Verteilnetzbetrieb und Flexibilitätsbereitstellung

Erfahrungen aus kommerziellen Anwendungen und F&E

Christoph Gutschi
cyberGRID Gmbh & Co KG

Fachtagung „Neue Anwendungen in einer neuen Stromwelt“
e-control, Wien, 16. Jänner 2020

Outline

- About cyberGRID
- Local flexibility provision for DSOs
  - The Integrid approach
  - The hybridVPP approach
- Meter integration and new business opportunities
  - Technical VPP services provided by DSOs
  - New balancing system in Slovenia
- Barriers to utilization of flexibilities

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About cyberGRID

- Utility partner since 2010
- Toshiba period 2012-2015
- Innovation period 2015 -2018
  - Over 120 partners across Europe
  - Our technology cyberNOC enables the **integration** of loads, renewable energies, storage devices, and energy markets.
    - 2019 Power Network Innovation Award Winner from EDSO and ENTSO-E.
- Focus on Commercialization since 2018

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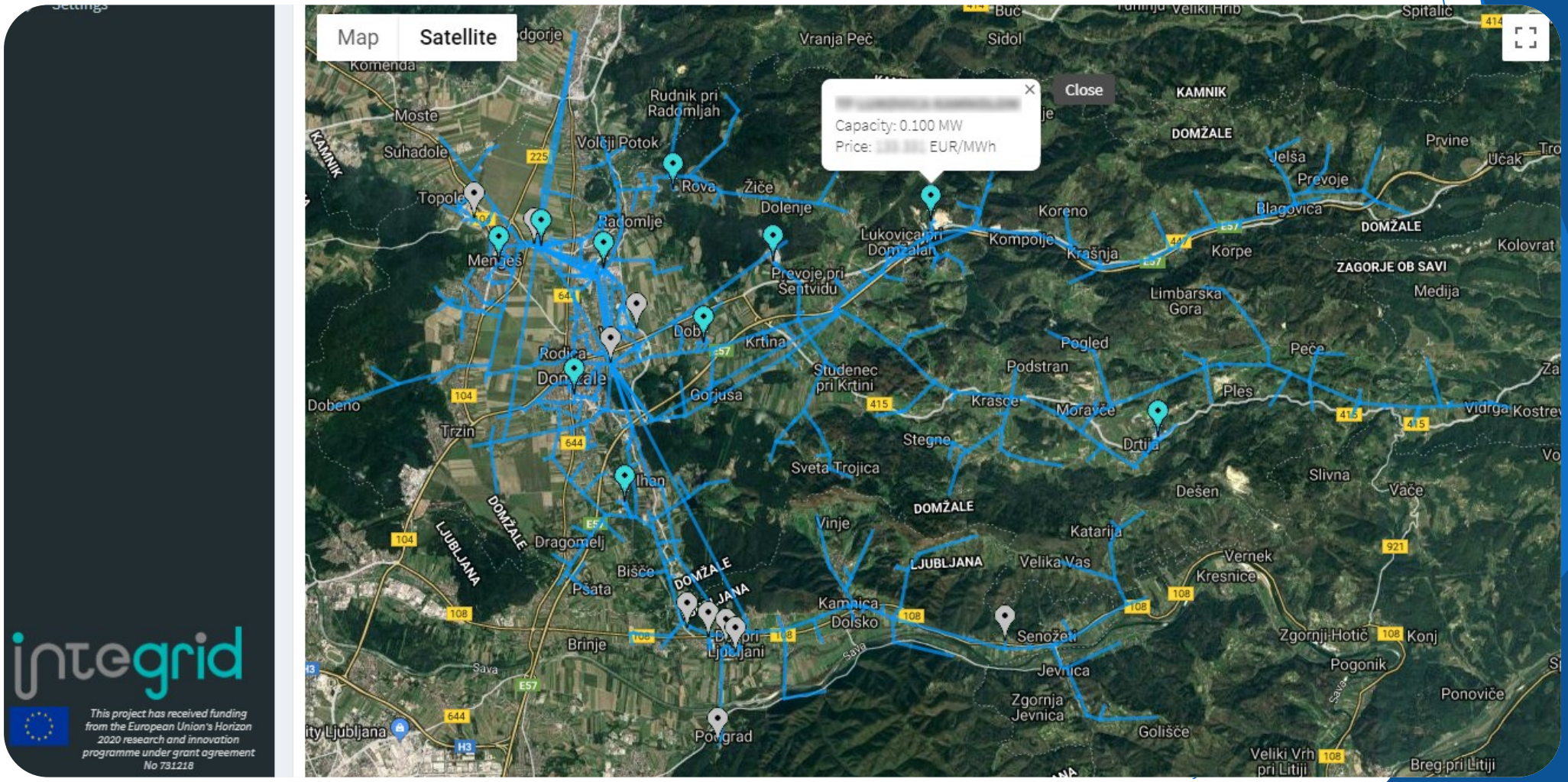
Local Flexibility for DSOs

