STRN Newsletter

N°48 | June 2023

Sustainability Transitions Research Network.

STRN

Newsletter 48 – June 2023

Content

- Editorial – p. 2
- EIST Journal – p. 4
- STRN Events – p. 4
- STRN News – p. 5
- New Projects – p. 6
- Other News – p. 6
- Publications – p. 7

About

The STRN newsletter is published four times a year in March, June, September & December

Cover picture:
Fan coral, Shutterstock

Editorial

by Jochen Markard

Professionalization of STRN: Great progress but still a way to go!

As previously announced, STRN is shifting network support from purely voluntary work by Steering Group members to more professional management via a formal secretariat; nonetheless, STRN will still involve a lot of voluntary support. The STRN secretariat is currently hosted by Utrecht University, with Adriaan van der Loos as our network manager and Lisa Bettoni for administrative support. This transformation is made possible with the financial support by a growing group of universities and other institutions in our network (see STRN News on p.6).

Earlier this month, the STRN Steering Group came together for a 2-day retreat in Karlsruhe (Germany) to discuss the future of the network, how we will organize ourselves given the ongoing process of professionalization and formalization, and what new services and resources we can provide for the community.

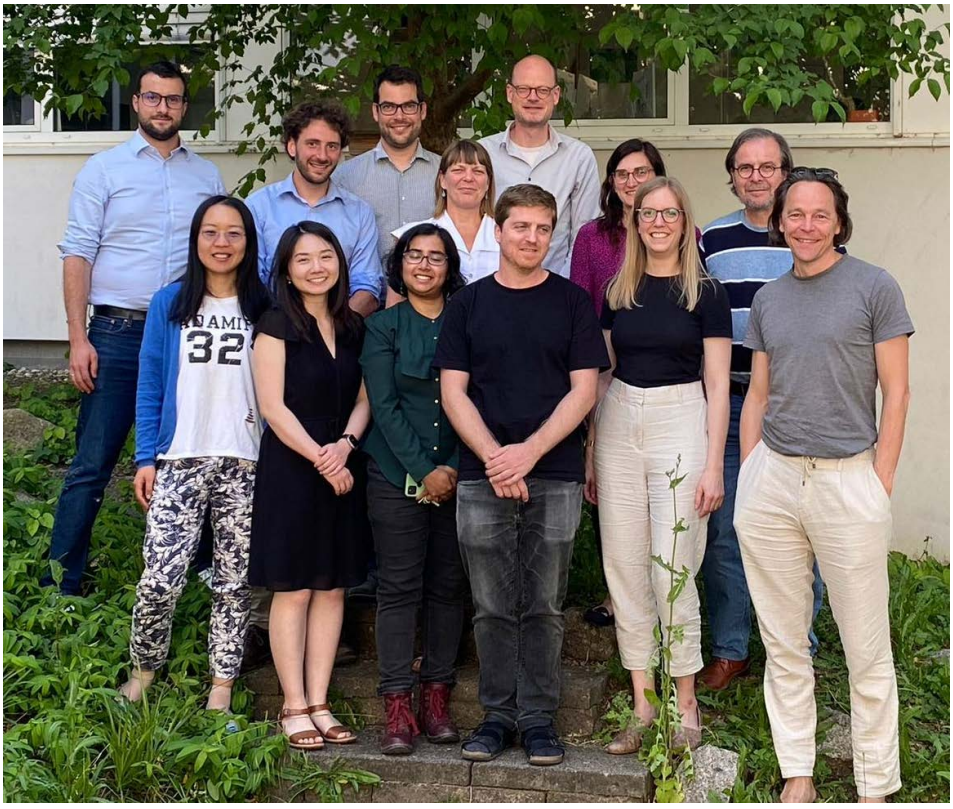
It was a special meeting: we had the opportunity to take a step back and reflect on the strengths and weaknesses of our network, our long-term ambition, and strategic priorities. We also discussed many practical issues, including how to better use the website (e.g., making more resources available), how to effectively interact with and support the thematic groups (and possibly adding new ones) and STRN events, how to define everyone's new responsibilities (Steering Group, board, secretariat, institutional members) and how to better interact and support you: the STRN community of researchers and practitioners.

A first thing we want to do is a little survey (in Fall), in which we will reach out to all of you, to better understand your ideas of STRN's future, your interests, needs and use of our current resources such as the email list, this newsletter, the website etc.

We also plan to kick-off some specific projects of both short-term and long-term character. The first involves a much more comprehensive "resources" section on the website (e.g., to get acquainted with our field

or for teaching courses on transition studies), a second PhD school (e.g., an introduction to transitions research), a set of tools to support teaching and perhaps even a Transitions' Master program in collaboration with one or several universities, and a more regular and systematic exchange with related networks such as Eu-SPRI, Earth System Governance, EASST, or others (e.g., joint workshops or events at conferences).

So, there is much going on at the moment and we are very excited. We are also aware that not everything will work immediately. It will take some time to implement these new ideas in practice and to transform STRN into an efficiently working organization. It is very important for us to highlight that STRN remains a network which is open, inclusive, diverse and accessible to everybody. This is also why we invite you to share your ideas (or complaints ☺) at any time, or in the upcoming survey. Everybody is also welcome to actively participate in building STRN – either as a member of the Steering Group (see email Call by Shan and Patience from June 15), as a member of NEST, by joining a Thematic group, or by reaching out to anyone of us in the Steering Group.



Steering Group Meeting Karlsruhe (top left to bottom right): Anton Sentic, Adriaan van der Loos, Florian Kern, Katharina Schiller, Wouter Boon, Lisa Bettoni, Bernhard Truffer, Kejia Yang, Xiao-Shan Yap, Bipashyee Ghosh, Bruno Turnheim, Alina Scherrer, Jochen Markard.
Mapula Tshangela, Patience Mguni and Wisdom Kanda joined online.

EIST Journal

We are happy to introduce the most recent issue of EIST, published in Volume 47. The full list of papers is featured in the publication section of this newsletter.

Our junior associate editor Wisdom Kanda (University of Linköping) organized a first **meet the EIST editors webinar** on April 27th to which more than 140 people subscribed and finally more than 40 participated. We invited manuscripts that were in a state of being submitted soon and commented on two of them regarding different considerations that a handling editor would have when judging whether or not to send them to reviewers. The feedback to the event was very positive and we intend to offer a next webinar about a similar topic in a year's time.

Finally, we advertised the opening of **two female associate editor positions** (one junior and one senior). In case of interest, please send me a short letter by email before **July 9th**. Please detail your motivation, the conceptual, methodological and empirical fields that you would feel competent to cover, and whether you would see yourself as fitting better in the junior or senior position. Also, provide a paragraph or two about how you would like to see the journal developing over the coming years. Finally, add your publication record and experience as a reviewer for academic journals (in particular regarding EIST).

Bernhard Truffer
Editor-in-Chief EIST

STRN Events

14th IST Conference, Utrecht, NL
August 30 – September 1, 2023

Preparations for IST 2023 are in full swing, and we have already received nearly 400 registrations! Remember, the deadline for presenting authors to register is **July 15th**.

