

Newsletter 15, March 2015

This is the fifteenth 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
- Event reviews
- New research projects
- Publications

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

The STRN steering group

Words from the Chairman

Dear transition research colleagues,

I am happy to introduce another STRN-newsletter that demonstrates the continued dynamism and high productivity of sustainability transitions research. Dynamism is evident, for instance, in the event announcements and research projects that pay attention to new topics (e.g. sharing economy), express concerns about speed and urgency ('are we doing enough') and announce a summer school (on the dynamics of social practices). High productivity is visible in the publication section which seems to grow longer in every successive newsletter. The publication section also includes many new PhD theses, which showcase the vitality of the transitions field in the sense that 'next generation' scholars decide to work on topics in this area.

Looking at the papers in the publication section I was struck by the high number of publications on green initiatives by local communities, grassroots, small-scale regions, and cities. While this may be a coincidence of this particular newsletter, it could be indicative of wider developments, e.g. a shifts in the green action from national to local levels. It could also indicate that transition dynamics at this level pose interesting new (empirical and conceptual) questions that attract scholarly attention; or it could indicate a normative preference of transition scholars for local solutions (small is beautiful). It is also interesting that several papers in the publications section (Moloney and Horne, 2015; Späth and Rohrer, 2015; Vandevyvere and Nevens, 2015; Hrelja *et al.*, 2015) express some doubts about the 'turn to the local', finding that many well-intended local initiatives face difficulties in 'scaling up' or replication in other locations. One paper (Marsden *et al.*, 2014) presents worrying results (based on interviews with local transport policymakers in the UK), which suggest that green transport has given way to economic growth as the over-riding political priority (also at local levels) and that this is often assumed to require more transport and

more road building. This tension between local initiatives and wider contexts will probably remain an interesting area for research and debate, perhaps also via blogs (see below).

The newsletter also includes various new examples of real-world impact of our research. First, a recent report by the Flemish Environment Agency (2014) describes transitions theory (p. 108-109) and uses it to make sense of the effects of and responses to mega-trends (see publications section). Second, the 'Making Transitions Happen' platform in Climate-KIC is applying transition theories to advise city authorities on comprehensive transition programs (see 'network news'). And, thirdly, STRN has been included as 'strategic partner' in an EU-funded network programme on eco-innovation, which enables us to disseminate transition insights to stakeholders and learn about specific problems and demands they face in real-world implementation (see 'new research projects').

On another note, I would like to remind you that the STRN-website (<http://www.transitionsnetwork.org/>) now has a blog functionality, which facilitates interactive discussion about transition topics, and enables STRN-members to post news items or engage in debates. Our hope is that members will use this blog functionality more for general issues and debates than for advertising personal projects or papers. If you want to post a blog on the STRN-website, please send an email to sustainabilitytransitions@gmail.com or to r.p.j.m.raven@uu.nl with your idea or with your entire blog. After a quick screening, we will quickly post the blog. Blogs are written on a personal basis.

Last but not least, I hope that many of you have submitted abstracts for the 6th International Sustainability Transitions (6-IST) conference from 25-28 August this year in Brighton (UK). The message from the conference organizers (see below under 'event announcements') suggests it promises to be a very exciting event, both intellectually and socially, so I hope to see many of you there.

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

Environmental Innovation and Societal Transitions

Volume 14 of *Environmental Innovation and Societal Transitions* was just published. It contains a special section, four regular papers and two viewpoints. The special section on "Electrification of the car – Will the momentum last?" contains the following contributions:

- Introduction - Sjoerd Bakker, Jacco Farla
- Low-carbon innovation from a hydroelectric base: The case of electric vehicles in Québec - Brendan Haley
- The EV paradox – A multilevel study of why Stockholm is not a leader in electric vehicles - Björn Nykvist, Måns Nilsson
- On the relation between communication and innovation activities: A comparison of hybrid electric and fuel cell vehicles - Björn Budde, Floortje Alkemade, Marko Hekkert
- Evaluating CO2 reduction policy mixes in the automotive sector - A. van der Vooren, E. Brouillat
- Assessing and comparing German and UK transition policies for electric mobility – C. Mazur, M. Contestabile, G.J. Offer, N.P. Brandon
- Analysing the potential for sustainable e-mobility: The case of Germany – K. Augenstein

The original research articles are:

- Trust and cooperation among urban poor for transition to cleaner and modern cooking fuel – B.P. Nayak, C. Werthmann, V. Aggarwal
- Broadening the national focus in technological innovation system analysis: The case of offshore wind - Anna J. Wiczorek, Marko P. Hekkert, Lars Coenen, Robert Harmsen
- The local community as a "low-carbon lab": Promises and perils - Eva Heiskanen, Mikko Jalas, Jenny Rinkinen, Pasi Tainio
- A socio-technical perspective on low carbon investment challenges – Insights for UK energy policy - Ronan Bolton, Timothy J. Foxon

Finally, two viewpoints are included:

- How transition management can inform development aid - Jens Marquardt
- Integrating industrial policies with innovative infrastructure plans to accelerate a sustainability transition - Thierry Giordano

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

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

Network News

Any news related to ongoing activities of STRN

Transitional theories applied to the decarbonisation efforts of leading European cities.

A new study by the Climate-KIC's Making Transitions Happen platform shows how towns and cities can chart a path for a successful transition to a low carbon economy. The report, entitled 'Maximising Europe's Low Carbon Activities: Moving from Individual Projects to Challenge-led, Transition Programmes' assesses programmes where public authorities have recognised the limitations of a traditional project approach, and moved towards more comprehensive transitional programmes. The document provides case studies of cities from across Europe and contextual analysis using transition theories as a basis. The lead policy adviser was Prof. Fred Steward of the Policy Studies Institute, a leading expert in innovation and societal transitions. The team behind the report hopes to use it to influence the allocation of European structural funds, stressing the need for a transitional approach to the decarbonisation efforts of Europe. Climate-KIC is now running a pilot project with the Polish region of Lower Silesia to apply transition methods to their structural funds programme. The Making Transitions Happen platform is now looking to expand the group to allow a wider range of cities to benefit from the application of transitional approaches.

Download the [Full Document](#) here and a [Summary Document](#) here. For more information about the future of the project contact Stuart Bowles at stuart.bowles@climate-kic.org

Event announcements

Calls for upcoming relevant events such as workshops and conferences

The 2015 annual Transitions Conference: A message from the program committee

The planning and preparing for this year's International Sustainability Transitions Conference hosted by SPRU (Science Policy Research Unit) is in full swing. We have received many proposals, and whilst the call for papers has now officially closed, submissions will be received up to the 20th March 2015. We are planning a conference with many exciting features based on the theme of 'Sustainability Transitions and Wider Transformative Change: Historical Roots and Future Pathways,' which looks at sustainability transitions with a long-term perspective. The transitions field is vibrant and diverse, and is in a process of deepening its knowledge base as well as expanding its agenda. The conference will fuel this process. Alongside an in-depth and innovative exploration of transitions in individual systems, as well as broader transformations of entire economies, societies and political systems, the conference will incorporate global perspectives, active engagement with business, civil society and government and the updating of the STRN Research Manifesto (which is available on the [Network's](#) website). We are also planning a PhD led session to introduce newcomers to some of the current debates in the field, and to help them make to make contributions to the conference. If you would be interested in organising or taking part otherwise, please contact Jonas Torrens (j.torrens@sussex.ac.uk). To celebrate and enjoy our sharing of ideas, we will also organize a big transition party! The conference is organized in the heart of the beautiful Sussex South Downs, a stone's throw from the Bohemian seaside city of Brighton and Hove, there will be no better place to be this summer between

25-28th August 2015. Registration will open in May. For more information, please see the website: www.ist2015.org We are looking forward to meeting you all at what promises to become an amazing transition event. **Johan Schot** on behalf of program committee (Florian Kern, Frans Berkhout, Benhard Truffer, Jonas Torrens).

First International Workshop on the Sharing Economy, 4-5 June 2015.

The sharing economy is a fast-growing phenomenon. People increasingly share their home, car, clothing or tools on Internet platforms such as Airbnb, Relayrides, BlaBlaCar and Peerby. In a strict sense, the sharing economy can be defined as consumers granting each other (“peer-to-peer”) temporary access to their under-utilized physical assets, possibly for money. In a broader sense, the sharing economy also includes peer-to-peer services (Uber, Lending Club, Taskrabbit, Helping), product-service systems (Zipcar, Philips lighting) and redistribution markets (eBay, freecycling groups on Facebook). The Copernicus Institute of Sustainable Development (Utrecht University, The Netherlands) is organizing an international workshop that aims to bring together researchers from all disciplines and regions to discuss scientific research on the sharing economy. Send in your full paper or extended abstract (750-1000 words) to k.frenken@uu.nl before March 15, 2015. You will be notified about acceptance before April 1st, 2015. For more information please visit this website (<http://www.uu.nl/en/events/first-international-workshop-on-the-sharing-economy>) or contact **Koen Frenken** (k.frenken@uu.nl).

Conference on Societal Transition – Are we doing enough?, 27 May, 2015, Edinburgh (UK)

We invite you to attend the TESS mid-term conference which explored the role of transition in addressing the societal challenge of moving from a high-carbon society to a low-carbon society. The event is for researchers, policy makers and those involved in community-led activity who share interests and ideas on sustainable transitions, societal change and community-led action. The event will include:

- * a debate by leading experts from different fields on the role of transitions in addressing the effects of climate change across different sectors (public, private, voluntary)
- * presentations on the latest research from TESS, looking at the contribution of community-based initiatives to societal change
- * a series of mini-symposia discussions on topics relating to low carbon transitions, community-based initiatives and sustainability

We will meet in the Edinburgh Centre for Carbon Innovation (<http://edinburghcentre.org/>).

