



Federal Ministry
for Economic Affairs
and Energy



MITTELSTAND
GLOBAL
FOREIGN MARKET
ENTRY PROGRAMME

Luftreinhaltung und Lärmschutz in Deutschland – aktueller Stand und Perspektiven

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Air pollution control and noise control in Germany – status quo and perspectives

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Agenda

- IUTA at a glance
- Current challenges in fields of air pollution control and noise reduction
- Policy and legislative framework
- Funding and support measures
- Funding agencies
- Political and economic effects
- Examples of how individual companies have benefited from greater commitment to air pollution control – success stories

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IUTA - Facts and Figures

- non profit research institution
- founded 1989
- associated Institute at the University of Duisburg-Essen
- founding member of the Johannes-Rau-Research Society (JRF)
- member of the German Federation of Industrial Research Associations - AiF
- Approx. 120 employees
- 8-10 Mio. €/a turnover
- 2.400 m² office and lab area
- 5.200 m² pilot plant area
- ca. 360 collaborations with industry
- approx. 150 R&D collaborations





IUTA - Profile

research.

- process engineering at industrially relevant scale
- chemical and physical analysis
- particles, gases, hazardous and toxic substances, ...

network.

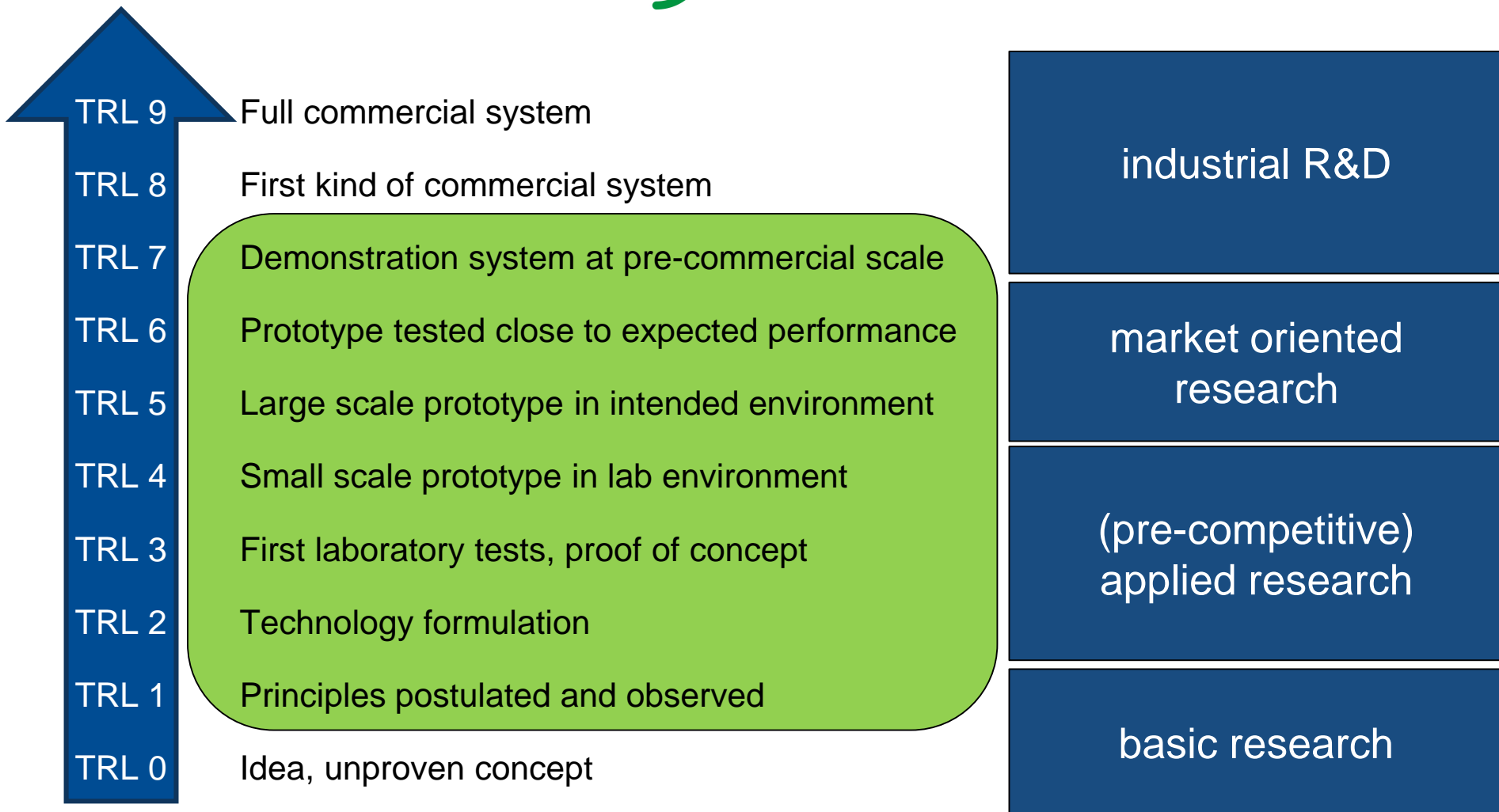
- bridge between basic research and industry
- > 50 project specific industrial advisory board meetings
- organisation of branch specific transfer activities

implementation.

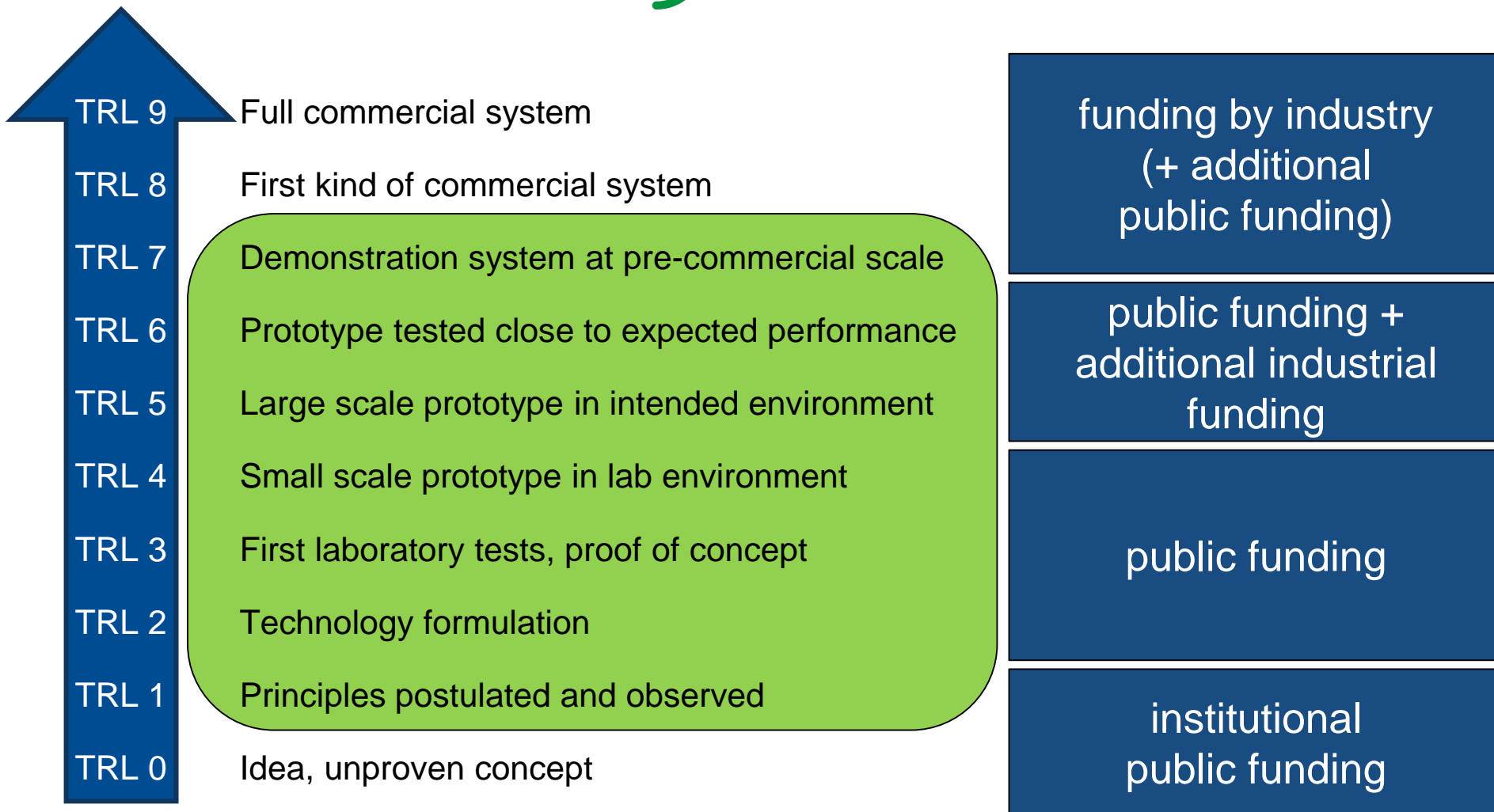
- applied R&D projects
- transfer of the outcome to industry
- focus on small and medium sized enterprises



