

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

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

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

The STRN steering group

Words from the Chairman

Dear transition research colleagues,

In a few weeks' time, many of us will meet at the fourth International Sustainability Transitions conference in Zurich (19-21 June, 2013). I am very much looking forward to the conference, which provides an excellent opportunity to meet colleagues, expand networks, exchange ideas, and articulate/expand research agendas. The organizers have set up a thorough selection and review process with the aim of further enhancing the quality of papers and presentations. They have also made efforts to invite interesting keynote speakers, who as sympathetic 'outsiders' may be able to offer stimulating reflections on where the field is going. A preliminary conference program is now available online (http://www.ist13.ch/conference/program/index_EN), where papers have been organized under eight themes: 1) Agency and Power, 2) Geography of Transitions, 3) Technological Innovation Systems (TIS), 4) Transition Dynamics, 5) Transitions in specific sectors, 6) Firms and Markets, 7) Governance and Policy, 8) Transition Theory.

In the second STRN-newsletter (November 2011), I articulated concerns about the possibility that transitions research could fragment along disciplinary lines, with scholars looking separately at the role of business in transitions, the role of civil society, the role of power and politics, etc. I was worried that such foci would lose sight of studying transitions as multi-dimension and co-evolutionary change processes. While most themes at the upcoming conference don't validate such concerns, some others do. Obviously, I have not read the papers yet, so perhaps my worry is unwarranted. Nevertheless, I offer the suggestion that it might be fruitful if research on certain focal groups (e.g. industry, policy, civil society) would also look at interactions with other groups. Studies of governance, for instance, could take into account that policymakers depend both on industries (for jobs, taxes, growth) and wider publics (for legitimacy, voters). Studies of industry could likewise study how policies help create markets and provide incentives for innovation, and how civil society affects legitimacy and reputations of firms in industries. Similarly studies of civil

society initiatives could investigate how the fate of these initiatives is shaped by wider political opportunity structures and business strategies. Various literatures (e.g. corporate political strategy, economic sociology, social movement theory, political process theories, business and society literature, political economy) have much to offer for co-evolutionary analyses of the roles of specific groups in transitions. They may also offer ways of further developing multi-dimensional understanding of transitions, which is one of the great strengths of our community.

The mainstreaming of transitions research, mentioned in the previous newsletter, is continuing apace. There are two other international conferences. First, a mainstream professional society (International Sustainable Development Research Society) dedicates its annual conference to 'Just Transitions' (1-3 July), highlighting both transition research (I am one of the keynote speakers) and issues of justice and distribution (see under even announcements). Second, the German Helmholtz Alliance ENERGY-TRANS organizes an international conference (9-11 October) to improve the understanding of conditions, dynamics and impacts of energy transitions towards sustainability, understood as changes in complex socio-technical systems. Another example of mainstreaming is that the UNEP and International Resource Panel have just published a new report on *City-Level Decoupling: Urban Resource Flows and the Governance of Infrastructure Transitions* (see under 'publications'). This report builds strongly on research from the STRN-network. These and other developments suggest that transitions research is increasingly moving beyond the confines of our initial niche, and affecting wider agendas. A possible next target could be the new *Future Earth* research program, which involves thousands of researchers worldwide who were working in the context of the IGBP, IHDP and Diversitas research programs. The website (<http://www.icsu.org/future-earth>) mentions that "The goal of Future Earth is to develop the knowledge required for societies worldwide: to face challenges posed by global environmental change and to identify and implement solutions and opportunities for a transition to global sustainability". Arguably, STRN-researchers may be well-placed to play a role in this global research program.....

In the last newsletter, I promised to update you about the FP-7 call (ENV.2013.6.2-3) on 'Transition to sustainable, low-carbon societies'. It appears that the three winning proposals in this call are all STRN-related consortia.

1) The ARTS-proposal (**'Accelerating and Rescaling Transitions to Sustainability'**) examines acceleration dynamics of sustainability transitions. It includes researchers from DRIFT (Derk Loorbach, Niki Frantzeskaki), SPRU (Adrian Smith, Florian Kern), VITO, IOER, Stockholm Resilience, Istanbul, Budapest and ICLEI.

