

Newsletter 16, July 2015

This is the sixteenth 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,

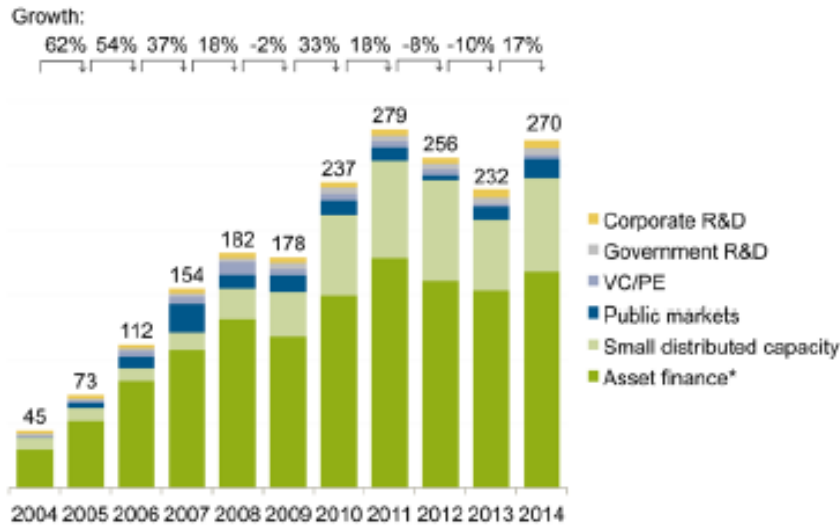
Welcome to the sixteenth newsletter, which is again filled with interesting news. Especially the section with 'new publications' seems to be getting longer and longer. It is only a few weeks until the sixth International Sustainability Transitions conference in Brighton (25-28 August), where many of us will meet to discuss research projects and new ideas. One of the keynote speakers is the director of the European Environment Agency, which just published a report (*The European Environment: State and Outlook, 2015*) that strongly emphasizes the need for transitions and has adopted some of our language, as the following quotes indicate:

- "The transition to a green economy is a long-term, multi-dimensional and fundamental process that will require a move away from the current linear economic model of 'take-make-consume-dispose' which relies on large quantities of easily accessible resources and energy. This will necessitate profound changes in dominant institutions, practises, technologies, policies, lifestyles and thinking (p. 155)
- "Investments can also support the emergence and upscaling of niche economic, technological and social innovations that enable society to meet its needs in less harmful ways" (p. 162).
- "This report has come to the conclusion that traditional incremental approaches based on the efficiency approach will not suffice. Rather, unsustainable systems of production and consumption require fundamental rethinking in the light of European and global realities. The overall challenge for the next decades will be to recalibrate mobility, agriculture, energy, urban development, and other core systems of provision in such way that global natural systems maintain their resilience, as the basis for a decent life. The systemic nature of the problems and dynamics identified here necessitates systemic solutions. There are currently a wide range of system lock-ins to be overcome, for example, in the fields of science, technology, finance, fiscal

instruments, accounting practices, business models, and research and development” (p. 168).

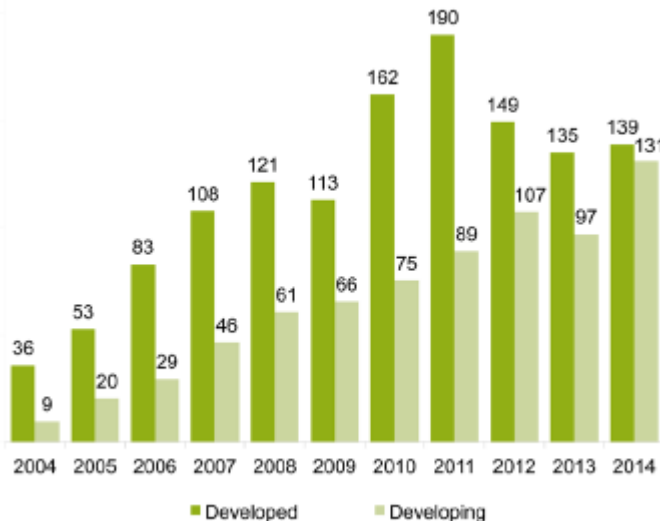
I think it’s quite interesting that an organization like the EEA so strongly embraces transitions thinking. Maybe we can use the keynote address (and subsequent parallel session) to further engage the EEA, which, I’ve been told, is also interested in the practical implications of our thinking for the governance of transitions.

Another interesting recent report is from Bloomberg New Energy Finance (*Global Trends in Renewable Energy Investment 2015*), which shows that global investments have increased again in 2014, after several years of decline, due to the recession.



Global new investment in renewable energy by asset class, in \$ billion (BNEF, 2015: 12)

Their analysis also shows that the ‘developing’ world is catching up (in terms of annual investments) with the ‘developed’ world, which may be indicative of a broader geographical and geo-political shifts, particularly with regard to China (which on its own accounts for 1/3 of global renewable energy investments) and Japan (which has seen rapid diffusion of solar-PV following Fukushima). Investments in Europe, on the other hand, continued to decline in 2014, as countries downscaled subsidies and feed-in-tariffs because of austerity pressures.



Global new investment in renewable energy: Developed vs. developing countries, in \$ billion (BNEF, 2015: 16)



Global new investment in renewable energy by region (BNEF, 2015: 21)

In the light of these developments, it is interesting and important that the sixth International Sustainability Transitions conference has more international participants than ever before. It is interesting that several papers in the newsletter's 'new publications' section are about non-Western countries (e.g. China, Philippines, Morocco, Taiwan, Thailand, Laos). While the increasing investments in 2014 suggest that the renewable energy transition may continue to unfold, after some difficult years, further progress obviously also depends on this year's climate change conference in Paris. Another point to realize is that progress in many other domains (e.g. heat, mobility, buildings, agro-food) tends to be less than in electricity. It is therefore important that STRN-publications, including in this newsletter, address sustainability transitions in many domains, including water, which is the topic of a special section in EIST. I hope you will enjoy this 16th newsletter and look forward to seeing many of you in Brighton. **Frank Geels**, Chairman of STRN (frank.geels@mbs.ac.uk)

Environmental Innovation and Societal Transitions

Volume 15 of *Environmental Innovation and Societal Transitions* was just published. It contains a special section and a few regular papers. The special section is on "Transitions through a lens of urban water" and contains the following eight papers:

- An introduction by the guest editors: Transitions through a lens of urban water – F. de Haan, B. Rogers, N. Frantzeskaki and R. Brown
- Building networks and coalitions to promote transformational change: Insights from an Australian urban water planning case study – J. Bos, R. Brown and M. Farrelly
- Learning processes during regime shifts: Empirical evidence from the diffusion of greywater recycling in Spain – L. Domènech, H. March, M. Vallès and D. Saurí
- Analysis of institutional work on innovation trajectories in water infrastructure systems of Melbourne, Australia – B. Rogers, R. Brown, F. de Haan and A. Deletic
- See no evil, hear no evil: The democratic potential of transition management – S. Jhagroe and D. Loorbach
- Understanding the transition to integrated flood risk management in the Netherlands – S. van Herk, J. Rijke, C. Zevenbergen and R. Ashley
- The impact of privatization on sustainability transitions: A comparative analysis of dynamic capabilities in three water utilities – E. Lieberherr and B. Truffer
- Transitions in urban water management and patterns of international, interdisciplinary and intersectoral collaboration in urban water science – B. Wen, M. van der Zouwen, E. Horlings, B. van der Meulen and W. van Vierssen

The four original research articles are:

- An emerging innovation system for deployment of building-sited solar photovoltaics in Sweden – A. Palm

- Spatial diffusion and the formation of a technological innovation system in the receiving country: The case of wind energy in Portugal - N. Bento and M. Fontes
- The role of politics in sustainable transitions: The rise and decline of offshore wind in Norway – H. Normann
- Lessons for model use in transition research: A survey and comparison with other research areas – J. Halbe, D. Reusser, G. Holtz, M. Haasnoot, A. Stosius, W. Avenhaus and J. Kwakkel

We look forward to receive your submission. Again, please don't forget to read, and if relevant to cite, EIST.

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

Network News

Any news related to ongoing activities of STRN

STRN Modelling group news

The STRN modelling group was initiated at IST 2013 in Zürich, with the objective of promoting modelling as an approach to the analysis of transitions. The members of the group felt and still feel, that modelling is underrepresented in the literature and has a great deal to contribute to a field which addresses the understanding of transitions in complex socio-technical systems and also how to influence them. The group has undertaken several activities. We have organised venues for researchers to present their work at the main relevant conferences. This includes modelling sessions at IST 2014 and IST 2015, and we will also propose a modelling theme for IST 2016 at the Wuppertal Institute. At IST 2015 we will also contribute a Dialogue session which will bring together modellers and researchers working on steering transitions with the aim of assessing the benefits of modelling for increasing impact of transition studies and to identify opportunities for collaboration between modellers and non-modellers. In addition to these activities within our home community STRN, we recently organised a session with six contributions on modelling transitions at EU-SPRI 2015 in order to raise attention in a related community. Besides conference sessions, we use joint publications as a means to foster and structure our group. A review paper on “Prospects of Transitions Modelling” has recently been accepted for publication in the EIST journal and is meanwhile freely accessible via Open Access on the journals website. It discusses the possible contributions that modelling can make to transitions studies and briefly reviews the approaches used so far. A second review, still being written, will consider in more depth the possibilities for different modelling approaches to transitions. We keep an e-mail list of researchers interested in transitions modelling and would welcome further researchers to our group. We will also meet to discuss progress and plan future activities at IST 2015. If you would like to join the e-mail list for our group or are interested in discussing modelling transitions, please do contact us: Jonathan Köhler j.koehler@isi.fraunhofer.de; Georg Holtz georg.holtz@wupperinst.org; Fjalar de Haan fjalar@fjalar.org.

Transitions theory incorporated at Carnegie Mellon University

The School of Design at Carnegie Mellon University has restructured its teaching and research around the idea of Transition Design – i.e., design-led multi-stage social change toward more sustainable futures. The initiative is bi-directional: on the one hand, it aims to expose designers to Multi-Level Transition Theory; on the other hand, it aims to call the attention of sociotechnical Transition researchers to the role of the design of human-scale products, communications and environments. Social Practices are understood to be at the convergence point between Transition and Design. To operationalize Transition Theory for the practice of designing, the School of Design is using a schematic model which foregrounds Future Visions (designing transitions toward what?), Theories of Change (how what is being designed enables transitions within particular contexts), and Posture and Mindset (the ways in which the professional practice of designing needs to be redesigned to facilitate Transition oriented designing). The School sees Transition Design as an extension

of new forms of Interaction Designing, such as Service Design and Sustainable Design. The research focus of the School of Design's Doctoral Program (one of the only a few doctoral programs in non-architectural design in North America) is now Transition Design. A document describing what is meant by Transition Design, which includes a preliminary bibliography and the syllabus for a Transition Design seminar, is available at: https://www.academia.edu/13122242/Transition_Design_Overview. The CMU School of Design held an Inaugural Transition Design Symposium earlier in the year for which briefing documents are also available at: https://www.academia.edu/11439480/Transition_Design_Symposium_Provocation_abbreviated_version. For more information, please contact: Cameron Tonkinwise (cameront@cmu.edu).