Book the date right now and register to attend:

<https://www.eventbrite.co.uk/e/tess-mid-term-conference-tickets-15480877722>

If you are interested in the TESS programme, you can subscribe to our newsletter at <http://www.tess-transition.eu/newsletter/>. The first TESS newsletter is out and available at <http://www.tess-transition.eu/newsletter-february-2015/>.

PEAKS, SITES AND CYCLES: A Summer School on Energy and Mobility

14th-16th July 2014, DEMAND Centre, Lancaster University, England.

The call for applications for the 2015 DEMAND Centre Summer School is now open. The DEMAND Centre (Dynamics of Energy, Mobility and Demand) takes a distinctive approach to end use energy demand, recognising that energy is not used for its own sake but as part of accomplishing social practices at home, at work and in moving around. In essence the Centre focuses on what energy is for, how this changes, and how it might be steered. (<http://www.demand.ac.uk>). Summer School 2015 will focus on Peaks, Sites and Cycles; the temporal and spatial dynamics of energy and mobility demand. These are critical issues in the social sciences, and for practical efforts to reduce and manage peak loads in energy and mobility. Participants, along with researchers and academics from the DEMAND Centre will explore a variety of concepts and approaches for studying social space and temporalities of daily life. We will use these ideas to consider a range of questions including: how and why

do patterns of daily life vary across space and change over time? In what ways do technologies, interfaces and infrastructures co-constitute these patterns? How are assumptions of time and space imagined and incorporated into future visions, strategies and policies? The 3 intensive days will be academically challenging and fun, with presentations, indoor and outdoor workshops and networking activities. Applications are invited from research students, early career researchers and practitioners. For further information and details of how to apply visit: <http://www.demand.ac.uk/events/event/summer-school-peaks-sites-and-cycles-14-16-july-2015/>.

PhD Summer School: Shaping transition pathways for a future economy

Climate-KIC will organise a summerschool in Frankfurt/Germany (24 August to 4 September 2015) for about 30 to 40 doctoral students, focused on the challenges of the transitions to a Green Economy. The two week programme combines inspiring lectures, workshops, excursions, discussions, as well as project work in interdisciplinary teams under the topic: "Green City Frankfurt: Shaping transition pathways for a future economy". It is the third PhD Summer School taking place at Provdavis School of International Management in Frankfurt/Main. Last year, the participants developed innovative ideas for the energy transition of the city of Frankfurt. These efforts have led to the Summer School 2014 being awarded as an outstanding sustainability initiative by the German Council of Sustainable Development ("Werkstatt N Projekt 2015"). Do you want to join this year's success story and create your own transition concepts? We are looking for highly-motivated doctoral students with diverse professional backgrounds such as engineering, architecture, economics, urban planning and environmental science. Application for the Summer School will presumably open in the second part of April. More information on the programme and about how to apply coming soon on: <http://ckic-phd-ffm.net/>.

Event Reviews

Review of events interesting to the STRN community

Transitions Event in Australia

Monash University and The University of Melbourne co-organised a large transitions event featuring keynotes by Prof Jan Rotmans (DRIFT, Erasmus University Rotterdam, NL) and Prof Ralph Horne (RMIT, Melbourne, AUS). The event took place on Wednesday, 25 February at Melbourne Sustainable Society Institute (The University of Melbourne) and kicked off a new network of Australia-based Sustainability Transitions Researchers (ASTRA). It was a massive success, around 40 people registered and the venue was packed – with several people having travelled interstate (Sydney, Canberra) to participate. You can find Prof Rotmans presentation and the short penguin film he showed here: <https://www.dropbox.com/sh/wru9gemdhgcsy8g/AAAa6LROmvr2vB7WQVAMgafRa?dl=0> Prof Horne's presentations can be found here: <https://www.dropbox.com/sh/s9vqlrldgg8td4c/AAA-EX2Sdk2kME0-gx8hD95ea?dl=0> In addition to this, Dr Idil Gaziulusoy of the University of Melbourne tweeted extensively about the event and Prof Rotmans' presentation in particular. These tweets can be read as a storified summary (including pictures) here: <http://sfy.co/s093c> ASTRA currently counts around 70 people from 10 universities across 5 different Australian states. ASTRA aims to provide a platform for communication amongst Australia-based sustainability transitions researchers, for sharing research and to foster collaboration. A next event is already in the process of being organised. If you're interested in ASTRA or want to sign up – it's free – send an email to Fjalar de Haan (fjalar.dehaan@monash.edu).

New research projects

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

Green.eu project and the launch of inno4sd.net: a global network of networks about innovation for sustainable development has been initiated

During the recent kick off-meeting of the green.eu project

(<http://www.zew.de/en/projekte/1466>), we launched inno4sd.net, which is a global eco-innovation transition network initiated with start-up funding of the EU Commission within the Horizon 2020 framework. A range of core organizations will organize a series of network symposia open to all interested stakeholders, network members and other interested people. Important stakeholders involved are UNEP, Future Earth and STRN, which can present its insights about transitions to wider communities, while also learning about stakeholder demands and questions. Inno4sd is a “network of networks” which reaches out to all corners of society and all corners of the world to think afresh about issues of innovation, green economy and sustainable development. Inno4sd.net is an open network with a stakeholder-based agenda for learning, which invites multiple perspectives on the role of policy, science, technology and practice, and new forms of association, producing and living for maximizing the contribution of innovation to sustainable development. It is based on the idea that achieving the goal of a transition towards a sustainable economic development through innovation requires connections to be made between citizens as consumers and people who care and matter, researchers, businesses, public officials, society organizations, politicians, funders, knowledge brokers, educators, students, writers, journalists, artists and opinion formers. Websites of green.eu and inno4sd will be developed soon. If you interested in the activities of inno4sd or green.eu, please send an e-mail to green.eu@zew.de.

Sascha Rexhäuser and **Klaus Rennings** (ZEW, Centre of European Economic Research), green.eu@zew.de.

Renewal of manufacturing towards a sustainable circular bioeconomy and implications for innovation policy (RECIBI)

During 2015-2016, the Finnish Environment Institute, Aalto University Business School in Finland and IIIIE at Lund University in Sweden will carry out a project linking circular economy and bioeconomy. The project uses the concept of a circular bioeconomy – referring to the efficiency in and reuse of bio-based resources - to explore the implications of circular economy for the renewal of manufacturing industries using renewable raw materials such as wood. The possibilities for the sustainable transition of manufacturing will be assessed by a careful analysis of selected frontrunner cases in forest based industries in Finland and in Sweden. The project will also produce new knowledge on how policies can support the renewal of manufacturing and what demands the renewal puts on policies for a sustainable circular economy. Theoretically, REICIBI aims to combine innovation studies to transitions, focusing on industrial renewal. Empirically, it combines innovation policy analyses to cross-country comparisons of frontrunner value chains connected to circular bioeconomy and their positive and negative life cycle impacts.

For more information contact: Paula Kivimaa (paula.kivimaa@ymparisto.fi), Armi Temmes (armi.temmes@aalto.fi) or Åke Thidell (aake.thidell@iiiie.lu.se).

Green transition and co-evolution of industry and the energy system – GIST

This research project will during the next three years focus on ambitious long-term structural transitions for the energy-intensive natural resource-based industry in Sweden by exploring mitigation options, integration aspects, and potential development pathways and governance/policy strategies. The project will address the need for greater scientific understanding of long term transitions in industry and the energy system (as well as associated institutions), more knowledge about the prospects for decarbonising basic industry, and the interdependencies of basic industry and the energy system as well as the prospects for their co-evolution. Our aim is to make scientific contributions on theory and

method for the transition of energy-intensive natural resource-based industry, its interplay with the energy system, and provide a basis for future governance and policy strategies. The project is funded by the Swedish Energy Agency and will be carried out in the period 2015-2017. The project build on multi-disciplinary knowledge and collaboration between four research groups at Lund University: the Division of Environmental and Energy Systems Studies, CIRCLE, the Environmental Policies Research Group at the Department of Political Science, and the Department of Economics. **For more information**, please contact the project coordinator: Lars J Nilsson (lars_j.nilsson@miljo.lth.se) or Oscar Svensson (oscar.svensson@miljo.lth.se).

Publications

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

PhD thesis: Rachel Durrant, 2014, *Civil society roles in transition: Towards sustainable food?* Doctoral thesis, University of Sussex.

Civil society organisations (CSOs) in the UK are currently engaged in attempts to make food systems more sustainable, i.e. greener, fairer and healthier. These efforts have been maintained over several decades, for instance the Soil Association was launched in response to concerns about modern agriculture and food in 1946. But more sustainable food systems remain marginal. Thus, the aim of this thesis is to improve understanding of the important roles that CSOs can and do play within processes of large-scale social change (or 'transitions'). It does this by developing a typology of the distinguishable roles played by CSOs in transition, and relating this to empirical findings from three UK case studies. Through a mixture of field observations, documentary analysis and in-depth interviewing, it makes a number of relevant findings. First, it provides detailed empirical characterisation of the activities, relationships with other actors, and stated intentions of specific CSOs. Second, it finds that CSOs chart unique transformative pathways, both individually and collectively, which emerge from their interactions and strategic repositioning over time. Third, rather than being guided by a single shared vision of transition, CSOs are found to be engaged in a plurality of intended transformations that contend with, cross-cut and partially encompass each other. These findings contribute to scholarly knowledge about how civil society innovation operates at different structural levels, targets different elements within socio-technical systems, and engages different kinds of actors and practices. They also reinforce and extend existing understandings of how civil society actors exercise power in the context of transitions, and reveal how systemic perspectives – such as underlie transitions theory – can obfuscate both the intentions and activities of the actors involved, thereby raising questions about the attribution of agency in studies of transition.

