**European Commission Ref. 070201/2014/693666/FRA/ENV.C.3 Service Agreement 7:
Continued improvements of inventory methodologies**

**Task 1: Small-scale Combustion: Updated emission factors and improved methodologies**

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**Consultation paper for discussion**

1. **Context**

Ricardo-AEA Ltd, Aether Ltd and AMEC have been commissioned to investigate and propose improvements to inventory methodologies in a number of key areas identified by the Task Force on Emission Inventories and Projections (TFEIP) and other bodies. The European Commission, as part of a collaborative initiative, has provided funding for this project, which is expected to be the focus of discussion at the TFEIP meeting and workshops in May 2015.

Task 1 of this project is entitled “Small-scale Combustion: Updated emission factors and improved methodologies.” This paper sets out our initial views on the delivery of this task, and is intended to form the basis of discussions with TFEIP subgroup chairs, TFEIP members, and other stakeholders.

1. **The issue(s) to be addressed**

Chapter 1.A.4 of the EMEP guidebook covers the activities relating to small combustion units assumed to have <50MW or less capacity, which will typically be used for heating and producing hot water within residential/institutional sectors, but also in some installations for cooking. They may also include appliances within agriculture used for crop drying or heating greenhouses, and small scale appliances 1 – 50MW found within industry. In practice this covers a wide range of appliances and fuel types which will be available. Table 2.1 provides further guidance from the guidebook chapter about the activities included based on SNAP code:

**Table 2.1 Breakdown of small combustion plant listed in the EMEP guidebook (2013)**



The guidebook chapter for small combustion would benefit from a review of the emission factors (dating to 1998) and from the inclusion of more recent technologies, particularly biomass, and therefore requires a review and update. The key issues to be addressed as part of this update are as follows:

* Tier 1 Inventory Approach: The basic level approach to developing emission inventory estimates are currently based on a limited set of factors based on fuel types. Typically in developing the estimates for tier 1 the factors presented use data from higher tiers aggregated to provide a conservative estimate for tier 1 approach.

The planned approach will be to investigate and propose an update of the emission factors for tier 1 based on the update of tier 2 described below; and where possible to further disaggregate the information within tier 1 to capture any fuel types, particularly biomass, which are currently omitted.

* Tier 2 Inventory Approach: This level of inventory approach provides a greater disaggregation for technology and fuel types to allow inventory compilers a more detailed breakdown of emission estimates. However the guidebook technology descriptions (particularly for residential appliances) are not readily identifiable. The terms used (for example ‘traditional’ and ‘advanced’) are often unclear to inventory compilers, policy makers and manufacturers of such equipment. This is particularly true for biomass technologies where a range of fuels, functions and technologies are available.

The planned approach will be to investigate and propose a review and update the emission factors for the range of existing appliance types with new data, as well as providing clearer definitions of appliance types. Secondly based on review of the chapter, any major technology types currently missing from the guidebook will be included, either through disaggregation of existing technology already covered in the guidebook, or by extension to include additional new technology types.

* Tier 3 Inventory Approach: This level of inventory approach provides the most advanced, in this case handling the issue of ‘age of fleet’, and the potential differences in emissions related to the nature and age of equipment in use. The current guidebook chapter provides tables of emission factors in Appendix A. Another key issue for development of emission estimates at tier 3 approach is the development of suitable activity data to use with the emission factors within Appendix A. Again this is an area which needs to be addressed.

The identified issues for tier 3 inventory approach include further development and update of the existing emission factors. A second key issue will be to develop guidance for inventory compilers on how to develop the necessary activity data to make use of the tier 3 approach.

1. **Proposed approach**

The proposed approach has been designed around five discrete steps, which will be used to address the issues identified for the different tiers of inventory development approach documented in the guidebook chapter. These five steps are summarised as follows:

Step 1. Review and assess existing guidebook chapter.

This step will cover a critical assessment of the current guidebook chapter based on the knowledge of the contractors, consultation with the TFEIP expert panel and rapid review of core literature. This review is intended to identify specific weaknesses of the existing guidebook chapter, the key technology groups/fuel combinations currently missing for tier 2 approach and to highlight the core areas of the guidebook as priority for update across all tiers. The output from the first step will be:

* A list of technologies that need to be included for tier 2, and;
* Sets of factors that are a priority for updating.

Step 2. Typify and define the missing technology/fuel combinations.

Based on the outputs from step one, the next part of the methodology will deal with providing definitions for those technologies/fuel combinations identified. In developing a set of technologies to allow tier 2 approach, a balance needs to be struck between the levels of specific detail for individual technologies and the characterisation of known technology types which can be easily recognised by inventory compilers. Where specific pieces of apparatus may vary from country to country, levels of detail which provide too narrow a range will make the definitions less useful to apply. Equally the definitions developed need be presented in a language which can be used to easily identify categories of equipment used in EMEP countries, so terminology such as ‘traditional’ or ‘standard’ may not be very helpful as it may differ from country to country. In typifying the technology types, consultation will be carried out with key stakeholders across the EU including members of the TFEIP and industry representatives. Step 2 will therefore work with the peer reviewed literature from step 1 and guidance of both the TFEIP industry expert panel and Commission Services to develop:

* New definitions for omitted technologies;
* Update of definitions of existed technologies where needed;
* Disaggregation/update of the existing technologies in the guidebook (where necessary).

Step 3. Literature review and compilation of factors.