Event announcements

Calls for upcoming relevant events such as workshops and conferences

The 6th Sustainability Transitions Conference: Update from program committee

We are really looking forward to the conference in August and now have a full and exciting program in place that incorporates the exploration of many new directions for transitions research with a range of social activities. There will be keynote speeches from Hans Bruyninckx, Executive Director of the European Environment Agency on *'Sustainability transitions and EU policy'*; Prof Jan Rotmans, DRIFT, on *'In Times of Transition: the role of game changers'* and in a session sponsored by Future Earth, Prof Frank Biermann, Earth System Governance Project will discuss *'Transformations in Global Governance for Sustainability'*. Each keynote is followed by a discussion session with experts in the area providing an opportunity to widen the debate. Alongside the parallel sessions, the conference also has sessions dedicated to updating the STRN Research Manifesto – providing you with the opportunity to shape the future research agenda, as well special introductory and skills development sessions for PhD students and newcomers to the field. As if that is not going to be enough fun and excitement, the social programme is packed out too. There is an exercise activity each morning including yoga, chi-gung and running, an optional volleyball and BBQ evening, and of course a transitional party with a barn dance and DJ set. So you may want to bring your trainers and your dancing shoes with you! We really hope that you will be able to join us for what is set to be a fantastic conference in August. Please do register to attend before the 8th August. Please see the conference website for further details.

A group of 21 PhD students from 11 different universities has been collaborating to propose a set of activities to enrich the experience of early career researchers and practitioners at the next IST conference. On the opening day (25th August) this group will host a newcomers' session (14.00-16.00) aimed at early career researchers and practitioners who are new to the academic field of Sustainability Transitions. It will help new participants get up to speed for the conference in a friendly and open environment, and provide a space for questions that are hardly raised in front of large audiences. At the beginning, a number of senior transitions scholars will reflect on the history of the field, its major contributions and impacts as well as the current debates. This will set the scene for more reflective small group discussions and several rounds of question and answers. At the moment, confirmed discussants include Johan Schot, Adrian Smith, Anna Wieczorek, Bernhard Truffer and Flor Avelino. Participation is open for up to 60 early career and practitioners attending the IST. Please sign if for the event while filling the registration form on the conference website, or contact Nora Blascok (N.Blascok@sussex.ac.uk) if you have already registered and would like to take part.

Other activities are being planned, and will soon be announced. In bringing forward this event, a friendly and creative network of students has started to emerge. If you are interested in getting involved or have any questions, please write to us at: welcome2transitions@gmail.com.

Workshop “Beyond transition”, Vienna, 17 November, 2015

The European branch of the Sustainable Consumption Research and Action Initiative (SCORAI Europe) and the Transformative Social Innovation Theory (TRANSIT) project are jointly organising a one-day workshop in Vienna on 17 November 2015 on: ‘Beyond’ Transition? Understanding and Achieving Sustainable Consumption through Social Innovation. The workshop focuses on the following themes:

- a) similarities and differences between various conceptions of social change, transition and transformation,
- b) case studies and examples of social innovation or sustainable consumption and their relevance to transformation, and
- c) roles and (inter-)actions of diverse participants (researchers, policy-makers, entrepreneurs, citizens) in potentially transformative social innovation or sustainable consumption initiatives.

Further information about the workshop is available at <http://scorai.org/vienna-2015/>. Please address queries to Professor Audley Genus by email at: a.genus@kingston.ac.uk.

Conference on “Social Innovation 2015: Pathways to Social Change”, 18-19 November, 2015, Vienna

We are proud to announce the key conference on social innovation in 2015: “Social Innovation 2015: Pathways to Social Change – Research, Policies and Practices in European and Global Perspectives” to take place November 18-19th, in Vienna. The conference presents interim empirical and theoretical research results as well as site visits. It discusses with researchers, policymakers and practitioners of social innovation the following key issues:

- The state-of-the-art of conceptualizing and doing social innovation;
- Methods and good practices to create desirable social change;
- Resources, means and levers making social innovation processes effective; and
- International comparison of social innovation practices, policies and research.

The conference is hosted by two EU-FP7 funded research projects focusing on a theory of social innovation, namely SI-DRIVE and Transformative Social Innovation Theory – TRANSIT and NET4SOCIETY, a network of National Contact Points in Horizon 2020. They are joined by two FP7-projects focusing on the economic underpinnings of social innovation, namely CRESSI and SIMPACT. Registration is open and further information about the conference is available at http://www.si-drive.eu/?page_id=1135

International Workshop on the Sharing Economy, 28-29 January, 2016, Paris

28-29 January 2016, the 2nd International Workshop on the Sharing Economy will be held in Paris. Russell Belk is keynote speaker. Deadline for submissions is 30 October 2015. See: <http://shareeco.strikingly.com/> . Information on the 1st edition in Utrecht held 4-5 June 2015 can be found at: <http://www.uu.nl/en/IWSE2015> including papers and Juliet Schor’s keynote on film.

Invitation for special issue on “Perspectives on the Sharing Economy”

Koen Frenken (Utrecht University) will edit a special issue “Perspectives on the Sharing Economy” for the journal Environmental Innovation and Societal Transitions. Deadline 30 September 2015. If you are interested to submit a paper and you want to have more information, send an email to k.frenken@uu.nl.

Event Reviews

Review of events interesting to the STRN community

TESS Transitions Event in Edinburgh (27 May, 2015)

Around 80 European researchers, policy makers and community activists met in the contemporary-Georgian surroundings of the Edinburgh Centre for Carbon Innovation to participate in an event organised by the James Hutton Institute as part of the FP7 project TESS (Towards European Societal Sustainability). The TESS project is looking at the potential of community-based transition initiatives to contribute to the shift to a low-carbon society. It runs until 2016 and involves partners from Scotland, Finland, Germany, Spain, Italy and Romania (<http://www.tess-transition.eu/>). The Edinburgh event was themed around the question “Can the transition to a sustainable future be locally led?”. The question was intentionally provocative to encourage ‘respectful’ and open dialogue between those with differing views. The audience was varied in interest, background, age and viewpoint, and the schedule enabled discussion through a number of formats including workshop sessions to formulate queries for an Any Questions-style debate, time for Any Answers in response and plenty of networking time. The day was filmed and videos of the lightning speakers and keynote speakers can be found here <https://www.youtube.com/watch?v=VkkzS2odlCg>. Our conference reflections, and the poem written during the course of the day by our resident listening poet, Emily Hinshelwood, can be found on our Sustainable Communities website <http://www.sustainable-communities.eu/blog/>.

For more info, please contact Liz Dinnie: liz.dinnie@hutton.ac.uk

New research projects

Information about ongoing research activities such as the start of new research projects

The role of regions in the European Socio-Ecological Transition (Research Area 5 of the Project ‘Welfare, Wealth, Work for Europe’)

Europe’s regions are diverse and heterogeneous. To understand Europe and to find future-oriented solutions to its problems requires understanding these regional differences and their implications. The assumption is that strategies toward more sustainability will only bring feasible and effective results if regional actors are involved from the bottom up and interactions between different political levels are taken into account. A wide range of WWWforEurope project work addresses regional questions and can be clustered in four topics, concerning cities, labour market policies, integration policies, and EU funding respectively. The sub-projects produced a thorough analysis of regional and local influences on a socio-ecological transition, which are collected in the form of working papers on [the project homepage](#). It includes research on the self-organisation potentials of urban resource systems of energy, green spaces, and water. Additionally the effects of national labour market policies on regional labour markets are analysed. Cultural diversity, another pressing issue in Europe, is researched in the light of innovation capabilities and social costs to foster integration and a diverse society. A last part of the project aimed at the question what adequate funding and distribution rules are, to take account of regional differences.

For more info please contact: Prof. Dr. Thomas Sauer, thomas.sauer@fh-jena.de.

Publications

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

PhD thesis: Francesca Cappellaro, 2015, *Engineering in Transition. Approaches, strategies and technologies for implementing system innovation towards sustainability*. University of Bologna, Italy.

This thesis embraced a transdisciplinary approach to Engineering and the scopes were two-fold. Firstly, the initiation of a new paradigm for Engineering (Transition Engineering) connected to the sustainable system innovation and especially to the Theories of Sustainability Transitions (TST). Secondly, the demonstration of the effectiveness of Transition Engineering (TE) in the specific context of the School of Engineering and Architecture of University of Bologna (Engineering in transition). From a theoretical point of view, the thesis defined the notion of Transition Technology (TT) as technical instruments of TE allowing to combine the promotion of sustainability and the enhancement of resilience within a transition process. The empirical part has mainly consisted in the adoption of TE and TT for a real transformation of a complex and fundamental system as university is. The experimentation was designed and implemented within the School of Engineering and Architecture of University of Bologna at Terracini Campus. As a result, the transition process has allowed a transformation of Terracini Campus into a *living-lab* of sustainability. For more information, please contact: francesca.cappellaro@enea.it

PhD thesis: Max Jerneck, 2015, *Sunrise of an Industry: Solar Energy under Financial and Industrial Capitalism in the U.S. and Japan, 1973 – 2005*, University of Lund

The thesis addresses the question of how to mitigate climate change by studying the emergence of solar photovoltaic energy as an example of a low carbon industry. By outlining the social conditions behind the growth of that industry, I aim to further the understanding of low carbon industrial development in general. The dissertation is a historical comparative study of solar photovoltaic development in the two early-stage leaders, the United States and Japan, from the 1973 oil crisis until 2005. Although American firms dominated the global market at the beginning of this period, they retained only a tenth of it toward the end, while Japanese firms held close to half. The main cause of this divergence can be found in differences among institutions governing the relation between finance and industry. In the United States, financiers were permitted to dominate industry, shifting decision-making further away from the shop floor and orienting corporate governance toward increasingly short term goals. Large financial conglomerates engaging in unrelated diversification came to dominate the industry, stifling competition from more innovative entrepreneurs. When they were swept away by financialization and the consequent merger wave of the 1980s, the photovoltaics industry was left without a home or a political constituency to support it. Underlying the rise of finance was a trend toward more permissive attitudes among policy makers regarding what were previously labelled anti-competitive behavior, prohibiting the use of industrial policy to foster small photovoltaics firms in a manner similar to what had occurred in other new high technology industries a decade before. In Japan's system of organized capitalism, finance remained subordinated to production, which encouraged long term innovation in the technology. Japanese institutions were also more conducive to related diversification, aiding the successful integration of solar cells with consumer electronics. By placing the development of the solar photovoltaics industry in social and historical context in the two countries, the study aims to raise questions about the future of mitigating climate change through technological innovation under the present system of finance-dominated capitalism.

Book: Bäckstrand, K. and Kronsell, A. (eds.), 2015, *Rethinking the green state environmental governance towards climate and sustainability transitions*, Routledge

This innovative book is one of the first to conduct a systematic comprehensive analysis of the ideals and practices of the evolving green state. It draws on elements of political theory, feminist theory, post-structuralism, governance and institutional theory to conceptualise the green state and advances thinking on how to understand its emergence in the context of climate and sustainability transitions. Focusing on the state as an actor in environmental, climate and sustainability politics, the book explores different principles guiding the emergence of the green state and examines the performance of states and institutional responses to the sustainable and climate transitions in the European and Nordic context in particular. The book's unique focus on the Nordic countries underlines the important to learn from Nordics, which are perceived to be in the forefront of climate and sustainability governance as well as historically strong welfare states. With chapter contributions from leading international scholars in political science, sociology, economics, energy and environmental systems and climate policy studies, this book will be of great value to postgraduate students and researchers working on sustainability transitions, environmental politics and governance, and those with an area studies focus on the Nordic countries.

