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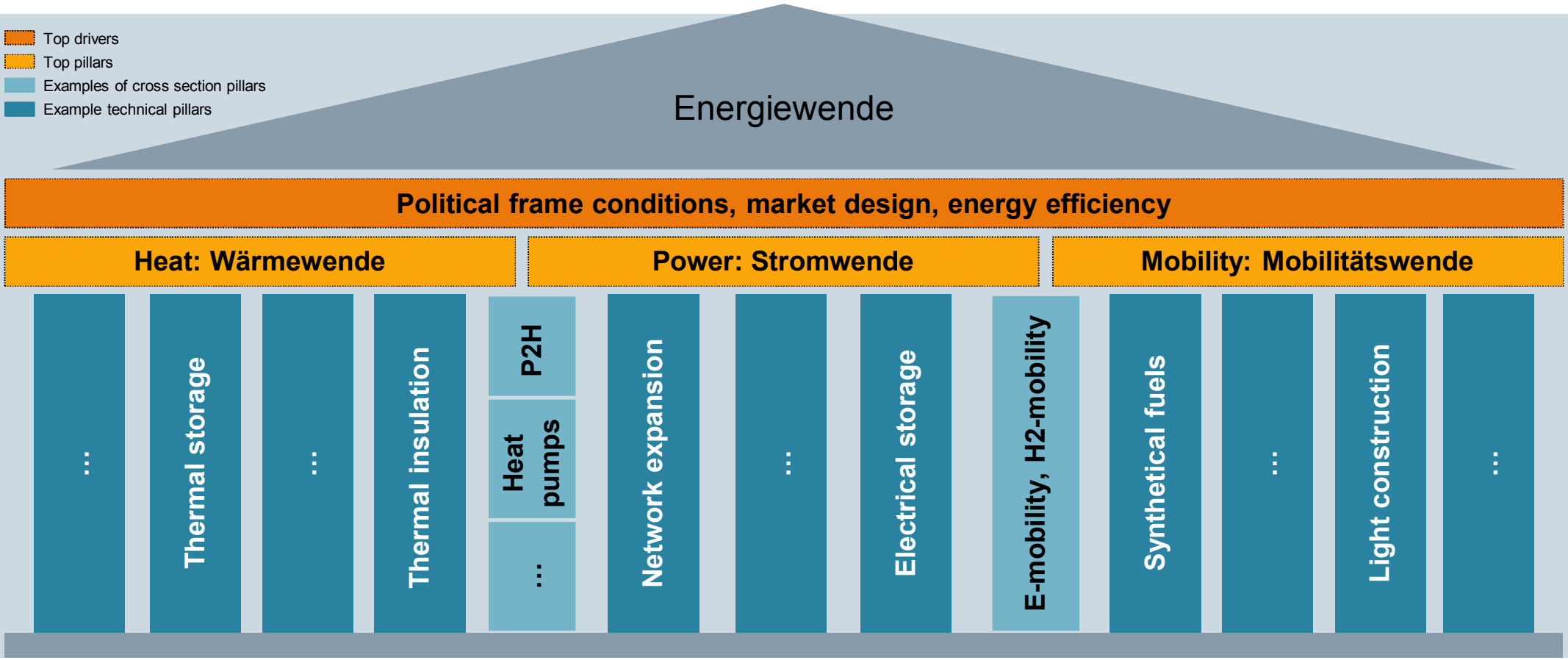
P2X Activities

Public Slide Set - English

The architecture of the Energiewende



Quelle: Siemens AG

Challenges exist today already integrating renewable energy sources into the system

