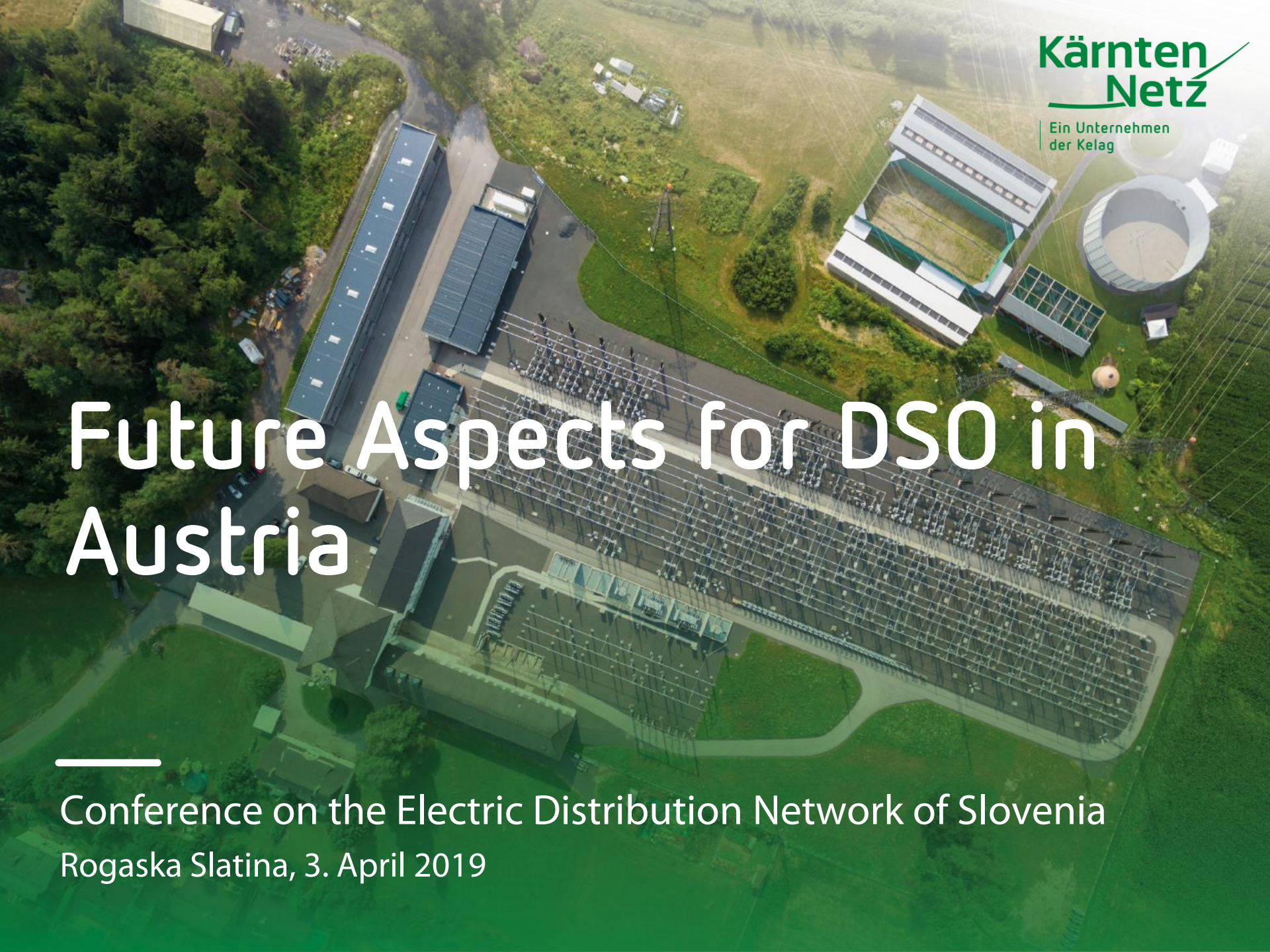

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Future Aspects for DSO in Austria

