

## **TASK 38**

# **Greenhouse Gas Balances of Biomass and Bioenergy Systems**

**Proposal for Prolongation for  
the New Triennium 2010-2012**

**ExCo64  
Liege, Belgium**

**30 September – 2 October 2009**

**Prepared by:  
Neil Bird, Annette Cowie, and Susanne Woess-Gallasch  
in collaboration with the National Team Leaders of Task 38**

## Task Period 2010-2012

### Task Proposal Summary Sheet – Final Version for ExCo 64

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#### Proposer

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#### Endorsement by ExCo Member of participating country

Country: Austria  
Name: Josef Spitzer  
Signature:

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The proposed Task will focus on the development and application of methods to document greenhouse gas (GHG) mitigation benefits of bioenergy systems.

#### Objectives

1. Promote the sustainable use of biomass and bioenergy through increased understanding of the GHG and other impacts;
2. Improve and modify the ‘standard methodology’ for the calculation of GHG balances based on life-cycle analysis by incorporating new issues, technologies and topics as they appear;
3. Work in cooperation with other IEA Bioenergy Tasks to assess GHG balances of new technologies;
4. Assess and report on best practices in participating countries for reducing GHG emissions using biomass and bioenergy; and
5. Aid decision makers in selecting mitigation strategies that optimise GHG benefits by disseminating the results of the above-mentioned activities.

#### Scope

The Task will continue to work on the GHG impacts of biomass and bioenergy systems but will extend the activities of the previous triennium to:

1. focus on impacts on soil organic carbon and emissions of other GHGs (e.g. N<sub>2</sub>O from fertiliser use);
2. emphasise the use of waste streams (e.g. forest residuals) and improving biomass use efficiency thus minimising the competition for biomass with other uses;
3. include emerging issues such as post-Kyoto climate change negotiations, albedo and other climate forcing, and timing of emissions and removals; and
4. incorporate discussion of non-GHG sustainability impacts.

#### Work programme (examples)

1. Revise the standard methodology for the GHG analysis of bioenergy systems to consider indirect land use change (LUC), albedo and other climate forcing, and timing;
2. Demonstrate the utility of the improved standard methodology by assessing case studies that are of interest to participating countries;
3. Prepare policy papers on key emerging issues; and
4. Hold workshops on topical issues of relevance to participating countries.

#### Deliverables

Case studies, spreadsheets, policy papers, workshops and associated documentation, contributions to annual reports and reports to Executive Committee, inputs into national discussion circles on the topics of the Task.

#### Management

Neil Bird – Task Leader (Interim Task Leader of the previous Task). Annette Cowie - Co-Task Leader. Susanne Woess-Gallasch – assisting Task Management

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<b>Annual budget (gross):</b>	<b>US\$ 116,000</b>
<b>Annual budget per participant:</b>	<b>US\$ 14,500</b>

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**Proposal for a new collaborative Task for the period 2010 - 2012**

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**TABLE OF CONTENTS**

1	INTRODUCTION.....	3
2	OBJECTIVES.....	3
3	WORK SCOPE .....	4
4	PROPOSED WORK PROGRAMME.....	5
	4.1 PRIMARY ACTIVITIES.....	5
	4.2 CASE STUDIES.....	5
	4.3 SECONDARY ACTIVITIES.....	6
	4.4 ONGOING ACTIVITIES.....	6
	4.5 CO-OPERATION WITH OTHER TASKS .....	6
	4.6 CO-OPERATION WITH OTHER INTERNATIONAL PROGRAMMES .....	6
	4.7 MEANS OF COLLABORATION WITHIN THE TASK, AND WITH OTHER TASKS / PROGRAMMES .....	7
	4.8 INDUSTRY INVOLVEMENT .....	7
5	DELIVERABLES .....	7
	5.1 TARGET AUDIENCE (IN ORDER OF IMPORTANCE) .....	7
	5.2 OUTPUT.....	7
	5.3 SCHEDULE AND MILESTONES.....	8
	5.4 DISSEMINATION.....	8
6	ANNUAL BUDGET (IN US\$) .....	8
	6.1 INCOME.....	8
	6.2 EXPENSES .....	8
7	COUNTRY PARTICIPATION.....	9
8	INSTITUTION AND PROPOSED TASK LEADER.....	10
	8.1 SHORT BIOGRAPHIES OF KEY PERSONEL.....	10

# **Greenhouse Gas Balances of Biomass and Bioenergy Systems**

## **Proposal for a new collaborative Task for the period 2010 - 2012**

### **1 INTRODUCTION**

The main drivers for bioenergy are the mitigation of global climate change, the increase in fossil fuel prices and concerns about energy security. The reduction of greenhouse gas (GHG) emissions has become an issue of great international importance: Ever increasing evidence of climate change and its impacts, and the adoption of the Kyoto Protocol and other regional, national, bilateral and multilateral agreements, have greatly increased interest in reducing GHG emissions and enhancing sequestration by natural systems. As a result, many countries have formulated strategies and implementing measures to reduce/offset GHG emissions. These measures include: switching from higher to lower GHG intense energy sources, using renewable energy, improving energy efficiency, and enhancing carbon sequestration in forest and agriculture lands.

