Monitoring & Detection of Pollution Cycle Webinar

20/01/2021 15:00 CEST

Beatrice Barresi, Roberta Mugellesi Dow, (ESA)

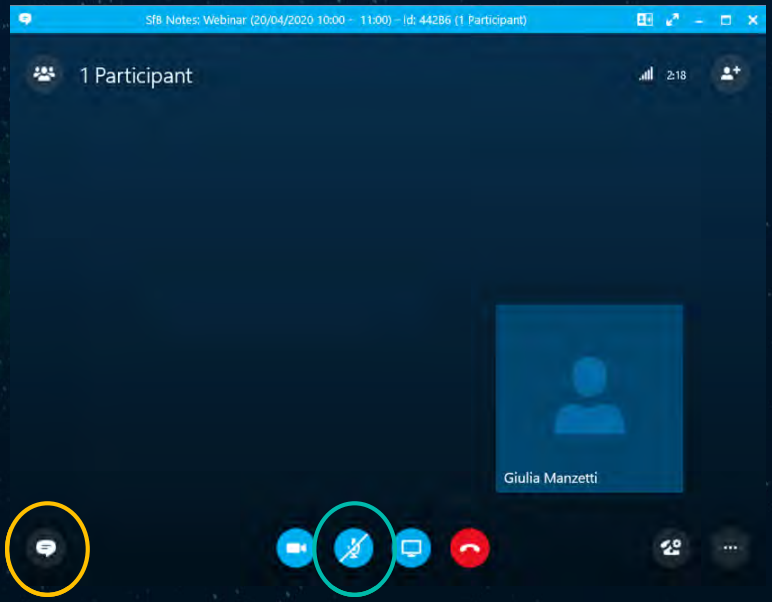
Alfred Schumm, WWF Germany
Ingwild Helland, Avinor

WELCOME TO THE WEBINAR!

Before we start...

- Due to the number of attendees, please keep your microphones muted at all times and switch off the webcam function

- You can use the conversation function anytime to submit your questions. They will be addressed during the Q&A at the end of the webinar



AGENDA

- ESA introduction
- “Space for Monitoring and Detection of Pollution Cycle” Invitation to Tender
  - Objectives
  - Examples of applications
- Management of Resources
  - Alfred Schumm, WWF Germany
  - Ingvild Helland - Avinor
- How to apply: funding and tender information
- Open Questions & Answers session

THE EUROPEAN SPACE AGENCY

Purpose of ESA

To provide for and promote, for exclusively peaceful purposes, cooperation among European states in space research and technology and their space applications.

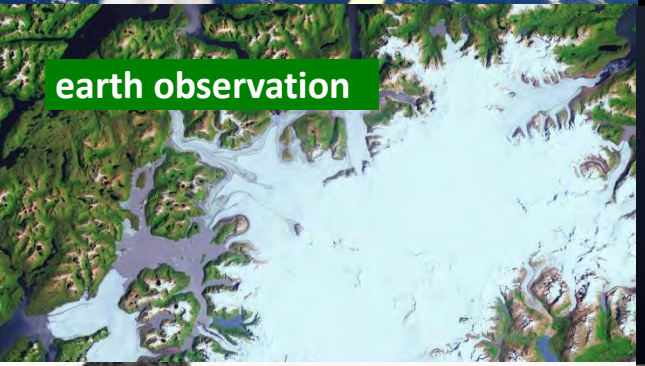
Facts and figures

- Over 50 years of experience
- 22 Member States
- 8 sites across Europe and a spaceport in French Guiana
- Over 80 satellites designed, tested and operated in flight

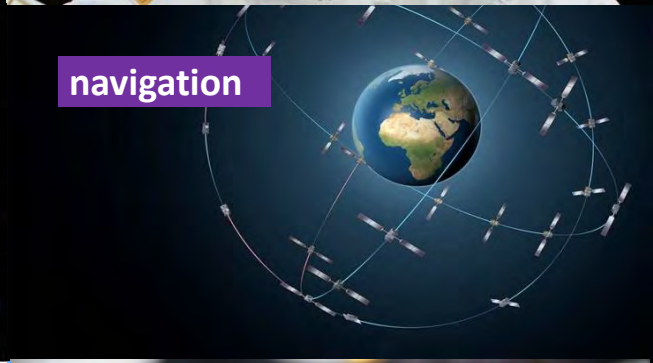

space transportation


science


human spaceflight


earth observation


telecommunications
and applications


navigation


exploration


operations


technology

→ ESA Space Solutions

- Space Weather
- Earth Observation
- Satellite Navigation
- Satellite Communication
- Human Spaceflight Technologies

