

# **Attribution of impacts to bioenergy production and use for the implementation of the GBEP Sustainability Indicators for Bioenergy (GSI)**

## **Technical Paper for the GBEP Task Force on Sustainability**

**- DRAFT OUTLINE -**

**prepared for**



**prepared by**

Horst Fehrenbach, ifeu

Uwe R. Fritsche, Scientific Director, IINAS

Ulrike Eppler, Research Fellow, IINAS

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## Background

The GBEP Task Force on Sustainability (TFS) was reopened in May 2015 with a new scope of work agreed by the GBEP Partners, with the focus to enhance the practicality of the GBEP Sustainability Indicators for Bioenergy (GSI) by producing an implementation guide to complement the “Global Bioenergy Partnership Sustainability Indicators for Bioenergy” report. The Working Group on Capacity Building (WGCB) - more precisely the Activity Group 2 of the WGCB – has started to analyse the need for action and to set up a first scope of work for the TFS, elaborating a list of specific working items. This list includes a number of cross-cutting issues, which shall be handled with priority.

One of these issues, which was raised by almost all of the GSI implementation projects executed, is: how impacts measured by the GSI should be attributed to bioenergy production and use.

During the 13<sup>th</sup> Meeting of the TFS it was agreed that a technical paper on attribution should be prepared to provide basic information about this complex matter in order to shed light on the implications of this topic and to give recommendations on how to develop guidance for practical application.

## Purpose of this Draft Outline and Next Steps

This **outline** gives an overview of issues to be addressed in the paper, and introduces first thoughts on the content.

The Technical Paper will be further developed after the 2016 GBEP meetings in Rome, with the aim to continue the discussion in a cross-cutting manner throughout the three TFS sub-groups (Environmental, Social and Economic). A workshop will be scheduled at a later date (tentatively back-to-back with the GBEP regular meeting or in Bonn, Germany).

## Acknowledgements

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Any error, misconception or omission remains the responsibility of the authors.

# **1 The attribution issue**

## **1.1 Why do we have this issue?**

Besides the generation of renewable energy, biomass could serve to several competitive scopes: it could be harvested and being used as food, feed or building materials. Bioenergy production demands just a (mostly small) share of the total amount of biomass produced within a country. Actually, the final uses of biomass are not always defined in advance and its final allocation depends on several factors (i.e. seasonal weather conditions, market price, etc.) linked to spatial and temporal contexts.

When focusing solely on bioenergy, a distinction must be made that does not exist in reality. Thus, measuring sustainability indicators for bioenergy (at least the level of feedstock production) means measuring the indicators for the total feedstock production at large.

There would be no “attribution problem” if the goal was not just to measure and evaluate the sustainability of bioenergy, but also for other agricultural products. The attribution problem results from a segregated view of production and markets which share identical impacts.

Consequently, the attribution problem would cease to exist if equal sustainability requirements were asked for all products, regardless of their final destination/use.

This ambitious goal might be achieved, step by step, through the extension of the scope of bioenergy towards bioeconomy, including also the food and building sectors. However this will take time – thus we need practical guidance to tackle the attribution issue at hand.

## **1.2 The core of the issue in a nutshell**

As mentioned before, bioenergy feedstock production is generally embedded in cropping. At national level the actual locally determined origins of bioenergy feedstock remains unknown. Even if there was sufficient information at local level (i.e. farm, village) an inquiry would be excessively laborious and connected with undue workload.

With that central lack of knowledge we consequently fail to know about:

- applied soil management practices (inputs needed – applied fertilizers, irrigation distributed, mechanization level, manpower);
- production area and, consequently, the impacts caused by transporting biomass to its final destination;

- The environmental conditions of the actual production sites – soil characteristics, weather conditions, affected waterbodies;
- In case of woodfuel: origin of wood – natural forest or planted forest; sustainability of forest management practices;
- (to be further developed)

As given in Figure 1, “reality” about bioenergy production can only be approached by averaging applied parameters which are meaningful in the sense of the respective GSI.