Conference on the Electric Distribution Network of Slovenia

Rogaska Slatina, 3. April 2019

Portrait KNG-Kärnten Netz GmbH

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616 employees

Fully owned subsidiary of KELAG-Kärntner Elektrizitäts-Aktiengesellschaft

Planning, construction, commissioning, operation management and maintenance of grid assets of the distribution system of electricity and natural gas in Carinthia

Distribution system of electricity

- 878 MW grid peak load
- 4 TWh grid distribution volume
- 18 200 km power supply system
- 46 substations
- 7 300 transformer stations
- 306 800 points of delivery
- 219 800 customers

Distribution system of natural gas

- 810 km gas distribution system
- 34 pressure reducing stations
- 10 400 points of delivery
- 9 800 customers

Distribution Grid in Carinthia (20-kV & 0,4-kV)

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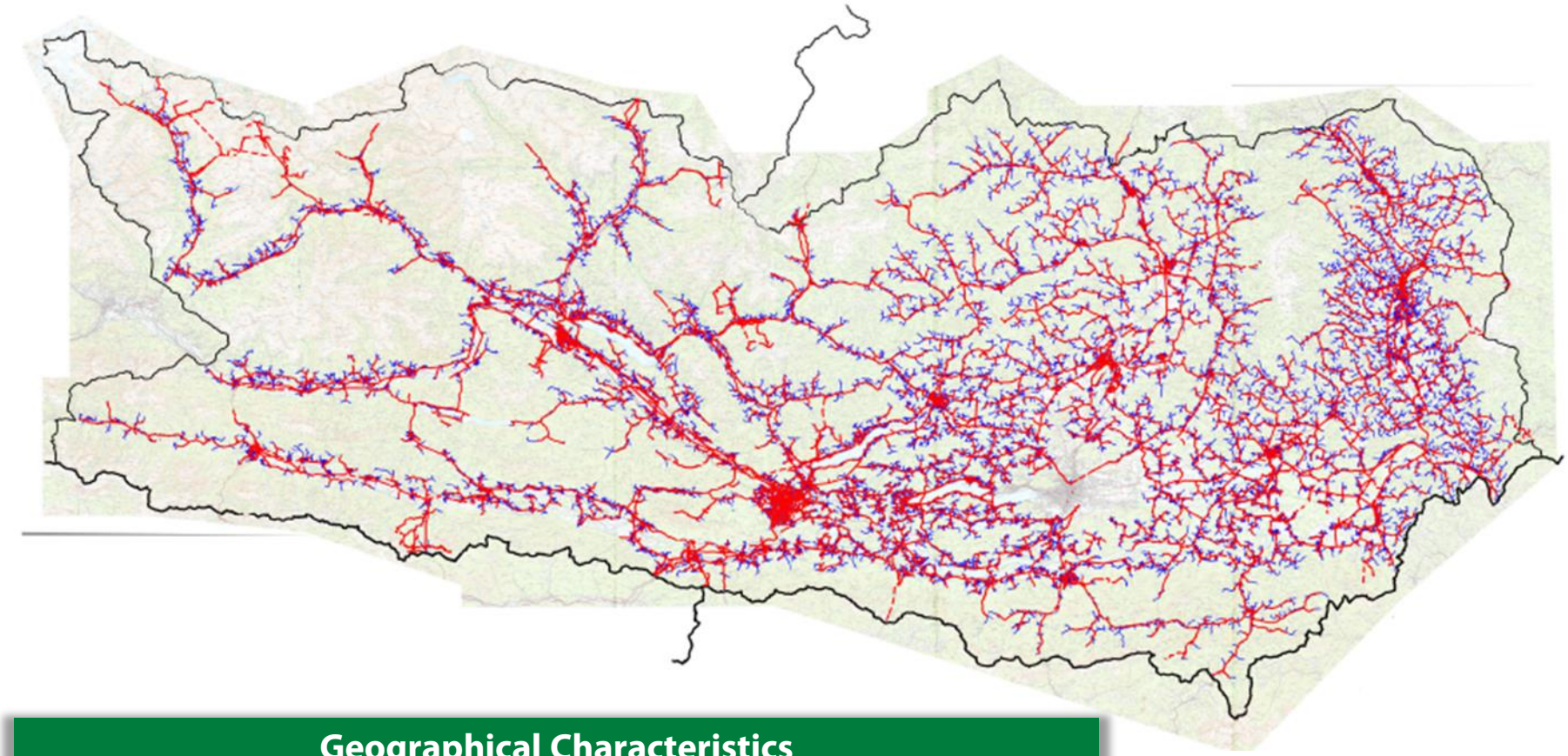
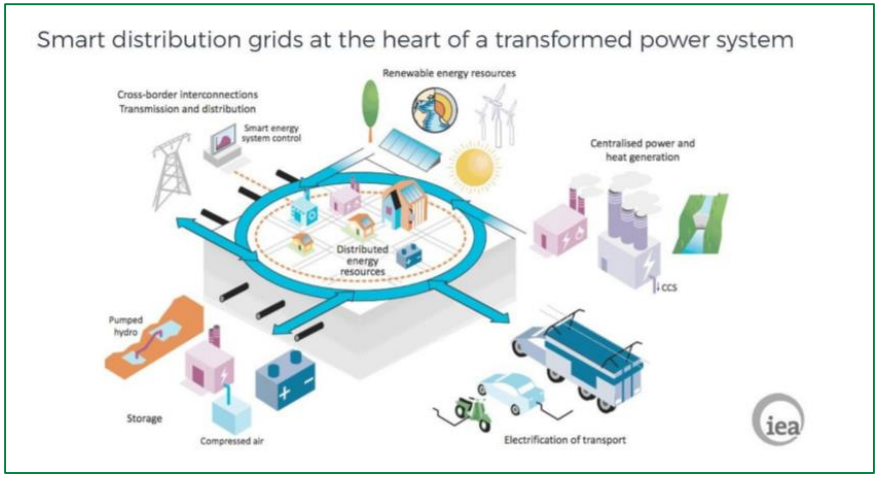


