

Strengthening the role of R&D in boosting eco-innovation and eco-efficiency

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The future needs research: priorities and processes

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Overview

Setting (technological) priorities

Type of Research

A bottom up look – the approach from Fraunhofer

Conclusions



Megatrends require eco-innovations and eco-efficiency

- Problems of decoupling economic growth and resource already in OECD countries
- Newly industrializing countries will increase their share at (global) environmental problems
- Environmental problems are increasingly global challenges
- Interactions between problems and systemic risks
- transnational production with global sourcing of knowledge

Need to tailor research towards more eco-innovations and eco efficiency

- **Getting the right priorities**
- **Getting the processes right**



Criteria for research priorities

- Contribution to tackle (global) challenges
 - Which environmental problems are especially relevant ?
- In which technological areas is the research frontier moving quickly offering huge opportunities for improvement?
 - Innovation dynamics
 - Integration of technologies into business strategies
- Contribution to (Post-)Lisbon goals
 - In which technological areas are future markets especially high?
 - In which of these areas are the prospects for competitiveness of EU very high? Where is a need „to catch up“?



Importance of environmental problems for sustainability

Criteria

- Irreversibility
- Depth of impact mechanisms
- Spatial scale

Results from Delphi survey respondents = experts from

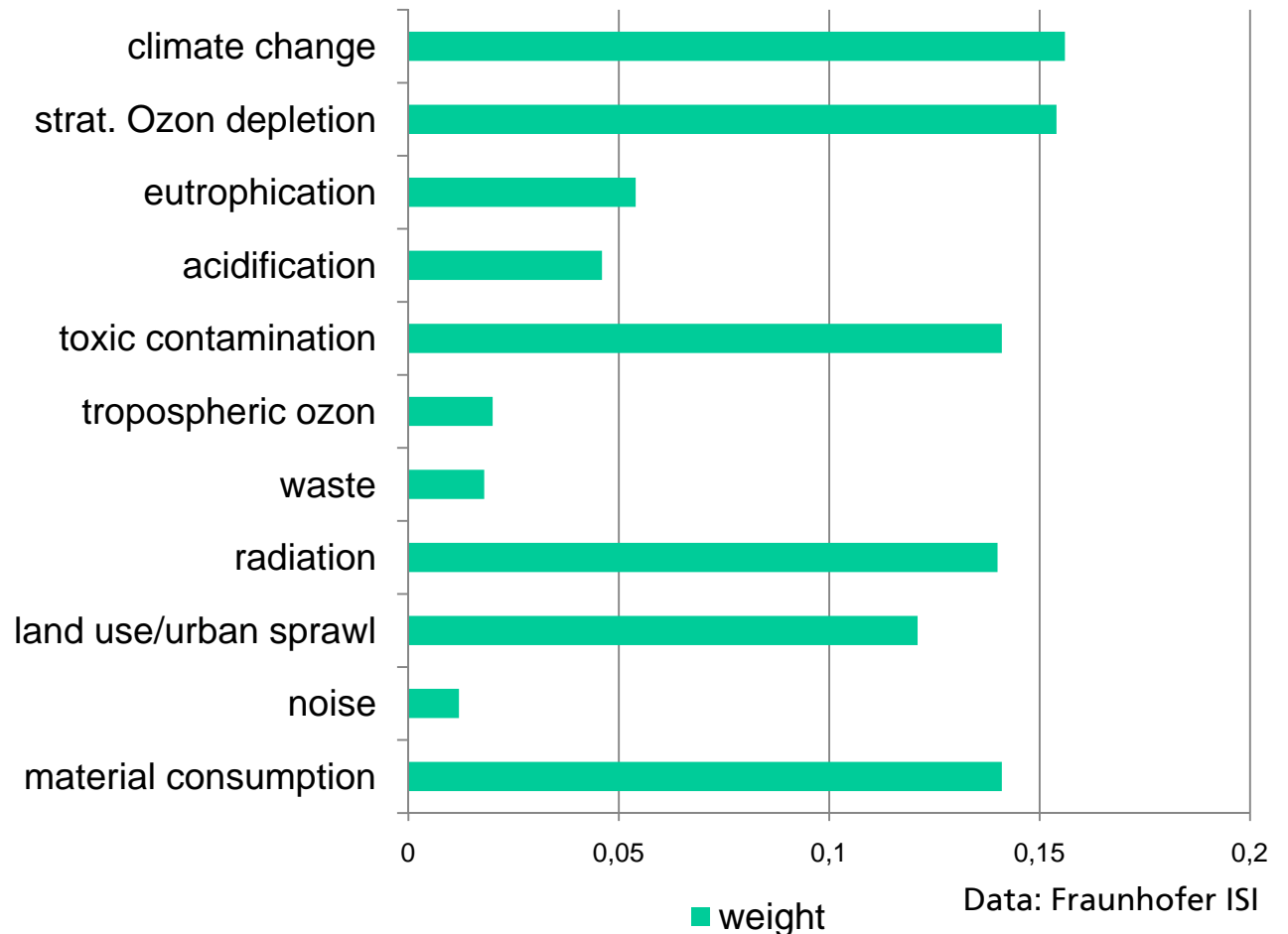
- Science
- Politics
- Business
- NGOs

Multicriteria analysis with AHP

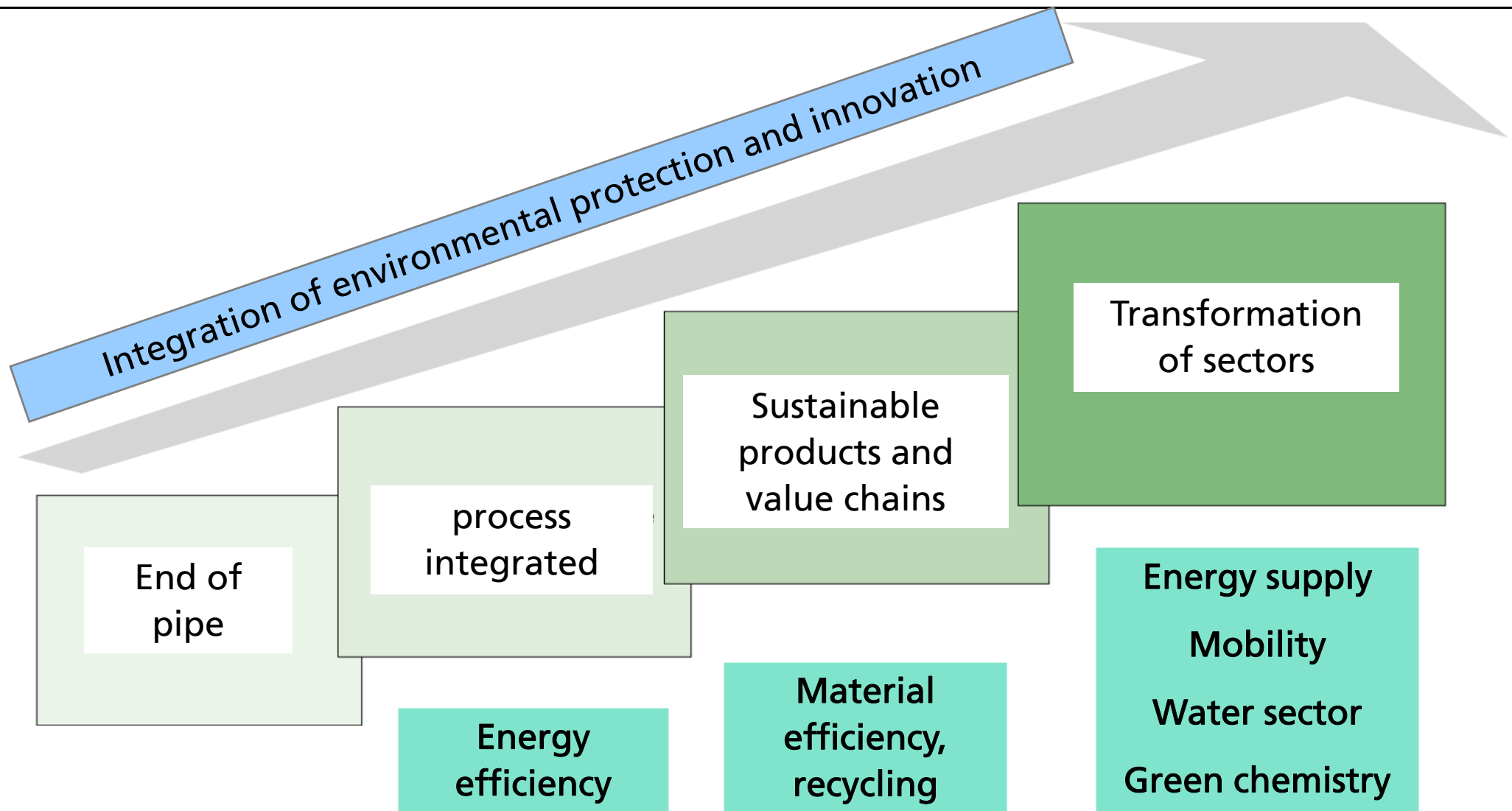
Additional assessment on distance to target necessary

