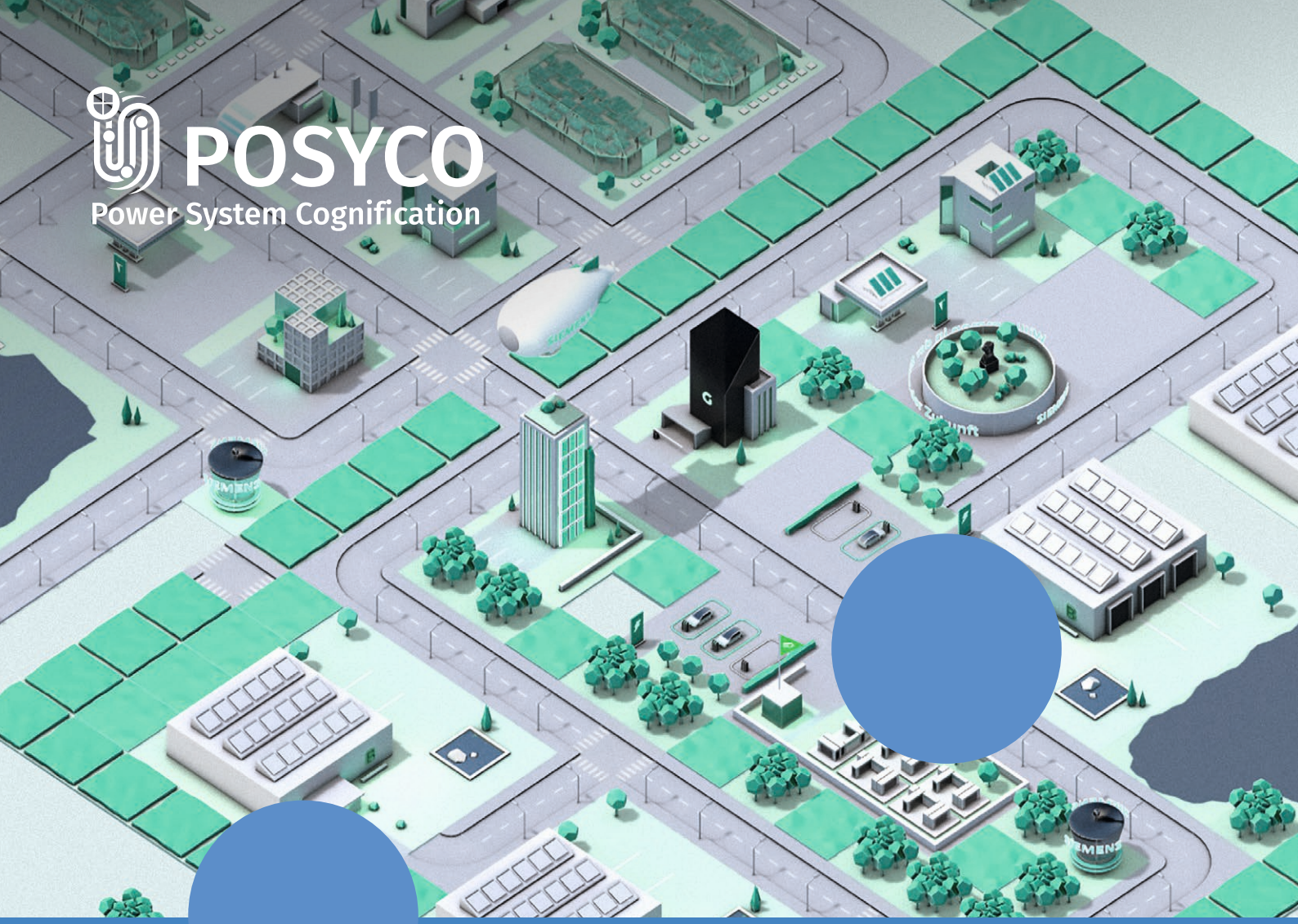


POSYCO

Power System Cognification

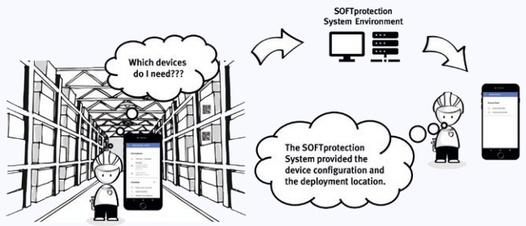
The research project “Power System Cognification” investigates the necessary designs of power grids to meet the new demands in times of renewable energies and energy communities.

