

ECMWF Copernicus Procurement

Invitation to Tender



Copernicus Atmosphere Monitoring Service Volume II

Products in support of users in the
policy domain

ITT Ref: CAMS_71
ISSUED BY: ECMWF Administration Department Procurement Section
Date: 12 November 2018
Version: Final



Funded by the European Union

Implemented by



Table of Contents

1	Introduction	4
1.1	Definitions	4
2	Contract Summary	6
3	Technical Specification.....	6
3.1	General Requirements	6
3.2	Work package 7110 – European Air Quality Annual Assessment Reports	7
3.2.1	Task 7111: Interim Annual Assessment Reports	7
3.2.2	Task 7112: Annual Assessment Reports	7
3.3	Work package 7120 – Air control toolbox	8
3.4	Work package 7130 - Source allocation service	9
3.4.1	Task 7131: Daily forecasts of source contributions to EU cities	10
3.4.2	Task 7132: Episode analysis reports	10
3.5	Work package 7140 - Interaction with users in the policy domain	11
3.5.1	Task 7141: Policy User workshop.....	12
3.5.2	Task 7142: Contribution to wider CAMS user interaction activities	12
3.6	Work package 7150 - User-driven studies	13
3.7	Work package 7160 - User support and documentation of service	14
3.8	Work package 7100 - Management and coordination	15
4	General Requirements	17
4.1	Implementation schedule	17
4.2	Deliverables and milestones	17
4.3	Acquisition of necessary data and observations	18
4.4	Operational aspects and quality control.....	18
4.5	Communication	18
4.6	User requirements	18
4.7	Data access via the ADS	19
4.7.1	Dataset registration	19
4.7.2	Access methods	20
4.7.3	Use of standards	20
4.7.4	Data formats	20
4.7.5	Data ownership.....	21
4.8	Key performance indicators.....	21
5	Tender Format and Content	23
5.1	Page Limits	24

5.2	Specific additional instructions for the tenderer’s response.....	24
5.2.1	Executive Summary.....	24
5.2.2	Track Record	24
5.2.3	Quality of Resources to be Deployed.....	24
5.2.4	Technical Solution Proposed.....	25

1 Introduction

Some of today's most important environmental concerns relate to the composition of the atmosphere. The increasing concentration of the greenhouse gases and the cooling effect of aerosol are prominent drivers of a changing climate, but the extent of their impact is often still uncertain.

At the Earth's surface, aerosols, ozone and other reactive gases such as nitrogen dioxide determine the quality of the air around us, affecting human health and life expectancy, the health of ecosystems and the fabric of the built environment. Ozone distributions in the stratosphere influence the amount of ultraviolet radiation reaching the surface. Dust, sand, smoke and volcanic aerosols affect the safe operation of transport systems and the availability of power from solar generation, the formation of clouds and rainfall, and the remote sensing by satellite of land, ocean and atmosphere.

To address these environmental concerns there is a need for data and processed information. The Copernicus Atmosphere Monitoring Service (CAMS) has been developed to meet these needs, aiming at supporting policymakers, business and citizens with enhanced atmospheric environmental information.

The Service consolidates many years of preparatory research and development and delivers the following operational services:

- a) Daily production of real-time analyses and forecasts of global atmospheric composition
- b) Reanalyses providing consistent multi-annual global datasets of atmospheric composition with a stable model/assimilation system
- c) Daily production of real-time European air quality analyses and forecasts with a multi-model ensemble system
- d) Reanalyses providing consistent annual datasets of European air quality with a frozen model/assimilation system, supporting in particular policy applications
- e) Products to support user in the policy domain, adding value to "raw" data products in order to deliver information products in a form adapted to policy applications and policy-relevant work
- f) Solar and UV radiation products supporting the planning, monitoring, and efficiency improvements of solar energy production and providing quantitative information on UV irradiance for downstream applications related to health and ecosystems
- g) Greenhouse gas surface flux inversions for CO₂, CH₄ and N₂O, allowing the monitoring of the evolution in time of these fluxes
- h) Climate forcing from aerosols and long-lived (CO₂, CH₄) and shorter-lived (stratospheric and tropospheric ozone) agents

This Invitation to Tender (ITT) is targeting the CAMS service elements described under item e.

1.1 Definitions

Definitions specific for this ITT are defined below.

Global Service Provider: ECMWF is the provider of global products

Real-Time Global Products: the operational real-time analyses and forecasts from the global CAMS data assimilation and forecasting system, which is run by the Global Service Provider. These analyses and forecasts are produced twice-daily and include 3-dimensional fields of aerosols, chemical species, and greenhouse gases with a temporal resolution of at least 6 hours.

Global Reanalysis Products: the outputs of a reanalysis from the global CAMS data assimilation and forecasting system, which is being run by the Global Service Provider. The reanalysis will cover the period from 2003 to 2017 and provide analyses and forecasts every 12 hours of 3-dimensional fields of aerosols, chemical species, and greenhouse gases with a temporal resolution of at least 6 hours.

Global Products: Near-Real-Time Global Products and Global Reanalysis Products.

Regional Products: all the products provided by the Successful Tenderer for ITT CAMS_50 (“Regional Production”). These comprise daily regional analyses, forecasts as well as reanalyses of air quality over Europe.

Regional Reanalyses: reanalyses of European air quality based upon validated surface observations of key regulatory pollutants, which will be delivered annually by the Successful Tenderer for ITT CAMS_50 (“Regional Production”).

Interim Regional Reanalyses: reanalyses of European air quality based upon “interim” surface observations of key regulatory pollutants, which will be delivered annually by the Successful Tenderer for ITT CAMS_50 (“Regional Production”). The use of observations in an “interim” validation stage allows faster delivery than in the case of validated data.

Policy Users: users involved in the implementation, monitoring and development of air quality management measures in Europe.

Policy Products: the products delivered by the Successful Tenderer in the context of this ITT (CAMS_71), comprising assessment reports, air quality scenario toolbox and source allocation services.