Results reflect long-term sustainability needs

Generic weighting according to Delphi study results



Innovation dimension of sustainability technologies



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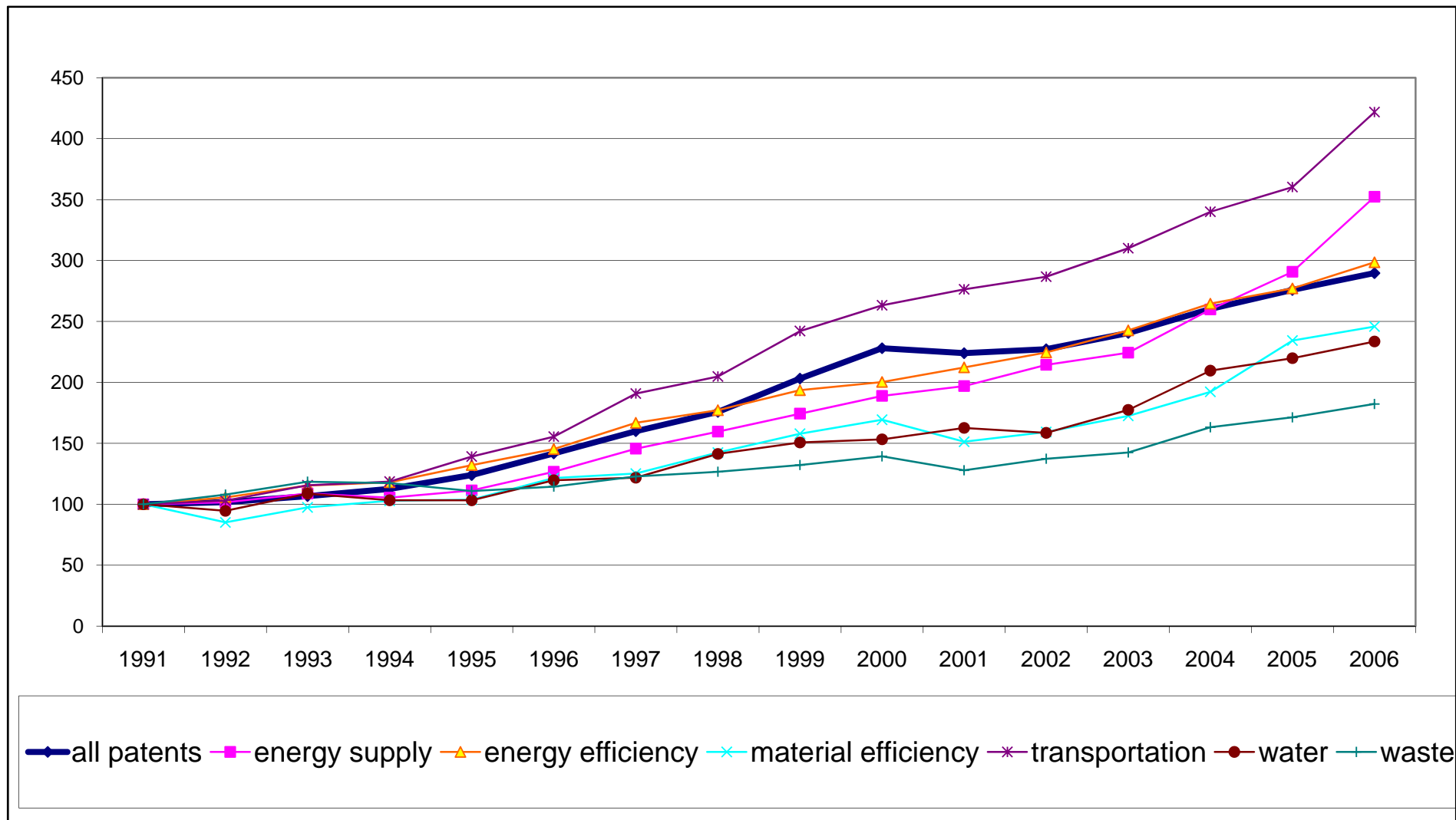


