

European Remanufacturing Council Annual Meeting

24th June «Smart Meters – Value Retention»

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Global Infrastructure & Networks (GI&N)**

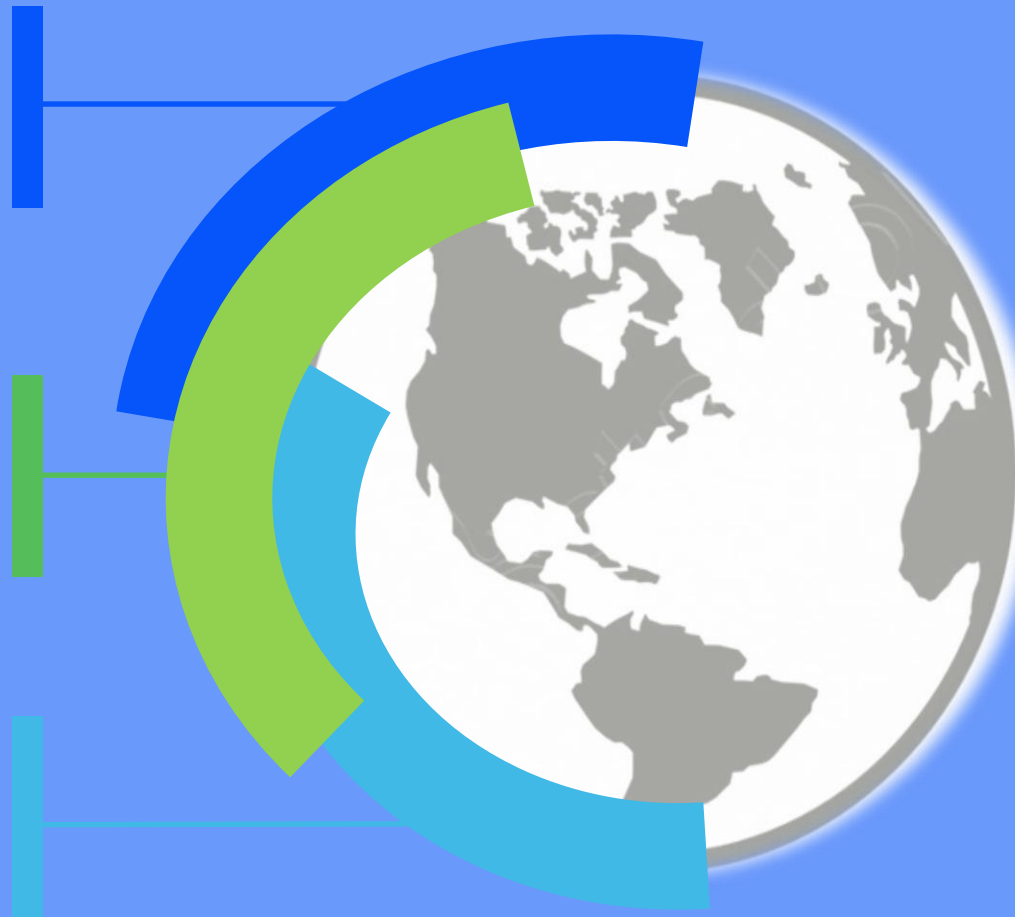
Enel Group



1st **network** operator¹

World's largest private player² in **renewables**

Largest retail **customer** base worldwide¹



73 mn end users



43 GW capacity²



46.5 GW capacity³



5.7 GW demand response



~ 64 mn customers⁴

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

GI&N - Positioning and key figures



COLOMBIA

3,5 M customers
23% (2nd DSO)

PERU

1,5 M customers
25% (2nd DSO)

CHILE

1,9 M customers
33% (2nd DSO)

SPAIN

12,2 M customers
42% (1st DSO)

ITALY

31,5 M customers
85% (1st DSO)

BRAZIL

17,3 M customers
21% (1st DSO)

ARGENTINA

2,6 M customers
16% (2nd DSO)

ROMANIA

2,9 M customers
36% (2nd DSO)

