

50
Years

Fraunhofer ISI
shaping | future | together

Symposium

Innovation and Systems Change:
Opportunities for Society and Governance

12 May 2022, Brussels

Agenda

Innovation and Systems Change: Opportunities for Society and Governance

- 15:30 **Welcoming and opening address**
Prof. Dr. Jakob Edler, Executive Director of Fraunhofer ISI
- 15:40 **Keynote speech**
Joanna Drake, Deputy Director of DG Research and Innovation of the European Commission
- 16:00 Fraunhofer ISI keynotes
Challenges & Success Factors in Systems Transformation: Insights from Energy Transition & Innovation Policy
Prof. Dr. Wolfgang Eichhammer, Dr. Stephanie Daimer, Prof. Dr. Rainer Walz
- 16:30 Parallel sessions
1. Technology sovereignty as a new framework for innovation policy
2. Regulation, innovation & innovation policy
3. Requirements of strategic intelligence
4. Social innovations for transformation?
- 17:30 Panel discussion
Transformation in the “Zeitenwende” – new requirements for combining sector policy with research and innovation policy
Suzana Anghel (ECOS), Peter Dröll (DG RTD), Christian Ehler, MEP (STOA), Sanna-Riikka Saarela (SYKE/ETC ST), Lieve Van Woensel (EPRS)
- 18:15 **First conclusions**
Prof. Dr. Jakob Edler

50
Years

Fraunhofer ISI
shaping | future | together

Symposium

Innovation and Systems Change:
Opportunities for Society and Governance

12 May 2022, Brussels

Welcoming and opening address

Prof. Dr. Jakob Edler
Executive Director of Fraunhofer ISI

Keynote Speech

Innovation for Climate Protection and Energy Transition

Joanna Drake

Deputy Director of DG Research and Innovation of the European Commission

Presentations

Challenges and Success Factors in Systems Transformation: Insights from the Energy Transition and Innovation Policy



Prof. Dr. Wolfgang Eichhammer, Dr. Stephanie Daimer, Prof. Dr. Rainer Walz

12 May 2022, Brussels



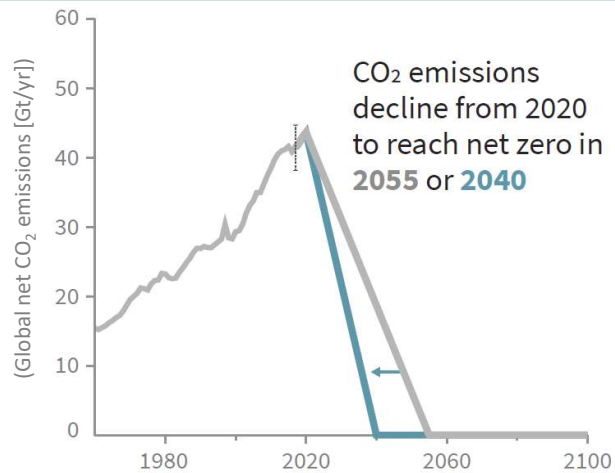
Fraunhofer Institute for Systems and
Innovation Research ISI

Innovation and System Change: Opportunities for Society & Governance

System Transformation in the Energy Sector

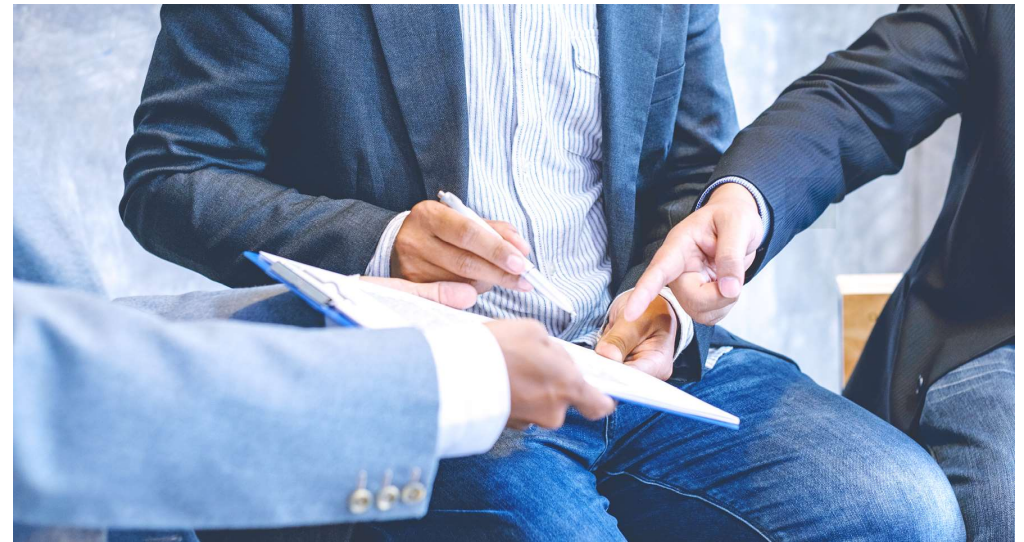
Prof. Dr. Wolfgang Eichhammer, Prof. Dr. Martin Wietschel

The process of transformation in the energy sector will once again be significantly accelerated



Greenhouse gas neutrality

Requires swift action at international, European and national levels.

