



DER Management for Grid Operation & Planning



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About Us

About Minsait ACS

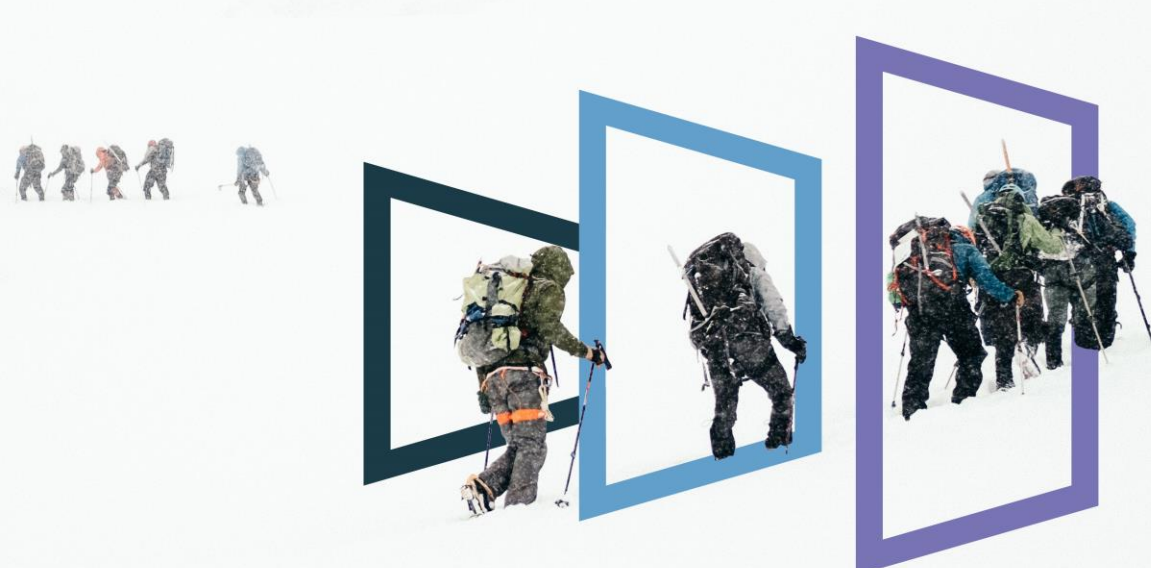
Minsait ACS (www.minsaitacs.com), an Indra Company, is a leading global technology and consulting company and technological partner for core business operations of its customers worldwide. Based in Atlanta, Georgia, Minsait ACS has over 40 years' experience in the utility industry, and we are proud to bring the broadest set of OT and IT solutions to our valued customers. At Minsait ACS, we leave our mark by providing solutions and services that support the entire energy value chain, from intelligent management networks and data to the commercialization of energy and new services. Our value proposition is based on innovation and knowledge of the business processes and challenges within the utility sector.

About Minsait

Minsait (www.minsait.com), an Indra company, is a leading firm in digital transformation and Information Technologies. Minsait possesses a high degree of specialization and knowledge of the sector, which it backs up with its high capability to integrate the core world with the digital world, its leadership in innovation and digital transformation, and its flexibility. Thus, it focuses its offering on high-impact value propositions, based on end-to-end solutions, with a remarkable degree of segmentation, which enables it to achieve tangible impacts for its customers in each industry with a transformational focus. Its capabilities and leadership are demonstrated in its product range, under the brand Onesait, and its across-the-board range of services.

About Indra

Indra (www.indracompany.com) is one of the leading global technology and consulting companies and the technological partner for core business operations of its customers around the world. It is a world-leader in providing proprietary solutions in specific segments in Transport and Defense markets, and a leading firm in Digital Transformation Consultancy and Information Technologies in Spain and Latin America through its affiliate Minsait. Its business model is based on a comprehensive range of proprietary products, with an end-to-end high-value approach and a significant innovative component. In the 2020 financial year, Indra achieved revenue totaling 3.043 billion euros and had nearly 48,000 employees, a local presence in 46 countries and business operations in over 140 countries.





Enable a Green Grid with DER Flexibility

The increased urgency to meet global sustainability goals is opening new conversations around the need for a more decarbonized grid. A combination of concerns surrounding conservation, gas and oil prices increasing, DER-related tax reduction and incentives, and technology developments, are favoring the adaption of renewables in a more decentralized energy generation.

The intermittent and non-dispatchable nature of renewables pose new challenges for electric utilities. However, this variability in generation can be compensated with sufficient flexibility in the DER and demand side, enabling a higher penetration of renewables without incurring in long-term costs and risks inherent to network reinforcements.

New Challenges to the Grid

As energy transition calls for decentralization, electric utilities need to be aware of the new potential challenges to grid planning and operation



Variable and unpredictable renewable output



Meshed networks and two-way power flow



Grid congestion from load and demand sides



Unexpected power flows in protective equipment



Increased grid capacity for new electric consumers



Niche solutions are not optimal for the system

Same Focus on Customer Satisfaction



Reliability

Power must be available at any time.

