

# THE CONTRIBUTION OF R&I PROGRAMMES TO THE GREEN TRANSITION AND THE ENERGY TRANSITION

Evidence from incorporating a Multi-Level-Perspective in socio-technical transitions research in R&I programme evaluations

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# BACKGROUND

- Defining the Green Transition remains an ongoing challenge
  - Discussions on the scope of sustainability, nature-society interactions
  - Complexity of Green Transition challenges beyond common policy pursuits for technological advances and reorientation of markets
- Transition-oriented (R&I) programmes could play a pivotal role in shaping a more resilient and sustainable future
  - Catalysts for innovative solutions
  - Promoting development of sustainable technologies and innovative practices
  - Navigate complexities of the Green Transition

# KEY OBJECTIVES

- To better understand and analyse the role R&I programmes can play in transition processes
  - Contribution of the Horizon Europe Framework Programmes to the Green Transition
  - Contribution to the Energy Transition of the German Energy Research Programme
- Embedding transition theory in evaluations
  - Evidence on the effects of R&I programmes from a transition perspective
  - Advance R&I policy evaluation frameworks and methods

# METHODOLOGY

- **Conceptualization of the Green Transition**
  - Reorientation of R&I: Toward net-zero solutions
  - Leverage and Scale-Up: Assessing the degree to scale existing solutions
  - Enabling Behavioral Change: Enhancing capacities and fostering adoption
  - Preventing and Repairing: Mitigating harm and addressing damage
- **Enhanced Programme Theory Approach**
  - Programme Theory (Rogers, 2014): Structured analysis of the programme's design and expected outcomes
  - Multi-Level Perspective (MLP): Examines system innovations across landscape, regime and niche levels
  - Transformative Outcomes (Ghosh et al., 2021): Focus on systemic impacts fostering sustainability transitions
- **Application**
  - To understand a programme's ability to induce impact
  - Specific focus on contributions to the Green Transition and Energy Transition

# THE PROGRAMMES UNDER CONSIDERATION

## Energy Research Programme: Innovations for the Energy Transition (ERP)

- Owner: Federal Ministry for Economic Affairs and Climate Action
- Runtime: 2018 – 2023
- Projects: (2022): 7.365
- Funding (2022): € 1,486 bn.
- Open Calls for participation, continuous application possibilities
- Project types: Open calls, Collaborative Projects (TRL 3-7), Real-World Labs(TRL 7-9)

## Horizon Europe: Climate, Energy, Mobility (CL5), Food, Bioeconomy, Natural Resources (CL6)

- Owner: European Commission
- Runtime: 2021-2027
- Projects (until June 2023): 1.016
- Funding (2021-2027): € 24,075 bn.
- Specific thematic calls in specified work programmes
- Project types: Research and Innovation Actions (TRL 2-6), Innovation Actions (TRL 6-8), Coordination and Support Actions, Partnerships

# SURVEY APPROACH

## Energy Research Programme

- Gather expert assessments on the progress of the energy transition and the contribution of ERP through two survey rounds
- Target Group: Project managers acting as domain experts in their respective fields
- First Survey Round (05/22-11/22)
  - Responses: 3,315 (69.6%)
- Second Survey Round (12/23-04/24)
  - Responses: 1,920 (58.8%)

## Horizon Europe: Green Transition

- Contribution of the project to the green transition and transformative outcomes
- Target Group: Representatives of applicants, beneficiaries, partnerships
  - Cluster 5, beneficiaries: 963
  - Cluster 6, beneficiaries: 1,010

# TRANSFORMATIVE OUTCOMES

- Specific understanding of dynamics of change in socio-technical systems
- Gosh et al. (2021) define three general macro processes that policy makers can have an impact on:
  1. Building and nurturing niches
  2. Expanding and mainstreaming niches
  3. Opening up and unlocking regimes
- In each of these 3 macro-processes, four sub-processes were identified, resulting in 12 Transformative Outcomes (TO)
- Co-evolvement of TOs through time and space

## 3. Opening up and unlocking regimes

De-aligning  
and  
destabilising

Unlearning  
and deep  
learning

Strengthening  
regime-niche  
interactions

Changing  
perceptions of  
landscape  
pressures

## 2. Expanding and mainstreaming niches

Upscaling

Circulating

Replicating

Institutionalisin  
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## 1. Building and nurturing niches

