

Widening scope of STI policies in sustainability transitions: transformation, justice and security

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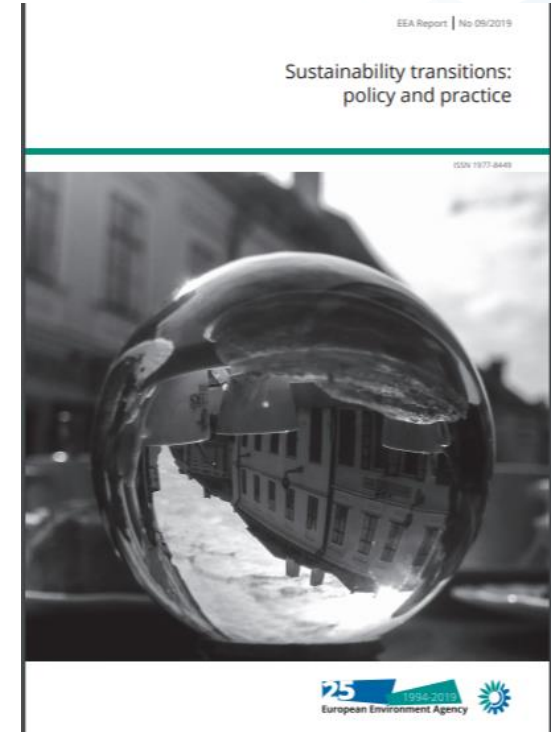
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Characteristics of sustainability transitions

- **Multi-dimensional** changes in socio-technical systems
- **Multi-actor, multi-scalar** processes
- Goal-oriented **directionality** (visions, pathways to sustainability)
- **Disruptive** (involving winners and losers)
- **Open-ended** and uncertain (learning and experimentation)
- Surprises, **unintended consequences** (evaluation, reflection)
- **Urgency** and acceleration (diffusion, phase out, exnovation)