PhD thesis: Graugaard, J., 2014, *Transforming Sustainabilities: Grassroots Narratives in an Age of Transition*, University of East Anglia.

This thesis investigates how sustainability transitions involve not only socio-technical change but a transformation in the worldview(s) that underpin high consumption lifestyles and culture. Building a theoretical understanding of how transitions in worldviews can be conceptualised and studied, it examines the way 'sustainability' is imagined, storied and enacted within the Dark Mountain Project, a network of writers, artists and thinkers who inquire into cultural responses to social-ecological crises. The thesis shows how engaging with the beliefs and assumptions inherent to dominant meta-narratives can open up for new knowledges and action to address the sustainability challenge. For more details see: <http://refiguring.net/thesis.html>.

PhD thesis: J.H. Wesseling, 2015, *Strategies of car manufacturers in sustainability transitions*, Copernicus Institute of Sustainable Development, Utrecht University

In this dissertation we study the role of incumbent firms in the socio-technical transition to a more sustainable society. Incumbents may oppose transitions to protect their vested interests, or they may support transition through innovation. To better understand the role of incumbents we study their innovation and political influence strategies. The focus is on the automotive industry. Firstly, we studied how competitive forces stimulate continued investments in the development of various Clean Vehicle Technologies (CVTs). Secondly, we quantitatively studied what types of incumbents pioneer radical innovation, by linking their incentive and opportunity to innovate to EV sales over the period 1990-2011. It turns out that during the period that EVs were commercialized (i.e. 2007-2011), car manufacturers that profited relatively little from the established technology and that had developed an EV asset position, were the ones to abandon the established technology first by engaging in radical innovation. Thirdly, we studied the innovation and political influence strategies incumbents used in response to the Californian zero emission vehicle mandate over the period 2000–2013. We developed a theoretical framework on corporate response strategies to public policy with which we integrate the innovation and political activities literature. Combining patent, sales and content analysis, the research shows that car manufacturers combine their innovation and political influence strategies in synergistic ways and that their role changed over time from hampering socio-technical transition to a more sustainable society, to facilitating it. We conclude with policy recommendations on how to deal with industry opposition to policy interventions.

PhD thesis: Augenstein, K. (2015). *E-mobility as a Sustainable System Innovation – Insights from a Captured Niche*, Schumpeter School of Business and Economics at the University of Wuppertal

Karoline Augenstein successfully defended her PhD thesis on November 26th 2014. The thesis investigates whether current developments in the field of e-mobility have the potential to contribute to a wider transition towards sustainable mobility. The empirical focus is Germany, where in 2009 the federal government launched its “National Development Plan for Electric Mobility” which aims at developing Germany as a lead market for electric mobility and set the concrete target of having 1 million electric vehicles on the road by 2020. A historical perspective shows that there have been unsuccessful hypes around e-mobility before and a sustainability transitions perspective highlights further that even if the German government’s goal were to be reached, a merely quantitative diffusion of electric vehicles will not suffice to achieve a sustainable transport system. This requires a more comprehensive vision of sustainable e-mobility including the development of renewable energies as electricity source, a reduction of the absolute number of vehicles and new mobility patterns, i.e. a system innovation. It is thus asked: How can we assess – at this critical early stage – whether there is potential for e-mobility developing as a sustainable system innovation? A theoretical framework is developed, based on the MLP and introducing the concepts of transformative capacity of a new technology (do electric vehicles trigger social innovations, e.g. new business models and use patterns?) and system adaptability (how stable is the mobility regime?). The analysis of the German innovation system shows that the system-innovative potential of this e-mobility niche remains limited, due to the powerful influence of incumbents, conflicting political goals and traditional science and R&D approaches. Momentum for system innovation can be identified where powerful actors from outside are involved, who are capable of viewing mobility in a more systemic way (e.g. actors from the public transport, ICT or housing sector). It is argued that the role of large demonstration projects is important, but they need to be designed as transdisciplinary research projects, in order to realize the true potential of e-mobility, which lies in its ability to cut across disciplinary and sectoral boundaries.

An electronic version of the thesis can be downloaded here: <http://www.reiner-lemoine-stiftung.de/en/scholarship-holders/publications.html>

PhD thesis: Maryam Nastar, 2014 *Navigating Troubled Waters. An analysis of how urban water regimes in the global South reproduce inequality.* Lund University

The dissertation analyzes driving forces behind inequality in access to water, while seeking also to develop a conceptual model capturing different aspects of the problem. In doing so, a structuralist perspective is built on the transition framework, integrated with critical urban theory and tested in two examples, Johannesburg, South Africa, and Hyderabad, India. In addition, a relational perspective, based on the concept of durable inequality, is used to scrutinize the relationship between state and citizen in contemporary South Africa and India. The dissertation illustrates that commercialization of cities and water utilities through the world-class narrative, combined with geo-historical and contextual inequality revolving around big social groups such as race, caste and class, are contributory factors in the enduring unequal water access that creates water crises. By asking the question “what can be done?”, the dissertation draws on the notion of collective agency and contentious politics, and strives to bring these concepts into the transition thinking, in order to contest the unsustainable characteristics of urban water regimes and ultimately inequality in access to water in urban areas. For more details see: <https://lup.lub.lu.se/search/publication/4377973>.

Book: Scoones, I., Leach, M., Newell, P. (eds.), 2015, *The Politics of Green Transformations*, Routledge

Multiple ‘green transformations’ are required if humanity is to live sustainably on planet Earth. Recalling past transformations, this book examines what makes the current challenge different, and especially urgent. It examines how green transformations must take place in the context of the particular moments of capitalist development, and in relation to particular alliances. The role of the state is emphasised, both in terms of the type of incentives required to make green transformations politically feasible and the way states must take a developmental role in financing innovation and technology for green transformations. The book also highlights the role of citizens, as innovators, entrepreneurs, green consumers and members of social movements. Green transformations must be both ‘top-down’, involving elite alliances between states and business, but also ‘bottom up’, pushed by grassroots innovators and entrepreneurs, and part of wider mobilisations among civil society. The chapters in the book draw on international examples to emphasise how contexts matter in shaping pathways to sustainability

Book: Bumpus, A., Tansey, J., Henriquez, B.L. and Okereke, C., 2015, *Carbon governance, climate change and business transformation.* Oxford: Routledge.

Transformation to a low carbon economy is a central tenet to any discussion on the solutions to the complex challenges of climate change and energy security. Despite advances in policy, carbon management and continuing development of clean technology, fundamental business *transformation* has not occurred because of multiple political, economic, social and organisational issues. *Carbon Governance, Climate Change and Business Transformation* is based on leading academic and industry input, and three international workshops focused on low carbon transformation in leading climate policy jurisdictions (Canada, USA and the UK) under the international Carbon Governance Project (CGP) banner. The book pulls insights from this innovative collaborative network to identify the policy combinations needed to create transformative change. It explores fundamental questions about how governments and the private sector conceptualize the problem of climate change, the conditions under which business transformation can genuinely take place and key policy and business innovations needed. Broadly, the book is based on emerging theories of multi-levelled, multi-actor carbon governance, and applies these ideas to the real world implications for tackling climate change through business transformation. Conceptually and empirically, this book stimulates both academic discussion and practical business models for low carbon transformation.

Book: Mukesh Lakum, 2015, *Socio-technical Transitions of Urban Mobility in India: from High to Low Carbon*, Shanti Publication, New Delhi

This book has examined the achievement of carbon emissions reduction target in transport sector could be required transition to new kind of mobility (transport) system, either a totally new or some combination of new and old systems. The existing belief that high mobility or incremental technological change provides the solution to the carbon reduction target is misconception or misplaced, as technological innovation can get part of the way, without mandatory institutional or behavioral change cannot be reduced carbon emission in transport sectors, which is only possible through socio-technical transitions. Therefore this book is providing significant contribution in the field of transport, climate change, urban studies and science, technology and innovation policy studies. This book is also provides detailed methodological explanations of past transition process, current challenges and possible future of the low carbon mobility system in India.

Flemish Environment Agency (2014), *Megatrends: far-reaching, but also out of reach? How do megatrends influence the environment in Flanders?*

The world's population is growing, development ambitions are increasing, the middle class is expanding, and urbanisation is on the rise. Emerging countries are reshaping the world order, both economically and geopolitically. But also society is in many respects becoming more diverse and vulnerable, with growing contrasts. They are examples of megatrends: already apparent long-term change processes that may have far-reaching effects for both society and the environment in Flanders. In the report "Megatrends: far-reaching, but also out of reach? How do megatrends influence the environment in Flanders?", the Environment Report Flanders (MIRA) identifies six global megatrends: 1) changing demographic balances, 2) accelerated technological developments, 3) growing scarcity of raw materials and other resources, 4) growing multipolarity in society, 5) climate change, and 6) increasing vulnerability of societal and ecological systems. With the input of experts, the driving forces were identified, as well as their societal and ecological impacts in Flanders. The report identifies, describes and analyses these six global megatrends as landscape-level developments, together with some (of their) counter-trends as niche-level developments. As a whole they heavily impact on Flemish society and the environment, mainly through four societal systems: spatial planning, mobility, energy, and production and consumption. Although Flanders' influence on these global developments is limited, the report shows how society and (environmental) policy can adequately deal with them by making those systems more sustainable, resilient and thus future-proof.' See also <http://www.milieurapport.be/en/publications/outlook-reports/megatrends-report> (in English) and <http://www.milieurapport.be/nl/publicaties/toekomstverkenningen/megatrends> (in Dutch).