2) The PATHWAYS-proposal (**'Exploring transition pathways to sustainable, low carbon societies'**) will explore future transition pathways with crossovers between three methods: Integrated assessment (computer models), socio-technical transition studies (case studies), participative action research (local projects). It includes researchers from PBL, IVM (Frans Berkhout), SCI (Frank Geels), SEI, Wuppertal (Uwe Schneidewind), Fraunhofer (Jonathan Kohler), FEEM.

3) The TESS-proposal (**Towards European Societal Sustainability**) focuses on high-potential community-based initiatives, investigating possibilities and dynamics of upscaling. The proposal includes researchers from Potsdam Institute for Climate Impact Research (Dominik Reusser), the James Hutton Institute, Universitat Autònoma de Barcelona, Università degli Studi di Roma La Sapienza, T6 Ecosystems srl, Climate Futures, Oulu University of Applied Sciences, University Stefan Cel Mare Suceava.

These successes are great news, because they validate the strengths of our research, and because the resources provide continuity for future research. Congratulations to members of both consortia!! The next newsletter will provide further information.

On another note, I would like to draw your attention to the EIST-journal ('Environmental Innovation and Societal Transitions'), which is officially linked to STRN. We all know that: a) it is important for a journal to have an impact-factor, because this makes it more attractive to publish in it (since many of us are under pressure to publish in journals with high impact factors), b) impact factors derive from citations to articles in the journal, c)

new journals, such as EIST, face difficulties because they do not yet have an impact factor (leading to a Catch-22 situation). Given these considerations, I would like to underline the plea made below by the EIST editor-in-chief, and ask you all to cite articles in the journal *if this is relevant for the topic of your paper*. This way EIST may be able to acquire an impact factor, which will further raise the profile of transition research, from which we all benefit.

Last but not least, I want to thank all contributors to this newsletter for sharing their news, which I hope you will find interesting and stimulating.

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

Environmental Innovation and Societal Transitions

After the special issue on “Economic crisis and sustainability transition” (Vol. 6, March 2013), the seventh issue of EIST has just been published

(<http://www.sciencedirect.com/science/journal/22104224>). It contains the following articles: Kronsell, A., 2013, ‘Gender and transition in climate governance’, *Environmental Innovation and Societal Transitions*, 7, 1-15

Chappin, E.J.L and Afman, M.R., 2013, ‘An agent-based model of transitions in consumer lighting: Policy impacts from the E.U. phase-out of incandescents’, *Environmental Innovation and Societal Transitions*, 7, 16-36

Söderholm, K., 2013, ‘Governing socio-technical transitions: Historical lessons from the implementation of centralized water and sewer systems in Northern Sweden’, *Environmental Innovation and Societal Transitions*, 7, 37-52

Papachristos, G., Sofianos, A., and Adamides, E., 2013, ‘System interactions in socio-technical transitions: Extending the multi-level perspective’, *Environmental Innovation and Societal Transitions*, 7, 53-69

Jack, T., 2013, ‘Nobody was dirty: Cultural exhibitions as societal transition tools’, *Environmental Innovation and Societal Transitions*, 7, 70-72

Bolton, R., 2013, ‘Governing the energy transition: Reality, illusion or necessity? Routledge Studies in Sustainability Transitions, G. Verbong, D. Loorbach (eds.), 2012, *Environmental Innovation and Societal Transitions*, 7, 73-75

I would like to ask all STRN members to submit good-quality papers, and cite in a relevant way published papers in EIST, especially in your articles forthcoming in ISI journals (please consider doing this right now, otherwise you will forget about it and it just doesn’t happen). Just browse the almost 70 articles in EIST online to find relevant ones for your research. Notice that if EIST doesn’t get enough citations in other (ISI) journals, it cannot get an official ISI impact factor, with the consequence that authors won’t submit their best work, citations won’t go up – meaning that we will be trapped in a vicious cycle. This would be bad news for STRN and EIST. I don’t think it is dishonest to ask for your conscious attention to cite relevant article in EIST, as it is much more difficult to start up a new journal compared to say 20 years ago, when the citation index didn’t have an influence as now. Once EIST is in the ISI system it can find its own equilibrium in terms of an appropriate author/reader population and associated impact factor. In other words, it is not my intention to push up the long term, stable impact factor but only to get a serious chance to become part of the ISI impact factor network. Please consider my advice seriously and stimulate your co-authors and PhD students to cite EIST in other/ISI journals, but only when relevant of course.

Finally, we welcome short viewpoints (1000 words), for example, in response to the special issue on the economic crisis and sustainability transitions – a very important but under-researched theme.

