

Cascais, 23 de Maio de 2019
APREN - Dia do Sol

Empowering the Future today.

Digitalization & Business Models

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The world is shifting into a New Energy Paradigm...

I. Centralized and Large Scale vs **Decentralized** Generation

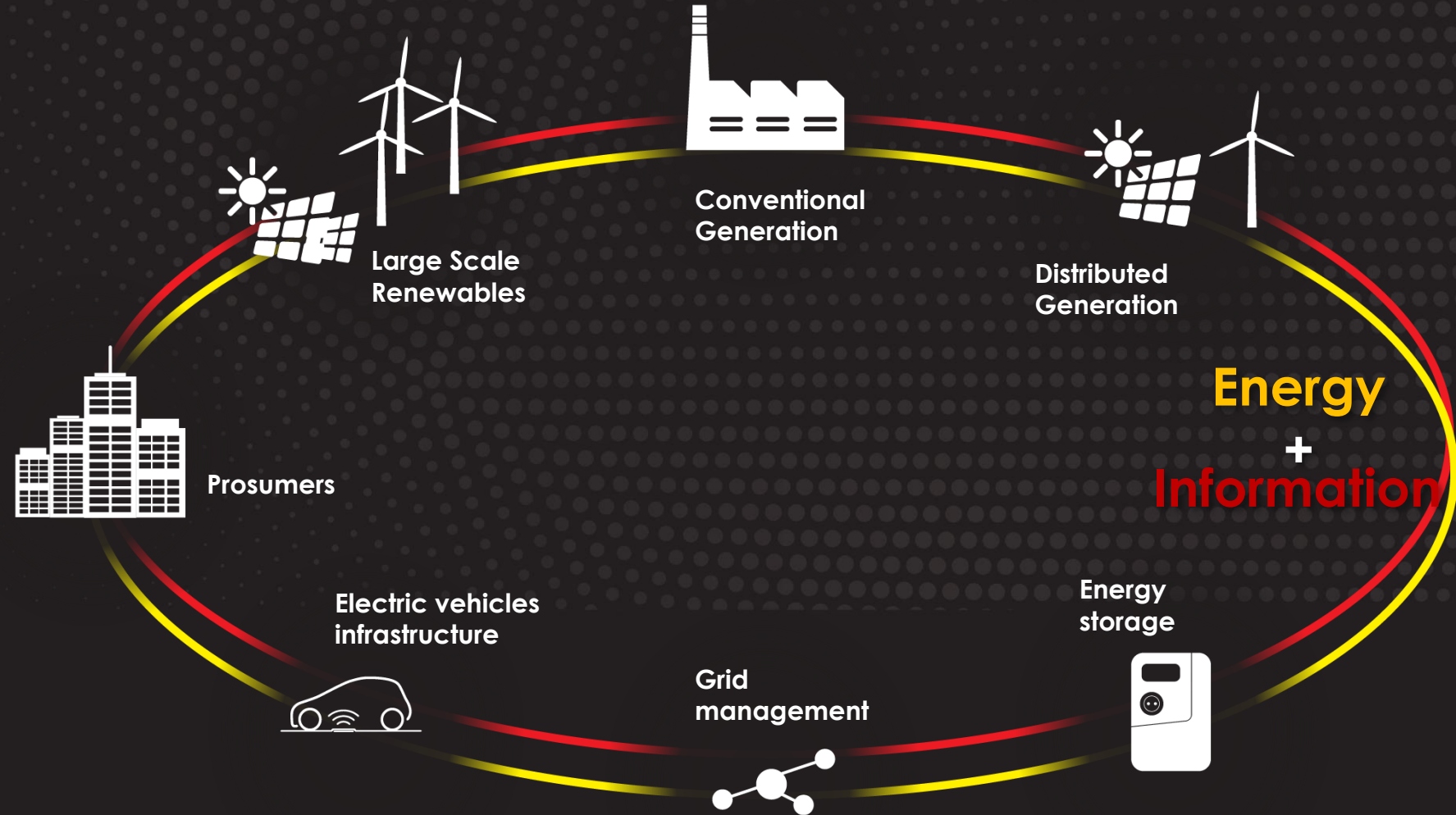
II. Increasing number of **Prosumers**

III. Energy **Storage** solutions

IV. Mixing **Renewables** with Conventional Generation Assets

V. Deployment of Smart **Electric Vehicles** infrastructure

VI. Improved grid **flexibility**



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...where new technologies and digital solutions will play a central role...