Key figures

	2018	2019
Distributed energy (TWh)	485	509
End-users (mn)	72.8	73.3

URBANIZATION

DECENTRALIZATION



ELECTRIFICATION

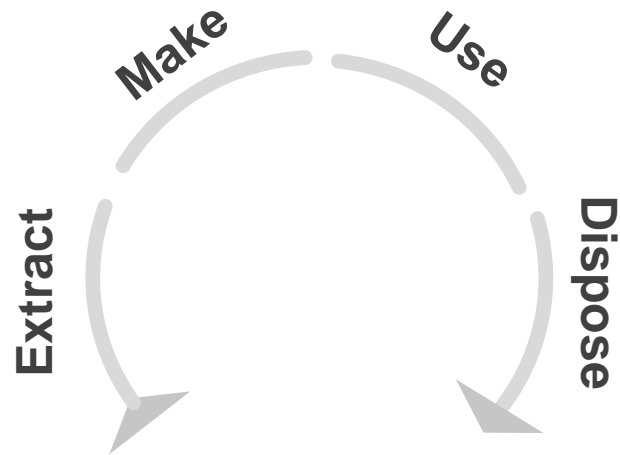
DECARBONIZATION

What is Circular Economy

From a Linear Model towards a Circular Model: closing the loop



Linear



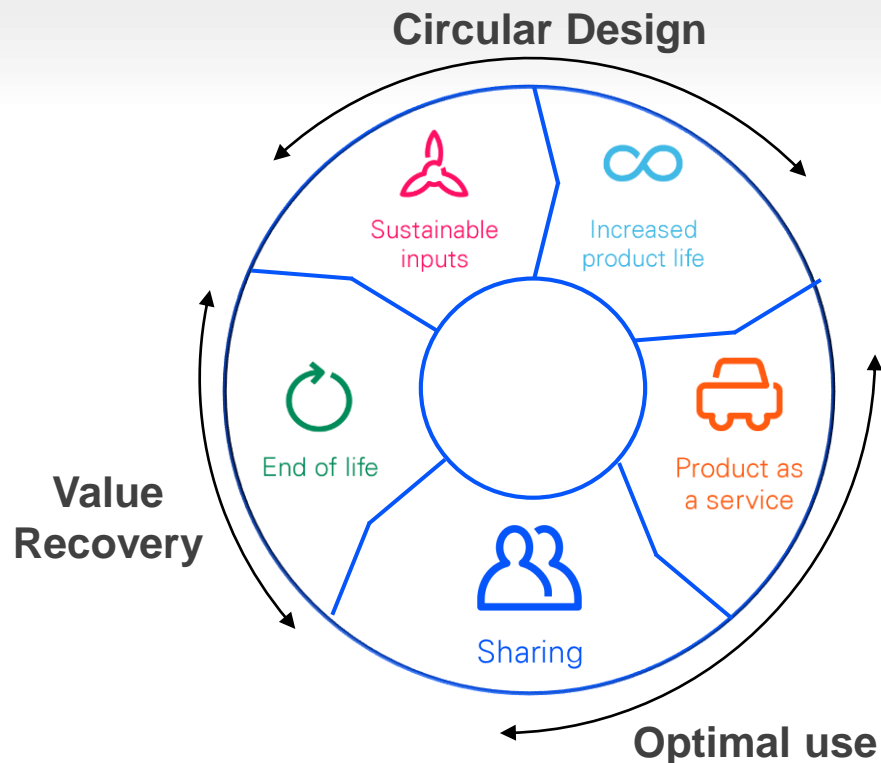
Circular



Enel's vision and approach



The Enel's five pillars of Circular Economy



Sustainable inputs: from renewable, reuse, recycle



Increased product life: Extending life through design, maintenance and repair



Sharing: increase utilization rate through shared use/access/ownership



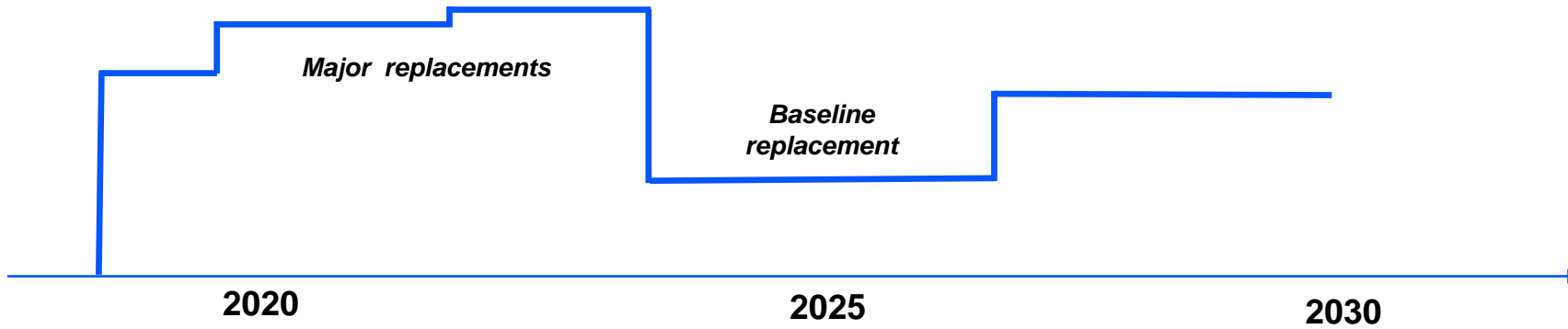
Product as a service: sell to clients a service instead of a product



