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Expert interview: How Redispatch 3.0 can make better use of flexibility in the power grid

The aim of redispatch measures is to identify grid bottlenecks at an early stage and avoid them in order to make the electricity grid more efficient, economical and resilient. This is also the aim of VDE SPEC 90032 V.1 (German only), which entered the public comment phase as a standardization proposal at E-World.

It is a result of the Redispatch 3.0 project funded by the German Federal Ministry for Economic Affairs and Climate Protection (BMWK), which is concerned with using the flexibility of small systems in the low-voltage range - such as heat pumps, electric vehicles, battery storage and PV systems - for congestion management. M. Sc. Athina Savvidis, Project Manager in the Energy Department of the DKE, and M. Sc. Marcel Otte, Senior Researcher at OFFIS - Institute for Information Technology, provide insights into the project and the development of the VDE SPEC in an expert interview.

Funding project and VDE SPEC at a glance

What are the Redispatch support programs about? What is the difference between Redispatch 3.0 and the previous versions?

Athina Savvidis: In the electricity grid, we are dealing with an increasingly decentralized supply and more and more feed-in systems such as wind turbines and solar parks are being connected. In order to do justice to this, the regulatory framework and the previous procedure in grid operation were adapted in the amendment to the Grid Expansion Acceleration Act (NABEG 2.0).

Redispatch 2.0 dealt with making feed-in management more flexible. The aim was to integrate systems over 100 kW or those that can be remotely controlled by the grid operator. However, there is still the problem that a lot of electricity is often generated in the north that we cannot yet

transport to the south, or that we generally see a peak in feed-in due to renewable energies. Instead of throttling the output when there is too much non-transportable energy available, Redispatch 3.0 aims to integrate consumers locally and absorb the energy fed in via e-cars, battery storage systems, etc., for example.

One result of the project is the new VDE SPEC 90032 V.1, published by the VDE. What specific problems are being solved?

Marcel Otte: Up to now, we have been dealing with larger systems that work according to schedules and forecasts and are therefore predictable to a certain extent. Now, however, we are dealing with potentially millions of households in the low-voltage range that do not follow a schedule of this kind. Our research project has looked at what technical processes are needed to enable transmission and distribution grid operators to solve this task. How can flexibility be provided, what incentives can be created for this, how can information be provided about it? All of these issues play a role in the considerations. The end result should be automated processes that benefit end customers directly - via systems that are connected to an intelligent metering system (iMSys) or bundled via an aggregator.

In order for this to happen, we based the project on existing guidelines such as Redispatch 2.0, Section 14a of the Energy Industry Act on the integration of controllable consumption facilities and the Solar Peak Act. Concepts from VDE, BDEW and the hybrid redispatch study were also taken into account. And, of course, we need the smart meter gateway rollout, which is still in full swing, as a basis for all measures.

Why do we need a standard and how was an overarching consensus developed?

Athina Savvidis: In order to manage generation and consumption efficiently, we need interoperability at all levels as well as standardized automated processes and interfaces. All market players involved need a common language. In addition, there must be no distortion of competition, which is why uniform specifications are important for everyone. None of this can be achieved without a standard.

The big sticking point is the complexity, because we have a large number of stakeholders involved. In addition to the familiar players from Redispatch 2.0, end customers who are connected via metering point operators or aggregators are now also being integrated. Organizing this is no easy task.

The preparatory work for the standard, which was published with the draft of the current VDE SPEC, was carried out by the funding project from 2022 and the extended project group from 2024. Transmission and distribution grid operators, industry partners, VDE, research and

development, manufacturers of smart meter gateways that already meet the requirements of the BSI were involved - in other words, a really large, representative cross-section.

We offered the opportunity to comment on the draft at any time, and the public comment phase began with the workshop at E-world.

Let's take a look at everyday life: What impact will Redispatch 3.0 have on the end customer?

Athina Savvidis: First of all, it is important to understand that only PV systems, battery storage systems, e-cars, wallboxes and heat pumps are involved and no other consumer devices in private households. So an end customer gets up in the morning, has a warm house and a charged electric car. During the course of the day, the PV system may generate a surplus that flows into the battery storage system or the electric car. In a smart home, the washing machine or dishwasher could also start in such a case. In the evening, the feed-in power decreases, while the grid load often increases. For this reason, charging the electric car may only start at night at a cheaper rate or it is done using the battery storage system that was full during the day.

This means that Redispatch 3.0 does not restrict the end customer in everyday life - on the contrary, anyone who actively participates in the electricity grid and becomes a flexible customer can benefit financially from this. For example, if you buy electricity when a lot of energy is available and cannot be transported, you can use it locally to charge your electric car very cheaply. The beauty is that charging is fully automated based on information from grid operators and aggregators. Figuratively speaking, you don't have to rush to the filling station because the fuel is cheap.

And what does the situation look like for network operators?

