



Energy powers Chemistry –
Chemistry powers Energy

Needs and Opportunities for BASF

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Energy & Climate Change: Essential for BASF

Regulatory Changes

Efficient production processes
Products & tech to abate GHG emissions, e.g. energy efficiency, renewable energy

- Competitive advantages
- Growing markets

Opportunities

Climatic Changes

Adaptable sites and production processes
Products & tech to adapt to climate change



GHG/energy intensive technologies
Feedstock for chemical production

Risks




- Shrinking markets
- Financial/cost burden (i.e. by regulation: taxes, levies etc.)

Endangered sites (including customer & supplier industries)

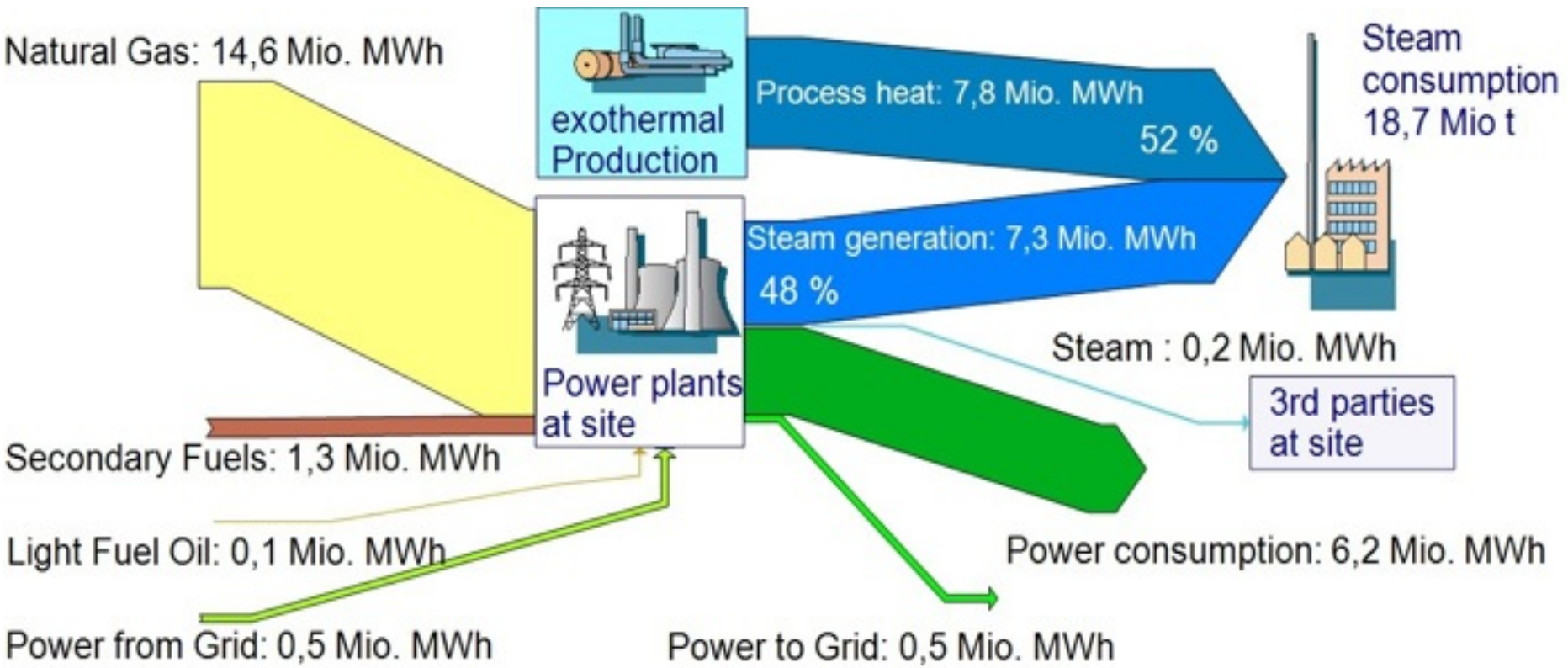
Infrastructure Verbund



Ludwigshafen site (Data 2013)