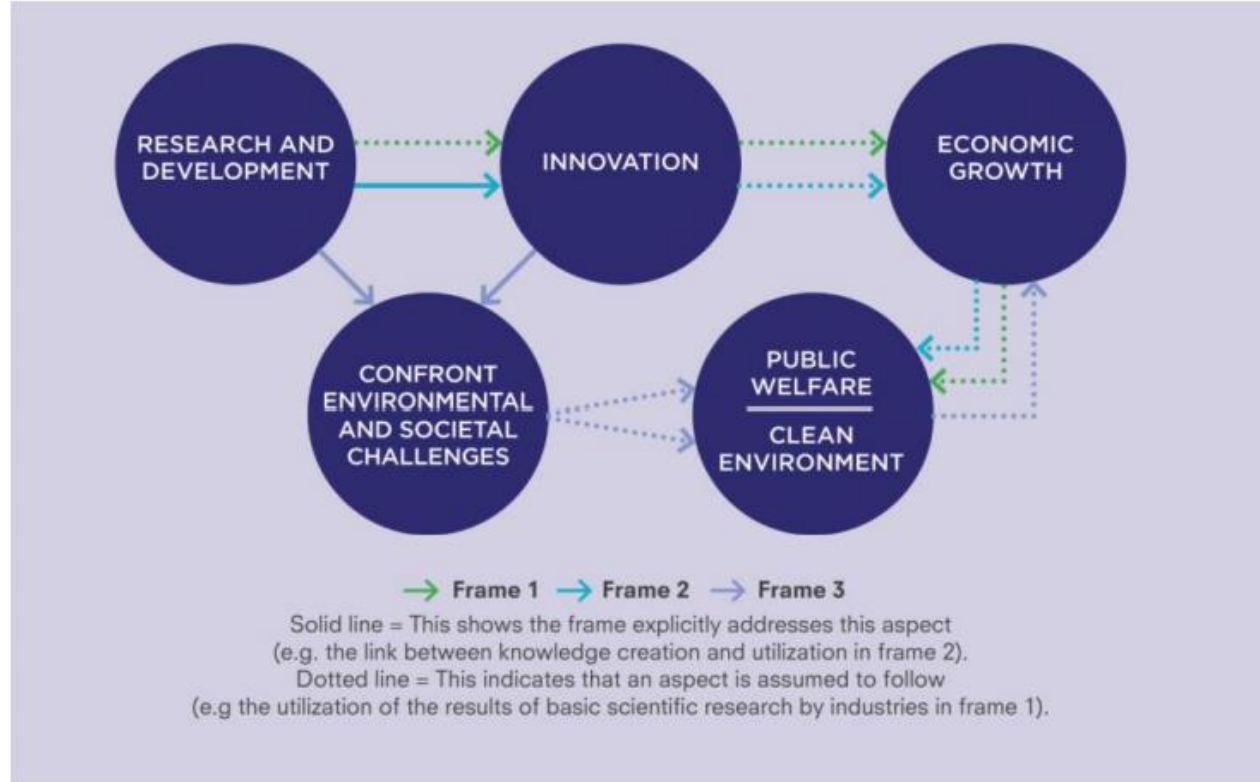
3 challenges for STI policy in focus

1. From technology push, market and export orientation & economic growth to *transformation*
 - a. *Environmental & societal transitions as a key objective to STI policy*
 - b. *Transformation of STI policy administration to be more aligned with transitions*
2. Increasing overall policy attention to social justice
 - a. Calls for just transitions
3. Changing geopolitics and security landscape
 - a. Security implications of sustainability transitions
 - b. Implications for innovation policy?

