The role of supply chains in financing bioenergy
  - **v.** Systems for improved supply chain performance and flexibility
  - **vi.** Efficient woody biomass supply within multi-forest product supply chains
- **Governance sustainability** of bioenergy supply chains (WP3).
  - **i.** Governance to support sustainability goals at multiple scales
  - **ii.** Effectiveness and efficiency of sustainability governance
  - **iii.** Governance to guide management of forests and other ecosystems affected by disturbances
  - **iv.** Governance addressing direct and indirect LUC impacts

v. Quantification of GHG balances and climate effects of LULUCF activities associated with biomass and bioenergy systems

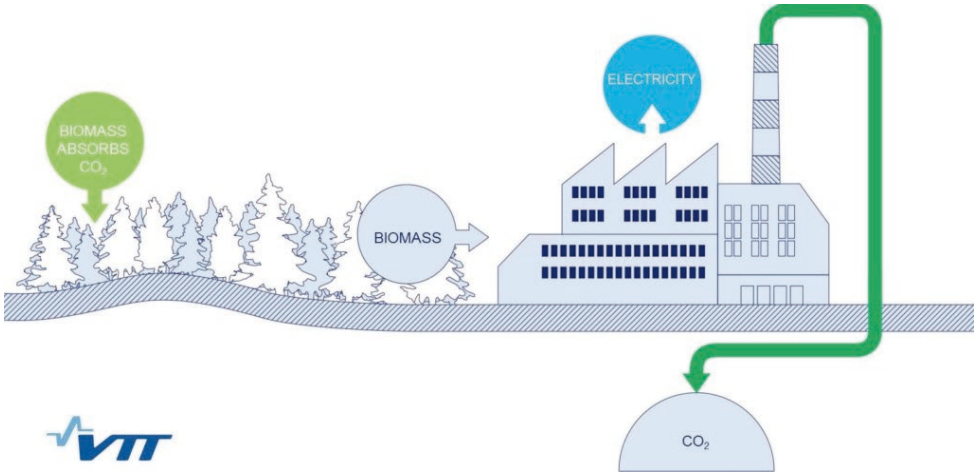
The Task intends to continue collaboration with organisations that has taken place during the previous triennium and will seek new collaboration where appropriate. Task workshops and meetings inclusive of the different WPs and international events will be arranged to address key questions for the Task.

3. Task leadership and participants

Task Leader: Ioannis Dimitriou,
Swedish University of Agricultural Sciences (Sweden),
Jannis.Dimitriou@slu.se

Participants: Australia, Canada, Croatia, Denmark, Finland, Germany, Ireland, the Netherlands, Norway, Sweden, United States, European Commission

Special Project 5 – Bio-CCS and Bio-CCUS in climate change mitigation and extended use of biomass raw material



http://task41project5.ieabioenergy.com/

1. Definition and Objective

Definition

The urgency to stabilise the global temperature rise at below 2°C calls for solutions that can remove CO_2 from the atmosphere. Achieving negative CO_2 emissions is possible by applying carbon capture in biomass-fired processes (Bio-CCS or BECCS). CCU (Carbon capture and utilisation) is referred to as a family of technology concepts utilising captured CO_2 as a feedstock for other processes, to produce materials, fuels or to be utilised as a process medium for e.g. C1 chemistry products, liquid biofuels, other products or enhanced oil or gas recovery.

Objective

The objective of this special project, running in 2016 and 2017, is to collect, analyse, share and disseminate strategic, technical and non-technical market based information on biogenic carbon capture and storage (Bio-CCS) and biogenic carbon capture and re-utilisation of CO_2 (Bio-CCU). The target for this action is to establish a forum gathering leading interested parties to discuss and disseminate the role and importance of Bio-CC(U)S.

2. Work programme

The primary way of working in this project is workshops and publication of scientific and high level articles/ publications based on the common understanding around specified topics. Four open workshops with invited speakers on different focus topics are foreseen as follows:

- Technological and financial aspects of Bio-CC(U)S
- Sustainability and GHG impact of Bio-CC(U)S
- Market driven future potential of Bio-CC(U)S
- Political and regulatory issues related to Bio-CC(U)S

Based on the findings and outcomes of these workshops summary publications from each focused workshop targeted to scientific and/or a wider audience will be prepared. The final outcome of this special project is a roadmap on commercial implementation of Bio-CCS.

3. Leadership and participants

Coordination: Antti Arasto,
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Participants: European Commission, Finland

Special Project 6 – Bioenergy in balancing the grid & providing storage options

http://task41project6.ieabioenergy.com/

1. Definition and Objective

Definition

In countries where wind and solar are expected to play a dominant role in the energy transition, integration of these intermittent energy sources with the power grid places significant pressure on the grid operation as the supply of the power especially from wind is intermittent and difficult to predict. This has led to extensive discussions with the grid operators on how to balance the grid. Furthermore often the renewable electricity from wind or solar is provided in times when demand is low and the electricity has to be stored or shed. Bioenergy can be used to relieve the pressure from system level management of the grid by making the grid more stable. In this respect, bioenergy has potential to play a focal role as a stabilising element in the renewable power (RE) supply system.

