

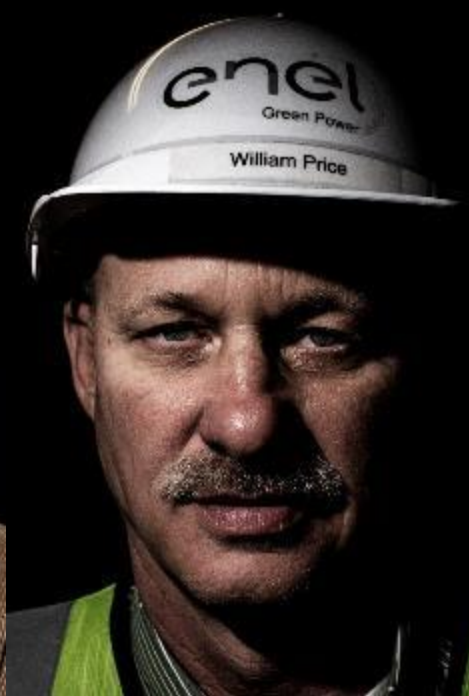


Enel Open Innovation approach

Ernesto Ciorra – Chief Innovability Officer, Enel

13/05/2019







Our BIG DREAM:

Ensure access to electricity for all

7 ENERGIA PULITA
E ACCESSIBILE





Innovability for a better world

enel

« We can't be **sustainable** without **innovating**,
this is the only way to create and share value while
improving our society»

Can we do it alone?



Let's do some math...

1000

40

1000

30

1000

20

1000

10



Definition



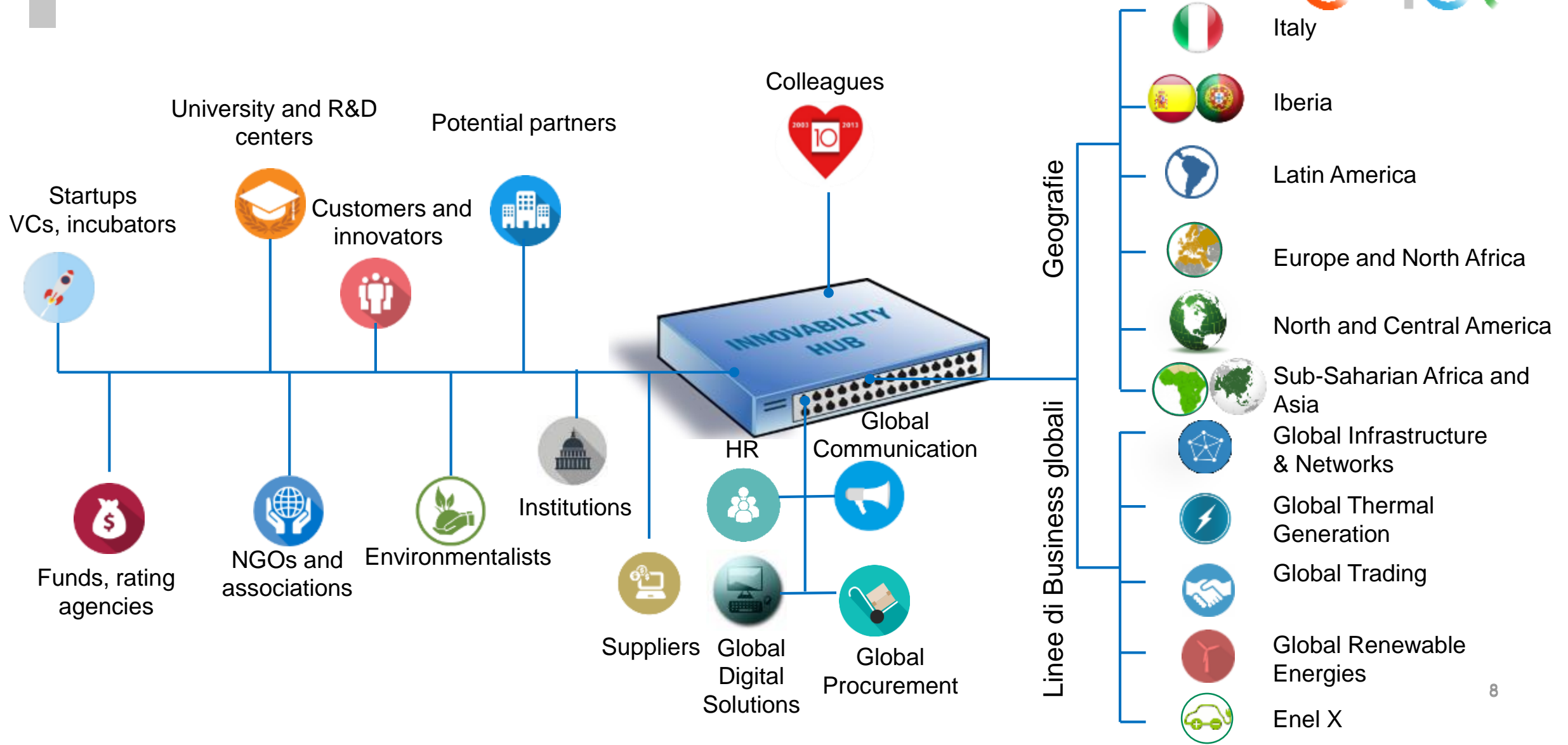
“Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology”



