SUSTAINABLE DIGITALLY CONNECTED SOLUTIONS FOR COMMODITIES CRISIS

Webinar, 13 September 2022

Davide Coppola, Roberta Mugellesi Dow - ESA
Mark Granaghan – EPRI

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

Davide Coppola
Head of Space Applications Initiatives Section
European Space Agency

Roberta Mugellesi Dow
Space Applications Initiatives Section
European Space Agency

Agenda

- **ESA introduction**
- **Sustainable Digitally Connected Solutions for Commodities Crisis**
  - Objectives
  - Examples of applications
  - Value of Space
- **EPRI – Guest Speaker: Mark Granaghan**
- **How to apply**
- **Questions & Answers**

We are ESA

EUROPE'S GATEWAY TO SPACE

WHAT	22 Member States, 5000 employees
WHY	Exploration and use of space for exclusively peaceful purposes
WHERE	HQ in Paris, 7 sites across Europe and a spaceport in French Guiana
HOW MUCH	€6.49 billion = €12 per European per year

PURPOSE OF THE EUROPEAN SPACE AGENCY

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

Artide 2 of
ESA Convention

ESA SPACE SOLUTIONS

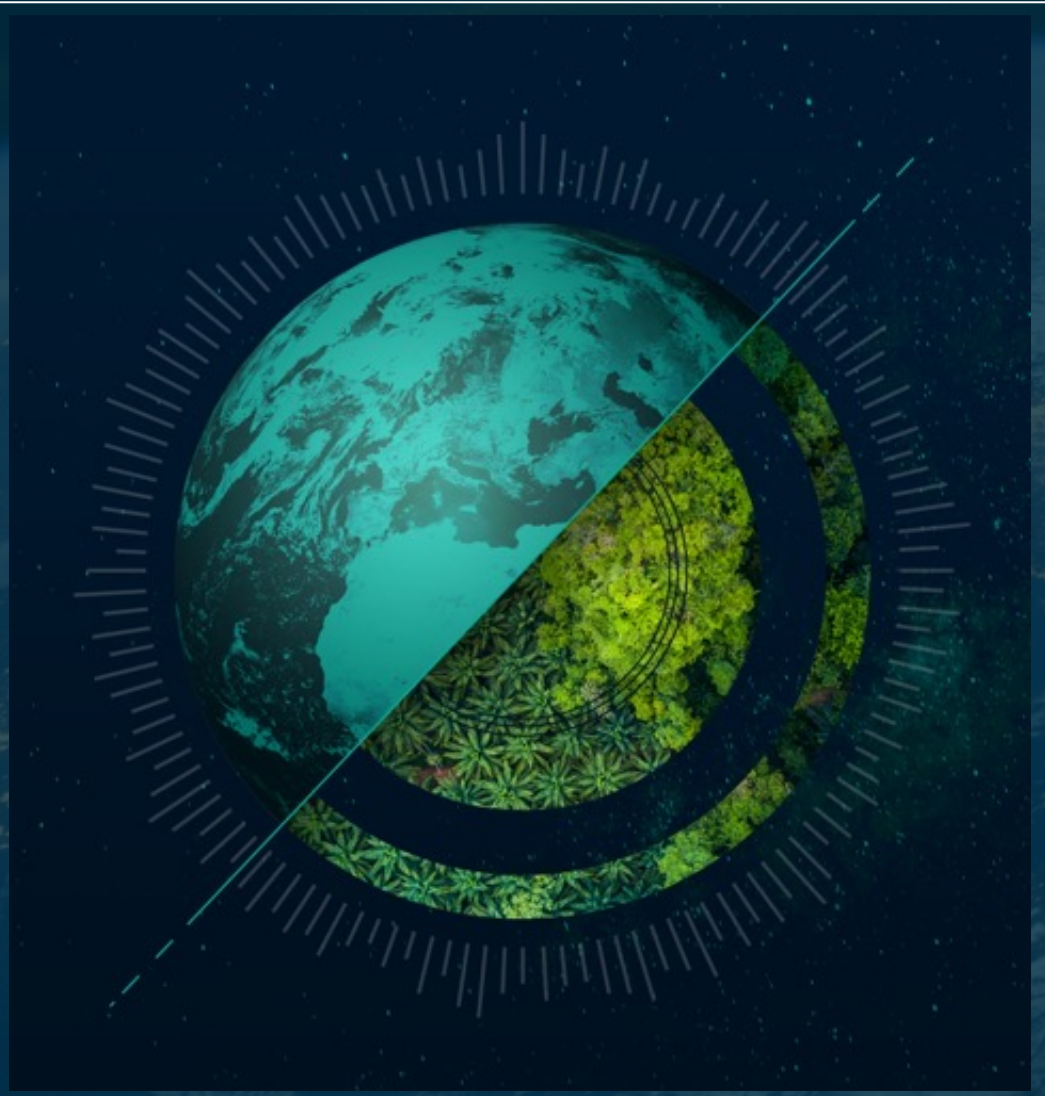
The largest space innovation network in the world

