SINTEG
SMART ENERGY SHOWCASES

WINDNODE

WindNODE – Showcasing Smart Energy Systems from Northeastern Germany

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Tokyo, 21 November 2017

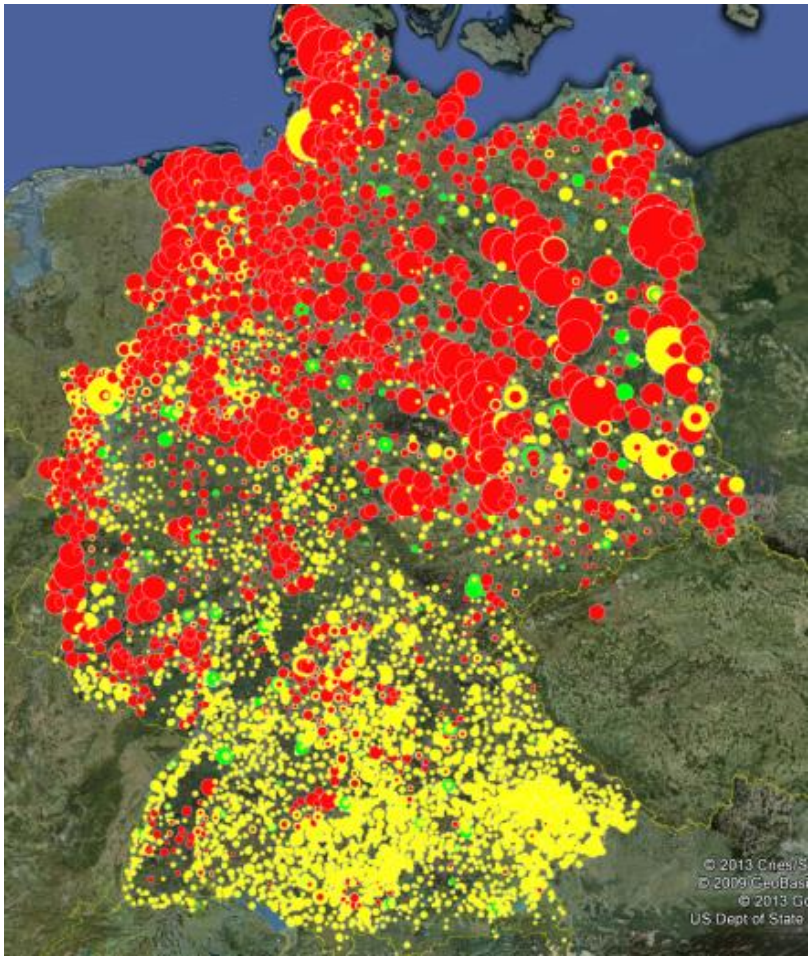
Supported by:

Federal Ministry
for Economic Affairs
and Energy

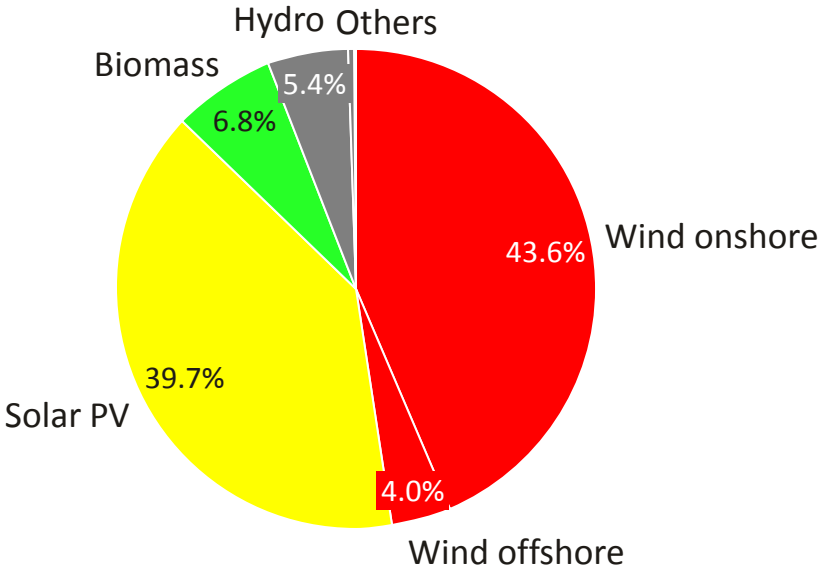
on the basis of a decision
by the German Bundestag

2nd Phase of Energy Transition: Large Amounts of Renewables

Renewable Energy Systems (RES) in Germany (2016)