R&D Roadmap and Research Activities



R&D Roadmap and funding opportunities

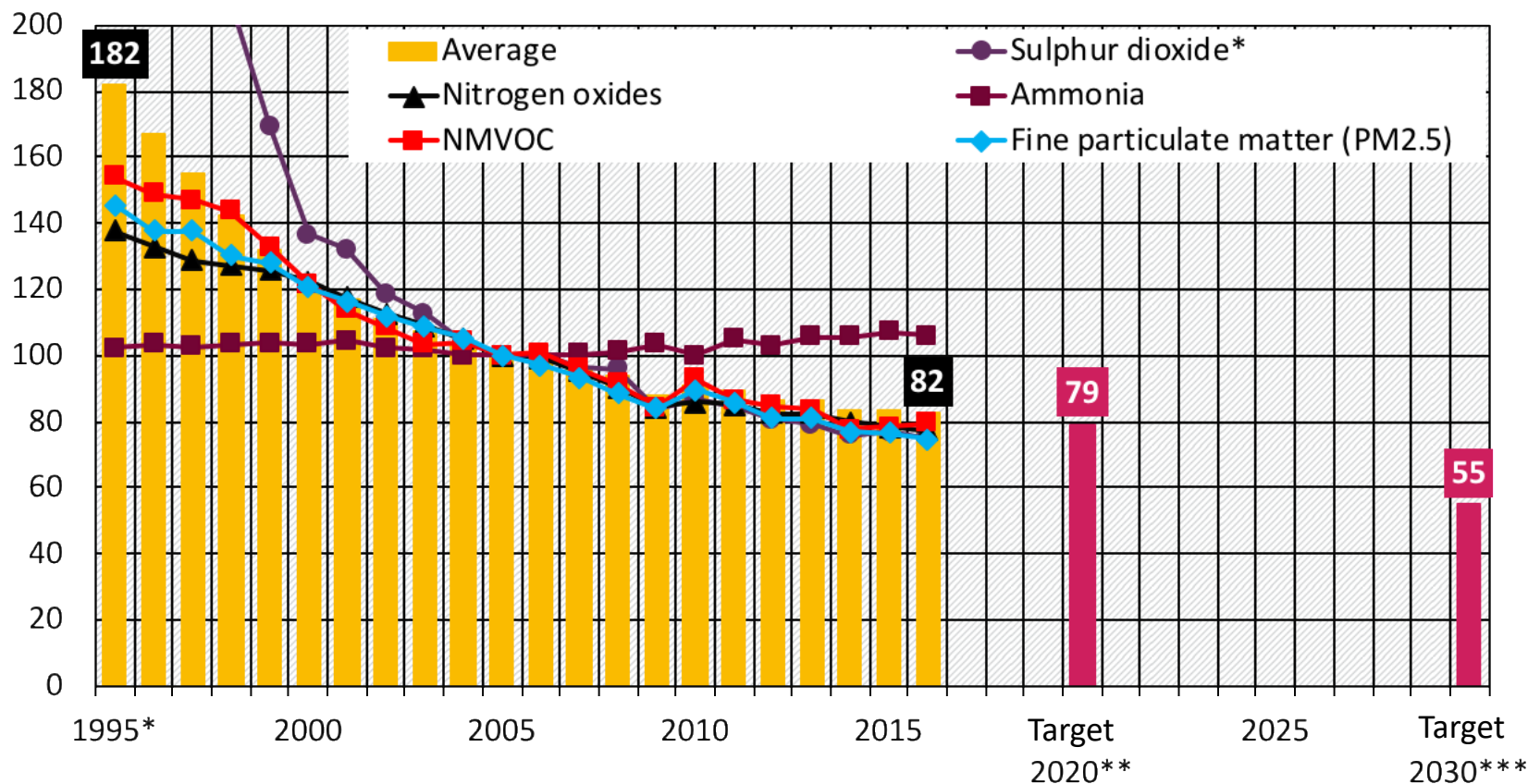


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Air Pollutant Index of Emissions

Mean percentage trend of different air pollutant emissions compared with 2005



* Sulphur dioxide value in 1995: 360

** 2020 target based on the Gothenburg Protocol reduction commitments

*** 2030 target based on the future EU 'national emission reduction commitments' and the target of the Federal Governments' Strategy for Sustainable Development

Source: German Environment Agency, National trend tables for German reporting on atmospheric emissions since 1990, Emissions from 1990 to 2016 (final version of 02/2018)



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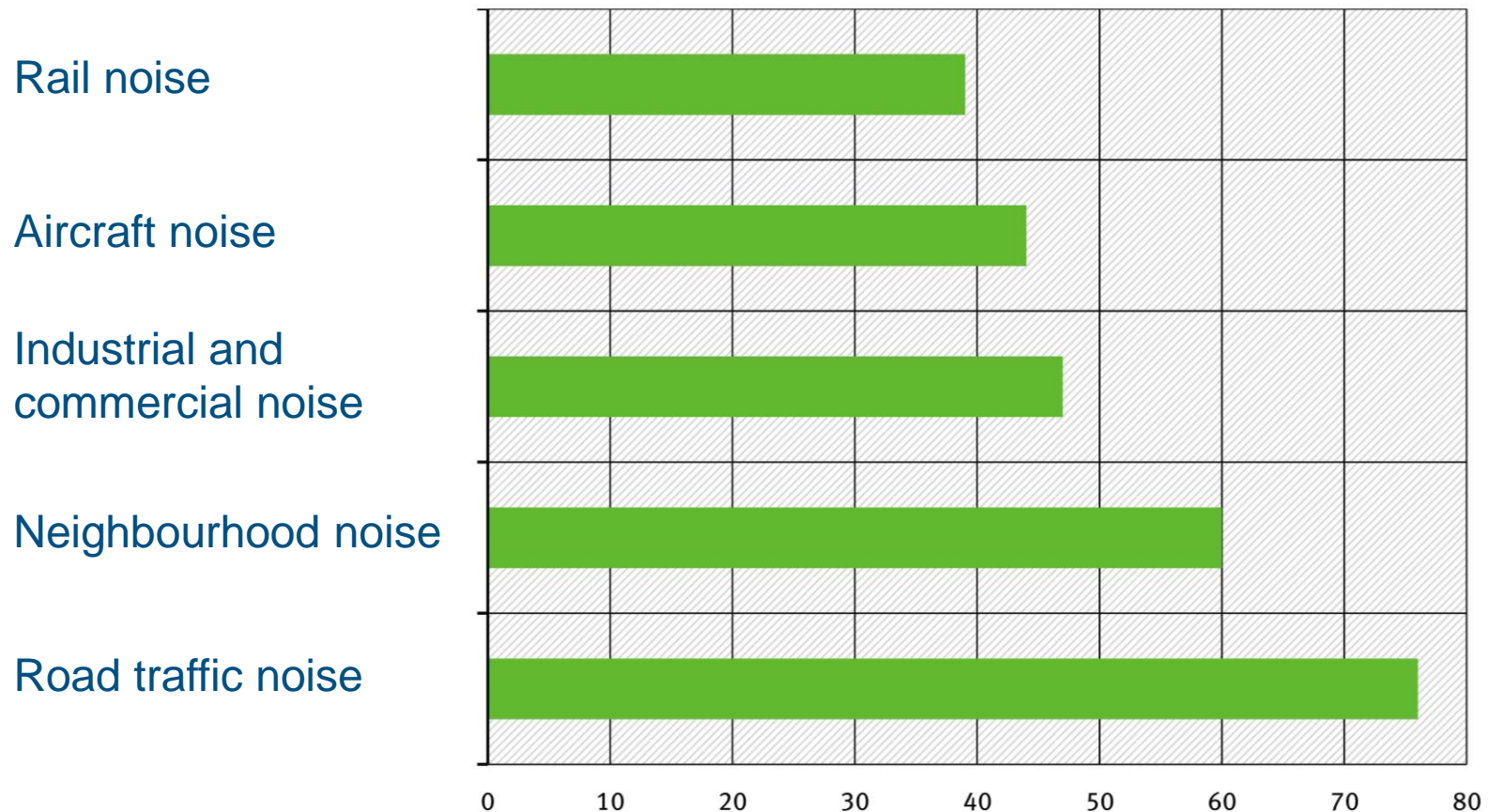


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Stefan Haep | Air pollution control and noise control in Germany
13.09.18, Page 10

Noise Annoyance in Germany

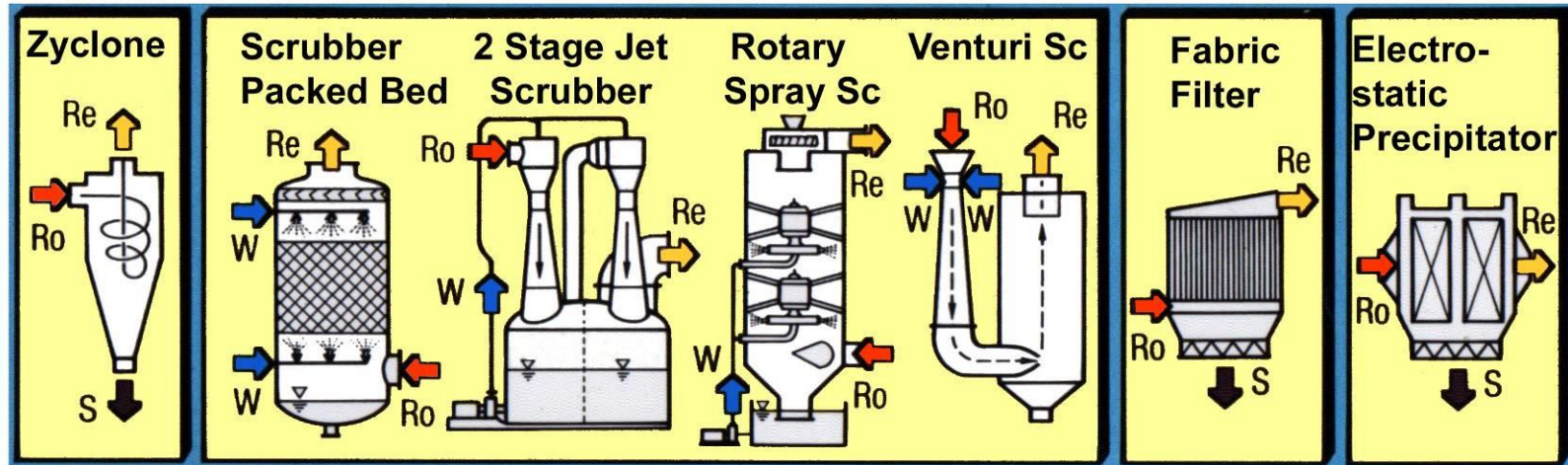
Representative public survey of some 2,000 adults in Germany 2016 (%)