The Integrid Project



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Local Flexibility for DSOs
The hybrid-VPP Concept

The hybrid-VPP supports the DSO by reducing voltage or congestion problems in stressed situations (e.g. special switching states) and thus preventing tripping of customers.

During non-critical hours, all units of the hybrid-VPP can participate in the balancing market.

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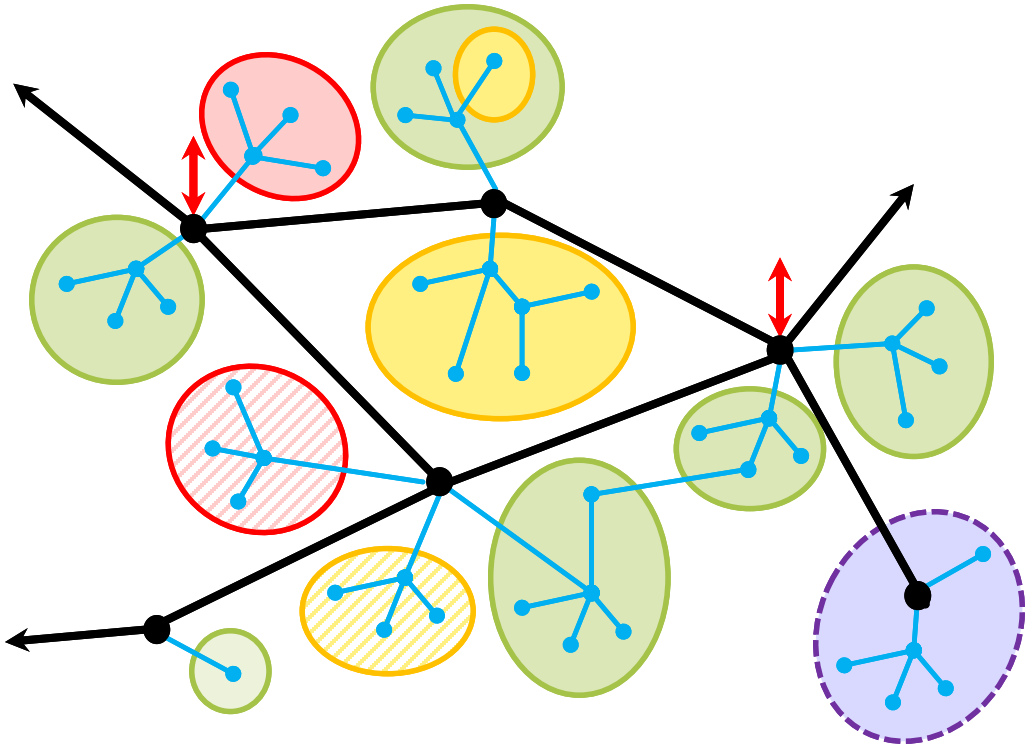
Traffic Lights in Distribution Networks

The hybrid-VPP Concept



MV grid

HV grid

Noncritical:
VPP operation P↕ permitted

Semi-critical:
only P↓ permitted

Critical:
P↓ required by DSO

Semi-critical:
only P↑ permitted

Critical:
P↑ required by DSO

Highly critical:
VPP operation prohibited

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Traffic Light for Distributed Flexibilities
The Integrid Project