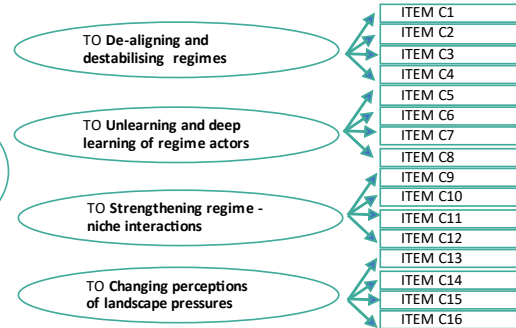
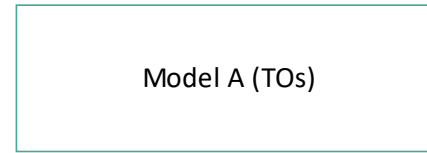
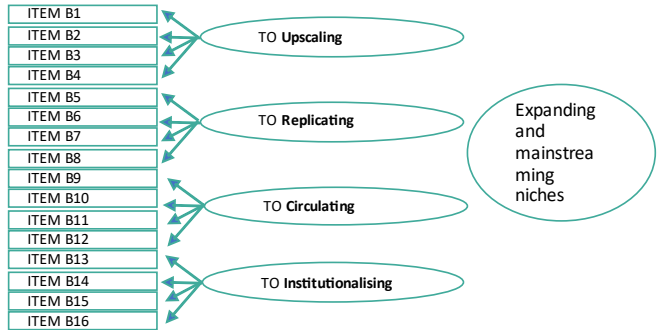
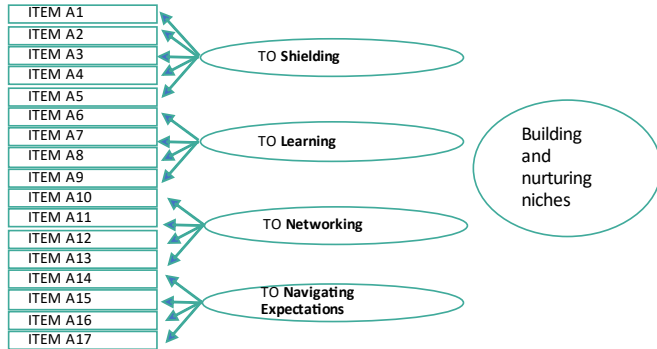
Shielding

Learning

Networking

Navigating  
expectations

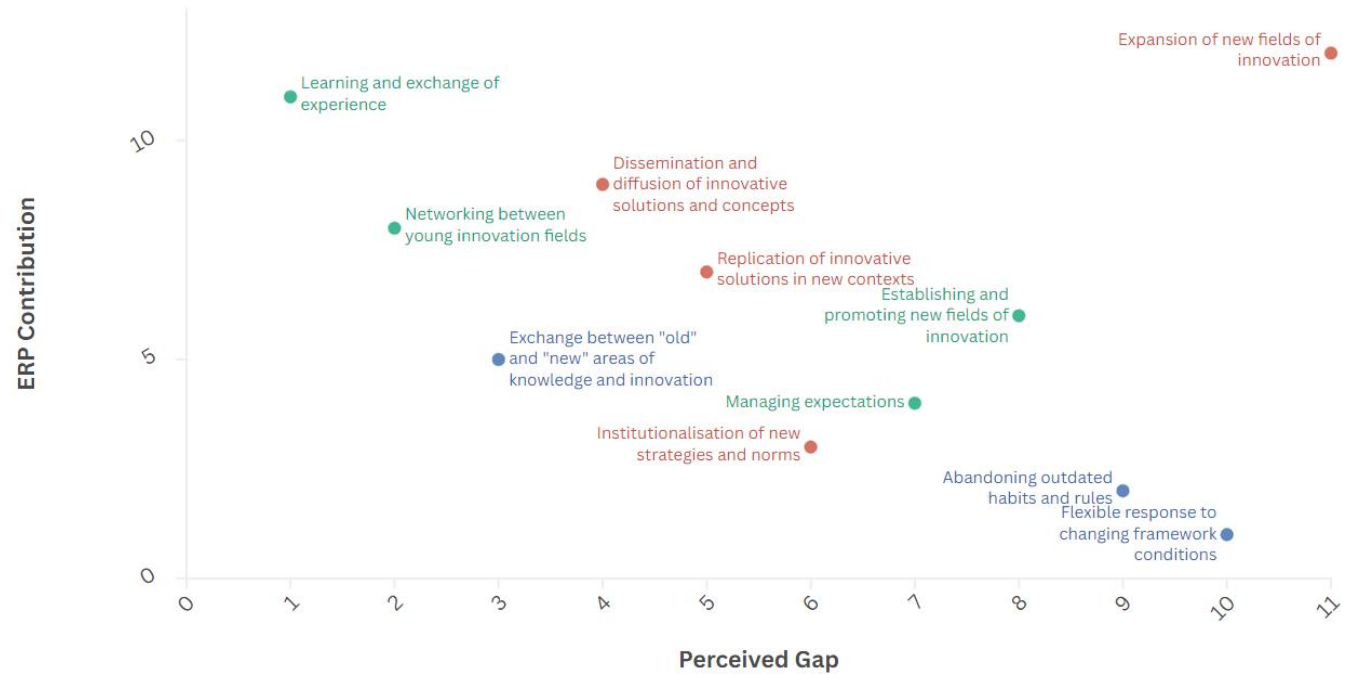
# CONCEPTUALISATION OF TRANSFORMATIVE OUTCOMES IN PARTICIPANT SURVEY (ERP)



