

## NOTE ON BIOFUELS

### I. Background

1. The Board at its 35<sup>th</sup> meeting discussed the case NM0228 (AGRENCO Biodiesel Project in Alto Araguaia", proposed by Agrenco do Brasil S/A) and noted the excessive treatment of the estimation of project emissions from the cultivation of raw material used in production of biofuel compared to the calculation of the baseline emissions from the production of petrodiesel. The Board requested the Meth Panel to review the estimation of project emissions from cultivation of raw material with a view to identify the relevance of the various emissions source in terms of their significance vis à vis inclusion of similar emissions sources in the production of petrodiesel. The Board also requested the Meth Panel to provide inputs on the extent to which upstream emissions should be considered and also the criterion that could be used to eliminate minor emission sources, both in the baseline and the project situation. The Board at its 36<sup>th</sup> meeting thanked the Meth Panel for changes effected, but noted that not all issues had been addressed adequately and requested the Meth Panel to take these into account and revise the draft revision.

2. The Meth Panel recommended the inclusion of the methodology NM0228 in the approved methodology AM0047. The Board raised concerns that the project emissions from biodiesel are considered in details, whereas, this is not the case with baseline emissions from the production of petrodiesel. The Board also raised concerns that the methodology includes some upstream emission sources from the production of biodiesel and that upstream emissions may not have been considered to the same extent for the estimation of baseline emissions from the use of petrodiesel.

### II. Comparison of emission sources from the production of biodiesel and petrodiesel undertaken by the Meth Panel

3. Based on the issues raised by the Board, the Meth Panel undertook a systematic comparison of the emissions associated with the production of biodiesel and petrodiesel. For this purpose, the Meth Panel identified all relevant GHG emission sources and assessed the relevance of each emission source. To reflect differences between different countries and different oil seeds, e.g. with regard to the cultivation practices or petrodiesel production processes, data was collected for:

- (a) Six types of feedstocks that are frequently used for the production of biofuels: fresh palm fruit bunches, cassava roots, jatropha nuts, soy beans, corn seed and sugar cane; and
- (b) For different climate zones, including countries in Latin America, Africa and Asia.

4. The data was collected from various literature sources. The countries were selected based on the available data. As the revised AM0047 is applicable to production of biodiesel from vegetable oil that is produced with oil seeds from plants that are cultivated on dedicated plantations established on lands that are degraded or degrading, only emission factors for jatropha and palm are provided.

5. The comparison was structured into the following four equivalent production stages for both petrodiesel and biodiesel. These are:

- (i) Production of primary raw materials: the production of crude oil in the case of petrodiesel and the cultivation of seeds and the production of feedstocks used for the cultivation (e.g. fertilizers) or processing (e.g. methanol) of the vegetable oil in the case of biodiesel;
- (ii) Transportation of primary raw material to the processing facility: transportation of crude oil to the refinery in the case of petrodiesel and transportation of oil seeds to the biofuel production facility in the case of biodiesel;
- (iii) Processing of the raw material: the production of petrodiesel from crude oil at a refinery in the case of petrodiesel and the processing of the oil seeds to biodiesel at the production facility for biodiesel; and
- (iv) Transportation to the final dispensation point.

6. The approach that the Meth Panel followed for revising AM0047 was to include cases where the biomass is cultivated in dedicated plantations on degraded or degrading lands.

7. In total four consultants assisted the Meth Panel in the comparison of the emission sources, including several independent peer reviews. The calculations performed for estimating emissions from the cultivation of jatropha nuts and fresh palm fruit bunches are published in a spreadsheet in annex 7 of the 40<sup>th</sup> Meth Panel meeting report.

### III. Key results from the comparison

8. Key results for the production of biodiesel are:

- Overall emissions from the production of biodiesel differ considerably among different oil seeds and, in some cases, among regions. Any default values should therefore be provided for different oil seeds and consider regional differences where necessary;
- Emissions from the production and use of vegetable oil (e.g. due to use of fertilizer or methanol) are in some cases small (e.g. if no or small quantities of fertilizer are applied) but in other cases very significant. The magnitude can in some cases be larger than all upstream emissions associated with the production of petrodiesel. Therefore, these emission sources can not be cancelled out with upstream emissions from petrodiesel if an overestimation of overall emission reductions should be avoided;
- Emissions resulting from changes in soil carbon stocks following a land use change or a change in the land management, estimated as per 2006 IPCC Guidelines for National Greenhouse Gas Inventories could be significant for annual plants like soya. However, this is not the case for perennial plants such as jatropha or palm. A future revision of the methodology could also include the option of monitoring any changes in soil carbon stocks through direct measurements. Such procedures were considered by the Meth Panel but require further work and external expertise.

9. Key results for the production of petrodiesel are:

- The most significant emission sources are fugitive emissions from the production of crude oil, emissions from refining and, in some cases, emissions from long-distance transportation;
- Other upstream emission sources, such as emissions associated with the construction of refineries (e.g. use of steel), are relatively small compared to other emissions sources.