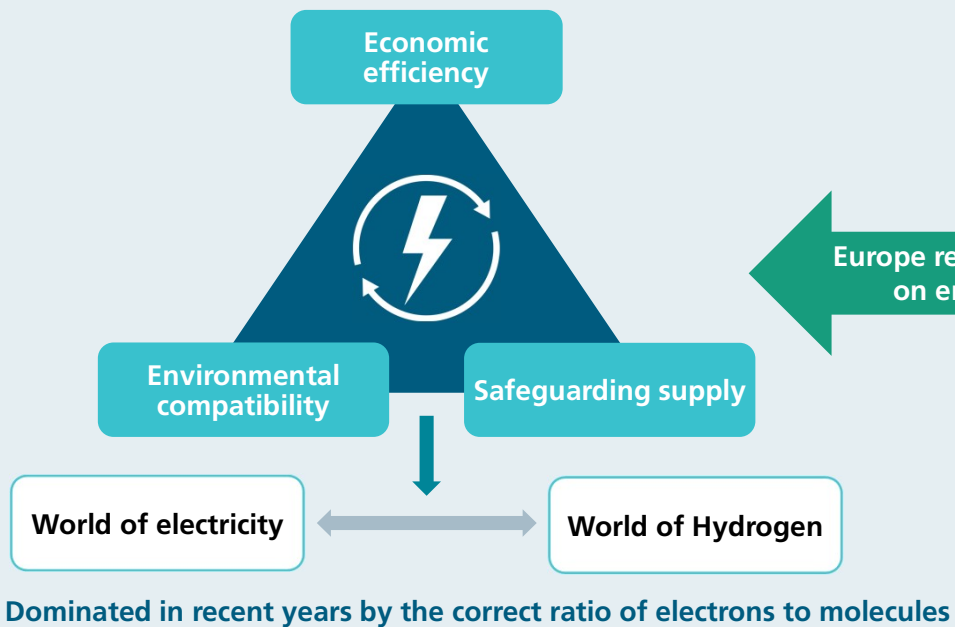


Safeguarding supply

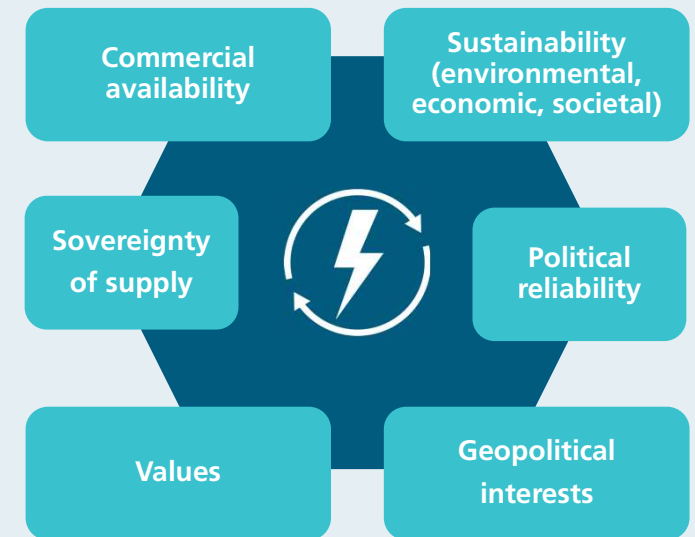
Russia's war against Ukraine has rendered old certainties obsolete.

As a result, conflicting goals and increasing complexity are becoming more prevalent.

The energy industry's target triangle



The target hexagon for energy partnerships



Europe remains dependent on energy imports

Taking into account the urgency of the transformation

The short-term necessity to safeguard supply must be reconciled with climate protection goals

- The development of new fossil fuel supply sources and transport routes should not stand in the way of climate protection goals
- Forward planning, e.g., making LNG terminals H₂ and ammonia ready.

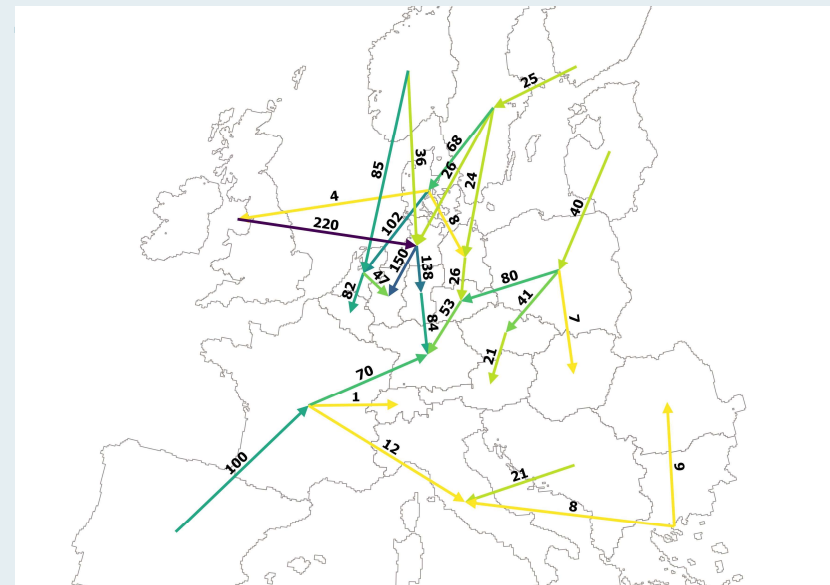
Viewing crisis (disruption) as an opportunity for change

- The development of leap frogging strategies
 - e.g. the possible bridging function of natural gas to H₂ and its synthesis products gets shorter or even will not materialize

The systemic approach of Fraunhofer ISI

- Systemic, quantitative and model-based analyses of the energy system of the future
- Analyses of acceptance and stakeholders
- Policy advice (evaluation of policy instruments)
- Consultation with commercial enterprises
- International dimension

The H₂ trade balance in 2050 in a H₂ scenario – the development of a European H₂ pipeline network would make sense



Reference: Long-term scenarios for climate protection, Study carried out on behalf of BMWK

Focus on evidence-based solutions

Example: Weather data and how these are implemented when modeling the PV potentials for H₂ production