Total Renewable Capacity: 104 GW

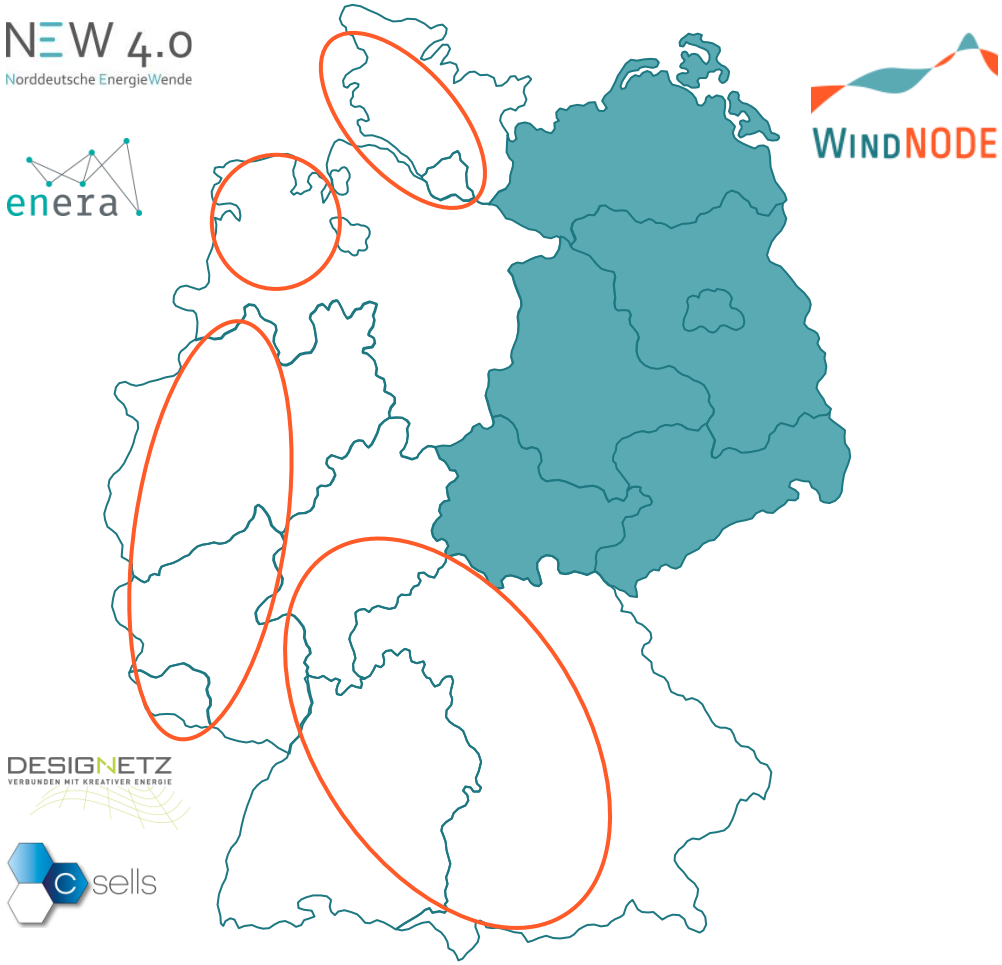


Total Generation Capacity: ca. 200 GW
Peak Load: ca. 80 GW

Source: 50Hertz, TenneT, Amprion, TransnetBW, Google Earth, BMWi, BNetzA

The Program: Field Tests for Smart, Sustainable Energy Systems

SINTEG Funds Five Model Regions for “Smart Energy Systems“



- ✓ Challenge: intermittence and integrating large shares of RES into the energy system
- ✓ Government funding*:
  230m € for SINTEG
  37m € for WindNODE
- ✓ Project duration is 4 years, starting in December 2016

SINTEG
SMART ENERGY SHOWCASES

* BMWi – Federal Ministry for Economic Affairs and Energy

Source: BMWi, WindNODE, websites of other consortia

The Capital Region: Modeling a Complete Energy System

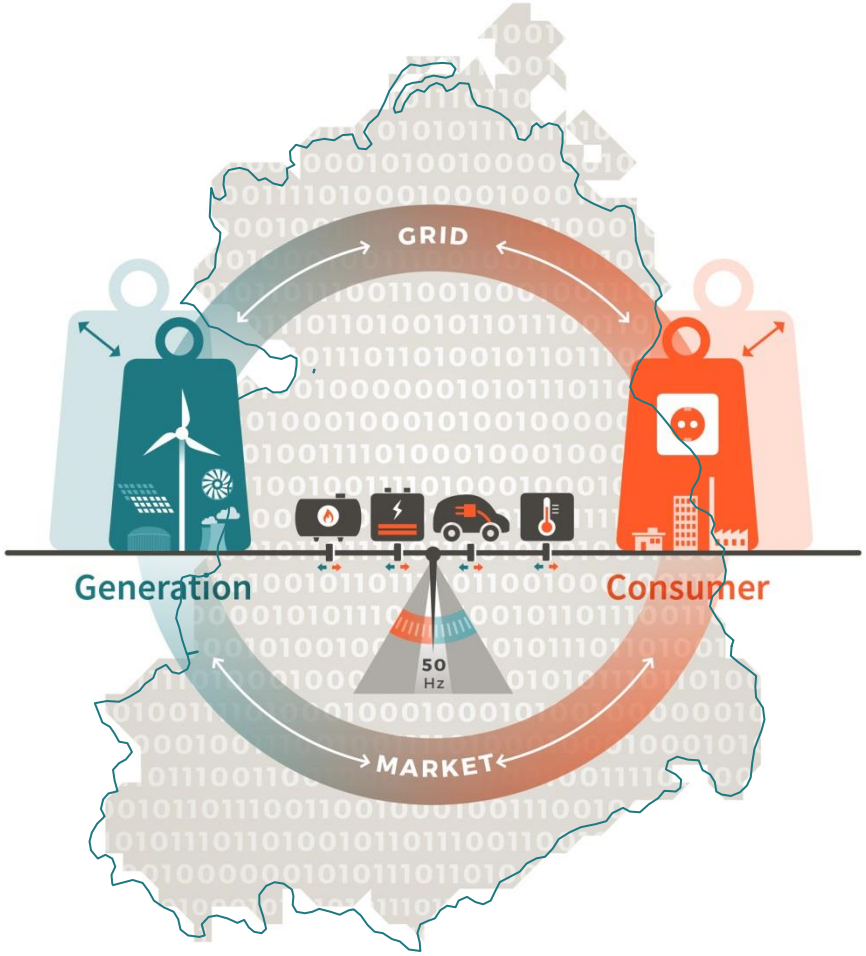
Northeastern Germany and the Capital Region at a Glance

- ✓ 1 Transmission Grid Operator: 50Hertz Transmission GmbH
- ✓ > 49 % renewables in the electricity mix (2015)
- ✓ ca. 16m people
- ✓ Major power export region: ca. 100 TWh consumption ca. 40 TWh export
- ✓ Challenges: increasing grid congestion, highest grid fees

Source: BMWi, PtJ, WindNODE

The Challenge: Coping with Intermittence at a Large Scale

The 10 Targets of WindNODE



✓ **Flexibility**

(1) Identify and characterize flexibility
(2) Activate and use flexibility
(3) Integrate different energy system sectors
(4) Organize regionalization and transmission

✓ **Integration into the "Energy Market 2.0"**

(5) Develop market roles and business models
(6) Test an intelligent, efficient grid infrastructure
(7) Make use of new data

✓ **Dissemination**

(8) Set standards for an intelligent energy system
(9) Strengthen regional development and export
(10) Involve visitors and the public

Source: WindNODE (www.windnode.de/konzept)

The Partners: a Joint Effort by Industry and Academia

WINDNODE

Board

50hertz, Berlin Partner für Wirtschaft und Technologie, Fraunhofer FOKUS, energy saxony, SIEMENS, Stromnetz Berlin, WFBB Wirtschaftsförderung Brandenburg

Partners

ASEW, BELECTRIC, BSR, BVG, Berliner Wasserbetriebe, BMW GROUP, Borderstep Institut für Innovation und Nachhaltigkeit, BOSCH, b-tu Brandenburgische Technische Universität Cottbus - Senftenberg, DECKEL MAHO Seebach GmbH, devolo, DIN, RIEDEL, Dresden., e2m, ENERTRAG, Fraunhofer IFF, Fraunhofer IWU, Fraunhofer IWES, GASAG SOLUTION +, Stadtwerke Cottbus Heizkraftwerksgesellschaft, IBAR, IKEM, ILK Dresden, KWD AUTOMOTIVE, ÖKOTEC ENERGIEMANAGEMENT GMBH, PUMACY TECHNOLOGIES, REINER LEMOINE INSTITUT, SCHWARZ, Lidl, Kaufland, SENERTEC Center Sachsen, SOLANDEO, stadtwerke FRANKFURT (ODER), STADTWERKE HENNIGSDORF, berlin, UNIVERSITÄT LEIPZIG, Universität Rostock, VATTENFALL, WEMAG NETZ GmbH, Westsächsische Hochschule Zwickau, zev strom erdgas wärme

