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Progress in the implementation of the 2012-2013 workplan

Techno-economic issues

Report by the co-Chairs of the Expert Group on Techno-economic Issues*

I. Introductory remarks

1. This report presents the progress in the work of the Expert Group on Techno-economic Issues (EGTEI), including the results of its twentieth meeting held on 22 November 2011, in Warsaw, Poland, hosted by the Polish European Union Presidency and its twenty-first meeting held on 12 June 2012, in Nice, France, in accordance with item 1.5 of the 2011 workplan for the implementation of the Convention (ECE/EB.AIR/106/Add.2). It also presents the results of the work of the Sub-group on Emerging Technologies in large combustion plants (LCPs) (EmTech50-500), which held its final meeting on 21 November 2011, in Warsaw, Poland, and the results of the third meeting on the update of cost data in large combustion plants (LCPs), held on 11 June 2012 in Nice, France.[1]

A. Attendance

2. Twenty seven experts (in Warsaw) and thirty-one experts (in Nice) from Parties to the Convention, European Associations, as well as, representatives of private companies,

*The present document is being issued without formal editing.

[1]The presentations delivered at the meetings are available on the website of the Expert Group:http://www.citepa.org/forums/egtei/egtei_meetings.htm

attended the meetings of the Expert Group: Belarus, Belgium, Czech Republic, Finland, France, Germany, Italy, Poland, Russian Federation, Netherlands, and the European Association for Environment, Health and Safety in Refining (CONCAWE), EURELECTRIC, the European Association of Gas and Steam Turbines (EU Turbines), the European Association of Internal Combustion Engine Manufacturers (EUROMOT), the European Chemical Industry Council (ESIG/CEFIC), the European Commission Intergovernmental Panel on Climate Change (IPPC) Bureau, the French-German Institute for Environmental Research (KIT-DFIU), the Inter-professional Technical Centre for Studies on Atmospheric Pollution (CITEPA), and the French Agency of Environment and Energy Management (ADEME). Simultaneous interpretation (English-Russian) was organized by the Polish Presidency in Warsaw and by the EGTEI Technical secretariat in Nice, to facilitate the active participation of the Russian-speaking experts. The participation of one expert from Belarus was financially supported by Sweden. The participation of two experts of the Russian Federation was financially supported by France.

B. Organization of work

3. Representatives of Italy and France co-chaired the meetings.

4. The twentieth meeting was held at the Polish Ministry of Environment, Department of Climate Change and Protection of Atmosphere, in Warsaw. The twenty-first meeting was held in Nice, France, organized by CITEPA.

II. Objectives and main discussion points of the meetings

5. The Expert Group addressed, at its twentieth meeting, the outcome of the discussions held at the forty-ninth session of the Working Group on Strategies and Review, held in Geneva in September 2011, in view of the revision of the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol) and analysed its implications for the activities of the Expert Group. The co-Chairs of the Expert Group also reported, at the twenty-first meeting, on the decisions of the Executive Body, at its thirtieth session, held in April/May 2012 and the consequences of the amended Gothenburg Protocol which had been adopted.

6. The Expert Group discussed the following issues in accordance with the 2011 and the 2012-2013 workplans for the implementation of the Convention (ECE/EB.AIR/106/Add.2, ECE/EB.AIR/109/Add.2):

(a) The cooperation between the Expert Group and the Eastern Europe, the Caucasus and Central Asia Coordinating Group, led by the Russian Federation;

(b) The work carried out by the Technical Secretariat of the Expert Group on Costs with regard to options proposed in the revised annexes for submission to the Working Group on Strategies and Review, and possible extended applications of this methodology;

(c) Further work to update the Expert Group's methodology on LCPs, and the outcome of the work on the emerging technologies in large combustion plants, carried out by the Sub-Group EmTech50-500, led by ADEME;

(d) Further work to update the guidance documents of the Gothenburg Protocol with information on black carbon;

(e) The cooperation with the European Integrated Pollution Prevention and Control Bureau, including the updating cost data of Best Available Techniques (BAT) reference documents for some industry sectors;

(f) The cooperation with the Centre for Integrated Assessment Modelling (CIAM) to improve the quality of the data concerning the electricity production and iron and steel production sectors, in the Greenhouse Gas and Air Pollution Interactions and Synergies (GAINS) model;

(g) The continuation of the cooperation with the Institute for Prospective Technological Studies (IPTS) in Seville, Spain;

(h) The exploration of further applications of the Expert Group/GAINS comparison methodology to the countries of Eastern Europe, the Caucasus and Central Asia.

