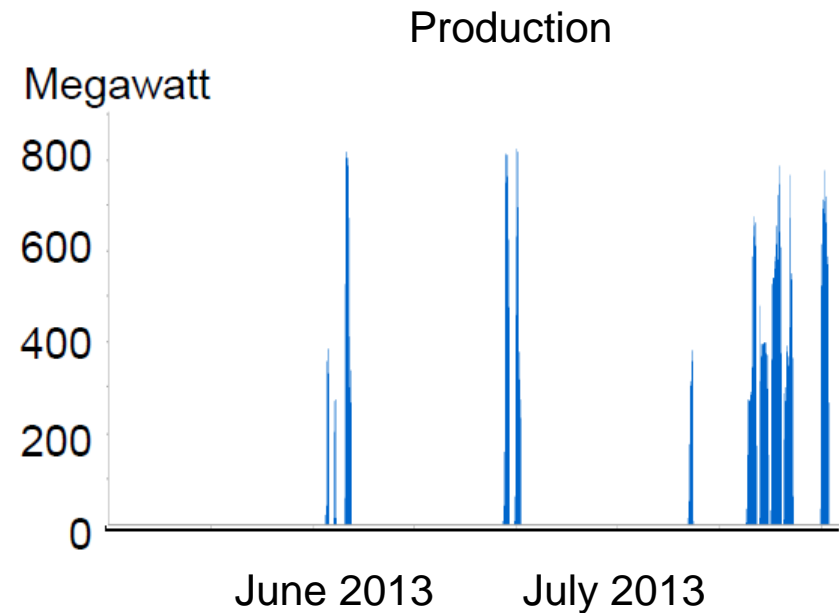
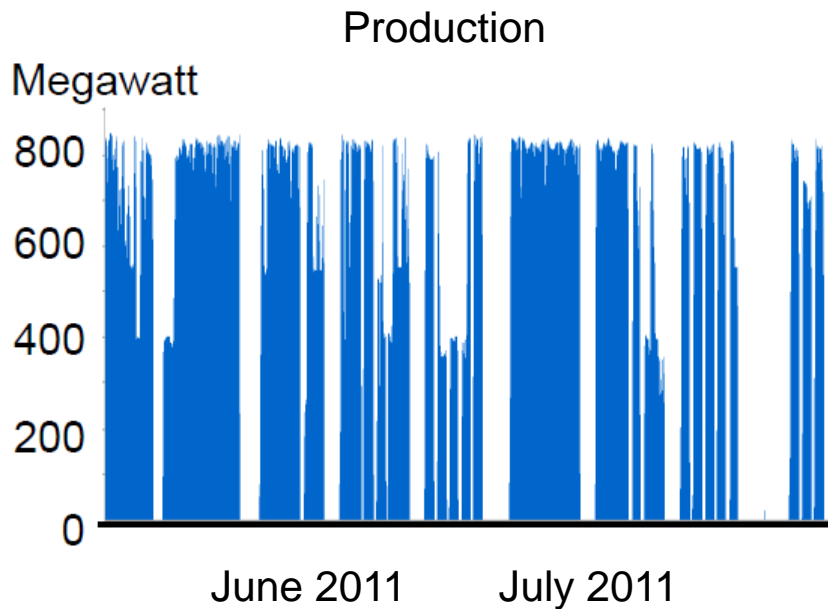


