Speeding up the grid compatibility testing at Syna: From 8 hours down to 15 minutes per request

Case Study | 2024

Customer Portrait

Regional distribution system operator Syna GmbH, headquartered in Frankfurt am Main, Germany, is a key player in the field of energy distribution and part of the renowned E.ON Group. The company operates a large grid area of about 940,000 grid connection points; an extensive low voltage, medium voltage and high voltage grid that plays a vital role in the supply and distribution of energy.

As part of the E.ON Group, Syna provides its expertise to develop and implement progressive energy solutions and to meet the demands of a dynamic and increasingly digitalized energy landscape. The company is committed to integrating modern technologies and innovative approaches to increase the efficiency of energy distribution and ensure reliable access to energy for its customers.

Syna GmbH; syna.de

Overview

”After the rollout of the IGP, we are now able to refer to concrete quality KPIs, such as the number of grids with high utilization rates. As a positive side effect, there is now significantly increased awareness of the importance of data quality.”

Dennis Theis
Head of Digital Grid Technologies
at Syna

The issue & what Syna set out to achieve

The number of photovoltaic (PV) systems to be integrated is growing significantly, resulting in an increase in the number of connection requests to be processed. However, the lack of integration between the systems, as well as an insufficient calculation basis for low voltage grids increase the effort required to process these requests, which, until now, have had to be handled manually. For customers, this results in longer waiting times before a request can receive a definitive answer.

In response to these challenges, Syna has been focusing on promoting the digitalization and automation of mass processes, especially those related to connection requests, by introducing the Intelligent Grid Platform (IGP). The primary objective was to reduce the workload of grid planners while, at the same time, increasing the transparency and accuracy of connection request evaluations.

Project outcomes

Creating a digital twin of Syna's entire low voltage grid

Testing larger sites for grid compatibility used to take up to **8 hours.**

The same task can now be completed in about **15 minutes**

Significant improvement of data quality in the source systems within a short period of time

Implementing the

Online Connection Check –

the self-service tool which enables the end customer to independently find the closest possible connection point without any commitment

Background

In low voltage grids, the absence of a dynamic grid model posed a significant challenge for Syna, when it came to determining available capacities.

In the past, it was sufficient to process connection requests manually. The large increase in connection requests in recent years, however, lead to a proportionate increase in the amount of work involved, which, in turn, lead to a delay in finalizing these requests. This situation made it necessary to (partially) automate the evaluation of connection requests in order to provide a timely response to the customer.

Matters were complicated further by the high risk of local grid overloads caused by the lack of reliable analysis capabilities.

With an expected continued increase in number of connection requests for PV systems, heat pumps, and charging stations, Syna saw the need to review its existing processes and implement more efficient grid planning and grid management solutions.

Project objectives

Establishing a reliable and dynamic model for the low voltage and medium voltage grids (i.e. a grid digital twin)

Optimizing processes to handle connection requests faster and more efficiently, especially for larger loads and generators

Improving the accuracy and reliability of results of grid compatibility testings for new feeders and loads

Implementing a system for daily updates of the grid state

Introducing efficient tools and methods to reduce the workload of grid planners

Ensuring a reliable power supply without disturbances by optimizing grid operation

Intelligent Grid Platform short: IGP

The Intelligent Grid Platform (IGP) is an assistance system that supports a variety of technical processes in the planning and operation of electrical grids. Our collaboration with Syna focuses on connection request and planning applications.

Basis for Carrying Out Connection Requests & Grid Plannings

Grid Transparency	Increased transparency about the current grid situation, providing Syna with an easier and automated method for determining the available grid capacities for the integration of additional generating plants and consumption devices in a specific area.
Online Connection Check	A customer portal on the website of the grid operator for a fully automatic customer feedback on non-binding connection requests.
Connection Request	Digitalizing and largely automating the entire technical evaluation process for new connection requests for generating plants and consumers.

Application

Connection Request

The Connection Request application enables users to largely automate the technical connection request process for new feeders and loads.

- Photovoltaic systems
- Charging stations
- Heat pumps

Challenges

Up until now, grid compatibility testing has been characterized by complex processes. Data, such as loads, information on other feeders and cable cross-sections had to be collected manually from various sources. The rising number of connection requests for PV systems, charging stations, and heat pumps at the low voltage level lead to a significant increase in the time and effort required to evaluate these grid connections.

Processing individual connection requests used to take several hours. This resulted in delayed feedback to customers and increased the risk of a negative impact on customer satisfaction. Even for micro-producers, the increase in connection requests required more accurate grid calculations to avoid grid overloads or supply interruptions.

”Given the trends of recent years, we have anticipated a significant increase in connection requests not only for PV systems, but also for heat pumps and charging stations. We came to realize that we did not have a tool to efficiently manage this increase. Driven by innovation and with a focus on the future, we decided to introduce the IGP.“

Vanessa Schuller
Advisor for Grid Development Planning
at Syna

Problem solving

Bringing together master data from assets, consumption and production data, data on connection requests, geo-information, and line data or switching information from SAP and GIS in the GridHub of the IGP

Creating a dynamic grid model that is updated daily for Syna's entire low voltage and medium voltage range

The ability to easily and quickly analyze the grid data made it possible to improve data quality in the source systems in a short period of time

Significant improvement of the grid calculations quality: The precise and reliable evaluation of the effects of new grid connections has been a vital factor in ensuring security of supply

Accelerating the processing of connection requests: The average time required has been reduced from several hours to as little as 10–15 minutes

Strategies for quick implementation

Syna has successfully implemented the Connection Request application in record time. It took only four months from achieving the required data quality to going live with the application – an impressive example of efficient project execution.

Early user involvement

Already in the development phase, when the data quality was not yet at the level required for productive use, dedicated users from the grid planning area were involved. This allowed for early feedback loops and hands-on testing to familiarize the selected users with the tool.

Targeted training

Special trainings were given, which were based on the experiences of the test users. The training, which was held on premises, was open to the entire staff. A major benefit was the fact that the test users acted as disseminators, sharing their knowledge and positive experiences with their colleagues.

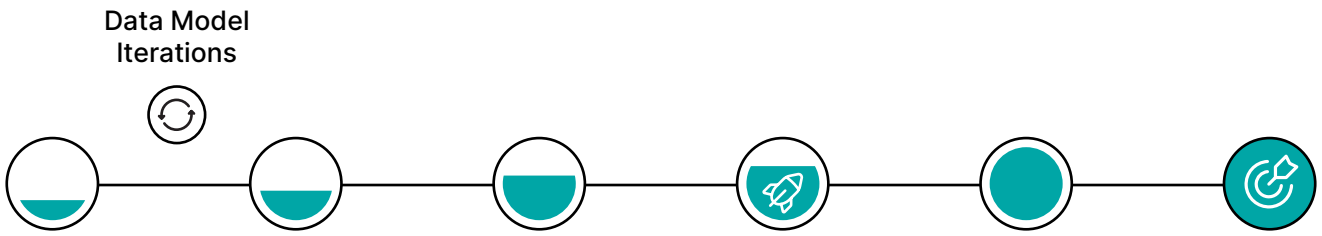
Weekly Consultation

Regular, recurring consultations provide a direct support and individual advice on user questions and problem solving.

”We wanted to offer interested users the opportunity to test the Connection Request application and its features before going into productive use. By the time the application went live, we had already gained valuable experience that helped us identify the most important topics for user training.”

Christian Becker
Senior Data Analyst
at Syna

Project phases



Jun 2022

Kick-Off
GridHub &
CR Pilot

Dec 2022

1st Deploy LV

Contracting CR

Apr 2023

Focus on
Data quality
improvements

Testing Phase
CR

Jul/Aug 2023

Go-Live
CR (manual
requests)

Contracting
OCC, GP, GS

Jan 2024

Planned
Go-Live OCC

Planned GP
trainings/usage

Q1 2024

Establish
Automated
CR process
integration

Project results & further milestones

Thanks to the introduction of the Intelligent Grid Platform (IGP), Syna now has a dynamic grid model for their entire low voltage and medium voltage grid at its permanent disposal. During the implementation of the IGP, Syna was able to automatically identify numerous data inconsistencies, allowing valuable corrections to be made in the source systems. Improving data quality also directly contributes to the optimization of grid planning processes, enabling the grid operator to respond quickly and accurately to changes in the grid.

The platform also supported Syna in the step-by-step digitalization and automation of important grid planning processes. Grid compatibility testing became a particular focus of interest. Thanks to the IGP, it can now be carried out in a matter of minutes.

In summary, Syna was able to gain the following advantages from using the Intelligent Grid Platform:

Establishing a reliable calculation basis to determine available capacities in low voltage grids

Permanent improvement in data quality and calculation results

Further digitalizing connection processes to fully automate and accelerate related internal processes in the near future

Significantly accelerating internal processes, thereby reducing the workload of grid planners considerably

Next steps

- Automating connection request processes with Fast Track* to the greatest possible extent
- Introducing an end customer portal on the website of the grid operator for a fully automatic, non-binding feedback on connection requests
- In addition to identifying the potential grid connection point, the project duration is to be indicated for non-binding connection requests to facilitate transparent communication with end customers.
- The implementation of the Grid Study and Grid Planning applications is intended to make it possible to evaluate some future scenarios and derive a development plan that shows how the grid utilization changes and how this affects the grid expansion planning
- By implementing the Online Monitoring application, Syna is preparing to meet the requirements of §14a EnWG

*Fast Track is a feature within the IGP that makes it possible to automate the processing of connection requests.

”We are very satisfied with the outcomes of the project so far and are confident that by implementing further applications of the IGP, we will be able to optimize our existing processes to an even greater extent. Furthermore, we will use the IGP to improve the data quality in our source systems on an ongoing basis, und thus have an even better foundation for data-driven decisions.“

Dr.-Ing. Tim Plößer
Project Manager for IGP Rollout
at Syna

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