7. The issue of black carbon (item 1.5 (h) of the 2011 Convention work plan and item 1.4 of the 2012-2013 work plan) was also addressed during the meetings. In addition to work already carried out by the Expert Group on Wood Combustion in the Domestic Sector, there was increasing demand for information on black carbon sources and abatement technologies, in connection to the revision of the Gothenburg Protocol. An update of the guidance documents to the annexes of the amended Gothenburg Protocol also referred to black carbon.

8. The Expert Group also discussed the revision of its work plan for 2012 and beyond.

9. The Executive Director of CITEPA introduced the organization of the work of the technical secretariat of the Expert Group, provided by CITEPA and the Karlsruhe Institute of Technology (KIT), with financial support by ADEME.

10. An invited speaker from Czestochowa University of Technology, Poland, delivered a presentation on the environmental acceptance of the coal combustion in large power plants. He highlighted that concerning CO2 capture and storage, the main issue was largely the public acceptance, whereas the relevant technology existed and was considered to be mature.

11. At the twenty-first meeting of the Expert Group, a representative of a technical agency in the Netherlands presented on the 2012 Dutch approach to cost-effectiveness of emission abatement techniques, highlighting how the revision process of the abatement costs had allowed to replace the old reference values for cost per kilogramme of abated pollutant (in reference to sulphur oxides, nitrogen oxides, volatile organic compounds and particulate matter) with new and more appropriate evaluation ranges. He also pointed out that cost effectiveness was only applicable to activities that were not covered by the European Union Industrial Emission Directive (IED) and not applicable to IED installations with a BREF and activities covered by general legislation.

12. The Italian co-Chair delivered an unofficial presentation concerning the changes introduced by the International Institute for Applied Systems Analysis (IIASA) in the structure of the power plant sector (including industrial boilers) in the GAINS Model. The old and new structures had been compared, highlighting the advantages of the new structure, which would allow for a more accurate calculation of the emissions from that sector, and the representation of the most modern plants in the GAINS model. More details were expected from IIASA at its the next meetings on the GAINS methodology, especially for what concerns the simulation of application of the IED, the recommendation of the upcoming new BREF document on LCPs and application of derogation and opt-out to existing plants.

13. A representative from the Institute of Glass, France, and the European Union sector association Glass Alliance Europe presented the results of a study on the cost of abatement in the glass sector. Numerical examples had been provided for abatement of dust by electrostatic device and sulphur oxides by wet scrubber. He indicated that costs were affected by the furnace size, the fuel, the abatement technology and level, the possible

recycling or disposal of dust. He also highlighted the uncertainties with regard to cost estimations and the cross media effects which make the simultaneous use of different abatement techniques not always efficient due to counter-effects.

14. A representative of the European Union association EU Turbines presented the last development in terms of environmental performances and energy efficiency, in gas turbines. He highlighted as, with the new trend in energy mix (characterized by more renewable energy), innovations are focused on new requirements (integrated design, fast cycling design, fast start up/fast ramp, stable frequency). In the last ten years, the Combined Cycle Plants have increased the energy efficiency from 52% to 60 %, while, in the same time interval, the CO2 emissions have decreased.

15. A representative of the International Cryosphere Climate Initiative (ICCI) presented a series of technical measures to reduce the emissions of black carbon from agricultural burning. He highlighted the feasibility of recommended measures and the related benefits, as well as the urgency of action in relation to the Arctic region.

III. Progress in the work of the Expert Group

A. Cooperation with the Coordinating Group for Eastern Europe, the Caucasus and Central Asia (item 1.5 (f) of the 2011 workplan and item 1.4(b) of the 2012-13 workplan)

16. The co-Chairs informed the Expert Group about progress in the work programme as concerns the technical cooperation with the Russian Federation and the countries of Eastern Europe, the Caucasus and Central Asia. With the funds that had been made available by Switzerland, the remarkable result of translating the guidance documents of the Gothenburg Protocol into Russian was achieved, thanks to the effective cooperation with the Scientific Research Institute for Atmospheric Air Protection, (SRI Atmosphere), San-Petersburg, Russian Federation[2]. The translation strictly follows the original document in English, available on the same web page. Consistently with the outcome of the negotiation process taking place within the Working Group, leading to the final adopted text of the Annexes to the revised Gothenburg Protocol, the Guidance Documents will be updated accordingly, both in the English and the Russian versions.

