OneNet open call project description

Watt-IS

WISeGrid – Electrical Grid Web-based optimization services

2022-11-02

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957739

1 Company Description

Watt-IS is a Portuguese data analytics company that develops and applies Artificial Intelligence based Data Analytics on top of smart metering data to provide high-value services to energy utilities, grid operators and other partners. We provide advanced data analytics services in a SW as a Service (SaaS) approach (or integrated into user engagement platforms) focused on energy efficiency, leveraging on an existing smart metering infrastructure deployed and managed by System Operators (DSOs & TSOs). Our main goals are to be able to increase customer satisfaction through innovative services provided and, with that, reduce churn rates and generate new revenue streams to our partners always with a focus on energy efficiency and the reduction of GHG emissions.

We have built a cloud-based data analytics architecture & supporting infra-structure that integrates different data analytics modules focused on the needs of energy retailers and grid operators. These data analytics services can be made available via integration with white-label visualization platforms, in a SaaS approach, or via API's following a Data Analytics as a Service (DAaaS) approach.

Watt-IS provides a wide range of data analytics services that aim to create value at the various layers of the energy value-chain, such as i) Load disaggregation from smart meter data; ii) targeted energy efficiency measures; iii) Load Forecasting; iv) estimation of the Demand Side flexibility potential of individual/group of clients; v) identification of solar PV and EV assets, among others.

Currently, Watt-IS is supporting DSO's, energy retailers and other stakeholders, providing real and non-real-time data analytics services to thousands of end clients, processing metering data for commercial settlements, developing user engagement platforms and providing DAaaS data analytics through API's incorporating advanced machine learning/AI services.

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2 WISeGrid Short Description

2.1 Challenge

Critical issues like global warming, depleting fossil fuel reserves, and greenhouse gas (GHG) emissions require attention for ensuring a sustainable future. New technologies and solutions need to be deployed to reach the ambitious targets set by the European Commission. Hence, the vast expansion of renewables (that are variable in nature and have a certain degree of unpredictability) together with the cross-sectorial electrification of the energy systems form a pillar in the sustainable development agenda of most countries, requiring a smarter and more flexible electricity grid, which comes hand in hand with an optimized coordination between system operators.

The clean energy transition and the introduction of new consumption dynamics that arise with new technologies such as heat pumps or electric vehicles (EVs) are deeply associated with the digitalization of the energy systems, where unprecedently high amounts of data are being generated from smart meters. Such data is esteemed to unlock the full potential to better manage the energy value-chain, including the grid. In fact, more data means the possibility to develop deep analytics that can deliver valuable services such as a more accurate and closer to real-time forecast and management of the demand and supply, the adoption of short-circuit preventive measures and the avoidance of unnecessary system costs.

Facing this scenario, an optimized coordination between DSOs and TSOs is paramount to sustain an effective and efficient management of the grid. Hence, identifying and sharing the information that enables better operational planning between their networks is a needed upgrade that will not only allow for a more efficiently managed and resilient grid, but also for a higher capacity to incorporate additional variable renewable energy resources that will bring us closer to the sustainability and climate goals that need to be achieved.

Having outlined the existing “Challenge(s)”, Watt-IS participation in the OneNet project has the objective to contribute towards an improved coordination between the DSOs and TSOs regarding information exchange about the grid “operational planning” and flexibility related services, to facilitate the definition of necessary actions in order to avoid grid constraints, avoid unnecessary investments and ensure a secure, reliable and efficient grid operation.

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2.2 Proposed solution

Within the scope of the OneNet open call Watt-IS, jointly with the project stakeholders (E-REDES & REN/NESTER) have outlined the proposed solution that will involve the refinement and implementation of a set of APIs, along with the support Backend and Frontend layers, that will facilitate an optimized coordination between the Portuguese DSO and TSO regarding information exchange focused on grid "operational planning" and flexibility service requirements. The set of APIs and related services will be implemented in order to exchange the following information between the Portuguese DSO and TSO: i) daily (next 72h) consumption and generation forecasts; ii) daily (next 72h) forecasted short-circuit information; iii) weekly, monthly and annual maintenance plans, iv) flexibility service providers prequalification and v) daily flexibility needs forecasts (next 24h). These developments will support the Portuguese Stakeholders in the implementation of the different System Use Cases (SUC) that are part of the OneNet Portuguese pilot, namely:

System Use Case 01 (REN/NESTER) – GUI & Integration with REN/NESTER APIs - The goal of this SUC is to evaluate if a given Flexibility Service Provider, connected to the TSO or DSO network, is capable of delivering a given product and therefore enter in the flexibility market. In order to do that, two types of pre-qualification should be considered: Product Pre-qualification (in this case, performed by the TSO) and Grid Pre-qualification (performed by the system operator of the network that the FSP needs to be connected to).

Regional Use Case (REN/NESTER) – GUI & Integration with REN/NESTER APIs and OneNet Connector - This use case has the same goal of SUC 01, although, the pre-qualifications will occur between system operators of the western cluster, exclusively via the OneNet Connector.

