

TECHNICAL ANNEX

SERVICE CONTRACT FOR THE DEVELOPMENT OF THE BASELINE AND POLICY SCENARIOS AND INTEGRATED ASSESSMENT MODELLING FRAMEWORK FOR THE CLEAN AIR FOR EUROPE (CAFE) PROGRAMME

1. INTRODUCTION

On 4 May 2001, the European Commission announced its intention to launch a programme of technical analysis and policy development — the Clean Air for Europe (CAFE) programme — leading to the adoption of a thematic strategy on air pollution fulfilling the requirements of the Sixth Environmental Action programme in 2004.¹

The current intention is that the thematic strategy adopted in 2004 will be a political document outlining the measures that need to be taken at various levels to improve air quality, backed up by robust scientific and technical analysis and followed by legislative proposals for those measures to be taken at Community level.

One of the essential inputs to the thematic strategy, and therefore an integral part of CAFE, is the development of a baseline scenario, the purpose of which is to understand how the air quality in Europe is likely to evolve between now and 2020, on the basis of current policies and measures. A well-constructed baseline gives vital input for determining the extent to which problems in relation to air quality can be expected to persist in the future. The baseline for the CAFE programme will, as far as possible, be the same as the air pollution and climate change baseline scenario being developed by the European Environment Agency (EEA) for the next State of the Environment and Outlook report to be published in 2004 (hereafter referred to the SEO₂₀₀₄ baseline).

The CAFE baseline will also provide the benchmark against which other policy scenarios will be compared in the context of CAFE. In order for this to happen, the modelling framework used to develop the baseline will also need to be capable of analysing the effect that various policy options and measures would have on the predicted air quality. In other words, in addition to the baseline scenario it will be necessary to develop an “integrated assessment modelling (IAM)” framework.

Integrated assessment can be defined as a methodological framework that helps us to make decisions in a transparent, open and informed manner. In CAFE the following related issues need to be assessed:

- (1) What impacts do/will current and future air quality and atmospheric deposition have on human health and the environment?
- (2) How do local and regional anthropogenic emissions affect air quality and deposition, and which economic activities cause these emissions?
- (3) How is air quality influenced by other factors (e.g., natural emissions, background levels, meteorological conditions)?

¹ More information on the CAFE programme can be obtained at the following address:
<http://europa.eu.int/comm/environment/air/cafe.htm>

- (4) To what extent and at what costs should emissions from the various sources/sectors be reduced?
- (5) What would be the effects of cleaner air on health and ecosystems (e.g., increased life expectancy, better health status, better soil and water quality)?

Integrated assessment tries to relate information on these aspects to each other in order to (i) quantify the likely effects of present emission reduction legislation on future air quality, (ii) to assess scope, costs and benefits of the available additional measures to further improve air quality, and (iii) if appropriate, to identify cost-effective packages of additional emission controls to meet certain air quality objectives. Integrated assessment is a complex process, which can be supported by computer models that put quantitative information on the various relevant aspects into consistent relations.

The IAM framework referred to above will assist the integrated assessment process within CAFE by providing quantitative information on the implications of alternative policy scenarios quickly, consistently and without excessive costs. To be successful, the modelling system needs to provide access to a wealth of relevant information on a large variety of aspects in a consistent, comparable and transparent manner and thus allow consistent comparisons of costs and benefits of actions in different economic sectors and in different countries. Input data to IAMs will need to be collected from all European countries and subject to consultation with interested stakeholders.

IAMs can also be used to search systematically for solutions that would meet environmental policy targets in the most efficient manner. In any case, the output of integrated assessment models needs to be assessed qualitatively (through e.g. “multi-criteria analysis”) as part of integrated assessment in a transparent manner, in order to ensure that uncertainty, political considerations and other non-quantifiable issues are taken into account.

2. OBJECTIVE

The objective of the assignment is to ensure the development of

- a robust baseline scenario;
- an operational integrated assessment modelling (IAM) framework allowing a sufficient number of scenarios to be analysed within CAFE;
- scenarios reflecting the various options for improving air quality in the enlarged EU for the period up to 2020.

The scenarios, as well as the modelling framework, should address 2020 as a target year, as well as two interim years – 2010 and 2015 – so that the evolution of air quality can be observed and assessed.