Associated Partners

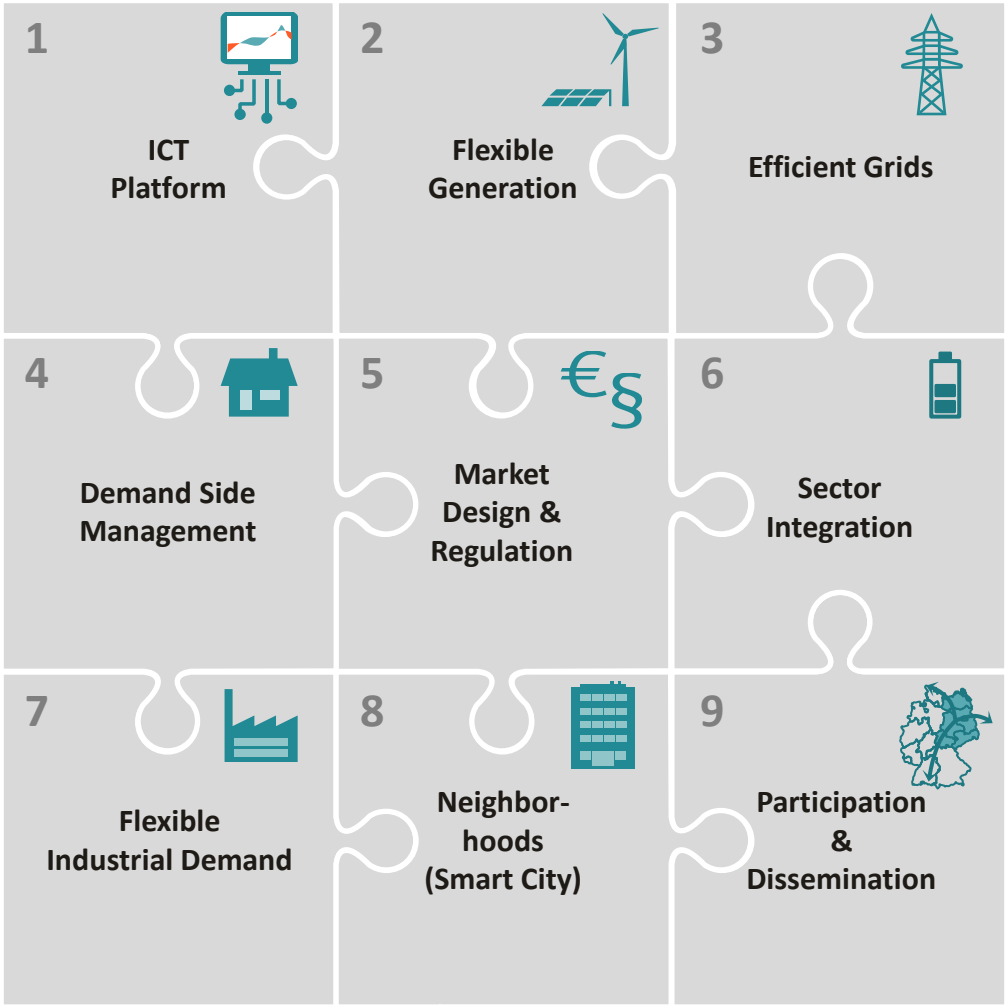
BES, BERLIN BRANDENBURG ENERGY NETWORK e.V., degewo, e.dis, eMO, energiequelle, ENERSTORAGE POWER TO HEAT. INDUSTRIAL SCALE., enso NETZ, enviaM, envia THERM, e+Zeit Ingenieure, Gewobag Die ganze Vielfalt Berlins., Fernheizwerk Neukölln AG FHW, HES, IBERDROLA, India Berlin, INFRALEUNA, eit InnoEnergy Knowledge Innovation Community, LEAG, LUMENION, MITNETZ STROM, RADEBERGER GRUPPE, SPIE, stadtwerke energie jena-pößneck STADTWERKE JENA GRUPPE, SW FORST, SWT STAHLWERK THÜRINGEN, ThEGA Thüringer Energie- und GreenTech-Agentur, ubitricity, VHP READY Virtual Heat & Power, T-Systems, VSB, WEWOBAU Bei uns wohnt die Zukunft., Zere

Subcontractors

B.A.U.M., Berliner Energie Agentur, BLS ENERGIEPLAN, DKE VDE DIN, ENERGIEAVANTGARDE ANHALT, enersis., EUREF Consulting, GRIDLAB, htw Hochschule für Technik und Wirtschaft Berlin University of Applied Sciences, i|ö|w INSTITUT FÜR ÖKOLOGISCHE WIRTSCHAFTSFORSCHUNG, E, nymoen strategieberatung, OPEN KNOWLEDGE GERMANY, OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG, Zentrum eG Wohnungsbaugenossenschaft