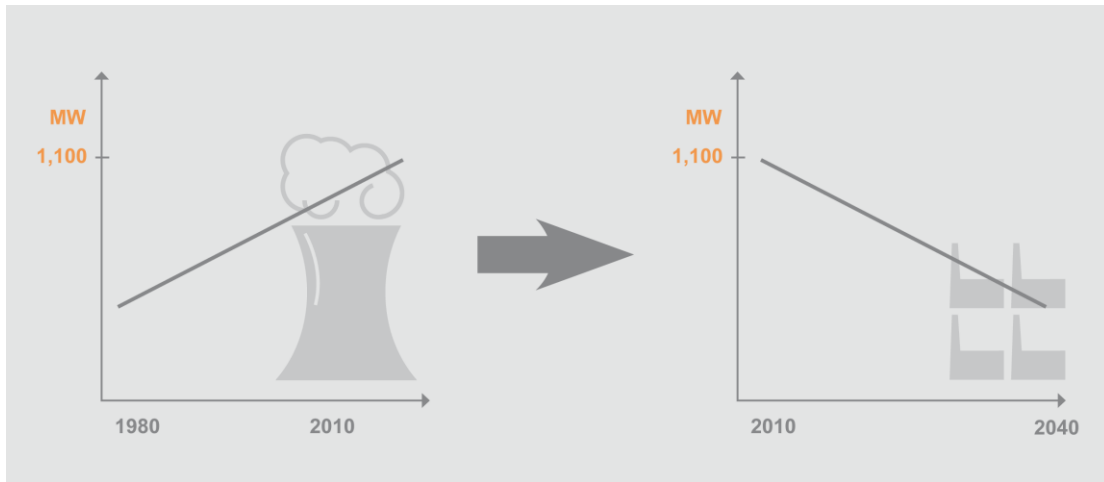
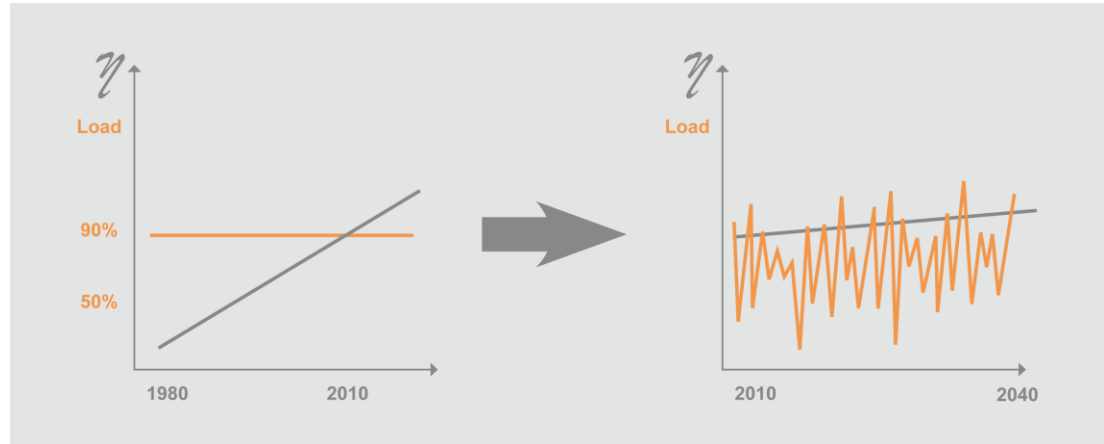
Example CCGT Lingen, RWE Generation, COD 2011



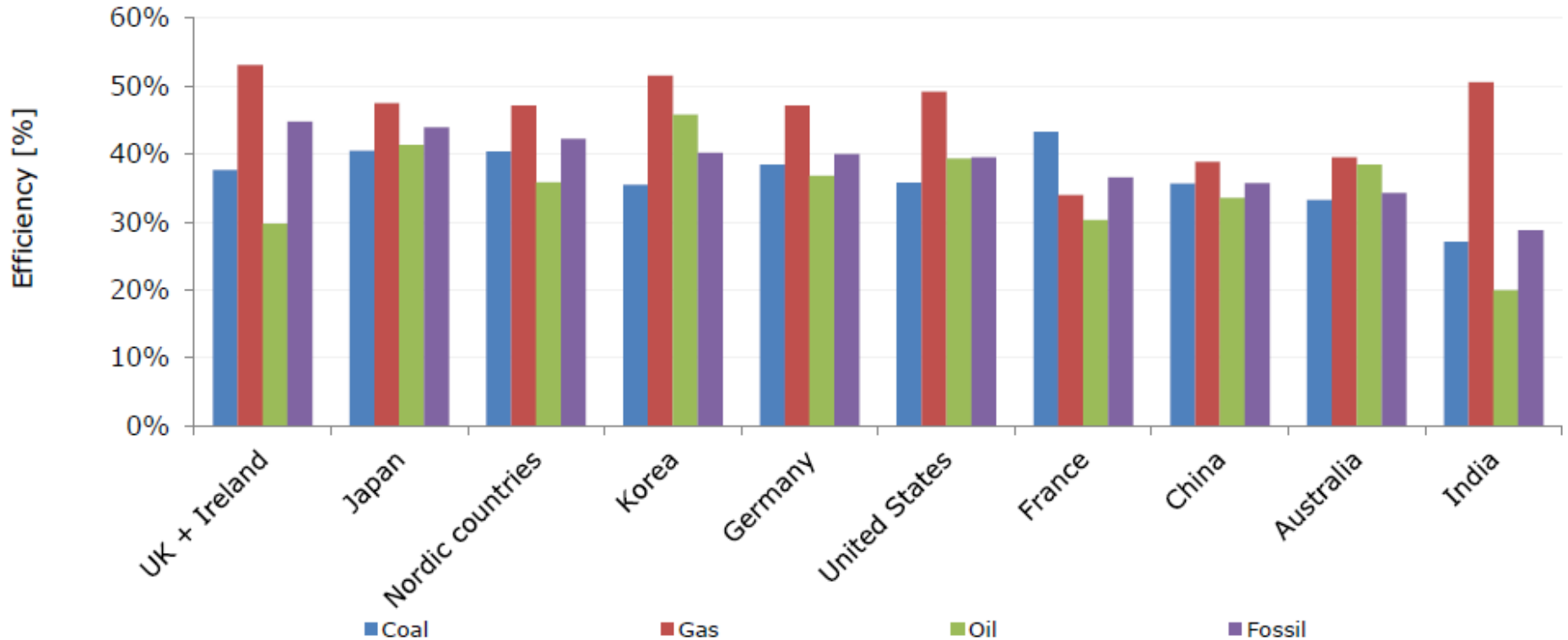
Is the Energy-only market the right market design to stimulate and ensure investments and operation of conventional power plants in the long-term?