Prof. Henry Chesbrough

Professor and Executive Director of the Center for Open Innovation at the Haas School of Business at the University of California, Berkeley

Thus, we created a “hub” that we call *Open innovability*



From needs to solutions by means of open innovation enabling tools



PARTNERSHIPS WITH INDUSTRIAL PARTNERS

INNOVATING WITH SUPPLIERS

INNOVATING WITH STARTUPS

INNOVATION COMMUNITIES

INNOVATION INTELLIGENCE

IDEA FACTORY/INNOVATION SEEDS

INNOVATING WITH ACADEMIC PARTNERS

CROWDSOURCING

CHALLENGE





INNOVATING WITH STARTUPS

Startups/SMEs to access innovative techs and develop solutions faster and cheaper



STRATEGIC COLLABORATIONS

- Sharing **know how** and **facilities**
- Investing in testing activities and **projects**



LONG TERM RELATIONSHIPS

- Developing solutions to bring **sustainable results**
- **Scaling-up** on Enel global business

#EnelInnovationHubs our global presence to catch innovation where it happens



- Labs and testing facilities
- Data, knowledge and experts
- Support and mentorship

- Direct investment in projects, not in equity
- Support to public funds and grants
- Introduction to VC funds
- Debt financing with banks

Scouting

Bootcamps and ad hoc scouting request:



Scouting sessions in the network of Innovation Hubs focused on one or more topics (e.g. “smart city”, “e-mobility”, “IoT”, etc)



SCOUTING
Scouting of possible solutions across the global networks of hubs and their partners



FEEDBACKS
Supporting the BL/Function in providing a final feedback for the startups

NEEDS DEFINITION
BLs and staff functions define the needs for Innovation and the requirements of solutions to be found



MATCHING
Local meeting with the selected startups to analyze their solution and evaluate possible collaborations



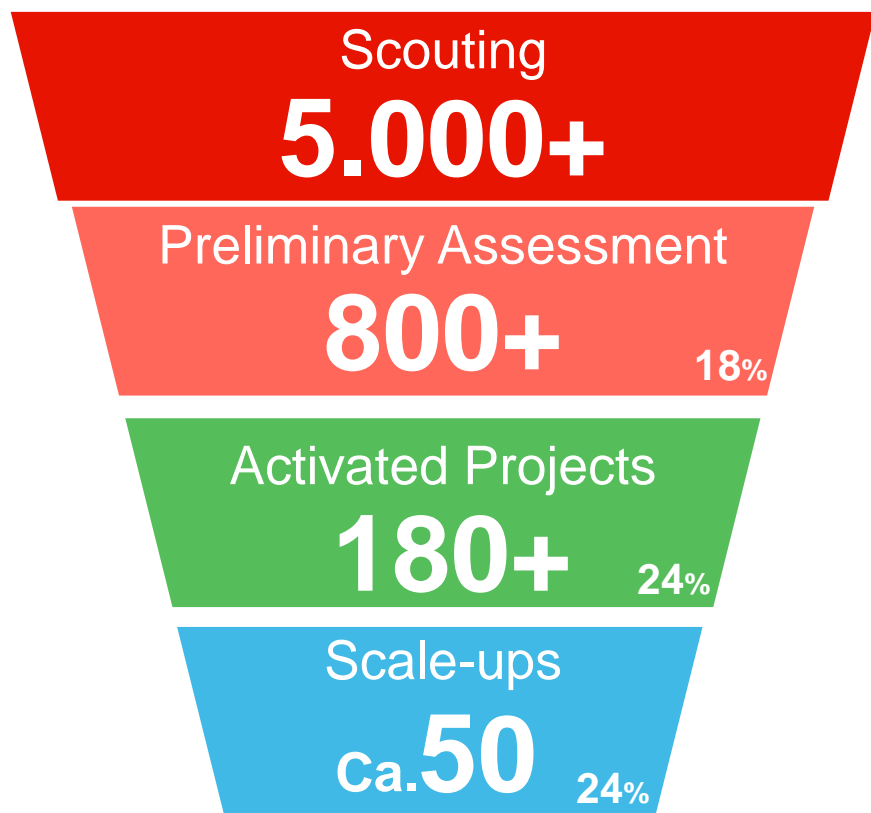
4 Weeks

3 Weeks

1 Week

4 Weeks

Startups have been an important source of innovation for Enel in the last 3 years