WindNODE: a 360° View on Smart Energy Systems

Activities are Organized in 9 Complementary Workstreams

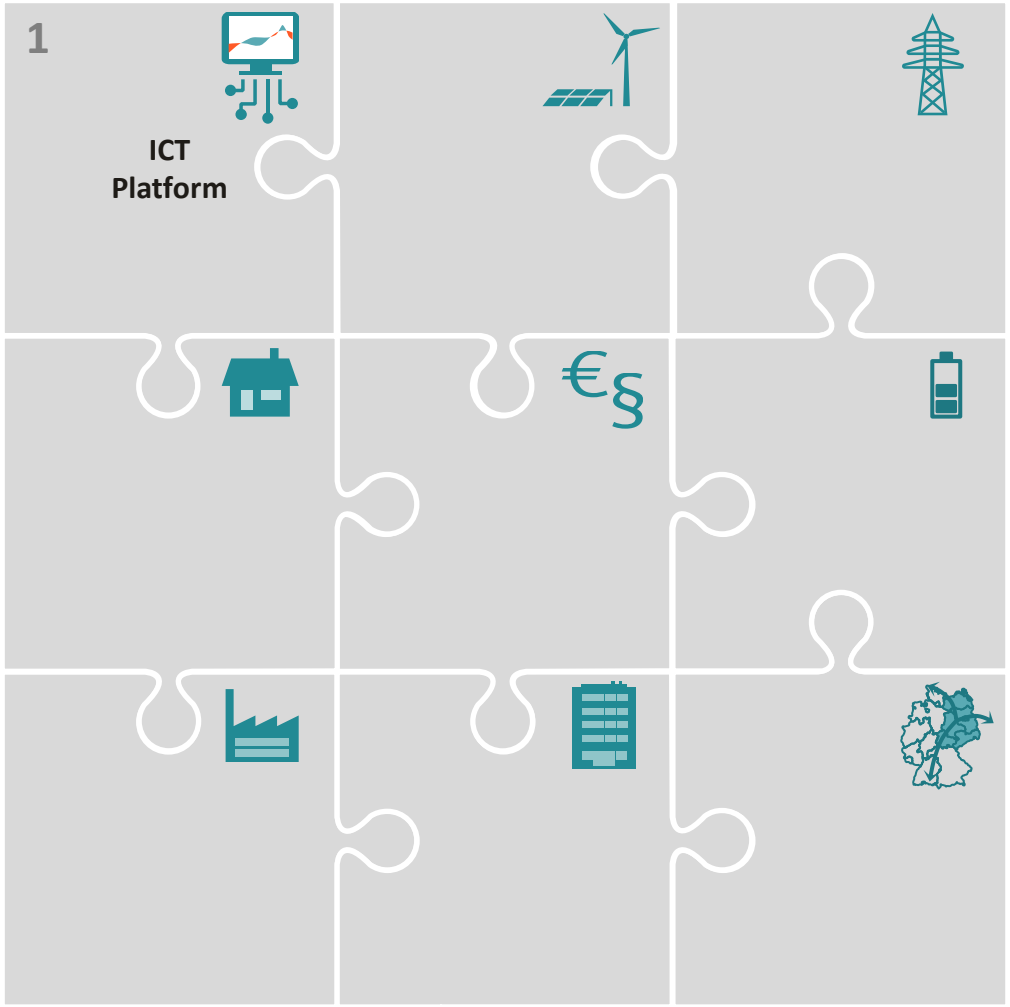


Source: WindNODE

BACKUP

WindNODE: a 360° View on Smart Energy Systems

Workstream 1: Connecting Flexible Prosumers

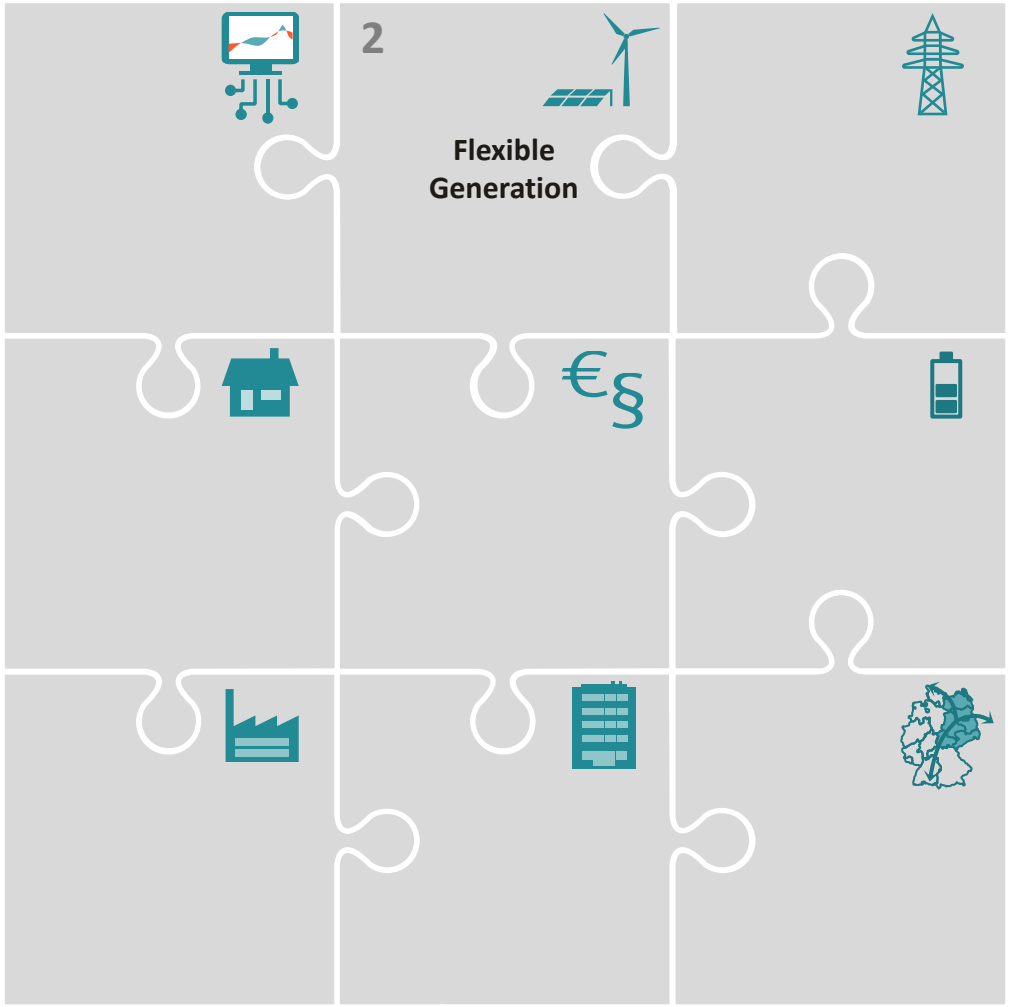


- ✓ Core services for a connected, smart energy system
- ✓ Flexibility platform for grid congestion management
- ✓ Open data portal
- ✓ Big data analytics and visualisation