The go-to place for great business involving space to improve everyday life.

Supporting European companies including start-ups and SMEs to develop businesses using space technology and data.

Offering funding, business and technical support to help to generate successful business and create jobs.

ESA SPACE SOLUTIONS OFFERS



- Zero-equity funding (from €50k to €2M+ per activity)
- A personalised ESA consultant
- Technical support and commercial guidance
- Tailored project management support
- Access to our international network of ESA and partners
- Access to our network of investors
- Credibility of the ESA brand

Invested
€250m

Over
1200 businesses

BUSINESS APPLICATIONS AND SPACE SOLUTIONS

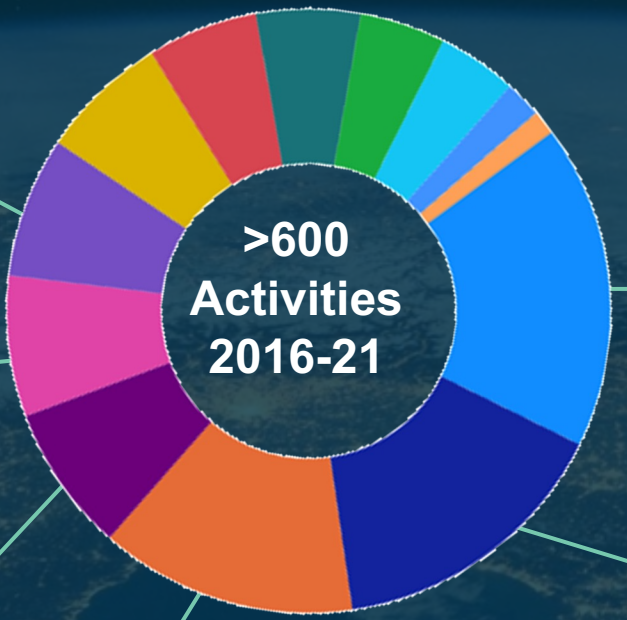
Using **any space asset(s)** and integrating them with terrestrial assets for the **benefit of life on Earth**

- Space Weather
- Earth Observation
- Satellite Navigation
- Satellite Communication
- Human Spaceflight Technologies
- Aviation
- Financial
- Education
- Energy
- Media
- Agriculture
- Environment
- Transport
- Healthcare
- Maritime

THEMATIC VARIETY

Safety & Security

Environment & Wildlife



Transport & Logistics

Energy & Utilities

Health & Social Care

Agriculture, Forestry & Fishing

>75% SMEs
>33% Newcomers

Background

- Latest geopolitical events, in addition to the large humanitarian catastrophe, have caused an unprecedented crisis across all commodities market characterised by a disruption of the supply chain with commodities prices increasing to a fastest pace.

