SURVEY IN SUPPORT OF PLANNING OF WORK IN WP1 IN THE 2017-2018 PERIOD – RESULTS REPORT

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SURVEY IN SUPPORT OF PLANNING OF WORK IN WP1 IN THE 2017-2018 PERIOD – RESULTS REPORT

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Background

IEA BIOENERGY TASK 43 - OBJECTIVE, SCOPE AND WORK PROGRAMME

IEA Bioenergy Task 43 (the Task) addresses issues critical to mobilizing sustainable bioenergy supply chains, including all aspects of feedstock production, its markets and environmental, social and economic impacts. The objective is to promote bioenergy development that is driven by well-informed landowners, businesses, governments and other stakeholders. The Task has a global scope and includes commercial, near-commercial and promising feedstock production systems in agriculture and forestry. The primary focus of the Task 43 triennium 2016-2018 is set on land use and land management of biomass production systems.

The Work Programme is organized into three work packages:

WP1 - Landscape management and design for bioenergy and the bio-economy;

WP2 - Developing effective supply chains for sustainable bioenergy deployment; and

WP3 - Governance of bioenergy supply chains.

The Task provides stakeholders with timely and topical analysis, syntheses and information related to\biomass feedstock supply. Outreach is especially important and is addressed through workshops, seminars and participation in relevant events which are regularly arranged by the Task. Specific Task studies are conducted to analyze topics identified as important by the National Team Leaders (NTLs) and experts associated with Task 43.

This document focuses on WP1, but the three WPs are inter-connected and the Task activities commonly tackle issues that are significant for several WPs.

WP1: LANDSCAPE MANAGEMENT AND DESIGN FOR BIOENERGY AND THE BIO-ECONOMY

Bioenergy implementation requires strategies for efficient use of biomass from sustainably managed landscapes. Formulating such strategies requires knowledge in how landscape management and land use decisions affect biodiversity and the capacity of ecosystems to provide biomass and other ecosystem services. In human-influenced landscapes, analyses need to consider both historical and current land use since today's landscape is shaped by past practices. Biodiversity preservation may require mimicking natural ecosystems as well as historic land use features in current landscapes.

WP1 aims at supporting landscape management and design for bioenergy and the bio-economy, by expanding the knowledge base required for sustainable expansion of biomass production systems that also contribute positively to biodiversity and the generation of other ecosystem services.

The work takes a landscape level approach to deployment of biomass production for bioenergy and integration of this objective with ownership and societal objectives for existing land use and associated systems.

The focus is on major land-based biomass production systems for bioenergy and other bio-based products, including (i) cropping systems such as willow and poplar short rotation coppice, poplar and oil mallee tree plantations, and grasses (e.g., reed canary grass, switchgrass, Miscanthus); (ii) agriculture by-products such as stover, straw and dung; and (iii) forest biomass including whole trees, logging residues and other by-products associated with forest management

operations. Other biomass production systems, which are currently not common but have shown potential for wider implementation may also be considered.

WP1 address the overarching questions below that are relevant for both agricultural and forestry systems and reflect that agriculture and forestry activities often co- exist and shape the landscape together.

- Which are the most suitable areas for production and extraction of various biomass feedstocks?
- How can biomass feedstock production systems be located, designed and managed to increase resource use efficiency, avoid/mitigate negative and promote positive environmental, economic, and social effects?
- How can outcomes be optimized to meet the goals of individual stakeholders and society as a whole, including environmental, economic, and social goals?
- How can analysis and assessment inform participatory processes engaging landowners, policy makers, and other stakeholders in further developing and re-defining goals and plans for landscape management and designs?

Specific projects and case studies in Task 43 member countries provide an important basis for work in WP1. Studies that evaluate the consequences of different feedstock-related alternatives with regard to effects on stakeholder economy, management systems, social conditions, and various ecosystem services are highly relevant. Data from experimental plots and/or modelling can be used to assess the potential of bioenergy feedstock production systems, which are currently not common.

Feedstock systems and landscapes will be compared with each other and with relevant reference systems, e.g., cultivation of conventional food/feed crops and forest management to produce sawn timber and pulpwood. It is expected that the feedstock alternatives, their location in the landscape, and the needed management systems will vary in how they perform relative to different stakeholder objectives (e.g., biomass yields, economy, nutrient use efficiency, energy efficiency, water quality, soil quality, biodiversity and GHG balances). Comparison with stakeholders' preferences, existing guidelines and regulations will help clarify benefits and trade-offs related to choices and alternatives.

Survey in support of WP1 planning

The purpose of this survey was to collect information about national interests and priorities and also relevant projects, networks, organizations and individuals - in relation to WP1.

The survey was perceived as an opportunity for national task leaders (NTL's) to contribute to the planning of WP1 activities in 2017-2018 and, in this way, ensure that the Task work reflects interests and priorities in the member countries (Australia, Canada, Croatia, Denmark, Finland, Germany, Ireland, the Netherlands, Norway, Sweden, USA, and the European Commission). The survey is also an opportunity for NTL's to solicit participation by other country experts (the "National Team") in Task 43 activities, and to represent relevant work supplied by these experts.