2 Contract Summary

The ITT is about activities to deliver a range of products of the CAMS portfolio especially relevant for Policy Users. These products are:

- annual interim assessment reports based on the Interim Regional Reanalyses and material in support of national reporting duties on air quality and threshold exceedances;
- annual assessment reports based on the Regional Reanalyses which make use of validated data, to serve as a reference document on the status of air quality in Europe;
- an “air control toolbox” that offers alternative forecasts of European air quality with reduced level of emissions, which allow assessing the effectiveness of possible temporary mitigation measures or of candidate measures as part of future policy developments;
- daily source-receptor calculations, which allow tracking the pollutants according to the geographical origin and chemical composition of their (or their precursors) sources;
- reports about major air pollution episodes in Europe produced within one month after the event in support of the concerned Member States’ a posteriori analysis;
- two sensitivity studies relying on different emissions scenarios in order to assess the impact of pollutants emissions abatement on health impacts and agriculture.

It also comprises the organisation of annual workshops to gather the community of Policy Users of CAMS in order to discuss and gather feedback on the products delivered under this ITT as well as more generally on other CAMS Regional and Global Products that are relevant for EU, national and local policies. Experts from the European Commission’s DG-ENV and JRC, as well as from the European Environment Agency (EEA) will assist ECMWF for the management of this contract in order to ensure that the products and services developed and operated as part of this contract are fully aligned with the activities and plans of the European Union.

3 Technical Specification

3.1 General Requirements

Several of the requested services in the sections below shall make use of one or more air quality forecasting systems. These air quality forecasting systems must have the following characteristics:

- the domain covered must be at least (25°W-45°E, 30°N-72°N);
- the system’s horizontal resolution must be finer than or equal to 0.3° by 0.3°, or equivalent resolution in kilometres;
- transport and physical processes must be driven by ECMWF’s high-resolution operational meteorological forecasts (using the most recent available forecast, which will be provided by ECMWF), either directly in the case of chemistry-transport models or by means of nudging or similar techniques;
- the system will use for the baseline the regional emissions dataset (other than fire) provided by the contractor of CAMS_81 (CAMS global and regional emissions);
- the system will use fire emissions as well as chemical boundary conditions provided by the CAMS Global Service Provider (aerosol, reactive gases and greenhouse gases -if accounted for) using the most recent available products;
- the system must have the capability to forecast atmospheric pollutants regulated at the European and national levels in Europe (gases and particulate matter);

- the system must have an existing track record of providing daily forecasts with evidence of performance (quality, timeliness/completeness of the output...) as documented in peer-reviewed publications, reports or technical notes.

3.2 Work package 7110 – European Air Quality Annual Assessment Reports

This work package shall deliver assessment reports based on the (Interim) Regional Reanalyses, which will be themselves produced as part of the activities covered by the CAMS_50 (“Regional Production”) contract. One interim regional reanalysis (available by the end of February each year for the previous year) and one regional reanalysis based upon validated surface observations (its timing depends upon availability of validated surface observations from the EEA) will be produced annually. The two reanalyses will cover key air pollutants (O₃, NO₂, SO₂, CO, PM₁₀ and PM_{2.5}) over the domain (25°W-45°E, 30°N-72°N) and with a horizontal resolution of 0.1° by 0.1°. Companion verification reports against surface observations will be produced together with each reanalysis dataset by the contractor of CAMS_50; these verification reports will complement the assessment reports produced as part of this workpackage. The production of the reports shall be discussed and co-ordinated with the EEA, which is producing annually its own report (based on observations only).

3.2.1 Task 7111: Interim Annual Assessment Reports

The Successful Tenderer shall produce one Interim Annual Assessment Report (IAAR) every calendar year, which will describe the past year in terms of background concentrations of air pollutants in Europe based upon the interim regional reanalysis dataset for the past year.

The IAAR shall be a reference document of high standard, including text, graphics and statistical tables. In addition, the IAAR shall have an executive summary of a few pages highlighting the main findings.

The IAAR shall document the situation for the main regulatory pollutants (ozone, NO₂, PM₁₀ and PM_{2.5}) in terms of concentrations and/or indicators for the whole of Europe and the entire year. Other pollutants and pollens shall be covered, but with less emphasis. The IAAR shall investigate and comment on the situation for the different seasons and at least a few sub-regions of Europe. Graphics and statistical tables (within the main text or in annex) shall support the text. The main significant adverse air quality episodes, particularly episodes extending over more than one country, shall be commented upon, highlighting in particular the contribution from (or absence of) natural contributions to PM and chemical pollutants (dust, fires, sea salts...) or from long-range transported pollution from outside Europe.

The IAAR shall be delivered not later than three months after the release of the interim regional reanalysis dataset. Unless there are delays with the production of the numerical dataset and evaluation report (by the CAMS_50 contract), the latest publication date for the IAAR is thus the end of May each year. Meeting this target date for delivery is of high importance because one of the main uses for the IAAR is to support Member States in completing their reporting duties to the European Commission, a process that has to be completed by the end of September annually. Bidders shall explain in their proposal how the process of delivering the IAAR will be handled for delivering on time and according to the required high standards.

3.2.2 Task 7112: Annual Assessment Reports

The requirements are the same as for Task 7111 but will be based upon the annual Regional Reanalysis datasets based upon validated surface observations. The Successful Tenderer shall deliver one Annual Assessment Report (AAR) during each year of the contract.

The Annual Assessment Report (AAR) shall be delivered not later than three months after the release of the Regional Reanalysis dataset by the CAMS_50 contractor. The AAR will be complemented by a verification report, which will also be delivered by the CAMS_50 contractor.

The tables below provide the deliverables and milestones for the work package. Tenderers shall complete Volume IIIC as part of their bid, which should include the deliverables and milestones already indicated in the tables below and will form a preliminary version. Volume IIIC will be used by the contractor to describe the complete list of deliverables, milestones and schedules for this work package. All milestones and deliverables shall be numbered as indicated. All document deliverables shall be periodically updated and versioned as described in the tables.

WP7110 Deliverables			
#	Type	Title	Due
D1.y.z-YYYY	Report	Interim Annual Assessment Report for YYYY	Annually, 3 months after delivery of CAMS_50 Interim Regional Reanalysis
D1.y.z-YYYY	Report	Annual Assessment Report for YYYY	Annually, 3 months after delivery of CAMS_50 Regional Reanalysis
...			

