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Executive Body for the Convention on Long-range Transboundary Air Pollution

1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to the Convention on Long-range Transboundary Air Pollution, as amended on 4 May 2012

Summary

On 4 May 2012 the Parties to the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol) to the Convention on Long-range Transboundary Air Pollution, meeting within the thirtieth session of the Executive Body (30 April–4 May 2012), adopted decisions to amend the Protocol and its annexes, as follows:

(a) Decision 2012/1 on amendment of annex I to the Protocol;

(b) Decision 2012/2 on amendment of the text of and annexes II to IX to the Protocol and the addition of new annexes X and XI;

(see ECE/EB.AIR/111/Add.1).

The Parties to the Gothenburg Protocol invited the secretariat to deposit the adopted amendments to the Protocol with the Secretary-General of the United Nations by forwarding them to the Treaty Section of the United Nations Office of Legal Affairs (ECE/EB.AIR/111, para. 22).

The amendments were communicated to Parties on 7 March 2013 and 28 February 2013 respectively (C.N.171.2013.TREATIES-XXVII.1.h and C.N.155.2013.TREATIES-XXVII.1.h), and the Treaty Section invited Parties to deposit their instruments of acceptance for the entry into force of the amendments. In accordance with article 13, paragraph 4, of the Protocol, the amendments to annex I will enter into force automatically on the expiry of 90 days after the date of its communication, i.e. on 5 June 2013, for those Parties that have not indicated an objection upon notification to the Depositary. In line with article 13, paragraph 3, of the Protocol, the amendments to the text of the Protocol and its annexes II to IX and the addition of new annexes X and XI require ratifications by two thirds of the Parties.

The Executive Body at its thirty-first session mandated the secretariat to produce a consolidated text of the Protocol and its annexes, as amended (ECE/EB.AIR/113). This document has been compiled by the secretariat and is not the certified true copy. It contains minor editorial changes. In case of any discrepancy between the consolidated text and the amendments contained in the document ECE/EB.AIR/111/Add.1, the latter document prevails.

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The Parties,

Determined to implement the Convention on Long-range Transboundary Air Pollution,

Aware that nitrogen oxides, sulphur, volatile organic compounds, reduced nitrogen compounds and particulate matter have been associated with adverse effects on human health and the environment,

Concerned that critical loads of acidification, critical loads of nutrient nitrogen and critical levels of ozone and particulate matter for human health and vegetation are still exceeded in many areas of the United Nations Economic Commission for Europe's region,

Concerned also that emitted nitrogen oxides, sulphur, volatile organic compounds, ammonia and directly emitted particulate matter, as well as secondarily formed pollutants such as ozone, particulate matter and the reaction products of ammonia, are transported in the atmosphere over long distances and may have adverse transboundary effects,

Recognizing the assessments of scientific knowledge by international organizations, such as the United Nations Environment Programme, and by the Arctic Council, about the human health and climate co-benefits of reducing black carbon and ground-level ozone, particularly in the Arctic and in the Alpine regions,

Recognizing that emissions from Parties within the United Nations Economic Commission for Europe's region contribute to air pollution on the hemispheric and global scales, and recognizing the potential for transport between continents and the need for further study with regard to that potential,

Recognizing also that Canada and the United States of America are bilaterally addressing cross-border air pollution under the Canada-United States Air Quality Agreement, which includes commitments by both countries to reduce emissions of sulphur dioxide, nitrogen oxides and volatile organic compounds, and that the two countries are considering the inclusion of commitments to reduce emissions of particulate matter,

Recognizing furthermore that Canada is committed to achieving reductions of sulphur dioxide, nitrogen oxides, volatile organic compounds and particulate matter to meet the Canadian Ambient Air Quality Standards for ozone and particulate matter and the national objective to reduce acidification, and that the United States is committed to the implementation of programmes to reduce emissions of nitrogen oxides, sulphur dioxide, volatile organic compounds and particulate matter necessary to meet national ambient air quality standards for ozone and particulate matter, to make continued progress in reducing acidification and eutrophication effects and to improve visibility in national parks and urban areas alike,

Resolved to apply a multi-effect, multi-pollutant approach to preventing or minimizing the exceedances of critical loads and levels,

Taking into account the scientific knowledge about the hemispheric transport of air pollution, the influence of the nitrogen cycle and the potential synergies with and trade-offs between air pollution and climate change,

Aware that emissions from shipping and aviation contribute significantly to adverse effects on human health and the environment and are important issues under consideration by the International Maritime Organization and the International Civil Aviation Organization,

Resolved to take measures to anticipate, prevent or minimize emissions of these substances, taking into account the application of the precautionary approach as set forth in principle 15 of the Rio Declaration on Environment and Development, *Reaffirming* that States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction,

Conscious of the need for a cost-effective regional approach to combating air pollution that takes account of the variations in effects and abatement costs between countries,

Noting the important contribution of the private and non-governmental sectors to knowledge of the effects associated with these substances and available abatement techniques, and their role in assisting in the reduction of emissions to the atmosphere,

Bearing in mind that measures taken to reduce emissions of sulphur, nitrogen oxides, ammonia, volatile organic compounds and particulate matter should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international competition and trade,

Taking into consideration best available scientific and technical knowledge and data on emissions, atmospheric processes and effects on human health and the environment of these substances, as well as on abatement costs, and acknowledging the need to improve this knowledge and to continue scientific and technical cooperation to further understanding of these issues,

Noting that under the Protocol concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes, adopted at Sofia on 31 October 1988, and the Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes, adopted at Geneva on 18 November 1991, there is already provision to control emissions of nitrogen oxides and volatile organic compounds, and that the technical annexes to both those Protocols already contain technical guidance for reducing these emissions,

Noting also that under the Protocol on Further Reduction of Sulphur Emissions, adopted at Oslo on 14 June 1994, there is already provision to reduce sulphur emissions in order to contribute to the abatement of acid deposition by diminishing the exceedances of critical sulphur depositions, which have been derived from critical loads of acidity according to the contribution of oxidized sulphur compounds to the total acid deposition in 1990,

Noting furthermore that this Protocol is the first agreement under the Convention to deal specifically with reduced nitrogen compounds and particulate matter, including black carbon,

Noting that measures taken to reduce the emissions of nitrogen oxides and reduced nitrogen compounds should involve consideration of the full biogeochemical nitrogen cycle and, so far as possible, not increase emissions of reactive nitrogen, including nitrous oxide and nitrate levels in ecosystems, which could aggravate other nitrogen-related problems,

Aware that methane and carbon monoxide emitted by human activities contribute, in the presence of nitrogen oxides and volatile organic compounds, to the formation of ground-level ozone, and

Aware also of the commitments that Parties have assumed under the United Nations Framework Convention on Climate Change,

Have agreed as follows:

Article 1
Definitions

For the purposes of the present Protocol:

1. “Convention” means the Convention on Long-range Transboundary Air Pollution, adopted at Geneva on 13 November 1979;

1 bis. The terms “this Protocol”, “the Protocol” and “the present Protocol” mean the 1999 Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone, as amended from time to time;

2. “EMEP” means the Cooperative Programme for Monitoring and Evaluation of Long-range Transmission of Air Pollutants in Europe;

3. “Executive Body” means the Executive Body for the Convention constituted under article 10, paragraph 1, of the Convention;

4. “Commission” means the United Nations Economic Commission for Europe;

5. “Parties” means, unless the context otherwise requires, the Parties to the present Protocol;

6. “Geographical scope of EMEP” means the area defined in article 1, paragraph 4, of the Protocol to the 1979 Convention on Long-range Transboundary Air Pollution on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP), adopted at Geneva on 28 September 1984;

7. “Emission” means the release of a substance from a point or diffuse source into the atmosphere;

8. “Nitrogen oxides” means nitric oxide and nitrogen dioxide, expressed as nitrogen dioxide (NO_2);

9. “Reduced nitrogen compounds” means ammonia and its reaction products, expressed as ammonia (NH_3);

10. “Sulphur” means all sulphur compounds, expressed as sulphur dioxide (SO_2);

11. “Volatile organic compounds”, or “VOCs”, means, unless otherwise specified, all organic compounds of an anthropogenic nature, other than methane, that are capable of producing photochemical oxidants by reaction with nitrogen oxides in the presence of sunlight;

11 bis. “Particulate matter” or “PM” is an air pollutant consisting of a mixture of particles suspended in the air. These particles differ in their physical properties (such as size and shape) and chemical composition. Unless otherwise stated, all references to particulate matter in the present Protocol refer to particles with an aerodynamic diameter equal to or less than 10 microns (µm) (PM_{10}), including those with an aerodynamic diameter equal to or less than 2.5 µm ($PM_{2.5}$);

11 ter. “Black carbon” means carbonaceous particulate matter that absorbs light;

11 quater. “Ozone precursors” means nitrogen oxides, volatile organic compounds, methane and carbon monoxide;

12. “Critical load” means a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur, according to present knowledge;

13. “Critical levels” means concentrations of pollutants in the atmosphere or fluxes to receptors above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur, according to present knowledge;

14. “Pollutant emissions management area”, or “PEMA”, means an area designated in annex III under the conditions laid down in article 3, paragraph 9;

15. “Stationary source” means any fixed building, structure, facility, installation or equipment that emits or may emit sulphur, nitrogen oxides, volatile organic compounds, ammonia or particulate matter directly or indirectly into the atmosphere;

16. “New stationary source” means any stationary source of which the construction or substantial modification is commenced after the expiry of one year from the date of entry into force for a Party of the present Protocol. A Party may decide not to treat as a new stationary source any stationary source for which approval has already been given by the appropriate competent national authorities at the time of entry into force of the Protocol for that Party and provided that the construction or substantial modification is commenced within five years of that date. It shall be a matter for the competent national authorities to decide whether a modification is substantial or not, taking account of such factors as the environmental benefits of the modification.

Article 2
Objective

1. The objective of the present Protocol is to control and reduce emissions of sulphur, nitrogen oxides, ammonia, volatile organic compounds and particulate matter that are caused by anthropogenic activities and are likely to cause adverse effects on human health and the environment, natural ecosystems, materials, crops and the climate in the short and long term, due to acidification, eutrophication , particulate matter or ground-level ozone as a result of long-range transboundary atmospheric transport, and to ensure, as far as possible, that in the long term and in a stepwise approach, taking into account advances in scientific knowledge, atmospheric depositions or concentrations do not exceed:

(a) For Parties within the geographical scope of EMEP and Canada, the critical loads of acidity, as described in annex I, that allow ecosystem recovery;

(b) For Parties within the geographical scope of EMEP, the critical loads of nutrient nitrogen, as described in annex I, that allow ecosystem recovery;

(c) For ozone:

(i) For Parties within the geographical scope of EMEP, the critical levels of ozone, as given in annex I;

(ii) For Canada, the Canadian Ambient Air Quality Standard for ozone; and

(iii) For the United States of America, the National Ambient Air Quality Standards for ozone;

(d) For particulate matter:

(i) For Parties within the geographical scope of EMEP, the critical levels of particulate matter, as given in annex I;

(ii) For Canada, the Canadian Ambient Air Quality Standards for particulate matter; and

(iii) For the United States of America, the National Ambient Air Quality Standards for particulate matter;

(e) For Parties within the geographical scope of EMEP, the critical levels of ammonia, as given in annex I; and

(f) For Parties within the geographical scope of EMEP, the acceptable levels of air pollutants to protect materials, as given in annex I.

2. A further objective is that Parties should, in implementing measures to achieve their national targets for particulate matter, give priority, to the extent they consider appropriate, to emission reduction measures which also significantly reduce black carbon in order to provide benefits for human health and the environment and to help mitigation of near-term climate change.

Article 3
Basic obligations

1. Each Party having an emission reduction commitment in any table in annex II shall reduce and maintain the reduction in its annual emissions in accordance with that commitment and the timescales specified in that annex. Each Party shall, as a minimum, control its annual emissions of polluting compounds in accordance with the obligations in annex II. In taking steps to reduce emissions of particulate matter, each Party should seek reductions from those source categories known to emit high amounts of black carbon, to the extent it considers appropriate.

2. Subject to paragraphs 2 bis and 2 ter, each Party shall apply the limit values specified in annexes IV, V, VI and X to each new stationary source within a stationary source category as identified in those annexes, no later than the timescales specified in annex VII. As an alternative, a Party may apply different emission reduction strategies that achieve equivalent overall emission levels for all source categories together.

2 bis. A Party that was already a Party to the present Protocol prior to entry into force of an amendment that introduces new source categories may apply the limit values applicable to an “existing stationary source” to any source in such a new category the construction or substantial modification of which is commenced before the expiry of one year from the date of entry into force of that amendment for that Party, unless and until that source later undergoes substantial modification.

2 ter. A Party that was already a Party to the present Protocol prior to entry into force of an amendment that introduces new limit values applicable to a “new stationary source” may continue to apply the previously applicable limit values to any source the construction or substantial modification of which is commenced before the expiry of one year from the date of entry into force of that amendment for that Party, unless and until that source later undergoes substantial modification.

3. Each Party shall, insofar as it is technically and economically feasible and taking into consideration the costs and advantages, apply the limit values specified in annexes IV, V, VI and X to each existing stationary source within a stationary source category as identified in those annexes, no later than the timescales specified in annex VII. As an alternative, a Party may apply different emission reduction strategies that achieve equivalent overall emission levels for all source categories together or, for Parties outside the geographical scope of EMEP, that are necessary to achieve national or regional goals for acidification abatement and to meet national air quality standards.

4. [Paragraph 4 has been deleted in the revised Protocol.]

5. Each Party shall apply the limit values for the fuels and new mobile sources identified in annex VIII no later than the timescales specified in annex VII.

6. Each Party should apply best available techniques to mobile sources covered by annex VIII and to each stationary source covered by annexes IV, V, VI and X, and, as it considers appropriate, measures to control black carbon as a component of particulate matter, taking into account guidance adopted by the Executive Body.

7. Each Party shall, insofar as it is technically and economically feasible, and taking into consideration the costs and advantages, apply the limit values for VOC contents of products as identified in annex XI in accordance with the timescales specified in annex VII.

8. Each Party shall, subject to paragraph 10:

(a) Apply, as a minimum, the ammonia control measures specified in annex IX; and

(b) Apply, where it considers it appropriate, best available techniques for preventing and reducing ammonia emissions, as listed in guidance adopted by the Executive Body. Special attention should be given to reductions of ammonia emissions from significant sources of ammonia for that Party.

9. Paragraph 10 shall apply to any Party:

(a) Whose total land area is greater than 2 million square kilometres;

(b) Whose annual emissions of sulphur, nitrogen oxides, ammonia, volatile organic compounds and/or particulate matter contributing to acidification, eutrophication, ozone formation or increased levels of particulate matter in areas under the jurisdiction of one or more other Parties originate predominantly from within an area under its jurisdiction that is listed as a PEMA in annex III, and which has presented documentation in accordance with subparagraph (c) to this effect;

(c) Which has submitted upon signature, ratification, acceptance or approval of, or accession to, the present Protocol a description of the geographical scope of one or more PEMAs for one or more pollutants, with supporting documentation, for inclusion in annex III; and

(d) Which has specified upon signature, ratification, acceptance or approval of, or accession to, the present Protocol its intention to act in accordance with this paragraph.

10. A Party to which this paragraph applies shall:

(a) If within the geographical scope of EMEP, be required to comply with the provisions of this article and annex II only within the relevant PEMA for each pollutant for which a PEMA within its jurisdiction is included in annex III; or

(b) If not within the geographical scope of EMEP, be required to comply with the provisions of paragraphs 1, 2, 3, 5, 6 and 7 and annex II, only within the relevant PEMA for each pollutant (nitrogen oxides, sulphur, volatile organic compounds and/or particulate matter) for which a PEMA within its jurisdiction is included in annex III, and shall not be required to comply with paragraph 8 anywhere within its jurisdiction.

11. Canada and the United States of America shall, upon ratification, acceptance or approval of, or accession to the present Protocol or the amendment contained in decision 2012/2 submit to the Executive Body their respective emission reduction commitments with respect to sulphur, nitrogen oxides, volatile organic compounds and particulate matter for automatic incorporation into annex II.

11 bis. Canada shall also upon ratification, acceptance or approval of, or accession to the present Protocol, submit to the Executive Body relevant limit values for automatic incorporation into annexes IV, V, VI, VIII, X and XI.

11 ter. Each Party shall develop and maintain inventories and projections for the emissions of sulphur dioxide, nitrogen oxides, ammonia, volatile organic compounds, and particulate matter. Parties within the geographic scope of EMEP shall use the methodologies specified in guidelines prepared by the Steering Body of EMEP and adopted by the Parties at a session of the Executive Body. Parties in areas outside the geographic scope of EMEP shall use as guidance the methodologies developed through the workplan of the Executive Body.

11 quater. Each Party should actively participate in programmes under the Convention on the effects of air pollution on human health and the environment.

11 quinquies. For the purposes of comparing national emission totals with emission reduction commitments as set out in paragraph 1, a Party may use a procedure specified in a decision of the Executive Body. Such a procedure shall include provisions on the submission of supporting documentation and on review of the use of the procedure.

12. The Parties shall, subject to the outcome of the first review provided for under article 10, paragraph 2, and no later than one year after completion of that review, commence negotiations on further obligations to reduce emissions.

Article 3 bis
Flexible transitional arrangements

1. Notwithstanding article 3, paragraphs 2, 3, 5 and 6, a Party to the Convention that becomes a Party to the present Protocol between 1 January 2013 and 31 December 2019 may apply flexible transitional arrangements for the implementation of limit values specified in annexes VI and/or VIII under the conditions specified in this article.

2. Any Party electing to apply the flexible transitional arrangements under this article shall indicate in its instrument of ratification, acceptance or approval of or accession to the present Protocol the following:

(a) The specific provisions of annex VI and/or VIII for which the Party is electing to apply flexible transitional arrangements; and

(b) An implementation plan identifying a timetable for full implementation of the specified provisions.

3. An implementation plan under paragraph 2 (b) shall, at a minimum, provide for implementation of the limit values for new and existing stationary sources specified in tables 1 and 5 of annex VI and tables 1, 2, 3, 13 and 14 of annex VIII no later than eight years after entry into force of the present Protocol for the Party, or by 31 December 2022, whichever is sooner.

4. In no case may a Party’s implementation of any limit values for new and existing stationary sources specified in annex VI or annex VIII be postponed past 31 December 2030.

5. A Party electing to apply the flexible transitional arrangements under this article shall provide the Executive Secretary of the Commission with a triennial report of its progress towards implementation of annex VI and/or annex VIII. The Executive Secretary of the Commission will make such triennial reports available to the Executive Body.

Article 4
Exchange of information and technology

1. Each Party shall, in a manner consistent with its laws, regulations and practices and in accordance with its obligations in the present Protocol, create favourable conditions to facilitate the exchange of information, technologies and techniques, with the aim of reducing emissions of sulphur, nitrogen oxides, ammonia, volatile organic compounds and particulate matter, including black carbon, by promoting, inter alia:

(a) The development and updating of databases on best available techniques, including those that increase energy efficiency, low-emission burners, good environmental practice in agriculture and measures that are known to mitigate emissions of black carbon as a component of particulate matter;

(b) The exchange of information and experience in the development of less polluting transport systems;

(c) Direct industrial contacts and cooperation, including joint ventures; and

(d) The provision of technical assistance.

2. In promoting the activities specified in paragraph 1, each Party shall create favourable conditions for the facilitation of contacts and cooperation among appropriate organizations and individuals in the private and public sectors that are capable of providing technology, design and engineering services, equipment or finance.

Article 5
Public awareness

1. Each Party shall, in a manner consistent with its laws, regulations and practices, promote the provision of information to the general public, including information on:

(a) National annual emissions of sulphur, nitrogen oxides, ammonia, volatile organic compounds and particulate matter, including black carbon, and progress towards compliance with the emission reduction commitments and other obligations referred to in article 3;

(b) Depositions and concentrations of the relevant pollutants and, where applicable, these depositions and concentrations in relation to critical loads and levels referred to in article 2;

(c) Levels of ground-level ozone and particulate matter;

(d) Strategies and measures applied or to be applied to reduce air pollution problems dealt with in the present Protocol and set out in article 6; and

(e) The environmental and human health improvements associated with attaining emission reduction commitments for 2020 and beyond as listed in annex II. For countries within the geographical scope of EMEP, information on such improvements will be presented in guidance adopted by the Executive Body.

2. Furthermore, each Party may make information widely available to the public with a view to minimizing emissions, including information on:

(a) Less polluting fuels, renewable energy and energy efficiency, including their use in transport;

(b) Volatile organic compounds in products, including labelling;

(c) Management options for wastes containing volatile organic compounds that are generated by the public;

(d) Good agricultural practices to reduce emissions of ammonia;

(e) Human health, environmental and climate effects associated with reduction of the pollutants covered by the present Protocol; and

(f) Steps which individuals and industries may take to help reduce emissions of the pollutants covered by the present Protocol.

Article 6
Strategies, policies, programmes, measures and information

1. Each Party shall, as necessary and on the basis of sound scientific and economic criteria, in order to facilitate the implementation of its obligations under article 3:

(a) Adopt supporting strategies, policies and programmes without undue delay after the present Protocol enters into force for it;

(b) Apply measures to control and reduce its emissions of sulphur, nitrogen oxides, ammonia, volatile organic compounds and particulate matter;

(c) Apply measures to encourage the increase of energy efficiency and the use of renewable energy;

(d) Apply measures to decrease the use of polluting fuels;

(e) Develop and introduce less polluting transport systems and promote traffic management systems to reduce overall emissions from road traffic;

(f) Apply measures to encourage the development and introduction of low-polluting processes and products, taking into account guidance adopted by the Executive Body;

(g) Encourage the implementation of management programmes to reduce emissions, including voluntary programmes, and the use of economic instruments, taking into account guidance adopted by the Executive Body;

(h) Implement and further elaborate policies and measures in accordance with its national circumstances, such as the progressive reduction or phasing-out of market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all sectors that emit sulphur, nitrogen oxides, ammonia, volatile organic compounds and particulate matter which run counter to the objective of the Protocol, and apply market instruments; and

(i) Apply measures, where cost-effective, to reduce emissions from waste products containing volatile organic compounds.

2. Each Party shall collect and maintain information on:

(a) Ambient concentrations and depositions of sulphur and nitrogen compounds;

(b) Ambient concentrations of ozone, volatile organic compounds and particulate matter; and

(c) If practicable, estimates of exposure to ground-level ozone and particulate matter.

Each Party shall, if practicable, also collect and maintain information on the effects of all of these pollutants on human health, terrestrial and aquatic ecosystems, materials and the climate. Parties within the geographic scope of EMEP should use guidelines adopted by the

Executive Body. Parties outside the geographic scope of EMEP should use as guidance the methodologies developed through the workplan of the Executive Body.

2 bis. Each Party should, to the extent it considers appropriate, also develop and maintain inventories and projections for emissions of black carbon, using guidelines adopted by the Executive Body.

3. Any Party may take more stringent measures than those required by the present Protocol.

Article 7
Reporting

1. Subject to its laws and regulations and in accordance with its obligations under the present Protocol:

(a) Each Party shall report, through the Executive Secretary of the Commission, to the Executive Body, on a periodic basis as determined by the Parties at a session of the Executive Body, information on the measures that it has taken to implement the present Protocol. Moreover:

(i) Where a Party applies different emission reduction strategies under article 3, paragraphs 2 and 3, it shall document the strategies applied and its compliance with the requirements of those paragraphs;

(ii) Where a Party judges certain limit values, as specified in accordance with article 3, paragraphs 3 and 7, not to be technically and economically feasible, taking into consideration the costs and advantages, it shall report and justify this;

(b) Each Party within the geographical scope of EMEP shall report to EMEP through the Executive Secretary of the Commission the following information for the emissions of sulphur dioxide, nitrogen oxides, ammonia, volatile organic compounds and particulate matter on the basis of guidelines prepared by the Steering Body of EMEP and adopted by the Executive Body:

(i) Levels of emissions using, as a minimum, the methodologies and the temporal and spatial resolution specified by the Steering Body of EMEP;

(ii) Levels of emissions in the reference year specified in annex II using the same methodologies and temporal and spatial resolution;

(iii) Data on projected emissions; and

(iv) An Informative Inventory Report containing detailed information on reported emission inventories and emission projections;

(b bis) Each Party within the geographical scope of EMEP should report available information to the Executive Body, through the Executive Secretary of the Commission, on its air pollution effects programmes on human health and the environment and atmospheric monitoring and modelling programmes under the Convention, using guidelines adopted by the Executive Body;

(c) Parties in areas outside the geographical scope of EMEP shall report available information on levels of emissions, including for the reference year as specified in annex II and appropriate to the geographic area covered by its emission reduction commitments. Parties in areas outside the geographical scope of EMEP should make available information similar to that specified in subparagraph (b bis), if requested to do so by the Executive Body;

(d) Each Party should also report, where available, its emissions inventories and projections for emissions of black carbon, using guidelines adopted by the Executive Body.