Task 43 will benefit from gaining an improved overview of activities and networks, organizations and individuals in member countries that are relevant to WP1 and that can contribute to the work in the Task. The intention is to update the Task 43 contact list to include new experts from the member countries that can be invited to engage in workshops and other activities organized by Task 43.

The survey was created in July 2016, conducted in the period of August – September 2016 via on-line form and word document. In total, 10 out of 12 NTLs provided responses. Two countries – Canada and Croatia, have conducted a national survey among several stakeholders to reflect

answers of wider group of experts involved in, not only bioenergy, but landscape management and design. In those cases, when more than one input (questionnaire) per a country was given, mode (the most frequent answer) or simple majority was used to aggregate the answer which will be further included in the final analysis. An exception was made for some questions where Canada provided a pair of eligible responses. In these cases, when two different responses were given, both responses were treated individually in the final analysis.

Given the fact that Task 43 members are heterogeneous both by geography (size, demographics, EU, North America, Australia…), economic parameters (GDP, employment, growth rate…), the level of bioenergy market (policy, supply, potential, energy mix), mode or the most frequent answer was chosen as an evaluation criteria at the survey. The arithmetic mean or average would lead to false conclusions given the diversity of the survey participants and large probability of having significant divergence in answers. Yet, whenever applicable, both parameters were calculated to offset the mode results.

The survey was organized in four sections:

1. Networking and expanding the research capacity
2. The level of interest among stakeholders to include bioenergy in landscape management and design
3. Information and preferences concerning feedstock options
4. Economic, social and environmental challenges that might be met with bioenergy ecosystem services

Section one used an open questionnaire intended to collect information on specific projects, research groups and individuals relevant to Task 43.

This report focuses on results from sections 2 to 4. The report was presented and discussed in a workshop held at University of British Columbia, Vancouver, on 21st September 2016.The full survey results are presented in Annex 1.

Survey outcomes

The Survey was structured in two parts: Section 1 and Sections 2-4. Section 1 was intended to broaden the research network in support of the Task 43 priority of integrating bioenergy in landscape management and design. It was structured as an open question in which NTLs were asked to provide a list or highlight activities in relation to the topic. Sections 2-4 consisted of a combination of close type questions with either single or multiple-choice responses..

RESULTS ON SECTION 1

Section 1 - Networking and expanding the research capacity has highlighted several on-going long-term **programme/projects** related to the Task 43 area. Examples include:

- Dry land salinity management with oil mallee, Australia[1]
- Future Forests and AquaAgri, Sweden[2]
- Research programs administered by USDA and USDOE, USA[3]

[1] Planting integrated woody crops with wheat to ensure there is not production loss due to rising sailine water tables

[2] More details at http://www.slu.se/en/Collaborative-Centres-and-Projects/future-forests http://www.aquaagri.se

- SEA for Forest Management Plan 2016-2025, Croatia[4]
- Sectoral Impacts on Biodiversity and Ecosystem Services - SIMBIOSYS project, Ireland[5]

As some countries have an extensive list of on-going projects, it has been decided to contact NTLs on specific topics and request their o recommendation as to the appropriate research networks.

The same was decided concerning experts and organizations (in addition to the NTLs home organizations) that were identified in the survey. Bioenergy is a topic that attracts many organizations that are more or less involved in activities that concern the integration of bioenergy systems in landscape management and design.

Task 43 will continue to expand the research network by inviting additional organizations and experts to engage in workshops and activities organized by the Task.

RESULTS ON SECTIONS 2-4

Section 2: The level of interest to include bioenergy in landscape management and design and stakeholders

The goal of Section 2 was **to detect the level of interest and/or advancement, within governments and among other stakeholders in Task 43 member countries, concerning landscape management and design, in relation to their support of bioenergy development** (Q 2.1). The development of landscape management systems that can supply biomass along with a range of other ecosystem services has been identified an important challenge along society's path towards a bio-based economy.

Four, mutually exclusive answers to Q 2.1 were provided:

LOWER: no/little interest within governments in developing synergies between bioenergy promotion and the promotion of systems for biomass production in landscapes that generate multiple ecosystem services and support biodiversity. Bioenergy promotion is not viewed as a possibility to address negative impacts of the existing land use. There is also limited capacity or attention from stakeholders to the concept landscape management and design.

MIDDLE: there is some interest in developing synergies between bioenergy promotion and the promotion of systems for biomass production in landscapes that generate multiple ecosystem services and support biodiversity. However, this interest is mostly manifested in the form of exploratory governmental publications and university research. There is currently relatively little interest/capacity and involvement of landowners and other stakeholders along supply chains. Possibly a few pioneering "demo" projects.