As the #1 priority for consumers, it is also in the highest focus for utilities to provide with stable power to their customers, including critical infrastructures such as medical facilities.



Sustainability

Consumers are increasingly demanding greater choices of primary energy and low-carbon generation of electricity. For generation utilities, this is translating to investments in utility-size renewable installations. On the distribution side, utilities are promoting the installation of distributed generation - at a household level.



Affordability

Investments in grid reinforcements must be carefully planned. In a rapidly changing environment, the risk of stranding assets is at an all-time high. For electric utilities, this has a direct impact to their costs, and alternative non-wire solutions are gaining traction in grid planning discussions.

System-wide visibility of criticalities and resources

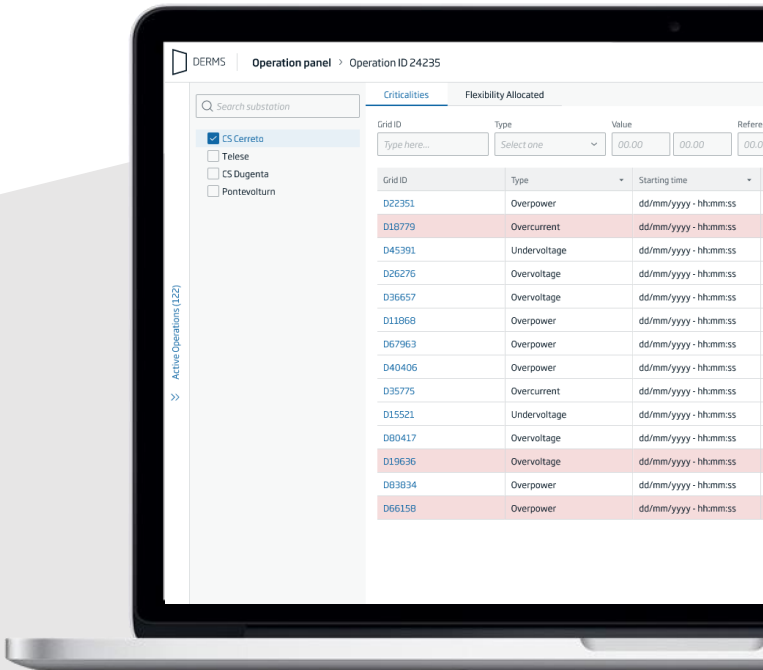
Onesait DERMS offers a real-time overview of resource availability for holistic and reliable grid operations

Get ahead of grid criticalities

Plan for grid criticalities before they occur with short-term resource forecasting and allocation. Onesait DERMS runs an Optimal Power Flow calculation for each criticality detected within a configurable period and controls DERs in real-time to solve criticalities or improve grid parameters.

Enhance your portfolio

Not only can proprietary assets play a role in grid flexibility, but markets are open for utilities to purchase demand-side flexibility and curtailment services through bilateral contracts or tender processes. Onesait DERMS offers transparency for all stakeholders during DER dispatch and settlement.



Avoid unnecessary network reinforcement

Grid extension requires thorough planning to target recurrent grid problems without excessive investment. Onesait DERMS provides utilities with insights about criticalities recurrence for the user to evaluate the trade-off between grid enhancement and non-wires alternatives.

Automate operation

Onesait DERMS can include a SCADA platform to command the participating assets directly, enabling quick reaction to sudden changes in the grid while recalculating alternative solutions if the assets do not perform as expected. The outcome: error-free autonomous operation.

A New Era in Software Development



Open

Minsait ACS adheres to the Linux Foundation and Linux Foundation Energy (LFE) and has adopted various open-source solutions from these consortia over the years. Minsait ACS invests in their improvement from a technical point of view through contributions and participation in technical committees. <https://www.lfenergy.org/members>



Collaborative

Minsait ACS, in order to strengthen its position in the IIOT world, has established two strategic partnerships with RedHat and Intel, creating the eWLC: Edge workload consolidation initiative.

<https://www.intel.com/content/www/us/en/developer/articles/technical/edge-workload-consolidation-ewlc.html>



Modular

Onesait DERMS is built as a set of self-contained services, featuring a customized solution for every need. From basic flexibility management modules to advanced hosting capacity and planning tools, Minsait ACS has the right application for the best DER management offering.



Versatile

Onesait DERMS can be deployed both on Cloud or on-premise.

Either way your software will be 100% secure and reliable.

Just pick the best option for your business.