3. SCOPE

The emissions of air pollutants in all scenarios need to cover all those countries and international areas (maritime/international aviation) whose emissions are relevant for the

air quality in the enlarged EU. The scope of the scenario development and IAM framework should thus – in principle – include all European countries.

The assignment must include the current EU Member States, and relevant European Economic Area and accession candidate countries as well as Switzerland.

The following air related problems need to be covered under the IAM: the effect of primary and secondary particles, nitrogen oxides, tropospheric ozone and acidification and eutrophication on human health and ecosystems. The tenderer needs to specify what PM sizes (10, 2.5, 1 and/or 0.1) will be used in the IAM. However, at least PM₁₀ needs to be covered. The Commission will address the other pollutants (benzene, CO, heavy metals etc.) separately (i.e. not part of this assignment).

The spatial resolution of the IAM should be 50x50 km² (or a more detailed resolution). The analysis should also consider air quality problems within each grid (i.e. local scale) to the extent that the results will be available for the IAM. A more extensive and detailed analysis of air quality problems at the urban/local scale will be addressed in a separate tender (feasibility study). The tenderer needs to take results of that work into account. The interaction with greenhouse gas emissions (in view of the importance of corresponding ancillary benefits and dis-benefits) needs to be included in the IAM framework.

4. TASKS

In order to fulfil the objective the contractor will undertake the following Lots.

4.1. Lot 1: Development of the CAFE baseline scenario and the IAM framework

The baseline to be developed for the CAFE programme needs to build on the air pollution and climate change SEO₂₀₀₄ baseline being developed by the EEA (see Enclosure 1 for details). Furthermore, the CAFE baseline needs to be based on the energy baseline scenario from Energy Outlook 2030, which is being developed by the Energy and Transport Directorate General (DG TREN) of the European Commission.

Ideally, the CAFE baseline should be the same as SEO₂₀₀₄ baseline and both should use the Energy Outlook 2030. If there are reasons to deviate from these baselines (which might also deviate from one another), they need to be agreed with the Commission and well documented.

The baseline scenario for the transport sector is being developed by Environment Directorate General as part of its work to further develop the transport and environment model TREMOVE. The aim is that the CAFE baseline incorporates the TREMOVE baseline, which includes the emissions of all pollutants from road, rail, sea and air transport. The baseline should also include air pollution resulting from agriculture and the underlying agricultural baseline scenario being developed by the Agriculture Directorate General of the European Commission. Finally, the baseline needs to include emissions from stationary industrial and other sources.

The baseline will also be developed in close co-operation with the United Nations Economic Commission for Europe (UN/ECE) Convention on Long-Range

Transboundary Air Pollution, particularly as concerns the prediction of air pollution and deposition levels on the basis of the emissions scenarios.

The baseline needs to be documented clearly so that all assumptions are shown, including a qualitative assessment of those assumptions that are deemed critical. The specifications of the main air outputs of the baseline are documented in Enclosure 2.

It should be noted that the development of the baseline will involve developing and running the same models that form the IAM framework. Development of the baseline and development of the IAM framework are therefore expected to start more or less simultaneously.

4.1.1. Stakeholder consultations on the baseline

The contractor shall hold three stakeholder workshops where the CAFE baseline will be consulted with the stakeholders. These workshops will be held in Brussels in a meeting room provided by the Commission. The first one would be held within a month from the selection of the contractor. A second shall be held when the preliminary baseline is ready (6-8 months after the first consultation) and the final will be held when the draft final baseline is ready (12 months after the first consultation) so that all can verify that the main concerns/suggestions have been adequately covered. In this third stakeholder workshop the CAFE baseline will be finalised. The Commission will work closely with the contractor to ensure that the stakeholder consultations are carried out so that they add value. It is also expected that the Commission will chair the sessions of the stakeholder consultations.

Apart from the reservation of the meeting room, the contractor will be responsible for all practical arrangements, including the reimbursement of travel costs of those participants that require this. The contractor should reserve enough funds to cover the travel costs for some 40 participants for each stakeholder workshop.

In addition to these three workshops, specific workshops will be held where the issues relating to agriculture, energy supply, transport and industry are discussed. Some of these workshops may be held under the auspices of CAFE. Others (e.g. agriculture or transport) may be held as part of the development of that specific sectoral baseline scenario (without a formal link to CAFE). The contractor is not expected to cover the costs of these workshops.