2. The information to be reported in accordance with paragraph 1 (a) shall be in conformity with a decision regarding format and content to be adopted by the Parties at a session of the Executive Body. The terms of this decision shall be reviewed as necessary to identify any additional elements regarding the format or the content of the information that is to be included in the reports.

3. Upon the request of and in accordance with the timescales decided by the Executive Body, EMEP and other subsidiary bodies shall provide the Executive Body with relevant information on:

(a) Ambient concentrations and depositions of sulphur and nitrogen compounds, as well as, where available, ambient concentrations of particulate matter, including black carbon, volatile organic compounds and ozone;

(b) Calculations of sulphur and oxidized and reduced nitrogen budgets and relevant information on the long-range transport of particulate matter, ground-level ozone and their precursors;

(c) Adverse effects on human health, natural ecosystems, materials and crops, including interactions with climate change and the environment related to the substances covered by the present Protocol, and progress in achieving human health and environmental improvements as described in guidance adopted by the Executive Body; and

(d) The calculation of nitrogen budgets, nitrogen use efficiency and nitrogen surpluses and their improvements within the geographical area of EMEP, using guidance adopted by the Executive Body.

4. The Executive Body shall, in accordance with article 10, paragraph 2 (b), of the Convention, arrange for the preparation of information on the effects of depositions of sulphur and nitrogen compounds and concentrations of ozone and particulate matter.

5. The Parties shall, at sessions of the Executive Body, arrange for the preparation, at regular intervals, of revised information on calculated and internationally optimized allocations of emission reductions for the States within the geographical scope of EMEP, using integrated assessment models, including atmospheric transport models, with a view to reducing further, for the purposes of article 3, paragraph 1, the difference between actual depositions of sulphur and nitrogen compounds and critical load values, as well as the difference between actual ozone and particulate matter concentrations and the critical levels of ozone and particulate matter specified in annex I, or such alternative assessment methods as approved by the Parties at a session of the Executive Body.

6. Notwithstanding article 7, paragraph 1 (b), a Party may request the Executive Body for permission to report a limited inventory for a particular pollutant or pollutants if:

(a) The Party did not previously have reporting obligations under the present Protocol or any other protocol for that pollutant; and

(b) The limited inventory of the Party includes, at a minimum, all large point sources of the pollutant or pollutants within the Party or any relevant PEMA.

The Executive Body shall grant such a request annually for up to five years after entry into force of the present Protocol for a Party, but in no case for reporting of emissions for any year after 2019. Such a request will be accompanied by information on progress toward developing a more complete inventory as part of the Party’s annual reporting.

Article 8
Research, development and monitoring

1. The Parties shall encourage research, development, monitoring and cooperation related to:

(a) The international harmonization of methods for the calculation and assessment of the adverse effects associated with the substances addressed by the present Protocol for use in establishing critical loads and critical levels and, as appropriate, the elaboration of procedures for such harmonization;

(b) The improvement of emission databases, in particular those on particulate matter, including black carbon, ammonia and volatile organic compounds;

(c) The improvement of monitoring techniques and systems and of the modelling of transport, concentrations and depositions of sulphur, nitrogen compounds, volatile organic compounds and particulate matter, including black carbon, as well as of the formation of ozone and secondary particulate matter;

(d) The improvement of the scientific understanding of the long-term fate of emissions and their impact on the hemispheric background concentrations of sulphur, nitrogen, volatile organic compounds, ozone and particulate matter, focusing, in particular, on the chemistry of the free troposphere and the potential for intercontinental flow of pollutants;

(d bis) The improvement of the scientific understanding of the potential co-benefits for climate change mitigation associated with potential reduction scenarios for air pollutants (such as methane, carbon monoxide and black carbon) which have near-term radiative forcing and other climate effects;

(e) The further elaboration of an overall strategy to reduce the adverse effects of acidification, eutrophication, photochemical pollution and particulate matter, including synergisms and combined effects;

(f) Strategies for the further reduction of emissions of sulphur, nitrogen oxides, ammonia, volatile organic compounds and other ozone precursors, and particulate matter based on critical loads and critical levels as well as on technical developments, and the improvement of integrated assessment modelling to calculate internationally optimized allocations of emission reductions, taking into account the need to avoid excessive costs for any Party. Special emphasis should be given to emissions from agriculture and transport;

(g) The identification of trends over time and the scientific understanding of the wider effects of sulphur, nitrogen, volatile organic compounds and particulate matter and photochemical pollution on human health, the environment, in particular acidification and eutrophication, and materials, especially historic and cultural monuments, taking into account the relationship between sulphur oxides, nitrogen oxides, ammonia, volatile organic compounds, particulate matter and ground-level ozone;

(h) Emission abatement technologies, and technologies and techniques to improve energy efficiency, energy conservation and the use of renewable energy;

(i) The efficacy of ammonia control techniques for farms and their impact on local and regional deposition;

(j) The management of transport demand and the development and promotion of less polluting modes of transport;

(k) The quantification and, where possible, economic evaluation of benefits for the environment, human health and the impacts on climate resulting from the reduction of emissions of sulphur, nitrogen oxides, ammonia, volatile organic compounds and particulate matter; and

(l) The development of tools for making the methods and results of this work widely applicable and available.

Article 9
Compliance

Compliance by each Party with its obligations under the present Protocol shall be reviewed regularly. The Implementation Committee established by decision 1997/2 of the Executive Body at its fifteenth session shall carry out such reviews and report to the Parties at a session of the Executive Body in accordance with the terms of the annex to that decision, including any amendments thereto.

Article 10
Reviews by the Parties at sessions of the Executive Body

1. The Parties shall, at sessions of the Executive Body, pursuant to article 10, paragraph 2 (a), of the Convention, review the information supplied by the Parties, EMEP and subsidiary bodies of the Executive Body, the data on the effects of concentrations and depositions of sulphur, nitrogen compounds and particulate matter and of photochemical pollution, as well as the reports of the Implementation Committee referred to in article 9 above.

2. (a) The Parties shall, at sessions of the Executive Body, keep under review the obligations set out in the present Protocol, including:

(i) Their obligations in relation to their calculated and internationally optimized allocations of emission reductions referred to in article 7, paragraph 5, above; and

(ii) The adequacy of the obligations and the progress made towards the achievement of the objective of the present Protocol;

(b) Reviews shall take into account the best available scientific information on the effects of acidification, eutrophication and photochemical pollution, including assessments of all relevant human health effects, climate co-benefits, critical levels and loads, the development and refinement of integrated assessment models, technological developments, changing economic conditions, progress made on the databases on emissions and abatement techniques, especially related to particulate matter, ammonia and volatile organic compounds, and the fulfilment of the obligations on emission levels;

(c) The procedures, methods and timing for such reviews shall be specified by the Parties at a session of the Executive Body. The first such review shall commence no later than one year after the present Protocol enters into force.

3. The Executive Body shall include in its reviews under this article an evaluation of mitigation measures for black carbon emissions, no later than at the second session of the Executive Body after entry into force of the amendment contained in decision 2012/2.

4. The Parties shall, no later than at the second session of the Executive Body after entry into force of the amendment contained in decision 2012/2, evaluate ammonia control measures and consider the need to revise annex IX.

Article 11
Settlement of disputes

1. In the event of a dispute between any two or more Parties concerning the interpretation or application of the present Protocol, the parties concerned shall seek a settlement of the dispute through negotiation or any other peaceful means of their own choice. The parties to the dispute shall inform the Executive Body of their dispute.

2. When ratifying, accepting, approving or acceding to the present Protocol, or at any time thereafter, a Party which is not a regional economic integration organization may declare in a written instrument submitted to the Depositary that, in respect of any dispute concerning the interpretation or application of the Protocol, it recognizes one or both of the following means of dispute settlement as compulsory ipso facto and without special agreement, in relation to any Party accepting the same obligation:

(a) Submission of the dispute to the International Court of Justice;

(b) Arbitration in accordance with procedures to be adopted by the Parties at a session of the Executive Body, as soon as practicable, in an annex on arbitration.

A Party which is a regional economic integration organization may make a declaration with like effect in relation to arbitration in accordance with the procedures referred to in subparagraph (b).

3. A declaration made under paragraph 2 shall remain in force until it expires in accordance with its terms or until three months after written notice of its revocation has been deposited with the Depositary.

4. A new declaration, a notice of revocation or the expiry of a declaration shall not in any way affect proceedings pending before the International Court of Justice or the arbitral tribunal, unless the parties to the dispute agree otherwise.

5. Except in a case where the parties to a dispute have accepted the same means of dispute settlement under paragraph 2, if after 12 months following notification by one party to another that a dispute exists between them the parties concerned have not been able to settle their dispute through the means mentioned in paragraph 1, the dispute shall be submitted, at the request of any of the parties to the dispute, to conciliation.

6. For the purpose of paragraph 5, a conciliation commission shall be created. The commission shall be composed of an equal number of members appointed by each party concerned or, where parties in conciliation share the same interest, by the group sharing that interest, and a chairperson chosen jointly by the members so appointed. The commission shall render a recommendatory award, which the parties to the dispute shall consider in good faith.

Article 12
Annexes

The annexes to the present Protocol shall form an integral part of the Protocol.

Article 13
Adjustments

1. Any Party to the Convention may propose an adjustment to annex II to the present Protocol to add to it its name, together with emission levels, emission ceilings and percentage emission reductions.

2. Any Party may propose an adjustment of its emission reduction commitments already listed in annex II. Such a proposal must include supporting documentation, and shall be reviewed, as specified in a decision of the Executive Body. This review shall take place prior to the proposal being discussed by the Parties in accordance with paragraph 4.

3. Any Party eligible under article 3, paragraph 9, may propose an adjustment to annex III to add one or more PEMAs or make changes to a PEMA under its jurisdiction that is listed in that annex.

4. Proposed adjustments shall be submitted in writing to the Executive Secretary of the Commission, who shall communicate them to all Parties. The Parties shall discuss the proposed adjustments at the next session of the Executive Body, provided that those proposals have been circulated by the Executive Secretary to the Parties at least 90 days in advance.

5. Adjustments shall be adopted by consensus of the Parties present at a session of the Executive Body and shall become effective for all Parties to the present Protocol on the ninetieth day following the date on which the Executive Secretary of the Commission notifies those Parties in writing of the adoption of the adjustment.

Article 13 bis
Amendments

1. Any Party may propose amendments to the present Protocol.

2. Proposed amendments shall be submitted in writing to the Executive Secretary of the Commission, who shall communicate them to all Parties. The Parties shall discuss the proposed amendments at the next session of the Executive Body, provided that those proposals have been circulated by the Executive Secretary to the Parties at least 90 days in advance.

3. Amendments to the present Protocol other than to annexes I and III shall be adopted by consensus of the Parties present at a session of the Executive Body, and shall enter into force for the Parties which have accepted them on the ninetieth day after the date on which two thirds of those that were Parties at the time of their adoption have deposited with the Depositary their instruments of acceptance thereof. Amendments shall enter into force for any other Party on the ninetieth day after the date on which that Party has deposited its instrument of acceptance thereof.

4. Amendments to annexes I and III to the present Protocol shall be adopted by consensus of the Parties present at a session of the Executive Body. On the expiry of 180 days from the date of its communication to all Parties by the Executive Secretary of the Commission, an amendment to any such annex shall become effective for those Parties which have not submitted to the Depositary a notification in accordance with the provisions of paragraph 5, provided that at least 16 Parties have not submitted such a notification.

5. Any Party that is unable to approve an amendment to annexes I and/or III shall so notify the Depositary in writing within 90 days from the date of the communication of its adoption. The Depositary shall without delay notify all Parties of any such notification

received. A Party may at any time substitute an acceptance for its previous notification and, upon deposit of an instrument of acceptance with the Depositary, the amendment to such an annex shall become effective for that Party.

6. For those Parties having accepted it, the procedure set out in paragraph 7 supersedes the procedure set out in paragraph 3 in respect of amendments to annexes IV to XI.

7. Amendments to annexes IV to XI shall be adopted by consensus of the Parties present at a session of the Executive Body. On the expiry of one year from the date of its communication to all Parties by the Executive Secretary of the Commission, an amendment to any such annex shall become effective for those Parties which have not submitted to the Depositary a notification in accordance with the provisions of subparagraph (a):

(a) Any Party that is unable to approve an amendment to annexes IV to XI shall so notify the Depositary in writing within one year from the date of the communication of its adoption. The Depositary shall without delay notify all Parties of any such notification received. A Party may at any time substitute an acceptance for its previous notification and, upon deposit of an instrument of acceptance with the Depositary, the amendment to such an annex shall become effective for that Party;

(b) Any amendment to annexes IV to XI shall not enter into force if an aggregate number of 16 or more Parties have either:

(i) Submitted a notification in accordance with the provisions of subparagraph (a); or

(ii) Not accepted the procedure set out in this paragraph and not yet deposited an instrument of acceptance in accordance with the provisions of paragraph 3.

Article 14
Signature

1. The present Protocol shall be open for signature at Gothenburg (Sweden) on 30 November and 1 December 1999, then at United Nations Headquarters in New York until 30 May 2000, by States members of the Commission as well as States having consultative status with the Commission, pursuant to paragraph 8 of Economic and Social Council resolution 36 (IV) of 28 March 1947, and by regional economic integration organizations, constituted by sovereign States members of the Commission, which have competence in respect of the negotiation, conclusion and application of international agreements in matters covered by the Protocol, provided that the States and organizations concerned are Parties to the Convention and are listed in annex II.

2. In matters within their competence, such regional economic integration organizations shall, on their own behalf, exercise the rights and fulfil the responsibilities which the present Protocol attributes to their member States. In such cases, the member States of these organizations shall not be entitled to exercise such rights individually.

Article 15
Ratification, acceptance, approval and accession

1. The present Protocol shall be subject to ratification, acceptance or approval by Signatories.

2. The present Protocol shall be open for accession as from 31 May 2000 by the States and organizations that meet the requirements of article 14, paragraph 1.

3. The instruments of ratification, acceptance, approval or accession shall be deposited with the Depositary.

4. A State or regional economic integration organization shall declare in its instrument of ratification, acceptance, approval or accession if it does not intend to be bound by the procedures set out in article 13 bis, paragraph 7, as regards the amendment of annexes IV to XI.

Article 16
Depositary

The Secretary-General of the United Nations shall be the Depositary.

Article 17
Entry into force

1. The present Protocol shall enter into force on the ninetieth day following the date on which the sixteenth instrument of ratification, acceptance, approval or accession has been deposited with the Depositary.

2. For each State and organization that meets the requirements of article 14, paragraph 1, which ratifies, accepts or approves the present Protocol or accedes thereto after the deposit of the sixteenth instrument of ratification, acceptance, approval or accession, the Protocol shall enter into force on the ninetieth day following the date of deposit by such Party of its instrument of ratification, acceptance, approval or accession.

Article 18
Withdrawal

At any time after five years from the date on which the present Protocol has come into force with respect to a Party, that Party may withdraw from it by giving written notification to the Depositary. Any such withdrawal shall take effect on the ninetieth day following the date of its receipt by the Depositary, or on such later date as may be specified in the notification of the withdrawal.

Article 18 bis
Termination of Protocols

When all of the Parties to any of the following Protocols have deposited their instruments of ratification, acceptance, approval of or accession to the present Protocol with the Depository in accordance with article 15, that Protocol shall be considered as terminated:

(a) The 1985 Helsinki Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent;

(b) The 1988 Sofia Protocol concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes;

(c) The 1991 Geneva Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes;

(d) The 1994 Oslo Protocol on Further Reduction of Sulphur Emissions.

Article 19
Authentic texts

The original of the present Protocol, of which the English, French and Russian texts are equally authentic, shall be deposited with the Secretary-General of the United Nations.

IN WITNESS WHEREOF the undersigned, being duly authorized thereto, have signed the present Protocol.

DONE at Gothenburg (Sweden), this thirtieth day of November one thousand nine hundred and ninety-nine.

Annex I

Critical loads and levels

I. Critical loads of acidity

A. For Parties within the geographical scope of EMEP

1. Critical loads (as defined in article 1) of acidity for ecosystems are determined in accordance with the Convention's *Manual on Methodologies and Criteria for Modelling and Mapping Critical Loads and Levels and Air Pollution Effects, Risks and Trends*. They are the maximum amount of acidifying deposition an ecosystem can tolerate in the long term without being damaged. Critical loads of acidity in terms of nitrogen take account of within-ecosystem nitrogen removal processes (e.g., uptake by plants). Critical loads of acidity in terms of sulphur are loads that — in the long term — will not cause adverse effects to the structure and functions of ecosystems. A combined sulphur and nitrogen critical load of acidity considers nitrogen only when the nitrogen deposition is greater than ecosystem nitrogen removal processes, such as uptake by vegetation. All critical loads reported by Parties, and approved by the Executive Body, are summarized for use in the integrated assessment modelling employed to provide guidance for setting the emission reduction commitments in annex II.

B. For Parties in North America

2. In Canada, critical acid deposition loads and geographical areas where they are exceeded are determined and mapped for lakes and upland forest ecosystems using scientific methodologies and criteria similar to those in the Convention's *Manual on Methodologies and Criteria for Modelling and Mapping Critical Loads and Levels and Air Pollution Effects, Risks and Trends*. Critical load values for total sulphur plus nitrogen and exceedance levels have been mapped across Canada (south of 60° N latitude) and are expressed in acid equivalents per hectare per year (eq/ha/yr) (2004 Canadian Acid Deposition Science Assessment; 2008 Canadian Council of Ministers of the Environment). The province of Alberta has also adapted the generic critical load classification systems used for soils in Europe for potential acidity to define soils as highly sensitive, moderately sensitive and not sensitive to acidic deposition. Critical, target and monitoring loads are defined for each soil class and management actions are prescribed as per the Alberta Acid Deposition Management Framework, as appropriate.

3. These loads and effects are used in integrated assessment activities, including providing data for international efforts to assess ecosystem response to loading of acidifying compounds, and provide guidance for setting the emission reduction commitments for Canada in annex II.

4. For the United States of America, the effects of acidification are evaluated through an assessment of the sensitivity and response of ecosystems to the loading of acidifying compounds, using peer-reviewed scientific methodologies and criteria, and accounting for the uncertainties associated with nitrogen cycling processes within ecosystems. Adverse impacts on vegetation and ecosystems are then considered in establishing secondary national ambient air quality standards for nitrogen oxides (NO_x) and SO_2. Integrated assessment modelling and the air quality standards are used in providing guidance for setting the emission reduction commitments for the United States of America in annex II.

II. Critical loads of nutrient nitrogen

A. For Parties within the geographical scope of EMEP

5. Critical loads (as defined in article 1) of nutrient nitrogen (eutrophication) for ecosystems are determined in accordance with the Convention's *Manual on Methodologies and Criteria for Modelling and Mapping Critical Loads and Levels and Air Pollution Effects, Risks and Trends*. They are the maximum amount of eutrophying nitrogen deposition that — in the long term — will not cause adverse effects to the structure and functions of ecosystems. All critical loads reported by Parties are summarized for use in the integrated assessment modelling employed to provide guidance for setting the emission reduction commitments in annex II.

B. For Parties in North America

5 bis. For the United States of America, the effects of nutrient nitrogen (eutrophication) for ecosystems are evaluated through an assessment of the sensitivity and response of ecosystems to the loading of nitrogen compounds, using peer-reviewed scientific methodologies and criteria, and accounting for uncertainties associated with nitrogen cycling within ecosystems. Adverse impacts on vegetation and ecosystems are then considered in establishing secondary national ambient air quality standards for NO_x. Integrated assessment modelling and the air quality standards are used in providing guidance for setting the emission reduction commitments for the United States of America in annex II.

III. Critical levels of ozone

A. For Parties within the geographical scope of EMEP

6. Critical levels (as defined in article 1) of ozone are determined to protect plants in accordance with the Convention's *Manual on Methodologies and Criteria for Modelling and Mapping Critical Loads and Levels and Air Pollution Effects, Risks and Trends*. They are expressed in terms of the cumulative value of either stomatal fluxes or concentrations at the top of the canopy. Critical levels are preferably based on stomatal fluxes, as these are considered more biologically relevant since they take into account the modifying effect of climate, soil and plant factors on the uptake of ozone by vegetation.

7. Critical levels of ozone have been derived for a number of species of crops, (semi-)natural vegetation and forest trees. The critical levels selected are related to the most important environmental effects, e.g., loss of security of food supplies, loss of carbon storage in the living biomass of trees and additional adverse effects on forest and (semi-)natural ecosystems.

8. The critical level of ozone for human health is determined in accordance with the World Health Organization (WHO) air quality guidelines to protect human health from a wide range of health effects, including increased risk of premature death and morbidity.

B. For Parties in North America

9. For Canada, it is understood that there is no lower threshold for human health effects from ozone. That is, adverse effects have been observed at all ozone concentrations

experienced in Canada. The Canadian Ambient Air Quality Standard for ozone was set to aid management efforts nationally, and by jurisdictions, to significantly reduce the effects on human health and the environment.

10. For the United States of America, critical levels are established in the form of primary and secondary national ambient air quality standards for ozone in order to protect public health with an adequate margin of safety and to protect public welfare, including vegetation, from any known or expected adverse effects. Integrated assessment modelling and the air quality standards are used in providing guidance for setting the emission reduction commitments for the United States of America in annex II.

IV. Critical levels of particulate matter

A. For Parties in the geographical scope of EMEP

11. The critical level of PM for human health is determined in accordance with the WHO air quality guidelines as the mass concentration of $PM_{2.5}$. Attainment of the guideline level is expected to effectively reduce health risks. The long-term $PM_{2.5}$ concentration, expressed as an annual average, is proportional to the risk to health, including reduction of life expectancy. This indicator is used in integrated modelling to provide guidance for emission reduction. In addition to the annual guideline level, a short-term (24-hour mean) guideline level is defined to protect against peaks of pollution which have significant impact on morbidity or mortality.

B. For Parties in North America

12. For Canada, it is understood that there is no lower threshold for human health effects from PM. That is, adverse effects have been observed at all concentrations of PM experienced in Canada. The Canadian national standard for PM was set to aid management efforts nationally, and by jurisdictions, to significantly reduce the effects on human health and the environment.

13. For the United States of America, critical levels are established in the form of primary and secondary national ambient air quality standards for PM in order to protect public health with an adequate margin of safety, and to protect public welfare (including visibility and man-made materials) from any known or expected adverse effects. Integrated assessment modelling and the air quality standards are used in providing guidance for setting the emission reduction commitments for the United States of America in annex II.

V. Critical levels of ammonia

14. Critical levels (as defined in article 1) of ammonia are determined to protect plants in accordance with the Convention’s *Manual on Methodologies and Criteria for Modelling and Mapping Critical Loads and Levels and Air Pollution Effects, Risks and Trends*.

VI. Acceptable levels of air pollutants to protect materials

15. Acceptable levels of acidifying pollutants, ozone and PM are determined to protect materials and cultural heritage in accordance with the Convention’s *Manual on Methodologies and Criteria for Modelling and Mapping Critical Loads and Levels and Air Pollution Effects, Risks and Trends.* The acceptable levels of pollutants are the maximum

exposure a material can tolerate in the long term without resulting in damage above specified target corrosion rates. This damage, which can be calculated by available dose-response functions, is the result of several pollutants acting together in different combinations depending on the material: acidity (sulphur dioxide (SO_2), nitric acid (HNO_3)), ozone and PM.

Annex II

Emission reduction commitments

1. The emission reduction commitments listed in the tables below relate to the provisions of article 3, paragraphs 1 and 10, of the present Protocol.

2. Table 1 includes the emission ceilings for sulphur dioxide (SO_2), nitrogen oxides (NO_x), ammonia (NH_3) and volatile organic compounds (VOCs) for 2010 up to 2020 expressed in thousands of metric tons (tonnes) for those Parties that ratified the present Protocol prior to 2010.

3. Tables 2–6 include emission reduction commitments for SO_2, NO_x, NH_3, VOCs and $PM_{2.5}$ for 2020 and beyond. These commitments are expressed as a percentage reduction from the 2005 emission level.