17. The Technical Secretariat of the Expert Group reported on the progress in the pilot project study on implementation costs of abatement technologies applied to the selected Apaty Power Plant in the Russian Federation. The cost methodology, developed and updated by Expert Group, has been successfully applied to the selected plant, showing the effects of the implemented abatement technologies, in terms of emission reductions and related costs, to be in line with the Option 2 in the revised Technical Annexes of the Gothenburg Protocol. The application test, provided in full details, has shown the applicability of the cost methodology at single plant level, highlighting that the cost-effectiveness of the technological upgrade strongly depends upon some key operating parameters of the plant. The report has been delivered to the Russian Federation. In the next steps of cooperation several actions are envisaged:

(a) A series of technical seminars with technical experts and officials;

[2] The unofficially translated document is now available on the Convention website: http://www.unece.org/env/lrtap/workinggroups/wgs/docs45thsession.html, in the section “Other Informal Documents.”

(b) Further development of assessment projects concerning implementation costs of abatement technologies;

(c) Extension of the cost assessments analysis to the implementation of the Gothenburg Protocol in countries of Eastern Europe, the Caucasus and Central Asia;

(d) Development of cost assessment guidelines.

18. At the twenty-first meeting of the Expert Group, the Chairman of the Coordinating Group for countries of Eastern Europe, the Caucasus and Central Asia had presented a series of proposals for the continuation of the fruitful cooperation with the Expert Group. The following had been proposed and agreed:

(a) Holding of a seminar in the Murmansk region, tentatively in November 2012, concerning explanations of the Guidance Documents, in particular for what concerns the technologies for controlling emissions of sulphur oxides, nitrogen oxides, volatile organic compounds and dust from stationary sources, including the example of applications of the cost methodology to the Apatity Power Plant;

(b) Development of a list of priority industries in EECCA countries for which the technologies described in the Guidance Documents could be applied;

(c) Study on cost comparison analysis for reduction of dust emissions from coal-firing power plants, using electrostatic precipitators as abatement technology, in the Russian Federation and in the European Union (tentatively March 2013);

(d) Holding of a regional Workshop for countries of Eastern Europe, the Caucasus and Central Asia countries to illustrate the experience of application of the Guidance Document technologies, for controlling emissions sulphur oxides, nitrogen oxides, volatile organic compounds and dust from stationary sources, in the Russian Federation and in Belarus (tentatively May 2013);

(e) Assessment of costs for meeting the provisions under the revised Gothenburg Protocol, in an oil refinery plant in Belarus.

19. At the twentieth meeting of the Expert Group, the expert from Belarus presented an analysis on abatement technologies for particulate matter applied in countries of Eastern Europe, the Caucasus and Central Asia. The analysis had highlighted in a number of cases significant differences in the cost parameters, with respect to those currently in use in the Greenhouse Gas and Air Pollution Interactions and Synergies Model (GAINS) Model, likely due to the peculiarities of the domestic market. In some cases, differences in the efficiency of the abatement technologies are also reported. Further cooperation with Belarus was envisaged, also with the perspective of applying the Expert Group cost assessment methodology to other countries in Eastern Europe, the Caucasus and Central Asia.

20. At the twenty-first meeting of the Expert Group, a representative of the Scientific Research Institute for Atmospheric Air Protection of the Russian Federation presented on the environmental and economic mechanisms of air quality management, in the Russian Federation. She introduced the legislative framework ruling the emissions from stationary and mobile sources, based upon a fine/fee system driven by environmental impact factors. The trend of total emissions and related revenue from fines/fee, over a time period of about ten years, had been presented, along with the amount of investment for environment protection.

21. At the twenty-first meeting of the Expert Group, a representative of Belarus presented the results of a paper on abatement technologies for particulate matter in Belarus. She illustrated the legislative framework, the classification of the several technologies, their technical characteristics, the unit costs as a function of the efficiency of the equipment.