Book: Smiths, M., 2015, *Southeast Asian Energy Transitions: Between Modernity and Sustainability*, Ashgate

Addressing the apparent tensions between modernity and sustainability in Southeast Asia, this book offers novel insights into the global challenge of moving towards a low carbon energy system. With an original and accessible take on social theory related to energy transitions, modernity and sustainability, Mattijs Smits argues for a reinvigorated geography of energy. He also challenges universalistic and linear assumptions about energy transitions and makes the case for 'energy trajectories', stressing embeddedness, contingency and connections between scales. Contemporary and historical empirical examples from Southeast Asia, primarily Thailand and Laos, are drawn upon to show the importance of scale at regional, national, local and household levels. The transitions in the national power sectors here have been intimately related to discourses of modernity and state formation since the colonial era. More recently, plans for international cooperation and discourses of regional power trade have taken centre stage. Local energy trajectories are understood to be part of these transitions, but also as embedded in local social, political and spatial relations. Examining how energy practices go hand-in-hand with the dissemination of different technologies, this work shows the complexities of achieving sustainability in the context of rapidly changing energy modernities in Southeast Asia.

Sutherland, L.-A., Peter, S. and Zagata, L., 2015, *Conceptualising multi-regime interactions: The role of the agriculture sector in renewable energy transitions*, *Research Policy*, 44(8), 1543-1554

The agriculture sector plays an important role in renewable energy transitions, owing to its historical involvement in managing key resources, particularly land and biomass. We develop the multi-level perspective in relation to these emergent transition processes, conceptualising transitions towards renewable electricity production as examples of multi-regime interaction between national-level agriculture and electricity regimes. We focus particularly on the role of niche 'anchoring' into multiple regimes as the mechanism through which multi-regime interaction occurs, utilising case studies in Germany, the Czech Republic and the United Kingdom. Analysis suggests the birth of a new 'fiat' regime, oriented towards renewable electricity production. We suggest that fiat regimes, which are heavily dependent on policy supports, are often multifunctional in nature. In addition, we argue that agriculture's inherent connection to land demonstrates one of the specific characteristics of 'fiat regimes': fiat regimes are constructed largely in response to policy efforts to produce or protect public goods, such as natural resources, as opposed to 'market regimes' based on technological developments. Findings demonstrate support for the 'special case' of the agriculture sector in transition processes: high degrees of policy involvement led to 'windows of opportunity'

created largely in response to national and international policy agendas, and the multiple functions of agriculture were reflected in competition between agriculture and electricity sectors over natural resource access. As renewable energy currently represents a secondary transition in the agriculture sector, we suggest that further attention needs to be paid to the impact of fiat regime policies on secondary transition processes.

Geels, F.W., McMeekin, A., Mylan, J., Southerton, D., 2015, A critical appraisal of Sustainable Consumption and Production research: The reformist, revolutionary and reconfiguration positions, *Global Environmental Change*, 34, 1-12

This conceptual review article provides a critical appraisal of Sustainable Consumption and Production research, which is currently framed by two generic positions. First, the 'reformist' position, which focuses on firms pursuing green eco-innovations and consumers buying eco-efficient products, represents the political and academic orthodoxy. Second, the 'revolutionary' position, which is a radical critique of the mainstream, advocates the abolishment of capitalism, materialism, and consumerism, and promotes values such as frugality, sufficiency, and localism. We find this dichotomous debate problematic, because it is intellectually stifling and politically conservative (in its outcomes). To move beyond this dichotomy, we propose a third position, 'reconfiguration', which focuses on transitions in socio-technical systems and daily life practices and accommodates new conceptual frameworks. For each of the three positions, we discuss: 1) the scale and type of change, 2) views on consumption and production in exemplary approaches, 3) underlying theoretical, epistemological and normative orientations, 4) policy implications, and 5) critical appraisal. The conclusion compares the three positions, provides arguments for the fruitfulness of the reconfiguration-position and offers four critical reflections about future Sustainable Consumption and Production research agendas.

Hu, M.C., Wu, C.Y. and Shih, T., 2015, Creating a new socio-technical regime in China: Evidence from the Sino-Singapore Tianjin Eco-City, *Futures*, 70, 1-12

The Sino-Singapore Tianjin Eco-City (SSTEC) in China was designed to leverage Singaporean expertise in top-down city planning, systematic management, and water treatment technologies and act as a replicable hub-and-spoke model. This study shows that an expansion of the scale of urbanization, and its transformation into the focal point of the hub-and-spoke eco-city model will enable China to advance as an international pioneer, by the creation of a new socio-technical regime dependent on green and ecologically sustainable systems. In particular, the potential capacity of China's new socio-technical regime, built on eco-cities, is based on its capability to (1) create a vision for a smart energy system; (2) drive down the cost of renewable energy equipment and devices; (3) support local industrial clusters for socio-economic development; (4) implement effective policies for city-level solutions; and (5) standardize and replicate these strategies in the new regime as a whole. In the top-down landscape approach, the public authority's integrated administrative capability and capacity is important as a means by which to link the various types of stakeholders. This has to be done, in the process of managing a city's transition and reducing the risk of transformational failure, by reinforcing the four types of capital assets – namely manufacturing capital, natural capital, human capital, and social capital.

Upham, P., Virkamäki, V., Kivimaa, Hildén, M. and Wadud, Z., 2015, Socio-technical transition governance and public opinion: The case of passenger transport in Finland, *Journal of Transport Geography*, 46, 210-219

As a governance perspective, transition management views the engagement of a wide variety of stakeholders in policy development as a necessary element in furthering sustainability through enhanced social learning. Yet as a literature it has paid relatively little attention to public consultation on socio-technical change. Here we set transition management in the context of longstanding debates in science and technology studies, technology assessment and deliberative democracy. Empirically, we use national survey data on Finnish public opinion of state support for future transport options. Showing how

transport practices and attitudes to transport innovation policy vary with both demography and geography, we argue that these differences have implications for policy legitimacy. We suggest that, both given and despite the practical difficulties of deliberative democracy, use of participative opinion surveying to better understand social groups with needs and interests that differ from national averages, may help to enhance policy legitimacy and hence the success of transition management.

Falde, M. and Eklund, M., 2015, Towards a sustainable socio-technical system of biogas for transport: the case of the city of Linköping in Sweden, *Journal of Cleaner Production*, 98, 17-28

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. Linköping municipality, 1976 [kommunfullmäktige] Motion om utredning angående eldrivna fordon. Dnr 1976.278. 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.

Ruby, T.M., 2015, Innovation-enabling policy and regime transformation towards increased energy efficiency: The case of the circulator pump industry in Europe, *Journal of Cleaner Production*, in press

When new energy efficient products are struggling with their commercialisation and diffusion into widespread applications you would typically expect policy-makers and green lead-users to guide the way. This paper examines the case of the hot water circulator pump industry in Europe, where parts of the industry envisioned and worked for a voluntary energy label, bringing technological innovation, new business and energy savings of approx. 85% for each new circulator pump. The case study explores the complexities of innovation processes where technology, market, actors and policy co-evolve over time to transform an existing socio-technical regime. The paper highlights the importance of policies to reduce barriers towards innovation and energy efficiency and shows that it is not always policy-makers that establish the crucial policies that change the innovation dynamics for the benefit of the environment and the industry.

Von Bock und Polach, C., Kunze, C., Maas, O, and Grundmann, 2015, Bioenergy as a socio-technical system: The nexus of rules, social capital and cooperation in the development of bioenergy villages in Germany, *Energy Research & Social Science*, 6, 128-135

Social resources are assumed to play an important role in the implementation of community renewable energy as a socio-technical system in Germany. The impact of social resources on the dynamics of community renewable energy has not been well understood until now. Given the importance of adapting to current and upcoming changes in the regulatory framework for renewable energy production, there is a need for a better understanding of the

role of social resources in the process of sustaining community renewable energy production. Based on two case studies of bioenergy villages in the German Federal State of Brandenburg, we elucidate the nexus and impact of social capital, rules and cooperation in the development of community renewable energy. Promoting social capital that results in a balance between leadership and collective action, trust among all actors based on transparency, almost complete access to relevant information, involvement in social activities, and a consistent network of bonding and bridging ties, may contribute to the sustained development of community renewable energy.

Yun, S. and Lee, J., 2015, Advancing societal readiness toward renewable energy system adoption with a socio-technical perspective, *Technological Forecasting and Social Change*,

The development of renewable energy systems has put a large emphasis on technical progress rather than examination of ways to foster societal demand to diffuse the new energy technologies. In order to understand demand-side issues that are important to sustainable energy innovation, this research examines key factors of renewable energy systems diffusion from a socio-technological perspective. Based on theory of planned behavior (TPB), a research model was constructed around “societal” factors such as social trust and social support alongside “technology” issues such as technical facilitating conditions and perceived system quality. This research reveals that attitude, subjective norm and perceived behavioral control impact on consumers' intention to use renewable energy systems. In addition, social trust and social support are influential factors on attitude and subjective norm while facilitating technical condition has influence on perceived behavioral control. The findings of this study suggest that business managers and policy makers should have a strategy to advance societal readiness toward sustainable energy innovation and to balance it with technology development.

Gaziulusoy, A. I., 2015, A critical review of approaches available for design and innovation teams through the perspective of sustainability science and system innovation theories, *Journal of Cleaner Production*, in press

Sustainability is a system property; therefore, products/services/technologies/organizations cannot be sustainable on their own but they may be elements of sustainable systems. In addition, to achieve sustainability, there is a requirement for transformation of socio-technical systems which fulfil certain social functions such as energy, mobility and food. The theoretical and practical approaches proposed so far in the broad field of design and innovation for sustainability have not satisfactorily addressed system level changes. This paper provides a critical review of approaches targeting different phases of design and innovation processes. The strengths/shortcomings of these approaches are analysed based on the criteria developed by integrating insights from sustainability science and system innovation/transition management theories. Based on the critical review, a future research agenda is suggested in following areas: exploration of synergies between existing approaches/tools/methods, development of a theoretical framework for design and innovation for sustainability with references to system innovation and transition management theories, and, development of new approaches/tools/methods for the use of design and innovation teams.

Gaziulusoy, A. I. and Brezet, H., 2015, Design for system innovations and transitions: A conceptual framework integrating insights from sustainability science and theories of system innovations and transitions. *Journal of Cleaner Production*, in press.

It is increasingly acknowledged that, in order to achieve sustainability, there is an urgent need for radical and transformative restructuring of socio-technical systems that meet our needs. These transformations are referred to as system innovations for sustainability or transitions. Transitions and system innovations cover not only product and process innovations but also changes in user practices, markets, policy, regulations, culture, infrastructure, lifestyle and management of firms and have significant implications for design

and innovation activity aiming to contribute to the societal endeavour of achieving sustainability. Even though theory on system innovations and transitions is now extensive, it provided explanations regarding how companies and design and innovation activities fit into the big and long-term picture of system innovations and transitions only to a certain extent. In addition, there have not been many efforts in the design for sustainability field to learn from the theories of transitions and system innovations. In this paper, we make an initial theoretical contribution into the design and innovation for sustainability field by integrating relevant insights from sustainability science and system innovations and transitions theories. The result of this integration is a proposal for a prescriptive conceptual framework which explains how wider-scale systemic changes can be addressed at smaller elements of socio-technical systems specifically focusing on the design and innovation level within companies.