Knöbel et al. (2023)



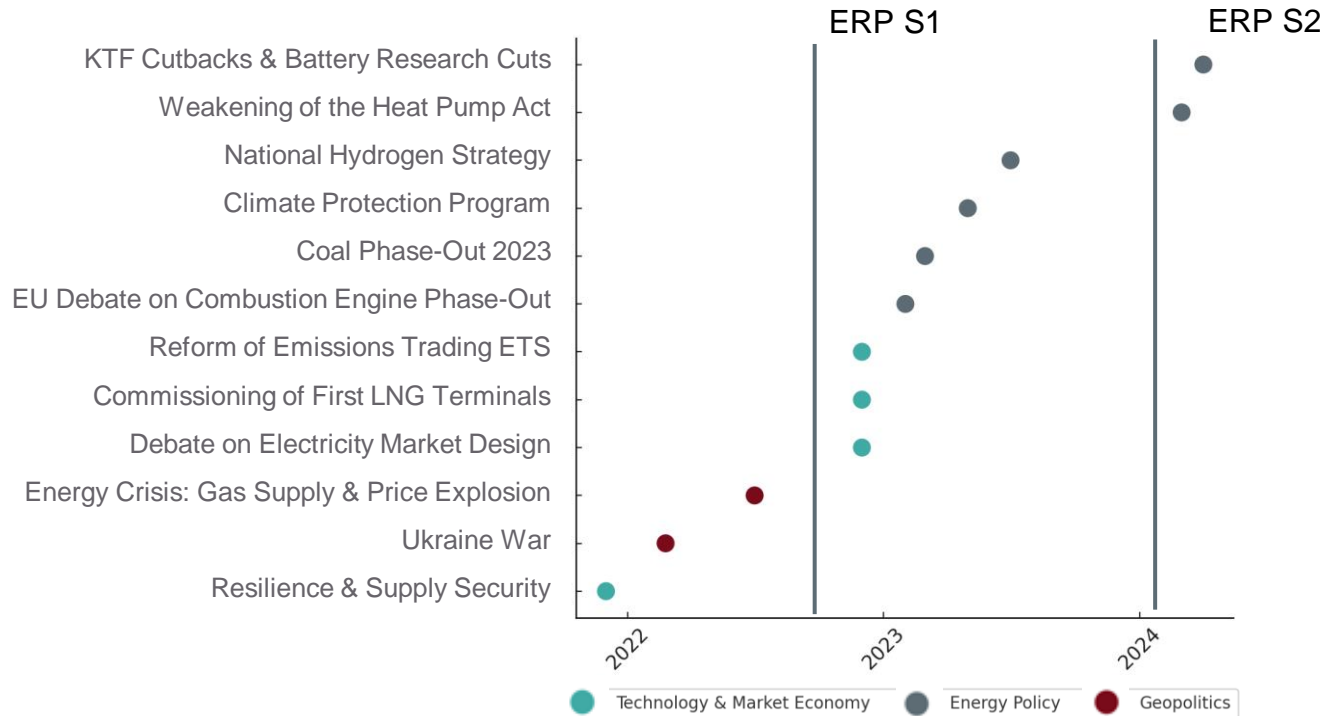
# MAPPING PERCEIVED TRANSFORMATION GAPS VS ERP CONTRIBUTIONS