Moreover, different estimations of the removal efficiencies (nominal, monitored, GAINS Model) had been compared, revealing some significant differences.

22. The technical secretariat of the Expert Group presented the document "VOC monitoring issues in the Gothenburg Annex VI" which it had developed. "The document aimed at providing detailed answers to requests for clarification raised during the two latest Working Group sessions, on how to control and monitor emissions of volatile organic compounds (VOCs), due to the heterogeneous nature of these compounds and the impossibility to monitor each of them simultaneously. An ad-hoc informal document had been prepared on such issues and submitted to the Convention secretariat. Exhaustive explanations were provided in the document. The Expert Group was seeking contributions, even in kind, to making the document available in Russian.

B. Estimation of the costs of reduction techniques associated with the options proposed by the Expert Group in the draft revised annexes to the Gothenburg Protocol (item 1.5 (b) of the 2011 workplan)

23. A representative of CONCAWE presented an update of the cost analysis for the refinery sector. Starting from a document publicly available on the CONCAWE website (document CONCAWE 6/11), the analysis had shown revised costs for Sulphur Recovery Units (SRU), based upon operational data from CONCAWE's 2006 sulphur survey and member company mid-range cost data, and compared with the "policy shadow price" derived from European Union Thematic Strategy on Air Pollution. Implications for existing installations have been then analyzed.

C. Methodology for Large Combustion Plants (items 1.5 (d) and 1.5 (e) of the 2011 workplan and items 1.4(d) and (e) of the 2012-13 workplan)

24. The French co-Chair of the Expert Group reported on the outcome of the first meeting dedicated to LCPs, held in Paris on 11 October 2011. As previously planned, the work would be concluded in 2012. The next steps planned were:

(a) Update of costs of investment on the basis of collected information for installation larger than 500 MWth;

(b) Extension to 50 to 500 MWth range installations, to other fuels, such as biomass, and gas turbines;

(c) Update of operating costs if necessary.

25. The second meeting took place on 31 January 2012.

26. At its twenty-first meeting, the French co-Chair and the technical secretariat of the Expert Group reported about the state of progress of the work, which can be summarized as:

(a) Investments and parameters for operating costs are currently being discussed by experts;

(b) A questionnaire had been developed to collect investment data and useful operating parameters. Answers to questionnaires were expected by mid-September 2012;

(c) The organization of the EXCEL tool had begun;

(d) The next meeting was planned for 22 November 2012 in Paris, France.

The final document would be made available for the revision of the LCP BREF document, in progress by the Technical Working Group of the Institute for Prospective Technological Studies (IPTS) in Seville.

D. Improving the representation of large combustion plants and the steel industry sector in the GAINS model (item 1.5 (c) of the 2011 workplan and item 1.4(c) of the 2012-13 workplan)

27. The French co-Chair informed the Expert Group about the progress in the cooperation with International Institute for Applied Systems Analysis (IIASA) for a better representation of LCPs and the steel industry sector in the GAINS Model. A technical meeting with the IIASA experts took place at IIASA headquarters on 28 February 2012.

28. At the twenty-first meeting of the Expert Group, a representative from EUROFER reported on the achievements of the cooperation with IIASA. The joint work had resulted successfully in a better re-definition of the sector. The GAINS model included a re-definition of abatement techniques, emission factors and removal efficiency of the described techniques, ultimately allowing for a better calculation of emissions from that sector.

E. Work on emerging technologies in LCPs lower than 500 MWth (items 1.5 (a) and 1.5 (g) of the 2011 workplan and items 1.4(a) of the 2012-13 workplan)

29. The Chair of the Sub-group on Emerging Technologies for LCPs with a thermal input between 50 and 500 MWth (EmTech50-500 Sub-group) presented the conclusions of the work and the final report at the twenty-first meeting of the Expert Group[3]. Data were provided by several national and industrial experts and an assessment had been carried out for 26 emerging techniques and technologies. In the report, each technology was described in a fact sheet, providing information on the following criteria: potential, status of research, status of implementation, description, achieved environmental benefits, applicability, operational data, economics, driving force for implementation and a selection of reference literature. All technologies were graphically summarized according to their status of development and to their pollutant emission reduction potential and with simple boxes with qualitative indications. The final report had been circulated to the Expert Group members, for final approval by mid-2012, and will be made available for the fiftieth session of the Working Group of Strategies and Review. The final report will also be made available for the BREF Document revision on LCPs by the Technical Working Group of the Institute for Prospective Technological Studies (IPTS) Seville. The work, chaired by ADEME, had been carried out in cooperation with the Karlsruhe Institute of Technology, experts from national administrations and industry

