

ECMWF Copernicus Procurement

Invitation to Tender



Copernicus Atmosphere Monitoring Service

Volume II

Solar radiation services

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1 Introduction

Some of today's most important environmental concerns relate to the composition of the atmosphere. Ozone distributions in the stratosphere influence the amount of ultraviolet radiation reaching the surface. In the troposphere, 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. The variable abundance of the reactive gases changes the oxidation capacity of the atmosphere and controls therewith also the abundance of long-lived greenhouse gases. The composition of the troposphere and the associated deposition fluxes are major components of the biogeochemical cycles of carbon, nitrogen and sulphur and iron, which affect the land- and marine ecosystems. Dust, 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.

The increasing concentration of the greenhouse gases and the various aerosol-weather feedbacks are prominent but often uncertain drivers of climate change. In the wake of the agreement signed in Paris at the UNFCCC's 21st Conference of the Parties (COP-21) in December 2015, the need to monitor and to inform about the effectiveness of mitigation efforts for anthropogenic emissions of key greenhouse gases has become more acute and prominent. With its global coverage (or regional in the case of geostationary platforms), Earth Observation has a decisive role to play within such a monitoring system, complementing ground-based observations, "bottom-up" estimates of the emissions (included in official reporting) based on inventory data and biogeochemistry models, and atmospheric transport modelling.

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.

Within its first phase (2015 – 2020, Cop1), the Service consolidated many years of preparatory research and development to deliver a range of operational services. In its second phase (2021 – 2028, Cop2), these services are further consolidated, improved and expanded to address all the existing and emerging societal needs related to the atmospheric environment. The CAMS service portfolio consists of the following service elements:

- 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 policy users, 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 atmospheric inversions for CO₂, CH₄ and N₂O net surface fluxes, allowing the monitoring of the evolution in space and time of these fluxes;
- h) Climate forcing from aerosols and long-lived (CO₂, CH₄) and shorter-lived (stratospheric and tropospheric ozone) agents;
- i) Anthropogenic and natural emissions, based on inventory data and modelling, for the global and European domains;
- j) Observation-based emission estimates of atmospheric pollutants for the global and European domains;
- k) Observation-based anthropogenic emission estimates of CO₂ and CH₄ for the global domain and emission hotspots.

This Invitation to Tender (ITT) is mainly targeting the CAMS service element described under item f) above.

1.1 Definitions

Definitions specific for this ITT are defined below.

Global Service Provider: ECMWF is the provider of global products

Global Production System: the modelling and data assimilation infrastructure used to provide the CAMS global analyses and forecasts of atmospheric composition.

Real-Time Global Products: the operational (near-)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 aerosol and chemical species 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 provided by the Global Service Provider. The reanalysis covers a period of approximately fifteen years and provides 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.

2 Contract Summary

This ITT, entitled “Solar Radiation Services”, is for providing and continuously evaluating the CAMS products related to solar radiation. The solar radiation service consists of global (clear sky) and multi-continental (defined by the field of view of geostationary satellite sensors to take into account the effect of clouds) solar irradiance databases. Daily updated time series for user-selected geographic locations covering a historical period defined by the data availability of the relevant geostationary satellite sensors shall be made available to users with a time lag of a few days maximum, targeting particularly solar energy applications. The successful bidder will have to demonstrate expertise in the field as well as a proven track record of delivering operational quality-controlled solar energy services.

3 Technical Specification

3.1 General Requirements

The successful Tenderer shall provide solar radiation services in the form of values of Global, Direct, and Diffuse Solar Irradiance as well as of Direct Normal Irradiance, which fulfil the needs of European and national policy developments and the requirements of (partly) commercial downstream services, e.g., for planning, monitoring, efficiency improvements, and the integration of solar energy systems into energy supply grids. The Irradiances defined above depend on various atmospheric quantities, such as aerosol optical properties, water vapour and ozone concentrations, and these shall all be taken into account for providing the solar radiation products. Other properties, such as ground albedo and ground elevation, shall also be taken into account. In the case of irradiance products for cloudy skies, the impact of clouds on the irradiance shall additionally be taken into account. Information about these atmospheric and surface properties shall be taken from either satellite observations directly or the CAMS Real-Time Global Products or Global Reanalysis Products.