In a Full Suite of Applications

Basic Modules



Grid Optimization

Detect grid criticalities with a system-wide Optimal Power Flow



Monitoring & Performance

Connect with SCADA and asset interfaces for full interoperability



Flexibility Dispatch

Select flexibility resources to be activated for each criticality period

Advanced Modules



Baseline & Forecast

Create accurate generation and load forecast scenarios



Edge Control

Distribute DER control coordinating IoT devices in the grid nodes



Market Connectivity

Interact with local and ancillary markets to purchase flexibility services



Hosting Capacity

Include probability in your hosting capacity for non-firm contracts



Grid Planning Assistant

Assess DER long-term rating for more informed grid planning decisions



Dual Services Coordination

Avoid conflicts with assets participating in different services



Grid
Optimization

Monitoring &
Performance

Flexibility
Dispatch

Baseline &
Forecast

Edge Control

Market
Connectivity

Hosting
Capacity

Grid Planning
Assistant

Dual Services
Coordination

Grid Optimization

Predict and resolve grid criticalities

Variable renewable generation and shifting loads are creating frequent local grid instabilities. Feeder congestions and over voltages at DER connection points are among the most frequent undesired conditions. Both can be detected in advance and resolved with DER flexibility. Forecasting periods can vary from the very short-term (less than 24 hours) to the short-term (up to 7 days). The machine learning engine constantly improves the prediction models and weights of influencing variables.

But local criticalities are not to be resolved as niche problems. While decentralized operation has benefits associated with more rapid data management and computing, system-wide operation ensures that not only local but global optimality is achieved. Onesait DERMS combines both worlds with federal computing algorithms that transfer only the relevant DER information to external systems (ADMS, CIS, OMS, etc.), avoiding massive data exchanges while preserving a 100% data usage.





Monitoring & Performance

Get full visibility of your DERs

DERs always behave differently from what was expected. Even with the most accurate forecasts available, the real output is inherently variable and requires continuous monitoring with a high sampling ratio and low latency. Continuous monitoring is enabled through various IoT technologies and protocols for complex information exchange, that often do not only include real-time electrical parameters, but physical limits and market prices as well. Onesait DERMS is suited to digest all this information for advanced techno-economic decisions.

In highly uncertain scenarios, resiliency is crucial. When generation varies and forecasted load changes unpredictably, the system operator must be ready to search a new optimal operating point in seconds, sometimes less. Also, after each flexibility event, a report of the asset performance is required to settle the remuneration or penalties based on the contracted availability. Onesait DERMS provides complete transparency for bilateral and public markets.



Monitor your assets alarms and behavior for real-time rescheduling and settlement

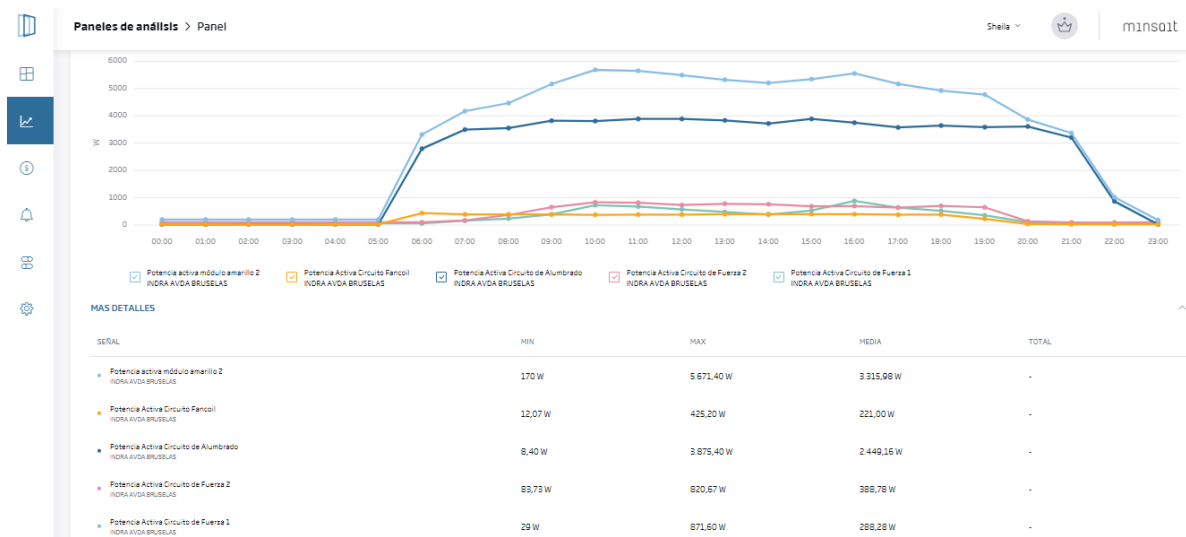


Information uniformity for better visibility

In a decentralized energy landscape, not only are the amount of grid assets growing, but the number of different types of DER and manufacturers are rapidly increasing. Onesait DERMS can communicate with the most common and used protocols (IEEE 2030.5, OpenADR, etc.), as well integrate with platforms that aggregate information, such as Charging Point Operators (CPO).