Geographical Characteristics

- extreme urban sprawl in the eastern part of Carinthia
- low density in the western part of Carinthia
- partial alpine terrain (up to 3,000 m)

Legal framework and general trends

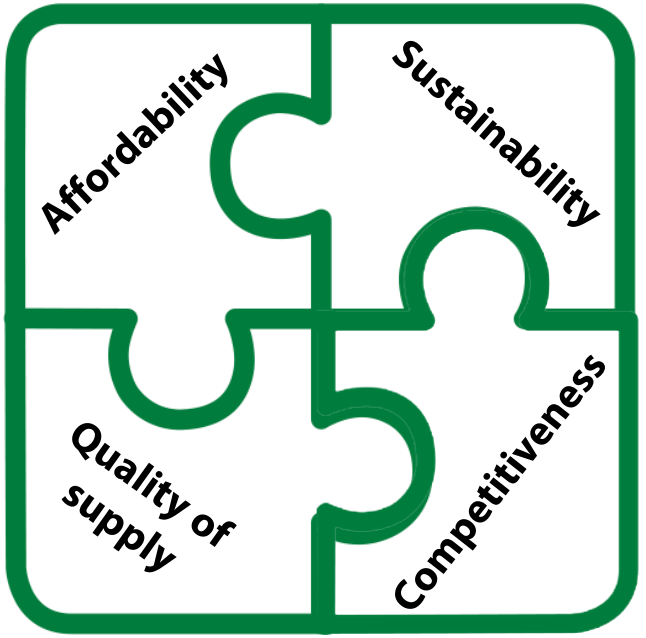


General trends and developments

- Decarbonisation
- Digitalisation
- Decentralisation

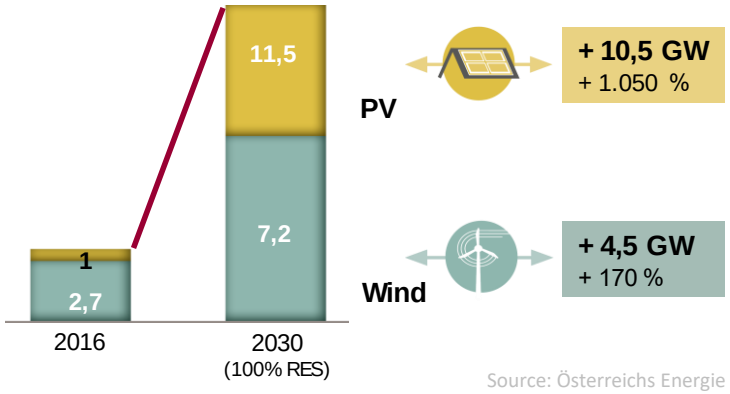
Actual modifications in EU and Austrian legal frameworks

- **EU:**
  - Climate goals 2030 (40-27-27)
  - **Clean Energy Package** – Clean Energy for all Europeans
- **AUT**:
  - **#mission2030** – „Klima- und Energiestrategie der österreichischen Bundesregierung“



Changes in the legal framework: #mission2030 – The Austrian climate and energy strategy

- **Main targets**
  - 100 % renewable energy sources



Source: Österreichs Energie

  - Decrease of green house gas emissions
  - Ecologic and economic sustainability
  - Keep security of supply at its high level
  - Competitiveness and affordability
  - Basis for new laws
- **Lighthouse projects**
  - E-Mobility
  - Thermal renovation of buildings
  - PV and storage
  - Greening the gas

General trends and developments

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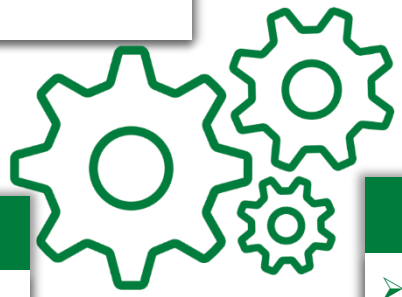
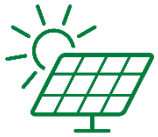
Digitalisation

- Smart Metering
- Big Data
- IT-Security
- Communication and automation
- Digital customer services



Decarbonisation

- Climate Goals 2030
- Renewable Energy Sources
- E-Mobility
- Sector Coupling
- Energy Efficiency