4. The 2005 emission estimates listed in tables 2–6 are in thousands of tonnes and represent the latest best available data reported by the Parties in 2012. These estimates are given for information purposes only, and may be updated by the Parties in the course of their reporting of emission data under the present Protocol if better information becomes available. The secretariat will maintain and regularly update on the Convention’s website a table of the most up-to-date estimates reported by Parties, for information. The percentage emission reduction commitments listed in tables 2–6 are applicable to the most up-to-date 2005 estimates as reported by the Parties to the Executive Secretary of the Commission.

5. If in a given year a Party finds that, due to a particularly cold winter, a particularly dry summer or unforeseen variations in economic activities, such as a loss of capacity in the power supply system domestically or in a neighbouring country, it cannot comply with its emission reduction commitments, it may fulfil those commitments by averaging its national annual emissions for the year in question, the year preceding that year and the year following it, provided that this average does not exceed its commitment.

Table 1

Emission ceilings for 2010 up to 2020 for Parties that ratified the present Protocol prior to 2010 (expressed in thousands of tonnes per year)

	Party	*Ratification*	*SO_2*	*NO_x*	*NH_3*	*VOCs*
1	Belgium	2007	106	181	74	144
2	Bulgaria	2005	856	266	108	185
3	Croatia	2008	70	87	30	90
4	Cyprus	2007	39	23	9	14
5	Czech Republic	2004	283	286	101	220
6	Denmark	2002	55	127	69	85
7	Finland	2003	116	170	31	130
8	France	2007	400	860	780	1100
9	Germany	2004	550	1081	550	995
10	Hungary	2006	550	198	90	137
11	Latvia	2004	107	84	44	136
12	Lithuania	2004	145	110	84	92
13	Luxembourg	2001	4	11	7	9

	Party	*Ratification*	*SO_2*	*NO_x*	*NH_3*	*VOCs*
14	Netherlands	2004	50	266	128	191
15	Norway	2002	22	156	23	195
16	Portugal	2005	170	260	108	202
17	Romania	2003	918	437	210	523
18	Slovakia	2005	110	130	39	140
19	Slovenia	2004	27	45	20	40
20	Spain[a]	2005	774	847	353	669
21	Sweden	2002	67	148	57	241
22	Switzerland	2005	26	79	63	144
23	United Kingdom of Great Britain and Northern Ireland	2005	625	1 181	297	1 200
24	United States of America	2004	[b]	[c]		[d]
25	European Union	2003	7 832	8 180	4 294	7 585

[a] Figures apply to the European part of the country.

[b] Upon acceptance of the present Protocol in 2004, the United States of America provided an indicative target for 2010 of 16,013,000 tons for total sulphur emissions from the PEMA identified for sulphur, the 48 contiguous United States and the District of Columbia. This figure converts to 14,527,000 tonnes.

[c] Upon acceptance of the present Protocol in 2004, the United States of America provided an indicative target for 2010 of 6,897,000 tons for total NO_X emissions from the PEMA identified for NO_X, Connecticut, Delaware, the District of Columbia, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin. This figure converts to 6,257,000 tonnes.

[d] Upon acceptance of the present Protocol in 2004, the United States of America provided an indicative target for 2010 of 4,972,000 tons for total VOC emissions from the PEMA identified for VOCs, Connecticut, Delaware, the District of Columbia, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin. This figure converts to 4,511,000 tonnes.

Table 2
Emission reduction commitments for sulphur dioxide for 2020 and beyond

	Convention Party	*Emission levels 2005 in thousands of tonnes of SO_2*	*Reduction from 2005 level (%)*
1	Austria	27	26
2	Belarus	79	20
3	Belgium	145	43
4	Bulgaria	777	78
5	Canada[a]		
6	Croatia	63	55
7	Cyprus	38	83
8	Czech Republic	219	45
9	Denmark	23	35
10	Estonia	76	32
11	Finland	69	30

	Convention Party	*Emission levels 2005 in thousands of tonnes of SO_2*	*Reduction from 2005 level (%)*
12	France	467	55
13	Germany	517	21
14	Greece	542	74
15	Hungary	129	46
16	Ireland	71	65
17	Italy	403	35
18	Latvia	6.7	8
19	Lithuania	44	55
20	Luxembourg	2.5	34
21	Malta	11	77
22	Netherlands[b]	65	28
23	Norway	24	10
24	Poland	1 224	59
25	Portugal	177	63
26	Romania	643	77
27	Slovakia	89	57
28	Slovenia	40	63
29	Spain[b]	1 282	67
30	Sweden	36	22
31	Switzerland	17	21
32	United Kingdom of Great Britain and Northern Ireland	706	59
33	United States of America[c]		
34	European Union	7 828	59

[a] Upon ratification, acceptance or approval of, or accession to, the present Protocol, Canada shall provide: (a) a value for total estimated sulphur emission levels for 2005, either national or for its PEMA, if it has submitted one; and (b) an indicative value for a reduction of total sulphur emission levels for 2020 from 2005 levels, either at the national level or for its PEMA. Item (a) will be included in the table and item (b) will be included in a footnote to the table. The PEMA, if submitted, will be offered as an adjustment to annex III to the Protocol.

[b] Figures apply to the European part of the country.

[c] Upon ratification, acceptance, or approval of, or accession to the amendment adding this table to the present Protocol, the United States of America shall provide: (a) a value for total estimated sulphur emission levels for 2005, either national or for a PEMA; (b) an indicative value for a reduction of total sulphur emission levels for 2020 from identified 2005 levels; and (c) any changes to the PEMA identified when the United States became a Party to the Protocol. Item (a) will be included in the table, item (b) will be included in a footnote to the table and item (c) will be offered as an adjustment to annex III.

Table 3

Emission reduction commitments for nitrogen oxides for 2020 and beyond[a]

	Convention Party	*Emission levels 2005 in thousands of tonnes of NO_2*	*Reduction from 2005 level (%)*
1	Austria	231	37
2	Belarus	171	25
3	Belgium	291	41
4	Bulgaria	154	41
5	Canada[b]		
6	Croatia	81	31
7	Cyprus	21	44
8	Czech Republic	286	35
9	Denmark	181	56
10	Estonia	36	18
11	Finland	177	35
12	France	1 430	50
13	Germany	1 464	39
14	Greece	419	31
15	Hungary	203	34
16	Ireland	127	49
17	Italy	1 212	40
18	Latvia	37	32
19	Lithuania	58	48
20	Luxembourg	19	43
21	Malta	9.3	42
22	Netherlands[c]	370	45
23	Norway	200	23
24	Poland	866	30
25	Portugal	256	36
26	Romania	309	45
27	Slovakia	102	36
28	Slovenia	47	39
29	Spain[c]	1 292	41
30	Sweden	174	36
31	Switzerland[d]	94	41
32	United Kingdom of Great Britain and Northern Ireland	1 580	55
33	United States of America[e]		
34	European Union	11 354	42

[a] Emissions from soils are not included in the 2005 estimates for European Union member States.

[b] Upon ratification, acceptance or approval of, or accession to, the present Protocol, Canada shall provide: (a) a value for total estimated nitrogen oxide emission levels for 2005, either national or for

its PEMA, if it has submitted one; and (b) an indicative value for a reduction of total nitrogen oxide emission levels for 2020 from 2005 levels, either at the national level or for its PEMA. Item (a) will be included in the table and item (b) will be included in a footnote to the table. The PEMA, if submitted, will be offered as an adjustment to annex III to the Protocol.

[c] Figures apply to the European part of the country.

[d] Including emissions from crop production and agricultural soils (NFR 4D).

[e] Upon ratification, acceptance, or approval of, or accession to the amendment adding this table to the present Protocol, the United States of America shall provide: (a) a value for total estimated nitrogen oxides emission levels for 2005, either national or for a PEMA; (b) an indicative value for a reduction of total nitrogen oxides emission levels for 2020 from identified 2005 levels; and (c) any changes to the PEMA identified when the United States became a Party to the Protocol. Item (a) will be included in the table, item (b) will be included in a footnote to the table and item (c) will be offered as an adjustment to annex III.

Table 4

Emission reduction commitments for ammonia for 2020 and beyond

	Convention Party	*Emission levels 2005 in thousands of tonnes of NH_3*	*Reduction from 2005 level (%)*
1	Austria	63	1
2	Belarus	136	7
3	Belgium	71	2
4	Bulgaria	60	3
5	Croatia	40	1
6	Cyprus	5.8	10
7	Czech Republic	82	7
8	Denmark	83	24
9	Estonia	9.8	1
10	Finland	39	20
11	France	661	4
12	Germany	573	5
13	Greece	68	7
14	Hungary	80	10
15	Ireland	109	1
16	Italy	416	5
17	Latvia	16	1
18	Lithuania	39	10
19	Luxembourg	5.0	1
20	Malta	1.6	4
21	Netherlands[a]	141	13
22	Norway	23	8
23	Poland	270	1
24	Portugal	50	7
25	Romania	199	13
26	Slovakia	29	15
27	Slovenia	18	1
28	Spain [a]	365	3

	Convention Party	*Emission levels 2005 in thousands of tonnes of NH_3*	*Reduction from 2005 level (%)*
29	Sweden	55	15
30	Switzerland	64	8
31	United Kingdom of Great Britain and Northern Ireland	307	8
32	European Union	3 813	6

[a] Figures apply to the European part of the country.

Table 5
Emission reduction commitments for Volatile Organic Compounds for 2020 and beyond

	Convention Party	*Emission levels 2005 in thousands of tonnes of VOC*	*Reduction from 2005 level (%)*
1	Austria	162	21
2	Belarus	349	15
3	Belgium	143	21
4	Bulgaria	158	21
5	Canada[a]		
6	Croatia	101	34
7	Cyprus	14	45
8	Czech Republic	182	18
9	Denmark	110	35
10	Estonia	41	10
11	Finland	131	35
12	France	1 232	43
13	Germany	1 143	13
14	Greece	222	54
15	Hungary	177	30
16	Ireland	57	25
17	Italy	1 286	35
18	Latvia	73	27
19	Lithuania	84	32
20	Luxembourg	9.8	29
21	Malta	3.3	23
22	Netherlands[b]	182	8
23	Norway	218	40
24	Poland	593	25
25	Portugal	207	18
26	Romania	425	25
27	Slovakia	73	18
28	Slovenia	37	23

	Convention Party	*Emission levels 2005 in thousands of tonnes of VOC*	*Reduction from 2005 level (%)*
29	Spain[b]	809	22
30	Sweden	197	25
31	Switzerland[c]	103	30
32	United Kingdom of Great Britain and Northern Ireland	1 088	32
33	United States of America[d]		
34	European Union	8 842	28

[a] Upon ratification, acceptance or approval of, or accession to, the present Protocol, Canada shall provide: (a) a value for total estimated VOC emission levels for 2005, either national or for its PEMA, if it has submitted one; and (b) an indicative value for a reduction of total VOC emission levels for 2020 from 2005 levels, either at the national level or for its PEMA. Item (a) will be included in the table and item (b) will be included in a footnote to the table. The PEMA, if submitted, will be offered as an adjustment to annex III to the Protocol.

[b] Figures apply to the European part of the country.

[c] Including emissions from crop production and agricultural soils (NFR 4D).

[d] Upon ratification, acceptance, or approval of, or accession to the amendment adding this table to the present Protocol, the United States of America shall provide: (a) a value for total estimated VOC emission levels for 2005, either national or for a PEMA; (b) an indicative value for a reduction of total VOC emission levels for 2020 from identified 2005 levels; and (c) any changes to the PEMA identified when the United States became a Party to the Protocol. Item (a) will be included in the table, item (b) will be included in a footnote to the table and item (c) will be offered as an adjustment to annex III.

Table 6

Emission reduction commitments for $PM_{2.5}$ for 2020 and beyond

	Convention Party	*Emission levels 2005 in thousands of tonnes of $PM_{2.5}$*	*Reduction from 2005 level (%)*
1	Austria	22	20
2	Belarus	46	10
3	Belgium	24	20
4	Bulgaria	44	20
5	Canada[a]		
6	Croatia	13	18
7	Cyprus	2.9	46
8	Czech Republic	22	17
9	Denmark	25	33
10	Estonia	20	15
11	Finland	36	30
12	France	304	27
13	Germany	121	26
14	Greece	56	35
15	Hungary	31	13
16	Ireland	11	18
17	Italy	166	10

	Convention Party	*Emission levels 2005 in thousands of tonnes of $PM_{2.5}$*	*Reduction from 2005 level (%)*
18	Latvia	27	16
19	Lithuania	8.7	20
20	Luxembourg	3.1	15
21	Malta	1.3	25
22	Netherlands[b]	21	37
23	Norway	52	30
24	Poland	133	16
25	Portugal	65	15
26	Romania	106	28
27	Slovakia	37	36
28	Slovenia	14	25
29	Spain[b]	93	15
30	Sweden	29	19
31	Switzerland	11	26
32	United Kingdom of Great Britain and Northern Ireland	81	30
33	United States of America[c]		
34	European Union	1 504	22

[a] Upon ratification, acceptance or approval of, or accession to, the present Protocol, Canada shall provide: (a) a value for total estimated PM emission levels for 2005, either national or for its PEMA, if it has submitted one; and (b) an indicative value for a reduction of total emission levels of PM for 2020 from 2005 levels, either at the national level or for its PEMA. Item (a) will be included in the table and item (b) will be included in a footnote to the table. The PEMA, if submitted, will be offered as an adjustment to annex III to the Protocol.

[b] Figures apply to the European part of the country.

[c] Upon ratification, acceptance, or approval of, or accession to the amendment adding this table to the present Protocol, the United States of America shall provide: (a) a value for total estimated $PM_{2.5}$ emission levels for 2005, either national or for a PEMA; and (b) an indicative value for a reduction of total $PM_{2.5}$ emission levels for 2020 from identified 2005 levels. Item (a) will be included in the table and item (b) will be included in a footnote to the table.

Annex III

Designated pollutant emissions management areas

1. The following pollutant emissions management areas (PEMAs) are listed for the purpose of the present Protocol.

Canada PEMA

2. The PEMA for sulphur for Canada is an area of 1 million square kilometres which includes all the territory of the Provinces of Prince Edward Island, Nova Scotia and New Brunswick, all the territory of the Province of Québec south of a straight line between Havre-St. Pierre on the north coast of the Gulf of Saint Lawrence and the point where the Québec-Ontario boundary intersects with the James Bay coastline, and all the territory of the Province of Ontario south of a straight line between the point where the Ontario-Québec boundary intersects the James Bay coastline and the Nipigon River near the north shore of Lake Superior.

Russian Federation PEMA

3. The Russian Federation PEMA corresponds to the European territory of the Russian Federation. The European territory of the Russian Federation is a part of the territory of the Russian Federation within the administrative and geographical boundaries of the entities of the Russian Federation located in Eastern Europe bordering the Asian continent in accordance with the conventional borderline that passes from north to south along the Ural Mountains, the border with Kazakhstan to the Caspian Sea, then along the State borders with Azerbaijan and Georgia in the North Caucasus to the Black Sea.

United States of America PEMAs

4. Description of the Geographical Scope of the U.S. Pollutant Emission Management Area (PEMA) For SO_2: The 48 contiguous states and the District of Columbia. This excludes Alaska and Hawaii.

5. Description of the Geographical Scope of the U.S. Pollutant Emission Management Area (PEMA) For NO_x: Connecticut, Delaware, District of Columbia, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin.

6. Description of the Geographical Scope of the U.S. Pollutant Emission Management Area (PEMA) For VOCs: Connecticut, Delaware, District of Columbia, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin.

Annex IV

Limit values for emissions of sulphur from stationary sources

1. Section A applies to Parties other than Canada and the United States of America, section B applies to Canada and section C applies to the United States of America.

A. Parties other than Canada and the United States of America

2. For the purpose of this section “emission limit value” (ELV) means the quantity of SO_2 (or sulphur oxides (SO_x) where mentioned as such) contained in the waste gases from an installation that is not to be exceeded. Unless otherwise specified, it shall be calculated in terms of mass of SO_2 (SO_x, expressed as SO_2) per volume of the waste gases (expressed as mg/m^3), assuming standard conditions for temperature and pressure for dry gas (volume at 273.15 K, 101.3 kPa). With regard to the oxygen content of the waste gas, the values given in the tables below for each source category shall apply. Dilution for the purpose of lowering concentrations of pollutants in waste gases is not permitted. Start-up, shut-down and maintenance of equipment are excluded.

3. Compliance with ELVs, minimum desulphurization rates, sulphur recovery rates and sulphur content limit values shall be verified:

(a) Emissions shall be monitored through measurements or through calculations achieving at least the same accuracy. Compliance with ELVs shall be verified through continuous or discontinuous measurements, type approval, or any other technically sound method including verified calculation methods. In case of continuous measurements, compliance with the ELV is achieved if the validated monthly emission average does not exceed the limit value, unless otherwise specified for the individual source category. In case of discontinuous measurements or other appropriate determination or calculation procedures, compliance with the ELV is achieved if the mean value based on an appropriate number of measurements under representative conditions does not exceed the ELV. The inaccuracy of the measurement methods may be taken into account for verification purposes;

(b) In case of combustion plants applying the minimum rates of desulphurization set out in paragraph 5 (a) (ii), the sulphur content of the fuel shall also be regularly monitored and the competent authorities shall be informed of substantial changes in the type of fuel used. The desulphurization rates shall apply as monthly average values;

(c) Compliance with the minimum sulphur recovery rate shall be verified through regular measurements or any other technically sound method;

(d) Compliance with the sulphur limit values for gas oil shall be verified through regular targeted measurements.

4. Monitoring of relevant polluting substances and measurements of process parameters, as well as the quality assurance of automated measuring systems and the reference measurements to calibrate those systems, shall be carried out in accordance with European Committee for Standardization (CEN) standards. If CEN standards are not available, International Organization for Standardization (ISO) standards, national or international standards which will ensure the provision of data of an equivalent scientific quality shall apply.

5. The following subparagraphs set out special provisions for combustion plants referred to in paragraph 7:

(a) A Party may derogate from the obligation to comply with the emission limit values provided for in paragraph 7 in the following cases:

(i) For a combustion plant which to this end normally uses low-sulphur fuel, in cases where the operator is unable to comply with those limit values because of an interruption in the supply of low-sulphur fuel resulting from a serious shortage;

(ii) For a combustion plant firing indigenous solid fuel, which cannot comply with the emission limit values provided for in paragraph 7, instead at least the following limit values for the rates of desulphurization have to be met:

a. Existing plants: 50 MWth–100 MWth: 80%;

b. Existing plants: 100 MWth–300 MWth: 90%;

c. Existing plants: > 300 MWth: 95%;

d. New plants: 50 MWth–300 MWth: 93%;

e. New plants: > 300 MWth: 97%;

(iii) For combustion plants normally using gaseous fuel which have to resort exceptionally to the use of other fuels because of a sudden interruption in the supply of gas and for this reason would need to be equipped with a waste gas purification facility;

(iv) For existing combustion plants not operated more than 17,500 operating hours, starting from 1 January 2016 and ending no later than 31 December 2023;

(v) For existing combustion plants using solid or liquid fuels not operated more than 1,500 operating hours per year as a rolling average over a period of five years, instead the following ELVs apply:

a. For solid fuels: 800 mg/m^3;

b. For liquid fuels: 850 mg/m^3 for plants with a rated thermal input not exceeding 300 MWth and 400 mg/m^3 for plants with a rated thermal input greater than 300 MWth;

(b) Where a combustion plant is extended by at least 50 MWth, the ELV specified in paragraph 7 for new installations shall apply to the extensional part affected by the change. The ELV is calculated as an average weighted by the actual thermal input for both the existing and the new part of the plant;

(c) Parties shall ensure that provisions are made for procedures relating to malfunction or breakdown of the abatement equipment;

(d) In the case of a multi-fuel firing combustion plant involving the simultaneous use of two or more fuels, the ELV shall be determined as the weighted average of the ELVs for the individual fuels, on the basis of the thermal input delivered by each fuel.

6. Parties may apply rules by which combustion plants and process plants within a mineral oil refinery may be exempted from compliance with the individual SO_2 limit values set out in this annex, provided that they are complying with a bubble SO_2 limit value determined on the basis of the best available techniques.

7. Combustion plants with a rated thermal input exceeding 50 MWth:[1]

Table 1
Limit values for SO_2 emissions from combustion plants[a]

Fuel type	*Thermal input (MWth)*	*ELV for SO_2 mg/m³* [b]
Solid fuels	50–100	New plants: 400 (coal, lignite and other solid fuels) 300 (peat) 200 (biomass)
		Existing plants: 400 (coal, lignite and other solid fuels) 300 (peat) 200 (biomass)
	100–300	New plants: 200 (coal, lignite and other solid fuels) 300 (peat) 200 (biomass)
		Existing plants: 250 (coal, lignite and other solid fuels) 300 (peat) 200 (biomass)
	>300	New plants: 150 (coal, lignite and other solid fuels) (FBC: 200) 150 (peat) (FBC: 200) 150 (biomass)
		Existing plants: 200 (coal, lignite and other solid fuels) 200 (peat) 200 (biomass)
Liquid fuels	50–100	New plants: 350
		Existing plants: 350
	100–300	New plants: 200
		Existing plants: 250
	>300	New plants: 150
		Existing plants: 200
Gaseous fuels in general	>50	New plants: 35
		Existing plants: 35

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[1] The rated thermal input of the combustion plant is calculated as the sum of the input of all units connected to a common stack. Individual units below 15 MWth shall not be considered when calculating the total rated thermal input.

Fuel type	*Thermal input (MWth)*	*ELV for SO_2 mg/m³ [b]*
Liquefied gas	>50	New plants: 5 Existing plants: 5
Coke oven gas or blast furnace gas	>50	New plants: 200 for blast furnace gas 400 for coke oven gas Existing plants: 200 for blast furnace gas 400 for coke oven gas
Gasified refinery residues	> 50	New plants: 35 Existing plants: 800

Note: FBC = fluidized bed combustion (circulating, pressurized, bubbling).

[a] In particular, the ELVs shall not apply to:

- Plants in which the products of combustion are used for direct heating, drying, or any other treatment of objects or materials.
- Post-combustion plants designed to purify the waste gases by combustion which are not operated as independent combustion plants.
- Facilities for the regeneration of catalytic cracking catalysts.
- Facilities for the conversion of hydrogen sulphide into sulphur.
- Reactors used in the chemical industry.
- Coke battery furnaces.
- Cowpers.
- Recovery boilers within installations for the production of pulp.
- Waste incinerators and
- Plants powered by diesel, petrol or gas engines or by combustion turbines, irrespective of the fuel used.

[b] The O_2 reference content is 6% for solid fuels and 3% for liquid and gaseous fuels.

8. Gas oil:

Table 2

Limit values for the sulphur content of gas oil[a]

	Sulphur content (per cent by weight)
Gas oil	< 0.10

[a] “Gas oil” means any petroleum-derived liquid fuel, excluding marine fuel, falling within CN code 2710 19 25, 2710 19 29, 2710 19 45 or 2710 19 49, or any petroleum-derived liquid fuel, excluding marine fuel, of which less than 65% by volume (including losses) distils at 250°C and of which at least 85% by volume (including losses) distils at 350°C by the ASTM D86 method. Diesel fuels, i.e., gas oils falling within CN code 2710 19 41 and used for self-propelling vehicles, are excluded from this definition. Fuels used in non-road mobile machinery and agricultural tractors are also excluded from this definition.

9. Mineral oil and gas refineries:

Sulphur recovery units: for plants that produce more than 50 Mg of sulphur a day:

Table 3

Limit value expressed as a minimum sulphur recovery rate of sulphur recovery units

Plant type	*Minimum sulphur recovery rate[a] (%)*
New plant	99.5
Existing plant	98.5

[a] The sulphur recovery rate is the percentage of the imported hydrogen sulphide (H_2S) converted to elemental sulphur as a yearly average.

10. Titanium dioxide production:

Table 4

Limit values for SO_x emissions released from titanium dioxide production (annual average)

Plant type	*ELV for SO_x (expressed as SO_2) (kg/t of TiO_2)*
Sulphate process, total emission	6
Chloride process, total emission	1.7

B. Canada

11. Limit values for controlling emissions of sulphur oxides will be determined for stationary sources, as appropriate, taking into account information on available control technologies, limit values applied in other jurisdictions, and the documents below:

(a) Order Adding Toxic Substances to Schedule 1 to the Canadian Environmental Act, 1999. SOR/2011-34;

(b) Proposed Regulation, Order Adding Toxic Substances to Schedule 1 to the Canadian Environmental Protection Act, 1999;

(c) New Source Emission Guidelines for Thermal Electricity Generation;

(d) National Emission Guidelines for Stationary Combustion Turbines. PN1072; and

(e) Operating and Emission Guidelines for Municipal Solid Waste Incinerators. PN1085.