Bakker, S., Leguijt, P. and Van Lente, H., 2015, *Niche accumulation and standardization - the case of electric vehicle recharging plugs*, *Journal of Cleaner Production*, forthcoming

In the socio-technical transitions literature, local niche projects have been described as sources of knowledge, experience, actor networks, and (positive) expectations. Local niches and local designs can however also become stumbling blocks when local designs are non-compatible with an emerging global standard. In this paper we study the emergence of standards for electric vehicle recharging plugs to answer the question whether and how local niches and their outcomes may hamper the process of niche aggregation. Our analysis shows that distinct local recharging plug standards have emerged for both regular and fast charging. Especially the standards for regular charging are clearly designed to comply with local regime rules and that these rules have thus prevented the development of a global standard. With our analysis we show that the local context may indeed be so intrusive that it inscribes itself irreversibly in technical designs and standards and hence lead to local lock-ins that prevent further aggregation. Even more so, we recognize a tension between the

need for local niche projects to comply with local rules and the need for the global niche to break free from such local rules in order to define universal designs instead.

Lachman, D.A., 2014, Transitioning the Dominican Republic: Regimes, niches and scenarios, *American Journal of Energy Engineering*, 2(1): 37-50

Energy security in the Dominican Republic is far from acceptable; black-outs, high tariffs, politicized decisions etc. are common. Furthermore, the future outlook seems worse due to effects of the global economy, climate change, oil prices, further degradation of the existing system, etc. A transition towards sustainable alternatives is therefore mandatory. In this paper a combination of existing concepts and approaches is used to identify possible roadblocks and windfalls for such a transition in the Dominican Republic. This combination starts with defining the unit of analysis, after which actors in the socio-technical energy system are charted through literature research and interviews. Next, using social network analysis, regimes and niches are identified to depict the unit of analysis in a more useful manner for managing transitions. The step hereafter consists of creating internal and external scenarios based on critical uncertainties to insure transition management efforts against uncertainty. Moving to Transition Management, robustness analysis is then used to evaluate strategies and policies in all combinations of these internal and external scenarios to get to an optimum set of strategies and policies which are used to form a normative scenario. This will be used to get stakeholders behind the transition effort. The results are a clear overview of the energy system, impediments and opportunities regarding transitions, possible futures, and the validity of strategies and policies in different scenarios for the Dominican Republic.

Ingram, J., Maye, D., Kirwan, J., Curry, N. and Kubinakova, K., 2015, Interactions between niche and regime: An analysis of learning and innovation networks for sustainable agriculture across Europe, *The Journal of Agricultural Education and Extension*, 21(1), 55-71

Purpose: This paper aims to reveal, and contribute to an understanding of, the processes that connect learning and innovation networks in sustainable agriculture to elements of the mainstream agricultural regime. Drawing on the innovations and transition literature, the paper frames the analysis around niche-regime interaction using the notion of niche-regime compatibility. Design/Methodology/Approach: 17 Learning and Innovation Networks for Sustainable Agriculture (LINSAs) engaged in agricultural food production, non-food and rural development were analyzed. In line with the project's transdisciplinary approach data were collected in a series of participatory workshops. Findings: Five modes of LINSAs-regime interaction are distinguished based on compatibility. The level of LINSAs-regime compatibility influences the extent of the diffusion of LINSAs ideas and practices into the regime. However, interaction processes within these modes reveal multiple and diverse connections between LINSAs and regime entities suggesting a more complex relationship exists. Practical implications: A range of connecting processes and activities (for example, certification, exemption from regulation, facilitation of networking) can bring about effective LINSAs-regime interaction and could be externally supported. Originality/Value: Empirical evidence from 17 case studies provides valuable insights from a number of different contexts across Europe. By directing analysis of interaction at the level of LINSAs (niche project), rather than at the macro level, the study offers an original perspective. It suggests that the transition to sustainable agriculture might be understood as a complex of interactive processes leading to a series of adaptive changes, rather than as regime change.

Walsh, C.L., Glendinning, S., Castán-Broto, V., Dewberry, E. and Powell, M., 2015, Are wildcard events on infrastructure systems opportunities for transformational change?, *Futures*, 67, 1-10

Infrastructure systems face a number of pressing challenges relating to demographics, environment, finance and governance pressures. Furthermore, infrastructure mediates the way in which everyday lives are conducted; their form and function creating a persistence of

unsustainable practice and behaviour that cannot be changed even if change is desired. There is a need to find means by which this obduracy can be broken so that new, more sustainable futures can be planned. This paper develops a methodology, taking concepts from both engineering and social science. Wild cards, or physical disruptions, are used to 'destructively test' complex infrastructure systems and the multi-level perspective is used as a framework for analysing the resulting data. This methodology was used to examine a number of case studies, and with focus groups consisting of a range of different infrastructure providers and managers, to gain a better understanding of systems' socio-technical characteristics and behaviours. A number of impactful 'intervention points' emerged that offered the opportunity to promote radical changes towards configurations of infrastructure systems that provide for 'less' physical infrastructure. This paper also examines the utility of wild cards as enablers of transition to these 'less' configurations and demonstrates how a 'wild card scenario' can be used to co-design infrastructure adaptation from with both infrastructure providers and users.

Penna, C.C.R. and Geels, F.W., 2015, Climate change and the slow reorientation of the American car industry (1979-2011): An application and extension of the Dialectic Issue LifeCycle (DILC) model, *Research Policy*, forthcoming

This paper uses the Dialectic Issue LifeCycle-model (DILC-model) to analyse the co-evolution of the climate change problem and strategic responses from the American car industry. The longitudinal and multi-dimensional analysis investigates the dynamics of the climate change problem in terms of socio-political mobilization by social movements, scientists, wider publics and policymakers. It also analyses how U.S. automakers responded to mounting pressures with socio-political, economic and innovation strategies oriented towards low-carbon propulsion technologies. We use a mixed methodology with a quantitative analysis of various time-series and an in-depth qualitative case study, which traces interactions between problem-related pressures and industry responses. We conclude that U.S. automakers are slowly reorienting towards low-carbon technologies, but due to weakening pressures have not yet fully committed to comprehensive development and marketing. The paper not only applies the DILC-model, but also proposes three elaborations: (a) the continued diversity of technical solutions, and 'ups and downs' in future expectations, creates uncertainty which delays strategic reorientation; (b) firms may develop radical innovations for political and social purposes in early phases of the model; (c) issue lifecycles are also shaped by external influences from other problems and contexts.

Konefal, J., 2015, Governing sustainability transitions: Multi-stakeholder initiatives and regime change in United States agriculture, *Sustainability*, 7(1), 612-633

Using a case study of US agriculture, this paper examines how governance affects sustainability transitions in socio-technical systems. The multi-level perspective (MLP) has become a leading framework for theorizing sustainability transitions in socio-technical systems. It posits that transitions to more sustainable socio-technical systems are an outcome of external pressure at the landscape level and internal pressure emanating from niches. While the MLP is a robust analytical framework, it under-theorizes the role that governance plays in sustainability transitions. This paper addresses this research gap through examining three multi-stakeholder initiatives (MSIs) that have developed sustainability metrics and standards for US agriculture: Field to Market; LEO-4000; and the Stewardship Index for Specialty Crops. Applying a governance analytical framework, membership selection, decision-making procedures, and access to resources are found to affect the kinds of sustainability metrics developed, as well as their likely implementation. Specifically, the governance processes functioned to channel sustainability metrics towards ones that were congruent with the existing agrifood regime, and marginalize metrics that had the potential to disrupt regime processes. Thus, this article proposes that governance is a key component of sustainability transitions, and that current usage of MSIs in much of environmental governance may function to moderate sustainability transitions.

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

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

Auvinen, H., Ruute, S., Tuominen, A., Ahlqvist, T. and Oksanen, J., 2015, Process supporting strategic decision-making in systemic transitions, *Technological Forecasting and Social Change*, forthcoming

This paper introduces a process for supporting strategic decision-making and policy planning in systemic transitions related to grand challenges such as climate change. The process uses the multi-level perspective (MLP) as an underlying theoretical framework and combines various methods and tools from the fields of foresight, impact assessment, simulation modelling and societal embedding. Decision-makers such as public sector authorities and politicians are the main target group, accompanied by other stakeholders and interest groups whose involvement throughout the process is stressed. The process is presented as a stepwise methodological working process and demonstrated by a theoretical case study. The demonstration explores the vision of 'emission-free transport in cities by 2050' in the context of motorised passenger transport in the Helsinki metropolitan area in Finland. The case study serves as an example of how to implement the process and how to make case-specific selections from the methods and tools from suggested fields.