WP7110 Milestones			
#	Title	Means of verification	Due
M1.y.z			
...			

3.3 Work package 7120 – Air control toolbox

CAMS operates an online air quality scenario web interface, called “Air Control Toolbox”, which allows assessing the potential impact of different anthropogenic emissions abatement measures on a daily basis (http://policy.atmosphere.copernicus.eu/CAMS_ACT.html). The Successful Tenderer shall provide and operate such a toolbox with at least the same functionalities as the existing one. The toolbox will offer users a flexible framework to explore quantitatively the benefit of different levels of emissions reduction on a daily basis. For the air quality situation forecasted in the upcoming days, the user can assess the magnitude of improvement that shall be expected from any reduction of the emissions of the four main activity sectors: traffic, industry, residential heating, and agriculture. The custom emission scenarios are targeting primary pollutants and precursors through uniform Europe-wide reductions that are translated on the fly in terms of ozone and particulate matter pollution, therefore including the secondary pollutants. The tool shall rely on an air quality forecasting system as described in Section 3.1.

The forecast results shall be presented in terms of daily mean surface concentrations of at least O₃ and PM₁₀ in the form of graphics, showing absolute values as well as difference plots compared to the reference (unperturbed emissions). The toolbox shall also provide graphics showing the emissions of

the various sectors for the European domain. While the main functionality of the toolbox relies on the user specifying the emission reductions, the toolbox should also include the functionality for specific pre-sets that mimic emission reductions as part of specific international agreements. At a minimum, this pre-set functionality shall include the emission reductions agreed as part of the Gothenburg protocol (see also, <http://policy.atmosphere.copernicus.eu/GothenburgScenario.html>).

The toolbox shall either be hosted on the CAMS website or in a single comprehensive web-based system, which will be embedded in the CAMS website. The Tenderer shall describe the chosen option. Technical support for the service shall be available on a next-working-day basis.

The Successful Tenderer shall describe the methodology employed and the system set up in a report, to be delivered less than three months after the start of the contract resulting from this ITT. By that time, the air control toolbox shall have started to be delivered on a daily basis. The report shall be written in a way that gives enough insight to the users of the service on the approach and its reliability.

As part of this workpackage, the bidder shall also conduct developments for the evolution of this service. A key outstanding user requirement is in particular to be able to restrict the sectoral emission reductions to single countries or group of countries. The proposal shall describe the work that will be carried out to this effect.

The tables below provide the deliverables and milestones for the work package. Tenderers shall complete Volume IIIC as part of their bid, which should include the deliverables and milestones already indicated in the tables below and will form a preliminary version. Volume IIIC will be used by the contractor to describe the complete list of deliverables, milestones and schedules for this work package. All milestones and deliverables shall be numbered as indicated. All document deliverables shall be periodically updated and versioned as described in the tables.

WP7120 Deliverables			
#	Type	Title	Due
D1.y.z	Report	Methodology and system set-up of the CAMS Air Control Toolbox	M3
D1.y.z	Service	Air Control Toolbox operations	Continuous, updated daily
D1.y.z-P1	Service	Air Control Toolbox operations - Period 1	At Payment milestone 1
D1.y.z-P2	Service	Air Control Toolbox operations - Period 2	At Payment milestone 2
...			

WP7120 Milestones			
#	Title	Means of verification	Due
M1.y.z			
...			

3.4 Work package 7130 - Source allocation service

CAMS provides a source allocation service, providing daily forecasts of source contributions and, on an experimental basis, chemical composition of particulate matter for a set of capitals and cities in the

European Union (<http://policy.atmosphere.copernicus.eu/DailySourceAllocation.html>). It aims at addressing specifically the characterisation of the sources that are contributing to air pollution. The relative influence of local and remote sources is critical information to assess effectiveness of potential measures to be taken: e.g., in the case of an episode where long-range transport from distant sources is prominent, local emission reduction measures may have only limited effect. Such calculations, also called source-receptor calculations, rely on regional air quality systems and the specific requirements for this ITT are described in Section 3.1.

3.4.1 Task 7131: Daily forecasts of source contributions to EU cities

The Successful Tenderer shall operate a regional source-receptor system, which shall be run daily to forecast for the next four days the relative influence of reducing local air pollution sources versus reducing sources from outside the agglomeration for three regulatory pollutants (ozone, PM₁₀ and PM_{2.5}) and for at least all the cities covered in the current service..

Source-receptor forecasts will be made available daily to the users in the form of graphics not later than 08 UTC (0-48h) and 10 UTC (49-96h). At the minimum, the current functionality, as available on <http://policy.atmosphere.copernicus.eu/DailySourceAllocation.html>, shall be reproduced. However, the bidder is free to suggest change in the graphical presentation, as long as at least the same information is available. The Tenderer is invited to describe in the technical solution the user interface and the different graphical products, which will be made available daily to the users. This material shall either be hosted on the CAMS web site or in a single comprehensive web-based system, which will be embedded in the CAMS web site. The Tenderer shall describe the chosen option. Technical support for the daily produced material shall be available on a next-working-day basis.

The Successful Tenderer will describe the methodology employed and the system set up in a report, to be delivered less than three months after the start of the contract resulting from this ITT. By that time, the daily forecasts of source contributions to EU cities themselves shall have started to be delivered on a daily basis.

In addition, the successful bidder shall provide an annual report building upon the routine operations of the source-receptor calculations. For each of the cities covered by the service, the results from daily operations will be averaged over seasonal (DJF, MAM, JJA, SON) and annual timescales. This will allow providing source-receptor information for each season of the past year, as well as for the past year as a whole, in terms of local/non-local/other, of geographical origin of species/precursors and of chemical composition.

3.4.2 Task 7132: Episode analysis reports

The Successful Tenderer shall use primarily the results from the source-receptor calculation service to provide specific information in case of large-scale/trans-boundary air pollution episodes in Europe. For each chosen episode, results will be presented in the form of a detailed report, which is intended to support the concerned Member States' a posteriori case analysis.