**From technology push,
market and export
orientation & economic
growth to
*transformation***

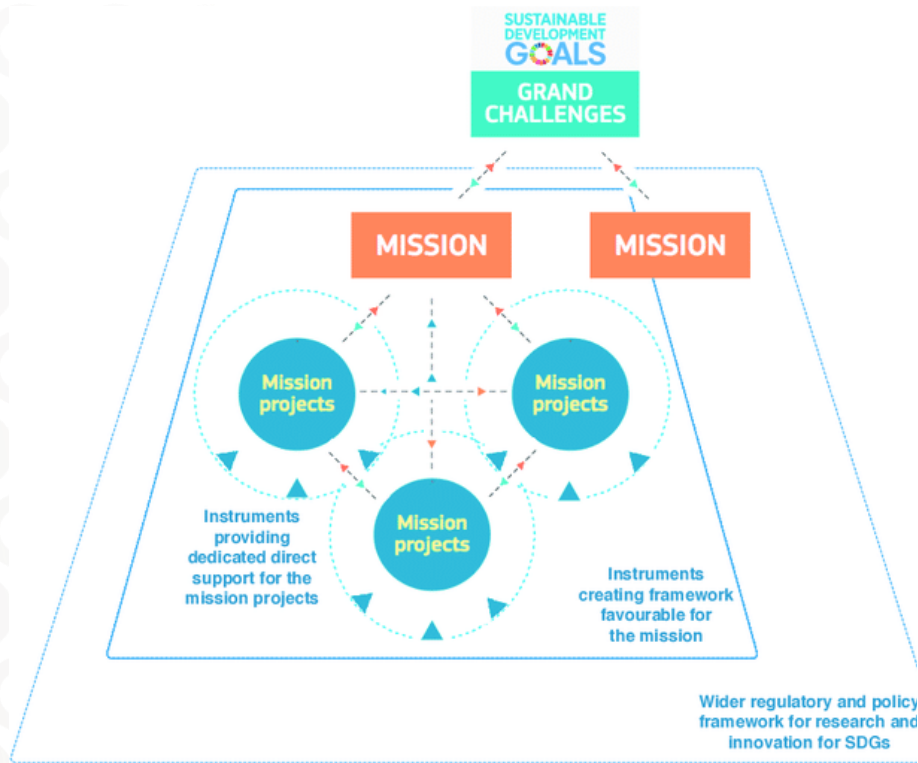


Towards transforming innovation policy



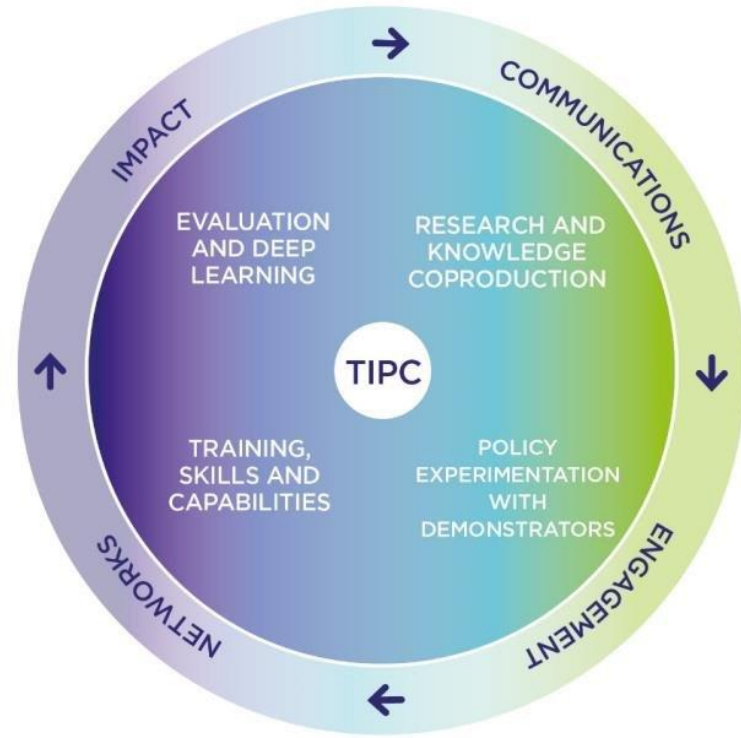
Source: Chataway et al., 2017a (See also Schot and Steinmueller, 2016 for discussions on 3 Frames)

Towards transforming innovation policy: MIP & TIP



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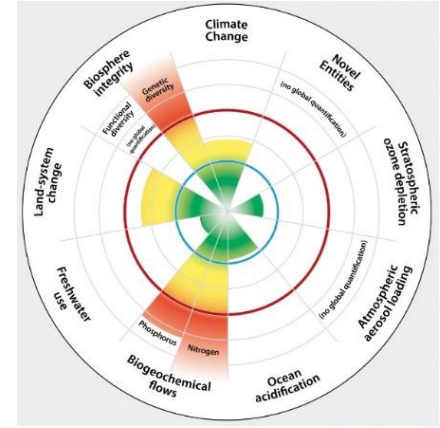
Mazzucato 2017,
Miedzinski et al. 2019