Digitalization is the new battleground for energy companies

\$3,5bn/year

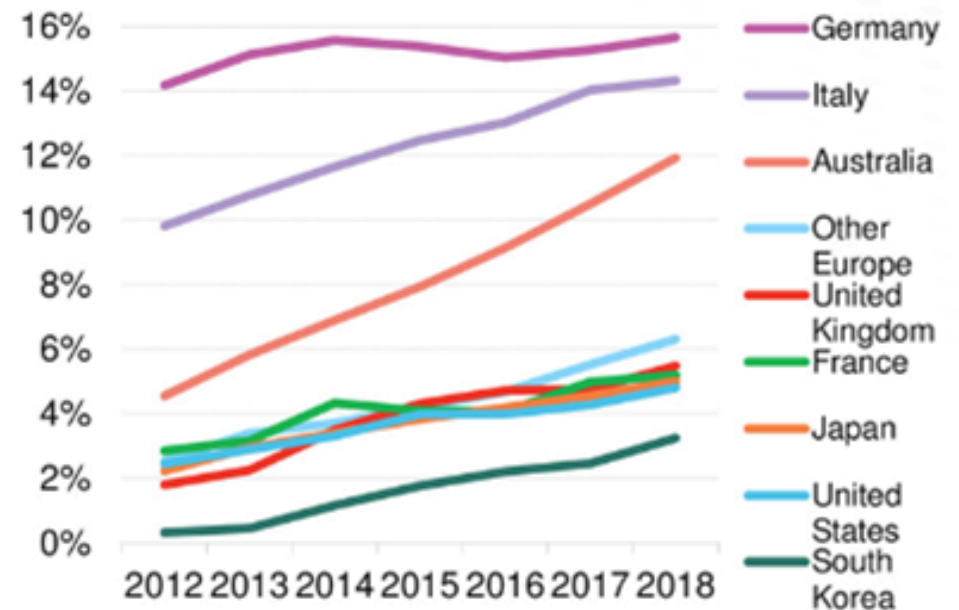
Utilities such as Enel, Iberdrola and Engie plan to invest >\$3,5 billion/year in **digitalization** in the upcoming years

725MW

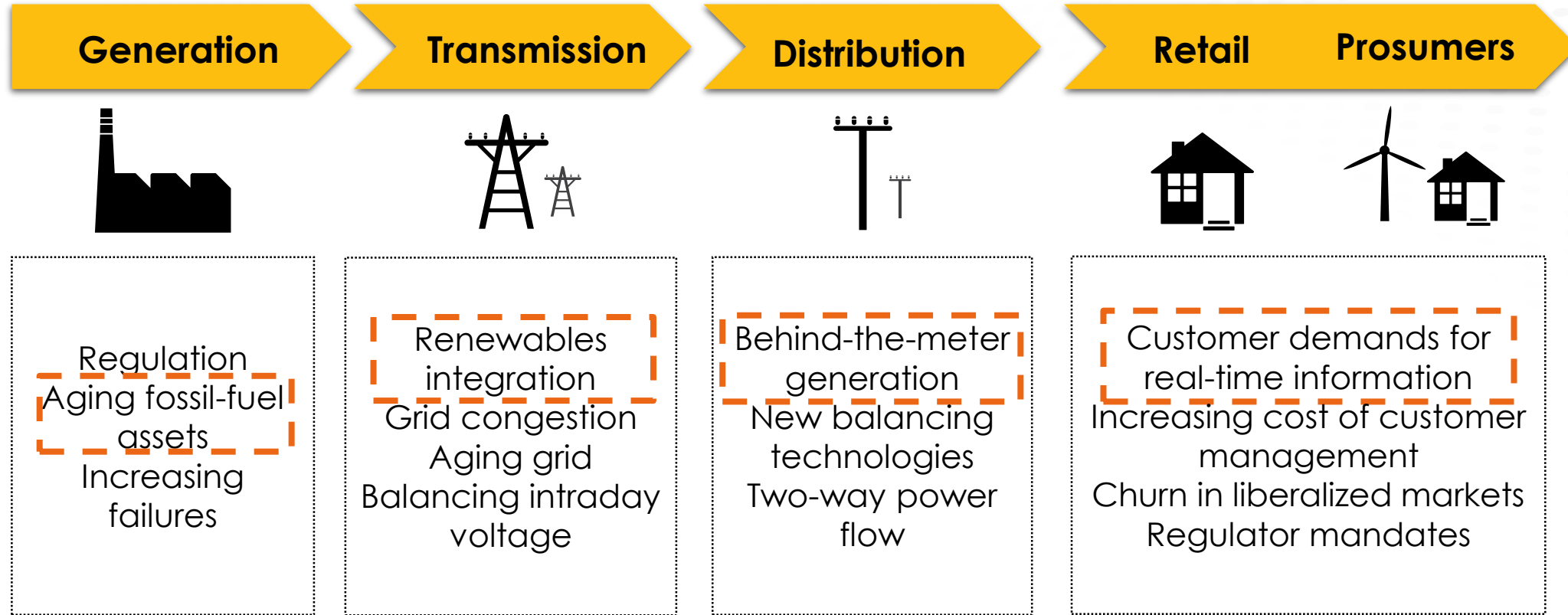
More than 725MW in **renewables microgrids** installed capacity across the world (and >5,000MW in Pipeline!)