This service will be activated upon request from ECMWF, which will consider queries from users sent to CAMS user support or identify itself situations where such information can be of general interest. It shall not be activated more than 5 times per year.

Other modelling results could be included to complement the results from the source/receptor calculations (task 7131), as long as the model(s) employed meet the requirements described in Section 3.1. The outputs from the CAMS global system should also be considered regarding long-range transported plumes of dust, fire, volcanic ash or pollution.

Once activation has been received from ECMWF, the Successful Tenderer shall complete the report within one month. Episode analysis reports will be made available on the CAMS website directly,

The tables below provide the deliverables and milestones for the work package. Tenderers shall complete Volume IIIC as part of their bid, which should include the deliverables and milestones already indicated in the tables below and will form a preliminary version. Volume IIIC will be used by the contractor to describe the complete list of deliverables, milestones and schedules for this work package. All milestones and deliverables shall be numbered as indicated. All document deliverables shall be periodically updated and versioned as described in the tables.

WP7130 Deliverables			
<i>#</i>	<i>Type</i>	<i>Title</i>	<i>Due</i>
D3.y.z	Report	Methodology and system set-up for production of system used for daily forecasts of source contributions to EU cities	M3
D3.y.z	Report	Detailed structure of the episode analysis reports and description of the tools employed	M3
D3.y.z	Website graphics	Daily provision of source contribution forecast service	Daily at 10UTC
<i>D3.y.z-P1</i>	<i>Website graphics</i>	<i>Daily provision of source contribution forecast service - Period 1</i>	<i>At Payment milestone 1</i>
<i>D3.y.z-P2</i>	<i>Website graphics</i>	<i>Daily provision of source contribution forecast service - Period 2</i>	<i>At Payment milestone 2</i>
...			
D3.y.z-YYYY	Report	Annual source-receptor information for European capitals and main cities - YYYY	Annually at the end of March
D3.y.z-MXX	Report	Episode analysis report for month XX	One month after service activation
...			

WP7130 Milestones			
<i>#</i>	<i>Title</i>	<i>Means of verification</i>	<i>Due</i>
M3.y.z			
...			

3.5 Work package 7140 - Interaction with users in the policy domain

Experience has shown that the community of Policy Users has specific needs and that dedicated workshops are needed to discuss these and follow up on corresponding development activities. The Successful Tenderer shall organize annual events dedicated to users in the policy domain. It shall also contribute to general user interaction activities by participating in and supporting user workshops (organised as part of ITT CAMS_94) and by providing the requirements gathered from users in the policy domain to the contractor of CAMS_94 for logging into the CAMS User Requirements DataBase

(URDB, see Section 4.6). The CAMS products presented and discussed should not be limited to the ones produced as part of this ITT, but also cover all the other CAMS products that are relevant for European or national environmental policies and regulations.

3.5.1 Task 7141: Policy User workshop

The Successful Tenderer shall organize one Policy User workshop (1 to 2 days) each year to interact with CAMS Policy Users. The location and timing of these user workshops shall be agreed between the Successful Tenderer and ECMWF each year taking into account relevant key meetings and events of the European policy community and involving EU member states.

Once agreed, the Successful Tenderer will propose one or more potential venues easily reachable by public transport where the event might take place. The Successful Tenderer will draft a programme including presentations as well as discussions with the Policy Users. The Successful Tenderer can use their own creative input to define the exact format of the workshop. The budget proposed for the organization of the CAMS Policy User workshops must include all aspects: venue hire, tea/coffee and lunch breaks for all attendees, engagement, and the organization of the event itself. In the case of a 2-day workshop, covering dinner and accommodation costs of participants is not mandatory. It is not expected that travel costs of participants shall be covered other than possibly for some invited speakers. The Tenderer can use an indicative number of 40 attendees for each event to estimate the budget, which has to be covered under this contract CAMS_71.

The Successful Tenderer must take minutes from the meeting and deliver a report not later than one month after each workshop. Workshop reports shall be approved by ECMWF before finalisation and publication.

3.5.2 Task 7142: Contribution to wider CAMS user interaction activities

The Successful Tenderer shall also take part in the general CAMS user workshops, when requested by ECMWF, sending at least one participant to present updates of Policy Products and gather related user requirements and feedback. Two meetings will be organised annually as part of ITT CAMS_94. It is expected that presentations and discussions in these user workshops can cover in principle all different aspects of European, national and regional/local policies, and it is thus essential that the Successful Tenderer of this ITT is actively involved.

The tables below provide the deliverables and milestones for the work package. Tenderers shall complete Volume IIIC as part of their bid, which should include the deliverables and milestones already indicated in the tables below and will form a preliminary version. Volume IIIC will be used by the contractor to describe the complete list of deliverables, milestones and schedules for this work package. All milestones and deliverables shall be numbered as indicated. All document deliverables shall be periodically updated and versioned as described in the tables.

WP7140 Deliverables			
<i>#</i>	<i>Type</i>	<i>Title</i>	<i>Due</i>
D4.y.z-YYYY	Workshop	Policy users workshop - YYYY	Annually
D4.y.z-YYYY	Report	Minutes of Policy User workshop - YYYY	Annually
...			

WP7140 Milestones			
#	Title	Means of verification	Due
M4.y.z			
...			

3.6 Work package 7150 - User-driven studies

Health and agriculture are two important policy areas, for which specific support from CAMS has been requested at international level in particular by the World Health Organisation, the World Meteorological Organisation and by the European Commission's Joint Research Centre.

The successful bidder shall support ECMWF in delivering two studies:

- one about the benefits of potential measures to be taken at global and European scales for reducing the health impacts of air pollution;
- the second about the benefits of potential measures designed to reduce the impact of air pollution on key crops' yield reduction in Europe and in the world.