We are happy that the Province of Utrecht will give us a warm word of welcome and will participate in a science-policy debate at the end of day 1. Professor Mark Swilling will give the keynote speech on day 2. On day 3, we invite everyone to join us in an interactive session on 'Roles, responsibilities, and radicalities. A collective (self-) reflection on our transitions researchers' identity in addressing societal challenges'. *Please consider filling in this 2-min survey, which we use as input for preparing the session*

We are also currently organizing numerous art installations, musical performances and other engaging events. There will be plenty of networking time during drinks at the end of day 1 and dinner at the end of day 2.

STRN Best Paper Award: The award will go to an outstanding paper at IST 2023 written by an early career researcher as the first author. An independent committee (including two senior EIST editors) set up by the STRN Steering Group will participate in the review process, invite reviewers, evaluate the scores, and jointly determine the winner. The deadline to upload your full paper and submit a self-nomination is **July 31st**. More details to come shortly.

We will also have a best poster award, granted by the community.

Website: www.ist2023.nl
Email: ist2023@uu.nl

The 2023 IST Organizing Committee
Simona Negro, Adriaan van der Loos, Wouter Boon

Early career day, August 29

The early career day of the IST 2023 conference in Utrecht will be held on August 29th! The event aims to connect early career researchers to the vibrant sustainability transitions community, and to explore complementarities with related research fields, perspectives and approaches. The event is organized by the Network of Early career researchers in Sustainability Transitions (NEST) and the Copernicus Institute of Sustainable Development (Utrecht University).

We will start the day with a morning programme at the Utrecht Science Park, where participants will learn about the concept of positionality and explore how it plays a role in their own research. The workshop will consist of a plenary session, breakout groups, and personal discussions to delve into the complexities of positionality in research. After lunch, we will collectively put these concepts to practice by reflecting on the role and future of the NEST community. For the morning programme, we will also be joined by Julia Wittmayer and other senior STRN scholars.

In the afternoon we are organising a social programme, so early career researchers can connect, exchange

experiences and get to know each other before the IST conference. We move from Utrecht Science Park towards city centre, where there is a chance to play pingpong, connect with peers, have a drink, and ultimately dinner. The organization team is looking forward to hosting this event and meeting PhD students and early career scholars in the transition's community!

Save the Date!
The 15th IST Conference will take place in Oslo, from June 17th – 19th, 2024

STRN News

STRN is very happy to announce that Monash, AIT and Syke have decided to support our network as part of the ongoing professionalization and formalization:

Monash Sustainable Development Institute
Monash University, Australia

AIT Austrian Institute of Technology
Vienna, Austria

Finnish Environment Institute (Syke)
Helsinki, Finland

These three join those institutions we already shared with you in the last newsletter:

Copernicus Institute of Sustainable Development
Utrecht University, The Netherlands

Department of Technology, Innovation and Society
Eindhoven University of Technology, The Netherlands

Fraunhofer Institute for Systems and Innovation Research ISI Karlsruhe, Germany

Group for Sustainability and Technology
ETH Zurich, Switzerland

TIK Centre for Technology, Innovation and Culture
Oslo University, Norway

Cirus Research Group
Eawag, Switzerland

There are more institutions in the process of joining and we will announce all inaugural institutional members at IST 2023.

Report on 4th NEST/STRN Methodology School

How to study sustainability transitions? by Bonno Pel

The 4th NEST/STRN Methodology School took place from June 5th - 9th 2023 at the Zurich University of Applied Sciences (ZHAW) in Winterthur, Switzerland. Organised by Anton Sentic and Vicente Carabias (ZHAW), Jonathan Köhler (Fraunhofer ISI), Lea Fuenfschilling (Lund University), Floor Alkemade (Eindhoven University of Technology) and Bonno Pel (Université Libre de Bruxelles), this week featured a series of methodology lectures from various perspectives, collective work on real-life research challenges, and animated exchanges between early career researchers from many different countries including South Africa and Australia.

Deliberations on the next school for 2024 and consolidation of the organisational part are currently ongoing.

This 4th edition confirmed the relevance of methodological reflection and education for STRN as an interdisciplinary and scientifically ambitious community of sustainability research.

To provide a comprehensive report, it is important to focus on its most important part – the participants. We like to thank **Nontsikelelo Mngqibisa** (Stellenbosch University), for sharing the following reflection:

"The Swiss climate is warming two to three times faster than the global average. Its average temperature already increased by 2.5°C in the last 10 years. So, discussions about sustainability transitions in the very hot climate at ZHAW in Winterthur, Switzerland, seemed appropriate!

I am grateful to the Centre for Sustainability Transitions (CST) for providing me with the opportunity to attend this year's Methodology Summer School. I was really blown away by the quality of the faculty, the diversity of the speakers, and the vibrant community of fellow students.

My days were filled with engaging lectures, discussions, and group work that enriched my knowledge and skills in ways I could not have imagined.

The speakers included Jochen Markard, Frank Geels,

Lars Coenen, Timo von Wirth, Bonno Pel, Jonathan Köhler, Julia Wittmayer, Bernhard Truffer, Saurabh Arora, and Bipashyee Ghosh, who spoke about various aspects of research and methodologies for sustainability transitions research. On Thursday I was particularly grateful to have a global south perspective brought into the conversation.

One of the most impactful aspects of this summer school was the opportunity to work in a group to develop a transformative innovation ecosystem. As we presented our work, we introduced ourselves in our native languages, which included French, Chinese, German, Dutch, and Tswana. Relatively speaking, we represent different cultures and are facing different challenges. It is, however, our passion for a just and sustainable society that binds us together."

New Projects

TRABBI - Socio-technical transformation processes for a sustainable construction sector in the bioeconomy

Regional lead markets and global innovation systems

TRABBI is a five-year research project funded by the German Federal Ministry of Education and Research (BMBF) under the funding programme 'Bioeconomy as Societal Change'. The junior research group investigates innovation systems and socio-technical structures in the construction sector. The transformation of the global economic system towards a bioeconomy is associated with profound societal changes, which, however, are shaped differently across regions.

Against this background, the project examines transformation processes towards a sustainable construction sector in the context of the bioeconomy. This involves analyzing innovation systems, socio-technical regimes, and lead market structures at the global, national, and regional level. The national and regional research focuses on Germany, Italy, China, and India.

Website: https://www.trabbi-bioeconomy.de/en
PI/contact: Sebastian Losacker (email)

Other News

European Mobility Week Award

The city of Braga won the European Mobility Week Award 2022, awarded at a Gala held in Ghent on March 23rd. For this award, the city of Braga has applied **Transition Experiments** (e.g. parklet and piano painting on the asphalt to widen the sidewalks near a music school). This action research is part of a PhD by Filipa Corais, a student of the School of Architecture, Art and Design from the University of Minho, MIT-Portugal, entitled "The city walking towards 2050. Braga as a laboratory for a resilient urban system."
Link Youtube-Video

Publications

PhD Theses

Iyabano A. H. (2023)
Unravelling the positions, roles, and agency of Farmers' Organizations in the promotion of agroecology in Burkina Faso
Wageningen University.
Link

Understanding the potential role of agroecology as a promising solution to the current agriculture development challenges (such as low productivity and rapid depletion of natural resources) is crucial for many sub-Saharan countries. This is because agroecology has always played an essential role in conserving and restoring highly degraded lands in many Sahelian regions. The main actors supporting the promotion of agroecology are NGOs and farmers organizations (FOs). These actors promote agroecology by establishing joint relations where the NGOs assist FOs to disseminate sets of agroecological techniques to their members. This research contributes to debates on the roles of farmers' organizations (FOs) as innovation intermediaries in the agricultural sustainability transitions with a particular focus on the Burkina Faso context.

