Innovations beyond Smart Metering

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Smart Meter Deployment

Status in Austria

Status of Smart Meter Deployment in Austria

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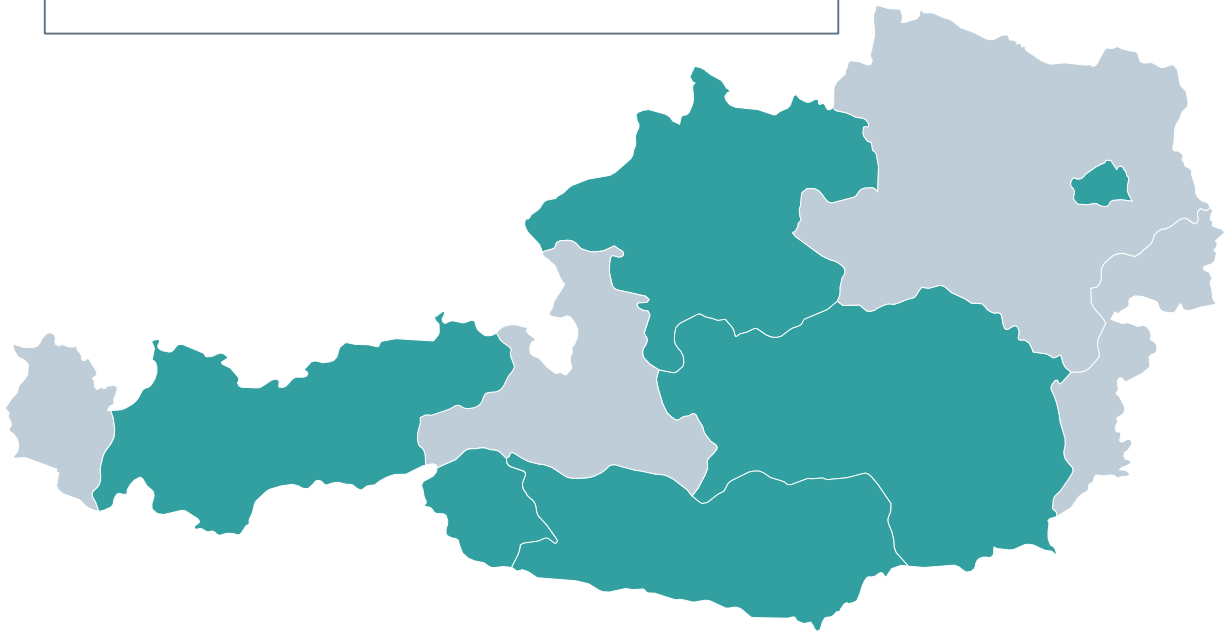
Consumer options *):

Opt-In:	**96 values** per day	7,6%
Standard:	one value per day	91,0%
Opt-Out:	one value per **year**	**1,4%**



Smart meter projects with Siemens participation

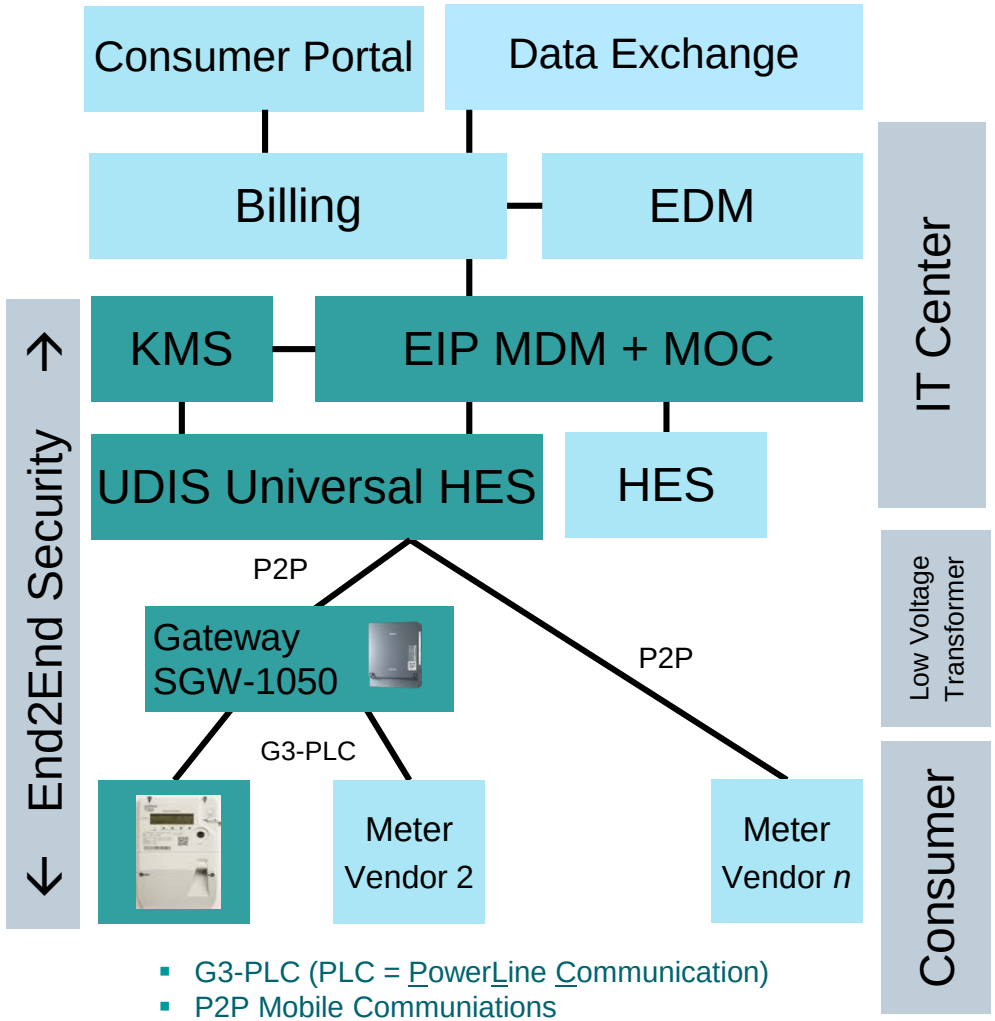
E-Control Report issues every october for last year,
Report from Oct 2018 for End of 2017 *):

Total Smart Meter:	6,1 Mio
Meters deployed or ordered	20,9%
Target for 80%	end of 2020
with PLC communication	>99%

**) Source: Bericht zu Einführung von intelligenten Messgeräten 2018, e-control*

Current information in German laguage from Oesterreichs Energie:
https://oesterreichsenergie.at/die-welt-des-stroms/stromnetze/smart-meter/roll-out.html

Unified Rollout System for Austria, based upon EnergyIP
Integration of Components from other Vendors



- G3-PLC (PLC = PowerLine Communication)
- P2P Mobile Communiations
- End2End Security acc. to Austrian requirements

Billing

SAP:	SAP MDUS Adapter + FlexSync
SDK:	EnergyIP FlexSync
E2000:	EnergyIP FlexSync and FileSync

Head-End System

UDIS:	Integration with EIP UAA for IDIS compatible meters
Sagem:	Adapter based on EIP SDK for SagemCom and comp. meters
Honeywell:	Gateway management