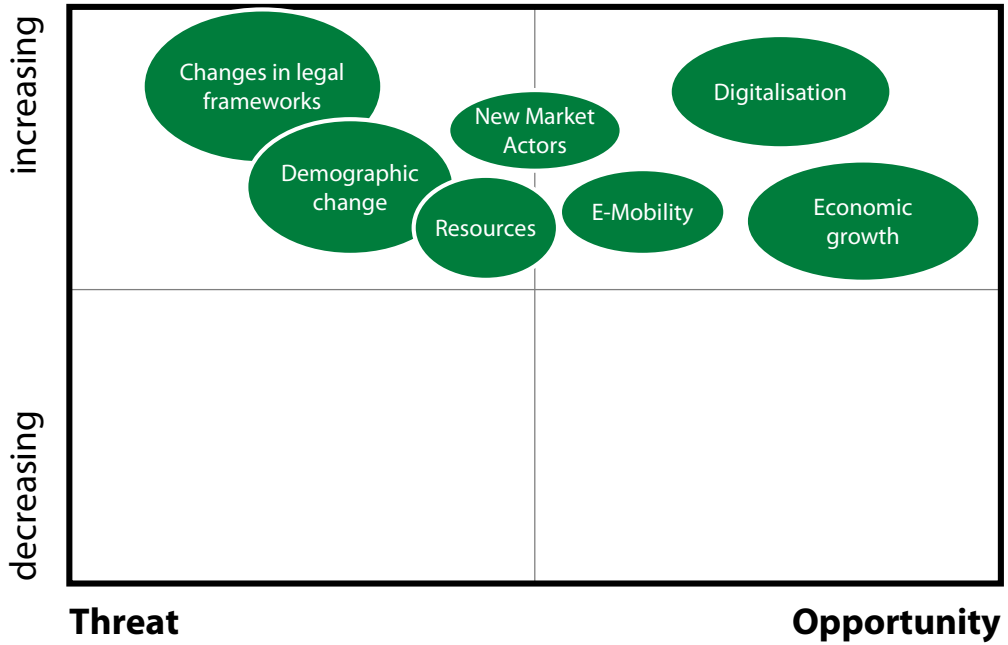


Decentralisation

- Decentralised Energy Generation
- Smart Grids
- New market actors
- Complexity
- Communication

Are these trends and developments relevant for DSO?

Environmental conditions for DSO (extracts)



Environmental conditions will have impacts for DSO's activities:

- Changes in the legal framework (EU and national legislation)
- Demographic change leads to challenges in grid activities (investment and maintenance activities)
- Preservation of grid stability and reliability of supply will be an important issue for the entire energy system
- Digitalisation, economic growth and new technologies (e.g. E-Mobility) should be seen as a chance for DSO

To fulfil the expected requirements, DSO have to become familiar with more complex and integrated business.

New technologies and market actors (Examples)

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E-Mobility

- Amount of electric vehicles will increase through the next decade
- Charging infrastructure
  - Supercharger (now: 150 kW / future: 350 kW)
  - Home charging (3,7 kW / 11 kW)

- Integration of charging infrastructure in the distribution grid is a matter of electric power demand
- Grid reinforcement, intelligent charging functions e.g. P(U) as well as regulatory frameworks will be the basis for a successful and efficient grid integration process