Ramanauskaitė, J. (2023)
Antecedents of tensions of corporate sustainability maturity
Kaunas University of Technology

Driven by increasing requirements or internal interest, organisations are taking on sustainability initiatives to engage with sustainability challenges. This creates the environment for long-term, complex, resource-intensive changes that lead to tensions. The thesis analyses sustainability transitions through the lens of sustainability maturity, distinguishing four levels of corporate sustainability maturity. Tensions are defined and analysed in this research using the existing categorisation of tensions of corporate sustainability. The causes of tensions - antecedents - have not been widely analysed in scientific literature. Consequently, an innovative research methodology is proposed to enable the revelation why tensions emerge in organisations that are determined to respond to the sustainability challenges. The context of Lithuania as a transition economy was chosen for the empirical study and analysed using embedded multiple case study research method. Eighteen sustainability-oriented organisations were examined using various information sources such as websites, reports, and interviews with their representatives. The research revealed that the main antecedents of tensions of corporate sustainability maturity were culture and sustainability perception. Moreover, the findings also suggested that tensions emerged at all levels of corporate sustainability maturity; however, organisations with higher sustainability maturity levels were more likely to define the tensions and identify their causes.

Wetzchewald, A.S. (2023)
Exnovation and the sustainable transition in transport - An analysis of exnovation processes as a shift away from the unsustainable automobility regime towards a sustainable urban transport transition.
Wuppertal Institute
Link (Thesis in German)

This thesis shows that exnovation is a central approach for implementing a transition in urban transport, that goes beyond a technological shift towards new propulsion technologies. An intended exnovation can help to overcome path dependencies to systematically destabilise the dominant automobility regime, enabling an alternative regime of sustainable mobility to be established in its place. Exnovation can accelerate the speed of implementation of a transition in urban transport, reduce the risk of undesirable developments including the development of rival parallel structures, thus increasing the certainty of direction and ensuring a fundamental change of appropriate scale and speed.
The aim of this thesis is to develop a definition and process understanding for the so far rudimentarily researched approach of exnovation in the context of the transition in urban passenger transport. It also aims to derive exnovation design approaches in urban space for municipal urban and transport planning. Therefore, an explorative research approach is applied, which combines theoretical-conceptual, and empirical components and is based on the transition and exnovation theory. It provides an innovative contribution to the expansion of the transition and exnovation theory both conceptually through the combination and successful transfer to a rudimentarily explored field of application and empirically in the field of urban passenger transport through the Oslo case study.

Giraldo Suárez, Á. (2023)
Economy, environment, and peace: modeling from the complexity economics approach
Link (Thesis in Spanish)

Under a growing demand for resources greater than the regeneration of the biophysical system (Wackernagel *et al*., 2021) stress is generated in environmental resources, and society faces uncertainties related to their scarcity and climate change. In this framework,

conflicts are observed that lead to questions about mechanisms to understand and adapt. Thus, the approach of Fisher and Rucki (2017) acquires relevance: economic development, ecosystem functioning, peace, and conflict management are necessary components of sustainability, but how they work is deeply unknown. Therefore, this research aims to analyze behaviors that promote peace within the framework of the complex economy based on the dynamics between the economic, environmental, and social systems. To accomplish this, first, a theoretical framework is deepened, which covers the three mentioned systems and inquiries about the emergence of peace in a self-organized and adaptive system, typical of complex systems. Cooperation is identified as an element that connects the subsystems with peace. Second, a simulation model is built from the agent-based models to recognize emergencies that contribute to understanding the dynamics that impact peace. As findings, it is identified that implementing intergroup selection mechanisms can favor the emergence of stable peace. In scenarios in which there is a perceived scarcity of resources, the non-cooperative strategy is the one that generates the least benefits.

Papers

EIST Volume 47

Nils Ohlendorf, Meike Löhr, Jochen Markard
Actors in multi-sector transitions - discourse analysis on hydrogen in Germany

Brit M. Bulah, Simona O. Negro, Koen Beumer, Marko P. Hekkert
Institutional work as a key ingredient of food innovation success: The case of plant-based proteins

D. Wemyss, F. Cellina, M. Grieder, F. Schlüter
Looking beyond the hype: Conditions affecting the promise of behaviour change apps as social innovations for low-carbon transitions

Inese Zepa, Volker H. Hoffmann
Policy mixes across vertical levels of governance in the EU: The case of the sustainable energy transition in Latvia

Marjolein J. Hoogstraaten, Koen Frenken, Taneli Vaskelainen, Wouter P.C. Boon
Replacing meat, an easy feat? The role of strategic categorizing in the rise of meat substitutes

Olufolahan O Osunmuyiwa, Andrew D Peacock
What matters? Unlocking householders' flexibility towards cooling automation in India

J.E.H. Kusters, F.M.G. van Kann, C. Zuidema
Exploring agenda-setting of offshore energy innovations: Niche-regime interactions in Dutch Marine Spatial Planning processes

Quoc Nguyen-Minh, Heleen Prins, Peter Oosterveer, Inge D. Brouwer, Raffaele Vignola
Food system transitions in Vietnam: The case of pork and vegetable networks

Nabil Haque, Sungida Rashid
Technology diffusion and green transition support in the brick sector of Bangladesh: Why transformational change is still elusive

Hanna Bach, Teis Hansen
Flickering guiding light from the International Maritime Organisation's policy mix

Adrian Smith, Gerardo A. Torres Contreras, Marie-Claire Brisbois, Max Lacey-Barnacle, Benjamin K. Sovacool
Inclusive innovation in just transitions: The case of smart local energy systems in the UK

Benjamin Ronald Silvester, Jens Kaae Fisker
A relational approach to the role of the state in societal transitions and transformations towards sustainability

Cholez Célia, Magrini Marie-Benoît
Knowledge and network resources in innovation system: How production contracts support strategic system building

Felix Butschek, Jared L. Peters, Tiny Remmers, Jimmy Murphy, Andrew J. Wheeler
Geospatial dimensions of the renewable energy transition — The importance of prioritisation

Karoline S. Rogge, Maria Stadler
Applying policy mix thinking to social innovation: from experimentation to socio-technical change

Michael Kriechbaum, Niklas Terler, Bernhard Stürmer, Tobias Stern
(Re)framing technology: The evolution from biogas to biomethane in Austria

Huei-Ling Lai
From protected spaces to hybrid spaces: Mobilizing A place-centered enabling approach for justice-sensitive grassroots innovation studies

Aline Scherrer
How media coverage of technologies affects public opinion: Evidence from alternative fuel vehicles in Germany

Marko P. Hekkert
Response to "Missions and mission-oriented innovation policy for sustainability: A review and critical reflection"

Julian Kirchherr, Kris Hartley, Arnold Tukker
Missions and mission-oriented innovation policy for sustainability: A review and critical reflection

Irja Vormedal, Julie Bjander, Mari Lie Larsen, Marie Byskov Lindberg
Technological Change and the Politics of Decarbonization: A *Re*-making of Vested Interests?