- A Traffic Light System (TLS) operated by the DSO can enable the exploitation of flexibilities from stressed distribution grid sections.
- In regular intervals the TLS calculates the supported (allowed) usage of flexibility from connected units
  - per **grid node**, per **direction** and per **unit**, for the next 48 h
  - TL status has a resolution of 1 h and is updated in 15 min intervals.
- Traffic Light evaluation
  - **Green:** All kind of operation allowed.
  - **Yellow:** Flexibility provision is only allowed to limited extend (max. value prescribed by the TLS).
  - **Red:** no flexibility provision allowed for particular unit(s).
- The results of the TLS are communicated to all flexibility operators (VPPs) active in the grid.

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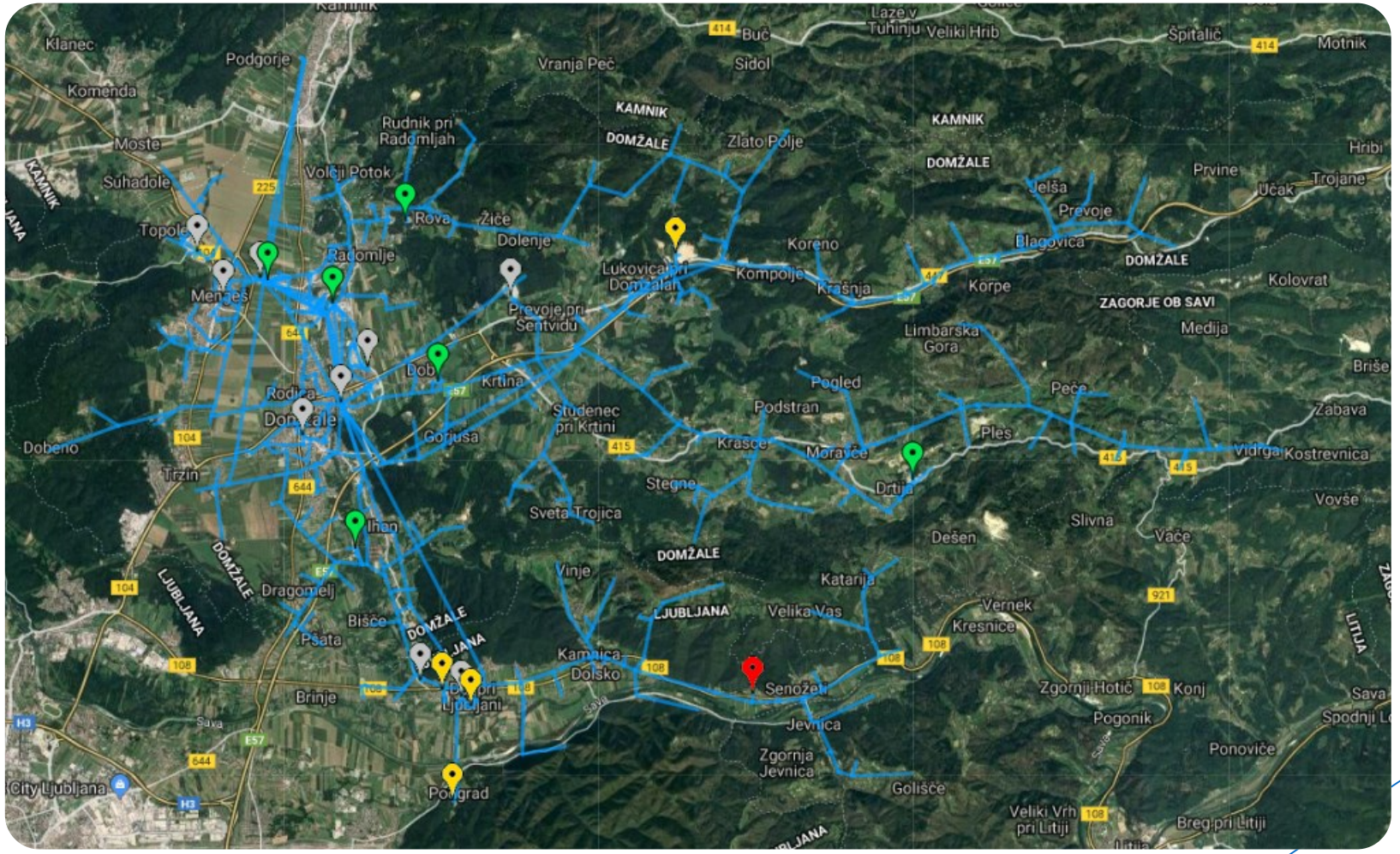
Traffic Light for Distributed Flexibilities