MIDDLE to HIGHER: there is a clear interest in developing synergies between bioenergy promotion and the promotion of systems for biomass production in landscapes that generate multiple ecosystem services and support biodiversity. The landscape level perspective is well established and governance systems are discussed concerning possible needs for revision to

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[3] More details at http://www.fs.fed.us/research/biomass-bioenergy, http://www.fs.fed.us/research/biomass-bioenergy, http://www.ars.usda.gov/research/programs/programs.htm?NP_CODE=213, https://nifa.usda.gov/topic/bioenergy, http://www.energy.gov/eere/bioenergy/bioenergy-technologies-office

[4] Fundament for sustainable deployment of forests, based on traditional Croatian forest school principals, and evaluation of other functions of the forests, e.g. ecosystem services; in the line with FSC

[5] More details at https://www.tcd.ie/research/simbiosys/

reflect this perspective. Significant stakeholder involvement and interest / initiatives to integrate new aspects of land use and biomass production into existing "traditional" land uses in agriculture and forestry.

HIGHER: there are ongoing activities (e.g., revisions of regulations, incentives, info campaigns) intending to establish favourable conditions for landscape management and design, i.e., biomass production for energy, food and other purposes in landscapes that generate multiple ecosystem services and support biodiversity. There is also involvement of most, if not all, stakeholders.

Denmark and Sweden have appraised the governments' involvement "middle to higher" while Australia and the US were on the other extreme, marking the interest of their stakeholders to support bioenergy development along landscape management and design, as "lower". Most countries settled at the "middle" (Figure 1).

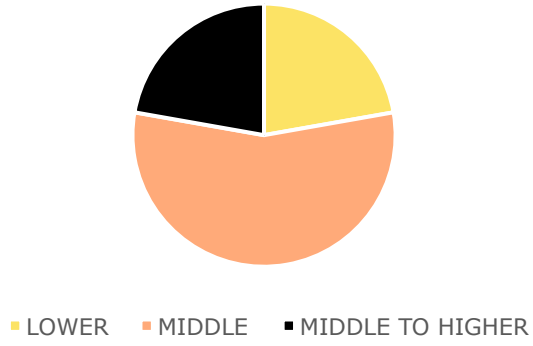

Figure 1 Outcome of the question 2.1. in relation to the interest and/or advancement of stakeholders in supporting bioenergy development along landscape management and design

Bioenergy feedstock supply source could originate both from agriculture and forestry. The next question (2.2) was **to identify which bioenergy supply source was considered as more advanced towards an integrated landscape management and design**. Most Task 43 NTLs classified "forestry" as the more advanced bioenergy supply source, but several considered forestry and agriculture as equally advanced. Australia was the only country that considered "agriculture" to be more advanced than the "forestry" sector towards an integrated landscape management and design. (Figure 2).

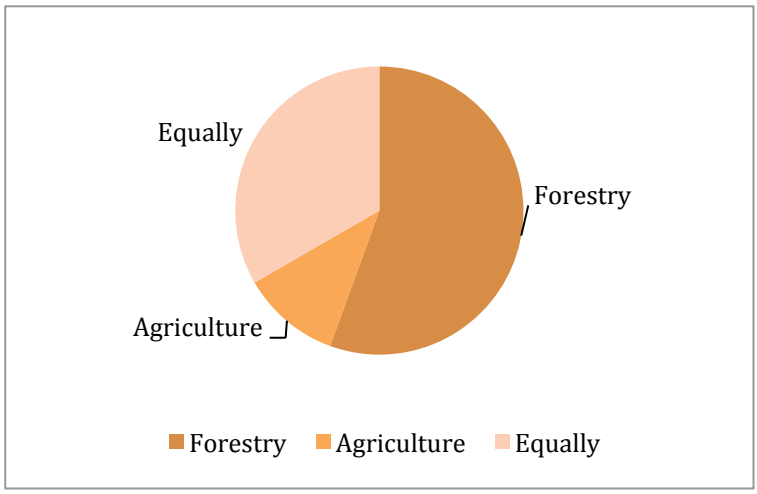

Figure 2 Outcome of the question 2.2 to identify which bioenergy supply source would be graded as more advanced towards an integrated landscape management and design

The following question (Q2.3) aimed **to identify the driving forces within stakeholders groups in relation to their efforts towards integration of bioenergy systems in landscape management and design**. The responses were processed both as arithmetic mean (average) and mode to indicate skewness of responses (Figure 3). In general, the more uniform the responses, the closer together are average and mode. Four stakeholder groups were found to be equally as more advanced than the others in terms of integration of bioenergy supply within landscape management and design: (1) Bioenergy and business community, (2) Biomass producers, (3) Scientific/research community and (4) Bioenergy users/consumers.

