Book of Abstracts

3rd International Conference on Sustainability Transitions

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Transition Agora I: Policy, agency and transitions-in-the-making

This paper serves as a background paper for one of two panel discussions – named Transition Agoras – at the IST2012 conference. The background paper addresses the issue of ‘policy, agency and transitions in the making’

The paper puts forward some discussion-points for the panel discussion and offers a review of current positions related to the theme. The discussion points have been identified in collaboration with the organizing committee and have been inspired by the abstract review process.

The panel will be composed of persons representing some of the different positions identified in the review below, who will be asked to reflect and comment on the discussion points.

Discussion points

Moving closer to the policy world...

As a response to fundamental societal challenges such a global warming the transition community argues that radical transformations in the socio-technical configurations by which societal functions are provided and used need to be pursued in order to achieve a drastic reduction of their environmental impact.

To this end the transition community offers an approach to societal development that focuses on situated socio-technical systems experimentation that (a) cuts across established sectorial and institutional and divisions between the operation, production and the infrastructure involved in the operation of socio-technical systems and established user-producer relationships, and which is (b) oriented towards long term societal goals such as sustainability.

In order to generate real-world effects a challenge of the transition community however is to move closer to the policy world. Some of the key questions in relation to this challenge are:

(a) What are the relevant policy arenas for a transition policy, which actors are engaged in these arenas, and who needs to be mobilised? What types of action are considered in transition theories?

(b) What is the relation between processes of deliberation and inclusion on the one hand and interests and conflicts on the other hand: Does transition policy entail steering or navigation? If theory is to inform action, how is this being conceptualized in the different theories of transition?

A brief elaboration of these questions follows below.

What are the relevant policy arenas for a transition policy, which actors are engaged in these arenas, and who needs to be mobilised?

In much of the early transition research, socio-technical systems were conceived of from a national point of view. National governments have hence been perceived as the key actors in the governance of strategic transitional change. National governments however tend to remain institutionally entrenched in
traditional sectoral- and technology focused innovation policies.

At the same time cities, regions as well as international networks, institutionsand movements appear as increasingly important sites for transitional experimentation, learning and network building because it is at these ‘sites’ that the societal functions, which transition policies aim to transform, are provided, used and shaped.

A key policy challenge for the academic transition community hence is to identify the different policy arenas characteristic of such ‘sites’, and to devise operational transition policies to be applied.

The challenge of identifying the relevant arenas, links up with the question of how to map the actors engaged on these arenas and identify those who will need to be mobilised. The prominence of the notion of ‘niches’ in transition thinking implies that peripheral ‘outsiders’ located as the fringes of regimes have traditionally been seen as key actors of transitional change, while incumbents have been seen as defenders of status quo. This divide may however be superseded by others as transition moves closer to the policy world and new alliances need to be developed. An alternative divide would be one between actors responsible for the operation of socio-technical configurations, and actors with a more narrow focus on single technologies or products. This divide would entail a need for interventions in order to empower the former at the expense of the latter. A key challenge of the academic transition community hence is to identify actors who may become agents of transitional change, and to develop strategies mobilising these actors.

**What is the relation between processes of deliberation and inclusion on the one hand and interests and conflicts on the other hand: Does transition policy entail steering or navigation?**

Since transitions signify change in the configurations of socio-technical systems oriented towards societal goals, processes of deliberation and inclusions have been recognised as strategically important. A key prerequisite of systems-change is accordingly the alignment of a diversity of situated actors that possesses capability or authority to transform different components of a socio-technical configuration in a coordinated way.

In recent years it has been recognised that transitions are guided by interest-specific articulations of the regime pressures, and that different actors are likely to promote different problematizations of established socio-technical configurations with different strategic implications. Deliberation and consensus-building thus seems to co-exist with interest driven manoeuvring. The ability to cope with the co-existence of deliberation and situated interests is likely to become increasingly important as transition thinking is moving closer to policy, as this entails entering a territory of interest and conflict. A key question accordingly is how this co-existence should be conceptualised, and what it implies for the development of transition policies?

This question relates to the relation between steering and navigation. The metaphor of steering suggests that transition strategies are informed understandings of established socio-technical configurations that can claim analytical neutrality – or at least have analytical neutrality as an ideal for learning. The metaphor of steering thus retains a position for ‘the expert’, as one who is relatively independent of the political sphere of interests. The metaphor of navigation is more overtly political. This metaphor suggests
that the very process of defining ‘the socio-technical’ is intrinsically political. This entails that learning and reflexivity becomes political processes rather than ‘epistemic’ ones. Understanding the strategic role of ‘regime analytics’ related to transition processes thus seems to become increasingly important.

### Some positions in the debate over transition policy

The debates about policy and transitions are informed by various positions in the community. Without necessarily contradicting with one another these positions emphasise different loci of transitional agency.

Three such positions are

- Strategic niche management (experimentation, learning (local / global), network building)
- Transition management (Visions, back-casting and transition pathways)
- Endogenous navigation of entrenched actors

### Strategic niche management

As a distinct approach to strategic system transformations the strategic niche management approach dates back to the very early development of the transition community (Kemp et al 1998). The notion of niches in this approach is related to the perception that societal change is driven by processes of variation, selection and retention. The purpose of niche management hence is to identify and support radical niche variations which serves long term societal goal.

In the early formulation of the niche management approach it was suggested that governments should seek both to develop the niche and to alter the section pressures of the broader section environment in favour of the niche. Later, the niche management approach became more focussed on the niche internal processes. Three core elements of niche management were identified: experimentation, learning and social network building. Experimentation constitutes the backbone of a niche. A niche can hence be perceived as a portfolio of experimental activities that operates to align a series of socio-technical elements into a new ‘working configuration’. In order to develop such a new working configuration, learning is essential. The niche management approach suggest that local learning associated with single experiments need to transcended by learning at the global niche level. As the niche evolves broader niche level rules and expectations should thus be developed in order to give direction to individual experimentation. Also a broader and more dedicated social network should be developed.

A key debate within the transition management approach is how niches are up-scaled to the regime level. An analytical approach to this questions has been developed by integrating the niche management approach with the MLP perspective, which suggests that niche are only likely to gain influence at the regime level if the regime level have been destabilised due to conflicts with higher-level landscape pressures. To account for the interaction between niches, regimes and landscapes a series of transitions pathways have furthermore been theorised. Also different types of co-evolution between niche and regime have been discussed (Raven 2006; Smith 2007)

### References

Transition Management

In contrast to the Strategic niche management which aim to support niches ‘shielded from the regime’ the focus of the TM approach is to cultivate endogenous capabilities for transitional change. Transition management is accordingly about strategies for endogenous goal oriented modulation. Also in contrast to the niche management approach transition management was conceived in close proximity to actual policy formulation in the Dutch Government.

A central conviction of the approach is that the conflict between long term ambitions and short term consideration can be managed by bringing about structural change in a stepwise manner. Key aspects of the approach are back-casting, portfolio management and cyclical learning and evaluation.

Back casting is about utilising long term visions of transitional change as a framework for short term policy formulation. The long term vision should thus be broken down into interim objectives that can be used as quantitative and quantitative measures of short-term progress. Another aspect is ‘portfolio management’. As transition management is not about ‘blue print solutions’ the strategy is keep different opportunities open by supporting different types of transition experiments. A third key aspect is cyclical learning and evaluation. It is argued that such leaning and evaluation should be organised into ‘development rounds’. In these ‘evaluation rounds’ progress is evaluated against the interim objectives and the design and setup of the transition processes themselves are evaluated.

Key debates in relation to the Transition management approach is the leading role ascribed to government and public policy, as well as the belief that deliberation and learning may succeed in transcending lock-ins and power structures of incumbent regime.

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Endogenous navigation by entrenched actors

An emergent and not yet well established position in relation to agency and unfolding transitions pays specific attention to how established institutions like socio-technical systems and transition strategies are conceived of and framed by entrenched and politically motivated actors. A conviction of this position is
that ambivalence and politics is at heart of the governance of transition. Transition governance should hence not attempt to eliminate ambivalence but rather accept conflicting representations and strategies as a condition for such governance.

By this position it is e.g. argued that socio-technical regimes and systems as well as broader societal configurations like liberal market models do not have an existence which is independent of the concept by which they are described and reproduced. It is argued that such societal institutions only exist in different incommensurable framings, which are designed to foreground certain concerns and interests at the expense of other. This approach is interested in how different framings are capable of building coalitions among certain actors while excluding others both as a critical approach to dominant representations and policy framings and as a way to build strategies for transitions emphasising the multiplicity of interpretations and the tensions involved in many societal institutions and practices.

This position thus seeks to escape the tendency of much transition governance literature to focus on the need for building consensus and gaining broad inclusion. Not denying the need for recruiting other actors for specific transitional strategies the approach taken is focusing on the need for demonstrating alternative solutions and emphasising the diversity of ways to organise societal functions.

The prescriptive implications of this approach however remain underdeveloped though attempts have been made both in governance, in practice theory and in the approach to arenas of development to create analytical frameworks that can support navigation building on transitional visions and still realising the continuous need for adjustments of means and ends.

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Transition Agora II: Foundational concepts and boundaries of sustainable transitions

This paper serves as a background paper for the second of two panel discussions – named Transition Agora’s – at the IST2012 conference. The background paper addresses the issue of ‘foundational concepts and boundaries of sustainable transitions’ which raises questions to the relationships of nature and society within the transition community.

The paper puts forward some discussion-points for the panel discussion and offers a review of current positions related to the theme. The discussion points have been identified in collaboration with the organizing committee and have been inspired by the abstract review process.

The panel will be composed of persons representing some of the different positions identified in the review below, who will be asked to reflect and comment on the discussion points.

Discussion points

Analysing social and natural systems as contradictory and multiple ...

A foundational conviction of the transition community is that sustainability in modern societies can only be realised through radical transformations of established socio-technical systems, which are often stable and path dependent, and therefore difficult to change. This conviction has been established by integrating strands of intellectual reasoning, which have traditionally been cultivated in relation to very different academic controversies. The dominant socio-technical system approach comprises a series of positions, which were not originally associated with sustainability, but rather to broader evolutionary patterns of societal development characterised by path-dependencies, technological speciation processes, and long term economic cycles of maturation, decline and transformation. During the 1990 such evolutionary arguments were associated with a growing environmental concern, as it became still more evident that environmental degradation was a deeply entrenched consequence of the established socio-technical configurations of production and consumption. These discussions also attracted more natural science oriented approaches that focused on how modern industrial configurations where endangering the stability of natural ecosystem systems.

The transition community is hence characterised by a diversity of analytical tools and approaches that offer different understandings of the relation between socio-technical systems and nature. The ability to embrace and cultivate this diversity of analytical perspective concerning the relation between socio-technical system and nature, and the ability to analyse their individual limitations and exploit their strengths will be critical for the further development of the community. This agora accordingly raises the following questions:

(a) How is sustainability understood by dominant analytically positions in the transition community?
   What does the transition conception imply for the perspective on sustainability?

(b) What is the role of theoretical transition approaches for the translation of different
conceptualization of sustainability into transition strategies? Are exclusions of perspectives intrinsic parts of these approaches?

A brief elaboration of these questions follows below.

**How is sustainability understood by dominant analytically positions in the transition community? What does the transition conception imply for the perspective on sustainability?**

Sustainability is addressed by the transition community as the relation between the socio-technical systems and natural eco-systems. Because different analytical positions constructs different system boundaries and foreground certain system dynamics at the expense of others, sustainability nevertheless remains a conceptually ambiguous phenomenon. A nature centred perspective may argue that there are certain, final limits to e.g. natures absorption capacity and that these limits can be understood by constructing eco-centred system boundaries, while a socially centred perspective may argue that sustainability is embedded in the social construction of nature and the perspectives of different socio-technical configurations and their specific design of these systems.

Can a consensual understanding of sustainability be expected or are conflicting interests and perspectives inherent to the understanding of sustainability? Can organized dialogs be established between approaches centred on nature and resilience of human society as part of the circulation of matter in nature and the institutions and practice centred conceptualizations of sustainability?

**What is the role of theoretical transition approaches for the translation of different conceptualization of sustainability into transition strategies? Are exclusions of perspectives intrinsic parts of these approaches?**

The transition community is a problem oriented academic community. The relevance of the community is consequently dependent of its ability to make its academic insights relevant to actors engaged in real life transformation of socio-technical systems. The ability to effectively communicate sustainability as a system challenge, and the ability to identify the potential transitional mechanism of these systems, must therefore be seen as critical to the community.

How do the different foundational concepts of transitions in the community communicate the sustainability challenge? How do these concepts identify transition mechanism that appear relevant to actors engages in transition processes?

Who can speak for nature, and what kinds of representations are able to align and mobilise strategic support? Can coordinated transition strategies be developed in the absence of an unequivocal understanding of sustainability?

The different foundational approaches do have their deliberate and specific take on which social processes should be at the core of studies of transitions. These frame the empirical material sough for and the type of representations and explanations constructed like e.g. the notion of path creation, variation and selection, innovation pathways, regimes, normalisations, resilience and arenas.
Some dominant positions in the transition community

The discussion on the relevance and performance of different theoretical approaches to transitions studies is important not only as questions of representation and scientific rigour, but for the impacts on these approaches on the type of advice and the framing of transition processes. Without necessarily contradicting with one another these approaches emphasise different conceptions of nature, societal institution and the loci of transitional agency.

Three such approaches are

- A socio-technical system perspective (regimes, niches, institutional behaviour)
- An eco system perspective (resilience, adaptation, system governance)
- A practice perspective (practices, normalisations)
- A navigational perspective (entrenched actors, arenas)

A socio-technical system perspective

The dominant analytical approach of the transition community is the socio-technical system perspective. The key notion of this perspective is the regime which signifies a coordinated set of rules that configure a socio-technical system by which a societal function is provided. Under normal conditions the regime renders the socio-technical system stable and very difficult to change in radical new directions. Dynamics are added to the model by embedding the socio-technical system in a context of broad ‘landscape pressures’ as well as ‘niches’ that develops alternative socio-technical configurations on a local and experimental scale. A complimentary understanding of the socio-technical systems perspective is offered by the technological innovation system approach, which conceptualise a socio-technical system as a series of system functions, which need to be coordinated. A key interest of this approach is to understand how emerging and weak socio-technical configuration may gain momentum.

The strength of the socio-technical system perspective is that it insists on associating the sustainability challenge to the established socio-technical systems by which societal functions are provided and used. The approach hence provides a deepening of dominant market oriented ‘green growth’ strategies, by suggesting that sustainability need to be associated which fundamental changes in key socio-technical system, which are not likely to be the outcome of market driven innovation processes. Also it offers insights into the evolutionary dynamics, as well as the complex triggers that may enable new socio-technical configurations to emerge. To cater for the micro- and macro-phenomena that frame and interact with the regimes and are involved in regime transformations the Multi Level Perspective has gained a central position bridging to other theories of social structures and change.

The limitation of the perspective is however that it does not operate with a very strong and elaborated understanding of sustainability. The main interest is to understand patterns of socio-technical evolution and change within the sphere of ‘the social’ rather than the relation between socio-technical systems and eco systems. System boundaries and system dynamics are accordingly established by reference to the socio-technical rather than by reference to the affected eco-systems.

Recent developments inspired from geographical positions as well as the recognition of new actor constellations and sites emerging as influential sites for sustainable transitions as e.g. cities and regions
have introduced a spatial dimension to the study of transitions bringing in the situated and material dimensions of transition and also recognising the specific environmental and differences for transitions and how they are triggered and may be structured in the interplay between existing material and local eco-systems and the socio-material configurations based on and interacting with these.

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An eco system perspective

Another set of analytical approaches that have had some exchange and interaction with the transition community though still mainly building its own constituencies and theoretical frames conceptualises the system dynamics by mean of ecological metaphors. These approaches thus departure from ecologically oriented system demarcations, rather than socio-technical ones. The notions of resilience and metabolism provide two different ecological understandings of the system dynamics. The concept of resilience is concerned with the ‘robustness’ of socio-ecological systems, i.e. with the system’s ability to reproduce their previous state of affairs or to adapt to a new state based on its responsive capacity characterised as its resilience. The concept of socio-ecological metabolism suggests that the socio-ecological may be perceived as an organism characterised by a complex series of exchanges that need to be balanced. In contrast to the socio-technical system perspectives which are interested in triggers for system transformation, these concepts thus operate with a normative ideal of systems balance and system stability though challenged by instabilities that trigger responses – if possible – within the systems adaptive capacity. In both cases the system configuration may have a strong emphasis on the natural, biological system component, but a growing emphasis has been on an extended understanding of resilience including socially organised responses including the use of technologies into the systems characteristics as e.g. the building of dams for protection, changing crops, changing practices and regulatory instruments etc.

The strength of this perspective is that it provides actual strategies for addressing the sustainability of socio-ecological systems. The limitation is however that ecologically constructed system-boundaries are likely to be arbitrary from a socio-technical system perspective. An ecologically defined system may in other words involve a set of different socio-technical systems that are structured according to alternative system boundaries. Assessments of sustainability based on ecologically constructed system-boundaries may hence be difficult to translate into strategies for socio-technical transitions.
A practice perspective

In contrast to the former perspective taking the outset in ‘global’, systemic models and approaches whether these are socio-technical or socio-biological the practice perspective takes the outset in studying the everyday life and professionalised practices in society as they unfold and change. Stating the need to understand how practices change and involve technologies, social organisation and skills the approach has contributed to the discussion of sustainability and transitions by looking at resource, energy and water consuming practices providing new form of comfort and life styles but also often making these less sustainable. Far from arguing that the described transitions to new forms of normalised practices are the only ways of providing comfort nor determined by an underlying social process of development, the challenge to this approach seem to lie in the often emphasised ‘tragedy’ of new developed comfortable practices concerning their impact on sustainability.

The role of normalisations may be challenged by the diversity and multiplicity of practices involved in daily life and the potential tensions they create in relation to personal engagements in change. This defines a strong empirical basis for this approach taking seriously the different practices at stake. When the institutional component of socio-technical systems refer to routines and practices these are often seen from the perspective of the institution as an integral part of their reproduction while the practice perspective take outset in the actual developed and demonstrated practices including their contradictions and tensions.

References


A navigational perspective

An emerging ‘navigational’ approach within the transition community has reframed the question about how system boundaries and the sustainability challenge should be academically constructed. This approach is rather interested in how the system boundaries and the sustainability challenges are framed by entrenched actors with situated interests, identities and experiences at stake. By this approach is it hence argued that system boundaries are continuously negotiated and re-framed as new networks and relations emerge and new alliances are forged. These navigational processes may result in incommensurable system and problem framings, with conflicting strategic implications. An example is that the international emission trading schemes may undermine the effect of local energy saving
initiatives, as these will cause the international price on emissions to go down. In this an example different system- and problem-framings counteract one another other.

A key interest of this approach is to understand the circumstances which provoke and enable actors to perceive sustainability as a challenge that requires system transformation, and to understand the political processes involved in framing the system to be transformed. Through a focus on the conflicts and the need to build alliances this approach emphasise the need for organising experiments and establishing learning processes in a situation where both means and ends are contested and characterised by uncertainties and lack of knowledge.

References


The sustainability challenge of modern societies requires fundamental ‘transitions’ in the systems by which societal functions are provided (i.e. changes in e.g. transport-, energy- and housing systems). These transitions entail not only technical changes (fuel cell vehicles, wind turbines etc.), but also changes in markets, regulations, consumer practices, infrastructure and cultural discourse.

While the current neo-Keynesian approaches (need for more investment and regulation) and neo-liberal approaches (need for the right incentives and prices) all seem to be framed within a market oriented green grown paradigm, the scholars at the IST 2012 conference aim to develop a deeper understanding of the innovation process the political struggles and the changes in cultural discourses that are needed to create legitimacy and public acceptance of more fundamental transition in the way societal function are provided and used.

The aim of this policy plenary is to stimulate a debate between transition scholars and policy actors on the policy challenges of sustainable transition.

Framing questions for Policy plenary at IST 2012:

1. How has the understanding of sustainability for the past ten years, developed within your policy arena?

2. How are existing policy institutions, instruments and practices challenged by the demand for transition of societal functions?

3. What are the opportunities for the transition agenda to gain influence within core policy arenas, where it is challenged by fx mitigation initiatives that dominate the current ‘green growth’ strategies?

4. Are new transition oriented policy arenas emerging and if so how may these be supported?

List of panel participants

Johan Schot – professor TU Eindhoven, NL (as chair)
Fred Steward – professor Policy Studies Institute, University of Westminster
Frank Geels – professor SPRU, University of Essex
Pieter de Pous – director EEB Bruxelles (tbc)
Connie Hedegaard – EU Commissioner (tbc)
Lars Aagaard – director The Danish Energy Association
Michel Schilling – director Danish Environmental Protection Agency
Jørgen Abildgård – project manager CO2-neutral Copenhagen
#83 Energy supply companies becoming energy service providers - Sandra Backlund

Energy services are stressed as an important instrument to improve energy end-use efficiency in sectors whose core business is not related to energy. Despite a recent strong market development in both Denmark and Sweden, the energy service market has far from reached its full potential. Energy services include a variety of activities ranging from indirect energy services such as energy audits and analysis to complex services that include implementation, maintenance and operation provided in performance based remuneration contracts. One of the dominating segments that provide both indirect and complex energy services are energy companies. Energy supply companies becoming energy service providers assume dual roles with partly competing objectives, selling energy while implementing solutions to reduce energy utilization. This paper studies energy supply companies that provide energy services Sweden and Denmark. By interviewing both privately and publicly owned energy supply companies, the objective is to study both the success factors and the hindering factors for the market development of energy services. The paper investigates energy supply companies’ incentives to implement energy efficiency measures and if the dual roles create conflicts of interest that can damage credibility and cause mistrust on the energy service market. It also explores how different policy measures affect the incentives for energy supply companies to improve energy end-use efficiency and if publicly and privately owned energy supply companies have different objectives and strategies.

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#100 Dynamics of Socio-Technical Transition – Constructing the Chinese Wind Power Sector - Julia Hollitsch

This article offers a case-study of the emergence of a socio-technical system for wind power in China. During less than a decade, the Chinese Government has introduced an impressive number of policies supporting the adoption of renewable energy sources in the Chinese electricity system, potentially constituting a major socio-technical sustainability transition. Based on primary and secondary data collected in China and Denmark with Chinese and European actors in China’s wind power sector, focus in the article is on the interplay between government agencies, research institutes, and firms – both foreign and domestic wind turbine manufacturers and component suppliers – providing an explorative analysis of the dynamics of the seemingly evolving sustainability transition in China. Theoretically, set into a developmental context of an emerging economy as the Chinese, the paper combines the lenses of socio-technical systems, sustainability transitions, and actor-network-theory (ANT) with the notion of global innovation networks (GINs), the latter primarily based on global production networks theory within economic geography and innovation systems theory. This allows for a dynamic perspective on how the emergence of the Chinese wind power sector is coupled to the Chinese strategy of accessing GINs by linking up with foreign companies and research institutes (and their technologies) to develop capabilities of indigenous innovation and, ultimately, industrial upgrading. Combining the different theoretical lenses
allows for a developmental perspective and the inclusion of material actors such as e.g. particular technologies, licenses, patents, and policies. The article concludes that China’s emerging socio-technical system of wind power is not automatic. Rather, it involves intense socio-material work, issues of governance and power in an intricate interplay between path creation and path dependence, with implications for the translation of the Chinese wind power sector, and pointing to the methodological issue of agency versus structure.

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#188 Transition into sustainable energy systems in Japan: A Case study of Geothermal Development in Japan - Aki Suwa, Masaru Yarime and Joni Jupesta

The Higashi Nippon (Great East Japan) Triple Disaster on March 11th 2011 was initiated from 9.0 magnitude earthquake followed by a series of tsunamis, which caused a series of melting-through and explosions in Fukushima nuclear power plant. This disaster all together made a huge impact on Japanese economy and the society as a whole. It is reported that this disaster costs Japan between 5-7% of its GDP in 2010. Japanese energy sector is also expected to see a paradigm change in the near future. Though Japan may still maintain its nuclear program as one of its energy sources for the time being, but its further development and capacity increase may be halted and reduce gradually in long run. On the other hand, Japan as one of the country with high volcano activities, there is a huge opportunity to introduce geothermal as substitute for nuclear in electricity power generation. Several barriers already identified in this geothermal development: for example tight regulation on nature conservation and strict environmental impact assessment procedure add up geothermal project risks to the developers. Also, resource competition with hot spring business operators often becomes highly sensitive issues upon geothermal development. As a contribution to making a transition to sustainable energy systems, this paper is going to apply stakeholders’ analysis to a case of Japan by applying strategic management as conceptual framework. The result of the analysis will have valuable implications for the future energy development, through identifying the key driving forces for the emergence of effective local energy governance.

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#250 Smart grid technology as a driver for sectoral transformation - Sabine Erlinghagen, Jochen Markard, Karin Ingold

Smart grid technologies are expected to have a major impact on the future development of utility sectors. Among other factors, they are regarded as a key enabler for a transformation towards more sustainable modes of production and consumption. In the electricity sector, the transformation towards a smart grid will be achieved through the application of ITC technologies to the traditional transmission and distribution grid. While previous research has primarily focused on the technological challenges or the user interface of smart meter technologies, this paper will address the implications for sectoral change. Smart grid technology may have a twofold effect here: First, it facilitates decentralized generation technologies which represent a radical innovation as such. Second, it opens the door for new industrial actors to enter the energy sector: incumbent firms from the ICT sector as well as newcomers. In this contribution, we will track the role and influence of players from the ICT and the energy sector in the
emerging field of smart grid technology. Based on a survey of smart grid projects in Europe, we will compare how firms with different backgrounds affect the development of the novel technology. We also discuss strategic reactions of firms (e.g. through acquisitions) and present first results of a network analysis.

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a2 – TIS – Energy studies

#44 The Technological Innovation System and its Functions in a New Context – the Case of Renewable Energy Based Village Grids in South East Asia - Nicola Blum, Tobias Schmidt, Volker Hoffmann

The world’s population and its energy consumption are growing. At the same time the international community is aiming to reduce the environmental impact of energy provision. To this end, a transition from conventional to more sustainable energy technologies is needed. Evolutionary economic theory provides valuable inputs for explaining such transition processes. Amongst others, the Technological Innovation System (TIS) and the related Functions of Innovation System (FIS) approaches provide insights on actor-based learning in networks. TIS/FIS scholars, such as Bergek et al. in Research Policy (2008, Vol. 37/Issue 3), aim to understand the mechanisms that foster the diffusion of a specific technology that is key to the transition process, and subsequently help to derive policy recommendations. However, to date TIS/FIS concepts have predominantly been studied in the context of developed countries with only little empirics existing in developing countries. However learning and thus transitions are context dependent, see e.g. Truffer and Coenen forthcoming in Regional Studies (2012). The question whether the current TIS/FIS concepts prove valid in different contexts so far remains under-explored. This research aims at challenging the TIS/FIS approaches by applying these concepts in a very new context, that of renewable energy based village grids in remote, poor areas of developing countries. To this end, we chose a case study approach and conducted 30 interviews with actors from the private and public sector during field trips in Laos, Cambodia and Indonesia. The first results of our study demonstrate the importance of end-user integration, the role of international actors and the important function of knowledge retention. These are aspects which are not sufficiently reflected in the current concepts. We thereby confirm the strong influence of context on learning between actors and suggest that the TIS/FIS approaches might be adapted to different contexts.

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#200 Regional innovation systems in the energy transition: towards a framework of indicators for analysing local reorganisation processes- Andreas Huber, Jannika Mattes

The aim of increasing significantly the share of renewable energy sources in regions entails numerous new challenges. The predominance of traditional large scale energy suppliers is being questioned. Local utilities (“Stadtwerke”) have been re-discovering the economic potential of locally generated electricity and heat. New emerging actors such as local energy cooperatives and private households (“prosumers”) have been pushing into the market. In this process, small-scale regions and their specific institutional settings turn into the geographical core entity for the energy transition. In this contribution, we look at selected regions and how they adjust to their aim of increasing the share of renewable energies. Our goal is to understand the social and institutional reconfiguration which occurs not only between individual groups of actors, but within the whole regional system. Borrowing freely from regional innovation systems analysis, we differentiate between various involved interest groups that are more or less directly involved in regional energy sectors: the scientific subsystem of universities and private research institutions; the industrial subsystem consisting of companies active in energy supply and services, as well as in the production and installation of material; private households and cooperatives; the political subsystem made up by councils and specialized expert boards; the intermediaries such as company associations and specialized NGOs; and finally the financial subsystem. The complex interplay between these manifold actors and the involved bargaining processes in the regional system are at the core of the analysis. Besides presenting a theoretical framework for grasping the involved processes of reconfiguration, accommodation and adjustment, we will present first results from case studies conducted in two German regions, an urban one (Bottrop) and a rural one (Ostfriesland). Our conclusions help derive practical implications for regional reconfiguration processes, but also enhance the understanding of the role of regions for green energy systems.

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#217 The relevance of institutional structures for energy transitions: lessons from agricultural biogas in Northern Italy - Steffen Wirth, Jochen Markard, Bernhard Truffer

The significance of institutions for the understanding of innovation processes has been clearly underlined in the last 15 years. This also implies for technological innovation system (TIS)-related studies. As a general pattern, studies with a focus on established technological systems have tended to emphasize the relevance of aggregated institutional structures (e.g., research and education system), while studies on emerging technological innovations have highlighted the influential role of regulation and demand side policies. In our contribution, we follow the general concept that institutions are potentially comprised of regulative, normative, and cultural-cognitive elements. Such an enriched perspective on institutions allows us a more differentiated understanding of the diffusion process of renewable energy sources (RE). This matters with regard to transitions to a sustainable energy supply because RE are supposed to be implemented in a institutionally robust way. This means to find socio-technical configurations that are environmentally sound, socially legitimated and economically feasible. In this paper, we show the peculiar biogas technology trajectory of the Autonomous Province of Alto Adige in Northern Italy, a region that is largely affected by the physical topography of the higher Alps. As characteristic features, biogas plants are
almost exclusively loaded with manure (80 percent or more) and a few are organized by cooperatives that were especially founded for this purpose. Two things are particular here: rather small biogas plants (e.g., 65 or 150 kWel) organized on the basis of a cooperative and large manure-dominated plants (e.g. 1.9 MWel). These configurations are unique, compared to other similar regions in Germany and Austria that are advanced with their biogas-related system. In our contribution, we explain this quite surprising empirical appearance with the institutional setting. Even though the political support conditions for renewable energies have changed several times within the last two decades in Italy, the region of Alto Adige managed to create its own application niches. Peculiarities regarding the existing institutional structures help to understand how and why biogas plants could diffuse in this unique manner. These are: cooperatives, institutional niches, high degree of regional autonomy, and two different farm-related inheritance systems. In particular, the long tradition of cooperatives is the ground for both the implementation of the biogas technology and creation of application niches. By conceptualizing cooperatives as an interrelation of regulative, normative, and/or cultural-cognitive elements, it is shown that an organizational form rooted in multiple institutions can enable very peculiar forms of biogas to gain ground.

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#225 Systemic instrument for systemic offshore wind problems in Europe - Anna J. Wieczorek

Offshore wind energy is a relatively young but rapidly developing and increasingly competitive sector. While in the early 90s the industry was still in its infancy with the first offshore wind turbine being set up in Denmark, in 2011 the total installed offshore wind capacity in Europe reached 3294MW and up to 2020 another 40GW is either under construction, consented or planned. Presently offshore wind energy covers 0.4% of the total European electricity demand and provides Europe with 160000 jobs. The additional 40GW is the combined ambition of the EU Member States specified in the National Renewable Energy Action Plans to contribute to the binding renewable energy target. Realization of this ambition would allow meeting over 4% of the EU’s total electricity demand and avoid 87mln tones of CO2 emissions. It would also provide with huge employment opportunities, help various countries diversify their energy sources and even help them become energy exporters to emerging markets. Despite of recent developments in the field, however, the sector is facing a number of problems that hinder its quick development. Some of them include: underdevelopment of technology, potential lack of specialized human capital, high costs, dependence on governmental subsidies or obsolete grid infrastructure unable to accept larger amounts of renewable electricity. In this paper we use insights from the innovation system studies to assess the offshore wind as a technological innovation system. In particular we make use of a systemic policy framework to identify systemic problems that hinder the system development and to design a systemic policy instrument that would address the identified problems in an integrated manner. By this, the paper links well to the other contributions proposed to this conference on systemic analysis of offshore wind in Europe but instead of presenting the analysis, it focuses on classification of identified problems as systemic problems and on the design of a systemic policy.
There is in Denmark much focus on the development and implementation of renewable energy and sustainable transforming of the energy system. Some actors have for a long time promoted hydrogen and fuel cell (H2&FC) technologies as means to the development of a future cleantech based society. Large scale system transitions are complex in nature and the analysis of this kind of change requires holistic models and an analysis of the interplay between the companies and other actors in the incumbent technological regime, the innovative technology system and the institutional factors. This paper is concerned with the H2&FC innovation system in Denmark and the development of the Danish energy system seen from a meso perspective. The innovation system is analyzed on the basis of structure and fulfillment of necessary functions (Hekkert et al., 2007; Bergek, Hekkert & Jacobsson, 2008). Empirical knowledge is gathered through interview of key stakeholders within the H2&FC industry and it is investigated how the sector has evolved and how this relates to the functions of the technological innovation system. Through the conducted interviews within the existing technological energy production regime and within the technological innovation system, it is demonstrated that this specific technological innovation system is approaching the valley of death (Raven & Geels, 2010). H2&FC is a prioritized technology in Denmark, and Danish companies are thus able to cover the entire value chain to market within certain technology trails. Furthermore the Danish actors in this innovation system form a strong coalition which is centralized around the Partnership for Hydrogen and Fuel Cell technology established under the Confederation of Danish Industry. However there is a lack of institutional support for establishment of supporting technologies and for incentives to implementing and utilizing fuel cell technology. Danish companies develop and diffuse the technology through niche markets, in order to develop technological maturity and competitive strength. The paper concludes that Denmark has a unique position and a unique possibility in creating a new ‘wind-mill adventure’ within specific FC technologies.
take stock of the work so far and suggest possible avenues for further research in this field, the purpose of this paper is to identify similarities and differences in how the functions approach is defined and applied by different (groups of) researchers. Through a review of previous literature, a clear lack of agreement between researchers is identified with regards to (i) how key concepts are defined, including the concept of ‘function’, (ii) which system components are described as having an influence on functions, (iii) how system dynamics are conceptualized, in particular the interaction between system components and functions, and (iv) to what extent system-external factors are considered in the analysis. Based on this analysis, the paper discusses the implications of this lack of agreement and identifies a number of critical choices that have to be made by individual researchers, but possibly also by the ‘functions’ community as a whole, in order to increase the lucidity and applicability of the functions approach to TIS analysis.