Both studies will include delivery of up to three global and regional emissions scenario datasets for each case, which will follow ECMWF's specifications. This work will have to be done in liaison with the providers of CAMS_81 (global and regional emissions), in order to ensure that the emissions scenarios remain consistent with the baseline global and regional CAMS emissions datasets (in particular in terms of species, emissions sectors, format, etc...). The Successful Tenderer shall provide support to ECMWF for running global simulations based on the scenarios and it shall itself run scenarios over Europe with at least one regional model that meets the requirements described in section 3.1. Finally, the successful bidder shall analyse results and provide a detailed report about the experiments, studying in particular the difference between global and regional outputs over Europe. The numerical datasets products shall be made available to the users through the Atmosphere Data Store.

The tables below provide the deliverables and milestones for the work package. Tenderers shall complete Volume IIIC as part of their bid, which should include the deliverables and milestones already indicated in the tables below and will form a preliminary version. Volume IIIC will be used by the contractor to describe the complete list of deliverables, milestones and schedules for this work package. All milestones and deliverables shall be numbered as indicated. All document deliverables shall be periodically updated and versioned as described in the tables.

WP7150 Deliverables			
#	Type	Title	Due
D5.y.z	Report	Experimental design of the health-related scenario simulations	M3
D5.y.z	Report	Experimental design of the agriculture-related scenario simulations	M3
D5.y.z	Dataset	Global and regional emissions for the health-related scenario simulations	M6
D5.y.z	Dataset	Global and regional emissions for the agriculture-related scenario simulations	M6

D5.y.z	Dataset	Regional model outputs for the health-related scenario	M12
D5.y.z	Dataset	Regional model outputs for the agriculture-related scenario	M12
D5.y.z	Report	Final report on the health-related scenario simulations	M15
D5.y.z	Report	Final report on the agriculture-related scenario simulations	M15
...			

WP7150 Milestones			
#	Title	Means of verification	Due
M5.y.z			
...			

3.7 Work package 7160 - User support and documentation of service

The objective of this work package is to provide specialised support to users of the delivered products and services.

ECMWF has established a centralised Copernicus Service Desk to provide multi-tiered technical support to all users of CAMS data, products, tools and services. The CAMS Service Desk is used for ticketing user requests and distributing these requests to specialists as needed. Dedicated staff at ECMWF provide basic support in the form of self-help facilities (FAQs, knowledge bases, tutorials etc.) as well as individualised support on technical queries related to the ADS, data formats, data access etc. In addition, ECMWF staff provide specialised scientific support to address questions related to its industrial contributions to CAMS, e.g. in the areas of global forecasting of atmospheric composition.

All CAMS contractors are expected to contribute to the delivery of multi-tiered technical support for the data and/or services they provide. Such specialised user support shall take the form of direct response to individual user queries via the CAMS Service Desk facility, as well as contributions to FAQs, user guides and knowledge bases.

As part of the bid, Tenderers shall describe the level of user support service on CAMS Service Desk tickets, they can provide.

Tenderers shall also address development of user guides. Documentation of the CAMS services is an integral part of the service provision. The technical and scientific specification of each service shall be documented in reports that will be available to users through the CAMS web site. The Successful Tenderer shall therefore produce documentation reports describing in detail the methodologies and products it delivers for this ITT.

The tables below provide the deliverables and milestones for the work package. Tenderers shall complete Volume IIIC as part of their bid, which should include the deliverables and milestones already indicated in the tables below and will form a preliminary version. Volume IIIC will be used by the contractor to describe the complete list of deliverables, milestones and schedules for this work package. All milestones and deliverables shall be numbered as indicated. All document deliverables shall be periodically updated and versioned as described in the tables.

WP7160 Deliverables			
#	Type	Title	Due
D6.y.z-YYYY	Other	Specialised user support via the CAMS Service Desk (Respond to user support queries requiring expertise specific to the Greenhouse gas flux products provided)	Continuous
D6.y.z-v1	Other	Specialised User Support - Period 1	At Payment milestone 1
D6.y.z-v1	Other	Specialised User Support - Period 2	At Payment milestone 2
D6.y.z-YYYY	Report	Documentation of policy user service - YYYY	Annually
...			

WP7160 Milestones			
#	Title	Means of verification	Due
M6.y.z	Link with CAMS User Support team established; service desk set-up completed	Specialised Service Desk up and running	Month 2
...			

3.8 Work package 7100 - Management and coordination

The following management aspects shall be briefly described in the bid:

- Contractual obligations as described in the Framework Agreement Clause 2.3 on reporting and planning.
- Meetings:
 - ECMWF will organise annual CAMS General Assemblies within EU member states. The Successful Tenderer is expected to attend these meetings with team members covering the various topics that are part of this ITT.
 - ECMWF will host monthly teleconference meetings to discuss CAMS service provision, service evolution and other topics. The Prime Investigator appointed by the Successful Tenderer will represent the Successful Tenderer in such meetings.
 - ECMWF will organise six-monthly project review meetings (linked to Payment milestones).
 - Tenderers should propose additional project internal meetings (kick-off meeting, annual face-to-face meeting and monthly teleconferences) as part of their response.
- Quality assurance and control: the quality of reports and Deliverables shall be equivalent to the standard of peer-reviewed publications. The final quality check of the deliverables should be made by the prime contractor (contents, use of ECMWF reporting templates for deliverables and reports (Microsoft Word), format, deliverable numbering and naming, typos...); all reports in this project shall be in English. Unless otherwise specified the specific contract Deliverables shall be made available to ECMWF in electronic format.
- Communication management (ECMWF, stakeholders, internal communication),

- Resources planning and tracking using the appropriate tools,
- Implementation of checks, controls and risk management tools for both the prime contractor and subcontractors;
- Subcontractor management, including conflict resolution, e.g. the prime contractor is responsible for settling disagreements, although advice/approval from ECMWF may be sought on the subject.
- A list of subcontractors describing their contribution and key personnel shall be provided, as well as back-up names for all key positions in the contract. The Tenderer shall describe how the Framework Agreement, in particular Clause 2.9 has been flowed down to all their subcontractors.
- Personal data management (name, ID and contact details of prime contractor's data controller in line with Clause 2.8).

The tables below provide the deliverables and milestones for the work package. Tenderers shall complete Volume IIIC as part of their bid, which should include the deliverables and milestones already indicated in the tables below and will form a preliminary version. Volume IIIC will be used by the contractor to describe the complete list of deliverables, milestones and schedules for this work package. All milestones and deliverables shall be numbered as indicated. All document deliverables shall be periodically updated and versioned as described in the tables.