The Decentralization path



...in addressing the significant challenges of the Power Sector that come along.



Some of the disruptive technologies for addressing Power Sector challenges...



Virtual Power Plants

- The power of Aggregation
- Connecting DER to Markets
- Addressing Prosumers needs



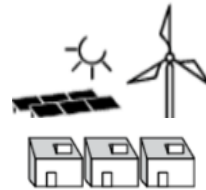
Storage

- Increase grid reliability and resilience
- Reduce grid infrastructure investment needs



Demand response

- Flexibility and Load Management
- Managing peak capacity (demand side)



Microgrids

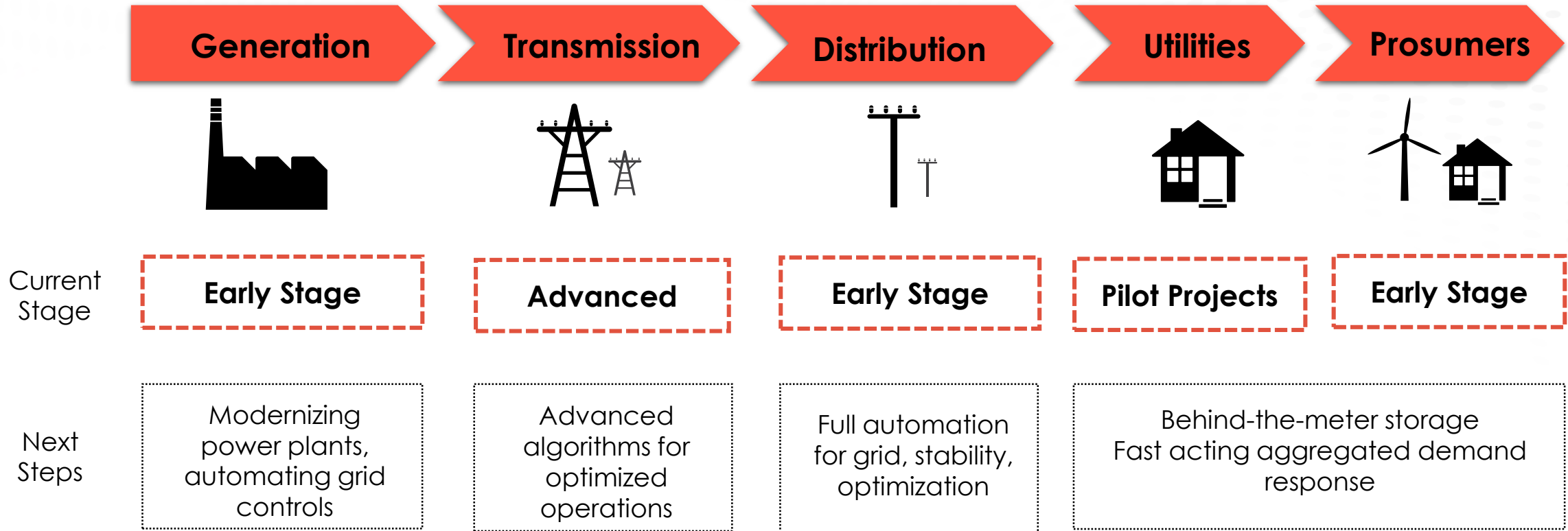
- Self-sufficiency: energy supply and demand at one site
- Addressing Prosumers needs



Smart EV charging

- Using cars batteries for balancing
- Bi-Directional Charging (V2G, V2X)

...are implemented already, although at different stages of development.



