Digital Supply Chain

Webinar - 12th January 2022

Davide Coppola, Roberta Mugellesi Dow - ESA

Alfred Schumm – WWF Germany

Fulvio Spelta, Giuseppe Leotta - ENEL

→ THE EUROPEAN SPACE AGENCY

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
Partner-led/Thematic Initiatives Section
European Space Agency

Agenda

- **ESA introduction**

- **Digital Supply Chain Announcement of opportunity**
  - Objectives
  - Examples of applications
  - Value of Space

- **WWF – Guest Speaker: Alfred Schumm**
- **ENEL - Guest Speaker: Fulvio Spelta, Giuseppe Leotta**

- **How to apply**

- **Questions & Answers**

→ THE EUROPEAN SPACE AGENCY

We Are ESA

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

→ THE EUROPEAN SPACE AGENCY

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.**"

Article 2 of
ESA Convention

→ THE EUROPEAN SPACE AGENCY

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 busin and create jobs.

→ THE EUROPEAN SPACE AGENCY

BUSINESS APPLICATIONS

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

Space Weather

Maritime

Healthcare

Transport

Earth Observation

Environment

Agriculture

Satellite Navigation

Media

Energy

Satellite Communication

Education

Aviation

Human Spaceflight Technologies

Financial

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

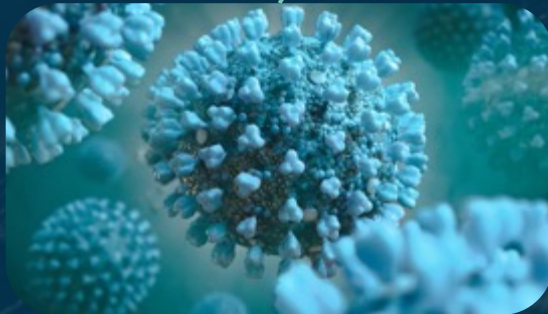Invested **€250m**

Over **1200 businesses**

THEMATIC VARIETY

Safety & Security

Environment & Wildlife

Transport & Logistics

Energy & Utilities

Health & Social Care

Agriculture, Forestry & Fishing

>600 Activities 2016-21

>75% SMEs
>33% Newcomers

→ THE EUROPEAN SPACE AGENCY

Next step… Digital Supply Chain

Roberta Mugellesi Dow
Partner-led/Thematic Initiatives Section
European Space Agency

Digital Supply Chain

➢ The pandemic has imposed stresses on all segments of the supply chain systems, particularly challenging for the delivery of sensitive goods, amongst which the pharmaceutical ones have exposed the vulnerability of the supply chain.

➢ At the core of the challenge is not only organizing the services that carry the sensitive goods, but rather making sure that every part of the supply chain is running, to avoid losses throughout the system and prevent delays that could damage the goods due to unstable temperatures.

➢ The Supply Chain needs to embrace the digital transformation, take advantage of digital technologies and manage the risks involved.

Digital Supply Chain: Benefits

- **Traceability**: the proliferation of IoT devices that produce real-time data allows for accurate traceability, monitoring and interventions.

- **Sustainability**: the availability of digital data and cloud computing enables the automation of processes and the optimization of resources leading to sustainable solutions.

- **Security**: in coordination with cybersecurity strategies, digital technologies such as blockchain can enable secure data-sharing and hinder tampering along the supply chain.

- **Risk mitigation**: particularly relevant for the insurance companies to significantly mitigate supply chain risks by enabling users to either take actions to prevent disasters or to respond to disruption by activating backup plans.

- **Efficiency of the delivery:** making sure that the goods are delivered on time by an improved collaboration amongst the different actors of the supply chain with the use of digital platforms and data visualization from digital technologies such as augmented reality and digital twin.

Digital Supply Chain : Announcement of Opportunity

The intended Announcement of Opportunities targets the development of services and products for supporting the digital transformation of the traditional supply chains, particularly in relation to sensitive goods transport. Among these, pharmaceuticals goods, vaccines, medical equipment, perishable or dangerous goods, luxury goods which impose specific logistics challenges.

Examples of use cases:

1. Connected supply chain of sensitive goods
2. Predicted demand in the supply chain
3. Automation of operations
4. Monitor the sensitive goods
5. Managing the risks

Call open planned on 21 February 2022

Digital Supply Chain: Use Cases

- **Use case 1 –** Connected supply chain of sensitive goods

  AI/ML to predict time of goods in motion and between transport modes keeping the related parties informed. Real-time tracking data to estimate the transportation performance, any delay in the delivery routes across all supply chain actors.

- **Use case 2 –** Predicted demand in the supply chain

  IoT combined with predictive analytics and AI/ML can monitor, collect and report information from the environment and reliably predict demand, recognize patterns, anticipate changes and optimize supply chain processes including distribution and warehouse planning.

- **Use case 3 –** Automation of operations

  Leveraging space data and digital technologies such as AI, ML, AR/VR and robotics can lower the operational costs of delivering goods and provide more reliable forecasts, analysis of trend data and better services to customers .

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Digital Supply Chain: Use Cases

- **Use case 4 –** Monitor the sensitive goods status

  By receiving real-time location and condition data from sensors on sensitive goods shipments en route, it is possible to continuously run data analytics monitoring sensitive parameters such as temperature and tilt, and other dynamic intelligence to manage and optimize distribution flows.

- **Use case 5 –** Managing the risks

  The digital supply chain, in particular of sensitive goods, needs to be able to respond to risks ranging from weather and natural disasters, to theft and counterfeiting, traffic and port congestion. By leveraging space and digital technologies and capabilities, such as sensors, robotics, automation and predictive analytics, the transparency and communications throughout the entire supply chain can increase.

Digital Supply Chain of Sensitive Goods: Space and Digital Technologies

The deployment of digital solutions integrated with terrestrial and space technologies, particularly 5G, indoor/outdoor PNT and AI is the opportunity to innovate the overall structure of the supply chain, moving towards digitally integrated supply chain services.

Earth Observation can be used:
- Monitoring changes in weather and atmospheric conditions;
- Advanced GIS for spatial information management.

Satellite Navigation can be used:
- Geo-referencing sensor data related;
- Ubiquitous high accuracy PNT technologies to support accurate and seamless indoor-outdoor 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.
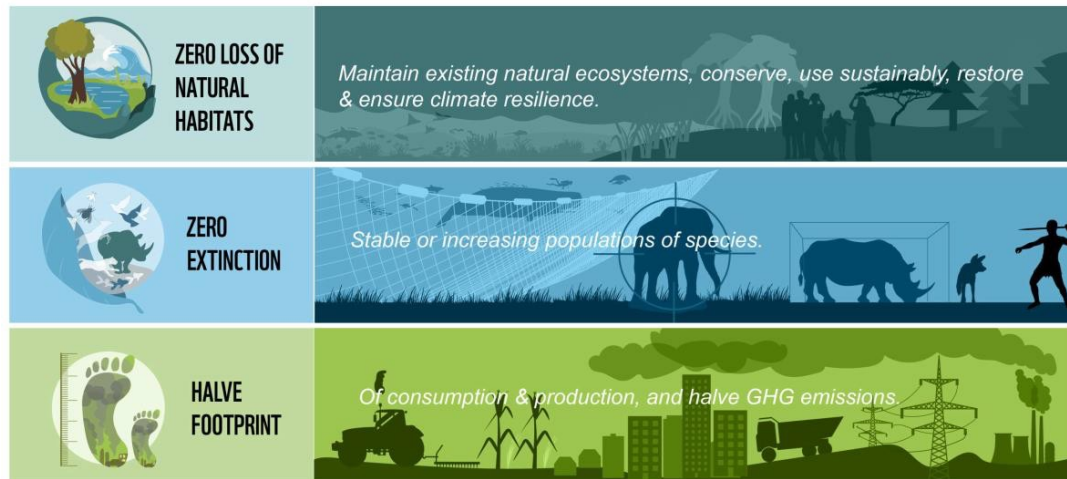
Cotton/Textile Supply Chain

12 January 2022

WWF NETWORK

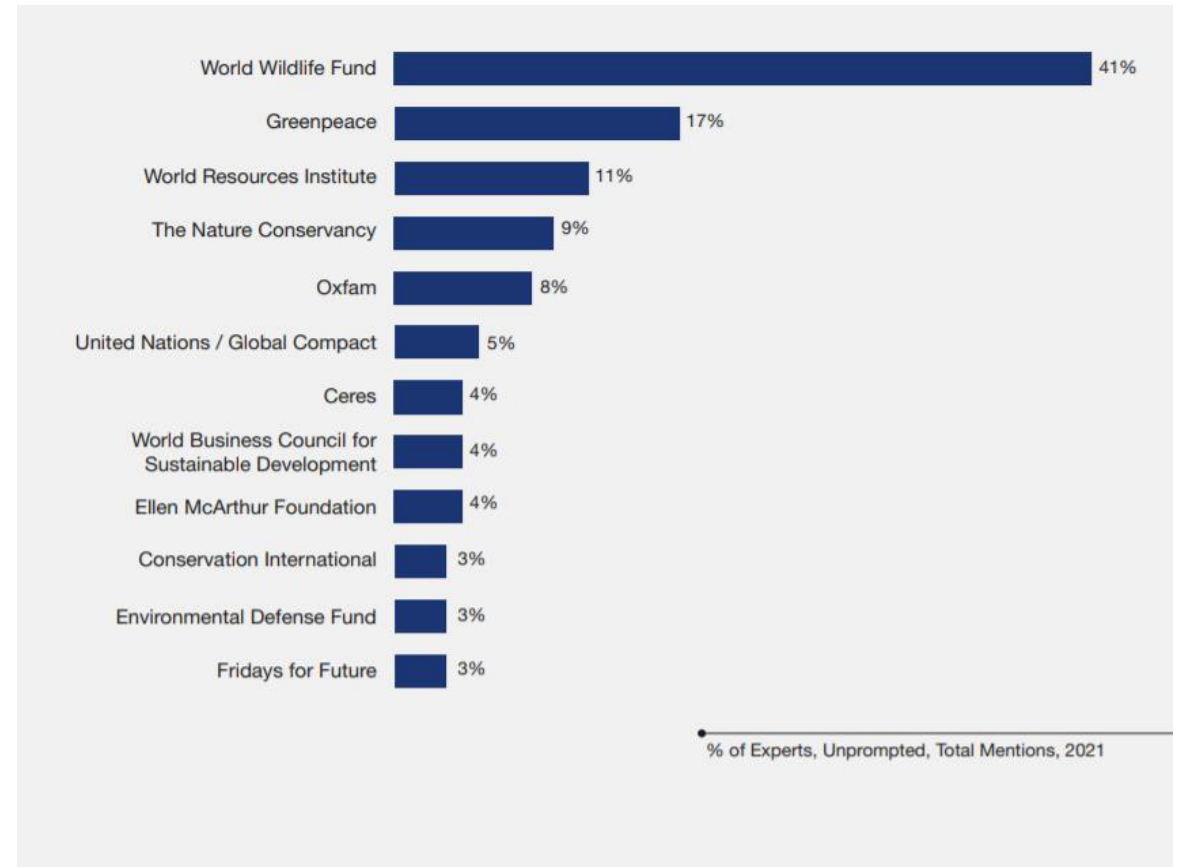For 60 years, WWF has worked to help people and nature thrive.

