

Newsletter 14, December 2014

This is the fourteenth newsletter from the steering group of the Sustainability Transitions Research Network. The newsletter is divided into the following sections:

- Words from the Chairman
- Environmental Innovation and Societal Transitions
- Network news
- Event announcement
- New research projects
- Publications

We welcome all members to submit news items for the next newsletter. You can use the website www.transitionsnetwork.org (submit projects, output or news), or send a message to sustainabilitytransitions@gmail.com. The advantage of using the website for submission is that the information also becomes available online.

The STRN steering group

Words from the Chairman

Dear transition research colleagues,

I am happy to send you another chuck-full newsletter with many interesting items and developments, some of which I highlight below.

First, we are in the process of making some changes on the STRN-website (<http://www.transitionsnetwork.org/>). To facilitate interactive discussion, we are introducing a blog functionality, where members can exchange their views on particular issues, post news or engage in debates. Our hope is that members will use this blog functionality for more general issues, rather than advertising individual projects or papers. We want to start with a relatively simple blog policy: everyone is invited to contribute. If you want to blog, please send an email to sustainabilitytransitions@gmail.com <<mailto:sustainabilitytransitions@gmail.com>>, with your idea, or with your entire blog. After a quick screening, we will quickly post the blog. Blogs will be written on a personal basis. We will also introduce a functionality on the STRN-website that enables STRN-members to change their own email address in case they move. This will hopefully lessen the burden on Rob Raven, who has so far made these changes by hand. We hope these new functionalities will further support the transitions community.

Second, some weeks ago members of the STRN board have written a letter to the new editor of *Energy Policy* to warn that newly adopted editorial policies may have negative consequences for adventurous papers on big topics (such as sustainability transitions). These policies, the gist of the letter, and the response from the editor are reported below.

Third, the newsletter notes that an influential bi-annual report from the OECD pays dedicated attention to system innovation and grand challenges. An in-depth OECD report on system innovation is expected in 2015, which would further introduce and legitimize the topic in high-level policy circles.

Fourth, the newsletter contains an announcement regarding the sixth International Sustainability Transitions conference (25-28 August, 2015), organized by SPRU in Brighton

(UK). This promises to be a very exciting conference, including new discussion formats, stakeholder interaction and a summer party (to bring your dance shoes.....).

The newsletter also contains other news updates, event reviews, and new research projects. Very striking in this newsletter is an explosion of transition papers in a wide range of journals, which is not only encouraging for the field, but also reinforces the trend towards diversification in terms of topics, frameworks, journals and empirical domains. With regard to the latter, it seems that more books and papers have appeared that address transitions in agro-food. This is important, because agro-food, forestry and land-use account for about 24% of global greenhouse gas emissions, according to the recent IPCC report, which is almost as much as electricity and heat (25%) and more than transport (14%). A focus on food is also interesting, because food systems differ in several ways from electricity and transport-systems, which have been the bulk of many transition papers. So, studying agro-food transitions may require making conceptual changes to accommodate domain-specific characteristics. On the other hand, it is also encouraging to see that transitions thinking offers useful insights for agro-food scholars. An article by the president of the Agriculture, Food and Human Values Society (Hinrichs, 2014) explicitly embraces transitions thinking because it “enlarges our thinking about food systems change”. The publications section also contains various papers about transitions in buildings, which may equally require conceptual adjustments to accommodate empirical characteristics (e.g. many small companies, no clear ‘dominant design’ but interactions between multiple components, greater variety, especially in the non-domestic sector). So, scholars continue to generate new insights, puzzles, problems and questions, which are important for a vibrant research community.

I wish you all a happy Christmas and a stimulating 2015, and hope to see you at some future event.

Frank Geels, Chairman of STRN (frank.geels@mbs.ac.uk)

Environmental Innovation and Societal Transitions

Volume 13 of *Environmental Innovation and Societal Transitions* was just published. It contains a special section and a few regular papers. The special section “IST 2013 finalists and plenary” contains the best conference papers and plenary lecture from the 2013 International Sustainability Transitions (IST) meeting:

- Juliet B. Schor, Climate discourse and economic downturns: The case of the United States, 2008–2013 (plenary lecture).
- Gill Seyfang, Sabine Hielscher, Tom Hargreaves, Mari Martiskainen and Adrian Smith, A grassroots sustainable energy niche? Reflections on community energy in the UK.
- Rick Bosman, Derk Loorbach, Niki Frantzeskaki and Till Pistorius, Discursive regime dynamics in the Dutch energy transition.
- Sjoerd Bakker, Actor rationales in sustainability transitions – Interests and expectations regarding electric vehicle recharging.
- Allan Dahl Andersen, No transition without transmission: HVDC electricity infrastructure as an enabler for renewable energy?

The two original research articles are:

- Jos Timmermans, Sander van der Heiden and Marise Ph. Born - Policy entrepreneurs in sustainability transitions: Their personality and leadership profiles assessed.
- Steven Sarasini - Electrifying the automotive industry: The geography and governance of R&D collaboration.

Finally, a book review is included:

- Halina Brown – “Sustainable Communities: Creating a Durable Economy”, edited by R. Phillips, B. Seifer, and E. Antczak.

We look forward to receive your submission. Please don’t forget to read (and if relevant cite) EIST.

Jeroen van den Bergh, Editor-in-Chief [jeroen.bergh@uab.es]

Network News

Any news related to ongoing activities of STRN

Chalmers Initiative for Innovation and Sustainability Transitions

The 1st of January 2015 Chalmers University of Technology in Gothenburg is launching “Chalmers Initiative for Innovation and Sustainability Transitions” (CIIST). The purpose of the initiative is twofold. First it aims at creating a competence node with a strong international position in research on innovation systems and transitions by connecting scattered activities, supporting mutual learning and attracting additional resources. Second, it has the ambition to develop an arena for knowledge exchange and stakeholder interaction to facilitate real world transition processes. The latter builds on Chalmers’ excellent networks with industry and regional and national public bodies, and mechanisms to mobilise students via Chalmers School of Entrepreneurship and the Challenge Lab. The initiative is set up as a university wide collaboration and is managed by a team from the Departments of Energy and Environment, and Technology Management and Economics.

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New editorial policies in *Energy Policy*

The journal *Energy Policy* has been one of the major academic outlets of transition scholars doing research on new energy technologies, energy policies and the energy transition (see also Markard et al. 2012, *Research Policy*). As you might have noticed, there have been recent changes in the editorial policy, including a strict paper structure and a ‘one-time revision attempt’ rule. For details see editorial of the December 2014 issue (<http://www.sciencedirect.com/science/article/pii/S030142151400562X>).

It was especially this new review rule that triggered our attention. We discussed the issue in the last STRN board meeting and then wrote a letter to Ms. Lorna Greening, the editor in chief. This letter was signed by most members of the STRN steering group.

Our main concern is that there are papers, which have a high potential to make an important contribution, but require a major revision. After such a major revision there are typically still a few minor issues to be addressed, which mostly require a second minor round of revisions. In *Energy Policy*, such a second round is no longer possible. If only one reviewer is not fully satisfied after the first round, the paper will be rejected. In our view, this is not good practice, which may waste efforts of both authors and reviewers. Moreover, these new rules may lead to ‘safer’ paper, thus discouraging ambitious and innovative papers that develop/apply new conceptual frameworks or methods and often require more interaction with reviewers than other articles.

Unfortunately, Ms. Greening reply to our letter was not very encouraging. She pointed to recent improvements in key indicators of the journal (citation index, review time etc.) and the high number of submissions (3000 per year out of which 20% are published). She did not leave us with any hope that the new policies may be revised or applied flexibly. She also said that ambitious theoretical papers are probably better suited for submission to other journals as the readership of *Energy Policy* “is largely composed of those individuals performing applied work with the intent of policy analysis”.

This reaction made the authors of the letter reluctant to further submit and review manuscripts for *Energy Policy*. We are also afraid that the journal will become more ‘economics mainstream’ with less of the diversity that made *Energy Policy* one of the interesting outlets for (energy) transitions research. We thought it would be useful to inform the wider transitions community about these editorial changes, which may shape your future publication decisions.

This initiative was a collective effort by the STRN steering group and we would like to thank all of the board members for their vivid support!

Jochen Markard [jmarkard@ethz.ch], Bernhard Truffer [Bernhard.Truffer@eawag.ch]

OECD interest in system innovation

The influential bi-annual *OECD Science, Technology and Industry Outlook 2014* contains a 4-page section on system innovation (p. 98-101). Some interesting quotes indicate that STRN-ideas are now gaining traction in high-level policy debates: “Interest in system innovation is motivated by the realisation that system-wide change is necessary to make economies socially, economically and environmentally sustainable. (...) Ensuring that socio-technical systems move towards greater sustainability is a major challenge for governments but also for civil society. At the core of the transition is a shift in governance structures that not only allows change to occur but also directs and orchestrates some of the changes. (...) System innovation can be defined as a radical innovation in socio-technical systems that fulfil societal functions, which entails changes in both their components and architecture. (...) Technological innovations arise first in niches then gather momentum and a dominant design emerges; the emergent dominant design interacts with the prevalent socio-technical regime and eventually breaks through. Pressures exerted by developments in the landscape (i.e. the general socio-economic context) may present opportunities to upset the status quo sooner; the absence of such pressures may thwart the transition.” The report also refers to “a larger OECD study on system innovation”, which will hopefully be published in 2015. This support for the topic from such a high-level policy body may galvanize further attention. The report can be found at: http://www.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-industry-outlook-2014_sti_outlook-2014-en

Event announcements

Calls for upcoming relevant events such as workshops and conferences

6th International Sustainability Transitions (IST) Conference, 25-28 August, 2015, University of Sussex

The 6th International Sustainability Transitions (IST-6) Conference will be hosted by SPRU (the Science Policy Research Unit) at the University of Sussex in Brighton (UK). As in previous years, the IST conference will provide opportunities for scholars to share theoretical, empirical and practical advances in the field of sustainability transitions.

