

EWE in Germany Uses Apps to Analyze Impact of Prosumers

Esri GeoConX – EGUG 2016, Phoenix (AR), USA

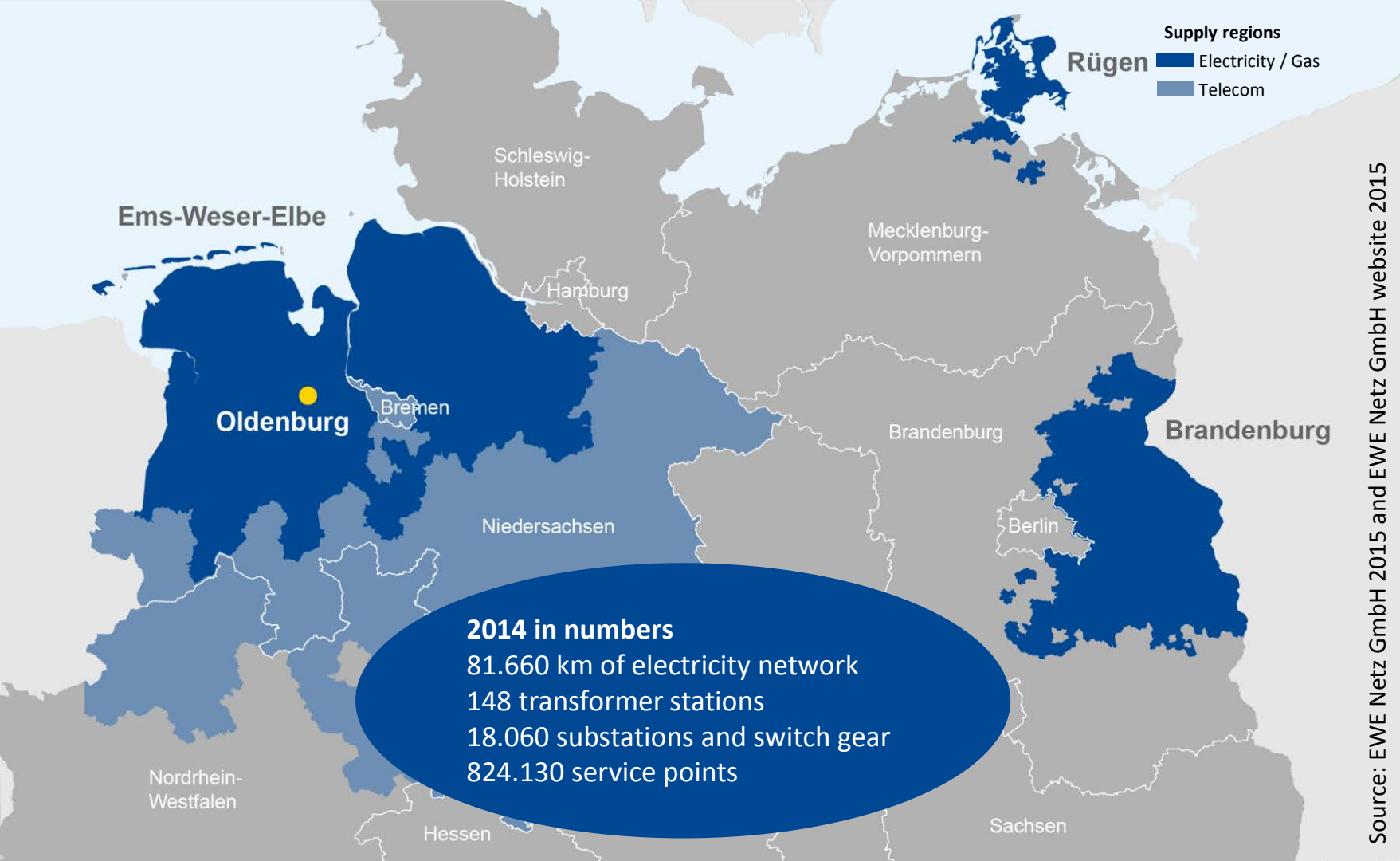
Thomas Kindervater, EWE Netz GmbH
Gerald Kreuwel, AED-SICAD AG

Agenda



- 1. EWE's role for sustainable energy systems**
- 2. Assessing local network stability in GIS**
- 3. Ideas for the future**

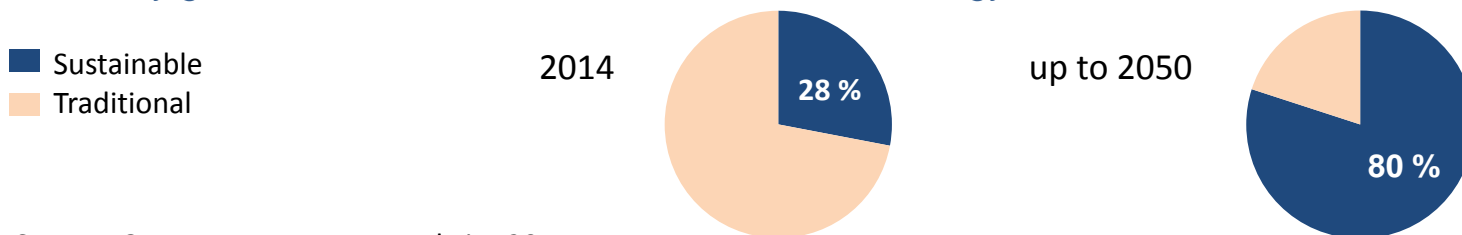
EWE's role for sustainable energy systems



Transition to sustainable energy supply

Goals proposed by german government

Electricity generation from sustainable and traditional energy sources



Source: German government website 2015

EWE NETZ: Current sustainable share in energy supply

Electricity generation from sustainable and traditional energy sources supplied to EWE networks