The energy systems transform from centralized and fossil-based to decentralized and renewable-focused.

- the value of flexibility will overrule the value of efficiency
- the economy of scales will be replaced by a low-cost & low-risk approach



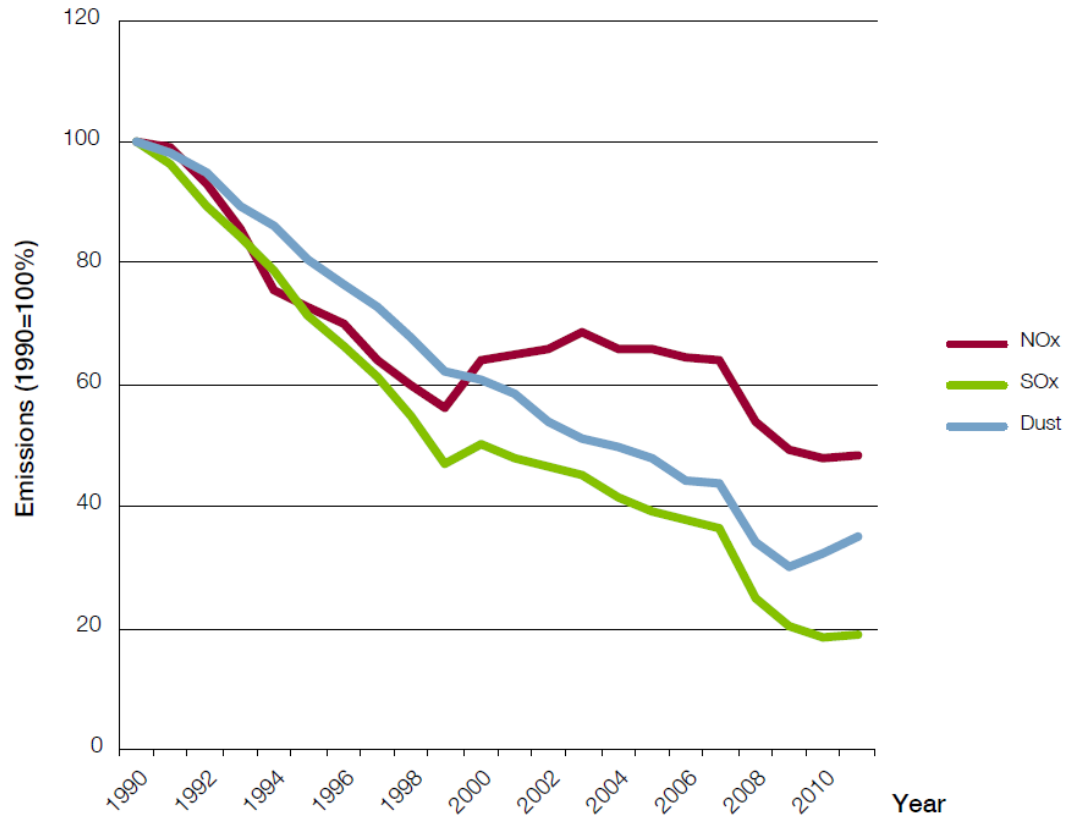
Technology development and O & M concepts need to adapt to the changed market requirements. A new thinking towards smaller, flexible, low-cost plants is required.