System Use Case 02 (REN/NESTER) – GUI & Integration with REN/NESTER APIs - This SUC supports the coordination between the DSO and TSO so that they can determine how much flexibility they will need to acquire, for a short-term timeframe.

System Use Case 06 (E-REDES & REN/NESTER) - The SUC 06 foresees the possibility for weekly, monthly and year ahead grid maintenance plans to be exchanged between the DSO (E-REDES) and the TSO (REN/NESTER).

System Use Case 07 (E-REDES & REN/NESTER) - The SUC 07 foresees the possibility for daily energy consumption and generation forecasts (including Wind, Solar (PV), Hydro, Pump Storage, Thermal, Other sources, Load P, Load Q) to be shared between the DSO (E-REDES) and the TSO (REN/NESTER).

System Use Case 08 (E-REDES & REN/NESTER) - The SUC 08 foresees the possibility for the short circuit levels regarding the contribution of distribution and transmission networks to be shared between the DSO (E-REDES) and the TSO (REN/NESTER).

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2.3 Expected results

With the successful implementation of all of the foreseen SUC's within the Portuguese pilot, the DSO and TSO will be empowered to have more efficient and streamlined data exchange mechanisms focused on:

i) "operational planning" - being possible to exchange and update between them weekly, monthly and annual maintenance grid plans;

ii) "forecasts" – allowing for a more efficient exchange of daily (next 72h) consumption, generation and short circuit forecasts;

iii) "flexibility related services" – making possible for Flexibility Service Providers (FSP) prequalification, both at the DSO and TSO level, and exchanging daily (next 24h) flexibility needs forecasts.

With these foreseen developments Watt-IS has the objective to contribute towards the achievement of a more efficient information exchange process between Portuguese System Operators, but also to facilitate the creation and development of a new layer of grid flexibility services that, as previously discussed, are key to support the vast expansion of renewables together with the cross-sectorial electrification of the energy systems.

Based on the experience gained in the OneNet project Watt-IS expects to have the possibility to deepen the collaboration with the Portuguese System operators in the flexibility services analytics area, but also to expand collaborations with other System Operator within the EU in the field.

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3 Figures

3.1 Frontend developments

Below we present some of the frontend mockups developed by Watt-IS in collaboration with the project stakeholders (E-REDES and REN/NESTER), that are now being implemented to support the foreseen SUCs.

3.1.1 SUC 01

Within SUC 01, Watt-IS has defined the layouts to be implemented and that will allow the grid and product pre-qualification of FSPs.