This year's theme 'Sustainability Transitions in the Long Run' seeks to place sustainability transitions in a long term perspective, considering its historical roots and future pathways. The conference will not only explore transitions in individual systems, but also investigate broader transformations of entire economies, societies and political systems. Papers on 'normal' transition topics are, of course, also welcome. Key dates are:

- 16 March 2015** Deadline for session proposals and abstract submission
 - 15 April 2015** Outcome of abstract review and acceptance decisions to be communicated and if necessary discussed between program committee and proposers
 - 15 May 2015** Finalization of draft program.
 - 7 August 2015** Deadline for Submission of full papers,
 - 15 August** Final program
 - 26–28 August 2015** IST 2015 (starting 25th around 5pm; ending August 28th around 2pm). A website with full information about the conference will be launched early in 2015. Meanwhile, you can also find the call for papers on the STRN-website (<http://www.transitionsnetwork.org/>).
- Johan Schot [J.W.Schot@sussex.ac.uk]**

STEPS Centre Summer School, University of Sussex, 11-22 May, 2015

Applications are invited from highly-motivated doctoral and postdoctoral researchers, working in fields around development studies, science and technology studies, innovation and policy studies, and across agricultural, health, water or energy issues. Participants will explore the theme of pathways to sustainability through a mixture of workshops, lectures, outdoor events and focused interaction with STEPS Centre members. The Summer School

takes place at the Institute of Development Studies on the Sussex University campus, near Brighton, UK. The deadline for applications is 5pm GMT on 28 January 2015. There is a fee to attend, but scholarships are available. For details of how to apply, financial support, programme information, and materials from the last three years' events, visit the STEPS website: www.steps-centre.org/summerschool

Event Reviews

Review of events interesting to the STRN community

Climate KIC: Green Skills for boosting transition in water management (Nov. 2014)

Climate-KIC offered an eight day coached sustainability transitions course for experienced environment and water management professionals, held in Valencia (Spain) from 22nd until 29th November 2014. Cristian Matti, Anna Wieczorek and Javier de Vicente coordinated a team of well-known international experts including Jan Jonker, Corporate Sustainability; Todd Gartner, Water Management and Innovation; Caroline Van Leenders, Process Manager in Sustainable Transitions; and, Fernando J. Díaz López, Eco-innovation for Green economies. Furthermore, several regional experts participated in debates activities trying to reproduce real working negotiations with stakeholders.

More than 35 people, from 15 different countries, were working on 'Green skills' in a programme designed to upgrade professional competences to face climate change and sustainability transitions. These competencies included, first, abilities to identify barriers, opportunities and make a stakeholders analysis; second, abilities to develop solutions –new business models– with system innovation projects, focus priorities for further exploration or low carbon innovation; and, finally, make transitions happen –translating plans into actions–. This pilot initiative performed as a living lab experience for both participants and experts who explored new learning techniques by shifting the role of experts, participants and speakers towards a more horizontal context of professional interaction. The initiative was part of the Innovator Catalyst series. Climate KIC is planning to run 5 new editions next year in which members of STRN will be invited to join the activities as participants as well as part of group of experts. For more information see: <http://www.catalystvlc.com/>.

Cristian Paulo Matti [crimat@ingenio.upv.es]

New research projects

SusValueWaste

Over the next four years, NIFU (the Nordic Institute for studies in Innovation, Research and Education) will work on a large research project on the transition to the bioeconomy. The project is funded by the Bionær programme (Sustainable Innovation in Food and Bio-based Industries) at the Research Council of Norway. The title of the project is «Sustainable path creation for innovative value chains for organic waste products (SusValueWaste)». The project will address the potential for value added and improved sustainability in the valorisation of organic waste streams, residual feedstock and by-products – by analysing value chains inside and across different sectors of the bioeconomy. We will conduct a number of industrial cases from different parts of the bioeconomy and collaborate with highly relevant industry actors (e.g. TINE, Cambi, Nortura/Norilia, Treklyngen), OREEC Oslo Renewable Energy and Environment Cluster, and technology experts. The project will help policymakers better govern and regulate the industry and the industry actors to identify and exploit new opportunities in the bioeconomy. The project is based on interdisciplinary collaboration between research groups specializing in innovation and value chain analysis (NIFU, TIK centre at University of Oslo, CIRCLE, DTU, Centre for Innovation Research at Stavanger University), environmental research and relevant technologies (LTH, Østfold Research, Forrest & Landscape), located in Norway, Denmark and Sweden. For more information please contact Antje.Klitkou@nifu.no

New research project: Smart Eco-Cities for a Green Economy (SMART-ECO)

A new, major comparative study of eco-city and smart city projects in China, the UK, France, Germany and the Netherlands has been awarded to an international multi-disciplinary team led by King's College London. The project is the first international comparative transitions-focused research on eco-city and smart-city projects, and it involves a significant focus on cross-case and international learning contexts in the development of new cities as spatial niches for transitions-focused policies, technological and other innovation and governance approaches aimed at kick-starting transitions towards a green economy. The project involves research teams from the UK, China, France, Germany and the Netherlands. In the UK, the institutions involved are King's College London (Federico Caprotti; Frans Berkhout), the University of Westminster (Simon Joss), Plymouth University (Ian Bailey) and Cardiff University (Li Yu and Andrew Flynn). The Chinese team is comprised by Renmin University (Ran Tao), Tsinghua University (Cheng Ling), and the University of Nottingham Ningbo China (May Tan-Mullins). The French team is composed by IAE Toulouse (Eric Jolivet) and the University of Paris 10 (Sophie Houdart). The German team is led by Philipp Spaeth from Albert Ludwigs University Freiburg. The team from the Netherlands includes Utrecht University (Rob Raven) and TU Delft (Martin de Jong).

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Publications

Announcement of new publications such as article, PhD theses and books

PhD thesis: Karltorp, K. (2014) Scaling up renewable energy technologies – The role of resource mobilization in the growth of technological innovation systems, Chalmers University of Technology.

Kersti Karltorp successfully defended her PhD thesis on October 3rd 2014. The thesis addresses the role of resources for the scaling up renewable energy technologies, focusing in particular on human capital, financial capital and infrastructure. The work includes studies of wind power and biorefineries in Sweden, the European Union and China. The theoretical contribution of the thesis is a conceptualisation of the technological innovation systems (TIS) context that enables analyses of the resource mobilisation needed for up-scaling of renewable energy technologies. The empirical findings indicate the magnitude and quality of the resources required, but also point to obstacles with lock-in of resources to incumbent actors. Industrial actors can contribute to overcoming these obstacles by, for example, clearly communicating their need for resources. Actors in the financial sector can contribute by stimulating the development of new investment models that suit the risk-return model of renewable energy technologies. Policymakers can also play an important role by managing conflicting interests of the use of resources. For more details see <https://publications.lib.chalmers.se/publication/202312-scaling-up-renewable-energy-technologies-the-role-of-resource-mobilisation-in-the-growth-of-technolo>.

Special issue: Urban energy transitions: Places, processes and politics of socio-technical change, *Urban Studies*, 2014, Vol. 51, No. 7

- Jonathan Rutherford and Olivier Coutard, 2014, Urban Energy Transitions: Places, Processes and Politics of Socio-technical Change, *Urban Studies*, 51(7), 1353-1377
- Cyria Emelianoff, 2014, Local Energy Transition and Multilevel Climate Governance: The Contrasted Experiences of Two Pioneer Cities (Hanover, Germany, and Växjö, Sweden), *Urban Studies*, 51(7), 1378-1393
- Sylvy Jaglin, 2014, Urban Energy Policies and the Governance of Multilevel Issues in Cape Town, *Urban Studies*, 51(7), 1394-1414
- Harald Rohrer and Philipp Späth, 2014, The Interplay of Urban Energy Policy and Socio-technical Transitions: The Eco-cities of Graz and Freiburg in Retrospect, *Urban Studies*, 51(7), 1415-1431

- Timothy Moss, 2014, Socio-technical Change and the Politics of Urban Infrastructure: Managing Energy in Berlin between Dictatorship and Democracy, *Urban Studies*, 51(7), 1432-1448
- Jonathan Rutherford, 2014, The Vicissitudes of Energy and Climate Policy in Stockholm: Politics, Materiality and Transition, *Urban Studies*, 51(7), 1449-1470
- Harriet Bulkeley, Vanesa Castán Broto, and Anne Maassen, 2014, Low-carbon Transitions and the Reconfiguration of Urban Infrastructure, *Urban Studies*, 51(7), 1471-1486
- Jago Dodson, 2014, Suburbia under an Energy Transition: A Socio-technical Perspective, *Urban Studies*, 51(7), 1487-1505
- Elizabeth Shove, Gordon Walker, and Sam Brown, 2014, Transnational Transitions: The Diffusion and Integration of Mechanical Cooling, *Urban Studies*, 51(7), 1506-1519
- Éric Verdeil, 2014, The Contested Energy Future of Amman, Jordan: Between Promises of Alternative Energies and a Nuclear Venture, *Urban Studies*, 51(7), 1520-1536

Book: Sutherland, L., Darnhofer, I., Wilson, G., Zagata, L., 2014, *Transition Pathways towards Sustainability in Agriculture: Case Studies from Europe*, CABI Publishing

Based on the research of an interdisciplinary team of sociologists, geographers and economists, this book focuses on understanding farming transitions in Europe. The book discusses the importance of understanding transition pathways towards sustainability using case studies from Bulgaria, the Czech Republic, France, Germany, Greece, Portugal and the United Kingdom. Assessing the utility of the multi-level perspective in transition theory for addressing contemporary issues, the book identifies future research needs and possible approaches, making this an essential read for researchers interested in issues of rural and agricultural change.

Book: Gross, M. and Mautz, R., 2014, *Renewable Energies*, Taylor and Francis

Renewable Energy normally refers to usable energy sources that are an alternative to fuel sources, but without the negatively evaluated consequences of the replaced fuels. Although energy issues have a long tradition in sociology and other social sciences, it may now be high time to conceptualize these in sociological terms as the lynchpin in our understanding of the way societies are set to develop in the 21st century. This concise book focuses on sociological attempts at better framing contemporary theories of energy transformations and to deliver an accessible overview on the relationships between different types of renewable energy sources and their practical usages in modern societies. A strong focus is laid upon new forms of environmental governance and unavoidable knowledge gaps triggered by attempts to transform contemporary energy systems to renewable ones. Critical topics include the challenge of transition from centralized to decentralized system structures, the integration of renewable energies into existing energy structures or the replacement of these, coping strategies to unforeseen risks and conflict issues, and socio-cultural reservations to new technologies connected to renewable energies.

Book: Bulkeley, H.A., Broto, V.C., and Edwards, G.A.S., 2014, *An Urban Politics of Climate Change: Experimentation and the Governing of Socio-Technical Transitions*, Routledge

The confluence of global climate change, growing levels of energy consumption and rapid urbanization has led the international policy community to regard urban responses to climate change as 'an urgent agenda' (World Bank 2010). The contribution of cities to rising levels of greenhouse gas emissions coupled with concerns about the vulnerability of urban places and communities to the impacts of climate change have led to a relatively recent and rapidly proliferating interest amongst both academic and policy communities in how cities might be able to respond to mitigation and adaptation. Attention has focused on the potential for municipal authorities to develop policy and plans that can address these twin issues, and the challenges of capacity, resource and politics that have been encountered. While this literature has captured some of the essential means through which the urban response to

climate change is being forged, is that it has failed to take account of the multiple sites and spaces of climate change response that are emerging in cities 'off-plan'. *An Urban Politics of Climate Change* provides the first account of urban responses to climate change that moves beyond the boundary of municipal institutions to critically examine the governing of climate change in the city as a matter of both public and private authority, and to engage with the ways in which this is bound up with the politics and practices of urban infrastructure. The book draws on cases from multiple cities in both developed and emerging economies to providing new insight into the potential and limitations of urban responses to climate change, as well as new conceptual direction for our understanding of the politics of environmental governance.