Source: 2014 Ecofys-international-comparison-fossil-power-efficiency

The weighted average efficiency for all countries in 2011 is 35% for coal, 48% for natural gas, 40% for oil-fired power generation and 38% for fossil power in general.

Emissions intensity of public conventional thermal power production in Europe
32 member countries



Source: UBA, EPPSA

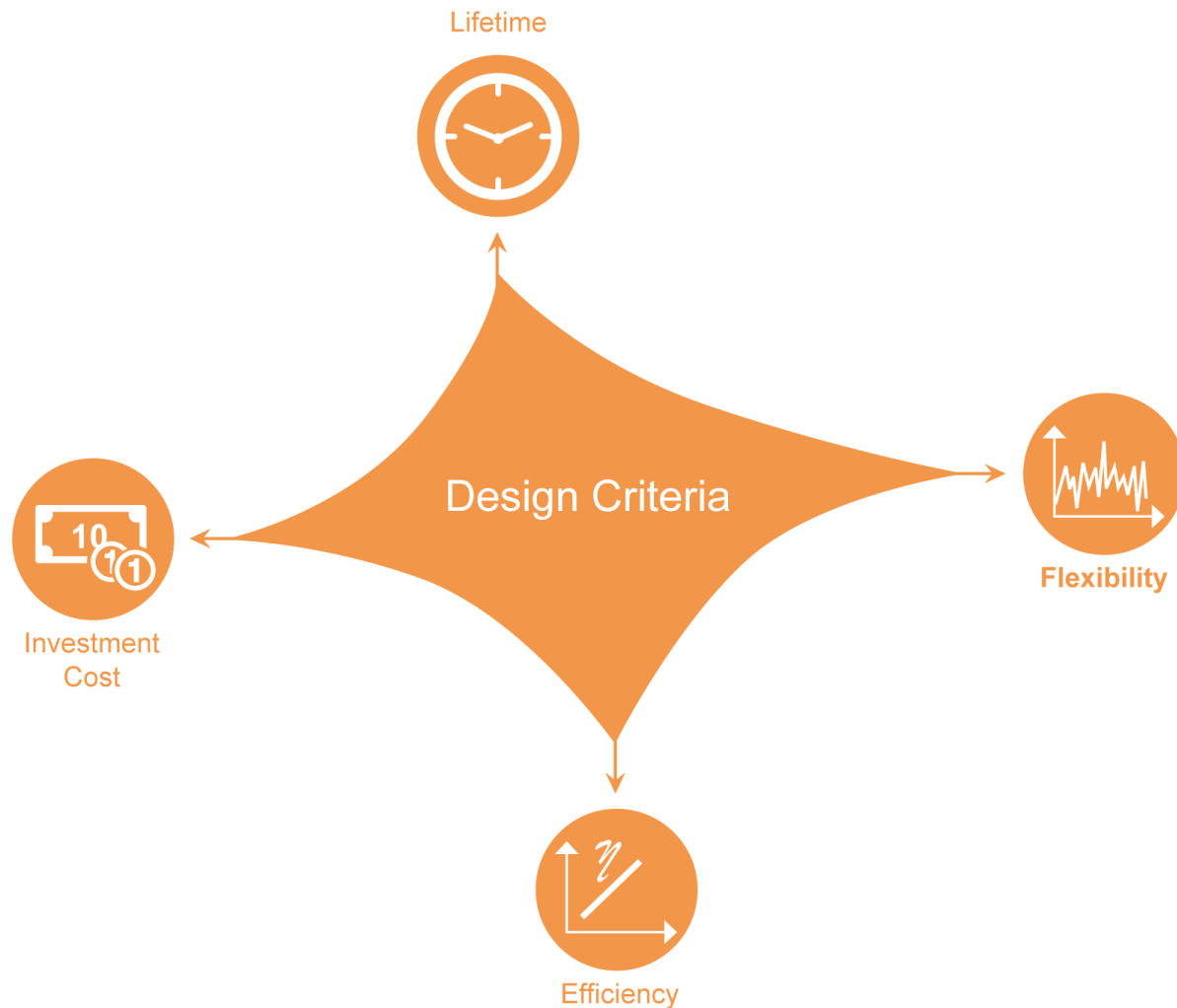
The emission level of major pollutants such as SO₂ and NO_x have been reduced significantly due to flue-gas desulphurization and low-NO_x-technologies.