Robertson, S., 2015, A longitudinal quantitative-qualitative systems approach to the study of transitions toward a low carbon society, *Journal of Cleaner Production*, in press

At present, low carbon scenarios have a propensity to focus either upon qualitative, social trend based approaches to developing futures or upon purely technological, engineering based views of an energy 'system' within specified emissions constraints. It is now recognised that transition scenarios attempting to examine pathways towards low carbon futures must not only address the social aspects of the system but also, due to their interdependency, the technological aspects. Notwithstanding the limitations of quantitative analysis, its inclusion must be regarded as being an essential component to the study of transition pathways towards a low carbon society, given that the metrics used to indicate the status of the system are quantitative. The objective of this study is to expound a 'systems' approach for an integrated quantitative and qualitative analysis of low carbon transition pathways. This is achieved through an interdisciplinary conflation of the Life Cycle Assessment and the Socio-Technical Scenario tools, a strategy that acknowledges the interconnectedness of the societal and the technical aspects of sustainability. An explicit adoption of a backcasting perspective further strengthens the approach with regard to emissions target fulfillment. The integrated methodology, as advanced in this study, synthesises these two tools in a way that helps overcome the limitations of each while also adding synergies that provide additional analytical capacity. The principal benefit of adopting this interdisciplinary 'systems' approach to the study of low carbon transitions is to improve the resolution of transition policy recommendations.

Ó Tuama, D., 2015, Ripples through the city: Understanding the processes set in motion through embedding a public bike sharing scheme in a city, *Research in Transportation Business & Management*, forthcoming

This paper seeks to elucidate the nature of the processes or 'ripple effects' associated with embedding a public bike sharing scheme (PBSS) into the physical, social and institutional fabric of a city. It draws on a case study of the *dublinbikes* scheme and was guided by the Multi-Level Perspective (MLP) conceptual framework. The study employed a mixed method data collection approach encompassing interviews with key informants and users (and non-users) of the PBSS and analyses of statutory plans, policy documents, engineering guidance and other material. Through an examination of a number of domains — rules and regulations, user experiences of navigating the city, the emergence of new actors and re-alignments of existing relationships, infrastructures and traffic management measures — it is revealed that the introduction of the PBSS set in motion an array of unpredicted processes and cascade effects (or feedback loops in complex systems terms) which are now playing out. The knowledge generated from this study of the planning and early operational phases of the new socio-technical system enhances our understandings of processes of change associated with PBSSs and, more broadly, of some potential transition pathways towards lower carbon futures. The paper also raises new questions for future research.

Oyake-Ombis, L., Van Vliet, B. and Mol, A.P.J., 2015, Managing plastic waste in East Africa: Niche innovations in plastic production and solid waste, *Habitat International*, 48, 188-197

This paper assesses the uptake of environmental innovation practices to cope with plastic waste in Kenyan urban centres at the interface of solid waste management and plastic production systems. The Multi Level Perspective on Technological Transitions is used to evaluate 7 innovation pathways of plastic waste prevention, reuse or recycling. An assessment is made as to whether the innovations lead to changes in the regimes of waste management and plastic production and eventually an integrated regime for plastic production and reuse. The study comprises of a review of policy documents and statistics, site visits and in-depth interviews with main actors involved in plastic waste related innovation. The comparative analysis of social network building, actor expectations and learning processes in the 7 innovation routes reveals that Kenya is still far from having a well-aligned plastic production-cum-waste regime that enables plastic waste prevention, recycling and handling practices. Innovations by yard shop owners and home grown industries contribute to an aligned plastic waste recycling regime, where PET exporters, bio-degradable plastic sellers and CBO collectors fail to do so. All innovation actors face a lack of governmental recognition and guidelines to close the loop of plastic production and waste handling.

Fatimah, Y.A., Raven, R.P.J.M., and Arora, S., 2015, Scripts in transition: Protective spaces of Indonesian biofuel villages, *Technological Forecasting and Social Change*, 99, 1-13

This paper studies the development of biofuel village pilot projects in Indonesia. Despite the central government's political and financial commitment to the projects, the projects failed to survive and produce sustainable effects. In order to understand why the projects were stalled, this paper traces how the design of Indonesia's biofuel policies shaped the actual socio-technical configurations of the projects. To trace this relationship between the policies and the actual project configurations, we develop a framework that combines the concept of protective space from transition studies and the concept of script from actor-network theory. The concept of script allows us to investigate how the designs of protective spaces and of the experimental projects are enacted through non-coherent processes involving misunderstandings and shifts in meanings between narratives and things (e.g. between policies implemented and the machines put in place). Our analysis makes manifest the non-linearity of the relation between the design of a protective space and the actual practices engendered. This non-linearity emerged through changes in direction brought about by the central government's inability to stretch and transform the local environment in accordance with the policy design and through changes in individual actors' interests in the projects.

Iizuka, M., 2015, Diverse and uneven pathways towards transition to low carbon development: the case of solar PV technology in China, *Innovation and Development*, forthcoming

Transition towards low carbon development is an urgent challenge for the global community. As increased economic activities usually result in more carbon emissions, the transition process is particularly critical for rapidly growing emerging economies. This paper reviews the literature that deals with sustainable transition, in particular the multilevel perspective framework, to identify challenges specific to developing countries. After reviewing the literature, the paper looks at the case of Chinese solar photovoltaic technology to link the conceptual discussion with a practical example.

Vasileiadou, E., Huijben, J., Raven, R.P.J.M., 2015. Three is a crowd? Exploring the potential of crowdfunding for renewable energy in the Netherlands. *Journal of Cleaner Production*, Forthcoming.

There is a huge gap between demand and supply of finance for energy transitions, and the financial and economic crisis have had a negative impact in the already meagre funds for

transforming the energy system towards renewable sources. In this paper we explore whether crowdfunding for renewable energy, as a novel sociotechnical practice developed in a niche, has the potential to break through and transform both the energy and the financial regimes, utilising the Multi-Level Perspective theory. We empirically investigate crowdfunding platforms linked to renewable electricity projects in the Netherlands. The main conclusion is that the volume of crowdfunding today is low, but the dynamic of these projects holds potential. There is limited indication of learning processes until now, as well as limited support from regime actors, pointing at a low level of niche stabilization and break-through potential, which may however be related to the early stage of development of crowdfunding in the Netherlands. On the other hand, the heterogeneity of crowdfunders is very promising. Platforms dedicated to renewable electricity exclusively, and with an investment based business model seem to be the most successful. We show how governmental market regulation and support mechanisms are shaping crowdfunding as a business model, and discuss the implications for other countries.

Verhees, B., Raven, R.P.J.M., Kern, F., Smith, A., 2015, The role of policy in shielding, nurturing and enabling offshore wind in The Netherlands (1973–2013), *Renewable and Sustainable Energy Reviews*, 47, 816-829

It is widely acknowledged that many renewable energy technologies cannot (yet) compete with incumbent (fossil fuel) options e.g. in terms of price. Transitions literature argues that sustainable innovations can nevertheless break out of their 'niches' if properly shielded, nurtured and empowered. Most studies using this perspective have focused on how innovation champions engage in shielding, nurturing and empowering (SNE) activities: none have so far focused specifically on the role that policy plays in relation to these three processes. This paper therefore aims to analyze the way in which policy constrains and enables the shielding, nurturing and empowering of renewable energy innovations. To do so, it presents a qualitative review of the development of offshore wind power (OWP) in The Netherlands over the past four decades. Based on interpretation of a wide variety of written sources (academic histories, reports, policy documents, parliamentary debate transcripts, news media) and nine semi-structured interviews, it discerns six periods of relative stability in the history of Dutch offshore wind. It then analyzes the effects of various policies on the shielding, nurturing and empowering of offshore wind in these periods. The paper contributes to transitions literature (1) by providing an analysis of how policies can enable and constrain the shielding, nurturing and empowering of renewable energy innovations, and (2) by bringing together, for the first time, fragmented accounts of the surprisingly long history of Dutch offshore wind development and implementation. Both contributions are timely, given the recent reprioritization of OWP on the Dutch policy agenda.

Vassalikopoulou, P. and Marmaras, N., 2015, Investigating technology-induced transitions in healthcare: Work practice adaptations within their overall context, *Health Policy and Technology*, forthcoming

Objectives: To demonstrate the usefulness of combining the "multi-level perspective" with the concept of "institutional work" for studying the relations between new technology introduction, socioeconomic pressures, policy and work practices. To this purpose, we examine the introduction of e-prescription and e-reimbursement in Greece by applying a combination of the two theoretical constructs. Methods: Theoretically informed interpretive study. Data have been collected using qualitative data collection techniques including documents' review, observations, and interviews. Results: We illustrate how changes at the macro level (a public debt crisis which resulted in commitments to external funding bodies) created pressure on the established regime of weak governance within Greek healthcare. This pressure facilitated the introduction of new information systems that support coordination and governance. The new systems aim to change the pre-existing institutional relations and to orient practitioners towards new modes of acting. Practitioners adjust their work practices by trying to accommodate the two newly introduced systems. In doing so, they manage the boundaries between ways of acting that they deem as amenable to

alterations and norms that they think that have to be preserved. Conclusion: Combining a focus to the micro level of work practices with a global framework that maps transition processes can produce valuable insights. Positioning e-prescription and e-reimbursement within the “bigger picture” helps us to appreciate the conditions that facilitated their fast-paced implementation.

Lu, I.Y., Kuo, T. and Chen, J.Y., 2015, The evolution of Taiwan’s Solar PV energy policy, *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects*, 27(2), 1253-1259

Taiwan has a considerable amount of photovoltaic manufacturing and a very sunny climate that it owns great potential to utilize more renewable energy based on photovoltaic to reduce the use of fossil fuels. This article aims to explore the evolution of the solar photovoltaic policy in Taiwan’s electricity power sector. Based on a multi-level perspective, this article analyzes the technological transition of photovoltaic in Taiwan’s electricity industry. In addition, the evolution and possible future directions of the country’s solar photovoltaic energy policy are investigated in detail.

Heiskanen, E., Nissilä, H., and Lovio, R., 2015, Demonstration buildings as protected spaces for clean energy solutions - the case of solar building integration in Finland, *Journal of Cleaner Production*, in press

Demonstrations serve an important role in the promotion of sustainable technologies. This paper analyzes sustainable building demonstration from the strategic niche management perspective. It studies how demonstration sequences conducted over a long time span gradually contribute to niche development for clean energy technologies at the national level. Our empirical analysis focuses on solar building demonstrations in Finland, an unfavorable context for the technology. Our findings show that the demonstrations leveraged sporadic windows of opportunity for the technology resulting from international developments. The projects supported three niche development processes: the building of networks, different types of learning and the creation of visions and expectations, thereby softening the ground for solar technology uptake in new buildings. However, they have also struggled to make an immediate impact on mainstream practices due to weak continuity and the challenging socio-technical environment. The paper concludes with implications for carrying out demonstration projects that provide continuity in unfriendly environments.