300 USDm

M&A:

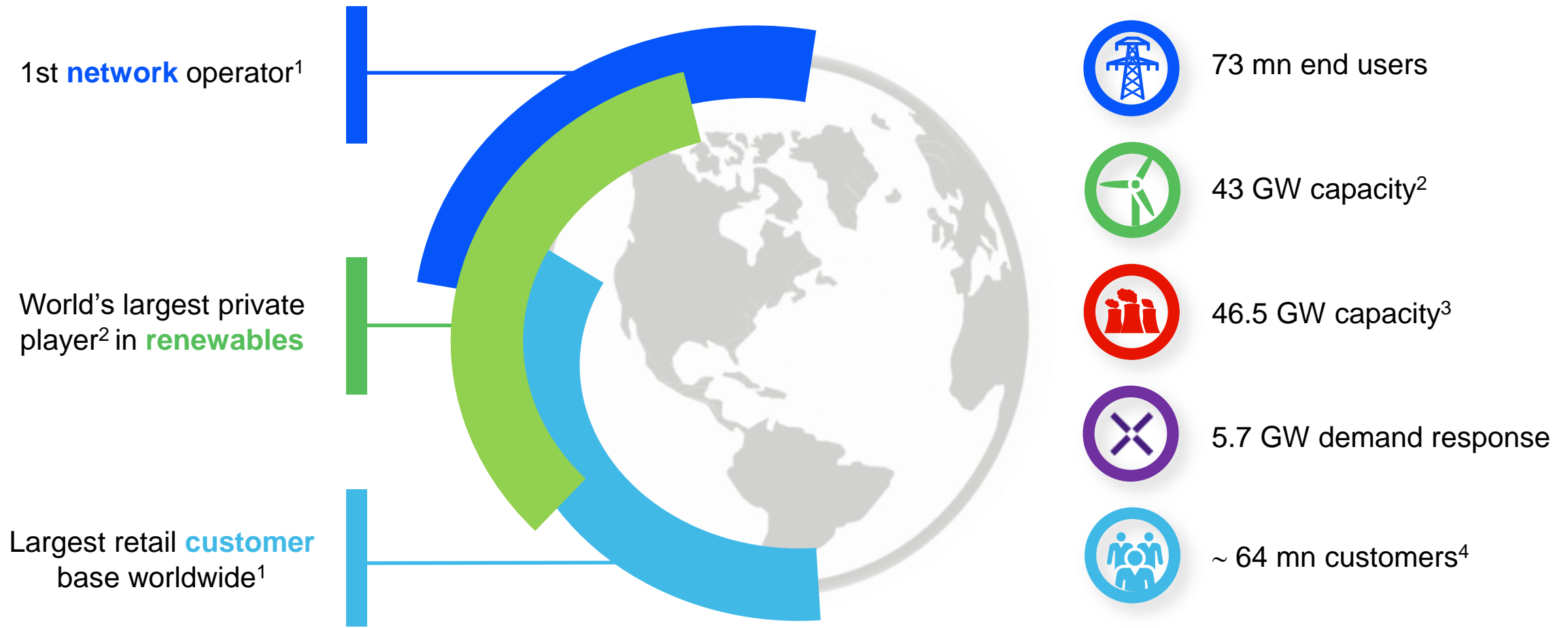
Enernoc, DEN,
Emotorwerks

About 20

EURm paid to
Italian startups in 3
years (as revenues for
the startups)

