

# Workshop – Inovação na Energia

digitalização, descentralização, descarbonização  
a perspetiva da Efacec



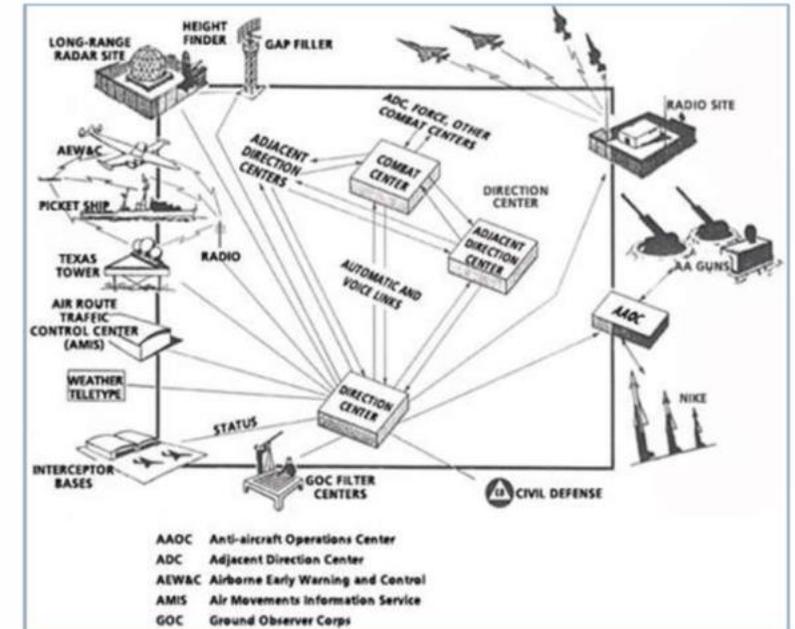
Alberto Jorge Bernardo

## O papel da Guerra Fria

- Sensores avançados
- Alta disponibilidade
- Comunicações *wide-area*
- Automação
- Otimização de equipas no terreno



sensores avançados



## SAGE Computer System

Developed in the 1950's

Operational between 1963 and 1983

"The Semi-Automatic Ground Environment system was a continental air-defense network commissioned by the U.S. military during the cold war."



Info and videos @  
<https://www.ll.mit.edu/about/History/SAGEairdefensesystem.html>

## O papel da Guerra Fria

- Sensores avançados
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- Comunicações *wide-area*
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há 54 anos já se falava  
de digitalização e de  
descentralização

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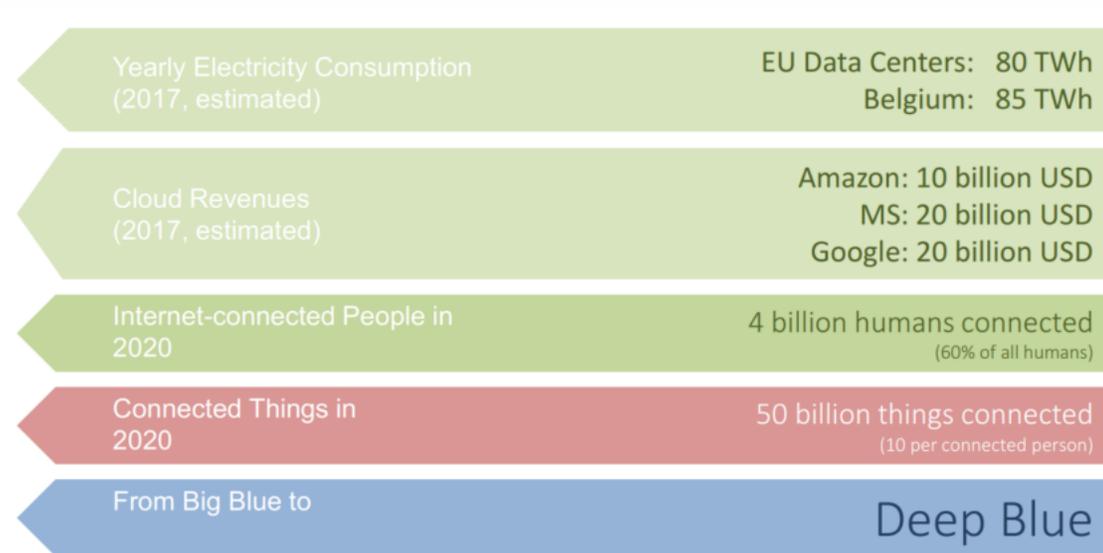
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\* superior ao orçamento do projeto Manhattan