- **Wind speed**

- 178.5 m
- 116 m
- 69 m

- **Temperature**

- 178.5 m
- 116 m
- 69 m
- 2 m

- **Direct sunlight**

- **Diffuse sunlight**

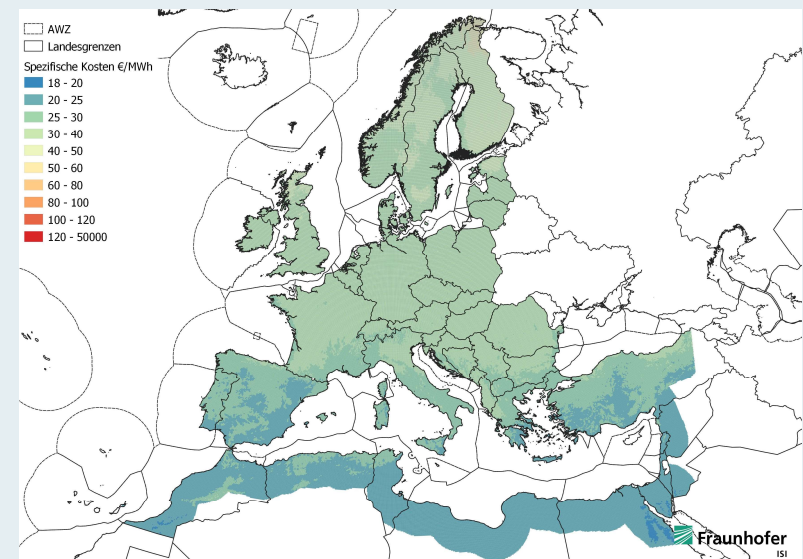
- **Years available 07.10.2020: 2010-2018**

55 billion entries
per year for Europe

Calculation of hourly speeds at
altitudes of 40-180 m in intervals
of 10 m with exponential altitude
profile with the **exponent**
determined on an hourly
basis.

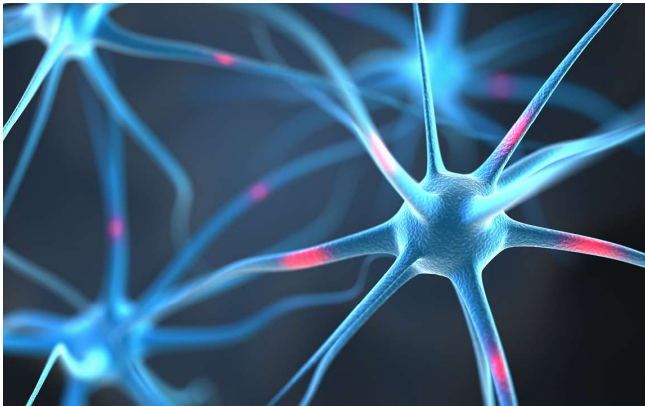
6 km regional resolution

Example result: PV cost graph



Reference: Long-term scenarios for climate protection, Study carried out for BMWK

The starting point for systems change is governance



Ability to analyze with increasing complexity and speed as well as systemic thinking (sector coupling)



Understanding socio-techno-economic systems



Profound grasp of supportive and inhibitive policies and regulations

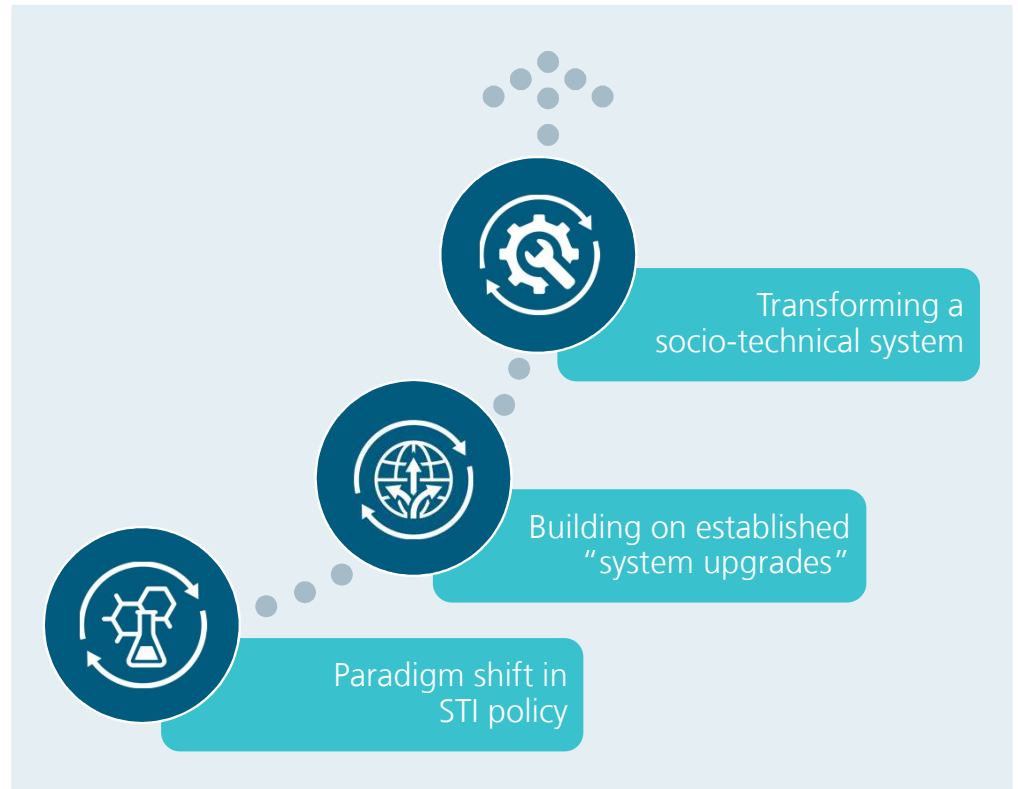
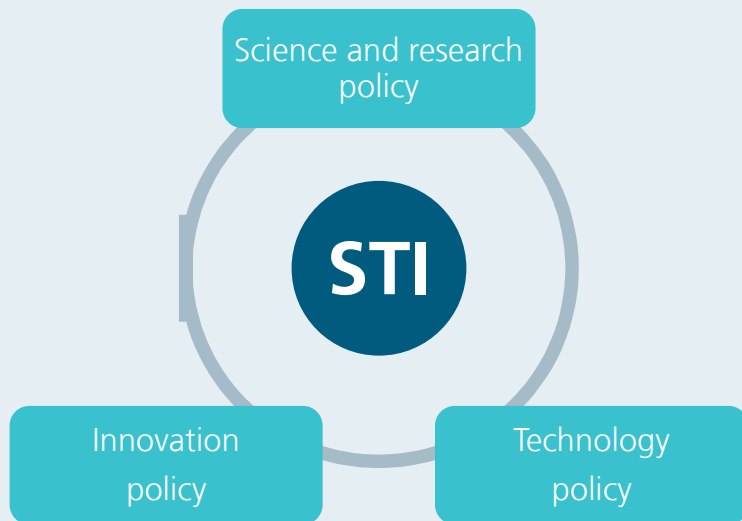
Innovation and System Change: Opportunities for Society & Governance

Systems Change from the Perspective of Innovation Policy

Dr. Stephanie Daimer, Dr. Ralf Lindner, Prof. Dr. Jakob Edler

What do STI policy (and RTI policy research) contribute to shaping sustainability transformations?