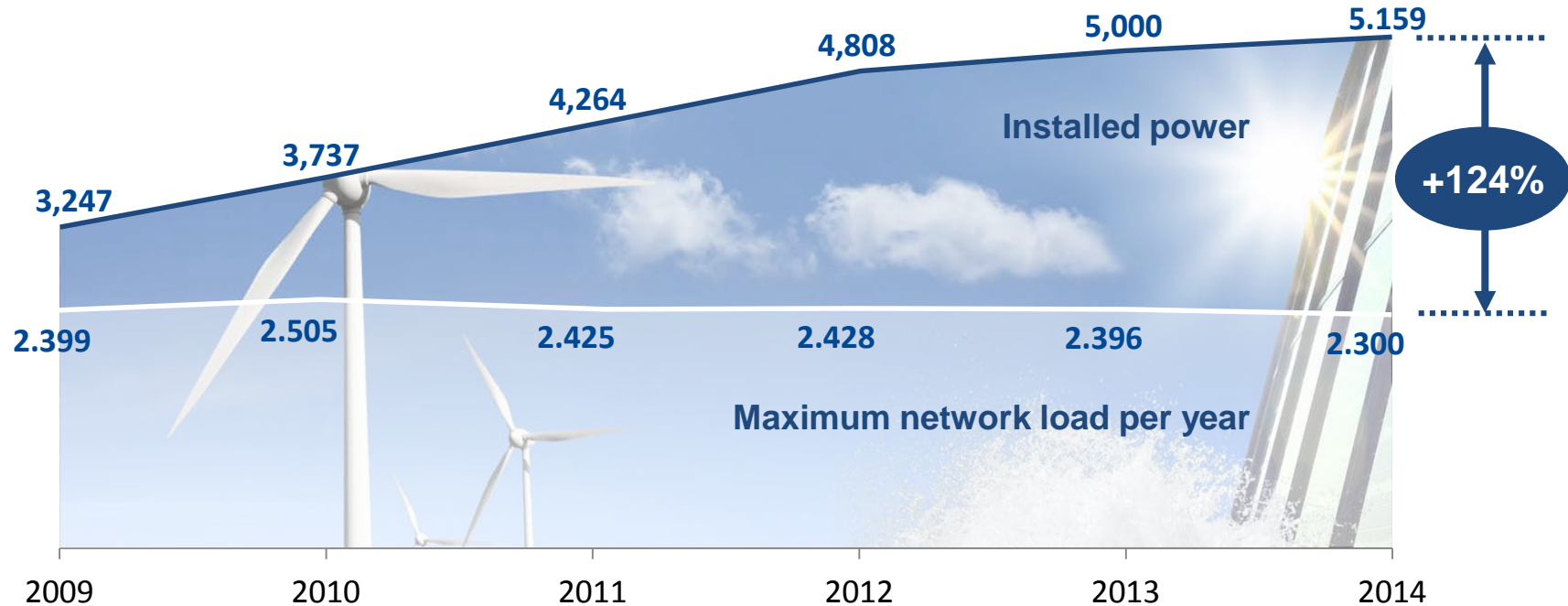
Source: EWE Netz GmbH 2015

Xaver's impact:
December 2013

A challenge to distribution networks

Energy sources: Wind, Solar, Biogas, Water, Gases (in MW)

EWE NETZ



Source: EWE Netz GmbH 2015

Why does network connection assessment help?



- **A new energy producer or consumer requests to be connected to the electricity network**

- **A utility company cares to do so**
 - in accordance with existing law (e.g. EN 50160)
 - cost-effective, but protective to network stability

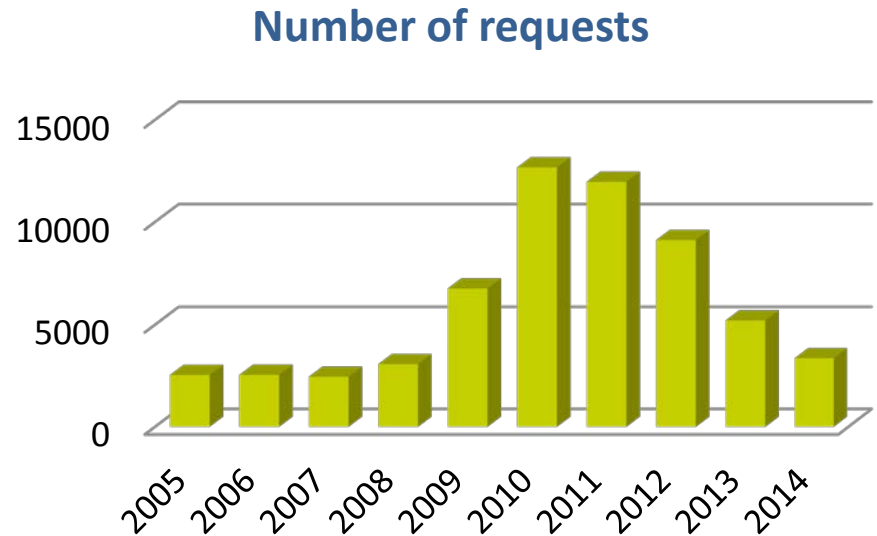
- **Network connection assessment means to**
 - evaluate the potential impact of one or more new connections
 - analyze scenarios with additional actions to take for stability
 - choose the most suitable scenario for each request

Assessing local network stability in GIS

1. Goals
2. Process
3. Results

Initial goals to use GIS

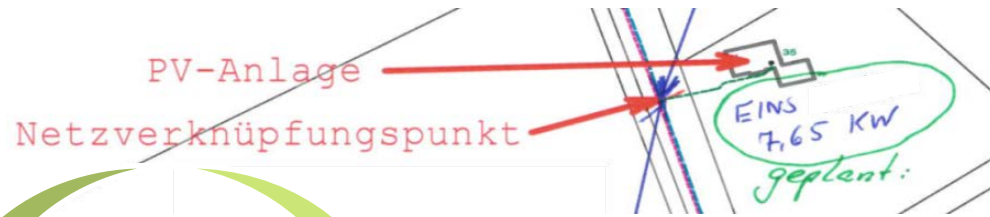
- **Reduce process time of requests for new suppliers to 0.5 h**
- **Harmonize process for network connection assessments through all regional offices**
 - Network calculation
 - Documentation
 - Reliable reproduction of results