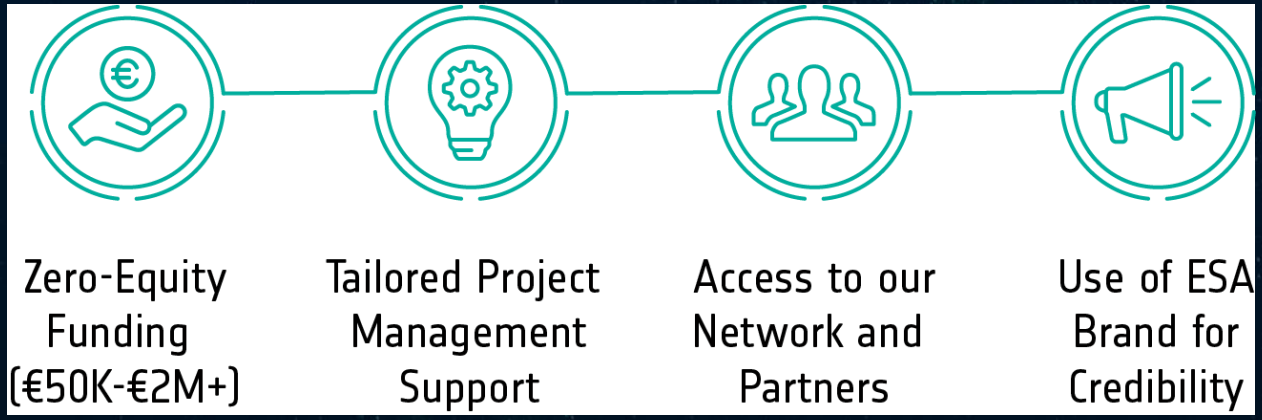
- Big Data analytics
- VR/AR
- Artificial Intelligence
- Megaconstellations
- 5G
- Crowdsourcing
- IoT
- Cybersecurity
- Blockchain
- ....

Users and Markets

esa space solutions

- Maritime
- Healthcare
- Transport
- Environment
- Agriculture
- Media
- Energy
- Education
- Aviation
- Financial

WHAT ESA SPACE SOLUTIONS OFFERS



Space for Monitoring and Detection of Pollution Cycle

Roberta Mugellesi Dow - ESA

Planned ESA-funded invitation to tender on Pollution Cycle Monitoring and Detection

Injection of pollutants into the atmosphere, soil water disturb the natural composition of the air, soil and water. The pollutants entering the water cycle can move throughout the Earth connecting ocean, to land and atmosphere and paving the way to a "pollution cycle".

Purpose of the Invitation to Tender is to analyse the technical feasibility and economic viability of sustainable space based services which can contribute to to the monitoring and reduction of the pollution in air, water and soil minimizing environmental impact in vertical sectors such as transport, industry and utilities, agriculture and others and define a roadmap for services implementation and demonstration.