4.1.2. Inclusion of results reported under current legislation into the baseline

The effect of current EU-wide as well as Member State level legislation needs to be included in the CAFE baseline. The EEA will document what legislation has been included in the SEO₂₀₀₄ baseline. This will be done based on information that is or will become available under the EU National Emission Ceiling Directive 2001/81/EC and also using other information sources on the state of action in Member States. Ideally, this baseline will be the same as the CAFE baseline. However, if there are differences between the SEO₂₀₀₄ and the CAFE baselines, these need to be documented clearly by the contractor. If there are clear signs of an implementation failure of EU-wide or Member State level legislation, the contractor shall discuss this with the Commission to get guidance on how to proceed.

The contractor shall assume that all accession candidate countries will have implemented all air quality related *acquis communautaire* at the latest by 2010.

4.1.3. Inclusion of climate change policies to the baseline

It should be noted that the climate policies being developed both at the EU and Member State level are likely to have an important impact to air quality. Climate policies will be included in the SEO₂₀₀₄ baseline and will be documented. In particular, variants of the baseline including and excluding the implementation of policies and measures to achieve the climate change Kyoto target will be developed. The contractor needs to have the tools available to be able to analyse the impact of such policies through sensitivity analysis. The Commission will give guidance on whether and how to include such policies in the baseline, or whether such policies are included in the different policy packages that will be analysed.

4.1.4. Scale of models: regional and local

A spatial resolution of 50x50 km² for the baseline and IAM framework is considered adequate to analyse air pollution at regional scale.

The CAFE programme will also address air pollution at local level. This is because some of the regional/long range pollutants are also local ones, and usually show high concentrations in urban areas, street canyons and in rural areas downwind of agglomerations. It is expected that the IAM selected for the CAFE programme will be able to incorporate particulate matter and NO_x concentrations at local level in urban areas and ozone concentrations in the urban plume. To the extent possible, hot-spots due to road traffic and industrial sources should be also considered (if they are not already a part of “urban scale” or “ozone plume”). It is recognised that the inclusion of local scale (i.e. areas smaller than 50x50 km² grid) and street canyons (very localised pollution) is inherently difficult at EU-level and it is not obvious how such issues would be included in the IAM.

Local scale analysis should help the Commission to understand the scale of air quality problems in the EU, i.e. to determine to what extent air quality problems are local, regional, national and EU-wide. The inclusion of local scale within an IAM will thus contribute to a better understanding of the balance between EU-wide, national and local measures, the cost effectiveness of different policy options and the benefits of local air quality. However, given the inherent complexity of the inclusion of local level to an IAM, the possibility of including the local scale in any optimisation routine(s) within the IAM needs to be further analysed and assessed.

The tenderer is requested to demonstrate how air pollution on a local and, if possible, hot-spot scale would be incorporated into the IAM. The incorporation should preferably be based on an estimate of the number of people (and where relevant, also the area of vegetation) in each grid cell that would be exposed to a higher concentration than the regional one, namely to urban background and – if available – hot-spot concentrations.

In parallel to the present call for tender, the Commission intends to issue a contract for a feasibility study on different options for addressing local scale issues . The feasibility study will give the pros and cons of each option including a budget estimate. It will recommend a particular option for which it would give a draft project implementation plan including the budget, schedule, staffing and other resource requirements, as well as a

draft technical annex for any additional work required to model and/or include local scale issues to the IAM.

The contractor chosen on the basis of the present call for tender will assist the Commission in finalising the technical annex. It is expected that the feasibility study is completed by August 2002.

4.1.5. Treatment of ancillary benefits and dis-benefits

It is important to include the most important ancillary benefits and dis-benefits in an integrated assessment in order to avoid overlooking side benefits or shifting environmental problems from one domain to another. Ancillary benefits are considered important at least in the following areas:

- Climate change, energy and transport policies all affect the amounts and types of fuels that are burned and these changes have an effect on air quality. And *vice versa*, measures taken to improve air quality affect the operation of energy producers and transport sector and consequently greenhouse gas emissions. These issues need to be clearly quantified in the integrated assessment carried out as part of the CAFE programme.
- Many conventional air pollutants are also greenhouse gases, even if they are not covered by the Kyoto Protocol. For instance, reducing tropospheric ozone levels by cutting VOC and NO_x emissions would reduce the greenhouse effect as well as improving air quality. On the other hand, sulphates are thought to have a cooling effect, so the reduction of SO₂ emissions could increase global warming. While this does not imply that SO₂ emissions should not be brought down it is important for the policy analyst to know what the impact is so that the “whole picture” is seen.
- Agricultural policies are likely to have smaller, but still potentially important effects on air quality, in particular through ammonia releases. Furthermore, agricultural productivity is itself affected by tropospheric ozone, acidification and eutrophication. These issues need to be quantified to the extent possible. The IAM needs to be able to analyse possibilities to reduce agricultural emissions as part of the reform of the Common Agricultural Policy.
- Water and soil quality are affected by air pollution through acidification and eutrophication, so the effects of different air quality policies water and soil quality need to be quantified. On the other hand, it is not obvious how policies to improve water and soil quality would significantly affect air quality so it is unlikely that any model runs would be made explicitly to look into this link.

The tenderer is requested to demonstrate how its modelling framework will be able to assess the ancillary benefits and disbenefits in particular in policy areas described above.

4.1.6. Role of cost-benefit and multi-criteria analyses

It is expected that the IAM will be able to assess the costs of different policy options. It would be preferable that the benefits could also be estimated in the IAM framework, at least in quantitative though not necessarily monetised terms. The tenderer is requested to demonstrate how well its IAM framework can be used for assessing the costs and benefits of the policy options. If the cost benefit analysis cannot be carried out in the IAM

framework, the tenderer is requested to clearly demonstrate what information will be made available to another team that would be called upon to make the full cost benefit analysis. In its demonstration the tenderer is requested to comment how the results could be used in a multi-criteria framework for benefits that cannot be expressed as a monetary value. It should be noted that in addition to benefits to health and ecosystems, it would be desirable to consider issues like improved visibility or reduced risk of damage of cultural heritage due to improved air quality.

4.1.7. Establishing the baseline

Accomplishment of the tasks described above will result in the development of an IAM framework as well as all the data required to establish a robust baseline scenario for CAFE. The last task in Lot 1 will therefore be a final, properly documented model run to establish the CAFE baseline, (see section 7 on deliverables).

4.2. Lot 2: Comparison with other IAMs; development and running of main alternative policy scenarios

It is recognised that there would be a value added to compare the results obtained from the baseline model run of Lot 1 with results from other European wide IAMs. The contractor is requested to propose how it would do this.

The level of ambition reflected in the thematic strategy will depend upon updated evidence concerning the effects of air pollution and evolving political priorities, and may be different for different pollutants. The policy mixes chosen will depend not only on the required level of ambition in relation to air quality but also on other factors relating to the measures envisaged. In order to be able to assess the various possibilities adequately, the Commission will identify about ten policy scenarios to be analysed within the IAM framework, representing a fairly wide range of policy options and ambition for improving air quality in Europe by 2020. Given the fact that CAFE programme is developing a thematic strategy for many pollutants, it is also possible that different mixes of air quality improvement could be analysed in a “multi-gas approach”. The contractor is invited to give a preliminary view on the main policy options that could be analysed

The corresponding model runs – including full details – will need to be reported in a technical background report. This report should also give a preliminary assessment of the results and make suggestions for additional runs to be made as part of Lot 3. The report will be disseminated to the stakeholders of the CAFE programme.

4.3. Lot 3: Testing variants to the main policy scenarios, reporting and dissemination of results

Lot 3 is similar to Lot 2 as far as the definition of different scenarios is concerned. However, it is envisaged that in Lot 3 further policy packages for the most promising main policy scenarios would be tested in order to find out those packages that would be most policy relevant. The contractor should be prepared to running in total up to 100 variants of the most promising alternative policy scenarios.

As part of Lot 3, the policy relevant results of the variants will be reported. It is expected that some 20 variants will be reported and commented upon. The purpose of the report of Lot 3 is to identify what kinds of policy packages would bring the most promising results to improve air quality in the EU.

In addition, a final report will be prepared. This report will include a summary description of Lots 1, 2 and 3, conclusions from the IAM and recommendations for main options to improve air quality in the enlarged EU up to 2020.