C. United States of America

12. Limit values for controlling emissions of sulphur dioxide from stationary sources in the following stationary source categories, and the sources to which they apply, are specified in the following documents:

(a) Electric Utility Steam Generating Units — 40 Code of Federal Regulations (C.F.R.) Part 60, Subpart D, and Subpart Da;

(b) Industrial-Commercial-Institutional Steam Generating Units — 40 C.F.R. Part 60, Subpart Db, and Subpart Dc;

(c) Sulphuric Acid Plants — 40 C.F.R. Part 60, Subpart H;

(d) Petroleum Refineries — 40 C.F.R. Part 60, Subpart J and Subpart Ja;

(e) Primary Copper Smelters — 40 C.F.R. Part 60, Subpart P;

(f) Primary Zinc Smelters — 40 C.F.R. Part 60, Subpart Q;

(g) Primary Lead Smelters — 40 C.F.R. Part 60, Subpart R;

(h) Stationary Gas Turbines — 40 C.F.R. Part 60, Subpart GG;

(i) Onshore Natural Gas Processing — 40 C.F.R. Part 60, Subpart LLL;

(j) Municipal Waste Combustors — 40 C.F.R. Part 60, Subpart Ea, and Subpart Eb;

(k) Hospital/Medical/Infectious Waste Incinerators — 40 C.F.R. Part 60, Subpart Ec;

(l) Stationary Combustion Turbines — 40 C.F.R. Part 60, Subpart KKKK;

(m) Small Municipal Waste Combustors — 40 C.F.R. Part 60, Subpart AAAA;

(n) Commercial and Industrial Solid Waste Combustors — 40 C.F.R. Part 60, Subpart CCCC; and

(o) Other Solid Waste Combustors — 40 C.F.R. Part 60, Subpart EEEE.

Annex V

Limit values for emissions of nitrogen oxides from stationary sources

1. Section A applies to Parties other than Canada and the United States of America, section B applies to Canada and section C applies to the United States of America.

A. Parties other than Canada and the United States of America

2. For the purpose of this section "emission limit value" (ELV) means the quantity of NO_x (sum of NO and NO_2, expressed as NO_2) contained in the waste gases from an installation that is not to be exceeded. Unless otherwise specified, it shall be calculated in terms of mass of NO_x per volume of the waste gases (expressed as mg/m^3), assuming standard conditions for temperature and pressure for dry gas (volume at 273.15 K, 101.3 kPa). With regard to the oxygen content of the waste gas, the values given in the tables below for each source category shall apply. Dilution for the purpose of lowering concentrations of pollutants in waste gases is not permitted. Start-up, shut-down and maintenance of equipment are excluded.

3. Emissions shall be monitored in all cases via measurements of NO_x or through calculations or a combination of both achieving at least the same accuracy. Compliance with ELVs shall be verified through continuous or discontinuous measurements, type approval, or any other technically sound method including verified calculation methods. In case of continuous measurements, compliance with the ELVs is achieved if the validated monthly emission average does not exceed the limit values. In case of discontinuous measurements or other appropriate determination or calculation procedures, compliance with the ELVs is achieved if the mean value based on an appropriate number of measurements under representative conditions does not exceed the ELV. The inaccuracy of the measurement methods may be taken into account for verification purposes.

4. Monitoring of relevant polluting substances and measurements of process parameters, as well as the quality assurance of automated measuring systems and the reference measurements to calibrate those systems, shall be carried out in accordance with CEN standards. If CEN standards are not available, ISO standards or national or international standards which will ensure the provision of data of an equivalent scientific quality shall apply.

5. Special provisions for combustion plants referred to in paragraph 6:

(a) A Party may derogate from the obligation to comply with the ELVs provided for in paragraph 6 in the following cases:

(i) For combustion plants normally using gaseous fuel which have to resort exceptionally to the use of other fuels because of a sudden interruption in the supply of gas and for this reason would need to be equipped with a waste gas purification facility;

(ii) For existing combustion plants not operated more than 17,500 operating hours, starting from 1 January 2016 and ending no later than 31 December 2023; or

(iii) For existing combustion plants other than onshore gas turbines (covered by paragraph 7) using solid or liquid fuels not operated more than 1,500 operating hours per year as a rolling average over a period of five years, instead the following ELVs apply:

a. For solid fuels: 450 mg/m³;

b. For liquid fuels: 450 mg/m³;

(b) Where a combustion plant is extended by at least 50 MWth, the ELV specified in paragraph 6 for new installations shall apply to the extensional part affected by the change. The ELV is calculated as an average weighted by the actual thermal input for both the existing and the new part of the plant;

(c) Parties shall ensure that provisions are made for procedures relating to malfunction or breakdown of the abatement equipment;

(d) In the case of a multi-fuel firing combustion plant involving the simultaneous use of two or more fuels, the ELV shall be determined as the weighted average of the ELVs for the individual fuels, on the basis of the thermal input delivered by each fuel. Parties may apply rules by which combustion plants and process plants within a mineral oil refinery may be exempted from compliance with the individual NO_x limit values set out in this annex, provided that they are complying with a bubble NO_x limit value determined on the basis of the best available techniques.

6. Combustion plants with a rated thermal input exceeding 50 MWth:[2]

Table 1

Limit values for NO_x emissions released from combustion plants[a]

Fuel type	*Thermal input (MWth)*	*ELV for NO_x (mg/m³)*[b]
Solid fuels	50–100	New plants: 300 (coal, lignite and other solid fuels) 450 (pulverized lignite) 250 (biomass, peat)
		Existing plants: 300 (coal, lignite and other solid fuels) 450 (pulverized lignite) 300 (biomass, peat)
	100–300	New plants: 200 (coal, lignite and other solid fuels) 200 (biomass, peat)
		Existing plants: 200 (coal, lignite and other solid fuels) 250 (biomass, peat)
	>300	New plants: 150 (coal, lignite and other solid fuels) (general) 150 (biomass, peat) 200 (pulverized lignite)
		Existing plants: 200 (coal, lignite and other solid fuels) 200 (biomass, peat)

---

[2] The rated thermal input of the combustion plant is calculated as the sum of the input of all units connected to a common stack. Individual units below 15 MWth shall not be considered when calculating the total rated input.

Fuel type	*Thermal input (MWth)*	*ELV for NO_x (mg/m³)*[b]
Liquid fuels	50–100	New plants: 300
		Existing plants: 450
	100–300	New plants: 150
		Existing plants: 200 (general) Existing plants within refineries and chemical installations: 450 (for firing of distillation and conversion residues from crude oil refining for own consumption in combustion plants and for firing liquid production residue as non-commercial fuel)
	>300	New plants: 100
		Existing plants: 150 (general) Existing plants within refineries and chemical installations: 450 (for firing of distillation and conversion residues from crude oil refining for own consumption in combustion plants and for firing liquid production residue as non-commercial fuel (< 500 MWth))
Natural gas	50–300	New plants: 100
		Existing plants: 100
	>300	New plants: 100
		Existing plants: 100
Other gaseous fuels	>50	New plants: 200
		Existing plants: 300

[a] In particular, the ELVs shall not apply to:

- Plants in which the products of combustion are used for direct heating, drying, or any other treatment of objects or materials.
- Post-combustion plants designed to purify the waste gases by combustion which are not operated as independent combustion plants.
- Facilities for the regeneration of catalytic cracking catalysts.
- Facilities for the conversion of hydrogen sulphide into sulphur.
- Reactors used in the chemical industry.
- Coke battery furnaces.
- Cowpers.
- Recovery boilers within installations for the production of pulp.
- Waste incinerators and
- Plants powered by diesel, petrol or gas engines or by combustion turbines, irrespective of the fuel used.

[b] The O_2 reference content is 6% for solid fuels and 3% for liquid and gaseous fuels.

7. Onshore combustion turbines with a rated thermal input exceeding 50 MWth: the NO_x ELVs expressed in mg/m^3 (at a reference O_2 content of 15%) are to be applied to a single turbine. The ELVs in table 2 apply only above 70% load.

Table 2

Limit values for NO_x emissions released from onshore combustion turbines (including Combined Cycle Gas Turbine CCGT)

Fuel type	*Thermal input (MWth)*	*ELV for NO_x (mg/m³)*[a]
Liquid fuels (light and medium distillates)	> 50	New plants: 50 Existing plants: 90 (general) 200 (plants operating less than 1,500 hours a year)
Natural gas[b]	> 50	New plants: 50 (general)[d] Existing plants: 50 (general)[c, d] 150 (plants operating less than 1,500 hours per year)
Other gases	> 50	New plants: 50 Existing plants: 120 (general) 200 (plants operating less than 1,500 hours a year)

[a] Gas turbines for emergency use that operate less than 500 hours per year are not covered.

[b] Natural gas is naturally occurring methane with not more than 20% (by volume) of inert gases and other constituents.

[c] 75 mg/m^3 in the following cases, where the efficiency of the gas turbine is determined at ISO base load conditions:

- Gas turbines, used in combined heat and power systems having an overall efficiency greater than 75%.
- Gas turbines used in combined cycle plants having an annual average overall electrical efficiency greater than 55%.
- Gas turbines for mechanical drives.

[d] For single gas turbines not falling into any of the categories mentioned under footnote c, but having an efficiency greater than 35% — determined at ISO base load conditions — the ELV for NO_x shall be $50 \times \eta / 35$ where η is the gas-turbine efficiency at ISO base load conditions expressed as a percentage.

8. Cement production:

Table 3

Limit values for NO_x emissions released from cement clinker production[a]

Plant type	*ELV for NO_x (mg/m³)*
General (existing and new installations)	500
Existing lepol and long rotary kilns in which no waste is co-incinerated	800

[a] Installations for the production of cement clinker in rotary kilns with a capacity >500 Mg/day or in other furnaces with a capacity >50 Mg/day. The O_2 reference content is 10%.

9. Stationary engines:

Table 4

Limit values for NO_x emissions released from new stationary engines

Engine type, power, fuel specification	*ELV[a,b,c] (mg/m^3)*
Gas engines > 1 MWth	
Spark ignited (= Otto) engines	95 (enhanced lean burn)
all gaseous fuels	190 (Standard lean burn or rich burn with catalyst)
Dual fuel engines > 1 MWth	
In gas mode (all gaseous fuels)	190
In liquid mode (all liquid fuels)[d]	
1 MWth–20 MWth	225
>20 MWth	225
Diesel engines > 5 MWth (compression ignition)	
Slow (< 300 rpm)/medium (300 rpm–1,200 rpm)/ speed	
5 MWth–20 MWth	
Heavy Fuel Oil (HFO) and bio-oils	225
Light Fuel Oil (LFO) and Natural Gas (NG)	190
>20 MWth	
HFO and bio-oils	190
LFO and NG	190
High speed (>1,200 rpm)	190

Note: The reference oxygen content is 15%.[3]

[a] These ELVs do not apply to engines running less than 500 hours a year.

[b] Where Selective Catalytic Reduction (SCR) cannot currently be applied for technical and logistical reasons like on remote islands or where the availability of sufficient amounts of high quality fuel cannot be guaranteed, a transition period of 10 years after the entry into force of the present Protocol for a Party may be applied for diesel engines and dual fuel engines during which the following ELVs apply:

- Dual fuel engines: 1,850 mg/m^3 in liquid mode; 380 mg/m^3 in gas mode.
- Diesel engines — Slow (< 300 rpm) and medium (300 rpm–1,200 rpm)/speed: 1,300 mg/m^3 for engines between 5 MWth and 20 MWth and 1,850 mg/m^3 for engines > 20 MWth.
- Diesel engines — High speed (> 1,200 rpm): 750 mg/m^3.

[c] Engines running between 500 and 1,500 operational hours per year may be exempted from compliance with these ELVs in case they are applying primary measures to limit NO_x emissions and meet the ELVs set out in footnote b.

[d] A Party may derogate from the obligation to comply with the emission limit values for combustion plants using gaseous fuel which have to resort exceptionally to the use of other fuels because of a sudden interruption in the supply of gas and for this reason would need to be equipped with a waste gas purification facility. The exception time period shall not exceed 10 days except where there it is an overriding need to maintain energy supplies.

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[3] The conversion factor from the limit values in the current Protocol (at 5% oxygen content) is 2,66 (16/6). Thus, the limit value of:
- 190 mg/m^3 at 15 % O_2 corresponds to 500 mg/m^3 at 5 % O_2.
- 95 mg/m^3 at 15 % O_2 corresponds to 250 mg/m^3 at 5 % O_2.
- 225 mg/m^3 at 15 % O_2 corresponds to 600 mg/m^3 at 5 % O_2.

10. Iron ore sinter plants:

Table 5

Limit values for NO_x emissions released from iron ore sinter plants[a]

Plant type	*ELV*[b] *for NO_x (mg/m³)*
Sinter plants: New installation	400
Sinter plants: Existing installation	400

[a] Production and processing of metals: metal ore roasting or sintering installations, installations for the production of pig iron or steel (primary or secondary fusion) including continuous casting with a capacity exceeding 2.5 Mg/hour, installations for the processing of ferrous metals (hot rolling mills > 20 Mg/hour of crude steel).

[b] As an exemption to paragraph 3, these ELVs should be considered as averaged over a substantial period of time.

11. Nitric acid production:

Table 6

Limit values for NO_x emissions from nitric acid production excluding acid concentration units

Type of installations	*ELV for NO_x (mg/m³)*
New installations	160
Existing installations	190

B. Canada

12. Limit values for controlling emissions of NO_x will be determined for stationary sources, as appropriate, taking into account information on available control technologies, limit values applied in other jurisdictions, and the documents below:

(a) New Source Emission Guidelines for Thermal Electricity Generation;

(b) National Emission Guidelines for Stationary Combustion Turbines. PN1072;

(c) National Emission Guidelines for Cement Kilns. PN1284;

(d) National Emission Guidelines for Industrial/Commercial Boilers and Heaters. PN1286;

(e) Operating and Emission Guidelines for Municipal Solid Waste Incinerators. PN1085;

(f) Management Plan for Nitrogen Oxides (NO_x) and Volatile Organic Compounds (VOCs) — Phase I. PN1066; and

(g) Operating and Emission Guidelines for Municipal Solid Waste Incinerators. PN1085.

C. United States of America

13. Limit values for controlling emissions of NO_x from stationary sources in the following stationary source categories, and the sources to which they apply, are specified in the following documents:

(a) Coal-fired Utility Units — 40 Code of Federal Regulations (C.F.R.) Part 76;

(b) Electric Utility Steam Generating Units — 40 C.F.R. Part 60, Subpart D, and Subpart Da;

(c) Industrial-Commercial-Institutional Steam Generating Units — 40 C.F.R. Part 60, Subpart Db;

(d) Nitric Acid Plants — 40 C.F.R. Part 60, Subpart G;

(e) Stationary Gas Turbines — 40 C.F.R. Part 60, Subpart GG;

(f) Municipal Waste Combustors — 40 C.F.R. Part 60, Subpart Ea, and Subpart Eb;

(g) Hospital/Medical/Infectious Waste Incinerators — 40 C.F.R. Part 60, Subpart Ec;

(h) Petroleum Refineries — 40 C.F.R. Part 60, Subpart J, and Subpart Ja;

(i) Stationary Internal Combustion Engines — Spark Ignition, 40 C.F.R. Part 60, Subpart JJJJ;

(j) Stationary Internal Combustion Engines — Compression Ignition, 40 C.F.R. Part 60, Subpart IIII;

(k) Stationary Combustion Turbines — 40 C.F.R. Part 60, Subpart KKKK;

(l) Small Municipal Waste Combustors — 40 C.F.R. Part 60, Subpart AAAA;

(m) Portland Cement —40 C.F.R. Part 60, Subpart F;

(n) Commercial and Industrial Solid Waste Combustors — 40 C.F.R. Part 60, Subpart CCCC; and

(o) Other Solid Waste Combustors — 40 C.F.R. Part 60, Subpart EEEE.

Annex VI

Limit values for emissions of volatile organic compounds from stationary sources

1. Section A applies to Parties other than Canada and the United States of America, section B applies to Canada and section C applies to the United States of America.

A. Parties other than Canada and the United States of America

2. This section of the present annex covers the stationary sources of VOC emissions listed in paragraphs 8 to 22 below. Installations or parts of installations for research, development and testing of new products and processes are not covered. Threshold values are given in the sector-specific tables below. They generally refer to solvent consumption or emission mass flow. Where one operator carries out several activities falling under the same subheading at the same installation on the same site, the solvent consumption or emission mass flow of such activities are added together. If no threshold value is indicated, the given limit value applies to all the installations concerned.

3. For the purpose of section A of the present annex:

(a) “Storage and distribution of petrol” means the loading of trucks, railway wagons, barges and seagoing ships at depots and mineral oil refinery dispatch stations, including vehicle refuelling at service stations;

(b) “Adhesive coating” means any activity in which an adhesive is applied to a surface, with the exception of adhesive coating and laminating associated with printing activity and wood and plastic lamination;

(c) “Wood and plastic lamination” means any activity to adhere together wood and/or plastic to produce laminated products;

(d) “Coating activity” means any activity in which a single or multiple application of a continuous film of coating is laid onto:

(i) New vehicles defined as vehicles of category M1 and of category N1 insofar as they are coated at the same installation as M1 vehicles;

(ii) Truck cabins, defined as the housing for the driver, and all integrated housing for the technical equipment of category N2 and N3 vehicles;

(iii) Vans and trucks defined as category N1, N2 and N3 vehicles, but excluding truck cabins;

(iv) Buses defined as category M2 and M3 vehicles;

(v) Other metallic and plastic surfaces including those of aeroplanes, ships, trains, etc.;

(vi) Wooden surfaces;

(vii) Textile, fabric, film and paper surfaces; and

(viii) Leather;

This source category does not include the coating of substrates with metals by electrophoretic or chemical spraying techniques. If the coating activity includes a step in which the same article is printed, that printing step is considered part of the coating activity.

However, printing activities operated as a separate activity are not covered by this definition. In this definition:

a. M1 vehicles are those used for the carriage of passengers and comprising not more than eight seats in addition to the driver’s seat;

b. M2 vehicles are those used for the carriage of passengers and comprising more than eight seats in addition to the driver’s seat, and having a maximum mass not exceeding 5 Mg;

c. M3 vehicles are those used for the carriage of passengers and comprising more than eight seats in addition to the driver’s seat, and having a maximum mass exceeding 5 Mg;

d. N1 vehicles are those used for the carriage of goods and having a maximum mass not exceeding 3.5 Mg;

e. N2 vehicles are those used for the carriage of goods and having a maximum mass exceeding 3.5 Mg but not exceeding 12 Mg;

f. N3 vehicles are those used for the carriage of goods and having a maximum mass exceeding 12 Mg;

(e) “Coil coating” means any activity where coiled steel, stainless steel, coated steel, copper alloys or aluminium strip is coated with either a film-forming or laminate coating in a continuous process;

(f) “Dry cleaning” means any industrial or commercial activity using VOCs in an installation to clean garments, furnishings and similar consumer goods with the exception of the manual removal of stains and spots in the textile and clothing industry;

(g) “Manufacturing of coatings, varnishes, inks and adhesives” means the manufacture of coating preparations, varnishes, inks and adhesives, and of intermediates as far as they are produced in the same installation by mixing pigments, resins and adhesive materials with organic solvents or other carriers. This category also includes dispersion, predispersion, realization of a certain viscosity or colour and packing the final products in containers;

(h) “Printing” means any activity of reproduction of text and/or images in which, with the use of an image carrier, ink is transferred onto a surface and applies to the following subactivities:

(i) Flexography: a printing activity using an image carrier of rubber or elastic photopolymers on which the printing inks are above the non-printing areas, using liquid inks that dry through evaporation;

(ii) Heat-set web offset: a web-fed printing activity using an image carrier in which the printing and non-printing areas are in the same plane, where web-fed means that the material to be printed is fed to the machine from a reel as distinct from separate sheets. The non-printing area is treated to attract water and thus reject ink. The printing area is treated to receive and transmit ink to the surface to be printed. Evaporation takes place in an oven where hot air is used to heat the printed material;

(iii) Publication rotogravure: rotogravure used for printing paper for magazines, brochures, catalogues or similar products, using toluene-based inks;

(iv) Rotogravure: a printing activity using a cylindrical image carrier in which the printing area is below the non-printing area, using liquid inks that dry through evaporation. The recesses are filled with ink and the surplus is cleaned off the non–

printing area before the surface to be printed contacts the cylinder and lifts the ink from the recesses;

(v) Rotary screen printing: a web-fed printing process in which the ink is passed onto the surface to be printed by forcing it through a porous image carrier, in which the printing area is open and the non-printing area is sealed off, using liquid inks that dry only through evaporation. Web-fed means that the material to be printed is fed to the machine from a reel as distinct from separate sheets;

(vi) Laminating associated to a printing activity: the adhering of two or more flexible materials to produce laminates; and

(vii) Varnishing: an activity by which a varnish or an adhesive coating is applied to a flexible material for the purpose of later sealing the packaging material;

(i) "Manufacturing of pharmaceutical products" means chemical synthesis, fermentation, extraction, formulation and finishing of pharmaceutical products and, where carried out at the same site, the manufacture of intermediate products;

(j) "Conversion of natural or synthetic rubber" means any activity of mixing, crushing, blending, calendering, extruding and vulcanization of natural or synthetic rubber and additionally activities for the processing of natural or synthetic rubber to derive an end product;

(k) "Surface cleaning" means any activity except dry cleaning using organic solvents to remove contamination from the surface of material, including degreasing; a cleaning activity consisting of more than one step before or after any other processing step is considered as one surface-cleaning activity. The activity refers to the cleaning of the surface of products and not to the cleaning of process equipment;

(l) "Standard conditions" means a temperature of 273.15 K and a pressure of 101.3 kPa;

(m) "Organic compound" means any compound containing at least the element carbon and one or more of hydrogen, halogens, oxygen, sulphur, phosphorus, silicon or nitrogen, with the exception of carbon oxides and inorganic carbonates and bicarbonates;

(n) "Volatile organic compound" (VOC) means any organic compound as well as the fraction of creosote, having at 293.15 K a vapour pressure of 0.01 kPa or more, or having a corresponding volatility under the particular conditions of use;

(o) "Organic solvent" means any VOC which is used alone or in combination with other agents, and without undergoing a chemical change, to dissolve raw material, products or waste materials, or is used as a cleaning agent to dissolve contaminants, or as a dissolver, or as a dispersion medium, or as a viscosity adjuster, or as a surface tension adjuster, or a plasticizer, or as a preservative;

(p) "Waste gases" means the final gaseous discharge containing VOCs or other pollutants from a stack or from emission abatement equipment into air. The volumetric flow rates shall be expressed in m^3/h at standard conditions;

(q) "Extraction of vegetable oil and animal fat and refining of vegetable oil" means the extraction of vegetable oil from seeds and other vegetable matter, the processing of dry residues to produce animal feed, and the purification of fats and vegetable oils derived from seeds, vegetable matter and/or animal matter;

(r) "Vehicle refinishing" means any industrial or commercial coating activity and associated degreasing activities performing:

(i) The original coating of road vehicles, or part of them, with refinishing-type materials, where this is carried out away from the original manufacturing line, or the coating of trailers (including semi-trailers);

(ii) Vehicle refinishing, defined as the coating of road vehicles, or part of them, carried out as part of vehicle repair, conservation or decoration outside manufacturing installations, is not covered by this annex. The products used as part of this activity are considered in annex XI;

(s) “Wood impregnation” means any activity giving a loading of preservative in timber;

(t) “Winding wire coating” means any coating activity of metallic conductors used for winding the coils in transformers and motors, etc.;

(u) “Fugitive emission” means any emission, not in waste gases, of VOCs into air, soil and water as well as, unless otherwise stated, solvents contained in any product; this includes uncaptured emissions of VOCs released to the outside environment via windows, doors, vents and similar openings. Fugitive emissions may be calculated on the basis of a solvent management plan (see appendix I to the present annex);

(v) “Total emission of VOCs” means the sum of fugitive emission of VOCs and emission of VOCs in waste gases;

(w) “Input” means the quantity of organic solvents and their quantity in preparations used when carrying out a process, including the solvents recycled inside and outside the installation, and which are counted every time they are used to carry out the activity;

(x) “Emission limit value” (ELV) means the maximum quantity of VOC (except methane) emitted from an installation which is not to be exceeded during normal operation. For waste gases, it is expressed in terms of mass of VOC per volume of waste gases (expressed as mg C/m^3 unless specified otherwise), assuming standard conditions for temperature and pressure for dry gas. Gas volumes that are added to the waste gas for cooling or dilution purposes shall not be considered when determining the mass concentration of the pollutant in the waste gases. Emission limit values for waste gases are indicated as ELVc; emission limit values for fugitive emissions are indicated as ELVf;

(y) “Normal operation” means all periods of operation except start-up and shut-down operations and maintenance of equipment;

(z) “Substances harmful to human health” are subdivided into two categories:

(i) Halogenated VOCs that have possible risk of irreversible effects; or

(ii) Hazardous substances that are carcinogens, mutagens or toxic to reproduction or that may cause cancer, may cause heritable genetic damage, may cause cancer by inhalation, may impair fertility or may cause harm to the unborn child:

(aa) “Footwear manufacture” means any activity of producing complete footwear or part of it;

(bb) “Solvent consumption” means the total input of organic solvents into an installation per calendar year, or any other 12-month period, less any VOCs that are recovered for reuse.