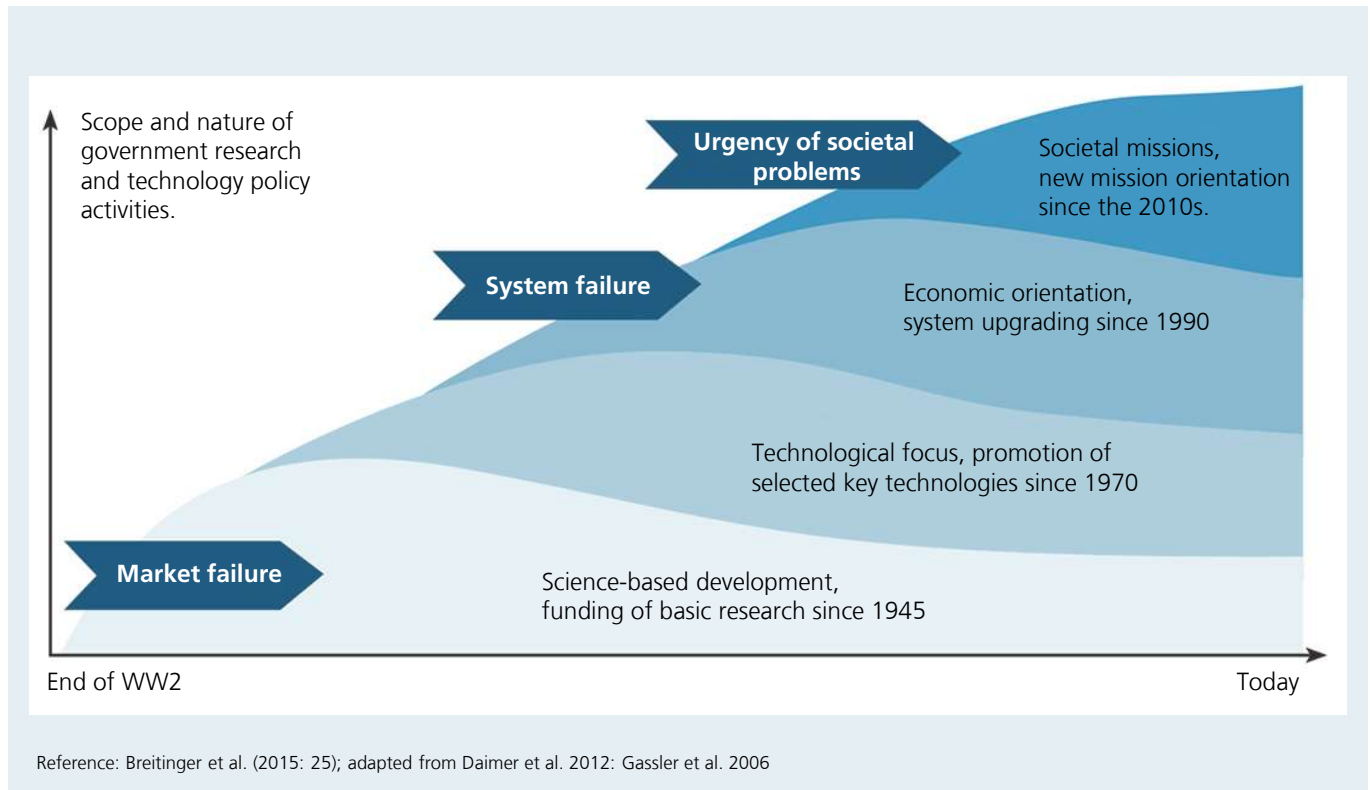
Fundamental premise: Societal goals can be achieved faster and more effectively thanks to innovations.



Paradigm Shift in STI Policy: How compatible are growth and sustainability?

Research and technology policy

The scope and nature of government research and technology policy activities.