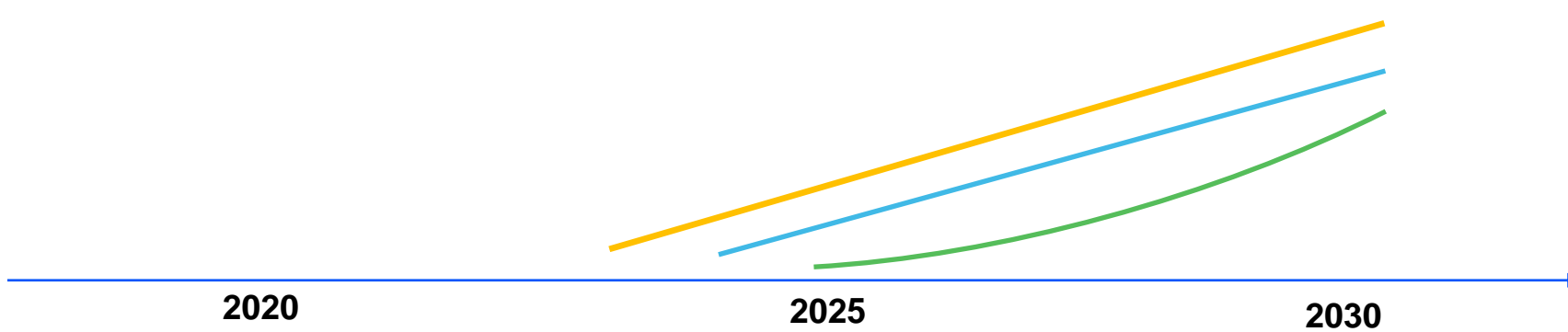
End of life: maintain value through upcycling, reuse and recycling

Huge material volumes expected

Qualitative purpose only



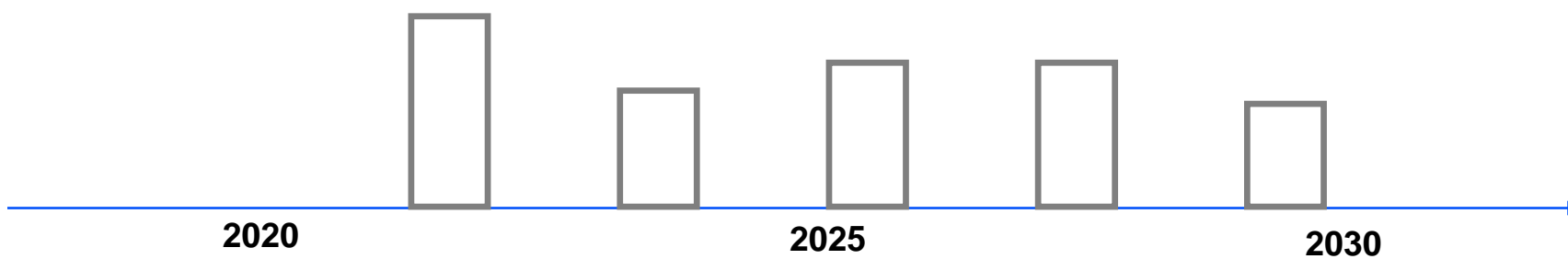
Smart meters



Wind dismantling/repowering

EV batteries

PV replacement



'Futur-e' equipment

Smart Metering

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3rd generation of Smart Meter Technology

Cloud-based system

Italy: >7.000.000.000.000 data per year

Meter as sensor for smart LV grid management

Data lake:
Predictive Maintenance
Anomaly detection

- 45 million smart meters in operation
- Deployments in Italy, Spain, Romania and Chile
- Pilots in Argentina, Brazil, Colombia and Peru

