

# The 3<sup>rd</sup> ACT Knowledge Sharing Workshop



## RWE Power - Coal Innovation Centre

Power Plant Niederaussem, 13.11.2018



Powering. Reliable. Future.

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# Agenda

10:00-10:20	Greeting, Introduction
10:20-10:50	Align (Tom Mikunda, Peter van Os)
10:50-11:20	Elegancy (Svend Munkejord)
11:20-11:50	Pre-Act (Peder Eliasson)
11:50-12:10	CCUS in the United States, Department of Energy (John Litynski)
12:10-12:30	7 <sup>th</sup> Energy Research Program, German Ministry of Economics and Energy (Johannes Kerner)
12:30-13:20	<i>Lunch</i>
13:20-14:50	Tour of power plant and CO <sub>2</sub> capture and utilization facilities
14:50-15:10	ECO-BASE (Anders Nermoen, Roman Berenblyum)
15:10-15:30	Acorn (Hazel Robertson, Philippa Parmiter)
15:30-15:50	Detect (Marcella Dean)
15:50-16:10	3DCaps (Robert de Boer, Jaap Vente)
16:10-16:30	Gastech (Shahriar Amini)
16:30-18:00	Meeting room will be available for informal exchange

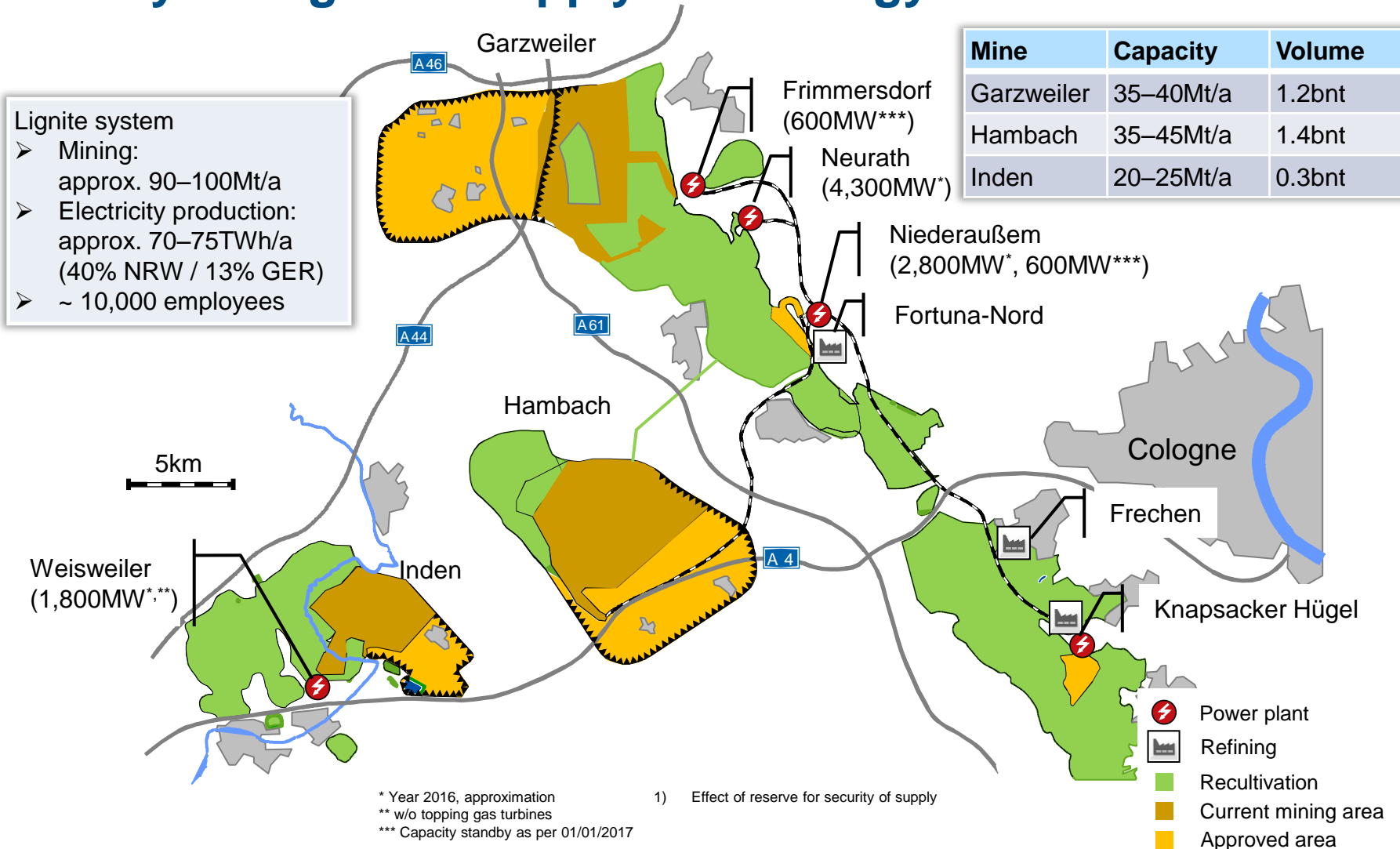


## The Rhenish lignite-mining area

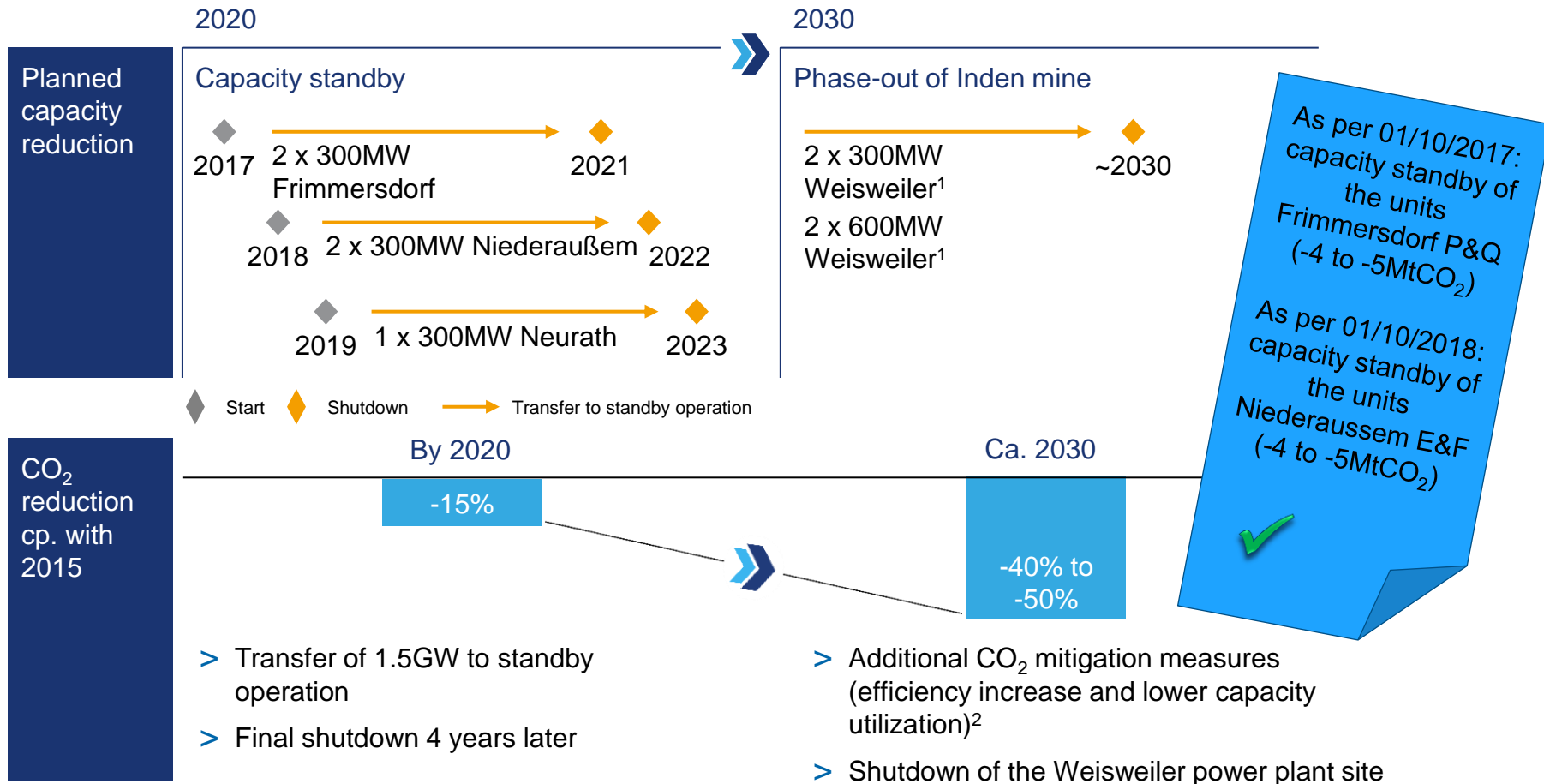
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## 2.4 billion tonnes of approved deposit reserves support Germany's long-term supply with energy and resources