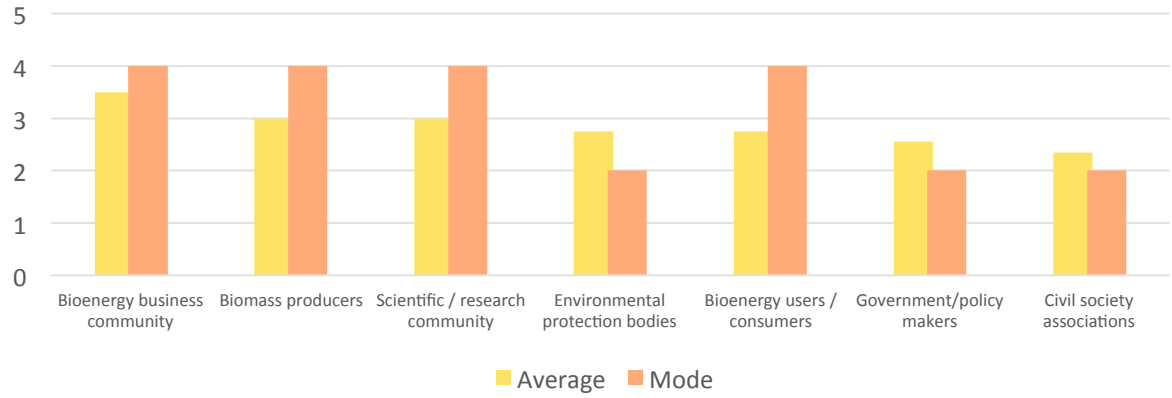

Figure 3 Evaluation of stakeholders group in relation to their efforts towards integration of bioenergy systems in landscape management and design (Q 2.3)

Further, the NTLs were asked to rank five aspects for better inclusion of bioenergy into landscape management and design. The results are presented in the

Table *1*, where 1 and 5 represent the most and least important, respectively. This question provides focus as it is not possible to address all aspects for better inclusion at once.

Table 1 Ranking of aspects for better inclusion of bioenergy into landscape management and design

Rank	Issue	Average	Mode
1	Interest in landscape management and design and how integration of bioenergy feedstock production into existing land uses can help address challenges (e.g., soil erosion and land degradation, eutrophication, groundwater quality impacts, fire risks…)	3.9	5
2	Dialogue between different types of stakeholders	3.8	5
3	Knowledge about the topic within civil society institutions (e.g., church, NGOs)	3.8	4

4	Knowledge / interest in bioenergy in general	2.9	3
5	Involvement of the scientific/research community	3.1	2

Section 3: Information and preferences concerning feedstock options

This section had two closed type questions and two open type questions. The aim of the first two questions was **to identify the perception and preferences concerning bioenergy feedstock supply, in relation to the energy market demand (biofuels, heating & cooling, electricity, process fuels & processing, biorefinery)**. There were not much variations in responses to these two question as shown in Figure 4, Figure 5 and Figure 6. In question Q3.1, Task NTLs were asked to indicate the position on bioenergy supply in their respective countries, relative to the different energy markets. Only single answers were allowed.

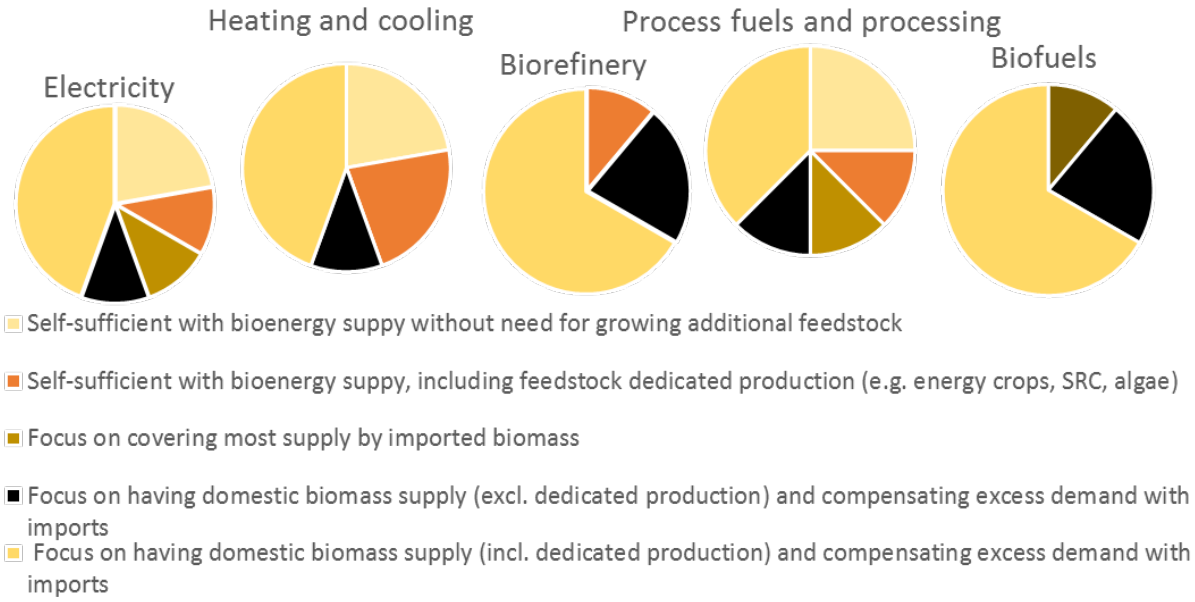

Figure 4 Bioenergy supply preferences as expressed by the Task 43 NTLs (Q3.1).