What Enel offers to startups

Access to clients and facilities to scale up

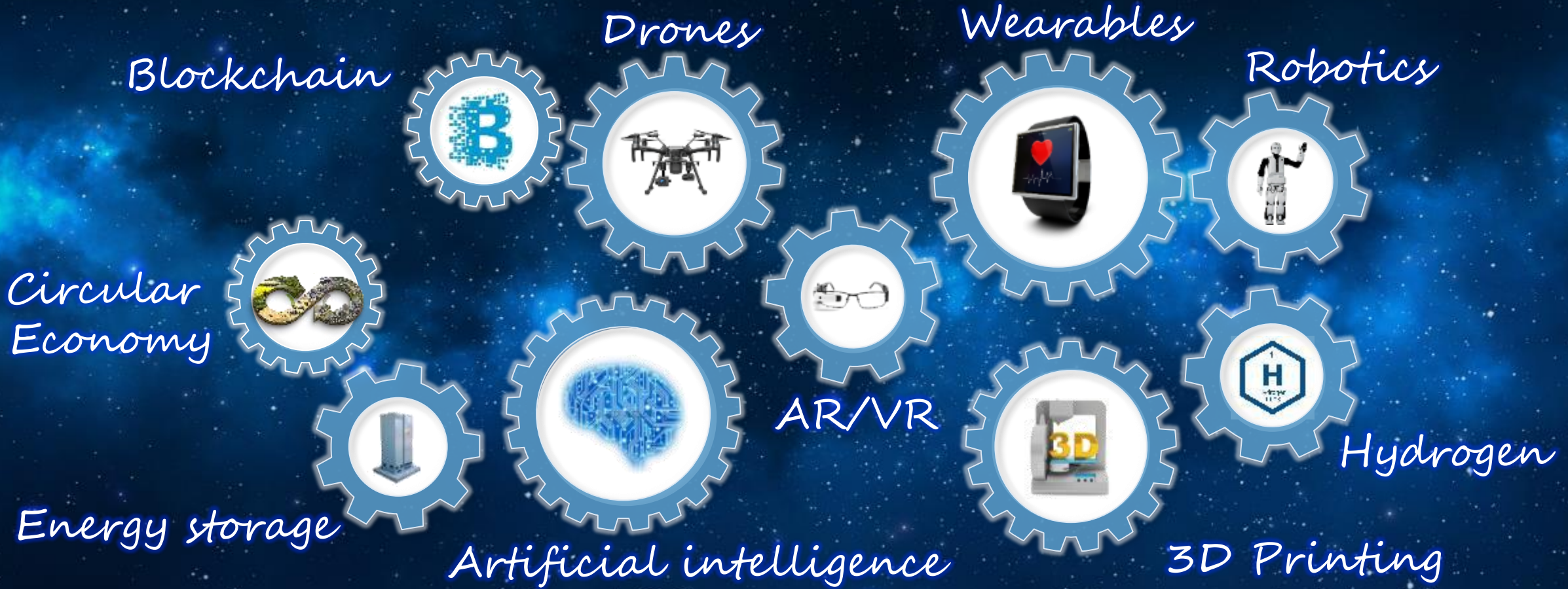


1. By number of customers. Publicly owned operators not included
2. By installed capacity. Includes managed capacity for 4.2 GW
3. It includes nuclear
4. Includes customers of free and regulated power and gas markets



INNOVATION COMMUNITIES

10 Innovation Communities **with no hierarchy**,
investigating forefront technologies and business
models

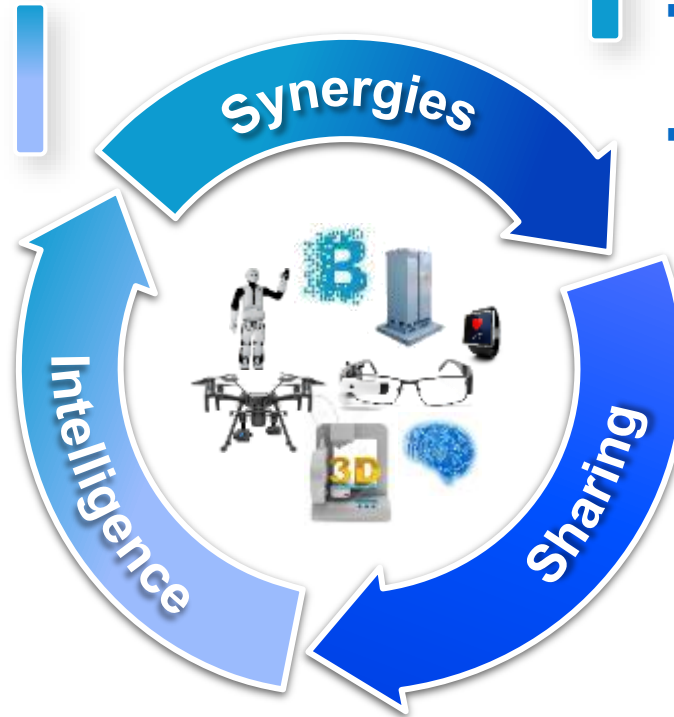


How they have actually worked



Intelligence & Origination

- **8 Creative Sessions** completed
- **1 challenge** on Energy Storage launched on **Open Innovability**
- **11 vertical deep dives** exploring tech trends, business models and applications
- **2 Bootcamps** in Enel **Innovation Hubs**



Promotion of synergies

- **Asset sharing** between **different BLs** (e.g. drones, 3D printers)
- **Regulatory monitoring and positioning**

Best practice sharing

- **Vendors assessment**
- **Internal sharing** of **new ideas** and **projects** under execution
- **External sharing** through **Meet Ups** events involving **outer ecosystem**
- **Dissemination**

Innovation Communities involve internal resources who collaborate to identify **new opportunities** for Enel and create **links with external potential partners**



**IDEA FACTORY & INNOVATION
SEEDS**

Vision




to
make
innovation
everyone
everyday's
job
at
Enel
!