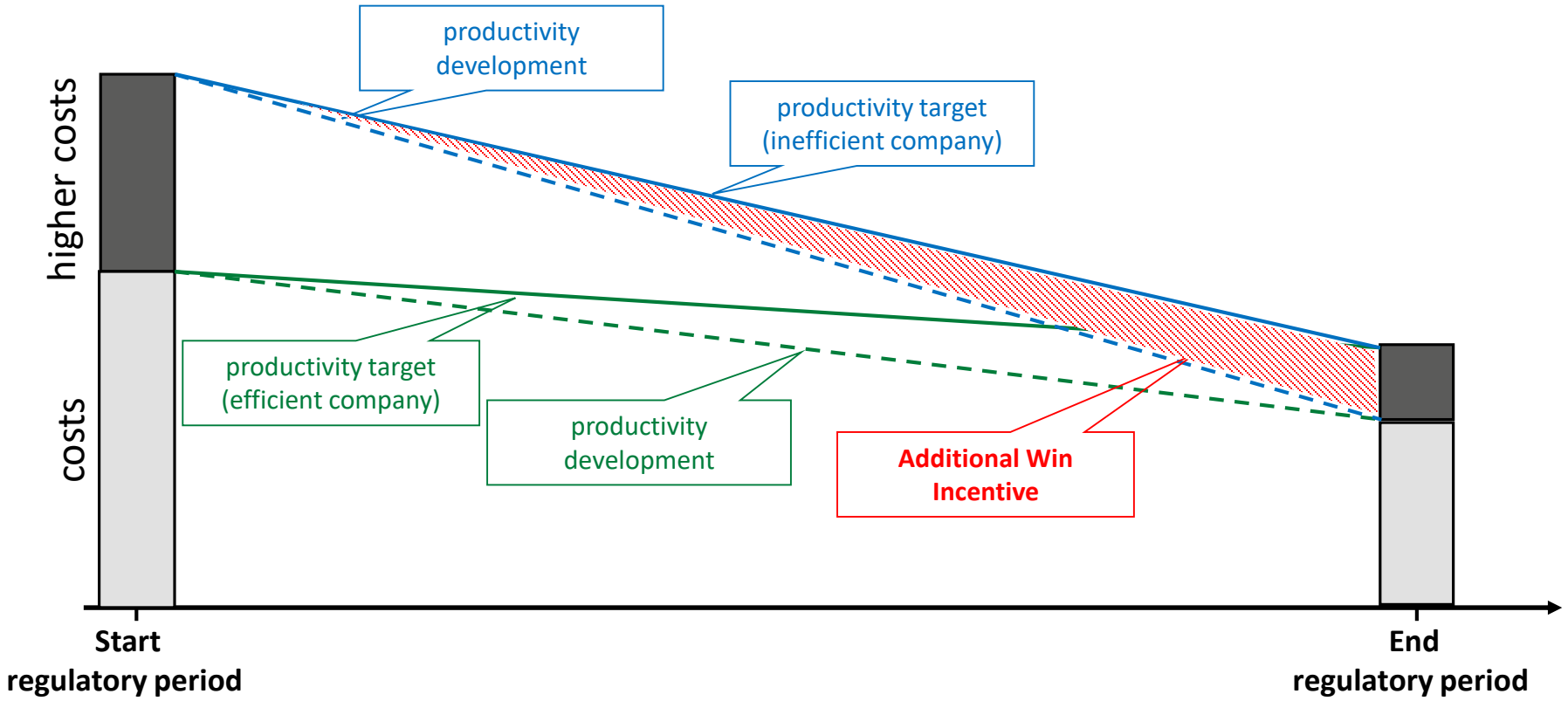
Energy Communities

- Energy Communities (EC) are included in the Clean Energy Package of the EU as well as in Austria's #mission2030
- Possibility of generating, consuming, storing and distributing electrical energy
- Risks for DSOs: kinds of customer discrimination, loss of metering points

- Legal framework must be developed
- Grid costs must be shared in an equitable and non-discriminatory way (→ tariff-structure)

New development plans, new energy market actors and technologies will change the actual system and will bring big challenges for DSOs, but they will also bring new opportunities.

Fundamentals of the Austrian incentive regulation



- **Regulation authority: E-Control Austria**
- **Grid tariffs prescribed by regulation commission**
- **Actual regulation period 2019 – 2023**

Strategic thrust of KNG

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Customer Relation

Initial situation

- Legal requirements (End-VO)
- Digital applications and services
- Understanding of customer needs

Targets

- Force customer oriented thinking
- Reinforcement of digital services and applications
- Efficient customer process management

Operational efficiency

Initial situation

- Permanent efficiency enhancement needed (regulatory aspects)
- Optimisation of internal working processes

Targets

- Implementation of permanent efficiency enhancement measures