In 2013, a new agreement on climate change mitigation may come into force. The negotiations for this agreement will begin at Copenhagen in December 2009. This new agreement may include reducing emissions from deforestation and forest degradation in developing countries.

Bioenergy is seen as an important mitigation option particularly for liquid fuels in transportation since it is a form of renewable energy. Unfortunately, the net mitigation benefits of bioenergy are not always as good as they may seem. There may be direct emissions from converting the land use from the previous system to a system for producing bioenergy feedstocks. As well, there are emissions from farming and forestry operations to produce the feedstock, the transportation of the feedstock to a processing facility, the transformation of the feedstocks to a useful form and utilisation of the fuel for a specific service (heating/cooling, electricity, or transportation). Finally, even if there is no direct land use change, the loss of service (e.g. food or fibre production) provided by the land prior to bioenergy feedstock production may cause emissions from indirect land conversion.

The primary goal of this Task is to assess the greenhouse gas balances of biomass and bioenergy systems and acknowledge the potential for other impacts. This information can be used by decision and policy makers to select bioenergy technologies and strategies that improve greenhouse gas emissions while reducing, or at least being aware of, the potential negative impacts of these technologies. The Task will develop and incorporate new methodologies as required.

### **2 OBJECTIVES**

The proposed Task builds on the achievements of its predecessor Tasks on Greenhouse Gas Balances of Biomass and Bioenergy Systems.

The proposed Task will primarily focus on the development and application of methods to aid the implementation of mitigation projects and programmes. In doing so, the Task will support especially the following six 'objectives and actions' elaborated in the IEA Bioenergy Strategic Plan

- 1: to promote the market deployment of technologies and systems for sustainable energy production from biomass.

- 2: to understand the potential for bioenergy to reduce greenhouse gas (GHG) emissions, and to identify and promote best practice solutions which lead to significant GHG savings.
3. to advise policy and decision makers by providing scientifically sound and politically and commercially independent data and information.
4. to support policy development and deployment in Member Countries, and more widely, by communicating effectively with the relevant IEA bodies, industry, other key stakeholders in the IEA Technology Network, and other interested parties
5. to actively encourage the maintenance and development of networks of participants involved in research, development, demonstration, deployment and education, and to provide for the effective dissemination of information on bioenergy
6. to increase the involvement of industry in IEA Bioenergy
7. to increase membership with emphasis on countries with a significant bioenergy R&D infrastructure and appropriate policies.
8. to increase interactions with other global, multilateral energy and environmental programmes.

Based on the ‘objectives and actions’ and the needs outlined in the introduction, the objectives of the proposed Task are to:

1. Promote the sustainable use of biomass and bioenergy through increased understanding of the GHG and other impacts;
2. Improve and modify the ‘standard methodology’ for the calculation of GHG balances based on life-cycle analysis by incorporating new issues, technologies and topics as they appear;
3. Work in cooperation with other IEA Bioenergy Tasks to assess GHG balances of new technologies;
4. Assess and report on best practices in participating countries for reducing GHG emissions using biomass and bioenergy; and
5. Aid decision makers in selecting mitigation strategies that optimise GHG benefits by disseminating the results of the above-mentioned activities.

### **3 WORK SCOPE**

The Task will continue to work on the GHG impacts of biomass and bioenergy systems but will extend the activities of the previous triennium to:

1. focus on impacts on soil organic carbon and emissions of other GHGs (e.g. N<sub>2</sub>O from fertiliser use);
2. emphasise the use of waste streams (e.g. forest residuals) and improving biomass use efficiency thus minimising the competition for biomass with other uses;
3. include emerging issues such as post-Kyoto climate change negotiations, albedo and other climate forcing, and timing of emissions and removals; and
4. incorporate discussion of non-GHG sustainability impacts.