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

Network News

Any news related to ongoing activities of STRN

Event announcements

Calls for upcoming relevant events such as workshops and conferences

4th International Sustainability Transitions (IST) Conference, Zurich, Switzerland

The countdown to the IST 2013 conference (June 19-21) is running and we are looking forward to welcoming the STRN community and other interested scholars to Zurich. We are currently in the last stages of making the final program. The submissions promise to account for a diverse range of topics that further the understanding of transition processes from different perspectives: Scholars of **technological innovations systems** (TIS) will elaborate on the various possibilities to conceptually advance the framework into a TIS 2.0 version and on ways to use it as a broader transition theory. The stream **geography of transitions** includes many presentations on the conceptualization and relevance of space and scale for transition studies and reflects on the global diffusion of environmental innovations. **Agency and power** are core topics of various other contributions, in particular questions of structure vs. agency and bottom-up processes of institutional change and institutional dynamics. Scholars working mainly with the **multi-level perspective** show a special focus on dynamics within regimes, such as destabilization, and between regimes and niches, e.g. adaptability of regimes to technological innovations. Furthermore, the **governance** of transitions and the relevance of **policies** are prominent in many presentations, as are the role of **firms** and **markets** in transition processes. Besides the classical focus of transition studies on **energy sectors**, the **agro-food** domain, **transport** as well as **urban water** are well represented sectors. Some contributions also tackle **new theoretical approaches** to the study of socio-technical transitions, include **modeling** techniques or take a more **reflective perspective** on transition studies in general.

All these contributions will be complemented by three outstanding keynote speakers. **Arie Rip** (University of Twente) will talk about the evolution of science and technology institutions, **Jim Murphy** (Clark University) will elaborate on promising intersections between human geography and transition studies and **Juliet Schor** (Boston College) will share her insights on sustainability in the shadow of the global economic collapse.

More details on the conference program can be found at <https://www.conftool.com/ist13/sessions.php>. Besides all the interesting paper sessions, there will be time to socialize and network on various occasions, amongst others during the conference dinner at the world famous vegetarian restaurant *tibits at NZZ Bistro*. For further information on the conference, accommodation or travel please look at our website www.ist13.ch or contact us at info@ist.ch.

Organizing committee: Bernhard Truffer, Jochen Markard, Lea Fuenfschilling, Christian Binz

International conference on 'Just Transitions', 1-3 July, Cape Town, South Africa

The 19th annual conference of the International Sustainable Development Research Society focuses on 'Just Transitions'. The conference draws the attention of general sustainability researchers to the topic of transitions, and highlights issues of justice and distribution (e.g. North-South issues). Keynote speakers include: Frank Geels, Gunter Pauli, Edgar Pieterse, Kevin Chika Urama. Conference themes include:

- 1) Achieving rapid transitions for sustainable living, decoupling production and consumption from resource limits and ecological constraints, and pioneering innovative, liveable and sustainable contexts
- 2) Better Governance, Institutions and Economic structures, to support sustainable development and design
- 3) Rethinking development in terms of greening the developmental state, new forms of urbanism in the context of ecology, social development and food security
- 4) Crisis, complexity, global change and transitions, with a critical analysis of the science of sustainability, academia, ethics and leadership.

More information at (<http://www.isdrc19.co.za/>).

International conference on ‘Energy Systems in Transition: Inter- and Transdisciplinary Contributions’, Karlsruhe, Germany, 9-11 October 2013

The Helmholtz Alliance ENERGY-TRANS organizes an international conference which aims to improve the understanding of conditions, dynamics and impacts of energy transitions towards sustainability. Energy systems are understood as complex socio-technical systems that require transdisciplinary methods and a focus on policy and action oriented research. The conference programme entails parallel thematic sessions, a policy-meets-science event, and high-level keynote speeches from Eberhard Umbach, Frank Geels, Leena Srivastava, Thomas Dietz, and Lucia Reisch. Conference topics include:

1. Concepts, scenarios or modelling approaches, taking explicit account of the interface between technology, economic development and social changes;
2. Criteria/indicators for assessing the sustainability of energy transitions as well as tensions/conflicts between different dimensions of sustainability
3. Governance of energy innovations with a particular focus on path dependencies or path creation;
4. The role of subnational governance levels (including regional/local energy independence or even autarky) for enabling or facilitating energy transitions.
5. Energy consumption of households and industry;
6. Potentials and limits of public/stakeholder participation in planning procedures;

For more information see: www.energy-trans.de/conference-2013.