Question Q3.2 investigated **if there were any expressed preferences concerning feedstocks in countries, e.g., incentives for specific feedstocks or exclusion of feedstocks from eligibility lists.** Multiple answers were allowed. The options included (i) specification of geographical regions from which feedstock could originate (EU; Commonwealth of Independent States (excl. Baltic States that belongs to EU); Middle East and North Africa; Sub-Saharan Africa; East Asia; South Asia; Oceania; Caribbean and Latin America; North America); (ii) "No geographical preferences"; (iii) "Sustainability aspects to be considered"; and (iv) "Other supply, please specify".

There was a different distribution of answers for biofuels than for the other potential bioenergy markets; the region "Caribbean and Latin America" was included among preferred regions (Figure 5). Yet, for all markets, consideration of sustainability aspects was in general more important than geographical region (Figure 5 and Figure 6).

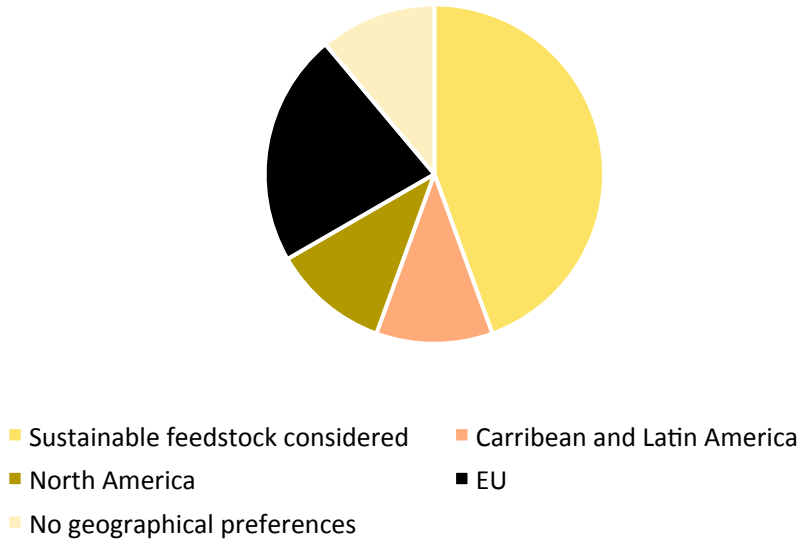

Figure 5 Preferences concerning feedstocks among NTLs (Q3.2) - biofuels

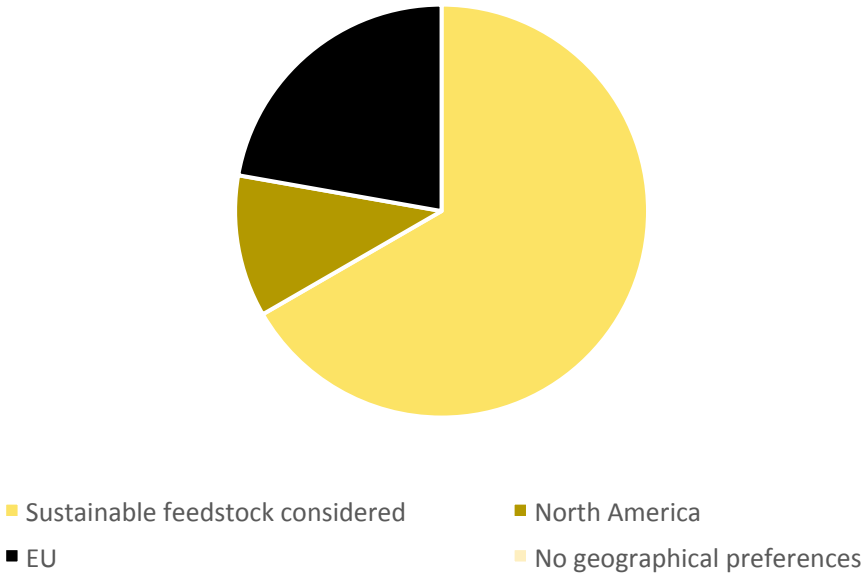

Figure 6 Preferences concerning feedstocks among NTLs (Q3.2) – all other bioenergy markets (heating & cooling, electricity, process fuel & industries, biorefineries), excluding biofuels

The next two questions were open type where NTLs could express their experiences concerning views on feedstocks, e.g. whether a certain biomass feedstock is perceived as desirable or not (e.g. considered to be risky from a market or company reputation perspective).

The answers to Q3.3 **Do producers of bioenergy and other biobased products consider certain feedstocks non-desirable?** gravitated towards lack of (proven) sustainability, if not explicitly stated. Stumps, wood from "native forests", "contaminated" biomass such as wood waste, sewage sludge, biowaste, and food crops were identified as risky from market or company reputation perspective.

Wood, forestry materials and wood waste from pulp &paper and wood processing industries for solid biomass were the most cited as **feedstock types dominating in NTLs' countries due to**

dominance of specific industry activities (Q3.4). Straw, grass, maize, sugar cane, bagasse, used cooking oil, canola, palm oil and sugar beet were listed as dominating feedstock but either with less repetition than wood type feedstock or single entry. Sugar beet has been cited as another major crop, feeding into food production but, in the Netherlands, increasingly also to biobased materials (biopolymers).