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#76 A framework for analyzing deployment of solar photovoltaics - Alvar Palm, Lena Neij

Policy intervention schemes for increased deployment of solar photovoltaics (PV) have been launched in several countries, with varying success. In order to ensure an efficient deployment of the technology, thorough knowledge is needed about relevant present actors and institutions, and about how a desirable actor base and institutional setup should look like; mere cost reductions are not enough to guarantee deployment of a new technology. A framework that captures the systemic nature of technical change, i.e. the development and deployment of new technology, is the technological innovation systems (TIS) framework. The objective of this paper is to discuss how the TIS framework could be used to analyze policy for PV with a focus on deployment. So far, little emphasis has been on using TIS for detailed analysis of deployment of new emerging energy technologies. The TIS framework has been used for analyzing market growth of new energy technologies including processes of deployment in parallel with processes of technology development and production. The question is if TIS also will be a suitable framework for a more detailed analysis of the deployment of new energy technologies. We argue that “upstream” parts of the PV value chain differ fundamentally from “downstream” parts in that “upstream” activities (e.g. production of purified silicon, wafers, and solar cells) can often be understood as pertaining to a global TIS, while “downstream” activities (system installation etc.) could generally be assumed to be part of a more local (or national) TIS, and we identify and discuss components and processes of the TIS that are of particular importance for deployment of PV.

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#137 A review of western european offshore wind innovation system- Anna Wieczorek, staffan Jacobsson, kersti karltorp, robert harmsen, gaston Heimeriks, simona Negro, Marko, Hekkert

One of the challenges for EU in reducing the threat of climate change is to transform the energy sector into a ‘low carbon’ one in less than three decades. This is an immense challenge. One of the technologies that may contribute to realizing this challenge is offshore wind energy. The technological advantage of offshore wind energy is the large potential due to high wind speeds, large available area, and much higher societal acceptance than onshore wind. Technological disadvantages are the current high costs of
offshore wind, significant technological barriers that need to be overcome in order to increase reliability and bring down the costs and additional infrastructures that need to be put in place to connect the offshore wind parks to onshore electricity grids. To overcome these technological bottlenecks and to live up to the technological potential, a well functioning innovation system is necessary. The purpose of this paper is to analyse the current state of the European Technological Innovation System (TIS) for offshore wind power and specify current and anticipated system weaknesses, weaknesses that may guide policy intervention and business strategy. Tentatively, the processes ‘influence on the direction of search’, ‘entrepreneurial experimentation’ and knowledge development and diffusion’ are well advanced; there are powerful factors directing firms’ attention to the system, many actors are entering along the whole value chain conducting numerous experiments with different designs, and many universities/research institutes are working with development/diffusion of new knowledge. However, several barriers remain and must be overcome in order to realize the potential of offshore wind power. These system weaknesses are primarily related to three relatively weak functions; legitimation, market formation and resource mobilization where the latter includes not only access to specialized competences but also financial capital and grid infrastructure. Policy intervention must be guided towards removing the system weaknesses that make these processes weak. The paper identifies these weaknesses and discusses the associated policy and strategy challenges.

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#279 Comparing the European and US nutraceuticals innovation system - Ellen Moors, Jef Pennings

In its health strategy to overcome the grand societal challenge of obesity, the European Union (EU) is committed to promote healthy lifestyles by stimulating healthy food choices (EU 2011). Accordingly, during the last decades the role of dietary active components in human nutrition has become an important focus of research. It has increased the awareness of consumers about diet and proper nutrition. An important product innovation emerging from this focus on dietary active components in human nutrition and food are so-called ‘nutraceuticals’. Nutraceuticals are defined as “any substance that may be considered a food or part of a food and provides medical or health benefits, including the prevention and treatment of disease” (DeFelice, 1994;1). Several studies showed that European food and life sciences firms encounter several problems due to regulations that might hamper market access of nutraceuticals. Other studies focused on consumer acceptance as a possible explanation of the low diffusion of nutraceuticals in the EU. Accordingly, this paper focuses on the weaknesses in the emerging nutraceuticals innovation system in Europe, compared to the US. By mapping the development of the European nutraceuticals innovation system over time using a technological innovation system (TIS) analysis (Hekkert et al 2007), this paper will give more insights in the barriers related to the low diffusion
of nutraceuticals in the EU. Furthermore, by comparing the emerging European nutraceuticals innovation system with the more successful nutraceuticals system in the US, policy recommendations could be given to overcome these barriers and promote competitiveness of the European nutraceuticals industry on the global market. Additionally, this paper contributes to the innovation and transition literature by introducing the TIS approach in the life-sciences field, which is characterized by long development times, rigid patenting laws, strict regulations and ethical issues.

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In their answer to Shove and Walker’s (2007) critique, Rotmans and Kemp (2008) admit to ‘a certain modernistic element’ in their approach to transition management. At the end of the day their goal is ecological modernization - rephrased as a ‘modulation’ of ongoing processes towards more sustainable outcomes. Instead of retaining this "modernistic element", in this conceptual paper, I explore how far and where non-modernist approaches to sustainability transitions will take us. More specifically, based on work done under the label "non-representational theory" (see Anderson and Harrison 2010), I discuss possible contributions of research on the role of a) technologies of the self, b) affects, and c) unexpected events in sustainable transitions. ad a) As also Shove and Walker note, the belief in the management of a transition towards more sustainability, neglects the vast hinterland of unconscious practices that not only constrain actions but also constitute them in fundamental ways. Foucault’s technologies of the self are special practices in this respect because they are used by subjects to regulate and police themselves in society. In the context of sustainable transitions, individuals experiment with a host of tools and exercises to influence their own daily practices (Marres 2009) - that have so far been neglected in research on sustainable transitions. ad b) Desires are important for non-representational theorizing because they constitute a mutually constitutive relation between existing and non-existing entities - typically neglected in modernist discourses. Sustainable transitions are clearly driven by desires that transcend the rational assessment of environmental impacts. The role of deeply rooted desires for an intact nature and unmediated social relations, for instance, is usually outside the scope of transition studies. ad c) The history of sustainability transitions is replete with accounts of unexpected events that had a major impact - both in favor and against more sustainable outcomes. This is not surprising given the complexity and uncertainty that is a defining characteristic of these processes. In a non-modernist approach, these events are not explored to make them controllable and reproducible. Instead, it is exactly their radical otherness that makes them part of sustainable transitions because it has the potential to rupture and change practices and desires. Using research on these three research topics as test case, the paper presented here concludes with an appraisal of what is lost together with the "modernist element" and what are the potential gains. References: Anderson, B. & Harrison, P., 2010. Taking-Place: Non-Representational Theories and Geography B. Anderson & P. Harrison, eds., Ashgate. Marres, N., 2009. Testing Powers of Engagement: Sustainable Living Experiments, the Object Turn, and the Undoability of Public Involvement. SSRN eLibrary. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1449735 [Accessed February 6, 2012]. Rotmans, J. & Kemp, R., 2008. Detour ahead: a response to Shove and Walker about the perilous road of transition management. Environment and Planning A, 40(4), pp.1006-1011. Shove, E. & Walker, G., 2007. CAUTION! Transitions ahead: politics, practice, and sustainable transition management. Environment and Planning A, 39(4), pp.763-770.
#159 Constructing users in the smart grid - insights from the Danish eFlex project - Sophie Nyborg, Inge Røpke

In the coming years the energy system is bound for a low-carbon transition due to concerns about e.g. climate change and insecurity of supply. In Denmark, as in many parts of the world, policy makers and the energy industry present the vision of the ‘smart grid’ as one of the most promising solutions to the upcoming challenges. This digital modernisation of the electricity grid is thought to enable better integration of fluctuating renewable energy sources and handle an expected increase in electricity demand. When new provision systems are constructed and when old systems are radically transformed, many forces have to be aligned and usually some actors play the role of strategic system builders (Hughes 1983), who should come together in transition arenas to develop common guiding visions and innovate through learning-by-doing to steer the transition reflexively (Loorbach & Rotmans 2010). This is also the case in relation to the smart grid in Denmark where the efforts of strategic system builders have culminated in the political decision to finalise a smart grid roadmap before the end of 2012. However, an interest in exploring user roles in relation to the establishment of a smart grid has only recently begun to emerge. In this paper we report on one of the first smart grid related projects in Denmark where consumer aspects have been central. The paper draws on participation in a user study connected to the ‘eFlex project’ — a demonstration project aimed at investigating potentials for flexible electricity consumption through testing of e.g. a home energy management system. The testing involved 119 households in the greater Copenhagen area and was commissioned by the largest utility company in Denmark, DONG Energy. The aim of the paper is to discuss what can be learned from such projects and which roles they play in the wider construction of the smart grid.

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#208 Participation and deliberation in low-carbon transition governance: Learning from climate policy making in Sweden. - Annica Kronsell

Abstract International Conference on Sustainability Transitions DTU, Lyngby, Denmark, August 29-31, 2012 Participation and deliberation in low-carbon transition governance: Learning from climate policy making in Sweden. Authors: Annica Kronsell, Roger Hildinsson and Jamil Khan, Lund University, Sweden. The strategies implied by the future climate objectives are posing challenges for governance. For Sweden it is based on the objective that by 2050 Sweden will have a resource efficient energy supply with no net emissions of greenhouse gases into the atmosphere (EPA 2012). On this topic, transition theories, sustainability studies, green democratic and deliberative theories converge on the call for inclusionary and participatory methods as one way to accomplish this transition through increased legitimacy and compliance in governance. However, the approaches differ as they come from different perspectives and disciplines, with the selective participation approach of the transition management model perhaps the most explicitly developed (Loorbach 2010). Approaches differ on which actors should be included on what grounds, what these actors are expected to contribute with and what the optimal procedures for collaboration might be. Such questions form the starting point for the analytical framework of this paper, used to analyze participation in climate governance in Sweden. The data consists of 59 interviews conducted during 2011 with policy makers responsible for climate policy making in the environment,
transport, energy and innovation sectors. In general, policy makers characterize the issue area as one of consensus seeking and cooperation. At the same time we found a variety of different types of collaboration: formal and institutionalized as well as informal and ad hoc arrangements difficult to oversee for an outsider. While a majority of the respondents viewed broad cooperation as necessary to accomplish the transition envisioned, our study reveal many different perceptions and opinions among the policy makers on suitable forms for participation, who to be included and the purpose of collaboration. The aim of our contribution is to analyze how Swedish policy makers view the inclusion of stakeholders in climate governance and against those findings assess different theoretical 'models' for participation in sustainability governance. This will be helpful in pointing to problems and potential challenges in the collaborative field around climate governance and, hence, help provide suggestions for improvement in the existing governance structure.EPA (2012) Underlag till en svensk färdplan för ett Sverige utan klimatutsläpp 2050, Stockholm: Naturvårdsverket, Rapport 6487, Februari.Loorbach, Derk (2010) 'Transition Management for Sustainable Development: A Prescriptive, Complexity-Based Governance Framework, Governance: An International Journal of Policy, Administration, and Institutions, 23(1): 161-183.

#252 Participation, politics and actor dynamics in low carbon energy transitions - Noel Longhurst, Jason Chilvers, Alex Haxeltine, Tom Hargreaves

The field of sustainability transitions has a strong theoretical emphasis on the sites and modes of intervention in socio-technical systems, with the intention of informing the purposive ‘steering’ of the system. Such aspirations have led to the emergence of a growing debate around ideas of reflexive governance. The literature on reflexive governance has raised questions not only about the limitations of modulating an objectified system from the ‘outside’, but also about the multiple forms of politics which surround any attempt to intervene in the dynamics of complex systems. For critics, questions of power, democracy and legitimacy are often obscured in what, it is argued, are optimistic and technocratic transition mechanisms. This paper contributes to these ongoing debates by seeking to interrogate what it means to participate in socio-technical systems, and therefore their potential transition. Drawing on a review of both the transitions and participation literatures, and a workshop that brought together international scholars working in these fields, it seeks to develop the concept of socio-technical participation. In doing so, the paper provides a richer account of the unfolding actor dynamics and the multiple ways in which actors contribute to the ongoing reproduction of the system, as well as the many different sites of system innovation. The paper concludes by sketching out the development of a research agenda that takes seriously the theoretical, methodological and governance implications that are raised by engagement with broader conceptions of socio-technical participation.

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b2 – Transition management pathways

#46 Microgeneration in New Homes: Transition opportunity or transitory non-starter? - Hannah James, Timothy Foxon, William Gale

This paper takes a whole systems approach in identifying the major drivers and barriers for including microgeneration technologies in new low carbon homes: demonstrating the use of the multi-level framework in conceptualising complex systems which evolve along heterogeneous timescales. Pressures upon the incumbent energy provision regime in the United Kingdom (UK) are giving rise to several different potential pathways towards a transition to a more decentralised system for domestic energy provision. New build provides opportunities for more radical changes to building fabric than retrofit, so new houses present a good opportunity for the emergence of niches for microgeneration to challenge the dominant centralised electricity generation regime. Using empirical data from a series of semi-structured interviews with a range of UK stakeholders in the fields of construction and energy management, emerging niches and pathways for microgeneration in new houses are characterised and evaluated in light of the major drivers and barriers identified. Here, a coevolutionary approach is used to examine the ways in which institutions, businesses and consumers shape and are shaped by the transition process. In addition to microgeneration technologies themselves, non-technical innovations such as new business models and multi-scale energy distribution methods are emerging in niches. However, current UK policies fail to recognise the plurality of these emerging pathways, and there is a widespread expectation amongst stakeholders that current policies will be not sufficient to overcome prevailing practices in the energy and housing sectors in order to stimulate a transition to decentralised domestic supply. UK policies for reducing emissions from new build homes are evaluated, with suggested interventions for transition management arising from the interviews and from literature. Comparisons are drawn with other countries where the transition to decentralised domestic energy is further along, in an attempt to identify elements of successful transition management in the domestic energy sector.

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#147 Transition pathways for a UK low carbon energy system: Reflections on conceptualising agency and governance within sustainability transitions - Peter Pearson, Timothy Foxon

In papers at previous International Sustainability Transitions Conferences, we have presented earlier stages of our work on developing and analysing a set of transition pathways to a highly electric, low carbon UK energy system. This work seeks to provide a greater role for the agency of actors in transitions, through using an ‘action space’ approach to explore the dynamic interactions between choices made by actors, and to explore the role of governance in transitions, by framing alternative pathways as dominated by competing governance ‘logics’ that different actors pursue. This paper provides a critical
reflection on these conceptual developments. This serves to situate our work within the socio-technical transitions literature, and to highlight the challenges remaining in applying these concepts to producing and analysing future pathways in ways relevant to policy and industrial stakeholders.

Our work has developed alternative transition pathways to a UK low carbon energy system, under ‘market’, ‘central government’ or ‘civil society’ logics, and analysed the potential implications of actors’ choices, under these logics, for patterns of energy service demand and rates and mixes of deployment of low carbon electricity generation options. We claim that going from qualitative narrative storylines to quantitative projections of demand-side and supply-side changes in this way is useful, but requires critical methodological reflection. We have also analysed ‘branching points’ on the pathways, in order to highlight how different technological outcomes may result from different actors’ choices under prevailing governance logics at key decision points.

Finally, we reflect on the challenges of using analytical constructs, such as the multi-level perspective, and detailed evidence from past historical transition processes, in order to develop future transition pathways, that are both methodologically sound and useful to policy and industrial stakeholders.

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#218 Pathways for transformation to sustainable nutrient management - Helena Kahiluoto

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Three major interacting distortions in the Earth system – climate change, biodiversity loss and escalation of the nitrogen cycle – have already transgressed their planetary boundaries and escalation of the phosphorus cycle is on the threshold. Peak oil and peak phosphorus interfere with the limits to growth of the prevailing linear nutrient flows, and food security is at risk. Major system innovations are required at numerous levels of the socio-technical systems to transform these dynamics. The agrifood system is in the core of these changes. As an application of the transition management framework, we create contrasting back-casting scenarios starting with various visions of sustainable nutrient economy. A corresponding range of plausible pathways for the case of Finland will be enlightened in the European and global context. The focus of the scenarios varies on the strategic axes of closed loop/cascade - eco-efficiency, market led - public driven and local/regional - global. The process is fed by and interacting with a transition arena involving relevant actors in a sequence of facilitated, documented workshops, and with a quantitative assessment of nutrient flows and their major leakages. Key determinants of the transition processes are identified at various system levels and enabling system shifts sketched for each inherently coherent scenario. Examples of the determinants focused on are fertilization strategy, waste management system, national fertilizer legislation, the agri-environmental scheme of European Union and a framework for global trading of nutrient related ecosystem services. The preliminary contrasting scenarios will be presented and methodological issues on managing the process will be discussed.

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#229 Commitment, reputation, and funding in strategic policy visions; the support of President Bush and Governor Schwarzenegger for hydrogen energy - Marloes Dignum

Around the year 2000, there was a surge of enthusiasm surrounding hydrogen energy. This global enthusiasm had its core in USA developments. California had progressive environmental legislation for decades and formed the breeding ground of many hydrogen projects. The hydrogen energy vision gained high level support in the USA federal policy discourse as well as in California state policy. In 2002 President Bush started the FreedomCAR program, a public-private partnership aimed at hydrogen and fuel cell commercialisation. A year later, Bush announced hydrogen as future automotive fuel in his State of the Union. In 2003, Arnold Schwarzenegger embraced hydrogen energy in his election campaign for state governor. Once in office, Schwarzenegger announced the launched the California Hydrogen Highway Network, a program to establish hydrogen fuelling stations every 20 miles along Californian highways by the year 2010. Both visions were grand, committing the name and reputation of the politician to hydrogen energy. Although accomplishments did not live up to the prestigious launch of these visions, efforts were made and resources were mobilised. The perception of the policy commitment differed. The lack of environmental policy of the Bush administration created suspicion and his commitment was frequently portrayed as a means to continue using nuclear energy and coal for hydrogen production. Schwarzeneggers’ fame and reputation was welcomed even when he proved unable to lift hydrogen development. This paper analyses the dynamics leading to the adoption of the hydrogen energy vision in USA federal policy and California state policy and provides insight regarding the impact of the vision by comparing the dynamics leading to the adoption of the hydrogen energy vision to the dynamics after its adoption.

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b3 – Visions and back-casting

#125 The role of the cultural and institutional context in the application of co-innovative approaches - Jessica (M.R.) Cornelissen, Bart Bremmer

The Reflexive Interactive Design (RIO) approach has been applied in several system innovation projects in Dutch husbandry. The main aim is to inspire and mobilise stakeholders in a socio-technical system (e.g. animal husbandry system) to take steps towards sustainability. Structural change (i.e. system innovation) is needed to get to coherent solutions for the complex challenge animal husbandry faces. By including a wide variety of stakeholders in and around animal husbandry in a transdisciplinary multi-stakeholder process, including reflexivity and design, the approach tackles this complex challenge. The first phase of the RIO approach – system and actor analysis – includes a collective system analysis (CSA) adapted from the Innovation Systems Framework. This tool is deemed to increase reflexivity: it helps in opening up the perceived solution space and reveals (joint) perspectives for action among those involved in the process. Awareness is growing that the cultural and institutional context plays a role in the success of co-innovative approaches, such as the RIO approach and its CSA tool. When exporting these co-innovative approaches it appears that application in another context is not straightforward. In this study the influence of the context is investigated by means of a case-study that examines the (Dutch-born) CSA in
the Ethiopian context. Characteristics of the Ethiopian institutional and cultural context that are deemed to influence the success of the CSA with regards to reflexivity (i.e. opening up of solution space and joint construction of perspectives for action) are indicated. Additionally, the implications for the design of the tool, especially with regards to the casting of participants and the facilitation, are discussed. Finally, an outlook on what this means for applying co-innovative approaches in different contexts is given.

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#195 ICT as a motor of transition - Josefin Wangel

Numerous studies have shown that a focus on technology alone is insufficient when promoting more sustainable levels of energy use. One reason for this is rebound effects, another is the variety of social practices for which specific technologies and their associated practices might not be apt, or ethically problematic. Thus, there is a need of shifting focus from the technical to the socio-technical. Socio-technical transitions aim at creating a more sustainable society through fundamental changes at all levels in the socio-technical structures of society. In this paper, the transition framework is further developed through applying the concept of Situations of Opportunity as research approach, which comprises an iterative exploration of what needs to be changed, by whom the changes could be initiated and managed, and how this can be done. Through merging the concept of Situations of Opportunity with the futures studies approach of backcasting these four questions can be integrated. With this as starting point this paper reports on a scenario study aimed at exploring how an innovative and ubiquitous introduction of ICT could act as a motor for a socio-technical transition towards a low energy low carbon society within the time span of 20 years. The scenario situated in the inner city area Södermalm Stockholm Sweden is guided by the vision of a 2 kW society in which each individual on average uses no more than 2 kW and does not emit more than 1 tonne of CO2 per year. One proposed way of achieving this is through the use of ICT. ICT has the advantage of creating possibilities for a more sustainable living without the need for extensive physical changes in the urban fabric through e.g. intelligent control and energy management. Through user awareness and persuasion ICT also has an acknowledged potential of altering peoples’ everyday practices.

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#242 Financing sustainability transitions - Kris Bachus

This paper explores how and when financial considerations are and should be taken into account in transition processes. Transition theory and practices traditionally pay much attention to innovation. System innovation, niche experiments, co-evolution all refer to the structural change that characterizes transitions (Grin et al., 2010). Many publications about transitions thinking and transition management acknowledge the importance of a multistakeholder approach, knowledge diffusion and learning, evaluation and experimenting as central elements in the multiphase process of a transition (Loorbach, 2007; Rotmans, 2003). However, most transition processes also require innovative financing, which is overlooked by most authors. In several of the phases of transition management, a budget is needed before the phase can be realized: when setting-up transition arenas, when identifying niches and
designing experiments, when realizing the step from experiments to regime-changing instruments. In many cases, they may be a barrier for the realization of a transition pathway: if no answer can be provided on the financing question, the necessary breakthrough may fail to occur. In the paper, I will first explain why, how and when the search for innovative financing instruments is relevant and important for transition processes. Secondly, I will introduce a number of innovative financing instruments. Thirdly, the application of those instruments will be explored by discussing the practicability in one existing transition process, which is the sustainable living and housing transition in Belgium and the Netherlands. This case is interesting, since it is a mature transition (management) process, which makes it possible to analyze different phases in practice. In the conclusion of the paper, I will develop recommendations for future transition processes’ advance.

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#261 Framework of Integrated Scenario Design: An Approach to Meso Level Research for Sustainability Transition - Yusuke Kishita, Keishiro Hara, Michinori Uwasu, Yasushi Umeda

Sustainability research aims to realize transitions to desirable future visions toward a sustainable society. There are many promising visions (e.g., 70% CO2 reduction by 2050), while many seeds are becoming available, such as element technologies (e.g., electric vehicles) that would serve as catalysts for transitions to those visions. However, the problem is that there is a huge gap in shaping transitions between macroscopic future visions and microscopic seeds. This paper defines “meso level research (MLR)” as a new research area that aims to bridge the gap between visions and seeds. As an essential approach to MLR, we focus on designing scenarios since it helps describe various images toward visions by assuming possible social situations that might occur. With an aim to understand the roles and research challenges of scenario design, this paper proposes a research framework for scenario design in the context of MLR. We firstly review existing literature of scenario design to derive requirements for making scenario design practical enough to enhance MLR. The important requirements include; (1) scenarios need to be designed with various stakeholders’ involvement to challenge sectionalism within and between academic disciplines, political institutions, industries, and citizens; and (2) scenarios need to be updated to maintain the consistency between the scenarios and the real world. Based on these requirements, we propose the concept of integrated scenario design (ISD) that reflects the scientific and social knowledge into scenarios in a comprehensive and dynamic manner. In particular, the ISD concept emphasizes the feedback loop functioning between the real world and designed scenarios for facilitating transitions toward sustainability. Finally, we investigate two cases of regional scenarios from the ISD viewpoint. The results reveal that governance is of particular importance for the ISD concept and that how to ensure reflexivity of designing scenarios remains as challenges in MLR.

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Bioenergy plays an important role in several Danish climate and energy plans. In some plans as much as 50-60% of the energy in 2050 is supposed to come from bioenergy sources. However, there are major controversies over this target and what types of biomass from what sources and in what amounts it is acceptable to produce and consume. Based on a combination of path dependency and path creation approaches to technological changes and actor-network theory, the paper analyses the shaping of recent controversies in Denmark about the roles of bio-energy as part of a Danish climate strategy. By identifying shared and contested visions and analysing how regime mechanisms are maintained and challenged through different actors’ navigation the paper develops a transition perspective on bio-energy arenas. The paper identifies actors within dominating socio-technical regimes in the Danish agricultural, industrial and energy sectors who try to enrol other actors, reports, standards etc. as part of the shaping of bioenergy strategies. Researchers and different types of non-governmental organisations (NGOs) are also trying to enrol actors as part of the bio-energy controversies. Big energy companies want to convert big coal fired power plants to biomass fired plants. Up till now straw from Danish agriculture has played an important role, but recently imported biomass sources from a variety of forests have been the preferred fuels because of more stable supplies and quality. Some of the forestry supplies have been criticized for causing increased greenhouse gas emissions because of fast logging of several years of forest growth and some for occupying land in developing countries. A major biotech company develops and produces enzymes for processing of biomass resources for production of first and second generation biofuels. The alignment between this company and the international petrol industry is strong, because biofuel is seen as enabling a continuation of the gasoline and diesel car regime. The biotech company uses life cycle assessments when arguing for its contribution to greenhouse gas reduction, but the company’s claims and practices are non-transparent to the public. The farmers’ association is promoting manure as energy source for biogas production and a strengthening of the natural gas regime while also reducing climate impact and nuisances from the application of manure as fertiliser. The biogas strategy is questioned by some NGOs who argue that the biogas path might be used as arguments for increased animal husbandry. The NGOs argue that the biggest reduction of climate impact from agriculture is obtained from reduced animal husbandry, which combined with conversion to organic farming could strengthen the national competitiveness. The controversies include disagreement about the methodologies for environmental assessments of bioenergy initiatives, for example whether so-called in-direct land use changes (ILUC) should be included. Furthermore the reliability of international certification systems for biomass is discussed. Some researchers and NGOs have contributed to the development of biomass certification schemes, while others are critical about the reliability of the schemes. The mapping show the need for governance strategies, which are able to organise dialogic processes which combine several types of concerns, including climate impact, non-climate environmental aspects, land use, food security, energy security, employment, and national competitiveness.

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Governance and Policy

c1 – Discourses in transition processes

#60 A Socratic method for impact assessment for sustainable development - Rene Kemp

Prevailing regimes of policy development & assessment are not sustainability-oriented. They are dominated by concerns of economic growth, de-regulation, and social stability, often, confusing means and ends. Predictive impact assessment in a world not oriented towards sustainable development often finds that environmental benefits are associated with economic costs, without proper considerations of how such trade-offs may be pre-ordained and co-produced by prevailing framing conditions. Equally, analyses of marginal changes in a few policy variables based on relationships within the realm of past experience risks that assessments overlook dangers of crossing critical thresholds. Our paper argues that policy assessment for sustainability requires an approach whose outcomes are not pre-ordained or constrained by assumptions of regime frameworks, marginal changes, and historical relationships. In our paper we argue that taking a Socratic approach may be much more useful. We outline what we mean by a Socratic approach, why we consider it to hold great potential in this domain, and demonstrate the procedure using the case of electric mobility and its role in sustainable mobility as an illustrative example. We outline, illustrate and evaluate a Socratic (conversation-based) knowledge exercise as the basis for – or as a component of – policy assessments for sustainability. In general, a Socratic dialogue seeks to articulate underlying values and to test assumptions. In this case, the knowledge production process (involving various iterations and dedicated research) is jointly managed in a way that is mindful of interdependencies, market competition, politics, and patterns of sociotechnical change. The overall aim is to generate socially robust knowledge based on an understanding of limits of knowledge and indeterminacy. As a knowledge exercise it helps to creates early warnings, to better consider interdependencies, and identify necessary and useful policies for sustainable development, based on relevant indicators and identified limits and tradeoffs. Such an approach depends upon bringing together experts and knowledge holders from different domains and who take different perspectives. These may include technical and scientific, experts, policy experts, those with business knowledge, lay experts, those with context knowledge, and others with the aim of integrating their different knowledges. Analytically as well as empirically our method is based on the following considerations: That a good sustainability assessment considers issues of complexity, uncertainty and opts for an integration of different types of knowledge That judgment is an essential aspect of impact assessment That the value of the exercise depends on the knowledge produced being seen as salient, credible and legitimate That impacts are co-produced and context-specific (instead of technology or policy specific) That contexts are dynamic and that impacts are context and configuration dependent and are co-produced; i.e. with innovations and sociotechnical systems co-evolving within the wider context composed of prices, policies, social wants and resistance, etc. Socratic assessment may prepare for modeling work but is not limited by the outcomes of computer calculations. Issues of complexity, uncertainty and context-specific results are not suppressed but explicitly considered. The aim of the exercise is not prediction but learning and the creation of (socially) robust knowledge about possible impacts in different context and how policy may be used to reduce negative impacts and achieve positive impacts. It is an assessment for policy instead of an
assessment of a predetermined policy, which draws on environmental assessment, technology assessment, organizational learning and integrated assessment. We will use sustainable mobility as an example case, with special attention to the role of electricity in sustainable mobility, leading us to consider issues of electric power generation, battery recycling, second-life use of batteries (e.g., in Vehicle-to-Grid configurations), the use of electric cars, scooters and bicycles within systems of intermodal transport and organized sharing, electric mobility in urban environments and how various policies, prices for fossil fuels and cultural values affects outcomes. For this case, we will describe the way in which the assessment process is organized (the types of expertise to be included, the rules of engagement, commitment to knowledge integration, dealing with different expert frames), the questions to be examined, and dilemmas for assessment and knowledge integration. Our paper concludes with an evaluation of the approach. Lessons learned are used as the basis for making recommendations for the use of a Socratic approach in policy assessment for sustainability and for making suggestions for further research.

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#117 On the relation of discourse and innovation activities: A comparison of hybrid electric and fuel cell vehicles - Bjoern Budde

The reductions necessary to reach the level of greenhouse gas emission reductions considered to be necessary to keep the effects of climate change manageable are enormous and require radical technological and social innovation at several levels (UNFCCC 2009; Stern 2006). Due to these requirements and the increasing share of the total GHG emissions caused by automotive transport, the automotive industry is expected by the public and policy makers to develop more sustainable alternative drive train systems. However, a number of experts argue that the automotive industry is probably “window-dressing”, by conducting innovation activities only at the necessary level to satisfy public concerns (van den Hoed 2005). Furthermore we have seen the emergence of several hype/disappointment cycles concerning alternative drive train technologies, in particular fuel cell technology in the past. These cycles were caused by an opening gap between the expectations raised and the ability to deliver the promised technologies to the market within the proposed timeframe (Konrad et al. in preparation; van Lente and Spitters 2009). This paper analyzes the relation between innovation and discourse activities in the cases of hybrid electric vehicles (HEV) and fuel cell vehicles (FCV). The outcome of the innovation activities up to now is quite distinctive: While HEVs are successfully deployed to the market; fuel cell vehicles are not commercially available yet. In this paper, we start with an overview about the discourse and innovation activities of the automotive industry using patent data and media attention as indicators. Second, two case studies - Daimler and Toyota - are presented, since these companies are regarded as pioneers and most influential actors with regard to fuel cell respectively hybrid technology. Our analysis reveals that in the case of HEVs innovation activities were intensified first, followed by an intensification of discourse activities. The opposite dynamics could be observed in the case of FCVs. The paper shows that these differences can be explained by the characteristics of the technology. HEVs are not dependent on a new infrastructure, therefore there was no incentive to inflate expectations about the technology prior to market introduction. However, FCVs are dependent on the build-up of a new infrastructure, thus there was an incentive to inflate expectations about the technology to motive other actors to join innovation activities in the field, since the build-up of an infrastructure for a
technology offered by a single car company was not considered a viable option.