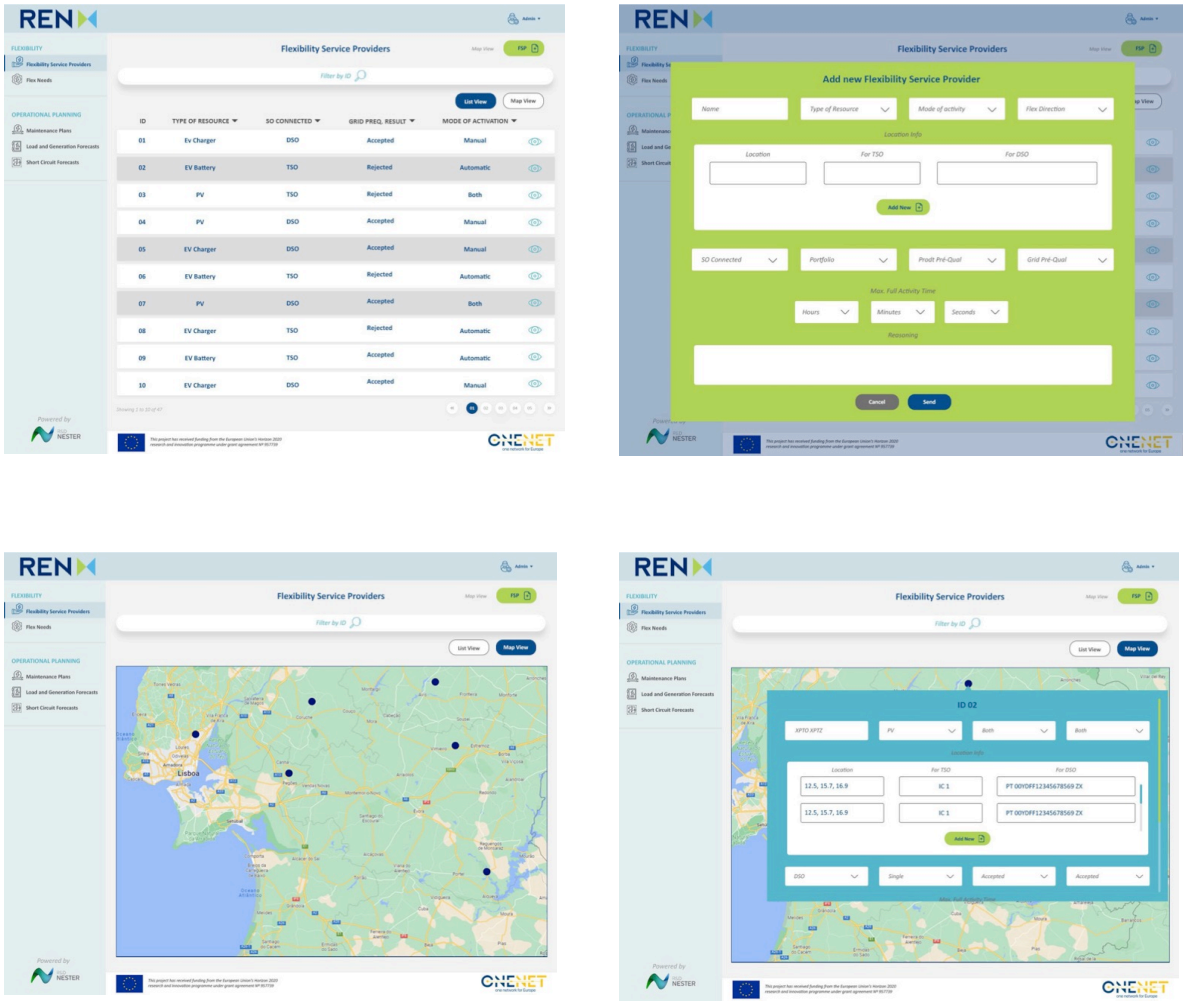

Figure 3.1 – SUC 01 proposed layouts (REN/NESTER)

3.1.2 SUC 02

Within SUC 02, Watt-IS has defined the layouts to be implemented and that will support the coordination between the DSO and TSO so that they can determine how much flexibility they will need to acquire, for a short-term timeframe.

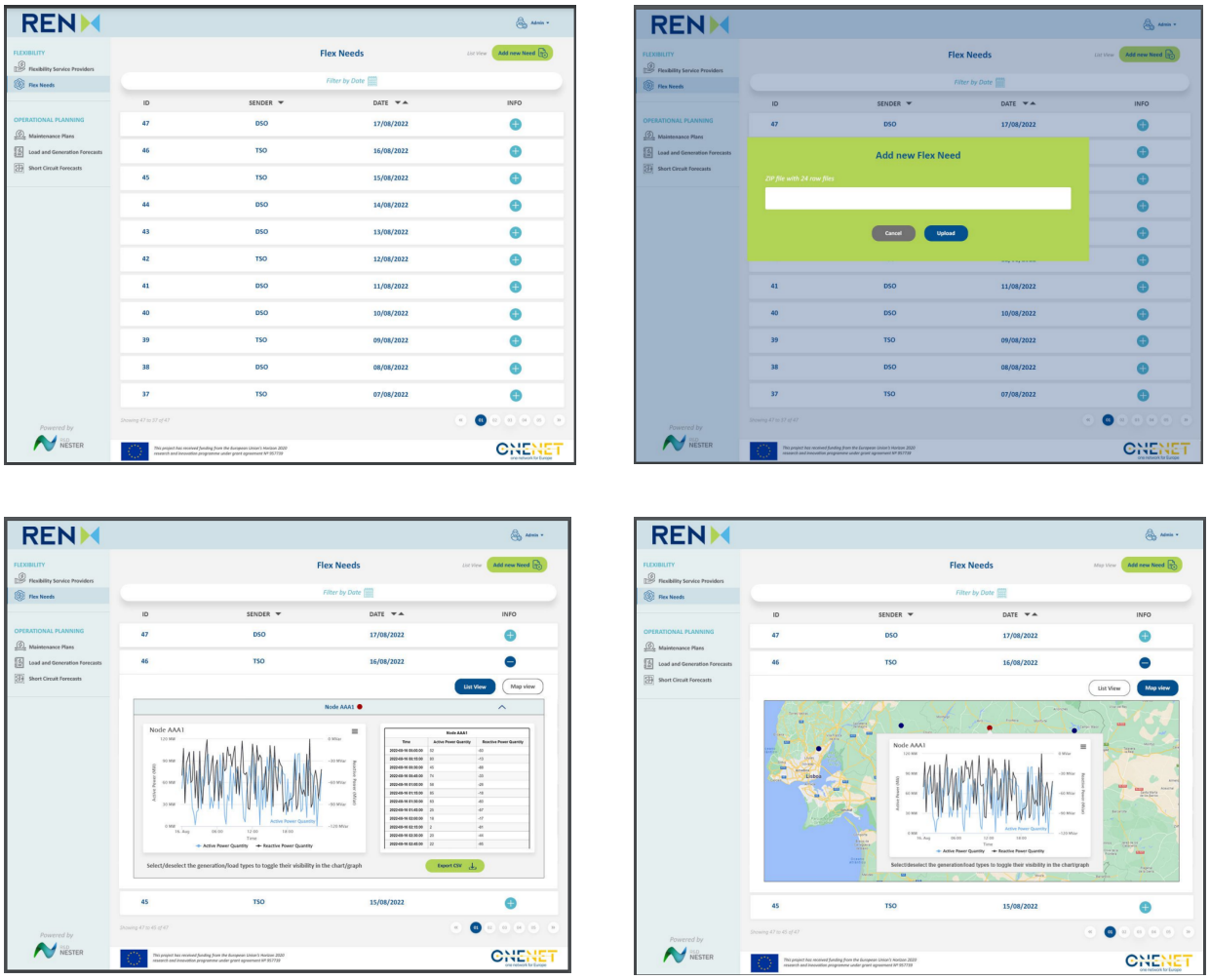

Figure 3.2 – SUC 02 proposed layouts (REN/NESTER)

