World Materials Forum

Workshop #3 “Better Access to R&D“

Nancy, 24 June 2015

WORLD MATERIALS FORUM

voestalpine AG

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ONE STEP AHEAD.

“Better Access to R&D“
Leading questions

I. What research and development (R&D) is needed for a globally sustainable future?

II. What do you consider to be the hurdles to quicker design, adoption and implementation of technologies in the industry?

III. Which support from stakeholders (regional or national grants, cooperation with universities, benchmark from other industries) do you consider to be the most efficient in terms of R&D acceleration?

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I. Research and development
Resource efficiency

Research & Development = core element of voestalpine's sustainable business strategy

- Efficiently use resources (especially raw materials and energy)
- Manage waste
- Prevent and minimize environmental impacts (active climate protection incl. CO_2 reduction)
- Analyze life-cycle and material flow (development of geological knowledge, exploration, mining, ore processing, metallurgy and refining, materials and products design, recycling)
- Information processing / intelligence development for more efficiency and reduction of capital intensity in R&D

→ material and product design for circular economy
→ alternative production routes and process optimization along the supply chain (up to zero-waste & low-carbon process)

I. Research and development

Resource efficiency requires two perspectives

Production and processing

Efficient and cost-optimized use and re-use of raw materials, energy, water, and byproducts

↓

voestalpine as industry benchmark in Europe

in resource and energy efficiency as well as environmental compatibility

E.g.: Integrated energy cycles, water management and self-sufficiency with electricity; emission reduction technologies

Life cycle

Material: high-tech steel

Resource balance over the entire life cycle; potential of a material for sustainable savings of resources

↓

Advantages of steel in comparison to other materials

Life cycle assessment as basis for sustainable resource efficiency

E.g.: Lightweight construction, increase of energy efficiency (power plants, turbines), contribution to “low carbon” transformation

I. Research and development

Resource efficiency – production and processing

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Reducing emissions & energy consumption

1985 – 2015

(per ton of crude steel)

*Steel Division

I. Research and development
Resource efficiency – life cycle

Steel is the most recycled material in the world.

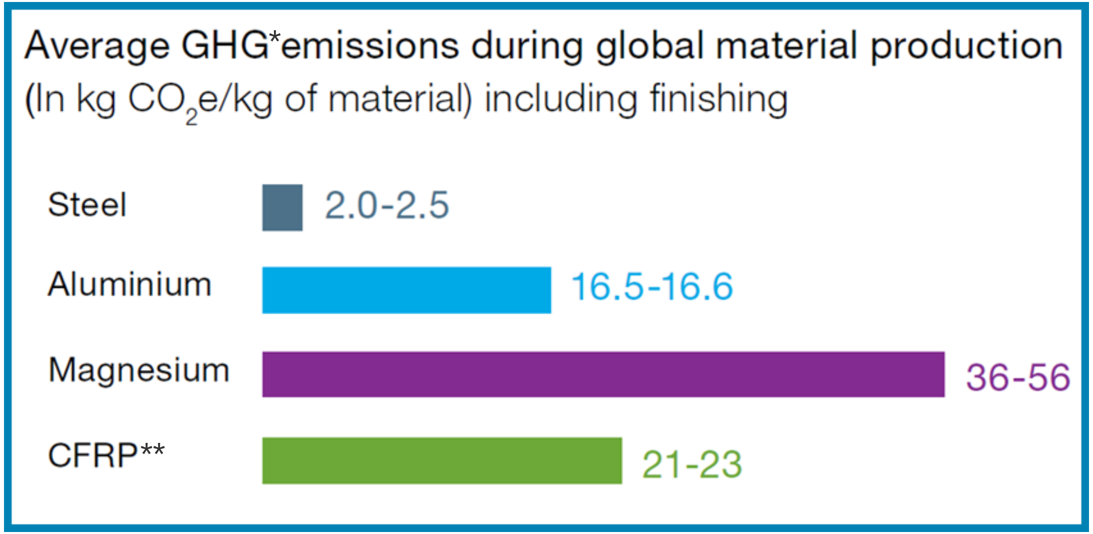
- Steel is almost 100% recyclable without loss of its inherent material properties
- The recycled content of steel products goes up to 100%.

  Examples for recovery rates for different sectors:
  - more than 90% for machinery
  - 95% in automotive industry in Europe
  - up to 98% for structural steel
- Around 75% of steel products ever made are still in use today.

voestalpine is investing in sustainability measures through innovative steel products and is actively working on standards for recycling and life cycle assessments.

