

# Interreg Caraïbes

Fonds européen de développement régional



UNION  
EUROPÉENNE

**SARG'COOP**  
Programme caribéen de coopération de  
lutte contre les algues sargasses



ORGANISATION OF EASTERN  
CARIBBEAN STATES

## INTERNATIONAL CALL FOR EXPRESSION OF INTEREST

"Establishment of an air quality measurement network for detecting gases resulting from Sargassum seaweed decomposition on the coasts of Caribbean countries".

**Applications opening: May 18, 2020**

**Deadline for submitting applications: July 28 2020 at noon**

**Submission in electronic form to the following e-mail address:  
procurement@oece.int**

**For any further information,**

Contact: [epiquet@cr-guadeloupe.fr](mailto:epiquet@cr-guadeloupe.fr) and [josette.edward@oece.int](mailto:josette.edward@oece.int)



## I. Introduction

The call for expression of interest is made by the OECS (Organization of Eastern Caribbean States) in partnership with the Regional Council of Guadeloupe. The goal is to set up strong cooperation on the Sargassum issue between the full members of the OECS and its associate members, by relying on EDF (European Development Fund) financial support mechanisms, within the framework of the INTERREG file, submitted in May 2019 by the Guadeloupe region. The EDF is one of the main instruments of Community development cooperation aid for countries in the Caribbean area. For this call for expression of interest, grants for applicant OECS countries and States could be available for up to 75% of the total project budget; the rest shall be borne by them.

## II. General context

Since 2014, the Caribbean islands have been facing massive Sargassum seaweed strandings on their coasts. This pelagic brown seaweed gathers to form rafts and drift along ocean currents, but eventually decompose in the coastal zone, deforming the coastal ridge, polluting the environment and inconveniencing human activities. The origin of these Sargassum seaweed quantities is still unknown and studies are under way to identify the potential anthropogenic origin of this proliferation.

Sargassum seaweed has been accumulating on the coasts, thus generating major health problems: their anaerobic decomposition gives off dangerous gases: hydrogen sulphide (H<sub>2</sub>S) and ammonia (NH<sub>3</sub>). The gases affect air quality and are harmful to the population and coastal biodiversity. At concentrations above 5 ppm (particles per million), these gases cause headaches, eye and throat irritation and prolonged exposure to higher concentrations affect the nervous system and can cause death.

In May 2018, H<sub>2</sub>S levels recorded in Guadeloupe reached 6 ppm and schools near the stranding sites had to close, affecting 2000 students. Between January and August 2018, the network of sentinel doctors and SOS doctors of Guadeloupe recorded over 3,742 cases of exposure to toxic gases emanating from Sargassum. Some schools were even temporarily closed in the town of Petit-Bourg in order to make pupils safe from gases.

Several solutions are conceivable to limit the negative impact, particularly on health, of mass strandings on the coastline. In order to protect populations in Guadeloupe and Martinique, the Regional Health Agencies, together with the approved air quality monitoring associations, namely Gwad'air and Madinin'air, have set up a network of sensors on the parts of the territory most impacted for hydrogen H<sub>2</sub>S and NH<sub>3</sub>. The French overseas regions have developed a unique competence in the Caribbean, particularly with regard to the measurement of pollutant emissions and the evaluation of the risks involved. Indeed, the network makes it possible for the local



authorities to be alerted to imminent danger to inhabitants and act accordingly, either by evacuating the affected areas, or by collecting the stranded seaweed as quickly as possible in order to avoid any emanation within 48 hours of the stranding.

The Guadeloupe region is the leader of the Caribbean program against Sargassum (SARG'COOP) and wishes to develop a similar network in all OECS Member States, the OECS being its official partner in the INTERREG file. This support takes the form of this call for expression of interest and a call for tenders to accompany and assist the applicant States in installing the air quality monitoring network in their territory.

### III. Purpose of the call for expression of interest

The call for expression of interest aims to identify countries that would be interested in the establishment of an air quality measurement network for hydrogen sulphide and for ammonia on their territories. It is also about networking this Caribbean-wide air quality monitoring.

This project is part of the Caribbean program against Sargassum (SARG'COOP, and whose first formalization meetings started during the international conference on Sargassum, which brought together the best national and international experts, representatives of 22 countries and states involved, in October 2019 in Guadeloupe.

Thus, the objective of this international cooperation approach is to provide technical and financial support to OECS States to install sensors to measure the concentrations of harmful emanations from seaweed degradation. The purpose is to provide pragmatic solutions to Sargassum strandings and enable local authorities to anticipate the health risks faced by the inhabitants thanks to this efficient and reactive system, both for forecasting and communicating. In short, the system would be positioned as a decision support tool to strengthen the response capacity of the territories in the event of strandings.