The Task will continue to cover: the three main greenhouse gases (CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O), emissions, and removals over the entire life cycle of biomass and bioenergy systems, all biomass pools (above and below-ground biomass, dead wood, litter, soils, and wood products in service and in landfills), and fossil fuels as an input to the system being studied. The assessment includes the various stages of a biomass/bioenergy system: land resource conversion, biomass production, transportation, conversion to energy, distribution, and end-use. The assessment is compared with a reference system (usually the business-as-usual activity)

## **4 PROPOSED WORK PROGRAMME**

### **4.1 Primary activities**

The primary activities undertaken by the proposed Task in 2010 - 2012 are:

1. Revise the Task 38 standard methodology to:
  - a. address indirect land-use change including non-CO<sub>2</sub> GHGs and changes in soil organic carbon in a transparent and consistent manner; and
  - b. support the analysis of longer fuel chains which include recycling and cascaded use.
2. Develop a methodology for including the time-value of greenhouse gas emissions and removals and other potential impacts (e.g. albedo) into a new indicator of climate impacts.
3. Develop guidelines for using the improved standard methodology for assessing greenhouse gas (GHG) balances of bioenergy and carbon sequestration systems at a project or activity level.
4. Work towards including an assessment of other non-greenhouse gas impacts in the standard methodology.
5. Demonstrate the utility of the improved standard methodology by assessing case studies that are of interest to participating countries.

In general, a bioenergy system uses land resources to create biomass and sequester carbon; the biomass can be transformed to make products; the product may be used, and reused or recycled to provide other products. Finally, at the end of the cycle, the products can be converted to energy. Given limited land resources, improving biomass use efficiency means cascading the biomass through as many products as possible. In so doing, the possibility of indirect land-use change, through loss of existing service, is minimised.

The result of the primary activities will be published as summary policy briefs, and policy papers that are supported by detailed case studies.

### **4.2 Case Studies**

Subprojects on bioenergy systems that are in the interests of involved countries / industrial participants will be carried out. The Task budget funds a portion of the subproject (up to 20% of total budget depending on participation. See section 6) The contribution covers proper documentation and some data collection and analysis for the case study. The majority of the costs of data collection and analysis are paid by funds external to the Task but leveraged by the Task. Funds will be allocated to subprojects, and individuals or institutions in the participating countries selected for coordination of subprojects, through unanimous decisions by all National Team Leaders. Some projects of particular interest have been identified, and a final selection of the first batch of subprojects will be made by the NTLs at the first Business Meeting of the new Triennium (the second batch will be decided in the following year):

The following potential case studies have already been identified for the period 2010 – 2012:

- Ethanol from sorghum and lignocellulosic feedstocks (Australia)
- Biochar and heat from slaughterhouse wastes (Austria)
- Charcoal production from a cascaded biomass system (Croatia)
- Soil carbon emissions from long term switchgrass cultivation (United States)

Case studies in the following themes are also possible:

- Combined improved forest management and material substitution
- GHG balance for whole tree harvesting, stump harvesting (Task 31 has expressed interest)

### **4.3 Secondary activities**

The Task also has the responsibility to:

1. Advise on matters of short-term interest of participating countries as required by governments and industry; and
2. Advise IEA Bioenergy on the impacts of potential post-2012 UNFCCC negotiations in the Agriculture Forestry and Other Land Use (AFOLU) sector and developments on GHG balances, GHG accounting and bioenergy

### **4.4 Ongoing activities**

In order to fulfil the other general six 'objectives and actions' as elaborated in the IEA Bioenergy Strategic Plan, the Task will undertake the following ongoing activities:

- Annual Task Workshops which communicate results and focus on issues as they arise;
- Maintenance of the Task 38 website
- Special activities according to the short-term needs of participating countries
- Development of specific presentation files, for use by the participating countries, on key topics
- Regular contributions to Newsletters (IEA Bioenergy Newsletter and Newsletters in the participating countries).
- Communication with the IEA Bioenergy Secretariat and the Operating Agent; preparing contributions for the IEA Bioenergy Annual Report, and regular Task progress reports etc. for the Executive Committee Meetings.

### **4.5 Co-operation with other Tasks**

Due to the cross-cutting nature of the issues surrounding biomass and bioenergy, co-operation with other Tasks is very important. Task 38 has worked with in the past, and will continue to collaborate with:

- Task 29: Socio-Economic Drivers in Implementing Bioenergy Projects
- Task 30: Short Rotation Crops for Bioenergy Systems;
- Task 31: Biomass Production for Energy from Sustainable Forestry;
- Task 39: Commercialising 1st and 2nd Generation Liquid Biofuels from Biomass
- Task 40: Sustainable International Bioenergy Trade; and
- Task 42: Biorefineries: Co-production of Fuels, Chemicals, Power and Materials from Biomass

In the future, members of other Tasks will be asked to review case studies and other reports for consistency with their approaches and considerations. Task 38 will pursue opportunities for collaboration. A potential topic for collaboration has already been identified. Task 34 (Douglas C. Elliott) has expressed interest on 'Pyrolysis of biomass and biochar utilisation'.