G3-PLC Gateway

Siemens SGW1050 and Honeywell Beacon

Smart Meters

Siemens IM-x50

Landis+Gyr, Iskraemeco, SagemCom, Kaifa

EnergyIP –
Flexible scalable platform for smart grid applications

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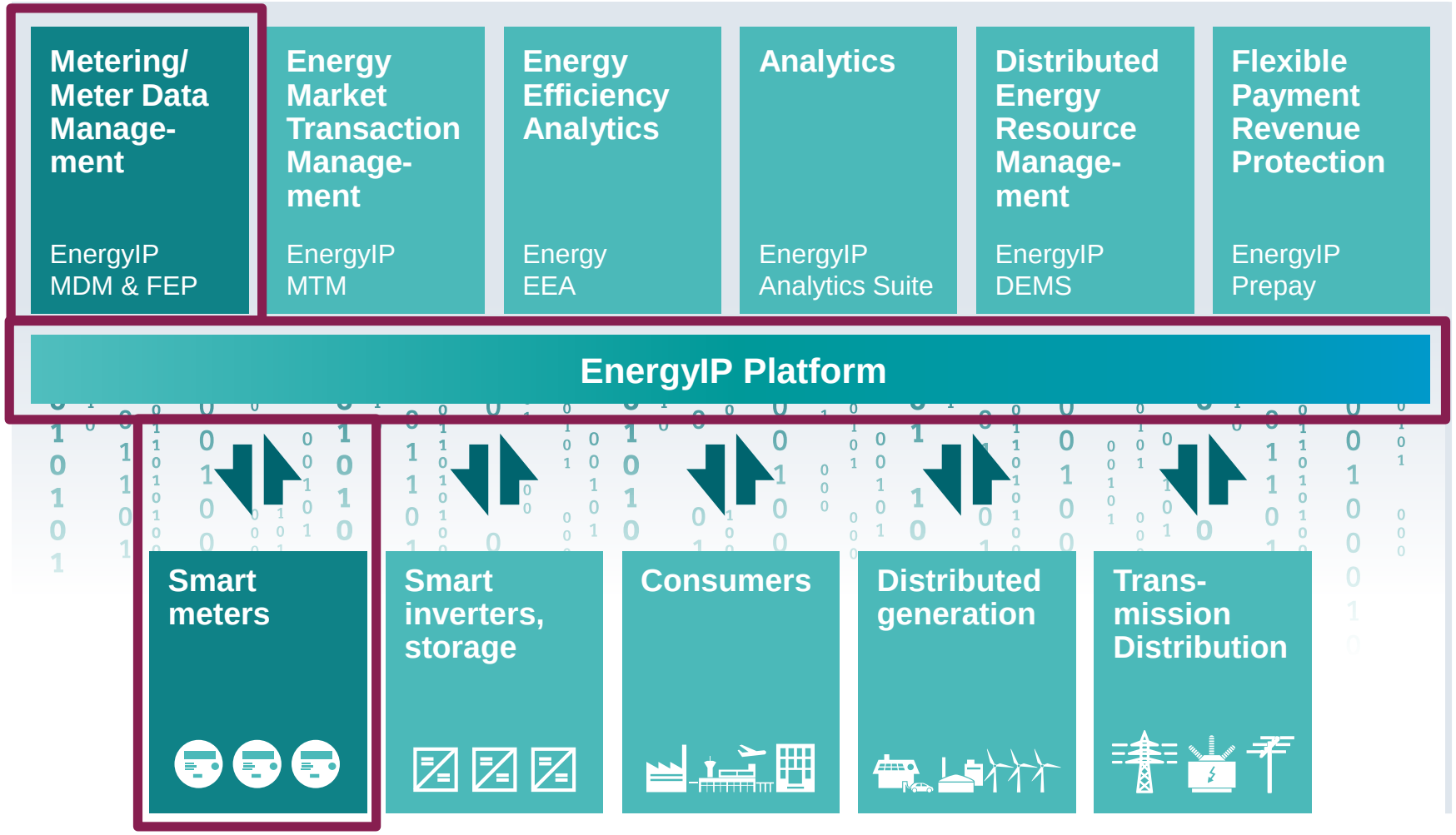

- Powerful Smart Meter and IoT-platform for management of data from millions of distributed assets in near real time
- Efficient IT-OT integration between IT-applications and field devices
- Utility data model to interpret data from energy assets
- Bi-directional, closed-loop communication

EnergyIP –
Proven leadership in energy data management

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Siemens EnergyIP MDM

continues to be the world leader in the Gartner's Magic Quadrant for Meter Data Management

Gartner®

80,000,000
intelligent meters contracted

80
EnergyIP installations

>500,000
smart meters operated by one MDM proven at 5 utilities

4,500,000
meters operated at an ISO with daily reads in 60 min interval data

Near real-time
data access in 15 min interval data

SGW 1050
Substation Gateway for the smart distribution grid

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- **Compact Plastic Housing** (IP52, 184*144*69 mm, -20° to +60° C)
- **Integrated power supply** (220-240V AC, 3-phases + N)

- **Future Proof Hardware:** Linux OS with up to 1GB RAM

Zero Touch provisioning

- **Built-In LTE Cat1/4 modem, 3 Ethernet Prots (LAN,WAN,MTC)**

- **New Functions with Applications (Apps) Download**

- **Cyber Security by design**
  - Integrated Hardware Security Module (HSM)
  - Interface-bound role-based acces (RBAC)

European Network for Cyber Security
ENCS APPROVED

- **Protocol Support**
  - DLMS/COSEM (IEC 62056) for smart meter communication
  - ModBus TCP with OPC UA PubSub for IoT communication
  - HTTPS, TLS, SNMP, NTP
  - G3-PLC Dual Band (Cenelec A and FCC)

G3-PLC CERTIFIED CEN A

G3-PLC Smart Meter Family IMx50 with additional functionality

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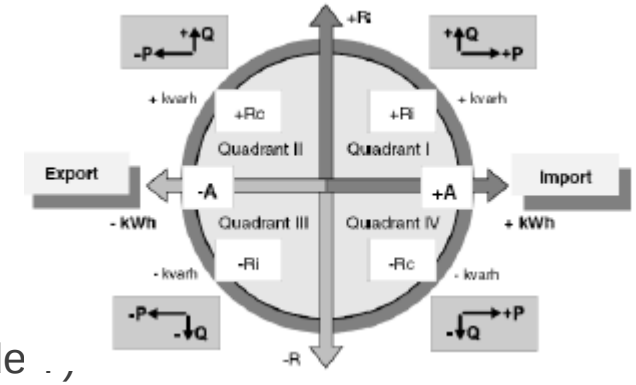
Single / Three Phase / CT Smart Meter IM150 and IM350

Four Quadrant Active and Reactive Energy



- **Interoperability**
- **Compliant to standards** (dlms/COSEM, G3-PLC ...)

- **Integrated breaker**
- **Consumer interface** (unidirectional, DSMR/CII)
- **Submetering: M-Bus** (wired, EN13707, OMS 4.0.2 Mode .)

Integrated Load management to replace ripple control receivers

- Switching with internal breaker
- Control with up to TWO load switch contacts
- Load Output with up to 5 digital pulse outputs

End-to-End Security as per guidelines of Österreichs Energie, e.g.

- Role based access
- Cryptographic methods
- Certified by ENCS

ENCS ***European Network for Cyber Security***

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Synergies and Extensions of Smart Meter Infrastructure

How an existing Smart Meter infrastructure can be used for future topics

Create New Value with existing Smart Meter System

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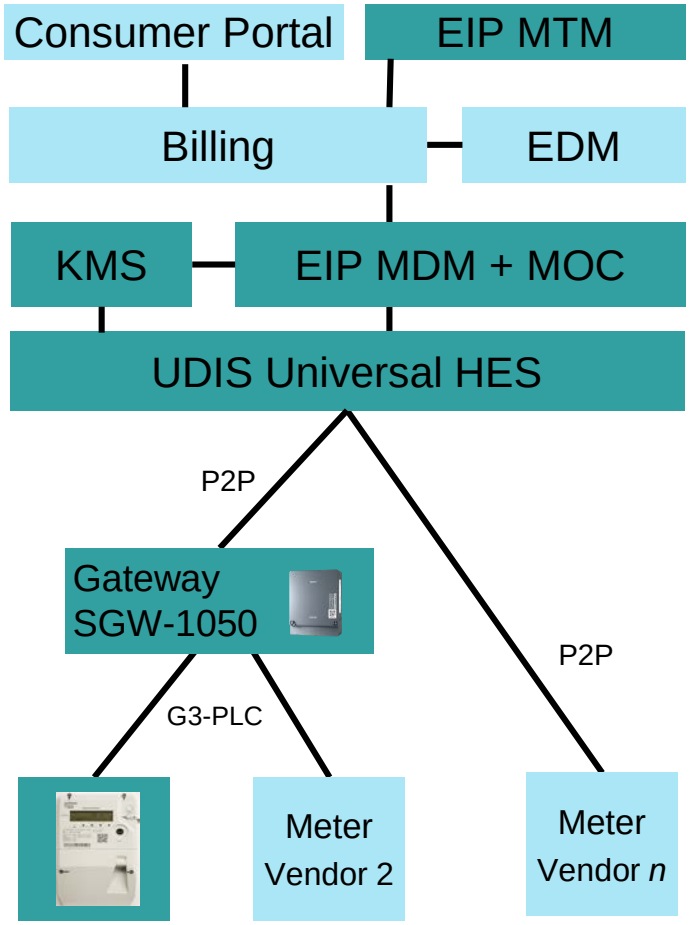


Color Code: Siemens Products

IT Center

High Secure IT Center with KMS and PKI Database of validated consumer and grid data

Data and Events from Smart Meter can be aggregated to meet GDPR and creates analytics use cases to support grid operations and SCADA