Wells, P. and Lin, X., 2015, Spontaneous emergence versus technology management in sustainable mobility transitions: Electric bicycles in China, *Transportation Research Part A: Policy and Practice*, 78, 371–383

This paper describes and seeks to understand the scale of the electric bicycle (electric two-wheeler) market in China, and to begin to explain its emergence with a view to outlining the prospects for learning from this case for applications in other countries around the world. Drawing on secondary data from Chinese government sources, electric bicycle industry websites, Chinese media sites and other sources, this exploratory paper positions the development of the electric bicycle market as occurring largely in the absence of positive policy intervention – in stark contrast to the nurturing afforded the electric car sector worldwide. The paper develops a multi-scalar perspective of transitions theory in an institutional setting, with examples drawn from Beijing and Fuzhou, to explain the processes of change outside of the traditional reference context of technology policy and management. It is concluded that transitions theory has a greater flexibility and adaptability as an explanatory framework than previously shown, but empirically the electric two-wheeler is a weakly-embedded alternative to mainstream automobility.

Ingram, J., 2015, Framing niche-regime linkage as adaptation: An analysis of learning and innovation networks for sustainable agriculture across Europe, *Journal of Rural Studies*, 40, 59–75

This paper draws on the transition literature to examine niche-regime interaction. Specifically it aims to reveal and contribute to an understanding of the processes that link sustainable agriculture innovation networks to the agricultural regime. It analyses findings from participatory workshops with actors in 17 Learning and Innovation Networks for Sustainable Agriculture (LINSA) across Europe. Framing linkage as an adaptive process, whereby regime actors and entities adapt to incorporate LINSA, and vice versa, reveals different patterns and processes of adaptation. Five adaptation modes are distinguished and described corresponding to different levels of adaptation between LINSA and the agricultural regime. Understanding adaptive linkage processes within and across these modes as reflexive, learning and networking processes enabled and facilitated by individuals and organisations provides more insights into linkage processes than a hierarchical approach. Analysis of results from 17 LINSA from a number of different contexts across Europe allows a broad empirical analysis and an overview of the interplay of processes contributing to the agricultural regime's adaptive capacity.

Marquardt, J., Steinbacher, K. and Schreurs, M., 2015, Driving force or forced transition? The role of development cooperation in promoting energy transitions in the Philippines and Morocco, *Journal of Cleaner Production*, in press

This paper contributes to the understanding of transitions towards low carbon societies in the developing world. While adding extensive empirical insights from the status of energy transitions in two countries faced with major energy challenges, the Philippines and Morocco, our contribution enquires what role external actors like international donors in general, and Germany in particular, can play in such transitions. Based on extensive semi-structured, in-depth expert interviews with energy sector stakeholders in the Philippines and Morocco, this article elucidates the opportunities and barriers of supporting and incentivizing energy transitions in developing countries through development cooperation. Taking transition management as an analytical framework to highlight links between niche level experiments and the electricity regime, this study reveals that donors cannot force an energy transition, but can be a driving force for testing alternative ways for electricity supply through niche level experiments and regime level interventions that are closely connected to the country's primary energy objectives. Multi-stakeholder coordination, a clearer linkage between niche level projects and regime changing effects, and a better understanding of a country's energy transition objectives are promising approaches to increase the likelihood of development cooperation positively affecting a regime level shift in the electricity system.

Reinsberger, K. Brudermann, T. and Posch, A., 2015, The role of photovoltaics in energy transition: Assessing the prospects for a regime shift, *GAIA: Ecological Perspectives for Science and Society*, 24(1), 41-47

Photovoltaics is still a niche technology, accounting for a low proportion of electricity generation. Combining an analysis of strengths, weaknesses, opportunities and threats (SWOT) with the analytic hierarchy process, we discuss the prospects and challenges relating to photovoltaics in Austria, when attempting to move from a niche level to a regime level change in energy transition. In carrying out this hybrid method, a set of pre-defined SWOT factors were judged by experts by means of pairwise comparisons. As results reveal, strengths and opportunities outweigh weaknesses and threats. According to the experts, financial and technological considerations dominate over environmental and social issues. Hence, characteristics such as rapid reduction in module costs, technological progress and low economies of scale imply that significant promise may be assigned to photovoltaics in terms of its expected contribution to the transformation of our energy system.

Nordensvärd, J. and Urban, F., 2015, The stuttering energy transition in Germany: Wind energy policy and feed-in tariff lock-in, *Energy Policy*, 82, 156-165

This article aims to examine whether the formulation of specific low carbon policy such as the feed-in tariff for wind energy in Germany can partly be a barrier to a comprehensive energy transition (Energiewende). Despite their short and medium-term success, these policies could create a long-term lock-in if they are formulated in a way that leads to a stagnation of systems innovation. The research finds that while the share of wind energy has increased rapidly over time, the feed-in-tariff and other low carbon policies and incentives have not been sufficient to achieve a socio-technical regime transition in Germany yet. We suggest that the German feed-in-tariff has incorporated wind energy (a niche-innovation) and wind energy actors (pathway newcomers) into a slightly modified socio-technical regime that is rather similar to the earlier 'fossil fuel dominant' socio-technical regime.

Verbruggen, A., Di Nucci, R., Fishedick, M., Haas, R., Hvelplund, F., Lauber, V., Lorenzoni, A., Mez, L., Nilsson, L.J., Del Rio Gonzalez, P., Schleich, J., Toke, D., 2015, Europe's electricity regime: restoration or thorough transition, *International Journal of Sustainable Energy Planning and Management*, Vol. 5., 57-68

Concerns about climate change, diminishing social acceptance of traditional fuels, and technological innovations have led several countries to pursue energy transition strategies, typically by massive diffusion of renewable electricity supplies. The German 'Energiewende' has been successful so far in terms of deploying renewable power, mainly by applying particular feed-in tariffs, and by bundling public, academic, industrial and political support. So far though, only few EU member states proceed with a similar transition. In March 2014 CEOs of Europe's major energy companies publicly opposed a fast and thorough transformation of electricity supplies to become fully renewable. In April 2014 the European Commission published new state aid guidelines, generally mandating renewable energy support mechanisms (premiums, tenders) of lesser performance than regularly adjusted, specific feed-in tariffs. The new guidelines are likely to be pernicious for the fast deployment of renewable electricity supplies. In light of these challenges, this position paper highlights two implications of power sector transitions. First, the engineering-economics theory of power generation systems needs fundamental revision, mainly since a growing share of power sources no longer function on command. Second, and based on the experience in Germany, the paper sketches out a strategy for a thorough transition of the power sector, which, in the end, also entails normative judgements. Deep changes in energy systems and associated ways of living require societal consensus building based on ethical considerations.

Devolder, S., and Block, T., 2015, Transition thinking incorporated: Towards a new discussion framework on sustainable urban projects, *Sustainability*, 7(3), 3269-3289;

Today, cities worldwide are engaged in urban projects and activities in a concerted drive towards sustainable development. However, the concept of "sustainable urban projects" is inherently normative, subjective and ambiguous. Furthermore, the popularity of sustainable urban initiatives does not guarantee that increased pressure on dominant unsustainable urban systems will occur. In this article, we argue that strong urban debates on these initiatives and on urban sustainability are required to facilitate and stimulate urban systems towards a more socially just and environmentally sustainable future. When we say "urban debates" we mean substantive talks and detailed discussions about the type of cities we want to live in and about a shared understanding of sustainable urban projects and how they affect urban systems. We aim to contribute to that objective by developing a discussion framework on sustainable urban projects that frames sustainable development as a challenge that concentrates on both ecological and social concerns and that avoids a sole reliance on technology fixes. But above all, we also incorporate insights and findings from transition thinking to focus on radical changes or transformations of urban systems and to acknowledge the importance of so-called "niches". In this article we describe the

fundamentals, the surplus value and the utility of the framework. The article contains empirical material from a pilot-study in Ghent, Belgium.

Trutnevyte, E., Strachan, N., Dodds, P.E., Pudjianto, D., Strbac, G., 2015, Synergies and trade-offs between governance and costs in electricity system transition, *Energy Policy*, 85, 170-181

Affordability and costs of an energy transition are often viewed as the most influential drivers. Conversely, multi-level transitions theory argues that governance and the choices of key actors, such as energy companies, government and civil society, drive the transition, not only on the basis of costs. This paper combines the two approaches and presents a cost appraisal of the UK transition to a low-carbon electricity system under alternate governance logics. A novel approach is used that links qualitative governance narratives with quantitative transition pathways (electricity system scenarios) and their appraisal. The results contrast the dominant market-led transition pathway (*Market Rules*) with alternate pathways that have either stronger governmental control elements (*Central Co-ordination*), or bottom-up proactive engagement of civil society (*Thousand Flowers*). *Market Rules* has the lowest investment costs by 2050. *Central Co-ordination* is more likely to deliver the energy policy goals and possibly even a synergistic reduction in the total system costs, if policies can be enacted and maintained. *Thousand Flowers*, which envisions wider participation of the society, comes at the expense of higher investment and total system costs. The paper closes with a discussion of the policy implications from cost drivers and the roles of market, government and society.

Devolder, S. and Block, T., 2015, Transition thinking incorporated: Towards a new discussion framework on sustainable urban projects, *Sustainability*, 7(3), 3269-3289.

Today, cities worldwide are engaged in urban projects and activities in a concerted drive towards sustainable development. However, the concept of “sustainable urban projects” is inherently normative, subjective and ambiguous. Furthermore, the popularity of sustainable urban initiatives does not guarantee that increased pressure on dominant unsustainable urban systems will occur. In this article, we argue that strong urban debates on these initiatives and on urban sustainability are required to facilitate and stimulate urban systems towards a more socially just and environmentally sustainable future. When we say “urban debates” we mean substantive talks and detailed discussions about the type of cities we want to live in and about a shared understanding of sustainable urban projects and how they affect urban systems. We aim to contribute to that objective by developing a discussion framework on sustainable urban projects that frames sustainable development as a challenge that concentrates on both ecological and social concerns and that avoids a sole reliance on technology fixes. But above all, we also incorporate insights and findings from transition thinking to focus on radical changes or transformations of urban systems and to acknowledge the importance of so-called “niches”. In this article we describe the fundamentals, the surplus value and the utility of the framework. The article contains empirical material from a pilot-study in Ghent, Belgium.

Davidson, D.J., Jones, K.E., and Parkins, J.R., 2015, Food safety risks, disruptive events and alternative beef production: A case study of agricultural transition in Alberta, *Agriculture and Human Values*, in press

A key focus for agri-food scholars today pertains to emerging “alternative food movements,” particularly their long-term viability, and their potential to induce transitions in our prevailing conventional global agri-food systems. One under-studied element in recent research on sustainability transitions more broadly is the role of disruptive events in the emergence or expansion of these movements. We present the findings of a case study of the effect of a sudden acute food safety crisis—bovine spongiform encephalopathy, or mad cow disease—on alternative beef production in the Province of Alberta, Canada. Employing the conceptual lens of Sustainability Transition Theory, we explore the perspectives of conventional and alternative beef producers, treating alternative beef production as a niche operating within

the dominant regime of global industrial agri-business. Three key findings are presented here. First, food safety risks and disruptive events can emerge as a direct consequence of the socio-ecological contradictions embedded in industrial agriculture, representing an opportunity for expansion of agricultural niches. Second, certain features of socio-economic regimes can also contribute to niche emergence, such as an economic system that disenfranchises beef-producing families. Finally, our study highlights the high level of diversity among niche agents and the complex and nuanced nature of their support for the niche.