Following on from previous steps this stage will be aimed at addressing the update of emission factors for priority areas at all three tiers of inventory approach. Based on identified areas and new technology types from step 2 the project team will carry out a focussed literature search for viable emission factors to be included within the guidebook. This literature search will also include where possible industry data to help typify the current emission rates for technology in use. In gathering and compiling this new data care will also be taken to ensure that referencing of factors is managed in an appropriate way and that the methodology for deriving the emission factors is clearly noted. The guidebook approach for tier 1 factors for more general use is usually derived as a composite of the factors for tier 2. Therefore the project team aims to update primarily the emission factor data for tiers 2 and 3 and based on that to update the factors quoted in tier 1 in order to ensure an overall comparability between tiers. Outputs from this step will include:

* Updated tables of emission factors to be included within the guidebook chapter.
* Update to database of emission factors maintained by EEA

Step 4. Assess activity data needs and Tier 3 Approach.

The current guidebook provides emission factor data for Tier 2 approach and, at Tier 3, some discussion of how inventory approach can broach the issue of ‘age of fleet’ and how that may affect the emissions. In making use of the emission factors within tier 2 or tier 3 the project team recognises that it is necessary to have the suitable activity data to drive the emission estimates. The project team will make contact with the inventory teams in those countries that already have adopted a higher tier approach for small combustion plants to gather further insight on how these estimates were derived. In the case of biomass which may prove to be an area which is currently omitted from the guidebook the project team will initially develop a definition of biomass. We will go on to look at what proxies might be used to help develop activity data to drive a higher tier approach. The outputs from this step of the process will be:

* A review and comment of the existing higher tier approach in the guidebook with feedback from inventory communities on what possible methodologies might be most suitable to help provide suitable activity data.

Step 5. Update of guidebook chapter.

Based on the preceding steps the final stage of the methodology will include the update of the guidebook chapter for small combustion based on the findings of the preceding steps.

1. **Key sources of data**

In carryout the approach detailed within the previous section we have identified a number of sources of information which we believe will be key in deriving the necessary data to update the guidebook. We do however welcome feedback from the TFEIP expert panel for any additional information not included within the following list:

* Analysis of the impacts of various options to control emissions from the combustion of fuels in installations with a total rated thermal input below 50MW (AMEC, 2014).
* Assessment of the benefits and costs of the potential application of the IPPC Directive (EC/96/61) to industrial combustion installations with 20-50 MW rated thermal input. Final Report to the European Commission. Available from: <http://www.cafe-cba.org/assets/ippc_ec_thernal_input.pdf> (AEA, 2007)
* Collection and analysis of data to support the Commission in reporting in line with Article 73(2)(a) of Directive 2010/75/EU on industrial emissions on the need to control emissions from the combustion of fuels in installations with a total rated thermal input below 50 MW. Final Report for the European Commission. (AMEC, 2012)
* Analysis and summary of the Member States' emission inventories 2007-2009 and related information under the LCP Directive (2001/80/EC). Final Report for the European Commission (AMEC, 2012b).
* Small combustion installations: Techniques, emissions and measures for emission reduction. Joint Research Centre. Available from: <http://publications.jrc.ec.europa.eu/repository/handle/111111111/229> (JRC, 2007)
* Best Available Techniques (BAT) Reference document for the Large Combustion Plants. Industrial Emissions Directive 2010/75/EU (IPPC) (Joint Research Centre, European IPPC Bureau, 2013 *draft*). Available from: <http://eippcb.jrc.ec.europa.eu/reference/BREF/LCP_D1_June_online.pdf>
* Best available technologies for the heat and cooling market in the European Union (Joint Research Centre, 2012)
* Options for limit values for emissions of dust from small combustion installations < 50 MWth. (EGTEI, 2010) Available from: <http://www.unece.org/fileadmin/DAM/env/documents/2010/eb/wg5/wg47/Informal%20documents/Info.%20doc%209_Options%20for%20PM%20ELVs%20for%20SCI%20%20final.pdf>
* Study to inform on-going discussions on the proposal for a Directive on industrial emissions. Part 1: Combustion Activities. Final Report to the European Commission (Entec, 2009).
* Overview on Technologies for Biomass Combustion and Emission Levels of Particulate Matter (<http://citepaax.alias.domicile.fr/forums/egtei/egtei_sci.htm>)
* Onderbouwing actualisatie BEES B: Kosten en effecten van de voorgenomen wijziging van het besluit emissie-eisen stookinstallaties B. (ECN, 2008) Available from: <http://www.ecn.nl/docs/library/report/2008/e08020.pdf>
* VITO (2011) Beste Beschikbare Technieken (BBT) voor nieuwe, kleine en middelgrote stookinstallaties, stationaire motoren en gasturbines gestookt met fossiele brandstoffen. Available from: <http://www.emis.vito.be/bbt-studie-stookinstallaties-en-stationaire-motoren-nieuwe-kleine-en-middelgrote>
1. **Your views**

Your views are sought on the following key issues:

1. The suitability of the approach detailed here to meet the objectives as described in section 3.
2. What key technologies/fuel combinations do consultees feel are currently omitted from the guidebook; and which of the existing definitions require further review?
3. What additional reference sources should be included as part of the list under section 4.
4. What approaches to addressing activity data disaggregation for tier 2 or 3 are consultees aware of; which could potentially be included in the guidebook?
5. **Consultation programme**

An introductory discussion has been held with the TFEIP management group at their meeting on 11 February 2015. Consultation with TFEIP members is planned to take place during the TFEIP meeting and workshop in May 2015. Following this, the project team will develop draft methodologies and Guidebook text. This will be circulated for consultation in late 2015, working with the TFEIP Expert Panel co-chairs.

Thank you for your co-operation with this process.

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