Low Voltage Transformer

App enabled device with high speed uplink in every LV transformer station with free ports

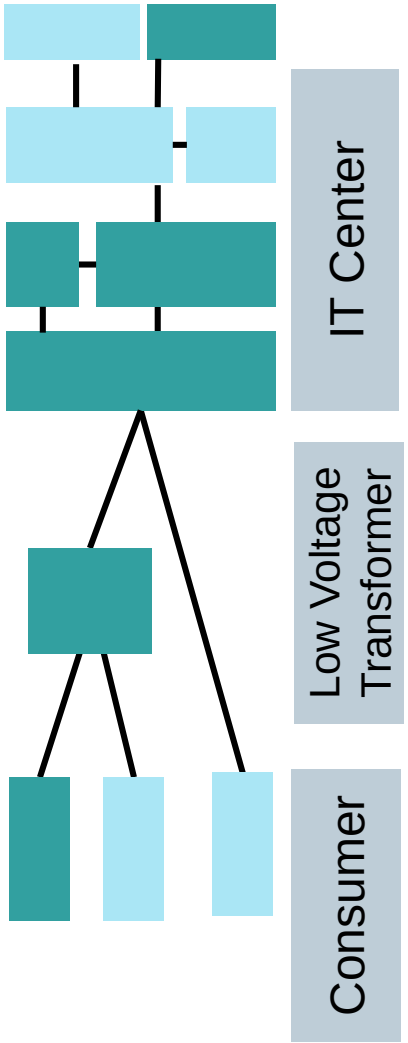
Add new applications and protocol support to read available devices
Read low range radio services

Consumer

Multi functional smart Meter with submeter and load management interface

Add new consumer centric services for avilable meters and devices (i.e. electric heating, car charging and photovoltaics)

Create New Value with existing Smart Meter System
➢ in the IT Center



provide consumption data for energy retailers and Energy savings consultants

Improve clearing quality with daily or 15 min values

Analyze grid events, forward to SCADA, provide reports

Aggregate grid data for advanced analytics:

- Equipment Load Management
- Load Forecasting
- Power and Grid Quality
- Asset Topology Mapping
- Revenue Protection, Grid Loss Detection together with Security Incident Monitoring

Create New Value with existing Smart Meter System
➢ in the Low Voltage Grid

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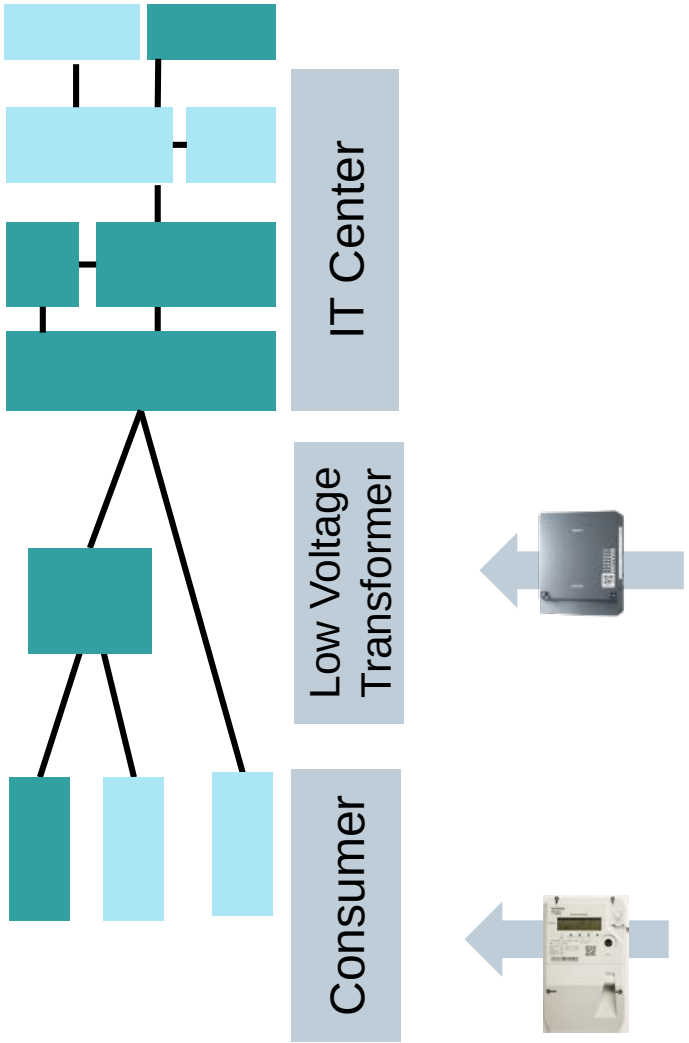

Analyze PLC performance data to better understand low voltage grids and cabling issues

Re-use P2P communication link into low voltage transformer station for the following applications:

- Automate and telecontrol Transfomer station with SCADA
- Read available and new sensor data into MDM/IoT Platform
- Radio: extend for other communication media
  – i.e. LoRA, M-Bus

Congestion management with ripple control applications in the smart meter to control heating, photovoltaic systems and car charging stations

Read out water, gas meters and other information available at consumer premise

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Innovation Topics

Selected Use Cases

With AMI Data and additional Sensors
New Applications Evolve at Meter and Grid Level

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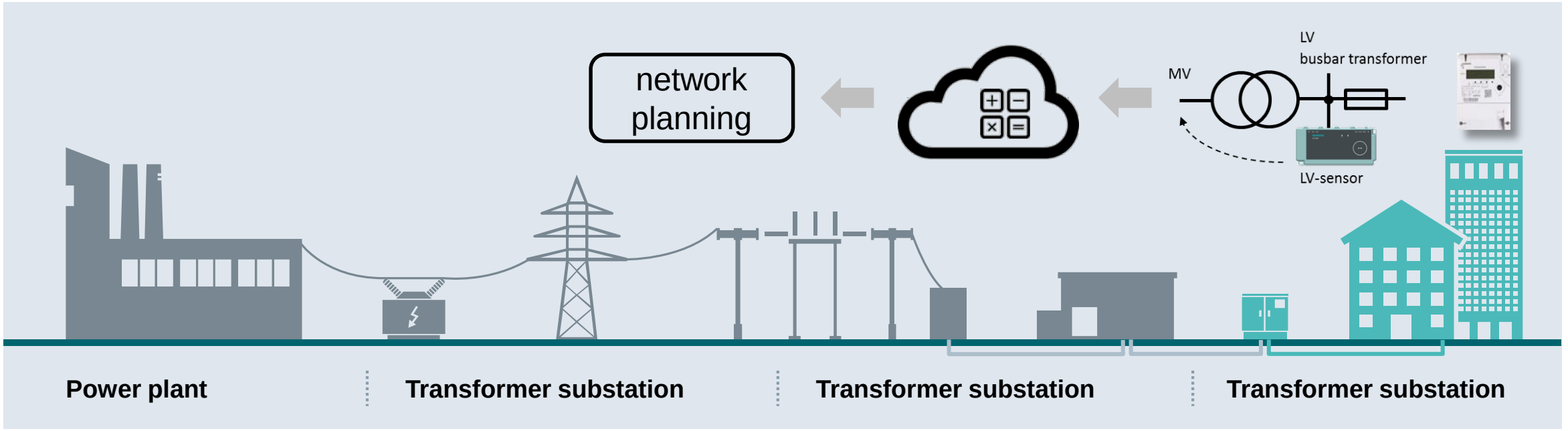

Asset Connectivity Model, Asset Parameter, SCADA Data, Asset Location Data

Equipment Load Management

Power Quality

Load Forecasting

Grid Loss Detection

Asset Topology Mapping

Meter Data

Revenue Protection

Evolution of “Trailing Pointer“ Functionality

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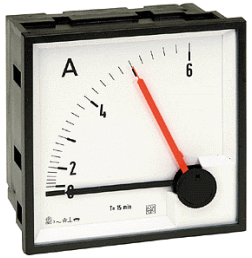
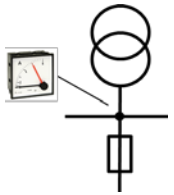
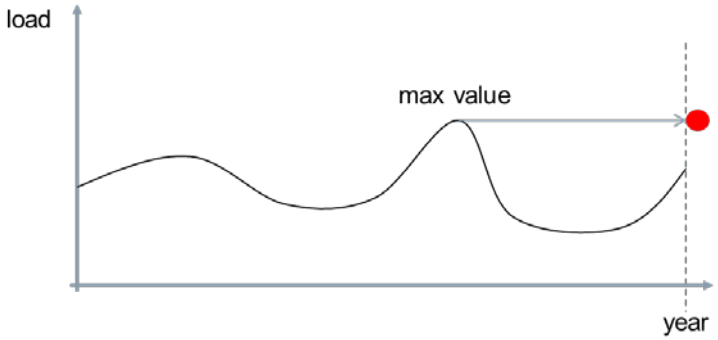
Analogue „Trailing pointer“