Sustainable Smart Meter as enabler of “Circular Digitalization”



Looking at smart meters value chain on disposal and recycling to find out areas of improvement and opening new business models

Existing process
As-Is: Focus in ITA and ES



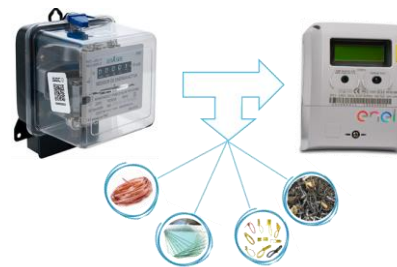
Identification of materials, composition, structure and volume of waste generated by the rollout plans

Evaluate the current steps, different waste treatment alternatives

Current process of Smart meters reuse, deconstruction and recycling of materials and components



New processes identification
To-BE: Focus in Brazil



Sustainable Smart Metering impact on SDGs



- Develop smart **metering projects based on circular economy concepts**, means designing new process and long – lasting products, which componentes and materials, can be reused, recycled and refurbished – minimizing waste and increasing resource resilience.
- The **recovery of expensive and scarce resources such as precious metals and critical materials from smart meters therefore representes a significant economic opportunity**. The expected benefits related to the Sustainable Development Goals include:



- ✓ Sizable employment creation
- ✓ Increase of local productive capacity and service production



- ✓ Integrate eco-design/circular economy principles in smart metering process



- ✓ Innovative and circular smart meters can help save energy, optimize energy use and be sustainable



- ✓ Lower energy and material consumption in the smart meter production process
- ✓ Increase amount of recyclable material in the end product



- ✓ Reducing CO2 emission by introducing more efficient production processes and Technologies



- ✓ Working together with local suppliers to strengthen recycling and circular process

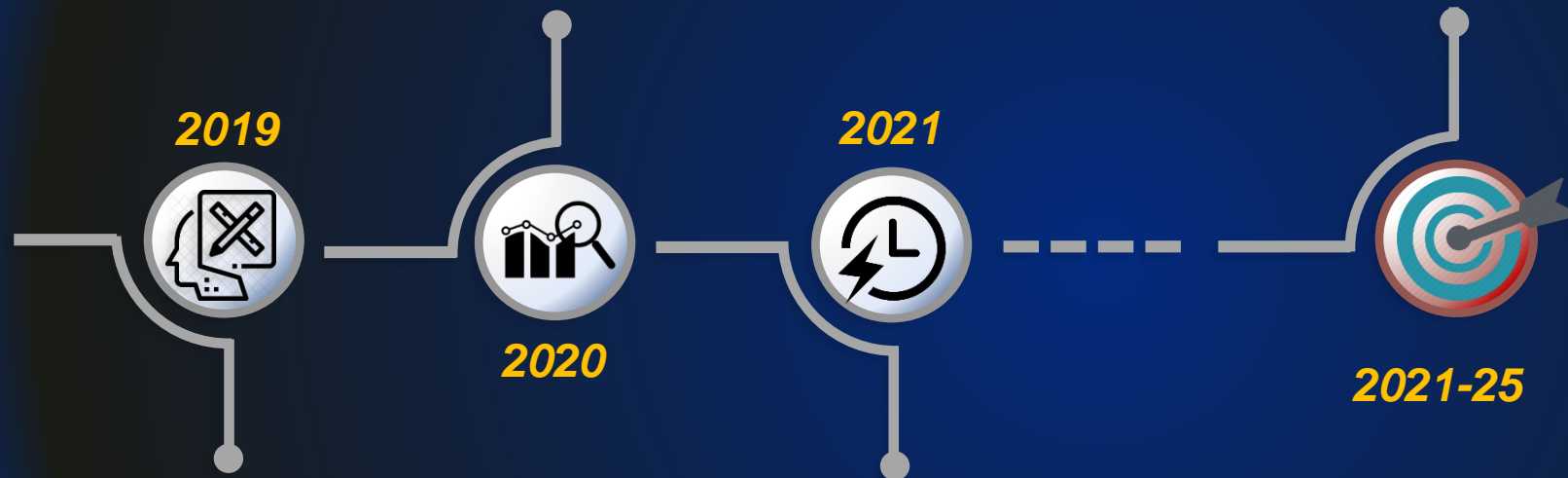
Circular and Sustainable Smart Meters in Brazil

Pre-feasibility analysis

- Scouting of financing opportunities
- CBA (including ad hoc KPI)
- Reverse logistic

Final installation

- MM installation
- Circular and sustainable roll-out



Design and Material

- Sustainable Circular design
- Materials recycled for smart meters:
 - **100% of copper**
 - **95% of plastic + 5% of for social initiatives**

Sustainable Pilot roll-out

- **Zero Waste** production line
- **Certification** of the new Smart Meter
- **Optimized reverse logistic**



Active cooperation with local companies



Smart metering based on circular economy - value chain on disposal and recycling to find out areas of improvement and opening new business models.