4. The following requirements shall be satisfied:

(a) Emissions shall be monitored in all cases via measurements or through calculations[4] achieving at least the same accuracy. Compliance with ELVs shall be verified through continuous or discontinuous measurements, type approval, or any other technically sound method. For the emissions in waste gases, in case of continuous measurements, compliance with the ELVs is achieved if the validated daily emission average does not exceed the ELVs. In case of discontinuous measurements or other appropriate determination procedures, compliance with the ELVs is achieved if the average of all the readings or other procedures within one monitoring exercise does not exceed the limit values. The inaccuracy of the measurement methods may be taken into account for verification purposes. The fugitive and total ELVs apply as annual averages;

(b) The concentrations of air pollutants in gas-carrying ducts shall be measured in a representative way. Monitoring of relevant polluting substances and measurements of process parameters, as well as the quality assurance of automated systems and the reference measurements to calibrate those systems, shall be carried out in accordance with CEN standards. If CEN standards are not available, ISO standards, national or international standards which will ensure the provision of data of an equivalent scientific quality shall apply.

5. The following ELVs apply for waste gases containing substances harmful to human health:

(a) 20 mg/m^3 (expressed as the mass sum of individual compounds) for discharges of halogenated VOCs, which are assigned the following risk phrases: “suspected of causing cancer” and/or “suspected of causing genetic defects”, where the mass flow of the sum of the considered compounds is greater than or equal to 100 g/h; and

(b) 2 mg/m^3 (expressed as the mass sum of individual compounds) for discharges of VOCs, which are assigned the following risk phrases: “may cause cancer”, “may cause genetic defects”, “may cause cancer by inhalation”, “may damage fertility”, “may damage the unborn child”, where the mass flow of the sum of the considered compounds is greater than or equal to 10 g/h.

6. For the source categories listed in paragraphs 9 to 22 where it is demonstrated that for an individual installation compliance with the fugitive emission limit value (ELVf) is not technically and economically feasible, a Party may exempt that installation provided that significant risks to human health or the environment are not expected and that the best available techniques are used.

7. The limit values for VOC emissions for the source categories defined in paragraph 3 shall be as specified in paragraphs 8 to 22 below.

8. Storage and distribution of petrol:

(a) Petrol storage installations at terminals, when above the threshold values mentioned in table 1, must be either:

(i) Fixed-roof tanks, which are connected to a vapour recovery unit meeting the ELVs set out in table 1; or

(ii) Designed with a floating roof, either external or internal, equipped with primary and secondary seals meeting the reduction efficiency set out in table 1;

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[4] Methods of calculation will be reflected in the guidance adopted by the Executive Body.

(b) As a derogation from the above-mentioned requirements, fixed-roof tanks, which were in operation prior to 1 January 1996 and which are not connected to a vapour recovery unit, must be equipped with a primary seal which is achieving a reduction efficiency of 90%.

Table 1

Limit values for VOC emissions from the storage and distribution of petrol, excluding the loading of seagoing ships (stage I)

Activity	*Threshold value*	*ELV or reduction efficiency*
Loading and unloading of mobile container at terminals	5,000 m^3 petrol throughput annually	10g VOC/m^3 including methane[a]
Storage installations at terminals	Existing terminals or tank farms with a petrol throughput of 10,000 Mg/year or more New terminals (without thresholds except for terminals located in small remote islands with a throughput less than 5,000 Mg/year)	95 wt-%[b]
Service stations	Petrol throughput larger than 100 m^3/year	0.01wt-% of the throughput[c]

[a] The vapour displaced by the filling of petrol storage tanks shall be displaced either into other storage tanks or into abatement equipment meeting the limit values in the table above.

[b] Reduction efficiency expressed in % compared to a comparable fixed-roof tank with no vapour-containment controls, i.e., with only a vacuum/pressure relief valve.

[c] Vapours displaced by the delivery of petrol into storage installations at service stations and in fixed-roof tanks used for the intermediate storage of vapours must be returned through a vapour-tight connection line to the mobile container delivering the petrol. Loading operations may not take place unless the arrangements are in place and properly functioning. Under these conditions, no additional monitoring of the compliance with the limit value is required.

Table 2

Limit values for VOC emissions for car refuelling at service station (stage II)

Threshold values	*Minimum vapour capture efficiency wt-%* [a]
New service station if its actual or intended throughput is greater than 500 m^3 per annum Existing service station if its actual or intended throughput is greater than 3,000 m^3 per annum as of 2019 Existing service station if its actual or intended throughput is greater than 500 m^3 per annum and which undergoes a major refurbishment	Equal to or greater than 85 wt-% with a vapour/petrol ratio equal to or greater than 0.95 but less than or equal to 1.05 (v/v)

[a] The capture efficiency of the systems has to be certified by the manufacturer in accordance with relevant technical standards or type approval procedures.

9. Adhesive coating:

Table 3
Limit values for adhesive coating

Activity and threshold	*ELV for VOC (daily for ELVc and yearly for ELVf and total ELV)*
Footwear manufacture (solvent consumption > 5 Mg/year)	25[a] g VOC / pair of shoes
Other adhesive coating (solvent consumption 5 Mg/year–15 Mg/year)	ELVc = 50 mg[b] C/m^3 ELVf = 25 wt-% or less of the solvent input *Or* total ELV of 1.2 kg or less of VOC/kg of solid input
Other adhesive coating (solvent consumption 15 Mg/year–200 Mg/year)	ELVc = 50 mg[b] C/m^3 ELVf = 20 wt-% or less of the solvent input *Or* total ELV of 1 kg or less of VOC/kg of solid input
Other adhesive coating (solvent consumption > 200 Mg/year)	ELVc = 50 mg[c] C/m^3 ELVf = 15 wt-% or less of the solvent input *Or* total ELV of 0.8 kg or less of VOC/kg of solid input

[a] Total ELVs are expressed in grams of solvent emitted per pair of complete footwear produced.

[b] If techniques are used which allow reuse of recovered solvent, the limit value shall be 150 mg C/m^3.

[c] If techniques are used which allow reuse of recovered solvent, the limit value shall be 100 mg C/m^3.

10. Wood and plastic lamination:

Table 4
Limit values for wood and plastic lamination

Activity and threshold	*ELV for VOC (yearly)*
Wood and plastic laminating (solvent consumption > 5 Mg/year)	Total ELV of 30 g VOC/m^2 of final product

11. Coating activities (vehicle coating industry):

Table 5
Limit values for coating activities in the vehicle industry

Activity and threshold	*ELV for VOC[a] (yearly for total ELV)*
Manufacture of cars (M1, M2) (solvent consumption > 15 Mg/year and ≤ 5,000 coated items a year or > 3,500 chassis built)	90 g VOC/m^2 or 1.5 kg/ body + 70 g/m^2
Manufacture of cars (M1, M2) (solvent consumption 15 Mg/year –200 Mg/year and > 5,000 coated items a year)	*Existing installations*: 60g VOC/m^2 or 1.9 kg/ body + 41 g/m^2 *New installations*: 45 g VOC/m^2 or 1.3 kg/body + 33 g/m^2

Activity and threshold	*ELV for VOC[a] (yearly for total ELV)*
Manufacture of cars (M1, M2) (solvent consumption > 200 Mg/year and > 5,000 coated items a year)	35 g VOC/m² or 1 kg/body + 26 g/m² [b]
Manufacture of truck cabins (N1, N2, N3) (solvent consumption > 15 Mg/year and ≤ 5,000 coated items/year)	*Existing installations*: 85 g VOC/m² *New installations*: 65 g VOC/m²
Manufacture of truck cabins (N1, N2, N3) (solvent consumption 15 Mg/year–200 Mg/year and > 5,000 coated items a year)	*Existing installations*: 75 g VOC/m² *New installations*: 55 g VOC/m²
Manufacture of truck cabins (N1, N2, N3) (solvent consumption > 200 Mg/year and > 5,000 coated items a year)	55 g VOC/m²
Manufacture of trucks and vans (solvent consumption > 15 Mg/year and ≤ 2,500 coated items a year)	*Existing installations*: 120 g VOC/m² *New installations*: 90 g VOC/m²
Manufacture of trucks and vans (solvent consumption 15 Mg/year–200 Mg/year and > 2,500 coated items a year)	*Existing installations*: 90 g VOC/m² *New installations*: 70 g VOC/m²
Manufacture of trucks and vans (solvent consumption > 200 Mg/year and > 2,500 coated items a year)	50 g VOC/m²
Manufacture of buses (solvent consumption > 15 Mg/year and ≤ 2,000 coated items a year)	*Existing installations*: 290 g VOC/m² *New installations*: 210 g VOC/m²
Manufacture of buses (solvent consumption 15 Mg/year–200 Mg/year and > 2,000 coated items a year)	*Existing installations*: 225 g VOC/m² *New installations*: 150 g VOC/m²
Manufacture of buses (solvent consumption > 200 Mg/year and > 2,000 coated items a year)	150 g VOC/m²

[a] The total limit values are expressed in terms of mass of organic solvent (g) emitted in relation to the surface area of product (m^2). The surface area of the product is defined as the surface area calculated from the total electrophoretic coating area and the surface area of any parts that might be added in successive phases of the coating process which are coated with the same coatings. The surface of the electrophoretic coating area is calculated using the formula: (2 x total weight of product shell)/(average thickness of metal sheet x density of metal sheet). The total ELVs defined in the table above refer to all process stages carried out at the same installation from electrophoretic coating, or any other kind of coating process through the final wax and polish of top-coating inclusive, as well as solvent used in cleaning of process equipment, including spray booths and other fixed equipment, both during and outside of production time.

[b] For existing plants achieving these levels may entail cross-media effects, high capital costs and long payback periods. Major step decreases in VOC emissions necessitate changing the type of paint system and/or the paint application system and/or the drying system and this usually involves either a new installation or a complete refurbishment of a paint shop and requires significant capital investment.

12. Coating activities (metal, textile, fabric, film, plastic, paper and wooden surfaces coating):

Table 6
Limit values for coating activities in various industrial sectors

Activity and threshold	*ELV for VOC (daily for ELVc and yearly for ELVf and total ELV)*
Wood coating (solvent consumption 15 Mg/year–25 Mg/year)	ELVc = 100[a] mg C/m^{3} ELVf = 25 wt-% or less of the solvent input *Or* total ELV of 1.6 kg or less of VOC/kg of solid input
Wood coating (solvent consumption 25 Mg/year–200 Mg/year)	ELVc = 50 mg C/m^{3} for drying and 75 mg C/m^{3} for coating ELVf = 20 wt-% or less of the solvent input *Or* total ELV of 1 kg or less of VOC/kg of solid input
Wood coating (solvent consumption > 200 Mg/year)	ELVc = 50 mg C/m^{3} for drying and 75 mg C/m^{3} for coating ELVf = 15 wt-% or less of the solvent input *Or* total ELV of 0.75 kg or less of VOC/kg of solid input
Coating of metal and plastics (solvent consumption 5 Mg/year–15 Mg/year)	ELVc = 100[a, b] mg C/m^{3} ELVf = 25[b] wt-% or less of the solvent input *Or* total ELV of 0.6 kg or less of VOC/kg of solid input
Other coating, including textile, fabric film and paper (excluding web screen printing for textiles, see printing) (solvent consumption 5 Mg/year–15 Mg/year)	ELVc = 100[a,b] mg C/m^{3} ELVf = 25[b] wt-% or less of the solvent input *Or* total ELV of 1.6 kg or less of VOC/kg of solid input
Textile, fabric, film and paper coating (excluding web screen printing for textiles, see printing) (solvent consumption > 15 Mg/year)	ELVc = 50 mg C/m^{3} for drying and 75 mg C/m^{3} for coating[b, c] ELVf = 20[b] wt-% or less of the solvent input *Or* total ELV of 1 kg or less of VOC/kg of solid input
Coating of plastic workpieces (solvent consumption 15 Mg/year–200 Mg/year)	ELVc = 50 mg C/m^{3} for drying and 75 mg C/m^{3} for coating[b] ELVf = 20[b] wt-% or less of the solvent input *Or* total ELV of 0.375 kg or less of VOC/kg of solid input
Coating of plastic workpieces (solvent consumption > 200 Mg/year)	ELVc = 50 mg C/m^{3} for drying and 75 mg C/m^{3} for coating[b] ELVf = 20[b] wt-% or less of the solvent input *Or* total ELV of 0.35 kg or less of VOC/kg of solid input
Coating of metal surfaces (solvent consumption 15 Mg/year–200 Mg/year)	ELVc = 50 mg C/m^{3} for drying and 75 mg C/m^{3} for coating[b] ELVf = 20[b] wt-% or less of the solvent input *Or* total ELV of 0.375 kg or less of VOC/kg of solid input Exception for coatings in contact with food: Total ELV of 0.5825 kg or less of VOC/kg of solid input

Activity and threshold	*ELV for VOC (daily for ELVc and yearly for ELVf and total ELV)*
Coating of metal surfaces (solvent consumption >200 Mg/year)	ELVc = 50 mg C/m^3 for drying and 75 mg C/m^3 for coating[b] ELVf = 20[b] wt-% or less of the solvent input *Or* total ELV of 0.33 kg or less of VOC/kg of solid input Exception for coatings in contact with food: Total ELV of 0.5825 kg or less of VOC/kg of solid input

[a] Limit value applies to coating applications and drying processes operated under contained conditions.

[b] If contained coating conditions are not possible (boat construction, aircraft coating, etc.), installations may be granted exemption from these values. The reduction scheme is then to be used, unless this option is not technically and economically feasible. In this case, the best available technique is used.

[c] If, for textile coating, techniques are used which allow reuse of recovered solvents, the limit value shall be 150 mg C/m^3 for drying and coating together.

13. Coating activities (leather and winding wire coating):

Table 7
Limit values for leather and winding wire coating

Activity and threshold	*ELV for VOC (yearly for total ELV)*
Leather coating in furnishing and particular leather goods used as small consumer goods like bags, belts, wallets, etc. (solvent consumption > 10 Mg/year)	Total ELV of 150 g/m²
Other leather coating (solvent consumption 10 Mg/year–25 Mg/year)	Total ELV of 85 g/m²
Other leather coating (solvent consumption > 25 Mg/year)	Total ELV of 75 g/m²
Winding wire coating (solvent consumption > 5 Mg/year)	Total ELV of 10 g/kg applies for installations where average diameter of wire ≤ 0,1 mm
	Total ELV of 5 g/kg applies for all other installations

14. Coating activities (coil coating):

Table 8
Limit values for coil coating

Activity and threshold	*ELV for VOC (daily for ELVc and yearly for ELVf and total ELV)*
Existing installation (solvent consumption 25 Mg/year–200 Mg/year)	ELVc = 50 mg[a] C/m^3 ELVf = 10 wt-% or less of the solvent input *Or* total ELV of 0.45 kg or less of VOC/kg of solid input
Existing installation (solvent consumption > 200 Mg/year)	ELVc = 50 mg[a] C/m^3 ELVf = 10 wt-% or less of the solvent input *Or* total ELV of 0.45 kg or less of VOC/kg of solid input

Activity and threshold	*ELV for VOC (daily for ELVc and yearly for ELVf and total ELV)*
New installation (solvent consumption 25 Mg/year–200 Mg/year)	ELVc = 50 mg C/m$^{3\,a}$ ELVf = 5 wt-% or less of the solvent input *Or* total ELV of 0.3 kg or less of VOC/kg of solid input
New installation (solvent consumption > 200 Mg/year)	ELVc = 50 mg[a] C/m^3 ELVf = 5 wt-% or less of the solvent input *Or* total ELV of 0.3 kg or less of VOC/kg of solid input

[a] If techniques are used which allow reuse of recovered solvent, the limit value shall be 150 mg C/m^3.

15. Dry cleaning:

Table 9

Limit values for dry cleaning

Activity	*ELV for VOC[a,b] (yearly for total ELV)*
New and existing installations	Total ELV of 20 g VOC/kg

[a] Limit value for total emissions of VOCs calculated as mass of emitted VOC per mass of cleaned and dried product.

[b] This emission level can be achieved by using at least type IV machines or more efficient ones.

16. Manufacturing of coatings, varnishes, inks and adhesives:

Table 10

Limit values form manufacturing of coatings, varnishes, inks and adhesives

Activity and threshold	*ELV for VOC (daily for ELVc and yearly for ELVf and total ELV)*
New and existing installations with solvent consumption between 100 Mg/year–1,000 Mg/year	ELVc = 150 mg C/m^3 ELVf[a] = 5 wt-% or less of the solvent input *Or* total ELV of 5 wt-% or less of the solvent input
New and existing installations with solvent consumption > 1,000 Mg/year	ELVc = 150 mg C/m^3 ELVf[a] = 3 wt-% or less of the solvent input *Or* total ELV of 3 wt-% or less of the solvent input

[a] The fugitive limit value does not include solvents sold as part of a preparation in a sealed container.

17. Printing activities (flexography, heat-set web offset, publication rotogravure, etc.):

Table 11

Limit values for printing activities

Activity and threshold	*ELV for VOC (daily for ELVc and yearly for ELVf and total ELV)*
Heat-set offset (solvent consumption 15 Mg/year–25 Mg/year)	ELVc = 100 mg C/m^3 ELVf = 30 wt-% or less of the solvent input[a]

Activity and threshold	*ELV for VOC (daily for ELVc and yearly for ELVf and total ELV)*
Heat-set offset (solvent consumption 25 Mg/year–200 Mg/year)	New and existing installations ELVc = 20 mg C/m^3 ELVf = 30 wt-% or less of the solvent input[a]
Heat-set offset (solvent consumption >200 Mg/year)	For new and upgraded presses Total ELV = 10 wt-% or less of the ink consumption[a]
	For existing presses Total ELV = 15 wt-% or less of the ink consumption[a]
Publication gravure (solvent consumption 25 Mg/year–200 Mg/year)	For new installations ELVc = 75 mg C/m^3 ELVf = 10 wt-% or less of the solvent input *Or* total ELV of 0.6 kg or less of VOC/kg of solid input
	For existing installations ELVc = 75 mg C/m^3 ELVf = 15 wt-% or less of the solvent input *Or* total ELV of 0.8 kg or less of VOC/kg of solid input
Publication gravure (solvent consumption > 200 Mg/year)	For new installations Total ELV = 5 wt-% or less of the solvent input
	For existing installations Total ELV = 7 wt-% or less of the solvent input
Packaging rotogravure and flexography (solvent consumption 15 Mg/year–25 Mg/year)	ELVc = 100 mg C/m^3 ELVf = 25 wt-% or less of the solvent input *Or* total ELV of 1.2 kg or less of VOC/kg of solid input
Packaging rotogravure and flexography (solvent consumption 25 Mg/year–200 Mg/year) and rotary screen printing (solvent consumption > 30 Mg/year)	ELVc = 100 mg C/m^3 ELVf = 20 wt-% or less of the solvent input *Or* total ELV of 1.0 kg or less of VOC/kg of solid input

Activity and threshold	*ELV for VOC (daily for ELVc and yearly for ELVf and total ELV)*
Packaging rotogravure and flexography (solvent consumption > 200 Mg/year)	*For plants with all machines connected to oxidation:* Total ELV = 0.5 kg VOC/kg of solid input *For plants with all machines connected to carbon adsorption:* Total ELV = 0.6 kg VOC/kg of solid input *For existing mixed plants where some existing machines may not be attached to an incinerator or solvent recovery:* Emissions from the machines connected to oxidizers or carbon adsorption are below the emission limits of 0.5 or 0.6 kg VOC/kg of solid input respectively. *For machines not connected to gas treatment*: use of low solvent or solvent free products, connection to waste gas treatment when there is spare capacity and preferentially run high solvent content work on machines connected to waste gas treatment. Total emissions below 1.0 kg VOC/kg of solid input

[a] Residual solvent in the finished product is not taken into account in the calculation of the fugitive emission.

18. Manufacturing of pharmaceutical products:

Table 12
Limit values for manufacturing of pharmaceutical products

Activity and threshold	*ELV for VOC (daily for ELVc and yearly for ELVf and total ELV)*
New installations (solvent consumption > 50 Mg/year)	ELVc = 20 mg C/m^3 [a,b] ELVf = 5 wt-% or less of the solvent input[b]
Existing installations (solvent consumption > 50 Mg/year)	ELVc = 20 mg C/m^3 [a,c] ELVf = 15 wt-% or less of the solvent input[c]

[a] If techniques are used which allow reuse of recovered solvents, the limit value shall be 150 mg C/m^3.

[b] A total limit value of 5% of solvent input may be applied instead of applying ELVc and ELVf.

[c] A total limit value of 15% of solvent input may be applied instead of applying ELVc and ELVf.

19. Conversion of natural or synthetic rubber:

Table 13
Limit values for conversion of natural or synthetic rubber

Activity and threshold	*ELV for VOC (daily for ELVc and yearly for ELVf and total ELV)*
New and existing installations: conversion of natural or synthetic rubber (solvent consumption > 15 Mg/year)	ELVc = 20 mgC/m^3 [a] ELVf = 25 wt-% of the solvent input[b] *Or* total ELV = 25wt-% of solvent input

[a] If techniques are used which allow reuse of recovered solvent, the limit value shall be 150 mg C/m^3.

[b] The fugitive limit does not include solvents sold as part of a preparation in a sealed container.

20. Surface cleaning:

Table 14
Limit values for surface cleaning

Activity and threshold	*Threshold value for solvent consumption (Mg/year)*	*ELV for VOC (daily for ELVc and yearly for ELVf and total ELV)*	
Surface cleaning using substances mentioned in paragraph 3 (z) (i) of this annex	1–5	ELVc = 20 mg expressed as the mass sum of individual compounds/m^3	ELVf = 15wt-% of solvent input
	> 5	ELVc = 20 mg expressed as the mass sum of individual compounds/m^3	ELVf = 10wt-% of solvent input
Other surface cleaning	2–10	ELVc = 75 mg C/m^3 [a]	ELVf = 20wt-%[a] of solvent input
	> 10	ELVc = 75 mg C/m^3 [a]	ELVf = 15wt-%[a] of solvent input

[a] Installations for which the average organic solvent content of all cleaning material used does not exceed 30 wt-% are exempt from applying these values.

21. Vegetable oil and animal fat extraction and vegetable oil refining processes:

Table 15
Limit values for extraction of vegetable and animal fat and refining of vegetable oil

Activity and threshold	*ELV for VOC (yearly for total ELV)*	
New and existing installations (solvent consumption > 10 Mg/year)	Total ELV (kg VOC/Mg product)	
	Animal fat:	1.5
	Castor:	3.0
	Rape seed:	1.0

Activity and threshold	*ELV for VOC (yearly for total ELV)*	
	Sunflower seed:	1.0
	Soya beans (normal crush):	0.8
	Soya beans (white flakes):	1.2
	Other seeds and vegetable material:	3.0[a]
	All fractionation processes, excluding degumming:[b]	1.5
	Degumming:	4.0

[a] Limit values for total emissions of VOCs from installations treating single batches of seeds or other vegetable material shall be set case by case by a Party on the basis of the best available techniques.

[b] The removal of gum from the oil.

22. Impregnation of wood:

Table 16
Limit values for impregnation of wood

Activity and threshold	*ELV for VOC (daily for ELVc and yearly for ELVf and total ELV)*
Wood impregnation (solvent consumption 25 Mg/year–200 Mg/year)	ELVc = 100[a] mg C/m^3 ELVf = 45 wt-% or less of the solvent input *Or* 11 kg or less of VOC/m^3
Wood impregnation (solvent consumption > 200 Mg/year)	ELVc = 100[a] mg C/m^3 ELVf = 35 wt-% or less of the solvent input *Or* 9 kg or less of VOC/m^3

[a] Does not apply to impregnation with creosote.