3.2 Work package 1 (WP1) – Provision of CAMS services for solar radiation

The successful Tenderer shall provide time series of Global, Direct, and Diffuse Solar Irradiance as well as Direct Normal Irradiance that would be observed at a specific geographical location anywhere on the globe under clear-sky conditions. A historical record shall be provided starting from at least 1 January 2004 up to a maximum of 1-day behind real-time and this time record shall be extended by one day each day. Data shall be available with a time step of one minute as well as in the form of time-aggregated products at 15-minutes, 1-hour, 1-day and 1-month resolution.

The successful Tenderer shall also provide time series of Global, Direct, and Diffuse Solar Irradiance as well as Direct Normal Irradiance that would be observed at a specific geographical location under cloudy conditions. The geographical domain must include the field-of-view of the Meteosat satellites located at 0° longitude and the Himawari satellites. For the Meteosat 0° longitude satellites, a historical record shall be provided starting from at least 1 February 2004 (commencement of routine operations of first Meteosat Second Generation satellite) up to a maximum of 1-day behind real-time and this time record shall be extended by one day each day. For the Himawari satellites, a historical record shall be provided starting from at least 1 February 2015 (commencement of routine operations of the Himawari-8 satellite) up to a maximum of 1-day behind real-time and this time record shall be extended by one day each day. Data shall be available with a time step of one minute as well as in the form of time-aggregated products at 15-minutes, 1-hour, 1-day, and 1-month resolution.

The Tenderer shall describe the time schedule of the ramp-up phase for the implementation of the maximum 1-day latency for both the clear-sky and cloudy conditions of the solar radiation service. It is envisaged that this service will be provided with at least weekday support as part of the operational data provision.

The successful Tenderer shall provide uncertainty estimates of the provided irradiance products, also taking into account the outcomes from the CAMEO project (<https://www.cameo-project.eu/>), and routinely monitor the quality of the products over all geographic areas for which the products are provided. An Evaluation and Quality Control (EQC) report describing the performance of the service in terms of scientific and operational performance shall be provided every 3 months. Each report shall document the 3-month period in terms of mean and variability of the product quality based on the individual irradiance estimates. For the scientific EQC, the Tenderer shall acquire the necessary independent observational data sets.

The successful Tenderer shall also routinely provide an Evaluation and Quality Control report describing the performance of the irradiance forecasts (Global Horizontal Solar Irradiance (“Surface solar radiation downwards” on the Atmosphere Data Store) and Direct Normal Irradiance (“Total sky direct solar radiation at surface” on the Atmosphere Data Store) produced as part of the Real-time Global Products. Each report shall document the previous 3-month period in terms of the mean and biases based on individual irradiance estimates and compare the performance of the Real-time Global Products to those produced by ECMWF’s NWP suite. Currently, the free and open access is restricted to “Surface net short-wave (solar) radiation downwards” at 0.2 resolution¹, but access to additional solar radiation products at higher resolution might happen during the duration of this contract as part of ECMWF’s move to open data. The Tenderer shall define in the proposal the timeliness of both the EQC reports considering the availability of the independent observations to be used for the EQC.

For the EQC methodology, the successful Tenderer shall interact with the CAMS2_82 and CAMS2_83 contracts on global and regional evaluation to explore further harmonisation of EQC data and tools/methods. This will also be supported by the CAMS EQC manager at ECMWF.

In addition, while the daily updated time series can be provided as an interactive service, the successful Tenderer shall also provide historical gridded data sets for the main areas of the service (Meteosat 0° longitude and Himawari) for the time period covered by the service at a minimum spatial resolution of 0.2° longitude/latitude and temporal resolution of 15 minutes.

Tenderers shall complete the relevant table in Volume IIIA as part of their bid, which shall at least include the deliverables and milestones for this work package already indicated in the tables below. Volume IIIA will be used by the Tenderer to describe the complete list of deliverables, milestones and schedules for each 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.