DER data for enhanced performance settlement

DER behaviors are subject to many decisions and their optimization is generally decentralized. This leads to a highly unpredictable flexibility provision and ability to perform as expected when called. Onesait DERMS evaluates the actual performance against the contracted service to ensure accurate settlements after dispatching.





Flexibility Dispatch

Activate your flexibility assets as required

Once your assets are contracted and reserved, it is time to put them to use as the potential criticality is confirmed. Every asset has their own activation time and ramp characteristics that must be considered for each activation. Operators need to be warned about the last call to activate a flexible resource before it is no longer available in the criticality timeframe. As the assets are called, the flexibility contract bonds the two parties – utility and flexibility service provider – under the terms established in the bilateral agreement or the public market.

Not all flexibility are called after reservation. These assets remain available for other uses and will not be remunerated for use. This distinction between capacity and energy is clearly established in many flexibility markets. Onesait DERMS allows the user to analyze the usage of the reserved capacity and the actual dispatching of the resources. This information is associated with the risk value during the flexibility request process.



Easily identify flexibility and integrate them in the operation workflow



Filter by type or required starting time

For the best operating decisions, operators must have an easy and direct view of the potential criticalities per type and the available grid resources to resolve them. Onesait DERMS features a list of these assets in a comprehensive dashboard that allows dynamic filtering and sorting for quick analysis and selection.

Focus on your relevant area

Although Onesait DERMS is conceived to operate at the grid level and is ready for complete network optimization, not all decisions require a total view of the network, and operators need to focus on a particular substation or flexibility area. This filtering feature does not affect the influence of the selected flexibility in neighboring areas, that are updated accordingly.

DERMS | Operation panel > Operation ID 24235

Search substation

CS Cerreto
 Telese
 CS Dugenta
 Pontevolturno

Active Operations (12)

Criticalities Flexibility Allocated

Grid ID Type Value Reference Date & Time

Type here... Select one 00.00 00.00 00.00 00.00 Choose Unsolved criticalities

| Grid ID | Type | Starting time | End time | Forecast Value | Critical Value |
|---------|--------------|-----------------------|-----------------------|----------------|----------------|
| D22351 | Overpower | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 205 kW | 200 kW |
| D18779 | Overcurrent | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 20.5 kA | 20 kA |
| D45391 | Undervoltage | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 255 V | 250 V |
| D26276 | Overvoltage | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 123 V | 120 V |
| D36657 | Overvoltage | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 142 V | 140 V |
| D11868 | Overpower | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 151 kW | 150 kW |
| D67963 | Overpower | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 62 kW | 60 kW |
| D40406 | Overpower | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 205 kW | 200 kW |
| D35775 | Overcurrent | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 20.5 kA | 20 kA |
| D15521 | Undervoltage | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 255 V | 250 V |
| D80417 | Overvoltage | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 123 V | 120 V |
| D19636 | Overvoltage | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 142 V | 140 V |
| D83834 | Overpower | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 153 kW | 150 kW |
| D66158 | Overpower | dd/mm/yyyy - hh:mm:ss | dd/mm/yyyy - hh:mm:ss | 62 kW | 60 kW |



Baseline & Forecast

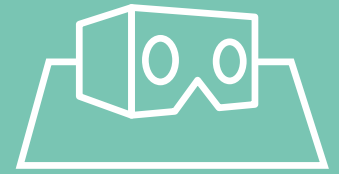
Schedule with confidence

Low carbon generation is difficult to predict and failure to perform accurate forecasts can lead to non-optimal schedules for generation, storage and power exchange. Onesait DERMS includes a module for renewable generation forecast by site or grid connection point. For DER assets not being monitored, Onesait DERMS calculates their output based on the asset characteristics and different conditions. This system-wide forecasting ensures global visibility and net generation calculation.

Most flexibility contracts are based on deviations from the projected schedule. Therefore, baseload calculations are the cornerstone for the flexibility service provider (FSP) and the contracting party. A combination of the baseload and operating ranges define the system flexible capacity that can ultimately be offered to the market. The accuracy of this outcome is of great importance to contain the risk while minimizing the ratio of unused contracted resources.



Calculate generation and load forecasts in distributed grids



Individual and net site forecasting

Generation and load asset curves are calculated in a disaggregated manner but can be combined in site net forecasts. This level of abstraction is useful for utilities to optimize areas of the grid and have a clearer idea of the dispersion of the power exchange between generation or hybrid installations and the grid

Baseload selectable timeframes

Power generation and consumption is difficult to forecast with accuracy for the long term, but not all variables influence the variability of the total calculation in the same manner. Onesait DERMS features a multivariate correlation model to present the operator with a sensitivity analysis for a separate accuracy and precision assessment, which is crucial for advanced risk-based cost analysis.