B. Canada

23. Limit values for controlling emissions of VOCs will be determined for stationary sources, as appropriate, taking into account information on available control technologies, limit values applied in other jurisdictions, and the documents below:

(a) VOC Concentration Limits for Architectural Coatings Regulations. SOR/2009–264;

(b) VOC Concentration Limits for Automotive Refinishing Products. SOR/2009–197;

(c) Proposed regulations for VOC Concentrations Limits for Certain Products;

(d) Guidelines for the Reduction of Ethylene Oxide Releases from Sterilization Applications;

(e) Environmental Guideline for the Control of Volatile Organic Compounds Process Emissions from New Organic Chemical Operations. PN1108;

(f) Environmental Code of Practice for the Measurement and Control of Fugitive VOC Emissions from Equipment Leaks. PN1106;

(g) A Program to Reduce Volatile Organic Compound Emissions by 40 Percent from Adhesives and Sealants. PN1116;

(h) A Plan to Reduce VOC Emissions by 20 Percent from Consumer Surface Coatings. PN1114;

(i) Environmental Guidelines for Controlling Emissions of Volatile Organic Compounds from Aboveground Storage Tanks. PN1180;

(j) Environmental Code of Practice for Vapour Recovery during Vehicle Refueling at Service Stations and Other Gasoline Dispersing Facilities. PN1184;

(k) Environmental Code of Practice for the Reduction of Solvent Emissions from Commercial and Industrial Degreasing Facilities. PN1182;

(l) New Source Performance Standards and Guidelines for the Reduction of Volatile Organic Compound Emissions from Canadian Automotive Original Equipment Manufacturer (OEM) Coating Facilities. PN1234;

(m) Environmental Guideline for the Reduction of Volatile Organic Compound Emissions from the Plastics Processing Industry. PN1276;

(n) National Action Plan for the Environmental Control of Ozone-Depleting Substances (ODS) and Their Halocarbon Alternatives. PN1291;

(o) Management Plan for Nitrogen Oxides (NO_x) and Volatile Organic Compounds (VOCs) — Phase I. PN1066;

(p) Environmental Code of Practice for the Reduction of Volatile Organic Compound Emissions from the Commercial/Industrial Printing Industry. PN1301;

(q) Recommended CCME[5] Standards and Guidelines for the Reduction of VOC Emissions from Canadian Industrial Maintenance Coatings. PN1320; and

(r) Guidelines for the Reduction of VOC Emissions in the Wood Furniture Manufacturing Sector. PN1338.

C. United States of America

24. Limit values for controlling emissions of VOCs from stationary sources in the following stationary source categories, and the sources to which they apply, are specified in the following documents:

(a) Storage Vessels for Petroleum Liquids — 40 Code of Federal Regulations (C.F.R.) Part 60, Subpart K, and Subpart Ka;

(b) Storage Vessels for Volatile Organic Liquids — 40 C.F.R. Part 60, Subpart Kb;

(c) Petroleum Refineries — 40 C.F.R. Part 60, Subpart J;

(d) Surface Coating of Metal Furniture — 40 C.F.R. Part 60, Subpart EE;

(e) Surface Coating for Automobile and Light Duty Trucks — 40 C.F.R. Part 60, Subpart MM;

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[5] Canadian Council of Ministers of the Environment.

(f) Publication Rotogravure Printing — 40 C.F.R. Part 60, Subpart QQ;

(g) Pressure Sensitive Tape and Label Surface Coating Operations — 40 C.F.R. Part 60, Subpart RR;

(h) Large Appliance, Metal Coil and Beverage Can Surface Coating — 40 C.F.R. Part 60, Subpart SS, Subpart TT and Subpart WW;

(i) Bulk Gasoline Terminals — 40 C.F.R. Part 60, Subpart XX;

(j) Rubber Tire Manufacturing — 40 C.F.R. Part 60, Subpart BBB;

(k) Polymer Manufacturing — 40 C.F.R. Part 60, Subpart DDD;

(l) Flexible Vinyl and Urethane Coating and Printing — 40 C.F.R. Part 60, Subpart FFF;

(m) Petroleum Refinery Equipment Leaks and Wastewater Systems — 40 C.F.R. Part 60, Subpart GGG and Subpart QQQ;

(n) Synthetic Fiber Production — 40 C.F.R. Part 60, Subpart HHH;

(o) Petroleum Dry Cleaners — 40 C.F.R. Part 60, Subpart JJJ;

(p) Onshore Natural Gas Processing Plants — 40 C.F.R. Part 60, Subpart KKK;

(q) SOCMI Equipment Leaks, Air Oxidation Units, Distillation Operations and Reactor Processes — 40 C.F.R. Part 60, Subpart VV, Subpart III, Subpart NNN and Subpart RRR;

(r) Magnetic Tape Coating — 40 C.F.R. Part 60, Subpart SSS;

(s) Industrial Surface Coatings — 40 C.F.R. Part 60, Subpart TTT;

(t) Polymeric Coatings of Supporting Substrates Facilities — 40 C.F.R. Part 60, Subpart VVV;

(u) Stationary Internal Combustion Engines — Spark Ignition, 40 C.F.R. Part 60, Subpart JJJJ;

(v) Stationary Internal Combustion Engines — Compression Ignition, 40 C.F.R. Part 60, Subpart IIII and

(w) New and in-use portable fuel containers — 40 C.F.R. Part 59, Subpart F.

25. Limit values for controlling emissions of VOC from sources subject to National Emission Standards for Hazardous Air Pollutants (HAPs) are specified in the following documents:

(a) Organic HAPs from the Synthetic Organic Chemical Manufacturing Industry — 40 C.F.R. Part 63, Subpart F;

(b) Organic HAPs from the Synthetic Organic Chemical Manufacturing Industry: Process Vents, Storage Vessels, Transfer Operations, and Wastewater — 40 C.F.R. Part 63, Subpart G;

(c) Organic HAPs: Equipment Leaks — 40 C.F.R. Part 63, Subpart H;

(d) Commercial ethylene oxide sterilizers — 40 C.F.R. Part 63, Subpart O;

(e) Bulk gasoline terminals and pipeline breakout stations — 40 C.F.R. Part 63, Subpart R;

(f) Halogenated solvent degreasers — 40 C.F.R. Part 63, Subpart T;

(g) Polymers and resins (Group I) — 40 C.F.R. Part 63, Subpart U;

(h) Polymers and resins (Group II) — 40 C.F.R. Part 63, Subpart W;

(i) Secondary lead smelters — 40 C.F.R. Part 63, Subpart X;

(j) Marine tank vessel loading — 40 C.F.R. Part 63, Subpart Y;

(k) Petroleum refineries — 40 C.F.R. Part 63, Subpart CC;

(l) Offsite waste and recovery operations — 40 C.F.R. Part 63, Subpart DD;

(m) Magnetic tape manufacturing — 40 C.F.R. Part 63, Subpart EE;

(n) Aerospace manufacturing — 40 C.F.R. Part 63, Subpart GG;

(o) Oil and natural gas production — 40 C.F.R. Part 63, Subpart HH;

(p) Ship building and ship repair — 40 C.F.R. Part 63, Subpart II;

(q) Wood furniture — 40 C.F.R. Part 63, Subpart JJ;

(r) Printing and publishing — 40 C.F.R. Part 63, Subpart KK;

(s) Pulp and paper II (combustion) — C.F.R. Part 63, Subpart MM;

(t) Storage tanks — 40 C.F.R. Part 63, Subpart OO;

(u) Containers — 40 C.F.R. Part 63, Subpart PP;

(v) Surface impoundments — 40 C.F.R. Part 63, Subpart QQ;

(w) Individual drain systems — 40 C.F.R. Part 63, Subpart RR;

(x) Closed vent systems — 40 C.F.R. Part 63, Subpart SS;

(y) Equipment leaks: control level 1 — 40 C.F.R. Part 63, Subpart TT;

(z) Equipment leaks: control level 2 — 40 C.F.R. Part 63, Subpart UU;

(aa) Oil-Water Separators and Organic-Water Separators — 40 C.F.R. Part 63, Subpart VV;

(bb) Storage Vessels (Tanks): Control Level 2 — 40 C.F.R. Part 63, Subpart WW;

(cc) Ethylene Manufacturing Process Units — 40 C.F.R. Part 63, Subpart XX;

(dd) Generic Maximum Achievable Control Technology Standards for several categories — 40 C.F.R. Part 63, Subpart YY;

(ee) Hazardous waste combustors — 40 C.F.R. Part 63, Subpart EEE;

(ff) Pharmaceutical manufacturing — 40 C.F.R. Part 63, Subpart GGG;

(gg) Natural Gas Transmission and Storage — 40 C.F.R. Part 63, Subpart HHH;

(hh) Flexible Polyurethane Foam Production — 40 C.F.R. Part 63, Subpart III;

(ii) Polymers and Resins: group IV — 40 C.F.R. Part 63, Subpart JJJ;

(jj) Portland cement manufacturing — 40 C.F.R. Part 63, Subpart LLL;

(kk) Pesticide active ingredient production —— 40 C.F.R. Part 63, Subpart MMM;

(ll) Polymers and resins: group III — 40 C.F.R. Part 63, Subpart OOO;

(mm) Polyether polyols — 40 C.F.R. Part 63, Subpart PPP;

(nn) Secondary aluminum production — 40 C.F.R. Part 63, Subpart RRR;

(oo) Petroleum refineries — 40 C.F.R. Part 63, Subpart UUU;

(pp) Publicly owned treatment works — 40 C.F.R. Part 63, Subpart VVV;

(qq) Nutritional Yeast Manufacturing — 40 C.F.R. Part 63, Subpart CCCC;

(rr) Organic liquids distribution (non-gasoline) — 40 C.F.R. Part 63, Subpart EEEE;

(ss) Miscellaneous organic chemical manufacturing — 40 C.F.R. Part 63, Subpart FFFF;

(tt) Solvent Extraction for Vegetable Oil Production — 40 C.F.R. Part 63, Subpart GGGG;

(uu) Auto and Light Duty Truck Coatings — 40 C.F.R. Part 63, Subpart IIII;

(vv) Paper and Other Web Coating — 40 C.F.R. Part 63, Subpart JJJJ;

(ww) Surface Coatings for Metal Cans — 40 C.F.R. Part 63, Subpart KKKK;

(xx) Miscellaneous Metal Parts and Products Coatings — 40 C.F.R. Part 63, Subpart MMMM;

(yy) Surface Coatings for Large Appliances — 40 C.F.R. Part 63, Subpart NNNN;

(zz) Printing, Coating and Dyeing of Fabric — 40 C.F.R. Part 63, Subpart OOOO;

(aaa) Surface Coating of Plastic Parts and Products — 40 C.F.R. Part 63, Subpart PPPP;

(bbb) Surface Coating of Wood Building Products — 40 C.F.R. Part 63, Subpart QQQQ;

(ccc) Metal Furniture Surface Coating — 40 C.F.R. Part 63, Subpart RRRR;

(ddd) Surface coating for metal coil — 40 C.F.R. Part 63, Subpart SSSS;

(eee) Leather finishing operations — 40 C.F.R. Part 63, Subpart TTTT;

(fff) Cellulose products manufacturing — 40 C.F.R. Part 63, Subpart UUUU;

(ggg) Boat manufacturing — 40 C.F.R. Part 63, Subpart VVVV;

(hhh) Reinforced Plastics and Composites Production — 40 C.F.R. Part 63, Subpart WWWW;

(iii) Rubber tire manufacturing — 40 C.F.R. Part 63, Subpart XXXX;

(jjj) Stationary Combustion Engines — 40 C.F.R. Part 63, Subpart YYYY;

(kkk) Stationary Reciprocating Internal Combustion Engines: Compression Ignition — 40 C.F.R. Part 63, Subpart ZZZZ;

(lll) Semiconductor manufacturing — 40 C.F.R. Part 63, Subpart BBBBB;

(mmm) Iron and steel foundries — 40 C.F.R. Part 63, Subpart EEEEE;

(nnn) Integrated iron and steel manufacturing — 40 C.F.R. Part 63, Subpart FFFFF;

(ooo) Asphalt Processing and Roofing Manufacturing — 40 C.F.R. Part 63, Subpart LLLLL;

(ppp) Flexible Polyurethane Foam Fabrication — 40 C.F.R. Part 63, Subpart MMMMM;

(qqq) Engine test cells/stands — 40 C.F.R. Part 63, Subpart PPPPP;

(rrr) Friction products manufacturing — 40 C.F.R. Part 63, Subpart QQQQQ;

(sss) Refractory products manufacturing — 40 C.F.R. Part 63, Subpart SSSSS;

(ttt) Hospital ethylene oxide sterilizers — 40 C.F.R. Part 63, Subpart WWWWW;

(uuu) Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities — 40 C.F.R. Part 63, Subpart BBBBBB;

(vvv) Gasoline Dispensing Facilities — 40 C.F.R. Part 63, Subpart CCCCCC;

(www) Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources — 40 C.F.R. Part 63, Subpart HHHHHH;

(xxx) Acrylic Fibers/Modacrylic Fibers Production (Area Sources) — 40 C.F.R. Part 63, Subpart LLLLLL;

(yyy) Carbon Black Production (Area Sources) — 40 C.F.R. Part 63, Subpart MMMMMM;

(zzz) Chemical Manufacturing Area Sources: Chromium Compounds — 40 C.F.R. Part 63, Subpart NNNNNN;

(aaaa) Chemical Manufacturing for Area Sources — 40 C.F.R. Part 63, Subpart VVVVVV;

(bbbb) Asphalt Processing and Roofing Manufacturing (Area Sources) — 40 C.F.R. Part 63, Subpart AAAAAAA; and

(cccc) Paints and Allied Products Manufacturing (Area Sources) — 40 C.F.R. Part 63, Subpart CCCCCCC.

Appendix

Solvent management plan

I. Introduction

1. This appendix to the annex on limit values for emissions of VOCs from stationary sources provides guidance on carrying out a solvent management plan. It identifies the principles to be applied (para. 2), provides a framework for the mass balance (para. 3) and provides an indication of the requirements for verification of compliance (para. 4).

II. Principles

2. The solvent management plan serves the following purposes:

(a) Verification of compliance, as specified in the annex; and

(b) Identification of future reduction options.

III. Definitions

3. The following definitions provide a framework for the mass balance exercise:

(a) Inputs of organic solvents:

(i) I1. The quantity of organic solvents or their quantity in preparations purchased that are used as input into the process in the time frame over which the mass balance is being calculated;

(ii) I2. The quantity of organic solvents or their quantity in preparations recovered and reused as solvent input into the process. (The recycled solvent is counted every time it is used to carry out the activity.);

(b) Outputs of organic solvents:

(i) O1. Emission of VOCs in waste gases;

(ii) O2. Organic solvents lost in water, if appropriate taking into account wastewater treatment when calculating O5;

(iii) O3. The quantity of organic solvents that remains as contamination or residue in output of products from the process;

(iv) O4. Uncaptured emissions of organic solvents to air. This includes the general ventilation of rooms, where air is released to the outside environment via windows, doors, vents and similar openings;

(v) O5. Organic solvents and/or organic compounds lost due to chemical or physical reactions (including, for example, those that are destroyed, e.g., by incineration or other waste-gas or wastewater, or captured, e.g., by adsorption, as long as they are not counted under O6, O7 or O8);

(vi) O6. Organic solvents contained in collected waste;

(vii) O7. Organic solvents, or organic solvents contained in preparations, that are sold or are intended to be sold as a commercially valuable product;

(viii) O8. Organic solvents contained in preparations recovered for reuse but not as input into the process, as long as they are not counted under O7;

(ix) O9. Organic solvents released in other ways.

IV. Guidance on use of the solvent management plan for verification of compliance

4. The use of the solvent management plan will be determined by the particular requirement which is to be verified, as follows:

(a) Verification of compliance with the reduction option mentioned in paragraph 6 (a) of the annex, with a total limit value expressed in solvent emissions per unit product, or as otherwise stated in the annex:

(i) For all activities using the reduction option mentioned in paragraph 6 (a) of the annex, the solvent management plan should be put into effect annually to determine consumption. Consumption can be calculated by means of the following equation:

$$C = I1 - O8$$

A parallel exercise should also be undertaken to determine solids used in coating in order to derive the annual reference emission and the target emission each year;

(ii) For assessing compliance with a total limit value expressed in solvent emissions per unit product or as otherwise stated in the annex, the solvent management plan should be put into effect annually to determine emission of VOCs. Emission of VOCs can be calculated by means of the following equation:

$$E = F + O1$$

Where F is the fugitive emission of VOC as defined in subparagraph (b) (i) below. The emission figure should be divided by the relevant product parameter;

(b) Determination of fugitive emission of VOCs for comparison with fugitive emission values in the annex:

(i) Methodology: The fugitive emission of VOC can be calculated by means of the following equation:

$$F = I1 - O1 - O5 - O6 - O7 - O8$$

or

$$F = O2 + O3 + O4 + O9$$

This quantity can be determined by direct measurement of the quantities. Alternatively, an equivalent calculation can be made by other means, for instance by using the capture efficiency of the process. The fugitive emission value is expressed as a proportion of the input, which can be calculated by means of the following equation:

$$I = I1 + I2;$$

(ii) Frequency: Fugitive emission of VOCs can be determined by a short but comprehensive set of measurements. This need not to be done again until the equipment is modified.

Annex VII

Timescales under article 3

1. The timescales for the application of the limit values referred to in article 3, paragraphs 2 and 3, shall be:

(a) For new stationary sources, one year after the date of entry into force of the present Protocol for the Party in question; and

(b) For existing stationary sources, one year after the date of entry into force of the present Protocol for the Party in question or 31 December 2020, whichever is the later.

2. The timescales for the application of the limit values for fuels and new mobile sources referred to in article 3, paragraph 5, shall be the date of entry into force of the present Protocol for the Party in question or the dates associated with the measures specified in annex VIII, whichever is the later.

3. The timescales for the application of the limit values for VOCs in products referred to in article 3, paragraph 7, shall be one year after the date of entry into force of the present Protocol for the Party in question.

4. Notwithstanding paragraphs 1, 2 and 3, but subject to paragraph 5, a Party to the Convention that becomes a Party to the present Protocol between 1 January 2013 and 31 December 2019 may declare upon ratification, acceptance, approval of, or accession to, the present Protocol that it will extend any or all of the timescales for application of the limit values referred to in article 3, paragraphs 2, 3, 5 and 7, as follows:

(a) For existing stationary sources, up to 15 years after the date of entry into force of the present Protocol for the Party in question;

(b) For fuels and new mobile sources, up to 5 years after the date of entry into force of the present Protocol for the Party in question; and

(c) For VOCs in products, up to 5 years after the date of entry into force of the present Protocol for the Party in question.

5. A Party that has made an election pursuant to article 3 bis of the present Protocol with respect to annex VI and/or VIII may not also make a declaration pursuant to paragraph 4 applicable to the same annex.

Annex VIII

Limit values for fuels and new mobile sources

I. Introduction

1. Section A applies to Parties other than Canada and the United States of America, section B applies to Canada and section C applies to the United States of America.

2. This annex specifies emission limit values for NO_x, expressed as nitrogen dioxide (NO_2) equivalents, for hydrocarbons, most of which are volatile organic compounds, for carbon monoxide (CO) and for particulate matter as well as environmental specifications for marketed fuels for vehicles.

3. The timescales for applying the limit values in this annex are laid down in annex VII.

A. Parties other than Canada and the United States of America

Passenger cars and light-duty vehicles

4. Limit values for power-driven vehicles with at least four wheels and used for the carriage of passengers (category M) and goods (category N) are given in table 1.

Heavy-duty vehicles

5. Limit values for engines for heavy-duty vehicles are given in tables 2 and 3 on the applicable test procedures.

Compression-ignition (CI) and spark-ignition (SI) non-road vehicles and machines

6. Limit values for agricultural and forestry tractors and other non-road vehicle/ machine engines are listed in tables 4 to 6.

7. Limit values for locomotives and railcars are listed in tables 7 and 8.

8. Limit values for inland waterway vessels are listed in table 9.

9. Limit values for recreational crafts are listed in table 10.

Motorcycles and mopeds

10. Limit values for motorcycles and mopeds are given in tables 11 and 12.

Fuel quality

11. Environmental quality specifications for petrol and diesel are given in tables 13 and 14.

Table 1

Limit values for passenger cars and light-duty vehicles

			Limit values[a]													
			Carbon monoxide L1 (g/km)		*Total Hydrocarbons (HC) L2 (g/km)*		*Non-methane volatile organic compound (NMVOC) L3 (g/km)*		*Nitrogen oxides L4 (g/km)*		*Hydrocarbons and nitrogen oxides combined L2 + L4 (g/km)*		*Particulate matter L5 (g/km)*		*Number of particles*[a] *(P) L6(#/km)*	
Category	*Class, application date**	*Reference mass (RW) (kg)*	*Petrol*	*Diesel*	*Petrol*	*Diesel*	*Petrol*	*Diesel*	*Petrol*	*Diesel*	*Petrol*	*Diesel*	*Petrol*	*Diesel*	*Petrol*	*Diesel*
Euro 5																
M^b	1.1. 2014	All	1.0	0.50	0.10	–	0.068	–	0.06	0.18	–	0.23	0.0050	0.0050	–	6.0x1011
N_1^c	I, 1.1.2014	RW 1305	1.0	0.50	0.10	–	0.068	–	0.06	0.18	–	0.23	0.0050	0.0050	–	6.0x1011
	II, 1.1.2014	1305 < RW≤ 1760	1.81	0.63	0.13	–	0.090	–	0.075	0.235	–	0.295	0.0050	0.0050	–	6.0x1011
	III, 1.1.2014	1760 < RW	2.27	0.74	0.16	–	0.108	–	0.082	0.28	–	0.35	0.0050	0.0050	–	6.0x1011
N_2	1.1.2014		2.27	0.74	0.16	–	0.108	–	0.082	0.28	–	0.35	0.0050	0.0050	–	6.0x1011
Euro 6																
M^b	1.9.2015	All	1.0	0.50	0.10		0.068	–	0.06	0.08	–	0.17	0.0045	0.0045	6.0x1011	6.0x1011
N_1^c	I, 1.9.2015	RW ≤1305	1.0	0.50	0.10	–	0.068	–	0.06	0.08	–	0.17	0.0045	0.0045	6.0x1011	6.0x1011
	II, 1.9.2016	1305 < RW≤ 1760	1.81	0.63	0.13	–	0.090	–	0.075	0.105	–	0.195	0.0045	0.0045	6.0x1011	6.0x1011
	III, 1.9.2016	1760 < RW	2.27	0.74	0.16	–	0.108	–	0.082	0.125	–	0.215	0.0045	0.0045	6.0x1011	6.0x1011
N_2	1.9.2016		2.27	0.74	0.16	–	0.108	–	0.082	0.125	–	0.215	0.0045	0.0045	6.0x1011	6.0x1011

* The registration, sale and entry into service of new vehicles that fail to comply with the respective limit values shall be refused as from the dates given in the column.

[a] Test cycle specified by NEDC

[b] Except vehicles whose maximum mass exceeds 2,500 kg.

[c] And those category M vehicles specified in note *b*.

Table 2

Limit values for heavy-duty vehicles steady-state cycle load-response tests

	Application date	*Carbon monoxide (g/kWh)*	*Hydro-carbons (g/kWh)*	*Total hydrocarbons (g/kWh)*	*Nitrogen oxides (g/kWh)*	*Particulate matter (g/kWh)*	*Smoke (m^{-1})*
B2 (“EURO V”)[a]	1.10.2009	1.5	0.46	–	2.0	0.02	0.5
“EURO VI”[b]	31.12.2013	1.5	–	0.13	0.40	0.010	–

[a] Test cycle specified by the European steady-state cycle (ESC) and the European load-response (ELR) tests.

[b] Test cycle specified by the world heavy duty steady state cycle (WHSC).

Table 3

Limit values for heavy-duty vehicles — transient cycle tests

	*Application date**	*Carbon monoxide (g/kWh)*	*Total hydro-carbons (g/kWh)*	*Non-methane hydrocarbons (g/kWh)*	*Methane[a] (g/kWh)*	*Nitrogen oxides (g/kWh)*	*Particulates (g/kWh)[b]*
B2 “EURO V”[c]	1.10.2009	4.0	–	0.55	1.1	2.0	0.030
“EURO VI” (CI)[d]	31.12.2013	4.0	0.160	–	–	0.46	0.010
“EURO VI” (PI)[d]	31.12.2013	4.0	–	0.160	0.50	0.46	0.010

Note: PI = Positive ignition, CI = Compression ignition.

* The registration, sale and entry into service of new vehicles that fail to comply with the respective limit values shall be refused as from the dates given in the column.