WP7100 Deliverables				
<i>#</i>	<i>Responsible</i>	<i>Nature</i>	<i>Title</i>	<i>Due</i>
D0.y.z-YYYYQQ	Tenderer	Report	Quarterly Implementation Report QQ YYYY <i>QQ YYYY being the previous quarter</i>	Quarterly on 15/01, 15/04, 15/07 and 15/10
D0.y.z-YYYY	Tenderer	Report	Annual Implementation Report YYYY <i>YYYY being the Year n-1</i>	Annually on 28/02
D0.y.z	Tenderer	Report	Final report, including letter from auditor specific to CAMS contract YYYY <i>YYYY being the last year of the contract</i>	60 days after end of contract
D0.y.z-YYYY	Tenderer	Report	Draft Implementation plan YYYY <i>YYYY being the Year n+1</i>	Annually on 28/02
D0.y.z-YYYY	Tenderer	Report	Finalised Implementation plan YYYY <i>YYYY being the Year n+1</i>	Annually on 31/10
D0.y.z-YYYY	Tenderer	Other	Copy of prime contractor's general financial statements and audit report YYYY <i>YYYY being the Year n-1</i>	Annually
D0.y.z-YYYY	Tenderer	Other	Letter auditor's opinion specific to CAMS most recent Annual Implementation Report YYYY <i>YYYY being the Year n-1</i>	Annually
D0.y.z	Tenderer	Other	Updated KPIs (list, targets...) after review with ECMWF	One year after start of contract

WP7100 Milestones				
<i>#</i>	<i>Responsible</i>	<i>Title</i>	<i>Means of verification</i>	<i>Due</i>
M0.y.z	Tenderer	CAMS General Assembly	Participation to the	Annually

			meeting	
M0.y.z	Tenderer	Monthly teleconference meetings with ECMWF	Participation to meeting	Monthly
M0.y.z	Tenderer	Progress review meetings with ECMWF / Payment milestones	Minutes of meeting	~ Every 6 months
M0.y.z	Tenderer	Kick-Off meeting	Minutes of meeting	Month 1
M0.y.z	Tenderer	Internal face to face project meetings	Minutes of meeting	Annually
M0.y.z	Tenderer	Internal project monthly teleconferences	Meetings happened	Monthly

4 General Requirements

4.1 Implementation schedule

The Framework Agreement will run from 1 April 2019 to 31 December 2021. The Tenderer shall provide a detailed implementation plan of proposed activities for the period until 30 June 2021 and should calculate the budget based on an expectation that activities will run up to this date.

2021 will be a transition year and following a review to be conducted by the European Commission in 2019, ECMWF will inform the contractors by Q4 2019 how this transition period will look like. Based on the outcome of this review, ECMWF might need to invite the successful tenderer (contractor) to negotiate a final service contract which runs longer than 30 June 2021 but it will not exceed the 31 December 2021 deadline of the Framework Agreement. If the final service contract needs to be extended, the same budget envelope still needs to be kept. Hence, as part of the final service contract negotiations, activities and service deliveries will need to be selected and agreed between ECMWF and the contractor.

In addition, adjustments to the proposed implementation plan can be made on an annual basis depending on needs for service evolution, changed user requirements, or other requirements as agreed between the European Commission and ECMWF.

4.2 Deliverables and milestones

Deliverables should be consistent with the technical requirements specified in Section 3.

All contract reports shall be produced in English. The quality of reports and deliverables shall be equivalent to the standard of peer-reviewed publications and practice. Unless otherwise specified in the specific contract, deliverables shall be made available to ECMWF in electronic format (PDF/Microsoft Word/Microsoft Excel or compatible) via the Copernicus Deliverables Repository portal.

Each Deliverable shall have an associated resource allocation (person-months and financial budget). The total of these allocated resources shall amount to the entire requested budget.

Milestones should be designed as markers of demonstrable progress in service development and/or quality of service delivery. They should not duplicate deliverables.

4.3 Acquisition of necessary data and observations

The Regional Service Provider will provide the data from the (Interim) Regional Analyses needed for this tender. The Global Service Provider will provide the boundary conditions from the Global Products needed for this tender.

4.4 Operational aspects and quality control

For the elements covered by this ITT, which have a time-critical dimension (air quality scenario toolbox described under work package 7120 and source allocation services described under work package 7130), timeliness and completeness of production, technical/scientific quality of the products and availability of them are the key operational dimensions. The Tenderer shall describe how these critical aspects are addressed in the Technical Solution proposed and how the performance will be monitored (see also section 4.8 on Key Performance Indicators).

4.5 Communication

The Successful Tenderer shall support ECMWF in its communication activities for the CAMS services, where they are related to the activities described in this ITT. This includes at least a regular policy contribution to the CAMS Newsletter, but other examples are contributions to the Copernicus State of the Climate report, CAMS web site news items, and CAMS brochures and flyers.

4.6 User requirements

As part of CAMS, the database and three documents described below will be maintained. The Successful Tenderer shall provide input to the User Requirements Database (URDB) regarding user requirements that are directly related to activities covered by this ITT. The Successful Tenderer shall also support ECMWF and the contractor for CAMS_94 (User Interaction) with the analysis of relevant user requirements in the URDB. Finally, in case the Successful Tenderer provides service elements that are listed in the Service Product Portfolio (SPP), the Successful Tenderer shall provide input on product lines and their metadata to ECMWF to ensure the SPP is up-to-date.

User Requirements Database (URDB) and Requirement Analysis Document (RAD)

User requirements are collected in this database in a structured and traceable way, and links to entries in the Service Product Portfolio (see below) are provided, when appropriate. The URDB, which tracks all requirements emanating from a wide variety of user fora, surveys, and support panels, is complemented by a Requirements Analysis Document (RAD) which captures the stratification of user requirements per domain, importance and feasibility. The RAD constitutes the basis for distilling, filtering and translating user requirements into technical specifications for the Service. The URDB and RAD are maintained and continually updated by ECMWF and its contractor for CAMS_94 (User Interaction).