WP1 Deliverables			
<i>#</i>	<i>Type</i>	<i>Title</i>	<i>Due</i>
D1.Y.Z- yyyyQx	Service	Provision of on-demand CAMS solar radiation service for clear-sky irradiances over the previous quarter	Quarterly
D1.Y.Z- yyyyQx	Service	Provision of on-demand CAMS solar radiation service for all-sky irradiances over the previous quarter	Quarterly
D1.Y.Z- YYYYQx	Report	EQC report on historical irradiance time-series	Quarterly
D1.Y.Z- YYYYQx	Report	EQC report on CAMS global irradiance forecasts	Quarterly
D1.Y.Z-yyyy	Report	Description of data sets used for EQC	Annually
D1.Y.Z-yyyy	Data set	Historical gridded data set of solar radiation products (clear-sky and all-sky) for the Meteosat field-of-view from 2005 – 2024 and the Himawari field-of-view from 2016 - 2024	June 2025
D1.Y.Z-yyyy	Data set	Historical gridded data set of solar radiation products (clear-sky and all-sky) for the Meteosat field-of-view from 2005 – 2025 and the Himawari field-of-view from 2016 - 2025	June 2026

¹ <https://www.ecmwf.int/en/forecasts/datasets/open-data>

D1.Y.Z-yyyy	Data set	Historical gridded data set of solar radiation products (clear-sky and all-sky) for the Meteosat field-of-view from 2005 – 2026 and the Himawari field-of-view from 2016 - 2026	June 2027
...			

WP1 Milestones			
#	Title	Means of verification	Due
M1.Y.Z	M1

3.3 Work package 2 (WP2) – Service evolution

Service evolution, driven by existing and emerging user requirements, is an important aspect of the CAMS services. As part of this Work Package, the Tenderer shall include in the Tender their proposal for future service evolution. It is envisaged that this will be in the form of investigations and subsequent developments either to improve the current service or to enable potential new and beneficial directions into which to take the service. It shall include at least the topics below, but the Tenderer can also propose additional service developments based on their expertise in this service domain.

The successful Tenderer shall prepare for the use of data from the Flexible Combined Imager (FCI) onboard the Meteosat Third Generation (MTG) satellites, once data becomes available, including investigating the most advantageous use of the 500m channel. This shall include an assessment of the best use of the higher resolution data and the transition to MTG from MSG, once the data is operational. It is expected that the transition of operational data provision from MSG to MTG will happen during the duration of this contract and the successful Tenderer shall therefore plan this transition for the data provision in WP1 accordingly.

The successful Tenderer shall provide an assessment of short-term 6-hour nowcasts based on satellite cloud motion techniques as a potential additional operational service to add to the CAMS solar radiation services. The evaluation shall include a comparison of the nowcast to the irradiance forecast produced as part of the Real-time Global Products.

The current operational CAMS solar radiation services have a limit of 100 requests per day per user for historical time-series. Users of the service report a need to increase this limit to allow for a much higher number of requests. The successful Tenderer shall develop the service to introduce greater flexibility in the number of requests to address this user requirement.

Finally, the successful Tenderer shall explore and assess the optimal use of the Real-Time Global Products and Global Reanalysis Products as input to the solar radiation products, taking into account the service evolution of these products. The impact of upgrades of the Real-Time Global Products on the solar radiation service products shall be assessed and feedback shall be provided to the Global Service Provider.

Tenderers shall complete the relevant table in Volume IIIA as part of their bid, which shall at least include the deliverables and milestones for this work package already indicated in the tables below. Volume IIIA will be used by the Tenderer to describe the complete list of deliverables, milestones and

schedules for each 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.

WP2 Deliverables			
#	Type	Title	Due
D2.Y.Z	Data & Report	...	Quarterly
D2.Y.Z-yyyy	Report	...	Annually

WP2 Milestones			
#	Title	Means of verification	Due
M2.Y.Z	Title		

3.4 Work package 3 (WP3) – User support and documentation of service

The objective of this work package is to provide 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 Service Desk handles user queries through a ticketing system and distributes these queries to specialists when needed. Dedicated staff at ECMWF provide basic support in the form of self-help facilities (FAQs, Knowledge Base, online Forum, tutorials etc.) as well as individualised support on technical queries related to the Atmosphere Data Store (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 Service Desk facility, as well as contributions to FAQs, Knowledge Base, and user guides. Contractors may also be requested by the CAMS Service Desk to contribute to support questions in the online Forum.