Mission


- ❑ To promote and disseminate open innovation **culture, knowledge** and **behaviors**
- ❑ To disseminate methodologies to **enhance innovation**
- ❑ To promote and manage **corporate entrepreneurship**


Innovation Seeds... a set of interconnected activities




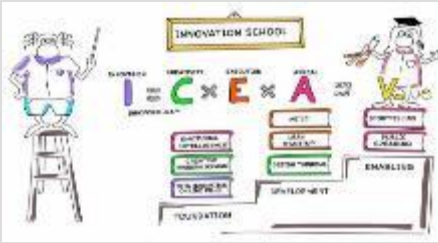

ENEL IDEA FACTORY






IDEA HUBS






INNOVATION ACADEMY






INNO AMBASSADORS






#NOMOREXCUSES






MY BEST FAILURE




MAKE IT HAPPEN!




CREATIVE SPACES



Enel Idea Factory

a challenge driven approach to foster creativity



To help BL and Functions to definition and solve challenges....





**INNOVATING WITH
ACADEMIC PARTNERS**



UNIVERSITIES AND R&D CENTERS



POLITECNICO
DI MILANO



Bocconi



POLITECNICO
DI TORINO



Sant'Anna
Scienze e Innovazione Superiore Pisa

Berkeley
UNIVERSITY OF CALIFORNIA



ISTITUTO
ITALIANO DI
TECNOLOGIA



COMILLAS



Strathmore
UNIVERSITY



UNIVERSITÀ
DEGLI STUDI
DI GENOVA



CROWDSOURCING

Positioning openinnovability.enel.com as the leading innovation crowdsourcing platform for energy sector and a tool to help Enel addressing SDG's



Innovation and sustainability are at the heart of Enel strategy, merge them together with our **Open Power** vision and what you get is **Open Innovability**. It is what drives our everyday activities and now it is also a digital place to collect **innovative and sustainable solutions** that contribute to meet "2020 UN Sustainable Development Goals (SDGs)" targets which represent an opportunity for development and creating shared value for us and our stakeholders through virtuous ecosystems, and to make a better world.

Enel committed itself with targets set for 4 of the 17 UN SDGs:

- Support for quality education - **SDG 4**
- Access to affordable and clean energy - **SDG 7**
- Contributing to socio-economic development in the communities in which Enel operates - **SDG 8**
- The fight against climate change - **SDG 13**

FEATURED CHALLENGES



Enel's Women in Tech

EXP DATE: 25/12/2018
REWARD: \$20,000

How can we build a more inclusive and diverse energy industry? Enel has been



New Augmented Reality solutions for the energy market

EXP DATE: 26/10/2018
REWARD: \$5,000



Vegetation growth estimation

EXP DATE: 16/11/2018
REWARD: COLLABORATION AND TESTING AGREEMENT

28th Feb

30th Jun

11th Dec

14th May

2017

2018

2019

Internal launch

External launch

Global ADV campaign

InnoCentive partnership

External companies challenges

A **digital open door** to collect solutions from anyone for both a sustainable innovation and innovative sustainability

400.000 solver community

2.000 solutions collected from **84** different countries

59 Challenges managed and **+350.000€** awards

The crowdsourcing steps

1. Identifying a **need**
2. Defining a **challenge**
3. Share it with the **crowd**
4. **Evaluating** the proposals
5. **Awarding** the best solution