Innovation dynamics sustainability technologies

Sustainability technologies

- Are not low tech
- Have high innovation dynamics

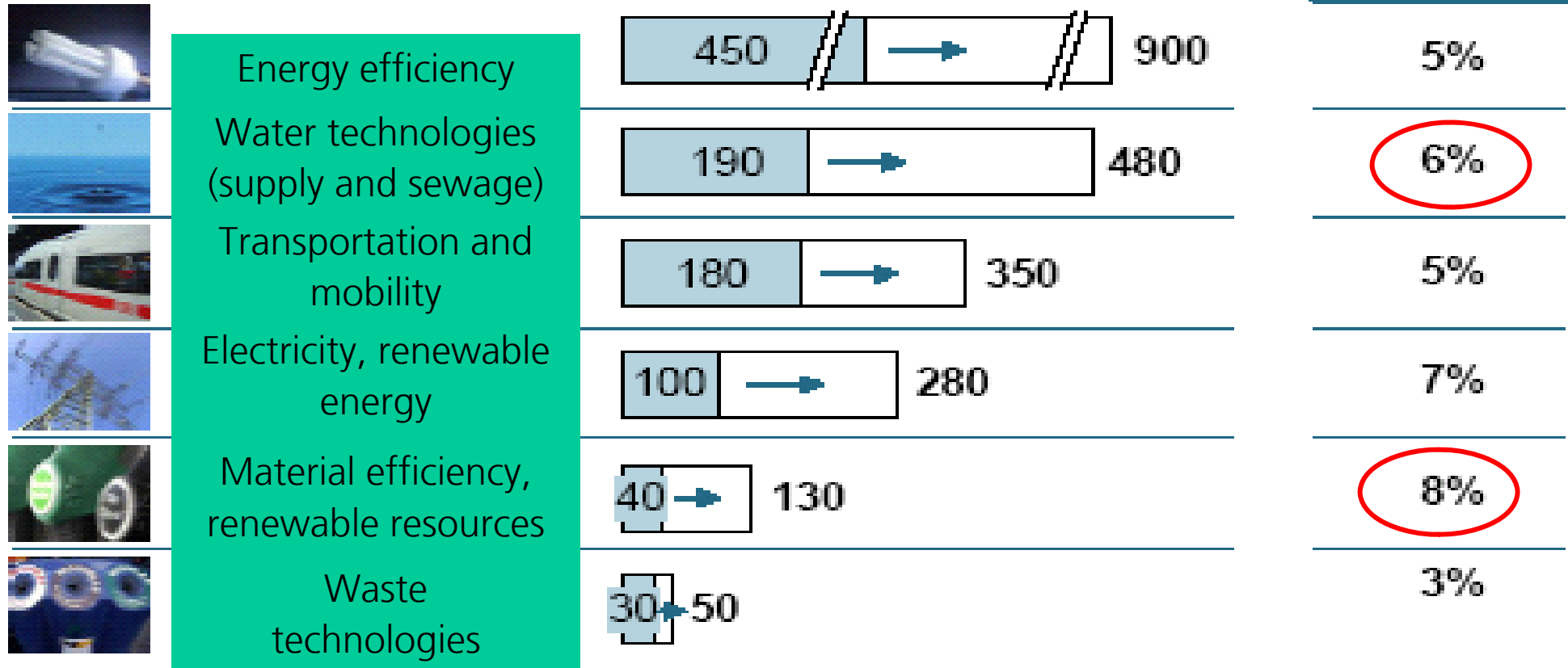
Results confirmed by technology foresight



Economic dimension of sustainability technologies

Figures in billion €/a!!!