Status quo: new 600/620°C coal fired power plants in Europe

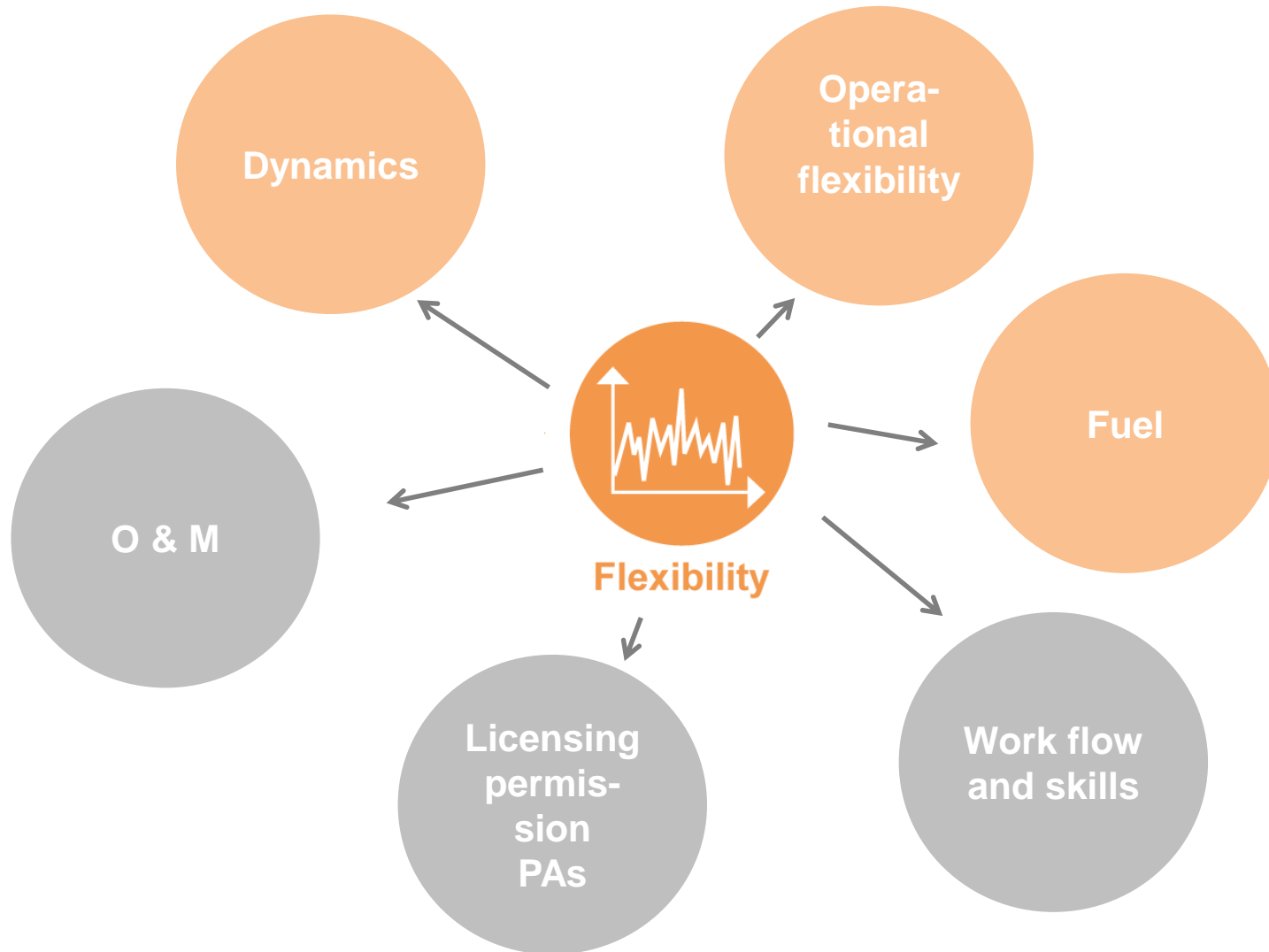
Anlage	Betreiber	Standort	Anzahl Blöcke	MW
Datteln 4	E.ON	Datteln	1	1100
Walsum 10	STEAG	Walsum	1	750
Moorburg 3-4	Vattenfall	Moorburg	2	820
Westfalen D-E	RWE Power	Hamm	2	800
Rheinhafen RDK 8	EnBW	Karlsruhe	1	912
GKM 9	GKM	Mannheim	1	912
Wilhelmshaven	Electrabel	Wilhelmshaven	1	800
Boxberg Block R	Vattenfall	Boxberg	1	675
Neurath G-F	RWE Power	Neurath	2	1100
Eemshaven A-B	RWE Power	Eemshaven	2	800
Maasvlakte	Electrabel	Rotterdam	1	800
Maasvlakte 3	E.ON	Rotterdam	1	1100
Ledvice	CEZ	Bilina	1	660



The new build projects are based on the Reference Power Plant NRW (net efficiency: 45.9%). They are all delayed due to technical problems (mainly caused by T24-issues).