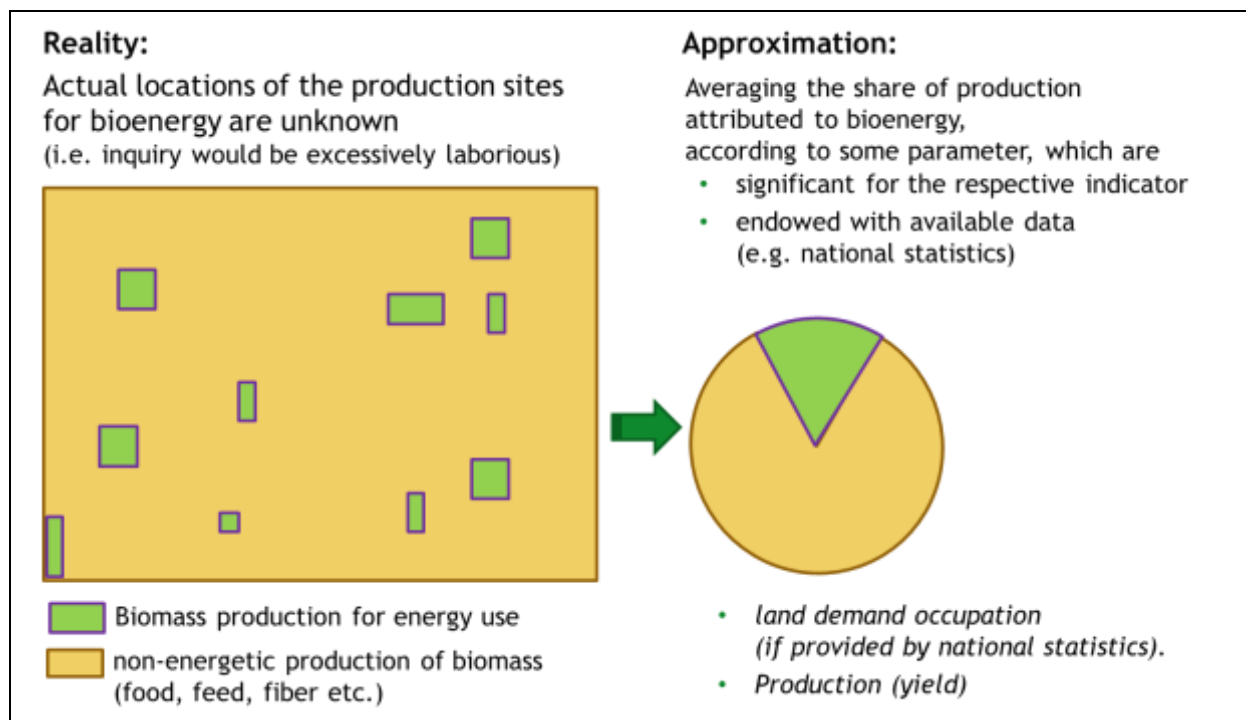


Figure 1 The need to approach reality by averaging and applying adequate parameters

### 1.3 General approaches from experience

In fact, attribution of environmental or economic effects by a production system to segregated markets is not a new challenge. There are many published examinations of this topic or at least with familiar issues.

Task of this section: provide a sufficient overview on established approaches available

- ➔ Examples available from the literature (see Annex 1)
- ➔ Most utilized allocation rules (mass, energy content, market prices ...)

## 2 Lessons learned from GSIs implementation projects: How GSI implementation projects handled the attribution issue

Fourteen GBEP partners or observers have performed or started to perform the measurement of the GSI at national or subnational level, while six further countries have committed to start implementing the measurement (See Table 1). Under AG 2 of the WGCB templates have been worked out to characterize and document the outcome of each of the accomplished implementation projects.

These templates contain also a list of the most frequent problem/difficulties tackled while measuring the indicators and a series of possible ways to handle each identified issue.

This table for the countries who have implemented the GSI will be analyzed.

COUNTRIES	COMPLETED	IN PROGRESS	PLANNED
Argentina	N		
Brazil	L		
China			L
Colombia	N		
Egypt	L		
Ethiopia			N
Germany	N1	N2	
Ghana	N		
India			N
Indonesia	N		
Italy			L
Jamaica	N		
Japan	L		
Kenya			N
Netherlands	N		
Paraguay		N	
USA		N	
Sudan			L
Uruguay		N	
Vietnam		N	

*Table 1 Overview of the implementation of GSI.*

Task of this section: provide the major conclusions from the GSI implementation projects according to attribution

### **3 How the measurement of GBIs are affected by the attribution issue: assessing the variability**

Task of this section: indicator by indicator analyzing the relevance of attribution and which approaches to solve attribution are considered to be appropriate.

#### **3.1 Environmental Pillar**

##### **3.1.1 GHG emissions**

- Are default values applied or actual emissions
- Actual values based on average situations or locally

#### **3.2 Social Pillar**

#### **3.3 Economic Pillar**

### **4 Recommendation for practical guidance**

This section will consolidate the conclusions from the previous ones in order to formulate a comprehensible guidance on useful and good practice approaches to handle attribution.