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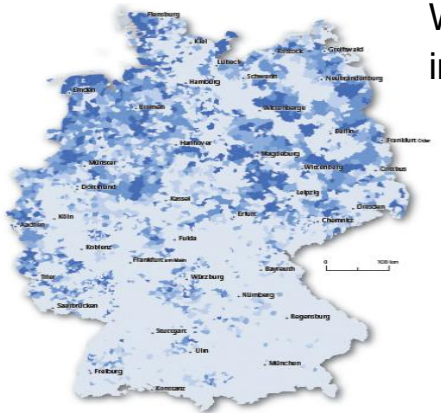
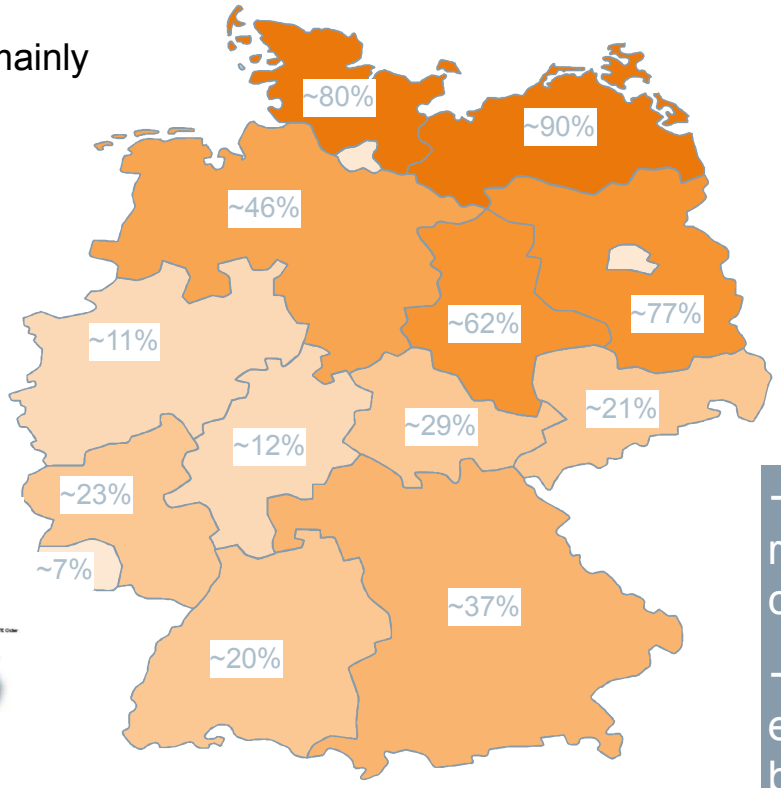


Wind power mainly in the north



Shutoff in the north was up to 40% in 01/2015

2030 ?

PV mainly in the south

Share of renewable energies in the regions *

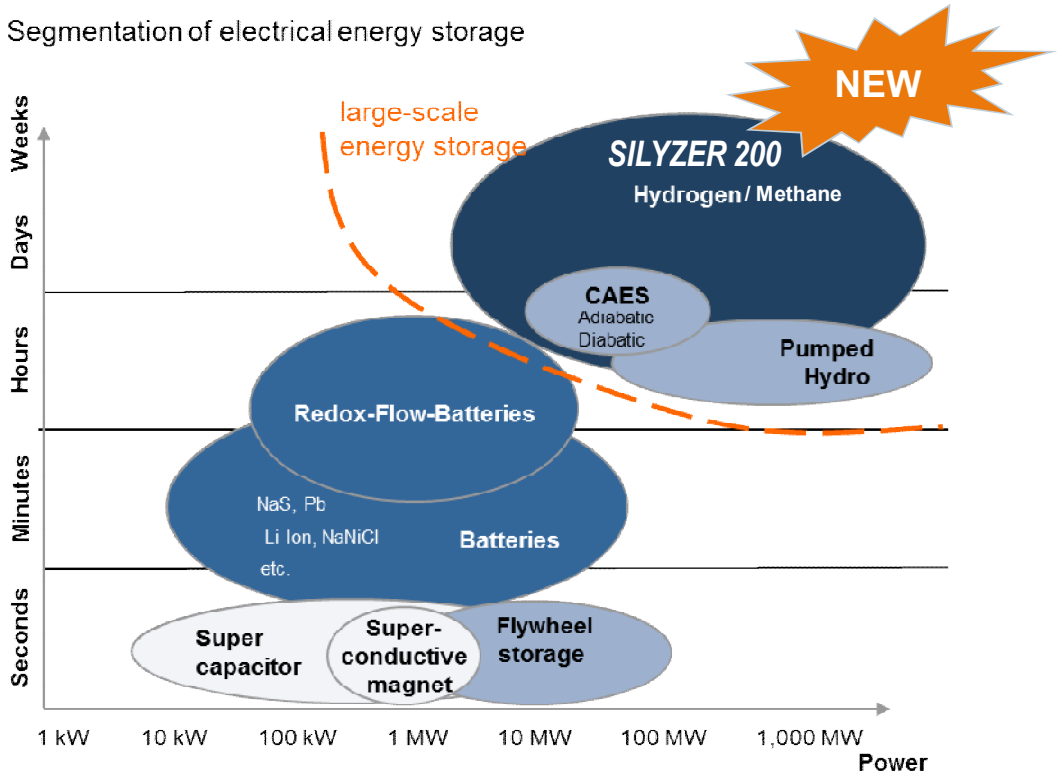
* Source: AGEE-Stat, LAK, extrapolated

→ Ambitious renewable targets require additional flexible capacities

→ Even with the planed network expansions Germany will not become a „copper plate“