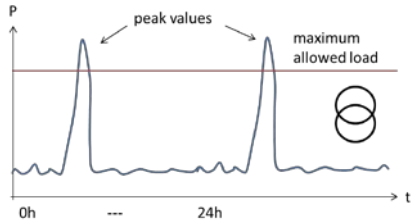




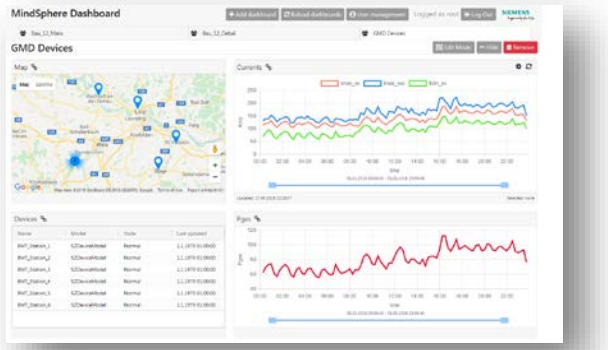
Only one maximum value per year



Digital „Trailing pointer“



Average values every 2,5 min



Sensors in the grid provide extensive status information

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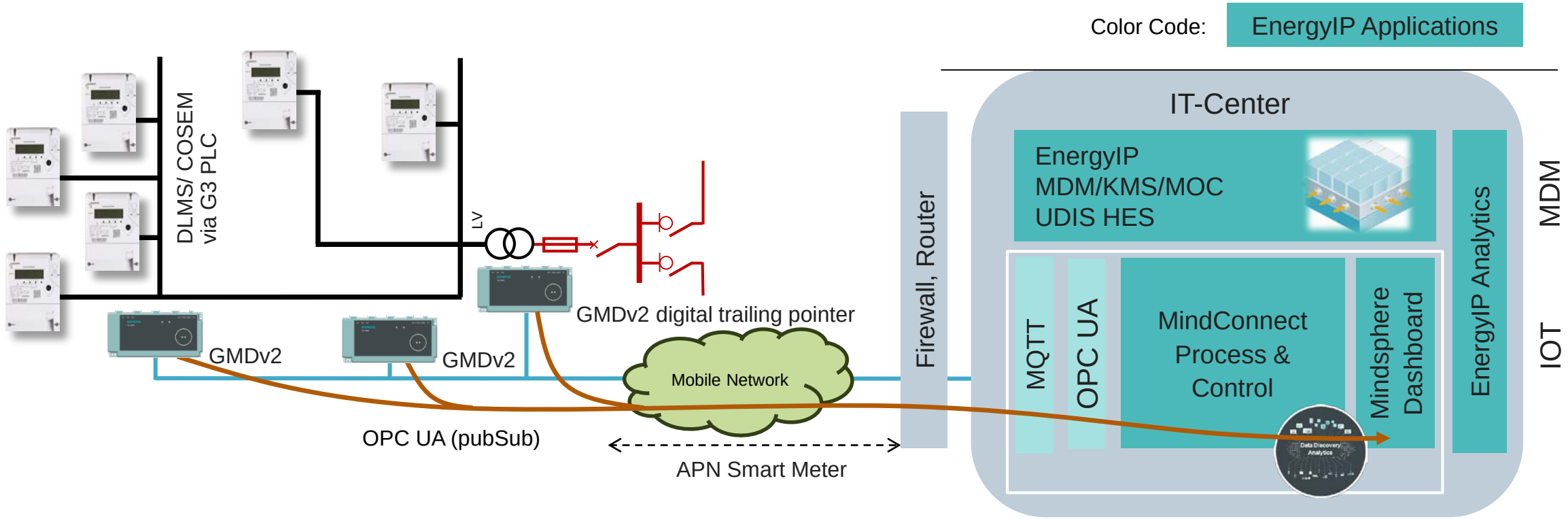

Determine system health precisely through **analysis of voltage**, **reactive power**, and **outage data** from available sensors and smart meters. Benefit from getting detailed and granular insights into momentary outages and **reports**.

Extending „Smart Meter Gateway - SGW1050“ with IoT-Applications

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DLMS/ COSEM via G3 PLC

Meter GW | Modbus TCP | OPC UA

SGW-1050 Platform

SGW1050

Modbus-TCP

RTU, PQ, Protection, SEM3

Connecting devices even from 3rd-party vendors

Transformer Station

Mobile Network LTE

APN Smart Meter

Firewall, Router

IT-Center

EnergyIP
MDM/KMS/MOC
UDIS HES

MQTT

OPC UA

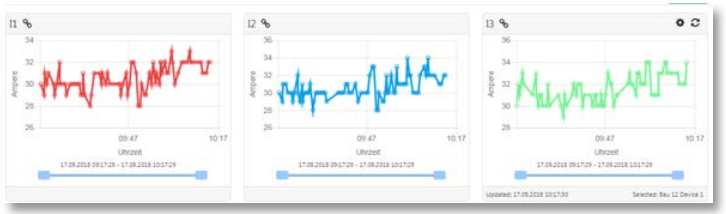
MindConnect Process & Control

Mindsphere Dashboard

EnergyIP Analytics

MDM

IOT



MindSphere Dashboard using MindConnect

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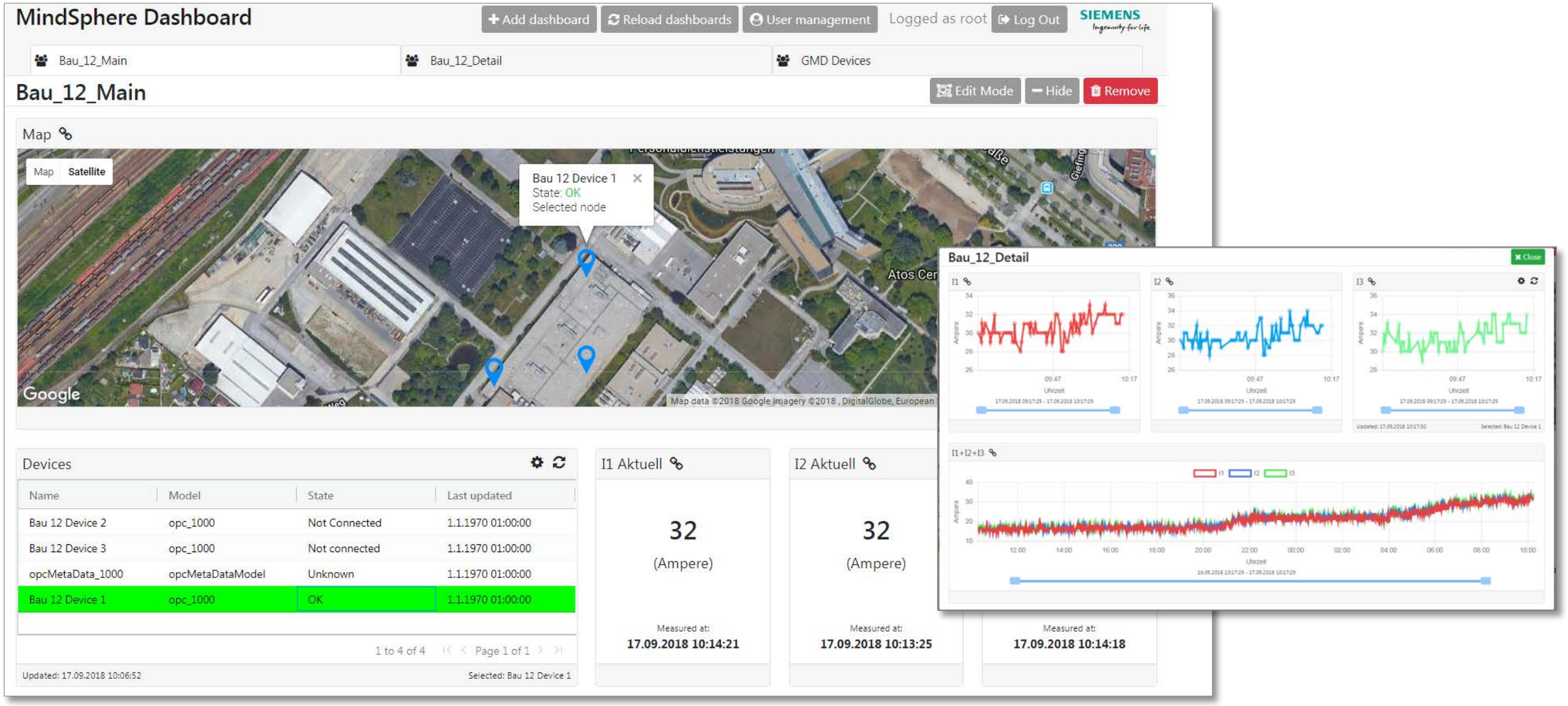