Andersen, A.D., Geels, F.W., Coenen, L. etal (2023)
Faster, broader, and deeper! Suggested directions for research on net-zero transitions.
Oxford Open Energy, Volume 2
Link

The growing attention to the political goal of achieving net-zero emissions by mid-century reflects past failures to alter the trajectory of increasing greenhouse gas (GHG) emissions. As a consequence, the world now needs to decarbonize all systems and sectors at an unprecedented pace. This commentary discusses how the net-zero challenge presents transition scholarship with four enhanced research challenges that merit more attention: (1) the speed, (2) breadth and (3) depth of transitions as well as (4) tensions and interactions between these.

Bidwell, D., Sovacool, BK. (2023)
Uneasy tensions in energy justice and systems transformation
Nature Energy 8, pp. 317-320
Link

Differences in the approach to community acceptance of energy technologies can muddy visions of energy futures. Acknowledgement of the tensions around justice perspectives and the degree of desired change can improve scholarship and policy dialogue.

Braams, R.B., Wesseling, J.H., Meijer A. J., Hekkert, M.P. (2023)
Civil servant tactics for realizing transition tasks understanding the microdynamics of transformative government
Public Administration, 1– 19.
Link

The transition literature argues that governments have an essential role in facilitating societal transitions. The current paper aims to provide a theoretical and empirical understanding of this government role by analyzing the work of entrepreneurial civil servants. These civil servants try to execute transition tasks but are often resisted by their colleagues who invoke dominant traditions in Public Administration. This raises the question of how they deal with this resistance and manage to execute government transition tasks. We introduce a heuristic rounds-model to understand the interplay between contestation and responses. Due to its subsequent rounds, the model shows ongoing tactical work navigating opposition and uncovers the tactics' temporariness and their capacity to backfire. We illustrate the value of the heuristic model by analyzing the clash between opposing rationalities and the change agents' continuous tactical adjustment in our case study on "Mobility as a Service" in the

Netherlands.

Brett, N., Magnusson, T., Andersson, H. (2023).
From global climate goals to local practice—mission-oriented policy enactment in three Swedish regions
Science and Public Policy, scad010
Link

As the national and supranational levels of government embrace the concept of missions to solve wicked problems, the importance of understanding how missions move from one level of governance to another becomes essential. In this paper, we present a comparative case analysis of evolving regional biogas systems to consider how global missions on climate action are enacted in local practice. Referring to wickedness in terms of contestation, complexity, and uncertainty of both problems and solutions, we examine how such framings affect the operationalisation of the missions. Our results indicate that in the process of local translation, wickedness often increases, but additional wickedness does not always worsen the outcomes.

Dzhengiz, T., Haukkala, T. and Sahimaa, O. (2023)
(Un)Sustainable transitions towards fast and ultra-fast fashion.
Fashion and Textiles, 10:19
Link

Due to pressing sustainability challenges, the fashion industry is undergoing tremendous change. Surprisingly, even though the unique context of fashion presents an opportunity for scholars to explore the (un)sustainable transitions, this context has yet to receive the attention of transition scholars. Our article explores fashion transitions and develops a conceptual framework demonstrating this transition's multi-level and multi-dimensional interactions. We draw on three literature areas: multi-level perspective (MLP) of sustainable transitions, institutional logics and framing contests. We then introduce a conceptual framework and illustrative examples from the industry and demonstrate the tensions between positive and negative environmental and social sustainability developments at the niche, regime and landscape levels. We show that while many positive developments can be seen in the regime players through the adoption of corporate sustainability initiatives, new business models and collaborations, more attention should also be given to some adverse developments. Overall, we contribute to the literature by exploring fashion transitions, an under-explored context, and by demonstrating the complexity of interactions due to the diffusion of heterogeneous institutional logics and framing contests between players.

Geels, F.W. (2023)
Demand-side emission reduction through behaviour change or technology adoption? Empirical evidence from UK heating, mobility, and electricity use
One Earth, 6(4), 337-340
Link

Demand reduction is an important climate mitigation strategy to complement supply-side approaches. Mobilizing evidence from the United Kingdom, this paper shows that technology adoption has contributed much more to demand-side emission reduction in the past 15 years than behavior change. I recommend a complementary socio-technical approach to emissions reduction

Geels, F.W. and Ayoub, M. (2023)
A socio-technical transition perspective on positive tipping points in climate change mitigation: Analysing seven interacting feedback loops in offshore wind and electric vehicles acceleration
Technological Forecasting and Social Change, 193; 122639
Link

This paper engages with climate mitigation debates on positive tipping points, which attract increasing attention but remain divided between technological and social tipping point approaches. Building on recent attempts to overcome this dichotomy, the paper develops a socio-technical transitions perspective which shows how co-evolutionary interactions between techno-economic improvements and actor reorientations can significantly accelerate diffusion. Mobilising insights from political science, discourse theory, business studies, consumption theory, and innovation studies, we elaborate the Multi-Level Perspective to articulate seven feedback loops in tipping point dynamics. We illustrate and test our co-evolutionary perspective with two case studies, UK offshore wind and electric vehicles. These case studies not only demonstrate the importance of interacting feedback loops, but also show a contrasting sequence in tipping point dynamics, with substantial techno-economic deployment *preceding* major actor reorientations in offshore wind, while *following* them in the EV case. The cases also indicate the crucial roles of policymakers in low-carbon tipping point dynamics as well as the importance of policy learning and social, political, and business feedbacks in strengthening and reorienting policy support.

Geels, F.W. and Gregory, J. (2023)
Low-carbon reorientation in a declining industry? A longitudinal analysis of coevolving contexts and company strategies in the UK steel industry (1988-2022)
Energy Research & Social Science, 96, 102953
Link

To assess the speed and directionality of low-carbon transition processes in the UK steel industry, this article makes a longitudinal analysis of changing external pressures and company response strategies over the last 34 years. Using the Triple Embeddedness Framework and a five-phase model of reorientation, the study finds that the steel industry's low-carbon reorientation strategies moved from inaction (phase 1 in our model) and incremental change (phase 2) in the 1988–1997 period, to hedging and exploration of technical alternatives (phase 3) in the 1997–2007 period, back to incremental change in the 2007–2015 period (phase 2), and then forward again to hedging and exploration of technical alternatives (phase 3) in the 2015–2022 period. The reason for this oscillation pattern is that economic decline and successive retrenchment strategies reduced managerial attention and organizational resources for low-carbon orientation, especially after the 2007/8 financial crisis which led to a survival-focus. In recent years, UK steelmakers have started to explore three decarbonisation pathways (scrap/ electric arc furnaces, carbon-capture-and-storage, and hydrogen direct reduction) but have not yet committed to their deployment, which is why reorientation speed is limited. New economic headwinds in 2021/2 threaten the implementation of low-carbon visions and roadmaps, leading steelmakers to ask for more government support. Future shifts to phase 4 (deployment and diversification) and phase 5 (full reorientation) in our conceptual model will depend on the outcome of currently ongoing political negotiations.