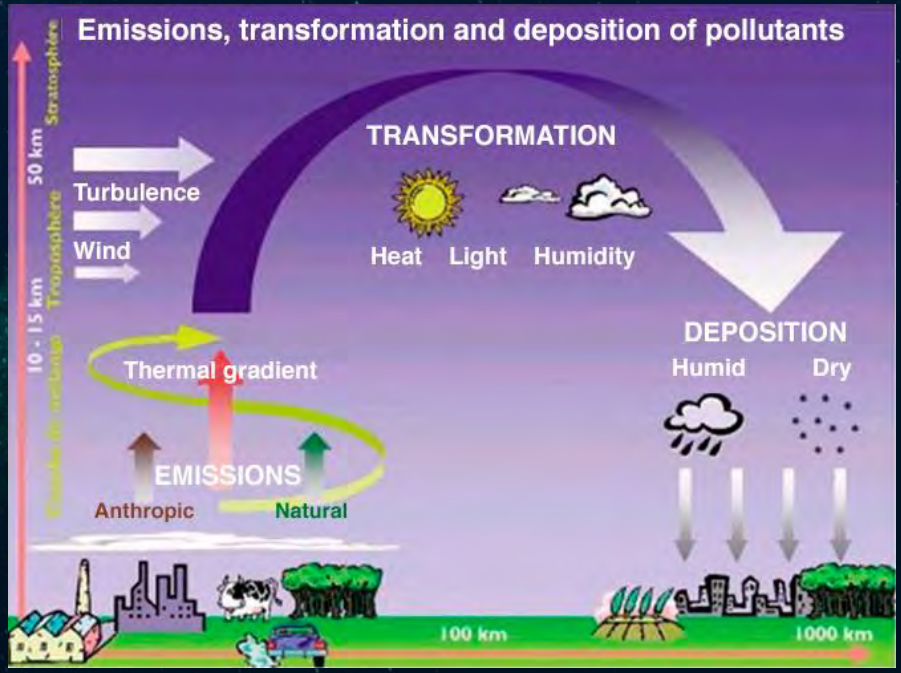


Image credit: Encyclopedia of the Environment

ESA-funded invitation to tender on Monitoring and Reduction of the Cycle Pollution

Invitation To Tender is open from 01st February 2021

until 15 March 2021

Funding up to € 200K per activity (100% ESA funded)

Duration 12 months

OBJECTIVES

- Assess technical feasibility and economic viability of space based services which can contribute to the monitoring and reduction of the pollution in air, water and soil minimizing environmental impact in vertical sectors such as transport, industry and utilities, agriculture and others;
- Get users/customers commitment towards services implementation and sustainable operation;
- Consolidate the business plan for supporting an informed decision for investment in further activities;
- Define a roadmap for services implementation and demonstration (potentially through a follow-up ESA co-funded demonstration project).

EXAMPLES OF APPLICATIONS

- Monitoring and Detecting Pollutants from Transport:
  - Development of applications able to monitor and detect sources of air pollutants emissions from the transport sector based on measurements of pollutants dispersed in air, water and soil leveraging space and non-space technologies;
  - Perform pollution control through environmental monitoring;
  - The contribution from the transport sector, in particular aviation, to the pollution cycle is generated not only from air emission but also by de-icing runways, de-icing aircraft, Micro plastic from e.g. plowshares and aircraft tyres and others.

EXAMPLES OF APPLICATIONS

- Monitoring and Detecting Pollutants from Industry:
  - Industrial pollutants released into the air include releases of greenhouse gases like carbon dioxide (CO_2) and acidifying pollutants such as sulphur oxides (SO_x);
  - Industrial pollutant released to the water include compounds that contain nutrients, such as nitrogen and phosphorous, which can induce and excessive growth of algae;
  - Polluted water can contaminate the surrounding soil and the soil surface through water sprinklers. Moreover, as the water evaporates, it can pollute the atmosphere.

EXAMPLES OF APPLICATIONS

Monitoring and Detecting Pollutants from Agriculture:

- Farming activities result in multiple greenhouse gas emissions, duch carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O);
- Agricultural soils can absorb carbon dioxide from the atmosphere by the growing crops. The carbon dioxide is subsequently stored in the soil in the form of crop residues and soil organic matter, and then is emitted to the atmosphere via decomposition of crop residue and soil organic matter;
- The agriculture sector accounts also for about 80% of emissions of ammonia, which is emitted during storage and spreading of manures and slurries and from the application of inorganic fertilisers. Ammonia damages sensitive natural habitats.

https://unece.org/environment/press/new-initiative-will-reduce-air-pollution-agriculture

VALUE OF SPACE

Satellite Navigation

- To locate where the emissions measurements are taken and to pinpoint the position of the source where most of the emissions are generated;
- SatNav is also required for RPAs and HAPS operations.
- Positioning information will be able to provide geo-tagging services for data collection.

Satellite Communications

- Provide connectivity where terrestrial communications are insufficient and to increase the communication network robustness and communication resilience, including M2M, voice and data.

