ONENET
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PORTUGUESE DEMONSTRATION

Testing an improved TSO/DSO cooperation mechanism for flexibility and operational planning. Partners: E-REDES, R&D NESTER, INESC-TEC and REN

Problem Statement

The transition towards variable RES, together with the expected changes in the consumption patterns resulting from the integration of new technologies, such as heat pumps and EVs, creates new challenges to TSOs and DSOs.

As these challenges are deeply associated with the digitalization of the energy systems, where unprecedently high amounts of data are being generated and processed, there is an urgency to **develop optimized data-sharing mechanisms between SOs to increase network efficiency and resiliency** while also aiming for a higher capacity to incorporate additional variable RES that will bring us closer to the current climate ambition.

Demo's Innovation

Optimized information exchange mechanism between the DSO and TSO through APIs. Two Data Exchange Platforms (DEPs): TDEP and DDEP, to exchange data for **improved flexibility acquisition and operational planning**: 1) flexibility prequalification; 2) flexibility needs (daily); 3) maintenance plans (yearly and month/week ahead); 4) consumption and generation forecasts (daily); 5) short-circuit forecasts (daily).
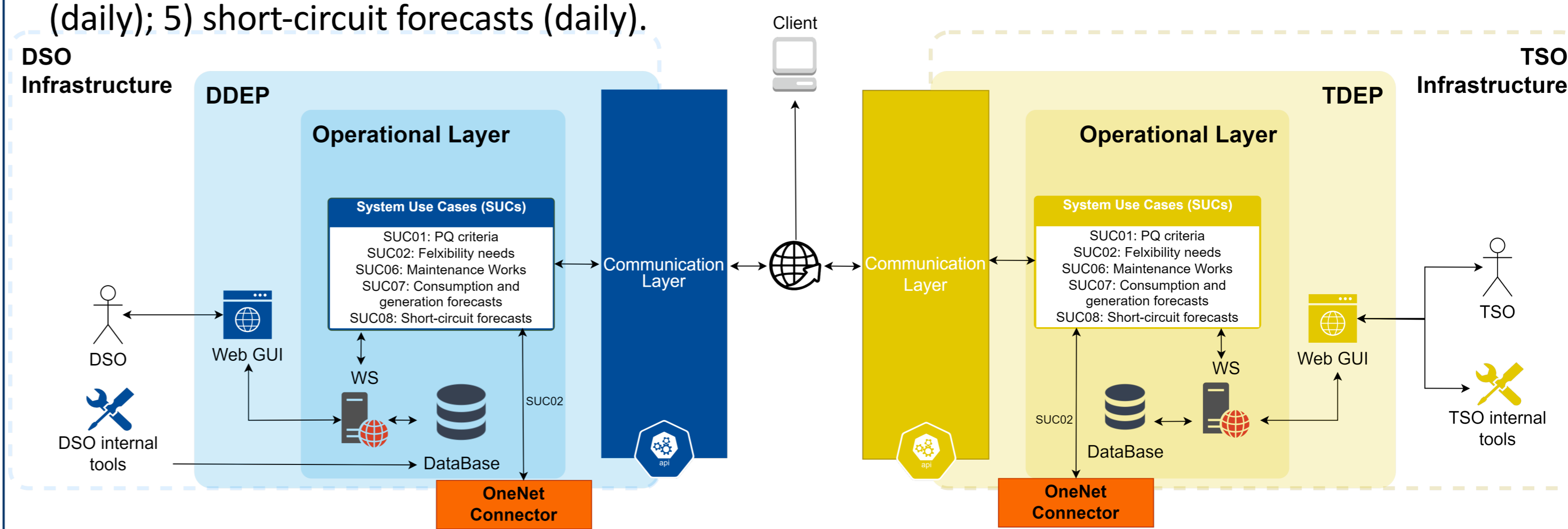
Results and Lessons Learned