EnergyIP Analytics – Equipment Load Management

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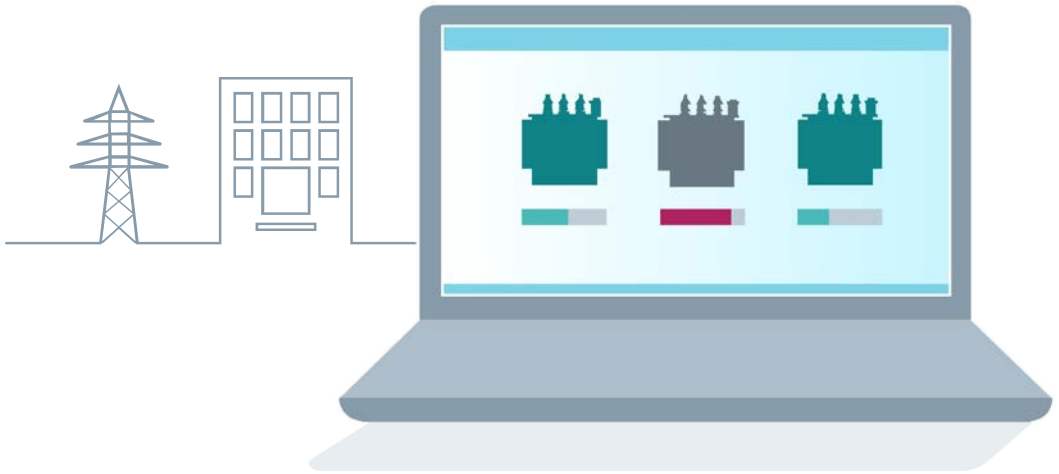
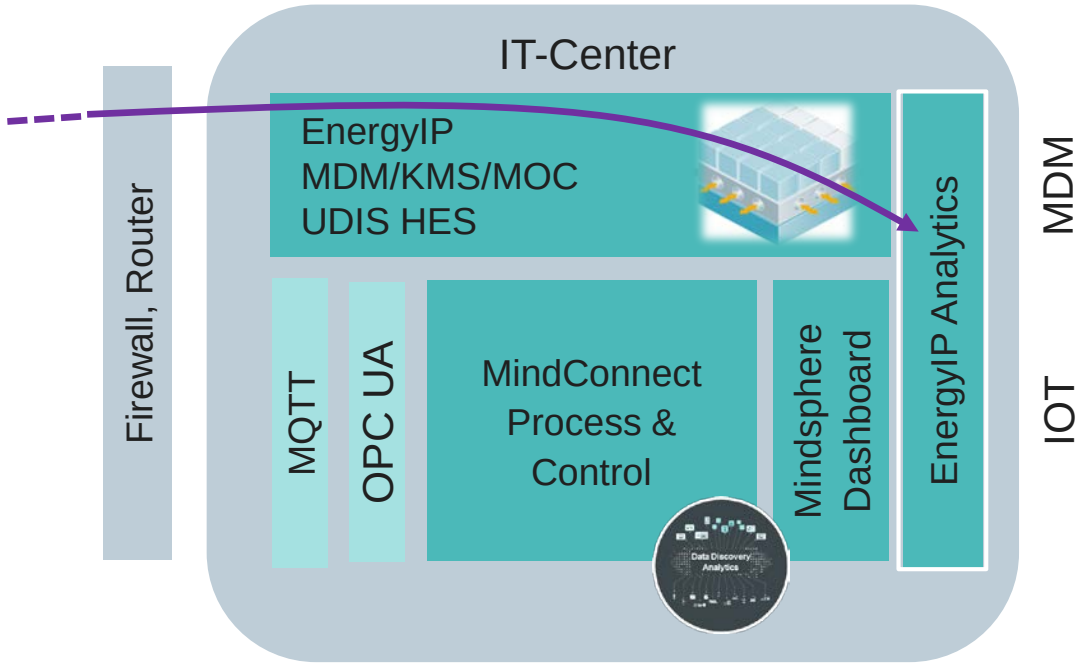
Combines AMI consumption data with distribution grid topology and equipment ratings

to identify **load on distribution transformers**

and to intervene **before** an overload occurs.





EnergyIP Analytics – Equipment Load Management

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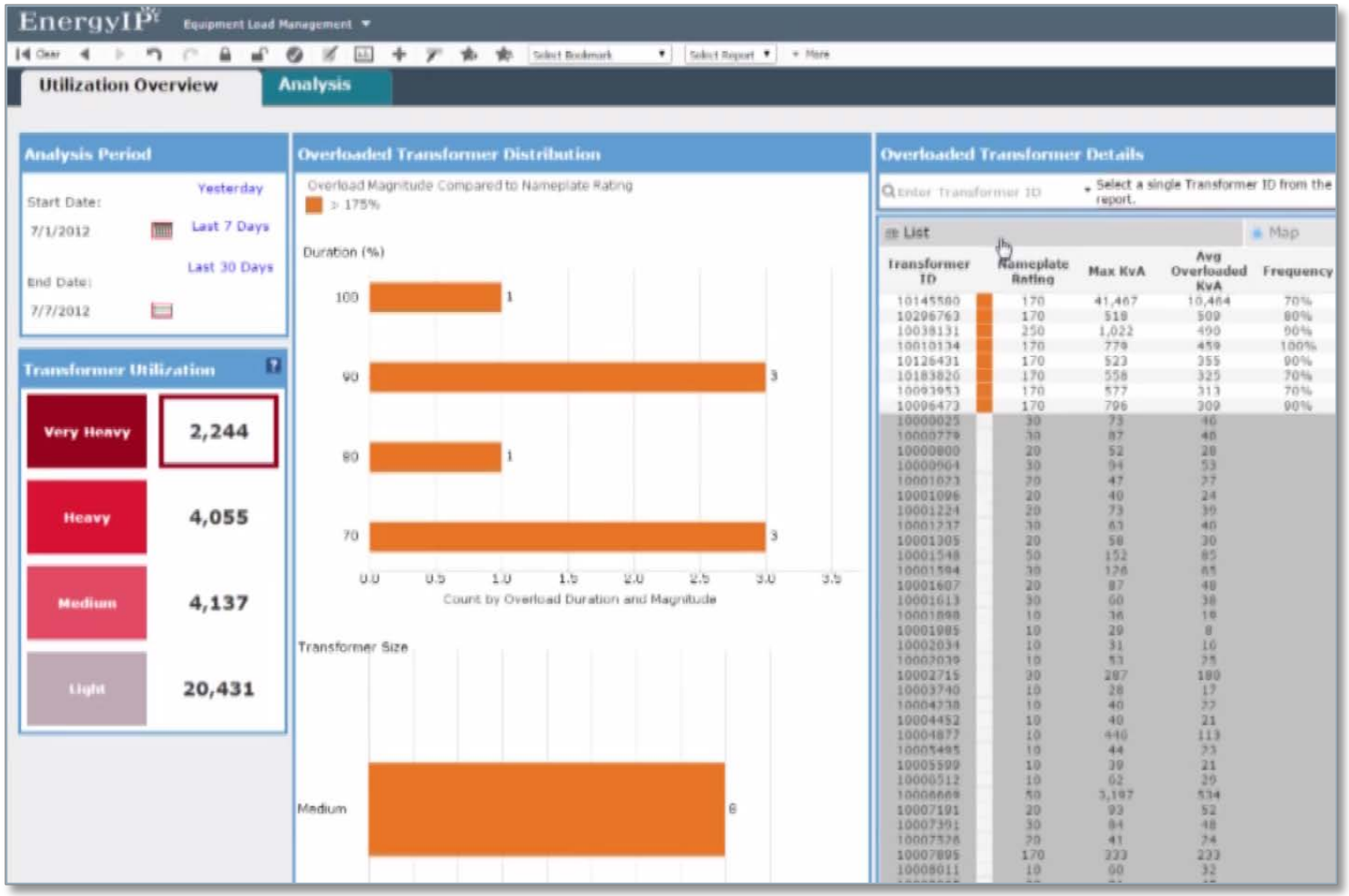
Build Your List of "At-Risk" Assets