The future design concepts are determined by costs, lifetime requirements, efficiency and flexibility. The prioritization of these criteria depends on the value of flexibility.



Flexibility is more than technology. It comprise aspects from system stability, design, operational concepts to shift organization and personal skills.

How can VGB support its members in this transition phase?





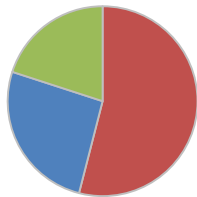
Our mission is...

...to support our members in their operational business.

...to support our members in strategic challenges.

...to be a key contact for international energy stakeholders.

- We have **484 members in 35 countries**, over 90 % are European based
- We represent an installed capacity of **458 GW** based on this energy mix:

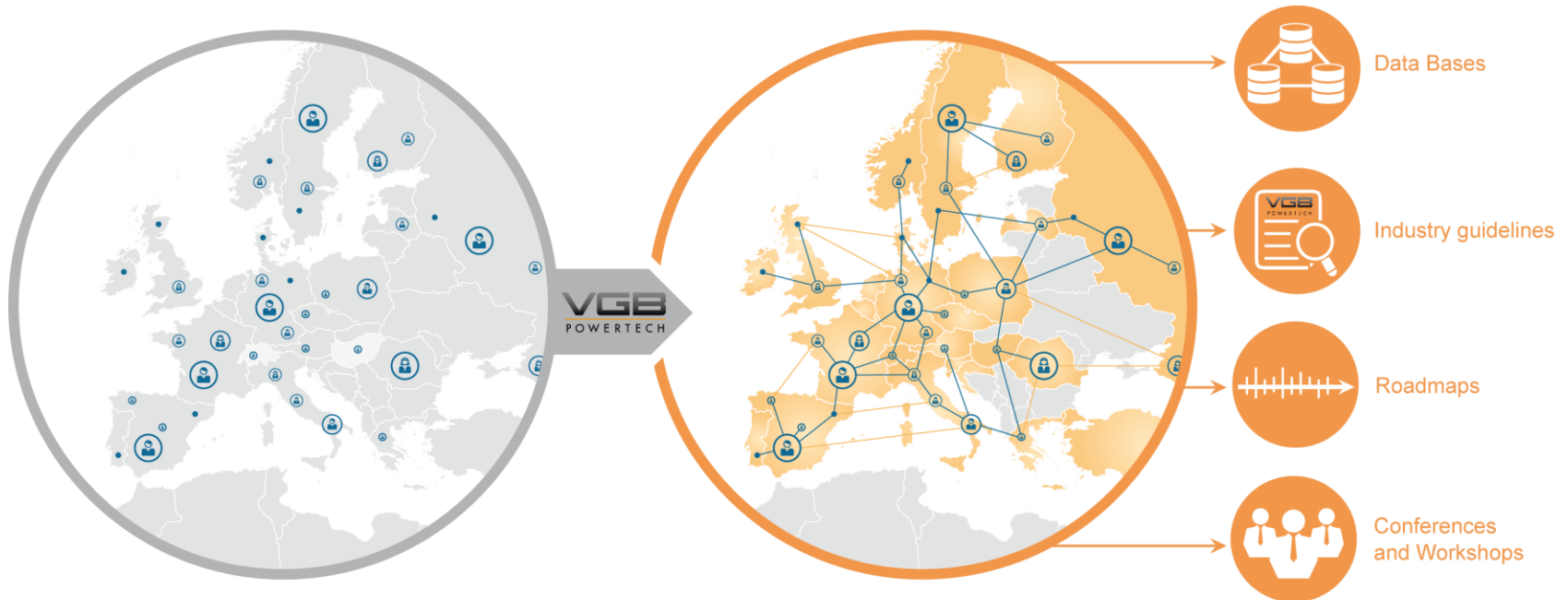


■ Fossil
■ Nuclear
■ Renewables



VGB is the European Competence Center of Heat and Power Generators. Founded in 1920 it is based on a voluntary association of companies active in the energy business.

Over 1,700 experts are active in the VGB network.



VGB facilitates the exchange of experiences between the experts and document and disseminate the results for the benefit of all members.