I. Research and development

Life cycle – materials for automotive applications



*Greenhouse Gas
**Carbon Fibre Reinforced Plastic
Note: 1kg of steel is not equal to 1kg of another material.
Functional units need to be compared (eg. light weight potential).
Source: World Steel Association 2015

I. Research and development
Material science supporting efficiency

Example for the development of new materials:
phs-ultraform®

- Substantially lower carbon emissions over life cycle
- Easier formability of high-strength steels
- Possibility to shape more complex geometries

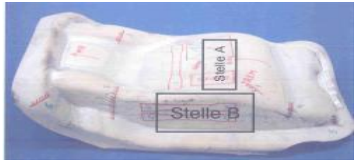
→ Supporting the trend to lightweight cars

phs-ultraform®

I. Research and development

Timeline of innovation – phs-ultraform®

2001	first experimental investigations
2003	first patents (in Austria)
2005	first prototype parts by OEM
2008	first presentation on serial parts by OEM
	further development of direct and indirect process, tailored property parts
2015	wide range of serial applications at different OEMs
2020	international roll out



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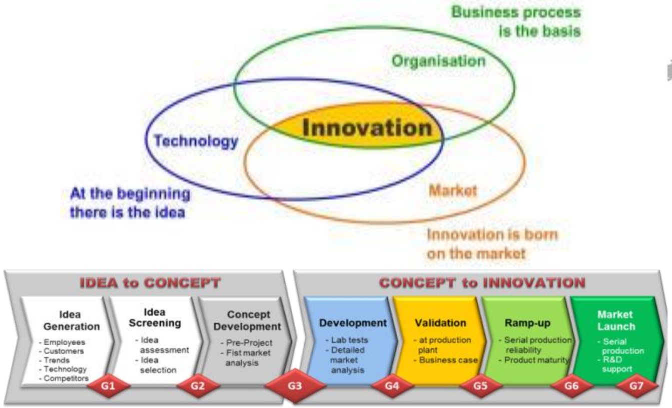
II. Hurdles

Difference in R&D and Innovation (Yesterday>Today>Tomorrow)



- Pioneers
- Central R&D

- Decentralized R&D
  Central steering board
  Standardized R&D and Innovation Process
- Cooperation partners
- Mainly national

- Global R&D centers
- Central strategic R&D planning
- Projects with global scope
- Open, flexible and learning culture

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II. Hurdles
Regulatory, financial, cultural & emotional hurdles

Global environmental standards and need for support / funding for investments in

- more energy efficient technologies or ways of further CO_2 reduction
  (resource efficient and/or sustainable production)
- technology development incl. the use of recyclable materials and recycling-friendly design
- research process itself (reduction of capital intensity of research and innovation)
- further support through
  - harmonization regarding patent system (eg. to high innovation content only)
  - transfer of the energy systems from high CO_2 fossil fuels towards renewable-based electricity

However, funds are limited and therefore, the process for getting funds is expensive because of high submission quotes; the rejection rate is at around 85 - 90%.

> Global regulations = key requisite
> to move investments of industry away from “only” product optimization to
> research & innovation by moving away from a patchwork of national regulations and industry standards
> → otherwise technology development will be limited

II. Hurdles
EU industrial policies and legislation

- Resource (and energy) intensive industries as main drivers of innovations in the field of resource efficiency – both with their products and their production
- EU legislation as serious burden and long-term threat to European companies
  - Energy:
    - Political influence in Europe leading to higher prices (e.g. for electricity or gas)
    - Shortages of resources at a competitive price level (needed for the intended transformation towards low-carbon production)
    - First – although insufficient – steps to an “Energy Union” for an EU-wide coordination of energy and climate issues
  - Unilateral climate policy, inefficient emission trading scheme (ETS)
  - Byproducts: Inconsistent, conflicting national regulations preventing reuse of high-quality sources (e.g. slag) and obstructing harmonization needed for resource efficiency at EU-level

The importance of energy intensive industry in Europe
Some facts for thought …

- Industry in the European Union accounts for
  - two thirds of non-governmental R&D expenses (actual >170 bn€)
  - a total gross value added of ~450 bn€
- Energy intensive sectors in particular have a production multiplier of ~1.7 and an employment multiplier (direct and indirect employees) of ~3
- Resource intensive industries are the basis of closely integrated supply and value chains (upstream and downstream services, R&D partners, suppliers, customers,…); 80% of companies* depend on energy intensive upstream producers

*Data for Germany; source: IW Köln, 2014

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III. Support from stakeholders
Cooperations & funding

Shared labs

Participation in EU-wide research projects within the steel industry

- Development of low carbon steel production processes

K1-MET (example for long term partnership between universities and industry co-funded by a national grant)

- Research on energy efficient production, energy recovery, process development and new recycling concepts
  (Examples: optimization of sinter process, upgrade of slag for better use in the cement industry)

Financial support for pilot plants

- Need for more “no strings attached” bottom-up as well as top-down funding to allow implementation of new processes
- High risk sustainable projects financially feasible only in the far future and only under environmental aspects

III. Support from stakeholders
Shared labs

- The voestalpine Group currently has around
    - 150 R&D cooperation projects
    - in 21 countries
- The company works with 36 universities, 35 university research facilities, ten competence centers, and twelve Christian Doppler Laboratories.

Common labs shared between universities and industry bear great potential to speed up innovation.

Better Access to R&D
Summary

R&D	Core element of voestalpine's sustainable business strategy

Resource efficiency	Production and processing	Life cycle

Hurdles	Need for uniform and binding global regulations, and coordinated energy EU policies to ensure a high level of research and innovation
Support	National, regional and global support from stakeholders through cooperations, partnerships and fundings to advance R&D

Life cycle thinking = key to every aspect of sustainability

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Dr. Wolfgang Eder, CEO voestalpine AG

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