Creates a prioritized list based on name plate rating as well as the current load conditions, such as extent and duration of overload



EnergyIP Analytics – Equipment Load Management

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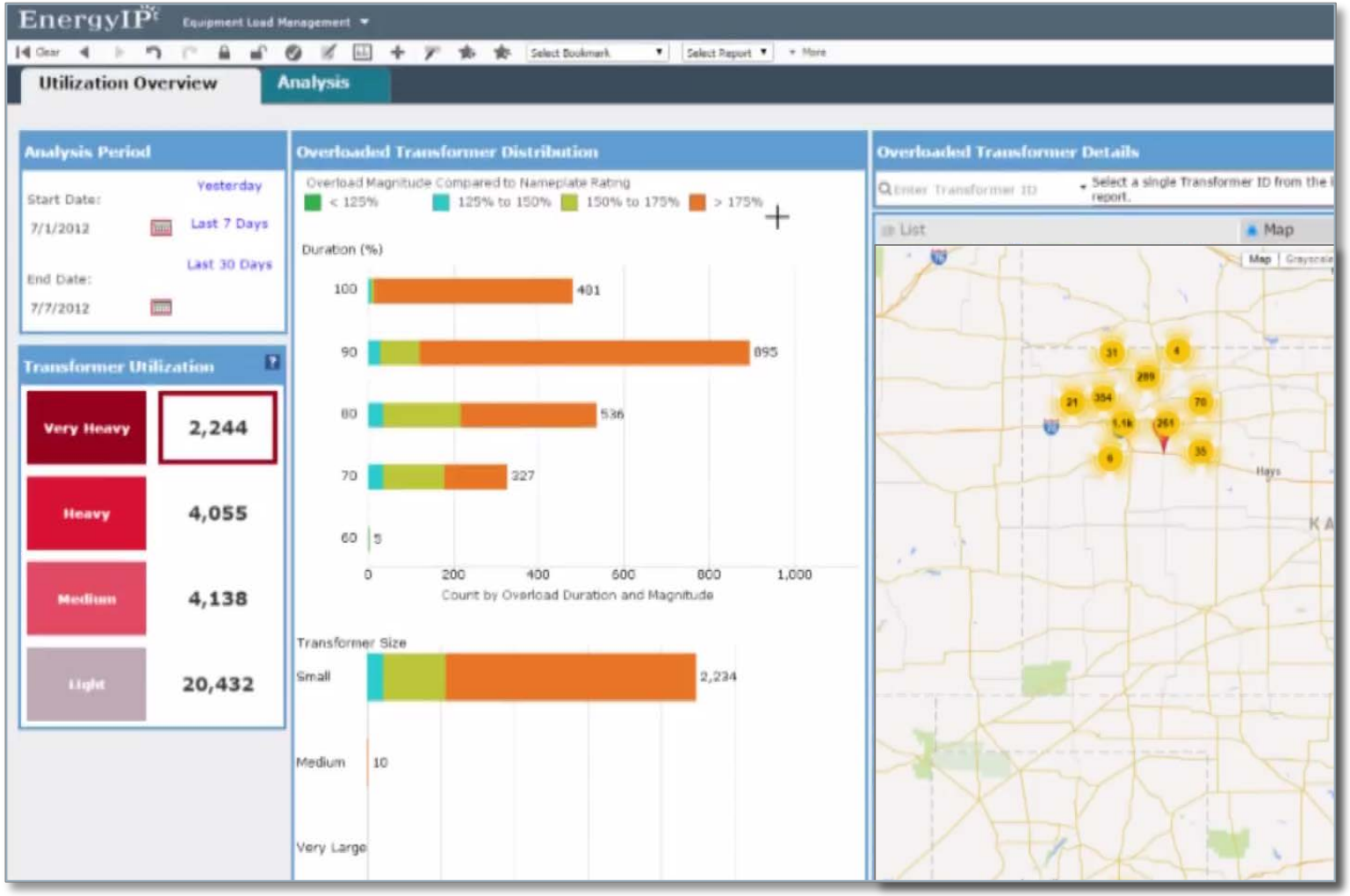
Where is the
main area
of my problem?

Understanding
Geographical
Dispersion



EnergyIP Analytics – Equipment Load Management

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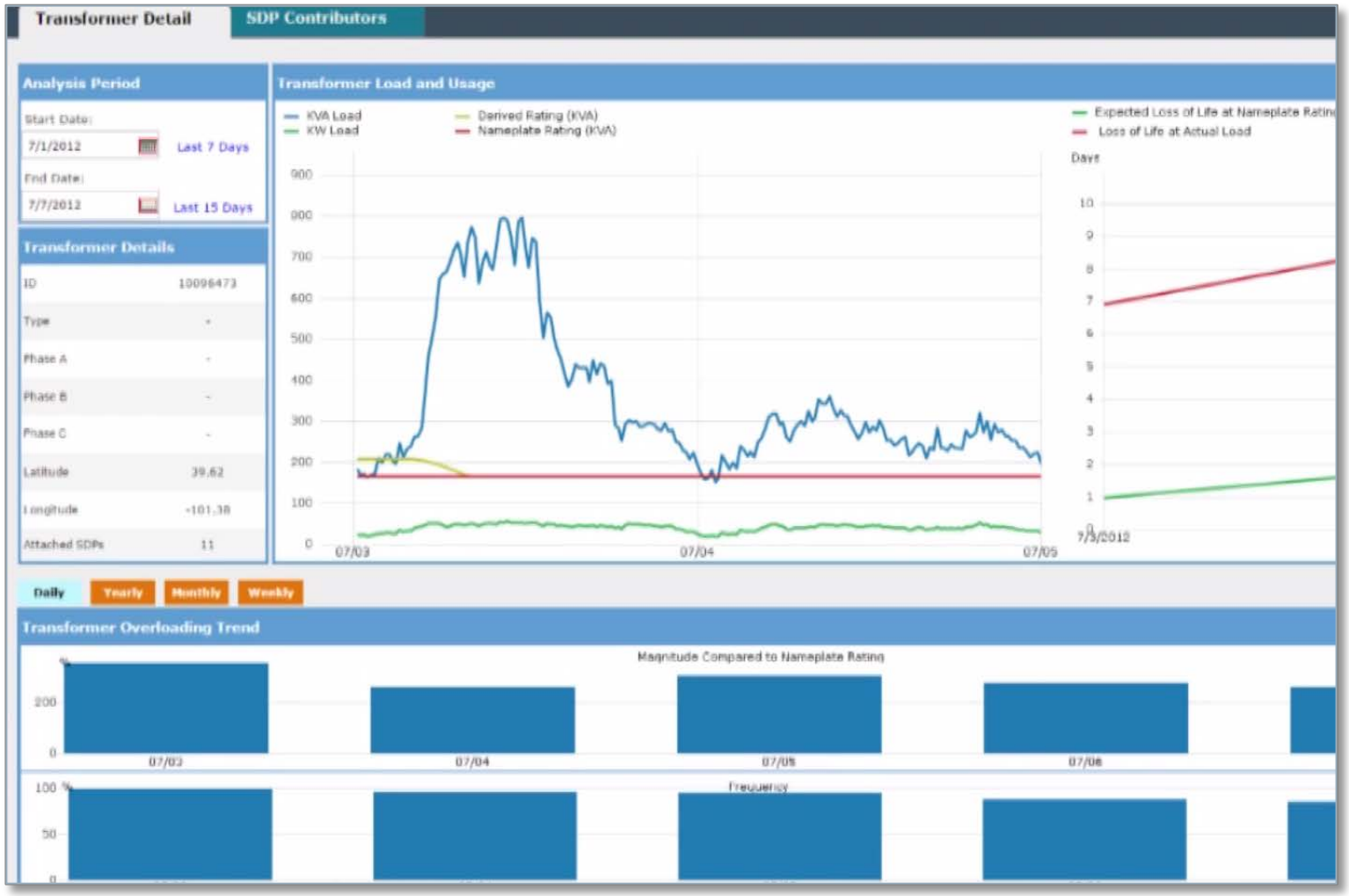
Drill down into individual transformer stations