5. EXPERIENCE OF THE CONTRACTOR

The contractor must have good knowledge of the environmental, technological and economic aspects of preparing air quality scenarios and the management of a complex set of integrated assessment models. The leader of the modelling team must have a proven track record in modelling air quality problems, understanding the issues related to ancillary benefits and disseminating the results in a non-technical manner. Tenderers must be independent entities with no conflict of interest with interested parties.

6. ORGANISATION OF THE WORK

The contractor will work exclusively for the Commission, represented by the Directorate-General for the Environment. In its work, the Commission will be assisted by three groups in the CAFE programme. They are the CAFE Steering Group, Technical Analysis Group (TAG) and Working Group (WG) for setting targets and assessing policies.

The details of the CAFE Steering Group can be found at http://www.europa.eu.int/comm/environment/air/cafe_steering_group.htm. The TAG – comprising the leaders or representatives of projects carried out within key organisations – assists in the co-ordination of the technical analysis work carried out within CAFE. The main purpose of the WG is to help the Commission to define the most relevant policy packages that would be modelled in the IAM framework and to assess critically the results. The WG will in particular pay attention to those issues that cannot be modelled or quantified but which are important when options to improve air quality are assessed. The tasks of the WG will be specified in the terms of reference, a preliminary version of which will be presented to the CAFE Steering Group in April 2002, and which will be finalised by the WG itself by June 2002. As described in section 4.1, the CAFE baseline will be developed in close co-operation with the Convention on Long-Range Transboundary Air Pollution (<http://www.unece.org/env/lrtap/>) and the European Environment Agency (EEA) (<http://www.eea.eu.int/>). The EEA has asked its Topic Centre on Air and Climate Change to prepare the baseline for air quality in as part of SEO₂₀₀₄. As this important work forms the basis for the development of the CAFE baseline, the contractor needs to work in close co-operation with the EEA and its Topic Centre for Air and Climate Change.

7. DELIVERABLES

The contractor will prepare the following main reports:

Detailed work plan for the development of the CAFE baseline and how IAM will be used in the CAFE programme (due for the kick-off meeting)

CAFE baseline and development of the IAM framework (report of Lot 1)

Technical background note on main alternative policy scenarios (report of Lot 2)

Final report

In addition, the contractor will need to prepare progress and other *ad hoc* reports based on the requests of the CAFE Secretariat. All reports should be delivered to the European Commission in Word, Excel and pdf formats. The reports will be made public on DG Environment web-site.

8. DISSEMINATION OF INFORMATION

The contractor needs to set up a web-site devoted to the development of the baseline as well as for disseminating information about the IAM framework. The tenderer is requested to demonstrate how it would disseminate information through the web-site to the Member States, accession countries, experts of industry organisations, non-governmental organisations and the citizens of Europe. The Commission will work in close co-operation with the contractor in the development of the web-site. The EEA will present the SEO₂₀₀₄ baseline on its web site. The contractor needs to demonstrate how he would develop the proper links to the EEA and CAFE web sites.

9. SCHEDULE

The tenderer is requested to prepare a schedule for each Lot. The deadlines of different Lots, as considered applicable at the time of writing this technical annex, are given below:

Lot 1:

- Kick-off meeting and first stake-holder consultation (within 1 month from the signing of the contract)
- Preliminary baseline needs to be ready within 6 months of the signing of the contract (i.e. before the second stakeholder workshop) and the draft final baseline within 11 months from the signing of the contract (i.e. before the third stakeholder workshop). The final baseline needs to be ready within 1 month after the third stakeholder workshop. The baseline needs to be finalised and reported within 14 months from the signing of the contract.
- The IAM framework needs to be developed so that it can be used for preparing the baseline scenario, including the sensitivity analysis as described in Lot 1. The inclusion of local scale issues will be decided once the results of the feasibility study are ready.

Lot 2:

- The main alternative policy scenarios need to be ready within 24 months of the signing of the contract.

Lot 3:

- The variant model runs can start once Lot 2 has been finalised. It is expected that the running of variants will be carried out during the period between 24 and 30 months from the signing of the contract. (i.e. in the latter part of 2004 in the first part of 2005).
- The final report, as well as a documentation of all assumptions used in basic scenarios needs to be ready within 36 months of the signing of the contract (i.e. in mid 2005).