Book: Stephens, J.C., Wilson, E.J., and Peterson, T.R., 2015, *Smart Grid (R)Evolution: Electric Power Struggles*. Cambridge University Press.

The term "smart grid" has become a catch-all phrase to represent the potential benefits of a revamped and more sophisticated electricity system that can fulfill several societal expectations related to enhanced energy efficiency and sustainability. Smart grid promises to enable improved energy management by utilities and by consumers, to provide the ability to integrate higher levels of variable renewable energy into the electric grid, to support the development of microgrids, and to engage citizens in energy management. However, it also comes with potential pitfalls, such as increased cybersecurity vulnerabilities and privacy risks. Although discussions about smart grid have been dominated by technical and economic dimensions, this book takes a sociotechnical systems perspective to explore critical questions shaping energy system transitions. It will be invaluable for advanced students, academic researchers, and energy professionals in a wide range of disciplines, including energy studies, environmental and energy policy, environmental science, sustainability science, and electrical and environmental engineering. Key Features: One of the first authored books to explore the social dimensions of creating an energy smart grid; Links social and technical aspects of energy system change for those interested in energy transitions; Written by three experts in energy and sustainability policy.

Book: Borrás, S. and Edler, J. (eds.), 2015, *The Governance of Socio-Technical Systems. Explaining Change*, Edward Elgar, Cheltenham

Why are so few electric cars in our streets today? Why is it difficult to introduce electronic patient records in our hospitals? To answer these questions we need to understand how state and non-state actors interact with the purpose of transforming socio-technical systems. Examining the "who" (agents), "how" (policy instruments) and "why" (societal legitimacy) of the governance process, this book presents a conceptual framework for the governance of change in socio-technical systems. Bridging the gap between disciplinary fields, expert contributions provide innovative empirical cases of different modes of governing change. *The Governance of Socio-Technical Systems* offers a stepping-stone towards building a theory of governance of change and presents a new research agenda on the interaction between science, technology and society. This book will appeal to scholars in the fields of political science, economics, STS and innovation studies, who are interested in the processes of socio-technical change, their democratic legitimacy, and the governance of grand societal challenges.

Book: D'Alisa, G., Demaria, F. and Kallis, G., 2014, *Degrowth. A Vocabulary For A New Era*, Routledge

Degrowth is a rejection of the illusion of growth and a call to repoliticize the public debate colonized by the idiom of economism. It is a project advocating the democratically-led shrinking of production and consumption with the aim of achieving social justice and ecological sustainability. This overview of degrowth offers a comprehensive coverage of the main topics and major challenges of degrowth in a succinct, simple and accessible manner. In addition, it offers a set of keywords useful for intervening in current political debates and for bringing about concrete degrowth-inspired proposals at different levels - local, national

and global. The result is the most comprehensive coverage of the topic of degrowth in English and serves as the definitive international reference.

Berger, G., Feindt, P.H., Holden, E., and Rubik, F., 2014, Sustainable mobility: Challenges for a complex transition, *Journal of Environmental Policy & Planning*, 16(3), 303-320

Editorial introduction to special issue

Hinrichs, C.C., 2014, Transitions to sustainability: A change in thinking about food systems change?, *Agriculture and Human Values*, 31(1), 143-155

In the present context of intertwined and intensifying economic, environmental and climate challenges and crisis, we need to enlarge our thinking about food systems change. One way to do so is by considering intersections between our longstanding interdisciplinary interest in food and agriculture and new scholarship and practice centered on *transitions to sustainability*. The general idea of transition references change in a wide range of fields and contexts, and has gained prominence most recently as a way to discuss and address sustainability challenges. To explore connections to food systems change, I highlight two broad approaches in the sustainability transitions research field. First is a multi-level perspective that examines sustainability innovation pathways and second is a social practices approach that illuminates the possibilities (or not) for shifts in normal everyday routines and practices. Taken together, these approaches offer different and useful ways to think about the dynamics, durability and significance of innovations in food and agriculture, and the part they play in transitions to sustainability. Numerous opportunities exist to forge more productive links between work on food systems change and the broad and growing sustainability transitions field. First, our research and practice insights about the importance of politics, governance, values and ethics in food and agriculture could help to strengthen the sustainability transitions field, which initially underplayed such questions. Second, the sustainability transitions field's implicit systems sensibility and its futures orientation could help to widen the scope of inquiry and the contribution to policy and planning of research and practice on food systems change.

Mylan, J., Geels, F.W., McMeekin, A., Gee, S., and Foster, C., 2014, 'Eco-innovation and retailers in UK milk, beef and bread chains: Enriching environmental supply chain management with insights from innovation studies', *Journal of Cleaner Production*, Accepted and forthcoming

This paper investigates why, how and to what degree supermarkets stimulate upstream eco-innovation in UK milk, beef and bread chains. To answer this question, we aim to enrich the environmental supply chain management literature with insights from innovation studies. The resulting conceptual framework distinguishes three elements: a) motivations for supermarkets to address eco-innovation (internal considerations and external pressures), b) characteristics of supply chains that hinder or enable eco-innovation attempts (e.g. breadth, length, degree of trust), c) mechanisms to stimulate eco-innovation. Regarding this third element, which is our main contribution, we distinguish: 1) economic mechanisms (supermarkets paying farmers more for eco-innovation or imposing eco-performance standards), 2) information exchange and interactive learning in networks ('innovation systems'), and 3) socio-cognitive coordination through the creation of shared meaning and visions (e.g. roadmaps). We demonstrate the usefulness of this framework with a comparative qualitative analysis of three UK sectors with different degrees of retailer-led eco-innovation: milk, beef and bread. The paper ends with three broader reflections and suggestions for further research.

Levidow, L., Pimbert, M., and Vanloqueren, G., 2014, Agroecological research: Conforming—or transforming the dominant agro-food regime?, *Agroecology and Sustainable Food Systems*, forthcoming

Agroecology has three practical forms – a scientific discipline, agricultural practices and social movements. Their integration has provided a collective-action mode for contesting the dominant agro-food regime and creating alternatives, especially through a linkage with food sovereignty. At the same time, agroecology has been recently adopted by some actors who also promote conventional agriculture. Agroecology can play different roles – either conforming to the dominant regime, or else helping to transform it – contingent on specific empowerment strategies. Tensions between ‘conform versus transform’ roles can be identified in European agroecological research, especially in three areas: farm-level agroecosystems development; participatory plant breeding; and short food-supply chains remunerating agroecological methods. To play a transformative role, collaborative strategies need to go beyond the linear stereotype whereby scientists ‘transfer’ technology or farmers ‘apply’ scientific research results. To the extent that farmer-scientist alliances co-create and exchange knowledge, such gains can transform the research system.

Geels, F.W. and Penna, C.C.R., 2015, ‘Societal problems and industry reorientation: Elaborating the Dialectic Issue LifeCycle (DILC) model and a case study of car safety in the USA (1900-1995)’, *Research Policy*, 44(1), 67-82

Addressing societal problems requires the reorientation of firms-in-industries, including changes in technology, belief systems, and mission. The paper aims to make two contributions to the Dialectic Issue LifeCycle (DILC) model, which captures the dynamics of socio-political mobilization around societal problems and industry responses. First, the five phases in the DILC-model are elaborated with insights from social movement theory, political science, public attention, issue management, corporate political strategy, and innovation management. Second, a ‘cyclical’ lifecycle pattern is explored, in which a social problem does not linearly progress through successive phases, but can also move ‘backwards’ if public attention or political will decrease. We explore these contributions with a longitudinal study of the car-safety problem and responses from American automakers (1900-1995). We use a combined quantitative-qualitative method that employs coupled time-series analyses as support for an in-depth case study. The case study showed that the industry long denied the influence of car design on fatalities, and reluctantly changed its position in the mid-1960s (under pressure from public opinion and policymakers). In the late-1980s, when markets emerged because safety became part of consumer preferences, the industry implemented comprehensive changes in technology, beliefs and mission.

Bush, S.R. and Marschke, M.J., 2014, Making social sense of aquaculture transitions, *Ecology and Society*, 19(3): 50.

Resilience deals explicitly with change and provides a middle ground between the social and the environmental sciences. However, a growing critique by social scientists questions the ability of resilience thinking to adequately examine the social dimensions of change. The question that emerges is how social scientists should engage with resilience. We addressed this question by comparing resilience with agrarian change and transitions theory, through the backdrop of the fastest growing global food sector, aquaculture. Our analysis showed that each theoretical perspective provides fundamentally different insights into social and environmental transition inherent in the aquaculture sector. Although resilience thinking is best suited to assessing the ecological aspects of production, its systems ontology limits the inclusion of dynamic social relations or innovation. In contrast, agrarian transition enables a more meaningful understanding of how social relations are reconfigured as agrarian society shifts toward more capitalist modes of production, and transitions theory provides insights into social process of innovation. Given the epistemological differences between these theoretical approaches, we argue against attempts that reify systemic thinking by naturalizing social theories and concepts into resilience thinking. Instead, we argue that social theories such as agrarian change and transition theory should be seen as

complimentary and that integration should focus on bridging results and insights. Doing so enables a more robust assessment of the social aspects of social-ecological transitions in the aquaculture sector and beyond.

Vinnari, M. and Vinnari, E., 2014, A framework for sustainability transition: The case of plant-based diets, *Journal of Agricultural and Environmental Ethics*, 27, 369–396

Societal and technological development during the last century has enabled Western economies to achieve a high standard of living. Yet this profusion of wealth has led to several outcomes that are undesirable and/or unsustainable. There is thus an imperative need for a fundamental and rapid transition towards more sustainable practices. While broad conceptual frameworks for managing sustainability transitions have been suggested in prior literature, these need to be further developed to suit contexts in which the overall vision is arguably clear, such as in the case of consuming animal-originated foodstuffs. In this article we introduce a novel transition management framework that is based upon the dimensions of sustainability. The suggested transition management process includes the identification of objectives and obstacles, the listing of options and their opportunities and threats as well as the evaluation of the outcomes (the Five O's). We argue that sustainability transition management should be a process in which the identification of the relevant dimensions of sustainability and related objectives forms the foundation for strategic, tactical and operational governance activities. We illustrate the practical applicability of the framework in the case of transition towards plant-based diets.

Auvinen, H. and Tuominen, A., 2014, Future transport systems: Long-term visions and socio-technical transitions, *European Transport Research Review*, 6(3), 343-354,

Long-term, system-level foresight is needed when grand challenges are addressed in the transport sector. This paper explores how socio-technical transitions can be anticipated and taken into account in strategic transport planning. Techniques to integrate long-term foresight and understanding of socio-technical change in the transport system to support long-term transport policy targets are introduced. The proposed approach extends and combines transport system vision building to analysis of system-level changes on a three-level framework. It presents a novel, policy relevant application in the field of socio-technical transitions. The case is demonstrated with a vision of a safe and secure Finnish transport system in 2100. First, a consistent transport system vision was created with transport experts and authorities using a structured vision building process. Second, key topics involved in the transition from the existing socio-technical system to the envisioned future were analysed using the three-level framework. The demonstration proved successful, and it has contributed to the understanding of importance of the shared long-term perspective in transport system decision-making and strategic planning. It has also generated wider discussion on transport system visions, desired futures paths as well as measures and changes required among the Finnish transport systems stakeholders.