Geels, F.W., Iskandarova, M., and Sovacool, B.K. (2023)
The socio-technical dynamics of net-zero industrial megaprojects: Outside-in and inside-out analyses of the Humber industrial cluster
Energy Research & Social Science, 98, 103003
Link

Although energy-intensive industries are often seen as 'hard-to-decarbonise', net-zero megaprojects for industrial clusters promise to improve the technical and economic feasibility of hydrogen fuel switching and carbon capture and storage (CCS). Mobilising insights from the megaproject literature, this paper analyses the dynamics of an ambitious first-of-kind net-zero megaproject in the Humber industrial cluster in the United Kingdom, which includes CCS and hydrogen infrastructure systems, industrial fuel switching, CO2 capture, green and blue hydrogen production, and hydrogen storage. To analyse the dynamics of this emerging megaproject, the article uses a socio-technical system lens to focus on developments in technology, actors, and institutions. Synthesising multiple megaproject literature insights, the paper develops a comprehensive framework that addresses both aggregate ('outside-in') developments and the endogenous ('inside-out') experiences and activities regarding three specific challenges: technical system integration, actor coordination, and institutional alignment. Drawing on an original dataset involving expert interviews (N = 46), site visits (N = 7), and document analysis, the 'outside-in' analysis finds that the Humber megaproject has progressed rapidly from outline visions to specific technical designs, enacted by new coalitions and driven by strengthening policy targets and financial support schemes. The complementary 'inside-out' analysis, however, also finds 12 alignment challenges that can delay or derail materialisation of the plans. While policies are essential aggregate drivers, institutional misalignments presently also prevent project-actors from finalising design and investment decisions. Our analysis also finds important tensions between the project's high-pace delivery focus (to meet government targets) and allowing sufficient time for pilot projects, learning-by-doing, and design iterations.

Giraldo-Suárez, A.I., and León Rodríguez, N. (2023)
Intergroup selection as a way to peace and sustainability
Visions for Sustainability, 19, 7157, 1-32
Link

Due to an increasing demand for resources that exceeds the biophysical system's ability to regenerate itself (Wackernagel et al., 2021), environmental resources are under stress, and society faces uncertainties related to their scarcity and climate change that can lead to violent conflicts. This context raises questions about mechanisms to understand the phenomenon and adapt. Therefore, Fisher and Rucki's (2017) approach becomes relevant: economic development, ecosystem functioning, peace, and conflict management are necessary components of sustainability, but how they work together is not well understood. To address this issue, a theoretical path is proposed based on three approaches: sustainability transition, complexity economics, and peace from a vision of complex systems. By promoting cooperative behaviors through intergroup selection processes, progress can be made toward sustainability and the emergence of peace as a stable behavior.

Grainger-Brown, J., Malekpour, S., Raven, R.P.J.M., Taylor, L. (2022)
Exploring urban transformation to inform the implementation of the Sustainable Development Goals
Cities. 131, 103928
Link

The Sustainable Development Goals (SDGs) call for rapid transformation towards a more sustainable society, particularly for cities and urban areas. There is a wide spectrum of research which could inform the initiation and management of this urban transformation, but these contributions are found in disparate disciplines and academic fields. This study aims to synthesise the different elements of the 'Urban Transformation' (UT) literature into a format which can inform the implementation of the SDGs. Using a systematic qualitative review methodology, the study identified 5150 potentially relevant papers. An extensive screening process was conducted to form a review corpus of 323 studies, upon which an interpretative, iterative content analysis was applied. The analysis resulted in 15 'factors of urban transformation' identified across the literature. These factors are a mix of mechanisms and enablers which are all identified in the literature as critical for urban transformation to occur or continue. By providing a link between the rich urban transformation literature and SDG implementation, the results of this review could be used to explore the transformative potential of current approaches to SDG implementation, or as an initial tool to design new and more transformative pathways to achieve the SDGs in cities.

Griffiths, S., Sovacool, BK., Furszyfer Del Rio, D., Foley, A., Bazilian, M., Kim J., Uratani J. (2023)
Decarbonizing the cement and concrete industry: A systematic review of socio-technical systems, technological innovations, and policy options
Renewable & Sustainable Energy Reviews 180 (July, 2023), 113291, pp. 1-55
Link

Concrete is the most highly used construction material globally. This is largely due to its durability, versatility and manufacture from inexpensive and readily available materials. Although concrete has become an essential and ubiquitous construction material for modern society, its use has significant environmental impacts. The full cement and concrete lifecycle, from production to final disposal, accounts for nearly 10% of global energy-related CO2 emissions with the majority of these emissions produced from cement, which is the binding material that holds concrete together. The cement and concrete industry (CCI), which is integral to global infrastructure development, is therefore confronted with a growing need to decarbonize its operations and products, as well as to support the decarbonization of associated end-user sectors. This paper provides a systematic and critical review of more than 800 studies to highlight ways in which the CCI can decarbonize. A socio-technical perspective is used to understand the full range of industrial and economic activities where a decarbonized paradigm for cement and concrete production is relevant. This perspective is further used to assess key technical, economic, social and political factors that will drive a net-zero transition in the CCI over the long term.

Guibentif, T. M. M., and Patel, M. K. (2023).
Do Intermediaries Have Blind Spots? Mapping the Activity Lifecycle of an Energy Efficiency Programme.
Energy Research & Social Science 101: 103141
Link

To address climate emergency, many countries are tightening their energy efficiency targets. How this ambition can be realized is still an open question. One thread of research focusses on intermediaries, i.e. actors contributing to transition processes by facilitating and enhancing the actions of others. This paper presents a participatory research project exploring the intermediation functions fulfilled by a regional energy efficiency programme. Intermediation functions are interpreted as the outcomes of the tasks performed along the lifecycle of programme activities, depending on the pursued intents. Based on a series of strategy workshops, five successive task categories are identified: (a) design, (b) communicate, (c) operate, (d) coordinate, and (e) strategize; along with three intent levels: (i) support, (ii) connect, and (iii) mobilize stakeholders. These are articulated as a "tasks-intents space" where activities evolve. Typically, while programme activities were primarily operated to support implementation of energy efficiency measures, work at the design stage nevertheless included connecting early adopters, and managers were expected to ultimately raise to a more strategist role, enhancing the mobilization of potential beneficiaries. Two factors are found to determine this focus on the support to individual measures: (1) the imperative to report quantified energy savings, and (2) the compartmentalization of competencies. This leaves the tasks-intents space partly unexplored, corresponding to intermediation functions that are yet to be studied. For instance, facilitating the convergence of competing visions of change and integrating existing solutions within a coherent framework are identified as promissory paths towards achieving the required magnitude of change.

Gürsan, C., de Gooyert, V., de Bruijne, M., Rouwette E. (2023)
Socio-technical infrastructure interdependencies and their implications for urban sustainability; recent insights from the Netherlands
Cities, Volume 140, 104397
Link

Cities are increasingly recognized as potential motors of sustainability transitions. These transitions build on existing as well as new infrastructures, and these infrastructures mutually influence each other in many ways, a phenomenon known as infrastructure interdependencies. These infrastructure interdependencies have significant implications for both enabling or restricting urban sustainability transitions but their implications remain understudied. We elaborate the role of interdependent infrastructure systems from a socio-technical perspective and explore recent examples of how socio-technical interdependencies in infrastructure systems influence urban sustainability efforts. We analyze infrastructure interdependencies in the Netherlands which is relevant because of its high urbanization rate, dense urban areas, and innovative developments. We distinguish seven socio-technical infrastructure interdependency types that can influence urban sustainability transitions: functional, evolutionary, spatial, life-cycle, policy/procedural, market, and culture/norm interdependencies. We identify and discuss contrasting multi-mode relationships of each interdependency example. Our results offer an interdisciplinary framework and examples of potential influential infrastructure interdependencies to explore, understand, and discuss the implications of infrastructure interdependencies for urban sustainability transitions.