Tenderers shall describe the level of user support service on Service Desk tickets as a specific Key Performance Indicator (KPI) with a target value of 80% of the assigned specialised user queries being resolved within 15 days after being informed by the CAMS Service Desk.

Tenderers shall also contribute to the relevant documentation. Documentation of the CAMS services is an integral part of the service provision and is directly linked to the Atmosphere Data Store. The technical and scientific specification of each service shall be documented in the CAMS Knowledge Base as linked from the Atmosphere Data Store (see example for GFAS at [https://confluence.ecmwf.int/display/CKB/CAMS+global+biomass+burning+emissions+based+on+fire+radiative+power+\(GFAS\):+data+documentation](https://confluence.ecmwf.int/display/CKB/CAMS+global+biomass+burning+emissions+based+on+fire+radiative+power+(GFAS):+data+documentation)), and, if more detail is required, in reports that will be available to users through the CAMS web site. The successful Tenderer shall therefore support the updates of the relevant documentation based on the latest developments. The documentation in the Knowledge Base shall be targeted at the general external user community, while the additional detailed reports shall address the needs of expert users.

Tenderers shall complete the relevant table in Volume IIIA as part of their bid, which shall include the deliverables and milestones for this work package already indicated in the tables below. Volume IIIA will be used by the Tenderer to describe the complete list of deliverables, milestones and schedules for each 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.

WP3 Deliverables			
#	Type	Title	Due
D3.Y.Z-yyyy	Other	Overview of contribution to CAMS Knowledge Base to document products and services requiring expertise specific to CAMS solar radiation service	Annually
D3.Y.Z-yyyy	Report	Documentation of solar radiation service	Annually
...			

WP3 Milestones			
#	Title	Means of verification	Due
M3.Y.Z
...			

3.5 Work package 0 (WP0) – Management and coordination

The following management and coordination activities are part of WP0 and shall be briefly described, and completed if necessary, in the bid:

- Management, planning and coordination of the different Work Packages activities and corresponding resources, including the appropriate tools used to monitor them.
- Contractual obligations as described in the Volume V Framework Agreement Clause 2.3 “Reporting and Planning” and its Annex 5 “Report content”.
- Meetings organisation and/or attendance (classified as tasks and listed in a separate table as part of the proposal):
 - ECMWF and the Successful Tenderer will organise a Kick-Off Meeting during the first month of implementation of the contract..
 - ECMWF will host monthly teleconference meetings to discuss CAMS service provision, service evolution and other topics (Service Level Board). The Prime Investigator appointed by the Successful Tenderer will represent the Successful Tenderer in such meetings.
 - ECMWF and the Successful Tenderer will organise Progress Review Meetings, linked to Payment Milestones, every six months unless otherwise agreed.
 - ECMWF will organise annual CAMS General Assemblies. The Successful Tenderer is required to attend these meetings with team members covering the various topics that are part of this ITT.
 - Successful Tenderer’s internal meetings.
 - Tenderers can propose additional project internal meetings (annual face-to-face meeting and monthly teleconferences) as part of their response.

- Quality assurance and control: the final quality check of the deliverables should be made by the prime contractor (contents, use of ECMWF’s templates for deliverables and reports, format, deliverables/milestones numbering and naming, typing errors, etc.).
- Implementation of checks, controls and risk management tools for both the prime contractor and its sub-contractors.
- Communication management (ECMWF, stakeholders, internal communication).
- Management of personal data and how this meets the requirements of Clause 2.8 and Annex 6 “Personal Data Protection” of the Volume V Framework Agreement.
- Sub-contractor management, including dispute 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 sub-contractors, if any, describing their contribution and key personnel shall be provided, as well as back-up names for all key positions in the contract. The Tenderers shall describe how the Volume V Framework Agreement, in particular its Clause 2.9 “Sub-contracting”, has been flowed down to all their sub-contractors.