- Both DEPs have proven to work well, ensuring effective bidirectional data transmission and interaction with internal tools.
- OneNet Connector deployed and tested for exchange of flex needs and potentials between the TSO and the Aggregator.
- Five use cases were successfully tested within 5 locations in two demonstration periods (August and November/December).
- Prequalification results did not completely align with PT's ancillary services market.
- No flexibility needs (and constraints) were identified for the periods analyzed, however, an upsurge in DER penetration is expected to cause increased congestions in the coming years.
- Digitalization/Virtualization of the information exchange regarding

maintenance plans.
- Several substations showed a joint TSO/DSO short-circuit contribution higher the TSO's planning estimate.
- TSO/DSO coordination leads to improvements of the load and generation forecast.
- Successful organization of a workshop involving customers to increase
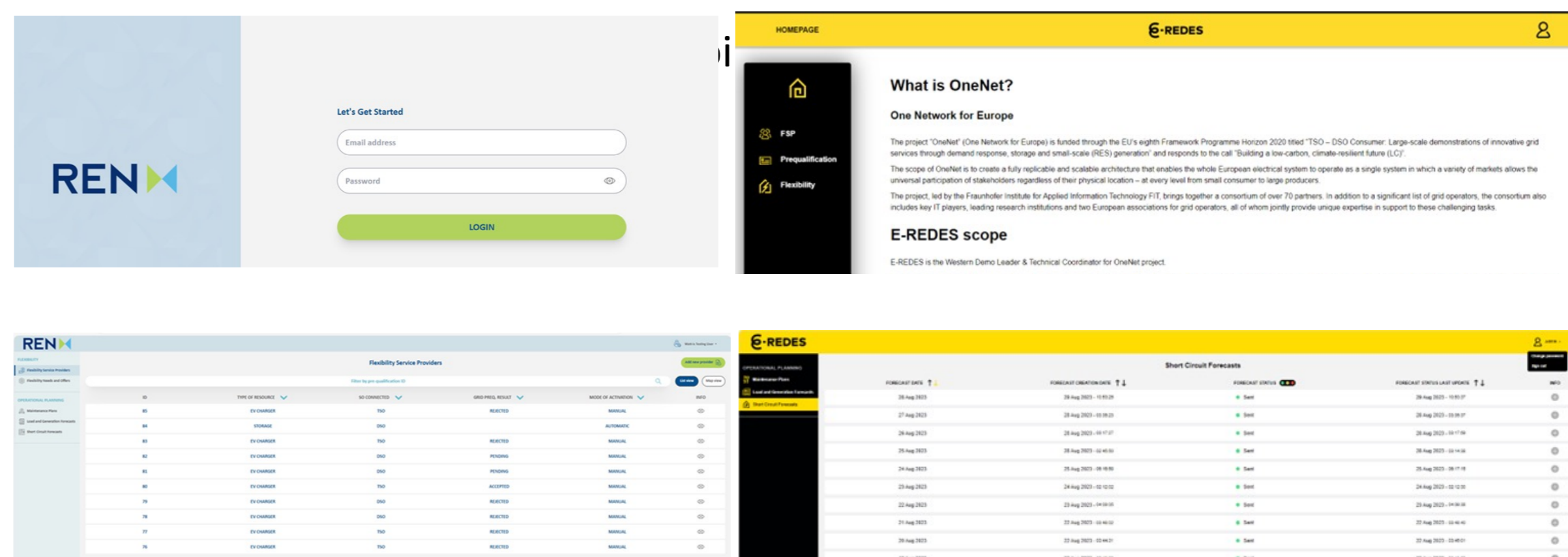
Main Challenges

- Deployment of the **OneNet Connector blocked** to some parties **by the cybersecurity measures** in place (non-negotiable) **(solved):** Use of other resources such as VMs and/or additional equipment using an independent network configuration.
- **Delays in the development of internal tools** that allowed automation of data computation and exchange **(solved):** 2-phase demonstration, the first without the tool and the second with the tool, also used to identify improvement areas and expand geographical scope.
- **Very few FSPs (only two) considered** in the flexibility potential estimation, which could have significantly hindered the quality of the results **(mitigated):** One of the FSPs with significant size (230 supermarkets).
- **Data protection and GDPR issues** when handling metering data **(mitigated):** Required anonymisation of data, but still impeding the use of location data, leading to less accurate estimations.
- Faced **several issues related to data quality**, in part, related to network modelling issues **(mitigated):** More time was given to the treatment of the data, still, several issues remained, namely related to network modelling

Recommendations

- Address scaling-up effects - up to thousands of offerings to the platforms.
- Move from from an API-based messaging (synchronous communication) to an asynchronous one (e.g., NATS).
- Consider the entire prequalification lifecycle, namely, including the FSP prequalification phase.
- Development of collaboration protocols where a common visibility is warranty without compromising the rights of protected data.
- Further explore and define the grid zone to be considered for allocation of each asset.
- Solve inconsistencies in network characterization and improve network modelling.

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