■ Area Ludwigshafen site		10 km ²
■ Production plants		160
■ Sales products		8,7 Mio. Quantity units/a
■ Length of quay		6 km
■		
■ Streets		115 km
■ Rails		213 km
■ Pipes		2600 km
■		

BASF Site Ludwigshafen Energy Balance 2013



Steam Verbund at Ludwigshafen

Process Heat (60 – 50 %)



Sulfuric acid

Acrylic acid



Urea



Adipinic acid



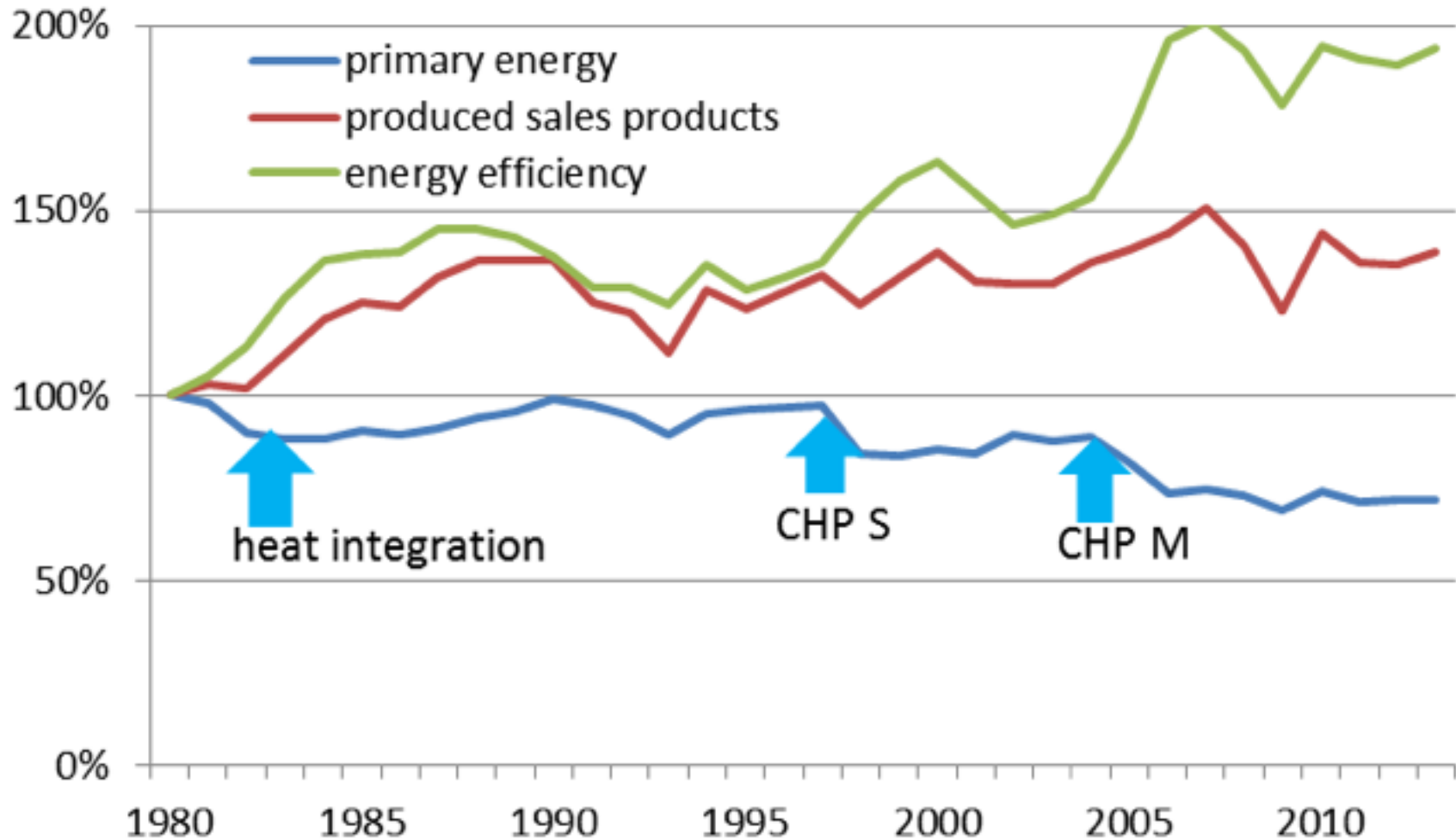
Buildings

**CHP- Plant
(40 – 50 %)**



**Steam
Consumer**

Energy Efficiency by Verbund (1976 = 100)