Much is about to change for our power grids in the next few years. Our electric energy will no longer be provided by a few big power plants but instead by decentralized power generation, for example photovoltaic systems. This trend has already started. But also the energy demand will fundamentally change due to the increasing amount of E-mobility and the transition from heating with oil and gas to heating with heat pumps. This development will be intensified by regional energy communities which improve the efficiency of distributed energy systems and the coordination of regional consumption.

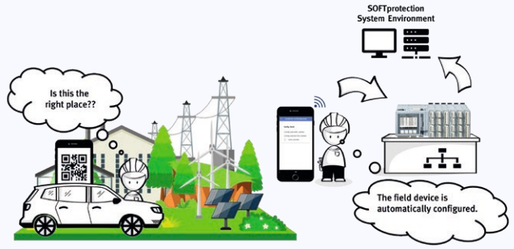
Our medium and low voltage power grids serve as supply base for many residential, business, and industrial customers and have to be adapted to the new challenges constantly in order to remain fail-safe. To achieve this, the project Power System Cognification (PoSyCo), which is led by Siemens and the Austrian Institute of Technology (AIT), was launched: Our power grids shall be transformed into smart grids – fully automatic, predictive, and digitalized systems that detect problems early and implement advanced protective features, for especially preventing power-outages and grid overload. The model region aspern Seestadt serves as a research area to investigate how these goals can successfully be implemented.

Showcase 1 Plug & Play Sensor Roll-Out

- In a certain supply area the number of connection requests for electric vehicle charging stations rises.
- The grid planner wants to be on the safe side and implements a permanent monitoring and an optional add-on for active charging management.
- The grid planner defines type and location for the implementation within the grid architecture.
- A technician receives the task to install the new monitoring system in the chosen transformer station.



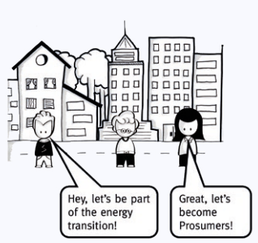
- The SOFTprotection BackEnd automatically derives the complete configuration from the planning environment and provides it in the download area.
- The technician picks up the correct devices from the warehouse of the distribution grid operator.
- The barcode gets scanned and the configuration is downloaded.
- The task instruction includes the designated installation location so the technician sets off.



- The service technician arrives at the transformer station, verifies the location via QR-Code and begins the installation.
- The configuration gets transferred to the device.
- The device logs in at the SOFTprotection BackEnd.
- If available, new updates are installed and then the transmission of measurement data begins.

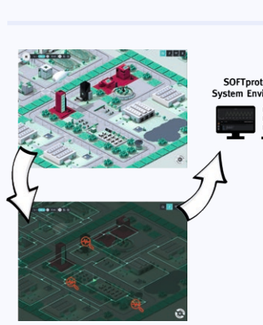
- The SOFTprotection operator checks if everything is alright.
- If so, the data streams of this sensor are labeled as validated and ready-for-use.
- The sensor transmits measurement data and the grid planner has detailed information of the respective supply area available.
- The connection demands for electric vehicle charging stations can now be handled based on real data.