Service Product Portfolio (SPP)

Both data and value-added products are presented in this document in a structured way, providing key technical aspects, when appropriate, such as geophysical parameter, temporal resolution and coverage, spatial resolution and coverage, data formats, time availability, expected quality, data format together with a direct link to detailed information on methodology and quality monitoring for each specific product or services.

Service Evolution Strategy (SES)

The appropriateness of the list of emerging and existing user requirements, the routinely updated Requirement Analysis Document and the existing Service Product Portfolio, are continually monitored

by ECMWF and feed into a Service Evolution Strategy (SES) document. The SES document is produced on an annual basis and provides, in addition to the annual implementation plan focussing on year n+1 service Deliverables, a proposed longer term (typically 4 years) perspective for forthcoming service upgrades and extensions, the expected benefits and costs, together with recommendations for potential research needs outside Copernicus operations. This document allows informed discussions to be opened on specific proposed service upgrades and extensions with the stakeholders.

The following deliverables are thus to be added to the WP7200 and WP7240 deliverable lists:

WP7200 Deliverables			
<i>#</i>	<i>Type</i>	<i>Title</i>	<i>Due</i>
D0.y.z- YYYY	Report	Input to CAMS SPP - YYYY	Annually in September
...			

WP7240 Deliverables			
<i>#</i>	<i>Type</i>	<i>Title</i>	<i>Due</i>
D4.y.z- YYYY	Other	Input to CAMS URDB - YYYY	Checked by ECMWF annually in December
...			

4.7 Data access via the ADS

Datasets generated as part of this ITT will be delivered to the users through the Atmosphere Data Store (ADS), which is operated and managed by ECMWF. It is expected that the implementation of all CAMS products in the ADS will take place in Q2 2019. While the ADS is under development, CAMS continues to use the data portal that is currently in place on the CAMS web site.

The ADS has been designed as a distributed system that provides access to datasets and tools through a unified web interface. The ADS is a clone of the Climate Data Store, which has been developed as part of the Copernicus Climate Change Service (C3S) and is operational since June 2018. A general description of the design and functionality can be found in Raoult et al. (2017) (Available at <https://www.ecmwf.int/sites/default/files/elibrary/2017/17181-newsletter-no-151-spring-2017.pdf>).

Note that the requirements below will strictly apply when the ADS is fully implemented.

4.7.1 Dataset registration

Dataset suppliers to the ADS shall provide a comprehensive description of their datasets at least one month prior to delivery, using a dataset registration process established by ECMWF. Details of the registration process, which serves to collect all ADS relevant information (to define metadata, user forms and necessary adaptors) will be provided to the preferred bidder during negotiation.

4.7.2 Access methods

Data access to CAMS data products, ancillary data and metadata, can be implemented in the ADS distributed infrastructure either by:

(a) **Push mode:** uploading datasets to a designated ECMWF ADS server.

ECMWF will not accept data in push mode if the initial volume exceeds 1 TB or if the annual increase in volume exceeds 0.5 TB. Upper bounds on data volume are subject to change and may be negotiable in exceptional circumstances.

(b) **Pull mode:** providing datasets via web services.

ECMWF has a strong preference for pull mode, which is consistent with the distributed architecture of the ADS and simplifies management of access, traceability and updates of an evolving data collection. However, the master copies of the Deliverables must be stored and archived only in places where the Copernicus Regulation and related delegation legislation such as the Copernicus Data Policy can be enforced up till six years after the end of the Framework Agreement.

ECMWF strongly prefers the use of the OPeNDAP protocol to implement pull mode. Tenderers who propose an alternative protocol shall justify the reasoning in their bids.

4.7.3 Use of standards

ECMWF will only accept service protocols that follow internationally recognised standards. Such standards must be open (i.e. non-proprietary), managed by a recognised international standardization process (e.g. ISO, WMO, OGC, etc), or be a de-facto standard such as OPeNDAP. ECMWF will consider using bespoke web-based APIs to access data and products if they implement very simple protocols (e.g. REST), as long as the results returned by these APIs are compatible with the results of a dataset upload via push mode. It should be noted that requests for these web services will mostly originate from the ADS itself, as part of a workflow run on behalf of an end-user. ECMWF will therefore need to have the necessary credentials to invoke these services. ECMWF will not provide information on the end user's identity when invoking the web services. ECMWF will nevertheless collect usage statistics for all aspects of CAMS.

4.7.4 Data formats

ECMWF will only accept data in formats that follow internationally recognised standards. Such standards must be open (i.e. non-proprietary), managed by a recognised international standardization body (e.g. ISO, WMO, OGC, etc.), or any de-facto standard. Open source software that can read and write files following these standards must be available. Serialization formats (e.g. NetCDF, XML, JSON) should be supported by standard schemas and conventions. All text-based formats should be encoded in UTF-8. ECMWF will implement tools to check the compliance of the provided data and products to the agreed standards before they are added to the ADS catalogue.

ECMWF strongly recommends that datasets be encoded in NetCDF according to the recommendations described in the "*ECMWF metadata recommendations for NetCDF*" document, available at <https://software.ecmwf.int/wiki/display/DGOV/ECMWF+Convention>. Tenderers who propose an alternative protocol shall justify the reasoning in their bids.

4.7.5 Data ownership

It is a condition of EU funding for CAMS that ownership of any Deliverable (including datasets and their documentation) developed with CAMS funding passes from the suppliers to the EC, via ECMWF. Ownership will pass on delivery of the Deliverable. In return, the suppliers will be granted a non-exclusive licence to use the Deliverable which they have provided to CAMS for any purpose except one which conflicts with the aims of CAMS.

All software and products used by the successful Tenderer to produce the CAMS datasets will remain the property of the successful Tenderer, except for those components which are acquired or created specifically for CAMS purposes, with CAMS funding, and which are separable and useable in isolation from the rest of the successful Tenderer's production system. The identity and ownership of such exceptional components will be passed to the EC via ECMWF annually, but in return the successful Tenderer will be granted a non-exclusive licence to use them for any purpose except one which conflicts with the aims of CAMS.