AGENTUR FÜR ERNEUERBARE ENERGIEN

Storage solutions – an overview

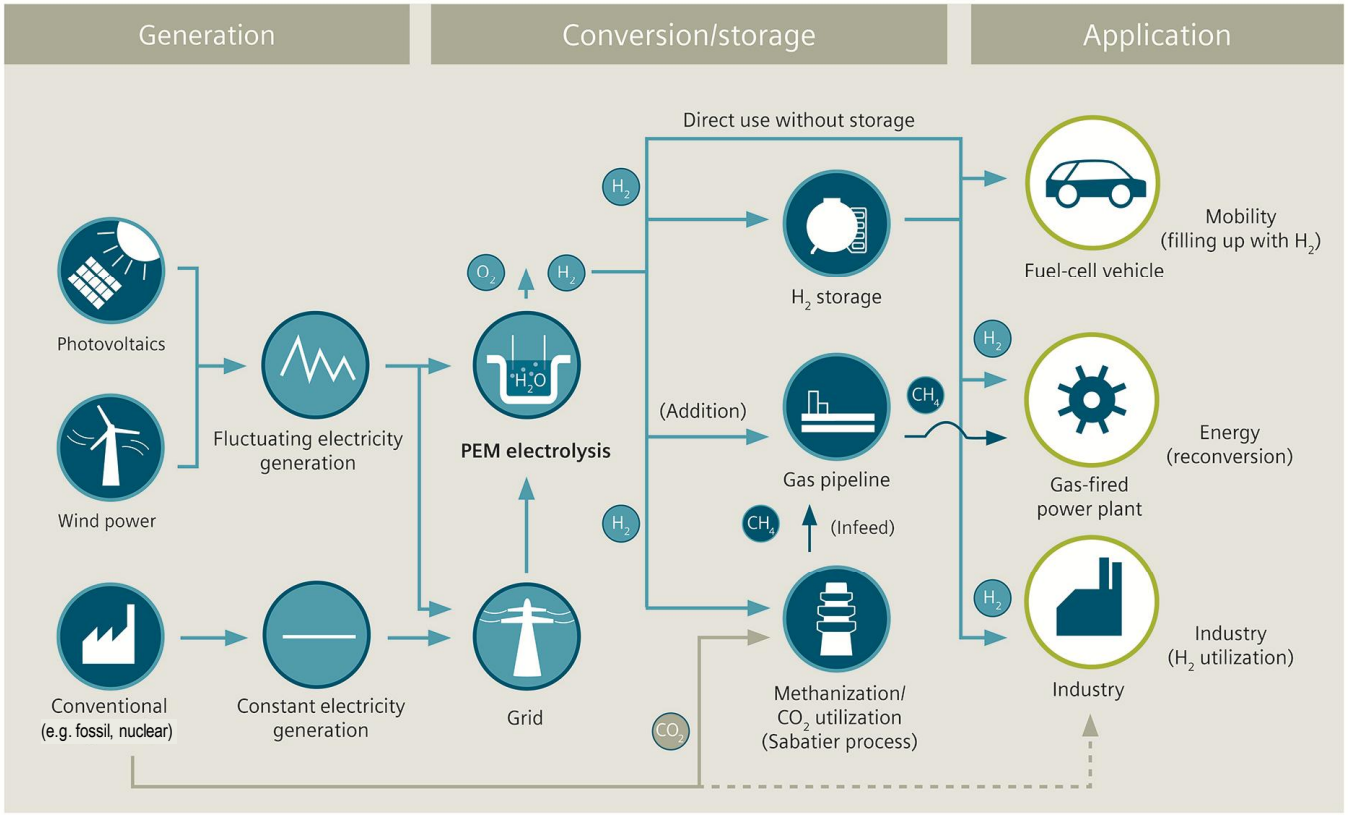


Key Statements

- Large scale storage can only be addressed by Pumped Hydro, Compressed Air (CAES) and chemical storage media like Hydrogen and Methane
- The potential to extend pumped hydro capacities is very limited
- Hydrogen is used in many main industries as a reductive or protective gas or is used as an input in synthesis processes; onsite hydrogen production is a promising alternative to trailer/truck supply