F. Update of the guidance document of the Gothenburg Protocol with information on black carbon (item 1.5 (h) of the 2011 workplan)

30. The technical secretariat of the Expert Group reported on information available on black carbon to be included in the guidance document of the Gothenburg Protocol on

[3] The report is available on the web site of the Convention, among the informal documents for the 50th session of WGSR at: http://www.unece.org/index.php?id=29873

stationary sources. The new information available originated from work carried out by the Centre for Integrated Assessment Modelling, at IIASA, the Ad Hoc Expert Group on Black Carbon, the Swiss Federal Office for the Environment, US Environmental Protection Agency, Arctic Council Task Force on Short Lived Climate Forcers and UNEP/WMO (Integrated Assessment of Black Carbon and Tropospheric Ozone report). A survey of sources involved had been presented, related with residential combustion, mainly biomass combustion, the transport sector, off-road machinery, agricultural residues, shipping, industry, tertiary, power generation small combustion. The efficiency of dust reduction techniques (electrostatic precipitators and fabric filters) had also been discussed.

31. The following updates had been introduced in the respective chapters of the guidance document on stationary sources:

(a) Chapter 1 Some definitions had been updated to be coherent with the text of the amended Gothenburg Protocol, black carbon definition added, main sources of black carbon cited.

(b) Chapter 6 “general issues for dust” had been updated with information on emissions of black carbon, the sources and the rates of emissions. Complementary information was provided on the chapters “Combustion techniques and optimization” “Reduction techniques for dust” with information on the efficiency for black carbon;

(c) Chapter 7.1 “combustion installations < 1 MW with domestic combustion installation included” (update already done by Switzerland);

(d) Chapter 7.2 Combustion installations between 1 to 50 MW;

(e) Chapter 7.3 Combustion installation larger 50 MW;

(f) Chapter 7.4 Mineral oil and gas refineries for SO2, NOx and dust emissions (flare);

(g) Chapters 7.6 to 7.9 related to ferrous and non-ferrous metal processing;

(h) Chapters 7.10 to 7.14 related to mineral industry (cement, glass…);

(i) Chapter 7.15 Pulp production;

(j) Chapter 7.42 New stationary engines (diesel engines).

32. The updates had been circulated within the Expert Group members. A number of comments had been received and illustrated at the twenty-first meeting of the Expert Group. The comments had been taken in due consideration for inclusion in the final revised version of the Guidance Documents to be submitted to the Convention Secretariat, by the end of June, for consideration of the Working Group on Strategies and Review, at its fiftieth session in September 2012.

G. Expert Group methodology for comparison between the Annex emission limit values (ELVs) and the emission scenarios developed by the GAINS Model (referred as “new activities in the 2011 workplan)

33. The Italian co-Chair of the Expert Group presented the developed ad-hoc methodology to compare the ELVs expressed in the Annexes to the Gothenburg Protocol, with the effects of such ELVs on the Emission Scenario calculated by the GAINS Model, in terms of emission reductions and costs, for what concerns the dust (TSP) emissions from the power plant sector. The methodology had been successfully applied by some Parties, including France, Italy, Spain, United Kingdom, Belarus. Recently, it had been decided to focus the application on countries in Eastern Europe, the Caucasus and Central Asia. A

demonstration application analysis for Poland could not be completed due to inconsistencies in some parameters (e.g. emission factors for abatements technologies for coal-fired plants). The analysis will be carried out again, as those parameters would be checked with the support of the national experts. A similar application of the GAINS model methodology is under consideration for Belarus, building on bilateral contacts.

III. Next Meeting

34. The Expert Group will hold its twenty-second meeting in 2013, in Saint Petersburg, Russian Federation, hosted by the Scientific Research Institute for Atmospheric Air Protection on a date to be defined.