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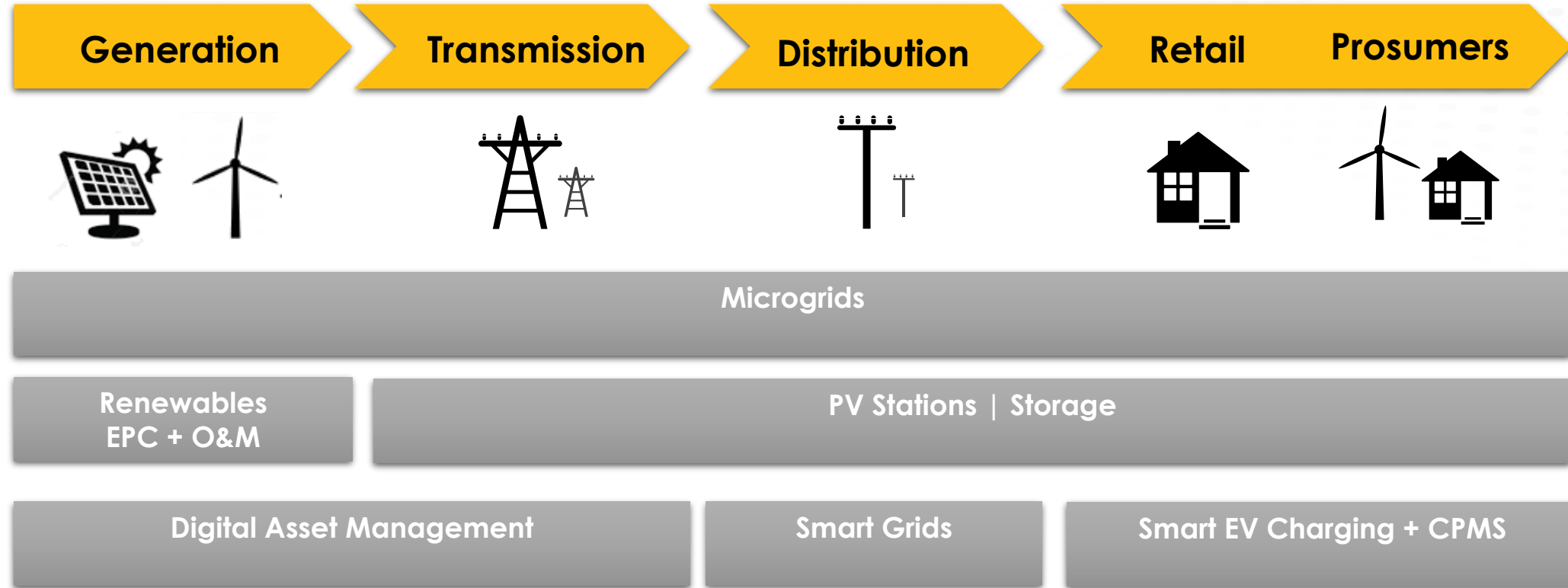
Renewables & Digital Projects



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Efacec delivers turnkey and digital solutions for Renewables



Efacec's track record in Renewables deployment speaks for itself

Worldwide



>600MW

Installed capacity of **Solar PV** and **Wind** projects delivered in 10 countries

132MW

Operation and Maintenance (**O&M**) of Solar PV power plants worldwide

Portugal

>100MW

Solar PV installed (+ ongoing) in Portugal

53MW

Operation and Maintenance (**O&M**) of Solar plants (PT)