The future CO_2-optimized energy scenario will require smart solutions

Hydrogen paths

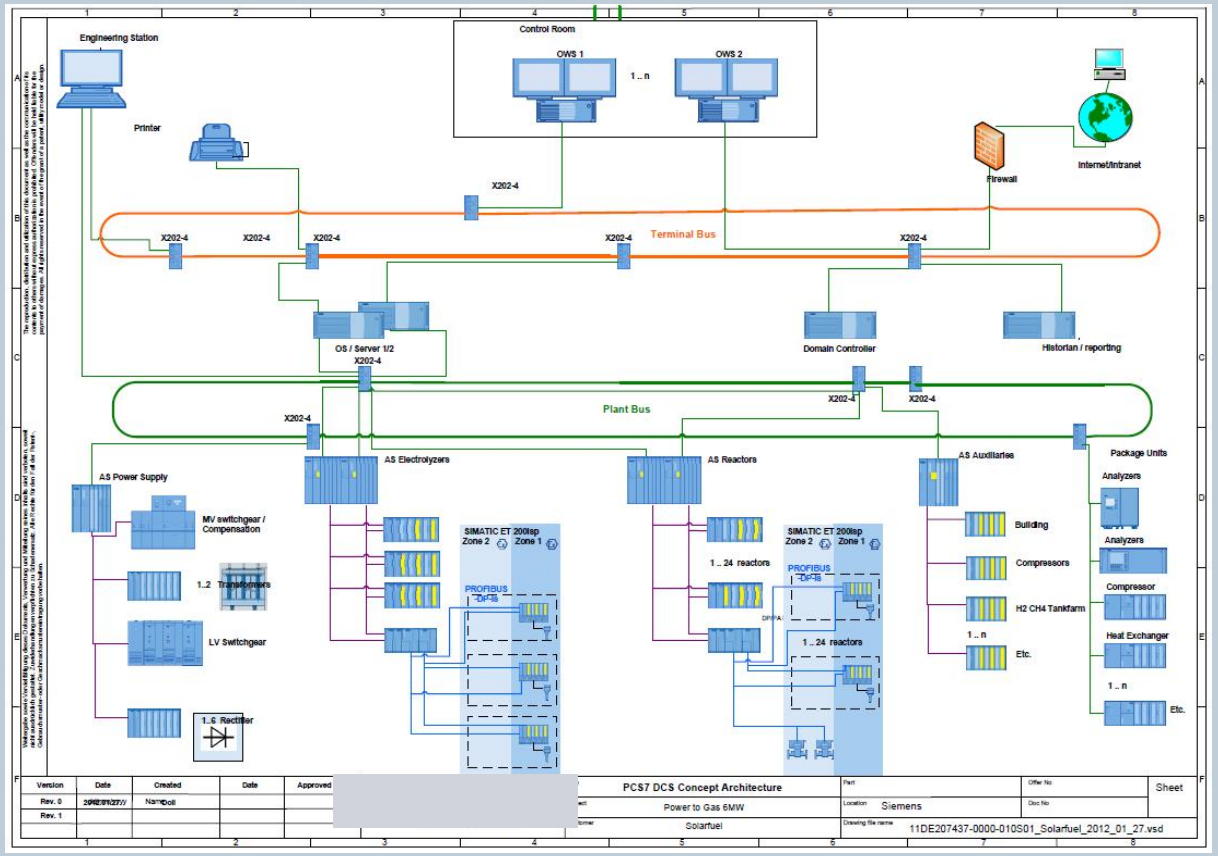


H_2 drives the convergence between energy & industry markets

Possible plant structure (model data)

Potential Siemens Portfolio:

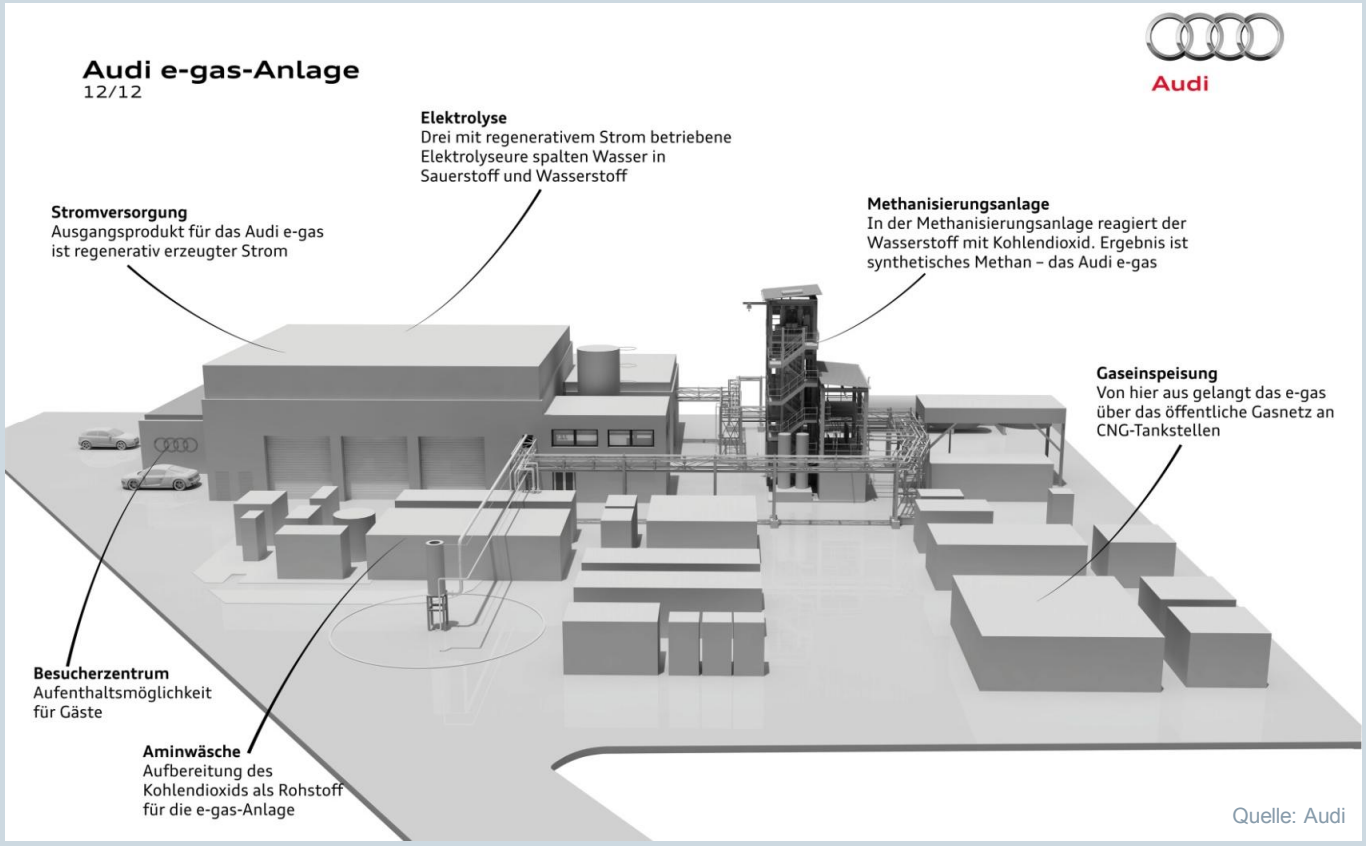
- Electrolyzer
- PCS 7 – DCS-System
- Sensors and Comunication equipment
- Gasanalytics
- Secure Remote Access solutions
- Engineering
- Transformers
- Rectifier
- …



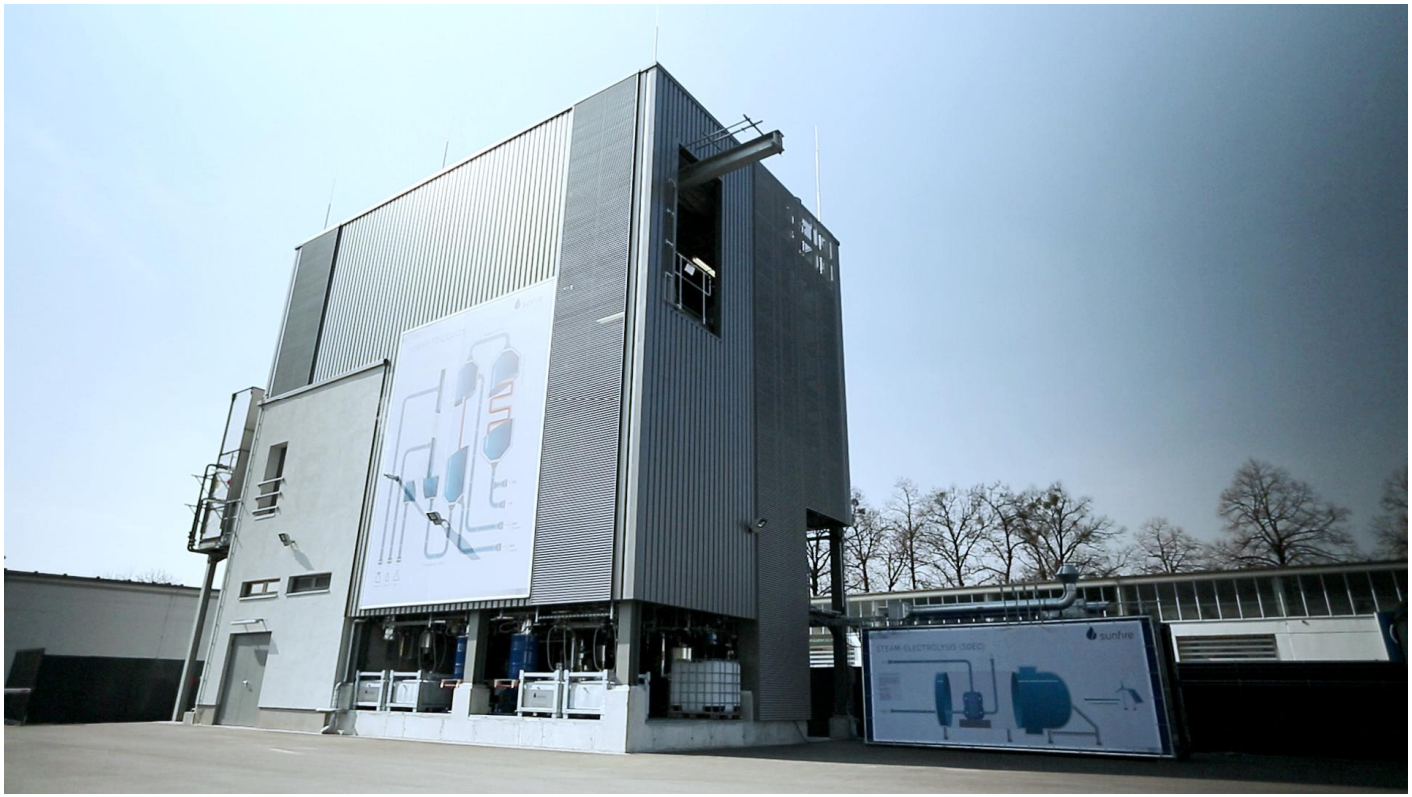
250 kW-pilot plant ZSW: Sabatier reactors