Making transitions happen – transforming the City of Frankfurt to 100% renewable energy by 2050

A Climate KIC PhD Summer School will be held in September 2013 in Frankfurt (Hesse). It comprises academic lectures and tasks on systems innovation, transition management, actor analysis and multi-level perspectives. Participants also have the chance to gain insights in real life transition challenges and state of the art solutions. There will be discussions with high level experts and city representatives, plus several on-site visits and excursions focused on how to make Frankfurt’s energy transition happen. PhD Students are invited both from the Climate KIC PhD programs, but also others interested in transitions and climate change topics. More information will soon be available on the Climate KIC website. For further details please contact Christoph Auch, Christoph.Auch@extern.provadis-hochschule.de

Event Reviews

Review of events interesting to the STRN community

Session on Sustainability Transitions at the Conference of the European Geoscience Union EGU 2013.

The conference of the European Geoscience Union (7-12 April 2013) brought together scientists from all over the world into one meeting covering all disciplines of the Earth, Planetary and Space Sciences. Interactions between human behavior and the earth system was an important topic at EGU 2013 and was topic of the session on sustainability transitions of the socio-ecologic system. The session was organized by Dr. Dominik Reusser and the Climate Change and Development group at Potsdam Institute for Climate Impact Research and works as interface between the STRN and the EGU community, fostering the interdisciplinary exchange. Contributions covered various scales from the global to the local and various levels of abstraction, from conceptual frameworks to global abstract simplifications to detailed case studies and provided the bases for a lively discussion. More details including abstracts are available at

<http://meetingorganizer.copernicus.org/EGU2013/session/11642>

New research projects

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

Rising powers and low carbon transitions in Southern Africa

Work has now started on an exciting two year ESRC-funded project entitled *Rising powers and low carbon transitions in Southern Africa*. The project team involves Professor Marcus Power (project leader), Dr Harriet Bulkeley and Dr Joshua Kirshner from the University of Durham (Geography Department) and Professor Peter Newell, Dr Adrian Smith, and Dr Lucy Baker from the University of Sussex (School of Global Studies and Science Policy Research Unit).

The team will work together with the UK-based NGO Practical Action; the University of Cape Town's Energy Research Centre in South Africa; the Chinese Academy of Sciences; and the Brazilian Centre for Strategic Management Studies

The project will develop new frameworks for analysis in order to systematically compare the roles that the Rising Powers, including China, Brazil and India, are playing in facilitating the transition to low carbon energy systems in Southern Africa. The project also seeks to assess the implications for the wider governance of energy and climate change at the local, national, regional and global scales. The team will conduct research in South Africa, Mozambique, Brazil and China, which will consist of semi-structured interviews and community-based participatory research methods.

Lucy Baker (L.H.Baker@sussex.ac.uk)

Local innovation initiatives for energy system transformation

In May 2013 a new project started coordinated by the Department of Organizational Sociology and Innovation Studies at the University of Stuttgart/Germany. The project is funded by the German Ministry for Education and Research. It will run for three years and will analyze socio-technical innovation impulses in the energy system originating from local or regional levels and study its influences on the transition of the overall energy system. The interdisciplinary project with research teams from the Universities of Stuttgart, Darmstadt and Münster and Consultant firms from Berlin will study citizen wind parks, new forms of contracting, intelligent infrastructures and small KWK using a Multi-Level Perspective. The official title of the project is "**Lokale Innovationsimpulse zur Transformation des Energiesystems** (LITRES)". The project coordinator is Gerhard Fuchs

(Gerhard.fuchs@sowi.uni-stuttgart.de)

Publications

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

Swilling, M., Robinson, B., Marvin, S. and Hodson, M., 2013, *City-Level Decoupling: Urban Resource Flows and the Governance of Infrastructure Transitions*, United Nations Environment Programme, and International Resource Panel

This new UNEP report examines the potential for decoupling at the city level. Analysing the role of cities as spatial nodes where the major resource flows connect as goods, services and wastes, the report's focus is how infrastructure directs material flows and therefore resource use, productivity and efficiency in an urban context. It makes the case for examining cities from a material flow perspective, while also placing the city within the broader system of flows that make it possible for it to function.