Hannon, M.J., Foxon, T.J. and Gale, W.F., 2015, 'Demand pull' government policies to support Product-Service System activity: the case of Energy Service Companies (ESCOs) in the UK, *Journal of Cleaner Production*, in press

Product-Service Systems (PSSs) constitute a family of service-based business models designed to satisfy our societal needs in an economically and environmentally sustainable manner. To date however PSS application has remained niche due to a variety of critical barriers. This paper explores how 'demand pull' national government policies could support PSS activity by addressing these barriers and cultivating market demand. Lessons are drawn from a case study of how *regulatory, economic incentive, informative* and *procurement* policies have supported Energy Service Company (ESCO) activity in the UK; a sub-set of the PSS family focused on energy service provision. Subsequently five policy recommendations are presented to support PSS activity: (1) balancing economic incentives and regulatory disincentives; (2) promoting indirect policy support; (3) redesigning existing market structures; (4) promoting locally-led PSS activity; and (5) creating stable policy frameworks. The paper warns however that national government policy cannot easily address all PSS barriers, such as customer preferences, international developments, technological progress and inherent business model weaknesses, pointing to the need for other complementary solutions. Furthermore, other governance actors beside national government could also implement PSS supporting policies.

Gazheli, A., Antal, M. and Van den Bergh, J., 2015, The behavioral basis of policies fostering long-run transitions: Stakeholders, limited rationality and social context, *Futures*, in press

Writings on sustainability transitions generally pay slight attention to the specific behavioral characteristics of individuals, groups and organizations. This paper examines how modern insights about bounded rationality, social interaction and learning can contribute to making transition policies more effective in addressing barriers and opportunities to realize a sustainability transition in the near future. We argue that the behavioral underpinnings of features like lock-in, surprises in innovation systems, and network interactions have been insufficiently elaborated and connected to policy design. We identify and illustrate the most important behavioral features of relevant stakeholders in transition processes. By focusing on behavioral features at both individual and organizational levels, we arrive at recommendations for policy makers regarding important barriers to change and how to overcome these. Specific policy insights are offered at multiple levels, for different stakeholders, and associated with both behavioral biases and social interactions. The analysis combines insights from the literatures on sustainability transitions, "environmental-behavioral economics", and behavioral foundations of learning and innovation. Our framework may serve as a basis for coherent behavior studies of transitions that otherwise run the risk of being ad hoc. This will improve conditional forecasting of system responses to transition policies.

Urpelainen, J., 2015, The social science of sustainability, *Emerging Trends in the Social and Behavioral Sciences*, in press

The sustainability of socioeconomic systems is widely recognized as a key global challenge, and a social science of sustainable societies is now emerging. Social scientists have made commendable progress in quantifying the cost-effectiveness of different environmental policy

instruments, explaining their diffusion across nations, and documenting the phenomenon of historical and ongoing sustainability transitions. However, social scientists should pay much more attention to the political economy of environmental policy formulation, the challenge of building coalitions that support more ambitious policies to promote sustainability, and the development of analytical models and testable hypotheses about sustainability transitions. Owing to the inherently problem-oriented nature of sustainability, the social science of sustainability must be strongly interdisciplinary, both among social sciences and with respect to the natural sciences. For the social science of sustainability to survive and thrive over time, academic researchers must both maintain the highest analytical standards and focus on research questions and answers that contribute to the solution of problems that practitioners face.

Schwanen, T., 2015, The bumpy road toward sustainable urban mobility: Case studies from two UK cities, *Sustainability*, 7, 7086-7111

Cities are increasingly seen as the places where innovations that can trigger a sociotechnical transition toward urban mobility are emerging and maturing. Processes such as peak car, rail renaissance and cycling boom manifest themselves particularly in cities, and success stories of cities experimenting with specific types of low-energy mobility abound in the academic literature. Nonetheless, innovation is known to be a precarious process requiring favorable circumstances. Using document analysis and in-depth interviews, this study examines the nature of low-energy innovation in the everyday mobility of people in two UK cities with favorable conditions for a transition away from fossil fuels—Brighton and Oxford. It shows that clear differences exist between the two cities in the sorts of innovation that emerge and diffuse as a result of path dependencies, local politics, and financial support from supra-local governments and agencies. While low-energy mobility currently has substantial momentum in both cities, the majority of low-carbon innovations in urban mobility are incremental rather than radical in nature, and their future is often imbued with uncertainty. The autonomy of small- and medium-sized cities as agents in bringing about transformational change toward low-energy urban mobility should not be overestimated.

Strachan, P.A., Cowell, R., Ellis, G., Sherry-Brennan, F. and Toke, D., 2015, Promoting community renewable energy in a corporate energy world, *Sustainable Development*, forthcoming

Small-scale, decentralized and community-owned renewable energy is widely acknowledged to be a desirable feature of low carbon futures, but faces a range of challenges in the context of conventional, centralized energy systems. This paper draws on transition frameworks to investigate why the UK has been an inhospitable context for community-owned renewables and assesses whether anything fundamental is changing in this regard. We give particular attention to whether political devolution, the creation of elected governments for Scotland, Wales and Northern Ireland, has affected the trajectory of community renewables. Our analysis notes that devolution has increased political attention to community renewables, including new policy targets and support schemes. However, these initiatives are arguably less important than the persistence of key features of socio-technical regimes: market support systems for renewable energy and land-use planning arrangements that systemically favour major projects and large corporations, and keep community renewables to the margins. There is scope for rolling out hybrid pathways to community renewables, via joint ownership or through community benefit funds, but this still positions community energy as an adjunct to energy pathways dominated by large, corporate generation facilities.

Sorrell, S., 2015, Reducing energy demand: A review of issues, challenges and approaches, *Renewable and Sustainable Energy Reviews*, 47, 74-82

Most commentators expect improved energy efficiency and reduced energy demand to provide the dominant contribution to tackling global climate change. But at the global level, the correlation between increased wealth and increased energy consumption is very strong and the impact of policies to reduce energy demand is both limited and contested. Different

academic disciplines approach energy demand reduction in different ways: emphasising some mechanisms and neglecting others, being more or less optimistic about the potential for reducing energy demand and providing insights that are more or less useful for policymakers. This article provides an overview of the main issues and challenges associated with energy demand reduction, summarises how this challenge is 'framed' by key academic disciplines, indicates how these can provide complementary insights for policymakers and argues that a 'sociotechnical' perspective can provide a deeper understanding of the nature of this challenge and the processes through which it can be achieved. The article integrates ideas from the natural sciences, economics, psychology, innovation studies and sociology but does not give equal weight to each. It argues that reducing energy demand will prove more difficult than is commonly assumed and current approaches will be insufficient to deliver the transformation required.

Nissilä, H., 2015, Conferences as sequential arenas for creating new sustainable fields, *Industry and Innovation*, 22(3), 209-228

The field-configuring events (FCE) literature has deemed conferences to be important in the emergence of fields. Yet little is still known about how they serve as interventions for deliberately creating new sustainable fields. Emerging sustainable technologies are typically not competitive on the market and are likely to be ruled out by established industries counteracting their development. Hence, they are in need of two types of measures: those that promote the single innovation and measures that generate "disruptive" systemic change (i.e. bring about a transition toward increased sustainability in the technologies, rules and roles that govern established industries). The article applies the FCE literature to a novel empirical context: the creation of a field for solar technology in an especially challenging environment. Based on observations, interviews and archival data on a conference sequence in 2011–2014, the findings show that the conferences triggered processes promoting the innovation that, then, generated steppingstones for processes of "disruptive" systemic change. The study contributes to the FCE literature by arguing that conferences can be fruitful arenas for furthering sustainable fields, as they have the potential to address the two aspects of sustainable field creation simultaneously.

Doci G., and Vasileiadou E. (2015), "Let's do it ourselves"; Individual motivations for investing in renewables at community level. *Renewable and Sustainable Energy Reviews* 49, 41-50

Renewable energy communities have multiplied the last years in many countries, even in contexts that the structural conditions are not favorable. The paper analyses individual motivations for partaking in local renewable projects and generating energy jointly in an investment community, in order to inform policy debates on how to support such communities. To do so, we applied a socio-psychological approach for studying renewable energy communities in Germany and the Netherlands. Our results show that mainly gain (such as decreasing energy costs) and normative (such as addressing climate change) considerations played a role in the decision, but in the background hedonic motivations were also present, such as having fun and integrating in a community. Each of the groups examined emerged in already existing strong communities, where trust was relatively high, which seems to be an important condition for the realization of local energy projects. Consequently, we argue that tailor-made incentives addressing the different types of motivations can be more effective for the support and spread of renewable energy communities.

Hamilton, J., Mayne, R., Parag, Y., and Bergman, N., 2015, Scaling up local carbon action: the role of partnerships, networks and policy, *Carbon Management*, in press

The transition to a low-carbon society is imperative to climate change mitigation and requires cross-sectoral action at multiple levels. A growing literature emphasizes local action, but less is written about scaling up action at a county level. Combining three analytical perspectives – transition theory, strategic niche management and the middle-out – we examine the

evolution and scaling up of local community-scale carbon action in Oxfordshire county. Our analysis is based on four local-level research projects. By identifying the roles and strategies of local actors in the development and scaling up of low carbon innovation and action, we conclude that local meso-level actors are crucial for catalyzing initial stages of county-level transitions, but limited in their capacity to scale up low-carbon innovation.

Boyer, R.H.W., 2015, Grassroots innovation for urban sustainability: comparing the diffusion pathways of three ecovillage projects, *Environment and Planning A*, 47(2), 320-337

Grassroots innovation literature proposes that ‘intermediately’ situated community-based projects—those which are neither too radical, nor too embedded in the mainstream—play an important cross-contextual bridging role in processes of innovation for sustainable development. This paper explores this intermediacy claim by comparing how three established ecovillage projects engage outsiders and diffuse their lessons learned. Employing comparative case-study methodology, I find that while all three projects successfully replicate alternative practices outside their boundaries—for example through education, outreach, and on-site activities—one project has partnered with municipal planners to translate ‘ecovillage concepts’ into a new zoning category that will facilitate similar development by mainstream actors. The argument is made that the landscape for grassroots innovation is uneven, and that niche-to-regime translation occurs through projects that position themselves as part of two action domains at once.

Pettersen, I.N., 2015, Fostering absolute reductions in resource use: The potential role and feasibility of practice-oriented design, *Journal of Cleaner Production*, in press

This article explores the potential role of design in fostering absolute reductions in everyday consumption. It links ambitions to achieve absolute reductions to concepts from social theories of practice and design. Practice theory directs attention towards expectation levels, opening up questions about sufficiency. Design activity is often pointed out as a potential key instrument for creating change in sustainable directions, and the social practice as a relevant starting point for such work. Little attention is however paid to what may help and hinder practice-oriented initiatives. Consequently, this article asks what the role of design may be in fostering actual reductions in resource use when social practices continuously are in flux, and, what the space for action is, given societal arrangements rooted in ideas about boundless consumption. This is done on a theoretical and empirical basis, by drawing on practice theory and system innovation theory, and a case study on television entertainment practices and work by related actors. This is relevant given the increasing contribution of electronics to the environmental impact of households. The analysis shows how standardisation and predominantly technical experience and value definitions have consequences for resulting resource use levels and the feasibility of creating change. The lack of policy attention to the relationship between resource use and practical value may prevent actors from making use of the theoretical space for practice-oriented action. The article concludes by presenting recommendations for policy and practice on how to foster further exploration of it.