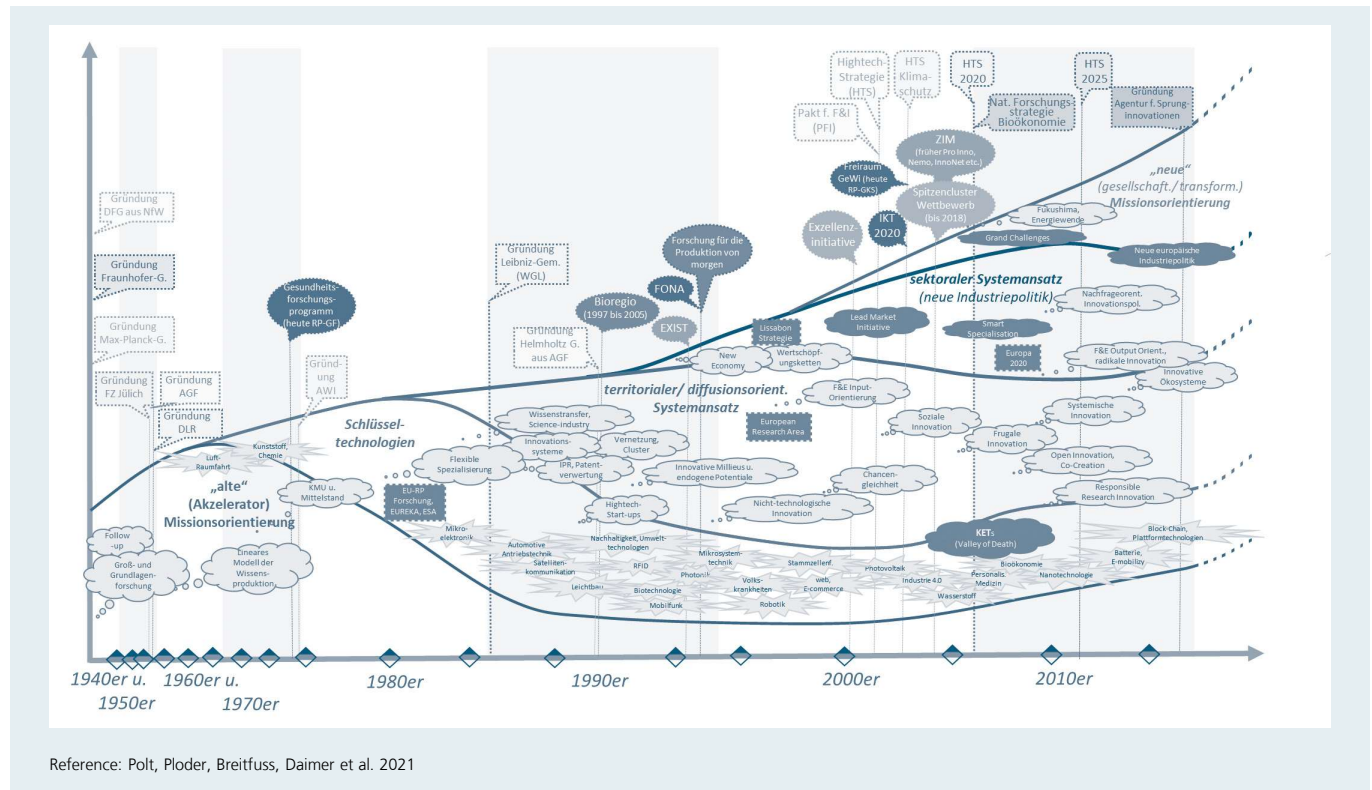


The differentiated toolbox for “system upgrade” developed since the 1990s

... can contribute to aligning innovations to societal problem solutions, e.g.

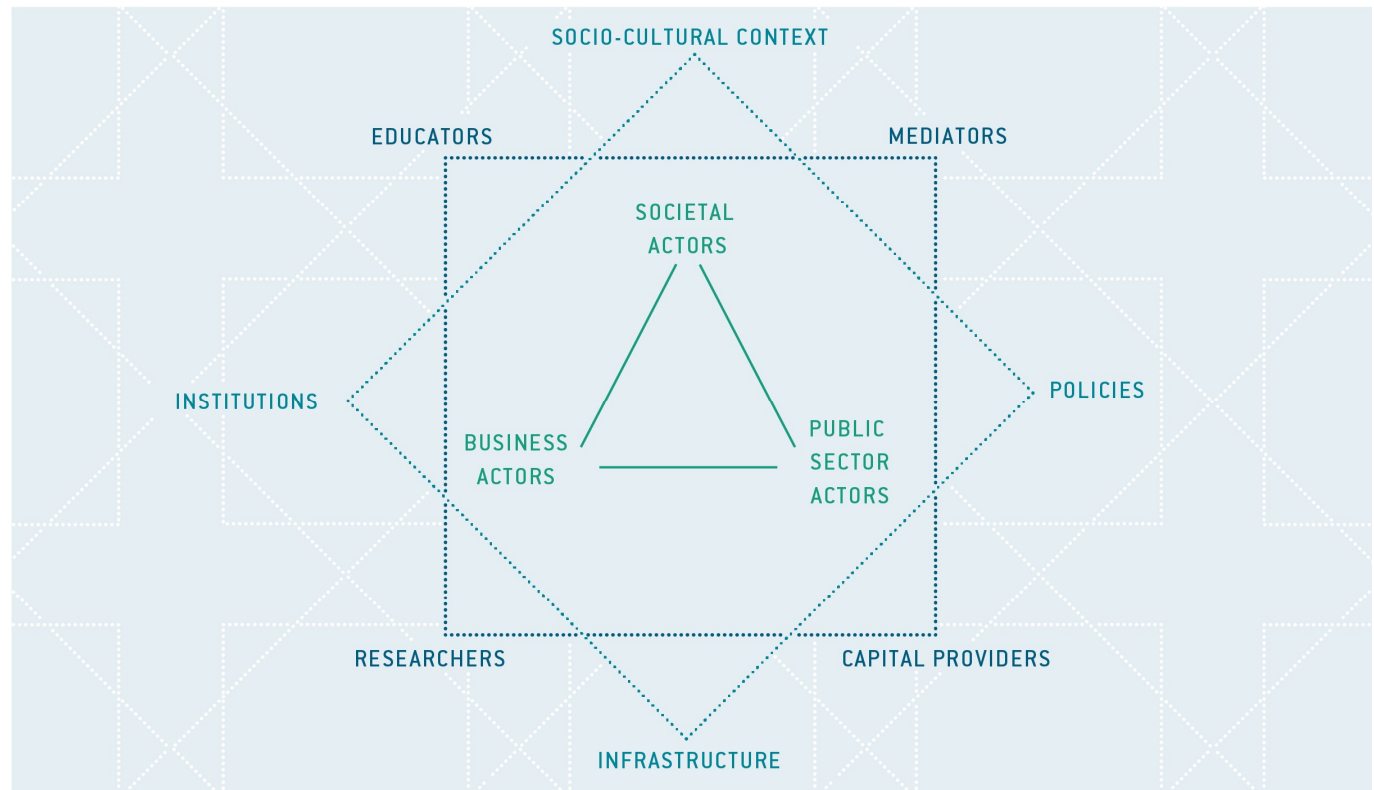
- Supporting exchange relations, networks
- Supporting learning and capacity development
- Foresight
- Demand-oriented instruments
- Regulation