The report also highlights the way that the design, construction and operation of energy, waste, water, sanitation and transport infrastructures create a socio-technical environment that shapes the "way of life" of citizens and how they procure, use and dispose of the resources they require. Its approach is innovative in that it frames infrastructure

networks as socio-technical systems, examining pressures for change within cities that go beyond technical considerations.

A set of 30 case studies provide examples of innovative approaches to sustainable infrastructure change across a broad range of urban contexts that could inspire leaders of other cities to embrace similar creative solutions. Of course, innovations in and of themselves do not suffice if they are not integrated into larger strategic visions for the city, and as each city is unique, interventions need to be tailored to the set of challenges and opportunities present in each case.

Hassink, J., Grin, J. and Hulsink, W., 2013, Multifunctional Agriculture Meets Health Care: Applying the Multi-Level Transition Sciences Perspective to Care Farming in the Netherlands, *Sociologia Ruralis*, 53(2), 223-245

Care farming is a promising example of multifunctional agriculture: it is an innovation at the crossroads of the agricultural and healthcare sectors. Our objective is to develop a framework for understanding the success of initiatives in this field. We link empirical data with the multi-level perspective from the transition sciences and extend this perspective with insights from the literature on entrepreneurship, alliance management and organisational attributes. This framework allows us to explain the success of the three major types of initiatives: (1) individual care farms; (2) regional foundations of care farmers; and (3) care institutions collaborating with groups of farmers at a regional level. We propose that the main factors responsible for the success of initiatives are the commitment and competences of the entrepreneur, the creation of alliances, the quality of the new regional organisations and the implementation of the care farm services in care organisations. The relative importance of the factors varies between the different types of initiatives and local and regional levels.

Ottosson, M. and Magnusson, T., 2013, Socio-technical regimes and heterogeneous capabilities: the Swedish pulp and paper industry's response to energy policies, *Technology Analysis & Strategic Management*, 25(4), 355-368

Based on a study of policy-induced changes in the Swedish pulp and paper industry, this paper follows a process of socio-technical regime destabilisation. Results from the study show that in industries where established firms have significant power, processes of endogenous renewal are more likely to destabilise established regimes than processes based on niche solutions. Further, the study shows how policy measures aimed to destabilise the current regime may result in different responses, owing to the different capabilities of individual firms. The analysis suggests that heterogeneous capabilities within established industries provide possibilities for policy makers to initiate change.

Turnheim, B. and Geels, F.W., 2013 'The destabilisation of existing regimes: Confronting a multi-dimensional framework with a case study of the British coal industry (1913-1967)', *Research Policy*, forthcoming

Because innovation studies are oriented towards novelty, scholars in this field have paid less attention to the destabilisation of *existing* regimes. This paper discusses four views on industry destabilisation and presents an encompassing conceptual framework, which addresses interactions between the build-up of external pressures, industry response strategies, and the gradual weakening of commitment to existing regime elements. We confront the framework with an in-depth longitudinal case study of the British coal industry (1913-1967). Specific conclusions are developed about different degrees of regime inertia, the ebb and flow of external pressures, the relative importance of economic and socio-political pressures, and interactions between them.

Campbell, B. and Sallis, P., 2013, Low-carbon yak cheese: transition to biogas in a Himalayan socio-technical niche, *Interface Focus*, 3(1)

This study looks at how potential for resilient low-carbon solutions can be understood and enhanced in the diverse environmental, economic and socio-political contexts in which actual scenarios of energy needs and diverse development pathways take shape. It

discusses socio-technical transition approaches to assist implementation of a biogas digester system. This will replace fuelwood use in the high forests of Central Nepal, where yak cheese production provides livelihood income but is under threat from the Langtang National Park, which is concerned to protect biodiversity. Alternatives for digester design are discussed, and the consultative issues for deliberative processes among stakeholders' varied agendas raised

Hermans, F., Van Apeldoorn, D., Stuiver, M., and Kok, K., 2013, 'Niches and networks: Explaining network evolution through niche formation processes', *Research Policy*, 42(3), 613-623

This paper uses the evolutionary perspective of Strategic Niche Management to investigate and explain the network dynamics of a collaborative innovation network. Building upon the theories of socio-technical transitions, we link macro-level network dynamics to the micro-level niche processes of vision building and experimentation. The paper describes a method to construct longitudinal two-mode affiliation networks and this method is illustrated with an analysis of the network properties of an agricultural niche in the Netherlands over a period of 15 years. Results show how a successful niche grows more connected, even when it grows in size. We found three distinct phases during which the network composition is more or less stable. Powerful actors are able to shape the composition of the network, either through providing the financial resources or through creating "legislative space" for the network to grow.