The Integrid Project



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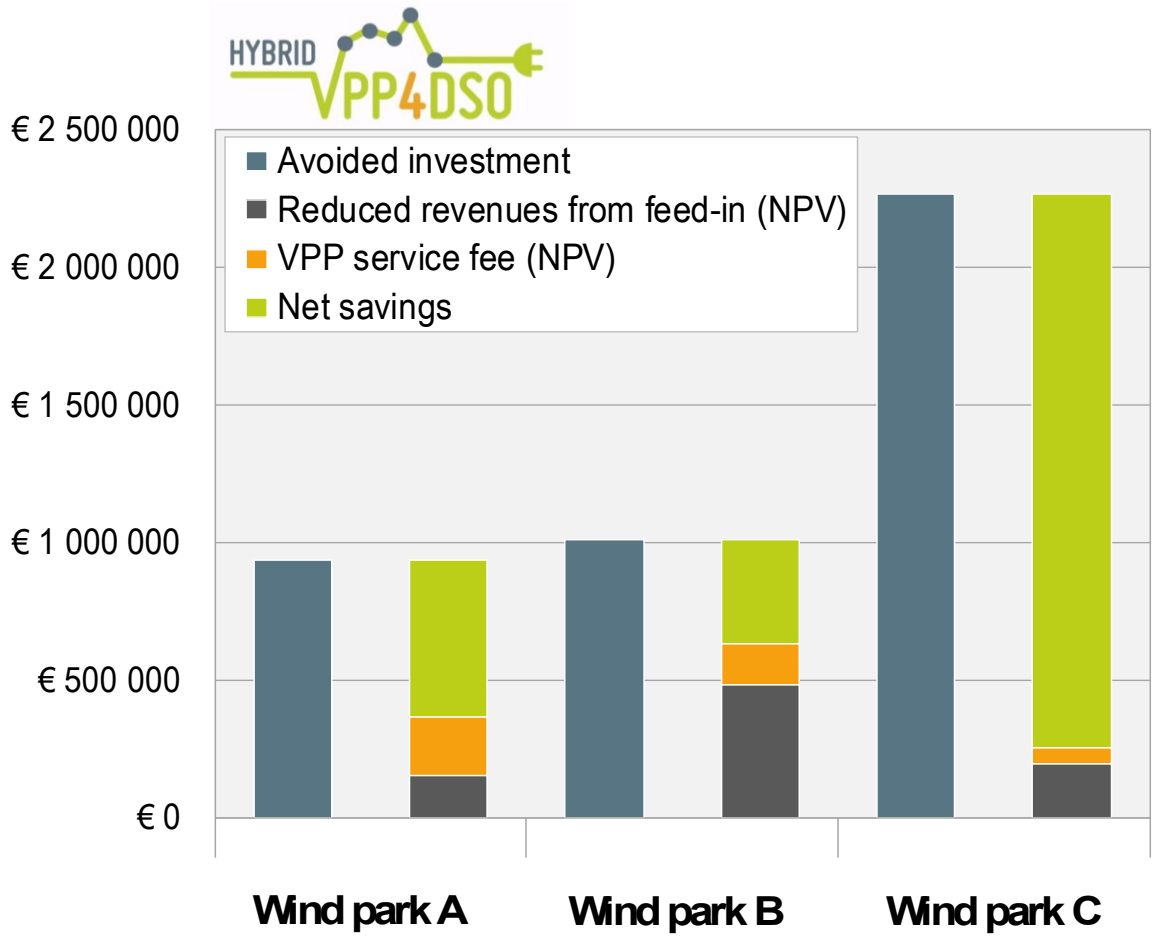
Local Flexibility for DSOs
Hybrid VPP Concept

- Substantial savings are possible *if* investments into a new grid connection or reinforcement of existing connection can be minimized.
- The customer has the main benefit.
- The combined operation of a hybrid-VPP for balancing energy provision and support of grid operator can be highly profitable.