10. SELECTION CRITERIA

- a) Tenderers should be individuals or legal entities (giving registration numbers from official registers).
- b) Evidence of a tenderer's financial standing, by furnishing (extracts from) financial statements of the last three years.
- c) Tenderers should have demonstrable experience in the areas that are part of this call for tender.
- d) Experience as evidenced by the composition of the proposed team (curriculum vitae of team members including a reference list of relevant previous projects). This should also show that the team is technically capable of carrying out the work as described in the technical annex.

11. AWARD CRITERIA

The award criteria are the following:

- (1) Understanding: This criterion is intended to assess whether candidates have taken into consideration all the aspects of the tasks required by the contract, such as they appear above, as well as the contents of the proposed end product.
- (2) Methodology: The degree to which the methodology shows the capacity to resolve the questions underlying the tender in a realistic and well-structured way as well as to whether the methods proposed are in conformity with the need of the Commission expressed in the technical annex.
- (3) Project management and availability: The offers will be assessed as regards the quality of the team organisation and the time share attributed to each of the members, which should clearly be outlined in the tender.

Points: A maximum of 20 points will be attributed to the criterion 'understanding', a maximum of 50 points will be attributed to the criterion 'methodology' and a maximum of 30 points is awarded to the criterion 'Project management and availability'. To be selected the companies will have to obtain a minimum of 15 points for the criterion 'understanding', a minimum of 40 points for of the points for the criterion 'methodology' and a minimum of 20 points for of the points for the criterion 'project management and availability', which gives a total minimum of 75 points to be achieved.

12. BUDGET

The budget is fixed at a maximum of €800.000 (including fees and all other costs) to be split approximately as follows:

Lot 1: €400.000 for the development of the baseline and the integrated assessment modelling framework, the stakeholder consultations and the reporting of CAFE baseline.

Lot 2: €200.000 for the development, running and reporting of about ten main alternative policy scenarios.

Lot 3: €200.000 for the development, running and reporting of in total up to 100 variants of the main alternative policy scenarios, as well as for preparing the final report.

The tenderer is requested to make a comprehensive bid for all Lots. Each Lot will be covered by a separate contract. Lots 2 and 3 will be issued on following satisfactory completion of the previous Lot and on budgetary availability. In case of failure to complete the previous Lot satisfactorily, the Commission reserves its right not to issue further Lots.

Price: The bid offering the best value for money will be chosen, providing the minimum number of points is achieved. This is calculated by dividing the price by the number of points awarded.

DEVELOPMENT OF AN AIR POLLUTION AND CLIMATE CHANGE BASELINE SCENARIO FOR THE “STATE OF THE ENVIRONMENT AND OUTLOOK 2004”**1. Objective**

Development of an integrated assessment framework and of an air pollution and climate change baseline scenario for the purpose of the European Environment Agency (EEA) report “State of the Environment and Outlook 2004” (SEO₂₀₀₄). The European Topic Centre on Air and Climate Change (ETC/ACC) assists in the development of this baseline, which also serves as the basis for the baseline scenario for the CAFE (Clean Air for Europe) programme.

2. Foreseen implementation

ETC/ACC will provide a final air pollution and climate change baseline scenario, including some sensitivity runs and “what if” assumptions² to the CAFE programme by October 2003 and to the EEA for the EEA State of the Environment and Outlook report 2004. The baseline will use, as input in the integrated assessment framework, the energy baseline scenario from of Energy Outlook 2030, which is being developed by the Energy and Transport Directorate General (DG TREN, PRIMES model) of the European Commission (expected to be available mid 2002). Also other sectoral baseline scenarios being developed by the European Commission will be used, in particular transport (TREMOVE model) and agriculture scenarios.

An important aspect in developing a baseline scenario is the credibility and acceptability towards the potential users (EEA, European Commission, EU/EEA member countries and other stakeholders). Therefore ETC/ACC has the intention to develop the baseline scenario in close co-operation with DG Environment and the involved sectoral DG’s (DG TREN and DG Agriculture), as well as with member countries.

The timetable in realising the air pollution and climate change baseline scenario for EEA will be in line with the foreseen timetable of the CAFE programme. An important part of the task will be an analysis the uncertainty of the baseline. Examples of uncertainty analysis are checks on the main model input parameters and assumptions (sensitivity runs with respect to e.g. energy prices or growth of GDP); consequences of various ‘what-if’ assumptions (e.g. different implementation pathways to fulfil the Kyoto Protocol target and assumptions related to the post Kyoto process, after 2012) and comparison of the results with projections carried out by EU-countries (e.g. as required by the NEC-directive).