Hasselbalch, J. A., Kranke, M. and Chertkovskaya, E. (2023)
Organizing for transformation: post-growth in International Political Economy
Review of International Political Economy
Link

The global political economy is organized around the pursuit of economic growth. Yet scholars of International Political Economy (IPE) have been surprisingly slow to address its wide-ranging implications and, thus, to advance debates about post-growth alternatives. The premise of the article is that for IPE to deepen its grasp of the escalation of contemporary socioecological crises both analytically and normatively, it needs to put the growth question front and center. To problematize the pursuit of economic growth from an IPE perspective, we bring together research on green growth, post-growth/degrowth, sustainability transitions and socioecological transformation. More specifically, we develop an analytical framework that revolves around four pathways of reorganization toward socioecological sustainability: (1) modification, (2) substitution, (3) conversion and (4) prefiguration. We use illustrative examples from the plastics and food sectors to show how the post-growth pathways of conversion and prefiguration could interact to trigger change for sustainability. Notably, our discussion reveals that conversion, which requires a strong state for developing post-growth institutions, is the least traveled pathway in both sectors. This insight points to a strategic priority for post-growth proponents and an urgent research agenda for IPE scholars.

Iyabano A**.**, Klerkx, L., Leeuwis, C. (2023)
Why and how do farmers' organizations get involved in the promotion of agroecological techniques? Insights from Burkina Faso
Agroecology and Sustainable Food Systems, 47:4, 493-519
Link

Agroecological techniques (AET) have been recognized by many farmers, NGOs, and farmers' organizations (FOs) as a promising solution for slowing down the persistent soil fertility degradation in West African drylands. In the context of Burkina, the promotion of AET is the result of the interactions between NGOs and farmers' knowledge through the intermediation of FOs. Although numerous studies have highlighted the instrumental role of FOs in the dissemination of AET in Burkina, there are limited studies focusing on the historical dynamic of FOs' involvement in the promotion of agroecology. To address this gap, this study aims to answer the following questions: why and how do FOs get involved in the promotion of agroecological techniques, and how do they define the term agroecology or agroecological techniques? A multiple case study approach was used to provide the answer to these questions. The results from the case studies reveal that the FOs' promotion of AET is largely connected to their aim of fulfilling one of the following three goals: enhancing the productivity of commercial crops; improving the resilience of subsistence farmers; enhancing both the productivity of commercial crops and the resilience of subsistence farmers. The quest to achieve these goals explained their constant interaction with external partners to get the necessary assistance for the provision of agroecological support services to their farmers. Furthermore, the results of the study also reveal that the Farmers' Organizations' definitions of agroecology or agroecological terms are mostly associated with the interpretation of agroecology as a collective practice encompassing both economic and ecological aspects of Burkinabè agriculture. A broader insight is that while FOs can fulfill important roles in agroecology transitions this comes with diverse

interpretations of agroecology, in which FOs facilitate the hybridization of existing farmers 'practices with those proposed by external actors. The study hence shows the complexity related to the local actors' definitions of agroecological terms and the broader implication is that in the debate on agroecology transitions, these blended or hybrid forms of agroecology should receive more attention. Areas for future research include drivers of FOs choice making processes in how they approach agroecology, and subsequently the influence of FOs on the drivers of farmers' decisions toward AET.

Iyabano, A. Klerkx, L., Faure, G., Toillier, A. (2021)
Farmers' Organizations as innovation intermediaries for agroecological innovations in Burkina Faso
International Journal of Agricultural Sustainability, 20:5, 857-873
Link

Agroecology has been recognized as a paradigm that can offer multiple ecological and socio-economic benefits. In many developing countries, the promotion of agroecology is facilitated by intermediary organizations such as Farmers' Organizations (FOs). Detailed studies on how FOs support their farmers in the adoption of agroecology innovations are still scarce, and particularly there are limited studies on the roles of FOs in this realm in Africa. This paper addresses this gap by presenting a study on how FOs stimulate farmers' adoption of agroecological innovations in Burkina Faso. Three case studies of FOs were done to unravel the ways FOs support of farmers' adoption of agroecological innovations processes, using the lens of innovation intermediaries. The findings show that FOs fulfil both knowledge and innovation intermediation functions in the process of stimulating their farmers' adoption of agroecological innovations. By doing this, FOs act as a facilitator for the introduction and/or development of complementary agroecological innovations over longer periods of time. Future studies could look more deeply into how intermediation may contribute to broader transitions and how it connects with the political activities of FOs such as advocacy and lobbying.

Jayaweera R, Rohracher H, Becker A, Waibel M. (2023)
Houses of cards and concrete:(In)stability configurations and seeds of destabilisation of Phnom Penh's building regime
Geoforum 2023;141:103744
Link

Scholars widely agree that cities and their built environments play a decisive role for a global transformation towards sustainability. This necessitates a shift away from unsustainable practices and constellations in cities towards more sustainable ones – particularly in contexts of the Global South, as they see the strongest current and projected urban growth and related construction activities. Research on urban sustainability transitions has however largely been biased conceptually towards innovation and new technologies, and geographically towards the Global North. While more research recently emerged that addresses the destabilization of dominant orders, it still predominantly considers Northern cases, and those with discernible transition processes. This paper seeks to address these biases and studies factors that contribute to the (in)stability of socio-technical regimes. We argue that (de)stabilizing factors and the particular *(in)stability configurations* they form, must be scrutinised regardless of transition phase as they are ingrained in regime structures before transition processes become apparent. Identifying and characterizing (in)stability configurations and the seeds of destabilization can then support the development of contextualised transition governance strategies. Employing the building sector of Phnom Penh, Cambodia, as an empirical case, this study differentiates sources of (in)stability from economic, socio-cultural and political-institutional dimensions. Our analysis suggests an ambiguous (in)stability configuration with tensions primarily within the socio-cultural and economic dimensions, and a dominance of stabilizing effects from the political-institutional dimension. The paper closes with implications for transition governance strategies and general arguments on the heterogeneity of transition contexts and regime constellations, particularly in countries of the Global South.

Kivimaa, P., Lukkarinen, J., Lazarevic, D. (2023).
Analysis of COVID-19 recovery and resilience policy in Finland: a transformative policy mix approach Science and Public Policy, Scad 016
Link

Transformative innovation policy (TIP) implies not only new directionality for innovation policy but also rethinking its means and scope. This requires further investigation into the role of horizontal and cross-sectoral policy programmes that may be relevant for upscaling innovation and destabilising regimes. This paper studies the national implementation, in Finland, of the European Union (EU) programme for COVID-19 recovery, the Recovery and Resilience Facility (RRF), as an example of a cross-sectoral policy programme. It is of interest, because the EU has set certain conditions related to sustainability transitions for the RRF. Using a transformative policy mix approach, the paper finds that the Finnish RRF Programme lists many policy measures that can be regarded as having a transformative intent.