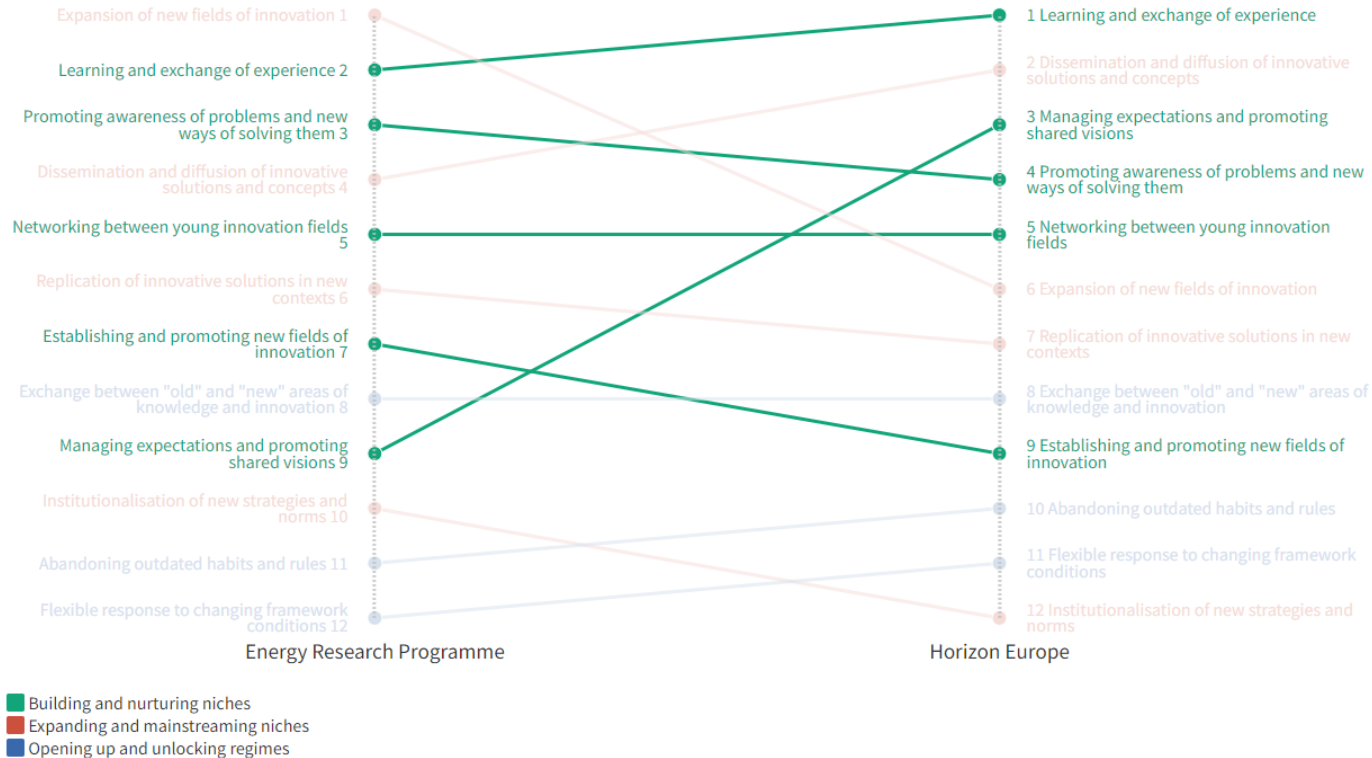
## Macroprocess

- Building and nurturing niches
- Expanding and mainstreaming niches
- Opening up and unlocking regimes