Newman, D., Wells, P., Nieuwenhuis, P., Donovan, C., and Davies, H. 2014, Learning from electric cars as socio-technical mobility experiments: Where next?, *Transfers*, 4(2), 23-41

This article considers electric cars as socio-technical experiments in meeting mobility requirements. There have been numerous trials and government incentives to promote such vehicles, but with a notable lack of success. The article thus seeks to address an urgent need to understand such "transition failure," which may ultimately impact upon how progress is measured in sociotechnical transitions. Presenting results from a recent research project, it is suggested that shared usage models hold greater potential for achieving sustainable personal mobility. It is concluded, however, that multiple niche experiments present a highly complex situation in which cumulative learning is problematic.

Nastar, M., 2014, What drives the urban water regime? An analysis of water governance arrangements in Hyderabad, India, *Ecology & Society*, 19(2), 57

Urban water scarcity is increasingly seen as a governance issue, not least in cities like Hyderabad, India, where the demand for urban water exceeds the available supply to the extent that some low priority areas in the city receive water for only a few hours on alternate days. Based on a multi-level perspective in transition studies, this study explores the major interplay between actors in the urban water regime and analyzes how that influences access to water among the urban poor. The findings show how the practices of the consolidated regime are environmentally, socially, and economically unsustainable. In investigating the driving forces behind the attributes of the urban water regime, we draw attention to the impact of landscape pressures, i.e., international donors' influence on water policy, and initiatives at the regime and niche levels. Further, and in response to that, we investigate potential niche experiments promoting water access for the urban poor. Accordingly, it is suggested that socio-technical and socio-political "niche" experiments could be combined into a citizen-based challenge against the existing urban regime practices and the dominant discourses at the landscape level. Here water harvesting techniques could be a viable niche innovation with citizen involvement to be scaled-up in an enabling institutional setting. This requires a coalition of social movement and political action, providing an arena for a new vision in the water sector that would replace the one imposed by landscape forces represented by international donors.

Tylfield, D., 2014, Putting the power in 'Socio-Technical Regimes' – E-Mobility transition in China as political process, *Mobilities*, 9(4), forthcoming

A mobility low-carbon transition is a key issue both socially and for mobilities research. The multi-level perspective (MLP) is justifiably a leading approach in such research, with important connections to high-profile socio-technical systemic analyses within the mobilities paradigm. The paper explores the key contributions that a Foucauldian-inspired cultural political economy offers, going beyond central problems with the MLP, specifically regarding: a productive concept of power that affords analysis of the qualitatively novel and dynamic process of transition; and the incorporation of the exogenous 'landscape' into the analysis. This move thus resonates with growing calls for attention to power dynamics in mobilities research and a 'structural' turn. In making this case, we deploy the key case study of contemporary efforts towards mobility transition in China. This not only sets out more starkly the importance of MLP's gaps but also provides an empirical case to illustrate, albeit in the form of informed speculation, possible routes to low-carbon urban mobility transition *and* the inseparability from broader qualitative power transitions at multiple scales, including the global.

Dijk, M. and Parkhurst, G., 2014, Understanding the mobility-transformative qualities of urban park and ride policies in the UK and the Netherlands, *International Journal of Automotive Technology and Management*, 14(3-4), 246-270

Park and Ride (P+R) has emerged as a key element of the sustainable mobility packages of many urban areas in Europe. The present article explores the impact of the introduction of P+R on urban car mobility, especially its potential transformative impact, in two of the densest European states: the UK and the Netherlands. An analysis of six case-studies (i.e., cities) showed a degree of disconnect between stated policy aims and implementation in practice, and in some of the cases this difference was substantial. No obvious national contextual factor explaining implementation success was identified: in both contexts the (local) political will and practical tools to ensure transfer of parking capacity to P+R, were the key factors. The overall car restraining effect of P&R hoped for was mostly not achieved - mainly due to transfer from public transport-only trips and from cycling and because overall parking supply across city centres increased.

Pan, W. and Ning, Y., 2015, A socio-technical framework of zero-carbon building policies, *Building Research & Information*, 43(1), 94-110

Zero-carbon building (ZCB) is regarded as an innovative and important approach to reducing both carbon emissions and energy consumption. Policies promoting ZCB have been explicitly set in several countries and regions. Other countries have developed relevant initiatives or demonstration projects. However, the sharing of knowledge of policies on ZCB is limited and challenging. A socio-technical transition framework is developed based on an examination of ZCB policies and the supporting literature. This framework depicts the technical systems of ZCB policies within the regulatory, social and geographical contexts. The technical systems comprise four components: carbon reduction targets and a timeline; a ZCB definition and scope; a carbon emission measure and indicator; and a reliance on renewable energy. This systems approach shows that reliance on only technical solutions is constrained to achieving the zero-carbon target, yet human behaviours are poorly addressed in the policies. Thus, a significant gap exists between policy intentions and actual practices. The developed framework can inform discussion on current and future ZCB policies.

Lyons, G., 2014, Transport's digital age transition, *Journal of Transport and Land Use*, forthcoming

2014 marks the 25th birthday of the World Wide Web. We have seen some remarkable developments as part of the digital age revolution in the last quarter of a century. These have taken place concurrently with a motor age that is possibly past its prime. A number of major motor manufacturers have faced disappointing sales or financial crisis alongside several countries seeing a halt to the historic trend of growing car use. The co-existence of the motor age and the digital age prompts this paper to consider the hypothesis that society is undergoing a fundamental transition from a regime of automobility to something significantly different. The paper considers what has characterized the motor age and proceeds to examine the digital revolution and how this is changing people's means to access people, goods, services and opportunities. The range of interactions between the motor age and the digital age are addressed, underlining the difficulty in establishing the net consequence of one for the other. The new debates concerning 'peak car' are considered in which the digital age is identified as potentially one key factor responsible for observed changes in car use. The paper then focuses upon a socio-technical conceptualization of society known as the Multi-Layer Perspective to examine its hypothesis. Support or not for the hypothesis is not, as yet, established. Transport's future in the digital age is uncertain and the paper sets out some views on resulting policy considerations and research needs.

Boyer, R., 2014, Sociotechnical transitions and urban planning: A case study of eco-cohousing in Tompkins County, New York, *Journal of Planning Education and Research*, 34(4), 451-464

The sociotechnical transitions framework describes how novel practice emerges from marginal "niche" contexts to the mainstream. Scholars of various fields have used sociotechnical transitions to explain processes of structural change for sustainability, yet little research examines the role of local plans or planners in transition processes. The author offers an in-depth case study following the evolution of an eco-cohousing model from its grassroots origins to its current application in the housing market of Ithaca, New York. Planners used existing planning documents to translate innovative practices to the public, defying assumptions of the rational-linear model still common in planning scholarship.

Berggren, C., Magnusson, T., Sushandoyo, D., 2015, Transition pathways revisited: Established firms as multi-level actors in the heavy vehicle industry, *Research Policy*, forthcoming

The multi-level perspective on sustainability transitions positions established firms (incumbents) as defenders of existing technologies at the "regime level." By contrast, it positions new entrants at the niche level, as promoters of new technologies. This paper challenges the positioning of firms as actors on either regime or niche levels. Based on a

comparative analysis of technology strategies in the heavy vehicle industry, the paper shows that established firms are active at both levels, developing several technology alternatives simultaneously. This means that incumbents' technology strategies determine important parts of the required niche-regime interactions. The paper also shows how incumbents may pursue contrasting technology strategies. While some adopt a dualistic approach, keeping regime and niche level activities technologically and commercially separate, others develop integrated strategies where niche activities are leveraged to impact upon the regime level. The cases studied illustrate how the success of such integrated strategies depends on the emergence of bridging policies. Bridging policies are relevant both for linking early niche markets to broader regime-level markets, and for supporting further technological advancements of niche markets.

Cairns, R.C., 2014, Climate geoengineering: issues of path-dependence and socio-technical lock-in, *WIREs Climate Change*, 5, 649–661

As academic and policy interest in climate geoengineering grows, the potential irreversibility of technological developments in this domain has been raised as a pressing concern. The literature on socio-technical lock-in and path dependence is illuminating in helping to situate current concerns about climate geoengineering and irreversibility in the context of academic understandings of historical socio-technical development and persistence. This literature provides a wealth of material illustrating the pervasiveness of positive feedbacks of various types (from the discursive to the material) leading to complex socio-technical entanglements which may resist change and become inflexible even in the light of evidence of negative impacts. With regard to climate geoengineering, there are concerns that geoengineering technologies might contribute so-called 'carbon lock-in', or become irreversibly 'locked-in' themselves. In particular, the scale of infrastructures that geoengineering interventions would require, and the issue of the so-called 'termination effect' have been discussed in these terms. Despite the emergent and somewhat ill-defined nature of the field, some authors also suggest that the extant framings of geoengineering in academic and policy literatures may already demonstrate features recognizable as forms of cognitive lock-in, likely to have profound implications for future developments in this area. While the concepts of path-dependence and lock-in are the subject of ongoing academic critique, by drawing analytical attention to these pervasive processes of positive feedback and entanglement, this literature is highly relevant to current debates around geoengineering.

Falldé, M. and Eklund, M., 2014, Towards a sustainable socio-technical system of biogas for transport: The case of the city of Linköping in Sweden, *Journal of Cleaner Production*, forthcoming

In this article, the development of biogas for transport in the municipality of Linköping, Sweden, is studied in order to contribute to a better understanding of the conditions for socio-technical transitions towards sustainability. Using concepts from multi-level perspectives and socio-technical perspectives on system builders, the study focuses on three time periods: During the first time period (1976–1994), a niche for biogas developed amongst dedicated actors in small networks representing energy and public transport within the municipality. That is, biogas was entirely connected to the vision of a 'green' public transport. Second, between the years of 1994 and 2001, the biogas producing company acted as a system builder and initiated a large-scale biogas production through close cooperation in networks with other actors. As a result, biogas reached a phase of technological maturity and also gained some support from national investment programs. Finally, from 2001 the expansion of biogas became clearer as the biogas production spread into a regional arena but also reached for new customers, like personal cars. Unforeseen spin-offs like the formation of new private companies and development of research were important results of the transition. Thereby, the transition is a move towards a new socio-technical regime. A conclusion from the study is that the development of biogas was highly influenced by national support and pressure, but was mainly driven by local actors – system

builders – that could steer the processes and had endurance as well as capability to mobilize resources in order to fulfill their purposes.