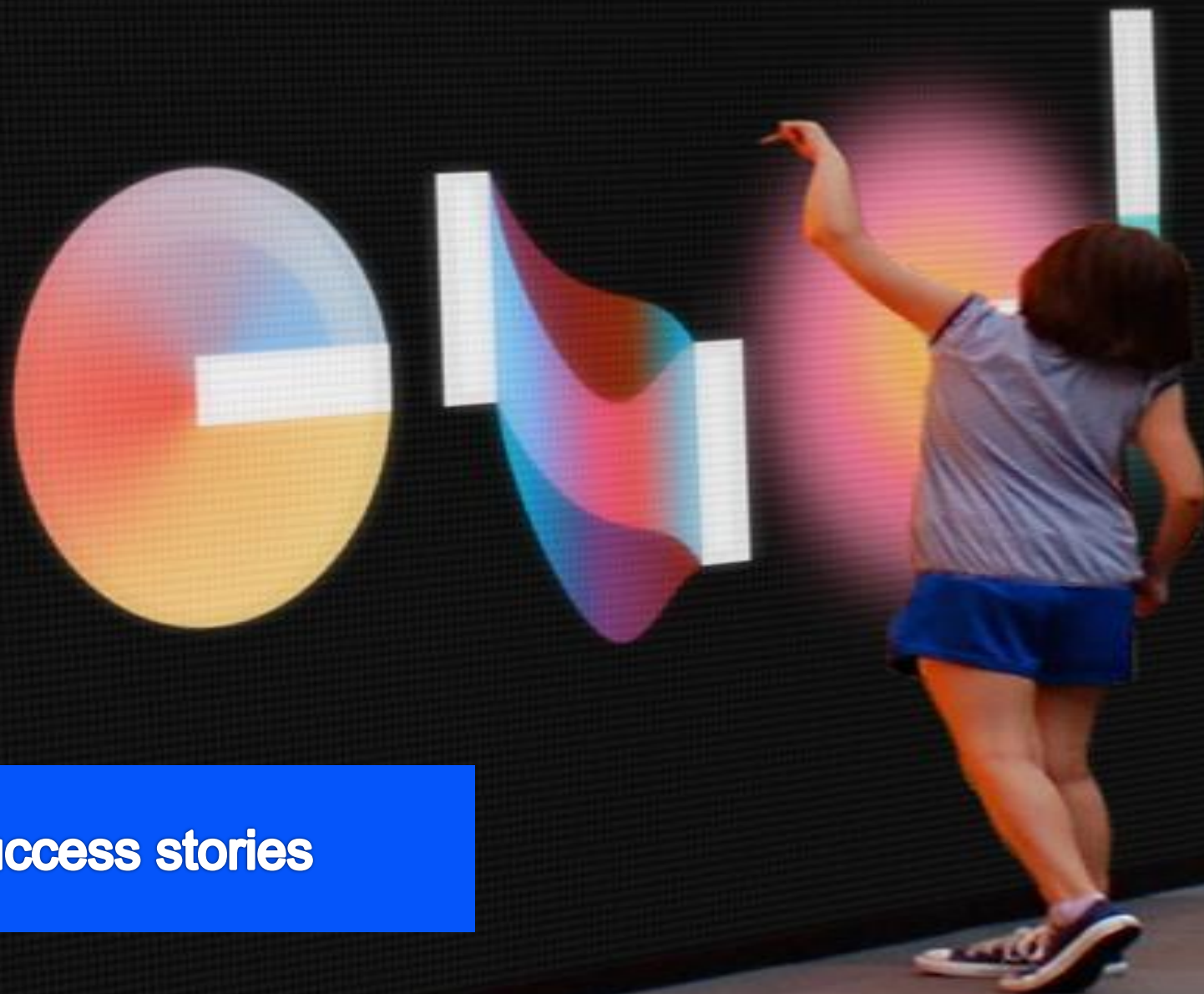
A solution to maximize H₂S abatement in geothermal power plants



Challenge: Enel Green Power is searching for innovative solutions that can **reduce the emission of hydrogen sulfide** in geothermal plants, without using soda.

Solution: The winning idea involved a change in the last stage of the AMIS cycle, where soda is used to regulate the level of acidity in the liquid solution coming from the H₂S reduction process. Specifically, the change involves halving the entry of soda in the scrubber and introducing a dosing system that allows for the optimization of the quantity of soda consumed for different sections.

Award: 15.000€



Innovability success stories



Is it possible to hybridize the geothermal energy with pv and csp in an effective way?



MIT said no. We did it.



Stillwater Nevada (USA)

33MW **Geo** + 26 MW_{el} **PV** + 17 MW_{th} **CSP**

Nozomi Networks (Italy, Silicon Valley)

Protecting critical infrastructure from cyber attacks



Nozomi Networks developed the leading solution for real time Cyber Security and Visibility for industrial control networks.

Nozomi Networks allows an efficient and effective protection of Enel's critical infrastructures from cyber attacks.

Treedom

Planting trees to reduce CO2 and promote local businesses



Thanks to Treedom, users can **plant and follow the growth of trees** all around the world, reducing CO2 and promoting the local communities.

Enel was its first large customer, “planting” about **70,000 trees (absorbing 21mln kg of CO2)**, around 15% of the total trees planted by Treedom

Athonet

Mobile Core Connectivity



ATHONET WINS A TOTAL OF 4 GLOBAL MOBILE AWARDS INCLUDING CTO'S CHOICE

Barcelona, 26th February 2019 – Athonet wins 3 more Global Mobile Awards including the top Outstanding Innovation – CTO's Choice Award. This brings Athonet to a total of 4 Global Mobile Awards, the biggest number of awards given to any company this year!