Edge Control

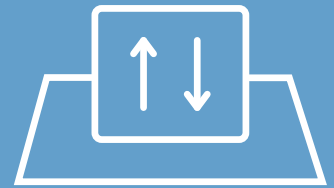
Incorporate lower-level DER control

Distribution grids are becoming more complex not only with the increasing participation of distributed and variable energy resources in the generation mix, but also the parties that govern these resources are growing in complexity and computing capabilities. In what is being called as grid edge, smart substation devices and microgrid controllers, are playing a crucial role in local optimization. Advanced control is necessary to combine quick real-time local automation with system-wide grid resiliency.

Onesait DERMS can send real-time requests to decentralized controllers to avoid grid constraint violations in the points of common coupling. And because cooperation is not only critical at the operational level but at the flexibility level too, Onesait DERMS allows for two-way information sharing with edge devices. The exchanged data includes forecasted flexibility needs and price signals that help edge controllers adapt their schedule for a more efficient flexibility offering.



Unlock the potential of decentralized grid control



Reduce uncertainty with local control

Edge controllers such as Microgrid controllers (MGC) and Energy Management Systems (EMS) are ready to predict generation and load behavior at the asset level. When individual DERs are not metered by the DSO, the aggregated information at the connection point may not be sufficient. Onesait DERMS enables two-way communication with edge controllers to capture this information, highly relevant for DSO flexibility purchasing planning.

Integrate Smart Substation IoT

With an increasing number of controllable assets being connected to the grid and higher requirements for low latency in operation, substations need to become more intelligent. Technologies like Internet of Things (IoT) enable smart substations to automate grid optimization decisions based on dynamic algorithms. For real grid optimization, centralized and decentralized operations must be highly coordinated. Onesait DERMS works with substation IoT to adapt automation algorithms and participate in system-wide optimization.



Market Connectivity

Gain access to all Flexibility offers

Traditional power consumers are not only producing energy – becoming prosumers – but are increasingly aware of the interest to adapt their baseline when there is a monetary reward for doing so. This idea is catching across many industries and players with the adoption of smart meters and controllable load assets. And when flexibility can be sold, new marketplaces are open to satisfy the need for services contracting and settlement.

Market bidding is a complex process since it requires the exchange of technical and economical offers for multiple flexibility services. Onesait DERMS is ready to communicate with flexibility marketplaces and open tenders to resolve short-term grid criticalities; as well as to propose long-term flexibility reserve agreements. In both cases, the most economic solutions are selected from the offers available in the marketplaces it is connected and added to the flexibility dispatch plan.



Widen your portfolio reaching multiple flexibility participants from one place

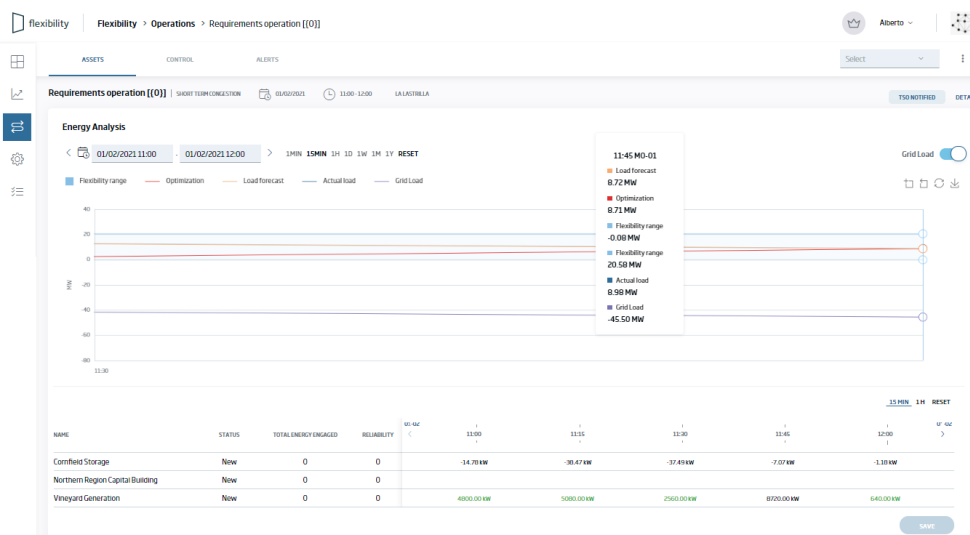


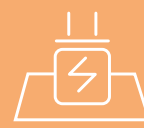
Simplify market interactions

Flexibility services are available in multiple market platforms, which increases information heterogeneity and makes bid selection a complex process. Onesait DERMS connects to multiple marketplaces simultaneously and flexibility bids are unified to be used by the optimization engine to determine the most economically efficient solution for grid criticalities resolution. Once the optimal solution is selected, offers are disaggregated and transferred for acceptance contracts that can be communicated back to individual marketplaces.

Purchase multiple grid services at once

Onesait DERMS can open different bids for a smart grid operation. From basic grid constraint resolution to more advanced functions such as dynamic Volt/VAR optimization and conservative voltage reduction. This allows for smart inverters participation in separate services for real and reactive power offerings, voltage regulation and frequency support. These bids can be combined with other services for more proficient use of the market portfolio.