As the world's leading conservation organization, WWF works in nearly 100 countries.

Over 5 million supporters

Over 30 million social media followers

WWF is well recognized as a credible partner with companies!

Source: https://globescan.com/2021-sustainability-leaders-report/

Water Stewardship in WWF

WWF has a network of over 80 people globally working on water stewardship

Focus sectors:

Food & Beverage/Retail

Textiles & Apparel/Retail

Finance

+ Mining, Electronics, Pharmaceuticals

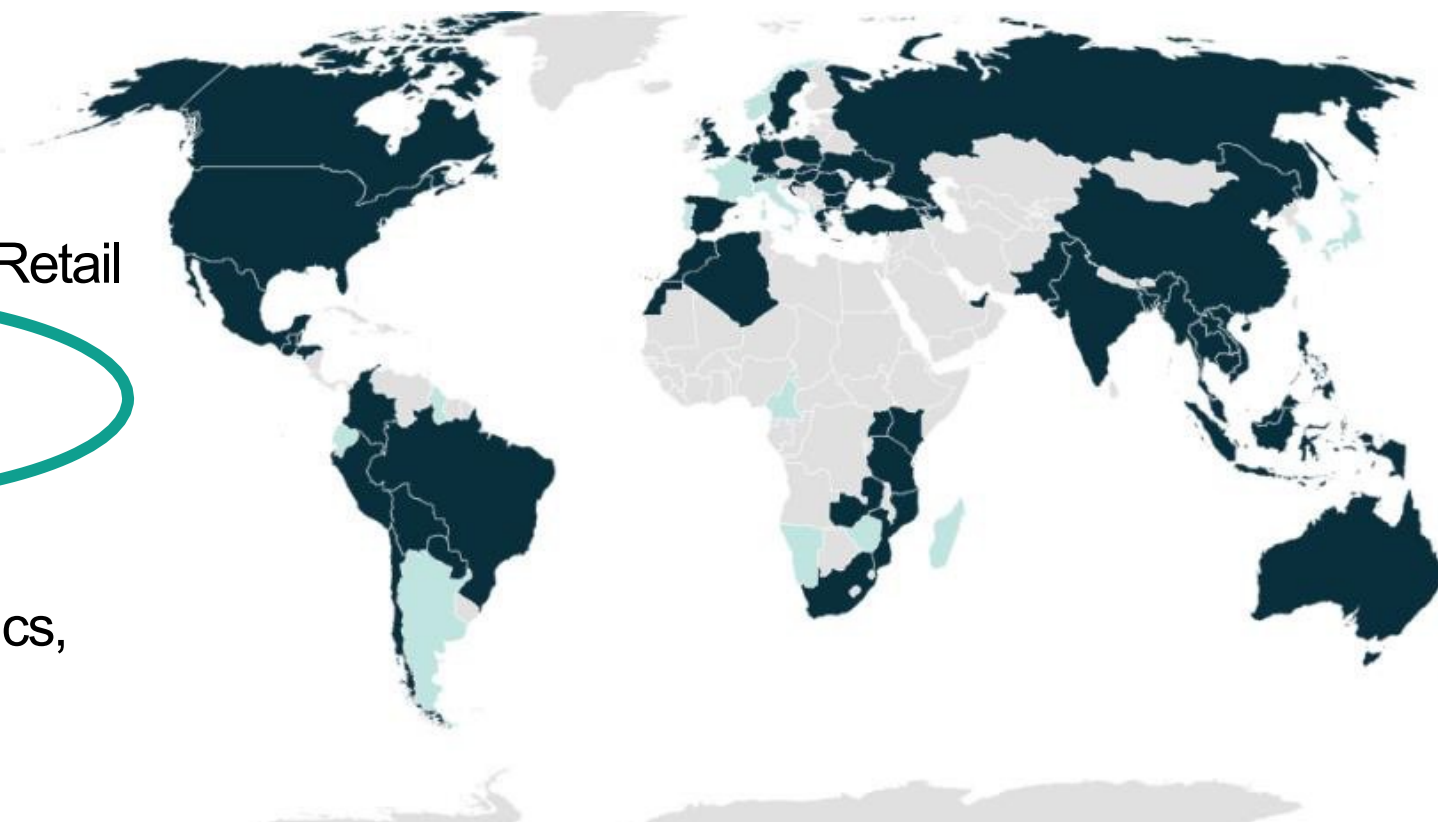**Areas of work:**

Partnerships (strategy & target setting)

Water risk

Basin collective action
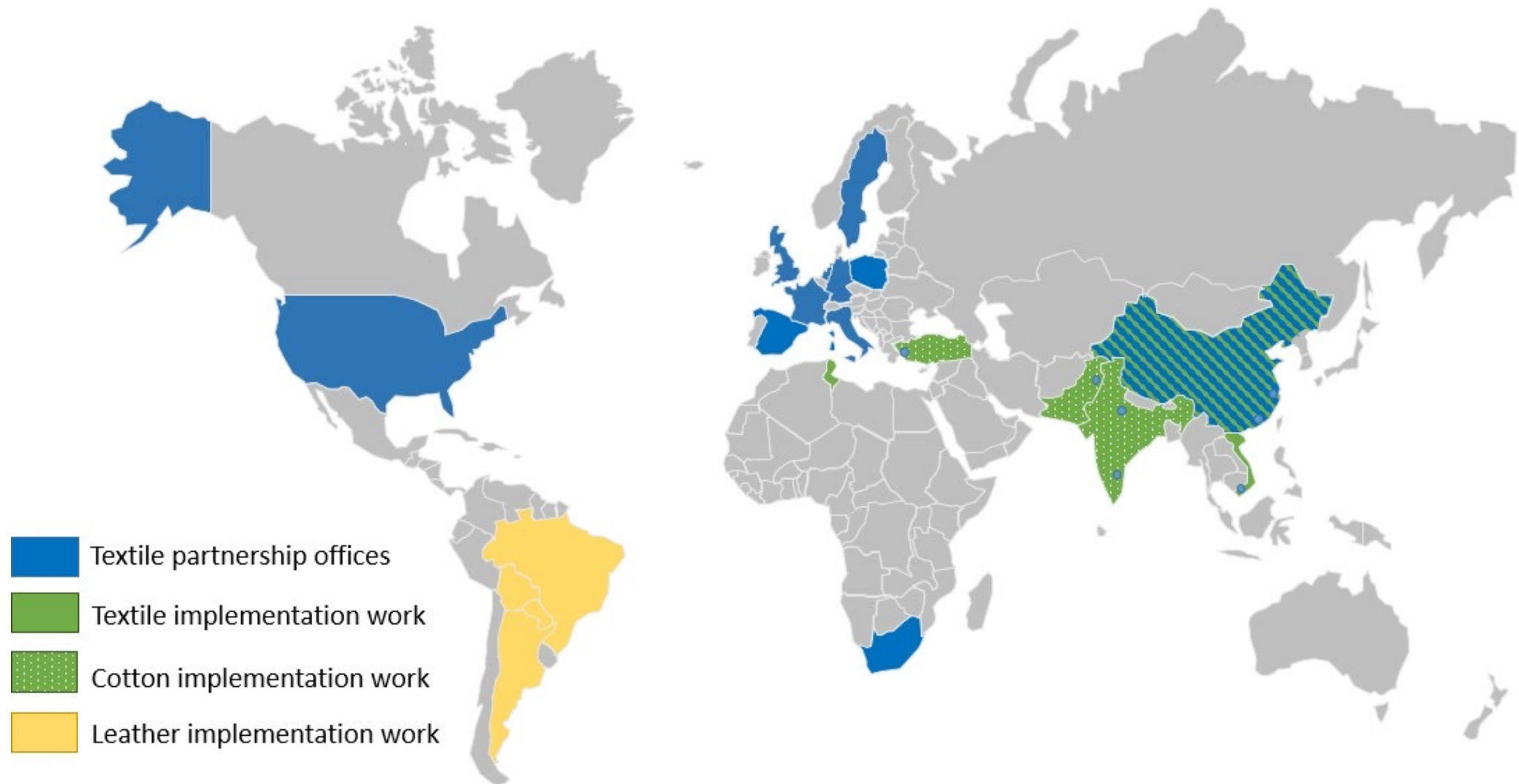
Policy engagement

Bankable water solutions

Guidance/research

■ **WWF Water Stewardship capacity**

■ **WWF capacity**

Source: https://globescan.com/2021-sustainability-leaders-report/

Textile work in WWF

Textile partnership offices
Textile implementation work
Cotton implementation work
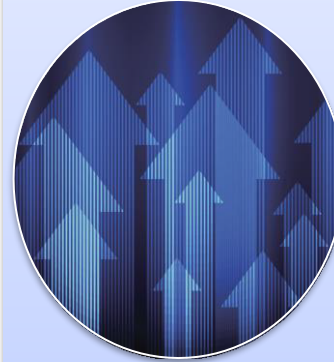Leather implementation work

COTTON IN NUMBERS

Accounts for roughly 25% of the global fiber supply of humanity's apparel [2]

75% is produced in India, China, the United States, Brazil, and Pakistan [1]

Employs 100 and 150 million people globally.