Parage, Y. and Janda, K.B., 2014, More than filler: Middle actors and socio-technical change in the energy system from the “middle-out”, *Energy Research & Social Science*, 3, 102–112

This paper concentrates on 'middles' and 'middle actors' in energy systems and introduces a “middle-out” framework for examining and supporting systemic change to a lower carbon society. We propose this “middle-out” approach as a complement to “top-down” and “bottom-up” strategies. Our approach suggests that two essential elements for successful systemic change are actors' agency and capacity, where 'agency' refers to actors' abilities to make their own free choices, and 'capacity' refers to actors' abilities to perform the choices they made. We argue that due to their position between top and bottom actors and between technology and implementation, middle actors play crucial functions in the transition process. Their abilities are based to their own agency and capacity which they can exercise to influence the agency and/or capacity of other actors. The paper discusses middle actors vis-à-vis 'intermediaries' and demonstrates the value of the middle-out approach. Through elaborated examples of three middle actors – congregations, building professionals, and commercial building communities – it shows how middles exert influence upstream (to top actors), downstream (to bottom actors) and sideways (to other middle actors) through mediating, enabling and aggregating both themselves and others. A few weaknesses of this approach are discussed as well.

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

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

Viétor, B., Hoppe, T. and Clancy, J., Decentralised combined heat and power in the German Ruhr Valley: Assessment of factors blocking uptake and integration, *Energy, Sustainability and Society*, 5: 5

Background: In Germany, the energy system is undergoing reorganisation from a centralised system based on fossil fuels and nuclear power to a sustainable system based on decentralised production and consumption of energy, the so-called Energiewende. Recently, there has been more attention to improving energy efficiency in those regions where conventional energy production activities and energy-intensive industries are located, such as the Ruhr area. Although the potential for decentralised combined heat and power (CHP) units is high in this region, local action plans show only modest developments for this technology. In this paper, we address this issue by answering the following research question: Which factors block the uptake and integration of decentralised CHP in the German Ruhr area's energy system? Methods: The multilevel perspective (MLP) was used to analyse the state of system innovation in relation to the uptake and integration of decentralised CHP technology. Prior to the MLP analysis, a stakeholders' analysis was conducted to identify stakeholders' views, positions and experienced barriers regarding the uptake and integration of decentralised CHP technology. Data collection included review of text documents and conducting 11 interviews. Results: Due to many regime barriers blocking niche development, the uptake of decentralised CHP technology is limited. Identified barriers relate to lack of market services and mismatches with user preferences, (sectoral) policies and industrial interests. Conclusions: Observed barriers relate to (i) lack of market services such as financial means for making investments; (ii) user awareness such as unawareness and information deficit regarding the benefits of decentralised CHP to potential users, (iii) the presence of centralised district heating systems, (iv) policy issues such as lack of sufficient policies supporting diffusion of decentralised CHP units, legal stipulations from social housing policies that prevent housing cooperatives from becoming energy producers and district heating systems owned by public and private owners (via concessions contracts); (v) sector issues such as lack of skilled service-providing companies; and (vi) industrial interested such as the vested interests of the coal and gas industry. Moreover, many of the mentioned barriers seem interrelated, especially those concerning policy and finance available for making upfront investments.

Baas, L.W. and Hjelm, O., 2015, Support your future today; Enhancing sustainable transitions by experimenting at academic conferences, *Journal of Cleaner Production*, forthcoming

Major societal changes which challenge societal functions and actors' activities are needed to enhance sustainable development. Thus sustainable transitions research emphasizes co-evolutionary approaches involving a multitude of actors including the business sector, the government, and academia. Academic research can catalyze sustainable transitions by

critically analyse current societal trends to develop and disseminate new knowledge. At research conferences, researchers and practitioners meet to network and discuss recent research findings providing arenas for testing and evaluating ideas to enhance sustainable transitions. This however requires some modifications of the standard design of a research conference. Here we report learning outcomes from experimenting at the 18th international Greening of Industry Network conference during 21-24 October 2012 in Linköping, Sweden. The conference was a combination of a traditional conference structure with different interactive elements such as sustainability jam-sessions to discuss future challenges of six companies and clusters of companies at their site. The intention of doing so was to enhance learning outcomes both for visiting conference delegates and among actors in the host region. This was perceived by the participants as an innovative approach fostering both problem solving and creation of new ideas. Four out of the six companies continued dialogues about sustainable production fields or bio-refineries with Linköping University. In addition we introduce and summarize research findings presented at the conference which were further developed into research articles. The essence of these articles covers sustainable industry management; cleaner production; industrial ecology; cooperation between industry, governments and academics; dissemination of concepts and technologies; methods and tools for modelling and measuring of industrial symbiosis, CO₂ performance and eco-efficiency.

Phillips, M. and Dickie, J., 2014, Narratives of transition/non-transition towards low carbon futures within English rural communities, *Journal of Rural Studies*, 34, 79-95.

Drawing on Anderson's (2010) identification of calculative, imaginative and performative modes of anticipatory action where futures are made present in the present day, this article explores how rural studies have explored futures before focusing its attention on the degree to which residents in four villages in England make evaluations of rural futures linked to issues of low carbon lifestyles and climate change. Particular attention is paid to the role of imaginative constructions of rurality in influencing anticipatory actions associated with carbon dependency and climate change. The study reveals the presence of disjunctures between expressed concerns over energy consumption and climate change, and associated mitigative and adaptive actions. It is noted that such disjunctures have been widely observed in previous studies and interpreted through some variant of a 'deficit model of public understanding'. It is argued, however, that such models ignore the presence of cultural and material constraints on action, the presence of pre-existing imaginative and performative interpretations of futures, and the degree to which people are aware of such disjunctures and construct narratives for the self that seek to resolve, deny or displace dissonances between beliefs and actions. The paper outlines five narratives that promote stasis as well as three narratives of transition, considering how they make a range of futures both present and absent.

Ratinen, M. and Lund, P., 2015, Policy inclusiveness and niche development: Examples from wind energy and photovoltaics in Denmark, Germany, Finland, and Spain, *Energy Research & Social Science*, 6, 136-145

In this article, we analyse the influence of the inclusiveness of policies on niche development. We focus on political inclusion. A typology is developed for analysing the influence of the relative degree of inclusion in policy processes and outcomes on niche development. The electricity industry is used as the empirical example of a regime, and wind energy and photovoltaics for niches. A qualitative case study of the relative inclusion in policies in Denmark, Germany, Finland, and Spain is presented. We found that the policies in Denmark and Germany are the most inclusive, then those in Spain, and those in Finland the least. The same countries have the most and the least developed niches. It seems that a relatively high degree of inclusion in policy processes and outcomes enhances niche development. Our findings also suggest that the role of the government is more political than is often proposed.

Vandevyvere, H. and Nevens, F., 2015, Lost in transition or geared for the S-curve? An analysis of Flemish transition trajectories with a focus on energy use and buildings, *Sustainability*, 7(3), 2415-2436

In recent years, many cities have adopted action plans to become climate neutral in the coming decades. Hereby, a strong motivational factor has been the goal to realize a win-win situation in the long term: climate neutrality and sustainable functioning are not only beneficial for the environment, but are equally beneficial for society and for the economy if well-integrated trajectories are adopted. Nevertheless, as actors across the fields start to implement these plans, many practical obstacles have arisen. These barriers are typical of a systemic transition: dominant practices are characterized by path dependencies, vast institutional frameworks and vested interests that are hard to break through. At the same time, relevant initiatives typically show some elements of uncertainty and a long term return, factors that make it difficult to attract financial investments. The present article addresses the state of the art for current transition experiments in the region of Flanders, Belgium, focusing on actions related to energy and buildings in cities. A brief overview of the state of affairs in several cities and provinces is presented, and some important opportunities and bottlenecks are identified. The resultant findings are tested against the framework of transition theory and related literature on the subject. Subsequently, a set of possible strategies to overcome the above mentioned barriers is formulated. These strategies focus on effectively mobilizing actors and investments. - See more at: <http://www.mdpi.com/2071-1050/7/3/2415/htm#sthash.EMkRPwIS.dpuf>

Brigss, M., Webb, J. and Wilson, C., 2015, Automotive modal lock-in: The role of path dependence and large socio-economic regimes in market failure, *Economic Analysis and Policy*, in press

This paper addresses less recognised factors which influence the diffusion of a particular technology. While an innovation's attributes and performance of are paramount, many fail because of external factors which favour an alternative. This paper, with theoretic input from diffusion, lock-in and path-dependency, presents a qualitative study of external factors that influenced the evolution of transportation in USA. This historical account reveals how one technology and its emergent systems becomes dominant while other choices are overridden by socio-political, economic and technological interests which include not just the manufacturing and service industries associated with the automobile but also government and market stakeholders. Termed here as a large socio-economic regime (LSER), its power in ensuring lock-in and continued path-dependency is shown to pass through three stages, weakening eventually as awareness improves. The study extends to transport trends in China, Korea, Indonesia and Malaysia and they all show the dominant role of a LSER. As transportation policy is increasingly accountable to address both demand and environmental concerns and innovators search for solutions, this paper presents important knowledge for innovators, marketers and policy makers for commercial and societal reasons, especially when negative externalities associated with an incumbent transportation technology may lead to market failure.