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Meter Integration and new Business Opportunities

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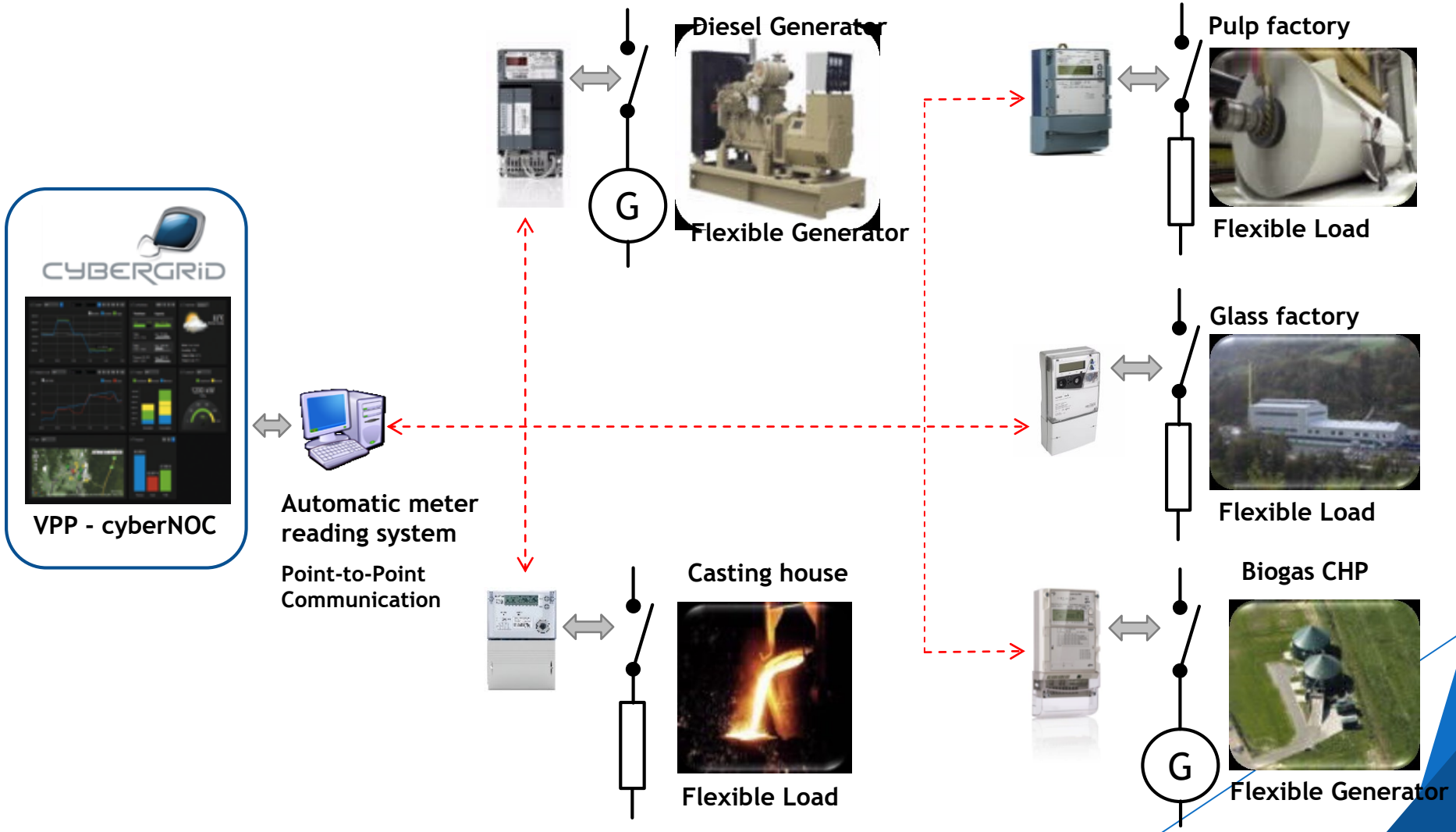
Meter Integration & New Business for DSOs