However: Not sufficient to transform complete systems

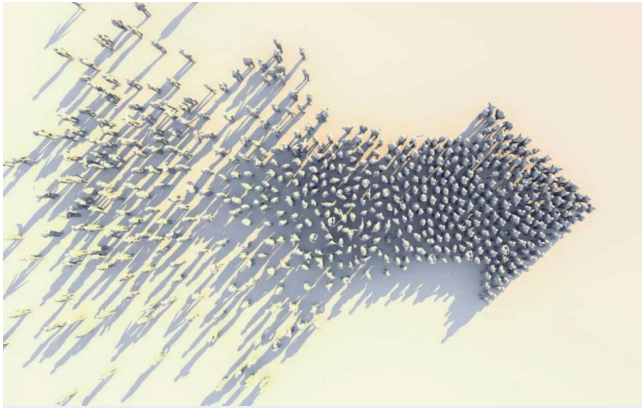


System transformation means transforming a socio-technical system

- “Out of the shadows of politics” (directionality, distributional effect)
- In parts completely new configurations of actors, institutions and practices
- Is also based on socio-cultural context: requires, e.g., behavioral changes
- Possibly cross-sectoral
- Sometimes clearly aligned towards one technology, sometimes competing solution paths
- Non-technological innovations



The starting point for systems change is governance



Activate and connect new configurations of actors from research, industry and society



Agile policies and administration release transformative capabilities



Holistic strategic intelligence brings together expertise from sectors and innovation

Innovation and System Change: Opportunities for Society & Governance

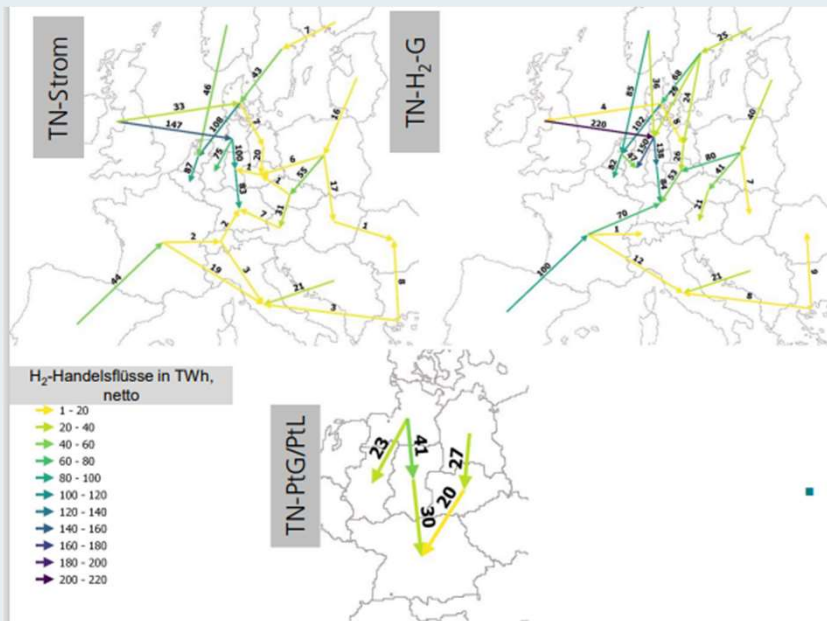
Systems and innovation research: Why the whole is more than the sum of the parts

Prof. Dr. Rainer Walz

Energy system of the future: Sector know-how and innovation competences

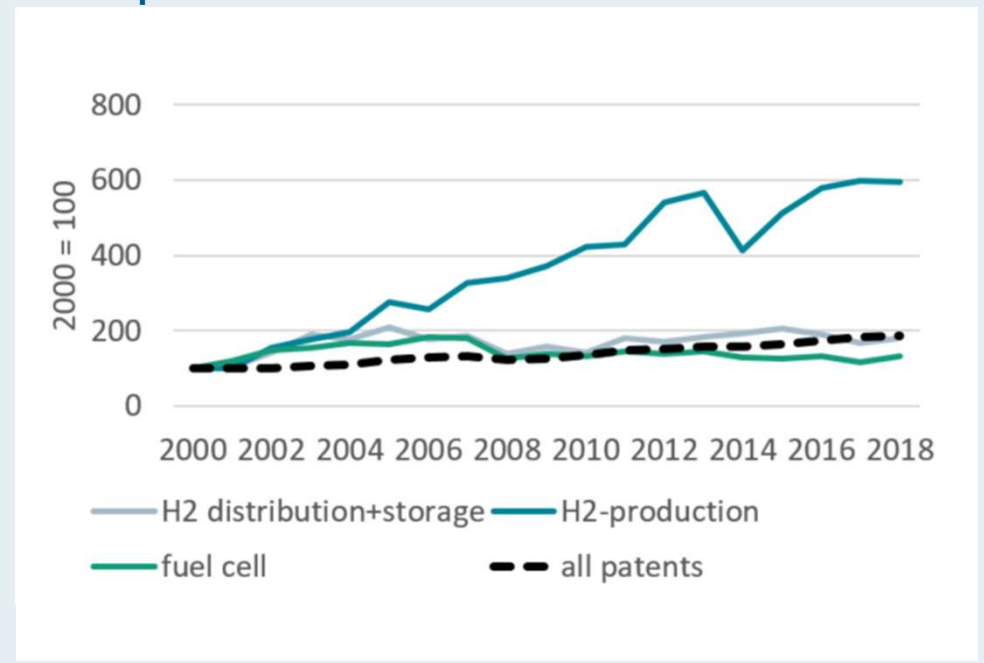
Long-term Scenarios: integrating technology development and business models into energy system modelling