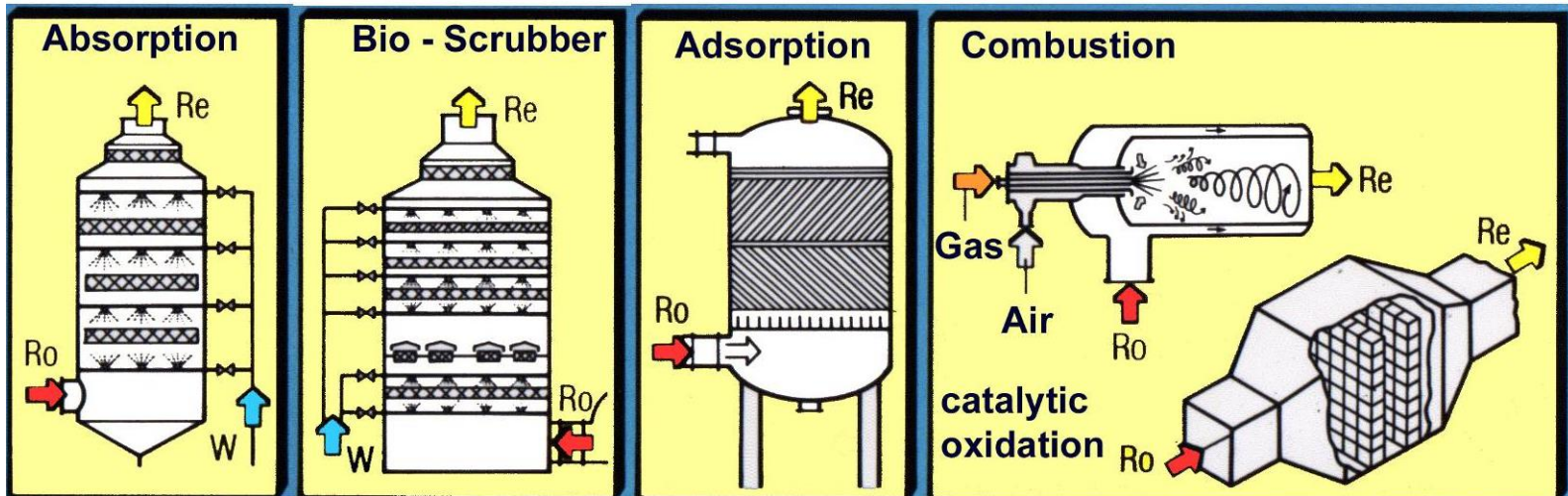
Reference: <https://www.umweltbundesamt.de/themen/verkehr-laerm/laermwirkung/laermbelastung>

Air Pollution Control Technologies

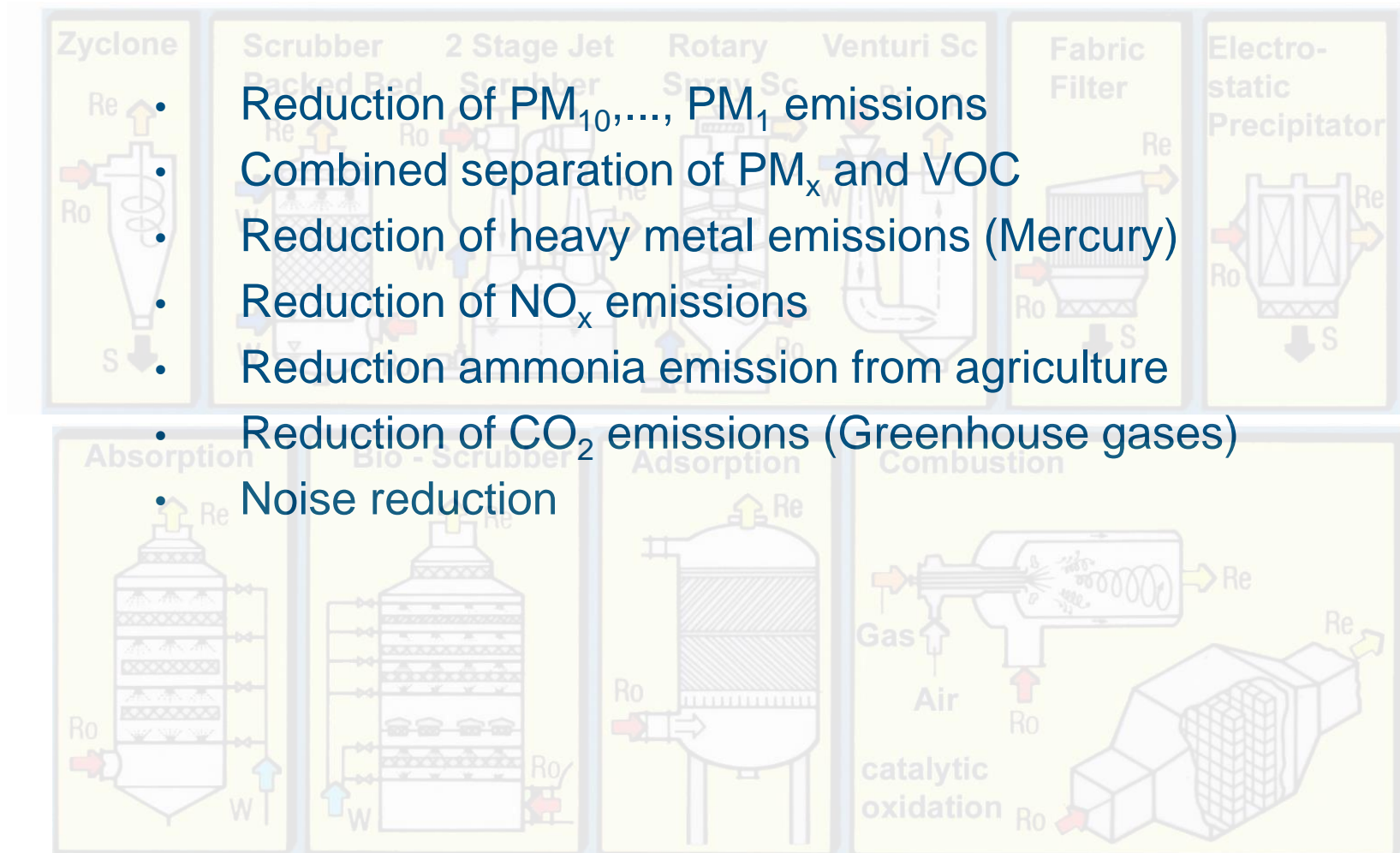
Reduction of Dust, Ash and Aerosols



Reduction of Gaseous Compounds



Actual Challenges APC Technologies



- Reduction of PM₁₀, ..., PM₁ emissions
- Combined separation of PM_x and VOC
- Reduction of heavy metal emissions (Mercury)
- Reduction of NO_x emissions
- Reduction ammonia emission from agriculture
- Reduction of CO₂ emissions (Greenhouse gases)
- Noise reduction

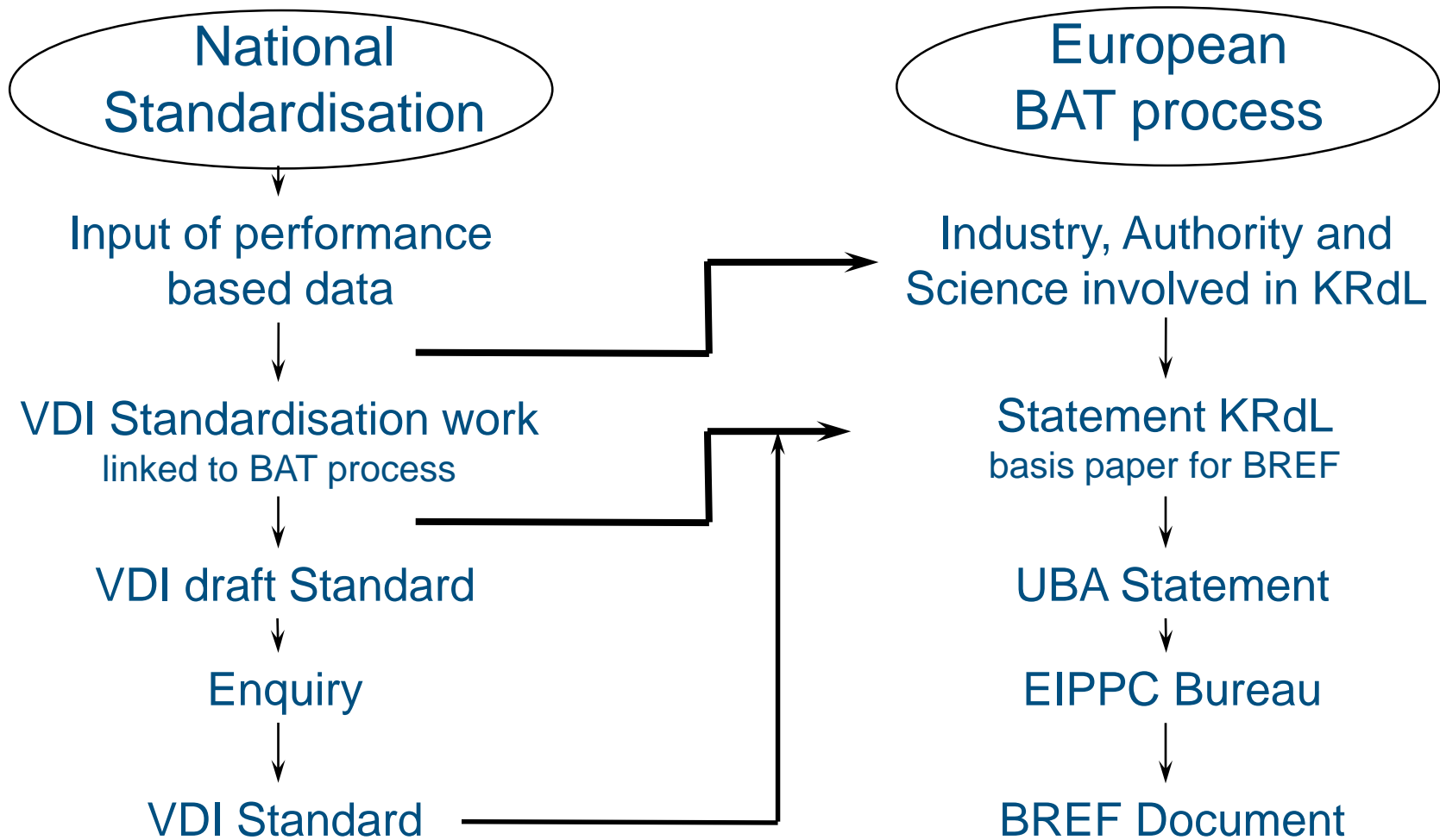
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Hierarchical Structure of Laws and Regulations