Global Infrastructure and Networks Labs

Developing the global network of open innovation



MiLAB, Milano



- Co-working spaces

- Hubs for startups and strategic technology partners

InfraLAB, Haifa



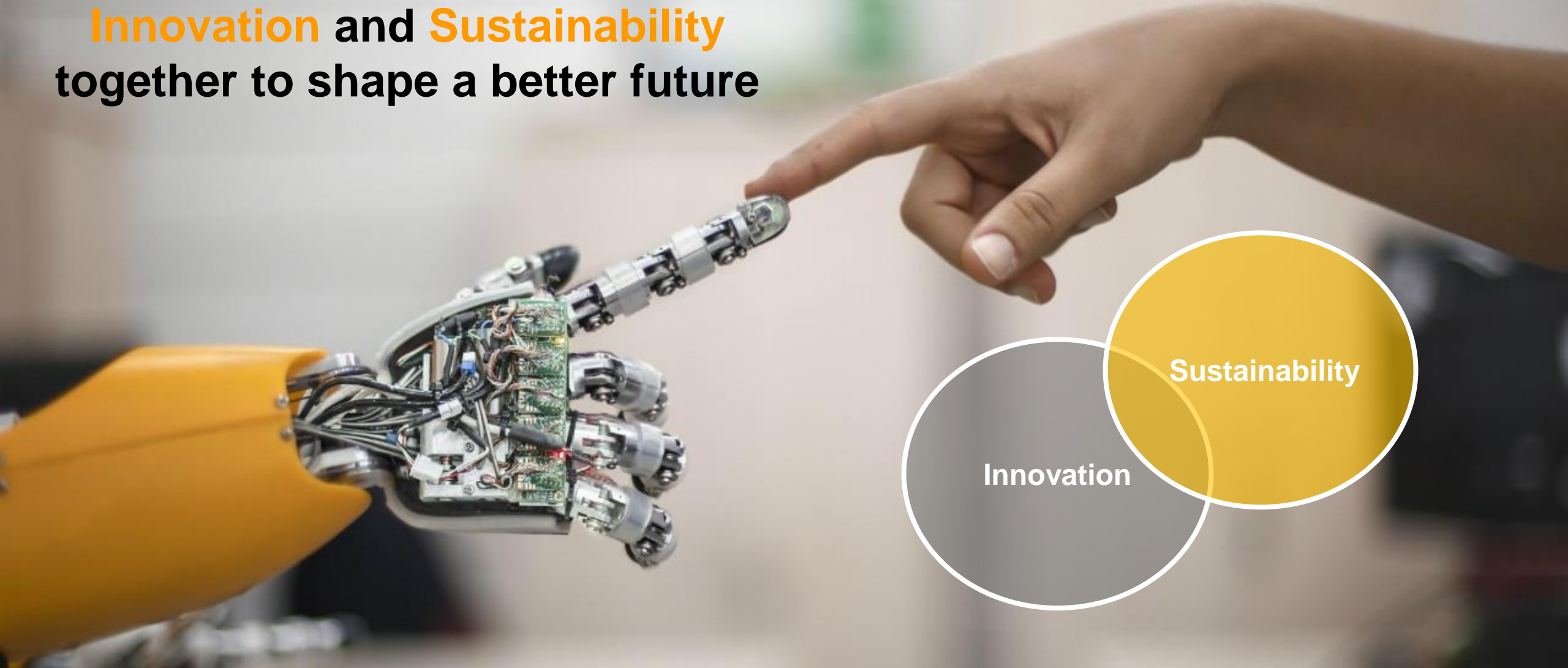
- Open Innovation culture

SãoLAB, São Paulo



- Innovation hubs in San Francisco, Tel Aviv, Madrid, Moscow, Rio de Janeiro (>300 Startups scouted / year)

Innovation and Sustainability together to shape a better future



Sustainability is driving **Innovation** towards long term value

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Thank you