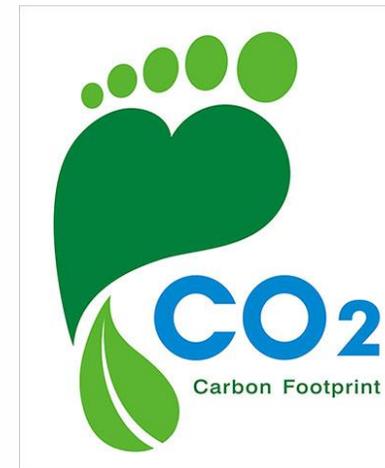


Computational Power  
Cloud and Connectivity  
Mobility and Web  
Internet of Things  
Big data and Analytics  
Artificial Intelligence



## Objetivos para 2030

- redução de 40% na emissão de gases de efeito de estufa, quando comparado com os níveis de 1990
- atingir pelo menos um *share* de 27% no consumo de energias renováveis
- atingir pelo menos 27% na redução do consumo de energia, quando comparado com o cenário do *business-as-usual*

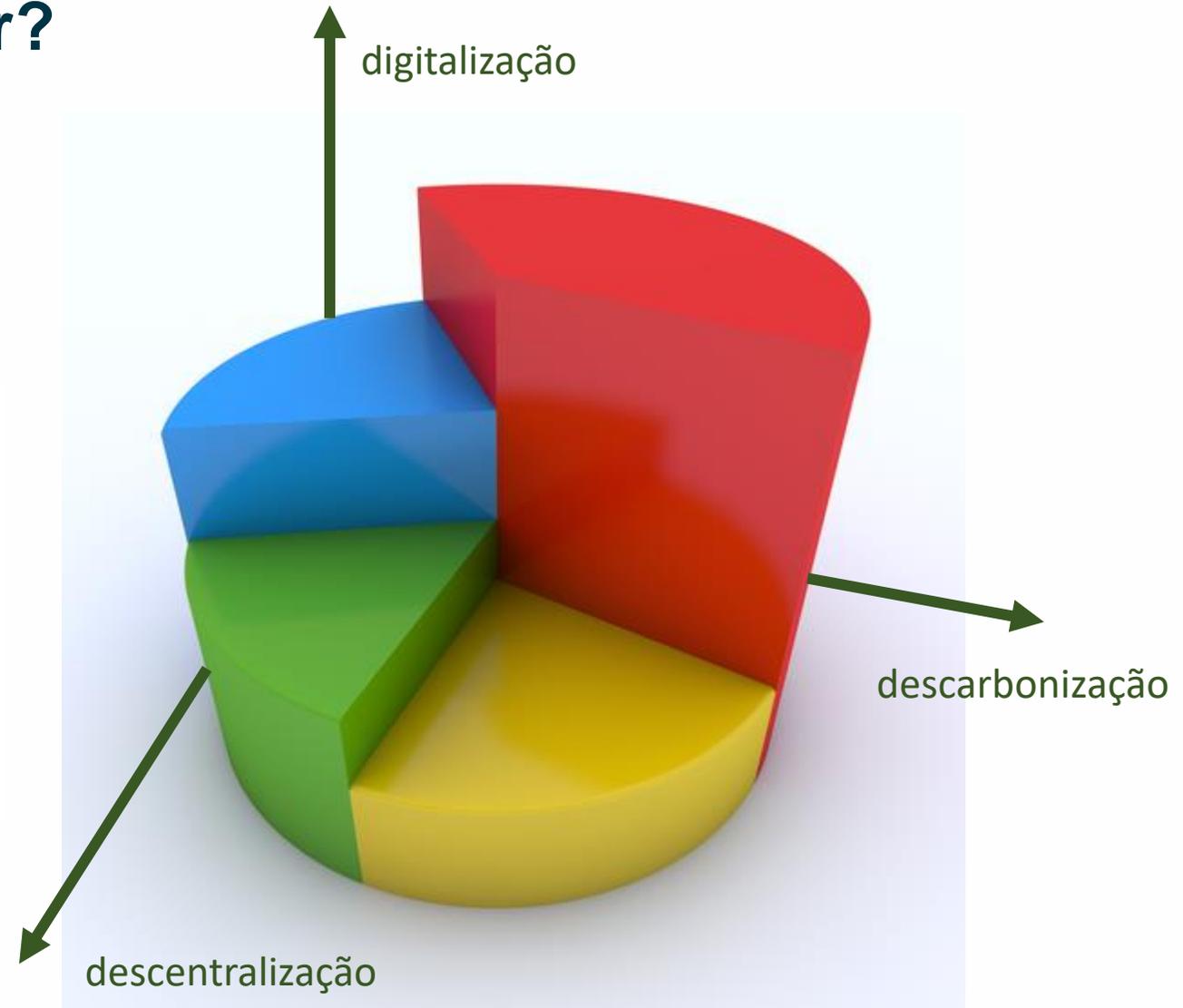


## efacec, onde queremos estar?

### Com que paradigmas?



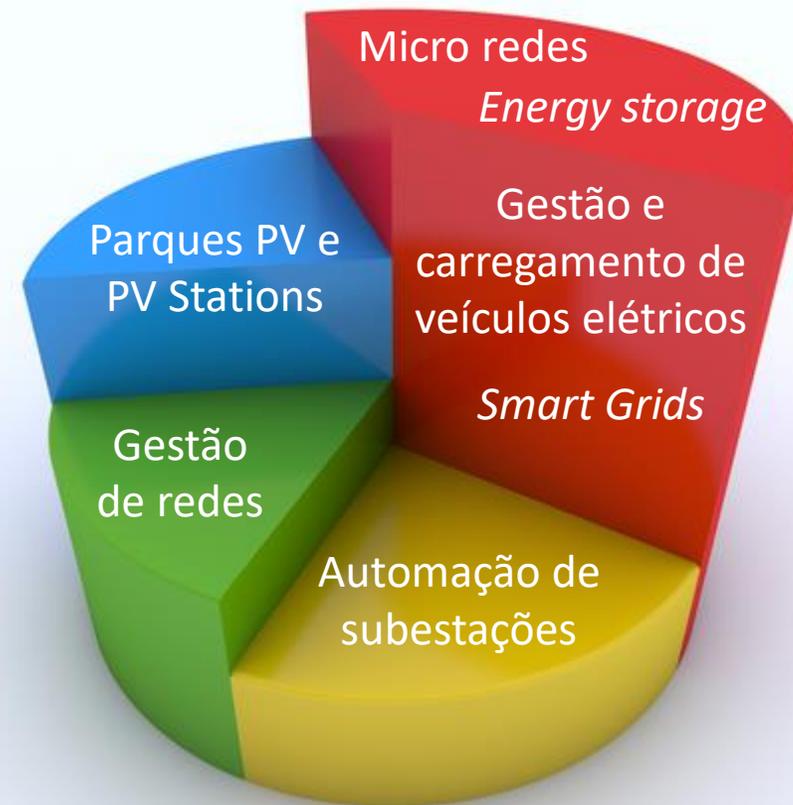
- Smart Grids em prol das Smart Cities



## Que papel para a efacec?

Competências e aposta no conhecimento:

- Processamento de sinal
- Eletrónica de potência
- Cálculo elétrico
- Arquiteturas distribuídas, com foco na IoT
- Ciber-segurança, com forte foco no RGPD / GDPR
- *Machine learning*
- *Big data analytics*
- *Cloud computing* e virtualização
- Integração de ativos convencionais e inteligentes
- Integração de sistemas ICT
- Sistemas abertos
- Standards internacionais
  - IEC 61131-3
  - IEC 61850
  - IEC 60870-5-101/104
  - OCPP1.5