Transfer of VDI Standards to BREF Documents



Reference: Commission on Air Pollution Prevention of VDI and DIN – Standards Committee

Technical Instructions on Air Quality (TA-Luft)

- Central Immission Control Regulation for Plant Approval
- administrative regulation specifying standards, binding for authorities
- approval basis for more than 50,000 plants
- installations to be approved must not exceed certain values for immissions (airborne pollutants)
- contains general emission requirements for certain air pollutants (prevention of harmful environmental impacts)
- concretizes the state of the art
- creates nationwide, binding requirements for plants requiring approval
- includes BAT conclusions

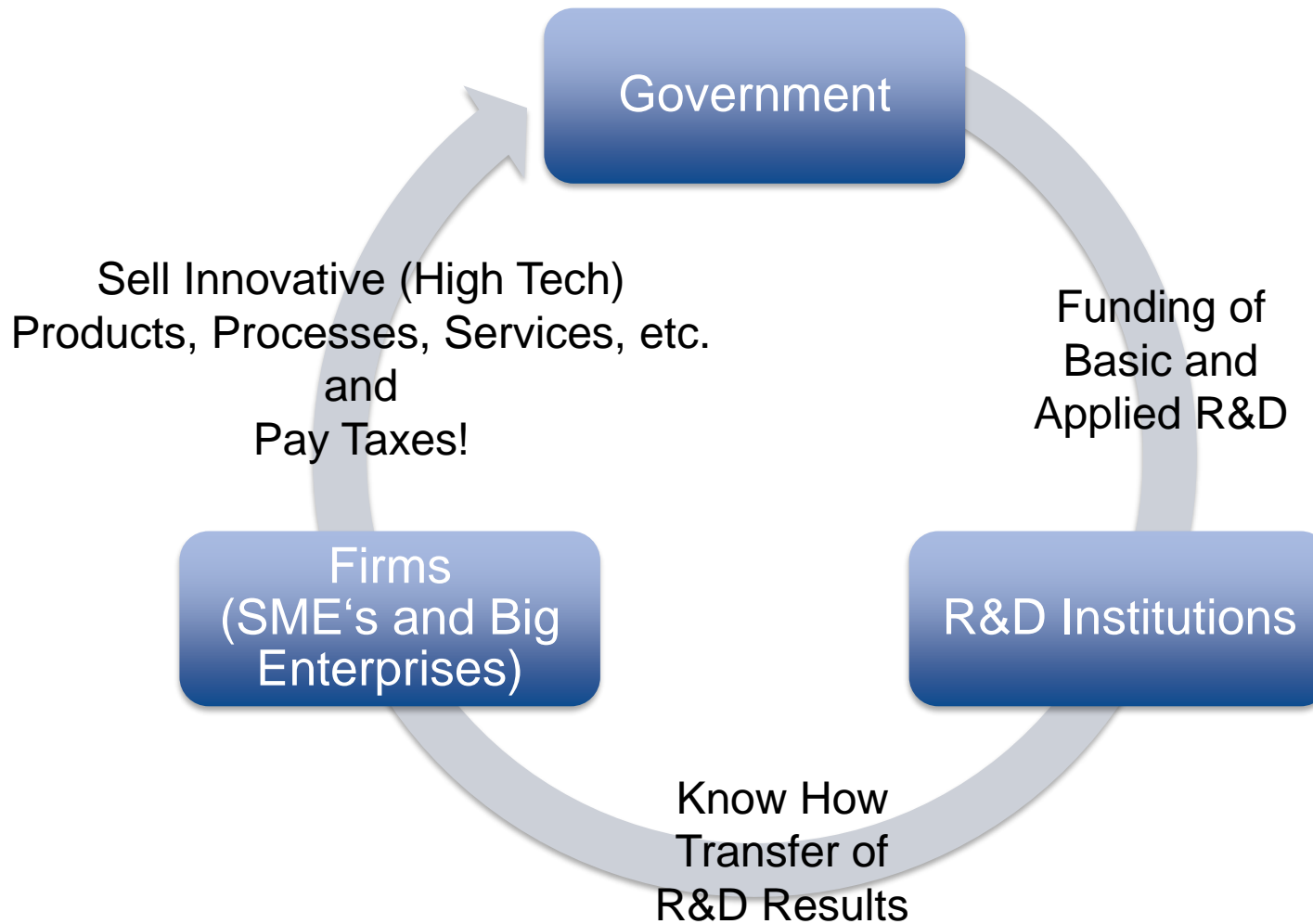
Technical Instructions on Noise Pollution Control (TA Lärm)

- Central Noise Control Regulation for Plant Approval
- administrative regulation specifying standards, binding for authorities
- installations to be approved must not exceed certain values for acoustic levels
- creates nationwide, binding requirements for commercial and industrial plants requiring approval

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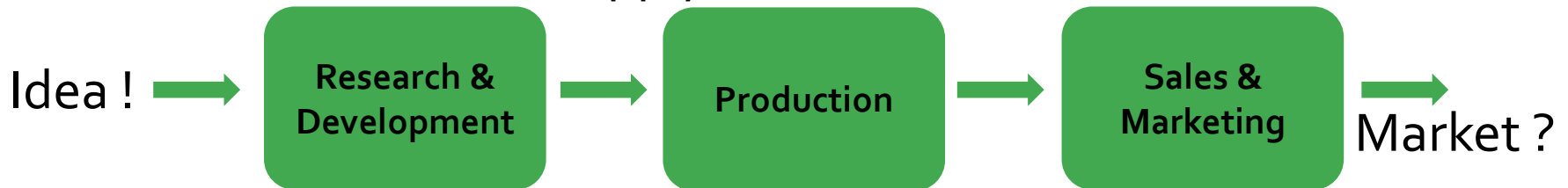
Economic Cycle



R&D as an instrument for promoting innovation

1

Technology Push
(supply orientation)

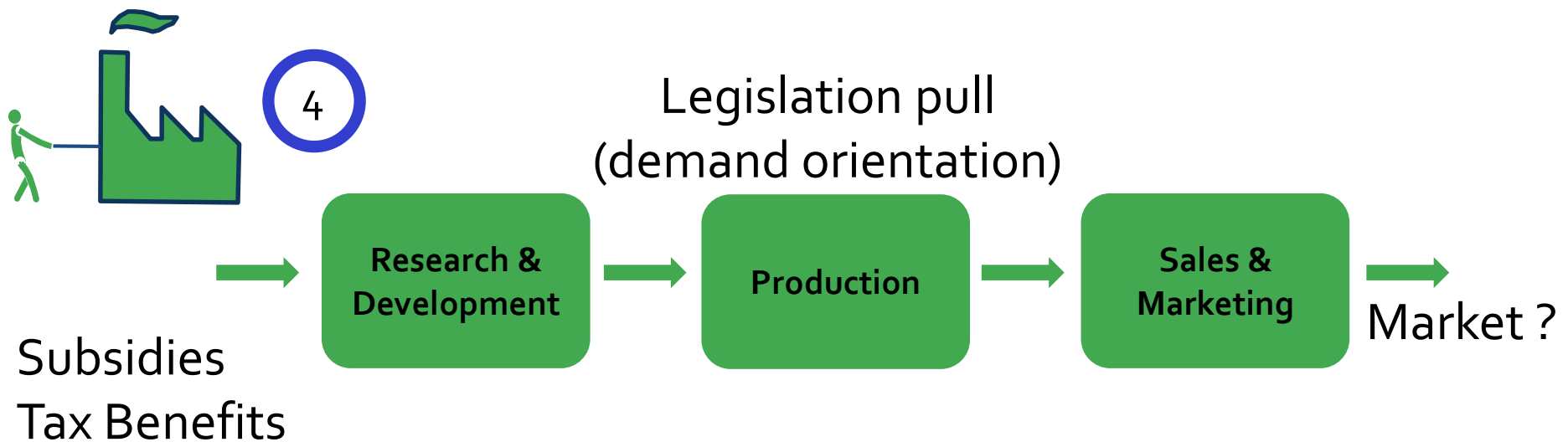
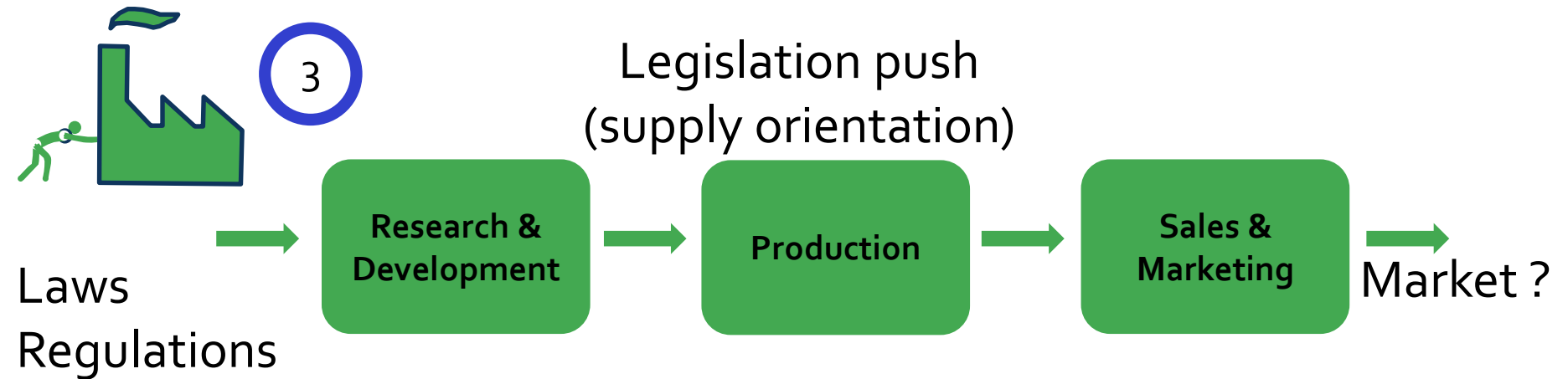


2

Market pull
(demand orientation)



R&D as an instrument for promoting innovation



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Funding Opportunities in Germany and EU



Ministerium für Wirtschaft, Innovation,
Digitalisierung und Energie
des Landes Nordrhein-Westfalen



Ministerium für
Kultur und Wissenschaft
des Landes Nordrhein-Westfalen



Ministerium für Umwelt, Landwirtschaft,
Natur- und Verbraucherschutz
des Landes Nordrhein-Westfalen



Deutsche
Forschungsgemeinschaft
DFG



And Many More!