CAGR¹⁾
2005-2020p



1) CAGR = Cumulated average growth rate = durchschnittliches jährliches Wachstum

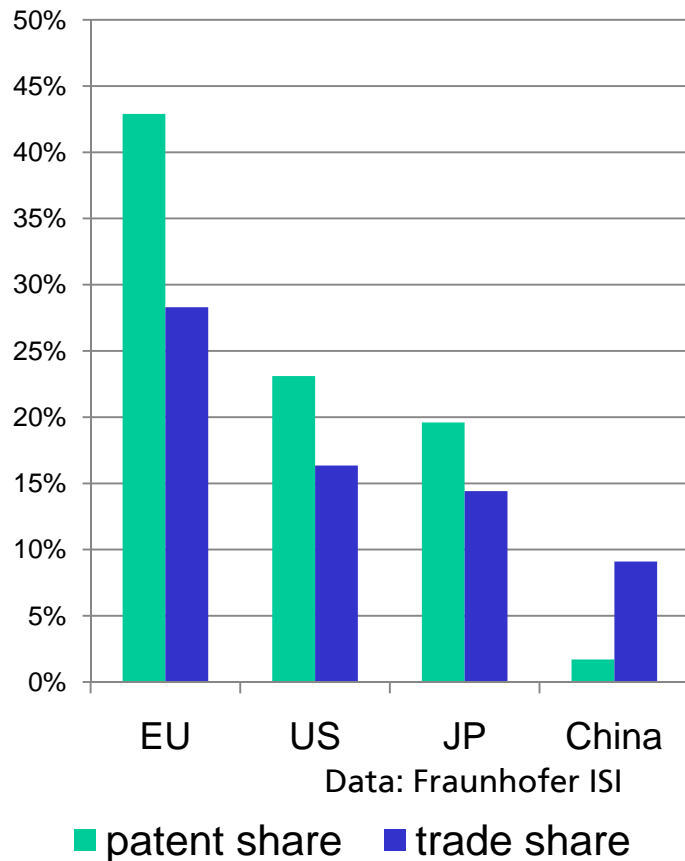
 2005

Source: Roland Berger Strategy Consultants

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Capabilities of Europe

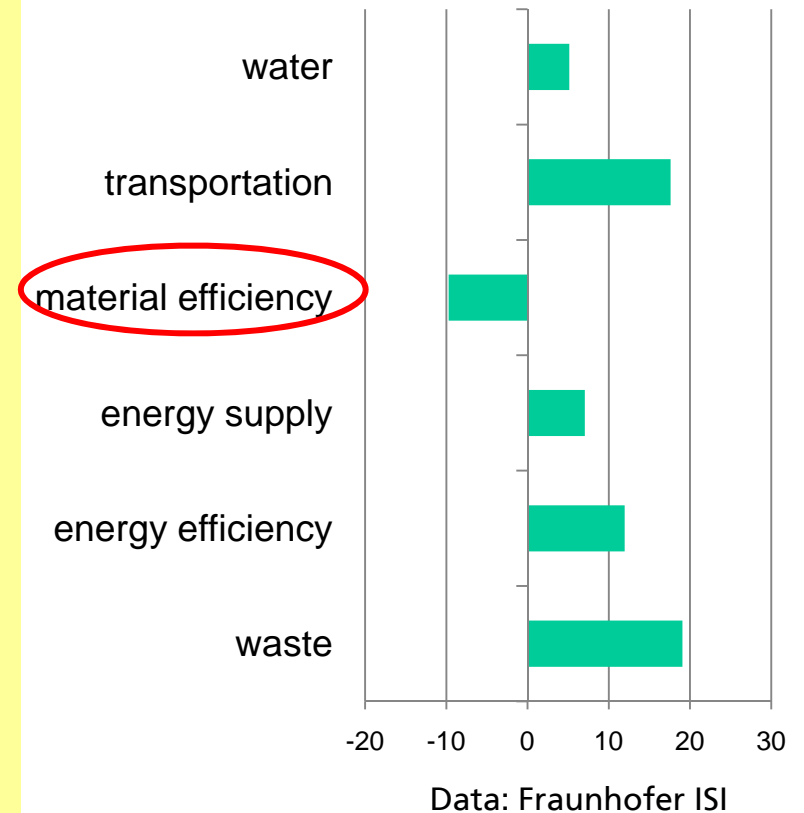


Trade without Intra-EU trade

Technological capabilities

- Show state of the art and competitiveness
- Measured with innovations indicators
- Europe is leading, ...
...but more in patents than trade
- Specialisation shows above average importance of eco-efficiency, ...
....but need to improve material efficiency

Relative Patent Advantage



RPA: positive value = above average



Foundation of R&D policies in innovation research

How innovations are occurring

- Innovation is a social process
- Not a linear process, but many feedback loops
- Co-evolution of technologies and institutions
- R&D and learning in the market
- Selection of solutions
- Change in paradigms and moving along trajectory
- knowledge and innovation follow the trend of globalisation