### **4.6 Co-operation with other international programmes**

As foreseen in Adam Brown's *IEA Bioenergy and GBEP – The Way Forward*; Task 38 will play an important role in cooperating with the GBEP GHG Task Force. In particular, members of Task 38 will;

- Provide feedback on the GBEP GHG LCA Methodological Framework;
- Comment on the use of the aforementioned methodology on case studies; and
- Test its use on some of the existing Task 38 LCA studies.

In addition, participants of Task 38 have been and will continue to be involved with:

- IPCC work on bioenergy and Land-Use, Land-Use Change and Forestry.
- the CDM Executive Board through the afforestation / reforestation working group (ARWG). This group sets the rules for CDM projects; this involvement provides the opportunity for Task 38 to contribute its expertise to the development of CDM rules;
- The Roundtable on Sustainable Biofuels (RSB) work on the sustainability of biofuels;
- Collaboration with the EC (and their institutions involved in Task 38 topics), IEA (and their climate-related working groups) and REWP, the European Forest Institute (EFI), the World Bank, the UNFCCC Secretariat and the UN Food and Agriculture Organisation (FAO).

#### **4.7 Means of collaboration within the Task, and with other Tasks / programmes**

Within the Task, collaboration between NTLs is promoted through:

- Workshops as outlined in the work programme;
- Business Meetings
- E-mail and teleconferencing on specific topics;
- Limited and carefully targeted resourcing of discrete work packages (e.g., software development and distribution, case studies); and
- Special meetings and joint policy papers according to short-term needs / discussions on topical issues.

#### **4.8 Industry involvement**

As a cross-cutting Task, Task 38 has limited direct contact with industry. For the next Triennium Task 38 will consult with both:

- a) Biomass producers (for example, agriculture, pulp and paper); and
- b) Bioenergy producers,

specifically on the design of sustainability standards and the assessment of the GHG balances of specific energy chains.

Task 38 will continue to promote attendance of industry at the Task's annual workshop.

## **5 DELIVERABLES**

### **5.1 Target audience (in order of importance)**

Policy makers (nationally and internationally – e.g. Conference of the Parties to the UN Framework Convention on Climate Change; CDM Executive Board), industry, NGOs, scientists and the interested public.

### **5.2 Output**

The Task will produce:

1. Case studies which will include two components:
  - a. A description of the methodology for the assessment of the net GHG emissions and other impacts from identified case studies; and
  - b. the results of the analysis of the case studies.
2. Policy papers on the following topics:
  - a. Options for incorporating indirect land-use change in LCA of bioenergy systems
  - b. Issues for consideration on the timing of emissions and removals in bioenergy systems; and
  - c. An improved 'standard' methodology for estimating the GHG and other impacts of bioenergy systems;

3. Annual workshops rotating through participating countries on the topic under public attention at the time.
4. The Task 38 website with all presentations and publications.
5. Contributions to IEA Bioenergy publications and consultations.
6. Reports as required by IEA Bioenergy
  - a. Semi-annual reports to the Executive Committee;
  - b. Annual reports of IEA Bioenergy;
  - c. Essential Technologies reports as required
  - d. Final report after completion of the Task;

### 5.3 Schedule and Milestones

Deliverable	Date
Workshops organised by Task 38 (1 per year, 3 in total)	Q 1 annually
Collaborative workshops	
Case Studies (3 in total)	Q 3, 2011 and 2012
Policy Paper 1 – Issues for consideration on the timing of emissions and removals	December 2010
Policy Paper 2 – <i>to be decided based on emerging issues</i>	December 2011
Policy Paper 3 – The improved ‘standard’ methodology	June 2012

*Titles are open for discussion*

One policy paper (*probably paper 1*) will be funded using the ExCo held back funds.

### 5.4 Dissemination

The main instruments for the dissemination of Task output are the annual workshops, and the Task 38 website. Workshops attract a core group of Task participants as well as a number of participants from the country where the workshop is held. The website has also proved to be a very useful way to inform people of Task results, with about 15,000 people visiting the site since its establishment in 1996.

Other avenues include the use of the bioenergy, climate, and forestry mailing lists to ensure Task information is received by a wider group of people. In the future we will also look at issuing targeted press releases to further extend the number of people receiving information about output from the Task.

## 6 ANNUAL BUDGET (IN US\$)

### 6.1 Income

The following budget is assuming the participation of eight countries.