10. These results are generally supported by the scientific literature on this matter.

#### **IV. Approach taken in the recommendation for revision of AM0047**

11. In this section, the approaches recommended by the Meth Panel for revising AM0047 to include cases where the production of biodiesel is from oil seeds cultivated in dedicated plantations on degraded or degrading lands are explained.

#### **V. Production of Petrodiesel**

##### *Upstream emission due to crude oil Production*

12. GHG emissions associated with the production of crude oil vary considerably between countries, in particular with respect to the amount of flaring and venting. Since the oil market is a global market, it is difficult to calculate the amount of GHG emission reductions from lowering the demand for crude oil as a result of a CDM project. If the oil consumption in a country is reduced as a result of a CDM project activity, this does not necessarily result in a decrease in the production of crude oil in that particular country or in the importing countries but could reduce crude oil production in other countries. Therefore, upstream emissions due to crude oil production are calculated using a default emission factor based on data for the year 2005 from well reputed resources such as World Bank and IEA. A global average value was calculated not accounting for upstream emissions from crude oil production in Annex I countries since no CERs should be claimed for emission reductions in Annex I countries. The calculated average default value corresponds to 0.073t-CO<sub>2</sub>/t-petrodiesel.

##### *Long Distance Transport*

13. Emissions from long distance transport (transport of crude oil to the refinery) will not be taken into account since the EB has clarified that CDM project activities can not claim emission reductions from reducing international bunker fuel consumption. EB 25 report paragraph 58 states that “The Board agreed to confirm that the project activities/parts of project activities resulting in emission reductions from reduced consumption of bunker fuels (e.g. fuel saving on account of shortening of the shipping route on international waters) are not eligible under the CDM.”

14. If long distance transport occurs within the host country where the project activity takes place, these emissions will be accounted for.

##### *Refining*

15. These emissions include emissions from fossil fuel combustion for energy generation at the refinery, emissions from the production of chemicals and catalysts used in the refinery, emissions from the disposal of production wastes (including flaring). If refining occurs in the host country, reliable local emission factors from an official information source may be used. Alternatively, a default emission factor can be used in the absence of a country-specific data. This default emission factor corresponds to the global average value based on IEA data and IPCC parameters and corresponds to 0.233t-CO<sub>2</sub>/t-petrodiesel.

16. Emissions related to the construction of infrastructure (e.g. construction of the refinery) will not be taken into account, as these emissions are very minor and in order to keep consistency with the biodiesel production emissions estimation.

*Distribution to filling stations*

17. Emissions from the distribution to filling stations will not be taken into account, as it is assumed that these emissions are similar to emissions from transportation of the biodiesel to the blending facility.

## **VI. Production of Biodiesel**

*Cultivation of oil seeds*

18. In order to provide project participants with flexibility, two options are provided to calculate emissions associated with the cultivation of lands to produce oil seeds:

- (a) A simple approach, using a conservative default value for the typical emissions intensity in different geographical regions. Default values are provided for palm and jatropha; and
- (b) The calculation of the emissions based on actual data from the cultivation process. This option is more accurate than option a) but requires the collection of data by the project participants.

*Transport of oil seeds or vegetable oil*

19. Project emissions from transport of oil seeds or vegetable oil are only taken into account if feedstocks are transported over distances of more than 50 km.

*Vegetable oil production and biodiesel production*

20. Emissions at the oil mills and the biodiesel plant include fossil fuel and electricity consumption and, where relevant, any methane emissions associated with anaerobic waste water treatment.

21. No default emission factors are provided for this stage given that project participants have direct control on these emissions. The consumption of fuel and electricity can be monitored.

22. Emissions associated with the production of the methanol used for esterification are estimated as leakage in the methodology. This emission source is significant and therefore considered. Consideration of this emission sources is consistent with the estimation of emissions at the refinery that will take into account emissions for the production of chemicals and catalysts used in the refining process. A default emission factor is provided in the methodology. Only methanol from fossil fuel origin is included because the methodology does not provide procedures for estimating emissions associated with the use of alcohols other than methanol from fossil fuel origin. Project proponents are invited to propose procedures to estimate the emissions associated with the production of other alcohols that could be used for esterification, such as ethanol or methanol from renewable sources, as a revision to this methodology. The Meth Panel could not identify cases of production of biodiesel using ethanol.

23. Emissions related to the construction of infrastructure will not be taken into account for the biodiesel production (e.g. construction of the biodiesel plant), as these emissions are very minor and in order to keep consistency with the petrodiesel production emissions estimation.

*Transport of the biodiesel*

24. Emissions from the transport of the biodiesel to the blending facility or final users will not be taken into account, as it is assumed that these emissions are similar to the emissions from the distribution petrodiesel to filling stations.

*Apportioning of project emissions*

25. Emissions for the production of biodiesel are allocated following the “Guidance on apportioning of emissions to co-products and by-products” (in annex 8 of the 40<sup>th</sup> Meth Panel meeting report). In the methodology overall project emissions are allocated between biodiesel and glycerol and, where applicable, project emissions associated with the cultivation of land are allocated between the different products produced from the plants.

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