Lopolito, A., Morone, P. and Taylor, R., 2013, 'Emerging innovation niches: An agent based model', *Research Policy*, forthcoming

The creation of an innovation niche depends on the interaction of three mechanisms involving: *converging* expectations, *networking* among the innovation actors, and *learning* about the novelty through efficient knowledge creation and diffusion. Such mechanisms define the key characteristics of a network of firms (i.e. the innovation niche), and the interaction among them guides the development and diffusion of a new technology. In this paper, we propose an agent-based model to investigate the dynamics characterising such interactions and the role that policy intervention can have in governing the niche development process. Specifically, we consider and assess the impact of two policy actions: (1) increasing actors' expectations towards the new technology by means of information spreading and (2) providing subsidies aimed at stimulating technological switch. Our results confirm the importance of policy intervention and show the dominance of information spreading activities over subsidies. The former policy action, in fact, preserves a broad consensus around the new technology, a fact which turned out to be fundamental in order to promote efficient knowledge diffusion and the effective use of individual and network resources.

Lachman, D.A., 2013, 'A survey and review of approaches to study transitions', *Energy Policy*, 58, 269 - 276

With the aim to achieve a sustainable future, the field of transition studies has recently received increasing attention. Transition thinking and transition management have even been provided with a prominent spot in strategies and policies of a growing number of countries. However, though various approaches to study transitions (in particular, sustainability transitions) have been discussed and used in the past, an overview of these – with their advantages and disadvantages – has not been provided yet. Furthermore, linkages between these approaches have also not been provided in a single overview. This article fills that gap in literature on transitions. It starts with the emergence of the "transition" concept and follows it to the notion of "sustainability transitions". Next, the article reviews approaches to study transitions. Thereafter, the paper provides some general criticism as well as strengths and contributions from transition research approaches to provide an impetus towards further research in this field.

Quezada, G., Grozev, G., Seo, S., and Wang, C-H., 2013, The challenge of adapting centralised electricity systems: peak demand and maladaptation in South East Queensland, Australia, *Regional Environmental Change*, forthcoming

South East Queensland's (SEQ's) centralised electricity system is under great pressure to adapt. Climate change is converging with socio-economic, demographic and technological changes to create a 'perfect storm' for the region's electricity system. Distribution networks are particularly affected, with these factors contributing to tremendous peak demand growth, about double the rate of growth in average demand in recent years. This paper reviews how Australia's electricity system is adapting to multiple drivers of peak electricity demand. We use sociotechnical transitions theory to understand the temporal interconnected social and technical dimensions of adaptation in this setting. Specifically, we present an historical narrative of the emergence of centralisation in Australia and outline the peak demand problem in SEQ and review adaptation options from the international literature. We also analyse the interactions between key social groups and their adaptation responses over the past decade. Our analysis shows that adaptation has become a contested process between supply-chain actors and end-users, each with different economic objectives, adaptation needs and capacities. The resulting adaptation dynamic that is emerging shows worrying signs of maladaptation. Implications for market governance and urban policy and research are discussed.

Gaziulusoy, A. I., Boyle, C., & McDowall, R. (2013). System innovation for sustainability: A systemic double-flow scenario method for companies. *Journal of Cleaner Production*, 45, 104-116.

It is commonly accepted that, in order to achieve sustainability, there is a need for societal transformation, which requires institutional, social/cultural, organizational and technological change. This societal transformation will involve all aspects of society co-evolving toward and aligning with sustainability goals and is defined as sustainability transition or system innovation for sustainability. However, neither the theory nor the operational approaches currently based on this emerging theory address how to link macro-level innovation within society to the micro-level innovation by companies. This paper presents a scenario method developed and tested for the use of product development teams. The scenario method uses both explorative and backcasting scenarios to link activities/decisions at the product development (micro-innovation) level in companies with the transformation which needs to take place at the societal (macro-innovation) level to achieve sustainability. Workshops were used to develop scenario maps for innovation pathways, leading to sustainable future visions. The method was evaluated by carrying out expert consultations and workshops with product development teams. The evaluation results demonstrated that the scenario method is a viable method to aid companies in aligning their innovation efforts with short, medium and long-term sustainability requirements and identified outstanding issues for further development of the scenario method.