Recent example: R&D-project Partner Steam Power Plant

Elaboration of measures on how existing fossil-fired power plants can handle fluctuations of power generation of renewable energy:

- improvement of start-up and shut-down behavior
- reduction of minimum load
- increase of load change rate
- adjustment of steam parameters
- optimization of steam generator
- optimization of steam turbine
- integration of thermal heat storage in the power plant process



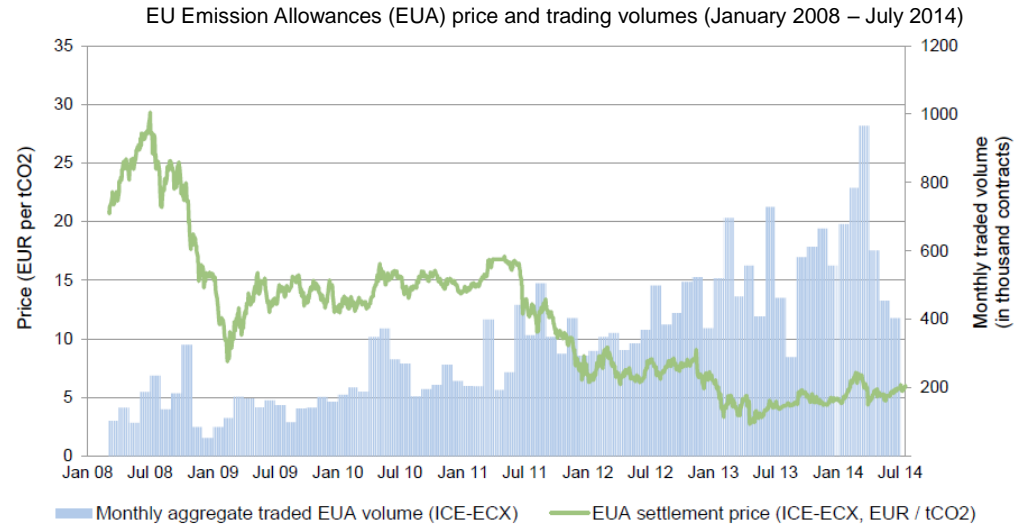
Project partners: E.ON, RWE, Steag, Vattenfall, University of Cologne, University of Dusseldorf, Mitsubishi Hitachi PSE and Siemens

The Partner-Steam-Power-Plant-project aims at the stabilization of the grids, the security of supply and the maximization of the application of renewables.

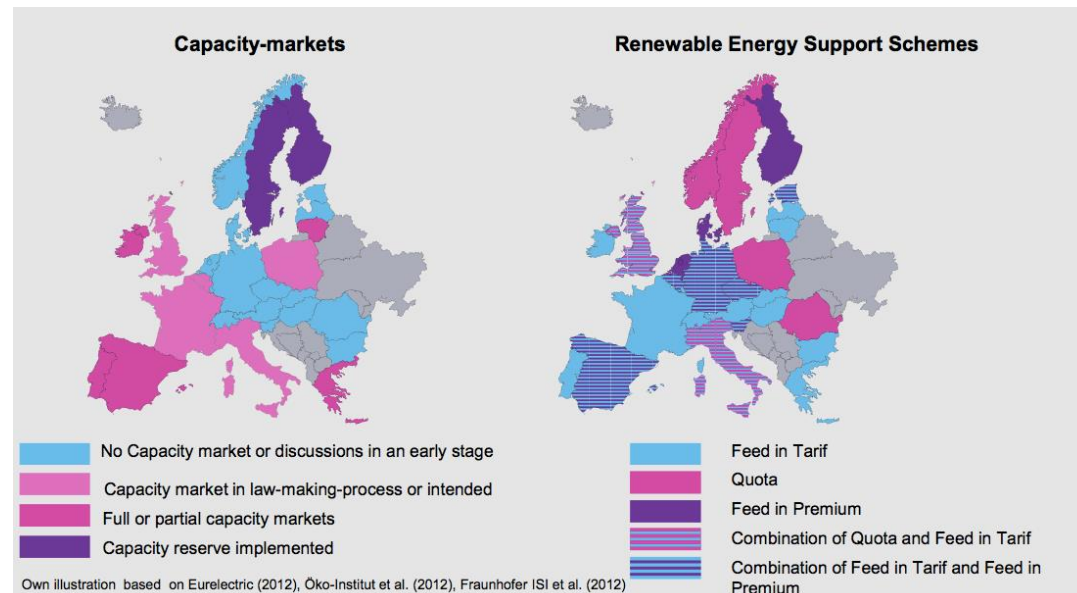
Future energy market design?
 Will there be an energy-only-market or a capacity market or both?