2% of the world's population depend on cotton for their cash incomes [1]

Cotton area is projected to expand by 1% by 2030 while yields are projected to increase by 10% compared to 2020 [1]

The increasing water demand and use of pesticides/fertilizers imply enormous impacts on ecosystems.

1 OECD-FAO Agricultural Outlook 2021- 2030
2 Textile Exchange (2021) Preferred Fiber & Materials Market Report 2021

Cotton production

Given the sector's predicted increase in the coming decade, it is important to understand the **impact of different agricultural practices on the landscape and ecosystems** and how they can support the fight against global challenges, such as climate change, freshwater depletion and biodiversity loss.

WWF Pakistan

CURRENT CHALLENGES

GREEN WATER FOOTPRINT FOR COTTON
BY PROVINCES OF PAKISTAN, INDIA, AND CHINA

(1) Many companies cannot identify their specific sourcing regions

(2) Increasing demand for different production systems, but there is little knowledge about the impacts of these systems.

(3) Scaling up approaches that benefit smallholders productivity, while protecting the environment.
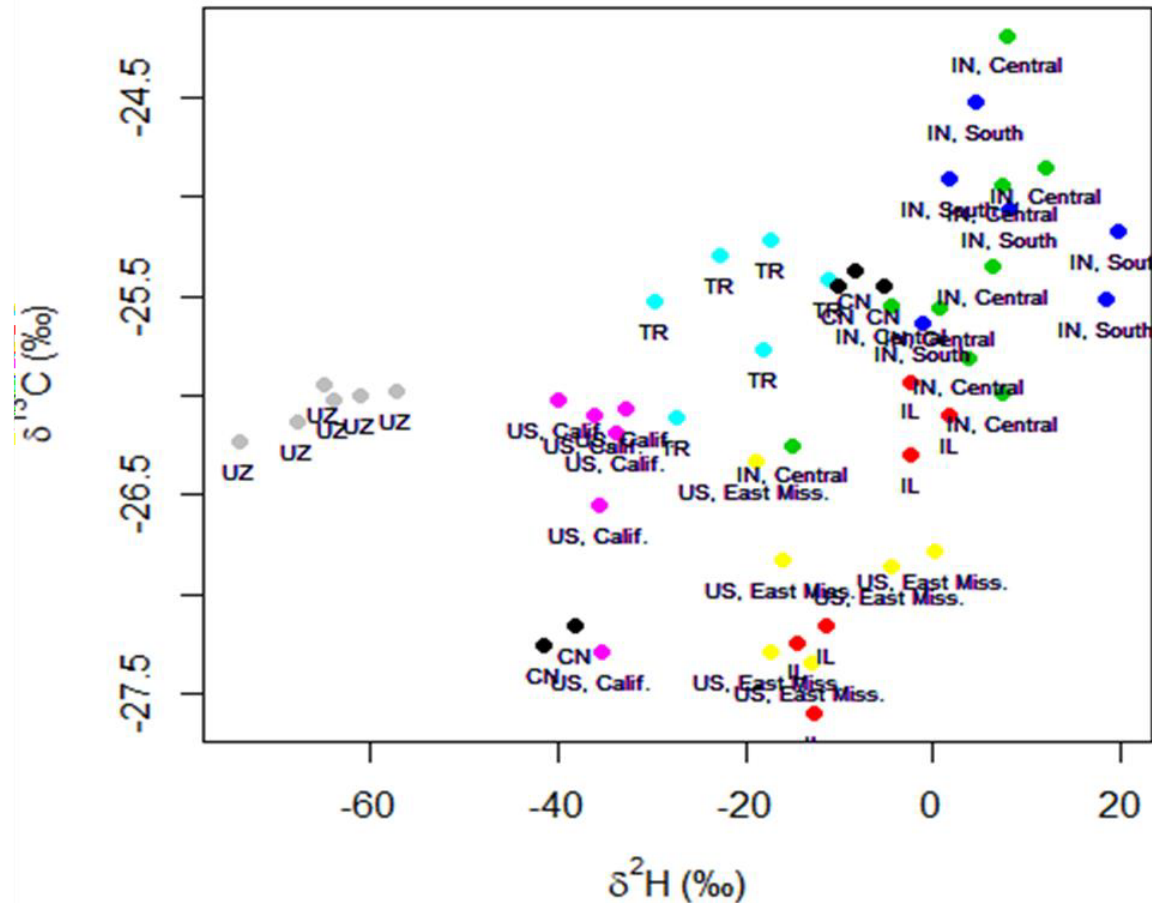
Challenge #1: Transparency in cotton sourcing regions

Brands' knowledge of supply chain is strongest for Tiers 0, 1, and, sometimes 2.
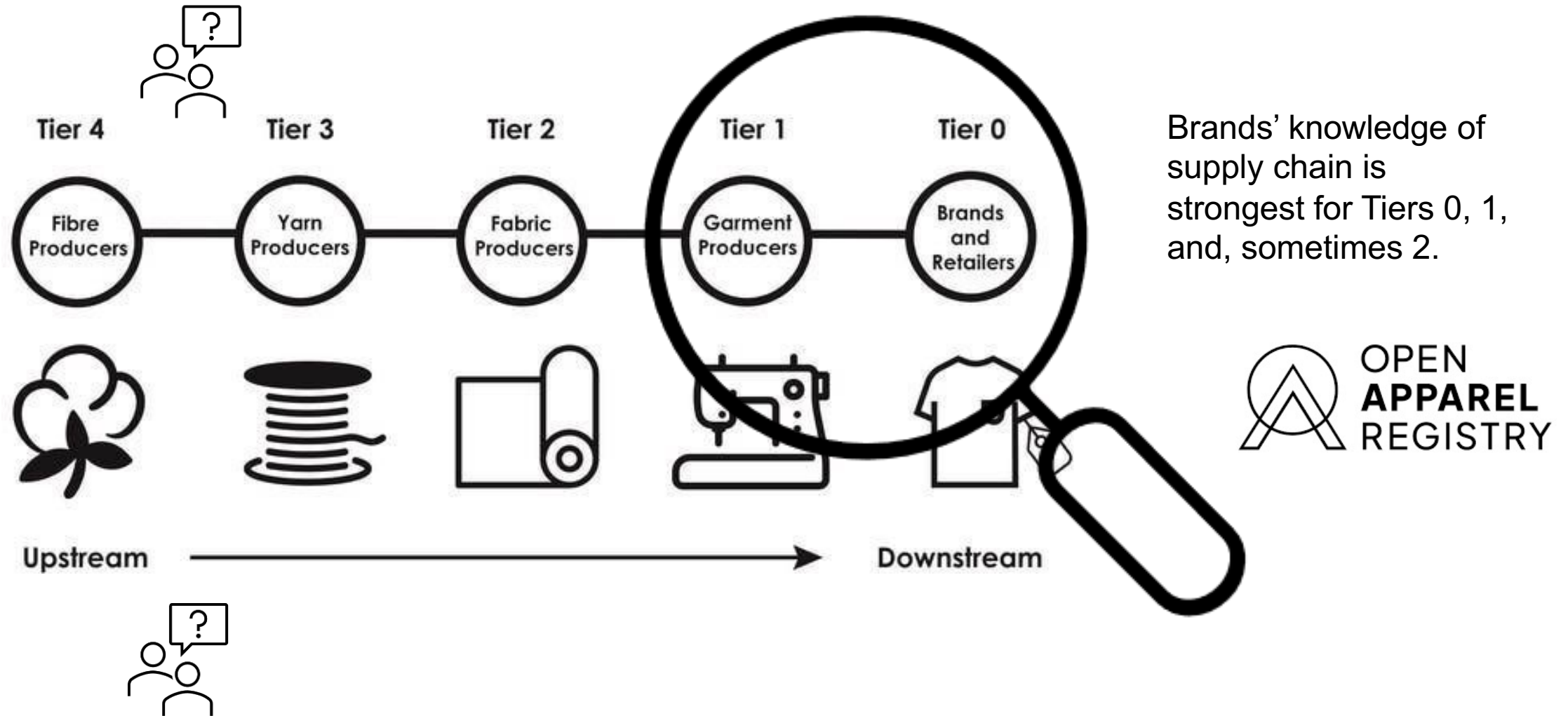
Some examples of the use of blockchain technology can be found at:
https://unece.org/trade/traceability-sustainable-garment-and-footwear