Bailey, I., 2014, The green economy: Functional domains and theoretical directions of enquiry, *Environment and Planning A*, 46, 1797 – 1813

The green economy is a highly complex construct in terms of its attempts to integrate economic, environmental, and social concerns, the wide range of actors involved, its material outcomes, and the forms of governance needed to regulate processes of economic greening. As such, it poses new empirical and theoretical challenges for social science research on socioenvironmental futures. This paper has two main aims. The first is to survey the emergent features and functional domains of the green economy. The second is to consider theoretical tools that might be used to analyse the drivers and processes shaping the green economy. Focusing on literature on sociotechnical transitions, ecological modernisation, the ‘green’ cultural economy, and postpolitical governance, we argue that understanding the functional and spatial heterogeneity of the green economy necessitates a multitheoretical approach. We then explore how combining branches of research on socioenvironmental governance can lead to theoretically and ontologically richer insights into the drivers, practices, and power relations within the green economy. In so doing, we respond to calls for socioeconomic research on environmental change which is neither just empirical nor bound to one theoretical outlook to the detriment of understanding the complexity of socioenvironmental governance and human–nature relations.

Epprecht, N., Von Wirth, T., Stunzi, C. and Blumer, Y.B., 2014, Anticipating transitions beyond the current mobility regimes: How acceptability matters, *Futures*, 60, 30-40.

Today's car-based transportation systems require a transition toward sustainability. This is particularly the case in suburban areas, where the costs for introducing a new transportation system are high due to the low population density. At the same time the negative externalities of the current mobility regime – such as health costs and congestions – are increasing rapidly. Based on expert interviews with car manufacturers, transportation authorities, environmental groups, and scientists we identify two visionary characteristics of future, more sustainable transportation systems: automated driving and sharing. Using these two characteristics, we apply the scenario-axes technique to develop four mobility scenarios for a suburban context that range from business-as-usual to a radical and more sustainable one. In an evaluation with ten criteria that measure a scenario's performance from a user perspective, the radical scenario performs worst since it does not meet current individualistic user requirements. Our findings suggest that lock-ins of users' expectations act as barriers for the diffusion of novel transportation systems. These barriers cannot be overcome by technological innovations and regulation alone. Hence, we call for innovative arenas, wherein technology and user acceptability could co-evolve.

Voß, J.-P., 2014, Performative policy studies: Realizing “transition management”. *Innovation – The European Journal of Social Science Research* 27 (4), 317-343

The paper analyses the relations between policy studies and public policy. It traces how they are constitutively entangled. Conceptually, this builds on a notion of performativity that has been developed in science studies. The performativity of policy studies is explored in a case study of the innovation journey of “transition management” as a model for governing sociotechnical change. The paper shows how practices of knowledge production and policy-making take shape in interaction with the model and how a specialized research field coevolves with political alliances and policy programs. They interact in the process of realizing transition management, both by establishing the model as collective knowledge and by materially enacting it. In this interweaving with public policy, policy studies contribute to creating the reality that they describe. The conclusions discuss “realizing” as a mode of governance.

Dijk, M., Orsato, R.J., and Kemp, R., 2014, Towards a regime-based typology of market evolution, *Technological Forecasting and Social Change*, forthcoming

This paper provides a typology for the analysis of markets in which new innovations have the potential to cause *regime transition*. We elaborate the typology of transition pathways (Geels and Schot, 2007) into a typology of market evolution, with transition being one of the possible types. We strengthen the theoretic link between transition and industrial innovation studies by moving beyond the incremental-radical innovation dichotomy, adopted in many industrial innovation studies, as well as map out the socio-technical dimension of market evolution. We test the Regime Evolution Framework (REF), as we call it, against the introduction of steam power in trains and ships, which are well-established cases. By doing so, we are better prepared to adopt the framework for the analysis of electric propulsion systems in cars, a potentially disruptive innovation that has slowly been entering mainstream markets. The framework allows us to: (i) better qualify the categories of sustaining and disruptive innovation; (ii) understand the evolution of hybrid patterns of market innovation, since the elements of emerging disruptive innovations sometimes sustain the established technology, and; (iii) assess and map emerging market patterns.

Söderholm, K. and Wihlborg, E., 2014, Policy for sociotechnical transition: Implications from Swedish historical case studies, *Journal of Environmental Policy & Planning*, forthcoming

In this paper we analyse past sociotechnical transitions, and based on that we discuss the prospects for the central state in promoting radical transitions towards improved sustainability today. The case studies include the sociotechnical systems in Sweden providing for: (a) urban housing; (b) passenger cars as a favoured mode of transport; and (c) piped water/wastewater, all fundamentally transformed over the first seven decades of the twentieth century and especially in the 1940s up until the 1960s. The core lesson from the case studies is that the central state, by taking an active role and by coordinating the roles of different stakeholders, values and knowledge as well as different policy areas and instruments, can accomplish a coherent and effective management of such transition processes. Also in contemporary network governance settings the central state is well suited to accomplish such an active and coordinative role based on its legitimate power to design and implement different public policy instruments.

Minh, T.T., Friederichsen, R. Neef, A. and Hoffmann, V., 2014, Niche action and system harmonization for institutional change: Prospects for demand-driven agricultural extension in Vietnam, *Journal of Rural Studies*, 36, 273-284

Drawing upon institution, power, and network concepts, this article analyzes how different actors interact with institutions in institutional change processes at niche level. The analysis builds on action research which developed and reflected upon the Farmer Research and Extension Network – an innovative, demand-driven approach to agricultural extension in Vietnam's north-western uplands. The action-researcher identified commune extension workers as strategic actors in the system and, consequently, supported them in exploiting and widening their existing room for maneuver. Throughout the research process, new rules and roles were developed with local stakeholders and carefully introduced into the local extension system. Thereby, the action research process helped institutionalizing demand-oriented approaches to public service delivery, in a manner firmly rooted in everyday action and politics. The findings reveal the critical contribution at niche level that commune extension workers can make to on-going institutional change in a late socialist polity.

Carvalho, L., 2014, Smart cities from scratch? A socio-technical perspective, *Cambridge Journal of Regions, Economy and Society*, forthcoming

This paper argues that contemporary smart city visions based on ITs (information and telecommunication technologies) configure complex socio-technical challenges that can benefit from strategic niche management to foster two key processes: technological learning and societal embedding. Moreover, it studies the extent to which those processes started to

unfold in two paradigmatic cases of smart city pilots 'from scratch': Songdo (South Korea) and PlanIT Valley (Portugal). The rationale and potentials of the two pilots as arenas for socio-technical experimentation and global niche formation are analysed, as well as the tensions and bottlenecks involved in nurturing socially rich innovation ecosystems and in maintaining social and political support over time.

Galvin, R. and Sunikka-Blank, M., 2014, The UK homeowner-retrofitter as an innovator in a socio-technical system, *Energy Policy*, forthcoming

Policy on domestic thermal retrofits is usually designed as a top-down enterprise, setting standards and inducing homeowners to retrofit accordingly. Its underlying assumption is that correct retrofit technology is developed by experts and comes down through supply chains to households, who apply it as designed to their properties. However, this model is challenged by the insight from socio-technical systems studies (STST) that technology and society mutually form and influence each other at every level of society. Using this conceptual framework, this study investigated whether innovations are happening among retrofitting households, and what support these have for diffusion upwards into supply chains and outwards to other households. Qualitative data was gathered through semi-structured interviews among homeowner-retrofitters plus building professionals and citizens' initiatives which support these, in Cambridge, UK. Local innovation was found in the development of new retrofit technology and novel reconfiguring of existing solutions. Much of this was triggered by clashes between standard retrofit solutions and heritage or aesthetic values, economic necessity, or building professionals' lack of knowledge or experience. The findings suggest that instead of treating homeowners as passive recipients, UK thermal retrofit policy should broaden to identify useful innovations developed by homeowners and support them where appropriate.

Spinardi, G., 2015, Up in the air: Barriers to greener air traffic control and infrastructure lock-in in a complex socio-technical system, *Energy Research & Social Science*, 6, 41-49

Greater automation of air traffic control (ATC) could reduce aviation's climate change impacts, but improvements predicted long ago have been slow to happen. This resistance to ATC modernisation is framed as an issue of lock-in, and the detailed case study described here enables an analysis of the factors involved in slowing change. Although the classic lock-in effects of 'increasing returns' and 'network externalities' are important, a major barrier to modernisation is due to the political and organisational challenges of coordinating change across a large, complex socio-technical system. However, lock-in effects are crucial with respect to the perceived increasing returns accrued from experience with manual ATC operations, and the difficulty of quantifying the risks of automation (particularly as regard the use of complex software) is a major barrier to further improvements. Overcoming this obstacle to further automation depends on finding ways to test and operate new ATC software and procedures without compromising safety.

Baker, L., Newell, P., and Philips, J., 2014, The political economy of energy transitions: The case of South Africa, *New Political Economy*, 19(6), 791-818

This paper explores the political economy of energy transition in South Africa. An economic model based around a powerful 'minerals-energy complex' that has previously been able to provide domestic and foreign capital with cheap and plentiful coal-generated electricity is no longer economically or environmentally sustainable. The paper analyses the struggle over competing energy visions, infrastructures and political agendas in order to generate insights into the governance and financing of clean energy transitions in South Africa. It provides both a rich empirical account of key policy developments aimed at enabling such a transition and provides reflections on how best to theorise the contested politics of energy transitions.

Baker, L., 2014, Renewable energy in South Africa's minerals-energy complex: A 'low carbon' transition?, *Review of African Political Economy*, forthcoming

This paper questions the extent to which the introduction of utility-scale, privately generated renewable energy into South Africa's coal-dominated electricity supply can be considered a 'low-carbon transition'. Rather, the renewable energy projects in question are embedded within and contribute to South Africa's high-carbon, electricity-intensive 'minerals-energy complex'. An empirical consideration is provided of some of the stakeholders involved in the implementation of the wind industry in South Africa, and the possibilities and pitfalls for its long-term sustainability.

Gibbs, D. and O'Neill, K., 2014, The green economy, sustainability transitions and transition regions: A case study of Boston, *Geografiska Annaler: Series B, Human Geography*, 96(3), 2-1-216

This article is focused upon exploring the development of the green economy in particular locations, with the aim of identifying why some cities and regions have been successful in engendering green growth. To date we have little idea where the green economy is developing, nor much insight, beyond anecdotal evidence, into why certain cities and regions appear to be more successful than others in this regard. We position our analysis within the context of research on socio-technical transitions that has theorized the potential shift to a more sustainable economy. We review the literature on sustainability transitions and the development of the multi-level perspective encompassing niches, regimes and landscapes. However, most research into socio-technical transitions has not given adequate consideration to the influence of places and spatial scale in these transition processes, and we therefore critique the socio-technical transitions literature from a geographical perspective. In this article we are interested in four key questions. What role does the enabling and facilitative state play in these cities and regions? What new institutional forms and governance structures are being developed? How do actors in particular cities and regions construct their green vision, and how do they encourage other actors to buy-in to this vision? How are links across levels and spatial scales developed to connect niches with the regime? We address these through a focus upon the Boston city-region in the USA, drawing upon both primary and secondary research material. We utilize this case study example to re-examine and re-theorize work on sustainability transitions from a spatial perspective.