Pre-existing Technology, foreseen Assets, and Integrated Technology (as defined in Framework Agreement Clause 3) shall also be described in the proposal, following the template below

Pre-existing Technology		
<i>Title</i>	<i>Type</i>	<i>Description</i>
Assets (tangible and intangible)		
<i>Title</i>	<i>Type</i>	<i>Description</i>
Integrated Technology		
<i>Title</i>	<i>Type</i>	<i>Description</i>

4.8 Key performance indicators

Contractors shall report to ECMWF on a set of Key Performance Indicators (KPIs) suitable for monitoring various aspect of service performance. These will be used in the overall monitoring of the CAMS programme for which the following KPI categories have been identified:

- KPI1 Service availability
- KPI2 Products usage
- KPI3 Products quality
- KPI4 User support
- KPI5 User statistics

- KPI6 Service audience
- KPI7 User engagement
- KPI8 User satisfaction
- KPI9 Contracts
- KPI10 Deliverables
- KPI11 data usage

The table below provides the template to be used by the Tenderer to describe the KPIs, relevant for this ITT, together with performance targets, delivery schedules and explanations if needed. Please note that the listed KPIs form part of the overall set of KPIs comprising the full CAMS service portfolio; the Successful Tenderer therefore might have to provide KPI values for a KPI in support of services outside this ITT.

All KPIs shall be labelled and numbered as indicated. All KPIs shall be periodically updated as described in the tables. Tenderers shall provide preliminary versions of the completed tables as part of their bid.

The list of KPIs shall be reviewed with ECMWF in the second year of the contract and updated if necessary.

Service availability KPI #	KPI Title	Performance Target and Unit of Measure	Frequency of Delivery	Explanations / Comments
KPI_71.1.2	Server or webAPI uptime	95%	Quarterly	Percentage of uptime vs total time for the data servers (running average over the past calendar year).
KPI_71.1.3	Completeness of production for each product	95%	Quarterly	Percentage of outputs delivered vs expected for each product defined in the SPP (running average over the past calendar year). This percentage is computed in terms of data volume
KPI_71.1.4	Timeliness of production for each product	90%	Quarterly	Percentage of products delivered completely and on time if delivery time is specified in the SPP (running average over the past calendar year).
KPI_71.5.1	Number of users segmented by main service product lines		Quarterly	

KPI_71.5.2	Number of active users by main service product lines		Quarterly	
KPI_71.5.3	Number of new users		Quarterly	
KPI_71.5.4	Number of users per country		Quarterly	
KPI_71.5.5	Number of active users per country		Quarterly	
KPI_71.5.6	Number of new users per country		Quarterly	
KPI_71.6.6	Policy audience		Annual	Total number of citations or uses in reports or documents done by institutional or policy entities to respond to EC regulations/laws (EU and national level). Note: this is difficult to track because of lack of bibliometric tools such as the ones which exists for scientific literature; many policy uses may actually be omitted. Also, policy uses of the Service's products may not systematically end up in a publicly available document (but rather in internal notes supporting public decision).
KPI_71.10.1	% of deliverables delivered on time or with short delay	%	Quarterly	

5 Tender Format and Content

General guidelines for the tender are described in Volume IIIB. Specific requirements to prepare the proposal for this particular tender are described in the next sub-sections.

5.1 Page Limits

As a guideline, it is expected that individual sections of the Tenderer's response do not exceed the page limits listed below. These are advisory limits and should be followed wherever possible, to avoid excessive or wordy responses.

<i>Section</i>	<i>Page Limit</i>
<i>Executive Summary</i>	2
<i>Track Record</i>	2 (for general) and 2 (per entity)
<i>Quality of resources to be Deployed</i>	2 (excluding Table 1 in Volume IIIB and CVs with a maximum length of 2 pages each)
<i>Technical Solution Proposed</i>	2 + 3 per Work package (Table 2 in Volume IIIB, the section on references, publications, patents and any pre-existing IPR is excluded from the page limit and has no page limit)
<i>Management and Implementation</i>	6 (excluding Table 3, Table 5 and Table 6 in Volume IIIB) + 2 per each Work package description (Table 4 in Volume IIIB)
<i>Pricing Table</i>	No limitation

Table 1: Page limits

5.2 Specific additional instructions for the tenderer's response

The following is a guide to the minimum content expected to be included in each section, additional to the content described in the general guidelines of Volume IIIB. This is not an exhaustive description and additional information may be necessary depending on the Tenderer's response.

5.2.1 Executive Summary

The Tenderer shall provide an executive summary of the proposal, describing the objectives, team and service level.

5.2.2 Track Record

This ITT targets a group of organisations with a lead contractor with relevant experience and with a track record of supporting environmental policies in topical areas related to CAMS at the regional, national or international levels. The Tenderer shall demonstrate for itself and for any proposed subcontractors that they have experience with relevant projects in the public or private sector at national or international level. ECMWF may ask for evidence of performance in the form of certificates issued or countersigned by the competent authority.

5.2.3 Quality of Resources to be Deployed

The Tenderer shall propose a team that meets at least the following requirements:

- A senior team member (Prime Investigator) with more than 5 years of experience in managing activities related to this ITT;
- At least two additional senior team members with more than 5 years of experience on performing activities related to the various aspects of this ITT.

These team members shall be involved in the activities of this ITT at a minimum level of 10% of their total working time. The Successful Tenderer shall also appoint a Service Manager, which will be its primary contact for contractual delivery and performance aspects.

5.2.4 Technical Solution Proposed

The Tenderer is expected to provide a short background to the proposed technical solution to demonstrate understanding of the solution proposed. This should include background of the Tenderer's understanding of the Copernicus Atmosphere Monitoring Service and the current state of policy users service provision.

An exhaustive and detailed description of the proposed technical solution for all work packages described above shall be given. The Tenderer shall indicate which air quality forecasting systems it intends to use and how it will acquire the relevant input data. The Tenderer shall describe the proposed method for producing air quality scenario toolbox and the source allocation services. The Tenderer shall describe the validation methodology. Finally, the Tenderer shall describe how they will deliver the potential service evolution aspects.