- The commodity sector has important linkages with many sectors: as supplier of raw materials to domestic industries; as supplier of food to the distribution network; as purchaser of inputs and of consumer goods from domestic industries; and as provider of foreign exchange for the purchase of abroad goods and services for consumption and investment.

- There is a risk of resorting to non-sustainable strategies (e.g.: increasing the use of fossil fuels) to react to supply shocks; these short- term reactive measures can result into major implications for the global climate agenda.

Announcement of Opportunity

The intended Announcement of Opportunities targets the development of services and products for addressing commodities sectors challenges in the short (2 years' time frame) and midterm by integrating satellite communications and other space assets with terrestrial and digital technologies. The commodities affected by the crisis and addressed in this call include:

- energy,
- all crude and processed products of agriculture and food,
- supply chain

Call open planned on 21 September 2022

Energy

- In the short term, in order to ensure security of energy supply, efforts need be undertaken to accelerate the deployment of green energy solutions.
- Short-term green energy solutions may include solar power generation for households, as well as renewable energy generation for large industrial plants, and solutions for monitoring off-grid energy plants.
- An increased demand for new tools to improve energy efficiency of infrastructures, buildings, and cities is to be expected, along with services for municipalities and local governments to identify and prioritise potential geographic areas for investments.
- SatCom connectivity and digitalization will be playing a key role by supporting the planning of green energy solutions, assess their socio, environmental and economic impacts, and monitoring their efficiency.

Agri-commodities and food

- Due to the geopolitical situation, the entire globe could face in the nearby future a deep crisis related to the shortage of food in commodities such as wheat, maize, barley, corn and sunflower oil.
- The global food resilience is also relying on the utilisation of agriculture fertilisers whose production relies on natural gas.
- The agriculture sector need to increase the agri-tech best practices towards regenerative farming, thus reducing the use of pesticides and fertilizers, development of machinery and processes and planning tools to determine key risk factors and support strategic decisions are needed.
- The utilization of space assets and digital tools can address those challenges and help producers assess the economic costs of best practices and optimize the planning of regenerative farming approaches to improve productivity.

Supply chain

- Key supply chain systems have suffered severed disruptions and unprecedented stress due to the pandemic that brought to light previously unseen vulnerabilities in the supply chain management systems.

- Current war conflict is having far-reaching ramifications for many supply chains, for example, there are immediate consequences for the transport of goods, not only the fuel raising prices, but also in looking for alternative routes outside of dangerous territories. This is causing port congestions, shipping delays and container shortages.

- In the short- and medium-term, it is compelling for the organizations to start re-planning their supply chain strategies to become more resilient, such as decrease the dependency on foreign supply. Another key element is the transparency and traceability throughout the supply chain, to increase coordination efforts across the involved players.

Space and Digital Technologies

Earth Observation can be used:

- provide imagery enabling services such as mapping, risk detection;
- support assessment of environmental impact and bankability of renew energy plants
- Advanced GIS for spatial information management, monitor risks along supply chain

Satellite Navigation can be used:

- Tracking and tracing vehicles and goods;
- Ubiquitous high accuracy PNT technologies to support accurate seamless positioning provided by GNSS and 5G.

Satellite Communications can be used:

- Enabling M2M communication / IoT communication for in-situ sensors;
- Provide communication for other imagery platforms, such as RPAS.
- Support tracking and trace solutions to optimise supply and logistic processes.

Mark Granaghan

Vice President of Integrated Grid
EPRI

Electric Power Research Institute

EPRI and ESA Collaboration

Accelerating Clean Energy Solutions

Mark McGranaghan (mmcgranaghan@epri.com)
Anne-Lise Laurain (allaurain@epri.com)

13 September 2022

EPRI's Mission

Advancing **safe, reliable, affordable and environmentally responsible** electricity for society through global collaboration, thought leadership, and science & technology innovation.