[a] For natural gas engines only.

[b] Not applicable to gas-fuelled engines at stage B2.

[c] Test cycle specified by the European transient cycle (ETC) test.

[d] Test cycle specified by the world heavy duty transient cycle (WHTC).

Table 4

Limit values for diesel engines for non-road mobile machines, agricultural and forestry tractors (stage IIIB)

Net power (P) (kW)	*Application date**	*Carbon monoxide (g/kWh)*	*Hydrocarbons (g/kWh)*	*Nitrogen oxides (g/kWh)*	*Particulate matter (g/kWh)*
$130 \leq P \leq 560$	31.12.2010	3.5	0.19	2.0	0.025
$75 \leq P < 130$	31.12.2011	5.0	0.19	3.3	0.025
$56 \leq P < 75$	31.12.2011	5.0	0.19	3.3	0.025
$37 \leq P < 56$	31.12.2012	5.0	4.7[a]	4.7[a]	0.025

* With effect from the given date and with the exception of machinery and engines intended for export to countries that are not parties to the present Protocol, Parties shall permit the registration, where applicable and the placing on the market of new engines, whether or not installed in machinery, only if they meet the respective limit values set out in the table.

[a] *Editor’s note*: This figure represents the sum of hydrocarbons and nitrogen oxides and was reflected in the final approved text by a single figure in a merged cell in the table. As this text does not include tables with dividing lines, the figure is repeated in each column for clarity.

Table 5

Limit values for diesel engines for non-road mobile machines, agricultural and forestry tractors (stage IV)

Net power (P) (kW)	*Application date**	*Carbon monoxide (g/kWh)*	*Hydrocarbons (g/kWh)*	*Nitrogen oxides (g/kWh)*	*Particulate matter (g/kWh)*
130 ≤ P ≤ 560	31.12.2013	3.5	0.19	0.4	0.025
56 ≤ P < 130	31.12.2014	5.0	0.19	0.4	0.025

* With effect from the given date and with the exception of machinery and engines intended for export to countries that are not parties to the present Protocol, Parties shall permit the registration, where applicable and the placing on the market of new engines, whether or not installed in machinery, only if they meet the respective limit values set out in the table.

Table 6

Limit values for spark-ignition engines for non-road mobile machines

	Hand-held engines	
Displacement (cm^3)	*Carbon monoxide (g/kWh)*	*Sum of hydrocarbons and oxides of nitrogen (g/kWh)*[a]
Disp < 20	805	50
20 ≤ disp. < 50	805	50
Disp ≥ 50	603	72
	Non-hand-held engines	
Displacement(cm^3)	*Carbon monoxide (g/kWh)*	*Sum of hydrocarbons and oxides of nitrogen (g/kWh)*
Disp < 66	610	50
66 ≤ disp. < 100	610	40
100 ≤ disp. < 225	610	16.1
Disp ≥ 225	610	12.1

Note: With the exception of machinery and engines intended for export to countries that are not parties to the present Protocol, Parties shall permit the registration, where applicable, and the placing on the market of new engines, whether or not installed in machinery, only if they meet the respective limit values set out in the table.

[a] The NO_x emissions for all engine classes must not exceed 10 g/kWh.

Table 7

Limit values for engines used for propulsion of locomotives

Net power (P) (kW)	*Carbon monoxide (g/kWh)*	*Hydrocarbons (g/kWh)*	*Nitrogen oxides (g/kWh)*	*Particulate matter (g/kWh)*
130 < P	3.5	0.19	2.0	0.025

Note: With the exception of machinery and engines intended for export to countries that are not Parties to the present Protocol, Parties shall permit the registration, where applicable, and the placing on the market of new engines, whether or not installed in machinery, only if they meet the respective limit values set out in the table.

Table 8

Limit values for engines used for propulsion of railcars

Net power (P) (kW)	*Carbon monoxide (g/kWh)*	*Sum of hydrocarbons and oxides of nitrogen (g/kWh)*	*Particulate matter (g/kWh)*
130 < P	3.5	4.0	0.025

Table 9

Limit values for engines for propulsion of inland waterways vessels

Displacement (litres per cylinder/kW)	*Carbon monoxide (g/kWh)*	*Sum of hydrocarbons and oxides of nitrogen (g/kWh)*	*Particulate matter (g/kWh)*
Disp. < 0.9 Power ≥ 37 kW	5.0	7.5	0.4
0.9 ≤ disp. < 1.2	5.0	7.2	0.3
1.2 ≤ disp. < 2.5	5.0	7.2	0.2
2.5 ≤ disp. < 5.0	5.0	7.2	0.2
5.0 ≤ disp. < 15	5.0	7.8	0.27
15 ≤ disp. < 20 Power < 3300 kW	5.0	8.7	0.5
15 ≤ disp. < 20 Power > 3300 kW	5.0	9.8	0.5
20 ≤ disp. < 25	5.0	9.8	0.5
25 ≤ disp. < 30	5.0	11.0	0.5

Note: With the exception of machinery and engines intended for export to countries that are not Parties to the present Protocol, Parties shall permit the registration, where applicable, and the placing on the market of new engines, whether or not installed in machinery, only if they meet the respective limit values set out in the table.

Table 10

Limit values for engines in recreational crafts

	CO (g/kWh) $CO = A + B/P^n_N$			*Hydrocarbons (HC) (g/kWh)* $HC = A + B/P^n_N$[a]				
Engine type	*A*	*B*	*n*	*A*	*B*	*n*	*NO$_x$ g/kWh*	*PM g/kWh*
2-stroke	150	600	1	30	100	0.75	10	Not Appl.
4-stroke	150	600	1	6	50	0.75	15	Not Appl.
CI	5	0	0	1.5	2	0.5	9.8	1

Abbreviations: Not Appl. = Not Applicable.

Note: With the exception of machinery and engines intended for export to countries that are not Parties to the present Protocol, Parties shall permit the registration, where applicable, and the placing on the market of new engines, whether or not installed in machinery, only if they meet the respective limit values set out in the table.

[a] Where A, B and n are constants and P_N is the rate engine power in kW and the emissions are measured in accordance with the harmonized standards.

Table 11

Limit values for motorcycles (> 50 cm^3; > 45 km/h)

Engine size	*Limit values*
Motorcycle < 150 cc	Hydrocarbons (HC) = 0.8 g/km NO_x = 0.15 g/km
Motorcycle > 150 cc	HC = 0.3 g/km NO_x = 0.15 g/km

Note: With the exception of vehicles intended for export to countries that are not Parties to the present Protocol, Parties shall permit the registration, where applicable, and the placing on the market only if they meet the respective limit values set out in the table.

Table 12

Limit values for mopeds (<50 cm^3; < 45 km/h)

CO (g/km)	*Hydrocarbons (HC) + NO_x (g/km)*
1.0[a]	1.2

Note: With the exception of vehicles intended for export to countries that are not Parties to the present Protocol, Parties shall permit the registration, where applicable, and the placing on the market only if they meet the respective limit values set out in the table.

[a] For 3- and 4-wheelers, 3.5 g/km.

Table 13

Environmental specifications for marketed fuels to be used for vehicles equipped with positive-ignition engines

Type: Petrol

		Limits	
Parameter	*Unit*	*Minimum*	*Maximum*
Research octane number	–	95	–
Motor octane number	–	85	–
Reid vapour pressure, summer period[a]	kPa	–	60
Distillation:			
Evaporated at 100°C	% v/v	46	–
Evaporated at 150°C	% v/v	75	–
Hydrocarbon analysis:			
Olefins	% v/v	–	18.0[b]
Aromatics	–	–	35
Benzene	–	–	1
Oxygen content	% m/m	–	3.7

		Limits	
Parameter	*Unit*	*Minimum*	*Maximum*
Oxygenates:			
Methanol, stabilizing agents must be added	% v/v	–	3
Ethanol, stabilizing agents may be necessary	% v/v	–	10
Parameter:			
Iso-propyl alcohol	% v/v	–	12
Tert-butyl alcohol	% v/v	–	15
Iso-butyl alcohol	% v/v	–	15
Ethers containing 5 or more carbon atoms per molecule	% v/v	–	22
Other oxygenates[c]	% v/v	–	15
Sulphur content	mg/kg	–	10

[a] The summer period shall begin no later than 1 May and shall not end before 30 September. For Parties with arctic conditions the summer period shall begin no later than 1 June and not end before 31 August and the Reid Vapour Pressure (RVP) is limited to 70 kPa.

[b] Except for regular unleaded petrol (minimum motor octane number (MON) of 81 and minimum research octane number (RON) of 91), for which the maximum olefin content shall be 21% v/v. These limits shall not preclude the introduction on the market of a Party of another unleaded petrol with lower octane numbers than set out here.

[c] Other mono-alcohols with a final distillation point no higher than the final distillation point laid down in national specifications or, where these do not exist, in industrial specifications for motor fuels.

Table 14

Environmental specifications for marketed fuels to be used for vehicles equipped with compression-ignition engines

Type: Diesel fuel

		Limits	
Parameter	*Unit*	*Minimum*	*Maximum*
Cetane number	–	51	–
Density at 15°C	kg/m3	–	845
Distillation point: 95%	°C	–	360
Polycyclic aromatic hydrocarbons	% m/m	–	8
Sulphur content	mg/kg	–	10

B. Canada

12. Limit values for controlling emissions from fuels and mobile sources will be determined, as appropriate, taking into account information on available control technologies, limit values applied in other jurisdictions, and the documents below:

(a) Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations. SOR/2010–201;

(b) Marine Spark-Ignition Engine, Vessel and Off-Road Recreational Vehicle Emission Regulations. SOR/2011–10;

(c) Renewable Fuels Regulations. SOR/2010–189;

(d) Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals. SOR/2007–86;

(e) Off-Road Compression-Ignition Engine Emission Regulations. SOR/2005–32;

(f) On-Road Vehicle and Engine Emission Regulations. SOR/2003–2;

(g) Off-Road Small Spark-Ignition Engine Emission Regulations. SOR/2003–355;

(h) Sulphur in Diesel Fuel Regulations. SOR/2002–254;

(i) Gasoline and Gasoline Blend Dispensing Flow Rate Regulations. SOR/2000–43;

(j) Sulphur in Gasoline Regulations. SOR/99–236;

(k) Benzene in Gasoline Regulations. SOR/97–493;

(l) Gasoline Regulations. SOR/90–247;

(m) Federal Mobile PCB Treatment and Destruction Regulations. SOR/90–5;

(n) Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products;

(o) Canada-Wide Standards for Benzene, Phase 2;

(p) Environmental Guidelines for Controlling Emissions of Volatile Organic Compounds from Aboveground Storage Tanks. PN 1180;

(q) Environmental Code of Practice for Vapour Recovery in Gasoline Distribution Networks. PN 1057;

(r) Environmental Code of Practice for Light Duty Motor Vehicle Emission Inspection and Maintenance Programs — 2nd Edition. PN 1293;

(s) Joint Initial Actions to Reduce Pollutant Emissions that Contribute to Particulate Matter and Ground-level Ozone; and

(t) Operating and Emission Guidelines for Municipal Solid Waste Incinerators. PN 1085.

C. United States of America

13. Implementation of a mobile source emission control programme for light-duty vehicles, light-duty trucks, heavy-duty trucks and fuels to the extent required by sections 202 (a), 202 (g) and 202 (h) of the Clean Air Act, as implemented through:

(a) Registration of fuels and fuel additives — 40 C.F.R Part 79;

(b) Regulation of fuels and fuel additives — 40 C.F.R Part 80, including: Subpart A — general provisions; Subpart B — controls and prohibitions; Subpart D — reformulated gasoline; Subpart H — gasoline sulphur standards; Subpart I — motor vehicle diesel fuel; non-road, locomotive, and marine diesel fuel; and ECA marine fuel; Subpart L — gasoline benzene; and

(c) Control of emissions from new and in-use highway vehicles and engines — 40 C.F.R Part 85 and Part 86.

14. Standards for non-road engines and vehicles are specified in the following documents:

(a) Fuel sulphur standards for non-road diesel engines — 40 C.F.R Part 80, Subpart I;

(b) Aircraft engines — 40 C.F.R Part 87;

(c) Exhaust emission standards for non-road diesel engines — Tier 2 and 3; 40 C.F.R Part 89;

(d) Non-road compression-ignition engines — 40 C.F.R Part 89 and Part 1039;

(e) Non-road and marine spark-ignition engines — 40 C.F.R Part 90, Part 91, Part 1045, and Part 1054;

(f) Locomotives — 40 C.F.R Part 92 and Part 1033;

(g) Marine compression-ignition engines — 40 C.F.R Part 94 and Part 1042;

(h) New large non-road spark-ignition engines — 40 C.F.R Part 1048;

(i) Recreational engines and vehicles — 40 C.F.R Part 1051;

(j) Control of evaporative emissions from new and in-use non-road and stationary equipment — 40 C.F.R. Part 1060;

(k) Engine testing procedures — 40 C.F.R Part 1065; and

(l) General compliance provisions for non-road programs — 40 C.F.R Part 1068.

Annex IX

Measures for the control of emissions of ammonia from agricultural sources

1. The Parties that are subject to obligations in article 3, paragraph 8 (a), shall take the measures set out in this annex.

2. Each Party shall take due account of the need to reduce losses from the whole nitrogen cycle.

A. Advisory code of good agricultural practice

3. Within one year from the date of entry into force of the present Protocol for it, a Party shall establish, publish and disseminate an advisory code of good agricultural practice to control ammonia emissions. The code shall take into account the specific conditions within the territory of the Party and shall include provisions on:

- Nitrogen management, taking account of the whole nitrogen cycle;
- Livestock feeding strategies;
- Low-emission manure spreading techniques;
- Low-emission manure storage systems;
- Low-emission animal housing systems; and
- Possibilities for limiting ammonia emissions from the use of mineral fertilizers.

Parties should give a title to the code with a view to avoiding confusion with other codes of guidance.

B. Urea and ammonium carbonate fertilizers

4. Within one year from the date of entry into force of the present Protocol for it, a Party shall take such steps as are feasible to limit ammonia emissions from the use of solid fertilizers based on urea.

5. Within one year from the date of entry into force of the present Protocol for it, a Party shall prohibit the use of ammonium carbonate fertilizers.

C. Manure application

6. Each Party shall ensure that low-emission slurry application techniques (as listed in guidance document V adopted by the Executive Body at its seventeenth session (decision 1999/1) and any amendments thereto) that have been shown to reduce emissions by at least 30% compared to the reference specified in that guidance document are used as far as the Party in question considers them applicable, taking account of local soil and geomorphological conditions, slurry type and farm structure.

7. Within one year from the date of entry into force of the present Protocol for it, a Party shall ensure that solid manure applied to land to be ploughed shall be incorporated within at least 24 hours of spreading as far as it considers this measure applicable, taking account of local soil and geomorphological conditions and farm structure.

D. Manure storage

8. Within one year from the date of entry into force of the present Protocol for it, a Party shall use for new slurry stores on large pig and poultry farms of 2,000 fattening pigs or 750 sows or 40,000 poultry, low-emission storage systems or techniques that have been shown to reduce emissions by 40% or more compared to the reference (as listed in the guidance document referred to in paragraph 6), or other systems or techniques with a demonstrably equivalent efficiency.[6]

9. For existing slurry stores on large pig and poultry farms of 2,000 fattening pigs or 750 sows or 40,000 poultry, a Party shall achieve emission reductions of 40% insofar as the Party considers the necessary techniques to be technically and economically feasible.[1]

E. Animal housing

10. Within one year from the date of entry into force of the present Protocol for it, a Party shall use, for new animal housing on large pig and poultry farms of 2,000 fattening pigs or 750 sows or 40,000 poultry, housing systems which have been shown to reduce emissions by 20% or more compared to the reference (as listed in the guidance document referred to in paragraph 6), or other systems or techniques with a demonstrably equivalent efficiency.[6] Applicability may be limited for animal welfare reasons, for instance in straw-based systems for pigs and aviary and free-range systems for poultry.

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[6] Where a Party judges that other systems or techniques with a demonstrably equivalent efficiency can be used for manure storage and animal housing in order to comply with paragraphs 8 and 10, or where a Party judges the reduction of emissions from manure storage required under paragraph 9 not to be technically or economically feasible, documentation to this effect shall be reported in accordance with article 7, paragraph 1 (a).

Annex X

Limit values for emissions of particulate matter from stationary sources

1. Section A applies to Parties other than Canada and the United States of America, section B applies to Canada and section C applies to the United States of America.

A. Parties other than Canada and the United States of America

2. In this section only, “dust” and “total suspended particulate matter” (TSP) means the mass of particles, of any shape, structure or density, dispersed in the gas phase at the sampling point conditions which may be collected by filtration under specified conditions after representative sampling of the gas to be analysed, and which remain upstream of the filter and on the filter after drying under specified conditions.

3. For the purpose of this section, “emission limit value” (ELV) means the quantity of dust and/or TSP contained in the waste gases from an installation that is not to be exceeded. Unless otherwise specified, it shall be calculated in terms of mass of pollutant per volume of the waste gases (expressed as mg/m^3), assuming standard conditions for temperature and pressure for dry gas (volume at 273.15 K, 101.3 kPa). With regard to the oxygen content of waste gas, the values given in the tables below for each source category shall apply. Dilution for the purpose of lowering concentrations of pollutants in waste gases is not permitted. Start-up, shut-down and maintenance of equipment are excluded.

4. Emissions shall be monitored in all cases via measurements or through calculations achieving at least the same accuracy. Compliance with limit values shall be verified through continuous or discontinuous measurements, type approval, or any other technically sound method including verified calculation methods. In case of continuous measurements, compliance with the limit value is achieved if the validated monthly emission average does not exceed the ELV. In case of discontinuous measurements or other appropriate determination or calculation procedures, compliance with the ELVs is achieved if the mean value based on an appropriate number of measurements under representative conditions does not exceed the value of the emission standard. The inaccuracy of measurement methods may be taken into account for verification purposes.

5. Monitoring of relevant polluting substances and measurements of process parameters, as well as the quality assurance of automated measuring systems and the reference measurements to calibrate those systems, shall be carried out in accordance with CEN standards. If CEN standards are not available, ISO standards, national or international standards which will ensure the provision of data of an equivalent scientific quality shall apply.

6. Special provisions for combustion plants referred to in paragraph 7:

(a) A Party may derogate from the obligation to comply with the ELVs provided for in paragraph 7 in the following cases:

(i) For combustion plants normally using gaseous fuel which have to resort exceptionally to the use of other fuels because of a sudden interruption in the supply of gas and for this reason would need to be equipped with a waste gas purification facility;

(ii) For existing combustion plants not operated more than 17,500 operating hours, starting from 1 January 2016 and ending no later than 31 December 2023;

(b) Where a combustion plant is extended by at least 50 MWth, the ELV specified in paragraph 7 for new installations shall apply to the extensional part affected by the change. The ELV is calculated as an average weighted by the actual thermal input for both the existing and the new part of the plant;

(c) Parties shall ensure that provisions are made for procedures relating to malfunction or breakdown of the abatement equipment;

(d) In the case of a multi-fuel firing combustion plant involving the simultaneous use of two or more fuels, the ELV shall be determined as the weighted average of the ELVs for the individual fuels, on the basis of the thermal input delivered by each fuel.

7. Combustion plants with a rated thermal input exceeding 50 MWth:[7]

Table 1
Limit values for dust emissions from combustion plants[a]

Fuel type	*Thermal input (MWth)*	*ELV for dust (mg/m³)*[b]
Solid fuels	50–100	New plants: 20 (coal, lignite and other solid fuels) 20 (biomass, peat)
		Existing plants: 30 (coal, lignite and other solid fuels) 30 (biomass, peat)
	100–300	New plants: 20 (coal, lignite and other solid fuels) 20 (biomass, peat)
		Existing plants: 25 (coal, lignite and other solid fuels) 20 (biomass, peat)
	>300	New plants: 10 (coal, lignite and other solid fuels) 20 (biomass, peat)
		Existing plants: 20 (coal, lignite and other solid fuels) 20 (biomass, peat)

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[7] The rated thermal input of the combustion plant is calculated as the sum of the input of all units connected to a common stack. Individual units below 15 MWth shall not be considered when calculating the total rated thermal input.

Fuel type	*Thermal input (MWth)*	*ELV for dust (mg/m³)*[b]
Liquid fuels	50–100	New plants: 20 Existing plants: 30 (in general) 50 (for the firing of distillation and conversion residues within refineries from the refining of crude oil for own consumption in combustion plants)
Liquid fuels	100–300	New plants: 20 Existing plants: 25 (in general) 50 (for the firing of distillation and conversion residues within refineries from the refining of crude oil for own consumption in combustion plants)
	>300	New plants: 10 Existing plants: 20 (in general) 50 (for the firing of distillation and conversion residues within refineries from the refining of crude oil for own consumption in combustion plants)
Natural gas	> 50	5
Other gases	> 50	10 30 (for gases produced by the steel industry which can be used elsewhere)

[a] In particular, the ELVs shall not apply to:
- Plants in which the products of combustion are used for direct heating, drying, or any other treatment of objects or materials.
- Post-combustion plants designed to purify the waste gases by combustion which are not operated as independent combustion plants.
- Facilities for the regeneration of catalytic cracking catalysts.
- Facilities for the conversion of hydrogen sulphide into sulphur.
- Reactors used in the chemical industry.
- Coke battery furnaces.
- Cowpers.
- Recovery boilers within installations for the production of pulp.
- Waste incinerators and
- Plants powered by diesel, petrol or gas engines or by combustion turbines, irrespective of the fuel used.

[b] The O_2 reference content is 6% for solid fuels and 3% for liquid and gaseous fuels.

8. Mineral oil and gas refineries:

Table 2
Limit values for dust emissions released from mineral oil and gas refineries

Emission source	*ELV for dust (mg/m³)*
FCC regenerators	50

9. Cement clinker production:

Table 3
Limit values for dust emissions released from cement production[a]

	ELV for dust (mg/m³)
Cement installations, kilns, mills and clinker coolers	20

[a] Installations for the production of cement clinker in rotary kilns with a capacity >500 Mg/day or in other furnaces with a capacity >50 Mg/day. The reference oxygen content is 10%.

10. Lime production:

Table 4
Limit values for dust emissions released from lime production[a]

	ELV for dust (mg/m³)
Lime kiln firing	20[b]

[a] Installations for the production of lime with a capacity of 50 Mg/day or more. This includes lime kilns integrated in other industrial processes, with the exception of the pulp industry (see table 9). The reference oxygen content is 11%.

[b] Where the resistivity of the dust is high, the ELV may be higher, up to 30 mg/m³.

11. Production and processing of metals:

Table 5
Limit values for dust emissions released from primary iron and steel production

Activity and capacity threshold	*ELV for dust (mg/m³)*
Sinter plant	50
Pelletization plant	20 for crushing, grinding and drying 15 for all other process steps
Blast furnace: Hot stoves (>2.5 t/hour)	10
Basic oxygen steelmaking and casting (>2.5 t/hour)	30
Electric steelmaking and casting (>2.5 t/hour)	15 (existing) 5 (new)

Table 6
Limit values for dust emissions released from iron foundries

Activity and capacity threshold	*ELV for dust (mg/m³)*
Iron foundries (>20 t/day): all furnaces (cupola, induction, rotary) all mouldings (lost, permanent)	20
Hot and cold rolling	20 50 where a bag filter cannot be applied due to the presence of wet fumes

Table 7

Limit values for dust emissions released from non-ferrous metals production and processing

	ELV for dust (mg/m³) (daily)
Non-ferrous metal processing	20

12. Glass production:

Table 8

Limit values for dust emissions released from glass production[a]

	ELV for dust (mg/m³)
New installations	20
Existing installations	30

[a] Installations for the production of glass or glass fibres with a capacity of 20 Mg/day or more. Concentrations refer to dry waste gases at 8% oxygen by volume (continuous melting), 13% oxygen by volume (discontinuous melting).

13. Pulp production:

Table 9

Limit values for dust emissions released from pulp production

	ELV for dust (mg/m³) (annual averages)
Auxiliary boiler	40 when firing liquid fuels (at 3% oxygen content) 30 when firing solid fuels (at 6% oxygen content)
Recovery boiler and lime kiln	50

14. Waste incineration:

Table 10

Limit values for dust emissions released from waste incineration

	ELV for dust (mg/m³)
Municipal waste incineration plants (> 3 Mg/hour)	10
Hazardous and medical waste incineration (> 1 Mg/hour)	10

Note: Oxygen reference: dry basis, 11%.