Crabbé, A., Jacobs, R., Van Hoof, V., Bergmans, A., Van Acker, K., 2013, Transition towards sustainable material innovation: evidence and evaluation of the Flemish case, *Journal of Cleaner Production*, Forthcoming,

In this article, we focus on testimonies on recent sustainable material innovations in 15 Flemish production firms. We look at evidence of transition towards sustainable material innovation, considering: (1) how material innovation can improve the sustainability of products and processes with respect to people, planet and profit and (2) what are stimulating and hindering factors met when adopting sustainable material innovation. Trends observed from assessing the sustainability features of the individual material innovation cases are presented in *3P evaluation grids*. A meta-analysis of the testimonies considers drivers and barriers for sustainable material innovation on the level of technological niches, socio-technical regimes and socio-technical landscapes, referring to the multi-level perspective used in transition literature. It was found that the interplay between these levels has been key in all the assessed cases. Stimulated by the increasing scarcity and rising prices of raw

materials, a growing eco-sensitivity among their customers, and the downright need for economic survival, production companies turn to look for more innovative ways of using materials in order to arrive at more sustainable products and production processes.

Ferguson, B.C., Brown, R.R., Deletic, A. (2013). Diagnosing transformative change in urban water systems: Theories and frameworks. *Global Environmental Change*, 23(1), 264-280.

As urban water systems become increasingly stressed from climate change impacts, population growth and resource limitations, there is growing acceptance by scholars and practitioners of the need to transform practices towards more sustainable urban water management. However, insights into how strategic planning should be made operational to enable this transformation are limited; there is a need for a reliable diagnostic procedure that could assist planners, policy analysts and decision-makers in selecting and designing strategic action initiatives that best fit an urban water system's current conditions to enable desired system changes. This paper is the first step in the development of such a diagnostic approach by proposing a scope for an operational procedure that maps a system's current conditions and identifies its potential transformative capacity. It then reviews five existing analytic frameworks, which are influenced by transitions theory and resilience theory, and applies them each to a common empirical case study of successful transformative change in the stormwater management system of Melbourne, Australia. In this way, the paper explores how existing frameworks could potentially contribute to a diagnostic procedure for selecting and designing strategic action initiatives from the perspective of dynamic transformative change. The paper found that such a procedure should guide an analyst through steps that develop descriptive, explanatory and predictive insights to inform which strategic action initiatives best fit the current system conditions. The types of insights offered by different analytic frameworks vary, so a diagnostic procedure should be designed with a particular aim, problem or question in mind and the underpinning framework(s) selected accordingly.

Brown, R.R., Farrelly, M.A., Loorbach, D., 2013. Actors working the institutions in sustainability transitions: The case of Melbourne's stormwater management. *Global Environmental Change*, forthcoming

The role of agency in overcoming path dependence and enabling sustainability transitions is receiving increasing attention. Currently lacking are more empirically derived explanations of the co-evolutionary dynamics between actors and institutional change that could potentially provide guidance on facilitating such transitions into the future. This paper investigates these dynamics through a longitudinal case analysis of Melbourne's transition to improved stormwater quality treatment. The complex data collection, analysis and validation approach, which included oral histories, semi-structured interviews, industry workshops and documentary analysis, examined the nuances of the actor-related strategies and institutional enabling processes throughout the different phases of the transition over the last fifty years. The results revealed the importance of a small group of loosely connected frontrunners from across government, private, community and scientific sectors who, through a mix of creating and disrupting institutional strategies, managed to facilitate a growing and diverse actor-network that steered this transition over decades. The establishment of networked bridging organisations was also instrumental because they formed different types of networks and alliances over time for protecting and deepening the reach of the transition dynamics across the city. The findings suggest there is no single cause-effect relationship nor one dominant intervention or action that shifted the urban stormwater management regime. Rather, it showed that the co-evolutionary processes between the broader transitional dynamics were played into by frontrunners and their actor-networks in such a way that emerging new narratives diffused, giving meaning to the evolving scientific agendas and on-the-ground experiments, which led to new institutional structures and enabling administrative tools. It seems as though each one of these dimensions is as crucial as the other in explaining the outcomes of this successful sustainability transition.