Earth Observation

- Geospatial data to to support the assessment of the impact on environment and population ,
- Provision of atmosphere components and meteorological data

World Wide Fund
for Nature

Alfred Schumm

Director
Innovation, Sciences, Technologies & Solutions
WWF Deutschland


WWF
esa
Break Pollution Cycles
Create Circular Economies
WWF


“We want to stop the degradation of our planet’s natural environment and build a future in which people live in harmony with nature.”

1961

Foundation

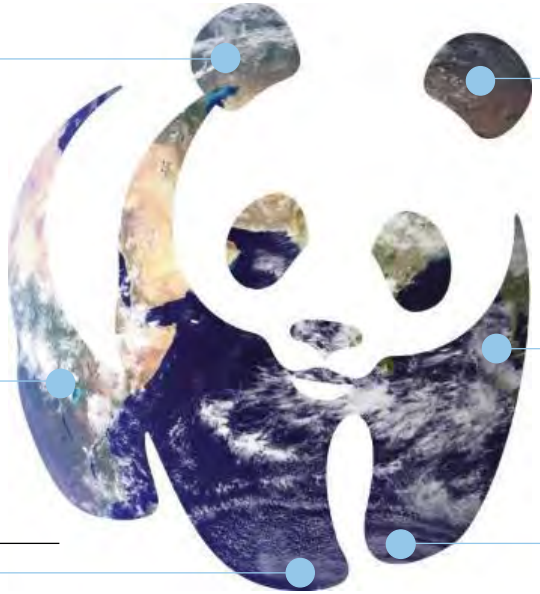
WWF International

+100

WWF is represented in more than **100 countries.**

787 Mio. €

Revenues via donations, licenses, external funds and testaments.



+5,3 Mio.

Supporters worldwide

7085

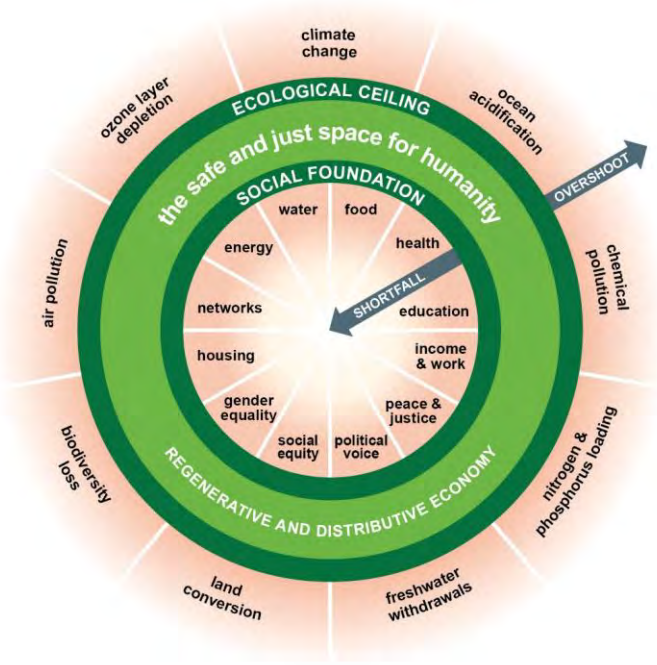
Employees worldwide

+25 Mio.

Followers on social media

Source: Network Performance Review 2018

Planetary boundaries - Doughnut economics



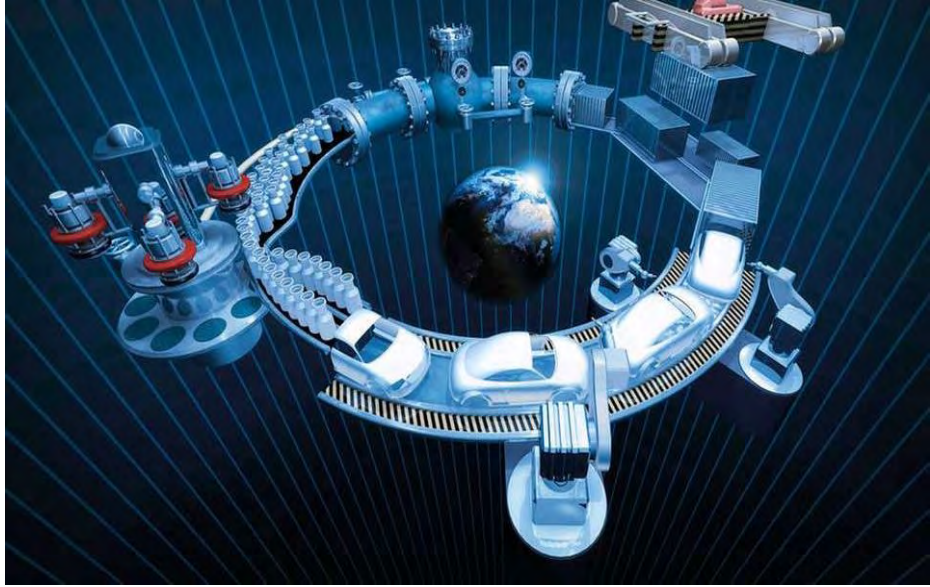
Source: Raworth, K. (2017) Doughnut economics: seven ways to think like a 21st-century economist. Chelsea Green Publishing.