Funding Opportunities in Germany and EU



Collective Research

organized by



German Federation of
Industrial Research
Associations

supported by



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and Energy



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and Energy



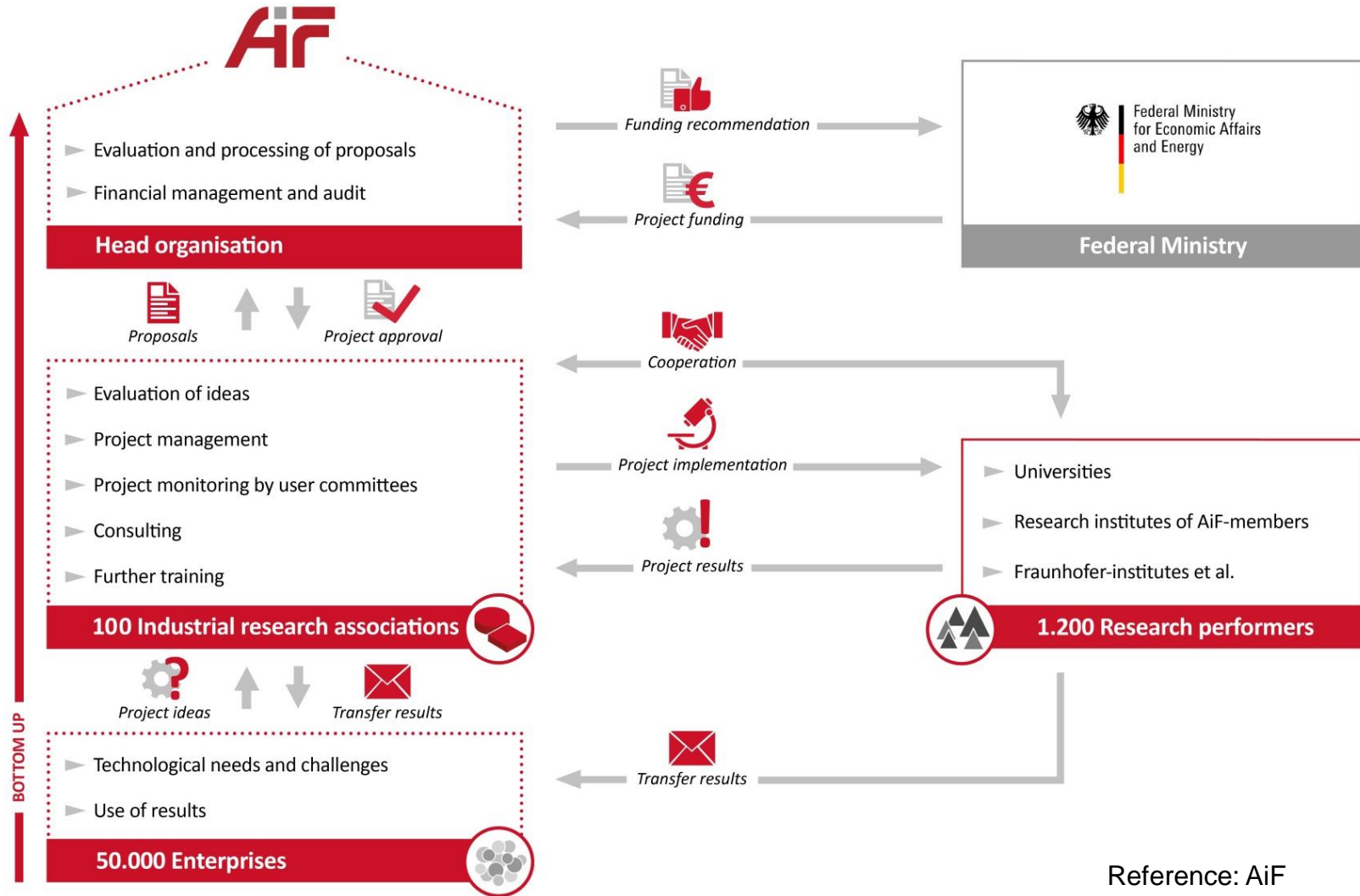
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Reference: AiF

iGr : German Collective Research Scheme




Reference: AiF

iGF : Subtypes of Collective Research

Supported by:



on the basis of a decision
by the German Bundestag

-  **cornet**
Transnational Collective Research
- **PLUS**
Projects of greater scale consisting of several individual parts that combine basic and applied research
- **Leading Technologies for SMEs**
Projects of greater scale concerning future technologies and increasing the competitiveness of an entire business sector

Reference: AiF

EU- Funding Opportunities

At local, regional and national level environmental projects and initiatives can be co-financed from the:

- EU Structural Funds of the European Social Fund (ESF)
- European Regional Development Fund (ERDF)
- European Agricultural Fund for Rural Development (EAFRD)

The public international financial institutions (IPFI) offer subsidised financial services in particular for companies / SMEs:

- grants for thematic projects
- soft loans
- guarantees

Links:

EIB: <http://www.eib.org/>

KfW: <https://www.kfw.de>

EBRD: <http://www.ebrd.com>

EIF: <http://www.eif.org/>

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Production of potential environmental protection goods in Germany by environmental sector

	Production in Billion Euro ¹			
Environmental Sector	2009	2011	2013	2015
Waste	7,8	10,2	10,3	10,2
Waste water	14,0	16,1	16,8	17,1
Noise	3,6	5,3	5,4	5,1
Air	5,2	7,6	7,3	9,3
Measuring and control technology	5,2	6,7	7,0	7,5
Climate protection	30,2	37,5	33,3	33,7
Total*	67,7	84,8	81,6	83,4

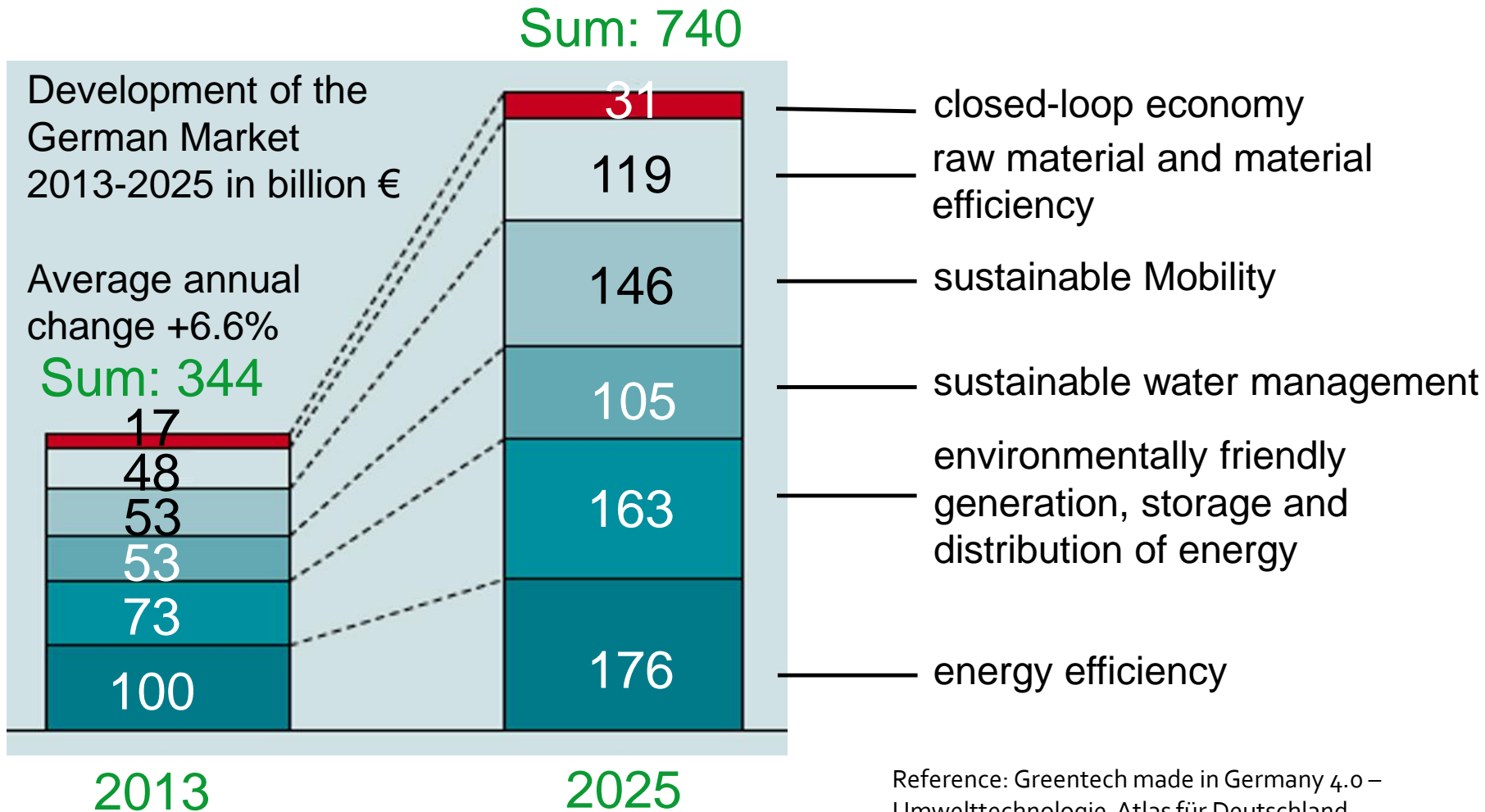
*including groups of goods not attributable due to secrecy

} **NRW²**
2015:
1,2

References:

- 1: Gehrke, B. und U. Schasse (2017): Die Umweltschutzwirtschaft in Deutschland. Produktion, Umsatz und Außenhandel - Aktualisierte Ausgabe 2017. In: UBA, BMUB (Hrsg.): Reihe Umwelt, Innovation, Beschäftigung 03/2017. Dessau-Roßlau, Berlin
- 2: <https://www.umweltwirtschaft.nrw.de/teilmaerkte/minderungs-und-schutztechnologien/>

Environmental Market in Germany



Reference: Greentech made in Germany 4.0 – Umwelttechnologie-Atlas für Deutschland, Stand Juli 2014, Herausgeber BMUB

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Example 1: (ECO)Industrial Park

An **industrial park** is a demarcated industrial site on which several independent companies from one or more sectors are active. The site companies are linked together by common value chains and share the site-related infrastructure and services, which are often provided by a public or private operating company.