# RWE's lignite roadmap is in line with the energy transition, ensures supply and provides a reliable framework for all stakeholders!

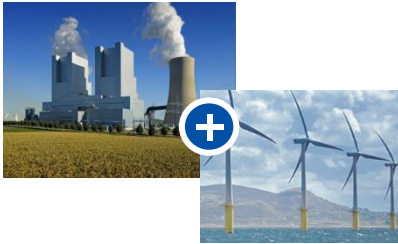


After 2030, further reduction in CO<sub>2</sub> emissions of lignite plants due to the growth of renewables until the phase-out of the Hambach and Garzweiler mines towards the middle of the century

# Research & Development is facing current challenges

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### Power plant technology for flexible operation



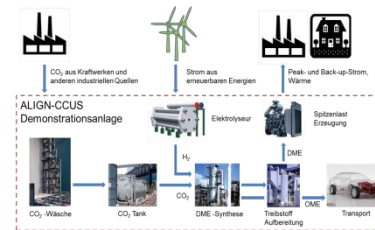
- Increase in power plant flexibility
- Conceptual designs for storage facilities and plants
- Development of materials
- Online coal analysis (KOLA)
- BigData@RWE

### Alternative use of lignite and biomass



- Coal-to-Liquid/Coal-to-Gas
- Sewage sludge drying & gasification, phosphorus recovery
- Lignite-water slurry as a substitute for fuel oil
- Advanced biofuels

### Flue gas cleaning and utilization of CO<sub>2</sub>



- Carbon capture and utilization; sector coupling
- ALIGN CCUS, OCEAN, LOTER.CO<sub>2</sub>M, MefCO<sub>2</sub> projects
- Emission reductions: mercury, SO<sub>2</sub>, dust,...

### Quality Assurance & Materials



- Materials testing/damage analyses
- Development of materials
- Quality assurance
  - Existing plants
  - New-build projects
- BigData@RWE