Challenge #1: Transparency in cotton sourcing regions
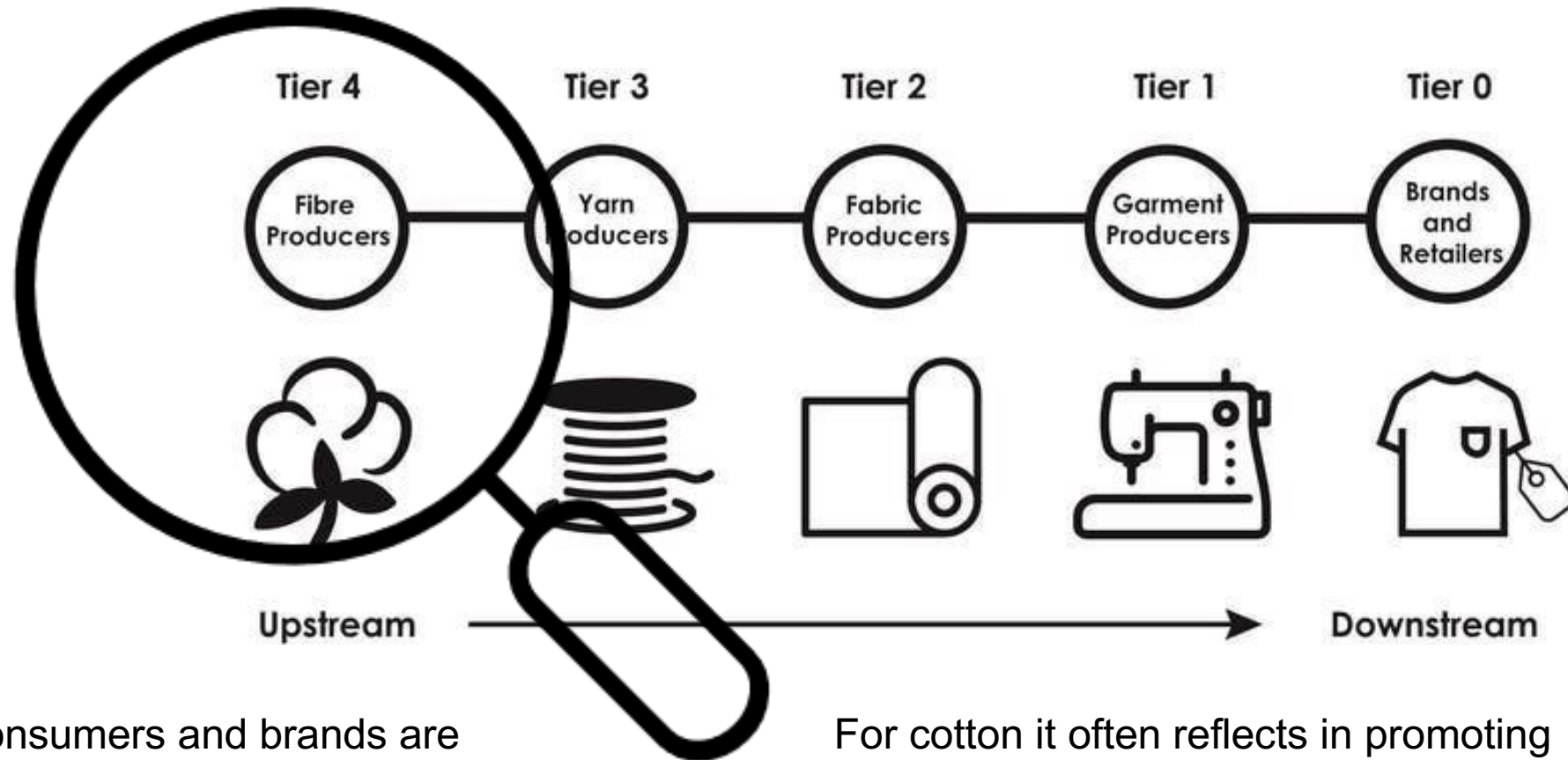
WWF "Textile Tracker"

The aim of this project is to investigate whether original chemical signatures of cotton are preserved across common textile processing steps in order to ensure unambiguous provenance without additional marking efforts

Traceability issues: Understanding cotton sourcing is a major challenge for many companies; we're bringing isotopic tracing to bear on this, but can we link it more broadly?

Challenge #2: Evaluating impact at scale

Tier 4 — Fibre Producers
Tier 3 — Yarn Producers
Tier 2 — Fabric Producers
Tier 1 — Garment Producers
Tier 0 — Brands and Retailers
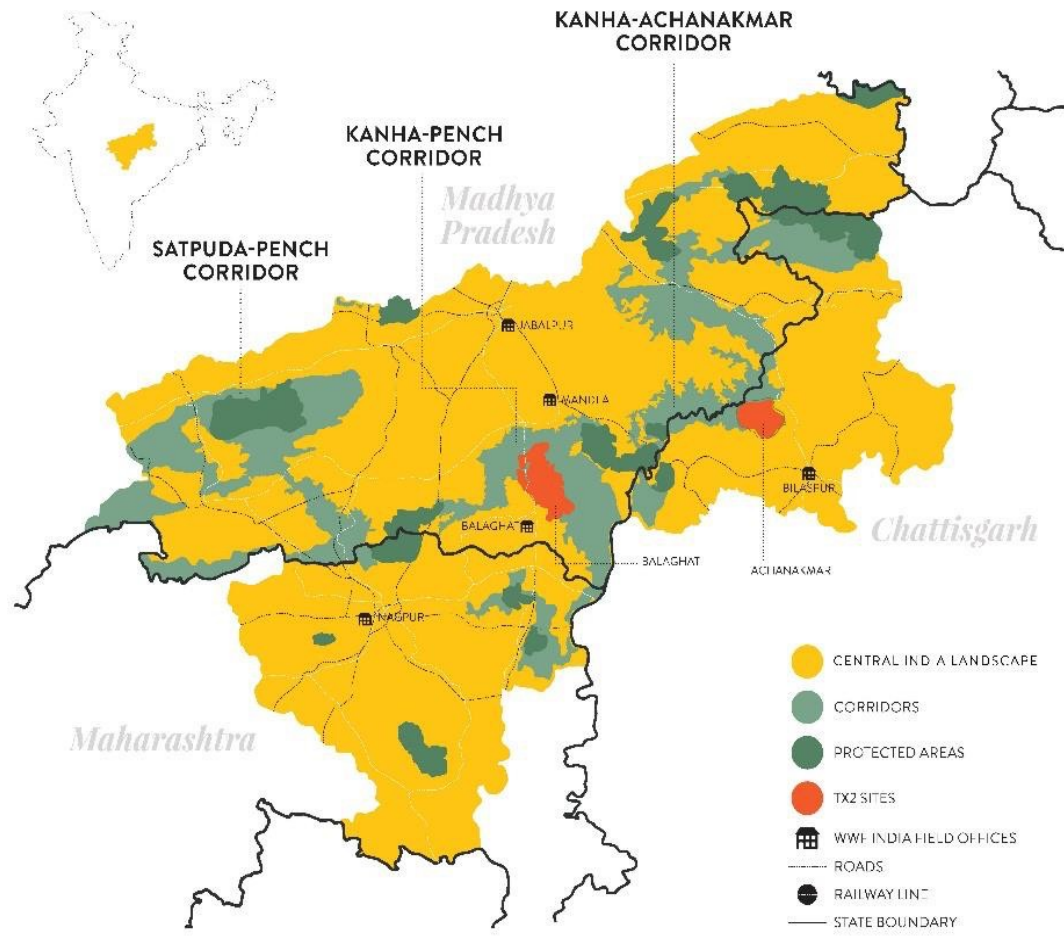
Upstream → Downstream

Consumers and brands are starting to ask more information about the sustainability of fibers' sources.

For cotton it often reflects in promoting changes in agricultural practices, in order to be able to more "sustainable" cotton (certified).

Challenge #2: Evaluating impact at scale

Example: WWF Regenerative, ecologically and economically viable agriculture (REEVA) in the Satpuda Pench Corridor

How to measure sustainability and impacts of standards at the landscape level?
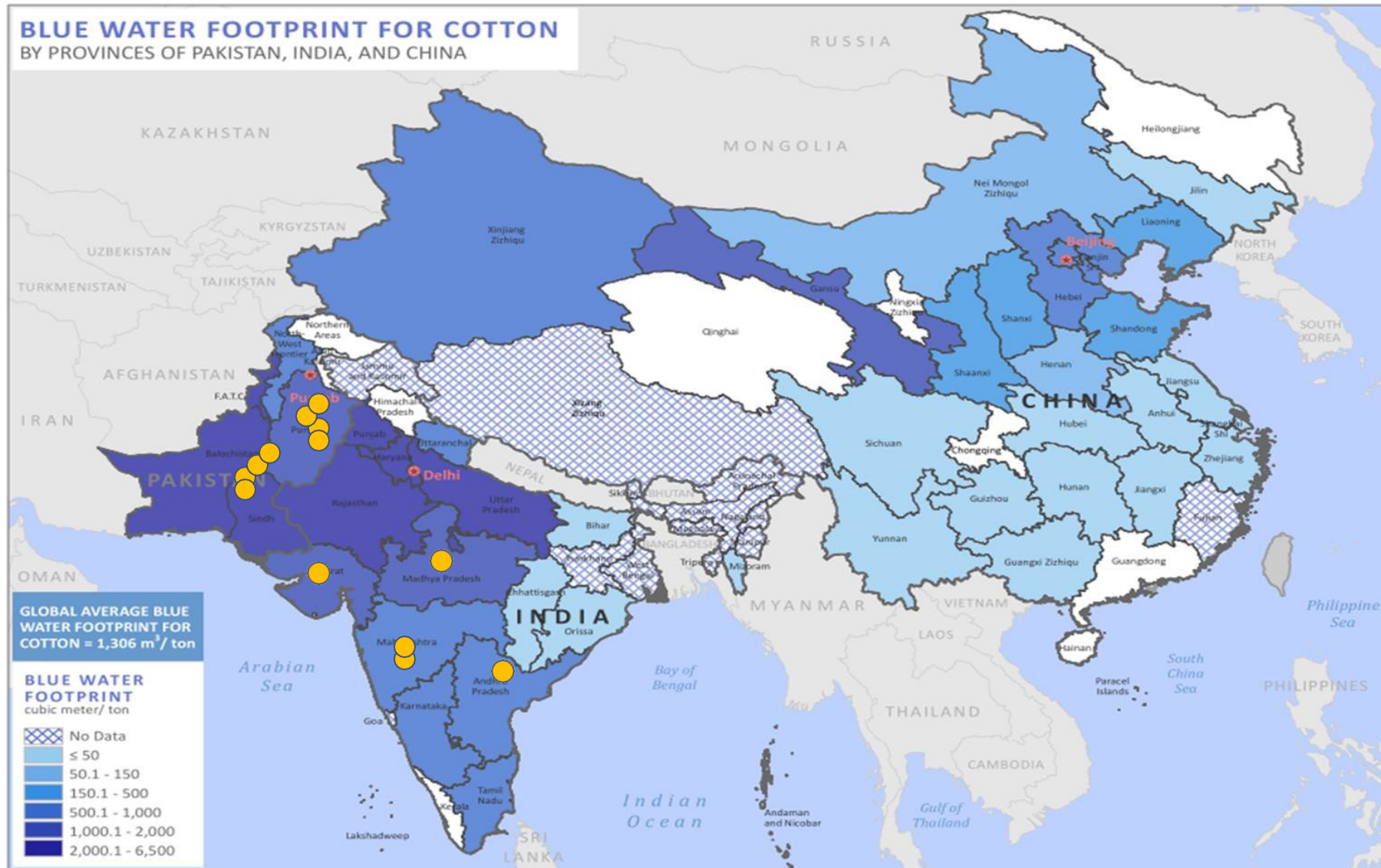
CONVENTIONAL COTTON

ORGANIC COTTON

REGENERATIVE COTTON

OTHER PRACTICES

Impact/performance issues: Can we leverage EO and other approaches to evaluate the performance of management systems (and other interventions) at scale (lots of growers at once)? As well as at scales (cumulative impacts of growers across a basin)?