Issues for community R&D

- Integrate technological development with non-technical research
- Integrate R&D policies with effects of diffusion on innovation
- Variety of solutions
- Include new technological paradigms and new actors
- Strengthen cooperation outside Community – internationalisation beyond the OECD countries



Types of research and challenges

Types of funding

- Institutional
- **Project**
- Individual support

Focus of research

- Technological solutions
=> see prioritisation
- **non-technical research**
- strategic intelligence

■ Challenge for (project) funding

- How to prevent fragmentation and bring forward scale-effects while maintaining diversity of possible solutions, actors, including newcomers and new ideas

■ Challenges for non technical research

- Improving innovation systems functioning
- Methods for integrating the horizontal dimension of eco-innovation
- Assessment, e.g. LCA-“easy“ for SME
Sustainability assessment of strategies with regard to economic and social dimensions
- Green lead markets, standardization



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The Fraunhofer institutes contribute with system- and technology-oriented innovations to the competitiveness of their clients and their region, of Germany and Europe.

Our target is an economically successful, socially just and environmentally sustainable development for society.



The Fraunhofer approach to strategic priority setting

Responsibility of each Fraunhofer Institute

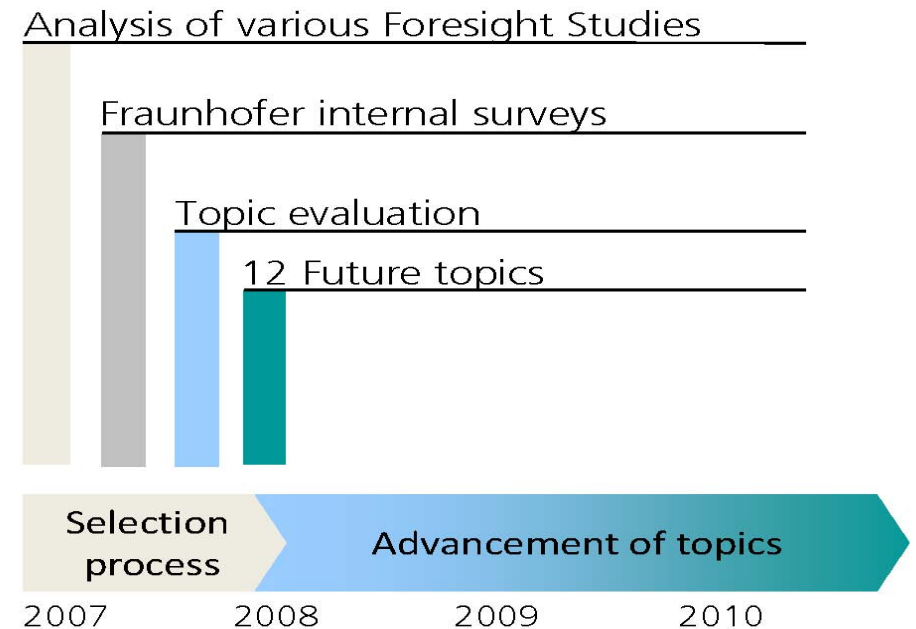
- Funding, personnel, and research strategy
- Own strategic planning

Need to coordinate

- Network „sustainability“ of Fraunhofer institutes: bottom-up coordination of activities
- Strategic common key themes

Process of search for key topics

- Bottom up generation of themes (e.g. internet based process)
- Discourse on grouping, prioritization and operationalization
- Result in 2008: Fraunhofer FUTURES
- Topics in the future???



Conclusions

- Eco-innovation encompasses a broad area including processes, products, transformation of sectors, and co-evolution of technology and institution
- Various criteria important: ecological, technological and economic; systematic evaluation of technologies with regard to these criteria necessary
- In addition to energy/climate change: water and material efficiency also extremely important: tremendous impact, good opportunities for EU companies, strengthening of efforts necessary
- Research to address how to close gap between competences and market success
 - Integration of technical and non-technical research, e.g. standardization, measurement issues etc.
 - Green lead markets
 - Internationalisation beyond OECD-countries
 - interdisciplinary assessment tools, indicators for innovation friendliness of policies
- strengthen collaboration by integrating R&D and diffusion policies
 - need to balance interests of incumbent industrial players and the need of variety of solutions and actors; research system must be flexible and open
 - Process of identification of themes: also use bottom up information and evaluation based on transparent criteria; avoid crowding out of actor groups