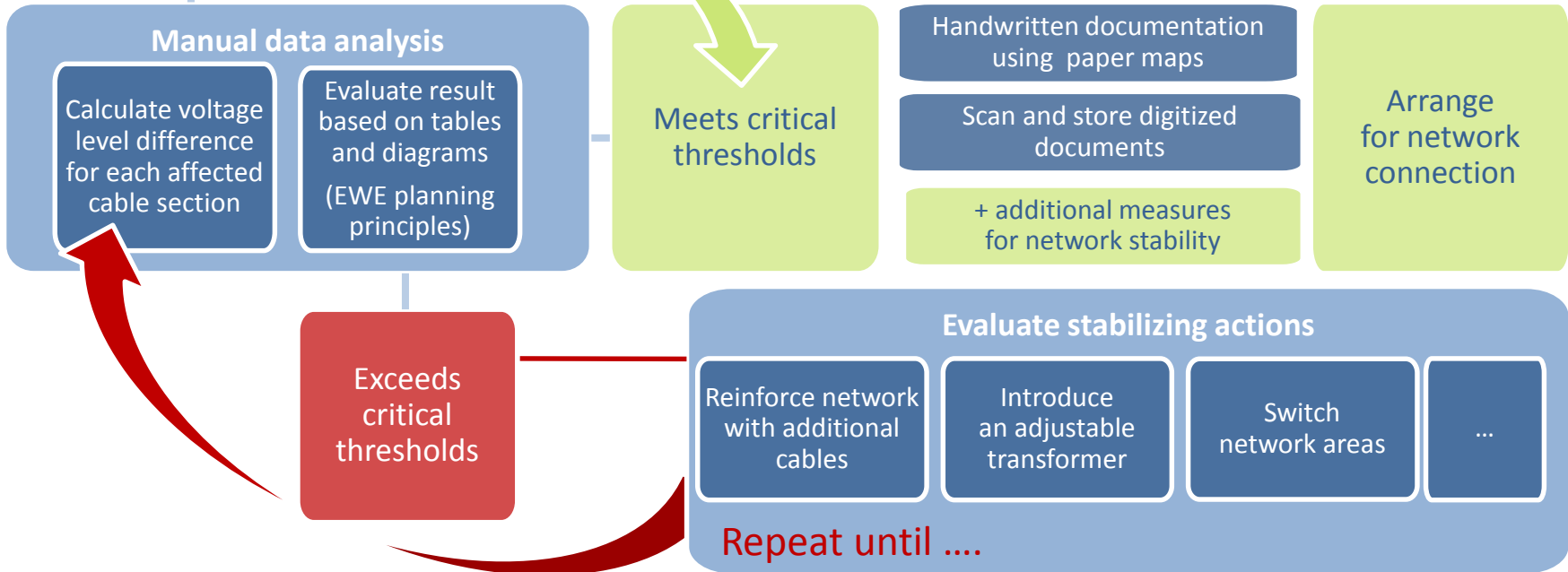
Source: EWE Netz GmbH 2015

Assessing the impact of a new solar panel manually

Source:
EWE Netz GmbH
2015

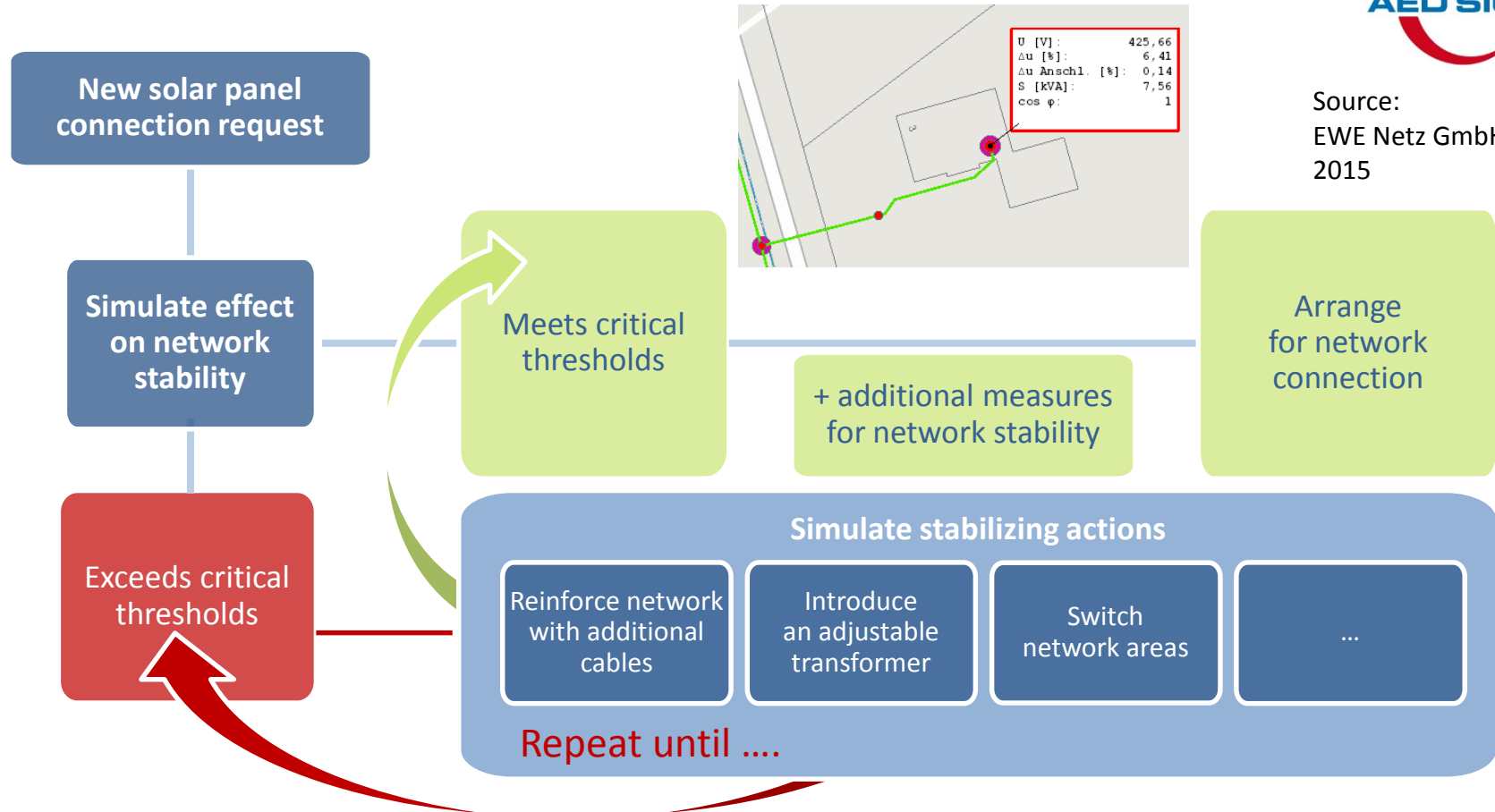


New solar panel connection request

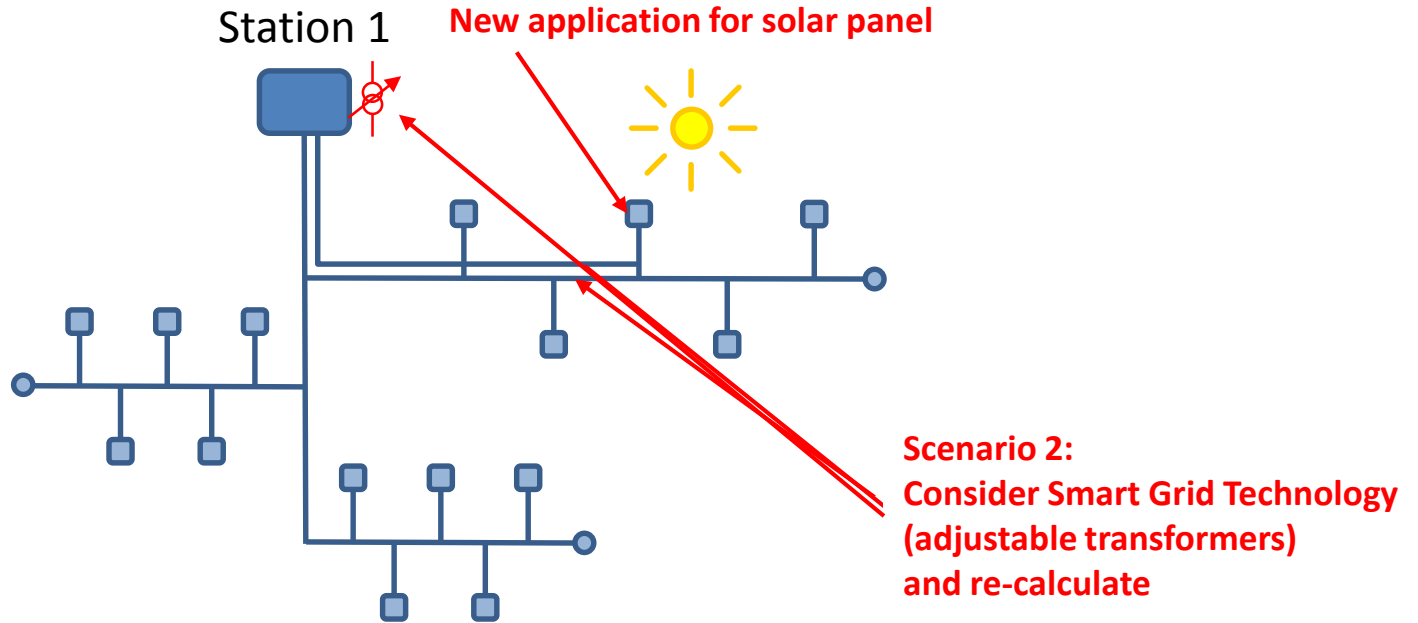