Athonet's technology allows the **creation of private ultra fast networks.**

Athonet won 4 awards at the **2019 WMC**, including the Outstanding Mobile Technology Award – The CTO's Choice

In 2012, Enel used Athonet to establish an emergency network during the earthquake in Italy.

eMotorWerks (Silicon Valley)

Charging infrastructure platform



eMotorWerks developed a charging station technology able to optimize the charging of vehicles and to enable vehicle-to-grid technology.

Leveraging on Enel's business, eMotorWerks speeded up its growth on a larger scale, becoming the **first electric vehicle infrastructure company in North America.**

Ares2t (Italy)

Enhancing EV charging and distribution network management

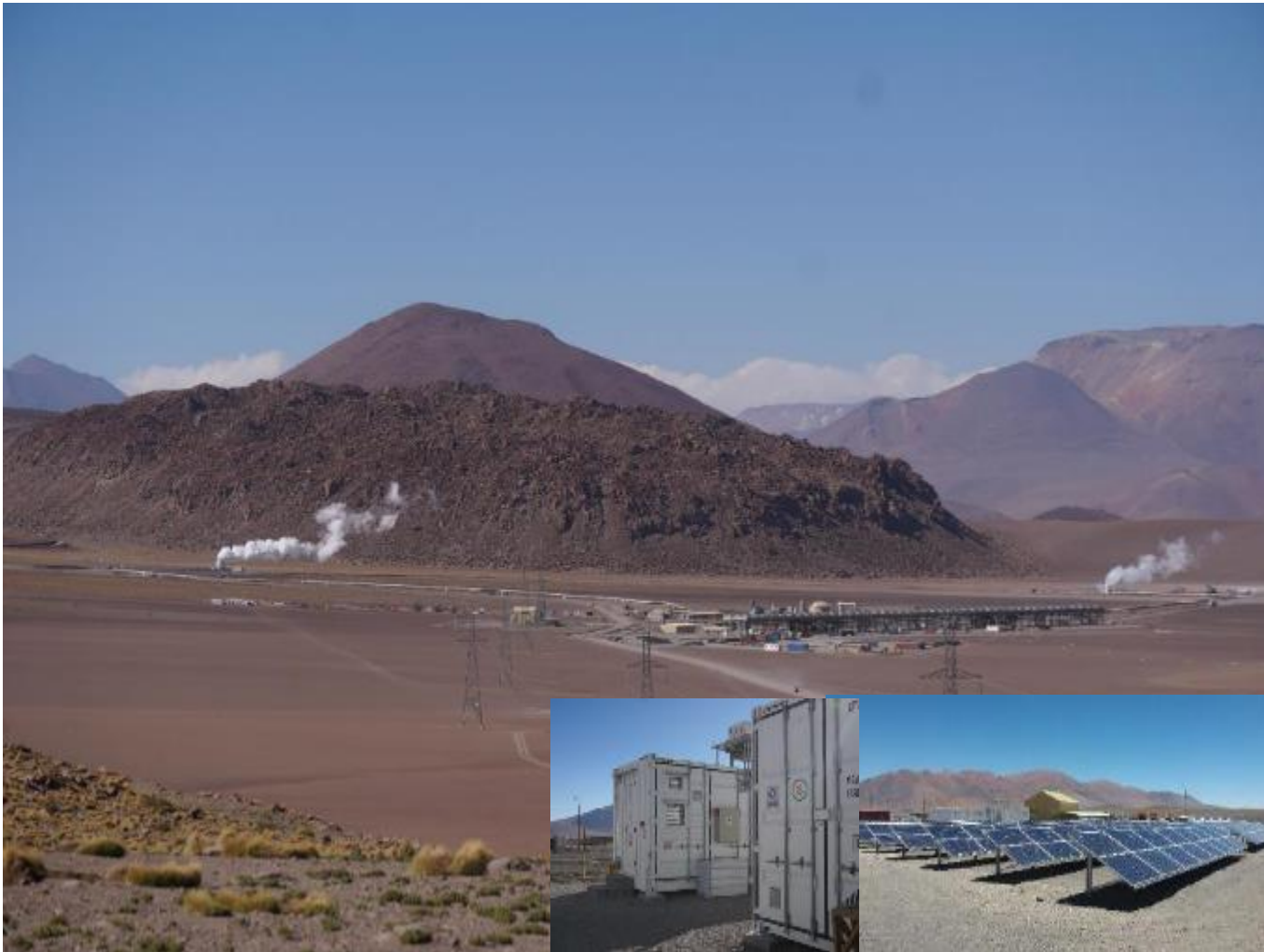


Ares2t developed a **platform to regulate EV charging, ensuring peak performance.**

This solution **links all charging stations to the energy distribution network in preparation for V2G deployment, which will turn EVs into mobile battery packs.**