Source: WindNODE

WindNODE: a 360° View on Smart Energy Systems

Workstream 2: Regional and Local Use of Renewables

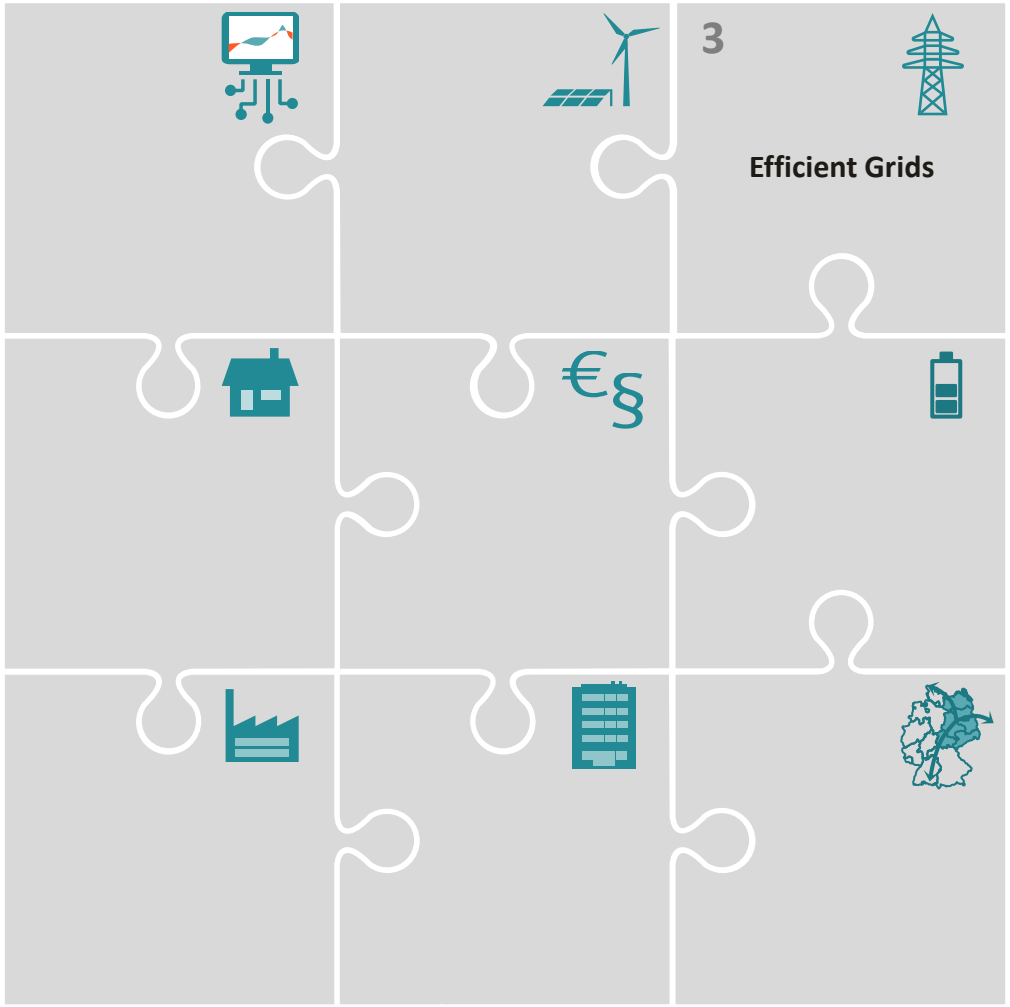


- ✓ “Cellular approach“: Hybrid power plants (including renewable generation, storage & batteries, prosumers)
- ✓ Cross-border integration of heat and power (Germany and Poland)
- ✓ Regional energy management system

Source: WindNODE

WindNODE: a 360° View on Smart Energy Systems

Workstream 3: Creating and Optimising Smart Grids

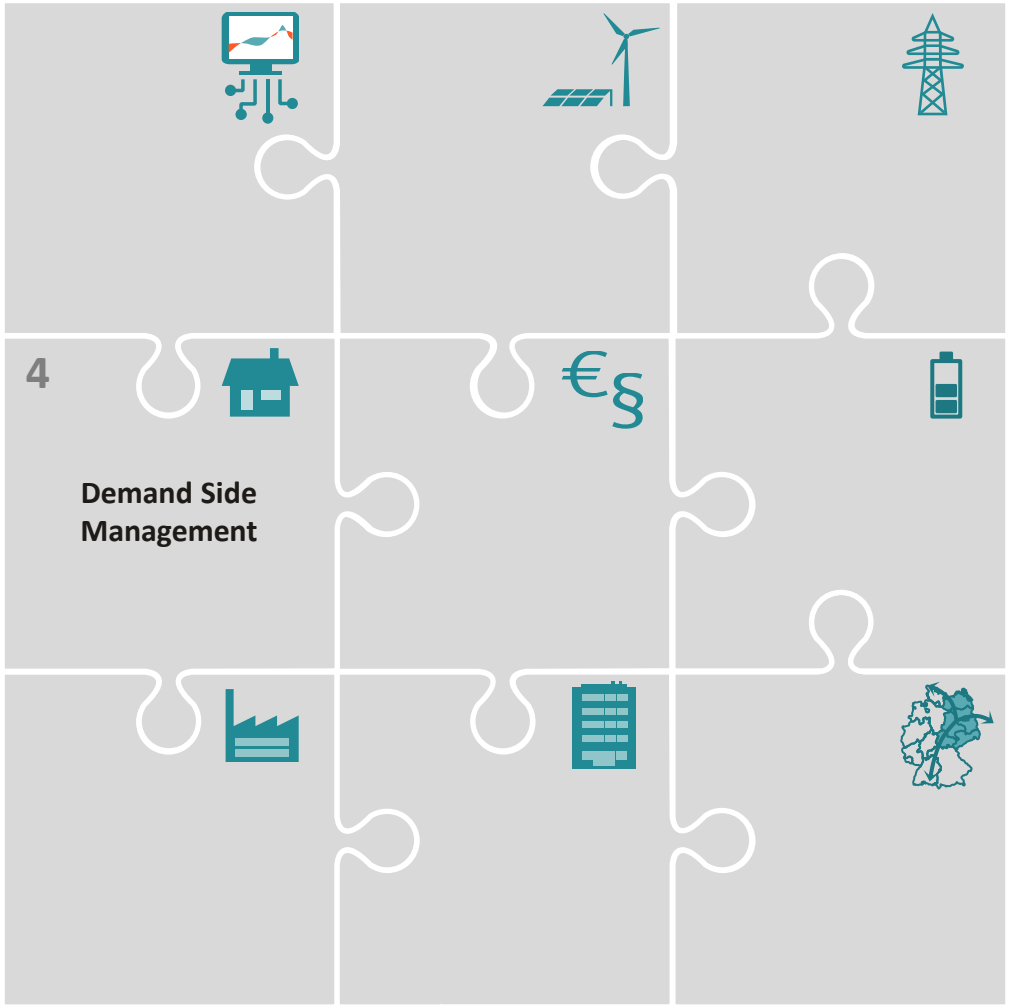


- ✓ Enhanced real-time lab environment for grid analysis
- ✓ Components for smart grids
- ✓ Predictive modelling and load management for smart grids

Source: WindNODE

WindNODE: a 360° View on Smart Energy Systems

Workstream 4: Controlling Distributed Loads



- ✓ Demand side management in businesses (supermarkets) at multiple sites
- ✓ Market-oriented use of flexible loads
- ✓ Smart meter scenarios in private households (formerly standard load profiles, SLP)

Source: WindNODE

WindNODE: a 360° View on Smart Energy Systems

Workstream 5: ”Smart Markets” and New Rules of the Future Energy System

- ✓ Assessment of overall system efficiency
- ✓ New market design, especially for times of grid congestion