- Ecological Footprint:
- Resources are becoming scarce

We use 60% more natural resources than the earth can regenerate during this period of time.

Without changing our lifestyle, we will need two earths by 2030.

From Pollution Cycles to Circular Use



Circular Economies: Nature, the role model

„Pollution“ and it´s sozio-ecological Impacts

- Monitor & evaluate land-based emissions and pollution (from **agricultural** runoff like chemical pesticides, fertilizers and antibiotics , **waste-water**, **transportation, housing** and **industries**) impacting air, soil, habitats, water and -via the rivers- as well our oceans and the health of all species (including humanity)
- Monitor & evaluate Sea-based pollution e.g. from **ships** or **extractive industries (oil and minerals)** at sea impacting air, habitats and water
- Monitor & evaluate **airborne pollution**
- Observe, understand and compare **structures, ecological** and **socio-economic qualities** and **human activities and it´s impacts** by using remote sensing / satellite indicators and data

Extractive Industries & Supply Chain Transparency

EITI

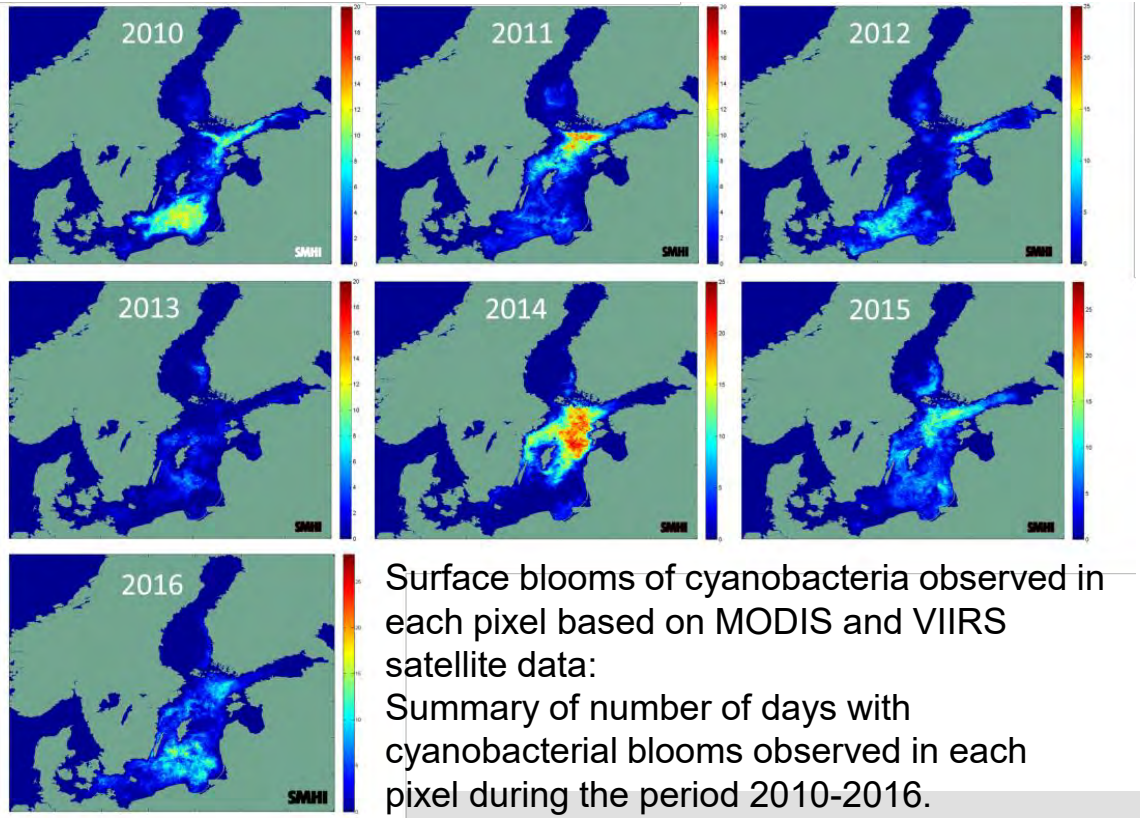
European Commission

1. Raw Materials Initiative

CRM ⇔ Economic importance + Supply risk

* Communication on the review of the list of critical raw materials for the EU and the implementation of the Raw Materials Initiative - COM(2014) 297, 26.5.2014

Indicators for the Pollution of the Baltic Sea



Surface blooms of cyanobacteria observed in each pixel based on MODIS and VIIRS satellite data:
Summary of number of days with cyanobacterial blooms observed in each pixel during the period 2010-2016.