Solar PV Flagship Projects

Renewables
EPC + O&M

Single Axis Solar Tracker

exus
Management Partners

Tendeiros

24MW

 **efacec**



Solar PV Flagship Projects

Industrial Rooftop

Renewables
EPC + O&M



The Navigator
Company

2,2MW



Solar PV Flagship Projects

Renewables
EPC + O&M

Floating PV



Alto Rabagão



Solar PV Flagship Project



58MW

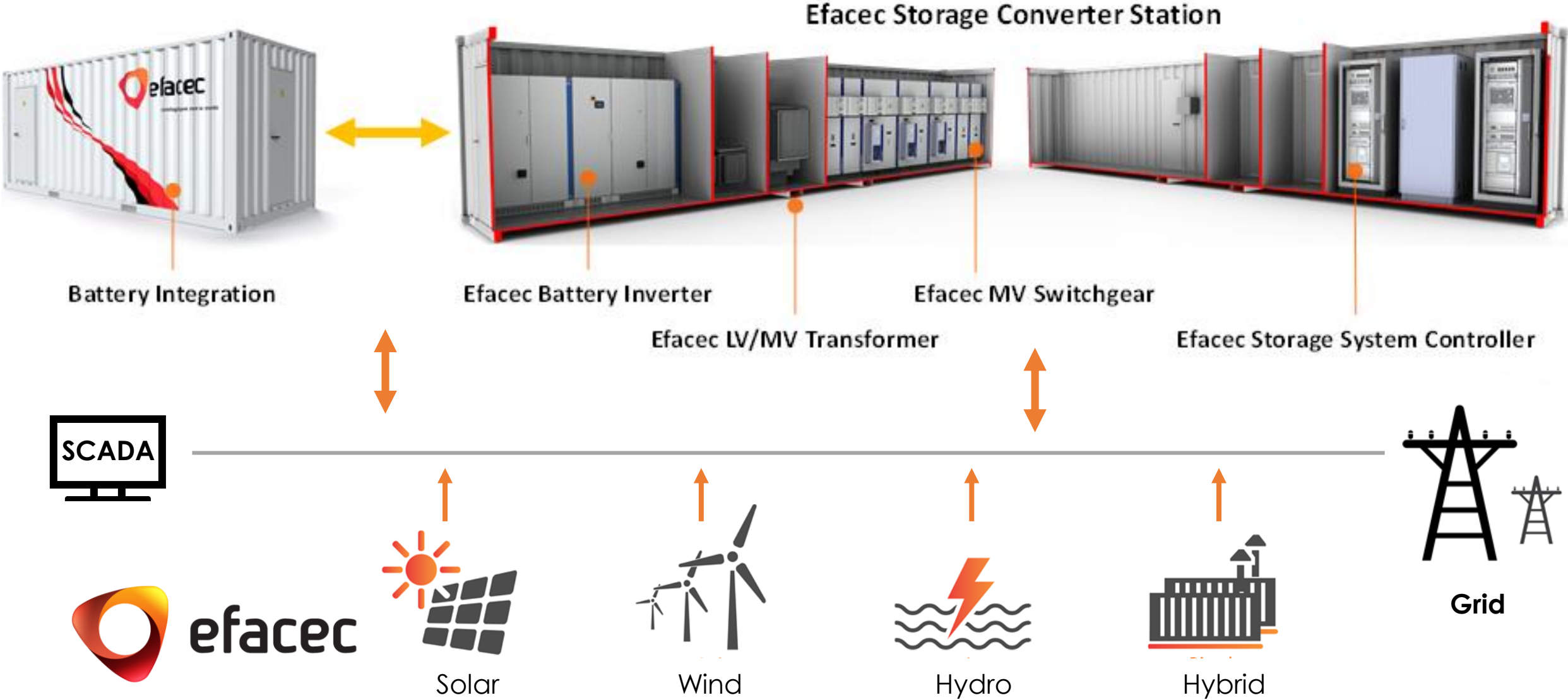
Full EPC + O&M

San Pedro II & IV

Chile - Atacama desert*

**Highest Plant Capacity Factor*

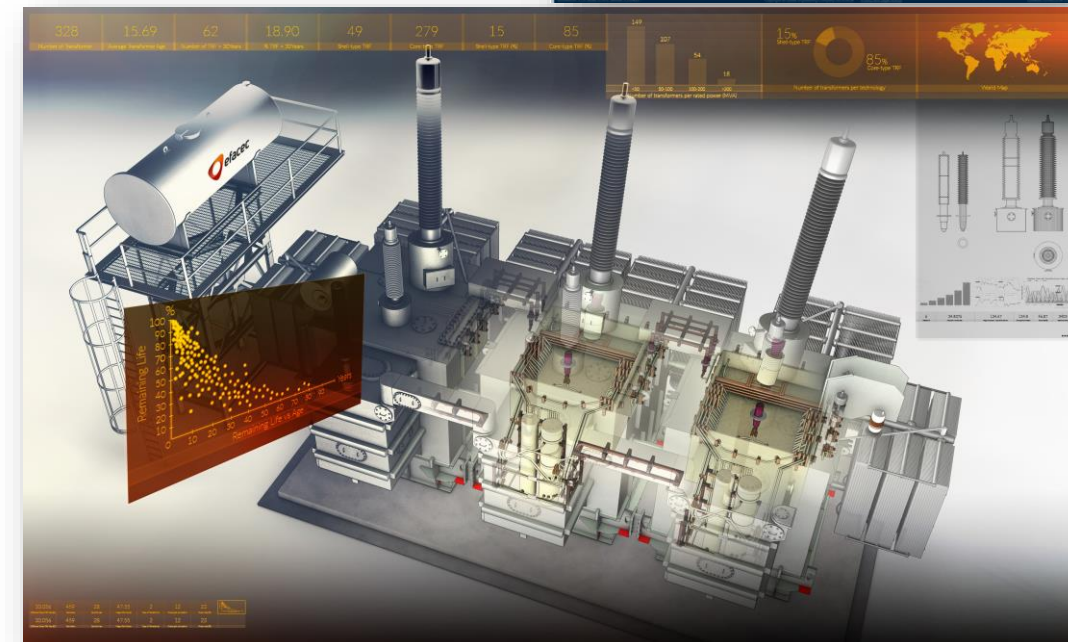
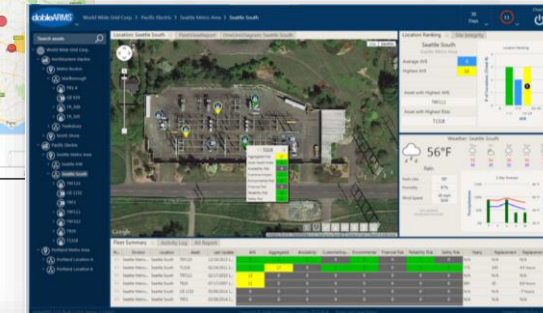
Storage & PV Station Solutions