Integration in the energy system



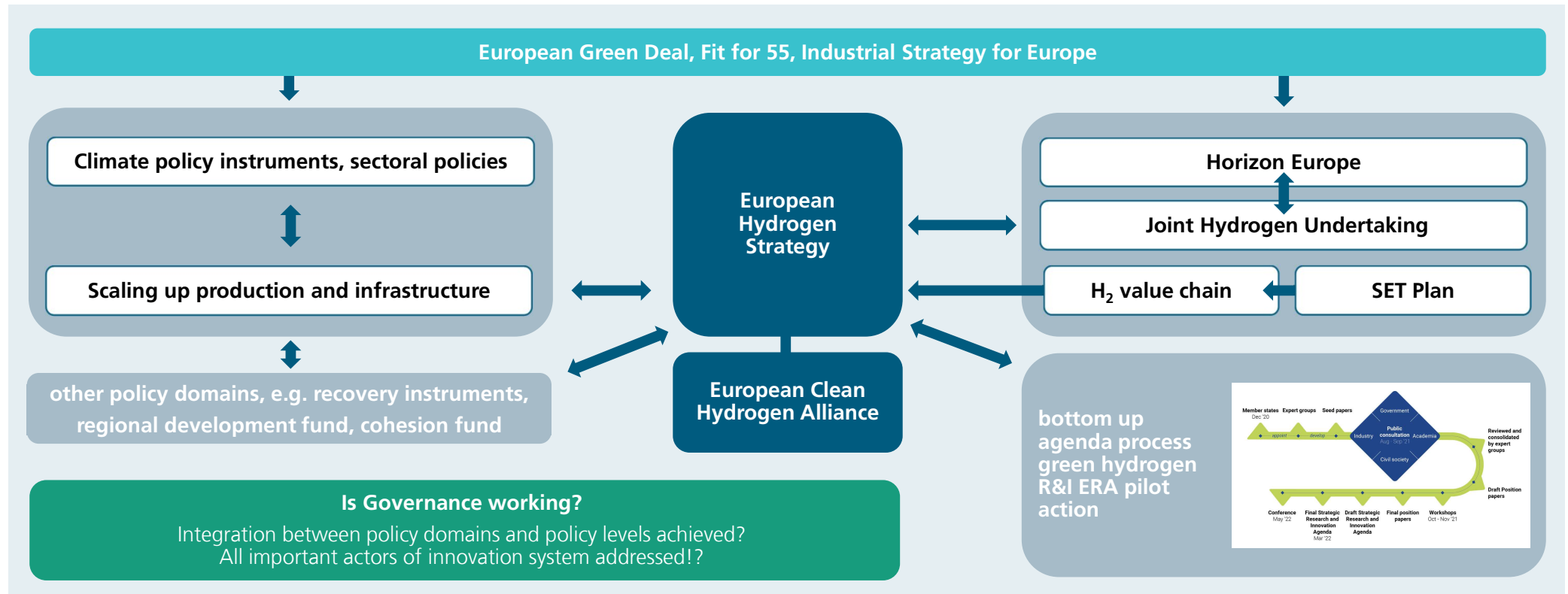
Reference: Long-term scenarios for climate protection, Study carried out on behalf of BMWK

technology development: worldwide patent development



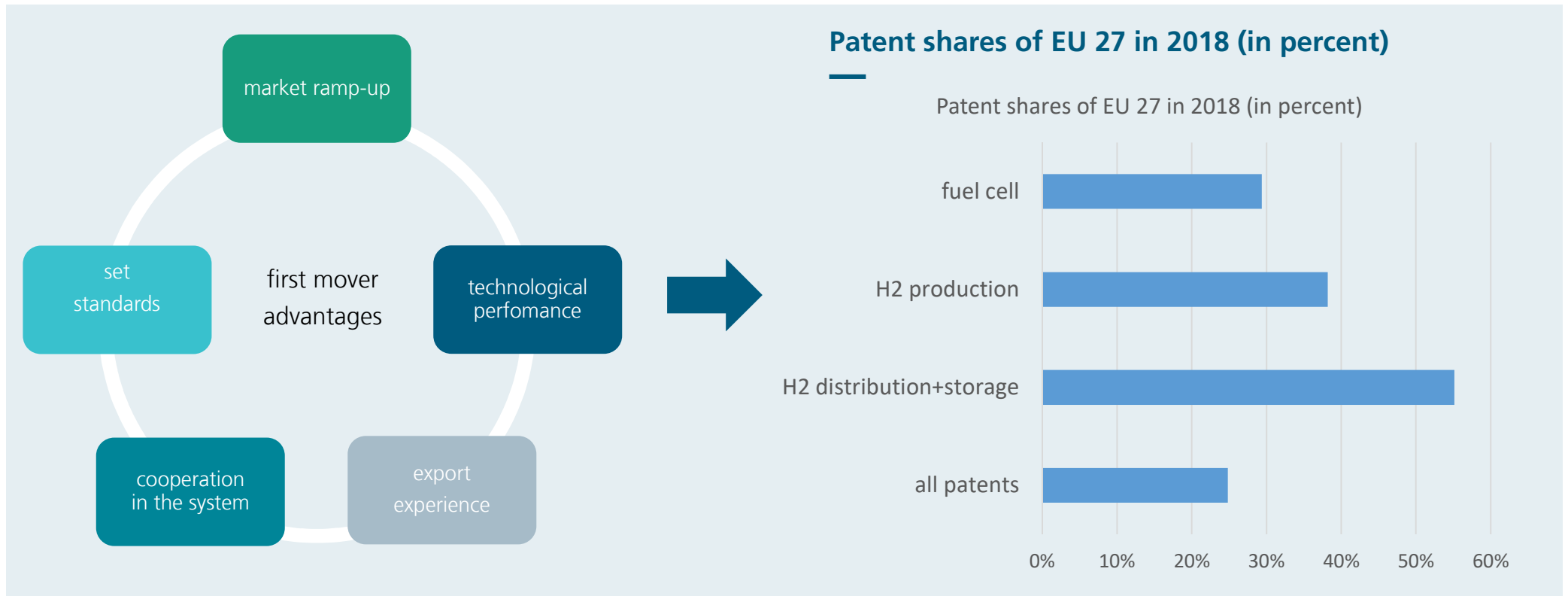
Integration of measures and governance using the example of hydrogen