- **Independent**
- **Non-Profit**
- **Collaborative**

Nuclear

Environment

Generation

Power Delivery and Utilization

EPRI and ESA Cooperation

- Smart Grid
- Resilience of grid and communications infrastructure
- Grid and asset monitoring
- Vulnerability to disturbances
- Wildfire risk
- Restoration support
- Load and EV forecasting
- DER integration
- Renewables forecasting and management
- Geomagnetic disturbance prediction and response management
- Circular economy – energy models

EPRI ELECTRIC POWER RESEARCH INSTITUTE

TECHNOLOGY INNOVATION

EPRI STRATEGIC ENGAGEMENT

Leveraging space applications for advancing environmentally responsible innovation in the electricity sector

A collaboration between EPRI and the European Space Agency (ESA)

There is a wealth of knowledge and technology in the space sector with potential applications that cut across many aspects of the energy system from power generation, to electric grid design and maintenance, real time control and forecasting, and efficient energy use. Many of these applications are becoming more critical because climate change is challenging the resilience of the electric system and electrification objectives provide opportunities to optimise new investments. Historically, the space sector has been a leader in non-carbon power generation as it was necessary for sustaining life during space missions. For instance, the successful employment of solar panels on spacecrafts precedes their use on homes by about 15 years [1]. Similarly, decades of knowledge about prioritizing energy conservation in space is transferrable to the current quests for energy efficiency on Earth [2].

The Electric Power Research Institute and EPRI Europe DAC (collectively, EPRI) and the European Space Agency (ESA) have signed a Memorandum of Intent to investigate space applications for advancing environmentally responsible innovation in the electricity sector. Specifically, ESA has expertise in space assets and their applications which are considered essential to future electricity systems. This collaboration between ESA and EPRI will actively pursue pre-operational solutions from space technology in the energy sector and help deepen knowledge across the two organisations.

[1] John Perlin. *From Space to Earth: The Story of Solar Electricity*. United Kingdom 1999.

[2] ESA, "Space Energy: How space technology can help us on Earth." [Online]. Available: http://www.esa.int/Enabling_Support/Preparing_for_the_Future/Space_for_Earth/Energy/Space_Energy_How_space_technology_can_help_us_on_Earth

EPRI engages with a wide variety of research organisations, academic institutions, industry organisations, and other groups to coordinate research activities, support technology transfer, and work to apply research results. These collaborative engagements enable EPRI research to keep pace with the rapidly changing energy industry. Each engagement provides EPRI with insights into unique industry challenges and pathways to solutions. This brief aims to highlight the potential value this engagement can bring to EPRI, EPRI members, and society.

https://www.epri.com/research/products/000000003002020720

incubatenergy labs

Open innovation program linking startups in the IncubatEnergy network with utilities to demonstrate and scale innovations in decarbonization, electrification, grid modernization and resilience.

HOST UTILITIES

and collaborators

Ameren
American Electric Power
Fortis Inc.
TVA
Xcel Energy
enel
Entergy
conEdison, inc.
FirstEnergy
Grupo Energía Bogotá
New York State of Opportunity. NY Power Authority
PG&E
PGE
Southern California Edison
SRP
vermont electric power company VELCO
nationalgrid partners