Showcase 1 & 2 Grid Supervision

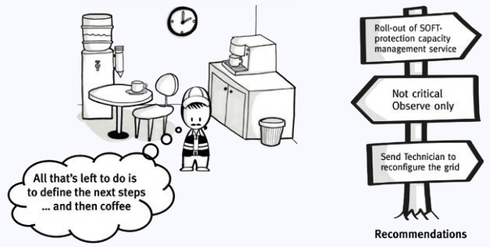


- Until now, the energy demand of the inhabitants was passive and easy to predict.
- The low voltage grids are equipped with capacity reserves and no detailed supervision is needed.
- As explained in the showcase before, a SOFTprotection measurement system has been installed in aspern Seestadt due to a recent increase of requests for electric vehicle charging stations.
- Now the residents themselves want to become part of the energy transition.

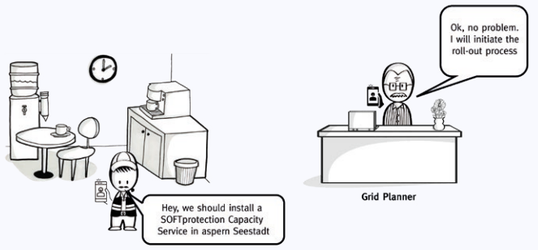
- The aspern Seestadt residents have switched to electric vehicles, have installed photovoltaic systems and participate in energy communities.
- The grid sensors provide continuous monitoring and send alerts when thresholds are exceeded.
- These alerts are sent to the SOFTprotection BackEnd where they get processed.
- The SOFTprotection operator gets notified and quickly has to find the source of the problem.



- SOFTprotection receives an alert and requests error logs (= high resolution measurements).
- To support the trouble shooting process SOFTprotection requests data of topologically related sensors as well. This can include sensors at the supplying transformer, neighboring grid branches and neighboring transformers.
- The SOFTprotection operator starts his day and logs in to SOFTprotection.
- With all the additional information gathered it is very easy to identify the underlying problems of all reported alerts.



- Now the SOFTprotection operator has to decide how urgent and critical the issue is.
- SOFTprotection supports all further steps. Options range from closely monitoring the grid section to sending a technician.
- Additional functionalities can be added to make smart solutions like grid capacity management possible.



- In this case the SOFTprotection operator opts for the smart solution of an active capacity management.
- The request is sent to the grid planer who now uses a planning tool like in Showcase 1, to define the optimal configuration for this functionality.
- The new functionality can be installed and activated via SOFTprotection BackEnd without the need for on-site work.

Research in aspern Seestadt

The model region, which is investigated by the project PoSyCo – located directly at aspern Seestadt in Vienna – provides the perfect environment for SOFTprotection: It contains intelligent buildings with decentralized production of electrical power and heat. Furthermore, the entire necessary communication infrastructure is already in place there. The power grid can be monitored and all necessary data collected. The residents are involved and provide information on usability, security, and data privacy. The SOFTprotection system will be developed during the project and will partly be tested under real conditions in collaboration with Aspern Smart City Research (ASCR).

Forecast

During the project the existing grid protection concept will be expanded by intelligent add-ons. This 'SOFTprotection' represents a set of functionalities to reduce overloads. Newly created information sources will allow better analyses and faster problem solving. This project will improve the capability for safely and reliably managing future energy systems with a high share of renewable, volatile production and flexible loads like E-mobility and battery storages. By the end of the project it will be clear, how a grid operator can face the upcoming challenges on a technical level by implementing SOFTprotection into the organizational processes.

All results will be documented and publicized in a final report. Highlights of the project will be published in the next flyer.

Factbox

PROGRAM	Energieforschung 4. Ausschreibung
PROJECT START	January 2019
PROJEKT BUDGET	€ 3,7 million The project is funded with € 2.5 million Euro by the Klima- und Energiefonds
CONSORTIUM LEAD AND PROJECT MANAGEMENT	AIT Austrian Institute of Technology GmbH
INDUSTRIAL PARTNERS	Aspern Smart City Research GmbH & Co KG, Siemens AG Österreich, Wiener Netze GmbH, Wien Energie GmbH
SCIENTIFIC PARTNERS	TU Wien – Institut für Energiesysteme und Elektrische Antriebe TU Graz – Institute of Electrical Power Systems TU Wien – Institute of Computing Engineering (E191)
SME PARTNER	MOOSMOAR Energies OG

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