Tenderers shall complete the relevant table in Volume IIIA as part of their bid, which shall include the deliverables and milestones for this Work Package already indicated in the tables below. All milestones and deliverables shall be numbered as indicated (see also guidelines in Section 4.2). All document deliverables shall be periodically updated and versioned as described in the tables below, and the corresponding due date defined in Volume IIIA for each iteration.

WPO Deliverables				
#	Responsible	Nature	Title	Due
D0.Y.Z-yyyyQx	Tenderer	Report	Quarterly Implementation Report (QIR) yyyyQx yyyyQx being the previous quarter (e.g. 2024Q3 due on 15/10/2024)	Quarterly on 15/04, 15/07 and 15/10
D0.Y.Z-yyyy-Part1	Tenderer	Report / Other	Annual Implementation Report (AIR) for year yyyy - Part 1 including: <ul style="list-style-type: none"> • the Quarterly Implementation Report (QIR) yyyyQ4, and • the preliminary financial information yyyy being the Year n-1 	Annually on 15/01
D0.Y.Z-yyyy-Part2	Tenderer	Report	Annual Implementation Report (AIR) for year yyyy - Part 2 yyyy being the Year n-1	Annually on 28/02
D0.Y.Z	Tenderer	Report	Final Implementation Report	Not later than 60 days after the end of contract and once all other activities duly performed
D0.Y.Z-yyyy	Tenderer	Report	Annual Implementation Plan for year yyyy yyyy being the Year n+1	Annually on 30/09
D0.Y.Z-yyyy	Tenderer	Other	Copy of prime contractor's general financial	Annually, not later

			statements and audit report for year YYYY YYYY being the Year n-1	than on 15/12 ⁽¹⁾
D0.Y.Z	Tenderer	Other	Updated KPIs (list, targets, etc.) after review with ECMWF	1 year after start of contract

WPO Milestones				
<i>#</i>	<i>Responsible</i>	<i>Title</i>	<i>Means of verification</i>	<i>Due</i>
M0.Y.Z-KOM	Tenderer	Kick-Off Meeting	Minutes of Meeting	30 days after start of contract
M0.Y.Z-PRMxx	Tenderer	Progress Review Meeting #xx <i>xx being the iteration number of the PRM</i>	Minutes of Meeting	~ Every 6 months
M0Y.Z-SLB ⁽²⁾	Tenderer	CAMS Service Level Board meeting	Attendance	Every month
M0.y.z-CAMSGA-YYYY	Tenderer	CAMS General Assembly YYYY	Attendance	Annually, not later than on 15/12 ⁽¹⁾

⁽¹⁾ These due dates are indicated to frame the corresponding deliverables and milestones schedule only, consequently the following shall be considered by the Tenderer:

- the general financial statements shall be sent by the contractor as soon as available,
- the schedule of the Progress Review Meetings shall be aligned with the different Payment Milestones during the contract negotiation,
- depending on the year, the CAMS General Assembly may take place at a different period of the year.

⁽²⁾ All iterations for this recurring SLB meeting do not need to be listed by the Tenderer, i.e., only one row shall be added in Volume IIIA "Pricing and deliverables" Excel sheet "Deliverables List".

4 General Requirements

4.1 Implementation schedule

The Framework Agreement will run from 1 January 2025 to 30 June 2028 with all proposed developments to be finalised before 31 December 2027. Operational service provision and operational support shall continue during 2028. The Tenderer shall provide a detailed implementation plan of proposed activities for the full period.

4.2 Deliverables and milestones

The Tenderers shall provide the list of deliverables and milestones (cf. ITT Volume IIIA “Pricing and deliverables”, Excel spreadsheet “Deliverables List”) for each Work Package. All deliverables and milestones must be consistent with the activities and objectives described in Section 3 of this ITT Volume II:

- A deliverable is a substantial, tangible or intangible good or service produced as a result of a project (see also the deliverable definition in this ITT Volume V Clause 1.2 and Clause 3.2). In other words, a deliverable is an outcome produced in response to the specific objectives of the contract and is subject to acceptance by both ECMWF’s Technical Officer (TO) and Contract Management Officer (CMO).
- Milestones should be designed as markers of demonstrable progress in service development and/or quality of service delivery (see also the milestone definition in this ITT Volume V Clause 1.2). They should not duplicate deliverables and shall not attract the budget under Volume IIIA “Pricing and deliverables”, Excel sheet “Deliverables List”.