incubate:energy labs

IEL 2022

EU Coordination

EPRI ELECTRIC POWER RESEARCH INSTITUTE

entsoe

E.DSO

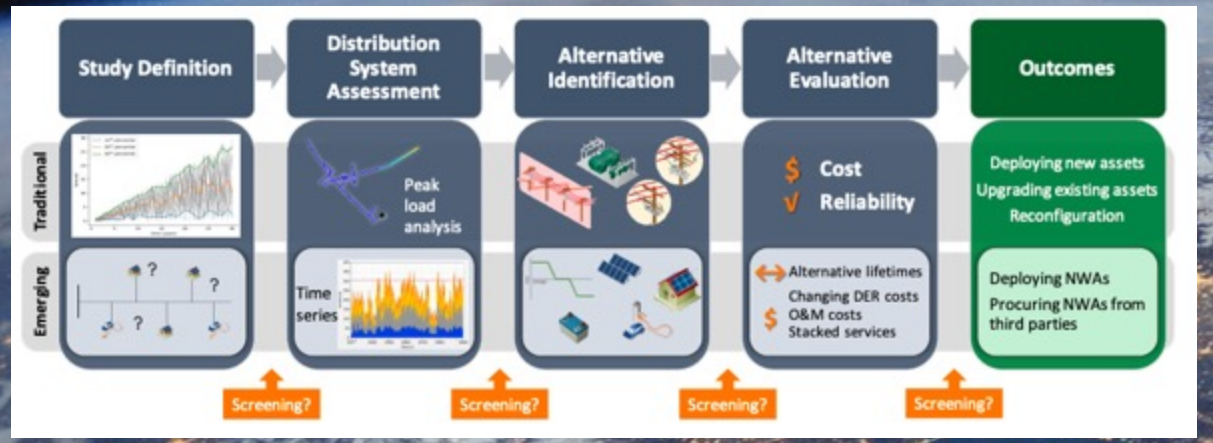
esa

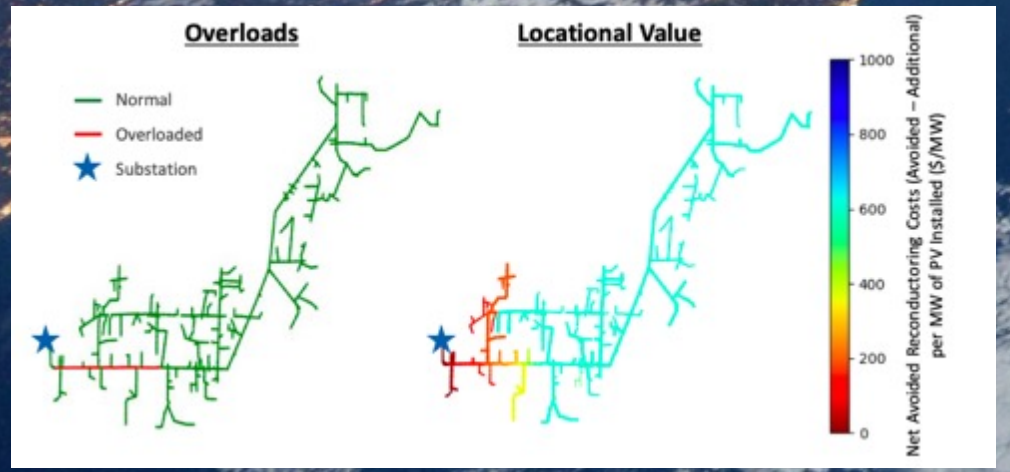
CLT CARBON LIMITING TECHNOLOGIES

eit InnoEnergy

EPRI

Example Use Case – Non-Wires Alternatives to Distribution Infrastructure Investment





Example applications -

EV charging infrastructure planning and management
EV charging communications infrastructure (5G)
Planning for community resources (PV, wind, storage, EV charging) – survey data
Microgrid management (especially important for developing economies)
Managing drone surveys for infrastructure planning and condition assessment
PV generation tracking and database
Wind generation tracking and status.
Wind and PV forecasting
Safety and security applications
Logistics - storm response
Community energy management (and Demand response) communications for community energy applications - both normal conditions and emergency
Flexibility as a commodity
Energy storage as a commodity
Efficiency as a commodity
Microgrids and backup generation for emergencies
Demand response as a commodity
Resilience in emergency conditions - local resilience
Climate change impacts forecasting and tracking

AI and Electric Power Summit

- Artificial Intelligence and data applications in general are key to the energy transition
- AI Summit builds on multi-year AI Initiative
- Followed by Innovation Forum where we will explore demonstration topics for Innovation challenges in 2023