Examples of AMR-Meter-Load Connection



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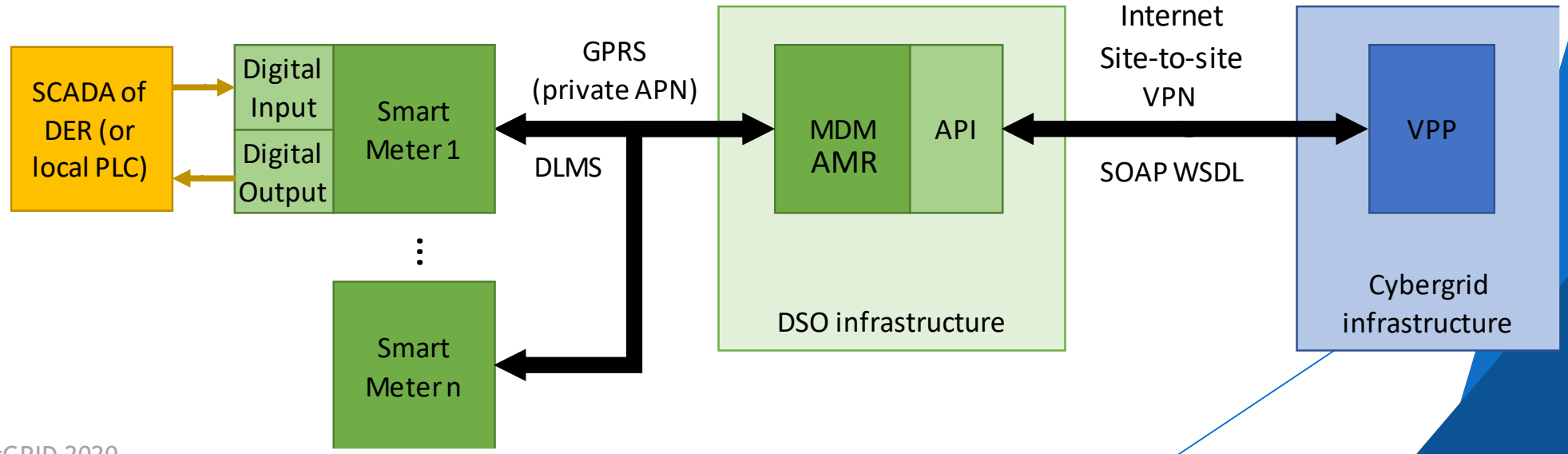
Ancillary Services via Smart Meters

- Synergies in communication and metering
  - DSO operates smart meters and reliable communication lines
    → Use the DSO's smart meter to provide certified measurements to the VPP.
  - DSO can receive information from VPP operator about ongoing changes or general status of the grid.
- DSO can offer the entire technical infrastructure of a VPP and offer the technical service to market players



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Meter Integration & New Business for DSOs
The Elektro Ljubljana Case

Elektro Ljubljana, Slovenia

Virtual Power Plant, Elektro Ljubljana

Operation started in 2011 providing 12 MW tertiary reserve

100% availability of positive and negative capacity

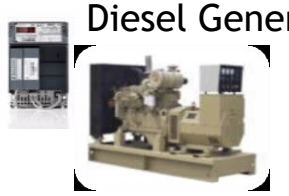
Load curtailment and distributed generation

Connections: Smart metering, automation system, cyberCONNECT

cyberNOC

AMR & MDM system

Diesel Generator



Pulp factory

Casting house

Biogas CHP

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Advanced Utilization of Meter Infrastructure
Example: EccoSP in Slovenia

- ECCO SP is used for
  - **Bidding in auctions for power**; and collection of the energy offers
  - **Sending mFRR activation** signals to the BSPs
  - **Collecting schedules at d-1** with updates – mFRR and aFRR
  - **Collecting BSP reports at d+1** – mFRR and aFRR
    - Meter data (1 min load profiles), at the site of the energy asset providing flexibility
    - setpoints, baselines, limits
- Reporting
  - BSPs need to report for 24h periodically on d+1
  - The data is used for accounting and validation purposes
  - The requested data to be sent to the TSO in 1 min average:
    - Metered active power, baseline, setpoint, positive and negative control band
    - participation status (participation in the activation)
  - Data from public meter can be used.
  - Future option: TSO can forward data to the market operator.