² Number and type of baseline runs will be specified in close consultation with the CAFE Secretariat.

3. Tasks to be carried out

The ETC/ACC infrastructure for integrated assessment, as developed for the EEA in 2001 (ETC/ACC, 2001), will be used for the construction of the CAFE baseline³.

The time-horizon of the air pollution and climate change baseline scenario will include 2010, 2015 and 2020, covering as far as possible all EEA member countries (currently 31, including EU-15 and the accession countries). The spatial resolution is 150x150 km, which will be updated to 50x50 km if feasible by October 2003. In addition the framework will be extended with a module to calculate the urban concentration of a number of European urban agglomerations, to be selected. The air quality indicators will include acidifying and eutrophication deposition at the regional scale, exposure of ecosystems/crops and humans to ozone; and exposure of humans to PM₁₀ (and PM_{2.5} under development), and to SO₂ and NO_x (possibly extended with NO₂).

Based on the information obtained from the Commission (DG TREN, models: PRIMES and TREMOVE) and DG Agriculture (CAPRI model)) the full causality chain will be covered and ETC/ACC will:

- (1) Prepare baseline scenarios for regional and urban scale using the sectoral DGs' scenarios for transport, agriculture and energy.
- (2) Perform sensitivity and uncertainty analysis of the baseline scenario.
- (3) Evaluate the effectiveness of different policies with respect to air pollution and ancillary (dis)benefits of climate change policies.
- (4) Compare the baseline scenario and its assumptions with available other scenarios covering Europe (e.g. IPCC-SRES).
- (5) Apply and report the baseline scenario for the full causal chain⁴.

"Further information about the air pollution and climate change baseline scenario for the "State of the Environment and Outlook 2004" report is available from EEA. Contact persons are Andre Jol (Andre.Jol@eea.eu.int) and Roel van Aalst (Roel.VanAalst@eea.eu.int).

³ Documents and background material can be found on the EEA web site <http://www.eea.eu.int/> or the ETC/ACC website: <http://etc-acc.eionet.eu.int/>

⁴ A preliminary list of prime output indicators to be included in the report is given in Appendix 1

Appendix 1: Summary of possible air pollution and climate change indicators in the SEO₂₀₀₄ baseline scenario (under development)

Indicators in **bold** are essential air pollution and climate change indicators for CAFE.

Indicators for socio-economic, sectoral and demographic driving forces

Indicators	DPSIR ²
GDP growth (total & by sector)	D
Energy prices (by fuel type ¹)	D
Energy consumption and production (total & by sector, fuel type ¹)	D
Population (total & by age, household)	D
Urban population (total & by age, density)	D
Transport growth (total & modal split)	D
Agricultural demand	D
Agricultural production (area, by live stock type)	D
Ecosystem (by type, area, critical load)	D
Waste production (by type, e.g. landfills)	D

¹ E.g. Petrol, Gas, Diesel, Steam, Nuclear, Solar, wind, thermal, biofuels

² Driving forces, Pressures, State, Impact and Policy Responses

Indicators for Air Pollution

Indicators	DPSIR
Emissions acidifying pollutants (total & by sector)	P
Emissions ozone precursors (total & by sector)	P
Emissions primary and secondary PM₁₀ (PM_{2.5} to be developed) (total & by sector)	P
Emissions SO₂ (total & by sector)	P
Emissions NO_x (total & by sector)	P
Emissions NH₃ (total & by sector)	P
Emissions NMVOC (total & by sector)	P
Urban emissions NO _x , VOC, PM ₁₀ , (PM _{2.5}), SO ₂	P
Effectiveness of policies and measures¹ to reduce SO₂ emissions¹	P+R
Effectiveness of policies and measures¹ to reduce NO_x emissions¹	P+R
Effectiveness of policies and measures¹ to reduce VOC emissions	P+R
Effectiveness of policies and measures¹ to reduce NH₃ emissions	P+R
Effectiveness of policies and measures¹ to reduce PM₁₀ emissions	P+R
(Percentage) Area Exceedance Critical Loads (max, 2%, 5%) Total acidity	S
(Percentage) Area Exceedance Critical Loads (max, 2%, 5%) Nitrogen	S
Average accumulated exceedance (AAE) of nutrient nitrogen and acidity	S
Exceedance days/potential population/vegetation exposure for ozone at the regional level	S
Exceedance days/potential population exposure for ozone in urban areas	S
Exceedance days/potential exposure for PM ₁₀ in urban areas	S
Exceedance days/potential exposure for SO ₂ in urban areas	S
Exceedance days/potential exposure for NO ₂ in urban areas	S
Aggregated exceedance AQ standards (in development)	S
Exposure of crops/forests to ozone	S
Human health exposure, risk and effects by air pollutants (total & by component) ⁵	I