Section 4. Economic, social and environmental challenges that might be met with bioenergy ecosystem services

This section concerns existing landscape management and design activities that may be likely to embrace production of bioenergy feedstock in strategies for the promotion of landscape management and design approaches to developing biomass supply chains.

NTLs were invited to **identify up to five challenges** among 20 listed that would be in focus in their countries **if bioenergy promotion is considered an option to address various environmental and landscape management challenges, besides producing biomass for energy** (Q.4.1). Besides the obtained ranking (Table 2), an interesting input was added under "Others": reducing costs of landscape management, a challenge that was missed to be listed.

Table 2 Ranking of challenges to be addressed besides producing biomass for energy (Q4.1)

Rank	Challenge	Votes/10
1	Making economic use of marginal farmland	7
	Transition to low carbon economy	7
2	Creating additional income opportunity	6
3	Avoiding groundwater pollution	5
	Reducing fire risks in landscapes	5
	Promoting biodiversity	5
4	Reducing eutrophication	4
	Improving life standard in rural community	4
	Carbon capture and storage	4
5	Controlling surface water flows	3
	Preventing rural population exodus	3
6	Economizing silviculture benefiting other product output, e.g., saw timber	2
7	Preventing soil compaction	1
	Controlling erosion	1
	Managing soil salinity	1
	Remediating polluted soils	1
	Mitigating desertification	1
	Economizing salvage logging	1
	Increasing property values	1
8	Improving game potential	0

In the following question (Q4.2) the same challenges were considered as in the Q4.1 but with a different perspective: **the relative importance of relating to specific challenges when promoting landscape management and design, compared to biomass demand for energy.** The results (average and mode) indicate differences among countries (Table 3). Several challenges (e.g. "Reducing fire risks in landscapes" and "Economizing silviculture benefiting other product output, e.g. saw timber", "Economizing salvage logging") were ranked significantly lower as average than as mode. This means that such challenges are of high importance in most of the countries, but of minor importance in some countries. The challenge "Carbon capture and storage (in soil and vegetation)" had a higher average score than mode, which means that it was ranked as highly important in a minority of countries while most countries considered it to be of lower importance.

Table 3 The relative importance of specific challenges when promoting landscape management and design, compared to biomass demand for energy

Rank	Challenge	Average	Mode
1	Reducing fire risks in landscapes	3	5
	Transition to low carbon economy	4.4	5
2	Economizing silviculture benefiting other product output, e.g., saw timber	2.95	4
	Promoting biodiversity	3.7	4
	Economizing salvage logging	2.8	4
	Preventing rural population exodus	3.2	4
	Improving life standard in rural community	3.7	4
	Creating additional income opportunity	3.7	4
3	Reducing eutrophication	2.75	3
	Avoiding groundwater pollution	3.45	3
	Controlling surface water flows	2.4	3
	Preventing soil compaction	2.5	3
	Controlling erosion	2.8	3
	Remediating polluted soils	2.9	3
	Making economic use of marginal farmland	3.3	3
	Increasing property values	2.7	3
	Improving game potential	2.25	3
	Carbon capture and storage (In soil and vegetation)	3.6	3
4	Managing soil salinity	2.3	1
	Mitigating desertification	1.85	1

Conclusions

Section 2: The level of interest to include bioenergy in landscape management and design (LM&D) and stakeholders

- Roughly half (56%) of the T43 countries assessed the interest to include bioenergy in LM&D as "middle" while the same portion (22%) was attributed to "higher" and "lower" value from the middle.
- Denmark and Sweden are having the advantage in efforts to include bioenergy in LM&D, yet there is still work to be done to bring the attention of the stakeholders how bioenergy can do much more for LM&D. In other countries, such as Australia and the USA, there seems to be less interest in including bioenergy in LM&D.
- The forestry sector was considered as more advanced towards an integrated LM&D (56%). One third has identified both agriculture and forestry (33%) as more advanced concept towards integrated LM&D. It is necessary to promote bioenergy development more in the agriculture sector since a major share of the biomass supply tends to come from agriculture in scenarios meeting the <2°C goal. Australia was the only country that considered "agriculture" to be more advanced than the "forestry" sector towards an integrated LM&D.
- The driving forces within stakeholders groups in relation to their efforts towards integration of bioenergy systems in LM&D are detected as (1) Bioenergy and business community, (2) Biomass producers, (3) Scientific/research community and (4) Bioenergy users/consumers.
- Efforts to promote approaches including bioenergy in LM&D need to target the „opinion makers": governments and civil society.
- Environmental protection bodies need to better informed about bioenergy options within LM&D.
- Three top priorities surfaced on how to increase inclusion of bioenergy in LM&D:
    - Rising interest in LM&D and how integration of bioenergy feedstock production into existing land uses can help address many challenges (e.g., soil erosion and land degradation, eutrophication, groundwater quality impacts, fire risks…) (3.9/5)
    - Promote dialogue between different types of stakeholders (3.8/5)
    - Increasing knowledge about the topic within civil society institutions (e.g., church, NGOs) (3.8/5)

Section 3: Information and preferences concerning feedstock options

- This section provided more uniformed answers in general:

1. Focus is placed primarily on domestic biomass supply (incl. dedicated production) and meeting excess demand with imports
2. Sustainability criteria are key for acceptance of bioenergy feedstocks. Country of origin is less important. The answers on open question have gravitated towards the three type of answers:
    - Sustainability issues are also of critical importance for biobased industries.
    - There is a tendency that „controversial" feedstocks are avoided
    - Wood and wood residues remain the most available feedstock.