Røpke, I., Complementary system perspectives in ecological macroeconomics — The example of transition investments during the crisis, *Ecological Economics*, forthcoming

Globally, societies are facing a number of interrelated environmental, economic and social crises. This paper is intended to contribute to the development of an ecological macroeconomics that addresses these multiple crises in combination. Insights from different research communities will be included in this effort. Taking an ecological economic understanding of sustainability as the point of departure, and inspired by systems thinking, it is discussed which economic sub-systems should be in focus for sustainability transitions, and whether relevant guides for sustainability can be formulated for these systems. In particular, the focus is on systems that are decisive for resource consumption and pollution

although their influence on these is indirect. A simple typology of sub-systems is suggested and applied in relation to an example that highlights the importance of the interplay between macroeconomic, provision and distribution systems. The example concerns investments in sustainability transitions of provision systems and demonstrates the complexities of implementing such transformations during the economic crisis. It also addresses the need for ecological macroeconomics to develop a third position beyond austerity policies and Keynesian approaches.

Watson, J., Gross, R., Ketsopoulou, I., Winskel, M., 2015, The impact of uncertainties on the UK's medium-term climate change targets, *Energy Policy*, forthcoming

The UK is committed to ambitious medium- and long-term climate change targets, including a commitment to an 80% reduction in emissions from 1990 levels by 2050. Whilst emissions have fallen significantly since 1990, further reductions will be increasingly difficult to achieve. The government has agreed carbon budgets to the late 2020s that are consistent with the long-term 80% target. However, increasing energy prices since the mid-2000s and the 2008 financial crisis have led to cracks in the political consensus in support of these budgets and targets. This paper carries out an assessment of the feasibility of the UK's agreed low carbon pathway over the medium term, with a particular focus on the fourth carbon budget (2023–27). It analyses the uncertainties associated with the specific changes that may be necessary to comply with this carbon budget – including measures to decarbonise electricity, heat and transport. This analysis focuses on 'instrumental' uncertainties associated with specific areas of the energy system (e.g. the decarbonisation of heat in households) and 'systemic' uncertainties that tend to have more pervasive implications for the energy system as a whole (e.g. uncertainties associated with public attitudes). A framework is developed that sets out and analyses the key uncertainties under those two broad categories, in terms of their complexity and their potential impact on the fourth carbon budget. Through the application of this framework the paper also considers strategies to mitigate or manage these uncertainties, and which actors could help develop and implement these strategies.

Martin, C.J. and Upham, P., 2015. Grassroots social innovation and the mobilisation of values in collaborative consumption: A conceptual model. *Journal of Cleaner Production*, in press

There is growing interest in the potential of grassroots innovations to play a role in the transition to sustainable production and consumption systems. However, the role of values has been little considered in relation to the development and diffusion of grassroots innovations. We develop a conceptual model of how citizens' values are mobilised by grassroots innovations, drawing on the value theory of Schwartz et al. (2012) and the theory of collective enactment of values of Chen et al. (2013). Using the results of a large scale survey of free reuse groups (e.g. Freecycle and Freegle), which enable collaborative forms of consumption, we apply the conceptual model to explore how participants' values are mobilised and expressed. We show that while the majority of free reuse group participants do hold significantly stronger self-transcendence (i.e. pro-social) values than the wider UK population, they also hold other values in common with that population and a minority actually place less emphasis on self-transcendence values. We conclude that diffusion of this particular grassroots innovation is unlikely to be simply value limited and that structural features may be more significant.

Laakso, S. and Lettenmeier, M., 2015, Household-level transition methodology towards sustainable material footprints, *Journal of Cleaner Production*, in press

This paper presents a new household-level methodology for transition towards sustainability. The methodology includes measuring the resource use of households on a micro level, testing relevant measures towards a one-planet resource use, and developing mainstreaming options in co-operation with households and providers of services, products, and infrastructures. We use the MIPS (*Material Input Per unit of Service*) method to calculate the use of natural resources and concentrate on the material footprint as an aggregated

indicator for the overall use of material resources. With HST (*Household-level Sustainability Transition*) methodology, we extend the material footprint methodology from just measuring household resource use to developing visions, conducting experiments, as well as learning and upscaling, all of which contribute to the whole *Transition-Enabling Cycle*. Results from the first application of the HST methodology on five households in Jyväskylä, Finland, show that it is possible to achieve a significantly more sustainable level of consumption by a relatively few changes in everyday living. Achieving a one-planet use of material resources, however, also requires systemic changes.

Jensen, J.S., Lauridsen, E.H., Fratini, C.F., and Hoffmann, B., 2015, Harbour bathing and the urban transition of water in Copenhagen: junctions, mediators, and urban navigations, *Environment and Planning A*, 47(3) 554 – 570

In 2002 the first public harbour swimming bath in the inner harbour of Copenhagen opened. By translating the old industrial harbour into a site of urban living and recreation, the practice of swimming in the harbour has been instrumental in aligning and catalysing a series of broader urban transformations pertaining to the wastewater infrastructure, industrial activities, urban development, and international marketing of the city. Through a study of the processes by which swimming in the harbour came into being as a transformative urban practice, we develop a navigational conceptualisation of urban transition processes. Our study suggests that the creation of the first harbour bath was not the end result of an overall master plan. Rather, we demonstrate that the harbour baths were the outcome of a contingent interplay among embedded actors' myopic and navigational actions over a period of twenty years. In order to conceptualise what provoked these navigational actions and how they translated into transformative urban change, we develop the notions of junctions and transition mediators. We introduce the notion of junctions to understand how navigations are provoked. Junctions are signified by particular sites with identities that have been rendered unstable due to tensions and ambiguities among the established sociomaterial assemblages by which they are configured. We argue that navigations signify sociomaterial repair work aimed at addressing such junctions. To conceptualise how such navigations might translate into coordinated urban transformations, we introduce the notion of transition mediators. A transition mediator is an artefact—such as the harbour baths—that succeeds in generating transformative change by displacing the boundaries and interdependencies within and among the established sociomaterial assemblages of the urban fabric.

Mäkinen, K., Kivimaa, P., Helminen, V., 2015, Path creation for urban mobility transitions: Linking aspects of urban form to transport policy analysis, *Management of Environmental Quality: An International Journal*, 26(4),

Purpose: The paper examines spatiality of transitions by combining aspects of urban form to policy analysis. It aims to increase understanding of how urban form relates to potential effects of transport policies on urban mobility transitions. *Design/methodology/approach:* Novel analytical framework combines concepts of path dependence, path creation and path destabilisation to three urban fabrics (walking, transit and car cities), to study the transition potential of recent transport policy measures influencing the Helsinki Region in Finland. *Findings:* Analysis showed that the potential effects of single policy measures often reach over all three urban fabrics. A policy measure may simultaneously contain elements of both path dependence i.e. support for fossil-fuel based private motoring in the car city and path creation i.e. stimulation of innovations in transit or walking cities. Policy outcomes are often conditional on implementation of other policy measures. For transition governance, this indicates that policy mixes should both destabilise car cities and enforce path creation in walking and transit cities. *Research limitations/implications:* Findings are based on potential rather than evaluated impacts and a limited sample of policies. *Practical implications:* Findings support previous research on the importance of policy coherence: multiple policies and coherence across domains are important. They demonstrate the usefulness of analysing recent or planned policies from the transition perspective. *Originality/value:* The paper provides novel insights by combining policy analysis to the spatial model of overlapping

urban fabrics. In addition, it applies the concepts of path dependence, path creation and path destabilisation in a new way.

Liang, M. and Jin, C., 2015, Innovation evolution and paradigm shift: Origin, features and framework of sustainability transitions, *Studies in Dialectics of Nature*, forthcoming (in Chinese)

Sustainable development guides long-term transitions and transformative change of society, reshaping the composition and interaction of elements in innovation systems. This paper focuses on the issue of sustainability transitions, discusses the origin, features and theoretical framework of sustainability transitions, and proposes implications for research of

Wittmayer, J.M., van Steenbergen, F., Rok, A. and C. Roorda, 2015, Governing sustainability: a dialogue between Local Agenda 21 and transition management. *Local Environment*.

Since the 1990s, the local level of governance has become increasingly important in addressing the challenge of sustainable development. In this article, we compare two approaches that seek to address sustainability locally, namely Local Agenda 21 and transition management. Discussing both approaches along six dimensions (history, aim, kind of change, governance understanding, process methodologies, and actors), we formulate general insights into the governance of sustainability in cities, towns, and neighbourhoods. This dialogue illustrates two related modes of thinking about sustainability governance. We touch upon the importance of an integrated perspective on sustainability transitions through which sustainability is made meaningful locally in collaborative processes. We suggest that the explicit orientation towards radical change is a precondition for governing sustainability in a way that addresses the root causes of societal challenges. Governing sustainability should address the tensions between aiming for radical change and working with status quo-oriented actors and governing settings. We conclude that governing sustainability should be about finding creative ways for opening spaces for participation, change, and experimentation, that is, for creating alternative ideas, practices, and social relations. These spaces for innovation encourage a reflexive stance on ways of working and one's own roles and attitudes, thereby preparing a fertile terrain for actors to engage in change from different perspectives.

Butler, C., Demski, C., Parkhill, K., Pidgeon, N. and Spence, A., 2015, Public values for energy futures: Framing, indeterminacy and policy making, *Energy Policy*, in press

In the UK there are strong policy imperatives to transition toward low carbon energy systems but how and in what ways such transitional processes might be realised remains highly uncertain. One key area of uncertainty pertains to public attitudes and acceptability. Though there is wide-ranging research relevant to public acceptability, very little work has unpacked the multiple questions concerning how policy-makers can grapple with and mitigate related uncertainties in efforts to enact energy systems change. In this paper, public acceptability is identified as an indeterminate form of uncertainty that presents particular challenges for policy making. We build on our existing research into public values for energy system change to explore how the outcomes of the project can be applied in thinking through the uncertainties associated with public acceptability. Notably, we illustrate how the public values identified through our research bring into view alternative and quite different problem and solution framings to those currently evident within UK policy. We argue that engagement with a wide range of different framings can offer a basis for better understanding and anticipating public responses to energy system change, ultimately aiding in managing the complex set of uncertainties associated with public acceptability.

Ockwell, D. and Byrne, R., 2015, Improving technology transfer through national systems of innovation: Climate relevant innovation-system builders (CRIBs), *Climate Policy*, in press

The Technology Executive Committee (TEC) of the United Nations Framework Convention on Climate Change (UNFCCC) recently convened a workshop seeking to understand how strengthening national systems of innovation (NSIs) might help to foster the transfer of climate technologies to developing countries. This article reviews insights from the literatures on Innovation Studies and Socio-Technical Transitions to demonstrate why this focus on fostering innovation systems has potential to be more transformative as an international policy mechanism for climate technology transfer than anything the UNFCCC has considered to date. Based on insights from empirical research, the article also articulates how the existing architecture of the UNFCCC Technology Mechanism could be usefully extended by supporting the establishment of CRIBs (climate relevant innovation-system builders) in developing countries – key institutions focused on nurturing the climate-relevant innovation systems and building technological capabilities that form the bedrock of transformative, climate-compatible technological change and development.