SIEMENS

IKEM
Institut für Klimaschutz, Energie und Mobilität

UNIVERSITÄT LEIPZIG

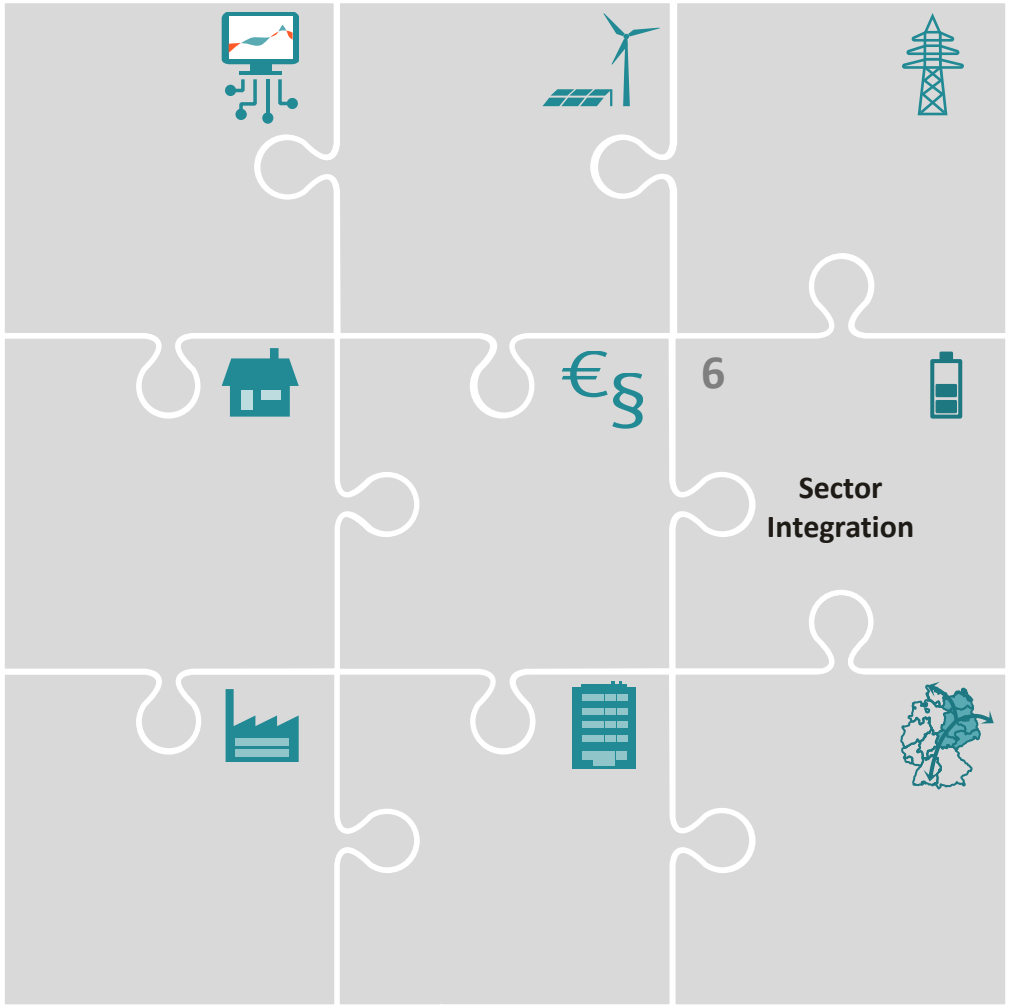
berlin

GRIDLAB

Source: WindNODE

WindNODE: a 360° View on Smart Energy Systems

Workstream 6: Integrating the Electricity, Heating, Cooling and Mobility Sectors

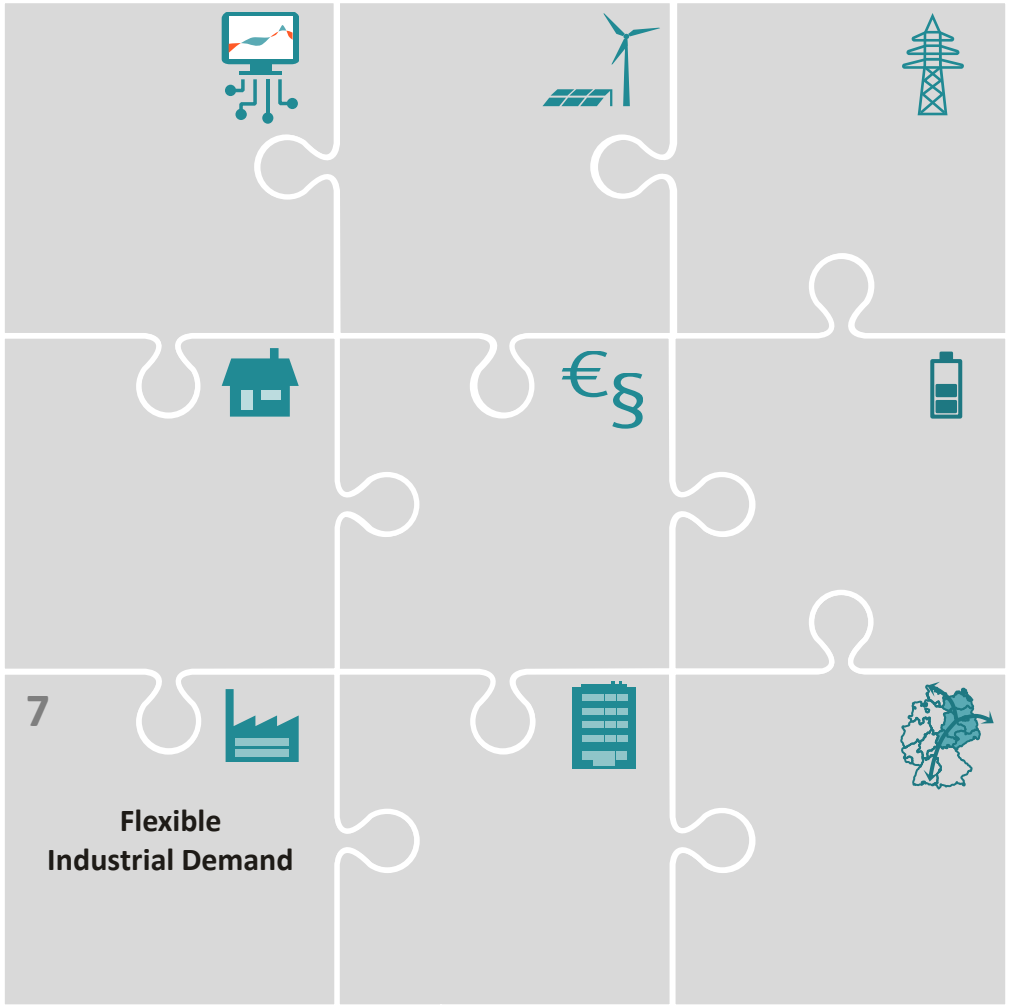


- ✓ E-Mobility (processes for controlled charging as a flexibility option)
- ✓ Distributed and large-scale application of Power-to-Heat and Power-to-Cold