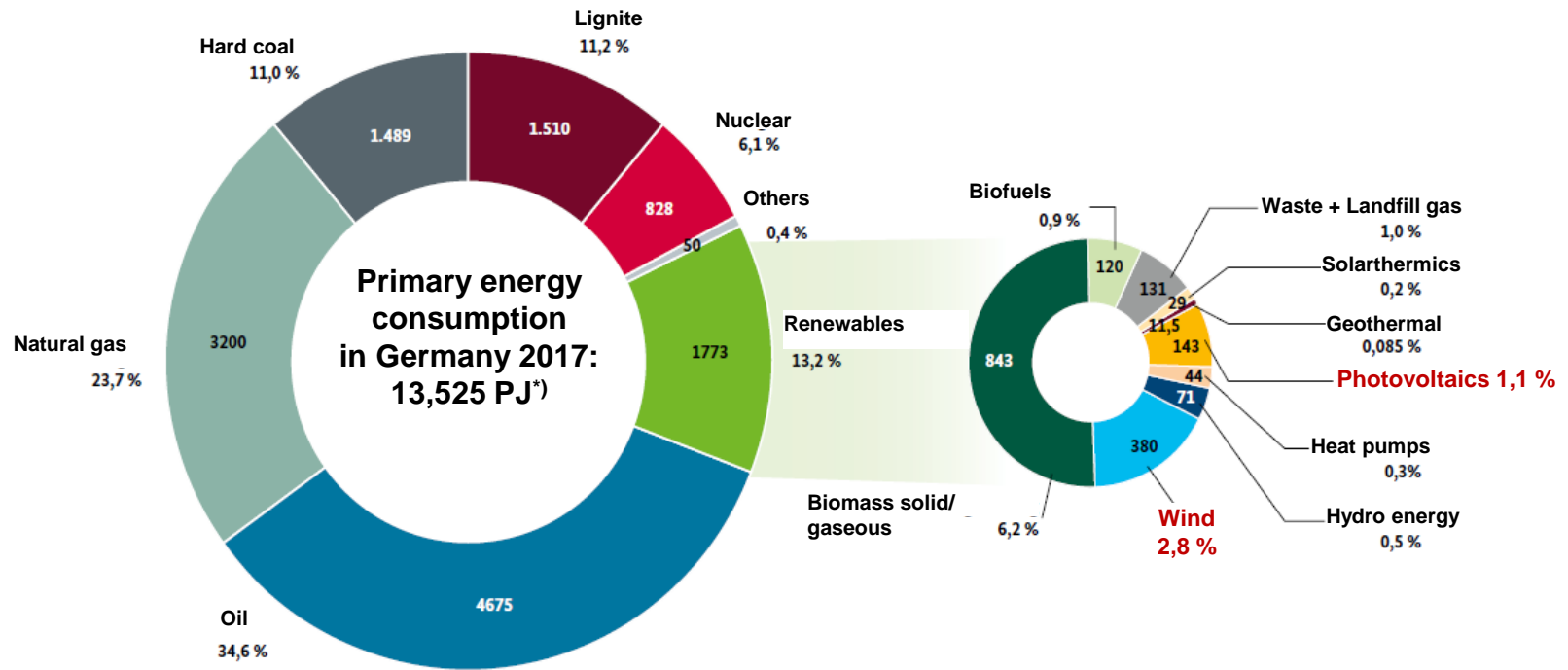


## CCU and sector coupling projects at RWE Power

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# Germany 2017: Primary energy consumption and fluctuating power production from wind and photovoltaics