Assessing the impact of a new solar panel in GIS

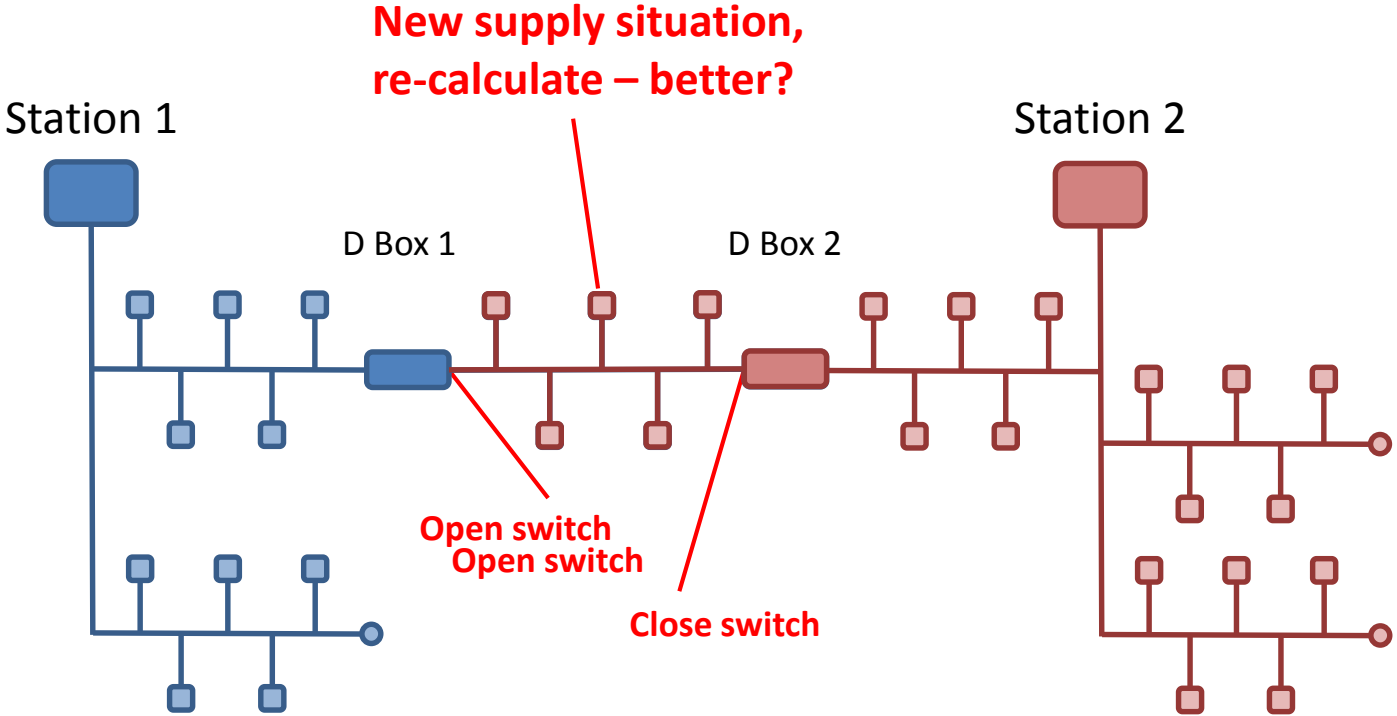
Source:
EWE Netz GmbH
2015



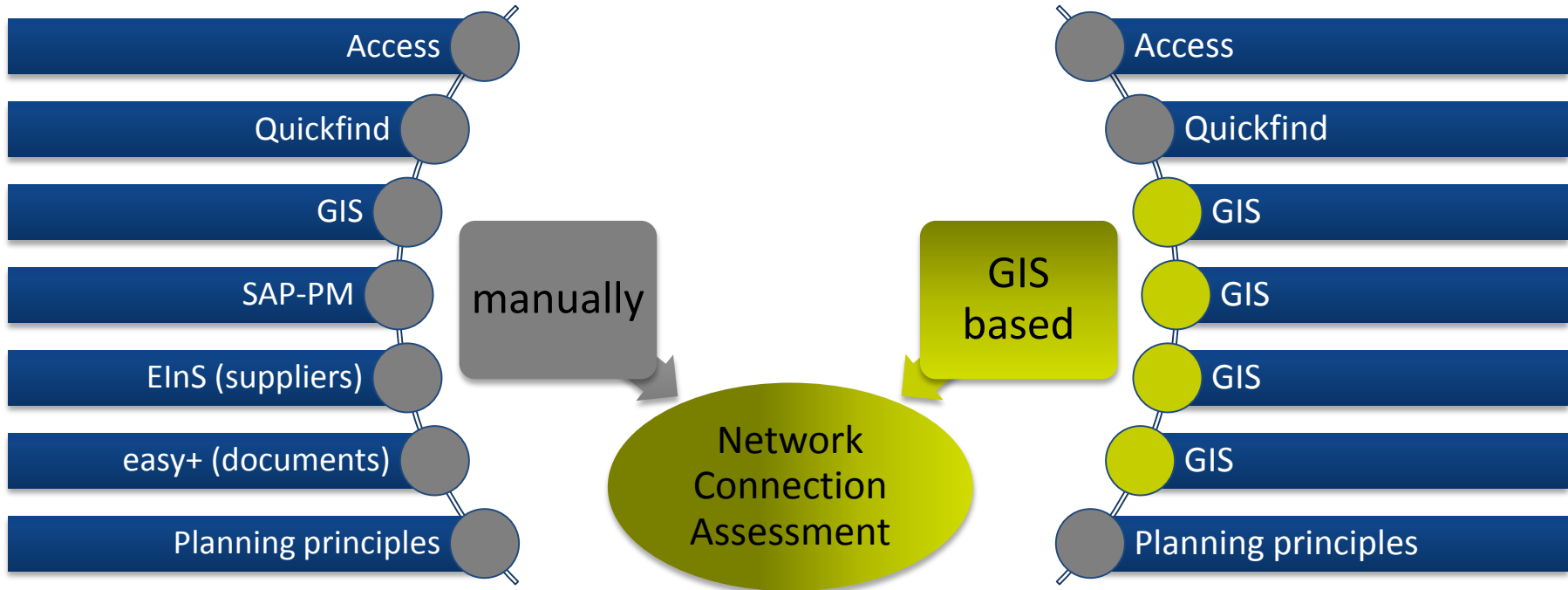
Example 1



Example 2



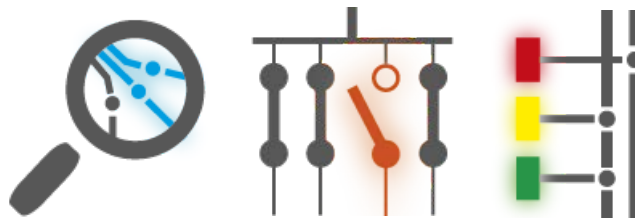
Access to data sources for each assessment