## Gestão de inovação na

### SliceNet Project (2017 – 2020)



End-to-End Cognitive Network Slicing and Slice Management Framework in Virtualised Multi-Domain, Multi-Tenant 5G Networks

### InnoDC Project (2017 – 2021)

Innovative tools for offshore wind and DC grids

### NEXTSTEP Project (2016 – 2019)



Secondary Distribution substation of the future, including advanced functionalities for Smart Grids

### GotSolar Project (2016 – 2018)

Third Generation of Solar Cells

### INCITE Project (2016 – 2020)



Innovative controls for renewable source integration into smart energy systems

### PowerFlow Project (2015 – 2018)

Storage solutions (>500kW) using Redox Flow batteries for domestic/condominiums and industrial clients

### AnyPLACE Project (2015 – 2018)



Adaptable Platform for Active Services Exchange

### MEDOW Project (2013 – 2017)



Multi-terminal DC grid for offshore wind

### e-balance Project (2013 – 2017)



Balancing Energy Production and Consumption in Energy Efficient Smart Neighborhoods

### SmartTransit Project (2015 – 2017)

Development of a solution for Automatic Vehicle Location System and public/passenger information

### iCubas5D Project (2016 – 2019)

Mechanical project for transformer's tank aggregating 3D modelling and automatic calculation & production

### EVolution Project (2015 – 2017)

Innovative EV charging solutions for fast charging with storage, wireless and fast charge and smart charging

### DSGrid Project (2016 – 2018)



Digital Systems Technology for Next Generation Grid Automation

### QT2 Project (2018 – 2019)

Quiet Transformer 2

### DEMOCRAT Project (2018 – 2019)



Demonstration of a microgrid integrating Storage

### ADMS4LV Project (2016 – 2018)



Advanced Distribution Management System for Active Management of LV Grids

### SmarTHER CORE Project (2016 – 2017)

Methodologies to enable design and conception of smarter, efficient and flexible CORE type transformers

### Win PSC Project (2017 – 2019)

Development of the encapsulation of perovskite solar cells (PSC) using a disruptive laser sealing process

### OSMOSE Project (2017 – 2021)



Optimal System-Mix Of flexibility Solutions for European electricity

### 5G Project (2018 – 2021)



Componentes e serviços para redes 5G

### DigiXSafe Project (2017 – 2019)

Sistema de proteção de nova geração para Passagens de Nível



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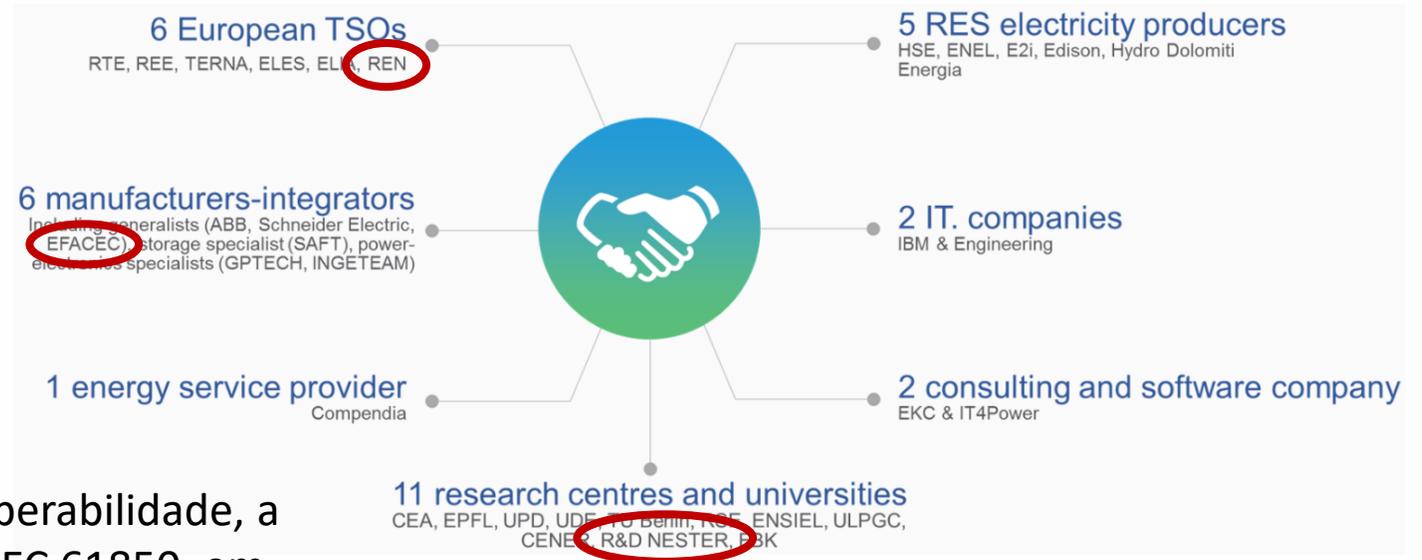
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## Gestão de inovação na efacec

