Draft guidance on apportioning of project emissions to co-products and by-products in biofuel production

Introduction

The production of renewable biomass/biofuels often involves generation of co-products, by-products or wastes[1]. In such cases, a procedure to apportion the project emissions associated with the production of renewable biomass/biofuels, between the renewable biomass/biofuels and its co- and by-products needs to be provided.

In currently approved methodologies, all project emissions are attributed to the renewable biomass/biofuels. This is a very conservative approach. To address this issue, the Meth Panel recommends the Board to adopt the guidance described below on apportioning project emissions between renewable biomass/biofuels and its co- and by-products. Though the guidance was developed in context of biofuel methodologies, the procedure presented can be applied to other processes where co- and by-products are produced, for example, where heat is consumed by a project activity from a co-generation source.

Background information

The International Energy Agency (IEA), the European Commission and others have undertaken considerable work on apportioning emissions between by-products and co-products. The BIOMITRE (**BIO**mass-based Climate Change **MIT**igation through **R**enewable **E**nergy) project was established by IEA to develop a software tool to provide a standard procedure for analyzing the GHG balance and emissions-saving cost-effectiveness of biomass energy technologies. The following extract from this tool provides the basic definitions and a proposal on how to apportion emissions:

The following assessment of three approaches to apportioning of emissions is based on BIOMITRE Technical Manual (Horne and Matthews, 2004[2]).

"Process chains which involve the provision of more than one product or service present a further important issue for LCA, because inputs and outputs then need to be divided between them. The various methods of division are called allocation procedures, and there is no single procedure, which is appropriate for all circumstances. Indeed, there are three main ways to allocate primary energy/GHG implications between main products, co-products (which involve similar revenues to the main product), by-products (which result in smaller revenues), and waste products (which provide little or no revenue).

According to ISO14040,[3] the preferred allocation procedure uses a substitution approach, where the main conventional process for producing a co-product, by-product or waste product is used to

[1] Co-products are defined as products with similar revenues to the main product; by-products are defines as products that have a lower revenues than that of the main product; and waste in this document this defined as a material that provide little or no revenue.
[2] http://www.ieabioenergy-task38.org/systemdefining/biomitre_technical_manual.pdf
[3] The standard provides " an overview of the practice, applications and limitations of Life Cycle Assessment to a broad range of potential users and stakeholders, including those with a limited knowledge of life cycle assessment". For further details see http://www.ems-14000.com/ems-iso14040.htm

generate comparative effective credits, which are then subtracted from the life cycle inventory of the process chain under investigation.

This allocation procedure is fundamentally sound, but clearly increases the scope of the LCA to include process chains of main methods of production of the relevant by-products and co-products. Also, the substitution approach cannot necessarily be used when co-products, by-products or waste products are not normally produced by any main process. There are numerous co-products, by-products and waste products generated by biomass energy production, including, variously, straw, soil, meal, bran and glycerine. Invariably, these are produced mainly as by-products of other process chains. Although this apparent conundrum may be solvable mathematically, using simultaneous equations, it does not necessarily make practical sense to expand the system boundary in such a way, for reasons which may vary from resources and data availability to the actual substitutability (in detail), to the potential availability of the substitution product in the quantities expected, produced by the current conventional means.

Hence, it is sometimes necessary to revert to simpler allocation procedures, of which allocation by market price and subsequent revenue is often the most appropriate.

This is invariably not an 'ideal' solution, since market prices often fluctuate, and in such cases the results of the LCA will change. However, the market price should reflect the value of the by-product in proportion to the main product as far as the producer is concerned, and thus, it is a valid measure of the proportional value society places on each, and therefore the same proportion of primary energy/GHG implications can be used in calculating allocation credits.

The third means of achieving allocation is by using more fixed physical relationships between the main product and by-products. The mass, volume or calorific value of products can be used, although such simple bases for allocation need to be justified satisfactorily, and this is only likely to be a logical and valid option in specific circumstances. For example, in cases where all the products are fuels, such as petroleum products produced by an oil refinery, allocation by relative output and calorific value can be regarded as appropriate. However, allocation by this means for products, which might have calorific values but are not, in fact, used as fuels, is quite tenuous and not suitable.