Source: WindNODE

WindNODE: a 360° View on Smart Energy Systems

Workstream 7: Managing Industrial Loads

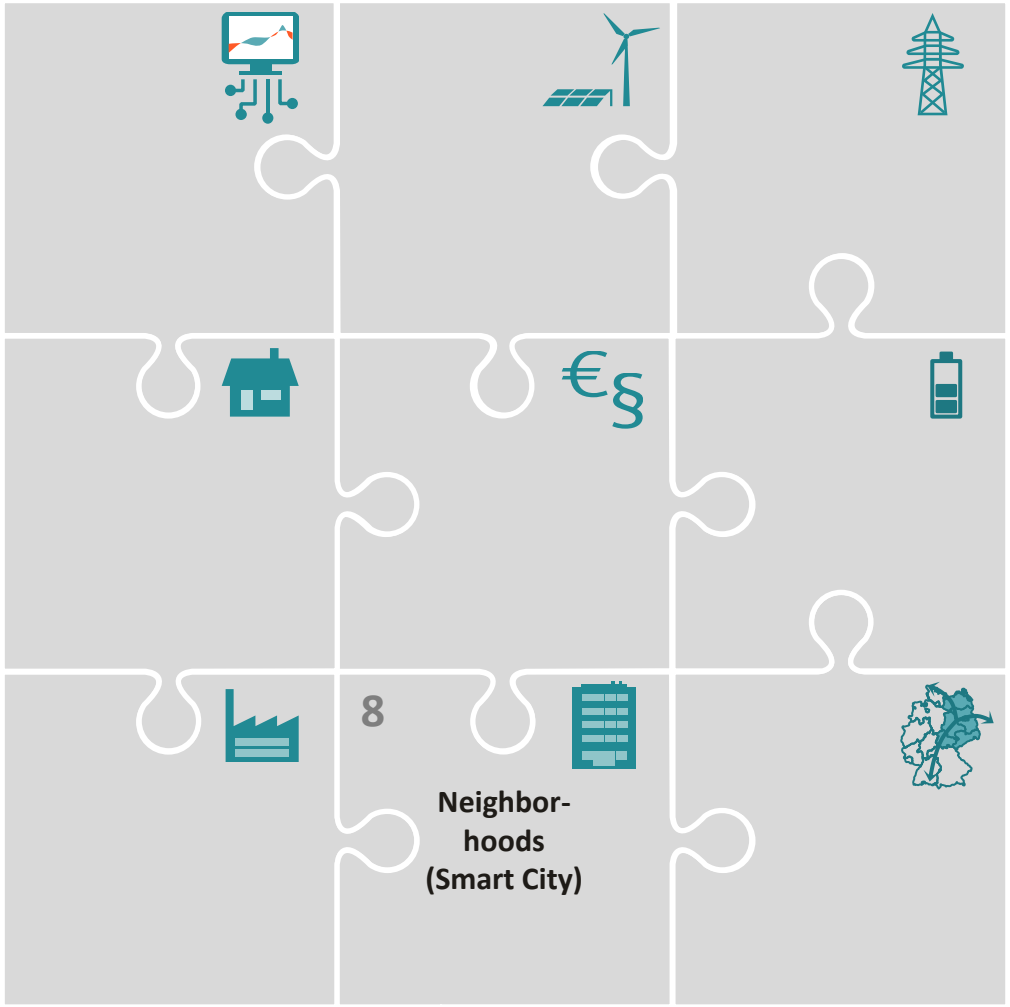


- ✓ Algorithms and methods for intelligent energy management
- ✓ Flexible loads at selected industrial sites, some of them in connection with battery storage
- ✓ Industrial energy management

Source: WindNODE

WindNODE: a 360° View on Smart Energy Systems

Workstream 8: Neighborhood Concepts, Prototyping Smart Cities

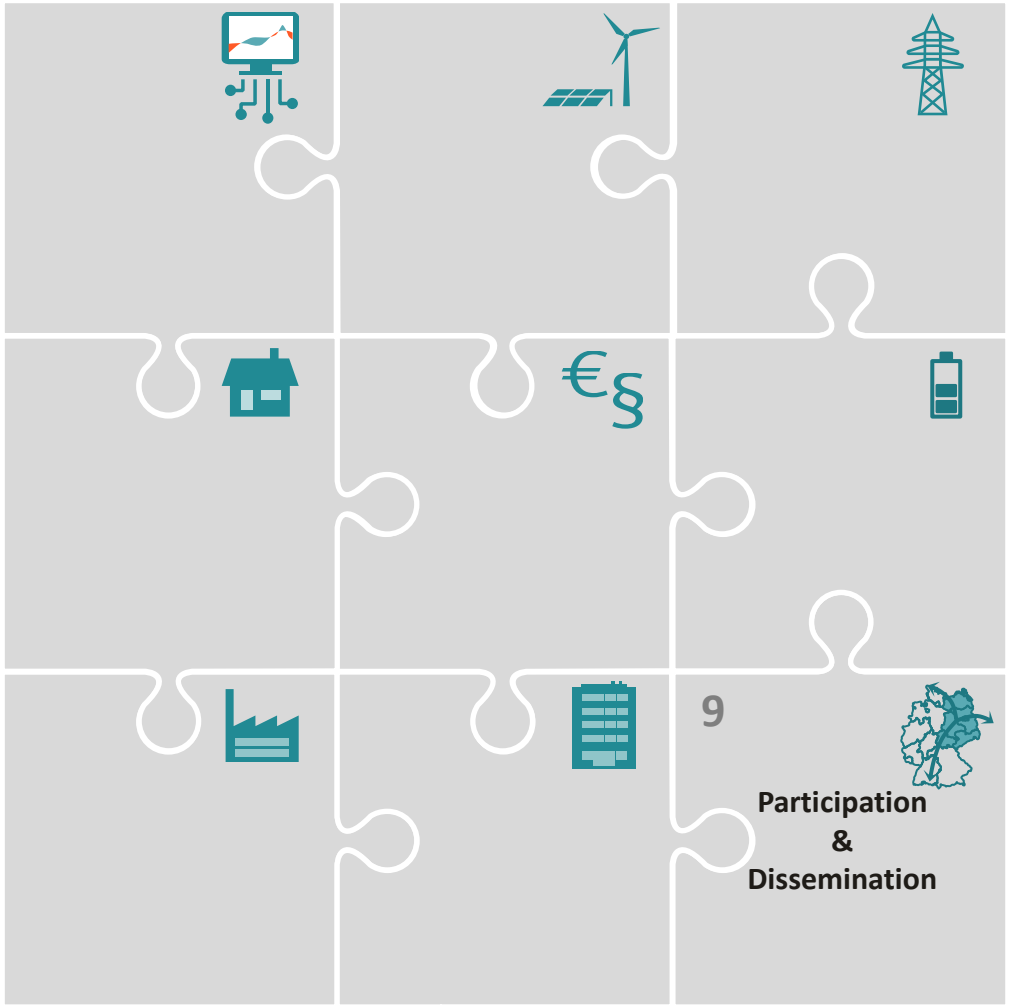


- ✓ Model region Zwickau
- ✓ Model region Berlin-Prenzlauer Berg
- ✓ Dresden: analyzing flexible loads in an urban environment

Source: WindNODE

WindNODE: a 360° View on Smart Energy Systems

Workstream 9: Spread the Word



- ✓ 20-30 “visitable sites“ with showcases / showrooms
- ✓ Idea competition for smart energy
- ✓ WindNODE International Network
- ✓ Gamification
- ✓ Acceptance, participation, fascination: “Energiewende narrative“

Source: WindNODE

Grid management organization and high integration of variable renewables

Elia Grid International – Japan Renewable Energy Institute Workshop on Large-scale Integration of Variable Renewables for Grid Companies

Elia Grid International
Tokyo, 27-28.11.2017
Ricardo Barreto, Rena Kuwahata

egi elia grid international

Workshop 27-28 Nov: Grid management organization and high integration of variable renewables

系統技術講習会：

変動型自然エネルギー大量導入と系統運用

自然エネルギー導入率約50%の電力系統を運営するドイツの送電会社50ヘルツなどを擁するエリア・グループは、革新的なノウハウと実績によって、激しい電力業界再編の時代に確固たる地位を築いてきました。
同グループのエリア国際送電（EGI）は、激変する日本の電力市場で送電事業に従事する方々を対象に、系統技術講習会を開催いたします。本講習会では、適切な電力市場設計、送電事業者間の連系メカニズム、自然エネルギー大量導入における送電事業者の位置づけの重要性について、わかりやすく解説いたします。皆様のご参加をお待ちしております。
※本講習会は、公益財団法人自然エネルギー財団が協力しています。