Quelle: Siemens AG

Audi 6 MW P2G-plant



sunfire Power to Liquids plant



Automized with PCS 7

Rectifier Container for Elektrolyzers

SILYZER 200 PEM Elektroyzer

SILYZER provides best-in-class PEM technology with a large-scale and industrialized design

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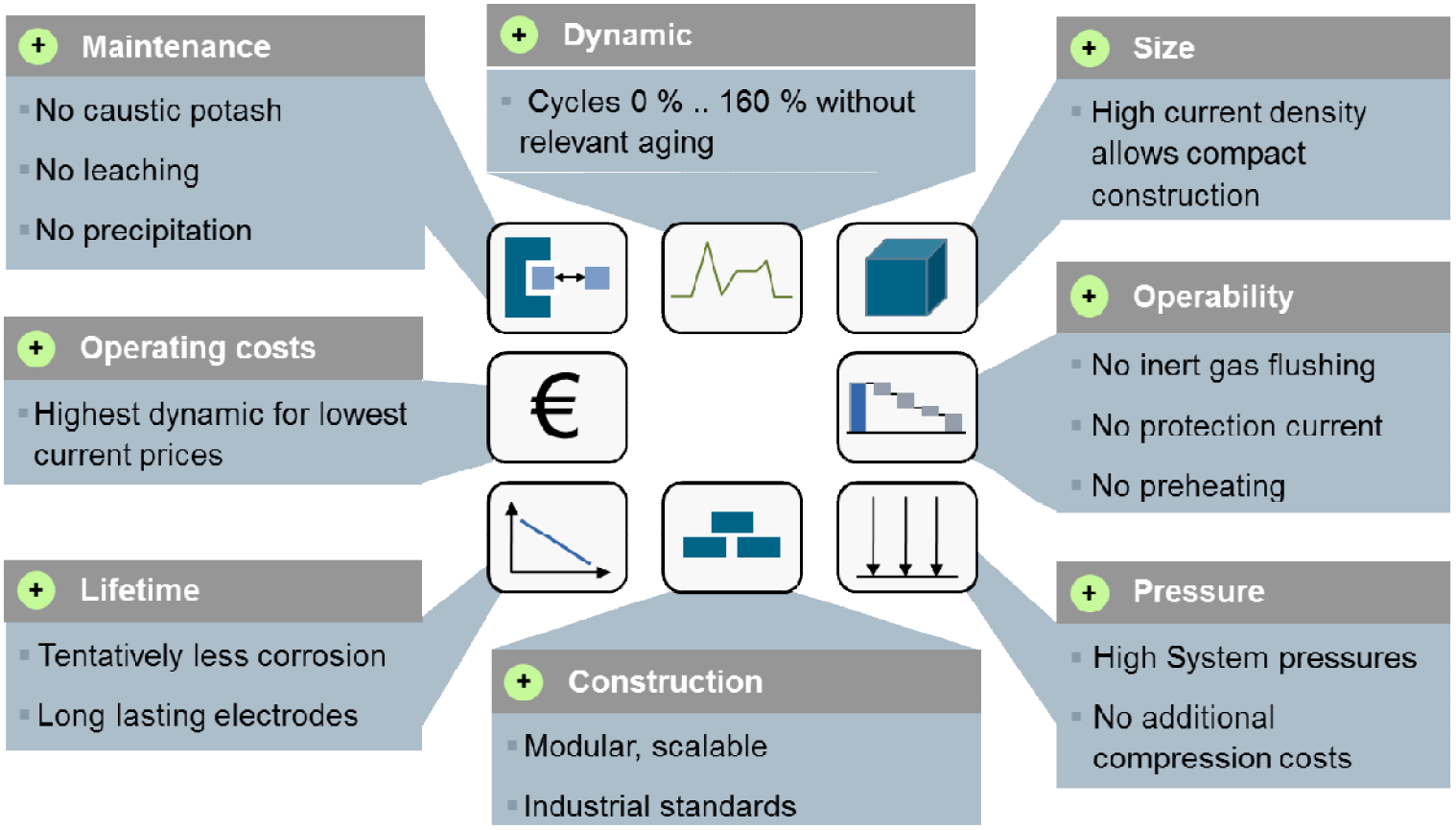