## Annex 1

- 1) "Impacts of biofuels on climate change, water use and land change" by Mark A. Delucchi
  - a. URL: <https://fas.org/pubs/pir/2011summer/Summer2011-ImpactsofBiofuelsHires.pdf>
- 2) "Measuring the impacts of bioenergy production on food security: summary of discussion no. 60" by the Food and Agriculture Organization of the United Nations
  - a. URL: [http://www.fao.org/fsnforum/sites/default/files/file/60\\_bioenergy/SUMMARY\\_60\\_Bioenergy\\_EN.pdf](http://www.fao.org/fsnforum/sites/default/files/file/60_bioenergy/SUMMARY_60_Bioenergy_EN.pdf)
- 3) "Incorporating bioenergy into sustainable landscape designs" by Virginia Dale et al.
  - a. URL: <http://www.sciencedirect.com/science/article/pii/S1364032115014215>
- 4) "Bioenergy production and sustainable development: science base for policymaking remains limited" by Carmenza Robledo-Abad et al.
  - a. URL: <http://onlinelibrary.wiley.com/doi/10.1111/gcbb.12338/full>
- 5) "Measuring and moderating the water resource impact of biofuel production" by Kevin Fingerma
  - a. URL: [http://digitalassets.lib.berkeley.edu/etd/ucb/text/Fingerma\\_berkeley\\_0028E\\_12330.pdf](http://digitalassets.lib.berkeley.edu/etd/ucb/text/Fingerma_berkeley_0028E_12330.pdf)
- 6) "Global climate impacts on forest bioenergy: what, when and how to measure?" by Francesco Cherubini, Ryan M Bright and Anders H Strømman
  - a. URL: <http://iopscience.iop.org/article/10.1088/1748-9326/8/1/014049/meta;jsessionid=95D96AAFC388C1CCBF04E4BACFCB1AFB.ip-10-40-1-98>
- 7) "The global land use impact of the United Kingdom's biomass consumption Part I: Biomass flows through the UK economy - an overview of biomass sources and overseas land requirements" by Tony Weighell
  - a. URL: [http://jncc.defra.gov.uk/pdf/JNCC452\\_web.pdf](http://jncc.defra.gov.uk/pdf/JNCC452_web.pdf)
- 8) "Key Measurement Uncertainties for Biofuel Policy" by Sonia Yeh et al.
  - a. URL: <http://steps.ucdavis.edu/files/09-06-2013-Chapter-12-Key-Measurement-Uncertainties-for-Biofuel-Policy.pdf>
- 9) "Net primary production in three bioenergy crop systems following land conversion" by Michael W. Deal
  - a. URL: <http://jpe.oxfordjournals.org/content/early/2013/11/07/jpe.rtt057.full>
- 10) "Using a life cycle assessment approach to estimate the net greenhouse gas emissions of bioenergy" by Neil Bird et al.
  - a. URL: [https://www.google.it/url?sa=t&rct=j&q=&esrc=s&source=web&cd=101&cad=rja&uact=8&ved=0ahUKEwjz5qv18YPNAhUCNxQKHVgQB2s4ZBAWCBswAA&url=http%3A%2F%2Fwww.pinshot.org%2Fuploads%2Fdownload%3FfileId%3D1384&usg=AFQjCNF7jaSgyGCtRkG02xuuhL4iF\\_SAxw&sig2=KCK9yhqKs6aQWHYQqRxIVg&bvm=bv.123325700,d.d24](https://www.google.it/url?sa=t&rct=j&q=&esrc=s&source=web&cd=101&cad=rja&uact=8&ved=0ahUKEwjz5qv18YPNAhUCNxQKHVgQB2s4ZBAWCBswAA&url=http%3A%2F%2Fwww.pinshot.org%2Fuploads%2Fdownload%3FfileId%3D1384&usg=AFQjCNF7jaSgyGCtRkG02xuuhL4iF_SAxw&sig2=KCK9yhqKs6aQWHYQqRxIVg&bvm=bv.123325700,d.d24)
- 11) "Indirect land use changes of biofuel production – a review of modelling efforts and policy developments in the European Union" by Serina Ahlgren and Lorenzo Di Lucia
  - a. <http://biotechnologyforbiofuels.biomedcentral.com/articles/10.1186/1754-6834-7-35>