These include upscaling innovative sustainability niches and destabilising existing practices. Yet, we also found that there is a risk that cross-sectoral programmes fail to find overall transformative visions and fund multiple potentially competing technological pathways instead.

Kok, K.P.W. (2023)
Politics beyond agency? Pluralizing structure(s) in sustainability transitions.
Energy Research & Social Science, 100, 103120.
Link

What exactly do transition scholars mean by structure? In efforts to articulate the politics of sustainability transitions, scholarship has en masse turned to unraveling and pluralizing the many different manifestations of agency and power in processes of transformative change. While this is valuable, such an agency-centered focus risks de-politicizing the role of structure in studies on the politics of transitions. This perspective explores the plurality of interpretations of structure presented in transitions research. Transitions research, perhaps paradoxically, considers structure to be (1) concrete or elusive; (2) a verb or a noun; (3) the medium or conditions for action; (4) internal or external to agents; (5) influenceable or contextual; (6) hierarchical or relational; and (7) stabilizing or transformative. Such a non-exhaustive overview of different interpretations of structure portrays the richness of the field, and could help scholars to reflect upon their assumptions when engaging with the concept of 'structure'. Finally, it provides pathways for re-politicizing structure, by articulating the different ways in which structure can be considered (a)political. Re-politicization requires governance efforts to more explicitly engage with the politics of structures. This entails de-constructing existing and oppressive structures that reinforce incumbencies and unjust dynamics, while embracing the transformative power of democratically designed structures that might help us to accelerate transformative change.

Kriechbaum, M.; Terler, N.; Stürmer, B.; Stern, T. (2023).
(Re)framing technology: The evolution from biogas to biomethane in Austria
Environmental Innovation and Societal Transitions, 47, 100724.
Link

Socio-technical niches are often presented as key drivers for transitioning established production and consumption systems to more sustainable configurations. In previous research, the important roles of collectively shared expectations in shaping the development and nurturing of such niches has been emphasised. At the same time, this research has shown that niches are often associated with fluctuating expectations, typically showing patterns of hype and disappointment. In this study, we analyse how such hype and disappointment patterns interact with framing dynamics by combining the concept of technological frames with the sociology of expectations and the multi-level perspective. By using the shift in understanding that has occurred from a 'biogas' to a 'biomethane' frame in the Austrian anaerobic digestion (AD) niche as an example, we shed light on niche-internal framing struggles, illustrate the normative character of technological frames, and relate the emergence of dominant frames to hype cycle and transition dynamics.

Kump, B., Wittmayer, J., Bogner, K., & Beekman, M. (2023)
Navigating force conflicts: A case study on strategies of transformative research in the current academic system.
Journal of Cleaner Production, 137374
Link

Against the backdrop of the increasing calls for scholars, universities and the broader academic system to become more societally relevant and contribute to tackling various sustainability challenges, researchers across all disciplines are themselves moving toward conducting more transformative research. Work to date has focused on challenges in these transitions, obstacles to transformative research, and researchers' resistance to 'impact strategies'; however, little is known about how those who actually do transformative research ultimately overcome these challenges. Using Lewin's field theory as a theoretical basis, we collected qualitative data and carried out 32 in-depth interviews with 'transformative' scholars and policy and support staff at Erasmus University Rotterdam (EUR) on the driving and conflicting forces related to transformative research, as well as strategies for dealing with them. An in-depth grounded analysis revealed transformative researchers' identity and goal conflicts and showed how they skillfully navigate those conflicts by choosing between two ideal-typical strategies, 'transforming through research output' and 'transforming through research process'. The constellations of forces identified that actually influence researchers' choices on those strategies need to be taken into account in the designing of effective research policies for leveraging the potential of transformative research to tackle sustainability challenges.

Mäkitie, T., Hanson, J., Damman, S., Wardeberg, M.(2023)
Digital innovation's contribution to sustainability transitions
Technology in Society, Volume 73
Link

Digital innovation is increasingly mentioned as a potential key contributor to sustainability transitions. However, there has been little theoretical discussion of this topic. In this conceptual paper, the authors draw on literature on both sustainability transition studies and innovation studies to explore critically the contribution of digital innovation in sustainability transitions. They conceptualize transitions as fundamental changes in patterns of production and consumption, such as those relating to energy. Radical innovation leads to changes in the structure of socio-technical systems underlying such patterns, while incremental innovation contributes to maintaining the structure and current patterns. The authors suggest that digital innovations may contribute positively to sustainability transitions through couplings with sustainable innovations. They propose the following typology of such couplings: incremental twin innovations, sustainability supported digital innovations, digitally supported sustainable innovations, and radical twin innovations. Radical twin innovations may possess the greatest potential for sustainability transitions, as they are linked to structural change and thus open new pathways for sustainability transitions, whereas incremental twin innovations merely optimize current unsustainable systems. The typology is illustrated with examples from shipping and from electricity systems, and some of the complexities of twin transitions encountered by researchers and practitioners alike are discussed.

McLaughlin, HK, Littlefield, A., Menefee, M., Kinzer, A., Hull, T., Sovacool, BK., Bazilian, MD., Kim, J., Griffiths, S.(2023)
Carbon Capture Utilization and Storage in Review: Sociotechnical Implications for a Carbon Reliant World
Renewable & Sustainable Energy Reviews 177, 113215, pp. 1-39.
Link

The decarbonization of industry and industrial systems is a pressing challenge given the relative lack of low-carbon options available for “hard to decarbonize” sectors such as steelmaking, cement manufacturing, and chemical production. Carbon capture utilization and storage (CCUS) represents a promising and crosscutting solution to this formidable problem. This review takes a systematic and sociotechnical perspective to examine how CCUS can support industrial decarbonization and relevant associated technical, economic, and social factors. This includes a focus on the energy and climate impacts of carbon emitting activities, the role, and options for CCUS in global responses to climate change, technical aspects of capture, transport, storage, and utilization, as well as policy implications and areas requiring further research. In doing so, the Review examines hundreds of published studies on the topic over the previous twenty years to offer a state-of-the-art investigation on technical options for capture (including direct air capture), transportation (including pipelines, ships, and rail), storage (including biotic and abiotic), and utilization (including enhanced oil recovery and biochar). The Review also investigates the evidence base within the literature on enablers and barriers to CCUS, policy mechanisms, and international frameworks as well as themes such as geopolitics, trade, and future research gaps. We conclude with insights about future CCUS pathways and sociotechnical systems dynamics

Miremadi, I.,. Mardukh, F . (2023).
Catching-up in renewable energies: the role of knowledge dimensions in sectoral innovation systems Innovation and Development
Link

The rapid development of renewable energy technologies and sectoral transformation can open green windows of opportunity for latecomer countries to leapfrog. The present study focuses on analyzing the relationship between the knowledge dimensions of the sectoral innovation system – including localization, diversity, concentration, and originality – and the outcomes of the catching-up process in the renewable energy sector. In this way, we distinguish between successful latecomers and leader countries. The study analyzed data from a panel of 15,600 patents in these countries from 2000 to 2015 and examined the quantitative indexes of knowledge dimensions. To illustrate the outputs of the catching-up process, we use two dependent variables: renewable equipment export and renewable electricity generation. The findings show how the evolution of knowledge dimensions impacts technological catch-up in both leader and successful latecomer countries in different ways. While knowledge localization is crucial in leader countries, latecomer countries benefit from concentration and originality.