Hosting Capacity

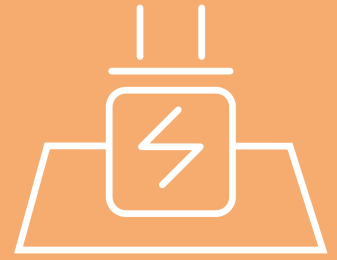
The future of grid connection contracts

Decentralized generation and electrification of loads are pushing the boundaries of the users' connections to the grid. Although net energy consumption may be stable, the intermittency of generation and duck curve effects of decoupled generation and consumption create challenging power peaks at the connection point. This may delay new connections and limit distributed renewable generation expansion. A fundamental step into a greener grid is to embrace flexibility at the user level connection.

Hosting capacity is no longer a matter of worst-case scenarios. A smarter grid management requires the adoption of risk-based operation and planning. New non-firm contracts may be the response to a need for connection flexibility to increase the usage factor of the existing network with more renewable generation. Users under these contracts can get faster grid connections when giving the utility the right to curtail their generation or consumption for a limited number of hours per year.



It is not gambling when you have the right information available

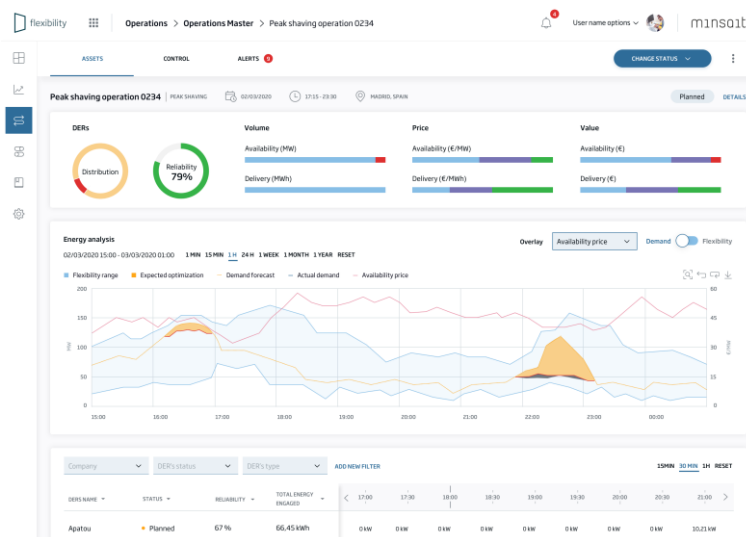


Embrace uncertainty with safety

Renewable generation is inherently variable and unpredictable, but this is not a problem with the ability to mitigate their effects. Onesait DERMS offers new grid connection requests assessment based on accurate load and generation forecasts in a risk-based range of scenarios. The result is a combination of different maximum allowable nominal load or consumption curves with expected shifting events for the user.

Resolve locally, map globally

Grid connection requests are approved individually, but Onesait DERMS provides the user with a heat map of the full network for available capacity. This is very useful for grid planners and collaborating entities that want to develop new projects. The colored map gives a snapshot view of the grid usage status and allows the user to evaluate different connection scenarios in a single session.



Grid Planning Assistant

Plan for high DER penetration

Grid planning is becoming more complex as renewable generation and difficult to predict loads are taking a big piece of the generation and consumption landscapes. But the problem can also be the solution with sufficient long-term visibility. Onesait DERMS provides not only forecasts for energy generation and consumption, but also price forecasts for flexibility suitable to be purchased in a market. This allows the user to perform a full investment evaluation for increased grid capacity.

Non wiring alternatives (NWA) are not a fuzzi concept. Regulation policies are requiring utilities to evaluate different ways to increase the grid capacity and usage, while embracing more renewable generation. This can only be done with accurate information for what the long-term operation of the network can look like attending to current and expected future trends in DER expansion, electrification and flexibility service prices.