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3.1.3 SUC 06

Within SUC 06, Watt-IS has defined the layouts to be implemented and that will allow the exchange of maintenance plans between E-REDES and REN/NESTER.

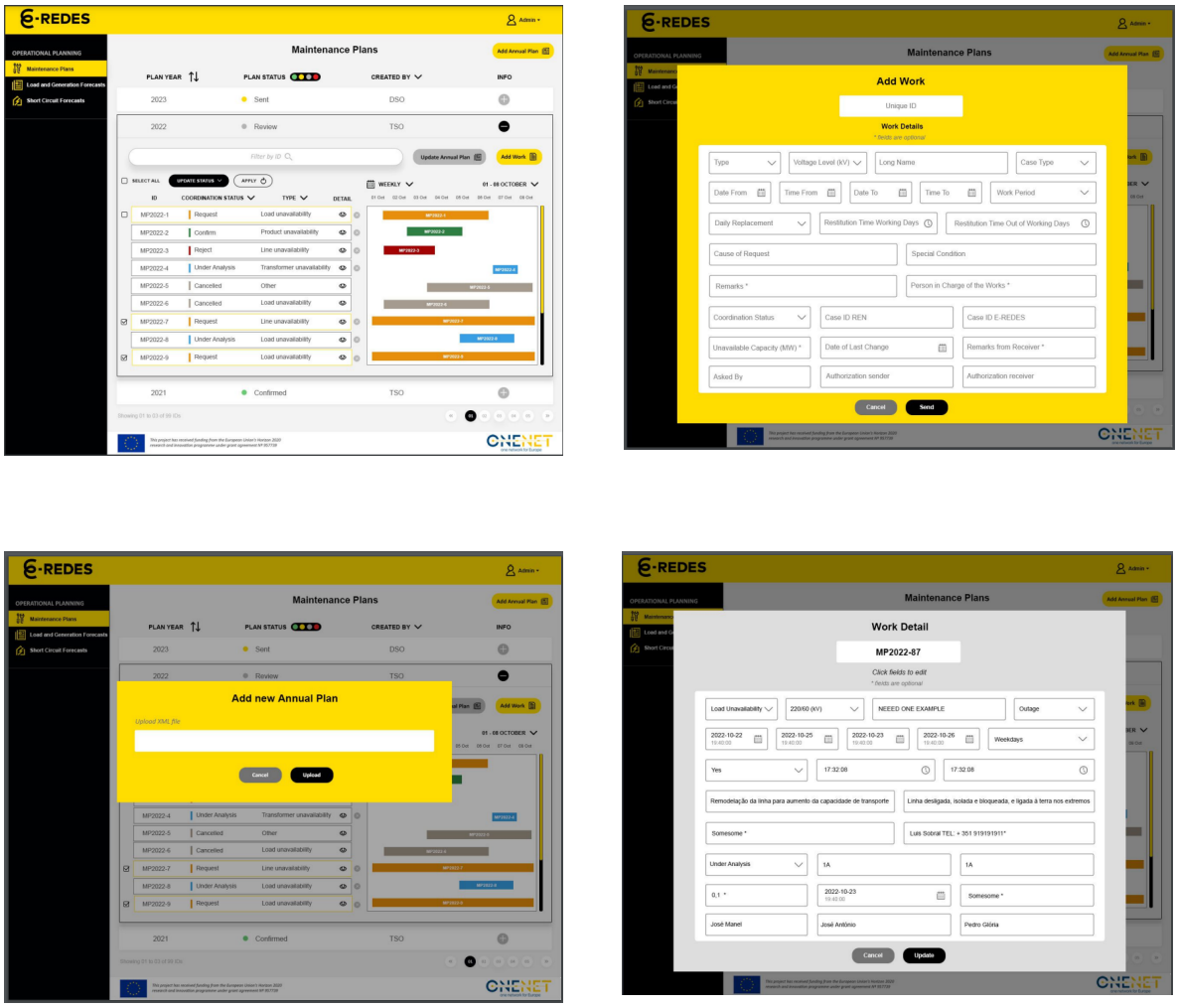

Figure 3.3 – SUC 06 proposed layouts (E-Redes)