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#160 States, tipping points and change in societal debate on new technologies - Eefje Cuppen

Sustainability transitions rely on the alignment of sustainable technologies with their socio-technical context, for example in terms of policies and regulation, support from local and larger socio-political communities or embedding in the value chain. Societal debate on new technologies can be seen as a vehicle to create alignment within the socio-technical context. Societal debates on new technologies help to articulate the potential impacts and risks of a technology and the values at stake. This requires a sufficiently open dialogue. An open dialogue means that actors with diverse perspectives are willing and able to learn, listen and exchange knowledge and viewpoints. Societal debates are dynamic processes in which different states may be identified. Not all of these states involve ‘open dialogue’ and contribute equally to alignment with the socio-technical context. Drawing on insights from dynamic system theory we distinguish between gradual change in societal debate and tipping points between different states of societal debate. A tipping point is a relatively rapid change to a different state that is hard to reverse. A tipping point may concern a shift to a situation where there is e.g. broad societal support for a technology, but it may also concern a shift to a situation of deadlock or polarised controversy. In this presentation we will explore 1) to what extent we can understand the dynamics of societal debate in terms of shifts between different states of ‘openness of dialogue’, and 2) investigate ‘early-warning signals’ that indicate that the debate will shift to a state in which the ‘openness of dialogue’ is seriously decreased. This may help policy makers to develop interventions in time for facilitating societal debate.

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#182 A social contract for the low-carbon transition? Insights from the Swedish example. - Jamil Khan

This paper will present and discuss the main results of the research project LETS 2050 that studies the governance challenges of a transition to a low-carbon transport and energy system in Sweden by 2050 (www.lets2050.se). A key finding of the project is that a low-carbon transition is technically possible and economically feasible, while the main challenge is political. At the moment there is an ongoing process both internationally and by national governments to develop road maps for a low-carbon transition. In the paper we explore the potential role of a positive narrative about a low-carbon future and the need for a re-negotiated ‘social contract’ for change. The objective to avoid dangerous climate impact will in itself not be enough to establish societal consensus for the transition. Instead, in analogy with the genesis of the welfare state, a transition embracing society as a whole has to appeal to other societal interests and to all major social groups. Special attention is devoted to rethinking the role of the state in a future transition. We argue that the challenge will require a revitalization of politics and the return of the state, although not necessarily in its traditional hierarchical form. The paper is based on empirical research in Sweden and we illustrate our findings with examples from the fields of energy and transport policy. For instance, in order to decarbonize industry it will not be sufficient to introduce economic policy instruments but industrial and innovation policy need to be reframed with the aim to engage industry as an active partner in the transition. Similarly the development of sustainable transport systems will hardly
be motivated purely on the basis of climate policy objectives. Instead there is a need to develop new
visions of mobility and transportation that are both sustainable and appealing to the general public.

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c2 – Policy pressures on regimes

#63 From coal crunch to wind rush? Governing power in South Africa - Lucy Baker

South Africa is historically dependent on cheap coal for approximately 90 per cent of its electricity
generation and 50 per cent of its carbon emissions. This paper forms an empirical analysis of how the
country’s development trajectory has to date been determined by its so-called ‘minerals-energy complex’
(Fine and Rustomjee 1996) founded on cheap coal-fired electricity and cheap labour for export. This
regime is now under threat from rising coal costs, national electricity supply shortages and climate change
mitigation requirements. In the wake of Durban’s COP 17 the country is taking steps to introduce
renewables into its electricity mix whilst expanding its conventional coal-fired generation. This paper
examines the emergent though as yet non-existent wind energy industry being developed largely by
independent power producers backed by private finance and the Medupi coal-fired power plant being
developed by state utility Eskom. These two case studies are examined within the context of significant,
yet at times conflicting policy developments taking place simultaneously at the national level. These
include the renewable energy feed-in tariff, the integrated resource plan, the industrial policy action plan
and the renewable energy white paper. In doing so the research illuminates key dynamics and tensions
between economic, political, industrial, environmental and social priorities in South Africa’s energy
policy. The research fuses perspectives from the socio-technical transitions (Kemp et al 2007, Kern and
Smith 2008, and Smith et al 2005) with a critical political economy approach, central for the analysis of
power relations, structural change and the underlying interests of dominant actors (Söderbaum 2003,
Büscher 2009) but which to date has provided limited focus on renewable energy. In doing this it
addresses a gap that the transitions literature has identified from within its own ranks of a limited analysis
of power and agency the political dimension of systems change (Meadowcroft 2011).

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#118 Societal problems and the strategic reorientation of incumbent industries: Auto safety and the
American car industry (1900-2000) - Caetano Penna, Frank Geels

An important topic for sustainability transitions research is the role played by incumbent firms and
industries. Incumbents hold strategic resources, such as knowledge, capabilities, financial and human
capital, contact networks etc., which they can deploy either to hinder change or to stimulate
the transition process. In the early phases of transitions, incumbents tend to hinder solutions to societal
problems, by lobbying against regulations that aim at promoting change, resisting to engage with more
radical innovations that could disrupt their markets. Later on, however, incumbents can reorient and
become part of the solution, e.g. through market campaigns that work towards changes in consumer
preferences, or through R&D that develops radically new technologies. How can we understand the
reorientation process of incumbent industries with regard to societal problems? Penna and Geels (2012)
proposed a five-phase Dialectic Issue LifeCycle (DILC) model, which conceptualizes how struggles between issue-related pressures and incumbents’ response strategies play out over time. The authors illustrate their model with a case study of air pollution and responses from the American car industry (1943-1985). This paper confronts the DILC-model with a new case study: auto safety and the American car industry (1900-2000). Unlike the air pollution case, the safety case did not follow a ‘normal’ issue lifecycle pattern. Instead it is characterized by recursive iterations between phases, forwards, but also backwards depending on (weakening) pressures and car industry strategies. The case also highlights: a) the importance of professional communities in getting the problem on the agenda (rather than protests from social movements), b) the continuing increase in public attention (rather than one up-and-down as in the air pollution case), c) spillovers of public attention to consumer preferences and the creation of demand for safer cars (in the late-1980s), d) rapid reorientation of the car industry once safety became a consumer preference (which did not happen in the air pollution case, where reorientation was forced by policy). Reflections on the similarities and differences of both cases enable us to elaborate and refine the DILC-model and to develop a broader typology of issue lifecycle patterns. Penna, C.R. and Geels, F.W., 2012, ‘Multi-dimensional struggles in the greening of industry: A dialectic issue lifecycle model and case study’, Technological Forecasting & Social Change, forthcoming.

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#120 The Two Faces of Market Support - How Deployment Policies Affect Technological Exploration and Exploitation in the Solar Photovoltaic Industry - Joern Hoppmann, Michael Peters, Malte Schneider, Volker Hoffmann

The recent years have seen a strong rise in policies aiming to increase the diffusion of clean energy technologies. While there is general agreement that such deployment policies have been very effective in bringing technologies to the market, it is less understood how these policies affect technological innovation. To shed more light on this important question, we conducted comparative case studies with a global sample of 9 firms producing solar photovoltaic (PV) modules, complemented by in-depth interviews with 16 leading PV industry experts. We propose that, on the one hand, policy-induced market growth serves as an important catalyst for innovative activity as it raises the absolute level of firm investments in technological exploration. On the other hand, however, strong market growth creates an incentive for firms pursuing more mature technologies to concentrate on technological exploitation. Firms focusing on less mature technologies cannot tap the potentials of exploitative learning to the same extent as those with more mature technologies. Therefore, stimulating strong market growth raises the barrier to market entry for less mature technologies. We conclude that, when designing deployment policies, great care should be taken to avoid excess market growth so as to a) not induce strong exploitative behavior of firms and b) reduce the likelihood of a premature lock-in into more established technologies.

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#128 Convergence and/or Sustainability Transition? : Energy Productivity Analysis for Select Indian Industries - Shyamasree Dasgupta, Joyashree Roy

Traditional literature in economics conceptualizes convergence of economic structure, growth and productivity across sectors and across countries from various perspectives. General conclusion is that the resource intensiveness of developing economy first increases and then eventually declines to converge with their developing counterpart. Empirical studies however, suggest that convergence has indeed been a historical reality but the domain of convergence with respect to time period and geographical coverage has been fairly restricted. So far convergence argument has yielded many useful insights towards formulation of economic policies for developing countries but analysis of policies and implication towards sustainability transition is yet to be explored. The pattern of convergence for industrial sector, a subsystem, has always been more complex as compared to the pattern displayed by the aggregate economy, the larger system. This paper analyses the pattern of convergence of ‘specific energy consumption’ (measured by energy input used per unit of output) of seven most energy intensive manufacturing industries in India namely, Iron and Steel, Cement, Aluminium, Fertilizer, Chemical, Pulp and paper and Textile to ‘the world best’. The Bureau of Energy Efficiency in India has taken up a strategic policy to cap the ‘specific energy consumption’ of these industries and has developed a market mechanism to generate the efficient outcome. This has left the industries with the challenge to achieve transition of energy sub-system without compromising on the growth in output and traditional goal of competitiveness. Taking the past trend of decline in specific energy consumption for these select industries this study empirically explores how this strategic navigation through multilevel experiments in terms of policy, technology and institutional can impact the process of convergence of a subsystem.

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#129 Policy for environmental innovation: a comparative review of empirical evidence -Specific policy means - christian berggren, Anna Bergek

Since the 1960s governments have sought to encourage technological development to reduce pollution. These efforts now include global greenhouse emissions, especially in sectors such as transport and energy generation. A variety of means are applied, economic and administrative, general or specific. At the macro-level, economists argue that general economic instruments are more efficient in regulating emissions than administrative or technology-specific measures. The theoretically assumed effectiveness of general economic instruments needs to be examined in relation to their innovation impact and the complexities of real-world markets, however. This paper builds on research in two high-emitting sectors, automotive and energy, to compare general and specific, economic and administrative, means in terms of their implications for different types of innovation. The findings demonstrate that there is no generally effective policy route.+ General economic instruments tend to induce investments and incremental innovation in mature technologies, as the various trading and certificate examples indicate, but constitute too limited incentives to invest in promising alternatives where costs are higher.+ General administrative
Instruments, especially if they contain stepwise increasing stringencies, may be highly effective in driving development and diffusion of modular innovations. Technology-specific measures are necessary to support radically new technologies, both in their early development, for market introduction and in the critical diffusion stages learning curves are still steep. Such measures include long-term R&D support and network building, and market-formation by means of e.g. public procurement, and policies for diffusion such as feed-in tariffs with differentiated tariffs. Implementation challenges and core design issues, such as timing, scale and inclusion of increasing stringencies, tend to be similar across the means spectrum, irrespective if the instruments are administrative or economic. For the development of major innovations several means need to be combined in policy packages extended over longer periods.

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c3 – Institutional conflicts & co-evolution

#10 The coevolution of renewable resources and environmental institutions. - Karolina Safarzynska

Human species have a long history of causing environmental destruction. Many of the major renewable resources like water, fisheries, and forests are under threat or in a state of decline (Copeland and Taylor, 2009). There are concerns that their scarcity will increase sharply in the next 50 years due to population growth, climate change and an unequal social distribution of natural resources (Homer-Dixon et al., 1993), increasing the frequency and intensity of resource conflicts (Diaz et al., 2004). In fact, entire civilizations had collapsed in the past due to overexploitation of their resources by group members, internal social turmoil or hostile invading groups (Diamond, 1995; Penn, 2003). On the other hand, environmental degradation and social conflict can inspire constructive social reforms, environmental policies and institutions for preventing resource exhaustion (Homer-Dixon, 1994). Against this background, this paper proposes a formal model of the coevolution of renewable resources and environmental institutions using a group selection framework to study possible pathways of change in resource regimes so as to indentify mechanisms which can foster/prevent resource exhaustion. Cultural group selection is widely regarded as a theoretically relevant evolutionary force in cultural evolution (Sober and Wilson, 1998; Henrich, 2004; van den Bergh and Gowdy, 2009). It has been increasingly applied to model evolution of institutions (e.g. Bowles et al. 2003; Choi and Bowles, 2007; Garcia and van den Bergh, 2011) and has a potential to offer insights to evolution of environmental policies over time (Safarzynska and van den Bergh, 2010). The proposed model is employed to examine the probability of society collapse, i.e. that resources become exhausted in the population, as a result of between and within group interactions. In addition, the model is used to study the evolution of environmental institutions aimed at preventing resource exhaustion. References: Choi, J., Bowles, S., 2007. The coevolution of parochial altruism and war. Science 318: 636-640. Copeland, B.R., Taylor, M.S., 2009. Trade, tragedy, and the commons. American Economic Review 99: 725-49. Diamond, J., 1995. Easter Island’s end. Discover 9: 62-69. Diaz, et al., 2004. Institutional adaption to climate change. Social Sciences and Humanities research council SSHRC Major Collaborative Research Initiative MCRI. Garcia, J., van den Bergh, J.C.J.M., 2011. Evolution of parochial altruism by multilevel selection. Evolution and Human Behaviour 32: 277-287. Henrich, J., 2004. Cultural group selection. Co-
This paper examines the governance of system innovation in energy sectors by developing and elucidating the concept of governance regimes. The diffusion of low carbon technologies tends to be discussed in terms of specific policy instruments and their influence on the uptake of individual technologies, for example, the appropriate design of a feed-in-tariff for renewable generation. While the design and implementation of such policy instruments is an important factor in stimulating radical innovations in low carbon technologies, we argue that in order to bring about structural transformations, or system innovations, in infrastructure based sectors, there is a need to move away from a linear, cause and effect conceptualisation of governance. We develop the concept of a governance regime in order to capture the broader context within which energy system transformation takes place. This concept draws on recent contributions to the environmental governance field, and the wider literature on state theory, governmentality and risk regulation regimes. Taking the UK as an example, we observe that there are two coevolving governance regimes shaping the transition to a low carbon energy system. Firstly, the liberalisation regime, which is associated with a market based logic and achieving marginal efficiencies, and, secondly, a decarbonisation regime, which is characterised by long term targets for emissions reduction and state intervention. In a number of respects these can be seen as competing logics. Through a discussion of recent developments in UK energy policy – the Electricity Market Reform, the smart meter roll out and efforts to promote active distribution networks - we show that the interactions and conflicts between these two governance regimes play a key role in shaping technological and institutional change. This, we argue, can inform our understanding of socio-technical transitions and their governance.

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#222 Transition Theories and the UK Electricity Market Reform - seyed emamian

While the necessity of a substantial change towards sustainability in energy system seems uncontroversial, the exact frame of the problem, the prospect of sustainability and the role of
government in this fundamental transformation are still quite contested. In the case of UK energy policy, after a long period of the orthodox dominance of liberalized market-based energy system with a very marginal role of state, apparently there is a pattern of energy policy re-birth alongside a substantial change in the policy objectives from competition and cheapest price towards low-carbon, secure and affordable energy system. This research is shedding light on the complex process of policy evolution and paradigm shift in the UK energy policy leading to the formation of Electricity Market Reform in 2011, as an obvious sign of policy change and complicated innovating governance. For this analysis, a combination of policy process frameworks and public policy theories has been used to explain how and under which contextual situation energy policies are developed and evolved. As an integrated analytical framework, I have used some elements of the Advocacy Coalition framework and Epistemic Communities. The rationale behind this combination is to provide a comprehensive framework to examine the contextual factors framing the energy policy context and highlight the role of new ideas and policy innovations embedded in epistemic communities, like transition management, in the dominance of one policy design amongst other competing policy alternatives.

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#233 Drivers of societal transitions : Drifting social-ecological, institutional and socio-technological transitions - Niki Frantzeskaki, John Grin

Systems can experience different types of transitions. The existing literature on transitions breaks into socio-technological, social-ecological and institutional transitions that each focus on different aspects of real-life systems. For every one of these types of transitions we have identified a common set of forces that co-shape and drive the transition. Building on previous work (Frantzeskaki and de Haan, 2009) and based on empirical analysis in Frantzeskaki (2011), we wish to add novel insight by investigating the complex dynamics of transitions in terms of how changes in different may unravel and trigger each other. We start with a conceptual scheme which captures the main characteristics of socio-technological, social-ecological and institutional transitions as discussed in the respective literatures. We then employ a case study on the emergence of a transition in the environmental protection regime in Greece (for the period of 1986 until early 2000s) in the face of the diversion of the Acheloos river project. Following a socio-ecological transition, the Acheloos River case went through an institutional transition involving five co-evolving and competing regimes: the environmental protection regime, the energy regime, the water management regime, the Acheloos river restoration issue-regime, and the Acheloos diversion issue-regime. The environmental protection transition in Greece was (and remains) a battlefield for both supporters and opponents of the Acheloos Diversion Project. The opponents of the Acheloos Diversion Project use the environmental protection regulation as a manifesto against the diversion project. The supporters of the Acheloos Diversion Project employed the environmental regulation and especially the Environmental Impact Assessment standards as pre-requirements to a large infrastructure project and strategically supported the perception that the Acheloos river is an infrastructure system and not a social-ecological system. We analyze how the dynamics of socio-ecological and institutional transitions have affected each other, and formulate issues for further research.

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Cluster dynamics and modular organizational architectures have been studied in management and organization scholarship, as well as in industrial economics and economic geography. The scope for organizational design has moved steadily from work flow issues and job specifications to firm-level considerations and now to supra-firm industrial structures, where such issues as modularity and clustering loom large. In this paper the focus is on the variety of alternative organizational architectures that have been found to arise, both spontaneously through industrial evolution and through deliberate entrepreneurial design, by state or private actors. Striking cases such as the Chinese automotive industries (conventional vehicles and motorcycles, and now both two-wheeled and four-wheeled electric vehicles) provide testimony of the power of some industrial configurations to outperform others. The paper places these findings in the global setting of the urgent need to find ways to accelerate the uptake of green technologies (like electric vehicles) in order to reduce emissions of greenhouse gases and at the same time promote the industrialization of countries still at low levels of income and wealth. Some organizational architectures considered at an industry level clearly work better than others. This provides a novel, organizational setting for consideration of governance and policy issues in sustainable transitions.

Innovation plays a critical role in making progress towards sustainability. The concept of innovation system has been developed to explain the mechanism of innovation with the basic components of knowledge, actors, and institutions. The dynamics of innovation systems is explained with a set of basic processes, such as knowledge development, search guidance, entrepreneurial experimentation, market formation, resource mobilization, and legitimation. Recent findings in sustainability science suggest that the sustainability of a system requires as a balance between efficiency and resilience. Efficiency is defined as the system’s capacity to perform in a sufficiently organized and efficient manner as to maintain its integrity over time, whereas resilience is considered to be the system’s capacity to deal with disturbances and fluctuations in the environment. Two key structure-related variables of diversity and connectivity play a central role in both efficiency and resilience. Under normal conditions, a system faces a strong pressure to increase efficiency through streamlining, reducing diversity and connectivity. The system also needs to maintain a certain degree of resilience, which is enhanced by more diversity and more connections. There are two types of resilience; the first one concerns short-term adjustment of the system for coping with abrupt and unexpected events to return to the original mode of operation, and the second one concerns long-term transformation of the system for dealing with structural changes in the environment. While too much efficiency leads to brittleness, too much resilience leads to stagnation. In this paper we discuss how to incorporate the concept of sustainability as a balance between efficiency and resilience for
understanding systems of innovation and investigate theoretically and empirically how the components and processes of a system of innovation can work for sustainability in the context of a changing environment, physically as well as socially, with implications for corporate strategy and public policy.

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#116 Appreciating incumbents agency: The case of a local e-mobility initiative in Stuttgart, Germany - Philipp Spath, Alanus von Radecki, Harald Rohracher

Key words socio-technical transitions / e-mobility / model region / discursive hegemony / capture / institutional change

Abstract An envisaged prevalence of electric vehicles - putting an end to the century long dominance of the combustion engine for propulsion of cars - has long been expected to come along with major system innovations in the transportation sector (Callon 1986, Schot et al. 1994, Elzen 2005, Köhler et al. 2009, Marletto 2010, Avelino 2011). Since recently, politicians of all provenance and firms committed themselves to realizing such a shift as part of a transition to a more sustainable transportation system. In line with this trend, various political and commercial actors in the Stuttgart region have joined forces to build a ‘model region’ for the uptake of e-mobility. On a rhetoric level, the aim is to ‘revolutionize’ mobility and the electricity sector at once. Increasingly, references are made to concepts of system innovations and socio-technical transitions as well as the governance models of ‘transition management’ and ‘strategic niche management’. However, looking at how these concepts are actually implemented and which institutional changes they result in, we can observe that the various projects in the region are far from being effectively coordinated. Interviews, conducted in the context of a master thesis (v. Radecki 2011), also revealed, that the various components of the model region initiative are discursively bound together only by a very vague idea of a future regional mobility system that would accompany e-mobility. Different actors’ perceptions vary substantially e.g. with regard to the expected departures from the current state towards ‘inter-modality’ or the possibility of reductions in mileage. We analyse recent institutional developments (e.g. the establishment of the E-mobil BW agency in 2010) against the backdrop of discursive particularities of the Stuttgart region: The largely unquestioned dominance of the Stuttgart based, global car manufacturers in the ‘project’ of transforming the (regional) transportation system. Together with a strikingly humble self-image of local and national level politicians, portraying their role merely as enabling and supporting market driven developments, this allowed for a strong capture of the potentially transformative initiatives by these incumbent actors. The initiatives have seemingly been emptied from all components except for the substitution of combustion engines with electric propulsion for the sake of continued economic growth. We analyze what local particularities resulted in what kind of discursive dynamics, and how these are reflected in the observed institutional developments. Comparing these local vs. global dynamics with other cases of attempted sustainability transitions in ‘model regions’ (particularly ‘Energy Regions’, c.f. Späth/Rohracher, in EPS 3/2012, forthcoming), we conclude that one quality of a model region area is of particular importance: the absence or disinterest of representatives of an incumbent regime in an area can result in a strengthening of transformative impulses as well as the presence of such actors can hugely foster the likeliness of attempts at building new institutions with alleged transformative capacity (in a systemic and socio-technical, not just a technical sense) to be captured by incumbents of the entrenched regime. This brings us back to the question about the conditions which allow for a discursive shift to really result in systemic
socio-technical transitions or, more precisely, about the power base required for a storyline to keep up its transformative impulse (cf. Smith/Kern 2009:95)

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#177 Transition science: how research, activism and governance blend. - Derk Loorbach

This paper describes how transition management tools and instruments are developed in an action research context. By experimental application of theoretical insights derived from transition theory, the science underlying transition management is developed as well as societal change impacted. The application of transition management operates at the boundaries of science, consultancy and governance. It is therefore often questioned within scientific circles as being too normative and applied, in policy circles as being too scientific and in a consultancy context as being too complicated. Simultaneously, it is also being considered an innovative approach that necessarily operates along these boundaries so as to achieve actual scientific and practical breakthroughs. This paper addresses both the critical as well as the innovative aspects of applied transition management. It will argue that this transition approach could be seen as and become a new way of doing science in the social domain; explicitly normative and engaged, with a constant reflexive and theorizing basis. However we will argue that much more needs to be done to establish applied transition management as a novel form of action research. Especially the explicit normative engagement and the multiple roles of researchers in these processes need to be methodologically and theoretically better developed. The paper will use the examples of local community transition arenas focusing on developing socio-economic resilience in deprived neighbourhoods as an illustrative case.

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#262 Making sense of complex systems. Lessons and insights on system's complexity and persistent problems from applying a tailored system analysis in Ghent and Aberdeen - Suzanne Maas, Niki Frantzeskaki, Karen Fortuin

Cities worldwide increasingly face challenges caused by complex problems such as climate change, the migration of people and resource scarcities. Transition Management is a governance approach to deal with complex problems that can support cities in their efforts to meet these challenges. This paper presents a systems analysis methodology that is being employed for generating input in a Transition Management process in Ghent and Aberdeen. The methodology is applied as part of the MUSIC (Mitigation in Urban areas and Solutions for Innovative Cities) project: a transnational project aimed at the reduction of CO2 emissions and energy use in the context of North-Western European cities. We show that the system analysis methodology is valuable, because it provides an overview of the system, and helps in producing a baseline assessment of the system’s state, demarcating system boundaries, and separating symptoms from problems. The data gathering and validation of the system analysis’ results in the two cities was realized in a iterative, participatory process. In this process, the gathered information
and results of the system analysis were discussed and negotiated, and changed participants’ perceptions on the problem’s scale, urgency, impact, and complexity. Transition Management in an urban context, with its wide variety of actors and issues requires a systems analysis method which allows for the integration of various domains, actors and problems. Reflecting on the methodology as it has been applied in Ghent and Aberdeen, we found that it was very important to collectively discuss and analyse the system, in order to complement an analysis based on scientific facts with values that result from divergent views. The output of the system analysis is a conceptual framework that contains a common information base and shared concepts. System analysis revealed the complexity of the urban system in both Ghent and Aberdeen and helped in unravelling complex problems. The participants of the transition arenas in both have become engaged in the transition of their city. They have become true frontrunners who have started formulating visions, transition pathways and an action agenda to steer their city towards a sustainable future.

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**c5 – Policy discourses and discursive struggles**

**#17 The Role of ‘Ego Networks’ in Effecting the Transition to Sustainability - Audley Genus, Kate Theobald**

Community level action to deliver low carbon futures is a crucial element in advancing the UK’s low carbon transition strategy, and this is clear from both recent policy interventions and academic research. The paper reports on continuing work undertaken collaboratively by Newcastle and Northumbria Universities which started in January 2007 in Newcastle upon Tyne on the potential for the creation of low-carbon neighbourhoods, with particular focus on the Newcastle Low Carbon Neighbourhoods (NCLN) project and network relations among university researchers, citizens and others. The NLCN project takes an ethnographic and participatory approach to action research, which focuses on analysis of changing social networks and their effectiveness in developing neighbourhood-based action for low carbon living.

The paper identifies a diverse range of participants within what is described as a partial ego-network. It explores the relationships of these participants with the university researchers undertaking the project, based on an analysis of the textual material such as researcher notes and diaries from meetings, workshops, committee reports, plus other relevant documentary evidence. The paper identifies connections among discursive processes, overarching storylines and domain-making, which constitute temporarily institutionalised relations among network participants and domains. In conclusion, the paper advances the merits and limitations of a partial ego-network rather than a total network approach to creating low carbon neighbourhoods, and the role within this to be played by university researchers and higher education institutions.

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#103 On the role of government in Transition Management: three discourses and their validation with Dutch Energy Transition Project professionals - Jan Bergen, Udo Pesch, Jaco Quist

The past decades have seen an increase in the recognition and severity of problems that are highly complex and suffer from normative dissensus, the most important of which concern sustainability (e.g. climate change). Parallel to this development, an analytical shift has occurred from ‘government’ to ‘governance’, as current governmental organizations seem to have significant difficulties in tackling such problems. This has allowed the creation of novel governance approaches, one of which is Transition Management (TM): a reflexive, multi-level, multi-actor, multi-domain approach with a focus on social learning. When one steps back and asks the question of what government’s role in TM is however, one finds in the TM literature ambiguity and disagreement on the role of government and even on how government itself is conceptualized. In order to clarify some of this conceptual confusion, a qualitative discourse analysis of TM literature has been performed, resulting in three different discourses, each with its conceptualization of government and its role in TM. The first discourse is characterized as elitist and prescriptive and is called “Complexity & Innovation”. The second is pluralist and prescriptive and is titled “Politics and Democracy”. The third and last discourse is analytical and revolves around “Policy learning & Adaptation”. These three discourses have been validated in seven extensive, semi-structured interviews with professionals that played a role in the largest TM experiment to date: the Dutch Energy Transition Project. These professionals were selected from four domains: policy making, politics, science and the private sector. As such, a wide range of perspectives was included. These interviews have shown that confusion concerning government is also present in the professional TM community and that the proposed discourses are deemed recognizable and appropriate by the interviewees. As such, these discourses might prove constructive for the discussion on government and its role in TM.

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#257 Just and/or sustainable? How sustainability transitions accommodate justice - Julia Wittmayer, Katinka Wijsman, Shivant Jhagroe

Sustainable development has become a central concept guiding science and public policies over the last decade (Meadowcraft 2000, Frantzeskaki et al. 2012). Justice can be seen as a key element in sustainability-led values and practices, however the notion of justice has to date rarely entered discussions of sustainability transitions and their governance. In this paper we aim to explore the role of justice and the ways it figures in discourses and practices of sustainability transitions and their governance. We will do so by considering different aspects of justice that figure prominently in other fields, such as social or environmental justice, and their relation to (the governance of) sustainability transitions. After an elaboration on how justice can be understood conceptually, we first look at current transition governance practices in the fields of Dutch healthcare, agriculture and infrastructures. We pinpoint the actors driving discourses and practices and analyze their justification thereof as well as their associated set of instruments. The paper then formulates how justice can indeed be conceptualized in the
context of transition governance such as transition management, with a particular focus on environmental justice and global citizenship. This will point to the important role of justice in direct relation to aspects of sustainability transitions such as time (generational aspects), scale (aspects of glocalisation), domains (such as society, economy, environment) and place (such as the Southern-Northern-divide). This ‘value discussion’ poses questions about the transferability of transition management approaches to global (or: non-Western) contexts. Thereby, it raises questions of global democratic process in TM: who actually decides what is important, how concepts are defined and what processes are appropriate to be followed in order to have a more environmentally just world, and why?

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#258 Competing for consensus: On the discursive struggles in Swedish climate policy-making on low-carbon transitions - Roger Hildingsson

A general insight from sustainability and transition studies is that efforts to transform societal structures and change behavioural patterns to promote sustainable futures require substantial policy reforms and institutional change. Sufficient interventions, however, presuppose discursive configurations establishing progressive consensus on the direction and means of the desired transition. Rethinking the role of norms, ideas and discourse in shaping and restraining the conditions for policy and social change, I present in this paper an empirical study showing ongoing discursive struggles between two contrasting views on how to govern low-carbon transitions. The study, based on interviews with key political actors involved in the formulation of Swedish climate policy, aimed at analyzing the policy discourse on climate governance subject to views on how to bring about low-carbon transitions regarding, for instance, which policy pathways are envisaged and which modes of governance are favoured. The mainstream view on Swedish climate policy provides a benevolent story about a country overachieving its Kyoto commitments explained by a broad political consensus on environmental policy and a win-win policy discourse on progressive climate policy strategies. In the present dislocation of climate policy discourse, that consensus is cracking when it comes to future strategies stretching beyond the Kyoto era of climate politics. Rather the analysis indicates a situation of conflict in which the dominating neoliberal climate policy discourse is being challenged. This discursive struggle resembles around two main storylines; a Kyoto-story emphasizing market-based policies aimed at low-cost abatement informed by orthodox neoclassic welfare economics; and a low-carbon-society-story emphasizing the transition to an eco-efficient economy by means of sociotechnical system transformations informed by reformist ecological modernization discourse. Interestingly, the study proves how these discourse coalitions cut across established communities of interest and, more importantly, provides insights into the discursive contestations foregoing political closure in an otherwise consensus-based governance system.

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#269 The Climate Coalition of the Willing’s Discourse on Transition - René Audet

This paper presents a discourse analysis of the notion of "transition" as it is framed by a “coalition of the
willing” at the global climate negotiations. While sustainability transitions increasingly draw the attention of scholars and policy makers, the topic of transition (in a more generic sense) also springs in the political discourse of diverse actors. In the recent climate talks in Cancun (2010) and Durban (2011), a coalition of the willing – gathering diverse bargaining state blocs and alliances (including the EU, the small island states and the least developed countries) as well as civil society organisations – have had a considerable role in keeping the negotiations on track. At the discursive level, the coalition insists on a necessary “transition towards a low carbon economy”, which attests the new prominence of this issue. The existence of such discourse implies a process of discursive struggles and alliances, of tendencies for fragmentation and for cohesion, that will eventually lead to a more broadly accepted (and, so to speak, a socially constructed) notion of transition in global environmental governance. In the process, the coalition’s discourse has to mediate between transition and other outstanding issues such as fairness and vulnerability, which makes it an important experimentation field for the challenges ahead of other sustainability transitions as they will become more global in scope. The discourse analysis undertaken for the redaction of this paper is based on textual material issued at the COP16 and COP17, including a body of texts composed of public statements from coalitions’ representatives, states’ representatives and NGOs.

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**c6 – Policy practices in transition governance**

*#71 Where climate and innovation policy meet: the role of intra-institutional dynamics in transportation system change - Paul Upham, Paula Kivimaa*

This paper investigates linked path dependence and creation in both policy institutions and socio-technical systems. We consider and compare the relationships between climate-related transport policy innovation and socio-technical innovation in Finland and the UK, focusing particularly on the roles of multi-departmental processes and interests in policy development and implementation. We are interested in the implications for climate-related innovation policy and theory, specifically relating to the opportunities and obstacles related to leveraging and managing policy change that spans the remits of more than one government department. Empirically the paper uses elite interviews in Finnish and UK government departments and associated agencies, together with policy document content analysis. Theoretically we draw upon aspects of the multi-level perspective on socio-technical systems transitions, as well as thinking on the mechanisms of path dependence and path creation in both policy institutions and socio-technical systems. Our aim is to enrich theory of socio-technical transitions with concepts from policy analysis, particularly in relation to interests.

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Scholars of sustainability transitions have put considerable effort into examining how policy makers can foster technological change, so as to decouple economic growth from its adverse environmental impacts. Theory stresses that policy makers are embedded in a socio-technical system and policy co-evolves with technology. Empirically, however, the literature which investigates the evolution of policy processes, such as transition management, remains relatively separate from the literature dealing with the analysis of broader socio-technical systems, such as the technological innovation systems approach. In this paper we draw on the case of the German feed-in tariff system for solar photovoltaic power to develop an overarching framework connecting these two important strands within the literature on sustainability transitions. Based on interviews with 21 industry experts as well as an analysis of more than 300 archival documents, we scrutinize the evolution of this widely copied policy instrument. We argue that, similar to technology, transition policies evolve through a process of what Rosenberg (1969) calls 'compulsive sequences'. More specifically, we propose that, at each point in time, policy makers tend to target what they perceive to be the bottleneck of the socio-technical system hindering the transition. Policy intervention then leads to changes in the socio-technical system and the unexpected occurrence of a new bottleneck to be addressed in the next step. Overall, the evolution of transition policies can therefore be described as an enduring cycle of problems and solutions which has its seeds in a) a high complexity of socio-technical systems and b) limited attention of policy makers. Building upon our findings, we derive implications for the literature on sustainability transitions and provide recommendations for the design of transition policies.