OSMOSE

<https://www.osmose-h2020.eu/>



Foco tecnológico D<sup>3</sup> da Efacec:

- Recomendações para fomento da interoperabilidade, a fim de standardizar modelos de dados IEC 61850, em prol de uma melhor integração de proteções numéricas de diferentes fabricantes
- Gestão da interação DSO/TSO, através da implementação de novas funcionalidades OPF (previsão cargas/RES, restrições TSO, trânsito de potência reativa com o TSO), para escalonamento e gestão da flexibilidade

OSMOSE Project (2017 – 2021)

Optimal System-Mix Of flexibility Solutions for European electricity

OSMOSE



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n°773406



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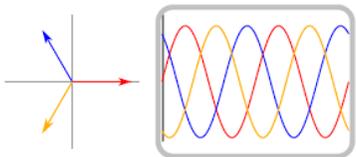
ENEIDA.IO



NEXT STEP

**NEXTSTEP Project (2016 – 2019)**

*Secondary Distribution substation of the future,  
including advanced functionalities for Smart Grids*



Foco tecnológico D<sup>3</sup> da Efacec:

- IoT na sensorização ubíqua (ambiente, integridade e segurança)
- Sensorização ao longo dos ramais BT, em prol da implementação de mecanismos de *self-healing*
- *Data mining* para *Automatic Feeder Mapping*, com base em dados de *smart meters*
- Novo controlador modular do posto de transformação
- Armazenamento de energia e regulação de tensão
- Uso de dielétricos verdes nos transformadores de distribuição

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## Gestão de inovação na efacec



DEMOCRAT Project (2018 – 2019)

Demonstration of a microgrid integrating Storage



Foco tecnológico D<sup>3</sup> da Efacec:

- Gestão de micro-redes interligadas e/ou isoladas
- Gestão do carregamento inteligente de veículos elétricos
- Gestão de iluminação pública
- Algoritmos de gestão de ativos baseados em *machine learning*
- Armazenamento de energia como ativo de flexibilidade (250 kVA / 208 kWh)
  - Controlo do sistema de baterias
  - Gestão do ativo de armazenamento
  - Solução contentorizada

Cofinanciado por:



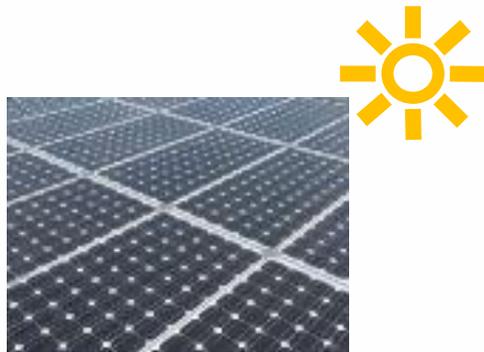
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Foco tecnológico D<sup>3</sup> da Efacec:

- Armazenamento de energia como ativo de flexibilidade (250 kVA / 208 kWh)
  - *Backup & black start*
  - *Capacity firming & suavização PV (250 kWp)*
  - *Peak-shaving*
  - Arbitragem de energia
  - Simulação de participação em mercados (*intraday*, mitigação de penalidades)
  - Prestação de serviços de sistema para o operador de rede (regulação de tensão, regulação de frequência, correção do fator de potência)