Moloney, S. and Horne, R., 2015, Low carbon urban transitioning: From local experimentation to urban transformation?, *Sustainability*, 7(3), 2437-2453

Climate change mitigation remains a contested political and policy issue nationally in Australia. Nevertheless, Australian cities have been actively engaging with low carbon policy for well over a decade and numerous actions and programs have resulted. A question arises as to whether such initiatives can amount to a transition; a systemic change from one dominant fossil-fuel based socio-technical regime, to another, fossil-free based socio-technical regime. In this paper, we review the critical literature on low carbon governance and socio-technical transitions and present a set of criteria by which we propose it is possible to assess the emergence of and/or progress towards low carbon urban transition. We then apply this approach to a case study. The paper presents findings from a review of

low carbon initiatives in Australia with a particular focus on Melbourne, Victoria exploring the policy context in which these initiatives and responses have emerged, the typical approaches adopted and the implications for urban change and governance. We examine the roles of, and relationships between, different levels of government, climate change alliances, community/environmental organisations and other actors, and assess progress of the urban low carbon transition. In so doing, we identify significant shortcomings and policy disconnects which we argue are limiting progress towards a low carbon future in Victoria.

Dóci, G., Vasileiddou, E., and Petersen, A.C., 2015, Exploring the transition potential of renewable energy communities, *Futures*, 66, 85–95

Renewable energy communities are grassroots initiatives that invest in 'clean energy' in order to meet consumption needs and environmental goals and thereby – often unwittingly – conduce to the spread of renewables. Our aim in the present study is to explore the potential of renewable energy communities in the Netherlands, as social niches, to contribute to transitions in the energy system. To do so, we propose three proxies for measuring the transition potential of social niches, based on proxies for technological innovations derived from the literature. In addition, we reinterpret the notion of niches and the way transition occurs by arguing that niches are complex systems in which both technological and social innovations develop simultaneously and that during a transition entire niches link up with the regime. Furthermore, we make a distinction between internally and externally oriented niches based on their orientation and application focus. We use a comparative case study analysis complemented by a systematic literature and documentary review to show that these communities are already changing the Dutch energy system, by connecting to regime actors. Their further advancement depends on strengthening their links to established actors, but also on providing a favorable regulatory framework.

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

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

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*, forthcoming

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.

Marsden, G., Mullen, C., Bache, I., Bartle, I., and Flinders, M., 2014, Carbon reduction and travel behaviour: Discourses, disputes and contradictions in governance, *Transport Policy*, 35, 71-78

Prospects for mitigating climate change require decarbonisation of the energy sector over relatively short time periods, coupled with significant changes to the way we consume energy. This is particularly true in the transport sector given the current levels of transport-related greenhouse gas emissions, the heavy dependence on fossil fuels, and the uncertainty surrounding transition pathways to ultra-low carbon vehicles. There are policy responses aiming to reduce carbon emissions by changing travel behaviour, but prominent approaches share a common theme of seeking to change behaviour by focusing on the individual and their choices. These are the object of critics who maintain that effective change requires collective action at the social, economic and cultural levels. This paper questions whether decision-makers are relying on these choice-based approaches to change travel behaviour and, if so, how effective they expect them to be. We address this through analysis of over 50 interviews with policy stakeholders in England and Scotland. We find dominant policy approaches do focus on individual choices, but significantly it is not because decision-makers have faith in their effectiveness. These approaches persist in policy on carbon reduction for two reasons. One is appeal to a politically powerful, but incoherent, discourse of individualism. The second is that decision-makers do not want significant behavioural change. There is an imperative of economic growth and a firm belief that a strong economy is linked to higher traffic levels, and that to reduce the demand for travel is to risk economic damage. We argue that these beliefs about the relation between travel demand and prosperity are narrowly defined and contestable for empirical and normative reasons. If there is to be a significant change in the approach to intervening in travel demand there is an urgency to engage in the politics of behaviour change – a meta-level behaviour change challenge.

Frondel, M., Sommer, S. and Vance, C., 2015, The burden of Germany's energy transition: An empirical analysis of distributional effects, *Economic Analysis and Policy*, in press

Germany's energy transition has been accompanied by a near doubling of power prices for private households since the outset of the new millennium. Millions of poor households and those that are close to the poverty threshold are likely to suffer from these increases in electricity cost. Focusing on low-income households, this paper illustrates the distributional implications of Germany's energy transition by investigating their electricity cost burden between 2006 and 2012, using data from the German Residential Energy Consumption Survey (GRECS). Our estimates suggest that in 2012, on average, households at poverty risk allocated 5.5% of their income to power and, hence, paid nearly as much for covering their electricity consumption as for heating purposes. Given Germany's ambitious targets to expand the share of costly renewable technologies in electricity consumption, which has broad support among the electorate, it is to be expected that households' expenditure for power will increase in the upcoming years. This raises the urgent question of how to mitigate the regressive impact of further increasing electricity prices on poor households. Direct cash transfers are suggested here as a non-distortionary instrument for easing the burden of high prices, one that is directly targeted at those endangered by energy poverty.

Ruth, M., Özgun, O., Wachsmuth, J. and Gössling-Reisemann, S., 2015, Dynamics of energy transitions under changing socioeconomic, technological and climate conditions in Northwest Germany, *Ecological Economics*, 111, 29-47

This paper analyzes regional interdependencies and trajectories of the energy and agriculture sectors in Germany's Northwest Metropolitan Region in order to assess the performance of regional low-cost and low-carbon strategies to alter energy sector profiles in

the light of changing socioeconomic, technological and climate conditions. Our assessment is based on a dynamic, interactive simulation model for the years 2010 to 2050, which was developed and played out in close collaboration with diverse stakeholder groups in the region. Results from the model and modeling exercises demonstrate the need to increase energy efficiency because the reduction in demand it generates extends the policy space for decreasing emissions and reduces vulnerability to climate change. The results also show the feasibility of expanding renewable energy without heavy reliance on biomass, which currently is an important and contested source of energy in the region.

Hrelja, R., Hjerpe, M, and Storbjörk, S., 2015, Creating transformative force? The role of spatial planning in climate change transitions towards sustainable transportation, *Journal of Environmental Policy & Planning*, in press

Informed by the concept of strategy making, this paper analyses the ability of spatial planning to support local climate change transitions towards sustainable transportation in two case studies of planning in Swedish municipalities with comparatively high climate ambitions. The analysis shows that the expectations on planning to effect change need to be moderated. Not even in these climate-ambitious municipalities did transportation planning result in strategic reorientation. While climate change was clearly filtered into local strategy making, no new climate frame was established. Rather in goals, it was linked to an overall attractive city storyline. Transportation planners have sought to mobilize force through developing new tools and routines to strengthen the role of climate change. In detailed planning, however, when plans become legally binding, agency in relation to climate change was limited by allowing private actors a pivotal position. Also, tools were used selectively and when settling priorities, climate change was subordinate to economic growth interests. While the planning observed can be regarded as weak, its ability to support climate transition would have been even weaker had it not been linked to the attractive city storyline. Consequently, to facilitate climate transition mobilizing force needs to be generated within the current local implementation structure.

Van der Schoor, T. and Scholtens, B., 2015, Power to the people: Local community initiatives and the transition to sustainable energy, *Renewable and Sustainable Energy Reviews*, 43, 666–675

The transition towards renewable and sustainable energy is being accompanied by a transformation of communities and neighbourhoods. This transition may have huge ramifications throughout society. Many cities, towns and villages are putting together ambitious visions about how to achieve 100% sustainable energy, energy neutrality, zero carbon emission or zero-impact of their communities. We investigate what is happening at the local community level towards realizing these ambitions from a social perspective. We use the case study approach to answer the following question: how do local community energy initiatives contribute to a decentralized sustainable energy system? We find that especially the development of a shared vision, the level of activities and the type of organisation are important factors of the strength of the 'local network'.

Vahl, F.P., and Filho, N.C., 2015, Energy transition and path creation for natural gas in the Brazilian electricity mix, *Journal of Cleaner Production*, 86, 221–229

Emerging economies will account for more than 90% of net energy demand growth to 2035. Although there is international consent about the need for reducing green-house gas (GHG) emissions, reduction targets have been left to governments' responsibility. Such opening lead to different energy policies and approaches among countries, specially comparing developing economies to developed ones. Technology development and new reserves found have set natural gas as the lead resource for transitioning energy mixes to lower carbon levels. However, hydropower has been the main source for the Brazilian electricity grid, and increasing dispatch of natural gas in fact increases GHG, which has been the core of current Brazilian energy policies. We estimated future Brazilian market shares of hydro, thermal, wind and nuclear power, through historical data analysis of power dispatch and

installed capacity. The findings propose that current Brazilian administration is creating a new technological path, which will lead far from the desired GHG targets. If actual growth rate of thermal power continues, by the year 2022 thermal plants will be major suppliers of the Brazilian electricity grid, leaving hydro with the second largest market share. Furthermore, we propose several approaches for increasing adoption of renewable distributed generation and the development of other market niches for natural gas in Brazil, as alternative paths.

Rodrigo, P., Muñoz, P., Wright, A., 2015, Transitions dynamics in context: Key factors and alternative paths in the sustainable development of nations, *Journal of Cleaner Production*, in press

The spatial dimension of sustainability transitions is central to understanding how systems change, yet current literature falls short when it comes to explaining transitions dynamics in context, and the central factors and alternative paths through which particular spaces move towards or away from sustainable development efforts. We conduct an exploratory factor analysis and a post-hoc cluster analysis of sustainability transition dynamics at a spatial level in 99 nations. Based on our analyses we establish a multi-dimensional measurement tool of nation sustainability that considers place, time and directionality. The analysis yielded four key dimensions - governance quality, industrial pollution, socio-environmental conditions and clean wealth creation - upon which we elaborated clusters of nations representing four distinct empirical types of transition pathways, *crossroaders*, *compliers*, *athletes* and *laggards*. In doing so we provide a holistic view of the phenomenon, which is relevant for both further theorizing and policy development.