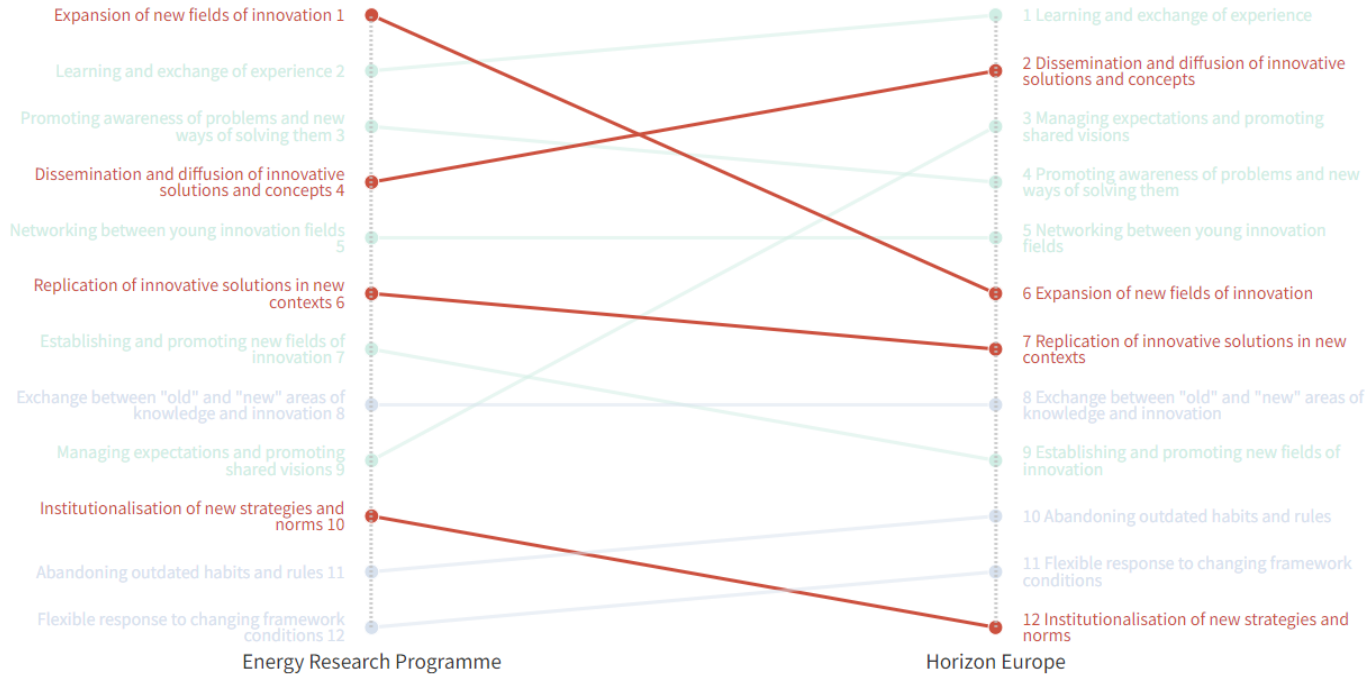
# EXTERNAL FACTORS INFLUENCING THE PERCEPTION OF THE ENERGY TRANSITION (DE)