Non wiring alternatives are the real green option for your grid reinforcements

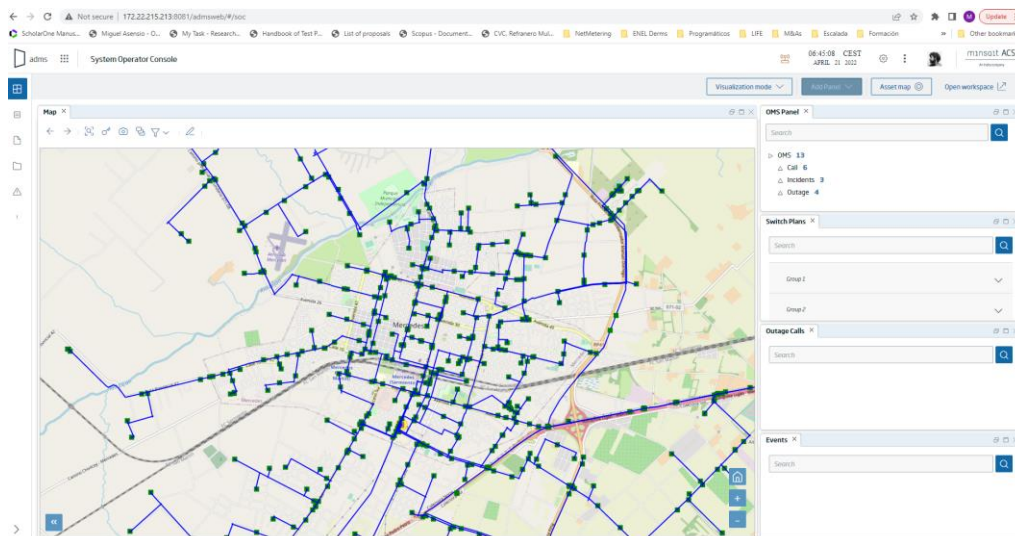


Postpone uncertain investments

With the current speed of grid development, planning for the long term is highly risky. Investments with a lifetime cycle of more than 20 years are the everyday business in grid planning. But load is changing with electrification of heaters and mobility, at the same time local generation is unevenly increasing and compensating the increase in load. These net load variations must be carefully considered for grid planning, as the current trends are no longer valid for long-term analysis.

Incorporate risk in your expenditure analysis

When talking economics, users need to have an evaluation of the risks of any decision. Onesait DERMS uses Conditional Value-at-Risk (CVaR) to evaluate the chances to not meet the required grid capacity during certain times. The result of this function can be translated into a cost that is evaluable against the savings of postponing or cancelling a more costly investment. Therefore, decisions are always supported by the total expected economical outcome.