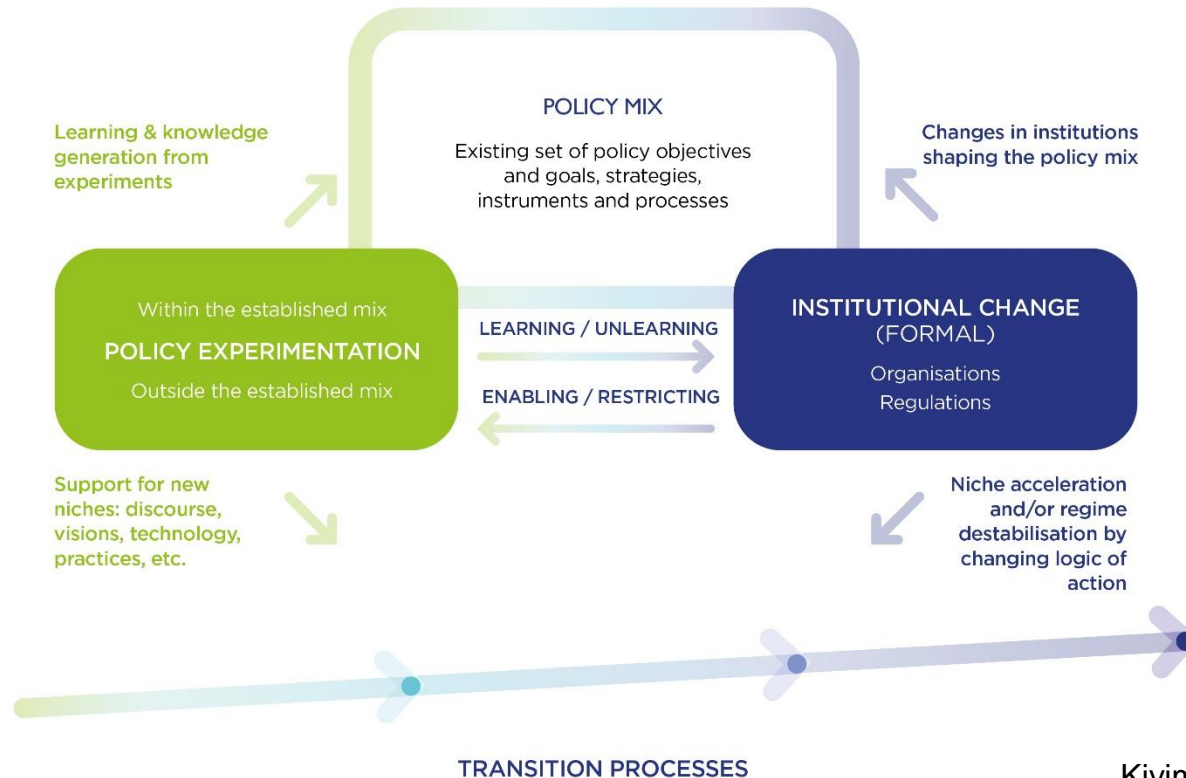
Schot et al. 2017

Environmental & social transitions as a key objective for innovation policy

- UN SDGs as justification & focus for these ambitions
- Increasing overlap with environmental and regional policies - need for horizontal coherence with innovation policy
- Increasing interest in the OECD and EC DG Research & Innovation
- Challenge to move from specific, individual RD&I programmes to a more holistic approach

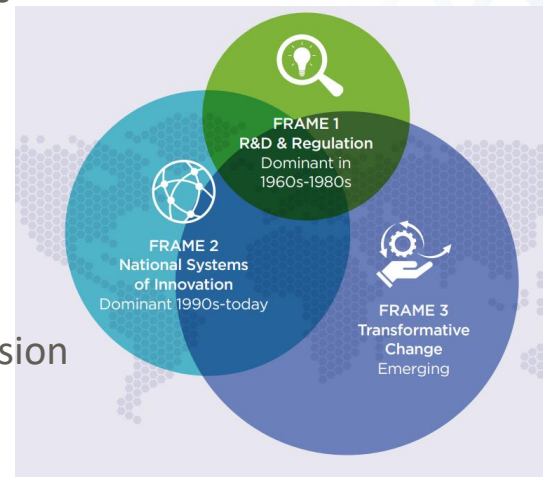


Transformative innovation policy places higher demands for experimentation & institutional change



Transformation of the STI policy administration itself to be more aligned with transitions

- Changing logic from R&D push to transformation
 - reflected in the mix of policy objectives and instruments
- RE-thinking the mix of instruments
 - what kind of 'policy experimentation' or 'intermediary actors/platforms' are needed?
- Increased need for horizontal & vertical coordination & coherence
 - With sectoral policy domains, with local & regional decision making
- Overcoming the bureaucracy of innovation governance
 - More flexibility and agility in new programme & project setting



Picture source: Schot et al., 2018

Some perceived problems

- Innovation policy plays a role in sustainability transitions BUT
 - It is not necessarily strategically focused on environmental/social sustainability issues
 - Synergies with sectoral policies can still be ad hoc
- Programmes exist in support of, e.g., renewable energy, mobility, sustainable food, or energy efficiency BUT
 - They have often been limited in scope and to the innovation domain
 - They require the destabilisation or opening of sectoral regimes
- Orientation to transitions requires breaking existing bureaucracies of established policy domains BUT
 - Procedures for setting up and evaluating research & innovation programmes may hinder quick, agile and reflexive enough processes