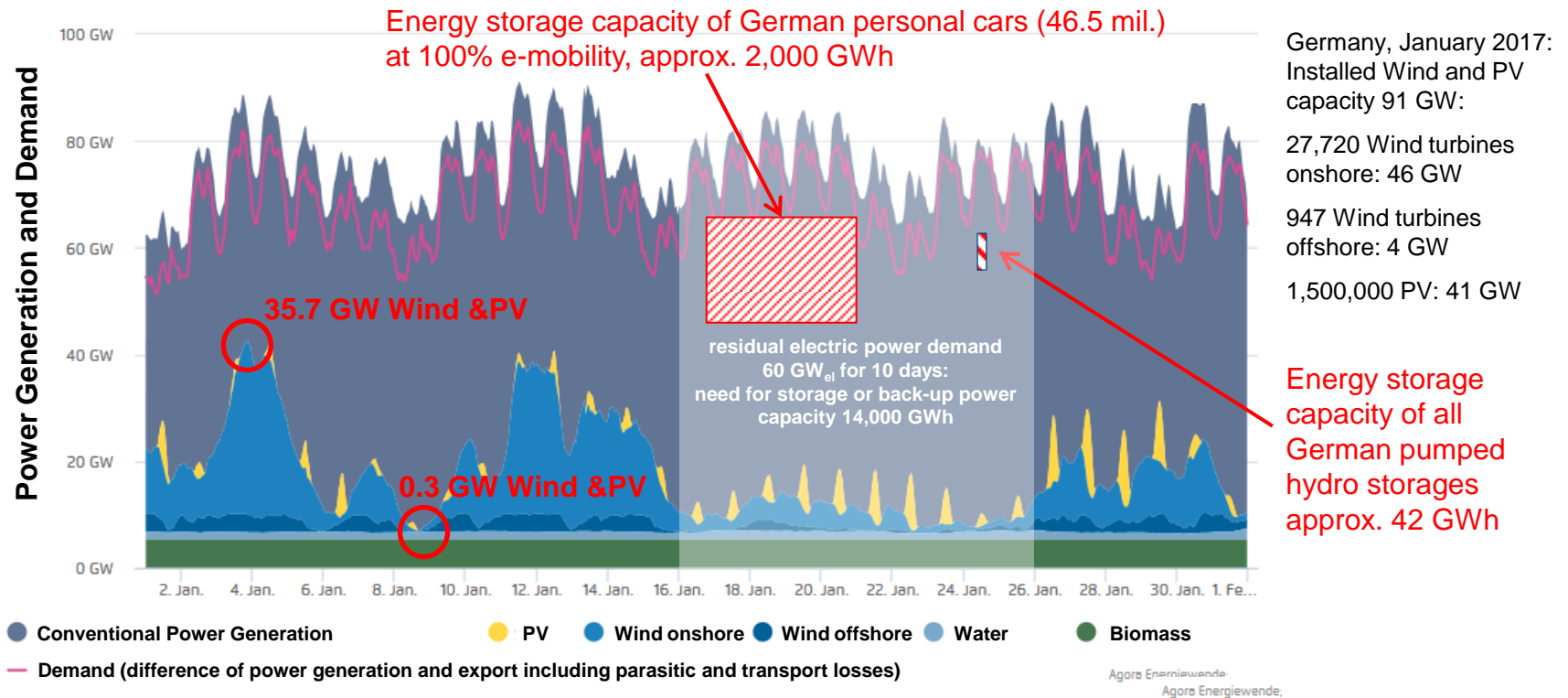
Source: Arbeitsgemeinschaft Energiebilanzen (AGEB), Arbeitsgruppe Erneuerbare Energien-Statistik (AGEE-Stat)

➔ Contribution of wind power and photovoltaic to the primary energy demand in 2017: 3.9%, despite 100 GW of installed capacity and a share of 24.3% in the electricity production.