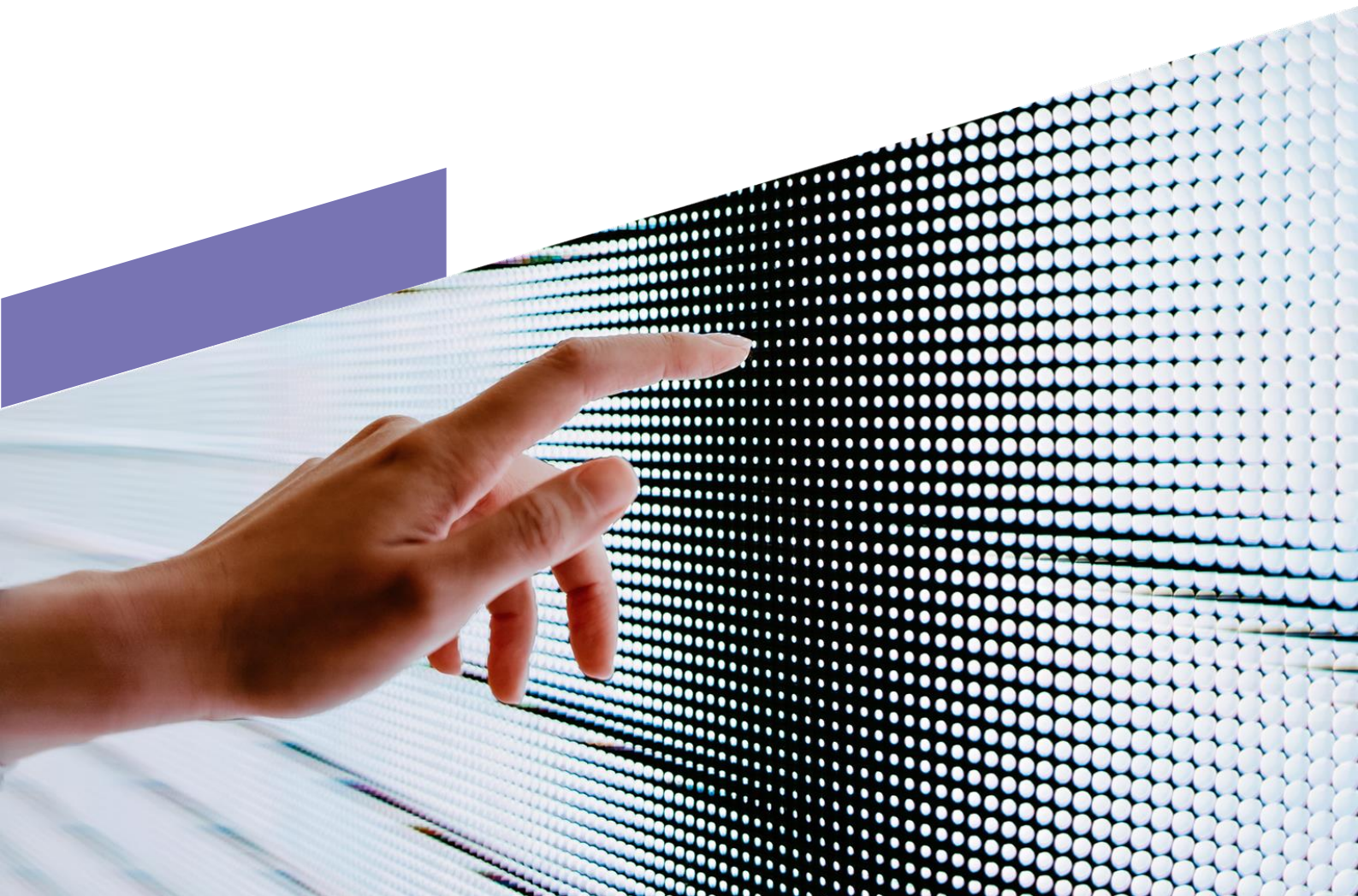


Dual Services Coordination

Resolve flexibility bid conflicts

Assets flexibility can resolve two grid problems at the same time. DER flexibility in power feed in/out can help balance the system and maintain the operation parameters within acceptable ranges. The electric system balance between generation and consumption must be guaranteed across the complete network and is typically a task for the ISO. DER flexibility resolves local criticalities at the distribution level, and DSOs are very interested in using them as an alternative to grid reinforcements.

These two functions of DER flexibility can be offered as services in marketplaces for the interested parties to purchase. However, ISO and DSO marketplaces are often separated, and the same service provider can place bids in the two of them, causing duplicated revenues in the event of an activation. Moreover, some flexibility requirements from the DSO to resolve a local criticality may be in conflict with the requirements from the ISO to balance the grid, and this must be carefully considered.



Full transparency for ISO and DSO coordination in flexibility purchasing



Manage indirect flexibility services

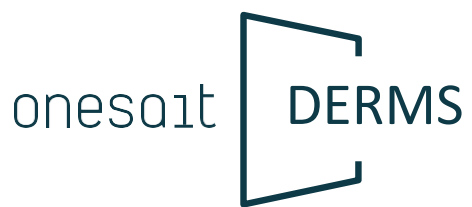
DER flexibility must be correctly settled for the services provided. Onesait DERMS can evaluate the performance of the DER assets against their baseline, or projected behavior. When a single DER or aggregated group of DER participate in ISO and DSO markets simultaneously, the activation for one service modifies the expected baseline of the asset in the way the purchasing entity requires. Hence, flexibility reserves must be communicated between ISO and DSO for correct settlements.

Avoid ISO/DSO flexibility conflicts

DER participation in one market can be opposed to the requirements for another market. In this case, although there is not a conflict of dual participation, ISO and DSO must coordinate their flexibility requirements to avoid conflicting actions in the network (i.e. local flexibility down during a global flexibility up requirement). Onesait DERMS can report the flexibility dispatching plan to the ISO for consideration before any local flexibility is activated to avoid conflicting actuations.

The screenshot shows the 'Flexibility > Operations > Peak shaving operation 0234' page in the Onesait DERMS system. The interface includes a navigation menu on the left, a top navigation bar with 'flexibility' and 'User name options', and a main content area. The main content area has tabs for 'ASSETS', 'CONTROL', and 'ALERTS'. Below the tabs, there is a header for 'Peak shaving operation 0234' with filters for 'PROSUMERS1827', 'PEAK SHAVING', 'PEAK THRESHOLD', '02/03/2020', '17:15 - 23:30', and 'MADRID, SPAIN'. A 'Planned' button and a 'DETAILS' link are also visible. The main content area contains a table with columns for DER, Equipment type, Signal type, Last measure, Current value, Value type, Direction, Value, Unit, Start, and End. The table is filtered by 'DER' and 'Signal type'. The table data is as follows:

| DER | Equipment type | Signal type | Last measure | Current value | Value type | Direction | Value | Unit | Start | End |
|------------------------|-----------------|-----------------------|------------------|---------------|------------|-----------|-------|------|-------|-------|
| Apatou | Termostato Lab | Temperature cold mode | Few seconds ago | 23 kW | Absolute | Up | 12 | kW | 17:17 | 17:17 |
| Noyarc | Washing machine | Active energy | 23/02/2020 12:32 | 23 kW | Absolute | Down | 43 | kW | 17:20 | 17:20 |
| Avda. Bruselas AM2 P18 | HVAC WOT | Charge point A | Few seconds ago | 26 °C | Relative | Down | 10 % | °C | 18:17 | 18:17 |
| Avda. Bruselas AM2 P18 | EQ 65478 | Charge point B | Few seconds ago | 24 °C | Absolute | Up | 3 | °C | 19:30 | 19:30 |



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A decorative graphic at the bottom of the page consisting of three overlapping, upward-sloping rectangular shapes. The bottom-most shape is a dark teal color, the middle one is a medium teal color, and the top one is a light grey color.

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