Reference: wikipedia

An **eco-industrial park** defines a community companies that works together to improve environmental and economic performance by addressing environmental and resource issues, including energy, water, materials, infrastructure and natural habitats.

Reference: Lowe 1995

Example 1: Industrial Park – APC Concepts

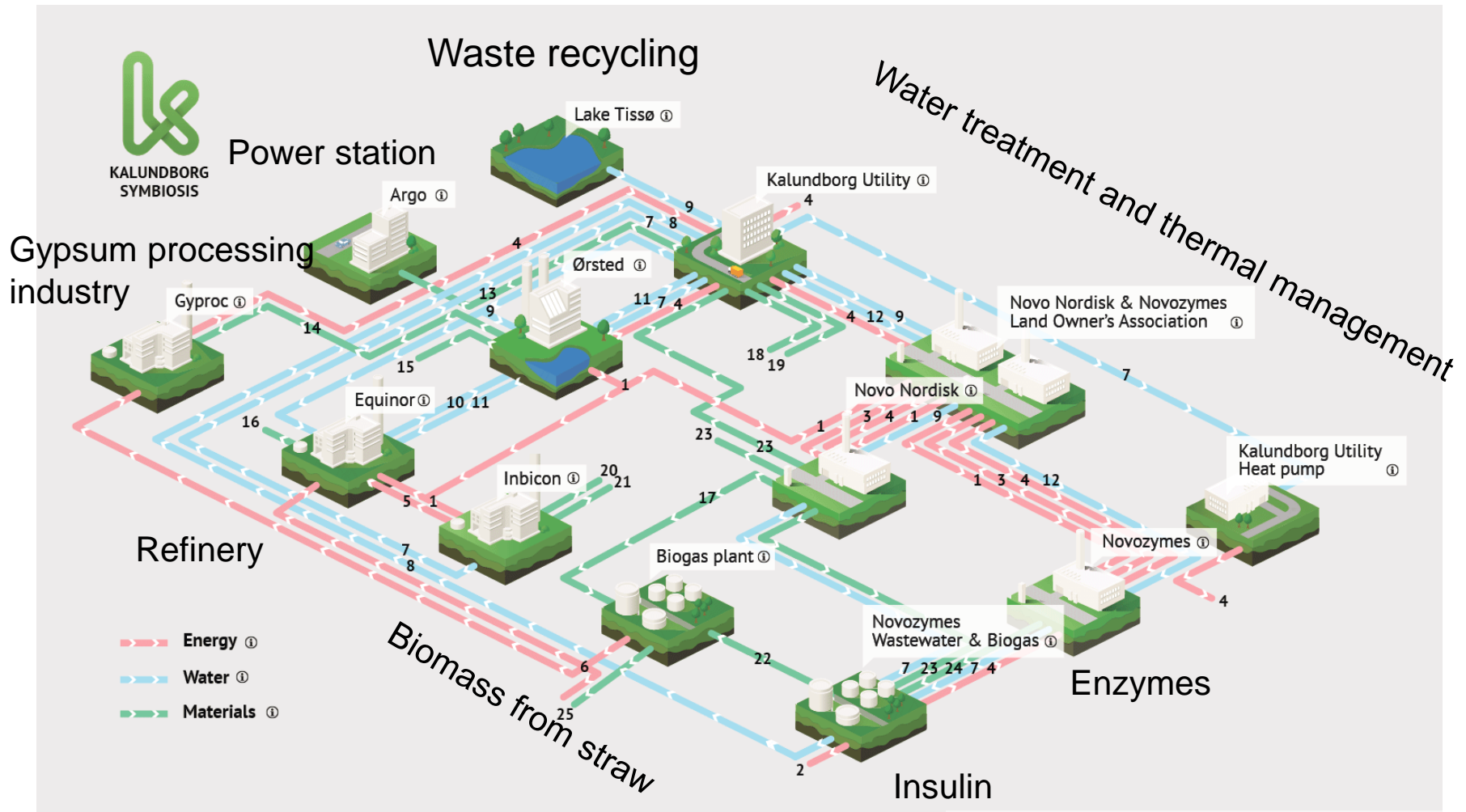
Avoidance of pollutant emissions by

- use/production on site of renewable energy and
- use of pollutant-free transport possibilities, e.g. electric vehicles on the basis of renewable energy

Reduction of pollutant emissions by

- reducing the need for primary energy
- combined heat and power generation, energy network, optimisation of production processes
- reduction of goods and passenger transport, waste disposal/recycling on site, close loop economy, public transport, infrastructure
- clean production processes
- end-of-pipe technologies

Example 1: Industrial Park Kalunborg DK



Reference: www.symbiosecenter.dk

Example 1: Industrial Park Kalunborg, DK

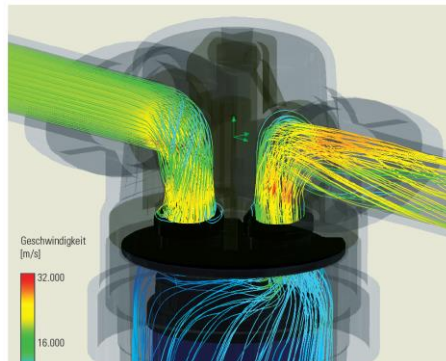
At site e.g.

- Coal-fired power plant (1.00 MWe)
- Refinery (3-4 million t/a crude oil)
- gypsum board production
- pharmaceutical companies

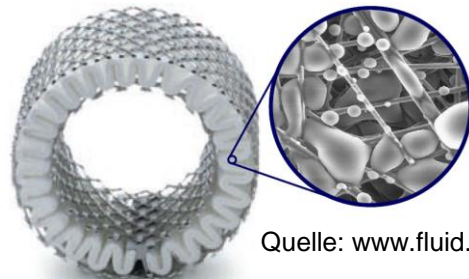
reduced raw material consumption		reduced emissions		recycling of waste	
Crude oil	19.000 t	CO ₂	130.000 t	Fly ash	135 t
coal	30.000 t	SO ₂	1.700 t	Sulfur	2.800 t
water	600.000 m ³			Gypsum	80.000 t
				N-Sludge	800.000 t

Reference: Förstner, 2012

Example 2: Optimizing Compressed Air Filter



source: Donaldson Filtration Deutschland GmbH, 2014



Quelle: www.fluid.de

Compressoren installed in the EU:

- Quantity: approx 320.000
- Energy cons.: approx. 80 Mrd. kWh
- Cost: approx. 6,4 Mrd. €
- CO₂: approx. 47 Mio. t

Reduce costs and environmental impact through:

- Increased compressor efficiency
- Prevention of leaks
- Optimization of compressed air filters

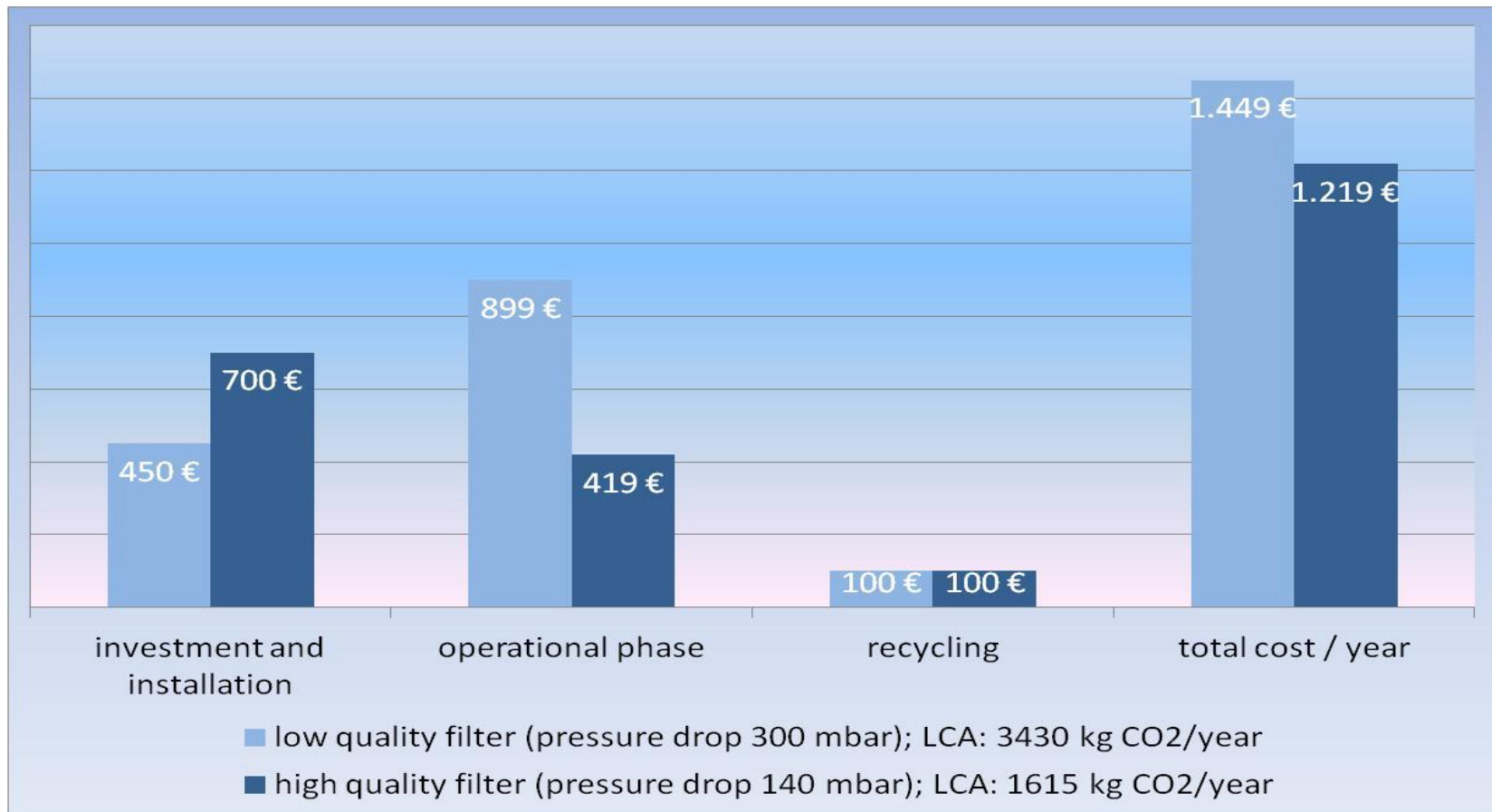
Pressure loss reduction with the same efficiency