In the Commission Cramer report allocation using market prices is mentioned as the system to be used because of its simplicity, but also with a hint that this can raise problems. Market prices fluctuate and are also influenced by subsidies in agriculture, energy, fuels etc. Some NGO's (eg Prof Lucas Reijnders) are against allocation with traditional prices and want allocation with corrected green prices. (Extracted from: GHG balances: International methodology, National Systems and Discussion points. Veronika Dornburg (UU), Geert Bergsma (CE) and Jan Vroonhof (CE)).

The Meth Panel recommends the Board to any one of the following three approaches for apportioning project emissions between main product and its co- and by-products can be used by the project participants:

1. **Allocation by market prices.** This approach can be used provided transparent information on market prices is available;
2. **System expansion** (referred to above as "substitution approach"). This approach can be used provided that the conventional production process for the co-product or by-product

can be clearly identified and that sufficient information is available to determine the GHG emissions intensity of the conventional process;

3. **Attributing all project emissions to the main product.** This approach may be used under the CDM project activity, as a simple and conservative approach.

In exceptional cases, project participants may use other allocation approaches but should justify their appropriateness compared to the above-mentioned approaches.

In line with the above recommendation, the panel proposed the following draft guidance to the Board.

Draft EB guidance on apportioning emissions from production processes between main product and co- and by-products

Scope and rationale of the guidance

The production of renewable biomass/biofuels often involves generation of co-products, by-products or residues (waste). In such cases, a procedure to apportion the project emissions, associated with the production of renewable biomass/biofuels, between the renewable biomass/biofuels, the co-products, and the by-products needs to be provided.

The purpose of this guidance is to provide criteria for apportioning emissions from a production process between the main product, the co-products, the by-products and the residues (waste) where the main product is produced and/or consumed/used in a CDM project activity.

For the purpose of this guidance the following definitions apply:

- Co-products: products produced along with the main product and having similar revenues as the main product;
- By-products: products produced along with the main product and having smaller revenues than the main product; and
- Residues/wastes: residues/wastes are generated along with the main product but have no or negligible revenues.

Proposed guidance for apportioning emissions from production process

This guidance is for situations where a product, which is a main product/co-product/by-product/residue (waste), is produced and/or consumed/used under a CDM project activity.

One of the following approaches to apportion emissions shall be used in the methodologies:

(a) **Apportioning by market prices**, i.e. apportioning of the emissions proportional to the market prices of the main product and the by-products or co-products. The market prices may be either monitored ex-post or be determined once for the crediting period. This rule can be applied only if transparent and reliable information on market prices is available;
(b) **System expansion**. The by-products and co-products are included in the project boundary. For each by-product or co-product, the baseline production process(es) is/are identified as part of the procedure to identify the baseline scenario. Respectively, the emissions associated with the production of the co-products and by-products in the absence of the project activity are included as baseline emissions;
(c) **Attributing all emissions to the main product.** As a conservative approach, all emissions from production process are accounted as project emissions where the main product is produced and/or consumed/used in a CDM project activity.

Furthermore, the following guidance applies:

(i) Emissions from the production process shall not be allocated to residues/wastes, which are used/consumed in a CDM project activity, for example, if biomass residues from sugar cane production (i.e. bagasse) are used for the production of electricity;

(ii) If a co-product or by-product produced in conjunction with the production of the main product is not sold on the market and is not used/consumed no production emissions shall be apportioned to the co-product(s)/by-product(s). This applies, for example, where the oilseed meal or glycerin produced along with biofuel in the project activity would be dumped or left to decay. In such situation no emissions are apportioned to oilseed meal or glycerin;

(iii) If a co- or by-product is currently not used in the market or is available in excess and project participants plan to use it under the CDM project activity, no emissions should be apportioned to it.

Procedure for proposing alternative approaches

In exceptional cases, project participants may propose, as revision of this guidance or as part of proposed new methodologies, different allocation rules if they can justify that they are better suited than the allocation by market prices and the substitution approach or if the necessary data to apply allocation by market prices and the substitution approach are not available.