Best Practices in Energy Efficiency

Handbook:
Best Practices
in Energy Efficiency

- 140 p. internal manual published May 2012
- Best Practice examples: energy generation, supply and use from several BASF sites
- Approach:
 - Problem
 - Goal
 - ▶ Solution
 - ▶ Benefit / investment
 - ▶ Contact
- Target audience: engineering, maintenance, production
 - Facilitation and promotion of know-how exchange
 - Awareness for energy issues

BASF Co-Generation & Verbund Advantages

- BASF and third party owned combined heat and power plants (CHP) (fuel efficiency almost 90%)
- **More than 70%** of BASF's electricity demand can be covered by electricity from **CHP** plants

Annual CHP savings* BASF Group 2011:

Primary energy 1.0 Mill. toe

CO₂ emissions 2.4 mill. t CO₂

* Comparison: Conventional power and steam generation in separate plants based on natural gas.



Annual Verbund BASF Group 2011:

Primary energy 1.5 Mill. toe

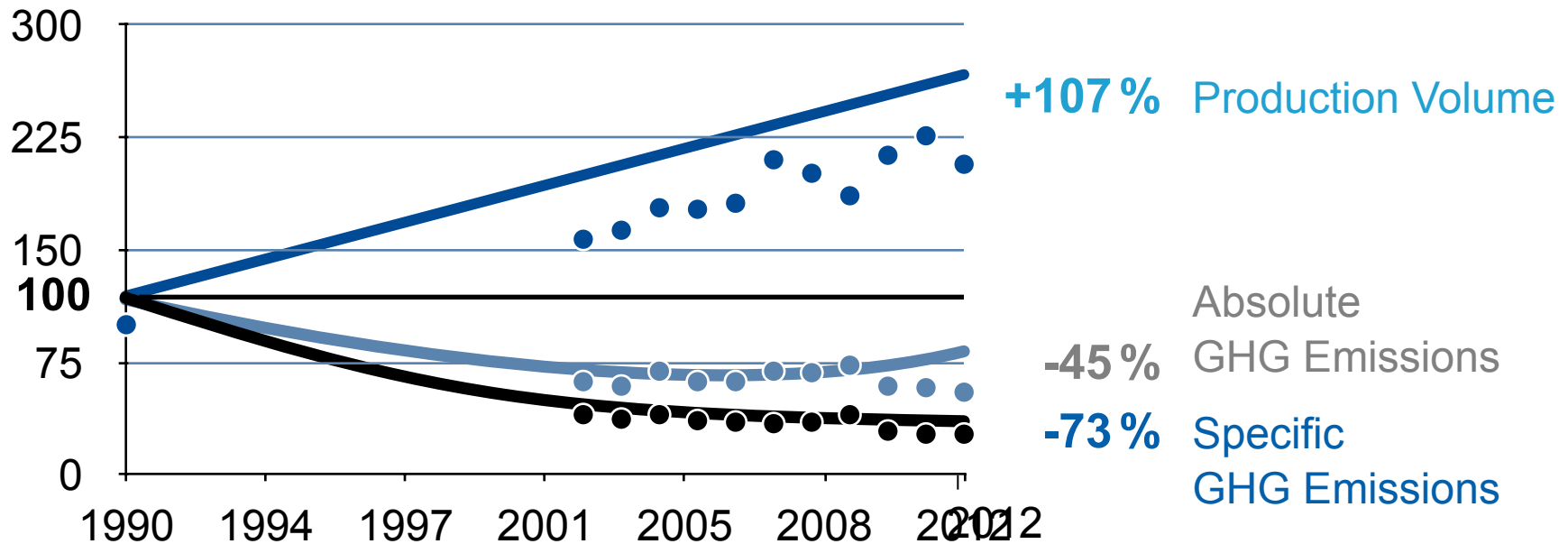
CO₂ emissions 3.5 mill. t CO₂

* Comparison: Conventional power and steam generation in separate plants based on natural gas.