Challenge #3: Scaling issues

BLUE WATER FOOTPRINT FOR COTTON
BY PROVINCES OF PAKISTAN, INDIA, AND CHINA

GLOBAL AVERAGE BLUE
WATER FOOTPRINT FOR
COTTON = 1,306 m³/ ton

BLUE WATER
FOOTPRINT
cubic meter/ ton

- No Data
- ≤ 50
- 50.1 - 150
- 150.1 - 500
- 500.1 - 1,000
- 1,000.1 - 2,000
- 2,000.1 - 6,500

Data Source: Mekonnen, M.M. and Hoekstra, A.Y. (2010) The green, blue and grey water footprint of crops and derived crop products, Value of Water Research Report Series No. 47, UNESCO-IHE, Delft, the Netherlands.

Small farmers depend on cotton for living. India and Pakistan have yields lower than other countries. Better information system can help farmers to take informed decisions on their practices.

WWF field-level cotton work

Challenge #3: Scaling issues

Example: WWF India Cotton Doctor app

This app. alerts farmers about weather vulnerabilities and assists them in making informed and effective decisions on cotton growing. The app provides information on weather forecasting based on AI and soil moisture, and has packages on pest and cotton diseases control, and groundwater forecasts.

Results:
- 50 villages benefitted from Android app
- 19.5M timely advisories & forecasts
- Yields were higher than the average of estimated yield.
- 2019 year shows better soil moisture than 2018 despite less rainfall.

Duration: 2017 – on going

Target groups
 41,000 cotton farmers in Jalna and Badnapur blocks

Scaling issues: How to leverage 4IR approaches allow us to potentially scale up support to farmers at global level.

From geospatial data to scaling conservation impact and social wellbeing of rural communities

Leveraging EO & AI to:

- trace & create traceability for agricultural commodities (#1)
- evaluate status (& baselines) & create transparency of production practices (#4)
- evaluate impact (change) of interventions (#5)
- identify conservation needs & social potentials (#5)
- identify circular use & raw material saving potential (#2,4,5)
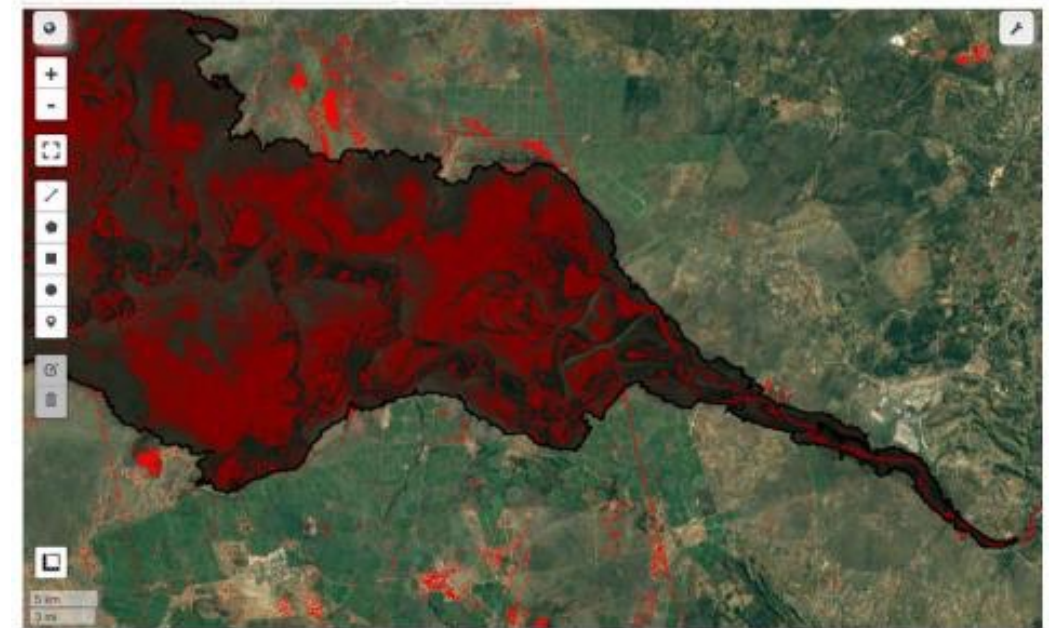
For more information:

alfred.schumm@wwf.de
Angela.ortigara@wwf.de

ENEL

Fulvio Spelta, Giuseppe Leotta - ENEL

Construction Advancement Monitoring Solar Construction Sites

Enel Green Power and Thermal Generation

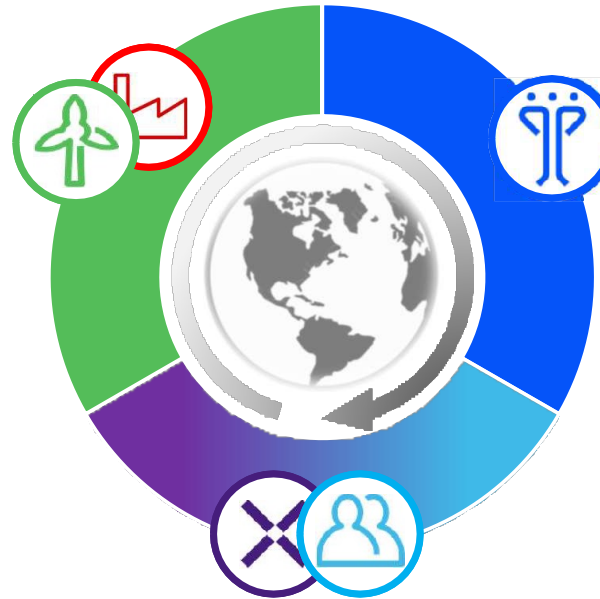Version 1.1 – Jan 12th 2022

The Enel Group

Enel business

Global Power Generation

Accelerates a sustainable energy transition, increasing **renewables** capacity growth and **decarbonizing** our fleet

Enel X

Enables the energy transition boosting electrification and decarbonization of customers, by providing **innovative services** and **system flexibility**

Global Infrastructure & Networks

Guarantees reliability and quality of service in the energy supply, through **efficient**, **resilient** and **digital** networks
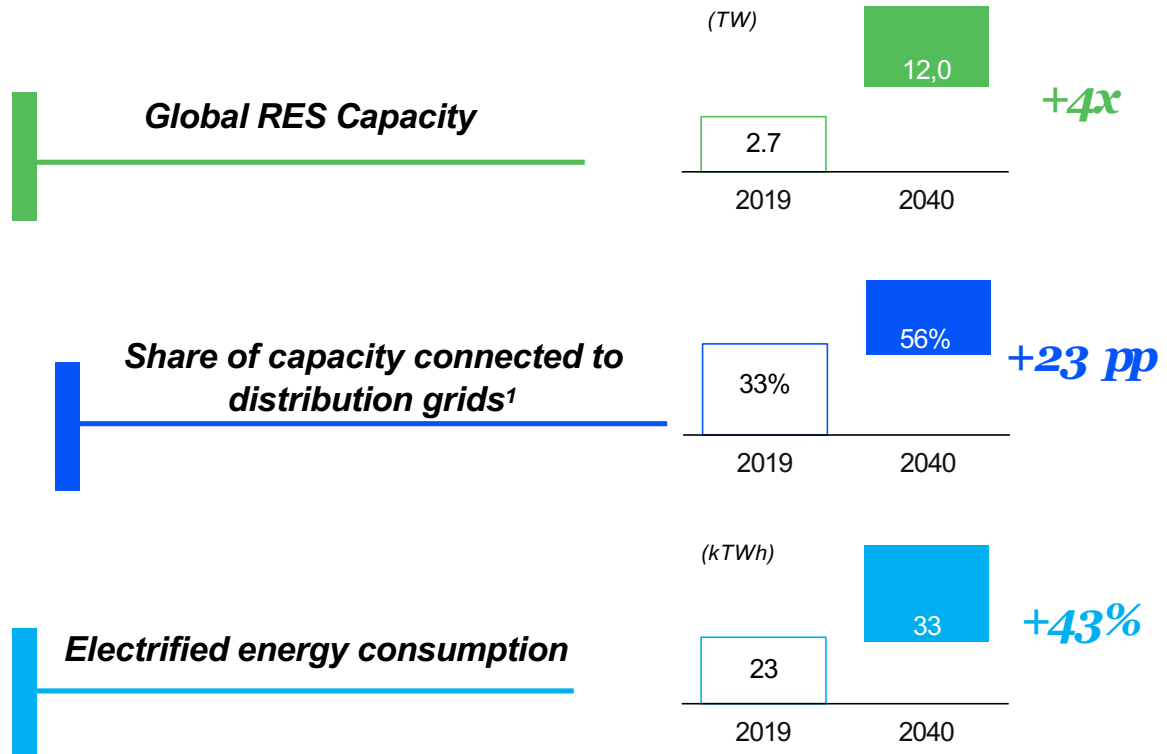
Global Energy & Commodity Management

Optimizes the Group margin as a single portfolio, finding its **best balance**

Retail

Increases customer value through commodities and "beyond commodities" services also thanks to **customer satisfaction and experience** improvement