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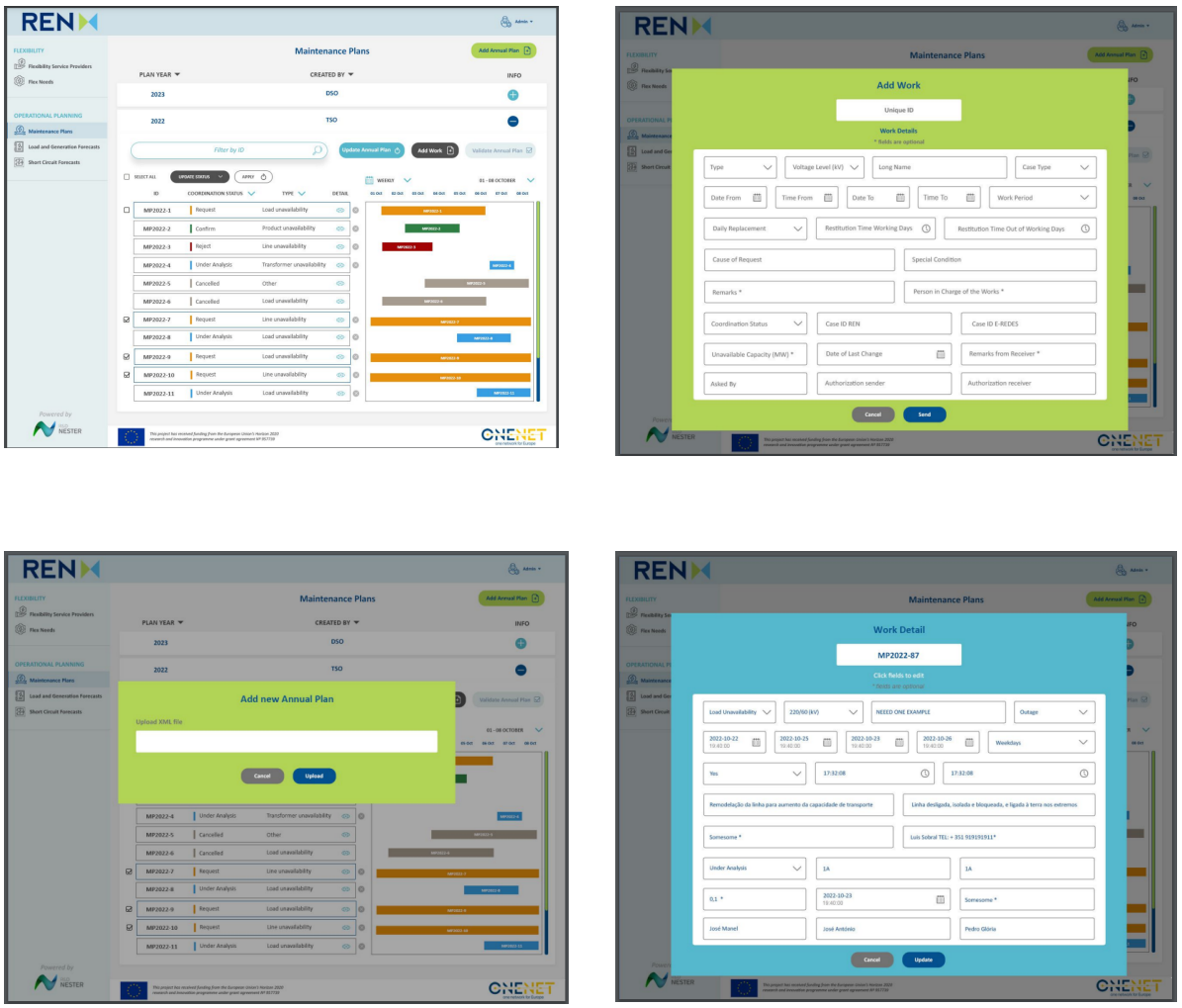

Figure 3.4 – SUC 06 proposed layouts (REN/NESTER)

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3.1.4 SUC 07

Within SUC 07, Watt-IS has defined the layouts to be implemented and that will allow the exchange of load and generation forecast information between E-REDES and REN/NESTER.