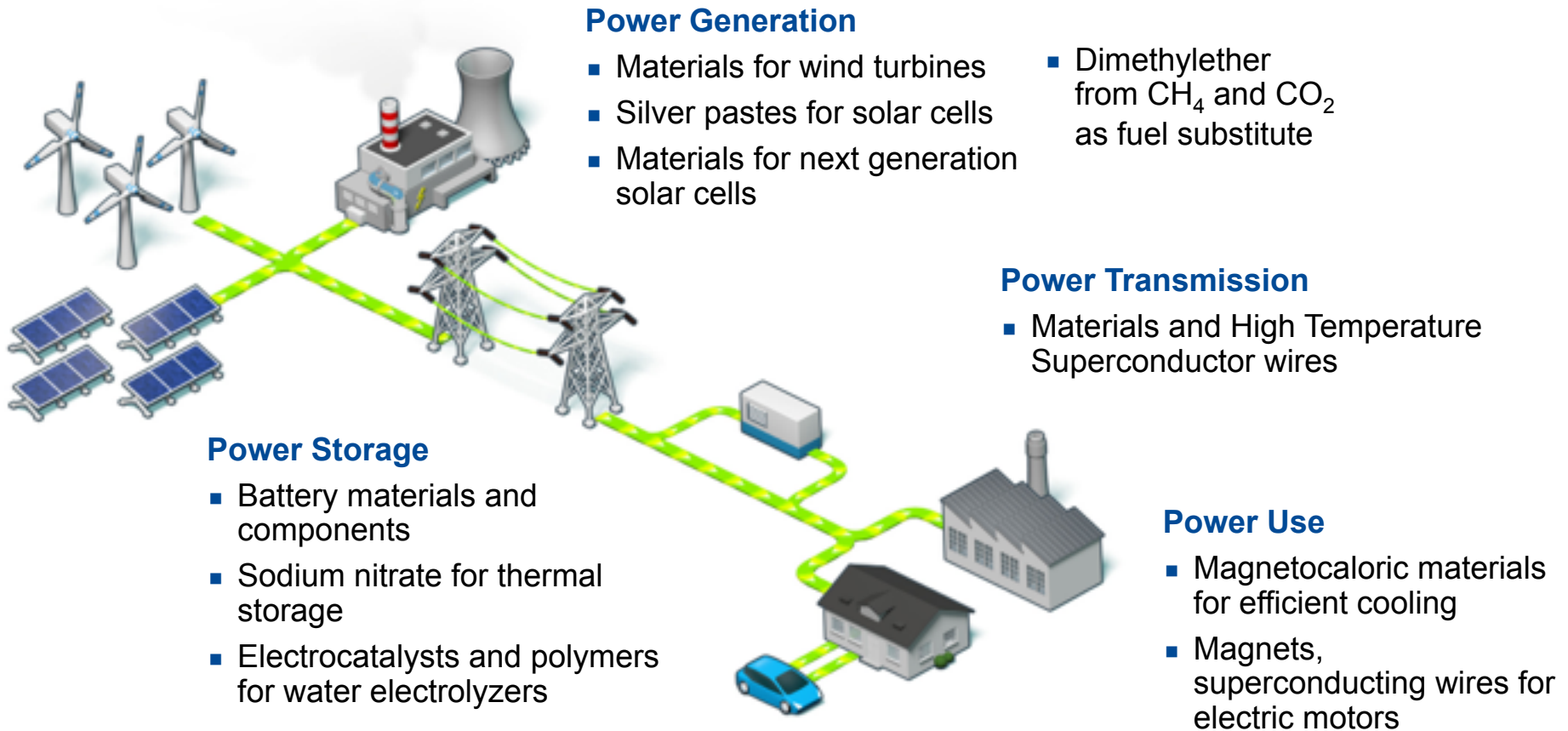
BASF: lowered specific GHG Emissions

Development since 1990