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Barriers to Utilization of Flexibilities

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The Magnitude Project:
Barriers to Flexibility Exploitation

- The Magnitude project investigates the potential of multi-energy-systems to provide flexibility to support the integration or renewables.
- Multi-energy-systems found in C&I facilities can provide flexible energy to ancillary service markets or to the intraday market.
  Many C&I can shift consumption between electricity and natural gas.
- However, fees for system utilization and renewables contribution could be improved for the participation of C&I consumers.
- Provision of negative balancing energy results in an increase of consumption and may cause additional peak consumption values.
  The operator of the industrial facility is charged for additional peak consumption.
- In case of ancillary service provision, only the system utilization fee is refunded.
- No refund of peak fees caused by intraday trades.

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Example: Peak Load Rates
Network level 5

Published rates:

Netznutzungsentgelt	39,00	€/kW/a
for ancillary services	*1,00*	*€/kW/a*
Ökostromförderbeitrag	6,377	€/kW/a
Biomasseförderung	1,69	€/kW/a

NNE (peak) since 01/2020: 10,306 €/kW/a

+1 MW peak means per month:

Netznutzungsentgelt	3.312 €
for ancillary services	*85 €*
Ökostromförderbeitrag	542 €
Biomasseförderung	144 €
Sum	**3.997 €**
for ancillary services	*770 €*

Revenues p.m. from **intraday trading**

- Assumed margin: 10 €/MWh
- **400 h/m** would be needed to cover peak fees!

Impossible!

Revenues p.m. from **mFRR provision**

- 1,5 €/MW/h | -400 €/MWh (ca. ∅12/2019)

Reserve fee	1.116 €
Energy fee (3 h activated)	1.200 €
Sum	**2.316 €**
– Peak load fees	-770 €
Net revenues:	**1.546 €**

Peak load fees reduce revenues by **-33%!**

2020: **-48%**

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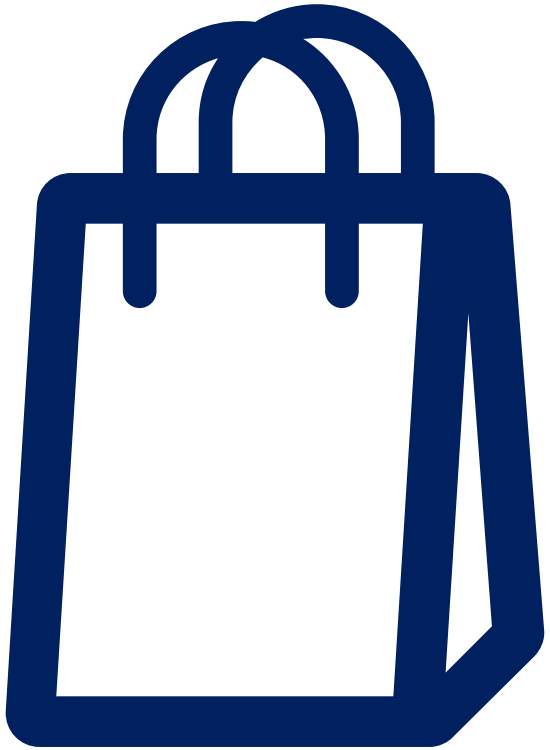

Key Take-Aways

- Local flexibility markets for DSOs are difficult to realize in practice.
- Alternative approaches:
  - Use **traffic light systems** to maintain control over BSPs in the grid.
  - Offer **reduced connection fees** for new flexible customers.
- Added value for DSO infrastructure
  - Monitoring and **switching services**
  - **Data hub services**
- Rethink peak load charges

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Many thanks for your attention!

Dr.techn. Christoph Gutschi
Senior Project Manager
cg@cyber-grid.com

cyberGRID GmbH & Co KG
Weimarer Straße 119/1
1190 Wien
Austria
www.cyber-grid.com

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