- Process management and monitoring

Leadership culture

Initial situation

- Executive Staff
- Need to deal with leadership aspects
- Executive staff influences companies' success

Targets

- Development and definition of common leadership principals
- Training measures
- Successful and Sustainable business development

Innovation and Digitalisation – Actual KNG Projects

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Drones for MV maintenance

- Easy-to-fly compact drones
- Visual inspection of inaccessible heights or tall structures (e.g. pole mounted transformers)
- Monitoring of vegetation management
- Operational know-how and legal aspects

Transformers with natural Esther

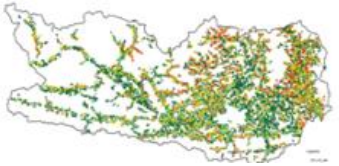
- Sustainability aspects
  - Peak load transformer design
  - Alternative to fossil products
- 3 Trafos: 160 kVA/250 kVA/400 kVA
- Experience with natural Esther
- Oil handling and chemical diagnostics
- Electrical measurements and tests

Battery storage

- Evaluation of
  - Peak-load shaving
  - P(U), Q(U), P(f)
- 2 Battery Systems
  - TESVOLT TS 40
    - 18 kVA, 24 kWh
  - Qinous Li-Ion Battery
    - 30 kVA, 61 kWh

Grid simulation

- Implementation of a full automated load flow and short circuit simulation program
- Load flow simulation with probabilistic load estimation
- Simulation of various future development scenarios (E-Mobility, integration of RES, …)