Outstanding performance paired with technical options allows integration in any project scope

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Main Technical Data - SILYZER 200	
Electrolysis type / principle	PEM
Rated Stack Power	1.25 MW
Dimension Skid	6,3 x 3,1 x 3,0 m
Start up time (from stand-by)	< 10 sec
Output pressure	Up to 35 bar
Purity H_2 (depends on operation)	99.5% - 99.9%
H_2 Quality 5.0	DeOxo-Dryer option
Rated H_2 production	225 Nm³/h
Overall Efficiency (system)	65 – 70 %
Design Life Time	> 80.000 h
Weight per Skid	17 t
CE-Conformity	yes
Tap Water Requirement	1,5 l / Nm³ H_2

Portfolio: Maintenance Package
SILYZER (Siemens Electrolyzer Systems)

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→ **Technical support**
→ **Online support**
→ **On-site repair**
→ **Troubleshooting**
→ **Spare Parts Supply**

Basic Services:
Services on demand;
based on time, material and effort

+

→ **Preventive Maintenance**
→ **Inspection**
→ **Condition Monitoring**
→ **Remote Data Access**

Advanced Services:
Scheduled Preventive Maintenance;
based on standard service contracts

+

→ **Extended Technical Support 24/7**
→ **Technician standby ("On call Service")**
→ **Spare Parts Management**

Performance Oriented Services:
Full Maintenance Services:
based on requirements specified in service contracts

Energiepark Mainz – Project scope and key facts

- Location: Mainz-Hechtsheim (DE)
- Three high performance electrolysis systems with peak power of 2 MW el. each (6 MW peak)
- Connection to 10 MW wind-farm
- 1000 kg storage (33 MWh)
- 200 tons target annual output (Trailer-filling station and injection into local gas grid)
- Highly dynamic operation over broad load range (ramp speed 10% per sec.)

Gefördert durch Bundesministerium für Wirtschaft und Energie aufgrund eines Beschlusses des Deutschen Bundestages

ENERGIESPEICHER Forschungsinitiative der Bundesregierung

SILYZER – PEM-Elektrolyseure von Siemens
Roadmap zur Hochskalierung der „SILYZER-Familie"

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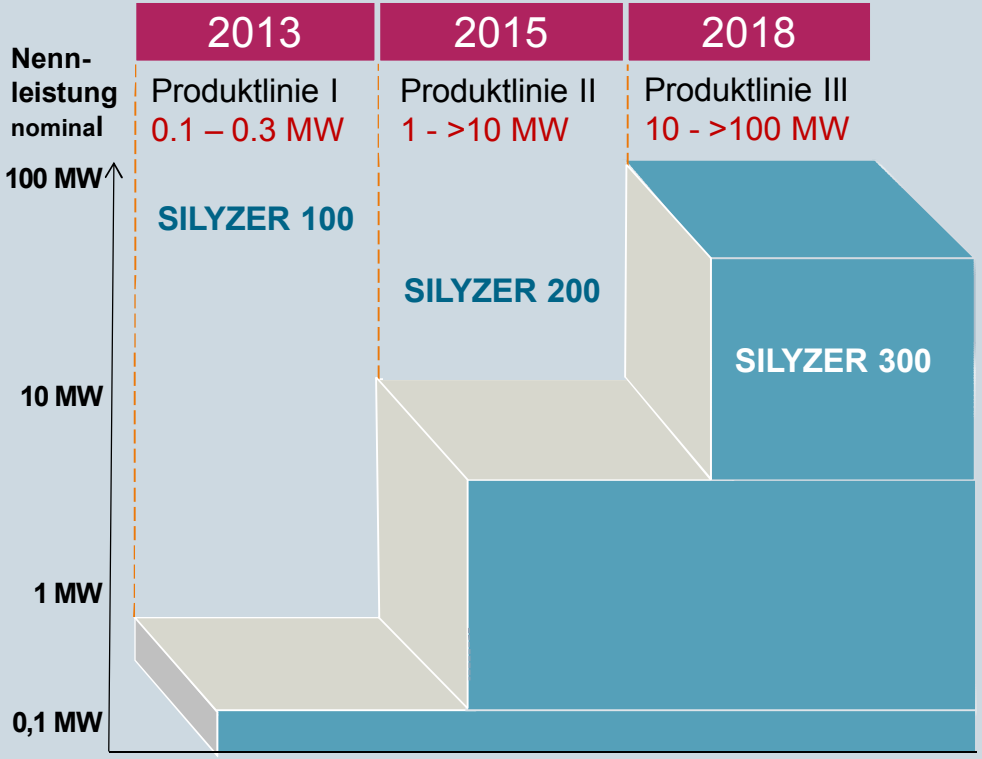
Roadmap: PEM-Electrolyzer-Portfolio "SILYZER"