Marcel Otte: We have four transmission grid operators and over 800 distribution grid operators in Germany, which means that coordination is immensely important. It must not happen that the solution to a problem in the distribution grid triggers a problem in the transmission grid or vice versa. Another aspect that is very important is that flexibility must be offered and used within a secure framework. This is why we are building a secure infrastructure with the smart meter gateways, which serves as the basis for the systematized exchange of information.

Detailed information

What are the biggest regulatory and technical hurdles for the implementation of Redispatch 3.0?

Marcel Otte: As we primarily carried out a technical study and did not create a regulatory framework, we used comparable regulations such as EnWG Section 14a or Section 13 as a guide. Technically, we could flexibilize 100 percent, but we need a framework for how much flexibility can and should be provided.

As far as the technical hurdles are concerned, it is important to keep in mind that potentially millions of non-technical end customers need to be integrated. Automation and standardization are the major tasks that need to be solved in detail. What is certain is that we have not yet reached the end of the road with Redispatch 3.0 and can also offer end customers flexibility for future market and grid-oriented applications.

What economic and ecological benefits do you expect from the application?

Marcel Otte: We are guided by the motto "use instead of dimming". "Dimming" systems, while storage systems and electric cars could absorb this energy in parallel and remain unused, clearly shows untapped potential. If, for example, we avoid interfering with wind farms and make the energy generated fully usable locally, this is of great ecological and economic benefit.

How are micro plants integrated into the system and how is their potential for unused flexibility assessed?

Marcel Otte: Let's assume, for example, that a grid operator detects a local bottleneck. It can now use the smart meter gateway infrastructure to activate the flexibility provided by the end customer. Aggregators offer another option: they aggregate large-scale systems from end consumers into a virtual power plant and provide market-based flexibility that is offered to a grid operator.

The assessment of potential flexibility is carried out by grid operators and, depending on the circumstances, also by aggregators. Model- or data-based algorithms are available for this purpose. They help to identify problematic situations in advance and thus create solutions before emergency measures are required. Artificial intelligence can also help to recognize where peaks are to be expected and thus facilitate their handling. As part of the funding project, two field tests were carried out with grid lead manufacturers, grid operators and smart meter gateway manufacturers in order to validate the quality of such forecasts together with the research institutes.

What role do intelligent metering systems (iMSys) and CLS interfaces play in this?

Marcel Otte: They are essential elements of the communication process chain that is currently being rolled out. The smart meter gateway together with a modern metering device form the iMSys. The smart meter gateway can read the meter and transmit the information to the grid operator or aggregator. A digital connection to the energy management system or other controllable resources, such as a battery storage system, can be established via the CLS (Controllable Local System) interface on the smart meter gateway. This enables communication to the grid operator and back and flexibility can be used in the first place.

Which communication protocols or standards are used for real-time data transmission?

Marcel Otte: The concepts that were developed as part of Section 14a to expand the control system already work with EEBUS as a communication interface. There are use cases that we can build on. We have also adapted the API (programming interface) published by the German Association of Energy and Water Industries (BDEW) for the implementation of Section 14a for the Redispatch 3.0 project. A final important element is TAF 10 (tariff use case) from the German Federal Office for Information Security (BSI), which makes it possible to provide and send network status data in the smart meter gateway and the status information of the meters connected to the gateway.

Have you already carried out field tests?

Athina Savvidis: We carried out two field tests with different topologies as part of the funding project: once with MVV Netze in Mannheim for urban areas and once with EWE NETZ in Oldenburg for urban/rural areas. We involved established network lead manufacturers and used the algorithms developed by the institutes. The technical cut-through to the end customer took place and theoretical scenarios were run through as to how flexibility could be used in the event of a bottleneck, as we do not want to create a real bottleneck as part of such tests. The results are available and are currently being evaluated. They will be published once the project has been completed by the end of 2025.

If you had one wish: What would you expect from the interested public?

Athina Savvidis: I hope that the comment phase on the VDE SPEC will be used intensively by all market players. The more technical comments we receive, the higher the quality and acceptance of the standard in the end.

The quotes from the interview can be used freely; Athina Savvidis and Marcel Otte are available to answer any questions. Please send your inquiries to:

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About DKE

The DKE German Commission for Electrical, Electronic & Information Technologies (DKE) is the national platform for about 10,000 experts from industry, science and public administration to elaborate standards and safety specifications for electrical engineering, electronics and information technology. Standards support global trade and, among other things, the safety, interoperability and functionality of products and systems. As a competence centre for electrotechnical standardization, the DKE represents the interests of German industry in European (CENELEC, ETSI) and international standardization organizations (IEC). In addition, the DKE provides comprehensive services in the field of standardization and VDE specifications.

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Shaping the e-dialistic future. The VDE (VDE Association for Electrical, Electronic & Information Technologies) is based in Frankfurt am Main. More information at www.vde.com