Smart Metering

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Smart Meter

Communication
… via PLC or GSM

Transformer Stations

Communication
… via wireless COM oder LWL

Central Unit

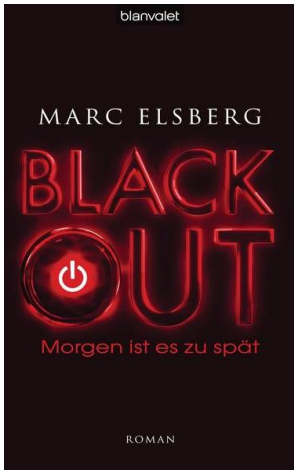
Customer services

Billing

MDMS

- **Smart Meter Roll-Out (61.000 out of 300.000 Smart Meters installed)**
- **Focus on:**
  - **Process stability and efficiency**
  - **IT- and Data Security**
- **Customer have the possibility of "Opt-Out" (→ reduced functions)**

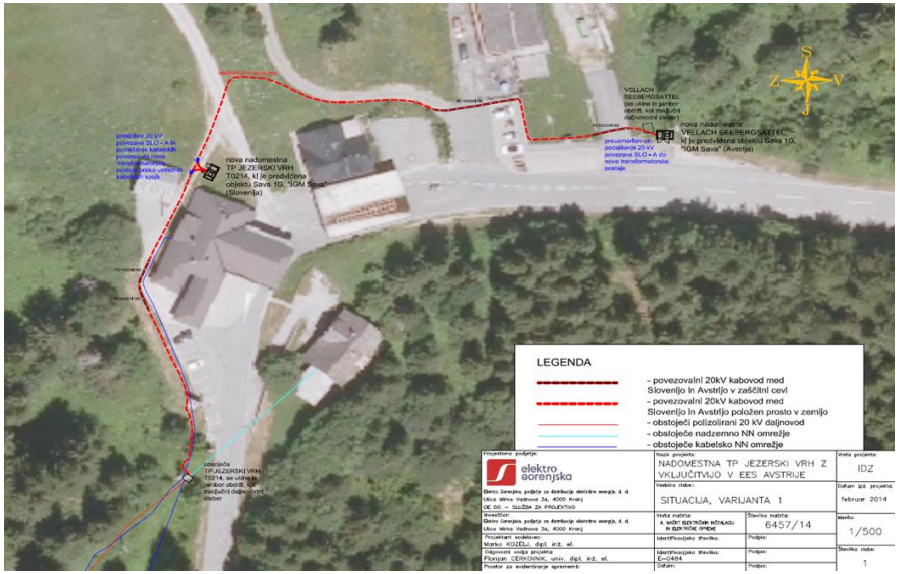
Blackout – KNG's disturbance management plan



- Thriller – Best Seller in 2012
- Fiction – but almost not unrealistic
- …are we prepared?

Best Practice Example for DSOs xBorder interaction

- Freezing rain in February 2014 caused big damages at the distribution system in parts of Slovenia
- Customers were out of supply with electrical energy for at least one week
- An emergency supply via a temporary MV-grid connection between KNG and ELGOR (20-kV-level) was enabled within 3 days
- MV-interconnection between KNG and ELGOR was built afterwards to handle future disturbances



Conclusions

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- **DSOs are playing a key role in achieving climate and energy goals [1])**
- **The transition of the energy system needs investments and maintenance on the classic grid assets as well as innovations and new technologies**
- **The grid has a high value for all its users – Security, high quality service, security of supply, reliability [1])**
- **Grid costs should be shared in an equitable an non-discriminatory way [1])**
- **New technologies and new market actors should facilitate partnerships or synergies to the convectional grid when connected**
- **Quality of supply with energy (electric and others) is a critical and important aspect for economic growth and sustainable development of a region or business hubs**

[1]) Source: EURELECTRIC - The Value of the Grid

All the best for your decisions in the future, looking forward having a good cooperation between Slovenian DSO and KNG!

About the Author

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