Olsson, P., Galaz, V. and Boonstra, W.J., 2014, Sustainability transformations: A resilience perspective, *Ecology and Society*, 19(4), 1

Scholars and policy makers are becoming increasingly interested in the processes that lead to transformations toward sustainability. We explored how resilience thinking, and a stronger focus on social-ecological systems, can contribute to existing studies of sustainability transformations. First, we responded to two major points of critique: the claim that resilience theory is not useful for addressing sustainability transformations, and that the role of "power" in transformation processes has been underplayed by resilience scholars. Second, we highlighted promising work that combines insights from different theoretical strands, a strategy that strengthens our understanding of sustainability transformations. We elaborated three research areas on which such combined perspectives could focus: innovation and social-ecological-technological systems interactions, patterns of transformation, and agency and transformation.

Tuominen, A., Tapio, P., Varho, V., Jarvi, T. and Banister, D., 2014, Pluralistic backcasting: Integrating multiple visions with policy packages for transport climate policy. *Futures*, 60, 41–58

Traditionally backcasting studies in the field transport are based on a single normative vision (often with clearly stated targets) and alternative pathways are then developed to reach that vision. This paper expands the discussion on the role and importance of backcasting towards using multiple visions as a part of strategic transport planning process. This is done by presenting a method for pluralistic backcasting, which is defined as a process where

multiple visions of the future are developed in a participatory, interdisciplinary process using the Delphi method. Further, the pathways to the alternative visions are constructed with a set of policy packages in a collaborative process with key stakeholders. The pluralistic backcasting approach outlined in the paper presents a set of practical tools to support development and implementation of climate strategies and policy programmes for transport. It presents a novel, policy relevant application in the field of backcasting. The approach is tested with a case study of multiple visions of the future on CO₂ emissions for transport in Finland up to the year 2050, including the identification of required policy packages to achieve the visions.

Trutnevyte, E., Barton, J. O'Grady, A., Ogunkunle, D., Pudjianto, D., Robertson, E., 2014, Linking a storyline with multiple models: a cross-scale study of the UK power system transition. *Technological Forecasting and Social Change*, 89, 26-42

State-of-the-art scenario exercises in the energy and environment fields argue for combining qualitative storylines with quantitative modelling. This paper proposes an approach for linking a highly detailed storyline with multiple, diverse models. This approach is illustrated through a cross-scale study of the UK power system transition until 2050. The storyline, called *Central Co-ordination*, is linked with insights from six power system models and two appraisal techniques. First, the storyline is 'translated' into harmonised assumptions on power system targets for the models. Then, a new concept called the landscape of models is introduced. This landscape helps to map the key fields of expertise of individual models, including their temporal, spatial and disciplinary foci. The storyline is then assessed based on the cross-scale modelling results. While the storyline is important for transmitting information about governance and the choices of key actors, many targets aspired in it are inconsistent with modelling results. The storyline overestimates demand reduction levels, uptake of marine renewables and irreplaceability of carbon capture and storage. It underestimates the supply–demand balancing challenge, the need for back-up capacity and the role of nuclear power and interconnectors with Europe. Thus, iteratively linking storylines and models is key.

Novotny, M. and Laestadius, S., 2014, Beyond papermaking: Technology and market shifts for wood-based biomass industries – management implications for large-scale industries, *Technology Analysis & Strategic Management*, 26(8), 875–891

Growing environmental concerns, emerging economies, and the strong uncertainties about future prices of fossil fuels as well as about CO₂ emissions contribute to a potential renaissance for biorefining industries. According to theories on technology shifts and innovations (e.g. [Utterback, J. M. 1994. *Mastering the dynamics of innovation. How companies can seize opportunities under technological change*. Harvard Business School Press]), heavy process industries like pulp and paper tend to be rigid towards disruptive innovations and instead focus on incremental innovations and economies of scale. However, a major empirical contribution from this case study demonstrates that some incumbents may escape the lock-in and form a new biomass development block. The study also contributes to academic as well as technology and innovation management perspectives in process-based and natural resource-based industries, where process innovations are tightly coupled with product innovations in inter-industry (vertical) linkages, the so-called development block.

Greene, D.L., Park, S., Liu, C., 2014, Analyzing the transition to electric drive vehicles in the U.S., *Futures*, 48, 34-52

Scenarios of the transition to electric drive passenger cars and light trucks are created using the same model, technology and market behavior assumptions used in the recent National Research Council study, *Transitions to Alternative Vehicles and Fuels*. The transition is assumed to begin in California and the other U.S. states that have adopted California's Zero Emission Vehicle (ZEV) requirements. Five years after the ZEV standards take effect in 2015, the rest of the U.S. adopts policies strongly supporting the transition. After roughly a decade of net costs, market adoption of electric drive vehicles becomes self-sustaining. In

the long run, the model implies that social benefits exceed excess costs by approximately an order of magnitude. Analysis of major energy transitions is characterized by deep uncertainty due to the long time constants for energy system change, the unpredictability of technological change and government policies, inadequate understanding of market processes, and the many important positive feedback mechanisms that create tipping points.

Wassermann, S., Reeg, M. and Nienhaus, K., 2015, Current challenges of Germany's energy transition project and competing strategies of challengers and incumbents: The case of direct marketing of electricity from renewable energy sources, *Energy Policy*, forthcoming

Electricity generated by renewable energies (RES-E) already accounts for 25% of Germany's electricity supply. This has led to recent discussions for a better market integration of RES-E. The paper examines how competing actors and their ideas on market integration developed new services for direct marketing according to their respective origins and tried to shape the regulatory framework. The paper analyses this process and explains the current shape of the field of direct marketing. Medium-sized structured actors, who favoured RES-E integration via the conventional wholesale power markets, and who formed early close coalitions with RES-E power producers at the same time, have been most successful in terms of market shares. Moreover, they have been very successful for different reasons in building-up coalitions with governance units and influencing the field rules and routines. Based on those findings, the paper will conclude with some policy advices for the future adjustment of the current regulative frameworks. As long as there is no evidence of how RES-E can be integrated most effectively and efficiently, policies should maintain a competition between different direct marketing strategies to find out which strategies serve the best in terms of achieving a successful energy transition.

Hess, D.J. and Mai, Q.D., 2015, The convergence of economic development and energy-transition policies in state-government plans in the United States, *Sustainability: Science, Practice, & Policy*, 11(1), 1-16

Because elected officials and voting publics in the United States have disagreed with policies to decrease greenhouse-gas emissions and increase renewable energy, research is needed to help guide practitioners toward policy initiatives that are less likely to trigger opposition. This study assesses one type of policy for which disagreements may be less heated: economic development targets for industrial sectors in U.S. state governments that support the renewable energy and clean technology (RE&CT) industrial sector. A review of state-government plans and strategy statements shows that support for plans with a sectoral strategy does not divide strongly along party lines, and likewise there are Republican governors who support plans for targeted economic development strategies that include their state's RE&CT sector. However, there is some ideological opposition to sectoral targeting in general, and a qualitative comparative analysis indicates that in states with both strong fossil-fuel employment and Republican governors, support is weaker for the RE&CT sector in the plans. Overall, whereas opportunities for political compromise are blocked in many policy arenas for renewable energy and greenhouse gas regulation, the arena of green economic development appears to offer modest opportunities.

Nurtado, L., Huijben, J., Verhees, B. and Verbong, G.P.J., 2014, The power of grid parity: A discursive approach, *Technological Forecasting and Social Change*, 87, 179–190

In the debate around solar photovoltaic (PV), the concept of 'grid parity' has emerged as the dominant benchmark for competitiveness, while some even argue that it will determine the point in time after which the PV industry will boom. But more recently, others have called into question the usefulness of the grid parity concept. Yet despite its pervasive use and increasing contestation, the grid parity concept has not been systematically interrogated to date. This paper makes two contributions towards that: first, to show how the grid parity concept emerged and how it is calculated and second, to explore the role of the grid parity

debate in the solar PV field. The first contribution takes the form of a literature study of grid parity studies. To arrive at a meaningful estimation of the grid parity point, assumptions made in each step of the calculations have to be articulated and carefully evaluated. Nevertheless, this is almost never done: the grid parity studies, presentations and reports we reviewed invariably used the simplest representation available. We argue that their authors chose a simplified model for strategic reasons, e.g. to obtain (material and/or non-material) resources. This assessment leads to our second contribution: a discourse analysis of the grid parity debate. We distinguished ten key storylines and six discourse coalitions, comprised of actors who share a specific set of these storylines. Analyzing these storylines and coalitions, we show that while these actors share a common goal of PV up-scaling, they can have drastically different ideas about strategies to achieve this goal. Opening the black box of grid parity thus reveals tensions about preferred strategies in an otherwise seemingly homogeneous PV discourse.

Vazquez-Brust, D., Smith, A.M. and Sarkis, J., 2014, Managing the transition to critical green growth: The 'Green Growth State', *Futures*, 64, 38–50

Political will at the national and multilateral scale is coalescing around the emerging discourse of Green Growth. The narratives and practices of Green Growth have already been rejected by many stakeholders as a reformulation of business as usual discourse. However, this article argues that this critique is grounded in a false conflation of distinct interpretations of the concept. In place of homogenising all associated narratives, we argue for an aspirational Critical Green Growth perspective, socially inclusive and conducive to structural transformation, incipiently identified in Asian national policies, particularly Korea. Drawing on this background, and other development insights, we conduct a 'backcasting' exercise to identify trajectories leading to this imagined future of Green Growth. We address a key gap in the literature, the lack of dialogue between Green Growth and Developmental State studies. We then argue for the importance of the Green Growth State (GGS) in introducing fundamental change in this critical window of opportunity. Elements of this overarching concept would include broad characteristics of: a flexible and diverse policy mix; value-driven, multi-stakeholder, multi-level governance; public trust and collaboration; and appropriate measurements of progress discouraging commodification of nature.

Antal, M., 2014, Green goals and full employment: Are they compatible?, *Ecological Economics*, 107, 276-286.

Two empirical correlations are studied: one between economic growth and environmental impacts, and the other between the lack of economic growth and unemployment. It is demonstrated that, at a global level, economic growth is strongly correlated with environmental impacts, and barriers to fast decoupling are large and numerous. On the other hand, low or negative growth is highly correlated with increasing unemployment in most market economies, and strategies to change this lead to difficult questions and tradeoffs. The coexistence of these two correlations – which have rarely been studied together in the literature on “green growth”, “degrowth” and “a-growth” – justifies ambivalence about growth. To make key environmental goals compatible with full employment, the decoupling of environmental impacts from economic output has to be accompanied by a reduction of dependence on growth. In particular, strategies to tackle unemployment without the need for growth, several of which are studied in this article, need much more attention in research and policy.