Kivisaari, S., Saari, E., Lehto, J., Kokkinen, L., and Saranummi, N., 2013, 'System innovations in the making: hybrid actors and the challenge of up-scaling', *Technology Analysis & Strategic Management*, 25(2), 187-201

The article addresses the problem of how to create sustainable change in health care. It builds on two case studies that examine endeavours to develop system innovations so that they deliver high quality services more efficiently. The innovation processes are studied through the lens of a multiple-level model of change. The model suggests that change takes place as the outcome of linkages between external pressures on the current regime, policy measures, and local initiatives. The results highlight the critical role of hybrid actors for (1) assuring the societal quality of the innovation, and (2) developing the embryo so that it is relevant beyond the local level. The up-scaling of an innovation embryo entails that local actors adopt a wider perspective and that policy-makers support the spreading of local innovations. The findings are thus useful for policy-makers and local developers.

Wieczorek AJ., Negro SO., Harmsen R, Heimeriks GJ, Hekkert MP., (2013). A Review of the Western European Offshore Wind Innovation System. *Renewable and Sustainable Energy Reviews*. In press.

Offshore wind has the potential of becoming an important pillar of the future European energy system. It can contribute to policy objectives on climate change, energy security, green growth and social progress. However, the large potential of offshore wind does not automatically lead to a large share in future energy systems; neither does the emergent stage of development of the technology. Recent insights in innovation studies suggest that the success chances of technological innovations are, to a large extent, determined by how the surrounding system - the innovation system - is built up and how it functions. In this paper we assess the offshore wind innovation systems of four countries: Denmark, the UK, the Netherlands and Germany with the objective to provide recommendations for strengthening the overall European offshore wind innovation system. We use the Technological Innovation System (TIS) approach to analyse the system in 2011. Based on the analysis we identify a number of challenges that the European offshore wind sector faces. Some of them include: a serious deficiency of engineers; fragmented policies and poor alignment of national regulatory frameworks; cost of the technology and limited grid infrastructure. Since the problems hinder the entire system development we call for a systemic policy instrument that would support the innovation system around this technology and contribute to its wider diffusion in Europe.

Wieczorek AJ, Hekkert MP, 2012. Systemic instruments for systemic innovation problems: A framework for policy makers and innovation scholars. *Science and Public Policy*, 39:74-87

Systemic policy instruments are receiving increased attention among innovation scholars as a means to stimulate sustainability oriented technological innovation. The instruments are called systemic in the expectation that they will improve the functioning of entire (innovation) systems. A first step in designing systemic instruments is an analysis of the systemic problems that hinder the development of a specific technological trajectory. This paper argues that two approaches to studying innovation systems—structural and functional analyses—can be combined in a systemic policy framework that helps to first, identify the systemic problems; and second, to suggest the systemic instruments that would address these problems.

Van Mierlo, B., Janssen, A., and Leenstra, F., 2013, 'Encouraging system learning in two poultry subsectors', *Agricultural systems*, 115, 29-40

This article contributes to the debate on participatory approaches to bring about system changes that support sustainability and other broad innovation challenges. We report on experiences of workshops in two Dutch poultry subsectors where actors from the value chains together with a few other actors and facilitated by researchers, conducted an analysis of the structural barriers and windows of opportunity for innovation. In this way, we

investigate the value of these collective system analyses in a wider approach for system innovation towards sustainable animal sectors. We expected that they would stimulate system learning among the participants: i.e. (1) recognising the multi-causality of recurrent problems, (2) redefining barriers into opportunities, and (3) designing options for collective action. The participants indeed recognised the integral and complex nature of the sustainability issues, and their commitment to sustainable development increased. However, the learning was limited in the sense that they defined few innovation opportunities and no options for collective actions. After analysing whether the workshops actively challenged the innovation barriers in the current subsectors, we conclude that the latter two dimensions of system learning seem to have been hindered by the representation of a large part of the value chains in the workshops. Our experiences provide new insights on how to stimulate a learning process geared towards overcoming lock-in in the incumbent production-consumption systems. Collective system analyses can be a relevant additional method for participatory innovation approaches. The innovation system perspective broadens the scope of the system and helps to distinguish the structures underlying current unsustainable practices. We suggest not seeking completeness by trying to bring all relevant value chain actors to the table at the same time, but rather organising multiple workshops with both value chain actors and innovating actors who operate more independently from the dominant system.