The call for expression of interest focuses primarily on the OECS states, and more generally on the CARIFORUM countries and territories, a quality which enables them to be eligible for the EDF. These are therefore the following countries: Antigua and Barbuda, the Bahamas, Barbados, Belize, Dominica, the Dominican Republic, Guyana, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname and Trinidad and Tobago. Other countries like Mexico (under certain conditions) could participate in this call for expression of interest.

In addition, this call for expression of interest also aims to strengthen coordination among Caribbean stakeholders for better sharing and dissemination of knowledge, methods and tools in all aspects of air quality management. In this sense, all data collected by the networks of sensors will be channeled to an international Caribbean resource center in Guadeloupe. With the approval of the applicant states, all of this data will be hosted and shared between the states participating in this call for expression of interest. These data may be used and processed by international organizations as well



as by the scientific community for the purpose of knowledge sharing or for expert or general public scientific publications.

## IV. Specifications to meet the call for expression of interest

### 1. Sensor locations

Applicant States for this call for projects will first have to identify the geographic sites deemed useful for monitoring. This approximation of the number of sites will make it possible to estimate the budget to be planned for each applicant. However, an additional study (carried out by the provider mandated by the Guadeloupe region) will specify the location and numbers of the sensors to be used.

So that the setting up sensors is relevant, they will have to be carefully located on areas systematically impacted by groundings and at the level of the dwellings forming the first coastal strip of houses. Gas concentrations resulting from the decomposition of Sargassum are highly variable in time and space. This varies according to geographic location, weather conditions, topography, and the distribution of observed stranding sites. Also, the larger the population in the vicinity of stranding sites, the more important in health term it becomes to monitor the site. For these reasons, site choices will only be validated if they come with a precise description of the site environment.

Indeed, measuring conditions will be influenced by:

- macro-environment, depending on the geographical location and the general environment of the measurement site.
- microenvironment, according to criteria of design, safety and position of the sampling point.

Applicants must therefore specify in their applicant file the following points for locations selected by OECS in collaboration with region Guadeloupe region and the service provider chosen for this purpose. They will review the selected sites and validate or not the applicant's choices,

Information to be specified	Comments
Altitude	In meters above sea level taken as level 0.
Meteorology	Local dispersion conditions: preliminary study of the wind conditions, rainfall and any other information deemed relevant.
Topography	Description of the project area, relief and other information that may influence the choice of location: the buildings surrounding the site, natural barriers. A photo, a map or a commented video can be added to the file.
General population density of	Description of population density within a perimeter of 5km from the site,



the site	in inhab/km2. The project aims to provide the best possible protection for the inhabitants. Density will influence the choice of locations.
Sources of influence on the site	Determine the main stranding sites of Sargassum seaweed. This factor is decisive for the final selection of sites.

Furthermore, the chosen sites must imperatively be covered by a telephone network allowing GPRS connections in order to allow the transmission of data from the sensors.

Finally, it is better if sensors are installed on private lands (with the owners' agreement) and little visited in order to avoid acts of degradation or vandalism

## 2. Installation of the air quality measurement network: material to be installed

With a view to sharing and disseminating data across the OECS, applicants will have to install an air quality monitoring network that is "compatible" with the Guadeloupe and Martinique networks.

H<sub>2</sub>S and NH<sub>3</sub> concentrations will be measured in real time using automatic measurement methods (24/7). They make it possible to monitor changes in ambient air concentrations with a temporal resolution of a few seconds to a few minutes.

Two types of measurement equipment are proposed in this call for expression of interest for hydrogen sulphide and ammonia, which should be combined:

- Cairpol type sensors measure concentrations from 0 to 20 ppm for H<sub>2</sub>S. Detection limit is 0.03 ppm. They operate autonomously and are powered by photovoltaic panels. Data is communicated via a GPRS connection to an acquisition rack and then sent to a central server via File Transfer Protocol (FTP). Cairpol sensors have the advantage of being mobile and energy sufficient, but have the disadvantage of being pre-calibrated at the time of delivery. The company guarantees the reliability of the measurements for one year, and the sensors must be renewed every year.
- Dräger type sensors: they measure hydrogen sulphide concentrations from 0 to 100 ppm. Detection limit is 0.1 ppm. This type of sensor is used in the industrial sector for their capacity to measure very high concentrations, and over a wider detection field than Cairpol sensors. Dräger sensors have a limited battery lifespan: Their battery has 120 hours of autonomy, and the data is stored locally. Such equipment therefore requires more maintenance resources than Cairpol-type sensors. Their calibration is done manually using a certified standard gas. It will be used on an ad hoc basis to check the consistency of Cairpol-type sensors as well as for occasional measurement campaigns in places not covered by the monitoring network.

Thus, the network will rely mainly on Cairpol type sensors, capable of continuously measuring low concentrations of H<sub>2</sub>S and NH<sub>3</sub> and of transferring data in real time remotely via the GPRS link. The sensors are made up of a cell that needs to be maintained and renewed every year. Maintenance of the sensor box and the rest of the equipment should be done regularly.