- Pleating of the filter medium
- Optimized flow control
- Use of functionalized filter media

Result:

- Reduction of pressure loss from 300 mbar (bad filter) to 140 mbar (good filter)

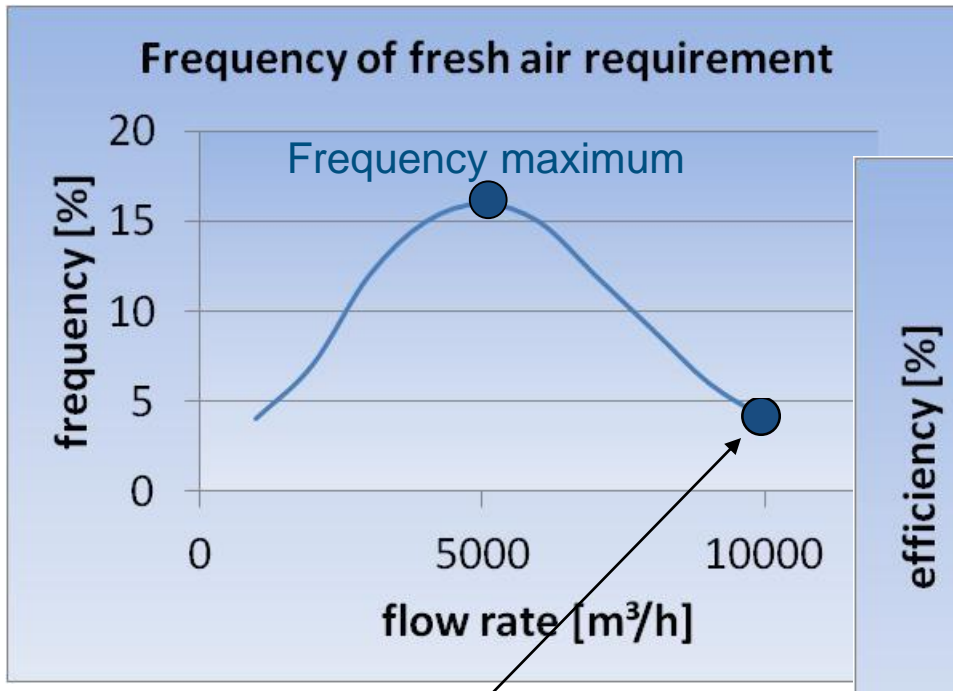
Example 2: Optimizing Compressed Air Filter



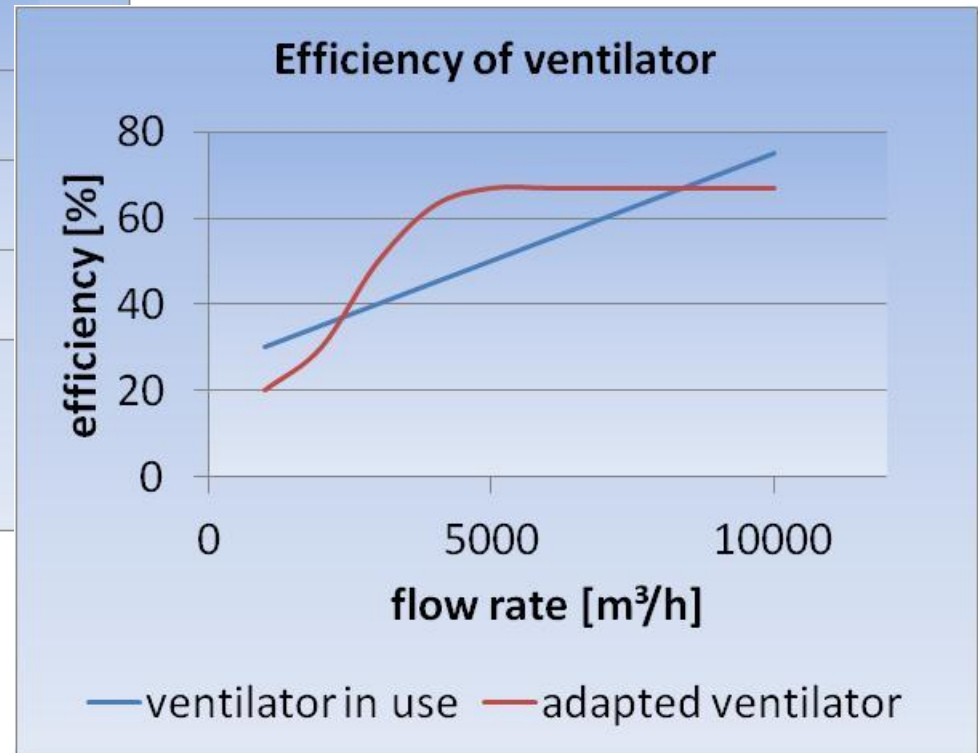
Manufacturer: Increased profit due to market advantage compared to cheap product

Users: Lower operating costs, lower CO₂ emissions

Example 3: Shopping mall air ventilation



Design point for choice of ventilator



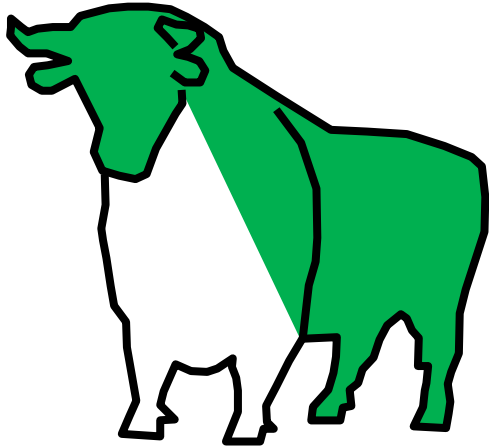
Idea: Adapt efficiency of ventilator to ventilation requirement

Plan: Development of rules for optimized ventilator selection depending on requirement

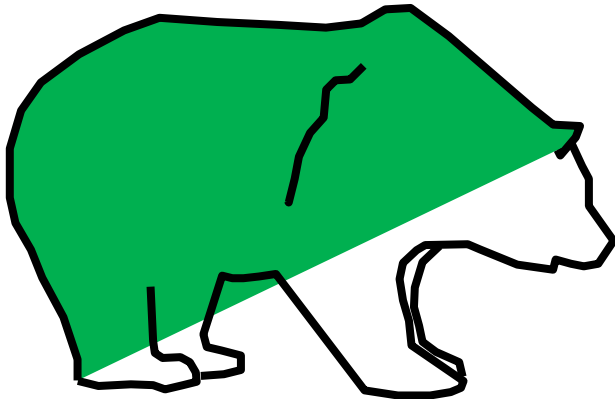
Approaches for further Measures

- NOx emissions from road traffic: **more demanding exhaust emission standards for trucks** (EURO VI), passenger cars (EURO 6), ...
- Solvents (NMVOC): **use of low-solvent or solvent free products** in all product areas
- Air pollution control in general: **energy saving measures**, increasing energy efficiency, the use of emission-free renewable energies, and the **use of low-emission feedstocks and products**.
- Ammonia emissions from agriculture: **reform of the common European agricultural policy** and various national agri-environmental measures
- PM_x: Despite decreasing trend according to WHO, the values should exceed 50 µg/m³ on a maximum of 3 days instead of 35 per year. This target is exceeded by 87% of all measuring stations in Germany. To protect human health, further efforts are therefore **needed to further reduce the health risk posed by particulate matter**. Special attention should be paid to particulate emissions not caused by combustion, e.g. from the abrasion of brake discs, clutches and tyres.

Outlook



- Positive Impacts
 - opportunities for growth
 - new innovative technologies
 - new business models
 - new business fields



- Uncertainties
 - USA – quo vadis?
 - UK – quo vadis?
 - EU- quo vadis?
 - Euro – quo vadis?



Thank you for your attention!

Backup Slides

Literature

Lowe E.A., Evans L.K.: Industrial Ecology and industrial ecosystems. Journal of Cleaner Production 3, 1995, 47–53

Bundesamt für Umwelt und ERA-NET ECO-INNOVERA, Hrsg.: International survey on eco-innovation parks, 2014 www.bafu.admin.ch/uw-1402-e

Förstner, U.: Umweltschutztechnik, 8. neu bearbeitete Auflage, Springer 2012
ISBN: 978-3-642-22973-2

Labour Market – Environmental Sector NRW

NR 14 | NR 2.2 **NRZ**
Dienstag, 17. Januar 2017

Environmental sector provides 27000 new jobs in NRW

Umweltbranche sorgt für 27 000 neue Stellen

Da ist noch mehr drin, meint die Landesregierung. Masterplan mit 800 Mio Fördergeld ausgestattet

Von Matthias Korfmann und Holger Dumke

An Rhein und Ruhr. Die Umweltwirtschaft in Nordrhein-Westfalen ist zwischen 2012 und 2015 deutlich gewachsen. Die Zahl der Beschäftigten stieg in diesen Branchen um 8,5% auf insgesamt 346 000 an – ein Zuwachs von 27 000 Arbeitsplätzen, während die Erwerbstätigkeit insgesamt in der Wirtschaft in diesem Zeitraum nur um 5,2% zunahm. Zur Umweltwirtschaft zählen z.B. Unternehmen, die sich mit Energieeinsparung, Stromspeicherung, sauberem Trinkwasser und umweltfreundlicher Mobilität beschäftigen.