Digital Asset Management Solutions: Partnership with Doble

Features

- ✓ Sensoring strategic assets
- ✓ Online Condition Assessment: Asset health & performance
- ✓ **Predictive**, condition-based and preventive maintenance
- ✓ Remote Assistance
- ✓ **Smart Aggregator**: digital + analog inputs
- ✓ Digital Support Center



Project ADMS4LV: Smart Grids for Low Voltage



Visibility

- Fault detection
- DER flexibility

Cybersecurity

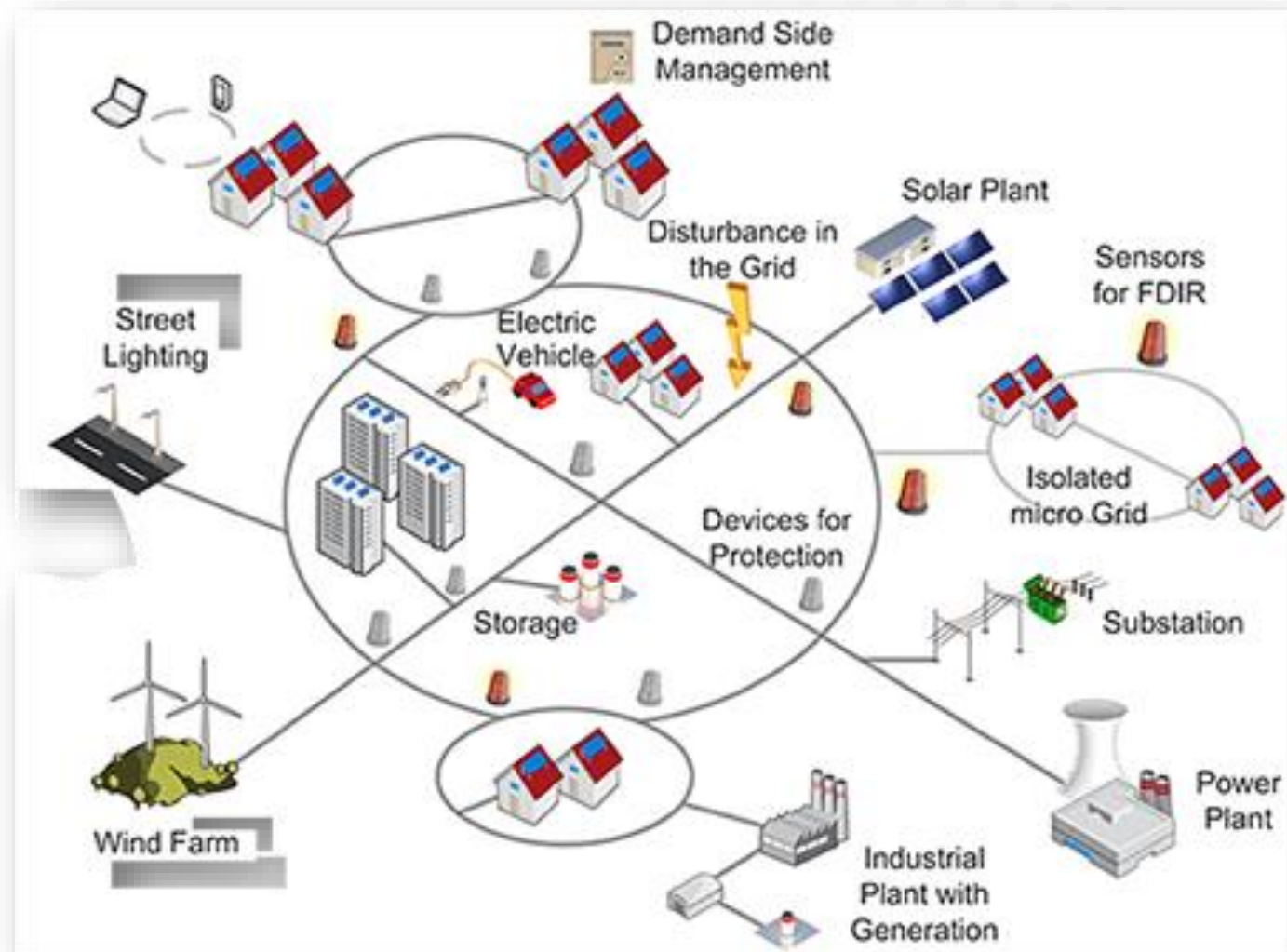
- Ensure regulation needs
- Asset management