Source: EWE Netz GmbH 2015

Assessing local network stability in GIS

Software Demo



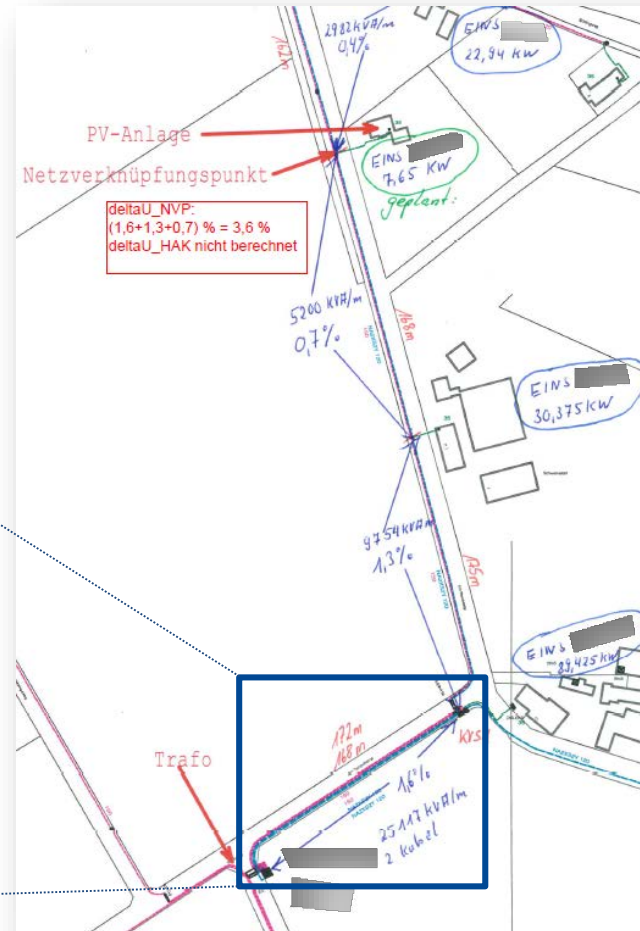
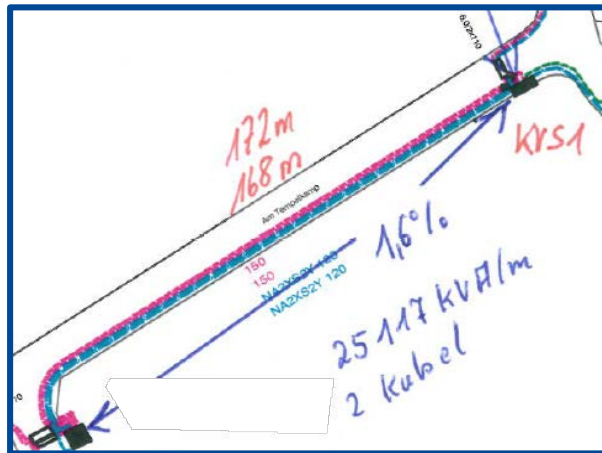
Results



- **Shorter calculation time**
- **Results are closer to real conditions**

Whenever time is costly ...