Marsden, G., Ferreira, A., Bache, I., Flinders, M. and Bartle, I., 2014, Muddling through with climate change targets: A multi-level governance perspective on the transport sector, *Climate Policy*, forthcoming

The UK Climate Change Act 2008 commits to a reduction of 80% in national GHG emissions by 2050 compared to 1990 levels. This article explores what happens next where these top-level aspirations are expected to be turned into radical action. It does so through examination of the transport sector, which is a highly complex, fragmented, and multi-level

delivery environment. The research draws on cases studies of four major cities with different governance structures within the two distinct, yet connected, national contexts of England and Scotland. It integrates a range of theoretical legacies, namely 'muddling through', multi-level governance, and positional analysis, to look across governmental layers and out to non-governmental actors at all levels. Underneath the 80% target, the framework for action remains unclear. Lower-tiered authorities report difficulties in acting in a more comprehensive or rapid manner than upper tiers of government, largely because of the potential costs involved and a significant resource dependency on national governments. Ambition is also tempered by conflicts with economic growth objectives and the difficulties in aligning the objectives of the myriad of public and private organizations that need to take action. The transport sector is seen to be a difficult sector in which to achieve early cuts in carbon emissions. Understanding how to mobilize the many public- and private-sector actors in the transport sector is a key challenge to be addressed in many developed countries. This article provides practical insights from real decision makers about the difficulties that a slow incremental strategy creates. Whilst it builds flexibility into future decision making, it also leads to short-termism and generates uncertainty about investment and policy choices. This allows carbon policy to be crowded out by other agendas, most notably economic growth. Whilst there are aspirations for green growth strategies that grow jobs and substantially cut carbon, these remain elusive in the transport sector, with major new infrastructure often stimulating more carbon consumption. A clearer framework for carbon management is necessary if sound long-term mitigation policies are to be put in place.

Martin, H. and Coenen, L., 2014, Institutional context and cluster emergence: The biogas industry in Southern Sweden. *European Planning Studies*, forthcoming

According to some scholars in evolutionary economic geography (EEG), the role of (territory-specific) institutions is relatively small for explaining where a new industry emerges and grows as firms develop routines in a path-dependent and idiosyncratic manner. This article evaluates this assertion by studying the evolution of the biogas industry in the region of Scania in Southern Sweden. The biogas is predominantly used as a fuel in the regional transport system and is considered as a crucial means to achieve environmental goals in the region. Recently, regional public policy has been actively promoting this biogas industry, aiming for cluster development. Drawing on literature from EEG and technological innovation systems, this article seeks to unpack the evolutionary process that has led to the emergence of this industry. In particular, it studies to what extent territory-specific institutions have been crucial in that respect. The analysis is case-based, drawing predominantly on in-depth interviews with key stakeholders and firms in the industry. By doing so, the paper seeks to make a contribution to our understanding of cluster development, considering the interplay between technology, industry dynamics and institutions.

Neuvonen, A., Kaskinen, T., Leppänen, J., Lähteenoja, S., Mokka, R. and Ritola, M., 2014, Low-carbon futures and sustainable lifestyles: A backcasting scenario approach, *Futures*, 58, 66–76

This study suggests a backcasting scenario method for understanding the relevance of lifestyle-level changes in low-carbon futures. Even though different scenario approaches to low-carbon futures have emerged in recent years, the main focus has been on macro-level development and the lifestyle-level change has been neglected. Focusing on changing lifestyles and social innovation, the outcome of this study is four scenarios depicting the path towards low-carbon futures. The purpose of the scenario study is to describe links between the significance of emerging lifestyle patterns and infrastructure, policy and technological development. Despite the normative constraint regarding material footprint, the scenarios offer a diverse set of lifestyle patterns. The study answers the following question: what lifestyle-level changes could have potential to drive the transition towards low-carbon futures that are within planetary boundaries. We suggest that lifestyle-level scenarios on low-carbon society could have an impact in empowering relevant early adopter groups to become gatekeepers of low-carbon transition.

Orstavik, F., 2014, Innovation as re-institutionalization: A case study of technological change in housebuilding in Norway, *Construction Management and Economics*, 32(9), 857-873

Case study can give important new insights into the systemic nature of construction innovation and the interrelationship between local innovation successes and structural forces shaping the sector. Even well-defined, modular innovations can have significant repercussions on the industry level. Recent innovation in building materials for wet rooms in Norway represents an attempt to modify only limited aspects of the established approach to housebuilding, but is made difficult by institutions and actors relying on established methods and existing building products. Institutions acting as innovation brokers can be very important for innovators. However, brokering is no panacea for promoting disruptive innovation. A broker can thwart rather than promote potentially useful but disruptive innovations. Because innovation is a re-institutionalization process, the third-party position needed for brokering effectively can be undermined, whenever a successful broker attains vested interests in the innovation outcomes it has helped bring forth. Methodologically, employing theories on technological innovation systems and on multilevel socio-technical systems shows that these are effective, complementary tools for analysis of innovation in construction. Only the latter incorporates the notion of innovation as creative destruction, and it is by drawing on this theory that the precariousness of the brokering role can be highlighted.

Langendahl, P.-A. Matthew Cook, M. and Potter, S., 2014, Sustainable innovation journeys: Exploring the dynamics of firm practices as part of transitions to more sustainable food and farming, *Local Environment: The International Journal of Justice and Sustainability*, forthcoming

Deep structural and sustained change is necessary to tackle contemporary environmental challenges. How such change emerges and can be governed has been explored through the notion of sustainable innovation journeys. To date research had conceptualised such journeys as transitions to more sustainable socio-technical systems, e.g. mobility, shelter, food and farming. However, there is a paucity of how innovation proceeds in firms as part of sustainable innovation journeys. This paper begins to address this gap in knowledge. A longitudinal case study was completed of a medium-sized foodprocessing firm in the UK. Qualitative data were collected using ethnographic methods such as participant observation. Drawing on practice theory, a conceptual framework was developed which enabled us to explore and make sense of the firm's sustainable innovation journey conceptualised as practices. Findings show that we can usefully treat a firm as a flow of practices that either resist or otherwise accommodate new practices deemed more sustainable.

Hall, S. and Foxon, T.J., 2014, Values in the Smart Grid: The co-evolving political economy of smart distribution, *Energy Policy*, forthcoming

Investing in smart grid infrastructure is a key enabler for the transition to low carbon energy systems. Recent work has characterised the costs and benefits of individual "smart" investments. The political economy of the UK electricity system, however, has co-evolved such that there is a mismatch between where benefits accrue and where costs are incurred, leading to a problem of value capture and redeployment. Further, some benefits of smart grids are less easy to price directly and can be classified as public goods, such as energy security and decarbonisation. This paper builds on systemic treatments of energy system transitions to characterise the co-evolution of value capture and structural incentives in the electricity distribution system, drawing on semi-structured interviews and focus groups undertaken with smart grid stakeholders in the UK. This leads to an identification of municipal scale values that may be important for business models for the delivery of smart infrastructure. Municipalities may thus pursue specific economic opportunities through smart grid investment. This supports recent practical interest in an expanded role for municipalities as partners and investors in smart grid infrastructures.

Späth, P. and Rohrer, H., 2015, Cities and socio-technical change - Dynamics at an urban junction of heat infrastructure and building standards, *Energy Policy*, forthcoming

Approaches to 'sustainability transitions' stress the possibility of aligning actors around a shared vision of the future, e.g. at the scale of a city. Empirical accounts reveal how difficult such coordination often is due to contradictory views involved. How can we better understand related processes of searching and negotiation? What does this mean for the organization of decision making processes regarding long-term infrastructural change? We analyze a conflict which erupted in Freiburg, Germany when two strategies of reducing environmental impacts of space heating were to be applied in the Vauban 'model district': A) Efficient co-generation of heat and power (CHP) combined with district heating systems (DHS), and B) Reducing heat demand by low-energy designs and ambitious energy standards ('passive house standard'). In order to understand the politics of infrastructure development, we unravel 1) enabling factors and driving forces of the conflict, 2) normative content of opposing viewpoints, 3) resources tapped into for settling the disagreement, and 4) the institutional setup of such decision making about energy policy priorities in the municipality. We reflect on implications of such a perspective on how policies and how governance arrangements should ideally be shaped and take a brief outlook on further research needed.

Monstadt, J. and Wolff, A., 2015, Energy transition or incremental change? Green policy agendas and the adaptability of the urban energy regime in Los Angeles, *Energy Policy*, forthcoming

Drawing on recent research in urban policy studies and social studies of technology, this paper examines the capability of urban energy regimes in adapting to environmental policy pressures. Focusing on the case of the City of Los Angeles, we critically analyze the transformative capacity of the city's recent energy and climate policies and the innovation patterns of its urban infrastructure regime. This case study suggests that despite considerable success in switching from coal to renewable energies, the patterns of sociotechnical change in Los Angeles still tend to supplement and sustain the existing regime. Sociotechnical change in Los Angeles tends to unfold incrementally through adjustments within the established patterns of the existing regime.

Rauschmayer, F., Bauler, T. and Schöpke, N., 2015, Towards a thick understanding of sustainability transitions — Linking transition management, capabilities and social practices, *Ecological Economics*, 109, 211-221

Scientific activities which are targeted to engage and enact on societal problems – and governance of sustainability transition itself is one such activity – are necessarily prescriptive endeavours, have to recognize the fundamental normativity of sustainable development, need to be based on a thick description of the issues to change, and should embrace the multi-dimensional importance that individuals take in societal change. Societally relevant research on and for sustainability transitions therefore has to produce systems, target, as well as transformative knowledge. The challenges of sustainability transitions require furthermore that the individual and the societal levels have to be linked as to relate individual agency and structural change within the different knowledge types. Taking transition management as a rather obvious starting point to enrich the concept of sustainability transitions, the paper elaborates that its conceptual basis is too thin to address the first two types of knowledge. In its current elaborations, transition management does furthermore not cover individual agency as potential driver of transitions. We therefore suggest complementing transition management approaches with the more descriptive practice theory and the more normative and individualistic capability approach. We suggest a heuristic combination that places individuals back into the study of sustainability transitions.

Hannon, M. J. and R. Bolton, 2015, UK Local Authority engagement with the Energy Service Company (ESCo) model: Key characteristics, benefits, limitations and considerations, *Energy Policy*, forthcoming

This paper explores how some UK Local Authorities (LAs) have opted to engage with the Energy Service Company (ESCo) model in a bid to enhance their influence over local energy system change and help them to deliver on their political 'public good' objectives. Three common approaches to LA ESCo model engagement are outlined including the: (1) LA owned 'arm's-length' model; (2) private sector owned concession agreement model; and (3) community owned and run model. The LA's decision to establish its own ESCo, or alternatively enter into a partnership with another, predominantly depends on: its willingness to expose itself to risk, the level of strategic control it desires and the resources it has at its disposal. However, the business case is contingent on the extent to which the national policy and regulatory framework facilitates and obligates LAs to play an active energy governance role. Stronger alignment of local and national energy agendas through communication and coordination between different governance actors could help to remove critical barriers to LA ESCo engagement and their wider energy governance activities.