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Guidelines for the governance of transitions are currently often based on research in the characteristics of transitions. This kind of research analyses in a first step for example the characteristics of change processes in socio-technical systems (Schot en Geels 2010) or in complex adaptive systems (Rotmans and Loorbach 2010) and, next, tries to draw guidelines from these characteristics for informing the governance of transitions, through approaches such as strategic niche management or transition management. The resulting guidelines are often quite general and seem to apply largely independent of the context of the transition governance process. While this line of reasoning may be informative for the overall strategic orientation of transition governance, it gives no insights in the actual strategies actors use in transition governance processes and the circumstances under which they have to take practical day-to-day decisions. Such insights can not only provide better information of how transition governance works in practice, but may also be helpful in formulating different and additional guidelines for the influencing of transitions. This paper builds on several years of empirical research, grounded in interpretative policy analysis, of two transition management processes in Flanders (in the field of

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#251 Planning Transitions. Planners' reflexivity in planning ‘sustainable mobility’ in Scandinavian countries - Enza Lissandrello

Which fundamental challenges address the transitions to sustainable mobility? This paper argues that present perspectives for future mobility in urban and regional contexts, challenge existing theories and models for understanding socio-technological transitions, which can be reframed and combined with planning theory. This paper explores the synergies between these two disciplinary approaches. Planning future transitions to sustainable mobility means reframing the planning institutional context. The article investigates about planners’ capacity of agency in this reconfiguration - their institutional planning context. Planners, through their practices perform actions of mobility/mobilisation navigating among a series of ‘unstable settings’ of policy and politics and in so doing, reframing their agency. But how to provide means for facilitating planners to reflect (and to learn) about themselves’ desires, motives and work as carriers of change? The methodology carried out with this research is based on ‘conversational interviews’ with planners, here explored as a means to engage ‘reflexivity’ in the planning process. The empirical material is based on reporting planners’ individual oral stories on their own tactics and strategies to move changes and possibly transitions (mobilise other actors’ interests and situations –
settings of interaction –) though the learning they acquired during their ‘travel’ of getting their ideas in the political agenda. The empirical material explored by this approach is related to the making of a series of institutional changes in public transportation planning in the Scandinavian countries (Denmark, Sweden, Norway). The intentionality of key individual planners as subjects-agents for change is here constitutive of planning practice as well as their performing, desires, motives and action of navigating through controversies. The conclusions invite a reflection on how transitions can be understood through the reflexive action of planners’ agents. Planning transitions entails micro-dynamics of the politics of transitions which require the re-positioning of actors within legitimation processes – and the ‘learning imperative’ – which develop from the ‘self’ capacity.

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#254 The Relativity of Efficiency – How can Technological Efficiency Improvements (Not) Help Transitions towards a Sustainable Economy? - Roebin Lijnis Huffenreuter

Abstract Governments of most developed countries are increasingly trying to stimulate technological efficiency improvements to meet sustainability objectives and to mitigate the costs associated with pursuing these goals (OECD 2011; IPCC 2011). Further technological efficiency stimulation measures will be a key-part of the “green growth” strategies that will be presented at Rio+20 Earth Summit. It is generally believed that because of natural resource scarcity and the rate of natural resource depletion we must direct our economic patterns to more efficient uses of our earth’s riches, if we want to maintain or increase our global level of economic activity. A necessity considering our growing global population and the rapid rise of upcoming economies. Technological efficiency improvements are often considered able to reduce the amount of resources required to produce commodities for daily consumption. In addition, these improvements are thought to offset diminishing returns of investing in sustainable technologies, because the efficiency returns open up the possibility for future investment in cheaper and less resource-dependent ones. In this optimistic view, investing in technological efficiency improvements raises resource scarcity limits because less economic input is required to produce a similar, or higher, level of economic output, and the returns provide opportunities for re-investing in even more efficiency measures. Ideally, we could feed, cloth, shelter, and transport more people with the same amount of resources, and less environmental damage. However, in a less optimistic view, improving efficiency cannot raise the total amount of natural resource stock, only the amount of economic output that can be generated from it, and therefore it is not countering the problem of running out of natural resources eventually. Even more, instead of curbing the rate of resource depletion and environmental damage, technological efficiency improvements may well accelerate resource depletion and increase damage by inducing growth in economic output. In economic terms, an efficiency improvement equals a relative decrease in price. For example, an efficiency improvement of a combustion engine by 50% can be interpreted as saving 50% fuel, but also as a 50% price decrease. The price decrease increases the economic viability of the combustion engine, because it has become cheaper to run. Therefore instead of saving fuel, the lower price may induce more use of the engine, and associated environmental damage. In other words, by improving the efficiency of technologies, and even whole economies, we may not counter the persistent problems of resource scarcity, depletion, and environmental damage but only make them worse by relatively decreasing the price of resources, technologies, and economic processes. For transition ambitions this raises important issues, as a common transition strategy is to stimulate the
society-wide dispersal of sustainable technologies, including more efficient versions of existing ones, partly by lowering the cost of using the technologies. More efficient technologies do not lead to resource savings and environmental protection per se, but can also lead to more use of resources, and an increase of the rate with which they enter and exit the economic process. Paradoxically, the ambition to use less resources by making technologies more efficient can lead to counter-productive results, if we take into account the price-mechanisms that accompany the efficiency improvement. In a more radical transition perspective this implies that efficiency improvements of existing non-sustainable technologies are not an adequate solution to persistent sustainable problems.

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#29 Overcoming regimes by regimes - Udo Pesch

Theories on system innovations have provided us with methods that aim to facilitate socio-technical transitions to a sustainable society. These methods, which are usually of a participatory nature and which are rooted in quasi-evolutionary theory, have to accommodate a fundamental dilemma: on the one hand, the engagement of newcomers and fresh ideas is necessary to overcome vested interests and routine solutions; on the other hand, the societal acceptance of newcomers and fresh ideas is largely dependent on the cooperation of the actors that represent the dominant institutional stakes. In other words, to induce a transition, actors from the so-called regimes have to be involved, while it is precisely the presence of regimes that obstructs the development of such a transition, and regime actors will usually have most to lose if a transition takes place. A number of ‘tricks’ in system innovation methods may be observed in system innovation methods that may help to conquer the potential reluctance of regime players to become involved. A first ‘trick’ is to include a certain level of ambiguity in the method description so that major actors do not recognize the effects of a transition. A second ‘trick’ is to postpone the assumed effects of a transition to a long term future so that immediate interests of key players are not threatened. A third ‘trick’ involves that the organizers of a method convince their participants that they are also part of the elite, and therefore share their interests. A fourth ‘trick’ is to bypass the elites in first instance, trusting that their resistance can be overcome in a later stage. By studying the application of these methods in the Netherlands, it will be shown that each of these ‘tricks’ have their own strengths, but they also may run in to problems.

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#131 Alliance formation in the electric vehicle industry during an era of ferment - William Sierzchula

Electric vehicles have recently become a topic of interest for media, policy makers and automobile manufacturers. The Nissan Leaf in late 2010 marked the most recent attempt at mass commercialization of electric vehicles (EVs). Other large auto manufacturers have been attempting to catch up and introduce their own electric vehicle. For this reason, there has been a great expansion in EV social networks as firms make alliances with battery manufacturers and other organizations that are necessary for the
development and commercialization of electric vehicles. Our research draws on a case study of the electric vehicle to answer the question, how do firms build social networks during the development and early commercialization of a radical innovation? Using a study period of 2007-2011, this research gathered social networks of 24 automobile manufacturers consisting of alliances forged pertaining to electric vehicles. It used a logistic growth model and Markov chain model to identify the growth of social networks and the order in which EV manufacturers made alliances with different types of organizations, e.g. battery manufacturers and EV charging companies. Auto manufacturers were grouped into the following classifications (incumbents of a developed country, incumbents of a developing country or startup firms). The results from this study will provide a quantitative analysis of how different types of firms develop their social networks as they attempt the early commercialization of a radical innovation.

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#191 The role of large incumbent energy companies in energy system transition - The case of Finland’s “coal coast” - Eeva-Lotta Apajalahti

The aim of this paper is to explore how large incumbent energy companies contribute to energy system transition, which has been a neglected topic in the transition research (Turnheim & Geels 2012). According to traditional view of innovation literature, new radical innovations are expected to emerge from small niches through new entrepreneurship. Albeit the important role of entrepreneurs, energy system transition will likely not mean that old incumbent energy companies are simply replaced by new energy companies. Instead, these actors will likely co-exist and co-evolve as a part of the transition (Hockerts & Wüstenhagen 2010). In addition to dynamics between new entrepreneurs and old incumbents, governmental policy intervention and civic activity play also an important role. This paper identifies contemporary systemic pressures in Finland’s energy system, explores how these pressures are perceived by large incumbent energy actors and are further translated into strategic action. To conceptualize and capture the systemic pressures, I apply the Triple Embeddedness Framework (TEF) (Geels 2012, Penna & Geels 2012, Turnheim & Geels 2012) in the empirical analysis. The TEF model identifies two external environments, the economic task environment and institutional environment, but also stresses the specific characteristics of industry regime that takes into consideration the contextual environment. The research focus is on Finland’s heat and power production, which as an industrial regime is struggling to shift from using coal to alternative power sources. Coal share in the production of heat and combined heat and power production is 24 per cent and therefore is a significant source of CO2 emissions. The study is based on company data and interviews with the energy actors that form the Finland’s “coal coast”.

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#249 Renewable detours? Offshore oil supply companies as transition actors - Gard Hansen, Markus Steen

Climate change and future shortage of fossil fuel provide strong arguments in favour of renewable energy, but these emerging crises have only to a limited degree been capable of persuading industry managers, investors, politicians and voters to commit to renewable energy. Still, these groups need to be
mobilized as transition actors. Is this possible, and in case, based on what kind of motives. One group of such actors is the Norwegian offshore petroleum sector, which to some extent has come to embrace offshore wind power as a part-time business area. In this paper, we look into why companies in the highly profitable offshore petroleum sector initiate and maintain activities in the less profitable offshore wind sector. While ‘making money’ probably can be entitled the ultimate rationale of most companies, what does offshore wind have to offer in that respect? Our analysis is based on in-depth interviews with 70 managers of Norwegian offshore companies, and reveals that the renewable initiatives of most of the offshore petroleum companies are motivated by a number of different drivers. At first, most of the managers assert that their company’s presence in offshore wind is a strategic choice to establish a position in an emerging market, or to enter a new market and extend the utilization of vessels, personnel and equipment designed for petroleum in a new, but related context. However, we also find solid evidence indicating that offshore wind in some cases is as much a human resource-strategy as a market seeking strategy. As the competition for skilled engineers is harsh in Norway, several offshore companies use their investments in offshore wind power as a recruitment strategy to attract and retain employees.

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#9 Grassroots innovations and complementary currencies – testing niche theories in the social economy
- Gill Seyfang, Noel Longhurst

This paper discusses the theoretical and empirical challenges of applying concepts from Strategic Niche Management (SNM) to civil society-based innovations for sustainability or ‘grassroots innovations’. Complementary currencies are parallel means of exchange, created to meet needs that are unmet by conventional monetary exchange systems. Previous research has demonstrated their potential contribution to economic, social and environmental sustainability, but their scope and scale remains small and marginal. Viewing these initiatives for the first time as innovations, this paper explores the extent to which complementary currencies ‘fit’ existing models of radical innovation niche development and diffusion. In particular, we discuss the challenges of delineating initiatives, niches and regimes in the messy, contested world of civil society. We present a new empirical case study of Time Banking, a type of complementary currency which rewards neighbourly service, mutual aid and volunteering, to boost social capital and cohesion. There are currently around 250 local Time Banks in the UK, linked by a national network, and with a history of adapted spin-off projects seeking wider adoption. Viewing ‘UK Time Banks’ as a socio-technical innovation niche, we describe and attempt to explain its origins, development and future potential in terms of how effectively Time Banking displays the characteristics normally considered essential elements of successful niche development (relating to expectation-management, learning and networks). We analyse the contextual and intrinsic factors responsible for its success to date, and seek to understand how it might further develop – or diffuse – into mainstream society. We discuss where SNM concepts are useful in explaining the empirical case, and where the framework could usefully be adapted to better explain radical socio-technical innovation in civil society.

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#13 LOCAL EXPERIMENTATION AND SOCIETAL LEARNING FOR SUSTAINABILITY TRANSITIONS – DOES IT WORK IN PRACTICE? - Eva Heiskanen, Stephanie Freeman, Sampsa Hyysalo, Mikko Jalas, Jouni Juntunen, Raimo Lovio, Jenny Rinkinen

Local climate action has recently gained attention as a complement to international and national climate policy. Within socio-technical transitions, local experiments (niches) are important initiators of change (Raven et al. 2008). Transition management views “local experiments” as central in a societal learning process for sustainability (Kemp et al. 2007). Accordingly, Hajer (2011) has developed a blueprint for an “energetic society”, in which national sustainability policy makes room for experimentation by flexible regulation. This argument builds on two key propositions: (1) Bottom-up and grassroots initiatives make more sense to ordinary people and connect to their everyday lives. They are more acceptable and
adaptable to local conditions than top-down, national level plans. (2) Local experimentation is central to societal learning in sustainability transitions. Lessons from local experiments can then be taken up in national policies and they can multiply through learning among different communities. There is evidence for these claims but it is fragmented. Our study aims to test these propositions in one singular context, an ongoing Finnish program for local climate action called Carbon-Neutral Municipalities (CANEMU). CANEMU started in 2008 and involves small municipalities that agree to curb greenhouse gas emissions faster than national targets. During the first two years, 70 activities to reduce greenhouse gases were initiated by officials, companies and citizens. We draw on various sources of data. The local citizens’ experience (P1) is investigated through participant observation and interviews with local officials and residents. The national relevance of local experiments (P2) is investigated through document analysis, interviews with national policy makers and observation in forums aiming to spread local best practices horizontally. We focus on identifying what lessons have been learned and whether these lessons have influence on a national level. In particular, we are interested in examining institutional conditions for building climate policy “from the bottom up”.

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#78 Self-Organization of infrastructures. Barriers and opportunities for self-organization of infrastructures in view of sustainability transitions - Flor Avelino, Niki Frantzeskaki, Shivant Jhagroe

This paper focuses on the self-organization of infrastructures by civil society, referring to the involvement of citizens, user cooperatives and/or non-governmental organizations in organizing, operating, and maintaining energy infrastructures. In recent years there has been an increasing interest for the role of civil society in infrastructure planning and development, especially in relation to sustainable energy technologies and community development. So far the participation of civil society has primarily focused on the design and/or assessment stages of infrastructure planning, whereas less attention has been paid to the involvement of civil society in the operation stage of infrastructure; including maintenance and exploitation. Our research contributes to filling of this knowledge-gap through: i) a cross-national comparison of self-organization infrastructure projects in Europe (the Netherlands, Belgium, Germany, and United Kingdom) that explicitly involve civil society in the operation stage; and ii) an exploration of institutional conditions that either impede or facilitate self-organization. In this paper we present the findings from our first four case-studies; user cooperatives in the UK, Belgium, Germany and the Netherlands, and secondary analysis of previous research on self-organization, user cooperatives and infrastructure. Self-organization of energy infrastructures is a novel and relatively uncommon arrangement, which often clashes with the more institutionalized organization of infrastructure (e.g. centralized, public and/or commercial ownership). As such, we analyze our empirical observations from a
transition perspective, in terms of niche-regime interaction and multi-level dynamics. We then relate this niche-regime interaction to broader European and international dynamics at the landscape level. Moreover, we elaborate on the role of self-organization by civil society in a transition to more sustainable infrastructures, and we present lessons for transition policies and sustainability-led infrastructure governance.

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#194 Exploring the transformative capacity of bottom-up initiatives in the food and energy systems - Anna Schreuer, Sandra Karner

With rising concerns over sustainability, both the energy system and the food system have come under increasing pressure over the last years, and various efforts have been made aiming at a transformation towards more sustainable systems of provision. However, efforts towards such transformation processes have not only taken the form of top-down regulations and programmes. Also grassroots initiatives have played an important role in the process. In the energy sector grassroots initiatives have supported the diffusion of renewable energy technologies, pioneered technology development and developed new forms of socio-economic organisation, such as energy cooperatives. Similarly, concerns over the effects of a food system largely based on large-scale agro-food enterprises have led to the emergence of several bottom-up initiatives aiming to establish more sustainable modes of food production and consumption. This paper presents findings from case study research on bottom-up initiatives in the food and energy systems in Austria and explores the ways in which they have challenged existing regimes. Case studies in the food system include a food coop established by young urban people, who buy collectively from organic farms; a farmers’ association cooperating with an organic wholesale trading company, which emerged from a producer-consumer cooperative; and a farmer-business cooperation. Case studies in the energy system include collective citizen ownership of wind power and a ‘green electricity trading platform’. The paper highlights that the alternatives developed by these initiatives may challenge different dimensions of a regime (e.g. technologies, socio-economic relations, guiding principles; see also Smith 2007) in various ways. Furthermore, by exploring the ways in which alternatives developed by these initiatives have established themselves or diffused into the mainstream, the paper argues that some challenges (alternative technologies and products) have more readily diffused into the regime than others (alternative forms of socio-economic relations).

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d2 – Intermediaries and niche-regime interactions

#2 Multi-level perspective in the shipping system: Exploring agency in the niche-regime interactions – The Green Ship of the Future as a case study
The Multi-Level Perspective (MLP) provides a comprehensive framework to explain the structure and agency leading socio-technological change. Historical case studies have optimized the MLP by revealing socio-technological transitions in different sectors (water management, electronics and energy). Moreover, recent research has pointed-out the useful character of MLP to understand socio-technical transitions in transportation (Whitmarsh, forthcoming; Geels, forthcoming). Despite the solidness of the MLP framework, there are recurring suggestions to further elaborate MLP’s propositions, in particular: (a) to diversify the methodological strategies to build evidence; (b) to better elaborate the agency-component of MLP (Geels 2010; Smith et al 2010). An explicit call was made by the Sustainable Transitions Research Network to integrate an improved understanding of “on the ground agency” originating from entrepreneurial strategies, routine reproduction, among others (STRN 2010). Recent research has redefined niches as “protective-spaces” to the selection processes of the regime. From this theory, the agency is manifested in the interactions between actors and the network to create these spaces of protection (Smith 2012). If “ground agency” is understood, it is possible to improve the translations –of sustainability practices and innovations- from the green niche experiments to the regime. Yet, more empirical evidence needs to improve the understanding of the interactions between niches and regimes (Smith 2007).

This article seeks to answer the research question: How can we characterize the agency in the niche-regime dynamics in the shipping sector and why is this relevant for shipping cleantech development and diffusion? We propose a methodological and theoretical framework to analyze niche-regimes interactions in the shipping cleantech niche. We acknowledge that an existing historical case study addresses technological transitions in the shipping industry using the MLP hermeneutic. However, the article in question focuses in an historic time span -from the XVII to the XX century- (Geels 2002). For this reason, we focus on the socio-technological developments of the shipping industry in the contemporary era (with landscape characterization after the 1970s’ Oil Crises). We integrate the MLP hermeneutic to explain structure. To propose the agency model, we contrast previous works on niche-regime dynamics –e.g. selection pressures and translation of practices- (Smith 2007, 2010), with alternative scholarships that have hitherto attempted to explain green niches diffusion into the regimes: cleantech and innovation in services. We then exemplify with a brief case study: the Green Ship of the Future (Denmark). Niche service-innovations in this case seek to respond to a growing market among ship-owners. Embedded in the socio-technical regimes, the ship-owners are influenced by regulations and market pressures to save fuel, and reduce the air and water pollution.

This paper contributes to the understanding of “on-the ground” agency in the niche-regime dynamics which are significant in the multi-level-perspectives. Furthermore, the model contributes to the theory-building on sustainable transitions in transportation. Finally, this is one of the few articles addressing “green” services niches and regime dynamics (instead of focusing on products).

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#20 Grassroots innovations in community energy: The role of intermediaries in niche development - Adrian Smith, Tom Hargreaves, Sabine Hilescher, Gill Seyfang

Multiple sustainability challenges are increasingly seen as demanding a fundamental transition in the
energy system. In this context, ‘community energy’ projects e.g. renewable energy cooperatives or local behaviour change schemes, hold much promise as sources of radical innovation. Studies of such bottom-up, civil society-led ‘grassroots innovations’, however, frequently highlight the profound challenges they face in growing, diffusing or even simply surviving. Strategic niche management theories are potentially useful here. They highlight the importance of ‘learning’ across different local projects, and the necessity of ‘institutionalisation’ to create a robust niche able to survive in the contemporary energy market. Crucially, this learning and institutionalisation doesn’t just happen, but demands dedicated work by intermediary actors. These intermediaries are vital in aggregating and sharing lessons from multiple projects, in creating networks capable of assisting future projects, and in campaigning for niche development, yet their work is often ignored. Drawing on interviews with intermediaries, and a content analysis of intermediary case studies, this paper examines the nature and extent of intermediary work in UK community energy. In so doing, it illuminates the difficulties faced in expanding and replicating locally-sensitive community energy projects, and tests the applicability of market-oriented innovation theories for community-based, grassroots innovations.

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#84 Government-affiliated intermediary organisations as actors in sustainable energy transitions - Paula Kivimaa

A variety of actors have been noted to participate in innovation and transition processes. Moreover, new networks need to be created for sustainable energy innovations and transitions to occur. Yet the role of intermediaries working between actors – e.g. energy producers and users, entrepreneurs and adopters, idea generators and funders – is seldom specifically addressed in sustainability transitions literature. Thus, the potential role and successfulness of intermediary organisations in enacting change in energy systems is of interest in this paper. The paper is particularly focused on the role of government-affiliated intermediary organisations in energy regime change, as they can be seen to fall between traditional public and private sector actors. They provide an alternative or complement to traditional policy instruments but yet differ from business-based intermediaries, whose actions are at least partly determined by profit. This paper aims to shed light on the issue by specifically examining the role of two Finnish case organisations, Sitra and Motiva, in energy systems and their potential to induce or contribute to system transitions. Following and combining the literatures on innovation intermediaries and sustainability transitions, the analysis examines the roles of intermediaries and their potential impact on system change. The potential system impact is analysed through mapping the range of projects undertaken by the case organisations and their anticipated impact. The empirical material used in the paper includes interviews, news articles and printed documents. The paper finds that government-affiliated intermediaries can have an important contribution to sustainability transitions by initiating and managing new processes in policy and business as well as acting as a crucial, impartial contact point or voice for new networks of actors.

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#122 Outside the networks?: a Strategic Niche Management analysis of renewable energy in off grid rural electrification in Chile - Jose Opazo

This research studies the dynamics behind success or failure in the diffusion of radical innovations. Through the lens of Strategic Niche Management (SNM) the study empirically looks at the use and diffusion of Renewable Energy Technologies (RETs) in off-grid rural electrification in the context of access to energy in developing countries. SNM thinking has been developed to understand the role of protected spaces (i.e. socio-technical niches) where experiments on sustainable innovation can be further developed in controlled absence of pressures from the dominant set of rules and institutions around a socio-technical practice (i.e. the regime), such as energy use, housing, transport and so on (see for example Schot et al. 1994; Kemp et al. 1998). Internal niche processes articulate dynamics that enhance transformation and adaptation of new technologies so they can stabilise and lead to regime shift. It has been suggested that these processes work more successfully when: a) expectations are shared by many actors and are based on tangible results; b) social networks are broad, deep and there is regular interaction between actors; and c) learning processes are both broad and reflexive (Raven 2005; Schot et al. 1996; Schot and Geels 2008). Recent contributions have highlighted how niches grow from the aggregation of local experiments (Geels and Raven 2006; Schot and Geels 2007), leading to co-ordination and structuring of new rules, practices and configurations. However is not clear the extent to which niche mechanisms allow for replication, scaling up and translation of niche experiments into regime practice, that is, how niches and regimes are linked and interact dynamically, particularly in specific contexts (Smith 2007). This study is analysing off-grid PV and wind projects implemented in the framework of rural electrification policies in Chile from 1994 to 2010, where rural electrification rates have increased from 53% to 95%. RETs account for nearly 10% of that increase. The study aims to understand the extent to which niche processes are relevant to understand niche creation from the aggregation of rural electrification projects in the Chilean context. It will also investigate translation mechanisms between niche practices and traditional ways of improving electricity access.

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#158 Interrogating protective space: shielding, nurturing and empowering Dutch solar photovoltaics - Bram Verhees

Authors: Bram Verhees a, Rob Raven a, Frank Veraart a, Florian Kern b, Adrian Smith b a Eindhoven University of Technology b University of Sussex Keywords: Strategic Niche Management, protective space, shielding, nurturing, empowering, solar photovoltaics Abstract: Sustainability transitions literature argues that path-breaking innovations ‘survive’ in protective spaces which (temporarily) render them more or less immune from mainstream selection pressures. But while this effect of protective spaces has been thoroughly discussed, systematic theorization of how these spaces are created and maintained or removed over time has not occurred. Recently, Smith and Raven (2012) have argued that protective spaces shield, nurture and empower innovations. Shielding is about multi-dimensional work aimed at shaping a protective space by exempting an innovation from mainstream selection environments; nurturing is about work aimed at improving its socio-technical performance; empowering is about work aimed at altering mainstream selection environments (e.g. incorporating sustainability criteria) or making innovations competitive within existing mainstream selection environments. This paper first makes an
‘insider analysis’ of how actors have created, maintained and removed protective spaces for solar PV in the Netherlands (which has so far failed to ‘break through’). It does so for five key spaces: research and development, off-grid applications, building-integrated PV, retrofitting, and PV manufacturing. In each space, “actors are driven by ‘a logic of control’ to effectuate through complex processes” and “agency is full blown and located in individuals” (Garud et al., 2010). Second, the paper explores the utility of shielding, nurturing and empowering concepts across these five spaces for constructing a more decontextualized ‘outsider’ analysis’. The paper concludes that 1) shielding, nurturing and empowering are useful concepts to gain a richer understanding of the survival of PV in the Netherlands; 2) they are not temporally successive phases, but analytical dimensions of different types of concrete work by (networks of) champions; 3) more detailed and comparative analysis of work done by these (networks of) champions is necessary for finding patterns across cases; 4) this poses challenges for researchers, because necessary data is not always recorded or remembered.

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**d3 – Niche learning**

**#39 Uncertainty of Technological Performance and Patterns of Learning - Implications for Energy Innovation Policy- Joern Huenteler, Volker Hoffmann, Tobias Schmidt**

The interdependency of innovation and diffusion, rooted in feedback cycles and cumulative learning along technological trajectories, is an underlying feature of theoretical frameworks to study sustainability transitions. Inter alia, it has been applied to emphasize the role of market formation in innovation systems, and to advocate policies for the protection and nurturing of market niches for sustainable technologies. Indeed, the use of market subsidies to implement innovation policy in the context of sustainability objectives has grown increasingly popular in recent years. For instance, more than 60 countries offer generous feed-in tariffs for renewable electricity. However, in both empirical studies and political debate, much controversy surrounds the argument that these subsidies can be reframed as being ‘learning investments’. This reflects that theoretical understanding of the innovation effects of such policies has not kept pace with their application. In this paper, we develop a model to introduce the explicit consideration of differences between technologies into this debate. In particular, we seek to conceptualize how technological characteristics determine the prevalent learning mechanisms, which in turn influence the interdependency of innovation and diffusion. We begin by emphasizing that technologies differ with regard to the importance of learning by searching, by trying, by doing or by using. We then reframe these differences as degrees of what von Hippel [von Hippel, E., 1994. “Sticky information” and the locus of problem solving: Implications for innovation. Management Science 40, 429-439] called the ‘stickiness’ of need information, a concept explaining why problem-solving activity in innovation processes may iterate between different functional loci in value chains. Building on the cases of PV modules and wind turbines, we then relate these degrees of stickiness to technological characteristics. We conclude by discussing the model’s implications for our understanding of the dynamics of sustainability transitions and the differential outcomes of policy support.

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#112 Initiating socio-technical experiments at the municipal level: A case study in fuel cell technology - Michael Ornetzeder, Anna Schreuer, Harald Rohracher

Transitions towards more sustainable socio-technical regimes crucially depend on processes of social learning and local experimentation. A number of questions arise around issues such as the deployment of supporting infrastructures, the organisation of value chains, the institutional embedding and regulations concerning new technologies or the development of new patterns of use. Only recently more attention has been given to the specific contexts and locations of such technology learning processes as well as to the processes of systematically identifying and selecting experiments and pilot projects at the municipal level. The municipal level clearly offers huge potential for social learning and experimentation. For many reasons (e.g. available infrastructure, concentration of stakeholders, clearly defined boundaries, etc.) municipalities can be seen as ‘natural’ niches for exploring new technologies in realistic use contexts on a limited scale. At the same time, municipalities can profit from environmental and economic benefits by experimenting with sustainable technologies. This presentation focuses on the process of selecting and setting up technology learning experiments at the municipal level. It reports on experiences using a Constructive Technology Assessment (CTA) approach to identify and evaluate potential deployment projects in the area of fuel cell technology in Graz, Austria. The results highlight that dialogue processes between R&D actors, municipal actors and intermediary organisations serve well for the identification of suitable niches for socio-technical experiments. However, for the actual implementation of such experiments the limited room for manoeuvre of municipalities and the importance of the coordination of various governance levels need to be taken into account. In particular, tensions may arise between overarching technology policy goals defined at the national level and problem-based approaches applied at the municipal level based on prevalent local issues and needs.

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#119 Conservation Agriculture: a professional model for the ecological transition of agriculture? - Audrey Vankeerberghen, Pierre Stassart

Over the last decades, the agriculture has experienced the development of several alternatives that aim to achieve sustainability, environment protection, farmers' livelihood improvement, etc. Amongst these alternatives, the “Conservation Agriculture” is expanding in many countries as an attempt to maintain soil fertility and prevent soil erosion through the application of principles such as minimal soil disturbance (zero-tillage), permanent soil cover and crop rotations. Based on an empirical case study that is being carried out in the South of Belgium, this paper discusses some questions raised by the Conservation Agriculture movement in the perspective of the theory of transition and its multi-level analysis (Geels 2007). At first, it suggests to investigate the farmers' trajectories in the adoption of the Conservation
Agriculture techniques to see how individual learning/lock-in affects the transition. At a collective level, we want to understand how far the associations providing technique support, advices and information to the farmers could be a source of reflexive learning: indeed, Conservation Agriculture is an ambiguous approach mixing ecological concerns with business- and industrial-oriented practices such the use of Round Up Pesticide (chemical tillage) and time saving for big cropfarmers. In Belgium, Conservation Agriculture is a “professional” initiative with weak visibility in the public sphere (compared to organic agriculture). What are the consequences of this lack of official recognition on the public debate about the future of agriculture? Further, the paper tries to highlight how the network or Conservation Agriculture has or not the ability to meet wider society’s concerns such as the problem of mudslides in the countryside or use of pesticide. And finally, through this multi-level analysis, we will address the question of the building of knowledge and know-how around Conservation Agriculture.

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#146 The political-organisational dimension of collective learning for system innovations (why) (no) learning in demonstration projects for hydrogen fuel cell buses? - Igor Struyf

Actor-related patterns [Geels (2005)] and collective learning processes between involved actors [1] are both commonly recognised as important research topics in transitions and system innovations studies [Rotmans et al. (2001)]. These two topics are here addressed in close relation, following a two-step rationale. First, the focus lies on the specific ‘political-organisational’ perspectives that various (types of) actors adopt, and their ‘room to manoeuvre’ and power within the organisational networks they are part of [Smith et al. (2005)]. This aspect was developed using an extended version of the PAIR-matrix concept. This tool identifies the positions, actions, interests and roles of an actor, as well as its motivations, objectives and relative power status. [2] I propose that the PAIR+ matrix of actors that (could) collectively learn, feeds into one of the following specific learning strategies adopted towards each other [Larsson et al. (1998)]: Collaboration, Competition, Compromise, Accommodation, or Avoidance. Second, collective learning processes and outcomes are argued being shaped by the interaction of such specific learning strategies and more particularly by the extent to which these are mutually supportive (or not). [3] The resulting two-step framework was applied to three case studies in demonstrations for hydrogen fuel cell buses. The empirical study led to three important insights: The PAIR+ matrix largely explains the specific learning strategy adopted by an actor involved in collective learning. Only combinations of the ‘positive’ learning strategies of Collaboration and/or Compromise result in very/fairly useful collective learning outcomes. In case of problematic/no learning, an adequate change in the relative power status can restore the learning relationship, and then still result in very/fairly useful collective learning outcomes. [1] See for example Geels & Kemp (2000); Johnsson & Jacobsson (2001); van Mierlo (2002); Hoogma et al. (2002); Brown et al. (2003); Elzen & Wieczorek (2005). [2] This extension is termed ‘PAIR+’. Such matrix encompasses the political-organisational characteristics of/adopted by an actor that operates in a multi-actor environment. It is theoretically based on Harvard negotiation theory and multi-actor management. [Diepenmaat (1997); Diepenmaat, Weterings & Quakernaat (2003)] [3] This part is based on seminal studies on the concept of network learning as developed by Knight (and Pye) [see for example Knight (2002); Knight & Pye (2005)] and on the research framework for inter-organisational learning developed.