Section 4: Economic, social and environmental challenges that might be met with bioenergy ecosystem services

The top economic, social and environmental challenges identified are:

1. Making economic use of marginal farmland
2. Transition to low carbon economy
3. Creating additional income opportunity
4. Avoiding groundwater pollution
5. Reducing fire risks in landscapes
6. Promoting biodiversity

As can be seen, four of these top challenges (2, 4, 5, and 6) relate to environmental issues and three (1, 2 and 3) relate to economic issues, which may also have high social relevance. Economic challenges were higher ranked than environmental challenges.

The specific challenges when promoting LM&D, compared to biomass demand for energy were considered as important if average score was above 3 and mode answer was either 5 or 4. The challenges were ranked in clusters as following:

- The most relative importance is given to challenges that obtained high scores in both average (>3) and mode (5 and 4) evaluation:

1. Transition to low carbon economy
2. Promoting biodiversity
3. Improving life standard in rural community
4. Creating additional income opportunity

This cluster of challenges includes all three dimensions of sustainability: environmental (challenge 1 and 2), economic (challenge 1, 4) and social (challenge 3 and 4) challenges.

- The next cluster of challenges with high relative importance is comprised from challenges that had the higher mode score than the average score.

1. Reducing fire risks in landscapes
2. Economizing silviculture benefiting other product output, e.g., saw timber
3. Economizing salvage logging
4. Preventing rural population exodus

This cluster of challenges also included all three dimensions of sustainability: environmental (challenge 1), economic (challenge 2 and 3) and social (challenge 4).

The only challenge that gained a higher average score (3.6) than the mode (3) score was "Carbon capture and storage (in soil and vegetation)".

The overall conclusion is that the integration of bioenergy systems in LM&D is not fully recognized neither as a potential bioenergy supply chain nor as a concept which highlights the importance in investing more efforts in raising awareness and promoting existing practice worldwide.

APPENDICES

SURVEY FORM

1. Programs, projects, networks, organizations and individuals in the country that are associated with activities addressing landscape management and design.

1.1. Please list programs/projects/networks (and related information) in your country that you judge are relevant in relation to the WP1 scope.

Just copy-paste if you need more tables.

Name	
Website	
Focus area	
Funding / responsible	
Duration	
Involved organizations	
Lead persons*	
Key experts**	

* Lead expert(s) is/are the official lead of the activity

**Key expert(s) is/are expert(s) that, in your opinion, are carrying the activity

Name	
Website	
Focus area	
Funding / responsible	
Duration	
Involved organizations	
Lead persons*	
Key experts**	

* Lead expert(s) is/are the official lead of the activity

**Key expert(s) is/are expert(s) that, in your opinion, are carrying the activity

Name	
Website	
Focus area	
Funding / responsible	
Duration	
Involved organizations	
Lead persons*	
Key experts**	

* Lead expert(s) is/are the official lead of the activity

**Key expert(s) is/are expert(s) that, in your opinion, are carrying the activity

2. The level of interest to include bioenergy in landscape management and design and stakeholders - A challenge along society's path towards a bio-based economy is to develop landscape management systems that can supply biomass along with a range of other ecosystem services.

2.1. How would you describe the interest/advancement within your government and among other stakeholders concerning landscape management and design, in relation to them supporting bioenergy development?

Please, select only one option below.

Lower: no/little interest within governments in developing synergies between bioenergy promotion and the promotion of systems for biomass production in landscapes that generate multiple ecosystem services and support biodiversity. Bioenergy promotion is not viewed as a possibility to address negative impacts of the existing land use. There is also limited capacity or attention from stakeholders to the concept landscape management and design.

Middle: there is some interest in developing synergies between bioenergy promotion and the promotion of systems for biomass production in landscapes that generate multiple ecosystem services and support biodiversity. However, this interest is mostly manifested in the form of exploratory governmental publications and university research. There is currently relatively little interest/capacity and involvement of landowners and other stakeholders along supply chains. Possibly a few pioneering "demo" projects.

Middle to Higher: there is a clear interest in developing synergies between bioenergy promotion and the promotion of systems for biomass production in landscapes that generate multiple ecosystem services and support biodiversity. The landscape level perspective is well established and governance systems are discussed concerning possible needs for revision to reflect this perspective. Significant stakeholder involvement and interest / initiatives to integrate new aspects of land use and biomass production into existing "traditional" land uses in agriculture and forestry.

Higher: there are ongoing activities (e.g., revisions of regulations, incentives, info campaigns) intending to establish favourable conditions for landscape management and design, i.e., biomass production for energy, food and other purposes in landscapes that generate multiple ecosystem services and support biodiversity. There is also involvement of most, if not all, stakeholders.