<b>Income</b>			
Contributions	8 participants	\$14,500 per participant	\$116,000
Held back funds	10%		-\$11,600
<b>Net</b>			<b>\$104,400</b>

### 6.2 Expenses

The budget is administered and calculated in Euros, with the exception of subprojects (case studies) which are paid in US Dollars. The budget is distributed approximately as follows:

<b>Expenses</b>	<b>Euros</b>	<b>USD</b>	<b>% of Total</b>
Labour and benefits	€ 33,733	\$50,600	48.5%
Workshops	€ 5,000	\$7,500	7.2%
Travel	€ 4,667	\$7,000	6.7%
Materials, supplies and publications	€ 667	\$1,000	1.0%
Contribution to annual report and newsletters			
Consultants and contracts (case studies)	€ 13,333	\$20,000	19.2%
Overheads	€ 12,200	\$18,300	17.5%
<b>Total</b>	<b>€69,600</b>	<b>\$104,400</b>	<b>100.0%</b>
Exchange rate	1.5 \$/€		

If more countries participate then the increase income will be distributed in the following manner:

<b>Expenses</b>	<b>Distribution of additional income</b>	<b>Budget with additional countries</b>			
		<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
Labour and benefits	18.4%	\$52,996	\$55,392	\$57,788	\$60,184
Workshops	50.0%	\$14,025	\$20,550	\$27,075	\$33,600
Travel	0.0%	\$7,000	\$7,000	\$7,000	\$7,000
Materials, supplies and publications	0.0%	\$1,000	\$1,000	\$1,000	\$1,000
Contribution to annual report and newsletters		\$0	\$0	\$0	\$0
Consultants and contracts (case studies)	25.0%	\$23,263	\$26,525	\$29,788	\$33,050
Overheads	6.6%	\$19,167	\$20,033	\$20,900	\$21,766
<b>Total</b>	<b>100.0%</b>	<b>\$117,450</b>	<b>\$130,500</b>	<b>\$143,550</b>	<b>\$156,600</b>

## 7 COUNTRY PARTICIPATION

The following countries are currently participating in Task 38:

Australia	Finland
Austria	Germany
Belgium	Sweden
Croatia	U.S.A.

At ExCo64, countries that expressed an interest in further participation were:

Australia	Germany
Austria	the Netherlands
Belgium	Sweden
Finland	U.S.A.

Undecided countries were:

Brazil
Croatia
New Zealand
Switzerland

## **8 INSTITUTION AND PROPOSED TASK LEADER**

It is proposed that Task leadership be carried out by Neil Bird with Annette Cowie as Co-Task Leader. Neil is a staff member at the Institute of Energy Research in JOANNEUM RESEARCH. In coordinating the Task, he will utilise resources of this institution and will have access to all means required for this duty (including electronic hardware and software equipment, graphics support, and managerial support). He will have close contact with the Operating Agent, Josef Spitzer. Annette Cowie is based in Australia and will maintain close links with Neil. The Task Leaders will be assisted by Susanne Woess-Gallasch, also at JOANNEUM RESEARCH.

### **8.1 Short biographies of key personnel**

*David Neil Bird* (Neil) joined Joanneum Research in August, 2005 where his main areas of interest and work are: estimation of emissions from bioenergy systems, the influence of changes in surface albedo on environmental benefits of agriculture, forestry and other land-use (AFOLU) projects; evaluation of emission reductions from AFOLU that result from improved land management and use of biomass; methodologies related to reduction in emissions from forest degradation (REDD); and development of unique CDM A/R projects including methodological development where necessary. In May 2007, he was appointed to the Afforestation / Reforestation Working Group of the UNFCCC Secretariat. In October 2007, Mr. Bird became the Task-leader of IEA Bioenergy Task-38.

*Dr Annette Cowie* has a background in soil science, plant nutrition, and a strong interest in sustainable resource management. She leads the New Forests program in NSW Department of Primary Industries' Science and Research Division, which researches environmental services from planted forests, including climate change mitigation, amelioration of dryland salinity and land rehabilitation through use of recycled organics. Her personal research program focuses on greenhouse gas balance of forestry systems for carbon sequestration and production of biomass for bioenergy, soil carbon dynamics, and greenhouse gas accounting for emissions trading. Annette has been the Australian national team leader for Task 38 since Australia joined the Task in 2000. She has been Co-Task Leader since December 2007.

*Susanne Woess-Gallasch* has a Master degree in Geography/Regional Planning and experience in regional and communal energy planning, bioenergy issues and LCA of renewable and fossil energy systems. She has provided assistance to the Task Management since 2001.