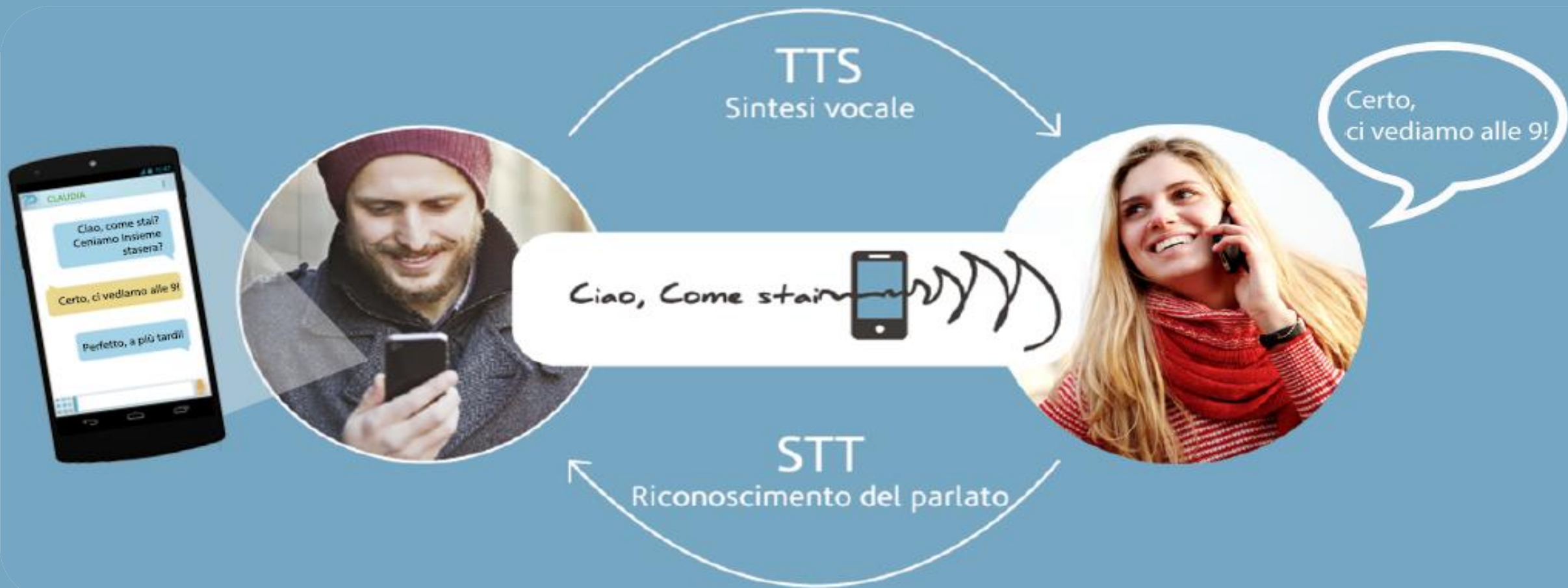
EPS – Electro Power Systems (Italy)

Hydrogen batteries integrated in microgrids



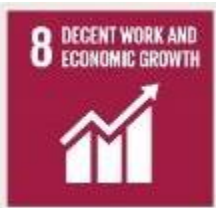
Enel has tested **EPS hydrogen system, which provides long-duration capacity**, in Chile in order to develop an **Hybrid RES Plant to supply electricity to remote microgrids, replacing diesel generators.**

PEDIUS



Nossa casa (Brazil)

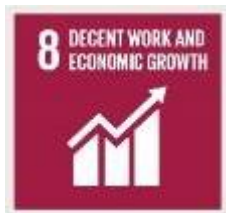
Recycled packaging brings thermal comfort to families in Rio



The Nossa Casa (Our Home) social startup employs local people to transform packaging for milk and other juices into thermal lining, protecting families from the intense heat emitted by roof asbestos tiles.

Chapingo (Mexico)

Water drainage and purification to foster local economy



We recover and purify wastewater in our windfarms so that, through the **Chapingo social startup**, local families and schools can grow crops, medical gardens and feed livestock.

Solar Mamas (Chile, Mexico, Brasil and Peru)



The Solar Mamas are illiterate women from remote communities who are trained with academic methods to set up small wind and solar system to power their communities

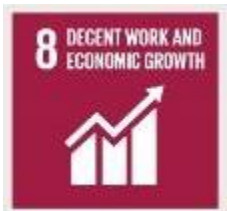
GHZero (Italy)

Innovative and mobile greenhouses



GHZero builds mobile, renewable energy self-powered, remotely monitored greenhouses that use air filtering, led lights and water recycling to grow organic vegetables in the hardest climates

Liter of light – a worldwide collaboration





IT ALWAYS SEEMS IMPOSSIBLE, UNTIL IT'S DONE!



Thank you!

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