Hajer, M., Nilsson, M., Raworth, K., Bakker, P., Berkhout, F., de Boer, Y., Rockström, J., Ludwig, K. and Kok, M., 2015, Beyond cockpit-ism: Four insights to enhance the transformative potential of the sustainable development goals, *Sustainability*, 7, 1651-1669

The Sustainable Development Goals (SDG) have the potential to become a powerful political vision that can support the urgently needed global transition to a shared and lasting prosperity. In December 2014, the United Nations (UN) Secretary General published his report on the SDGs. However, the final goals and targets that will be adopted by the UN General Assembly in September 2015 risk falling short of expectations because of what we call “cockpit-ism”: the illusion that top-down steering by governments and intergovernmental organizations alone can address global problems. In view of the limited effectiveness of intergovernmental efforts and questions about the capacity of national governments to affect change, the SDGs need to additionally mobilize new agents of change such as businesses, cities and civil society. To galvanize such a broad set of actors, multiple perspectives on sustainable development are needed that respond to the various motives and logics of change of these different actors. We propose four connected perspectives which can strengthen the universal relevance of the SDGs: “planetary boundaries” to stress the urgency of addressing environmental concerns and to target governments to take responsibility for (global) public goods; “the safe and just operating space” to highlight the interconnectedness of social and environmental concerns and its distributive consequences; “the energetic society” to benefit from the willingness of a broad group of actors worldwide to take action; and “green competition” to stimulate innovation and new business practices. To realize the transformative potential of the SDGs, these four perspectives should be reflected in the focus and content of the SDGs that will be negotiated in the run up to September 2015 and its further implementation.

Gibbs, D. and O'Neill, K., 2015, Building a green economy? Sustainability transitions in the UK building sector, *Geoforum*, 59, 133-141

This paper explores the interest by policy makers to encourage and develop a green economy, with a particular focus on UK government attempts to engender a shift in the mainstream building and construction sector towards adopting green building methods and

techniques. The building sector has been the focus of endeavours to engender a shift towards greener ways of working and building, due to its high contribution to greenhouse gas emissions and associated concerns over enhanced global warming and climate change. The paper outlines the recent development of national UK policy on green building as exemplified in legislation for the Code for Sustainable Homes and in Building Regulations. These have given rise to a particular set of responses to green building requirements that favour technological solutions that can readily be accommodated by the existing system. In critiquing these developments we draw upon socio-technical sustainability transitions research, one strand of which has focused on the ways in which niche developments can challenge and disrupt existing regimes of practice. We do this empirically through our research into the green building sector which has involved in-depth interviews with a range of actors from the UK green building sector, including architects, building companies, materials suppliers and policy makers. Respondents from within the green building niche are critical of current UK legislation, and argue that its narrow conceptualisation fails to adequately encourage, or recognise, what they would consider to be green building forms that will contribute to substantial reductions in carbon emissions, nor does it respect locally appropriate building methods.

Seiwald, M., 2014, The upscaling of renewable energy technologies: Experiences from the Austrian biomass district heating niche, *Moravian Geographical Reports*, 22(2), 44-54

The successful diffusion of sustainable technologies is termed “upscaling” in the transition studies literature. This paper maintains that upscaling is an ambiguous notion that suggests that technology diffusion processes follow a linear trend from small-scale pilot plants to industrial-scale facilities. On the ground, however, socio-technical configurations are implemented at a variety of scales, simultaneously. These issues are demonstrated in this paper by analysing the historical development of the Austrian biomass district heating niche. Drawing on secondary statistical data and primary qualitative semi-structured interviews, it is possible to identify four generic socio-technical configurations or dominant designs that, in conjunction, shape the diffusion dynamics of this technology in Austria

Miller, C.A., Richter, J. and O’Leary, J., 2015, Socio-energy systems design: A policy framework for energy transitions, *Energy Research & Social Science*, 6, 29-40

In the context of large-scale energy transitions, current approaches to energy policy have become too narrowly constrained around problems of electrons, fuel, and carbon, the technologies that provide them, and the cost of those technologies. Energy systems are deeply enmeshed in broad patterns of social, economic, and political life and organization, and significant changes to energy systems increasingly are accompanied by social, economic, and political shifts. Energy policy is therefore, in practice, a problem of socio-energy system design. In this article, we offer a definition of socio-energy systems, reconceptualize key questions in energy policy in terms of socio-energy systems change, analyze three case studies of energy policy development as problems of socio-energy systems design, and develop recommendations for rethinking energy policy and governance in the context of socio-energy systems transitions.

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.

Nissilä, H., 2015, Conferences as sequential arenas for creating new sustainable fields, *Industry and Innovation*, forthcoming

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 towards increased sustainability in the technologies, rules and roles that govern established industries. The paper 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.

Puente-Rodriguez, D., Swart, J.A.A., Middag, M. and Van der Windt, H., 2015, Identities, communities, and practices in the transition towards sustainable mussel fishery in the Dutch Wadden Sea, *Human Ecology*, in press

The Dutch mussel fishery in the Wadden Sea, a World Natural Heritage Site, is currently involved in a step-by-step transition from the traditional but controversial method of dredging mussel seed from natural beds using trawl nets to alternative sustainable practices. The main objectives of the transition are to allow the natural development of mussel bed ecosystems and to simultaneously achieve a large-scale sustainable mussel fishery. The transition is a joint enterprise of state officials, environmental organizations, and the mussel fishery sector and requires striking a balance among their differing interests and identities. As such, it may be considered as an example of social learning. This article explores the multiple efforts and controversies of this transition using concepts such as identities, communities and practices. We conclude that the transition endeavor is characterized by innovative new practices that have brought together two in principle contradictory identities in order to negotiate natural and social limits that might facilitate a sustainable future for the mussel fishery in the Wadden Sea.

Zhao, P. and Pendlebury, J., 2014, Spatial planning and transport energy transition towards a low carbon system, *disP - The Planning Review*, 50(3), 20-30

In recent years, transport-related carbon emissions in cities have been increasingly recognized as a vital issue in relation to climate change. A transition in urban transport energy use has been called for by both politicians and the public. The use of less energy generally and greener energy if possible have been widely accepted by planners as the two goals of this transition. However, the question of whether and how we can achieve these goals through spatial planning remains debatable. This paper conducts a literature review examining the role of spatial planning in the transition in urban transport energy use. Four major aspects of spatial planning are discussed with regard to its influence on this transition: effectiveness, efficiency, equity and enforcement. Furthermore, the four main elements of

the urban transport energy transition process will be addressed: instruments, individuals, institutions and the complex interactions between them. Ultimately, it is difficult to say whether spatial planning can play an efficient role in assisting the transition in urban transport energy use. However, it is clear that if it is to do so, it must be supported by proper policy instruments and enforced in a manner that changes current human practices and market conditions in the field of transport. Dealing with sociotechnical uncertainties in the process of transition is another challenge to spatial planning. More innovative approaches are needed if spatial planning practice is to assist in the transition towards a low carbon urban transport system and a low carbon city.

Hunt, M. and De Laurentis, C., 2015, Sustainable regeneration: a guiding vision towards low-carbon transition?, *Local Environment*, forthcoming

While the concept of sustainable development brings together concepts of economic, environmental and social sustainability, much has been said regarding inherent tensions between them. Conflicts between economic and environmental objectives, in particular, have been noted as restraining efforts to instigate transitions to environmental sustainability, with growth ambitions limiting environmental policy to “win-win” cases. This paper argues that they can also play complementary roles in managing transitions by creating inclusive visions for rallying actors and resources. This is explored by looking at a case of sustainable regeneration in Wales, UK. Using as a case study the Arbed scheme, an area-based project established in 2009 to retrofit housing stock for energy efficiency, this paper shows how the scheme explicitly addresses economic, environmental and social aspects of sustainability; and, in particular, how sustainable development aims constituted a guiding vision that supported the formation of actor and resource networks necessary for large-scale retrofitting.

Mattes, J., Huber, A. and Koehrsen, J., 2015, Energy transitions in small-scale regions: What we can learn from a regional innovation systems perspective, *Energy Policy*, forthcoming

The prevalent theories in the debate on sustainability transitions have been criticised for not sufficiently addressing energy change processes at the local level. This paper aims to enhance our understanding of local energy reorganisation processes. Drawing on the Regional Innovation Systems (RIS) approach, we argue that local development dynamics result from the interaction of various subsystems: science, politics, public administration, industry, finance, intermediaries and civil society. The analysis of the involved subsystems and their interaction shows how energy transitions are shaped by different individual and organisational actors as well as institutions on the local level. Empirical evidence from case studies on the German cities of Emden and Bottrop illustrates our theoretical conceptualisation of energy transitions. We conclude by presenting characteristic interaction patterns for energy transition drawn from the two cases.

Hoppe, T., A. Graf, B. Warbroek, I. Lammers, and I. Lepping. (2015). Local governments supporting local energy initiatives; Lessons from the best practices of Saerbeck (Germany) and Lochem (The Netherlands). *Sustainability*, 7(2),1900-1931

The social dimension of the transition to a low carbon economy is a key challenge to cities. The establishment of local energy initiatives (LEIs) has recently been attracting attention. It is of great importance to draw lessons from best practices when LEIs have been facilitated by local governments and made a substantial contribution to greening local energy systems. The main research questions in this paper are: What lessons can be drawn from successful local low carbon energy transition cases, and which strategies proved successful to support LEIs? We have used analytical notions from the Strategic Niche Management (SNM) and grassroots innovation literature to analyze two best-practice cases: Saerbeck (Germany) and Lochem (The Netherlands). Data collection involved a set of fourteen in-depth interviews and secondary data. The results show that three key factors from SNM (building networks, managing expectations, and facilitation of learning) are of great importance. However, to a great degree it is also strategic, community serving, responsive, reflexive leadership and

proper process management by public officials that spurred success, which would not have been possible without close interaction and mutual trust between local government and representatives of the local communities.