開催日 2017年11月27日(月)
11月28日(火)

会 場 イイノホール&カンファレンス（東京都千代田区内幸町）

受講料 50,000円（税別）※テキスト・レセプション・昼食代込
要事前申込（申込多数の場合は抽選）

講師・プログラム 日英同時通訳あり／プログラム・講師は変更の可能性あり

リカルド・バレット　エリア国際送電（EGI）最高経営責任者
桑畑玲奈　エリア国際送電（EGI）電力システム計画・運用シニアエキスパート

◇第一日目　※終了後レセプションあり
セッション1　電力市場の進化とグリッド事業者の役割

◇第二日目　※昼食あり
セッション2　送電事業者間の運用最適化のための連系メカニズム
セッション3　変動型自然エネルギー導入拡大を活用したグリッド事業者の位置づけ

講習会事務局　自然エネルギー財団　プログラム詳細・お申込みは　自然エネルギー財団 講習会　検索

http://renewable-ei.org/activities/events_20171127.php

Workshop agenda: Grid management organization and high integration of variable renewables

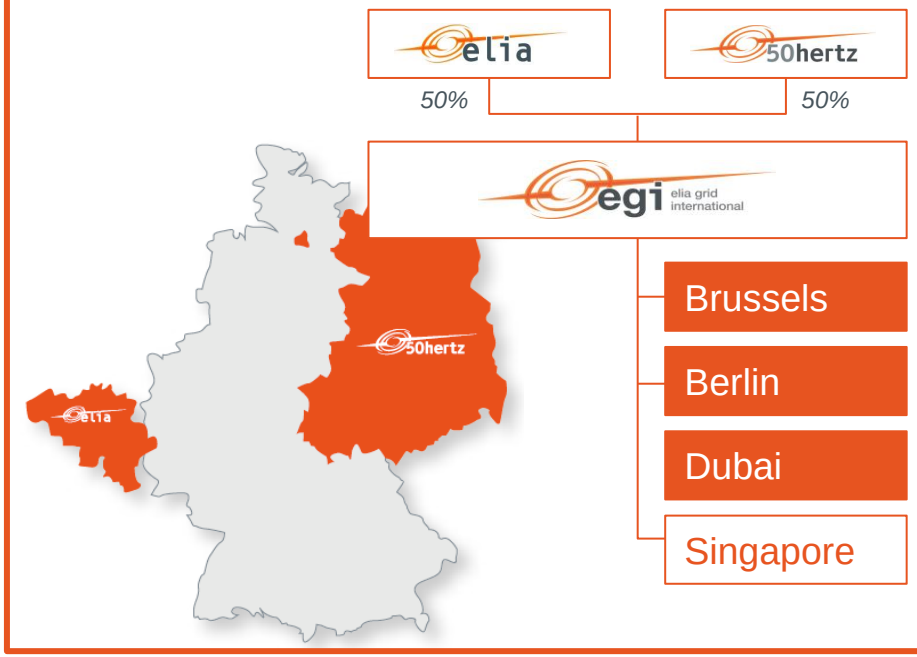
Monday	Session 1: Evolution of European power markets and role of grid operators
14:30 – 16:00	Evolution of the role of grid operators under industry unbundling and development of power markets
16:30 – 18:00	The role of grid operators under different Balancing Market Design Options

Tuesday	Session 2: Operational Optimization Cooperation Mechanisms Between Grid Operators
9:00 – 10:30	Grid Control Cooperation Mechanisms (cross-regional balancing mechanisms)
11:00 – 12:30	Regional coordination centre, inter-regional coordination processes

Tuesday	Session 3: Positioning of grid operator business taking advantage of large scale integration of renewables
14:00 – 15:30	Deriving Corporate Value through M&A of TSO business
16:00 – 17:00	Corporate Value of Large Scale Integration of Renewable: Positioning of TSO

Elia Grid International (EGI) provides advisory services based on experience and expertise of two major transmission grid operators

The Elia Group and EGI:



- Elia Grid International (EGI) is part of the **Elia Group** and a joint subsidiary of the two TSO **Elia in Belgium** and **50Hertz in Germany**
- EGI has more than 40 consulting **experts with strong TSO background** and made a **turnover of EUR 26 m in** 2016
- **Close cooperation** with dispatching training centre **GridLab** – “sister” company of EGI – as well as **WindNode project**

Unique experience of the Elia Group in the transformation of the power sector with increasing shares of RES

- World leading position in integrating **volatile renewable energy source onshore and offshore** to the power and ensure highest level of security of supply
- Active role and reliable partner in **designing power sector of the future** on grid development, electricity markets, RES integration, system operations, digitalization

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- Leading role in **development of interconnectivity and power markets in Europe** (e.g. creation of power exchange, Entso-e network codes, flow-based mechanism)
- High expertise in **managing complex investment and maintenance programs** for a densely meshed asset base of medium to high voltage grid

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- **Training centre** for power systems security of Elia and 50Hertz provides dispatcher training based on own **grid simulator**, esp. for inter-TSO collaboration and high RES

- Large research project **showcasing smart energy solutions** for efficient, secure &sustainable integration of large share RES into the grid – consortium led by 50Hertz

EGI lead advisor and support team for grid operators

- EGI brings the best of the Elia Group's capabilities, European best practices and state of the art expertise
- EGI framework leverages systemic design decisions to capture exhaustively all the components of the electricity system and shaping long-term targets.

Mr Ricardo Barreto

Elia Grid International

Chief Executive Officer

MBA and BSc. Engineering

Ricardo.Barreto@eliagrid-int.com

Over 25 years' experience in the global energy sector, seasoned executive specialised in strategy formulation for top line growth, regulatory review, business development and acquisition & divestitures. He brings value with his knowledge of the entire value chain in the energy sector, his understanding of the changes induced by deregulation and of the impact of the development of renewables in substitution to fossil fuels, together with an international, multicultural background.

Ms Rena Kuwahata

Elia Grid International

Power System Operation and Security Expert

MSc. and BSc. Elec. Engineering

Rena.Kuwahata@eliagrid-int.com

Over 10 years' experience in the power sectors of Europe, Latin America and Asia Pacific. working on multi-disciplinary and international projects. Specialist in renewables integration into power systems and markets. At Elia Grid International, she is a leader in providing services for grid planning studies, balancing and congestion management, cross border security and cooperation mechanisms, and DER business case analysis.

Leveraging expertise and experience from Elia Group

Thank you for your attention

Ricardo Barreto, CEO **ricardo.barreto@eliagrid-int.com**

Rena Kuwahata, Senior Power System Expert **rena.kuwahata@eliagrid-int.com**

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Tokyo, 27-28.11.2017

An Elia Group company