Dezentral & Regenerative Energy

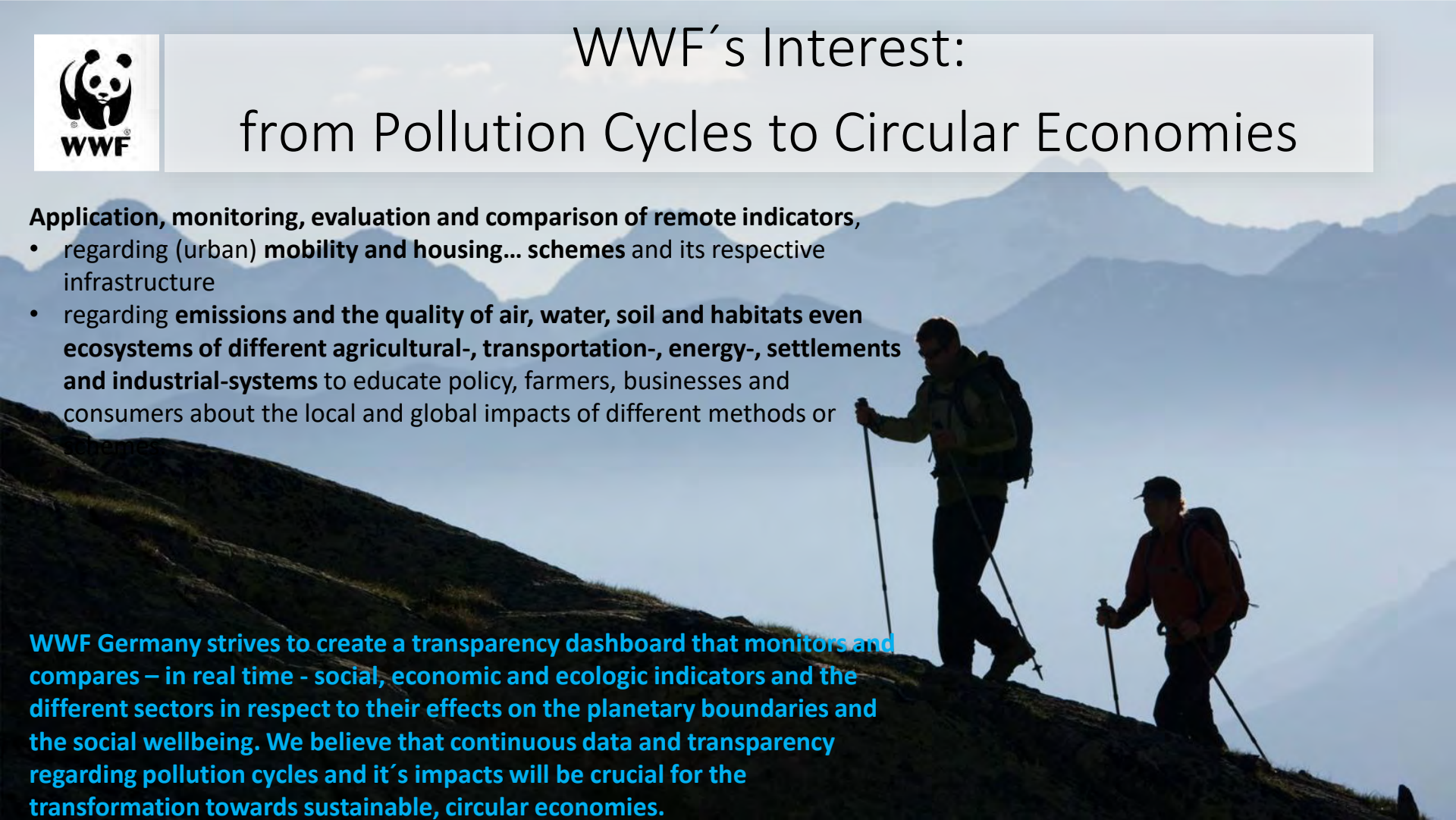
Urban Mobility

Vertical Gardens
Greening the Cities

Agro-Forestry


Restoring Ecological Services

WWF´s Interest:
from Pollution Cycles to Circular Economies



Application, monitoring, evaluation and comparison of remote indicators,

- regarding (urban) **mobility and housing… schemes** and its respective infrastructure
- regarding **emissions and the quality of air, water, soil and habitats even ecosystems of different agricultural-, transportation-, energy-, settlements and industrial-systems** to educate policy, farmers, businesses and consumers about the local and global impacts of different methods or schemes

WWF Germany strives to create a transparency dashboard that monitors and compares – in real time - social, economic and ecologic indicators and the different sectors in respect to their effects on the planetary boundaries and the social wellbeing. We believe that continuous data and transparency regarding pollution cycles and it´s impacts will be crucial for the transformation towards sustainable, circular economies.

Space for Cycle Pollution Monitoring and Reduction

Ingvild Helland, Avinor AS

Januar 20, 2021

Operator of 43 Norwegian airports

Activities causing environmental challenges (water and soil):

- De-icing runways
- De-cing aircrafts using chemicals
- Previous use of firefighting foam containing PFAS
- Micro plastic from e.g. plowshares and aircraft tyres

Deicing chemicals

Deicing plattform

- Aircrafts: Polypropylene glycol
- Taxi/runways: Potassium formate (granules) and Sodium formate (liquids)
- Organic compounds
- Oxygen demanding decomposing processes
- Oxygen loss in water recipients

Micro plastic

- Plastic plow shares
- Marking paint
- Aircraft tyres

Reuse of sand:

- Sand is used to reduce use of chemicals