Umweltminister Johannes Remmel (Grüne) kündigte gestern einen „Masterplan“ mit 100 Einzelmaßnahmen zur Förderung der Umweltwirtschaft an. Dazu gehören eine neue Messe für diese Unternehmen, Programme zur Förderung von Solarstrom und ein Pilotprojekt für eine umweltfreundlichere Binnenschifffahrt. Bis zum Jahr 2020 stehen

aus verschiedenen Etats rund 800 Mio Euro Fördergeld zur Verfügung. Im Umweltministerium spricht man vom „größten industriepolitischen Projekt der Landesregierung“.

„Unser Ziel ist es, dass bis zum Jahr 2025 mindestens 420 000 zukunftsfähige Arbeitsplätze in der NRW-Umweltwirtschaft entstehen oder gesichert werden“, sagte Johannes Remmel. Der jetzt vom Kabinett verabschiedete Masterplan sieht zum Beispiel eine neue Messe für Firmen der Umweltwirtschaft am Standort NRW vor. Geplant ist auch ein „Low Carbon Zentrum“, das Wege aufzeigen soll, wie die Gesellschaft mit immer weniger Kohlenstoff auskommt. Und, ganz allgemein, sollen sich Betriebe und Hochschulen austauschen, um zu neuen Lösungen zu kommen. In den nächsten Wochen das „Kompetenznetzwerk Umweltwirtschaft“ an.

Etwa jeder dritte Beschäftigte in der Umweltbranche arbeitet im Bereich der Energieeffizienz. Der Anteil der Beschäftigten in der Umweltwirtschaft ist in den Regionen Köln/Bonn und Düsseldorf höher als im Rest des Landes. Die „Green Tech Ruhr“ als Dachmarke für kleine und mittlere Unternehmen im Bereich des Regionalverbandes Ruhr oder den Zusammen-

368,000 employed in North Rhine-Westphalia's environmental economy (2016)

5.1 % Share of employees in the environmental economy in North Rhine-Westphalia's total economy (2016)

6 % of total North-Rhine Westfalian gross added value (27.7 billion Euros in 2015)

FOTO: GRABEN

Reference: Ministry for Environment, Agriculture, Conservation and Consumer Protection of the State of North Rhine-Westphalia

Example 1: Industrial Parks in Germany

- BASF Verbundstandort, Ludwigshafen
- Bayer Industrial Park Brunsbüttel
- Chemiepark Knapsack
- Chemie- und Industriepark Zeitz
- Chemiepark Bitterfeld Wolfen
- Chempark Dormagen
- Chempark Krefeld Uerdingen
- Chempark Leverkusen
- Dow ValuePark, Merseburg
- Industriepark Gertshofen
- Gewerbenetzwerk Pfaffengrund, Heidelberg
- Honeywell Seelze
- Industriepark Höchst
- Industriepark Kalle Albert, Wiesbaden
- InfraLeuna
- Chemiepark Marl
- Industriepark Oberbruch
- Pharma- und Chemiepark Wuppertal
- Chemiepark Schwedt
- InnovationCity Ruhr, Bottrop
- Zero Emission Park Eberswalde
- Dortmund Technologiepark
- Werk Gendorf Industrial Park
- Infracore Rhodia Industriepark Freiburg
- Industrie Center Obernburg
- Industriepark Münchsmünster
- BASF Verbundstandort, Schwarzheide
- Industriepark Griesheim
- Industriepark Wolfgang
- Standort Behringwerke Marburg
- Industriepark Köln-Merkenich
- Industriepark Solvay Rheinberg
- TroPark Troisdorf-IndustrieStadtspark
- Chemiepark Rudolstadt/Schwarza

Reference: www.bafu.admin.ch/uw-1402-e

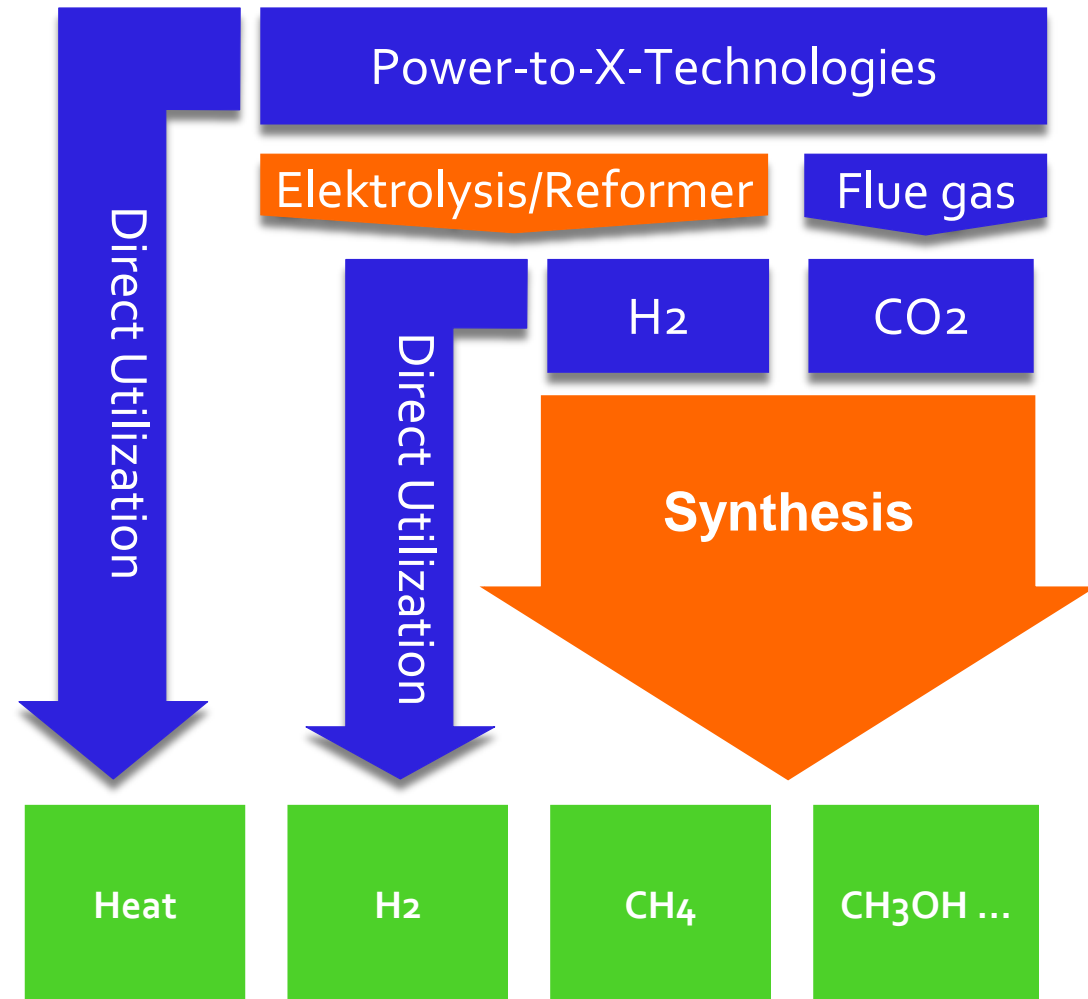
Example 4: PtX - Optimizing Methanol Synthesis

Energy system transformation:

- Expansion of renewable energy
→ volatile power generation
- Stabilization of the grid by
 - ✓ coupling of decentralised energy systems and consumers
 - ✓ Expansion of control energy
 - ✓ sector coupling and
 - ✓ coupling of storage technologies

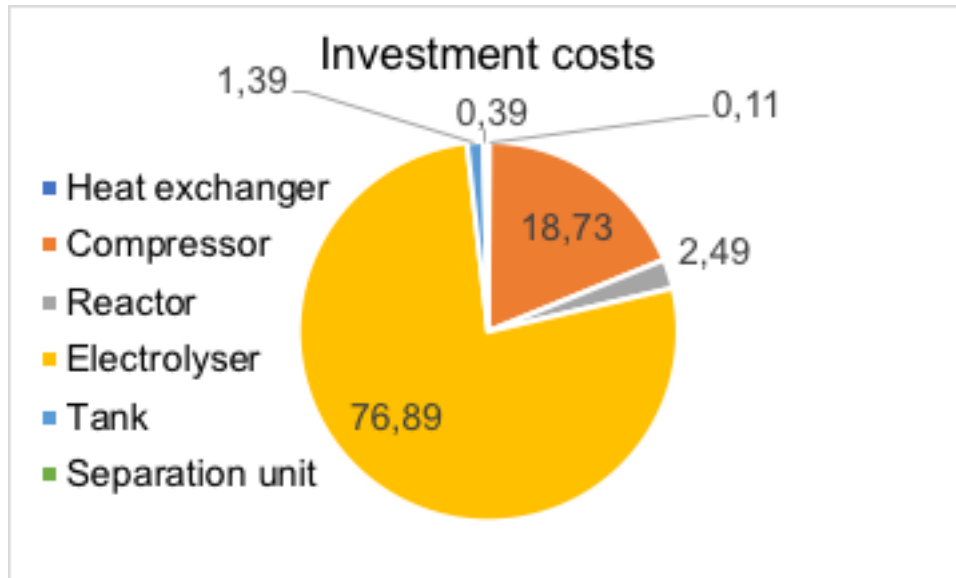
Reduction of greenhouse gas emissions

→ chemical storage



Example 4: PtX - Optimizing Methanol Synthesis

Distribution of investment and operating costs



Methanol production costs: 820 €/t MeOH
Current MeOH price: 250 €/t MeOH

Operating expenses (%)

Electricity	84 %
Steam	6 %
Maintenance, operation, etc.	6 %
Other	4 %

[Ambrosy 2016]

Conclusions of R&D:

- what are price drivers (electrolysis, electricity)
- where development potential must be tapped (H₂ supply, process optimization electrolysis, methanol yield)
- which energy policy measures are necessary (reduction of electricity costs for storage technologies)