15. Titanium dioxide production:

Table 11
Limit values for dust emissions released from titanium dioxide production

	ELV for dust (mg/m³)
Sulphate process, total emission	50
Chloride process, total emission	50

Note: For minor emission sources within an installation, an ELV of 150 mg/m³ may be applied.

16. Combustion installations with a rated thermal input < 50 MWth:

This paragraph is recommendatory in character and describes the measures that can be taken insofar as a Party considers them to be technically and economically feasible for the control of particulate matter:

(a) Residential combustion installations with a rated thermal input < 500 kWth:

(i) Emissions from new residential combustion stoves and boilers with a rated thermal input < 500 kWth can be reduced by the application of:

a. Product standards as described in CEN standards (e.g., EN 303–5) and equivalent product standards in the United States and Canada. Countries applying such product standards may define additional national requirements taking into account, in particular, the contribution of emissions of condensable organic compounds to the formation of ambient PM; or

b. Ecolabels specifying performance criteria that are typically stricter than the minimum efficiency requirements of the EN product standards or national regulations;

Table 12
Recommended limit values for dust emissions released from new solid fuel combustion installations with a rated thermal input < 500 kWth to be used with product standards

	Dust (mg/m³)
Open/closed fireplaces and stoves using wood	75
Log wood boilers (with heat storage tank)	40
Pellet stoves and boilers	50
Stoves and boilers using other solid fuels than wood	50
Automatic combustion installations	50

Note: O_2 reference content: 13%.

(ii) Emissions from existing residential combustion stoves and boilers can be reduced by the following primary measures:

a. Public information information and awareness-raising programmes regarding:

i. The proper operation of stoves and boilers;

ii. The use of untreated wood only;

iii. The correct seasoning of wood for moisture content.

b. Establishing a programme to promote the replacement of the oldest existing boilers and stoves by modern appliances; or

c. Establishing an obligation to exchange or retrofit old appliances.

(b) Non-residential combustion installations with a rated thermal input 100 kWth–1 MWth:

Table 13

Recommended limit values for dust emissions released from boilers and process heaters with a rated thermal input of 100 kWth–1 MWth

		Dust (mg/m³)
Solid fuels 100 kWth–500 kWth	New installations	50
	Existing installations	150
Solid fuels 500 kWth–1 MWth	New installations	50
	Existing installations	150

Note: O_2 reference content: wood, other solid biomass and peat: 13%; coal, lignite and other fossil solid fuels: 6%.

(c) Combustion installations with a rated thermal input > 1 MWth–50 MWth:

Table 14

Recommended limit values for dust emissions released from boilers and process heaters with a rated thermal input of 1 MWth–50 MWth

		Dust (mg/m³)
Solid fuels > 1 MWth–5 MWth	New installations	20
	Existing installations	50
Solid fuels > 5 MWth–50 MWth	New installations	20
	Existing installations	30
Liquid fuels > 1 MWth–5 MWth	New installations	20
	Existing installations	50
Liquid fuels >5 MWth–50 MWth	New installations	20
	Existing installations	30

Note: O_2 reference content: wood, other solid biomass and peat: 11%; coal, lignite and other fossil solid fuels: 6%; liquid fuels, including liquid biofuels: 3%.

B. Canada

17. Limit values for controlling emissions of PM will be determined for stationary sources, as appropriate, taking into account information on available control technologies, limit values applied in other jurisdictions and the documents listed in subparagraphs (a) to (h) below. Limit values may be expressed in terms of PM or TPM. TPM in this context means any PM with an aerodynamic diameter of less than 100 µm:

(a) Secondary Lead Smelter Release Regulation. SOR/91-155;

(b) Environmental Code of Practice for Base Metals Smelters and Refineries;

(c) New Source Emission Guidelines for Thermal Electricity Generation;

(d) Environmental Code of Practice for Integrated Steel Mills (EPS 1/MM/7);

(e) Environmental Code of Practice for Non-Integrated Steel Mills (EPS 1/MM/8);

(f) Emission Guidelines for Cement Kilns. PN 1284;

(g) Joint Initial Actions to Reduce Pollutant Emissions that Contribute to Particulate Matter and Ground-level Ozone; and

(h) Performance testing of solid-fuel-burning heating appliances, Canadian Standards Association. B415. 1-10.

C. United States of America

18. Limit values for controlling emissions of PM from stationary sources in the following stationary source categories, and the sources to which they apply, are specified in the following documents:

(a) Steel Plants: Electric Arc Furnaces — 40 C.F.R. Part 60, Subpart AA and Subpart AAa;

(b) Small Municipal Waste Combustors — 40 C.F.R. Part 60, Subpart AAAA;

(c) Kraft Pulp Mills — 40 C.F.R. Part 60, Subpart BB;

(d) Glass Manufacturing — 40 C.F.R. Part 60, Subpart CC;

(e) Electric Utility Steam Generating Units — 40 C.F.R. Part 60, Subpart D and Subpart Da;

(f) Industrial-Commercial-Institutional Steam Generating Units — 40 C.F.R. Part 60, Subpart Db and Subpart Dc;

(g) Grain Elevators — 40 C.F.R. Part 60, Subpart DD;

(h) Municipal Waste Incinerators — 40 C.F.R. Part 60, Subpart E, Subpart Ea and Subpart Eb;

(i) Hospital/Medical/Infectious Waste Incinerators — 40 C.F.R. Part 60, Subpart Ec;

(j) Portland Cement — 40 C.F.R. Part 60, Subpart F;

(k) Lime Manufacturing — 40 C.F.R. Part 60, Subpart HH;

(l) Hot Mix Asphalt Facilities — 40 C.F.R. Part 60, Subpart I;

(m) Stationary Internal Combustion Engines: Compression Ignition — 40 C.F.R. Part 60, Subpart IIII;

(n) Petroleum Refineries — 40 C.F.R. Part 60, Subpart J and Subpart Ja;

(o) Secondary Lead Smelters — 40 C.F.R. Part 60, Subpart L;

(p) Metallic Minerals Processing — 40 C.F.R. Part 60, Subpart LL;

(q) Secondary Brass and Bronze — 40 C.F.R. Part 60, Subpart M;

(r) Basic Oxygen Process Furnaces — 40 C.F.R. Part 60, Subpart N;

(s) Basic Process Steelmaking Facilities — 40 C.F.R. Part 60, Subpart Na;

(t) Phosphate Rock Processing — 40 C.F.R. Part 60, Subpart NN;

(u) Sewage Treatment Plant Incineration — 40 C.F.R. Part 60, Subpart O;

(v) Nonmetallic Minerals Processing Plants — 40 C.F.R. Part 60, Subpart OOO;

(w) Primary Copper Smelters — 40 C.F.R. Part 60, Subpart P;

(x) Ammonium Sulfate Manufacturing — 40 C.F.R. Part 60, Subpart PP;

(y) Wool Fiberglass Insulation — 40 C.F.R. Part 60, Subpart PPP;

(z) Primary Zinc Smelters — 40 C.F.R. Part 60, Subpart Q;

(aa) Primary Lead Smelters — 40 C.F.R. Part 60, Subpart R;

(bb) Primary Aluminum reduction plants — 40 C.F.R. Part 60, Subpart S;

(cc) Phosphate Fertilizer Production — 40 C.F.R. Part 60, Subparts T, U, V, W, X;

(dd) Asphalt Processing and Asphalt Roofing Manufacturing — 40 C.F.R. Part 60, Subpart UU;

(ee) Calciners and Dryers in Mineral Industries — 40 C.F.R. Part 60, Subpart UUU;

(ff) Coal Preparation Plants — 40 C.F.R. Part 60, Subpart Y;

(gg) Ferroalloy Production Facilities — 40 C.F.R. Part 60, Subpart Z;

(hh) Residential Wood Heaters — 40 C.F.R. Part 60, Subpart AAA;

(ii) Small Municipal Waste Combustors (after 11/30/1999) — 40 C.F.R. Part 60, Subpart AAAA;

(jj) Small Municipal Waste Combustors (before 11/30/1999) — 40 C.F.R. Part 60, Subpart BBBB;

(kk) Other Solid Waste Incineration Units (after 12/9/2004) — 40 C.F.R. Part 60, Subpart EEEE;

(ll) Other Solid Waste Incineration Units (before 12/9/2004) — 40 C.F.R. Part 60, Subpart FFFF;

(mm) Stationary Compression Ignition Internal Combustion Engines — 40 C.F.R. Part 60, Subpart IIII; and

(nn) Lead Acid BatteryManufacturing Plants — 40 C.F.R. Part 60, Subpart KK.

19. Limit values for controlling emissions of PM from sources subject to National Emission Standards for Hazardous Air Pollutants:

(a) Coke oven batteries — 40 C.F.R. Part 63, Subpart L;

(b) Chrome Electroplating (major and Area sources) – 40 C.F.R. Part 63, Subpart N;

(c) Secondary lead smelters — 40 C.F.R. Part 63, Subpart X;

(d) Phosphoric Acid Manufacturing Plants — 40 C.F.R. Part 63, Subpart AA;

(e) Phosphate Fertilizers Production Plants — 40 C.F.R. Part 63, Subpart BB;

(f) Magnetic Tape Manufacturing — 40 C.F.R. Part 63, Subpart EE;

(g) Primary Aluminum— 40 C.F.R. Part 63, Subpart L;

(h) Pulp and paper II (combustion) — 40 C.F.R. Part 63, Subpart MM;

(i) Mineral wool manufacturing — 40 C.F.R. Part 63, Subpart DDD;

(j) Hazardous waste combustors — 40 C.F.R. Part 63, Subpart EEE;

(k) Portland cement manufacturing — 40 C.F.R. Part 63, Subpart LLL;

(l) Wool fiberglass manufacturing — 40 C.F.R. Part 63, Subpart NNN;

(m) Primary copper — 40 C.F.R. Part 63, Subpart QQQ;

(n) Secondary aluminum — 40 C.F.R. Part 63, Subpart RRR;

(o) Primary lead smelting — 40 C.F.R. Part 63, Subpart TTT;

(p) Petroleum refineries — 40 C.F.R. Part 63, Subpart UUU;

(q) Ferroalloys production — 40 C.F.R. Part 63, Subpart XXX;

(r) Lime manufacturing — 40 C.F.R. Part 63, Subpart AAAAA;

(s) Coke Ovens: Pushing, Quenching, and Battery Stacks — 40 C.F.R. Part 63, Subpart CCCCC;

(t) Iron and steel foundries — 40 C.F.R. Part 63, Subpart EEEEE;

(u) Integrated iron and steel manufacturing — 40 C.F.R. Part 63, Subpart FFFFF;

(v) Site remediation — 40 C.F.R. Part 63, Subpart GGGGG;

(w) Miscellaneous coating manufacturing — 40 C.F.R. Part 63, Subpart HHHHH;

(x) Asphalt Processing and Roofing Manufacturing — 40 C.F.R. Part 63, Subpart LLLLL;

(y) Taconite Iron Ore Processing — 40 C.F.R. Part 63, Subpart RRRRR;

(z) Refractory products manufacturing — 40 C.F.R. Part 63, Subpart SSSSS;

(aa) Primary magnesium refining — 40 C.F.R. Part 63, Subpart TTTTT;

(bb) Electric Arc Furnace Steelmaking Facilities — 40 C.F.R. Part 63, Subpart YYYYY;

(cc) Iron and steel foundries — 40 C.F.R. Part 63, Subpart ZZZZZ;

(dd) Primary Copper Smelting Area Sources — 40 C.F.R. Part 63, Subpart EEEEEE;

(ee) Secondary Copper Smelting Area Sources — 40 C.F.R. Part 63, Subpart FFFFFF;

(ff) Primary Nonferrous Metals Area Sources: Zinc, Cadmium, and Beryllium — 40 C.F.R. Part 63, Subpart GGGGGG;

(gg) Lead Acid Battery Manufacturing (Area sources) — 40 C.F.R. Part 63, Subpart PPPPPP;

(hh) Glass manufacturing (area sources) — 40 C.F.R. Part 63, Subpart SSSSSS;

(ii) Secondary Nonferrous Metal Smelter (Area Sources) — 40 C.F.R. Part 63, Subpart TTTTTT;

(jj) Chemical Manufacturing (Area Sources) — 40 C.F.R. Part 63, Subpart VVVVVV;

(kk) Plating and Polishing Operations (Area sources) — 40 C.F.R. Part 63, Subpart WWWWWW;

(ll) Area Source Standards for Nine Metal Fabrication and Finishing Source Categories — 40 C.F.R.Part 63, Subpart XXXXXX;

(mm) Ferroalloys Production (Area Sources) — 40 C.F.R. Part 63, Subpart YYYYYY;

(nn) Aluminum, Copper, and Nonferrous Foundries (Area Sources) — 40 C.F.R. Part 63, Subpart ZZZZZZ;

(oo) Asphalt Processing and Roofing Manufacturing (Area Sources) — 40 C.F.R. Part 63, Subpart AAAAAAA;

(pp) Chemical Preparation (Area Sources) — 40 C.F.R. Part 63, Subpart BBBBBBB;

(qq) Paints and Allied Products Manufacturing (Area Sources) — 40 C.F.R. Part 63, Subpart CCCCCCC;

(rr) Prepared animal feeds manufacturing (Area Sources) — 40 C.F.R. Part 63, Subpart DDDDDDD; and

(ss) Gold Mine Ore Processing and Production (Area Sources) — 40 C.F.R. Part 63, Subpart EEEEEEE.

Annex XI

Limit values for volatile organic compounds content of products

1. Section A applies to Parties other than Canada and the United States of America, section B applies to Canada and section C applies to the United States of America.

A. Parties other than Canada and the United States of America

2. This section concerns the limitation of emissions of volatile organic compounds (VOCs) due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products.

3. For the purpose of section A of the present annex, the following general definitions shall apply:

(a) "Substances" means any chemical element and its compounds, as they occur in the natural state or as produced by industry, whether in solid or liquid or gaseous form;

(b) "Mixture" means mixtures or solutions composed of two or more substances;

(c) "Organic compound" means any compound containing at least the element carbon and one or more of hydrogen, oxygen, sulphur, phosphorus, silicon, nitrogen, or a halogen, with the exception of carbon oxides and inorganic carbonates and bicarbonates;

(d) "Volatile organic compound (VOC)" means any organic compound having an initial boiling point less than or equal to 250°C measured at a standard pressure of 101.3 kPa;

(e) "VOC content" means the mass of VOCs, expressed in grams/litre (g/l), in the formulation of the product in its ready to use condition. The mass of VOCs in a given product which react chemically during drying to form part of the coating shall not be considered part of the VOC content;

(f) "Organic solvent" means any VOC which is used alone or in combination with other agents to dissolve or dilute raw materials, products, or waste materials, or is used as a cleaning agent to dissolve contaminants, or as a dispersion medium, or as a viscosity adjuster, or as a surface tension adjuster, or as a plasticizer, or as a preservative;

(g) "Coating" means any mixture, including all the organic solvents or mixtures containing organic solvents necessary for its proper application, which is used to provide a film with decorative, protective or other functional effect on a surface;

(h) "Film" means a continuous layer resulting from the application of one or more coats to a substrate;

(i) "Water-borne coatings (WB)" means coatings the viscosity of which is adjusted by the use of water;

(j) "Solvent-borne coatings (SB)" means coatings the viscosity of which is adjusted by the use of organic solvent;

(k) "Placing on the market" means making available to third parties, whether in exchange for payment or not. Importation into the Parties customs territory shall be deemed to be placing on the market for the purposes of this annex.

4. “Paints and varnishes” means products listed in the subcategories below, excluding aerosols. They are coatings applied to buildings, their trim and fitting, and associated structures for decorative, functional and protective purpose:

(a) “Matt coatings for interior walls and ceilings” means coatings designed for application to indoor walls and ceilings with a gloss ≤ 25 @ 60 degrees;

(b) “Glossy coatings for interior walls and ceilings” means coatings designed for application to indoor walls and ceilings with a gloss > 25 @ 60 degrees;

(c) “Coatings for exterior walls of mineral substrate” means coatings designed for application to outdoor walls of masonry, brick or stucco;

(d) “Interior/exterior trim and cladding paints for wood, metal or plastic” means coatings designed for application to trim and cladding which produce an opaque film. These coatings are designed for either a wood, metal or a plastic substrate. This subcategory includes undercoats and intermediate coatings;

(e) “Interior/exterior trim varnishes and wood stains” means coatings designed for application to trim which produce a transparent or semi-transparent film for decoration and protection of wood, metal and plastics. This subcategory includes opaque wood stains. Opaque wood stains means coatings producing an opaque film for the decoration and protection of wood, against weathering, as defined in EN 927-1, within the semi-stable category;

(f) “Minimal build wood stains” means wood stains which, in accordance with EN 927-1:1996, have a mean thickness of less than 5µm when tested according to ISO 2808: 1997, method 5A;

(g) “Primers” means coatings with sealing and/or blocking properties designed for use on wood or walls and ceilings;

(h) “Binding primers” means coatings designed to stabilize loose substrate particles or impart hydrophobic properties and/or to protect wood against blue stain;

(i) “One-pack performance coatings” means performance coatings based on film-forming material. They are designed for applications requiring a special performance, such as primer and topcoats for plastics, primer coat for ferrous substrates, primer coat for reactive metals such as zinc and aluminium, anticorrosion finishes, floor coatings, including for wood and cement floors, graffiti resistance, flame retardant, and hygiene standards in the food or drink industry or health services;

(j) “Two-pack performance coatings” means coatings with the same use as one-performance coatings, but with a second component (e.g., tertiary amines) added prior to application;

(k) “Multicoloured coatings” means coatings designed to give a two-tone or multiple-colour effect, directly from the primary application;

(l) “Decorative effect coatings” means coatings designed to give special aesthetic effects over specially prepared pre-painted substrates or base coats and subsequently treated with various tools during the drying period.

5. “Vehicle refinishing products” means products listed in the subcategories below. They are used for the coating of road vehicles, or part of them, carried out as part of vehicle repair, conservation or decoration outside of manufacturing installations. In this respect, “road vehicle” means any motor vehicle intended for use on the road, being complete or incomplete, having at least four wheels and a maximum design speed exceeding 25 km/h, and its trailers, with the exception of vehicles which run on rails and of agricultural and forestry tractors and all mobile machinery:

(a) “Preparatory and cleaning” means products designed to remove old coatings and rust, either mechanically or chemically, or to provide a key for new coatings:

> (i) Preparatory products include gunwash (a product designed for cleaning spray-guns and other equipment), paint strippers, degreasers (including anti-static types for plastic) and silicone removers;
>
> (ii) “Pre-cleaner” means a cleaning product designed for the removal of surface contamination during preparation for and prior to the application of coating materials;

(b) “Bodyfiller/stopper” means heavy-bodied compounds designed to be applied to fill deep surface imperfections prior to the application of the surfacer/filler;

(c) “Primer” means any coating that is designed for application to bare metal or existing finishes to provide corrosion protection prior to application of a primer surfacer:

> (i) “Surfacer/filler” means a coating designed for application immediately prior to the application of topcoat for the purpose of corrosion resistance, to ensure adhesion of the topcoat, and to promote the formation of a uniform surface finish by filling in minor surface imperfections;
>
> (ii) “General metal primer” means a coating designed for application as primers, such as adhesion promoters, sealers, surfacers, undercoats, plastic primers, wet-on-wet, non-sand fillers and spray fillers;
>
> (iii) “Wash primer” means coatings containing at least 0.5% by weight of phosphoric acid designed to be applied directly to bare metal surfaces to provide corrosion resistance and adhesion; coatings used as weldable primers; and mordant solutions for galvanized and zinc surfaces;

(d) “Topcoat” means any pigmented coating that is designed to be applied either as a single-layer or as a multiple-layer base to provide gloss and durability. It includes all products involved such as base coatings and clear coatings:

> (i) “Base coatings” means pigmented coatings designed to provide colour and any desired optical effects, but not the gloss or surface resistance of the coating system;
>
> (ii) “Clear coating” means a transparent coating designed to provide the final gloss and resistance properties of the coating system;

(e) “Special finishes” means coatings designed for application as topcoats requiring special properties, such as metallic or pearl effect, in a single layer, high-performance solid-colour and clear coats, (e.g., anti-scratch and fluorinated clear coat), reflective base coat, texture finishes (e.g., hammer), anti-slip, under-body sealers, anti-chip coatings, interior finishes; and aerosols.

6. Parties shall ensure that the products covered by this annex which are placed on the market within their territory comply with the maximum VOC content as specified in tables 1 and 2. For the purposes of restoration and maintenance of buildings and vintage vehicles designated by competent authorities as being of particular historical and cultural value, Parties may grant individual licences for the sale and purchase in strictly limited quantities of products which do not meet the VOC limit values laid down in this annex. Parties may also exempt from compliance with the above requirements products sold for exclusive use in an activity covered by annex VI and carried out in a registered or authorized installation complying with that annex.

Table 1
Maximum VOC content for paints and varnishes

Product subcategory	*Type*	*(g/l)**
Interior matt wall and ceilings (Gloss ≤ 25@60°)	WB	30
	SB	30
Interior glossy walls and ceilings (Gloss > 25@60°)	WB	100
	SB	100
Exterior walls of mineral substrate	WB	40
	SB	430
Interior/exterior trim and cladding paints for wood and metal	WB	130
	SB	300
Interior/exterior trim varnishes and wood stains, including opaque wood stains	WB	130
	SB	400
Interior and exterior minimal build wood stains	WB	130
	SB	700
Primers	WB	30
	SB	350
Binding primers	WB	30
	SB	750
One pack performance coatings	WB	140
	SB	500
Two-pack reactive performance coatings for specific end-use	WB	140
	SB	500
Multi-coloured coatings	WB	100
	SB	100
Decorative effects coatings	WB	200
	SB	200

* g/l ready to use.

Table 2
Maximum VOC content for vehicle refinishing products

Product subcategory	*Coatings*	*VOC (g/l)**
Preparatory and cleaning	Preparatory	850
	Pre-cleaner	200
Bodyfiller/stopper	All types	250
Primer	Surfacer/filler and general (metal) primer	540
	Wash primer	780
Topcoat	All types	420
Special finishes	All types	840

* g/l of ready-for-use product. Except for "preparatory and cleaning", any water content of the product ready for use should be discounted.

B. Canada

7. Limit values for controlling emissions of VOCs from the use of consumer and commercial products will be determined, as appropriate, taking into account information on available control technologies, techniques and measures, limit values applied in other jurisdictions, and the documents below:

(a) VOC Concentration Limits for Architectural Coatings Regulations. SOR/2009-264;

(b) VOC Concentration Limits for Automotive Refinishing Products. SOR/2009-197;

(c) Regulations Amending the Prohibition of Certain Toxic Substances Regulations, 2005 (2-Methoxyethanol, Pentachlorobenzene and Tetrachlorobenzenes). SOR/2006-279;

(d) Federal Halocarbon Regulations. SOR/2003-289;

(e) Prohibition of Certain Toxic Substances Regulations. SOR/2003-99;

(f) Solvent Degreasing Regulations. SOR/2003-283;

(g) Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations. SOR/2003-79;

(h) Order Adding Toxic Substances to Schedule 1 to the Canadian Environmental Protection Act, 1999;

(i) Notice with Respect to Certain Substances on the Domestic Substances List (DSL);

(j) Order Amending Schedule 1 to the Canadian Environmental Protection Act, 1999 (Miscellaneous Program);

(k) Ozone-depleting Substances Regulations. SOR/99-7;

(l) Proposed regulations for VOC Concentrations Limits for Certain Products;

(m) Proposed notice requiring the preparation and implementation of pollution prevention plans in respect of specified substances on Schedule 1 of the Canadian

Environmental Protection Act, 1999, related to the resin and synthetic rubber manufacturing sector;

(n) Proposed notice requiring the preparation and implementation of pollution prevention plans in respect of specified substances on Schedule 1 of the Canadian Environmental Protection Act, 1999, implicated in the polyurethane and other foam sector (except polystyrene);

(o) Notice with Respect to Certain Hydrochlorofluorocarbons;

(p) Notice with Respect to Certain Substances on the Domestic Substances List (DSL); and

(q) Environmental Code of Practice for the Reduction of Solvent Emissions from Dry Cleaning Facilities. PN 1053.

C. United States of America

8. Limit values for controlling emissions of VOCs from sources subject to National Volatile Organic Compound Emission Standards for Consumer and Commercial Products are specified in the following documents:

(a) Automobile refinish coatings — 40 C.F.R. Part 59, Subpart B;

(b) Consumer products — 40 C.F.R. Part 59, Subpart C;

(c) Architectural coatings — 40 C.F.R. Part 59, Subpart D; and

(d) Aerosol coatings — 40 C.F.R. Part 59, Subpart E.