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#335 OPENING UP NATURAL RESOURCE-BASED INDUSTRIES FOR TRANSITIONS IN LATIN AMERICA – Anabel Marin

This paper explores the emergence of alternatives (niches) in the exploitation of natural resources (NRs) in three Latin American (LAC) countries, Argentina, Brazil and Chile. Latin America countries are heavily specialised in NRs (over 60% of total exports of the region are explained by NRs). Activities based in NRs are considered to be very problematic for development (due to among other things their low technological and demand dynamism and rate of employment creation, high risk of long term environmental damage, trend to induce concentration of incomes and activities, etc.). The more common view in LAC is that NRs should be heavily taxed and instead other economic activities should be encouraged (in other words that structural change should be encouraged). The paper proposes and
explores a different view: Can NR activities be transformed so they can best serve economic (resilience), social (justice) and environmental (sustainability) challenges in the region?. Industries get transformed and re-structured through the development and growth of alternatives/niches, or new projects which propose technologies and organisational practices that departure from the conventional (or dominant) ones in a given industry. The paper investigates different types of transformative alternatives (or niches) in three types of activities in the region: the agricultural sector in Argentina, the exploitation of the Amazonian biodiversity in Brazil, and the exploitation of copper mines in Chile. Through fieldwork we have indentified three types of alternatives within each activity: Path-breaking, which aims to transform the industry and eventually take it in a different direction of change - or pathway, Path-repairing, which offers partial solutions to some of the problems of the dominant system, but do not challenge its main logic of development and Path creating, which aims to create new pathways for innovation in other sectors linked to the dominant system. The analysis focuses on understanding the of degree of development and the barriers for growth of each type of alternative.

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#37 Transition to organic farming in Austria: The co-evolution of actors’ strategies - Ika Darnhofer, Lee-Ann Sutherland

Various analyses point out the unsustainability of intensive, conventional agricultural production practices. One of the alternatives is organic farming, which is widely seen as more environmentally friendly and as realizing higher animal welfare standards. While most EU countries have ‘National Action Plans’ to promote organic farming, none have been as successful as Austria, where currently 20% of agricultural land is certified organic (EU-average: 4%). It can thus be argued that in Austria organic farming has broken out of the niche. However such a ‘breakthrough’ is not possible without the support of regime actors (e.g. ministry of agriculture, chamber of agriculture, supermarkets). This paper will analyze the period between 1989 and 1996 in Austria, when landscape-level turbulences (esp. the demise of the USSR and the subsequent accession of Austria to the EU) led to fundamental changes in the agro-food regime, and opened a ‘window of opportunity’ for organic farming. The focus will be on how the niche actors maneuvered to ‘anchor’ organic farming, e.g. through contacts with regime actors during the take-off phase; and on how the strategies of various key actors co-evolved to take advantage of emerging opportunities in the growth phase. The analysis will show that the breakthrough was not planned, but emerged from the interactions between actors. Indeed, each step by an actor opened a new field of possibilities to which other actors responded. This type of breakthrough is thus highly context specific and depends on the actors’ perceptions of both constraints and opportunities, as well as on the future benefits they expect from supporting a specific alternative.

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#69 Motorization of cycle-vans in India: Analysis of two experiments in West Bengal - Duke Ghosh, Joyashree Roy, Samir Saha

After being introduced in India in the early years of the last century, “cycle rickshaws” have emerged as a popular mode of non motorized transport in the country. A modified variant, the cycle rickshaw van, is used in the rural and sub-urban India for providing dual service - carrying passengers and goods. A recent development, apparent in the sub-urban and rural India during the last ten years, is the natural transition of the non-motorized cycle vans to a motorized form –through fitting a locally manufactured engine, running on fossil fuels, onto the vehicles. The number of such motorized vehicles is increasing. However, the role of such bottom-up natural experiments in sustainability transition needs to be understood very dispassionately and, to our knowledge, there is no rigorous research addressing this issue. Policy making Institutions, technology research and development centers have taken up, as parallel and strategic moves, initiatives to transform these motorized vehicles to become cleaner and more efficient. At least two distinct strategic experiments can be identified in Wet Bengal (a state in India) – one aims at making these vehicles electric (in 2003) and, the second attempts at using solar power (in 2008). Both the experiments were initiated by the government and technology research institutes. In this article, within the framework of transitions literature, we intend to present preliminary findings from process tracing study of these top-down strategic experiments and investigate as to what extent the experiments have been “embedded” in the incumbent mobility regime for ushering in a “sustainability transition” in the mobility domain in the rural and sub-urban India. Further, we deploy the strategic niche management (SNM) framework to understand the drivers and barriers for the success (or failure) of these experiments. Our study offers an insight into the uniqueness in the challenges of up-scaling such strategic experiments for sustainability transition.

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#123 Interactive design for sustainable egg production: alignment of niche and regime actors. - Sierk Spoelstra

The Netherlands is a main egg producing and exporting country. Annually 10 billion eggs are produced of which 80% is exported. Societal criticism from the 1980's on notably animal welfare of caged layers led to introduction of alternative husbandry systems allowing hens to move freely in the house. Nevertheless, in 2000 still 80% of the eggs were produced by caged layers. The acceptance in 1999 of the EU Directive to ban conventional cages for layers, effective from January 2012, prompted the Dutch Ministry of Agriculture to commission a research project for alternatives. This project named Keeping and loving hens was from the onset meant to contribute to change of Dutch egg sector towards sustainability by expliciting and integrating basic needs of the hen, farmer and citizens in an interactive design process with stakeholders. The design envisaged a combination of income to the farmer, acceptance to the public and improved animal welfare (Groot Koerkamp and Bos, 2008). The design process of Keeping and loving hens which ended in 2004 elicited a concatenation of follow up activities by various actors. Many of these follow up activities have been evaluated and published. Evaluations included learning effects of the
stakeholders involved in the design process, the learning processes of 5 entrepreneurs striving to realise parts of the design, animal welfare and environmental performances of 2 realised new husbandry systems and framing in professional and public media of new supply chain and its overall sustainability assessment. In summary, animal welfare o.a. by using no beak trimmed hens, farmers income and local embedment were improved over conventional aviary systems, whereas no improvements in the emissions to the environment were found. Overall sustainability assessment showed improved farmers income and local embedment. Framing in the public was rather neutral or positive in framing the new husbandry system as a first step on a route to sustainable egg production. Taken together these evaluations form a detailed description of a route for change. Analysis shows that the design of well-founded images of a more sustainable egg production elicited entrepreneurial innovation which gained support of animal welfare organization and retail. Furthermore it prompted government to develop additional policy instruments to support innovation for sustainable development. This supports the observation of Bos et al. (2011) that the design process, although focusing on the husbandry system not only elicited innovation niches but also aligned niche formation with changes in the existing regime. Thus Mid-2011 4 egg producing facilities were in operation according to the principles developed in the project which included free ranging of none beak trimmed layers, representing about 0.4% of total egg production. However, the main outcome is a realignment of actors including farmers, retail, animal welfare organization and government. Together they contribute to a pattern of emergent supply chains consisting of improved sustainable animal production at the farm level coupled to a possibly emerging market that is prepared to pay a premium for these products.


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#206 Upscaling of wind energy niches in Tamil Nadu and Andhra Pradesh and the role for collective institutional entrepreneurship - Suyash Jolly, Rob Raven, Geert Verbong

The processes through which niches upscale in transitions to sustainability is still not well understood. Existing analyses have proposed notions such as ‘niche-branching’, ‘niche-accumulation’, ‘fit-stretch patterns’ and ‘niche-regime interactions’. These conceptualizations embrace an outsider ontology, i.e. ‘a de-contextualized comparative approach to viewing and evaluating phenomena’ (Garud et al, 2010). However, less emphasis has been paid to an ‘insider ontology’, i.e. perspectives which takes outset in understanding how actors navigate through transitions and experience phenomena in a more culturally and institutionally embedded way, with adequate emphasis on ‘agency’ of (collective) actors. This paper aims to make an ‘insider’ contribution by focusing on one particular but crucial aspect in processes through which niches upscale, i.e. how actors do work in creating supportive institutional environments for niche innovations. In particular, this paper discusses the literature on collective institutional
entrepreneurship, and proposes a number of mechanisms that institutional entrepreneurs use to institutionalize niche innovations in two different dimensions (techno-economic i.e. installed capacity, share in electricity production, reduction in cost etc; socio-technical i.e. new regulations and standards, improvement in grid friendliness, domestication and increased socio-cultural and user acceptance). Such mechanisms may include developing new calculative devices like business models, risk models, value metrics, technical reports etc; legitimizing new interpretative categories; framing crises in the regime strategically, exploiting political windows; building alliances with other actors through narratives strategies. A comparative case study approach is used to explore these mechanisms in upscaling wind energy in two Indian states (Andhra Pradesh and Tamil Nadu) from 1990 till date. These states differ considerably in how far wind energy niches have developed. The paper ends with a discussion of the conceptual consequences for the multi-level-perspective and for niche-informed management strategies. Key words: Upscaling, niche, agency, institutional entrepreneurship, wind energy

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#213 Innovation strategies for the hydrogen economy – A critical review - Alexandra Nikoleris, Oscar Svensson, Lars Nilsson

This paper reviews over 20 national and regional hydrogen strategy documents focusing on the envisioned deployment strategies and technological value chains. By using concepts of technological innovation systems, a multi-level perspective on transition, and co-evolution, the dynamics of national and regional innovation and commercialization strategies were examined beyond the linear technology push/market pull perspective. The importance of creating codes and standards, demonstration projects and niche markets for hydrogen technologies is generally acknowledged, but commonly there is a lack of analyses concerning the interactions and dynamics between the emerging hydrogen technologies and existing regimes. National and regional hydrogen strategies tend to focus on value chains that take advantage of domestic resources and local conditions, with final use in hydrogen fuel cell cars. This relatively limited and “technology push” oriented scope is understandable but limits the use of such strategies as a basis for formulating transition policy. According to theory, windows of opportunity for new development blocks open up easier when niches cumulate to form alliances of stakeholders with a sufficient critical mass. By not relating hydrogen and its value chains to the broader context of energy systems, existing regimes and landscape developments there is a risk of missing important mechanisms and dynamics behind niche breakthroughs. No matter the technological sophistication, the success of innovations is jeopardized if the innovation is not sufficiently embedded in the existing system and the market. To catch and utilize developments in existing regimes and the greater landscape, co-evolution with institutions and markets is vital for the development of the hydrogen economy. Based on the review, and informed by theory, we conclude by identifying important aspects that should be considered in order to increase the policy relevance and usefulness of hydrogen future strategies.

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Due to concerns on climate change numerous industries are faced with a growing regulative pressure to implement more sustainable modes of production. In the case of the cement industry, these efforts meet a matured sector, where process innovations and a growing usage of substitute fuels already led to a decrease in energy consumption during the past decades. The industry argues that further advancements are only expectable to a limited degree and successfully calls for an adequate consideration of its limited ability to further reduce its emissions. Anyhow, a number of potential substitutes for cement have been developed – partly for decades – but did not achieve any significance in terms of market shares. Thus the aim of this paper is twofold. First, institutional and technical settings of the established cement innovation system are delineated. It is shown, how these lead to a lock-in in the existing innovation system architecture. Secondly, alternative material binder concepts are analyzed: Why did they fail or in how far do they have the potential to initiate a transition process in the cement industry? Thus, the paper introduces a case study from the building material sector and thus broadens the empirical focus within the discourse on transition dynamics und sustainable innovations.
challenge in LES is to combine various promises in the portfolio so that they may add-up to lead towards an ‘integrally sustainable’ system. At the 2nd IST conference in 2011 we presented the outline of the approach. Since, we have applied it to the dairy cow and glasshouse horticulture sectors. In the paper we will describe the method and the results of these first applications.

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**#161 Technology and ressource change in the European fertilizer sector. Influences of system dynamics on established industries. - Sarah Debor**

The energy intensive fertilizer industry could become more independent from CO2 emissions and from non-renewable resources, such as natural gas, with new hydrogen production technologies. The same technologies are currently considered as a promising solution for distributing renewable energies, such as wind, in areas where the existing grid capacity is insufficient in order to transport the energy to the point of demand. The long term strategic orientation of the fertilizer sector, one of the largest hydrogen producers to date, could contribute to the development of a supply and demand infrastructure for hydrogen as a carrier of renewable energy. Therefore the following questions shall be discussed: Which are the forces and barriers of the diffusion of new technology in the European fertilizer industry? What is the influence of the industry’s long term strategies on the evolvement of the renewable energy sector? The paper gives insights into interrelated dynamics of two key incumbent industries, the fertilizer and the energy industry. The point of entry in the analysis of forces and barriers of the diffusion of new technologies in established industries to foster transition is the regime level, a “dynamically stable” configuration of dimensions involving technology, industry, culture, policy and the market (Geels 2007 #22:407). Regime dynamics play a central role in technological change since a transition can be defined as a shift from one regime to another (Geels 2007 #22). Furthermore, special attention is paid to long term corporate strategies against the background of the regime environment. The aim is to introduce a framework of key elements that determine the dynamics of incumbents in the regime level. This framework shall be the basis on which a typology of basic strategies can be identified. The paper ends with a critical reflection of the value added of a theoretical analysis in which transition theory and corporate strategic approaches are combined.

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**d6 – Standards and translations between niche and regime**

**#43 Technical standards as a strategic tool to restrain radical innovation? - Magda Smink**

The transition to a sustainable energy system requires technologies that are often radical in nature: they are innovations that build upon a substantially different core technology. Technological Innovation Systems and the Multi Level Perspective have contributed to understanding the system level mechanisms of such transition processes. However, they largely lack insight into the behavior of individual actors in the system. Especially the behavior of actors with vested interests, so-called incumbents, merits attention. They are known to have difficulties in embracing radical innovations, which may be competence destroying for them. Therefore, they are expected to engage in strategic behavior to safeguard their
interests. One way in which incumbents can protect their interests is through standardization. Standards provide the technical quality and safety specifications that a product needs to fulfill to be accepted to the market, as well as how these specifications should be measured. This research focuses on the role of technical standards in sustainability transitions, and especially how standards may serve as a strategic tool for incumbents to restrain radical innovation. Many standards are set by Standard Development Organizations, such as the CEN in Europe. The stakeholders that assemble in CEN’s committees are mostly company experts, and generally decide on the basis of consensus. Incumbent firms are overrepresented. This institutional set-up allows for strategic maneuvering by powerful actors. The effects of standards are significant. By their specifications they shape the (emerging) market. Strict quality or safety standards can raise the production cost of a product or even exclude it from the market. Standards also affect the relative competitiveness of firms, depending on their respective products’ performance. In this paper we specifically analyze the role of standards in incumbent strategies in the fields of biogas, biodiesel and LED lighting. A comparative case study design will be used.

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#104 Standardizing electric vehicle plugs: connecting two sociotechnical regimes - Sjoerd Bakker, Pieter Leguijt, Harro van Lente

A technological niche can be understood as a collection of local projects that generate valuable lessons, design rules, and positive expectations about an emerging technology. Essential for the success of such niches is the actual aggregation of local outcomes towards, what has been labeled as, the global level of the niche (Geels & Raven 2006). In this paper we study this process with a focus on the most tangible outcome of aggregation: standardization. Case and MethodElectric vehicles are being developed and deployed worldwide and it is often argued that charging plugs must be standardized. We ask how and to what extent different local standards were aggregated, what influenced the selection of globally shared designs and what role different actors played in the process. Online media are used to construct a basic storyline of the standardization processes. Additional documents and interviews where used to gather more in-depth information when needed. Furthermore, social network graphs are used to gain insight in the roles of different groups of actors. Results and conclusionsFormal standardization is mostly limited to safety issues. Compatibility standards are not formalized but instead rely on multilateral agreements on the (supra-)national level. The differences between locally developed plug designs and charging protocols result from differences between the local electricity regimes such as electrotechnical regulations and grid quality. The social networks that have emerged over the years show that (the incumbent) firms in the automotive and electricity regime are the most active firms on the global level of the niche and ultimately determine the standards. Startup firms that develop recharging technology are the most important intermediaries between the levels of the niche. Our findings highlight that with the transition towards electric mobility, a fusion is taken place between two sociotechnical regimes, the automotive and the electricity regime, and we propose that our case presents an example of an additional type of transition pathway: regime fusion.

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#144 Governance transitions: the emergence of a governance regime for sustainable biomass? - Mattijs Taanman

This paper aims to describe and analyze the emergence and dynamics of global standards for sustainable biomass in relation to bio-energy by applying multi-level transition dynamics theory (De Haan & Rotmans, 2011). The goal of this paper is to better understand the mechanisms in this particular governance transition and to use these mechanisms to reflect on short- and medium-term developments that may result in a successful transition or, conversely, a backlash or early lock-in. Starting point is the ‘92 Rio Summit where the failure to reach international consensus on sustainable forestry policies led to the initiation of the Forest Stewardship Council, in which NGOs and companies created a voluntary ‘frontrunner’ standard. In response to FSC, companies created their own standards. This paper describes these developments in terms of an interaction between (1) ‘frontrunner standards’ as new niches that emerge and scale up, (2) voluntary private-lead standards and changing regulation representing processes of regime adaptation, and (3) new (inter-) national legislation as macro-level interventions. These multi-level interactions can also be seen for other sustainable biomass standards surrounding bio-energy, palm oil, coffee, etc. On the one hand, self-reinforcing interactions between these niche, regime and landscape level developments may ratchet up sustainability norms and promote wide-spread diffusion. On the other hand, these interactions can negatively influence each other, thereby actually hampering the emergence of an effective governance regime for sustainable biomass. Using transition theory as an analytical framework this paper reinterprets existing empirical studies on sustainable biomass governance in forestry, coffee and bio-energy from the period 1992-2010 to make an inventory of these interaction patterns. These patterns include a competition for legitimacy, learning processes about (un)intended consequences of standards, and institutionalization. Based on this inventory and some 25 interviews with scientists, companies, and policymakers about the future of biomass governance conducted in 2011, we speculate about medium term developments in sustainable biomass governance. These speculations may be used to inform policy advice and/or to monitor the governance dynamics. References: De Haan, J. and J. Rotmans (2011), “Patterns in transitions: Understanding complex chains of change”, Technological Forecasting and Social Change, Volume 78, Issue 1, pp 90-102

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#284 Scaling-up local niche experiments for transitions to low carbon energy& transport systems - Lars Coenen

There is a particular need within studies of sustainability transitions to understand better how the process from the initial 'niche' to a large scale transformation can be accelerated (Geels et al., 2008). Previous studies have stressed the importance of societal experimentation projects to improve, and, eventually, embed emergent technologies into market environments (Kemp et al., 1998; Raven, 2005). Pilot and demonstration projects are often small-scale and geographically bounded by nature (Truffer, 2003; Schot et al., 1994). However, spatial dimensions have, until recently, remained off-radar in sustainability transitions (Coenen et al., forthcoming; Truffer and Coenen, 2012). The aim of this paper is to gain a better understanding of how location and the small scale of local experiments with low carbon energy& transport systems might affect their potential for future development, the conditions for successful up-
scaling and consequences this process may have on the value chain. By virtue of proximity advantages, the localized nature of niche experiments can give rise to various kinds of beneficial clustering effects (Coenen et al., 2010). On the other hand, there is an inherent ambition to scale-up these local niche experiments into more wide-spread application and commercial use. If and when such up-scaling takes place, parts of the value chain may relocate to other parts of the country or the world, e.g. to reduce production costs or create economies of scale while other value-added activities are further embedded in the region. The paper is mainly conceptual in nature but will be illustrated by empirical examples of biofuel experiments in the Nordic Countries.

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Theory Development & Critical Perspectives

e1 – MLP – Time, space & linearity

#108 Transition and temporality: the case of personal automobility and electric vehicles - Peter Wells

This paper uses the transitions framework and the multi-level perspective to envision change. Specifically, it posits that different elements of the landscape, regime and niche levels will change at different rates according to concrete contextual conditions. The multi-level perspective allows a more precise understanding of socio-technical system development, but the treatment of time within the multi-level perspective requires greater precision both at the three levels themselves and with respect to phenomena located within each level. This paper uses the on-going transition towards electric vehicles as a case study of differential temporality by identifying the significant characteristic phenomena at each of the three levels and seeking to understand the meaning of time, and change over time, for each. In this way the transitions framework becomes a more precise guide to policy intervention because it highlights those aspects of the prevailing regime (or indeed landscape) that are most obdurate. As a residual outcome, the paper also suggests that concern over the transient nature of many niches is perhaps misplaced in that the effect of niche development is collective and cumulative through multiple learning experiences. On the other hand, the lack of penetration into regime change does require more depth of analysis. The paper concludes that the application of transitions theory and the multi-level perspective requires to be grounded in an understanding of how regimes create and re-create the conditions for their own existence but equally how such regimes exist under differential potentials for a specific rate of change depending upon many structural contingent conditions.

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#189 Sustainability experiments in Asia: transnational layerdness and its impact on up-scaling - Anna J. Wieczorek, Rob Raven, Frans Berkhout

This paper draws on two insights from the system innovation studies. One relates with the suggestion that a sequence of critical number of originally unrelated and local experiments may gradually lead to an emergence of a stable niche. The niche, under certain conditions, may further contribute to a radical regimes change that defies the conventional development pathways. The second insight relates with the recent attempts to complement the 2D conception of the multilevel perspective with a third, spatial, dimension. Introduction of this dimension is a response to the criticism of the system innovation studies as focusing too strongly on the national level on cost of other geographical levels. Introduction of the spatial dimension makes it possible to investigate the flows and interactions across spatial scales. In the context of developing countries a great deal of sustainability oriented experimentation can be observed. Sustainability experiments are defined as planned initiatives that embody a highly-novel socio-technical configuration likely to lead to substantial sustainability gains. Their presence in Asian countries is well documented but there is no systematic work that would map the initiatives and analysed their factual contribution to sustainability transition. What particularly is unexplored is the specific characteristics of sustainability experiments and especially the impact of flows and interactions across spatial scales on
experiments up-scaling. In this paper we review a body of the development literature to reveal that the transnational linkages between institutions, actors and flows are critical for successful up-scaling of sustainability experiments. Using the database of local sustainability oriented initiatives in various energy and mobility fields in India and Thailand we demonstrate the local, national and international features of these linkages (layeredness in experiments) and explore the extent to which the various factors and their combinations contribute to the up-scaling of these initiatives.

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#196 Reconceptualizing niche upscaling in emerging Asia with multiscalar technological innovation systems – the case of on-site water recycling in Beijing - Christian Binz, Bernhard Truffer

China is increasingly becoming a forerunner in environmental industries, but little is known on how its competence in cleantech sectors is built up and how this might affect future sustainability transition potentials. Transition literature argues that in developing Asia, niche experiments and niche accumulation (in addition to the typical policy interventions of Asian development states), are crucial processes for the build-up of environmental innovation (Berkhout et al., 2009). Niches are conceptualized as interacting sets of localized experiments which are connected to, or even induced by global knowledge networks. However, the relationships between interacting experiments and niche upscaling are not specified and it remains rather unclear how the proposed global-local interaction influences upscaling processes. As an alternative to the currently prevailing focus on experiments and niche accumulation and the unclear space concept in transition literature, this paper proposes to understand upscaling processes from a spatially conscious technological innovation system (TIS) perspective (Coenen et al., 2012). We argue that the relevant processes for upscaling cannot be bound to niche processes at a priori set discrete scales, but have to be conceptualized as co-evolving multiscalar TIS structures (Binz et al. 2012) and related localized end user experiments which are conceptualized as market segments (Dewald and Truffer 2012). We develop a respective analytical framework which is based on the relational ties among TIS actors at and between different geographic scales and their activities in market segment creation. This analytical frame is exemplified with a case study on on-site water recycling technology, based on interviews with 40 experts in Beijing, China. The case study suggests that on-site water recycling in Beijing developed in three distinguishable spatial patterns, which are characterized by specific sets of involved actors and relevant market segments. Innovative activity in Beijing switched from a nursing market segment in hotels with international TIS structures to a localized mode driven by Chinese entrepreneurs to a final stage of growing market segments in urban residential buildings and rural communities, served by both local and international TIS structures. We conclude by discussing how the proposed framework can provide new explanations on niche upscaling in emerging Asian countries and its consequences for potential sustainability transitions in this region.

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#202 A Multi-Scale Model of Low Carbon Innovation Systems - Carla De Laurentis, Malcolm Eames, Yan Wang

Over the last decade research on sustainability transitions has emerged as a dynamic frontier within broad interdisciplinary field of innovation studies. As Coenen et al (2010) note two conceptual frameworks, Technological Innovations Systems (TIS) and the Multi-Level Perspective (MPL), have provided the dominant analytical heuristics shaping research into the dynamics of sustainability transitions. In broad terms, whilst TIS analysis focuses upon the emerging actors, networks and institutional structures supporting new (sustainable) socio-technical configurations, the MPL draws particular attention to the role of niches in fostering (sustainable) innovation and the dynamics of competition between emerging niches and incumbent socio-technical regimes. However, both approaches have been criticised for lacking an adequate conceptualisation of space. Indeed Coenen et al (2010: p 32) have recently argued that “transition research would do well to take a closer look at the global networks and local clusters of transition pathways in conceptual, methodological and empirical terms.” In responding to this call this paper proposes a multi-scale systems model of low carbon innovation. The model is distinctive in that it draws attention to: i) the multi-scale interactions and functional linkages between Regional and Global Technological Innovation Systems; ii) the both competitive and/or synergistic interactions between multiple emerging Technological Innovation Systems; and iii) the importance of regional context, not just in terms of the broader institutional, economic and governance dimensions (which are considered within the Regional Systems of Innovation (RSI) framework) but also the importance of the natural and built environment as a source of competitive regional advantage (and constraints) shaping low carbon innovation and transition pathways. Key Words: transition studies, territorial innovation systems, technological innovation systems, low carbon innovation, geographies of transition, natural and built environment

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#256 The significance of energy densities for sustainability transitions - Andrés Bucio, Noel Longhurst, Jeppe Graugaard

This paper focuses on the significance of energy densities for sustainability transitions. It is argued that immoderate institutional focus on CO2 emissions tends to obscure the energy density challenge implied by the low-carbon economy transition. Such attention-deficit gap is often apparent in the sustainability transitions literature in general and in the multilevel perspective (MLP) in particular as a salient methodology. At the moment, the MLP, notwithstanding its diverse repertoire of empirical case-study applications, unnecessarily fails to accommodate, as a likely normative parameter, the almost imminent system-wide earthquake-like effects of a shift from high to low energy density carriers implied —though not always made sufficiently explicit— by a low-carbon economy transition. MLP’s conceptual framework draws on historical case studies (horses to cars, sailing boats to steamships, small airplanes to jetliners and so forth) inadvertently reflecting industrial society’s high-energy-density-carrier consolidation period
where high-entropy processes typically led to (1) epochal boosts in labour productivity and business profitability, and (2) to the historical emergence of modern economic theory, which effectively puts biophysical limits to economic activity outside its “marginal analysis” radar. Somewhat explicably, holding constant (or simply ignoring) energy-density considerations allows MLP-type heuristics, to characterise the comparatively benign conditions of societies which, riding the upside of the energy-density curve, did not have any historical concern for sustainability. Such a methodological luxury currently imputes considerable costs to the explanatory value of MLP at a time when understanding the trajectories that are relevant to the down slope of the energy-density curve presents itself as manifestly urgent and imperative a requirement in policy decisions and social dialogue. In the second part of the paper a simple preliminary reconfiguration of the socio-technical landscape is put forward in order to bring about energy density considerations into MLP type analyses, hopefully with constructive implications for other sustainability-transition approaches.

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Session e2 – Reviews on transition research

#11 The difference between transition and transformation: a biblometric analysis of two scientific networks - Emile Chappin, Andreas Ligtvoet

The terms 'transition' and 'transition management' have a special connotation in the Dutch policy context: they encompass the change towards a more sustainable society and embody questions of how this goal should be achieved. Researchers under the banner of 'transition' seem to have been concentrated in the Netherlands -- other researchers with similar interests may rally under different banners. To find out to what extent 'transition' is a Dutch preoccupation, we perform a literature search using Scopus to identify key references, key authors, and the coherence between references and authors. We contrast this with an alternative nomer '(societal) transformation'. We also included referenced sources in our analysis if references were available. Both authors and referenced documents partly overlap. By analysing co-author and citation networks, we find large differences in these groups of papers. The transition literature is characterised by a large network of directly and indirectly cooperating authors with clear clusters that are institution-related; transformation literature only contains small and isolated author networks. The transition literature is tightly knit: with high degrees of internal references and only one clearly distinguishable core. Tranfornation literature has two cores with far lower degrees. The global number of citations as listed by Google Scholar (indicating scientific relevance) is far larger for 'transformation '. From the top 20 articles for both sets, 9 manuscripts in the 'transformation' set have a very high number of citations (1k-23k), whereas only one article in the 'transition' set reaches that amount. The core of the literature on 'transition' is from Dutch scholars, although the network contains scholars from all over the world. The connection to established and highly cited research is low as compared with 'transformation'. This suggests that there are opportunities for strengthening the field.
This analysis can be used to identify opportunities that may strengthen such connections.

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#127 The concept of regime and ‘flat ontologies’ – empirical potential and methodological implications

- Benjamin Best, Magdolna Prantner, Karoline Augenstein

The concept of “regime” is central to the Multi-Level Perspective (MLP) on Transitions. A major strength of the MLP is its heuristic character, which allows for addressing complex, multi-dimensional and dynamic phenomena. At the same time, this leads to difficulties regarding the operationalization in concrete empirical studies. On the basis of a literature review of research articles and case studies in the field of transition studies, we find ‘broad’ and ‘narrow’ regime concepts. ‘Broad’ regimes comprise actors, infrastructure, technology and institutions while ‘narrow’ regimes are limited to explaining different types of rule sets. The regime concept is not applied coherently across the field of transition studies and often there is a lack of clarification regarding the way it is used in individual Transition Research projects.

Based on this, the Constellation Analysis (CA) is presented as a tool for inter- and transdisciplinary research projects. CA is a tool used in interdisciplinary research contexts for analyses of complex problem areas with a large number of heterogeneous elements and relations. Integrating the MLP as a heuristic framework and CA as an analytical tool seems promising and common ground between the two approaches can be found, in so far as both draw on elements from Actor-Network Theory (ANT). Transition literature dealt with ANT under the heading of ‘flat ontologies’. We critically reflect the assumptions of a ‘flat’ ANT and a ‘hierarchical’ MLP. Hence, CA is discussed as possible solution to this problem. This method is based on assumptions of ANT but allows transition scholars to study different phases of transitions and, above all, it offers a crosscut of niches, regimes and landscapes. It is argued that integrating CA in the framework of Transition Research allows for more profound theory building and potentially fosters real-world transition processes.

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#227 Abstract title: Towards an Actor-Centered Approach in Sustainability Transitions - A systematic review of the literature - Lisa-Britt Pfaff, Jens Newig

Transition Management (TM) presents a leading way to cope with complex and global sustainability challenges. While mainly based on systems approaches, the TM literature stresses the importance of agency for successful sustainability transitions (Smith et al. 2005). Surprisingly, the precise role of actors in (sustainability) transition management has attracted only sparse attention. This paper performs a systematic review of 338 journal articles listed in Scopus on transition management and sustainability transitions as to whether and how they address the issue of agency and concrete actors in (sustainability)
transitions. We define actors as individuals or groups that share the same resources and act goal-oriented (Sauer 2006). Stakeholders on the other hand do not necessarily act. We show how actors and stakeholders are positioned in different models (Rip & Kemp 1998, Geels 2004) and to what extent they embody the different aspects that define TM, namely the emphasis of long-term thinking, the use of participatory processes, the importance of learning processes, regime membership, the necessity of system innovation (not only system improvement), and a certain openness towards a variety of options (Rotmans et al 2001). Doing so, we discuss the role of actors both in the ‘bottom-up’ (e.g. niche building) and the ‘top-down’ approaches. We illustrate the different concepts of actors and agency by drawing on the case of energy transition in a Northern German region. This paper seeks to refine the conceptual basis of transition and TM focusing on the role of agency and thus to advance the applicability of the TM concept for sustainability transitions.

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#246 Sustainability Transitions: An emerging field of research and its prospects- Jochen Markard, Bernhard Truffer, Rob Raven

In the past 10-15 years, sustainability transition studies have received increasing attention in the scholarly literature. Today, we witness the emergence of a new field with specific institutional structures and an output of about 100 journal articles per year. Key topics include new energy technologies, the transformation of infrastructure systems, sustainable mobility, transition management and reflexive governance. In this article, we review the conceptual development of the field and present the results of a bibliographic analysis of 540 journal articles with a strong link to “sustainability transitions”. The idea is to identify the contours of the emerging field in terms of key journals, central concepts and focal empirical domains. We will argue that the field has reached a certain level of maturity (e.g. consolidation of key concepts, critical mass of researchers) but needs to develop further in order to tackle the full range of complexities that arise in sustainability transitions. In the second part of the paper, we will discuss established and emerging lines of research with regard to the actual and potential contribution to the field.

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e3 – The financial crisis as part of a transition to a new sustainable economy?