European Climate Policy Governance: Integration of energy and sector policies with STI policies



Economic opportunities for the EU using the example of hydrogen

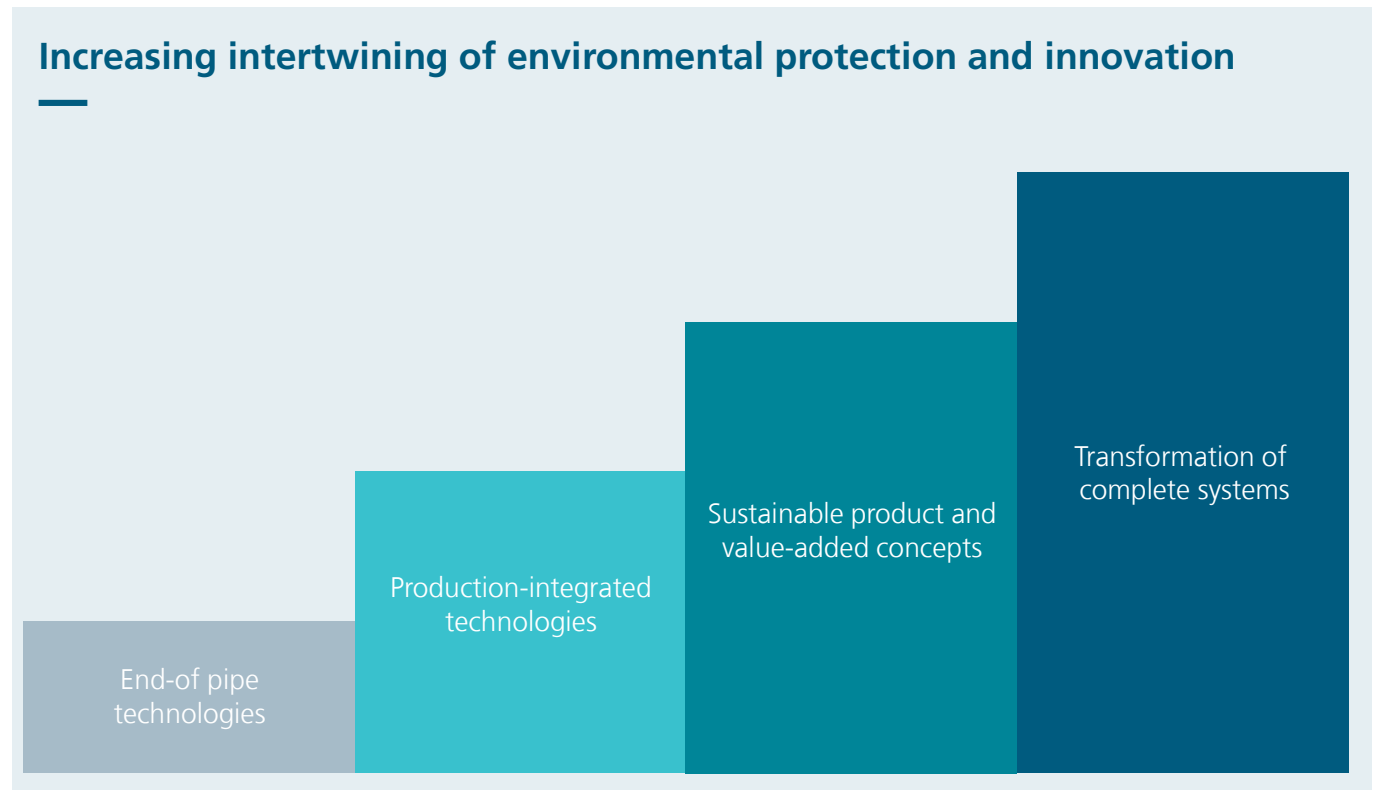
combine energy policy and STI toolbox: ensure early market diffusion and create first mover advantages



Understanding transformation dynamics

Example: Hydrogen

- Coordination requirements technology, use, markets, infrastructure, behavior
- Future-oriented processes
- Danger of new lock-in effects
- Non-linearities due to interactions of the subsystems
- Disruptions require societal balance
- Avoid new dependencies



Conclusion

1

Shaping transformation requires energy and innovation systems analysis.

2

It is not enough to place the two side by side without any connection, as the results influence each other.

3

In order to cope with the complexity, it is necessary to have profound expertise in both areas, as well as well-rehearsed interdisciplinary cooperation.



50
Years

Fraunhofer ISI
shaping | future | together

Symposium

Innovation and Systems Change:
Opportunities for Society and Governance

12 May 2022, Brussels

Parallel sessions

1. **Technological sovereignty as a new conceptual framework for innovation policy**
2. **Regulation, innovation and innovation policy**
3. **Requirements of strategic intelligence**
4. **Social innovations for transformation?**

Parallel sessions

Innovation and systems change: Opportunities for society and governance

1. Technological sovereignty as a new conceptual framework for innovation policy

- Dr. Henning Kroll | Dr. Rainer Frietsch

2. Regulation, innovation & innovation policy

- Professor Dr. Knut Blind | Dr. Nicholas Martin

3. Requirements of strategic intelligence

- Dr. Elisabeth Dütschke | Dr. Philine Warnke

4. Social innovations for transformation?

- Dr. Kathrin Ostertag | Prof. Dr. Karoline Rogge

50
Years

Fraunhofer ISI
shaping | future | together

Coffee break

Innovation and Systems Change:
Opportunities for Society and Governance

12 May 2022, Brussels

Panel discussion

Transformation in changing times – new requirements for combining sector policy with research and innovation policy

Suzana Anghel (ECOS) | Peter Dröll (DG RTD) | Christian Ehler, MEP (ITRE) |
Sanna-Riikka Saarela (SYKE, ETC ST) | Lieve Van Woensel (EPRS)

Moderated by Prof. Dr. Karoline Rogge

50
Years

Fraunhofer ISI
shaping | future | together

Symposium

Innovation and Systems Change:
Opportunities for Society and Governance

12 May 2022, Brussels