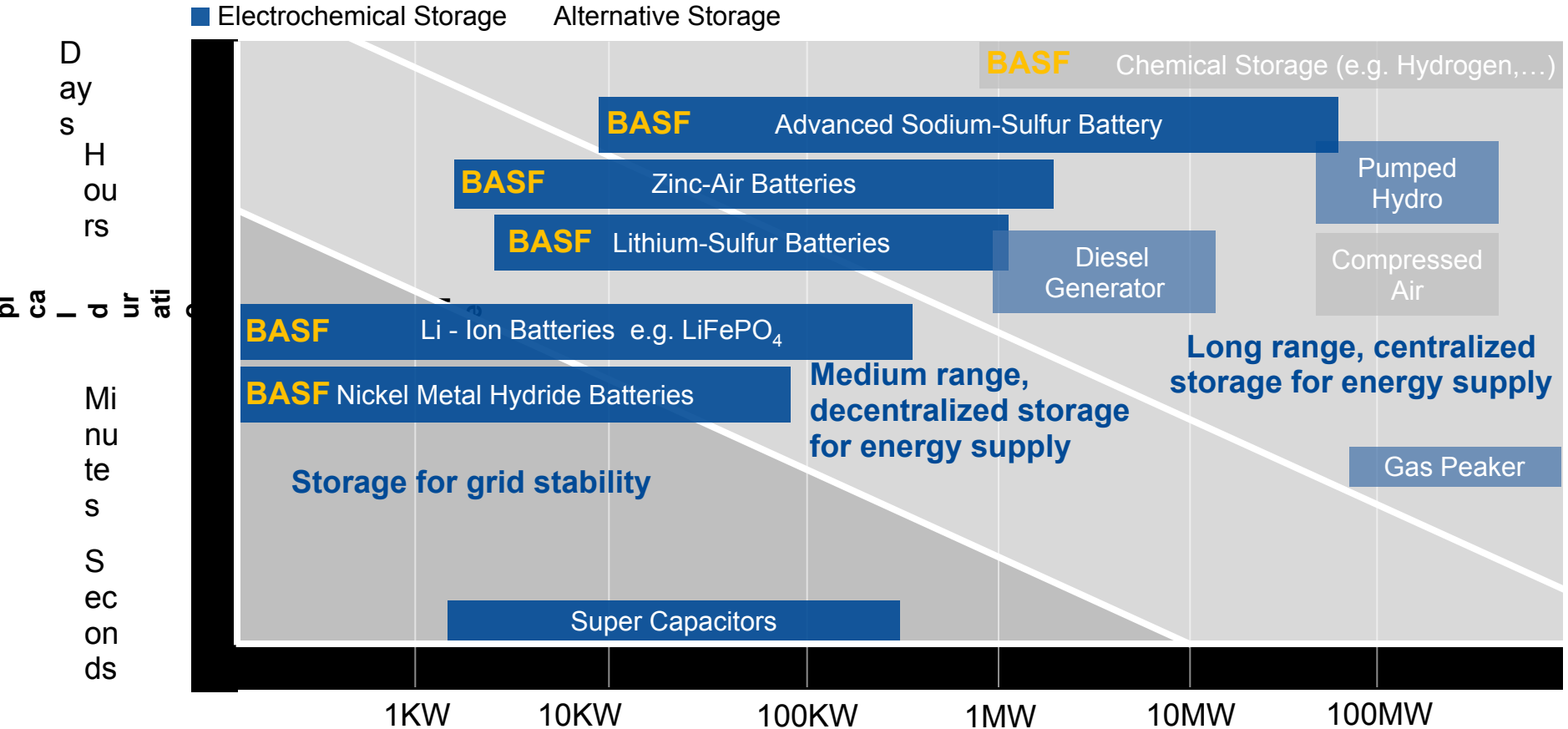
Index 1990 = 100%, BASF Group w/o Oil and Gas