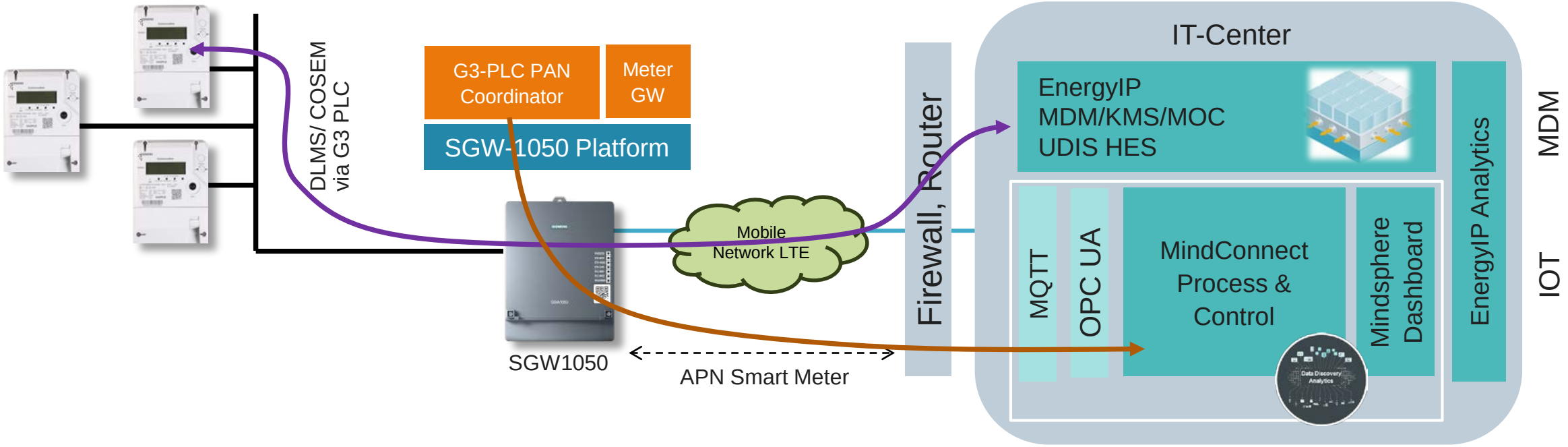
Very interactive and intuitive user interface –

makes it easy to go from big picture to details and vice versa.

Saves time and effort.

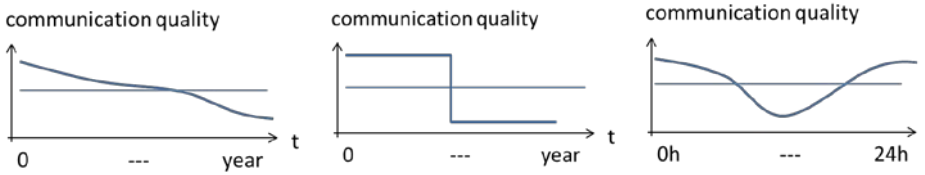


G3-PLC performance provides additional grid status information



G3-PLC **PAN Coordinator has a lot of detailed information**:

- Quantity of connected Smart Meter
- Communication topology
- Number of hops and quality for communication link
- Percentage of successful / missed communication attempts



EnergyIP Analytics – Power and Grid Quality

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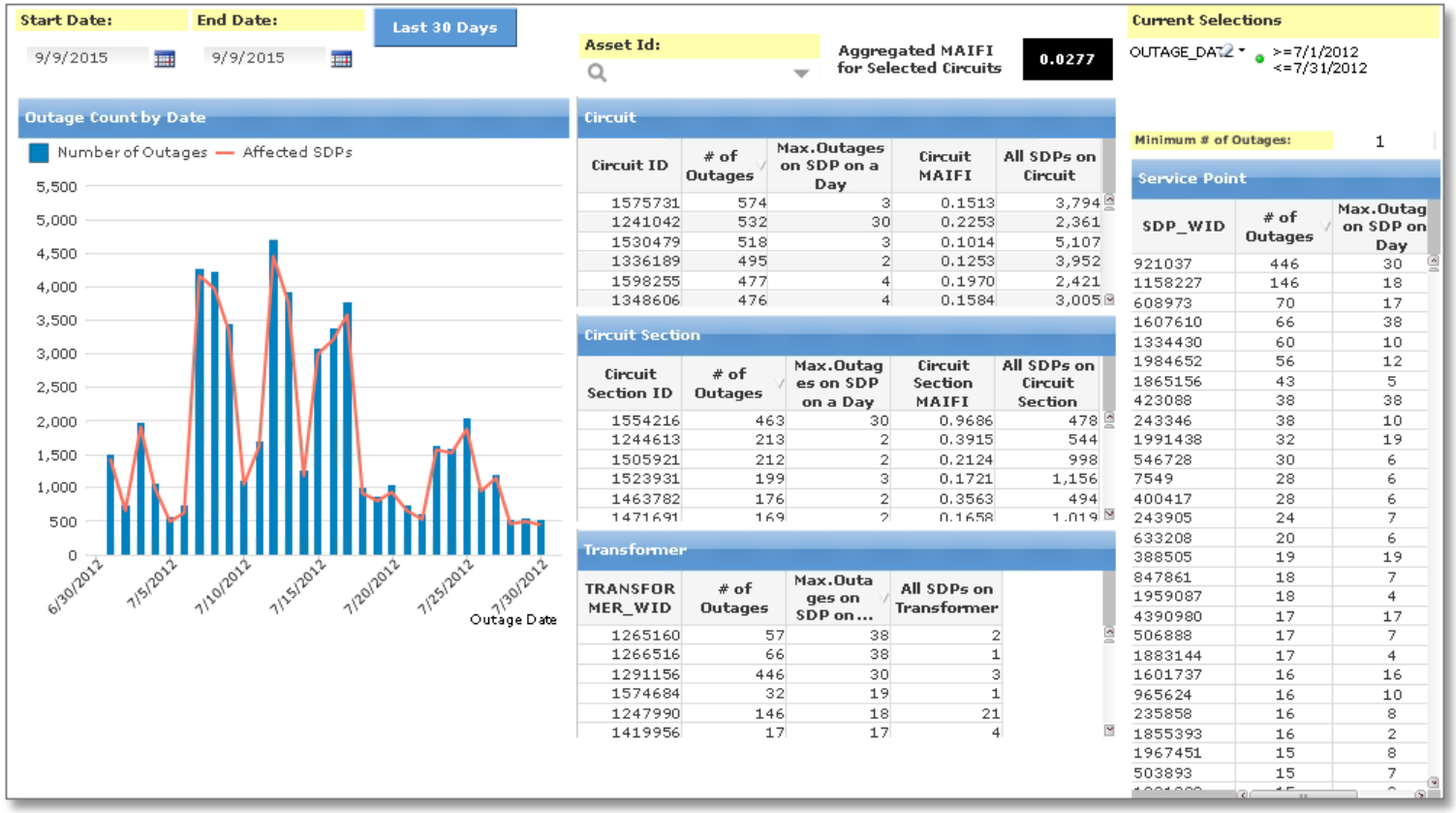
Where is the likely source of a majority of momentary outages?