Special topical session
Format:

- 1.5 hours for introduction and 4 presentations of 20 minutes each (see overview below)
- 1 hour for remarks by discussant + questions & discussion with audience and speakers panel
This panel discusses contemporary economic developments from a transition perspective. Can we explain the financial crisis through the lens of transition theory? How does the current crisis affect the opportunities for, and direction of, a transition to a sustainable economy? What can transition research contribute to our understanding of the causes and the solution to the current crisis? How can we integrate insights from economics into transitions thinking and policy to make it more effective and influential? In this session transition scholars will present complementary perspectives on the issues raised by the foregoing questions. The session will cover three paper presentations and a proposal for a research agenda. This will be followed by remarks from a discussant and an interactive discussion between the speaker panel and the audience on policy implications and future research challenges for the field of transition studies.

**Speakers**

Tim O’Riordan - “Sustainability in an age of austerity”
Derk Loorbach - “Financial-economic crisis from a transitional perspective”
Miklós Antal - “On incorporating macroeconomics in transitions thinking”
Frank Geels - “Transitions to a green economy (A research agenda)”

**Research agenda “Transitions to a green economy. Economic risk, governance, and public participation” – Frank Geels**

The OECD, UNEP, European Commission and UK Government are increasingly preoccupied by green growth and transitions to a green economy. The issue is also of rising importance to firms, think tanks, and civil society organizations (e.g. World Wildlife Fund, Green Alliance, New Economics Foundation). Green innovation plays a key role in the integration of economic growth and sustainable development. This research agenda aims to contribute to this debate through interdisciplinary ‘big picture’ theorising, thorough empirical research, and serious stakeholder engagement. Most policy reports on green growth focus on changes in incentive structures (taxes, subsidies), expanded investments or regulatory changes. This research agenda aims to provide a deeper understanding (by seriously addressing innovation processes in firms and industries) and a broader understanding (by addressing the political and socio-cultural dimensions of green growth). The key challenge is that industries, policy makers and citizens are locked in to established ways of doing and thinking (business models, competencies, policy networks, lifestyles, mindsets). Therefore they prefer incremental over radical change. We propose to elaborate this challenge for three domains: 1) Economic risk and investment, 2) Governance, politics, and power, and 3) Civil society, public support and participation. Interactions between the three strands need to be theorized and investigated, because transitions to a green economy depend on dynamics within and alignments between the three associated communities.

**#79 Sustainability in an age of austerity - Tim O’Riordan**

The manner in which sustainability is presented needs to change to fit the national mood of anxiety and frugality over the coming decade. It seems timely to portray a new form of social enterprise economy, where investment in social betterment and individual well-being takes on a higher purpose, and the overall value of nature’s bounties is fully included in national accounts. Above all, we face a future, not experienced since the end of the last war, when our offspring may be financially worse off than their parents, with fewer jobs of a conventional kind to choose from. If this is to be the case, then sustainability

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needs to embrace the confidence, sense of self worth, and capacity to adapt to new forms of employment and living that all people need to experience before they can become true citizens. Citizenship is both a frame of mind and way of sharing. It conveys responsibility and virtue, with companionship and neighbourliness. All tribal creatures have to display such qualities if the group as a whole is to survive. Any significant change to take place in this shift to a ‘well-being sustainability’ will depend on the state of the conventional economy in the coming years, the experiences of young people in getting a decent education and employment, the tolerance of parents, and the plight of the growing underclass of the disadvantaged. This framework sets the scene for both opportunity and deepening crisis. To follow the first is to embrace the emerging age of sustainable development.

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#157 “Financial-economic crisis from a transitional perspective” - Derk Loorbach, Jan Rotmans

We live in transitional times in search of value systems. This goes along with turmoil, uncertainty, lack of confidence, fear and crises. From a transitions perspective crises are a chance for radical change since existing institutions are pushed and many embark on a quest for new values and norms. The current financial-economic crisis is a mere symptom of a deeper-lying systems crisis, which is rooted in the disbalance between unsustainable consumption and production patterns. Analyzing the current crisis from a transition viewpoint we can distinguish three different levels of analysis: Financial and banking crisis. This is about the financial supervision and regulation of financial markets. On the global, European and national level attempts are made to organize this supervision and regulation to combat excesses and to protect consumers and investors against fraud and too risky financial constructions. Relations between market, government and society. Responding to current crises will prompt and require innovation in this relationship. In particular a return to a more government intervention, but in a new as a facilitator and a guarantee that we are looking for lasting solutions, not short-term fixes. Values and their expression in lifestyles. This regards a new, sustainable economic order that is based on different virtues, norms and values more in tune with sustainable development. Transition analysis of the current crisis deals in particular with the second and third level, offering a transition perspective based on a quest for new value systems.

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#336 On incorporating macroeconomics in transitions thinking – Miklos Antal

Transitions thinking has largely neglected macroeconomics, despite the fact that its relevance is suggested by the landscape in the influential multilevel perspective. We raise fundamental questions about the macroeconomic system, which are relevant not only to escape from the current crisis but also to make a transition to a sustainable economy. The article discusses a selected number of macroeconomic mechanisms and their potential role in a transition. First, changes in productivity are analyzed from a growth, employment, and environmental perspective with reference to the social cost of complexity, the Baumol disease and decoupling. The link between pollution intensities and growth rates at the level of sectors is emphasized. In addition, the importance of energy for the economy, substitution and...
conservation options, and the impact of peak oil receive attention. Second, the interaction between real and monetary economic spheres and its impact on barriers or opportunities for a transition is examined. This includes paying attention to finance and investment incentives for renewable energy. Third, the ability of governments to implement an environmental tax revision and direct technological change toward cleaner sectors is discussed, noting constraints imposed by deficit reduction and rent-seeking are. Finally, the role of income and wealth distributions in fostering or hindering a transition is considered.

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**e4 End-user practices**

#12 Strategic urban governance of transition in household practices - Maj-Britt Quitzau, Birgitte Hoffmann, Trine Hansen

Several studies have indicated that urban governance is in different ways intertwined with transitions in socio-technical systems (see e.g. Bulkeley et al. 2011). For example, some local authorities attempt to gain degrees of influence and control over regimes in order to achieve territorial priorities (Hodson and Marvin 2010). It has been argued that such governance initiatives do seldom represent transition paths in themselves, due to the delimited focus on the urban scale (Geels 2011). However, these governance initiatives still represent important transition activities that need to be addressed more specifically in relation to sustainable transitions. In this paper, we wish to contribute to the on-going discussions about the role of urban governance in sustainable transitions by analyzing what role lock-in of daily routines play in relation to strategic attempts to promote sustainable technologies at the urban scale. In doing this, we more specifically challenge the technological emphasis in strategic niche management (Kemp et al. 1998) by pointing to developing a broader conception of niche management, which also addresses changes in daily routines of practitioners. We forward this point based on the work by Shove and Walker (2010), who note that practitioners are actively involved in making and reproducing socio-technical systems. We especially wish to put forward this point in relation to discussions about what role urban governance initiatives may play in transitions in socio-technical systems, since local authorities often face the challenging lock-in of daily routines, when attempting to promote different kinds of sustainable urban development projects. The paper is based on an in-depth case study of an urban governance initiative aimed at promoting low energy dwellings in a new urban development area in Denmark. This governance initiative is especially interesting in terms of addressing the issue of daily routines in relation to sustainable technology implementation, since the urban development project illustrates the influence that everyday norms and expectations play in relation to implementation of more energy efficient technologies. Through the case study, we show how some technologies are easily implemented – and hence important technological niches have been established – whereas some technologies are resisted and turned down by the practitioners. Based on the case study, the paper discusses the challenge of strategically promoting sustainable practices through governance initiatives at the urban scale. An important argument in the paper is that local authorities are well positioned to take on the challenge of engaging with transitions in household practices, which underlines the importance of addressing transition activities at the urban scale.

References: Bulkeley, H.; Broto, V.C; Hodson, M. and Marvin, S.
Facing a greater need to usher the Norwegian power grid into a transition towards a low carbon future, the Norwegian Water Resources and Energy Directorate has decreed that all Norwegian households must have Advanced Metering Infrastructure (AMI) installed within the end of 2016. As a result of this, local distribution company Nord-Trøndelag Energi (NTE) of the county of North-Trøndelag has already begun the process of implementing new infrastructure. In the town of Steinkjer 300 units have already been implemented in private households in the last quarter of 2011 and a little over 400 more are scheduled to arrive in early 2012. The main reason for this is the need for this region in particular to solve some bottle-neck issues during high-peak morning and afternoon hours. Theoretically, this new technology will be able to help redistribute power and the consumption of it more efficiently, and customers will be able to keep track of their consumption more comprehensively. However, as we have been able to witness elsewhere, the introduction of this new technology and its potential for change have not been welcomed by everyone. Concerns regarding privacy and security for the consumers have been raised, as have questions about how AMI might, from a consumer perspective, negatively complicate our current plug-and-play relationship with electricity. Also, in order for AMI to facilitate the transition in electricity consumption behavior needed, users need to embrace the new potential posed by this new technology and the new socio-technical regime its potential might herald. Introducing AMI then, among many other things, becomes an issue of public acceptance. With a framework of Strategic Niche Management (SNM) this paper presents results that have been compiled during the last quarter of 2011 and first quarter of 2012, drawing on material from participatory observations, analysis of correspondence, and in-depth interviews of experts and household residents. It tries to make sense of these fledgling attempts by Steinkjer’s local DSO in introducing socio-technical change into what might be argued to be one of the household’s most rigid structures.

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#181 Not in whose backyard? Public perception of post-carbon energy production - Henrik Karlstrom

A successful transition to a sustainable society requires the large-scale conversion of the energy system to new, renewable, non-fossil sources of energy. This transition presupposes a positive public engagement with the new technologies, which includes the public dealing with new challenges in terms of placement, area requirements, ecological degradation and price developments. Several theories have been proposed to explain the fact that post-carbon energy production is often favourably viewed in theory while still...
meeting with a lot of resistance in actual construction situations, among them the NIMBY (Not In My Back Yard) thesis and attempts at explaining opposition to post-carbon energy production as a factor of the urban/rural divide or a general information deficit. This paper discusses the possible effect of the challenges mentioned above on how citizens view the new, renewable energy technologies. It does so by analysing two sets of responses on representative surveys of the Norwegian population on the desirability of various energy technologies such as hydro dams, onshore windmill parks, offshore wind, bioenergy combustion plants, solar panels and, for contrast, gas plants with and without carbon capture and storage technology. These findings are used to discuss the various explanations for the sometimes lukewarm enthusiasm for post-carbon energy technologies. Is the transition towards new renewables facing challenges with respect to public engagement, and if so, what are these challenges?

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#219 Images of light - is phasing out the solution - Charlotte Jensen, Arne Remmen

Due to a combination of reasons such as climate change, peak oil, security, etc., especially EU and several national governments have an increased focus on a transformation of the current energy systems through reduction of energy consumption and increased use of renewable energy sources. In 2005 approximately 20% of the world’s total energy consumption was consumed by lighting (Brown, 2010) which calls for attention to how energy consumption from lighting may be reduced. A strategy for phasing out the worst-performing light bulbs for domestic use is included in the European Ecodesign directive (2005/32/EC), constantly raising the performance standards. Various lighting technologies are now on the market, however with fluctuating quality, which, among other things, affect the rate households adopting new technologies (Krantz and Bladh, 2008) (Wall and Crosbie, 2009). However, aspects such as culture and routine also seem to influence the adaptation rate (Wall and Crosbie 2009, Krantz and Bladh, 2008, Gram-Hanssen 2005), and these aspects may not be as recognized in the strategies. In Denmark, people have to some extent been hoarding the incandescent light bulbs through the steps of banning the incandescent bulb[1], which seem to imply that some people oppose this move. However, some people are reaching out for the new lighting technologies, especially the light emitting diodes (LED), and it is interesting to analyze why these people, the so-called front runners, have chosen to incorporate this technology in their homes. This paper will present the initial studies of how front-runners have incorporated the technology, why they have, and how/whether it has influenced their everyday life practices of which lighting engage with. The study is done through semi-structured interviews inspired by social practice theory (Gram-Hanssen 2011, Røpke 2009 and Shove & Pantzar 2005) and domestication theory (Pantzar 1997, Lethonen 2003). In this way, actors and factors are identified that have influenced people towards a system-configuration that ‘seem to work’ for them. These factors can be difficult to generalize due to the focus on front-runners who may not represent the average household in this sense, and the conclusions should be considered as results of an extreme/exemplary case study (Yin, 2003). 

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This paper explores the possibilities, methodological challenges and possible handicaps of evaluating and monitoring engineered processes of societal transitions. Our focus derives from the fact that the transitions approach as an application of sustainable development is a fairly new mode of governance, with all attention being devoted to design and development. Despite various ongoing and concluded cases, there has been no systematic engagement to develop models and practices of evaluating and monitoring. However, that issue is retained crucial to cyclical and reflexive processes at the heart of transition processes and other attempts at systemic innovation (Kemp & Grin, 2009; Loorbach, 2007; Rotmans, 2009). Our take on the subject is exploratory, exploring existing academic traditions of policy evaluation (e.g. Dunn, 2004; Scriven, 1991; Vedung, 1997) and social learning (e.g. Baybrook & Lindblom, 1963), environmental impact assessment (Mickwitz, 2006), and combining that with insights from existing transition practices. In doing so, we distil useful methods to be used for evaluating transitions. Further, our analysis sets out to explore the possibilities (and challenges) involved in incorporating insights and core assumptions of various approaches to societal transitions (Loorbach, 2007; Shove & Walker, 2010; Spaargaren et al., 2002; Seddon, 2008). All the while our scope covers two dimensions of evaluation: evaluating the process of the transition (procedural factors, such as actor involvement, efficiency, or context evaluation) and the goals of the transition (the substantive dimension and the transition as a model itself; Howlett, Ramesh & Perl, 2009; Rotmans, 2009). The goal of the paper is to infer current knowledge gaps and potential symbiosis between academic traditions. That leads us to formulate questions for further research and propose some first steps when facing the challenge of evaluating transitions. Key words: transitions, evaluation, monitoring, social learning, reflexive processes, system analysis

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#184 Developing solar cell technologies: The role of scientists as actors in the transition to renewable energy - Heidrun Åm

In transition management studies, a multilevel model has been outlined where a multiplicity of actors at different governance levels interact in various experiments enrolled in sustainability goals. Developing these goals and providing for platforms for cooperation are cornerstones of the transition management approach, as well as a constant monitoring and “learning-by-doing and doing-by-learning” (Kemp & Rotmans 2009). This paper explores feedback and learning within a complex transition regime through an empirical analysis of the everyday practices of developing solar cell technologies. The paper is based on interviews with scientists of the Norwegian Research Center for Solar Cell Technology (FME Sol) about conditions for a successful implementation of solar energy. The FME Sol is one of eleven recently funded Norwegian research centers on environmentally-friendly energy. The interviews focus on scientists’ ideas about transition strategies and on their capacities to act. Do they see a role for themselves in sustainable transitions, what is this role, and how do they perceive scientists’ achievement relative to other stakeholders? If we accept that the “very idea of deliberate transition management supposes some kind of orienting vision (Shove & Walker 2007:765)”, questions emerge about the goals pursued by the research center. Who, for example, defines these goals and what possibilities for re-evaluation exist? Are the scientists’ concrete practices aligned to these goals? Next, we explore whether scientists can “affect the processes in question”, i.e. “steer trajectories towards predefined, normative goals (Shove & Walker 2007:764)” or shape, make, and select paths or variations of solar technologies. As a third issue, we probe the scientists’ understanding of the complexities and contingencies impacting their work. Do they share a “synoptic view on broader developments (Voss, Smith & Grin 2009:281)”?

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#271 Governance of learning processes in transdisciplinary climate research projects - knowledge co-production in protective spaces - Wouter Boon

Climate change calls for transformative structural changes in socio-technical systems. Research initiatives aiming to contribute to transitions in the climate system are organised in the Netherlands in a large research programme, Knowledge for Climate. This programme typically stimulates ‘sustainability experiments’. These experiments are characterised as 1) involving a large array of scientific disciplines and societal actors; and 2) taking place in a local, context-specific setting. This article specifically focuses on the knowledge producers involved in these niche experiments and how they interact with knowledge users who are part of the research team. The notion of ‘team science’ is borrowed from studies on healthcare research communities and concerns the scientific endeavours aiming at working on complex problems that call for a cross- and transdisciplinary approach. Much is known about transdisciplinary interactions in the context of technological development, but the way in which this collaborative knowledge production is embedded in the individual, organisational and institutional backgrounds of the actors involved is not well understood. Moreover, the influence of these backgrounds on learning in these teams could benefit from more research. This boils down to the following central research question: to what extent do individual, organisational and institutional factors influence the effectiveness of teams consisting of a large range of scientists, disciplines and locations that aim to contribute to sustainability.
experiments? We study the characteristics of actors involved in transdisciplinary teams in the context of Knowledge for Climate projects and compare these projects to monodisciplinary team projects in climate science in the Netherlands. Event history analysis based on document research and in-depth interviews is used to capture the learning processes over time. The individual, organisational and institutional factors are mainly gathered from in-depth interviews. The analyses will contribute to formulating recommendations on the governance of learning in multi-actor, transdisciplinary research projects.

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#274 The ‘sustainability living lab’ as a reflexive user-integrating research infrastructure - Carolin Baedeker, Justus von Geibler, Nino Jordan, Holger Rohn, Christa Liedtke

Transition studies have concerned themselves extensively with the possibilities for using insights on the path-dependent developments of socio-technical systems for managing sustainability transitions. In this context, eco-innovations play an important role. However, their potential contributions to sustainable development often do not fully materialise due to a lack of diffusion, imperfect utilisation or unintended side effects. The presentation is structured as follows: First, it discusses the methodology of the Sustainability Living Lab (SSL) as a reflexive user-integrating research infrastructure that seeks to respond to these problems. By integrating users and other relevant actors early on in the innovation process, chances for the diffusion of innovations and their appropriate use are improved; at the same time unintended side effects might be recognized at an earlier stage than usually. The authors discuss a reflexive, cumulative and integrating approach to SSL, that engages in theoretical exchange as well as in a practical division of labour with more meso-level oriented approaches to transition management. Second, results from a German exploratory case study are presented. Here, important conditions for the successful implementation of an SSL infrastructure in Germany as well as those sectors with the most promising potentials for the application of the SSL methodology are analysed. Third, a possible approach to establishing a trans-European SSL infrastructure is put forward. The presentation discusses and reflects results from applied sustainability research projects at the Wuppertal Institute, including two on-going research projects on the SSL approach for the German Federal Ministry for Education and Research and the European Commission. Publications: Liedtke, C., Welfens, M. J., Rohn, H. Nordmann J: (2011) LIVING LAB: User-driven innovation for sustainability, Paper accepted for publication by the International Journal of Sustainability in Higher Education (forthcoming).

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The emerging academic discussion about transition to more sustainable modes of development (or a 'green economy') has tended to be dominated to date by European writers largely concerned with a developed world context (stable states, strong bureaucracies, substantial investments in innovation, mature financial systems, fairly well developed social democratic structures, strong private sectors). Writers interested in transitions from rapidly growing developing country economies are few and far between. One reason for this may be the lack of an adequate conceptual linkage between transition, development and growth. Indeed, for many who are interested in sustainability transitions, growth is regarded with suspicion. This sets up a problematic foundation for an inclusive discussion that engages the developing world. To remedy this problem, this paper will propose a synthesis between the Multi-Level Perspective (MLP) (Grin et. al.), the theory of industrial transitions developed by Carlota Perez (Perez), and the theory of long-term development cycles formulated by Charles Gore (Gore). The resulting synthesis makes it possible to conceptualise the possible dynamics and modalities of the next long-term development cycle. Following Gore, it will be argued that the year 2009 marked the end of the post-WWII development cycle. What follows is a (more than likely quite a long) interregnum plagued by the consequences of what Edgar Morin called the "polycrisis" - a set of interlocked ecological and socio-economic crises. What is needed is a clear conceptual fusion of the deployment phase of the information age (Perez), the unfolding logic of the "spring/summer" phase of the next Kondratief cycle (Gore) and the dynamics of niche-level innovations (MLP). This provides a critical framework for evaluating the key claims being made about the transition to a 'green economy' as contained in UNEP's Green Economy Report and the 2011 UN World Social and Economic Survey. This framework of thinking is then applied to develop a critical analysis of South Africa's 'green economy' policy framework. As a small growing developing country economy (with the highest Gini Coefficient in the world) that is, in turn, highly dependent on the exploitation of natural capital, South Africa is an example of the challenges many similar economies face across the developing world. It will be argued that unless policy-makers in South Africa and the developing world recognise the deeper logics of transition underway, they will make decisions that will result in severe system failure in the relatively near future. By clearly demonstrating the linkages between transition, development and growth, it will be possible to draw developing countries into the discussion about transition.

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#67 What are environmental innovations? - Romain DEBREF

Environmental issues are influencing economics in questioning the nature of innovations in order to achieve a sustainable sociotechnical regime. A peculiar attention has been given to environmental innovations (van den Bergh et al. 2011), but, 20 years after the Earth Summit, their existence is always disputed from a theoretical point of view (Kemp 2008). As a matter of fact, what are environmental innovations? What are the conditions for an innovation to be considered as an environmental innovation? Are these conditions reachable for a sustainable transition? Instead of answering from a normative point of view, we propose rather to compare environmental innovations to innovations. For this, an original methodology is developed to emphasize the peculiarities of each one and their differences. We adopt a systemic point of view in focusing on the three fields of analysis - micro, meso and macroeconomics - . Then they will be studied both from a static and a dynamic point of view. As a results, we discover similarities and paradoxes in terms of preservation of environment. The latter questions the originalities of environmental innovations. We criticize traditional beliefs in showing some drawbacks of their categorizations and their characteristics (Kemp & Arundel 1998; Oltra & Saint Jean 2005); for instance, end-of-pipe/clean technologies (Rennings 2000), radicality/incrementality, technological trajectories vs anticipations and finally the quest for eco-efficiency/efficiency. Notably this quest can contribute to six rebounds effects and acceleration of scarcity (Blake et al. 2008). Finally, we argue that environmental innovations are not radical and that they could have worse ecological impacts than classical innovations. Thus, we confirm the Kemp's thesis (2008) who say "sustainable innovation do not exist".References
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#176 Multiple dynamics of sustainable housing concepts in Denmark – on the role of passive houses - Christian Koch, Martine Buser, Roine Leiringer

Multiple dynamics of sustainable housing concepts in Denmark – on the role of passive houses The multilevel perspective of Geels (2005) outlines a number of dynamics of transition, yet after establishing pluralism what really remains from the analysis is a two sided competition between an existing regime and an upcoming technological niche. Critically using Geels’ conceptualization of a world of dynamics, the paper reviews institutional theory and actor network approaches to transition in an attempt to better account for contemporary developments, encompassing EU and governmental reforms and their role in transition in the building sector as well as multiple competing concepts. Referring to multiparadigmatic approaches (Goia & Pitre 1990, Schultz &Hatch 1996) we argue that the combination of institutionalist
and actor network theory can bring a fruitful understanding of this process. We use institutional theory to address emerging multiple competing institutions (Dover and Lawrence 2010, Meyer 2008, Suddaby 2010), and actor network to understand the heterogenous actor dynamics (Pipan &Czarniawska 2010). The emergence of ‘passive houses’ in Denmark is used as a case of transition dynamics. The concept was developed in Germany and imported into Denmark. In Geels’ vocabulary it constitutes a technological niche, encompassing technologies, players, improvisation and early customers. Passive houses have entered into fierce competition with other concepts such as LEED, DGNB/green building council and active houses. It was at the outset a well-developed concept with its own design principles, - software, certification and numerous material realizations, e.g. reference buildings, strong enough to be a challenger institution. Passive houses are promoted by a characteristic alliance of architects, consulting engineers, a few clients, and an architect school, whereas the other concepts exhibit their specific actor alliances. Yet passive houses experience barriers such as the reputation of being expensive and non-user friendly and are currently surpassed by the other concepts.

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#198 Understanding transition dynamics using a combined TIS-MLP approach - Marlous Kooijman, Peter van Meer, Ellen Moors, Huub Schellekens, Marko Hekkert

We studied the transition to animal-free testing in medicine regulation and while doing this we follow-up on the suggestion of Markard and Truffer (2008) that combining the Technological Innovation System (TIS) and Multi Level Perspective (MLP) is very useful for understanding societal transitions. The urgency of the transition to animal-free medicine testing is due to the societal resistance, the huge quantities of animals that are used and the scientific dispute concerning the value of animal testing. Understanding societal transitions has emerged as an important topic of research during the last decade. Several perspectives have been developed to contribute to the understanding of how these transitions work. Two frameworks have become dominant: 1) The TIS approach focusing on the emergence of a particular technology and 2) the MLP approach that aims to study the broader transition process. Both TIS and MLP approaches are subject to criticism. The TIS approach is praised for its analytical power but is regarded as myopic concerning the explanation of technological transitions. The strength of the MLP approach is that its conceptual repertoire links innovation activities in niches with transformations in regimes of current practices, however the analysis of the regime level is often underexposed as MLP studies are largely confined to the niche level. To enhance insight in transitions Markard and Truffer (2008) suggested exploiting the complementary strengths of the TIS and MLP approaches. We used this combined framework to assess whether this actually works out in practice. To reinforce the regime analysis insights in cultural and structural inertia to change are used to explore regime mechanisms that inhibit the transition. This paper not only contributes by showing the implications of using the combined TIS-MLP approach but also reveals TIS and regime mechanisms that inhibit the transition to animal-free methods in regulatory medicine testing.

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With the EU Eastern enlargement process, Hungary - as a new EU member state - had to undergo a complete political and economic transformation from a centrally planned to a market economy and a substantial re-orientation of the economic ties away from the former Eastern Block towards the EU. Various radical processes took place in the energy sector, such as the privatisation and liberalisation of the energy sector, and the EU energy directives are largely implemented. Nevertheless, the energy field in Hungary still faces serious challenges in order to reach a more sustainable structure. The EU enlargement process was also the genesis of the renewables niche in Hungary. The empirical analysis aimed to analyse the driving forces and barriers for deployment of the renewable energy production technologies in Hungary. The purpose of the paper is to show how the multi level perspective can be applied for the description of a fundamental and rapid transformation process. The aim of the Hungarian case study was to highlight the institutional, social, political, economic and technical factors and their relations to each other. Therefore the multi-level perspective was extended by the method of Constellation Analysis (Schön 2007). The Constellation Analysis is an interdisciplinary concept, which is developed to describe and analyse complex problem areas. Its core idea is the equal ranking of heterogeneous elements and focussing on the relations among them. The combination of the two methodologies contributes to better understanding of the structures of niches and regimes and to the interaction among the actors and networks.


In order to fully understand sustainable transition projects and their potential, they should be situated within their broader social, economic, and especially political context. A number of authors, such as Chantal Mouffe, Ernesto Laclau, Jacques Rancière and Slavoj Žižek argue that this context has become post-political today. This diagnosis targets its failure to acknowledge 1) the constructed and therefore contingent and alterable nature of the social; 2) the fact that each such construction generates exclusions and therefore possibly entails conflicts; 3) the inevitable presence of power relations. Post-politics not only has potentially detrimental effects on democracy, but can also make us blind to the possibility of
radical alternatives and to the role of conflict and power in processes of change. Conceived as consensus-driven multiple stakeholders-models which focus on governance beyond government, transition projects seem to uncritically choose for market approaches and exclusively appeal to people as producers and consumers. Hence, many of the existing sustainable transition experiments seem to be particular vulnerable for depoliticisation. This paper addresses this problem both on a theoretical and empirical level. Concerning the latter, we compare two transition arenas in Flanders (Belgium), one which tends to externalize conflict, power and decision, and one which, as an answer to the lack of effectiveness of the first, explicitly tries to give a place to actually existing conflicts and power relations. The central question is to what extent (de)politicisation affects the potential of sustainability transitions to realize democratic change. The paper is part of the panel Critical eyes on transitions: intertwining critical perspectives and sustainability transitions.

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#55 Beyond ‘resistance to change’: Interference management in System Innovation - Bonno Pel

This paper addresses a recurring theme in system innovation and sustainability transitions research, pertaining directly to the politics of system innovation: The issue of ‘barriers’ and ‘resistance’ to change. Framed as such, they appear as accidental and unfortunate phenomena, as obstacles on the road towards transformative change. These framings do not do justice to the multisided and contested nature of system innovation processes, however. Introducing a unidirectional ‘race-track metaphor’ (Stirling, 2011), they normatively dismiss the voices of actors experiencing interference from change attempts. Taking a more polycentric perspective, by contrast, ‘resistance to change’ can be appreciated with more nuance, through the bidirectional concept of ‘interference’. Based on four in-depth case studies into innovation attempts in the Dutch traffic management field (Pel, 2012), it is argued that alleged ‘resistance’ and ‘barriers’ are by no means accidental, but are only regular manifestations of innovations interfering with stakeholders: Interference occurs even in cases of seemingly ‘incremental’ innovation. Compared as sequences of translations (Callon, 1982, Akrich et al, 2002a,b), the cases bring forward various faces of interference. The key conclusion is that management of system innovation involves not only avoidance and reduction of interference, but also its somewhat paradoxical counterpart of interference-seeking. The term ‘interference management’ denotes the integrated handling of interference, offering both a framework for analysis and a repertoire for action.

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#102 The transnational scope of sustainability transitions: aligning the level of observation of transition theory with its global purpose - Sander Happaerts, Hans Bruyninckx

With this paper, we join a growing group of scholars who criticize the transition approach, but retain a firm belief in its potential and a willingness to strengthen it with further theory-building. Our critique addresses the transnational character of sustainability transitions, which has been underexplored in transition theory. We feel that such a research gap is inconsistent with the theory’s purpose. Transition theory has the ambition to analyze systemic changes in society. Until now, most transition studies have investigated national or sub-national cases, or changes within certain economic niches. We argue,
however, that transitions are per definition transnational processes. Societal systems such as the energy or the food system are increasingly globalized, and the persistent problems that characterize them are linked to global production and consumption patterns. Furthermore, the economic structures and regulatory systems that are part of the dominant regimes, and the forces of technological development that are needed for transitions, are essentially transnational in scope. Therefore, in order to understand the systemic dynamics of transitions, the theory should also look at transnational processes. Pertinent examples are the long-term roadmaps that the EU is currently developing and that adopt an explicit transition discourse. In existing studies, transnational developments are often considered as part of the landscape level. But an analysis with an international level of observation requires a re-thinking of the common heuristics of transition theory. This paper explores how insights from other strands of literature, including globalization theory and critical perspectives on international relations, can contribute to that.

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#234 Developing a research agenda for transition studies: to boldly go where no man has gone before - Niki Frantzeskaki, Jonathan Koehler, Florian Kern

While the literature on transitions is growing rapidly, it seems to have reached a plateau. The early breakthroughs that now define the field, the Multi-Level Perspective (MLP) and strategic niche management (SNM) are established. The question for transition studies is now: what next? This paper reviews the research goals of transition studies and defines the ‘persistent problems’ and ‘radical’ socio-technical transformations that transitions studies sees as its main areas of application. It uses recent surveys to identify areas where current theory could be deepened and used to improve empirical analyses. There is a limitation in the understanding of niches, regimes and the processes that lead to niche growth ideas from complexity theory are often mentioned, but their ontological connections to other literatures such as STS and even evolutionary economics are still not clear. At the same time, niches, regimes, landscapes and the interaction between them have been used as language-concepts describing different phenomena not always sustainability transitions (e.g. Kivits and Ryan, 2010; Brown et al, 2012). We take a critical angle to those ontological and empirical applications of transition concepts for proposing what are the future steps for transitions’ frameworks and theory. We also indentify some potential areas for case studies: applications to General Purpose Technologies such as ICT or nanotechnologies, urban water management, urban planning and earth-system sustainability challenges (e.g. climate change).

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#72 The ‘Fukushima-effect’: measuring the dynamics of public preferences for energy technologies using choice experiments - Frank van Rijnsoever, Allard van Mossel

The public acceptance of energy technologies remains an important topic in the energy transition debate. For good reason; it is repeatedly identified as a success factor in the implementation of energy projects, policy makers face increasing demand for accountability, and liberalization of energy markets calls for further sensitivity to market demands. Previous studies have employed public preferences as a measure of acceptance of energy technologies. However, the 2011 nuclear incident in Fukushima obscures the pertinence of their findings to the present debate. The incident also provides a unique opportunity to study the dynamics of public preferences. This study applies two choice experiments on Dutch citizens to measure pre- and post-Fukushima public preferences for nine of the most prominent energy technologies. Furthermore, we assess to what extent reputation, technology attributes and various respondent characteristics can explain preferences for these alternatives. Respondents were asked to choose between two alternatives, in a series of six choice tasks with systematically varying attributes. To measure reputation effects respondents were randomly distributed amongst two equally sized groups, whereby only one group was provided with the name of the technology represented by the alternatives. Our results indicate that public preferences exhibit remarkable temporal stability and are relatively insensitive to major external incidents. Shifts in the reputation and acceptance of nuclear energy were significant, but minor. Overall, off-shore wind is the most widely supported technology. In terms of the influence of technology attributes, price and long-term risks take prominence over other attributes. Their influence, however, is dramatically reduced by reputation effects. This leads to the conclusion that reputation effects are dominant over technology attributes in preference formation. Similar effects could well play a role in the context of other studies, suggesting that great caution should be employed in the design and interpretation of stated preference studies.