# CONTRIBUTION TO THE GREEN TRANSITION: BUILDING AND NURTURING NICHES

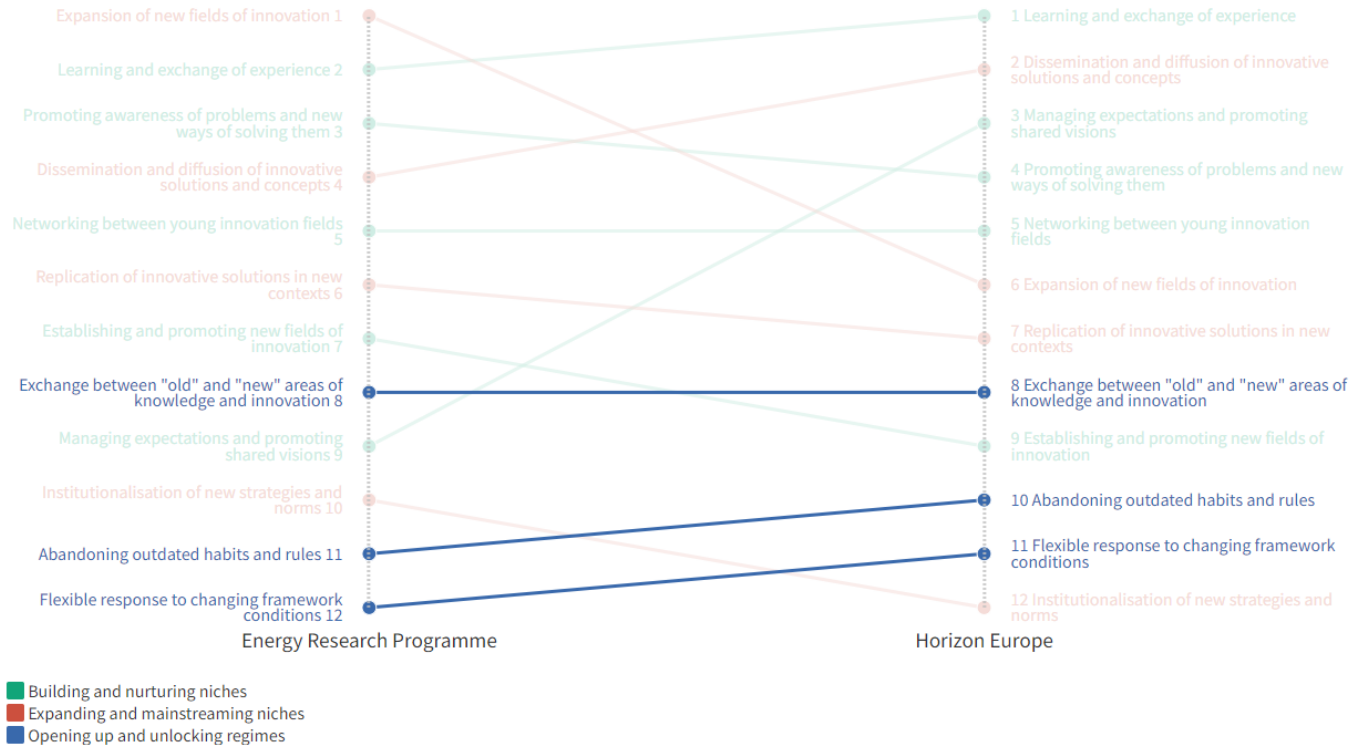


# CONTRIBUTION TO THE GREEN TRANSITION: EXPANDING AND MAINSTREAMING NICHES

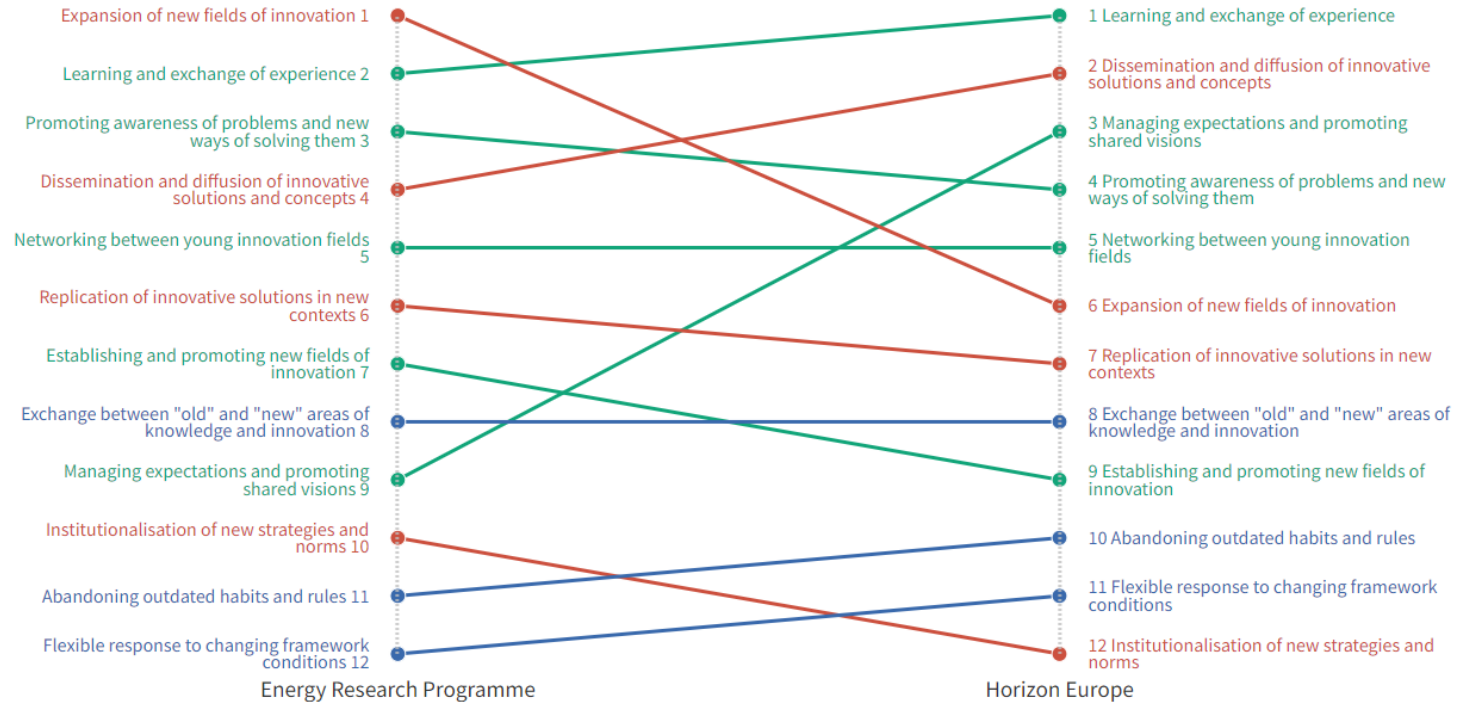


- Building and nurturing niches
- Expanding and mainstreaming niches
- Opening up and unlocking regimes

# CONTRIBUTION TO THE GREEN TRANSITION: OPENING UP AND UNLOCKING REGIMES



# RANK ORDER OF PROGRAMMES' CONTRIBUTION TO THE GREEN TRANSITION



- Building and nurturing niches
- Expanding and mainstreaming niches
- Opening up and unlocking regimes

# BENEFITS OF ANALYSING TRANSFORMATION PROCESSES IN EVALUATIONS



Better assessment of contributions to transformation processes of instruments and programmes

Empirically verify intended impact mechanisms  
Make changes in prioritisation visible  
Identify gaps/need for change in the set of interventions  
Enable comparisons between instruments



Development of transformation processes for the energy transition (comparison over time)

Recording changes in perceptions of the energy transition  
Identify transformation needs in different sectors  
External influences



Use empirical survey design to identify internal and external influences on perceptions of the energy transition and programme impact

Project progress  
Characteristics of the organisations involved  
Characteristics of the projects

# REMAINING CHALLENGES

- Concept of transformation needs comprehensive explanation
- Design of survey items (Knöbel et al. 2023)
  - Extensive survey parts with many items leads to comparatively high effort
- Inadmissible short cut: R&I programmes fostering transformation = niche development
  - Technical change drives its own transformation by persistent creation of new niches (Schot and Geels, 2007)
  - Niches as source for path-breaking innovation
  - Defining characteristic: need for temporary 'protective space' for developing such innovations (Schot et al., 1994, Kemp et al., 1998).
- Regulatory learning is only poorly covered but of high importance eg in the energy sector: what role can RTI play?
- Importance of interfaces: old and new actors <> behavioural change



# CONCLUSIONS



Embedding R&I programmes related to transition processes in the multi-level perspective of STS helps to develop the programme theory



Provides indications of the limits of an R&I programme, and thus also indications for coordination requirements



Empirical review provides indications of the need for further development of programme theory



Particularly transformation-relevant instruments and topics can be identified



Contributions of the projects to transformation processes provide indications of transformation needs deserving policy attention



Need for sharpening measurement concepts and empirical tools