2.2. Which bioenergy supply source would you grade as more advanced towards an integrated landscape management and design?

- Forestry
- Agriculture
- Both forestry and agriculture are equally advanced
- Add other: _____

2.3. Please evaluate 1 to 5 (5 being the highest) each group of stakeholders in relation to their efforts towards integration of bioenergy issues in landscape management and design.

Stakeholder group	1 – lowest	2	3	4	5- highest
Government/policy makers					
Biomass producers					
Bioenergy business community					
Bioenergy users /consumers					
Environmental protection bodies					
Civil society associations					
Scientific / research community					

2.4. Below are listed 5 aspects for better inclusion of bioenergy into landscape management and design. It is not possible to address them all at once and we need you to rank them according to the priority for your country.

Please rank 1 to 5, 1 being the most important

Rank	Issue
	Knowledge / interest in bioenergy in general
	Interest in landscape management and design and how integration of bioenergy feedstock production into existing land uses can help address challenges (e.g., soil erosion and land degradation, eutrophication, groundwater quality impacts, fire risks,)
	Dialogue between different types of stakeholders
	Knowledge about the topic within civil society institutions (e.g., church, NGOs)
	Involvement of the scientific/research community

Did we miss any important aspects?

3. Information and preferences concerning feedstock options

3.1. How would you position your country's bioenergy supply (column) with market preferences (row)?

Multiple answers per bioenergy demand are not accepted.

Supply	Biofuels	Heating & cooling	Electricity	Process fuel in industries	Biorefineries
Self-sufficient with bioenergy supply without need for growing additional feedstock					
Self-sufficient with bioenergy supply, including feedstock dedicated production (e.g. energy crops, SRC, algae)					
Focus on having domestic biomass supply (excl. dedicated production) and compensating excess demand with imports					
Focus on having domestic biomass supply (incl. dedicated production) and compensating excess demand with imports					
Focus on covering most supply by imported biomass					
Other supply, please specify					

3.2. 2. Are there any expressed preferences concerning feedstocks in your country, e.g., incentives for specific feedstocks or exclusion of feedstocks from eligibility lists?

Multiple answers per bioenergy demand are accepted.

	Biofuels	Heating & cooling	Electricity	Process fuel in industries	Biorefineries
EU					
Commonwealth of Independent States (excl. Baltic States)					
Middle East and North Africa					
Sub-Saharan Africa					
East Asia					
South Asia					
Oceania					
Caribbean and Latin America					
North America					
No geographical preferences					
Sustainable feedstock considered					
Other supply, please specify					

3.3. Do producers of bioenergy and other biobased products consider certain feedstocks non-desireable (e.g. considered to be risky from a market or company reputation perspective)?

- *See also question 4 below, but welcome to elaborate here*

3.4. Are certain feedstock types dominating in your country due to dominance of specific industry activities?

- *For example, pulp and paper production, meat and dairy production*

4. Economic, social and environmental challenges that might be met with bioenergy ecosystem services - Strategies for promotion of landscape management and design approaches to developing biomass supply chains.

4.1. 1.If bioenergy promotion is considered an option to address various environmental and landscape management challenges, besides producing biomass for energy, which challenges would be in focus in your country (select 5 out of 20)?

Challenge	Focus (mark up to 5 challenges)
Reducing eutrophication	
Avoiding groundwater pollution	
Controlling surface water flows	
Preventing soil compaction	
Controlling erosion	
Managing soil salinity	
Remediating polluted soils	
Mitigating desertification	
Making economic use of marginal farmland	
Reducing fire risks in landscapes	
Economizing silviculture benefiting other product output, e.g., saw timber	
Promoting biodiversity	
Economizing salvage logging	
Preventing rural population exodus	
Increasing property values	
Improving game potential	
Improving life standard in rural community	
Creating additional income opportunity	
Carbon capture and storage	
Transition to low carbon economy	
Other, please specify	

4.2. Please, indicate the relative importance of relating to specific challenges when promoting landscape management and design, compared to biomass demand for energy?

Challenge	Relative importance					
	0: Low importance of challenge	1	2	3	4	5: High importance of challenge
Reducing eutrophication						
Avoiding groundwater pollution						
Controlling surface water flows						
Preventing soil compaction						
Controlling erosion						
Managing soil salinity						
Remediating polluted soils						
Mitigating desertification						
Making economic use of marginal farmland						
Reducing fire risks in landscapes						
Economizing silviculture benefiting other product output, e.g., saw timber						
Promoting biodiversity						
Economizing salvage logging						
Preventing rural population exodus						
Increasing property values						
Improving game potential						
Improving life standard in rural community						
Creating additional income opportunity						
Carbon capture and storage						
Transition to low carbon economy						
Other, please specify						

4.3. What is the country assessed in the questionnaire?

Thank you for improving our work with your feedback!

IEA Bioenergy

Further Information

IEA Bioenergy Website

www.task43.ieabioenergy.com
www.ieabioenergy.com

Contact us:
www.ieabioenergy.com/contact-us/