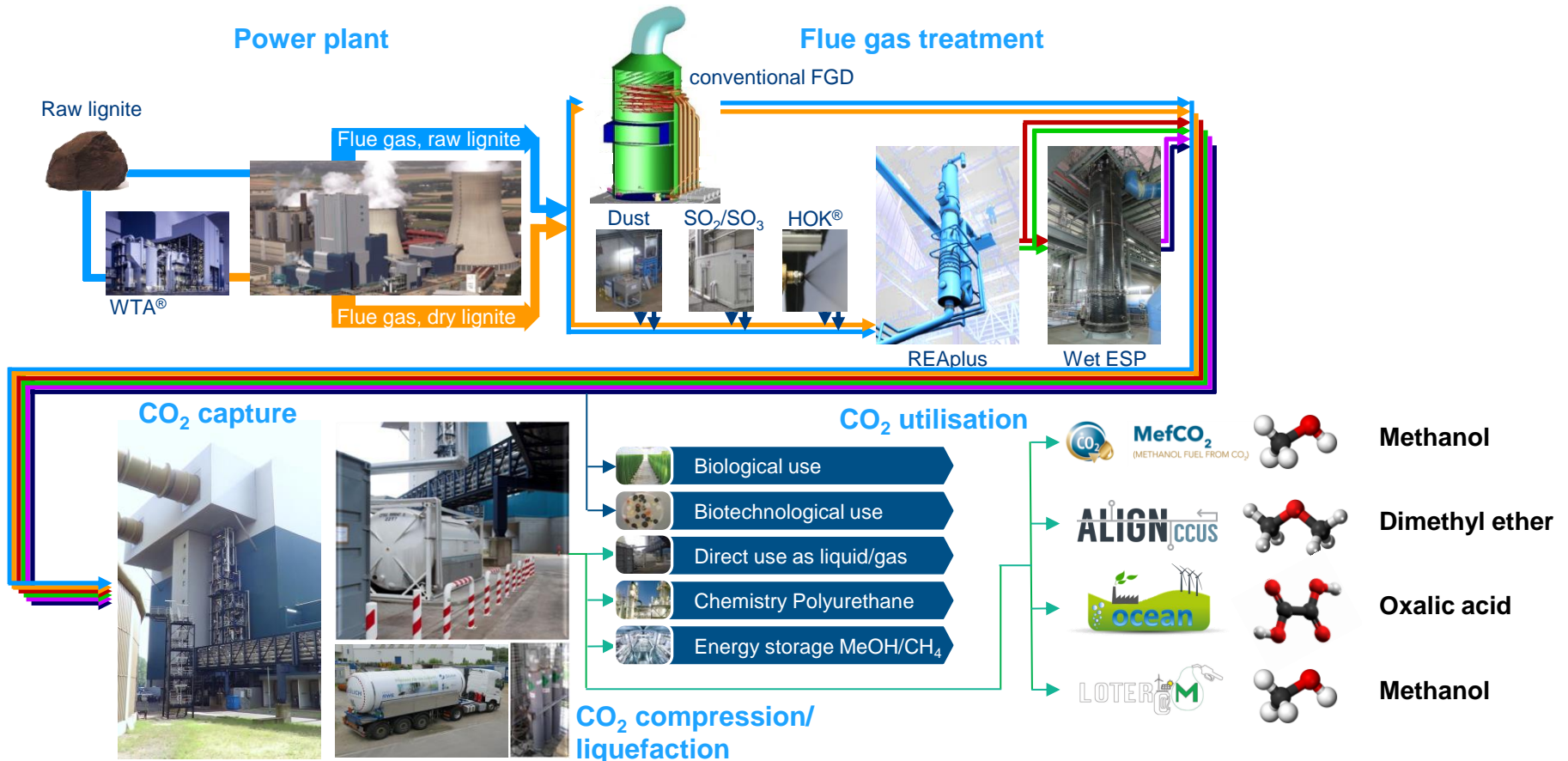
# Fluctuating Renewable Energies – Challenges for Grid Stability and Security of Supply

Germany January 2017 – Wind turbines & Photovoltaic produced together between 0.3 and 35.7 GW



➤ Conventional power plants will be needed for decades before sufficient energy storage capacity is operational; CCU can help to reduce the CO<sub>2</sub> emissions and to store energy.

# CCU projects at the Coal Innovation Centre at Niederaussem



Interlinked continuous 24/7 operation of R&D pilot plants by own R&D shift system.

# Four ongoing CCU demonstration projects at the Coal Innovation Centre in Niederaussem



- EU funded project ■ 2015-2019
- 9 partners (BE, DE, ES, IS, IT, SL, UK)
- Demonstration of the CCU-chain of methanol production using synthesis gas made from captured CO<sub>2</sub> and H<sub>2</sub> from an electrolyser

1,5 t<sub>CO2</sub>/day



- EU/national funded project ■ 2017-2020
- 31 partners (NO, NL, UK, DE, RO)
- Acceleration of the demonstration and implementation of European CCUS-projects; demonstration of the CCU-chain using captured CO<sub>2</sub> and H<sub>2</sub> from an electrolyser in order to produce e-fuels such as DME and OME

0,18 t<sub>CO2</sub>/day



- EU funded project ■ 2017-2021
- 8 partners (NL, DE, IT, BE)
- Demonstration of the CCU chain in order to produce oxalic acid (2 carbon atoms per molecule) as a pre-product for high-value chemicals

0,03 t<sub>CO2</sub>/day



- EU funded project ■ 2018-2021
- 9 partners (BE, DE, DK, ES, FR, IT, UK)
- Demonstration of the CCU chain of methanol production using electrochemical direct synthesis without need of rare raw materials for the electrodes and catalysts

0,01 t<sub>CO2</sub>/day



**THANK YOU!**

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