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#73 A choice based approach to regime shifts - Allard van Mossel, Frank van Rijnsoever

This paper forms the introduction to the special session dedicated to the role of choice in transitions processes. Both the transition literature and research into the management and governance of social-ecological systems address transitions using holistic frameworks on the regime or system level. Though valuable, these perspectives tend to disregard the role of individual agents in the transition process. Little empirical attention has been dedicated to understanding how choice-processes on the micro-level contribute to transitions at higher levels. I argue that socio-ecological-technical systems and regime shifts are directly linked to choice processes of individual agents. I link these choice processes to the system level. First, I combine organizational ecology theory with innovation systems thinking. I conceptualize an innovation system to consist of separate heterogeneous populations of agents (e.g. consumers, firms, universities, ect.) that co-exist in one system, but that are subject to different institutional demands. These institutions constrain individual choices by agents within a population. Second, I explain how, given these constraints, choices on the individual level can be explained using Random Utility Theory (RUT),
how RUT can be applied to different populations, and I give a short empirical demonstration. Third, by drawing on insights from regime shift theory in bio-ecology and theory innovation diffusion, I link the outcome of these choice processes back to the population and system level. I argue that in order for a transition to occur, it is required that the choices on the individual level result in sufficient legitimacy for change within each population and eventually on the system level. When sufficient legitimacy for change has been gained a tipping point is reached after which a rapid regime shift takes place. Changes within the institutional environment of each population can influence individual choices and thereby help gaining the critical amount of legitimacy required.

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#110 Understanding multi regime interactions: A combined case study and simulation modelling approach - George Papachristos, Emmanuel Adamides, Aristotelis Sofianos

This paper explores the addition of modelling and simulation to the case study research methodology which is used in Multi Level Perspective (MLP). So far, the case study approach has been the main approach to sociotechnical transition studies following the MLP. While it is possible with it to deduce the nature of the interactions that influence transitions, simulation allows a more detailed study of ‘what if’ scenarios both in terms of the timing and nature of multi regime interactions. This is illustrated with a case of multi regime interaction which is analysed and further explored through the use of a system dynamics model. The case is based on the functional foods niche, which emerges out of the interaction of two ‘parent systems’ of foods and pharmaceuticals. Since there is no theoretical framework that treats comprehensively multi regime interactions and niche emergence, the use of modelling for exploration is further justified. The model shows how pressures acting on the two ‘parent systems’ lead to the emergence of a new one. It enables ‘seeing’ them in action and reinforces the validity of the nature and timing of interactions as criteria for transitions in the MLP.

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#111 Modelling transitions with system dynamics: A view from the shoulders of ... many - George Papachristos

This article builds on previously published modelling work on MLP sociotechnical transitions. With the hindsights and understanding of the theory developed from that, the subsequent steps to developing the next version of system dynamics transition model are outlined. The aim is to develop a model that will enable a more elaborate exploration of the theoretical framework. A first step towards this was a review of system dynamics literature. It has revealed some interesting published work that has been narrowed down to four published models in organizational studies, technology adoption and change processes. These are presented in order to discuss and evaluate their relevance to modelling sociotechnical transitions concepts and processes. Based on these, a provisional and abstract outline of a future model is proposed.
There is currently much attention for achieving socio-technical transitions to sustainable systems. This focuses on sectors such as energy, transport and agriculture. These transitions involve interrelated changes in technology, organisation, institutions and culture that have society-wide repercussions. Writings on transitions do not always reflect a good understanding of the particularities of behaviour of humans and organizations. This is somewhat surprising since an important problem which transition management needs to tackle is inertia or resistance to change. More generally, transition policy should account for the bounded rationality and social interaction of agents, so as to arrive at a more realistic view of which limits and opportunities follow from individual behaviour for transitions. System failures like lock-in, unpredictability and surprise in innovation systems, and network interaction between agents have received some attention, but their behavioural underpinnings can be improved. The identification of change agents and their behavioural features may also be crucial to understanding how to stimulate transitions. In this paper we investigate opportunities to integrate bounded rationality into sustainable transition policy theory so as to arrive at recommendations for more effective policies. We combine insights from the literatures on sustainability transitions, environmental policy under bounded rationality, and behavioural theories of innovation. We identify norms, habits, information asymmetries, status seeking, imitation and risk attitudes as all of these may affect transitions. Understanding the prevailing culture can help to inform the type of change needed, as well as the readiness for change. In addition, identifying interim stages in the change process is crucial as each may involve particular agents and behaviours which require adaptations in policy approaches (or instruments). The result will be a more realistic perspective on the role of individual and organizational behaviour in transition processes and the design of effective transition policy and management.
The Role of the Cities and Regions in Transition

f1 – The urban as context of transitions experiments

#35 Energy transition towards the inclusion of local stakeholders in cities - Sophie NEMOZ

Technical innovation is a central process to meet growing demand for energy amidst concern about the safety of supplies and appeals for environmental protection. The spectres of climate change and natural resource depletion create an urgent need to change our ways of living in urban societies. At the moment, most energy efficiency promotion schemes are targeted at individual consumers and households. Whilst this can be effective, it can be more efficient to treat the energy efficiency upgrading of buildings as a local infrastructure problem, and to gain efficiency savings by focusing resources on a single area for a short period, in order to install energy efficient equipment and community owned micro generation like biomass boilers, CHP, solar panels or domestic windmills within a street. Furthermore, focusing on a community-wide approach can help to create incentives for people to work together to improve efficiency, as well as building common awareness of the importance of climate change mitigation efforts. Such engagement is particularly important for those at risk of social exclusion who must be given a proper chance to participate through capacity building. Thus, street-by-street energy efficiency roll-out schemes are viewed by many as the best means to deliver the scale and pace of change required by the environmental and fuel poverty issues. In this session we will discuss possibilities, chances, limits, critical aspects and utopias of these alternative ways of negotiating the relations between the social and the ecological spheres. To start, our presentation aims to overview research findings from various urban energy case studies. Additionally, the theoretical perspective of sociotechnical transitions will be applied to street-by-street energy efficiency roll-out schemes and their community-wide approach. And finally recommendations will be based on the debate on policy instruments which was organized in 2011 with Belgian academics and local government experts.

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#93 Cities as “real-world laboratories” for system innovations – Theories, models and empirical Designs - Hanna Scheck, Uwe Schneidewind

Transitions to sustainable development will be brought about by far-reaching system innovations that are the result of fundamental changes not only in technology, but also in markets, user practices, regulation infrastructure and culture. The multidimensionality of such processes of system innovation poses a methodological challenge: research on analysing and understanding system innovations will have to rely on knowledge from technology, natural and social sciences and in particular from practice. This is the challenge of typical transdisciplinary research processes becoming more and more relevant for gaining knowledge of complex human-environment interactions (Scholz 2011). So far there are no comprehensive methodologies for analysing such system innovations. Conventional analytical approaches (theories, models, traditional empirical designs) will not be able to meet these challenge of deconstructing processes of system innovations and the role of social innovations therein. According to the transition research approach and following the principles of transdisciplinary research designs, such research...

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#105 Advancing Sustainable Urban Transformation through Living Labs- Looking to the Öresund Region - Kes McCormick, Maria Hellström Reimer, Elisabet Nilsson

The Öresund Region, which covers Southern Sweden and Eastern Denmark, aims to be a regional ‘powerhouse’ in Europe for sustainability, innovation and clean-tech. It therefore provides a laboratory by which to experiment, implement, examine and evaluate the progress of transition governance and infrastructural investments. The Urban Transitions project (2011-2014) is a cross-border cooperation between Swedish and Danish partners (including academic institutions, local governments, regional authorities, and clean-tech businesses) in the Öresund Region to evaluate and improve collaborative efforts to promote sustainable urban transformation. The working approach is the analysis of case studies – encompassing existing and planned buildings and districts in the Öresund Region – from which essential lessons are being extracted and subsequently tested on further projects in order to obtain general lessons. Importantly, the case studies from the Öresund Region are being supplemented by research on international experiences with a particular focus on Living Labs, which can be simply described as a concept to integrate research and innovation processes within a public-private-people partnership. The purpose of this paper is to present the Urban Transitions project (including the partners, objectives, working methods and preliminary findings) in the context of transition governance, to provide an overview of Living Labs in Europe that are working with sustainability, innovation and clean-tech, and to discuss how the concept of Living Labs can be applied to advance sustainable urban transformation in the
Öresund Region and beyond.

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#186 WHICH URBAN PROJECTS LEAD TO SUSTAINABILITY TRANSITIONS? A COMPARATIVE ASSESSMENT FRAMEWORK. - Thomas Block, Sophie Devolder, Han Vandevyvere, Erik Paredis

Today, towns and cities, all over the world, are engaged in urban projects and activities to move towards sustainable development. This paper focuses on the first phase of a four years research project on Sustainable Urban Projects (SUPs). Starting from a synthetic study of the available literature (e.g. One Planet Principles; BREEAM communities; LEED for neighbourhood development; the Flemish City Monitor; etc.), we elaborated a conceptual framework to position, evaluate and stimulate SUPs in the 13 Flemish central cities (Belgium). SUPs can be very different: initiatives concerning cohousing, passive housing areas, smart grids, lets, social innovation, Community Land Trusts, eco-neighbourhoods, sustainable urban villages, climate neutrality, etc. Which urban projects facilitate the transition toward a new, more sustainable, and intelligent city model? How can they be sorted out and classified? With the newly developed comparative assessment framework, we will screen urban projects from the 13 Flemish central cities, with specific attention to all projects that fit within transition thinking. By screening policy documents and interviewing urban key figures, we will determine which cities developed (since 1990s) or plan which SUPs. In our paper we will also demonstrate if and to what extent the 13 cities are on a transitional path. This comparative assessment framework for SUPs is necessary to scrutinize (in a next research phase) the decision making characteristics of the different types of SUPs (e.g. motivation and strategic behaviour of dominant actors, the necessity of ‘policy windows’, the impact of technological development, etc.). The overall goal of this research is to generate empirical insights about the local and distinctive conditions (in West-European cities) that can reinforce transitionary evolution. How can we stimulate SUPs that lead to sustainable transitions in our cities?

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#231 Local responses to global challenges. Urban neighborhoods as salient sites for transition insights. - Frank van Steenbergen, Julia Wittmayer, Derk Loorbach

Today’s socio-economic landscape is in turmoil and our world faces prolonged austerity (O’Riordan 2012). The public debt crisis, an instable financial and economic system, climate change, an ageing population, weakened social ties and poverty are only some of the challenges that the world society faces
on a global scale. These global challenges are manifesting themselves most apparent on the local scale, e.g. urban neighborhoods, communities, towns, cities and regions. It is at this scale that human agents most noticeably interact with global challenges and structures and where these challenges are contested, destructed, reconstructed and thereby become ‘indigenized’ (Appadurai 1990) in one way or the other. While a number of scholars in the transitions field explore global solutions (e.g. Walker et al 2009), our main foci in this paper is the urban neighborhood as a local site where global challenges are apparent, especially those with a strong social dimension. In 2011 researchers started a transition governance approach in Carnisse, a neighborhood in the south of Rotterdam with about 10.000 inhabitants. Carnisse is known as a deprived area and is characterized by poor infrastructures and persistent social-economic problems. It is in neighborhoods like these where the current crises, changing demographics and the withdrawal of the Western welfare state is felt most. At the same time individuals are expected to take more responsibility for their own and each other’s environment. With this paper, we aim to show the great impact of the changing landscape and the accompanying regime responses on the social life in these neighborhoods while exploring the ways in which the local scale deals with these imperative questions. Based on empirical/action research, we show that new local solutions are rapidly emerging which bear the promise of a global systemic shift. Through these local solutions and experiments, it becomes apparent which actors are involved and how their corresponding roles and actions are being rediscovered and redefined. What can we learn from these experiments regarding the global challenges? What necessary shifts do they make apparent? Who is involved and what are their roles? Is it possible to deepen, broaden and upscale these experiments? Appadurai, A. (1990) Disjuncture and Difference in the Global Cultural Economy. Theory, Culture and Society. 7: 295-310 O’Riordan, T. (2012) On social sustainability in a world of limits facing prolonged austerity. Sustainability: Science, Practice & Policy. 8(1): 1-2 Walker, B., Barrett, S., Polasky, S., Galaz, V., Folke, C., Engström, G., Ackerman, F., Arrow, K., Carpenter, S., Chopra, K., Daily, G., Ehrlich, P., Hughes, T., Kautsky, N., Levin, S., Mäler, K., Shogren, J., Vincent, J., Xepapadeas, T. & de Zeeuw, A. (2009) Looming Global-Scale Failures and Missing Institutions. Science 325(5946):1345-1346.

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f2 – City concepts and the role of urban visions

#68 “Vision-meso-seeds” model towards sustainability transition - Concept and research agenda - Keishiro Hara, Michinori Uwasu, Shuji Kurimoto

Growing numbers of promising visions of the future and scenarios that may lead toward building sustainable societies are being developed. At the same time, advanced technologies and research seeds that could increase the likelihood of achieving such visions are also being rigorously conceived. Even so, we face a number of challenges and barriers in achieving these visions due to large gaps between
individual seeds and shared visions. In this paper we propose a “vision-meso-seeds” model for sustainability transition and demonstrate meso level research whose aim is to bridge the gap between promising seeds and societal visions, facilitating sustainability transition. We first summarize barriers that hinder the transition to sustainability, highlighting the disconnection between available seeds and shared visions. We then specify what we mean by “meso level” research in the vision-meso-seeds model, whose primary function is to explore gaps between individual science & technology seeds and societal visions and to fill those gaps. We demonstrate a case study to address research agenda for the model, by introducing a case: Japan’s strategy towards low-carbon society, in which the vast amount of waste heat in urban areas is fully utilized in a low-carbon society through use of advanced technologies such as thermoelectric conversion elements. Utilization of waste heat in urban areas is considered a key for low-carbon society in Japan. However, many aspects have to be taken into consideration in materializing the vision. In this case study, we clarify the specific components and functions of meso level research and address research agenda to further advance the vision-meso-seeds model. We finally discuss how meso level research through interdisciplinary collaboration at the university level will play an important role in advancing sustainability transition.

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#207 Scenarios for implementing an economic sustainable transition in Paris-Region - Dominique Sellier

Several regional political exercises established a vision 2030 or 2050 regarding the reduction of greenhouse gases, or sustainable regional planning. The paper presents the results of a forecasting survey which proposes various scenarios of transition to concretize these visions of « post-carbon territories » in various key sectors: food, energy, mobility, building renovation. To reach an energy and carbon positivity, an autonomy in resources at the regional scale, or accessibility with the green local amenities supposes to identify the innovative pilot projects connected with the territories of experimentation. The survey consists in defining the first steps towards a positive transition of the regional economy, so called positive economy. This concept applies to generate an economic growth that restores ecological capital, i.e. the capacity of the environment to supply the economy with resources (energy, raw materials) and services (waste recycling, water treatment, etc.) Positive Economy represents for example reaching factor 4 carbon emissions before 2030, to obtain more than 50 % of local and renewable energy for thermal and electrical use. By example, a yearly rate of 3% thermal refurbishment of the individual housing is needed to achieve the whole renovation of the residential and tertiary real estate between 2010 and 2050. For each selected innovative selected pilot project, it is suggested a synthesis of the principal social, economic and environmental benefits. This supposes to analyze the key success factors, the barriers and leverage effects for each project. Finally the paper presents the three main scenario of transition to the horizons 2015, 2020 and 2030, with a synthesis in the form of a strategic planning for the Paris-Region, describing the means of implementation and accompaniment.

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#215 Smart Cities: an emerging city concept to frame sustainable transitions? - Andreas Huber, Ines Mayer

Recently, “Smart Cities” have become a pervasive topic in the public discourse, in politics (cf. the EU initiative on Smart City) and science (cf. Giffinger et al. 2007, Think 2011). They are often brought forward as a solution that leads to resource efficient, low carbon cities. However, up to now the term “Smart City” has remained a fuzzy concept that is frequently used but does not seem to be clearly defined. Hence, in this paper we want to present the results of an empirical study that aimed to explore the core elements of the Smart City concept. Based on our data, we claim that Smart City does not provide any specific new orientation in terms of content that would allow distinguishing it clearly from other city labels such as Green Cities, Sustainable Cities or Low-Carbon Cities. Yet, the term might be useful for framing the transition process, as most interview partners stressed the need to reorganize the patterns of interaction between city stakeholders (governance dimension), the ways of collecting, processing and connecting available information for an efficient resource management (instrumental dimension) and the rules and procedures of defining objectives and actions for future pathways of the city development (normative dimension). We hence suggest that the added value of the term is not, as might have been expected, a genuine city concept on its own, but Smart City rather provides a frame for the procedural re-thinking of urban transition. Methodologically, we pursued a media analysis of German and French newspapers and subsequently conducted semi-structured interviews with representatives from the cities of Amsterdam, Stockholm and Mannheim, from the German Climate Alliance, the German Association of Towns and Municipalities as well as from two international consultancies.

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#216 Re-engineering the City: Retrofit, Governance and Strategic Navigation - Malcolm Eames

Cities may be responsible for up to 70% of global carbon emissions and 75% of global energy consumption. By 2050 it is estimated that 70% of the world’s population could live in cities. The built environment in Europe currently accounts for some 40 % of energy consumption. In the UK, buildings contribute to some 45% of carbon emissions, moreover approximately 87% of the current stock will still be functioning in 2050 (Kelly, 2009). The critical challenge for contemporary urbanism, therefore, is to understand how to develop the knowledge, capacity and capability for public agencies, the private sector and multiple users in city-regions to systemically retrofit their built environment and urban infrastructure in response to climate change and resource constraints (Eames et al, forthcoming). From a sustainability transitions perspective this raises a number of challenging questions. Specifically this paper will consider:

- How should we define sustainable urban retrofit?
- How should we conceptualise the current regimes and emerging niche processes involved across multiple scales (building, neighbourhood, city-region, etc) and domains (energy, water, waste & resources, etc)?
- What are the implications of these definitions and conceptualisations for our understanding of the governance processes involved at different scales?
- What can we learn from city-regional case studies (of Greater Manchester and Cardiff/SE Wales) in terms of the framing, drivers and governance of contemporary retrofit activities?
- What contribution can foresight processes play in ‘opening up’ the strategic navigation of urban sustainability transitions?
- And, Given the inherently contested character of sustainability, what is the role of expectations or ‘guiding visions’ of
city-regional futures, in the governance of these transition processes and how should they be deployed? The Retrofit 2050 (www.retrofit2050.org) is an EPSRC funded interdisciplinary research project seeking to advance theoretical and practical understandings of urban retrofitting from a sustainability transitions perspective.

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#224 Climate neutral city initiatives: wishful thinking or thoughtful wish? - Han Vandevyvere, Thomas Block

Many cities, of which a representative group is organized in the C40 Cities Network, have recently developed plans for realizing climate neutrality over the coming decades. At this moment, local climate initiatives indeed seem to be more promising for the much needed energy transition than their global counterparts. This tendency is, without any doubt, very encouraging. However, one must at the same time be aware of the dangers that a failure of realizing these plans would bring on. Are the carbon roadmaps realistic, and if not, what could happen when the concerned actors realize the full bearings of their commitments? What about the technical and economical feasibility of measures in relation to the many uncertainties of long term planning? What about mechanisms of burden-shifting for realizing the ambitious goals? These challenges can however also be approached from a positive angle. Given the fact that local authorities and stakeholders have embarked on a carbon transition path, can they be convinced to make the exercise to the bottom of the matter? Considered from a transition governance perspective, what are then the stimulating factors, and what are the discouraging ones? We briefly analyze these questions by means of three case studies in Flanders, Belgium. The first case investigates a recently elaborated plan to make the province of Limburg carbon neutral. The second and third case consider roadmaps which are in the making for the cities of Leuven and Ghent. In the case of Leuven and Ghent, much emphasis is put on combining a top-down and a bottom-up transition approach to guarantee effective results.

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f3 – Space and place in transitions

#80 Pushing the Boundaries: Advocating Space and Place in Innovation Studies - Nick Hacking, Malcolm Eames

Much theory-building in transition studies in recent decades has lacked a coherent sense of the territorial and spatial distribution of transition processes. The multiple scales at which dynamic processes occur and the boundaries of the systems and territories being considered have not always been clearly delineated (Truffer and Coenen, 2012). However, recent papers have begun to address this issue (Hassink and Klaerding, 2009; Fløysand and Jakobsen, 2010; Hodson and Marvin, 2010; Smith et al, 2010). In part at least this latest work suggests that more overtly geographical, relational and scalar insights into space and
place need to be included in case study analyses involving, National Systems of Innovation (NSIs), Regional Systems of Innovation (RSIs), Sectoral Systems of Innovation (SSIs), Technology-Specific Innovation Systems (TSISs) and the Multi-level Perspective (MLP). Such theoretical refinements are likely to offer much improved understanding of the temporal and spatial dynamics of transition processes within nations and between them and these will have obvious applicability to transition policy-making. In this paper, we specifically address the need to incorporate a stronger geographical dimension into transition studies via a review of the literature and a detailed empirical comparative case study of the development of the hydrogen and fuel cells TSISs in Germany and the UK. We incorporate into our analysis ideas from economic geography concerning the multi-scalar and spatial distribution of socio-technical processes in a transition: comparing these two national systems via inter- and intra-regional comparison of hydrogen and fuel cell activity in ten leading regions. From this, we seek to provide a functionally, relationally and spatially richer and more coherent account of the observed transition dynamics. Finally, we reflect upon the implications of our analysis by advancing theoretical and conceptual understandings of the role of space and place in the dynamics of innovation systems and sustainability transitions.

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#155 Energy transition in Germany – How can we deal with the contextual diversity? - Lotte Lutz, Daniel Lang

A transition of the German energy system is currently intensively discussed in academia as well as on all levels of politics and administration. The German Federal Environment Agency showed in its region’s network scenario (scenario Regionenverbund) that it would be possible to sufficiently supply German industry and households with renewable energy by 2050. If this ambitious scenario should be achieved, fundamental structural changes in all societal domains are necessary. However, there are large differences with regards to local/regional context conditions related to the required changes. These conditions must be considered when developing regional strategies that should efficiently and effectively contribute to a national energy transition. In this study, we therefore (i) present a literature based framework for classifying regional administrative districts in Germany (Landkreise) according to relevant contextual factors related to the envisioned energy transition (ii) present initial results of applying this framework to all regional administrative districts in Germany (iii) outline how the results of the study will later be embedded in scenario considerations to allow for the development of robust regional transition strategies that account for regional specificities and utilize the regional potentials in an optimal way. The parameters used in the context analysis describe relatively stable boundary conditions for regional energy transitions. Besides the potentials of the renewable energy sources in each district, these conditions include different socio-economic/socio-political factors such as population density, GDP per capita, landuse, degree of industrialisation and the current energy consumption (including base and peak load). The context analysis presented is realised and visualised using GIS. Cluster analysis is applied to identify classes of districts of minimal variance within and maximal variance between classes. In a next step the selected factors will be validated and complemented in interviews with relevant actors in different regions.

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#168 Cities, Major Technology Revolutions and Transitions to Sustainability

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The profound processes of change that are concentrated in cities are the key drivers of socio-cultural, political, spatial and economic change in this era. Cities today have large national, regional and global influence. The evolution of cities in this era will likely be a key determining factor in the kind of local, regional and global societies, economies and ecologies that emerge to dominate this century, and perhaps the next. Yet this era is also one of resource scarcity conditions that are compounded by global and climate change effects, and the rapidly growing and concentrating urban populations of the world present a special challenge i.e. how to achieve liveable and humane cities that are also sustainable (GGC, 2011). We explore the grand global socio-metabolic transitions (Fischer Kowalski & Swilling, 2010;) and technology revolutions (Perez, 2002) or ‘industrial transitions’ and link them to the evolution of cities and their infrastructures. We argue that the phases of major technology revolutions (Perez, 2002), which are accompanied by changing relationships between financial capital and production capital at a global scale, are important factors to consider when establishing how meta-scale transitions to sustainability occur (i.e. in terms of the theory of sustainability transitions or ‘transition theory’). We also argue that the infrastructure choices that cities make after the collapse of the deployment phase, dictates - to a large extent - the direction that the deployment phase of the technology revolution takes at a global scale. That is, cities are both impacted by technology revolutions, and in turn, directly influence the direction that technology revolutions take due to their scale and influence. This argument has special relevance in the current global period, that is, in the wake of the post-2008 financial collapse. Moreover, it has implications for transition and resilience theories of sustainability. Cities simultaneously play host to all three levels of socio-technical system transitions to sustainability (i.e. the landscape, regime and niche levels), and have a large influence on regime level transitions to sustainability through their infrastructure choices. Lastly, with respect to theories of transition this argument highlights shortcomings in how social-ecological system change is envisaged in resilience theory, when it makes use of the ‘adaptive cycle’ as a metaphor for envisaging social-ecological system phase changes.

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#273 Navigating the transition to sustainable bioenergy in Sweden and Brazil - Semida Silveira, Francis Johnson

The industrial revolution was accompanied—and facilitated by—a transition away from biomass in favour of higher density fossil and nuclear fuels. Over the past few decades, however, many countries have been promoting modern bioenergy in various end-use sectors and carriers. The shift away from traditional biomass thus no longer implies a shift away from biomass but rather an upgrading in scale and technologies and better matching to end-use requirements so that bioenergy can play an enhanced role in industrial development. In this context, it is worth analysing the elements and stages of the transition from traditional to modern bioenergy. It is not obvious that developing countries will move quickly towards modern bioenergy. In fact, many developing countries are still following the old track towards fossil fuels and higher carbon content in their energy matrix. In this paper, we consider the transition to
modern bioenergy as it occurred in Sweden and Brazil to extract lessons for other countries. Both countries have become world leaders in modern bioenergy across several sectors and with respect to both research and implementation. However, they undertook the transition at rather different stages in their economic development. The role of bioenergy as a factor affecting the industrial development process itself can thereby be compared. We examine the historical record of the transition in each country from a multi-level perspective and in light of the path dependence that characterises large-scale energy systems. It is found that niche technologies had an important role but the key factors in the expansion of modern bioenergy in the two countries were associated with the alignment of old established structures in agriculture and forestry, with industrial actors at both national and sub-national scales. In addition, energy security was coupled with economic development objectives to define policies that have become central to the climate change debate. A continued development of these bioenergy models in line with sustainability principles has now become more than only a national goal.

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#337 Transitions across place and space – Spatial transitions in an Actor Network perspective – Søren Kerndrup

The empirical and theoretical frameworks of transitions focus mainly on specific scale of change e.g. local, regional or national transitions. One reason for this lack of an integrative framework of territorial and spatial distribution of transitions process is the ambition of transition framework to develop concepts to develop solutions for the economic, political and environment problems facing the societies. (Latour, 2005). Another reason is the lack of a coherent framework for understanding the relational dimensions of spatial distribution of transitions. Most often these are understood in a simple one dimensional framework based on geographical distance overlooking the social, economic and institutional dimensions. (Latour 2005, Boshma 2005, Knoben 2008)

Therefore the aim of this paper is to combine the transitions framework with a relational geographic perspective influenced by the actor network perspective in order to develop the spatial dimensions of transitions. The paper is based on an ongoing research project of spatial dimensions of the transitions in energy production and consumption networks in the northern part of Denmark. The paper show by using an actor network perspective, that interactions and relations in these networks in spite of their focus on proximity, locality and regional development are integrated in multiple scalar interactions. These multiscalar interactions and relations are mediated by objects and artefacts, and therefore they are often not seen as part of the networks.

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#174 Towards a Green Urban Economy? Unravelling Urban Sustainability Transitions from a Regime Perspective - Ulrich Mans

The current debate about sustainability transitions has embraced the multi-level perspective as a useful methodological tool for assessing the dynamics that are at play between landscape, regime and niche. As a consequence, the thinking about socio-technical transitions has gradually shifted in favour of an increasingly holistic view on innovation and societal change. In order to understand the complex interactions between what is considered a stable environment (landscape), the rules of the game (regime) and current innovative developments (niches), many scholars have used the national context in order to investigate regime-level developments. In response to this national focus, recent publications (for example Hodson & Marvin; Smith, Voss & Grin) called for a greater focus on the urban context, arguing that at a time urban dwellers make up 50% of the global population, the debate would have to put greater emphasis on sustainability transitions in the urban context, and to investigate whether and if so to what extent the multi-level perspective can be applied as an appropriate framework for analysis. This paper presents the findings from comparative research on the role of local governments in promoting renewable energy industry clusters in six cities with different national contexts: Germany, China, US, Canada Morocco and Brazil. It aims to address the following questions: what are the opportunities for city leaders to foster sustainable economic development through green growth? How ‘stable’ is the urban context from a regime point of view, and how influential is the interaction between such an urban regime and other levels of government (provincial, national) in the context of the renewable energy industry? Finally, can cluster initiatives in this business sector act as a catalyst for innovation and change? The paper concludes that municipalities employ different strategies when promoting the local renewable energy industry, and that these policy choices reflect the characteritics of the urban regime, as defined by its sector-specific social, political and economic endowments.

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#203 Linking Cradle to Cradle and Transition Studies: How effectiveness of natural systems can lead to system-innovation in the built environment - Marleen Lodder, Philine Krosse

Marleen Lodder & Philine KrosseCradle to Cradle (C2C) has gained attention in the scientific discourse. Even though there are some implicit linkages with Transition Studies (TS), they seem to be unexplored. In this paper we specifically explore the effectiveness- versus the efficiency approach as a part of the C2C-philosophy vis-à-vis the notion of system-innovation versus sub-optimization expressed in many transition approaches. We will explore both approaches at a conceptual level, grounded in a case study on the soil ecosystem. This investigation departs from the assumption that an effective approach (C2C) or system-innovation (TS) is needed for a potential transition towards not only a sustainable but also a value-creating built environment. In the case study we specifically look at the current problem of CO2 and a recently proposed ‘solution’: underground CO2 Storage. We argue that this can be considered as an efficient solution, a sub-optimization. When we look at the natural systems however, ‘vital soil’ for example has the capacity to absorb CO2 from the air and convert it into nutrients such as Carbon. Vital soil has more advantages; it mitigates problems of erosion, water accumulation, it produces healthy food,
it supports biodiversity, and so on. This understanding does not only grasp the problem of CO2 overproduction, but has the potential for system-innovations. The physical built environment, then, could actually contribute to the quality of our living environment instead of only being ‘less bad’ by efficiency matters and sub-optimization. Extending on the effectiveness approach (C2C) or the system-innovation approach (TS), we argue that it could be possible to re-frame the concept of buildings as ‘trees’ and cities as ‘forests’ (C2C), to pursue transitions towards sustainable and value-creating built environments. This would enable us to affirm and expand our positive footprint instead of reducing our negative footprint.

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#211 Framing low carbon transitions in regeneration areas: sustainable development as a guiding vision - Miriam Hunt

While concepts of economic, environmental and social sustainability are intrinsically linked in policy, much has been said regarding inherent tensions between the three objectives. 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 (While et al, 2004). This paper will argue that they can also play complementary roles in managing transitions by creating inclusive visions for rallying actors and resources. Indeed, guiding visions play an integral role in transition management. Emerging in recent years as a means of governing large scale transitions, most notably regarding environmental sustainability, transition management aims to generate long term responses through short term policy (Loorbach and Rotmans, 2010). Visions play a number of integral roles; this paper will focus on their ability to articulate problems, recruit actor networks and attract resources. This will be explored by looking at a case study in South Wales, UK. The Arbed scheme was established in 2009 with the aim of retrofitting housing to increase energy efficiency. Explicitly adopting a view of sustainability that incorporates economic, environmental and social aspects, it cites the supporting aims of building capacity in the local supply chain and creating an evidence base going forwards (WG, 2011). The paper will argue that economic development aims constituted a guiding vision that supported the formation of actor and resource networks necessary for large scale retrofitting.

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#228 Governing local transition processes in the building and housing sector - Inger Stauning

Our research during the last 3 years have investigated the roles of Danish municipalities in formulation and implementation of climate plans and goals for GHG-reduction. The building and housing sector is particularly in our focus, as high CO2 reductions can be obtained by changing to energy-efficient architecture and construction techniques, by changing behavior of dwellers, and by a closer coupling to transition and innovations in the energy sector[1]. Our studies have shown different strategic approaches,
with different variations in governance forms and different configurations of actors involved in niche experimentation of the socio-technical system of energy and housing [2]. In this paper we will focus on the initiation and governance of such local transition processes. What makes actors take steps to transform their practice and orient their development towards future goals? What are roles for municipal actors in the transition processes towards a low-carbon housing and building sector? The paper will build on empirical studies in Danish municipalities carried out through a 4 years period. On this background, the paper examines municipalities as transition agents reconfiguring local socio-technical systems: Presenting an understanding of localized transition processes– specific contexts and specific local actor constellations may be turned into transition places holding potential innovative practices. Examining the local climate policies and programs with a focus on the capacity to form local transition arenas (transition places) and on the reconfiguration of local socio-technical systems. Focus on differentiations in the role of municipalities and the developments of mediators and network relations between public and private actors. Discussion of governance forms aiming at climate transition processes Jesper Holm, Inger Stauning and Bent Søndergaard, Department of Environmental, Social and Spatial Change, Roskilde University (RUC). Contact: bents@ruc.dk The paper is based on the research within the KIBS-project “Klimaændringer og Innovation i Byggeriet, region Sjælland” [Climate changes and innovation in construction sector, Region Zeeland ], supported by region Sjælland [1] (Holm J., Stauning I., Søndergård B. (2012). Local transition strategies for low carbon construction and housing – studies of innovative Danish municipalities, Forthcoming Ashgate). [2] (Søndergård B., Stauning I. and Holm J.: Municipal Climate Governance and Formation of Local Transition Places, Paper for Second International Conference on Sustainable transition Lund 13-15 June 2011).