PROCUREMENT APPROACH

1 ESA releases AO

2 Industry OP submission and early engagement with Delegations

3 ESA reply and consultation with Industry and Delegations for orientation

4 ESA recommendation on Full Proposal submission to Industry

5 Industry Full Proposal submission under existing implementation lines Letter of Support from Relevant Delegate(s) shall be provided with Full Proposal

Call open planned from 21 September 2022 to 21 January 2023 for OP submission

https://business.esa.int/funding/digital supply chain

ESA-STAR REGISTRATION

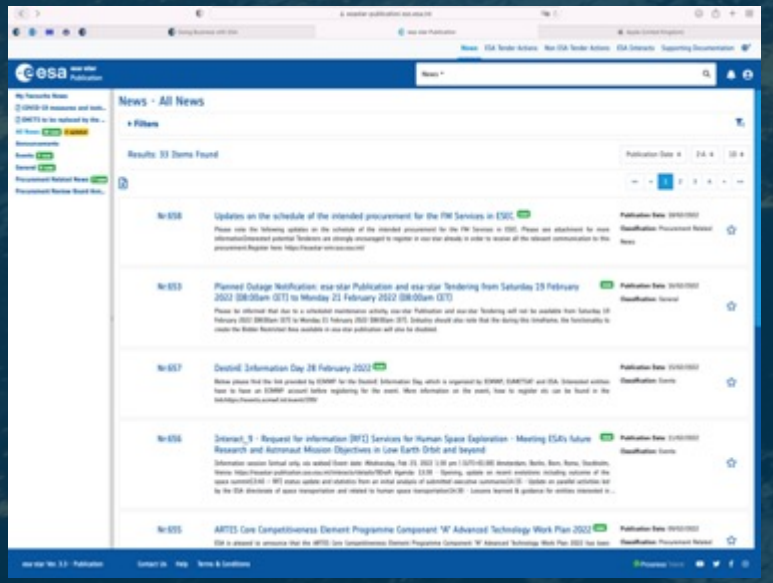
Registration (minimum ‘light registration’) on ESA-STAR Registration (https://esastar-emr.sso.esa.int)

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.

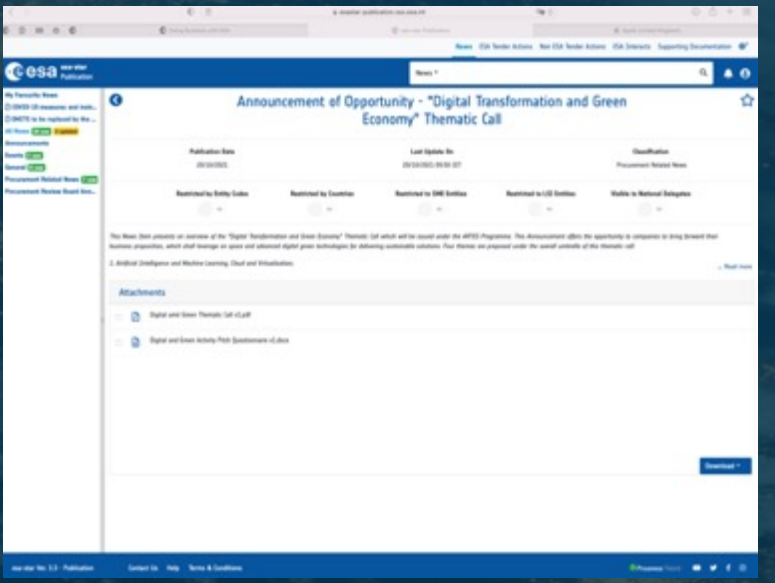
ACCESS TO THE THEMATIC CALL

1. Access the News on ESA-STAR Publication (https://esastar-publication.sso.esa.int/news/),
2. Find and click on the Announcement of Opportunity “Sustainable Digitally Connected Solutions for Commodities Crisis” Thematic Call. This will give you access to the AO main document and the Outline Proposal template.

Example:



1



2

THANK YOU!

For more information please contact:
Davide.coppola@esa.int
Roberta.Mugellesi.dow@ext.esa.int