- «Cannot» reuse sand containting micro plastic

Per- and polyfluoroalkyl substances (PFAS)

- Historically used in fire fighting foam at all Avinor's airports 1970-2011. (historically legal products but are now banned from the European marked).
- A large group of synthetic, fluorinated carbon-chain chemicals.
- Several are classified as POPs (Persistent Organic Pollutants).
  - In nature
  - In human body
- EFSA: TWI= 4,4 ng per kilo body weight
- Focus on removing PFAS from the pollution cycle

Environmental monitoring program

- Groundwater
- Surface water
- Infrastructure and discharge points
- Water recipients
- Manual single sampling
- Time consuming
- Various number of sampling points

Contaminated soil investigation

- Environmental investigations prior to construction to prevent contaminations to spread
- Carried out through digging or drilling, analysing soil samples
- «Whenever excavating», we find PFAS
- Increased costs in construction projects.
- In Norway only three land fill sites are approved for receiving PFAS contaminated soil.

Improvements or new functionalities

- Digital monitoring in water and online transfer of data (e.g. oxygen, PFOS, PFAS).
- Technology to determine PFOS/PFAS in soil (to replace digging/drilling and a large extent of analyses).
- Technology to remove PFOS/PFAS from water and soil.
- Technology to determine micro plastic in soil.
- Technology to remove micro plastic from sand around runways, to enable reuse of sand without risk of spreading micro plastic.

How to apply:
Funding and Tender Information

ESA TENDER INFORMATION

Funded participation to ESA Space Solutions is open to any company and/or organisation, be it as group of users, public body or non-governmental organisation, residing in the following Member States:

Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden and Switzerland.