Increasing overall attention to social justice

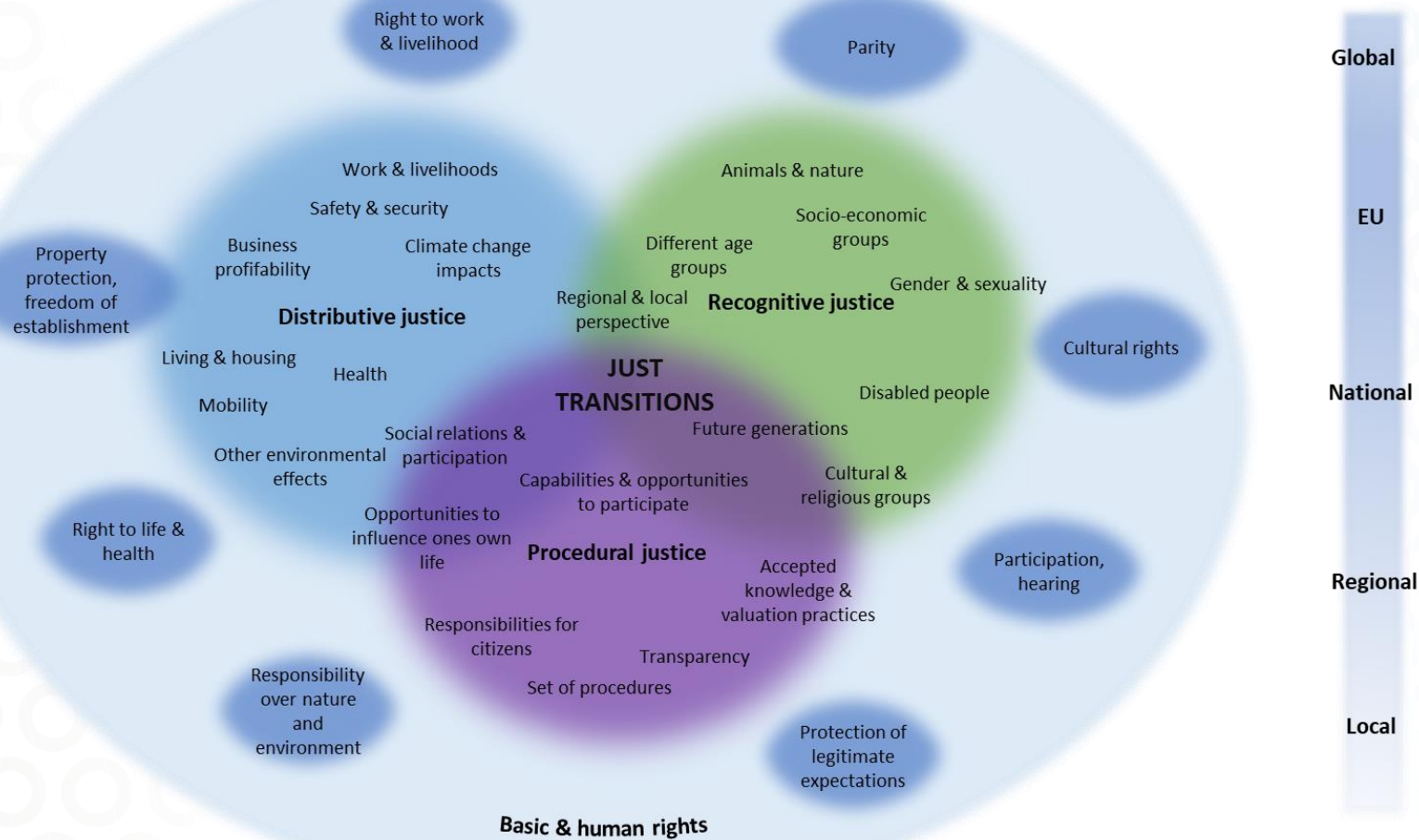


*Illegal artisanal mine in the Democratic
Republic of Congo*

Photo by: Erberto Zani / Alamy Stock
Photo



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How could/should innovation policy address the justice of transitions?