¹ Policies and measures in the baseline scenario

⁵ This indicator needs further to be developed in co-operation with WHO-Europe.

Indicators for Climate change

Indicators	DPSIR
Emissions of six greenhouse gases (GHG) (total & by sector)	P
Emissions CO₂ (total & by sector)	P
Emissions CH₄ (total & by sector)	P
Emissions N₂O (total & by sector)	P
Emissions fluorinated greenhouse gases (HFCs, PFCs, SF ₆)	P
Effectiveness of policies and measures¹ to reduce GHG emissions (by gas/sector)	P+R
Concentration GHG (total & by component, world/Europe)	S
Radiative forcing (total & by component) world/Europe	S/T ⁶
Temperature world/Europe (annual mean deviations)	S/I
Precipitation Europe	S/I

¹ Policies and measures in the baseline scenario

Indicators for the interaction between air pollution and climate change

Indicators	DPSIR
Sulphur, ozone and PM effect on climate (e.g. temperature)	P
Climate change effect on Percentage Area Exceedance Critical Loads Total acidity	I
Climate change effect on Percentage Area Exceedance Critical Loads Total nitrogen	I
Climate change effect on urban air pollution stress (e.g. O ₃)	P
Effectiveness of existing climate change policies and measures for air pollutant emission reduction (SO₂, PM₁₀, NO_x)	R

⁶ An extended set of climate change impact indicators is under development by EEA/ETC-ACC and expected to become available in 2002

MAIN AIR QUALITY OUTPUTS FROM THE BASELINE AND POLICY SCENARIOS

The IAM is expected to give two kinds of output as far as air quality is concerned. First, it will provide an air quality related output for each 50x50 km² grid cell, generated by the IAM. Second, it should be able to link to more detailed, i.e. local scale, information that will become available through supplementary means (i.e. outside the IAM).

1. For each 50x50 km² grid cell (from the IAM):

- Population in the grid (ideally with some age characteristics)
- Vegetation type of the grid (for acidification, eutrophication and tropospheric ozone)
- Concentration levels of tropospheric ozone (including precursors), NO_x, PM and SO₂

It should be noted that ideally the IAM should be able to differentiate between different sizes of PM (10, 2.5, 1 or 0.1). However, at least PM₁₀ needs to be covered. The tenderer needs to specify what PM data will be used in the IAM.

2. If it is likely that the air quality in some local areas within the grid is worse than the grid cell average (from a model outside the IAM):

Even if the average concentration level of air pollutants in the grid is low, it is possible the concentration level is high in areas within the grid. Thus, it is likely that one needs an indicator of the likelihood of higher concentration levels within the grid. This would be used as a criteria for “zooming in” within the grid.

The local scale pollutants that are of particular importance are PM, NO_x and tropospheric ozone. Below the most important pieces of information for each grid cell are outlined. It is expected that the feasibility study will recommend how such information can be collected and integrated with the IAM selected for the CAFE programme.

2.1 PM and NO_x:

- Estimated population affected by higher concentrations than the grid cell average of PM and NO_x in the urban part of the grid
- Concentration level(s) of PM and NO_x in the urban part of the grid
- Estimated population affected by higher concentrations than the grid cell average of PM and NO_x in the street canyons within the grid
- Concentration level(s) of PM and NO_x in street canyons within the grid

2.2 Tropospheric ozone:

- Estimated population affected by higher concentrations than the grid cell average of tropospheric ozone in the urban plume part of the grid
- Estimated vegetation type affected by higher concentrations than the grid cell average of the urban plume part of the grid (ideally using Level II approach)
- Concentration level(s) in the urban plume part of the grid

With the above information it should be possible to estimate the likely local impacts of air quality in different scenarios.