Development of the Emission Trading Scheme?
 Will the introduction of a market stability reserve revive the CO₂-market?

Increased importance of security of supply?
 Is there a conflict between the dependence on gas and European foreign policy?

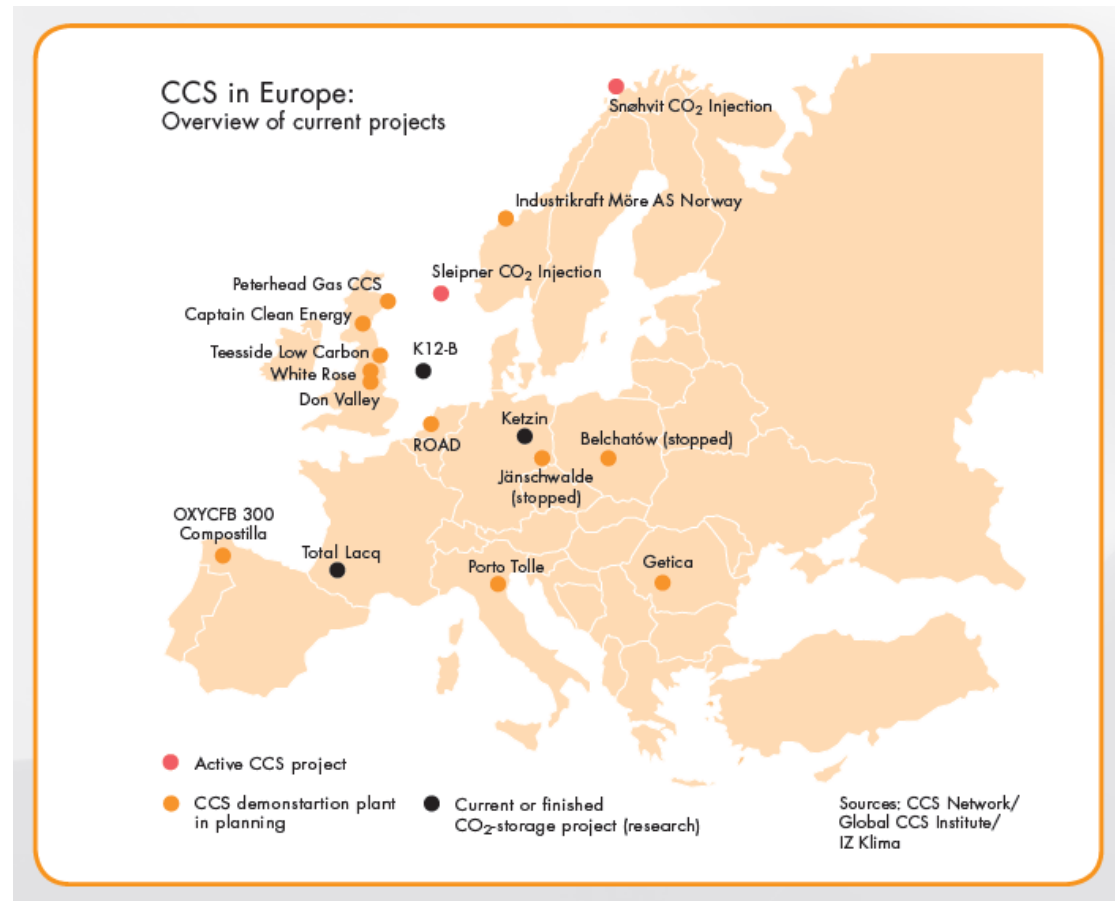


Source: Thomson Reuter Datastream



New impulses for CCS? Will climate change targets and the further use of fossil fuels drive CCS-projects?

- 13 large-scale projects world-wide, nine under construction
- in spite of funding in Europe (e.g. EU New Entrants Reserve NER300) no final investment decisions for demonstration projects have been yet taken
- main reasons: public resistance as well as weak carbon price development



Status quo: many wishes – but little activities

- Renewables need dispatchable reliable support as long as grid expansion and large scale storage lag behind
- Priorities will change from efficiency, size and emissions to flexibility and costs
- Flexible technologies are available for new builds as well as for existing assets
- Market conditions must allow a minimum of investment and business – an according political framework is needed
- European energy technologies (renewables and conventional) will remain export champions



Coal-fired power plants will have a future in Europe even in times of decarbonization in power generation and energy transition.



धन्यवाद

Thank you

for your interest!

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