HOW TO APPLY

1. Register (minimum 'light registration') by completing online questionnaire on ESA-STAR Registration (esastar-emr.sso.esa.int)
2. Download the official tender documentation (Invitation to Tender), which will be available as soon as the ITT is open via EMITS (emits.esa.int). ITT number is AO 10598
3. Create 'Bidder Restricted Area' in ESA-STAR
4. Write your Proposal using the template provided in the Tender documentation and obtain Letter of Authorization from your National Delegation (business.esa.int/national-delegations)
5. Submit your proposal via 'Bidder Restricted Area' in ESA-STAR Tendering (esastar.sso.esa.int)

More info can be found here:
esa.int/About_Us/Business_with_ESA/How_to_do/esa-star_Registration_Process

BASIC PRINCIPLES - ESA-STAR

Registration (minimum 'light registration') on ESA-STAR Registration (https://esastar-emr.sso.esa.int)

Please note that esa-star allows two levels of entity registration: "Light" and "Full". This allows new users wishing to do business with ESA to carry out their registration in two steps. A "Light" registration will grant access to all esa-star services up to and including proposal submission. The award of ESA contracts requires "Full" registration.

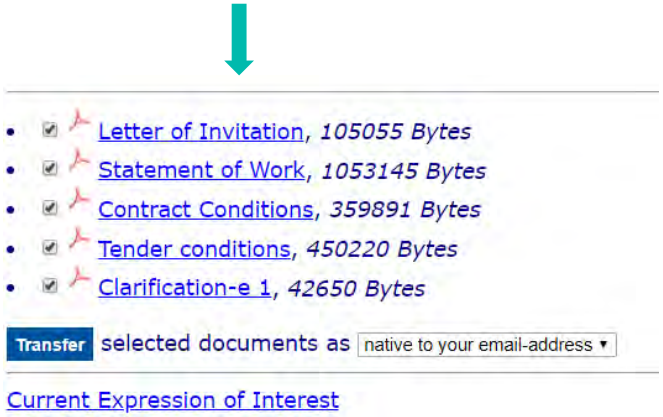
BASIC PRINCIPLES - EMITS

Tender documentation: on emits.esa.int

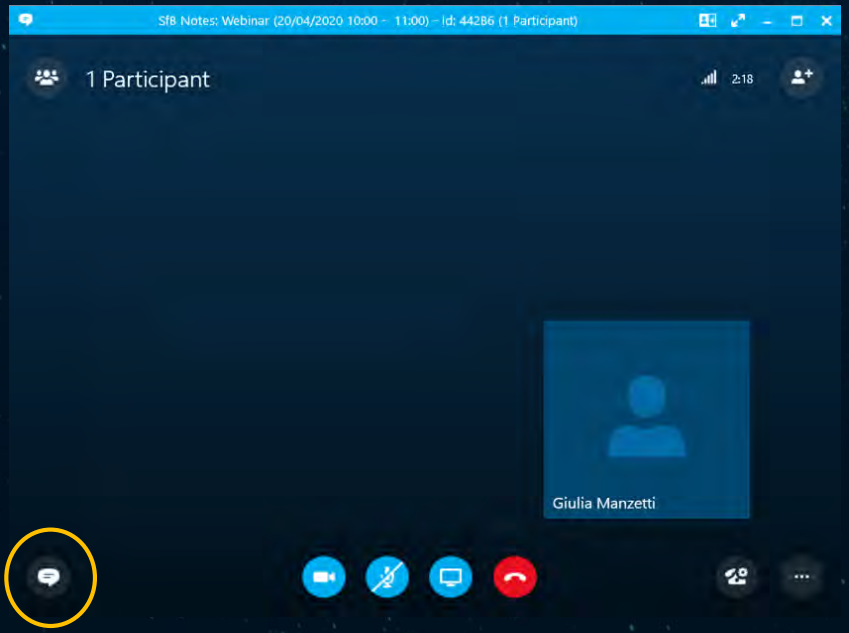
- Published under “Open Invitations
- Look for ITT number AO 10598

BASIC PRINCIPLES - EMITS

Registration on esa-star is required to access tender documents in Emits



OPEN QUESTION & ANSWER SESSION



business.esa.int

THANK YOU FOR PARTICIPATING

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