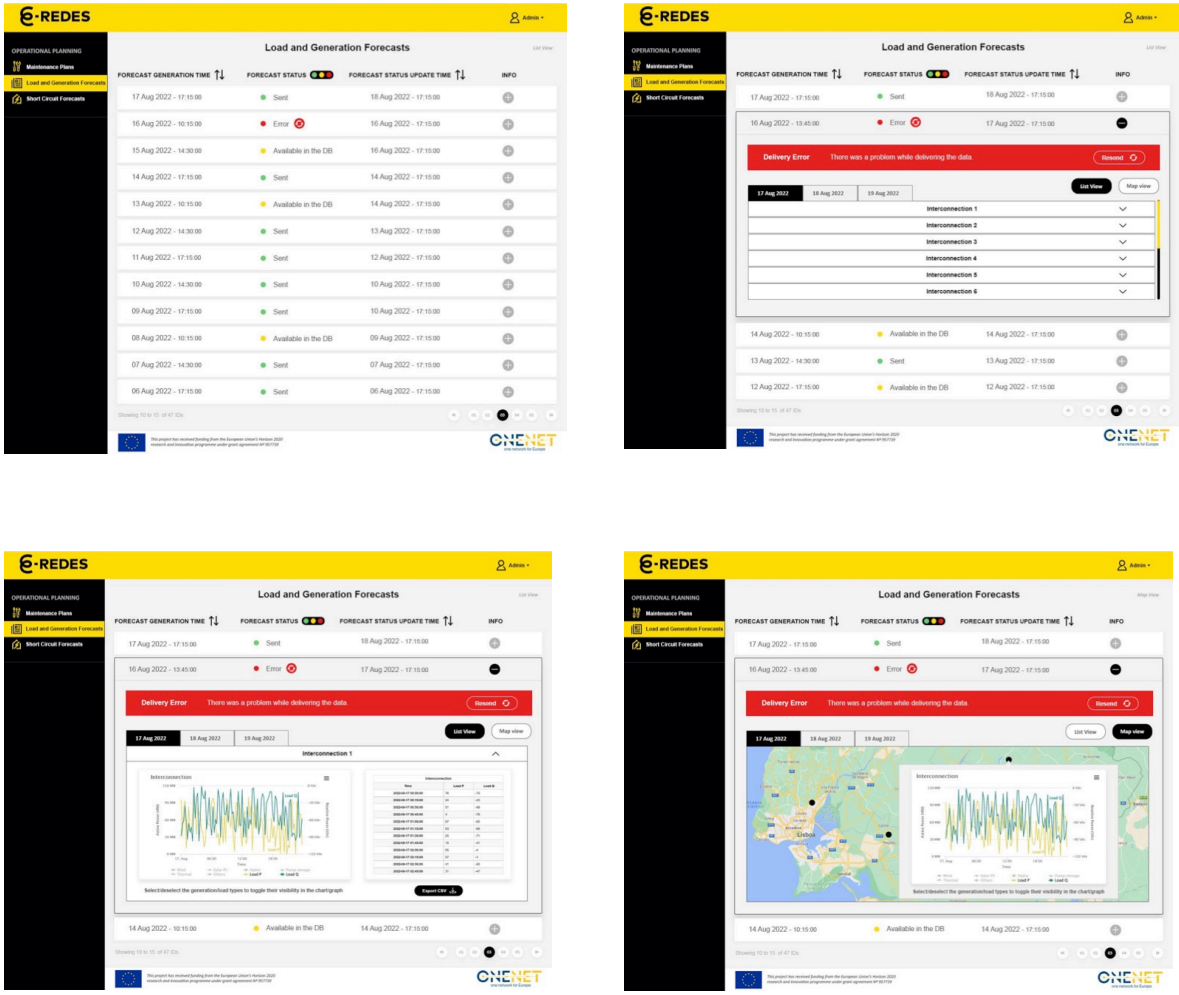

Figure 3.5 – SUC 07 proposed layouts (E-Redes)

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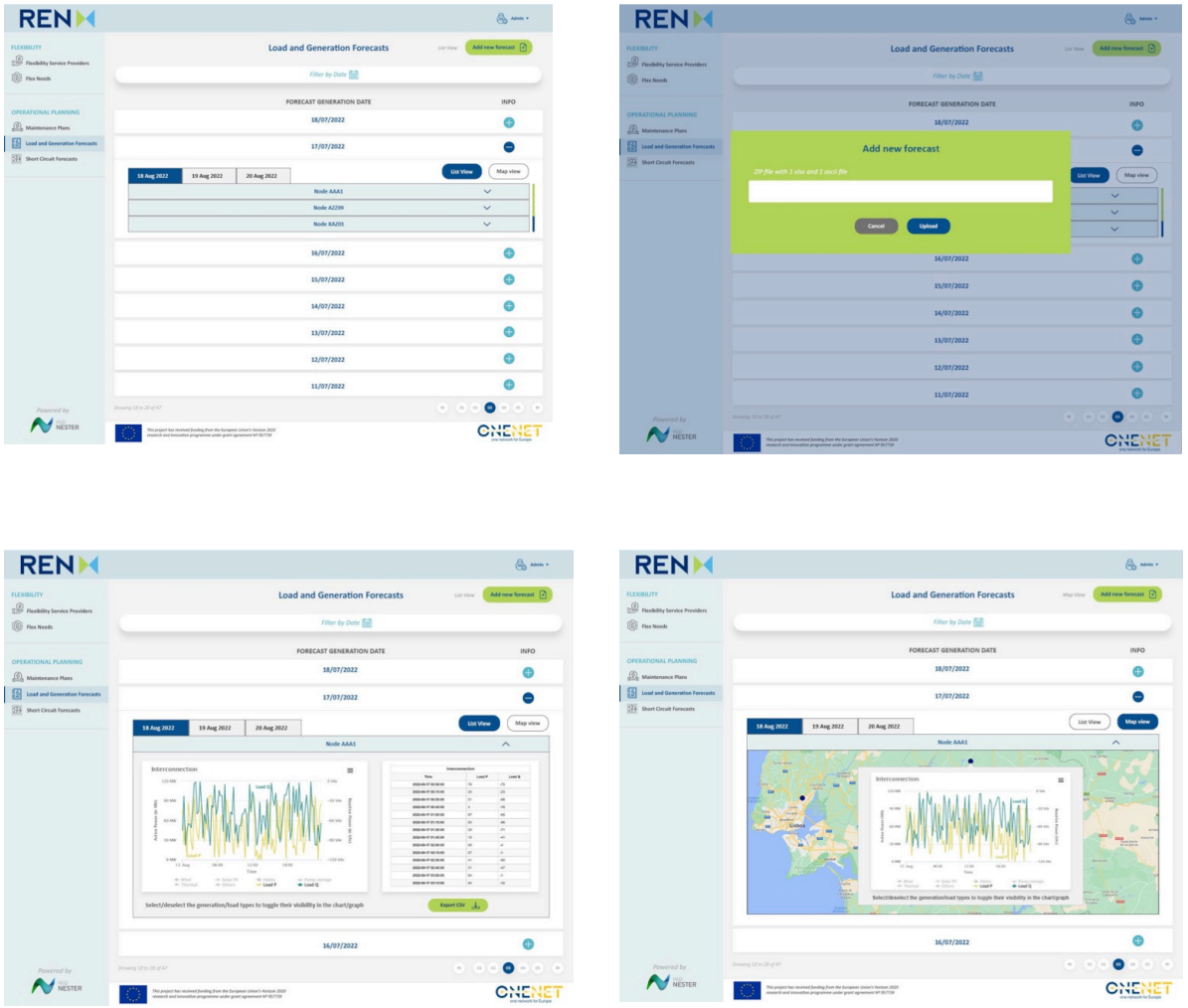