Management

- Issues prioritizing and identification
- Helping with the increase of system complexity



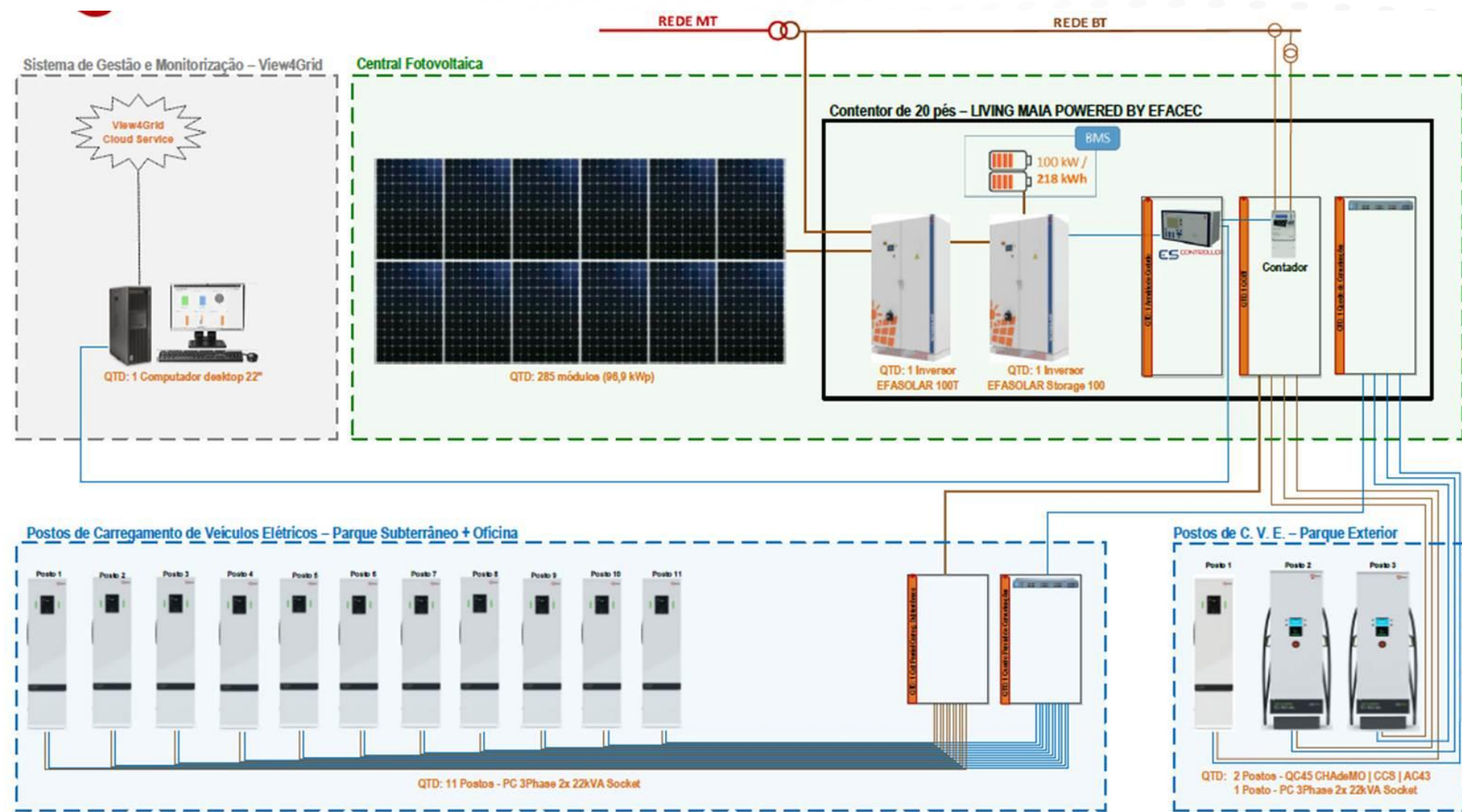
<http://www.adms4lv-project.efacec.com/>



Microgrids: An integrated approach Solar PV + Storage + EV Charging

✓ Pilot in development:
Solution for **parking**

- ✓ Solar PV
- ✓ Storage
- ✓ Inverters
- ✓ EV Chargers
- ✓ CPMS
- ✓ Grid automation