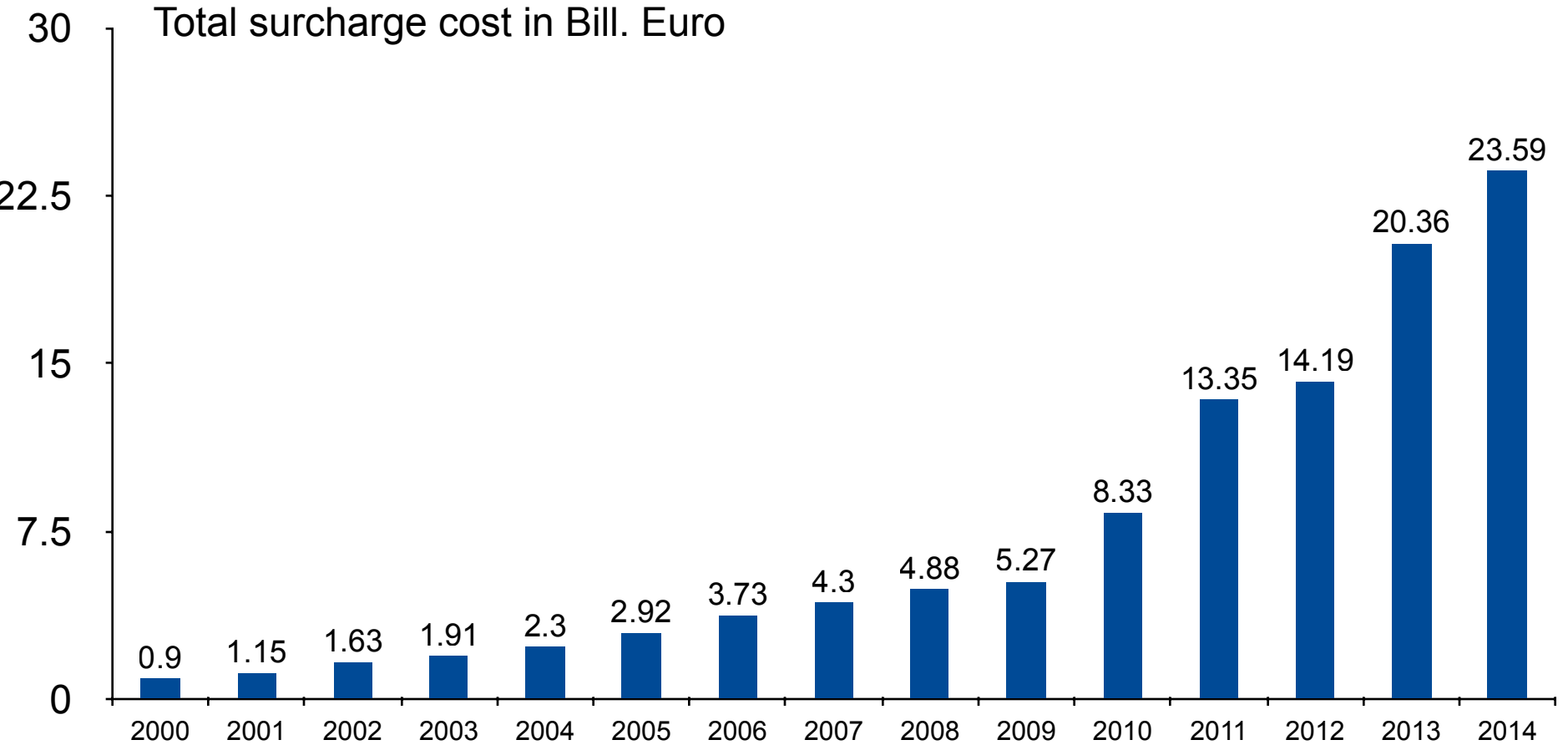
Integrated Renewables: Chemistry as key enabler