Figure 3.6 – SUC 07 proposed layouts (REN/NESTER)

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3.1.5 SUC 08

Within SUC 08, Watt-IS has defined the layouts to be implemented and that will allow the exchange of short-circuit forecasting information between E-REDES and REN/NESTER.

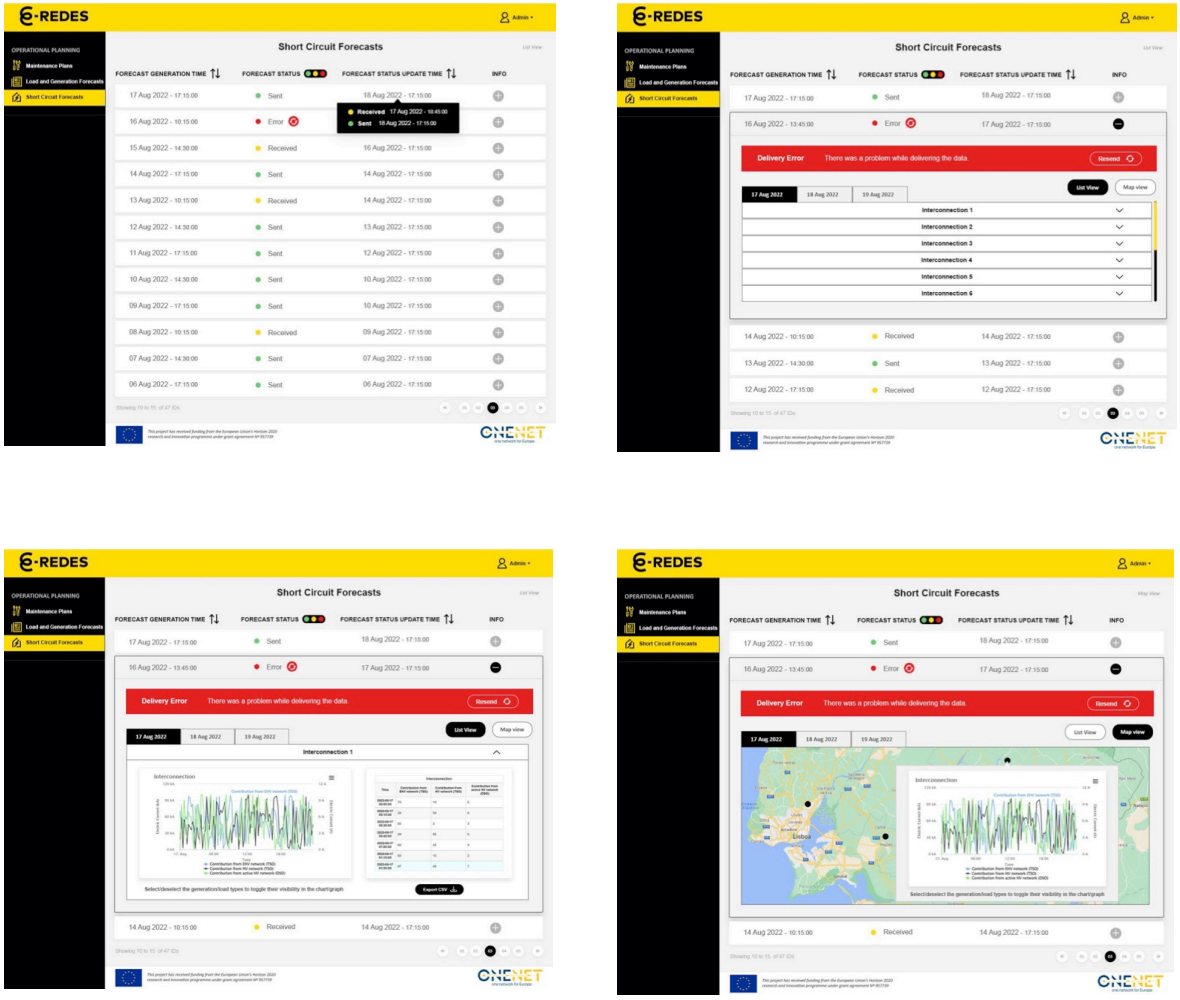

Figure 3.7 – SUC 08 proposed layouts (E-REDES)

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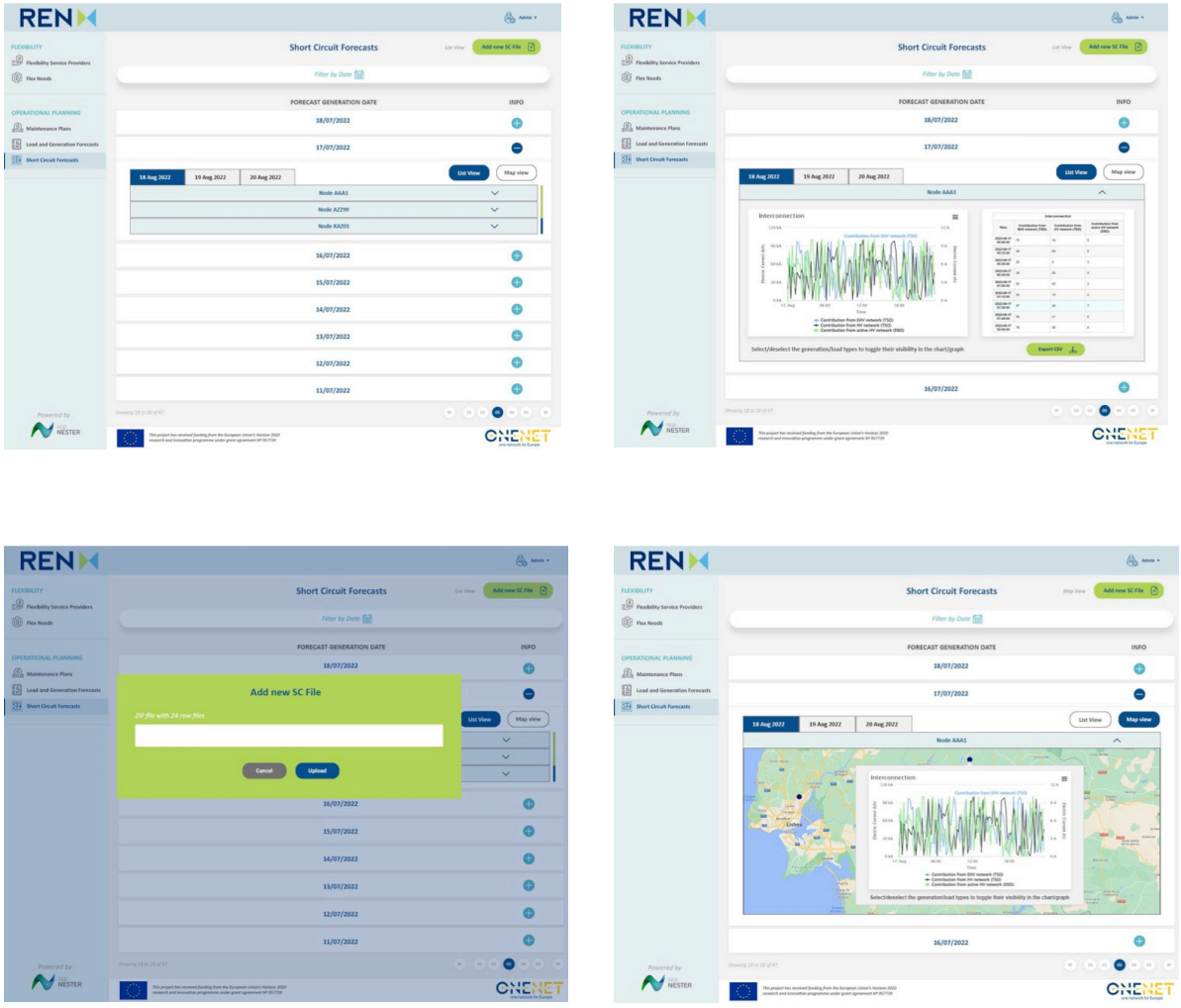

Figure 3.8 – SUC 08 proposed layouts (REN/NESTER)

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