Bakker, S., Zuidgeest, M., De Coninck, H. and Huizenga, C., 2014, Transport, development and climate change mitigation: Towards an integrated approach, *Transport Reviews: A Transnational Transdisciplinary Journal*, 34(3), 335-355

Transport and infrastructure development enables economic and social development, but is often detrimental to sustainable development due to congestion, accidents, air pollution, as well as greenhouse gas emissions. Various policy frameworks have been created to connect transport with development, development with climate change and climate change mitigation with the transport sector. However, so far no consistent framework exists that addresses these three areas in an integrated manner. This article demonstrates that sustainable development of the transport sector is not viable on the longer term in the absence of such a three-way framework. First, current perspectives and practices on transport and (sustainable) development are reviewed, demonstrating that outcomes and policies are not consistently positive on all three dimensions. The article then re-evaluates the Avoid-Shift-Improve (ASI) approach, initially developed to address climate change mitigation and other environmental issues in the transport sector, adding two perspectives on sustainable development that are not generally taken into account when discussing ASI: transition theory and sustainable lifestyles. Together with attention to the development function of transport by incorporating Access into ASI, this could enable a more long-term sustainability-oriented view on transport, development and climate mitigation.

Gsottbauer, E., and J.C.J.M. van den Bergh, (2014), Environmental policy when pollutive consumption is sensitive to advertising: Norms versus status. *Ecological Economics* 107: 39-50.

A theoretical model is developed to analyse optimal environmental policy when consumer preferences are endogenous. It captures that pollutive consumption is sensitive to consumption by others and commercial advertising. This is conceptualized through a consumption norm. An increase in this norm means that consumers will become dissatisfied with a given consumption level and try to raise it, which will cause an increase in pollution. The model is particularly relevant for the study of conspicuous consumption which generally is subject to concentrated advertising efforts while it generates considerable pollution. The model can accommodate the cases of an externality created by advertising being positive or negative. We also show that using different functional specifications for the norm function one can address either conformity or status seeking. We derive optimal rules for a pollution tax, a subsidy or tax on advertising, and information provision by the government. The results not only contribute to more realism in environmental policy theory but also extend public policy with new instruments.

Wittmayer, J.M., Schöpke, N., Van Steenbergen, F., Omann, I., 2014, Making sense of sustainability transitions locally: How action research contributes to addressing societal challenges, *Critical Policy Studies*, forthcoming

Today's society is facing a broad array of societal challenges, such as an unstable economic system, climate change and lasting poverty. There are no straightforward solutions, rather these challenges ask for fundamental societal changes, that is, sustainability transitions. Faced with the question of how these challenges can be understood and dealt with, we argue for action research as a promising approach. Focusing on their localized manifestations, we ask whether and how action research can support understanding and addressing societal challenges and making sustainability meaningful locally. We tackle this question on the basis of two case studies in local communities based on principles of transition management. Our main finding is that societal challenges, sustainability and sustainability transitions acquire meaning through practice and interactions in the local context. Action research can offer a space in which alternative ideas (e.g., knowledge, future visions), practices (e.g., practical experiments, transformative action) and social relations (e.g., new actors) can emerge to further a sustainability transition.

Schöpke, N. and Rauschmayer, F. 2014. Going beyond efficiency: including altruistic motives in behavioral models for sustainability transitions to address sufficiency. *Sustainability: Science, Practice, & Policy* 10(1):29-44

Sustainability transitions require altered individual behaviors. Policies aimed at changing people's consumption behavior are designed according to efficiency, consistency, and sufficiency principles. Taking into account shortcomings of the first two principles, this paper specifically addresses the sufficiency principle. Sufficiency policies are not very popular due to the fear that they may impede quality of life. This fear might be eased when highlighting the motivational side of sustainable behavior, such as the wish to care for future generations and the world's poor. This article uses the capability approach (CA), developed primarily by Nobel-laureate economist Amartya Sen (1987a) and philosopher Martha Nussbaum (1993, 2000), to a) include the differentiation between self- and other-oriented goals and behavior, b) build on its demonstrated success in assessing quality of life, and c) assess the sustainability of behavior and policies. These three facets make CA suitable to analyze the effectiveness of sufficiency policies on sustainability and quality of life. To better understand the motivational side of sustainable behavior, CA is here for the first time enriched through approaches from environmental psychology. This enables us to highlight the idea of intrinsic empowerment as a building block for sustainability transition policies including sufficiency principles.

Garcia Sierra, M., and J.C.J.M. van den Bergh (2014). Policy mix to reduce greenhouse gas emissions of commuting: A Study for Barcelona, Spain, *Travel Behaviour and Society* 1(3), 113-126.

Commuting or the journey to work makes up an important part of transport. It should therefore be a target of climate policies that aim to reduce greenhouse gas emissions from transport. To design an effective climate-transport policy package, this article constructs a framework consisting of two core aspects of commuting patterns driven by five categories of underlying factors. Policy implications are derived from this. The set of factors and policies are then studied for the Barcelona Metropolitan Region in Spain. We find that it is essential to limit dispersion of the population and provide spatially adequate public transport services. In addition, effects of imperfections in labour and housing markets, and commuter bias in transport preferences towards car use, should be addressed in policy.

Jolly, S. and Raven, R.P.J.M., 2014, Collective institutional entrepreneurship and contestations in wind energy in India, *Renewable and Sustainable Energy Reviews*, 42, 999–1011

With 21,136 MW of wind energy installed in 2014, India is considered a success story in terms of net installed capacity. Few existing studies on Indian wind energy have highlighted

the important role of institutions, and how they stemmed from the work of advocacy groups; studies also tend to focus on short time periods. This paper uses the notion of collective institutional entrepreneurship to analyze Indian wind energy across three time periods (1985–1995, 1995–2003, and 2003–2013). The analysis shows that Indian wind power development was driven by collective efforts of institutional entrepreneurs using two aggregated strategies, that is, supportive techno-economic and socio-political networks and an indigenous innovation infrastructure. The paper highlights setbacks, controversies, and tensions between various entrepreneurship groups and argues that actions must be taken for including actors who have been marginalized.

Stephenson, J., Hopkins, D. and Doering, A., 2014, Conceptualizing transport transitions: Energy Cultures as an organizing framework, *Wileys Interdisciplinary Reviews: Energy and Environment*, forthcoming

The dominance of fossil fuel-powered transport systems presents a serious risk to human well-being and the natural environment. Transitioning to a low-carbon transport system requires changes to many dimensions of transport, including: technologies, and mobility practices and expectations. It also requires changes across multiple scales of activity. Conceptual models play an essential role in transitions within complex systems such as transport, as they can help identify key interactions and opportunities for change. A variety of theoretical models offer useful perspectives on transport transitions from different disciplinary positions. In this paper, we introduce the Energy Cultures framework, which was developed to support interdisciplinary understandings of energy behavior and energy-related transitions. It offers an integrating framework for transport behavior and a group of concepts to assist with analysis. We explore the potential of the framework in the transportation context by using the findings from a series of in-depth interviews with international transport experts. Applied to the interview material, the framework provides a structure which works at different scales to highlight key influences that lock-in the prevailing transport culture, as well as key drivers that are producing new emerging transport cultures. The framework complements other models and approaches, and offers a gateway to deeper exploration of the elements of interest via these complementary theories and models. We conclude that the Energy Cultures framework has the qualities of a successful integrating model for conceptualizing energy transitions in transport.

Porter, N., Claassen, M. and Timmermans, J., 2014, Transition experiments in Amsterdam: Conceptual and empirical analysis of two transition experiments in the WATERgraafsmeer program, *Technological Forecasting & Social Change*, forthcoming

In the wake of a rapidly changing world, cities need to cope with global threats and opportunities, and changing societal demands regarding living standards in cities. These are urgent issues for mega cities in the global South, and are becoming increasingly relevant for the more consolidated cities in the North. In the Watergraafsmeer area, a low-lying urban polder area in the eastern part of Amsterdam, water issues are a salient problem and are perceived as persistent by citizens, businesses, and the municipal and water management authorities alike. Therefore, under the flag of the WATERgraafsmeer (WGM) program, municipal and water management authorities and local partners adopted transition management as a governance approach to change. In transition management, experimenting is a vital activity. The present research analyzed the WGM program and the Eindhoven redevelopment project in the Watergraafsmeer as transition experiments. The research used recently developed management guidelines for transition experiments as an evaluative framework for the systematic analysis of project documentation and written communication. The analysis shows that the WGM program functions well as a transition experiment, and that the limited transition potential of the Eindhoven project is strengthened by its incorporation in the WGM program. Furthermore, we conclude that the management guidelines for transition experiments do not incorporate interaction processes between projects and program, and do not pay attention to technology and engineering.

Feola, G. and Nunes, R., 2014, Success and failure of grassroots innovations for addressing climate change: The case of the Transition Movement, *Global Environmental Change*, 24, 232–250

Grassroots innovations emerge as networks generating innovative solutions for climate change adaptation and mitigation. However, it is unclear if grassroots innovations can be successful in responding to climate change. Little evidence exists on replication, international comparisons are rare, and research tends to overlook discontinued responses in favour of successful ones. We take the Transition Movement as a case study of a rapidly spreading transnational grassroots network, and include both active and non-active local transition initiatives. We investigate the replication of grassroots innovations in different contexts with the aim to uncover general patterns of success and failure, and identify questions for future research. An online survey was carried out in 23 countries ($N = 276$). The data analysis entailed testing the effect of internal and contextual factors of success as drawn from the existing literature, and the identification of clusters of transition initiatives with similar internal and contextual factor configurations. Most transition initiatives consider themselves successful. Success is defined along the lines of social connectivity and empowerment, and external environmental impact. We find that less successful transition initiatives might underestimate the importance of contextual factors and material resources in influencing success. We also find that their diffusion is linked to the combination of local–global learning processes, and that there is an incubation period during which a transition initiative is consolidated. Transition initiatives seem capable of generalising organisational principles derived from unique local experiences that seem to be effective in other local contexts. However, the geographical locations matter with regard to where transition initiatives take root and the extent of their success, and ‘place attachment’ may have a role in the diffusion of successful initiatives. We suggest that longitudinal comparative studies can advance our understanding in this regard, as well as inform the changing nature of the definition of success at different stages of grassroots innovation development, and the dynamic nature of local and global linkages.

Mans, U., 2014, Tracking geographies of sustainability transitions: Relational and territorial aspects of urban policies in Casablanca and Cape Town, *Transforum*, 57, 150-161

Many countries in the Global South work on greater sustainability. Transition and economic geography scholars are well-positioned to contribute to a better understanding of these processes and their underlying dynamics. However, there is a lack of attention to the role of the city. In this article I apply a ‘varieties of glocalisation’ lens to explain the interplay between national, urban and global developments in the context of sustainability transitions. This article presents empirical data from Morocco and South-Africa about current renewable energy ambitions. These cases illustrate the cities’ differences; while Cape Town was able to foster economic development in the slipstream of national policies, Casablanca’s renewable energy sector is less developed. The green-driven growth triangle is then presented as a new analytical framework for future research on geographies of sustainability transitions.