Storage: BASF addresses key technologies

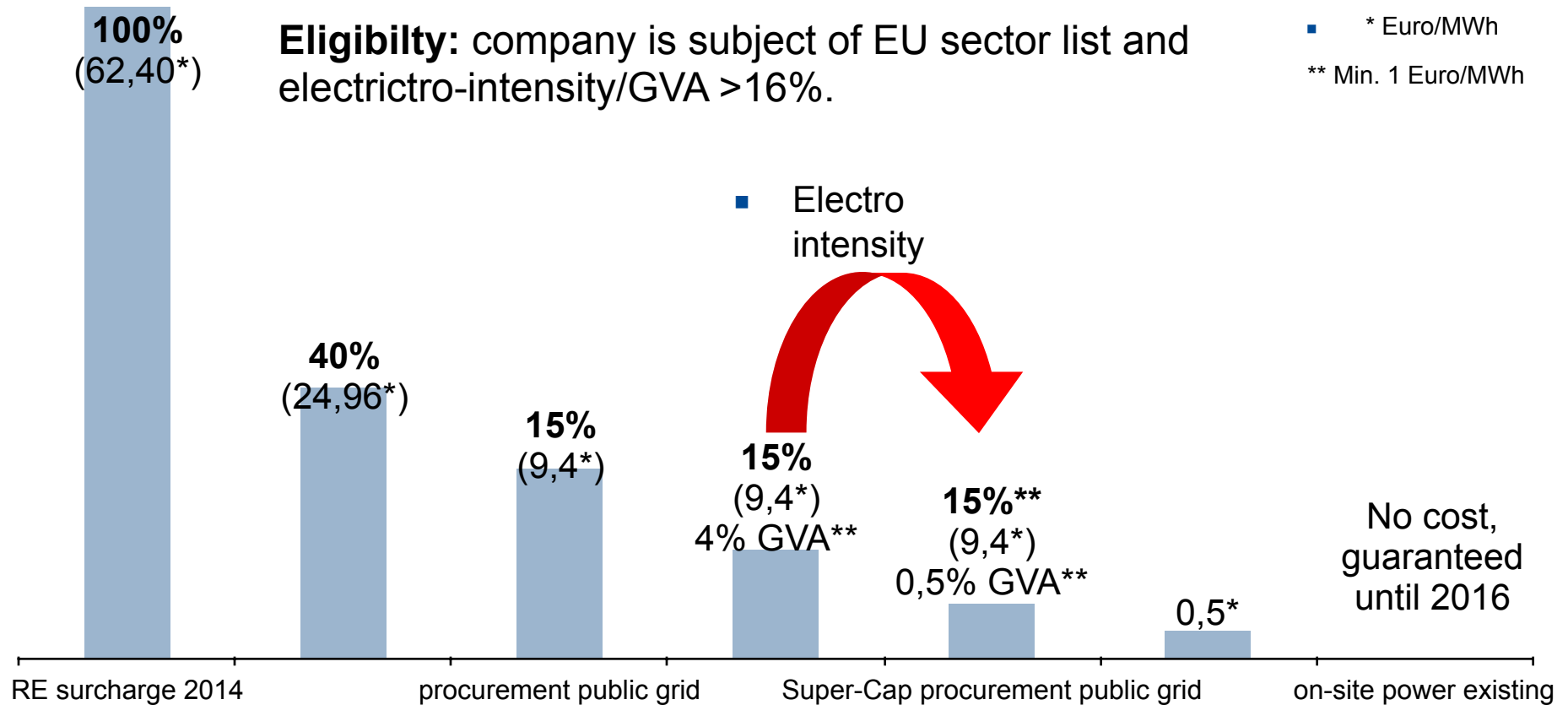


**European/German Energy Policies:
EEG compensation volume (in total)**



Eligibility: company is subject of EU sector list and electro-intensity/GVA >16%.

- * Euro/MWh
- ** Min. 1 Euro/MWh



Conclusions

- Industry to further increase their energy efficiency → **Potentials get smaller**
- German Energiewende has been a bet on increasing global energy prices → **Key assumption not been confirmed**
- German Government locked in high-cost policies (e.g. renewables) with long-term funding → **high energy prices/charges for customers**
- EU and German energy policies not aligned (e.g. EU ETS and German EEG): → **Reforms & better alignment between EU and German Bund/Länder**
- Industry provisions (e.g. no/lower surcharges) discussed → **Appropriate & EU compliant regulations necessary to allow for global competitiveness**
- Industry to deliver on energy efficiency products/services → **Increase support for real R&D rather than deployment; innovation friendly society**



The Chemical Company