Grubb, M., Hourcade, J-C., Neuhoff, K., 2015, The three domains structure of energy-climate transitions, *Technological Forecasting and Social Change*, in press

This paper argues that the development of energy systems rests on a combination of three different domains of socio-economic processes and associated modes of decision-making. For shorthand these are termed ‘satisficing’, ‘optimising’, and ‘transforming’ domains, with corresponding underpinnings found in behavioural, neoclassical, and evolutionary economics respectively. Each domain operates at different scales of time and personal/organisational/societal decision-making, and explains different characteristics of how energy systems develop. At least since the industrial revolution, the nature of energy systems has depended on government policy, and each domain implies a need for different policy instruments; the combination of all three lays the foundations for far more coherent, effective, and mutually reinforcing policies, including those required to transform energy systems in the light of environmental constraints. The approach also provides a coherent theoretical framework for understanding the conditions under which co-benefits and ‘green growth’ may emerge from environmental policy.

Bohnsack, R., Kolk, A. and Pinkse, J., 2015, Catching recurring waves: low-emission vehicles, international policy developments and firm innovation strategies, *Technological Forecasting and Social Change*, in press

Low-emission vehicle (LEV) technologies have grown in the 1990s, but have since experienced fluctuating interest. Initially, electric vehicles (EVs) were the most promising technology. Most large car firms developed EVs and started bringing them to the market, in limited numbers. Yet, car firms halted their EV engagement around 2001 and focused on hybrid vehicles (HVs) and fuel-cell vehicles (FCVs) instead. Hybrids found their way into the product portfolios of most car manufacturers while FCVs failed to gain traction. In 2006, car firms again committed to EVs, and on a larger scale. To better understand recurring waves of firms’ low-emission-vehicle investments in the international context, this paper explores the influence of geographically-bound government policies on car firms’ innovation strategies. An analysis of archival data from 1997 to 2010 details LEV-specific developments per region/firm, and shows the complex interplay between policies on local, national and international levels and firms’ strategies. Three mechanisms seem to shape the international LEV trajectory: (1) international policy diffusion (vertically and horizontally), (2) firms’ international operations, (3) fit between policy requirements and firm capabilities. Heeding the call for a better geographical conceptualization of technological trajectories, this paper also proposes a framework that explains co-evolution between government policies and car manufacturers.

Kuzemko, C., 2015, Energy depoliticisation in the UK: Destroying political capacity, *British Journal of Politics and International Relations*, forthcoming

Depoliticisation, as a concept, has been utilised to explain specific aspects of economic governance as it has developed over the past thirty years, particularly in certain OECD countries. This article focuses on the outcomes of three forms of depoliticisation, marketised, technocratic and non-deliberative, for political capacity. Political capacity is defined in relation to a notion of politics as social interaction, deliberation, choice and agency. Using UK energy governance as a case study it claims that the depoliticisation of energy policy has resulted in embedded corporate power, a widening disjuncture between experts and majoritarian institutions and limited knowledge structures. As a result the state's role is still confined to giver of market signals and to temporary interventions in the face of complex and unprecedented commitments to transition the UK towards a low carbon future.

Affolderbach, J. and Schulz, C., 2015, Mobile transitions: Exploring synergies for urban sustainability research, *Urban Studies*, forthcoming

Urban sustainability approaches focusing on a wide range of topics such as infrastructure and mobility, green construction and neighbourhood planning, or urban nature and green amenities have attracted scholarly interest for over three decades. Recent debates on the role of cities in climate change mitigation have triggered new attempts to conceptually and methodologically grasp the cross-sectorial and cross-level interplay of enrolled actors. Within these debates, urban and economic geographers have increasingly adopted co-evolutionary approaches such as the social studies of technology (SST or 'transition studies'). Their plea for more spatial sensitivity of the transition approach has led to promising proposals to adapt geographic perspectives to case studies on urban sustainability. This paper advocates engagement with recent work in urban studies, specifically policy mobility, to explore conceptual and methodological synergies. It emphasises four strengths of an integrated approach: (1) a broadened understanding of innovations that emphasises not only processes of knowledge generation but also of knowledge transfer through (2) processes of learning, adaptation and mutation, (3) a relational understanding of the origin and dissemination of innovations focused on the complex nature of cities and (4) the importance of individual actors as agents of change and analytical scale that highlights social processes of innovation. The notion of urban assemblages further allows the operationalisation of both the relational embeddedness of local policies as well as their cross-sectoral actor constellations.

Von Pechmann, F., Midler, C., Manjak, R. and Charue-Duboc, F., 2015, Managing systemic and disruptive innovation: lessons from the Renault Zero Emission Initiative, *Industrial and Corporate Change*, forthcoming

Some innovations are challenging to deploy because they destabilize existing technologies and value chains (*systemic*) as well as traditional customer preferences (*disruptive*). The existing literature does not provide clear guidance as to effective management methods for systemic and disruptive innovations (SDIs). We build on a unique set of in-depth data, based on a 7-year participating observation of an ambitious Renault program, targeting the development and scale-up of four electric vehicles. We propose three management levers for SDI scale-up: autonomous spanning units, a portfolio of viable local systems, and concurrent platform management.

Hornberger, G.M., Hess, D.J., and Gilligan, J., 2015, Water conservation and hydrological transitions in cities in the United States, *Water Resources Research*,

Cities across the world have had to diversify and expand their water-supply systems in response to demand growth, groundwater depletion and pollution, and instability and inadequacy of regional surface freshwater sources. In the U.S., these problems plague not only the arid Western cities but increasingly cities in the Eastern portions of the country. Although cities continue to seek out new sources of water via Promethean projects of long-distance supply systems, desalinization plants, and the recharge of aquifers with surface

water, they also pursue water conservation because of its low cost and other benefits. We examine water conservation as a complex sociotechnical system comprising interactions of political, sociodemographic, economic, and hydroclimatological factors. We provide quantitative data on the factors that affect more and less advanced transitions in water conservation regimes, and we show that water stress and other hydrological data can only partially predict the transition. We also provide qualitative case studies to identify institutional and political barriers to more advanced water conservation regimes. This interdisciplinary, mixed-methods approach typifies the need for knowledge that informs hydrologists about how their research may or may not be adopted by decision-makers.

Liedtke, C., Baedeker, C., Hasselkuss, M., Röhn, H., and Grinewitschus, V., 2015, User-integrated innovation in Sustainable LivingLabs: an experimental infrastructure for researching and developing sustainable product service systems, *Journal of Cleaner Production*, 97, 106-116

A key challenge of the 21st century is to transform society into one that features sustainable patterns of production and consumption. To achieve this, transition processes need to be designed in key areas such as housing, mobility and nutrition. The design and large-scale implementation of sustainable product service systems (PSS) is regarded a promising approach for sustainability transitions. Real-life socio-technical experiments are an important infrastructure for designing PSS in collaboration with stakeholders and users. In this paper, we argue that transdisciplinary and action research methods are required for institutionalising an experimental set-up and developing PSS within such infrastructures. We present the Sustainable LivingLabs (SLL) research infrastructure and its methodology as an example of such experimental settings. It was collaboratively developed with key stakeholders in three consecutive research projects and applied to e.g. heating and space heating. We show new qualities of SLL in relation to existing LivingLabs and approaches for PSS design and present its methodological three-phase model (insight research, prototyping, field testing) of research. Our article contributes to knowledge on a methodological framework and tool-kit for PSS development in SLL with a clear focus on socio-ecological sustainability. Intermediate findings confirm the high influence of user practices on heating energy consumption and show starting points for PSS development: e.g. transformational products, home-automation combined with consulting along value chains. We hypothesise that developing PSS in user- and stakeholder-integrated settings supports acceptance and diffusion and, by taking into account users' social practices of utilising novelties, reduces rebound effects caused by incorrect application.

Hamilton, J., Mayne, R., Parag, Y., Bergman, N., 2015, Scaling up local carbon action: the role of partnerships, networks and policy, *Carbon Management*, forthcoming

The transition to a low-carbon society is imperative to climate change mitigation and requires cross-sectoral action at multiple levels. A growing literature emphasizes local action, but less is written about scaling up action at a county level. Combining three analytical perspectives – transition theory, strategic niche management and the middle-out – we examine the evolution and scaling up of local community-scale carbon action in Oxfordshire county. Our analysis is based on four local-level research projects. By identifying the roles and strategies of local actors in the development and scaling up of low carbon innovation and action, we conclude that local meso-level actors are crucial for catalyzing initial stages of county-level transitions, but limited in their capacity to scale up low-carbon innovation.

Brown, H.S. and Vergragt, P.J., 2015, From consumerism to wellbeing: toward a cultural transition?, *Journal of Cleaner Production*, in press

As it becomes evident that technology alone is unlikely to fully counteract the ecological impacts of consumer society, the debate increasingly focuses on a need to shift beyond the consumerist economy and culture. This paper considers how a cultural shift toward less consumerist lifestyle choices might originate, driven not by moral imperatives or environmental movements, but by the core pursuit of human wellbeing. Our goal is to

jumpstart a serious conversation about plausible pathways to change, grounded theoretically and empirically. The history of consumer society is a reminder that cultural transformation of that magnitude could occur in a relatively short period of time. We hypothesize, drawing on demographic and economic trends, that technologically connected, educated, and open to change millennials might lead the way in that transition. Their diminishing interest in suburban life in favor of cities, constricted economic opportunities, and their size and interconnectedness all point in that direction. We envision a scenario in which the core understanding of wellbeing will change through the combined effects of changing lifestyles, adaptation to the economic, technological and demographic realities, and emerging new social practices. Extensive research on wellbeing suggests that such reframing can readily incorporate a shift away from consumerist lifestyles. To succeed, this shift needs government support at all levels through policies that enable young urban families to thrive. This paper is about the United States because it a global leader in the creation of the consumer society, with a per-capita ecological footprint about twice that of Europe, and with many emulators across the world. We contend that the US-grounded analysis presented in this paper has relevance for other parts of the world, and that it can inform research and debate on similar cultural transitions in other national contexts.

Tuominen, A., Wessberg, N. and Leinonen, A., 2015, Participatory and prospective value network analysis: supporting transition towards biofuels in Finnish road transport, *European Journal of Futures Research*, in press

If the European energy and transport sectors are to meet the 2050 energy and climate policy targets, major socio-technical change (transition) is necessary. Along with new technologies, changes are required also in other societal functions such as business models and consumer habits. The transition will require cooperation between public and private actors. This paper discusses the socio-technical change towards a 2050 road transport system based on renewable energy. More precisely, it proposes a novel, participatory foresight approach in the context of biofuels in Finland. The participatory and prospective value network analysis outlined in the paper combines elements from the fields of foresight, socio-technical change on multiple levels and value network analysis. It presents a novel, policy and business-relevant application with a set of practical tools to support development of implementation strategies, but also to boost new business opportunities in the fields of energy and transport.

Teles, E.O., Silva, M.S., Freires, F.G.M., Torres, E.A., 2015, Energy analysis and proposals for sustainability from the energy transition, *Low Carbon Economy*, 2015, 6, 21-29

The energy transition has become an increasingly attractive and necessary issue nowadays because of the tendency of scarcity and increased demand for fossil energy, and associated environmental impacts—for example, increased emission of greenhouse gases (GHGs), particularly CO₂, CH₄ and N₂O. From the study of several papers and reports from various international agencies like the World Energy Council (WEC), the International Energy Agency (IEA), the Policy Network for Renewable Energy (REN) and the World Organization of the United Nations (UN), this paper analyzes the global energy context, making a survey of what is being discussed under the theme “energy transition”, and suggests ways to reduce the consumption of fossil fuels, aiming at sustainability.