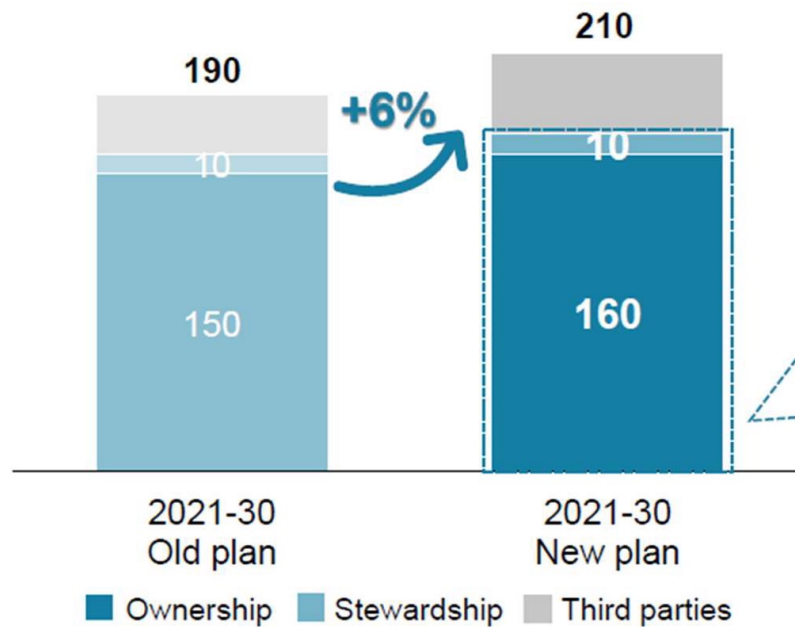# The energy world will be completely transformed over the next decades…

Global RES Capacity

(TW)

12,0

2.7

2019   2040

+4x

Share of capacity connected to distribution grids[1]

56%

33%

2019   2040

+23 pp

Electrified energy consumption

(kTWh)

33

23

2019   2040

+43%

Source: IEA, World Energy Outlook 2020, Sustainable Development Scenario | Grid data from BNEF, NEO2020, Europe Figures
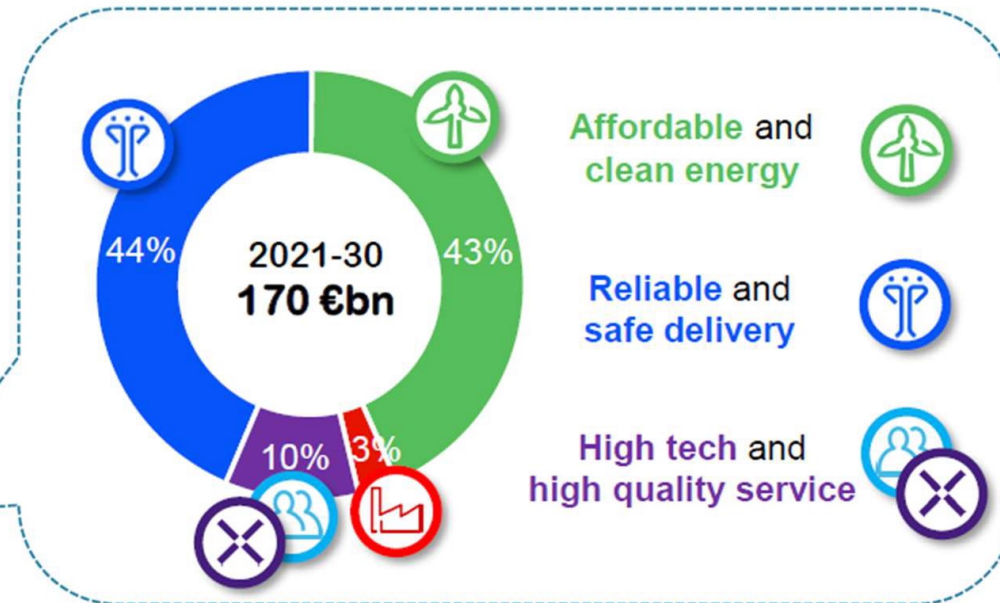1. Europe

4

An investment plan tailored to address customers' needs…

Total investments[1] (€bn)

190

10
150

+6%

210

10
160

2021-30
Old plan

2021-30
New plan

- Ownership
- Stewardship
- Third parties

Capex by business line and customers' needs

44%   2021-30
         170 €bn   43%

10%   3%

Affordable and clean energy

Reliable and safe delivery

High tech and high quality service

Full Strategic Plan 2022-2024 available on enel.com

enel
Green Power

Foster renewable penetration…

Capacity evolution (GW)

+84 GW

2020	2021E	Capacity additions	2030

- BESS
- RES

Additional capacity by geo and tech[1]

~84 GW

43 · 9 · 32

Gross Capex 2021E-2030[1]

Maintenance · BESS · RES growth

~70 €bn

4 · 6 · 60

~65 €bn development
IRR-WACC 150 bps
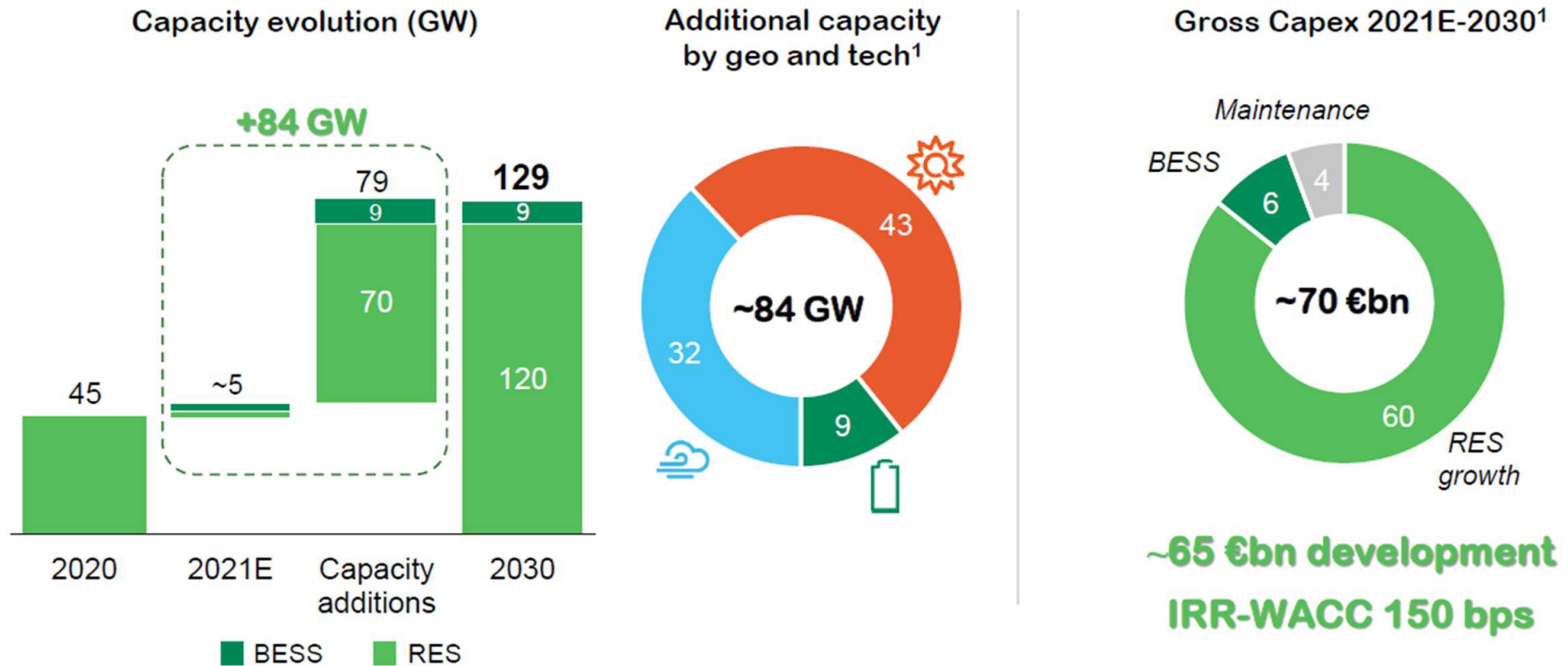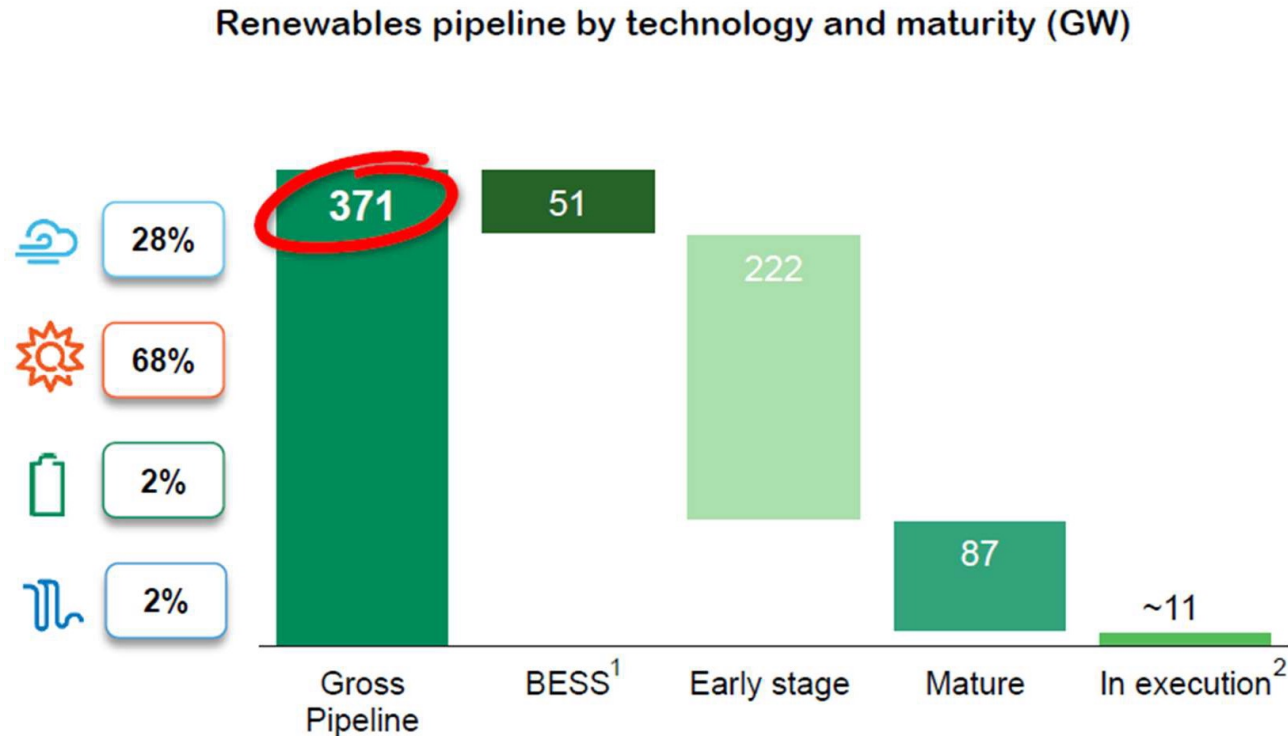
1. It includes 5 GW capacity in 2021E and 6.6 €bn capex in 2021E.