- **Procedural justice**

- Inclusiveness to new types of actors (e.g. marginal groups, social innovators)
- Transparency & opportunities to participate

- **Distributive justice**

- Who benefits from research & innovation?
- E.g. knowledge & skills to use new products, financial costs & benefits

- **Recognitive justice**

- How research & innovation addresses the concerns of more vulnerable groups & indigenous people?
- What are the justice implications of (transformative) innovations locally / globally?



How can innovation policy be used to thinking about the social justice implications of innovation?

- *Reactive:* Creating new solutions to new problems?
 - E.g. circular economy to reduce the consumption of virgin raw materials
- *Proactive:* Is it possible to set more specific criteria & evaluate the social justice of innovation funding?
 - Can these be known in advance?
 - Sometimes innovations can later benefit whole societies (e.g. military technologies)?

Changing geopolitics & security landscape



British & Norwegian navy ships during exercise in Scotland

Photo by: US Army Photo / Alamy Stock Photos



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Geopolitics of science

- Expanding research enterprise of China
 - A global leader and key player in several strategic technology areas and industries (Schwaag-Serger et al., 2021)
- Practices of the 'global research enterprise' (openness, ethics)
- Control of scientific research results, technologies, information availability

Geopolitical & security implications of sustainability transitions

- Impacts of large-scale transformations (e.g. fossil fuel phase out) to global power balance & stability
- From old to new dependencies (e.g. critical minerals & metals, technological components) – innovation policy solutions?
- Perceptions of justice, polarisation of views, populism – impact on local & global stability vs. conflict
- Environmental & social impacts → conflicts → cascading impacts to European trade & security



Photo: <http://www.industrialunion.org/>



Photo: elonkapina.fi





Interplay between low-carbon energy transitions and national security: An analysis of policy integration and coherence in Estonia, Finland and Scotland