The following shall apply to the deliverables and milestones:

- The deliverables and milestones should be consistent with the technical requirements specified in Section 0.
- When defining deliverables, please assign clear due dates to each of them.
- All contract reports and deliverables 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. See also Section 4.7 in what regards the data provision.

Volume IIIA “Pricing and deliverables” (cf. Excel sheet “Deliverables List”) of this ITT shall be used by the Tenderer to describe the complete list of deliverables, milestones and schedules for each work package (due dates). Please note that:

- All deliverables and milestones shall be numbered as per the following format DX.Y.Z (for deliverables) and MX.Y.Z (for milestones), where X is the WP number, Y is the task number and Z is the deliverable or milestone number in this task. Deliverables delivered annually should be numbered DX.Y.Z-yyyy, where yyyy is the year the deliverable refers to (e.g. DX.Y.Z-2016). Deliverables delivered quarterly should be numbered DX.Y.Z-yyyyQx, where yyyyQx is the quarter of the year the deliverable refers to (e.g. DX.Y.Z-2016Q1, DX.Y.Z-2016Q2). The

same numbering format shall be applied for the milestones. Continuous deliverables at higher frequency can be labelled in the same way as quarterly deliverables.

- Each deliverable shall have an associated resource allocation and price (cf. column I “Nb of PM allocated” and column J “Estimated price”), while the only resource type to be considered is “payroll” (the total of these allocated resources and prices shall therefore amount to the total price associated with payroll in Volume IIIA spreadsheet “Costs and Prices”). Milestones should not have such associated resource allocation, unless otherwise agreed.
- The Tenderers shall provide a due date for each proposed deliverable and milestone (in accordance with those indicated in Section 3):
 - o The Tenderers shall ensure that the proposed due dates of deliverables and milestones are realistic and achievable. **Any dependencies on input data (whose origin must be specified) shall be detailed and also accounted for in the risk table.**
 - o It is advised to schedule the submission/completion of the last deliverables and/or milestones associated to a Payment Milestone not later than 15 days before the expected date of completion of the said Payment Milestone (i.e. when all deliverables have been submitted by the contractor and all milestones have been completed by the concerned parties).

4.3 Acquisition of necessary data and observations

The Successful Tenderer shall acquire the relevant observational data sets needed for the optimisation and evaluation of the developments of this ITT.

4.4 Data and IPR

It is a condition of EU funding for CAMS that ownership of any datasets developed with CAMS funding passes from the suppliers to the European Union via ECMWF. Ownership will pass from the date of creation of the datasets. Suppliers will be granted a non-exclusive licence to use the datasets which they have provided to CAMS for any purpose.

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 Tenderers’ production system. The identity and ownership of such exceptional components will be passed to the European Union via ECMWF annually. The successful Tenderer will be granted a non-exclusive licence to use them for any purpose.

4.5 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.

KPI #	KPI Title	Performance Target and Unit of Measure	Frequency of Delivery	Explanations / Comments
KPI_1	Server or webAPI uptime	95%	Quarterly	Percentage of uptime vs total time for the data servers (running average over the past calendar year).
KPI_2	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_3	Timeliness of production for each product	90%	Quarterly	Percentage of products delivered completely and on time based on at least weekday support.
KPI_4	Level of user support service on Service Desk tickets	80% of the assigned specialised user queries being resolved within 15 days after being informed by the CAMS Service Desk.	Annual	

KPI_5	% of deliverables delivered on time or with short delay	100%	Every payment milestone	
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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, Table 6 and Table 7 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

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 solar radiation 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 observational data sets it intends to use and how it will acquire the relevant data. The Tenderer shall describe the proposed method for producing the time series of Global, Direct, and Diffuse Solar Irradiance as well as Direct Normal Irradiance for clear and cloudy skies. The Tenderer shall also describe the validation methodology for above-mentioned irradiance products and the solar radiation forecasts from the Global Service Provider, which will be used including the acquisition of relevant independent observations. Finally, the Tenderer shall describe how they will deliver the required service evolution aspects.