Ningrum, D., Raven, R.P.J.M., Malekpour, S., Moallemi, E.A., Bryan, B.A. (2023)
Transformative potential in sustainable development goals engagement: experience from local governance in Australia
Global Environmental Change. 80, 102670
Link

Localising the Sustainable Development Goals (SDGs) is often associated with the act of localising goals, targets and indicators, as well as the activities to measure and monitor progress. However, local communities worldwide are starting to engage with the SDGs by other means, for example, by incorporating the SDGs into local governance. In these efforts to make the SDGs part of an existing local governance

process, which we call SDG engagement, the SDGs can be valued differently. They can be valued for their potential to support a widespread and fundamental change in society (the SDG transformative potential) or for their moderate addition to ongoing practices and activities (the SDG conventional value). Currently, how local governments can engage with the SDGs in different local governance activities is underexplored. This study introduces eight modes through which local governments can engage with the SDGs in local governance and discuss the unique transformative potential of those engagements via synthesising knowledge across 14 empirical studies of local communities in Australia. Building on the findings of this study, we propose a framework to aid SDG engagement in local governance activities, highlighting the transformative potential of the engagements. The study highlights the need for future explorations on the opportunities to enact a deliberate and more ambitious transformation driven by governance institutions.

Nordt, A., Raven, R.P.J.M., Malekpour, S., Sharp, D. (2023)
The politics of intermediation in transitions: Conflict and contestation over energy efficiency policy
Energy Research & Social Science. 97, 102971
Link

This study investigates transition intermediation in energy efficiency regulation for buildings and light vehicles in Australia by using an analytical framework that draws on transition literature and the multiple streams approach (MSA) from policy studies. By focusing on Australian cases, this study examines required functions of transition intermediaries in a highly politicised context in which sustainability transitions are contested to improve an understanding of transition-oriented policy processes, including policy failures. The findings highlight the role of transition intermediaries that brought knowledge capacity into policy processes, advocated for new policy visions, and built consensus on policy proposals. The analysis suggests that the functional influence of transition intermediaries is particularly important when there is conflict among organised interests. In doing so, this study offers new insight into how transition intermediation is shaping the dynamics of energy transitions in politicised contexts.

Pel, B., Wittmayer, J., Avelino, F. & Bauler, T., (2022)
Paradoxes of Transformative Social Innovation: From Critical Awareness towards Strategies of Inquiry
Novation (4), 35-62
Link

Society is transforming through a whirlpool of innovations. This includes technological as well as social innovations, i.e. changes in social relations involving new ways of doing, organizing, framing and knowing. Especially the potentials for transformative social innovation (TSI) are gaining the interest of progressive political actors and critical scholars. Occurring in the form of new modes of governance and alternative ways of working and living together, TSI involves the challenging, altering or replacing of dominant institutions. As documented in various strands of critical social inquiry and innovation research, TSI praxis is pervaded with contradictions, anomalies and paradoxes. This methodological contribution addresses the challenge that tends to remain: How to elaborate this general critical awareness into more operational 'strategies of inquiry'? The paper discusses paradoxes of a) system reproduction, b) temporality, and c) reality construction. Identifying distinct kinds of contradictions and distinct empirical phenomena, this differentiation also calls attention to the associated differences between realist, processual and constructivist research philosophies. Gathering the empirical analyses, theoretical interpretations and methodological advances that have been made on these paradoxes, this contribution opens up the scope for critical and practically relevant innovation research: It is important to bridge the divide between rigorous but sterile methodological knowhow, and critical-reflexive theorizing that lacks operational insights.

Sovacool, BK. (2023)
Expanding carbon removal to the Global South: Thematic concerns on systems, justice, and climate governance
Energy & Climate Change 4, 100103, pp. 1-16
Link

Conversations on how to assess, innovate, and develop policies for carbon removal are for now largely confined to the Global North – reflecting a concentration of academic interest (and concern), innovation capacity, early funding initiatives, and policy path-dependence in climate, energy, and land-use. However, future population growth, emissions trajectories, and even concentrations of economic (and technological power) are shifting to the Global South. Here, after explaining the positionality of the author, this paper summarizes the perspectives and concerns of 90 key academics, technologists, and policy entrepreneurs on expanding carbon removal assessment, innovation, and policy beyond early foci within (northern) Europe, the US, Japan, and Australia. It explores how concerns about systems (coupling and infrastructure deployment), justice (equity and inclusion), and governance (including pledges, funding, and offsets) markedly differ across Global North and Global South dynamics. It discusses how such issues intersect with

each other, and concludes with insights for research and policy.

Sovacool, BK, Bazilian, MD., Kim, J., Griffiths S. (2023)
Six bold steps towards net-zero industry
Energy Research & Social Science 99, 103067, pp. 1-9
Link

The rapid and deep decarbonization of global industry is key to reaching climate policy targets, yet it remains an incredibly difficult challenge. We propose six bold steps for accelerating progress on achieving net-zero industrial carbon emissions by mid-century with a focus on lessons learned and emerging analysis from both the Global North and Global South, the latter of which we consider as low or middle income countries primarily located in Africa, Asia and Latin America. These steps are (1) quintupling financing, (2) expediting technology transfer, (3) investing in human resources, (4) setting binding targets, (5) steering social acceptance and (6) enacting a new global treaty and shaping climate clubs. Perhaps surprisingly, there are more than thirty effective historical and contemporary initiatives to learn from, showcasing a rich tapestry of previous efforts and templates to build on and to inform net-zero decarbonization efforts.

Sovacool, BK, M Iskandarova, and JF Hall (2023)
Industrializing theories: Conceptual frameworks and typologies for industrial sociotechnical change in a low-carbon future
Energy Research & Social Science 97, 102954, pp. 1-36
Link

Decarbonizing industry represents a critical challenge, requiring massive technology up-scaling, accelerated investment, and substantial science-supported policy changes. Such broad challenges call for inputs from diverse disciplinary perspectives. In this paper we identify, analyze and synthesize theories and conceptual frameworks shaping industrial decarbonization research, with the aim of exploring those most relevant for understanding industrial sociotechnical change in a low-carbon future. We draw from an expert-guided process covering 71 years of academic literature to present 88 distinct theories connected to industrial decarbonization and change. Based on an expert review, a literature review, and thematic analysis, we identify eight families of perspectives: theories of sociotechnical transitions, innovation and diffusion, social equity and acceptance, space place and geography, organizational behavior and management, politics and governance, risk and communication, and industrial ecology and sociology. We analyze these theories in terms of their 'fit' to the topic of industrial decarbonization, with 25 theories identified as being core. The second part of the study delves more deeply into typologies of underlying focus, theoretical emphasis, scale and unit of analysis, temporality, and theoretical crossovers. We conclude with implications for synthesis and lacuna in theory selection. In doing so, we seek to broaden conceptual debates that often risk being narrowly discussed in silos, missing opportunities from cross-disciplinary pollination. We provide a toolkit for researchers to utilize when studying industrial decarbonization, decline, and change. We also offer strategies for ordering, selecting, and synthesizing diverse theoretical options.