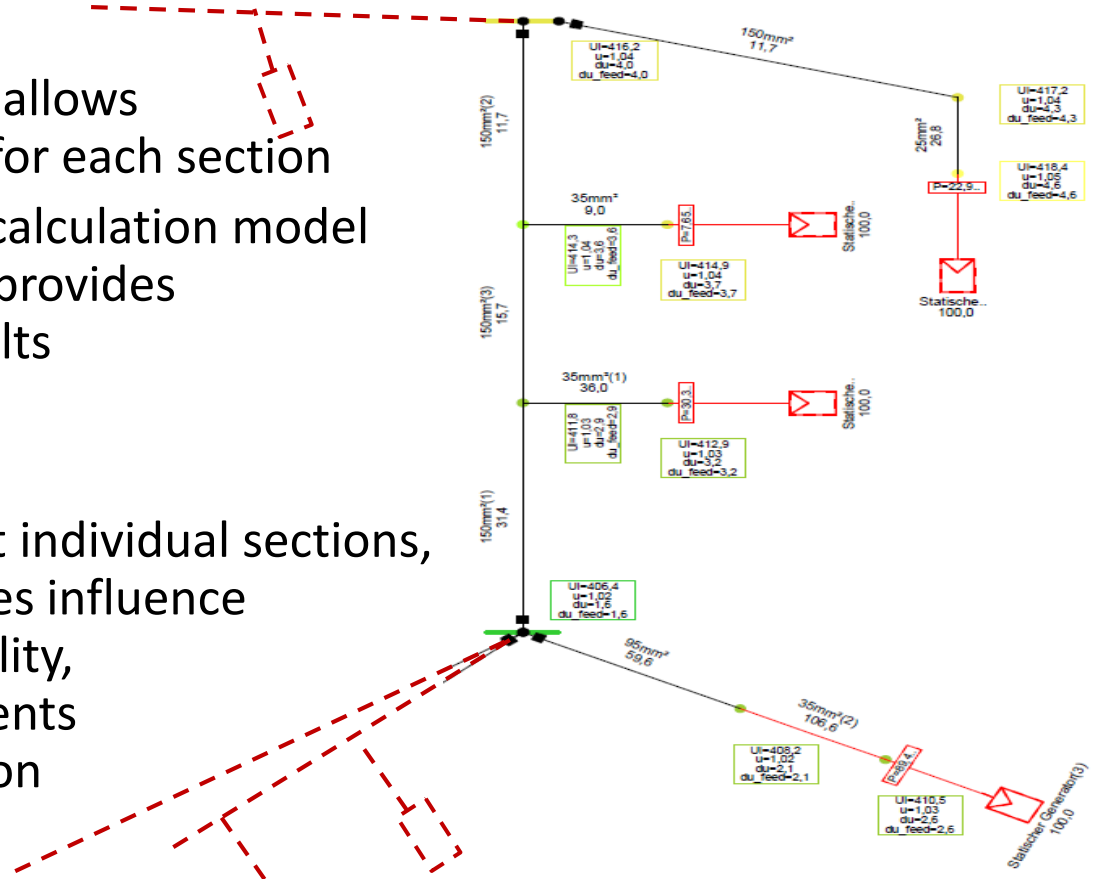
- Voltage level difference had to be calculated based on each cable section