Digital Connectivity Smart Digital eMobility

Buildings, Condominiums



Hotels / Retail



Fleets

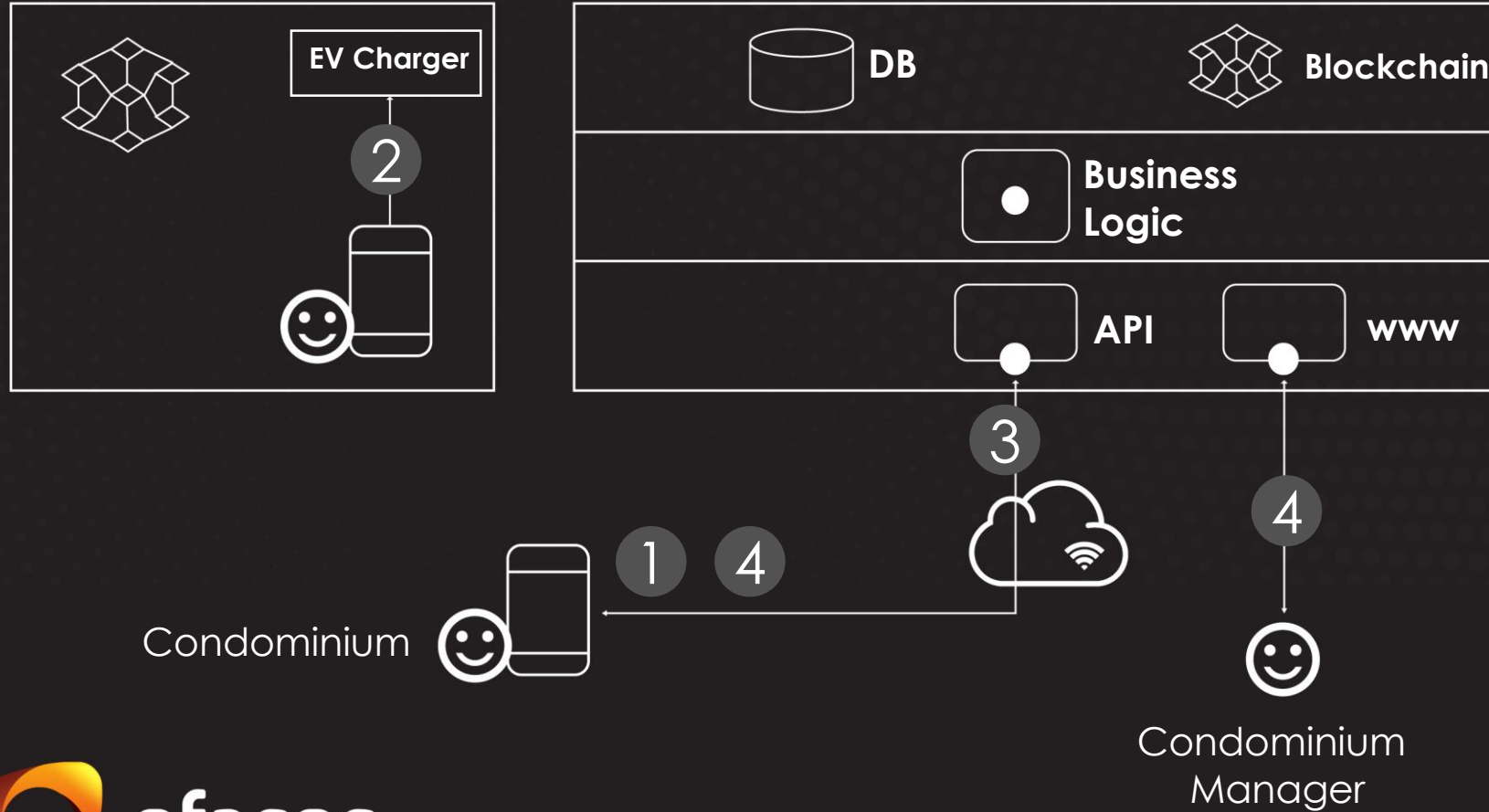


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Smart Digital E-Mobility



- 1 Token
- 2 Offline mode
- 3 Transactions record
- 4 Consumptions

Welcome to our world of empowerment.

We face the present as a moment to build a better future. We do it by creating, developing and delivering state-of-the-art solutions with high added-value for energy, mobility, environment, cities and digital connectivity, which will have a positive impact in human life all around the globe.

Energy

Mobility

Environment

Cities

Digital Connectivity

Thank you

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