Creates a prioritized list based on the specific power quality metrics

and combines with other key derived metrics



EnergyIP Analytics – Load Forecasting

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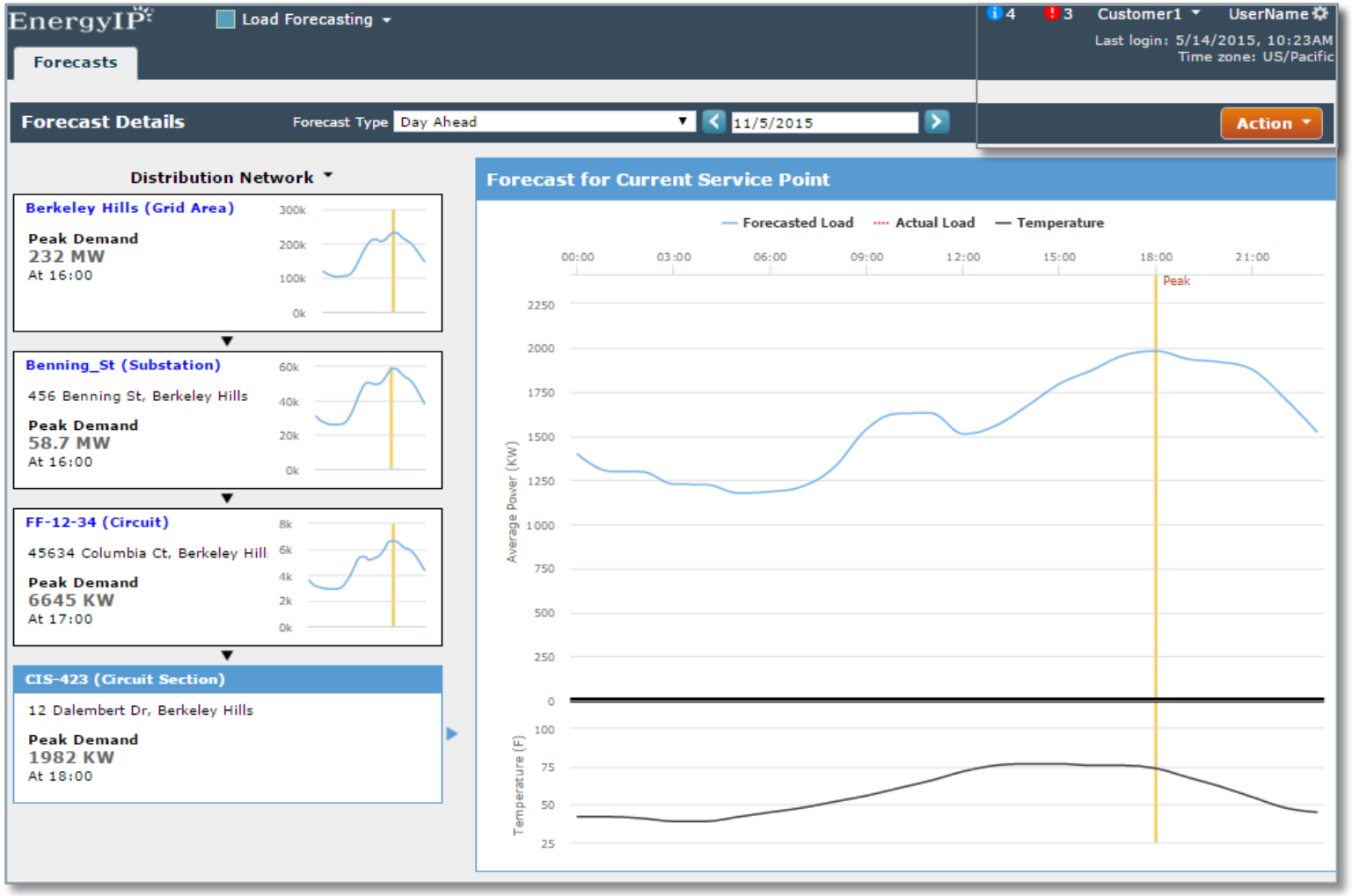
Not just what the peak will be but also who the key contributors will be

Provides load forecasts at every level of the low-voltage grid – enables reliable identification of the source of variance.



Local Grids – Key Element for “Energy Revolution”

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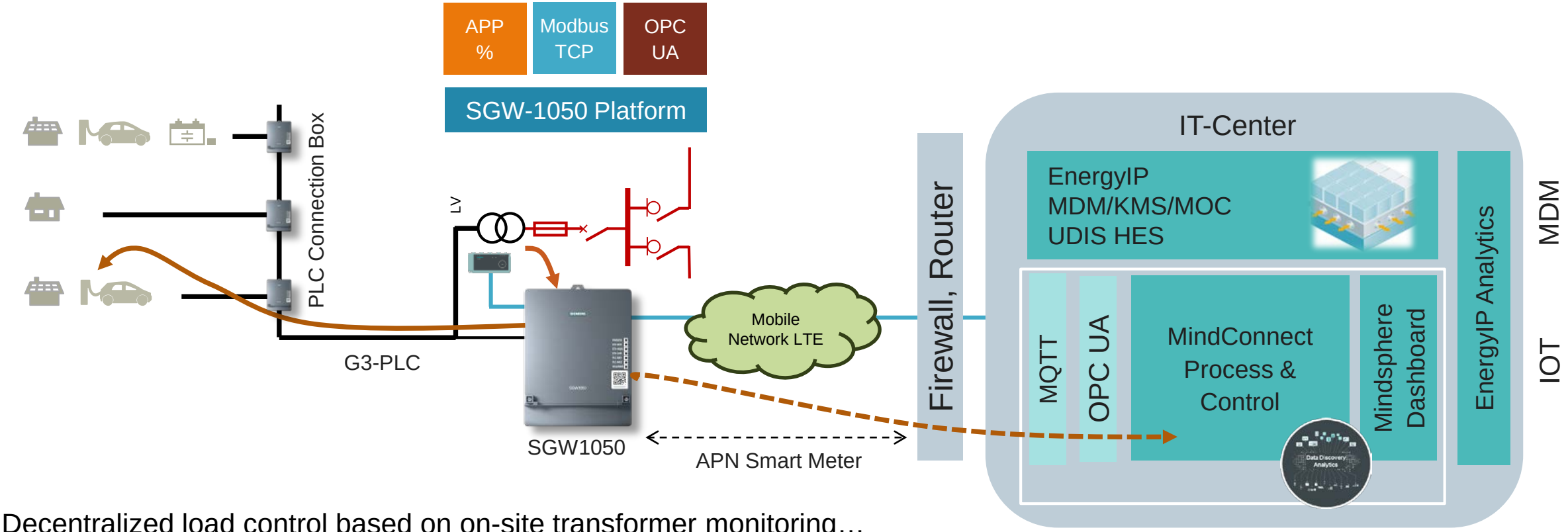


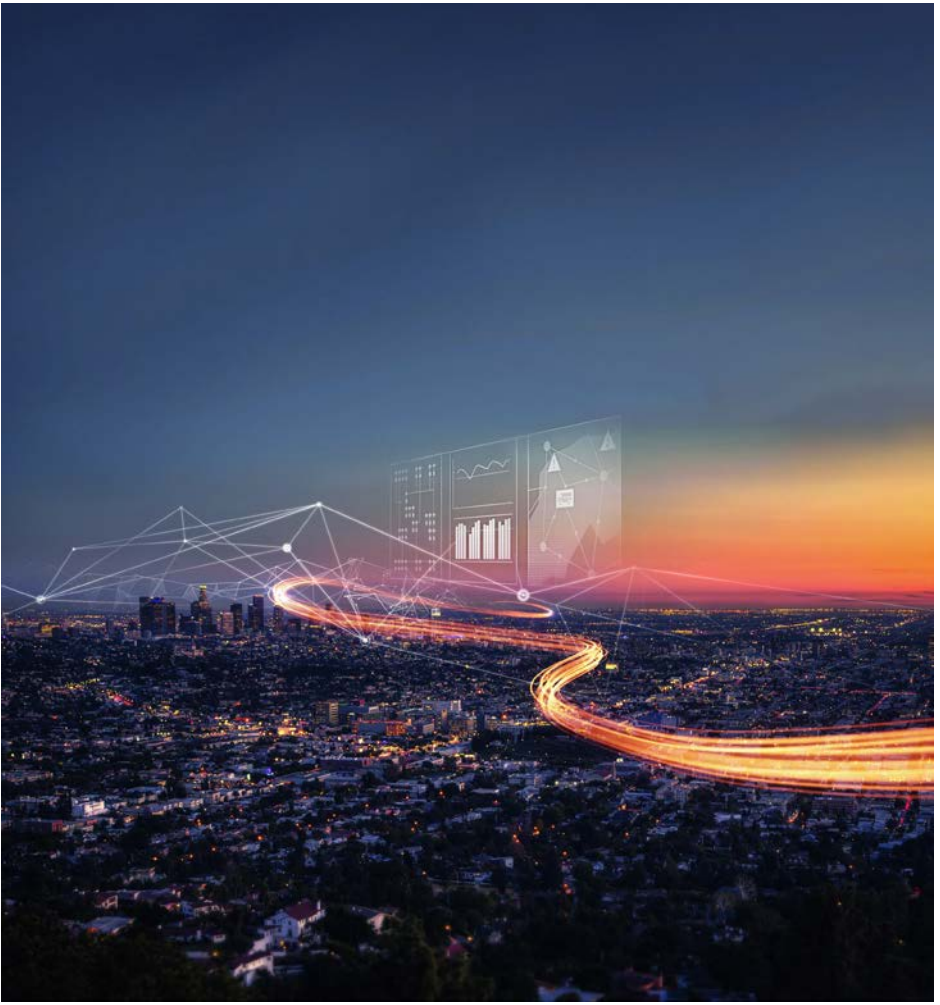
Decentralized load control based on on-site transformer monitoring…

- **E-Mobility (first use-case)**
- Decentralized generation
- Heat pumps

DSO specifies the connection requirements
DSO is able to **ramp down amount of load** (selective load control) at charging locations

Siemens offers EnergyIP powered by MindSphere a future proof solution platform for the all-electric, digitalized energy world

Contact information



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