…supported by the largest pipeline in the industry

Renewables pipeline by technology and maturity (GW)

371 — Gross Pipeline

51 — BESS[1]

222 — Early stage

87 — Mature

~11 — In execution[2]

28%
68%
2%
2%

1. It includes storage for around 40 GW in Early Stage and around 11 GW in mature pipeline; 2. It includes 0.7 GW of BESS capacity in execution

Extensive pipeline secures growth ambitions, covering our future targets towards 2030
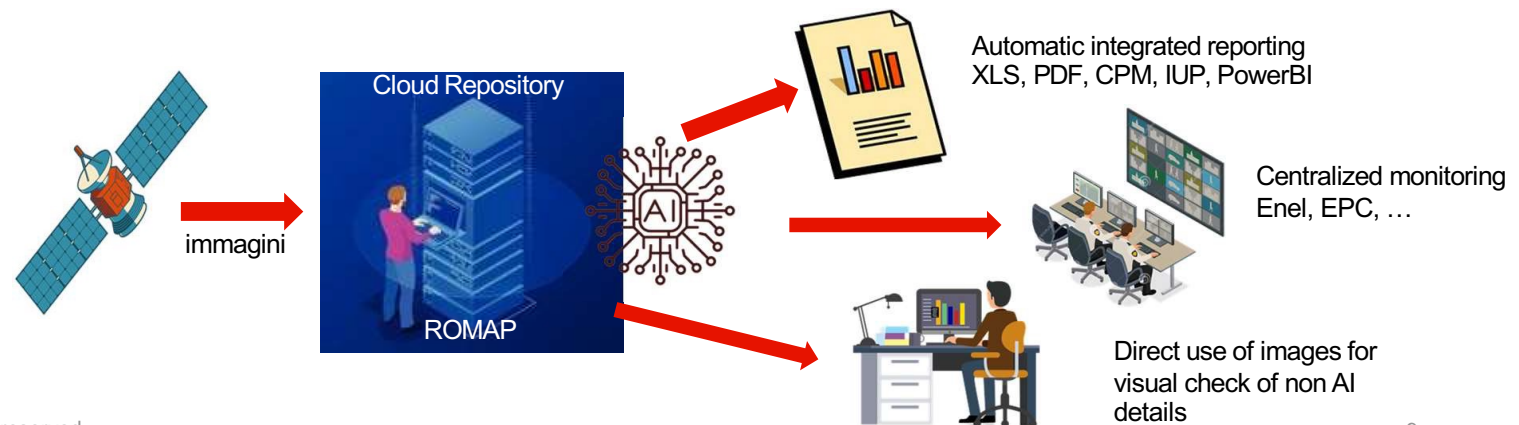
The Use Case

8

Satellite Monitoring

- Value vision

Monitoring using drones is based on in-field driven activities so it can be done «field-up» and can't be done on full EPC sites without a strong collaboration by the partner.
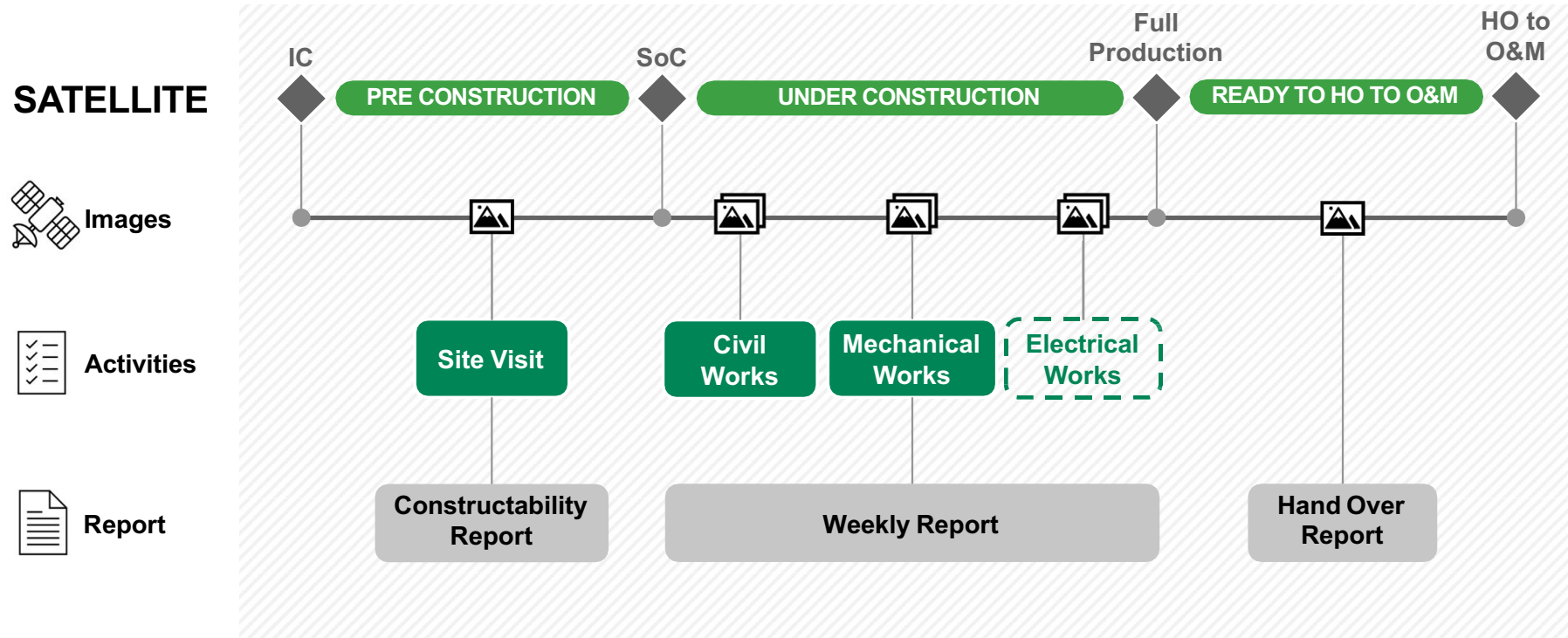
Using satellite and AI a «true remote monitoring» system can be built.

We can set the goal to have a centralized and automatic «control tower» like a «monitoring scada system» that can automatically extract KPIs, share them with Enel and partners teams but creating «alarm» too, when the planned KPIs are not reached.

Cloud Repository

ROMAP

immagini

Automatic integrated reporting XLS, PDF, CPM, IUP, PowerBI

Centralized monitoring Enel, EPC, …

Direct use of images for visual check of non AI details
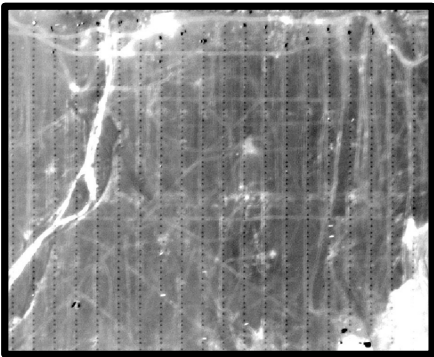
9

Satellite Monitoring

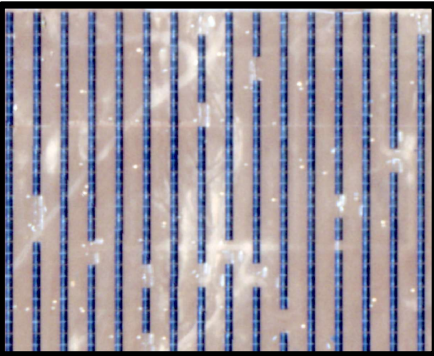Flow

10

Site Remotization

Satellite for construction monitoring: Solar Plant use cases
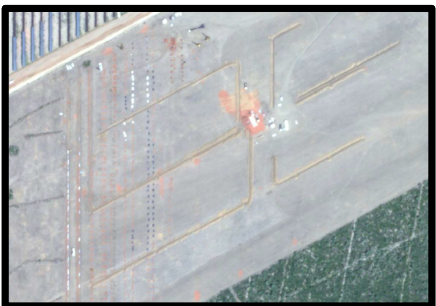

Mechanical Works

Poles

Trackers

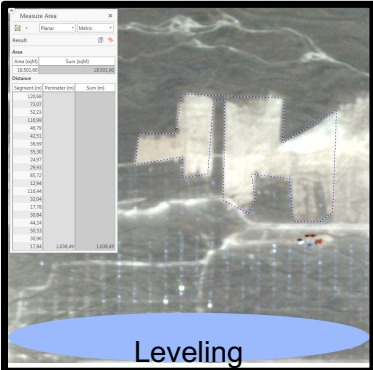**Electrical Works**

Conversion Unit

Trenching

Logistic

Pallet

Civil Works

Leveling

Road Execution

Drainage basins
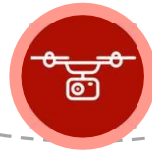
Site Remotization
Main features needed for Solar Plant

enel
Green Power

PROGRESS REPORTING
Automatically report installation of objects such as piles, structures and modules.