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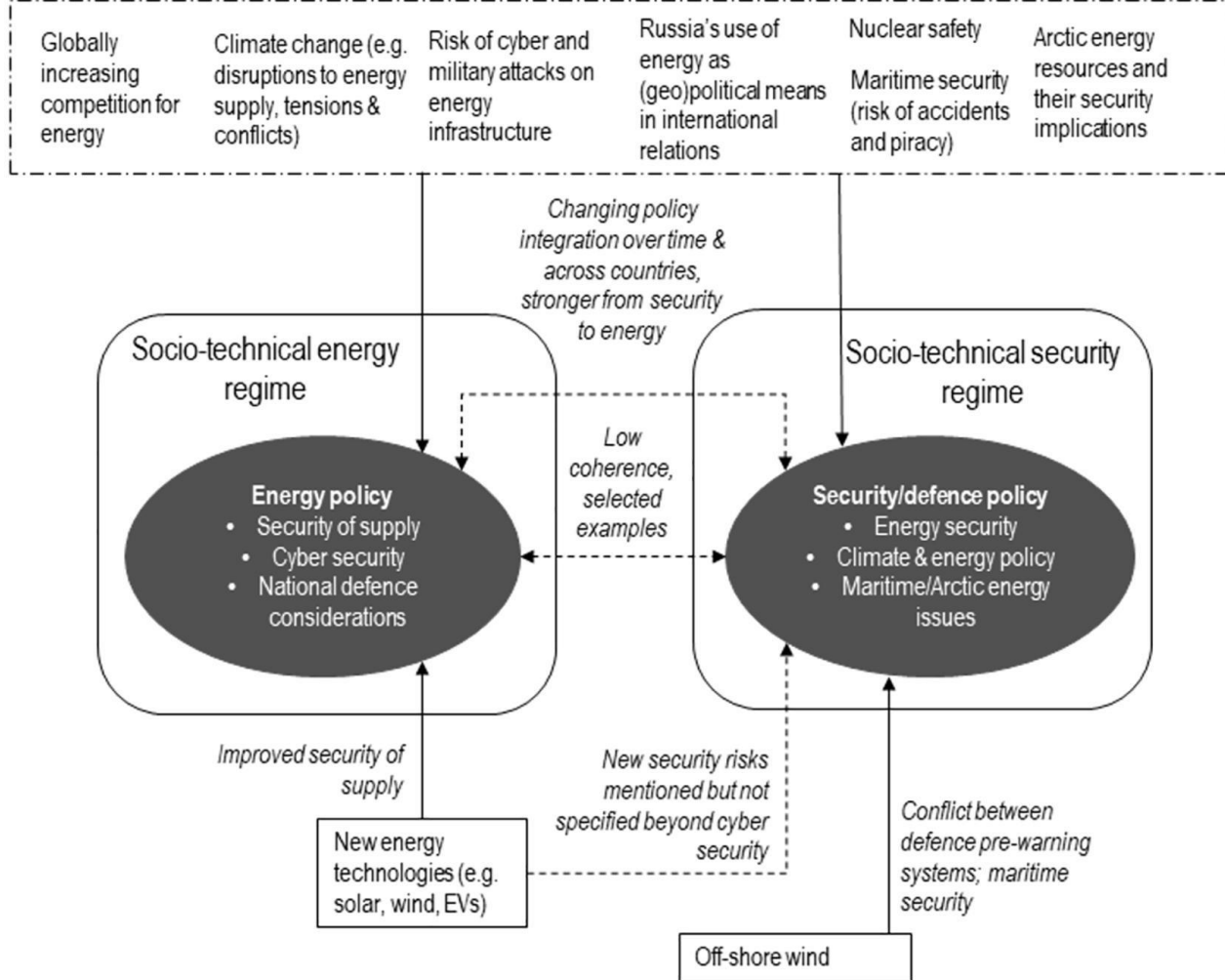
Highlights

- Combining policy coherence and integration with sustainability transitions.
- Policy document analysis explored the interplay of energy and security policies.
- Security and defence at times integrated in energy policy, particularly in Estonia.
- Lack of coherence between low-carbon energy transition and national security policy.
- Security inferences of growing energy niches little covered in strategy documents.

Landscape
megatrends &
challenges

Socio-
technical
regimes

Innovation
niches
connected to
energy



Example of electric vehicles and security & geopolitics

- Innovation in electric vehicles enables phasing-out oil-based transport and significant reductions in CO2 emissions
 - Reduced dependence on global oil supply and trade, improved climate security
- Dependency on critical raw materials supply (e.g. nickel, cobalt & lithium)
 - Majority of supply chains in Chinese ownership, setting conditions on where production of technological components can occur
 - Environmental & social consequences of mining (e.g. in Democratic Republic of Congo), with risk of local/regional conflicts & cascading effects
- Increased dependency via sector-integration on electricity grids
 - Cyber security & hybrid risks

What does the changing geopolitical & security landscape mean for innovation policy?

- The innovation solutions for global sustainability challenges have complex interconnections
 - with both positive and negative effects on global security, stability & justice
- Innovation policies need to address the scaling of niches in transitions
 - What are the resource requirements, and implications on global trade and security?
 - What can be thought as solutions?
 - What is perceived as just & fair (regionally, nationally, globally)?

How science and innovation policies can accelerate transitions?

How science & innovation policies can accelerate transitions

1. Introducing environmental/social sustainability “directionality” into science & innovation policy more strongly
2. Coordinated planning and implementation with sectoral policies
3. Creating policy mixes that address systemic change
4. Rethinking how science & innovation policy administration can be reorganised

How science & innovation policies can accelerate transitions

5. More attention to social & business model innovation, institutional change, "disrupting" the old systems – alongside new technology
6. Creating connections to green industrial & educational policies
7. Addressing also the flipside of transitions – paying attention to potentially negative consequences of the expansion of innovations & how to alleviate them

Thank you!

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