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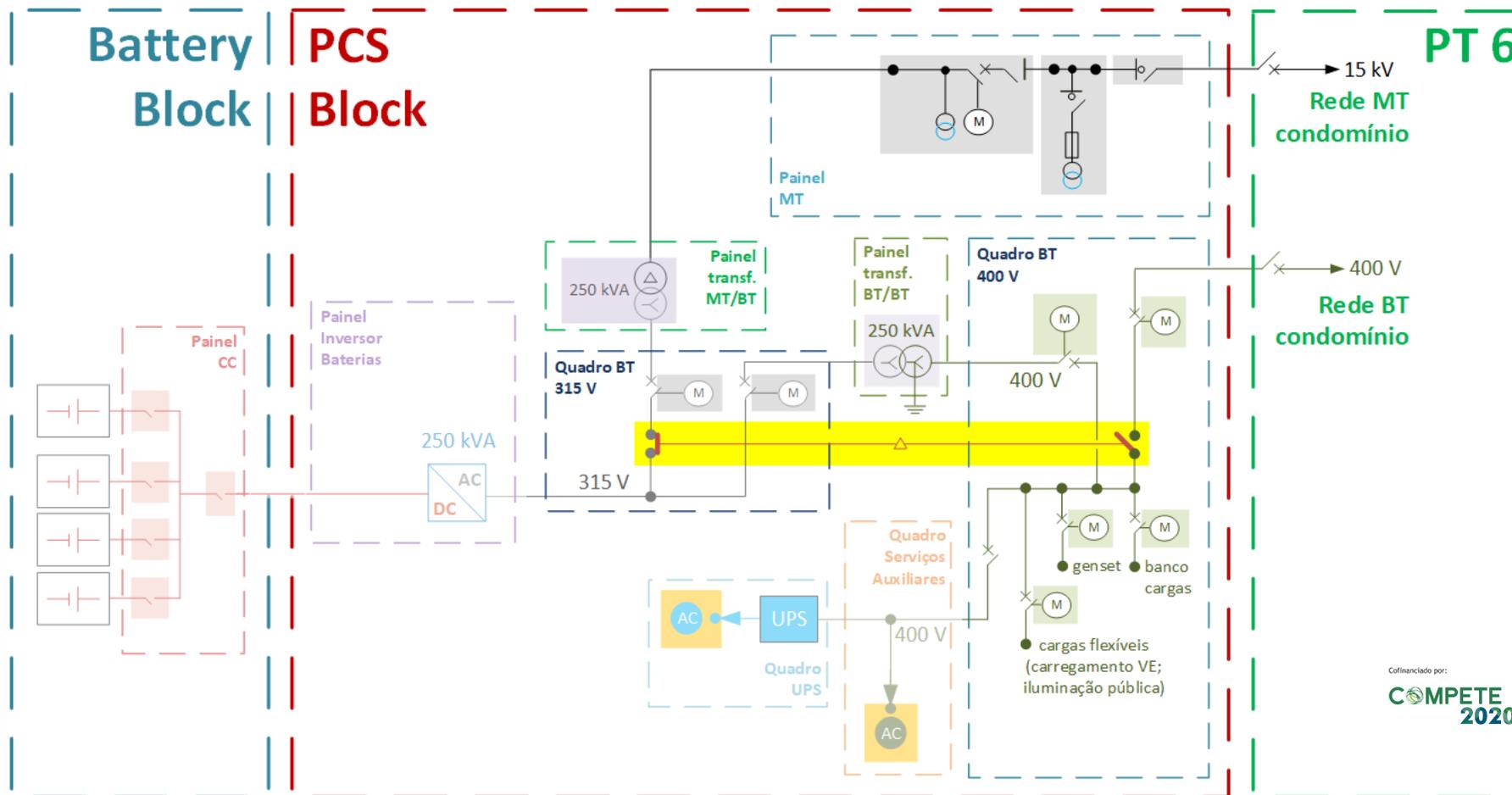


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DEMOCRAT Project (2018 – 2019)  
Demonstration of a microgrid integrating Storage



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# Obrigado!



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