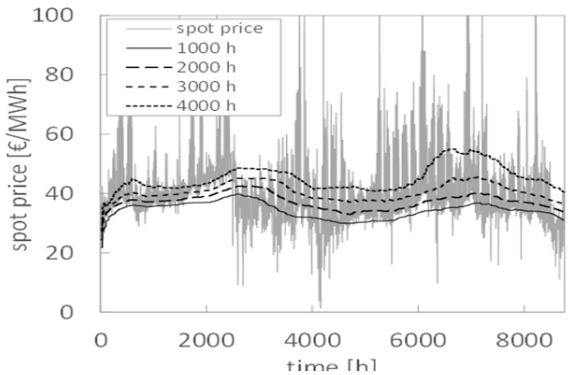
Objective

The scope of this project will be to monitor, review and accelerate the deployment of technologies that can be applied in balancing the grid by producing heat, fuels or storage. In addition, this Special Project seeks to identify and disseminate sound business models for practical, cost-effective and environmentally friendly ways to facilitate the transformation of the electricity grid based to a great extent on bioenergy technologies in new market conditions. Finally, in addition to market prospects the Special Project will put forward suggestions for policy and RTDD options.

2. Work programme

The deliverable will be a report addressing all the above opportunities for bioenergy, providing in addition policy options. The report will (i) make an analysis of the balancing problems faced by the grid due to RES electricity from wind and solar, (ii) identify and explain the role of bioenergy technologies and applications that can be used effectively in balancing the grid; (iii) identify and explain the role of bioenergy technologies and applications that can be used effectively for storage applications and (iv) make policy recommendations.

The project will organise a workshop in Brussels to present the results of the study.



3. Leadership and participants

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Participants: European Commission, Finland

Special Project 7 – Bioenergy RES Hybrids

http://task41project7.ieabioenergy.com/

1. Definition and Objective

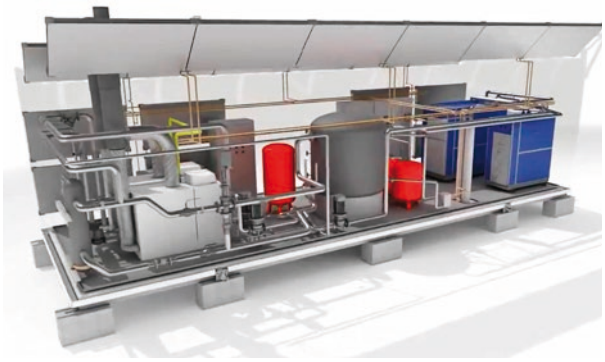
Definition

Integration of intermittent energy sources with biomass can be used to relieve pressure on system level management by making the processes themselves more stable. Bioenergy is ideally suited for balancing due to its storage capability and flexibility. On the other hand, as biomass is often available only at limited quantities or in limited seasons, sharing the energy supply with other RE sources contributes to stable biomass availability and using it at its best.

Integration of bioenergy with other renewable energy sources will open completely new applications for bioenergy ranging from frequency regulation to reserve energy and other services needed to maintain a reliable and secure energy supply with low environmental impact. In short, integrated renewable energy systems having biomass as one input, e.g. bioenergy hybrids, have the potential to make better use of abundant renewable energy sources, and produce reliable and affordable energy in comparison to separate processes operating with single source energy input.

Objective

The project is schedule to run for one year (in 2016). The Bioenergy RES Hybrids project targets the following market segments: renewable heating and cooling, renewable electricity generation and renewable fuels production. The main scope of this project is (i) to monitor, review and evaluate information from ongoing RD&D programs and operating hybrid systems to create a better understanding of the current state of bioenergy hybrid technologies, (ii) identify promising hybrid solutions, (iii) identify those sectors in the energy system, where bioenergy and RES hybrids could play a strategic role, (iv) perform a cost and market assessment for selected hybrid processes (v) sketch preliminary roadmaps for countries or regions seeking new renewable solutions to facilitate transition to energy systems on a sustainable basis and (vi) promote cost-effective, reliable and environmentally friendly ways to produce energy.



2. Work programme

The proposed work within the Strategic Project consists of meetings and workshops. Based on feedback gathered during the workshops, a final version of the project report will be prepared.

The following workshops are scheduled:

- Workshop on the state of art of bioenergy hybrids. Current status of bioenergy hybrids in various segments (including cross-cutting topics) will be discussed through expert presentations.
- Workshop on the main findings of the project. Project participants will present a draft version of the final report in addition to presentation detailing the main findings of the work conducted in the project.

3. Leadership and participants

Coordination: Ilkka Hannula,
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Participants: European Commission, Finland, Austria, Germany

IEA Bioenergy

Further Information

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