Kernaussagen

- Siemens hat zur Entwicklung und Industrialisierung von PEM-Elektrolyseuren das Geschäftssegment "Hydrogen Solutions" gegründet.
- Systeme im MW-Bereich sind ab 2015 verfügbar.
- Anschließend ist eine dritte Produktlinie im Bereich bis 100 MW geplant.
- Siemens unterstützt als Mitglied der „Clean Energy Partnership" den Aufbau der Infrastruktur für eine H_2-Mobilität.
- Siemens ist Systemlieferant (Elektrolyse-Systeme) für alle künftigen Wasserstoffszenarien.

EEG-Umlage does not allow a possitive business case

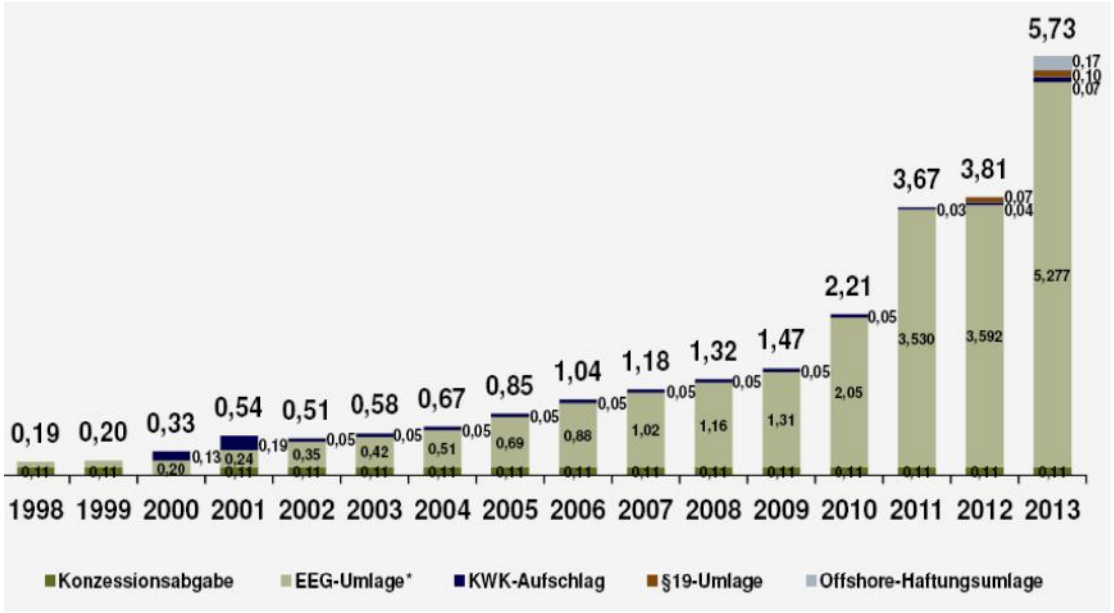
The EEG-Umlage of 6,24 ct/kWh in 2014 adding to the delivery costs for the electricity enables no known positiven BusinessCase so far.

Electrolyzers should not be treatet as end consumers as they are energy converters. A change of regulations is necessary in order to create a market.

Preis-Komponente	Status
Bezugskosten	✓
Netznutzungsentgelte (NNE)	✓
EEG-Umlage	!
KWK Umlage	?
Umlage nach §19 Abs. 2 StromNEV	?
Offshore Haftungs-umlage §17f EnWG	?
Stromsteuer	✓
Konzessionsabgabe	?
Umlage für abschaltbare Lasten	?

Average addional fees for the industry in Cent/kWh (without electicity tax)

Annual consumption 160 bis 20.000 MWh
(Mittelspannungsseitige Versorgung; Abnahme 100kW/1.600h bis 4.000kW/5.000h)



*) Quelle: Strompreisanalyse Januar 2013 des BDEW (Bundesverband der Energie- und Wasserwirtschaft e.V. – 31.1.2013)

Thank you for your attention!

Questions?

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