Blanchet, T., 2015, Struggle over energy transition in Berlin: How do grassroots initiatives affect local energy policy-making?, *Energy Policy*, forthcoming

This paper examines the growing role of grassroots initiatives in the governance of urban energy systems. In recent years, research has increasingly underlined the potential for sustainable innovation of community-led bottom-up actions but has at the same time underestimated their potential impact on the governance of energy systems. Based on a strategic action field framework (SAF), this paper analyses the conflicts over the remunicipalisation of Berlin's electricity grid and investigates the creation and strategic development of two grassroots initiatives as well as their interaction with the local government and the established grid operator. We argue that grassroots initiatives have an important impact on the local energy system, not just through their influence on the implementation of local energy policy but above all by their framing of a specific vision of a local energy transition. The paper discusses the scope and limits of such initiatives in an urban context.

Späth, P. and Rohracher, H., 2015, Conflicting strategies towards sustainable heating at an urban junction of heat infrastructure and building standards, *Energy Policy*, forthcoming

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

Antal, M. and Van Den Bergh, J.C.J.M., 2015, Green growth and climate change: conceptual and empirical considerations, *Climate Policy*,

The feasibility of green growth is studied in the context of climate change. As carbon emissions are easier to quantify than many other types of environmental pressure, it will be possible to reach a more definite conclusion about the likelihood of green growth than has been possible in the long-standing historical debate on growth versus the environment. We calculate the rate of decoupling between gross domestic product (GDP) and GHG emissions needed to achieve internationally agreed climate targets. Next, eight arguments are considered that together suggest that fast decoupling will be very difficult. Subsequently, we examine the main lines of research used by proponents of green growth to support their viewpoint, including theoretical arguments, exercises with integrated assessment models, and studies of the environmental Kuznets curve hypothesis. It will be concluded that decoupling as a main or single strategy to combine economic and environmental aims should be judged as taking a very large risk with our common future. To minimize this risk we need to seriously consider reducing our dependence on growth. This requires a fundamental change of focus in both economic research and policy.

Cecere, G., Corrocher, N., Gossart, C., and Ozman, 2015, Lock-in and path dependence: An evolutionary approach to eco-innovations, *Journal of Evolutionary Economics*, 24(5), 1037-1065

The article presents an overview of the evolutionary approach to eco-innovations with particular emphasis on the role of lock-in and path dependence. In doing so, it focuses on the processes of radical change and the transition of technological systems that require the co-evolution of technology, firms, institutions and the society as a whole. Starting from clarifying the different notions of eco-innovations used in the literature, the article discusses the issues of lock-in and path dependence, by investigating the technological, organizational, institutional and social processes that strengthen as well as weaken path dependence. To this aim, it draws upon the evolutionary literature and discusses the relevance of path dependence and lock-in processes to understand the development of eco-innovations.

Arkesteijn, M., van Mierlo, B., & Leeuwis, C. (2015). The need for reflexive evaluation approaches in development cooperation. *Evaluation*, 21(1), 99-115.

Within development cooperation, development issues are increasingly recognized as complex problems requiring new paths towards solving them. In addition to the commonly used two dimensions of complex problems (uncertainty and disagreement), we introduce a third dimension: systemic stability; that is, stability provided by rules, relations and complementary technology. This article reflects on how development evaluation methodologies and especially those introducing a complexity perspective address these three dimensions. Inferring that this third dimension deserves more attention, we explore the characteristics of reflexive evaluation approaches that challenge systemic stability and support processes of learning and institutional change. We conclude that reflexive evaluation approaches may well complement current system approaches in development evaluation practice.

Hansen, U., Pedesen, M., Nygaard, I., 2015. Review of solar PV policies, interventions and diffusion in East Africa. *Renewable and Sustainable Energy Reviews*, forthcoming.

Previous research on the diffusion of solar PV in Africa has mainly focused on solar home systems (SHS) in individual countries and thus overlooked developments in other PV market segments that have recently emerged. In contrast this paper adopts a regional perspective by reviewing developments in supportive policies, donor programs and diffusion status in all PV market segments in Kenya, Tanzania and Uganda, as well as identifying the key factors put forward in the literature to explain differences in the diffusion of SHS in these three countries. The paper finds two emerging trends: (i) a movement from donor and government-based support to market-driven diffusion of solar PV; and (ii) a transition from small-scale, off-grid systems towards mini-grids and large-scale, grid-connected solar power plants. The paper points out three generic factors that have contributed to encouraging SHS diffusion in all three countries: (i) the decline in world market prices for PV modules; (ii) the prolonged support from international donors; and (iii) conducive framework conditions provided by national governments. The paper also identifies five key factors that have been elaborated in the literature to explain the higher level of SHS diffusion in Kenya compared to Tanzania and Uganda: (i) a growing middle-class; (ii) geographical conditions; (iii) local sub-component suppliers; (iv) local champions; and (v) business culture. Finally, the paper discusses the lack of attention in the literature given to analysing the amount, nature and timing of donor and government support across countries, processes of learning and upgrading in local PV industries and the interaction between the different explanatory factors.

Fischer-Kowalski, M., Krausmann, F. and Pallua, I., 2014. A socio-metabolic reading of the Anthropocene: modes of subsistence, population size, and human impact on Earth. *Anthropocene Review* 1(1), 8 – 33.

We search for a valid and quantifiable description of how and when humans acquire the ability to dominate major features of the Earth system. While common approaches (such as Kaplan et al. 2011 for example) seek to quantify the human impact upon the carbon cycle by identifying the area of land cleared by humans, our point of departure is different human modes of subsistence, and we base our analysis on their social metabolism, in particular their energy metabolism. As a starting point, we use Ehrlich's classical IPAT formula, and give it a specific interpretation: human impact on Earth equals population size times affluence (interpreted as energy available per person) times technology – for each mode of subsistence. The overall impact (or rather human pressure) then equals the composite sum of these. We qualitatively describe the functional characteristics of hunter gatherers, agrarian and industrial modes of subsistence such as population dynamics, energy regime and the technologies by which they interact with their environment. In a 'toy' model, we translate these considerations into global numbers for the past millennia: we estimate the respective population sizes and affluence (energy), and finally also technology concerning its impact on the carbon cycle. We see a major historical dividing line around AD 1500: up to then, human population growth and metabolic rates carry about equal weight in increasing human pressure on the environment approximately fivefold from the year AD 1 onwards. From then on, the overall pressure of humanity upon Earth increases by one order of magnitude; energy intensity contributes to this rise by roughly tripling the impact of population growth. Technology, because it is based upon a shift from biomass to fossil fuels (and other "modern" energy carriers), does not moderate this impact, but enhances it by a factor of 1.5.

Blum, N. U., Bening, C. R., and Schmidt, T. S., 2015, An analysis of remote electric mini-grids in Laos using the technological innovation systems approach, *Technological Forecasting and Social Change*, available online

The electrification of the world's rural poor is an important aim of the United Nations. Off-grid technologies, such as electric mini-grids are seen as appropriate solutions. However, their diffusion rate in developing countries is not sufficient to reach poverty reduction targets. In this paper we analyze the case of remote electric mini-grids in Laos, a least-developed country characterized by many barriers to the diffusion of modern technology. We apply the *Technological Innovation Systems (TIS)* approach in order to derive policy recommendations on how to increase the diffusion rate. As the *TIS* framework has hardly been applied to such challenging contexts, we also aim to produce insights for the theoretical advancement of the *TIS* literature. Our analysis, which draws from secondary and primary data collected through field work, points to two systemic root causes for the low diffusion rate: institutional mismatches within and across *geographical levels* as well as hampered flows of resources across these levels. Based on these findings we derive policy recommendations proposing to formulate a national technology-specific electrification strategy. In terms of insights for the *TIS* community, we suggest to strengthen the role of culture in empirical *TIS* analyses and to extend the definition of one specific *TIS* function.

Moore, M-L., Tjornbo, O., Enfors, E., Knapp, C., Hodbod, J., Baggio, J.A., Norström, A., Olsson, P. and Biggs, D., 2015, Studying the complexity of change: toward an analytical framework for understanding deliberate social-ecological transformations, *Ecology and Society*, 19(4), 54

Faced with numerous seemingly intractable social and environmental challenges, many scholars and practitioners are increasingly interested in understanding how to actively engage and transform the existing systems holding such problems in place. Although a variety of analytical models have emerged in recent years, most emphasize either the social or ecological elements of such transformations rather than their coupled nature. To address this, first we have presented a definition of the core elements of a socialecological system (SES) that could potentially be altered in a transformation. Second, we drew on insights about transformation from three branches of literature focused on radical change, i.e., social movements, socio-technical transitions, and social innovation, and gave consideration to the similarities and differences with the current studies by resilience scholars. Drawing on these

findings, we have proposed a framework that outlines the process and phases of transformative change in an SES. Future research will be able to utilize the framework as a tool for analyzing the alteration of social-ecological feedbacks, identifying critical barriers and leverage points and assessing the outcome of social-ecological transformations.

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