This method is used in Martinique and Guadeloupe for the same problem. Easy to handle, sensors are mobile and can therefore be moved if necessary.

**The monitoring device therefore consists of:**

- Cairsens type gas sensors: each Cairsens measures a pollutant with ranges from 0-20 ppm for H<sub>2</sub>S and 0-1000 ppm for NH<sub>3</sub>. The number of sensors allocated will be determined in the applicant file;
- At least two Dräger type sensors as a standard for Cairsens sensors and spot measurements as required;
- GPRS modules, Cairnet type: these modules are composed of a protection box that can accommodate 1 to 3 Cairsens sensors, a battery and an antenna / GPRS communication box;
- Photovoltaic panels to power the sensors, for autonomous outdoor operation;
- Fixed supports (tripods), consisting of a stainless steel tube 1.5m high and 28mm in diameter;
- An acquisition rack for automatic retrieval of the collected data and their routing to the central server (Regarding this aspect, technical elements will be specified later with the help of the Central Air Quality Laboratory of France).
- A Caircloud type Cloud, allowing processing and formatting of data before transmission to local authorities and release to the general public;

### 3. Data acquisition and management

The air quality measurement network operates according to the following protocol:

- 1) The sensors measure the concentrations in the ambient air continuously.
- 2) The acquisition rack checks the sensors every minute via a GPRS connection and then averages over ten minutes.
- 3) The average is sent to the central server (hosted on a Cloud) according to the File Transfer Protocol, a communication tool programmed to share files over a TCP/IP network. It allows you to copy files from one computer to another through the Internet network.
- 4) The collected data is processed on the Cloud or using XR type software, a tool used in air quality monitoring for processing and formatting the collected data.
- 5) Production of a daily report and map of toxic gas concentrations using the software and dissemination of the results to local authorities, the population and the Caribbean International Resource Center located in Guadeloupe.



The XR type software will need to have a module for automatic validation, control, configuration and piloting of the entire measurement chain (acquisition systems, measuring devices, communication systems). It will also allow technical monitoring of all installations, more efficient management of automatic calibrations and maintenance monitoring. It also ensures the traceability of data and technical information for detecting and reporting malfunctions or pollution episodes. It must be compatible with the XR type system.

The Guadeloupe region, with the support of the central air quality laboratory, will offer an adapted computer protocol making it possible to make all computer communications compatible and to easily bank data.

### 3.1 Alert

Each state will own its data, and the data will allow each state to alert the public if necessary. The data must nevertheless be transmitted to the common resource center which will be hosted in Guadeloupe.

### 3.2 Data banking

The data will be banked in Guadeloupe. Each state participating in the operation will have free access to the database for the purposes of scientific exploitation.

## 4. Communication

The air quality monitoring network's aim is to inform the population about potential health risks. The applicant state will have to take the necessary measures to inform its inhabitants as best it can, using daily communications which are comprehensible, concise and adapted to the public's expectations.

As regards to the public, we advise applicants to issue a daily online press release and to inform the public during peak concentrations on the radio and news channels. On their official websites, applicants can create a section dedicated to the issue of air quality. If the applicant state does not have an official website, it will have to create a web platform where daily bulletins (accompanied by a map) will be presented. The site will present alert thresholds to the public in order to limit prolonged exposures.

**If the alert thresholds have not already been defined, the call for tender for network installation assistance provides for hiring a service provider to define alert thresholds and the protocols to be followed in the event the thresholds are exceeded. The creation of a standardized alert scale in all OECs states is part of the program against Sargassum. It must be the result of consultation and consensus among all states and partner organizations in order to ensure its legitimacy and sustainability. By way of example, we advise states to use the alert scale in force in Guadeloupe and Martinique as a basis.**



The applicant state may, of course, propose the communication plan that suits it best. This plan is included in this call for projects and the costs incurred may be covered by EDF grants.

Finally, the banked data in Guadeloupe will be "open data" for the states and scientists of the states participating in the international project.

**Finally, the countries applying and selected within the framework of this call for expression of interest will benefit from assistance with project management offered by the Guadeloupe region and the French Development Agency to complete the installation of their air quality measurement network.**

## V. Application documents

Application is open to all OECS member states as a priority, and to other states of the Caribbean Basin (countries not eligible for the EDF will not be able to benefit from this grant).

All applications must include:

- The application form duly completed (see appendix 1)
- The technical and financial description (see appendix 2)
- The files of sensor installation sites (ie IV. Specifications, see appendix 3).

## VI. Financial provisions

### Grant rate

The amount of EDF grant amounts to a maximum of 75% of the total cost of eligible expenditure. The remaining balance is at the expense of the applicant, who may apply for funding by other bodies (World Bank, Development Agencies, UNDP, UNEP, etc.).

A budget is allocated for all successful grant applications. The amount of aid that may be granted for the installation of a monitoring network under this call for expression of interest will depend on the number of applications submitted and the needs of each applicant.

### Expenditure Eligibility

Eligible expenditures shall include:









