Stable network operation **with eMobility infrastructure**

Research project by Fraunhofer IFF, Stadtwerke Emden, Siemens Germany

The challenge

The transformation of urban mobility towards eMobility is in full swing. However, the effects on the distribution grid in urban areas can currently only be roughly estimated.

Urban grid operators are increasingly finding that raised charging demand can lead to grid congestion. Understanding the interactions between grid operation and charging management is therefore essential, especially for municipal utilities.

At the same time, electromobility presents a great chance: eMobility services offer new business opportunities and will become an integral part of the business processes of municipal utilities.

To meet these new challenges and take advantage of the opportunities, Siemens, Stadtwerke Emden and the Fraunhofer IFF Magdeburg are working together on the research project "Cross-Sector Dynamic Load Management".

"Within the project, it was possible to create comprehensive simulation options for use in operations. Using a digital twin, it is possible to detect critical operating conditions at an early stage and thus to continue to ensure a high level of supply security."

Dr. André Naumann
Head of Digital Tools for Integrated Infrastructures

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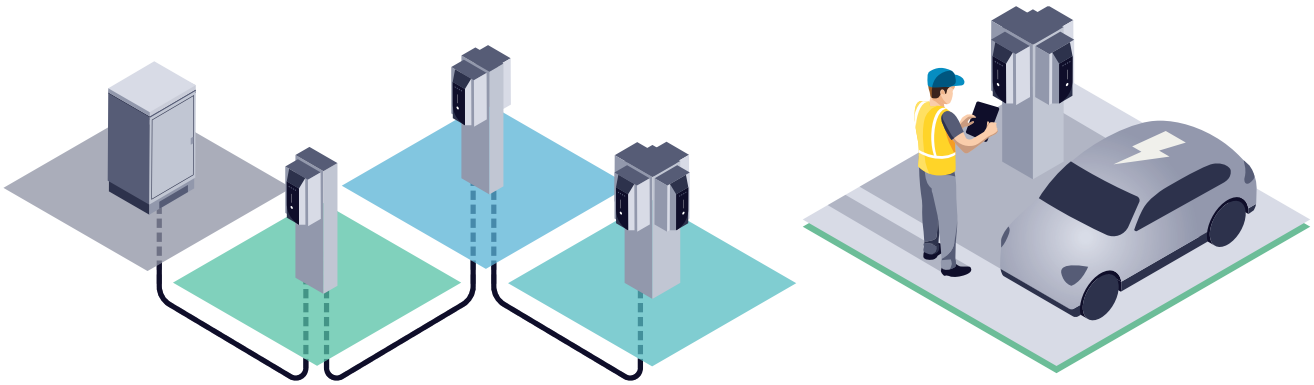

The solution

In the project, a test and simulation environment (digital twin) with comprehensive simulation tools was created for testing a grid-compliant rollout of the charging infrastructure in cooperation with the grid operation management.

At the center is a platform on which cross-functional and cross-system applications and operating modules are available and which is equipped with the necessary interfaces and data management mechanisms.

The aim is to use the test and simulation environment to derive recommendations for action for energy suppliers. This is to limit grid expansion by dynamic load management and at increased supply security.

At the same time, integrated workflows were developed that show practical ways of optimizing operational management in conflict between grid operation and the control of the charging infrastructure in the future.

The next step in the project is the expansion of the system platform and the development of interfaces and integration options for crosssector operation management.

In addition, a cross-system visualization via web UI and mobile app, as well as additional assistance systems for the management will be provided.

High supply security without grid expansion with intelligent dynamic load management

Structure of the test- and simulationsystem
With the digital twin as the basis for the research project, various load management scenarios, like grid switching during maintenance work or re-supply in the event of a fault depending on the operation of the charging infrastructure, can be simulated. Two systems work hand in hand for this:

In a Spectrum Power 5 grid control system, the potential critical parts of the medium and low-voltage grid are monitored and controlled. This is also where the maximum load setpoints for the test area are determined and fed into the eCar load management system as an input variable.

The eMobility backend system, E-Car OC, simulates the operation of the charging points in the test area and provides various options for dynamic load management within the defined charging groups, e.g. setting the maximum charging power or load management based on load schedules.

With the E-Car OC charging infrastructure simulator, the charging behavior in the test area can be realistically simulated or modelled for the future. Alternatively, it is also possible to integrate online charging stations into the test.

Features included
Die Testsystemplattform stellt umfangreiche The test system platform provides extensive options for connecting components from grid and/or charging infrastructure management. Moreover, dynamic load management can be carried out in various forms across sectors.

Dashboards, reports, and data export options are available to evaluate the results.

User benefits
Users benefit from a database consolidated on the platform and thus from greater trans-pa-rency in your network area. This results in new, data-supported options for action, which are available for optimizing operational management in the overall system.

Thanks to the digital twin, current and future expansion scenarios can be simulated, checked, and then rolled out in operational grid management.

The use of the E-Car OC Test & Simulation System creates a sound basis for the decision between Grid expansion and dynamic load management.

Conclusion

As the energy supplier for local customers, the grid integration of charging infrastructure is in the responsibility of local grid providers. This presents challenges, but also opportunities for new business models.

Siemens, with its expertise in grid automation and grid operating systems, as well as in e-mobility management and charging infrastructure control, is an ideal partner for opening new business areas.

We will be happy to support you with our know-how and our Software as a Service solution "E-Car Operation Center" in the integration and management of your eMobility infrastructure.

Of course, with our solution, the entire range for cross-sector dynamic load management is available to you to limit grid expansion, avoid grid overload, and increase supply security

Are you getting started with the charging infrastructure rollout in your network area? We will be happy to support you!

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