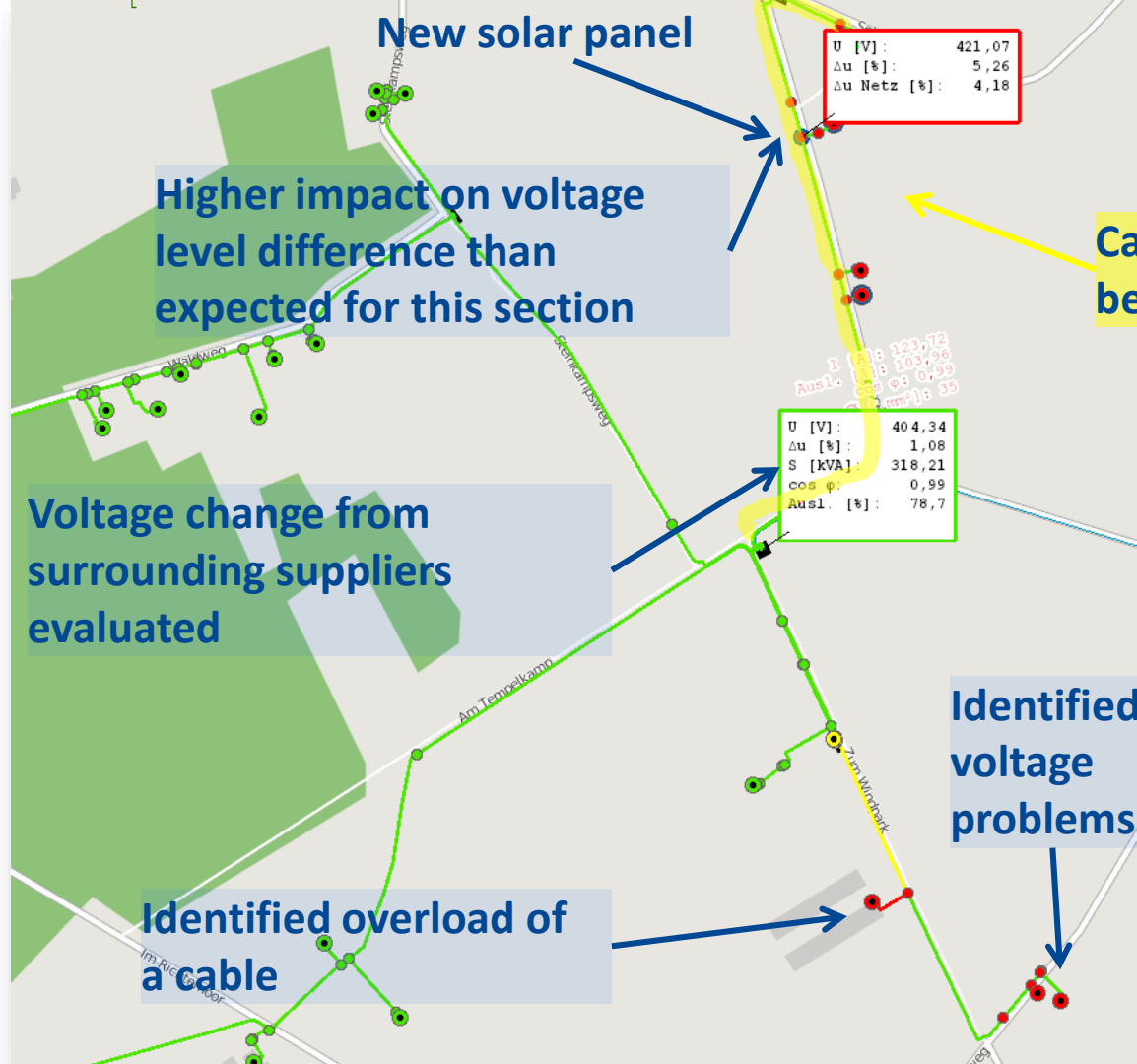
Source: EWE Netz GmbH 2015

... it limits the possible extent of analysis

- Manual data analysis allows sufficient evaluation for each section
- Automated network calculation model for the same section provides almost the same results
- BUT** results only represent individual sections, while network changes influence not only section stability, but all network elements fed by the same station



Source: EWE Netz GmbH 2015



U [V]:	421,07
Δu [%]:	5,26
Δu Netz [%]:	4,18

I [A]:	123,72
Ausl. [%]:	103,96
cos φ:	0,99
mm ² :	35

U [V]:	404,34
Δu [%]:	1,08
S [kVA]:	318,21
cos φ:	0,99
Ausl. [%]:	78,7

Higher impact on voltage level difference than expected for this section

Cable section that could be manually evaluated

Voltage change from surrounding suppliers evaluated

Identified overload of a cable

Identified voltage problems

Source: EWE Netz GmbH 2015

Results



- **Shorter calculation time**
- **Results are closer to real conditions**
- **Evaluation with visual feedback**
 - Traffic light system
 - Overview for each network fed by the same station
 - Compare results for scenarios and calculation types
- **Enhanced data quality through combination of data sources**

Advantages of a “tailor-made” network

- **Optimize usage of existing network capacities**
- **Guarantee voltage quality (e.g. EN 50160)**
- **Protect network equipment from overload**
- **Reduce or delay costs for network expansion**
- **Simulate impact of new technology, e.g. intelligent substations, to operate low voltage with smart grid solutions**

Source: EWE Netz GmbH 2014

A successful collaboration from a new approach to a product



Ideas – Scenarios – Data – Pilot and productive use



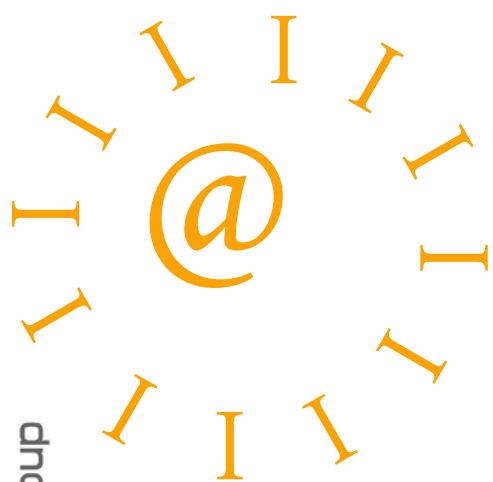
Concept – Implementation (Project)



Concept – Implementation (Client)



Concept – Architecture – Implementation (Server)



UT Smart Apps

PLAN – CALC - EDIT



UT Smart Apps PLAN – CALC – EDIT



- **Studies with different scenarios**
- **Simulation of the switch positions**
- **Simulation of the effect of new service points or feed-in points (e.g. photovoltaic)**
- **Simulation of network stabilizing actions / smart grid technology**
- **Network calculation („load flow“) integrated**
- **Bill of Materials**

Architecture: UT Smart Apps

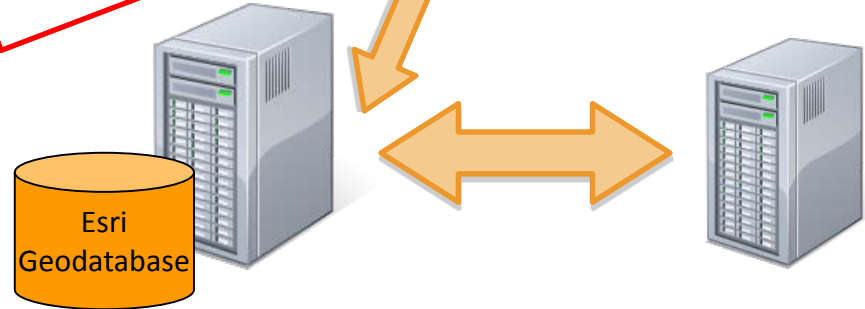
Web Clients



Intranet

Web-based Network Planning & Calculation on Live LV GIS Data

Servers



Network Planners:
Planning,
Network Assessment,
Network Calculation

Type of Calculation can be adapted:

- Load flow
- Short Circuit
- etc

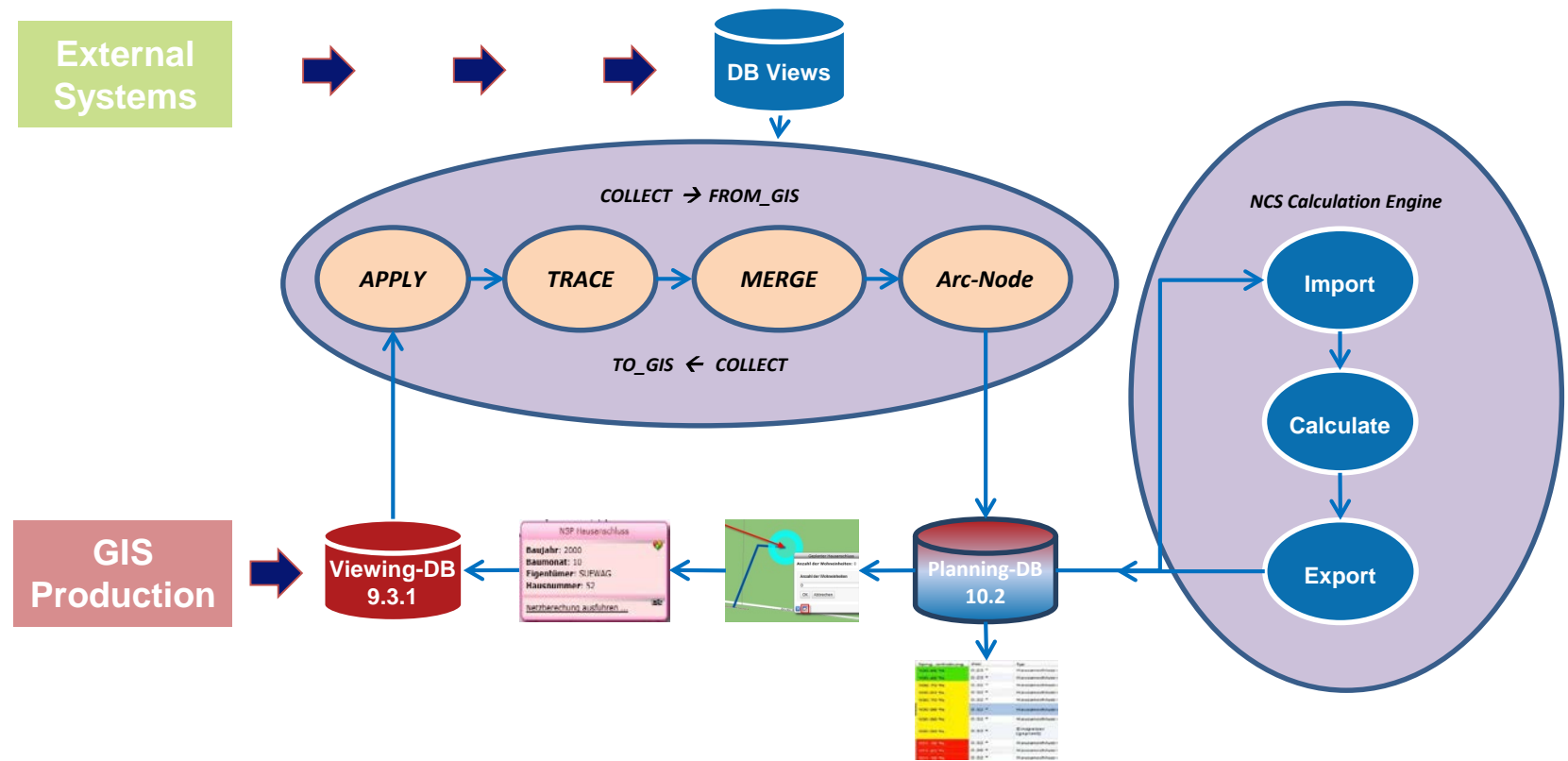
Professional Network Calculation Package (Powerfactory)

AED Solution Group



UT Smart Apps – Process & Data Flow

AED Solution Group



Ideas for the future

Ideas for the future

1. Electricity data + network analysis

- Station internals
- Switches and states
- Circuits
- Topology
- Supplied Power
- Load per year

2. Calculation, Planning + Simulation

- Network calculation
- Simulation of various planning scenarios
- Modified assets incl. switches and trafos
- Planned, new assets

3. Taking simulation to the next level ...

- Advanced scenarios
- Integrated statistics
- Short circuit calculation
- Network management
- Time series scenarios
-
-

Sources



[EWE Netz GmbH 2015]

Presentation „SmartGIS II bei EWE NETZ“ (AED-SICAD Kongress der Versorgungswirtschaft) by Sven Niedermeier

Date of presentation: 24.09.2015 + additional slides: 25.09.2015

[EWE Netz GmbH 2014]

Presentation „Anschlussbeurteilung – Stand der Produktentwicklung“ (AED-SICAD Kongress der Versorgungswirtschaft) by Thomas Kindervater

Date of presentation: 24.09.2014

[EWE Netz GmbH website 2015]

<https://www.ewe-netz.de/unternehmen/zahlen-daten-fakten.php>

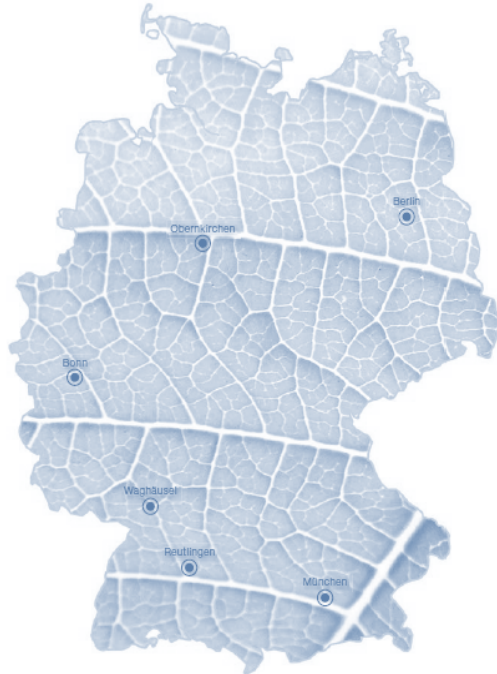
Date of online query: 01.10.2015

[German government website 2015]

http://www.bundesregierung.de/Webs/Breg/DE/Themen/Energiewende/Fragen-Antworten/1_Allgemeines/1_warum/_node.html

Date of online query: 28.09.2015

Thank you for your attention!



Gerald Kreuwel
AED-SICAD AG
Carl-Wery-Str. 22
81739 Munich
Germany

gerald.kreuwel@aed-sicad.de
www.aed-sicad.de

Thomas Kindervater
EWE NETZ GmbH
Cloppenburgstr. 302
26133 Oldenburg
Germany

Thomas.Kindervater@ewe-netz.de
www.ewe-netz.de