COMPARE
Compare installation progress against images taken on previous dates from the same site

CONTROL
Support site controls activities by historical data repository

Red points: Piles Installed

Orange lines: Trachers/structures Installed

Yellow Lines: Modules Installed

Blue Lines: Trenches opened

PILES COUNTING (piles/week)

2634 Piles installed

Pile number
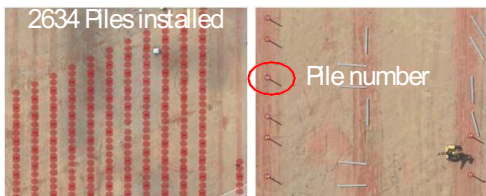
PANEL COUNTING (piles/week)

21,510 Panels installed

Panel number

SWIPE-COMPARING PROGRESS MONITORING

TRACKER ASSEMBLY (trackers/week)

3D View

TRENCHING

Trench excavation

Week 20   Week 23

Architecture

Power BI

Integrated E&C Portal

Project status dashboard

E&C Global Platform

Data Driven Analytics

Project

**Project schedule updating
(on weekly basis)**

**Construction data repository for analytics
(on weekly basis)**

Tools used by E&C Units

**data integration by contractors
(e.g. Manhours - machineries, activities
not available by AI)**

Site

Contractor

CPM

enel
Green Power

**Data check and validation
by Enel site Team**

Activity progress for main activities
Automatic data filling in CPM
(on weekly basis)

AI Platforms

13

Use case details

Metrics

1. Mechanical Works:
1.1. Metal piles: number, percentage.
1.2. Trackers structure: number, percentage.
1.3. PV modules: number and percentage.

2. Electrical Works:
2.1. Trenching: Length, Percentage
2.2. Trenching Backfill: Length, Percentage
2.3. Conversion Unit (Cabin which host the inverters in charge of the DC to AC conversion): done/not done, percentage
2.4. Transformer CU: done/not done, percentage (if transformer is installed outside the CU)

4. Site Logistic:
4.1. Pallet positioning: number/sub area
4.2. Coil medium voltage cable: number per sub area

3. Site Works:
3.1. Conversion Unit (Standard foundation):
3.1.1. Excavation of Foundation, Lean concrete & Grounding System: percentage, done/not done
3.1.2. Lean Concrete: done/not done
3.1.3. Reinforcing bars: done/not done
3.1.4. Pouring: done/not done
3.1.5. Backfilling & Grounding Finishing: done/not done
3.2. Drainage system and retention/sediment basins: percentage
3.3. Roads: length of roads (polyline)
3.4. Road Clearing: Length
3.5. Road Excavation and Fill: Length
3.6. Road Execution: Length
3.7. Road Drainages: Length
3.8. Surface preparation: Hectares/percentage
3.9. Site Fence: Length of installed fence and gates

INTERNAL

Use case details
Evaluation KPIs

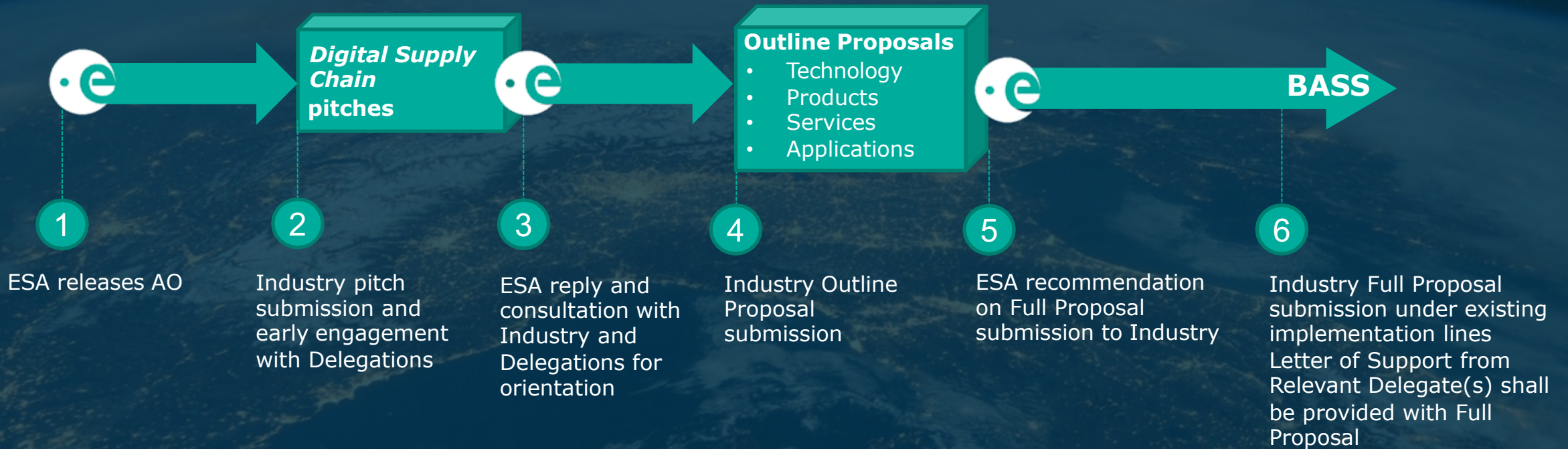| KPI	Unit of Measure
Ratio of recognized poles over installed poles (per sub-batch and survey)	%
Ratio of falsely recognized poles over not already installed poles (per sub-batch and survey)	%
Ratio of recognized tracker over installed tracker (for sub-batch and survey)	%
Ratio of falsely recognized tracker over not already installed tracker (for sub-batch and survey)	%
Ratio of recognized PV modules over installed PV modules (for sub-batch and survey)	%
Ratio of falsely recognized PV modules over not already installed PV modules (for sub-batch and survey)	%
Ratio of recognized CU over installed CU (whole site)	%
Ratio between the number of pallets present in the subfield and the expected number (if possible)	%
Ratio of the leveled area to the expected surface	%
Ratio of falsely recognized CU over not already installed CU (whole site)	%
Ratio of length of recognized aerial cables over installed aerial cables length (if possible)	%
Length of falsely recognized aerial cables over not already installed aerial cables length (if possible)	%
Computation time on assigned infrastructure (for sub-batch and survey)	min
Computation time on reference architecture (for sub-batch and survey)	min

Thank you

Davide Coppola
Partner-led/Thematic Initiatives Section
European Space Agency

PROCUREMENT APPROACH

Digital Supply Chain pitches

Outline Proposals
- Technology
- Products
- Services
- Applications

BASS

1 ESA releases AO

2 Industry pitch submission and early engagement with Delegations

3 ESA reply and consultation with Industry and Delegations for orientation

4 Industry Outline Proposal submission

5 ESA recommendation on Full Proposal submission to Industry

6 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 February 2022 to 21 May 2022 for pitch submission

https://business.esa.int/funding/digital_supply_chain

→ THE EUROPEAN SPACE AGENCY

Q&A

→ THE EUROPEAN SPACE AGENCY
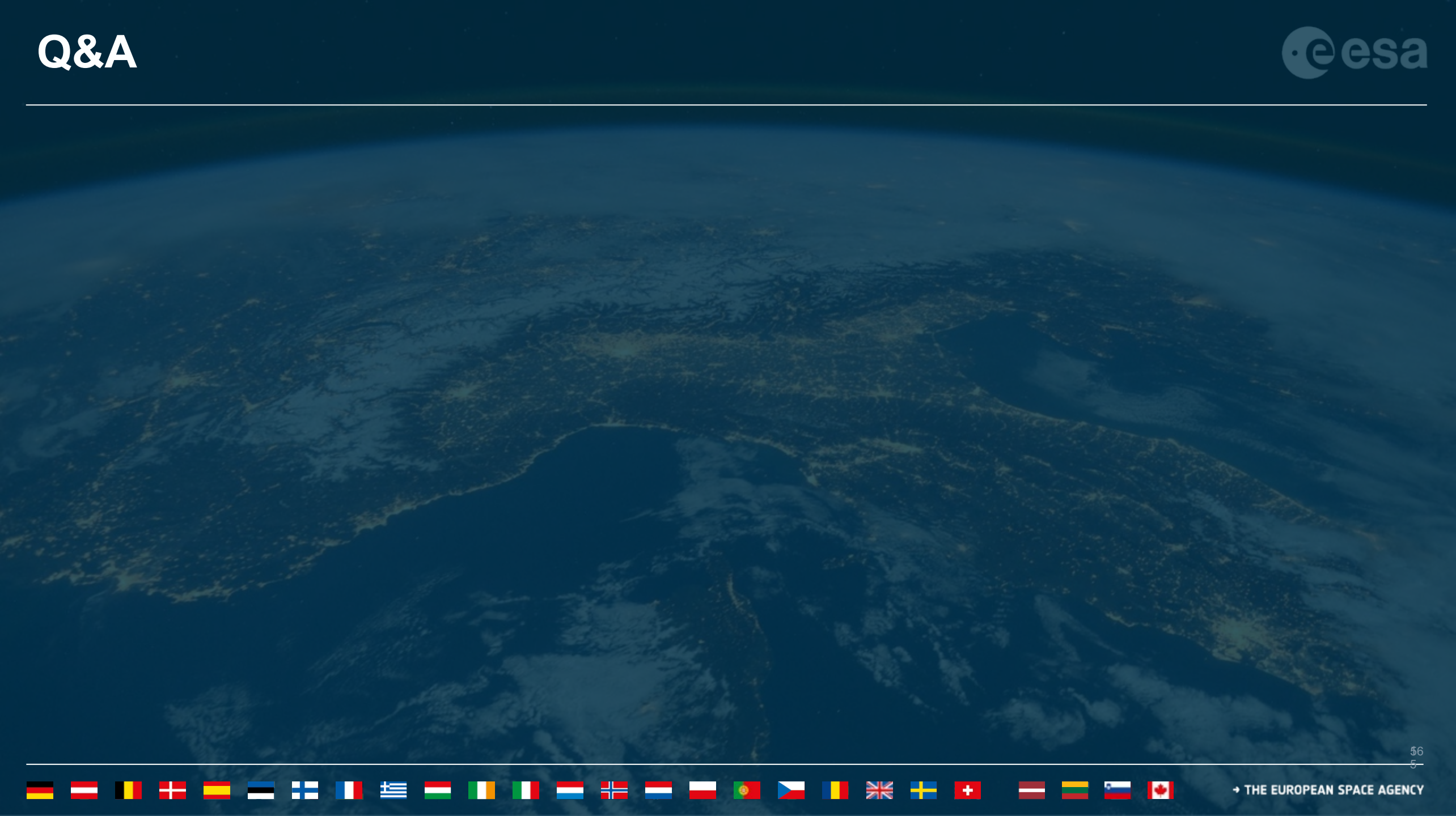
THANK YOU!

For more information please contact:
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