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**f5 – Mobility and urban infrastructure**

**#22 A socio-technical analysis of low-carbon transitions in transport: introducing the multi-level perspective into transport studies - Frank Geels**

Building on findings in a recent book (Geels et al, 2012), this paper uses the MLP to make a comprehensive analysis of stability and change in contemporary transport systems. At the niche-level, six innovations are discussed: a) intermodal travel, b) cultural and socio-spatial innovations, c) demand management, d) public transport innovations, e) Intelligent transportation systems (ITS), f) green propulsion technologies (BEV, HEV, FCV). At the landscape level, three destabilising trends are discussed: a) climate change, b) peak oil, c) the emergence of an information society. But I also discuss several landscape trends that help stabilize the existing auto-mobility regime (e.g. cultural preference for speed and time saving, physical landscape and urban structures, cultural values such as freedom, choice, progress, wealth and status). At the regime level, I discuss mechanisms of inertia and incremental changes as well as emerging ‘cracks in the regime’ (increasing policy activity at city level because of increasing problems, diminishing growth of auto-mobility sometimes indicated as ‘peak car’, some dissociation of policymakers from the automobile regime, awareness of regime actors of landscape pressures). The conclusions make an interpretive assessment of multi-level interactions and the question to what degree
transport systems are in transition.

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#31 The Copenhagen story: urban transportation from 1950 to 2050 – Andrés Felipe Valderrama Pineda, Nina Vogel

There is an increasing attention towards the role of cities in discussions regarding sustainability, climate change and the environment. On one hand it is a fact that an increasing number of people are moving into cities. In the coming years the proportion of human beings living in cities is estimated to be 70-80% of the world population. There are multiple efforts of conceiving of cities as fertile places to create and promote the socio-technical configurations that will have a positive impact on sustainability goals on a global scale. However, these efforts still collide with a tradition of conceiving of cities as problematic spaces, or places where especially unsustainable daily practices happen. This twofold character and in general the complexity of cities and their transition processes is discussed and exemplified in this article with the case of Copenhagen and its mobility development through the transition theoretical perspective of the multi-level perspective (MLP). The “Copenhagen story” is often regarded as a story of a leading city in terms of non-motorized urban transportation, environmental policies and in general as a place where people are ‘happily green’. In this article we critically research the pathways Copenhagen took, the struggles and conflicts involved and what potential transitions in terms of sustainable mobility considered for the future. We do so attempting to answer the questions: How does sustainable mobility unfold in the transition processes of Copenhagen? What transitions have happened in urban mobility in Copenhagen since 1950 and what may happen up until 2050? To be able to discuss these questions we adapt the MLP framework, placing culture and space –following Sheller, Coenen, Zijstra and Avelino- at the same explanatory level as technology in the three levels of structuration of the MLP model: niche, regime and landscape.

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#132 Mobility and cities: global artifacts and situated systems - Anne Katrine Harders, Morten Elle

We are facing the significant challenge of unsustainable mobility in cities caused by a rising number of citizens and number of kilometres travelled per person. One issue could be the particular focus on technological fixes such as the electric car. However, technological innovations have not yet managed to fix the unsustainable mobility in cities. This calls for exploring other ways of contributing to the transition to a more sustainable mobility. Much literature on transition theory dealing with transport and mobility acknowledge that all transport technologies are part of complicated socio-technical systems. Nevertheless, the majority of this literature has a primary focus on the development of the actual technology as a global artefact, and thereby neglecting the interrelationships between different transport technologies and the spatial context, including situated systems. For example, the spatial context played a significant role in shaping the automobile as the scattered urban structure of the US made it desirable to develop a horseless horse carriage with a long range. But this global artifact was almost immediately used in quite other contexts in spite of the fact that the cities’ spatial structure and infrastructural systems in many cases did not provide good conditions for car traffic. Working with transition theory prospectively in
Aiming towards more sustainable mobility, it is a necessity to make the spatial structure, creating the frames for mobility, the point of origin, rather than the development of one specific transport technology. This paper will deal with the bearing of the interplay between the different transport technologies and the spatial structure. It is the aim to stress the importance of focusing on the city and mobility as a whole in order to understand how this could be improved and which technologies could contribute to the transition to a more sustainable mobility.

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#156 Transitions in the System of Urban Transport and Land-use: an analysis of Amsterdam and Zürich since 1950 – Andrew Switzer, Luca Bertolini

In the domain of transition studies considerable research has already been carried out dealing with transitions in the past as well as structured attempts in various sectors (agriculture, energy, etc) to bring about transitions. This research has delivered rich insights into how various socio-technical systems evolve. Although, in the area of mobility transitions, research dealing alternative fuels (Hüttink e.a. 2010) or the modeling of transitions towards sustainable mobility (Köhler e.a. 2009) has been carried out, little or no research has been conducted examining transitions in the system of transport and land-use in urban regions. In many western cities and regions attempts are being made to coordinate transport and land-use planning as a way to combat increasing automobility. The results of these attempts vary. Amsterdam is an example of a region where, despite the success of the bicycle as a mode of transport, limited success has been achieved in the development of a regional transportation system and the coordination of transport and land-use planning (Tan & Bertolini, 2009). On the other hand, Zürich is a case often noted for its good coordination between transport and land-use planning and high quality public transport at a regional level (Cervero, 1998). This paper examines how transitions in the system of regional transportation and land-use have taken place in the regions of Amsterdam and Zürich during the period from 1950 until the present. By examining these cases from a transitions perspective (Grin et al. 2010) it is hoped that it will be possible to understand the transition pathways that transitions in the system of transportation and land-use in urban regions take and the conditions that are supportive of a transition.


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#163 Bangkok’s transport ecosystem: some thoughts on transitions to sustainable urban mobility in an Asian megacity - Frans Sengers, Rob Raven, Henny Romijn,

Much previous research on sustainability transitions highlights two things. 1) The empirical interrogation of contexts in Western Europe. 2) The importance of the national level by conceptualizing the nation-state as the unit ‘under transition’. This paper makes a contribution by ‘setting the stage’ for a transnational account of sustainability transitions in urban mobility in two rapidly developing Asian cities - Bangkok (Thailand’s hectic capital and ‘global city’) and Chiang Mai (provincial medium-sized city). This ‘setting the stage’ entails the explorative use of the Multi-Level Perspective (MLP) in characterizing urban mobility in this under-investigated context based on primary data collection (interviews and document analysis). In both cities we find an ongoing overarching trend of ‘unabated motorization’ represented by the observed range of pro-car policies and the dominance in road-space use by the car. Despite the prevalence of this trend, most passenger trips involve the use of other modes besides private motorized vehicles. Looking at current practices, we suggest there is merit in conceptualizing not a single mobility regime based on one dominant mode, but rather to view the regime-level as being populated by ‘an ecology of modes’ (partly competing with each other, partly non-competing and partly symbiotically complementary - each optimizing in particular ways in relation to the other modes and niche developments). Moreover, we find that the mobility regimes under study are not typical local, national or international. An in-depth study of different regime dimensions (industry, technologies and infrastructures, knowledge base, markets and user preferences, public policy, cultural meanings) reveals the scalar ‘layerdness’ of these regimes. Finally, a number of promising sustainability experiments are analyzed in greater detail, revealing a similar layerdness. The paper ends with a discussion of how this multi-modal regime conceptualization and scalar layerdness are important in analyzing and steering sustainability transitions in urban mobility regimes.

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#32 A climate of change: a transition approach for carbon neutrality in the city of Ghent (Belgium) - Frank Nevens, Chris Roorda

In 2007, Ghent (a 240.000 inhabitants city in Flanders, Belgium) announced the visionary objective to become a climate neutral city by 2050. Therefore, the idea of a ‘climate alliance’ was launched, in which all relevant forces ought to be joined. A guiding process following the setting of an ‘Urban Transition’ (UTL) started in spring 2011. Coached by a ‘T-team’ (city administration collaborators, VITO and DRIFT), a transition arena was established. Its 14 members - connected with the city in diverse ways - were considered to be frontrunners, i.e. having the willingness and potential to co-creatively think out-of-the-
During six arena meetings, the following elements of the envisaged transition were discussed/established:

- **System analysis:** what are the relevant assets/topics that should be considered of major importance to understand and describe contemporary Ghent; bearing in mind the general idea of the need (‘sense of urgency’) for change towards climate neutrality and generic sustainable development?
- **Principles of a sustainable Ghent:** what are the major chalk lines that are vital for the design of a sustainable city was established (people, planet and profit related)?
- **Vision 2050:** taking into account its assets and the envisaged sustainability principles, how would Ghent look like by 2050?
- **Pathways:** with regards to the desired 2050 situation, what are the major ‘turning themes’ to tackle; and what are the strategic headlines to be followed?
- **Actions:** can a number of real-life-scale demonstration projects be established to link up the vision with contemporary potential? In this contribution, we share the major outcomes of the Ghent UTL process (thus far). We summarize the results related to content (system analysis, vision, pathways...) as well as the ‘lessons learned’ with regards to the co-creative/participatory process; specifically the consequences for the city government will be highlighted.

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**#47 Limburg Carbon Neutral by 2020: A Belgian transition case exploring the boundaries of sustainability and desirability - Leen Gorissen**

In 2008, the province of Limburg, Belgium launched the ambition ‘Limburg Carbon Neutral by 2020’, one of the most far-reaching ambitions in terms of climate policy in the world. Since emission reductions are often correlated to sectors like energy production, industry and transport, technological solutions are generally what authorities and the general public expect when it comes to reducing emissions. However, technological feasibility is confounded by non-technological barriers obliterating any guarantee on success and secondly, also non-technological measures will be essential parts of the solution. In the recent study Limburg carbon neutral for the province of Limburg (Flanders) we started out depicting scenario’s to carbon neutrality from the technological point of view. During our quest however, opportunities arose to widen the scope of the project to include also non-technological measures. In this presentation, we will briefly depict the evolution of the Limburg carbon neutral project, highlighting how bottlenecks of technology can provide opportunities for broader sustainability, which favourable conditions allowed widening the scope of the study (reframing) beyond technological solutions and how conditions and components of transition theory have been fashioned to the local hands-on approach. Together with the audience, we aspire to reflect upon the possible pitfalls and opportunities that lay ahead for realizing the transition to a post carbon Limburg.

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**#204 Constructing Sustainable Cities - Roar Samuelsen**

This paper address the role of cities in promoting sustainable transitions by focusing on innovation related to climate change mitigation and adaptation measures for urban infrastructure. Cities function as integrated systems, consisting of many closely interlinked sectors of economic activity and complex types
of infrastructure. A well-functioning infrastructure is decisive for cities to be both competitive and liveable places. An ongoing “Cities of the Future-programme” (2008–2014) which encompass a wide range of innovation projects, aims to re-construct the 13 largest Norwegian cities as sustainable cities by promoting clean technologies, smart grids and smart buildings. The vision is to achieve large-scale transformative changes at the system level of urban infrastructures in order to meet challenges related to current climate change and resource utilisation in Norway. Increased efficiency and improved practices may result both in specific sectors and across sectors. The paper will present a conceptual framework that can enable both theoretical and practical insights into this issue. The following research questions are pursued: How are innovation processes organised and coordinated through transition governance and learning processes, and what are the results in terms of sustainability transition? Can different urban and regional development trajectories be identified and what are the characteristics of these? What are the implications of the embeddedness of the innovation projects in different urban and regional institutional regimes for transition efforts and results? A synthesis of the IS and the MLP approaches will be used to identify and analyse different modes of organisation and coordination of the transition efforts. The results of the project will i) contribute to the development of the systems approaches as research tools for studying sustainability transitions; and ii) provide knowledge relevant for targeted intervention in constructing more sustainable cities and – in the longer run – enabling transitions to sustainability. Submitted by: Roar Samuelsen and Ove Langeland NIBR Norwegian Institute for Urban and Regional Research

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#223 Cities in Transition: Visioning and Planning for a Low-Carbon Energy Future - Isabel Pares

During the 20th century, the design and construction of cities was based on fossil fuels because oil was cheap over the last 150 years. Urban growth occurred in the form of car-oriented developments, increasing sprawl and greenhouse gas emissions thus contributing to global warming and climate change. We can no longer continue this unsustainable carbon-based development, particularly since we are approaching peak-oil production. Urban planning and design is crucial to achieve a sustainable and productive transition towards a low-carbon energy future. This study aimed to review the planning process by which different cities built visions and action plans to reduce fossil fuel dependence and greenhouse gas emissions in the next 20 to 50 years. We selected four cities/towns based on the use of diverse strategies and methods at different planning scales (e.g., regional, city and community levels), including: Helsinki (Finland), Portland (USA), the London Borough of Sutton (UK), and Kinsale Town (Ireland). We then examined the planning, development and implementation process of the vision-action plans using information obtained from official documents and interviews with local authorities from the cities selected. We discuss tools used to build the vision-action plans, role of stakeholders, importance of public policies and urban governance, use of external advisory groups and community participation in decision making processes among other methods. Overall, a city’s vision-action plan is a roadmap for change that specifies what will be done, who will do it and how it will be done. These case studies present sustainable urban development practices concerning land use, housing and traffic, environmental conservation, renewable energy use, water and waste management, food production and community building. These visions-plans show how to align sustainable development and climate protection actions to reduce the energy burden and facilitate the transition to a low-carbon energy future maintaining a high
quality of life.

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#238 Envisioning urban sustainability transitions: Lessons from an envisioning process for climate mitigation in five European cities - Julia Wittmayer, Niki Frantzeskaki, Frank van Steenbergen, Chris Roorda, Derk Loorbach, Pepik Henneman

Cities are facing major sustainability challenges at local level, such as climate change, environmental degradation and social-economic turmoil. At the same time, European cities need to consider the European 2020 Energy Strategy. This demanding landscape agenda requests action at all levels for energy efficiency and an increase of sustainably sourced energy with many cities embracing even more ambitious targets. Consequently, cities formulate climate mitigation agendas that comprise radical transformative change to escape the current energy lock-in. As part of the MUSIC project, five European cities take on these challenges, which ask for fundamental changes in existing structures, cultures and practices. Aberdeen, Ghent, Ludwigsburg, Montreuil and Rotterdam work towards initiating local (energy) transitions with the aim to reduce CO2 emissions by 50% in 2030. In order to do so, these cities adopt an urban transition management approach (based on Loorbach 2010). Starting from a transition analysis, one of the key steps is setting up an envisioning process and drafting transition visions, visionary images and targets with a small but diverse group of people in so-called transition arenas. These visions guide the search for strategies to transform existing structures, cultures and practices. In our paper we show how envisioning processes can generate new networks, broaden the initial ambitions and create sustainable long-term guiding images based on the potential of the cities as well as guide short- and medium-term actions by local government and other urban actors. We also show how interdependency, uncertainty and differences in perspectives, when negotiated under the prism of sustainability, can yield driving visions for transformative change which have the capacity to bridge possible disparities of the local context. We report and analyze the envisioning experiences in all five cities and show how contextual characteristics and governance realities of each city influence the envisioning process and the content of the transition visions. This paper attends to the nature of these contextual differences and similarities as well as the ways in which they come to the fore through envisioning. Last but not least, the empirical findings are compared with inputs from an extensive literature review of envisioning and scenario drawing with a focus on the function/benefits of envisioning for initiating transformative change.

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#33 Sustainable urban development and the multi-level transition perspective - Petter Næss, Nina Vogel

This paper discusses some challenges and possible adaptations of transition theory as a framework for analyzing the prospects for environmentally more sustainable development of urban land use and transport infrastructure. Rather than depending first and foremost on niche innovations, a transition toward sustainable urban development is a matter of changing the composition of existing multi-segmented land use and transportation regimes. Those well-experienced forms of built environment and transport infrastructure that are in line with sustainability objectives should be strengthened while those that are not should be actively constrained and reduced. Urban development in a Danish provincial city is used as a case to illustrate some of the points made in the theoretical part of the article. Due to the wide gap between present conditions and those required to realize a sustainable urban development, more attention should be directed toward landscape level conditions and possibilities for changing them. In order to address the ‘utopian sustainability’, the scenario method of backcasting could preferentially be integrated into the analytical framework of transition theory.

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#179 The city as a nexus of sustainability transitions - Harald Rohracher, Philipp Späth

Innovation policies in the European Union are increasingly addressing ‘grand challenges’ such as climate change, resource depletion or aging societies. Such transformations go far beyond conventional product or process innovations and require a restructurings of broad socio-technical regimes, e.g. the built environment, systems of mobility, the energy system or the way we organize processes of production and consumption. The focus of research on socio-technical transitions has predominantly been a national or European level, while the role of place as well as the city level as part of multi-scalar governance systems has been largely neglected. However, the distributed nature and specific socio-technical dynamics of large-scale transition processes towards greater sustainability makes cities an important arena of infrastructure transformation and a crucial nexus between different levels of governance and strands of socio-political discourse. With a focus on the Cities of Graz, Freiburg and other European cities we will discuss what roles cities may play in transformation processes towards sustainable infrastructure systems, how opportunity structures for a greater urban role in such transitions look like and which limitations as well as specific advantages exist at the city level. We will be dealing with questions such as: - How can cities serve as a place of experimentation and social learning for sustainability transitions and how can they support the strengthening and growth of greener socio-technical configurations? - How are changes in the governance of infrastructures (e.g. decentralisation, market liberalisation) influencing the potential role of cities in sustainability transitions? - What is the role and dynamics of discourses and visions around urban sustainability transitions? How do such visions emerge? How do they interact with discourses and visions at different scales? - How important have external pressures (energy prices, particulate matter, new regulatory context etc.) been to destabilise the existing regime? How heterogeneous and inconsistent are urban energy or transport systems and to which extent can such frictions be used to
promote change in certain parts of the system? - How is it possible to create and keep up transition momentum? To which extent and with which strategies can urban energy transformations become irreversible, e.g. by social and material entrenchment? - Can we speak at all of ‘transitions’ at a city level? We are especially interested in the room for manoeuvring for cities that is left by institutional contexts and socio-technical networks beyond the city boundaries.

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#193 (Re-)Design of Intervention Programs for Regional Transition using Social Theories - An application in Dutch Horticulture - Eric Poot, Pieter Wolf, Esther Veen

In the last decade, a number of programs were conducted with the aim to enhance agricultural development in various regions in The Netherlands, in terms of sustainability, innovation and economic viability. Most of these programs have a strong focus on technical issues, e.g. innovation and implementation of sustainable energy technology. Because some program directors, researchers and advisors are involved in several programs, “copy paste” of program elements occurs, e.g. match making between entrepreneurs and knowledge institutes and training programs for entrepreneurship. However, interventions that worked well in one setting are not necessarily successful in another. The effectiveness of programs will undoubtedly improve by taking specific regional aspects into account. Social theories can contribute to this, because they can help to be aware of dynamics in social systems and to understand why presumed mechanisms lead to different outcomes in different contexts. In our paper, we describe two cases we have analysed in retrospective. The first describes the transition program “Betuwse Bloem”, which was carried out to enhance economic and sustainable development of a pluriform horticulture sector (fruit, trees, mushrooms and greenhouses) in the River Area in The Netherlands. The second case is about the initiative to create a “Cradle to Cradle Agropark” in the province of Flevoland, The Netherlands. In both cases, multiple stakeholders are involved, embedded in a quite sharp bounded area. Analysing these cases using social theories revealed the existence of different social systems, influenced by certain regional aspects like regional communication systems and regional identity. In a brief cross case analysis, we will describe similarities and differences, we will also reflect on the role of the participating researcher and the methods and tools used. Finally we will elaborate on how we plan to apply the results for the design, or re-design, of a new intervention program in the North West of Holland.

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#212 The role of local niches in creating pathways towards low carbon buildings: Lessons from Freiburg city in Germany - Arian Mahzouni

This paper will contribute to the current debate on the ‘spatial dimension’ of the strategic niche management (SNM) about which there is limited research (Coenen et.al 2010:2), requiring more cross-
country empirical studies in order to unpack the processes of upscaling emerging niches in different contexts. By developing insights and drawing lessons from the Vauban district in Freiburg in south-west Germany, the role of locality in creating and enhancing niches will be discussed. Vauban, as a success story of bottom-up approaches to niche development, has drawn worldwide attention[1]. The transitional pathway in Vauban is shaped by special social dynamics and institutional arrangement. In 1994 the Vauban Forum as a civil society organization was founded to support the citizens’ initiatives and coordinate their activities (Frey 2011:111). The Forum has created a social learning platform for exchanging ideas on the methods of energy-efficient buildings. The Forum has been able to create a dynamic niche network among users, planner and wider community groups by linking the self-building groups (end-users aimed at reducing the construction costs) to broader social aims such as ecological protection and energy efficiency. The Vauban case shows clearly that local community can create a solid base to integrate the renewable technologies (such as vacuum toilets, biogas reactor and solar water heater at the household level and woodchip heating at the district level) into the existing systems (regimes) for creating energy self-sufficient houses (Frey 2011:127; Ornetzeder and Rohracher 2006:141).

But, Vauban has rarely been targeted for transition studies. Based on the concept of the SNM discussed by many scholars (such as Raven et.al 2011; Schilpzand et.al 2011) the internal niche processes will be studied to explore: 1) if and how the ‘expectations’ are specific, tangible and shared by niche actors; 2) how far the ‘social networks’ (actors from both niche and regime) are heterogeneous and dynamic; and 3) if and how the ‘learning processes’ are second-order to bring social and techno-economic interests together. Then the notions of proximity (cognitive, organizational, social, institutional and geographical), discussed by Coenen et.al (2010:2), will be used to better understand the internal processes and the typology of niches in Vauban, which could also help identify the nature of niche-regime relationship (competitive or collaborative). Necessary data will be collected by conducting desk research and semi-structured interviews with key stakeholders.

References


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#62 Postulates of urban resilient sustainability transitions: a cross-disciplinary approach - Marta Olazabal, Unai Pascual

Significant steps have been made towards reaching the goal of sustainable development in urban areas in the last two decades, especially in industrialised countries. However, there is still a long way to go in cities to correct key problems regarding socio-economic inequalities, environmental degradation and overconsumption. Cities are facing old and emergent global challenges including demographic growth, ageing and climate change. In this paper we pose the question of whether cities will be able to respond to these challenges with the current management and planning practices. Based on current and future consumption demands of energy, food, space, etc. the aim of this paper is to bring to the fore the notion of “urban resilient sustainability” to answer to questions such as: what is the added value of the idea of urban resilience for urban sustainable development? Furthermore, given the current unsustainable urban trends, how are local transitions stimulated towards resilient sustainability? We attempt to provide some answers based on the fast growing, although highly scattered, conceptual and empirical literature on urban resilience and by paying special attention to the role of urban governance towards sustainability transitions which we argue require the fulfilment of a set of key necessary conditions.

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#150 Transforming Technopark: Building Local Institutional Capacities for Innovation and Sustainability - Pieter van Heyningen

Transforming Technopark: Building Local Institutional capacities for Innovation and Sustainability Designed as South Africa’s first science park in the 1980’s, Technopark, in Stellenbosch was the focus of an intervention study, which seeks to shift the focus of the mandate of the park towards a sustainability-orientation. The transition and learning process was a result of a series of stakeholder engagement workshops and various visioning processes. The process was not without conflict, and showing the common overlaps in the visions of various stakeholders brought the processes closer towards a ‘strategic collective vision’ for the park as an ‘innovation hub for sustainability’. This paper describes the process through a socio-cognitive and institutional lens, describing the importance of these factors in the process of transitions at the micro level. The micro-level here refers to ‘transition regions’ and includes the economic geography element into the transition theory, which adds a new dimension to the MLP theories of Geels, as well as the Transition management theory of Rotmans, Kemp and Loorbach. The paper highlights specifically the importance of social contexts in the shift towards sustainability-orientation and shows how leadership can make a difference in the transition process. The paper also gives a developing country perspective to the transitions literature, and shows the importance of ‘informal factors’ of innovation in the transition process.

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#180 Dynamics of sustainable energy transitions in developing countries: a conceptual framework and two case studies - Linda Kamp, Wim Ravesteijn, Otto Kroesen

Development and implementation of sustainable energy technologies in developing countries is necessary in view of worldwide environmental, developmental and poverty problems - but difficult. Local R&D, if present, is rarely connected to local businesses; and in general, network building is laborious. Furthermore, problems related to maintenance, repair and ownership frustrate implementation of sustainable energy technologies. Lack of technology policies and regulatory frameworks constitute obstacles for transitions in the longer term. What are higher level dynamics and bottlenecks that explain these issues? How can barriers be overcome and self-sustained trajectories be started and supported? These questions form the starting point and subject of this paper. Taking a higher-level systems view, it proposes a conceptual framework for better understanding the dynamics of sustainable energy transitions in developing countries. This framework is based upon the Multilevel Perspective, Sectoral Innovation Systems approach, the Technological Innovation Systems approach, and insights from Appropriate Technology and Intercultural Management. Such a systemic framework for understanding sustainable energy transitions in developing countries is so far lacking in science. The framework deals explicitly with the local institutional context, local capacities and cultural values. It will be explained and supported by a number of examples from practice. Furthermore, in the paper the framework will be applied to two case studies: the development and implementation of small wind turbines in Kenya and the development and implementation of PV in Nigeria. The paper will identify dynamics, opportunities and barriers within these innovation systems and formulate stakeholder strategies to overcome the barriers identified.

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#197 Multi-Level-Perspective and Conflict-Oriented Cooperative Understanding. A framework to analyse and interpret regional governance networks - Manuel Gottschick

In this paper, a heuristic framework to analyse regional governance networks with regard to their reflexivity is introduced (Gottschick, 2013 in review). The framework is based on two complementary Reflexive Governance approaches: The Multi-Level Perspective (MLP) (Rip and Kemp 1998; Geels 2011) focuses on social-technical structures and dynamics for societal change, whereas the Conflict-Orientated Understanding approach (CU) (Feindt, Gottschick et al. 2008) concentrates on actor specific conflicts, options for action, coalitions, and arenas for Reflexive Governance processes. These comprehensive approaches have been melted down to a set of ten questions. Two case studies of regional governance networks have been chosen for the analysis. These networks reveal a number of similarities but also some decisive differences. Central among these are: existing network versus newly established network; strong
personal interests versus weak personal interests; and scientists as consultants versus scientists as persons in charge of the workshop conduct. The framework’s analytical application has been facilitated by a structuring of the respective case studies with regard to a) goals proposed, b) concepts used, and c) outcomes observed. The application of the framework allows for the derivation of recommendations for advancement of MLP and CU. For MLP, not only technological but also social innovations are likely to emerge on the niche level. With regard to the theory of institutional change, social innovations might be conceptualised like technological ones in MLP (see, e.g., Quack 2005). Concerning the CU approach, it seems to be promising to use the MLP to conceptualize the CU approach as method for social innovation on niche level. In this way the CU approach (in terms of preconditions) could benefit of a protected niche to develop. In niches, it might be possible to experiment with new actor-coalitions and to overcome some strategic behaviour of actors.


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#248 The diffusion of family size anaerobic digestion technologies as a case of socio-technical transition
- Willington Ortiz, Carmen Dienst, Hanna Scheck

Biogas systems of family size are regarded as a promising alternative for improving the energy supply of poor population, particularly rural households in emerging and developing countries. The development and diffusion of such household technologies have been the objective of several initiatives around the world, since more than thirty years. However, the current diffusion of family size biogas systems at global level offers a rather uneven picture (ranging from millions of installed plants reported in some Asian Countries to marginal figures in most African Countries). The difficulties to move forward in the development and diffusion of the technology vary depending of the national or regional context. However, we argue that many of those difficulties may actually derive from crucial structural components, which are common to any process striving to disseminate family size biogas solutions. Our analysis is based on the assumption that initiatives supporting the diffusion of these technologies can be understood as socio-technical transition management processes. The proposed analysis starts by identifying the common features of the technology and its functionality as well as the specific setting of challenged regimes, involved actors and resources for adoption. Subsequently, heuristic concepts from the multi-level perspective on socio-technical transitions and from transition management are applied in order to identify (ex-ante) possible features, mechanisms and patterns that can emerge in a transition process towards the broad implementation of family size anaerobic digestion technologies. The expected particularities of a ‘generic’ transition process are confronted with empirical observations from
representative initiatives in three different contexts. The discrepancy on expectations among relevant actors and the multi-regime functionality of the technology arise as particularly challenging patterns, which may confine possible transition pathways and explain certain observed stagnation in programs pursuing similar visions, i.e. societies where family size biogas solutions have become ‘taken-for-granted’ options for rural population.

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Markets in Transitions

#53 Linking supply and demand side innovation policies in supporting niche development - case electric vehicle cluster in Finland - Armi Temmes, Raimo Lovio

Innovation policy in Finland (and elsewhere) has traditionally mainly focused on promoting the supply of innovations e.g. through R&D funding, but demand-side has lately been emphasized. Traditionally the descriptions of demand-side policies have emphasized regulation and public procurement, but the present approach of the Finnish Government amends the toolbox with indirect measures like knowledge and capability development and infrastructure improvements (TEM, 2010). It is broadly accepted that supply- and demand-side policies are complementary (e.g. Breznitz et al., 2009). This is especially important in the case of major systemic innovations in which both types of policies are needed. From the point of view of the innovation policy development the question is: How to implement R&D policies in a way to enhance the demand-side elements within the mainly supply-oriented programs and how to evaluate the success of these programs? We approach this question drawing on the literature on strategic niche management (Kemp et al, 1998, Schot and Geels, 2008, Raven et al., 2010) as innovation policies are important tools in niche protection. Our proposition is that a successful policy combination enhances the main niche-internal processes (articulation of expectations, networking and learning). More specifically we propose that an important element of the success of the programmes is the development of aggregation activities (Geels and Deuten, 2006), which create demand through improved knowledge and capabilities of all actors. We study this in the context of the various ongoing activities for enhancing the electric vehicle (EV) cluster in Finland. EV cluster is driven by climate change policies which enhance the demand of low-emission vehicles and increase the prices of existing fuels. The activities include a major research program TransEco, a regional testing platform for EV’s in the Helsinki region and a EV funding program EVE by Tekes.

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#151 Sustainability transitions in agriculture: challenges for the UK beef sector - sally gee, Chris Foster

Between 20-30% of the UK’s overall greenhouse gas (GHG) emissions are associated with food, the majority arising from agriculture. Livestock rearing alone accounts for over 57% of agricultural emissions in the UK, and the beef sector is considered a candidate for transformative eco-innovation. Several high profile reports and numerous global and local initiatives promote sustainable agriculture practices, yet stimulating change has proven challenging. To examine why, we investigate the UK beef sector, which is relatively unusual in that domestic demand is mainly met from domestic supply. This structure facilitates study of the impact of demand and supply dynamics in the sector on eco-innovation and the diffusion of sustainable practices. This paper considers major purchasers’ role in driving eco-innovation. Retailers’ dominance of food supply chains is well documented, and we refer to major buyers with the potential to stimulate system-wide change as focal organisations (FOs). Case studies compare the activities and
impact of beef sustainability initiatives at four major supermarkets and one major hamburger restaurant in the UK. Our analysis considers the influence of industry structure, agricultural subsidies, commercial factors and the nature of the sustainability challenge itself on the behaviour of these major purchasers and their ability to affect change. We conclude that; · The highly fragmented production base and the particular role of primary processors in meat systems limit the FO’s ability to interact directly with farmer suppliers · The structure of the supply chain influences the nature of interactions between primary suppliers, secondary suppliers and FOs · The relative commercial importance of beef affects each FO’s motivation to pursue eco-innovation · The requirement to source large quantities of beef can inhibit a FO’s capacity to effect change · Finally, a lack of consensus about sustainable practice in beef farming affects major purchasers’ activity

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#270 User practices and heat pumps in a low carbon transition - Lars Larsen, Inge Røpke

Current energy systems face the challenge of including more renewable energy sources (RES) in their supply. While some RES are almost as flexible as fossil fuels other are inherently fluctuating. In Denmark wind power is put forward as a main RES and is expected to increase substantially towards 2025. This has shaped ambitions to push an increased electrification of heating and transport services. One example is the promotion of central heating heat pumps (CenHPs) as a main heat supply in residential buildings. To fulfill their potential CenHPs must be operated in respect of wind availability and grid congestion. This presents a new situation where users are confronted with a demand for flexibility. The paper aims to deepen the understanding of the user perspective in relation to CenHPs in order to address the likely acceptance of CenHPs and the extent of flexibility in use.

The paper employs an understanding of residential energy consumption developed within the social practice approach. Here consumption is seen as a result of the performance of everyday practices. Hence the analysis draws on a variety of qualitative methods ranging from desk top studies of reports about heat pumps to research interviews with central actors and household users. Due to the stage of development, the household interviews have been targeted at families enrolled in various ‘flexibility testing’ projects. This leads to an investigation of the practices related to heating services. These encompass both comfort practices and practices related to the budgeting and information gathering preceding a CenHP installation.

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#281 The demand side of Sustainable Transitions: Sustainable Consumption - Philip Vergragt, Maurie Cohen

In 2011 and 2012, SCORAI (Sustainable Consumption Research and Action Initiative) has organized three workshops, and co-organized the Global Research Forum in Rio de Janeiro in June 2012. The first of these workshops (April 2011, New Jersey) explored how social practice theories and new economics, jointly with sustainability transitions, could jointly create a broader understanding of systemic transformations.
The second workshop, in Vancouver (March 2012), explores life style changes and experiments in niches, while the third (in Bregenz, May 2012) explores sustainable consumption in times of crisis. Jointly these workshops thematize a systemic perspective on transitions towards sustainable consumption and production. The Global Research Forum in Rio adds to this a perspective from developing countries. Although it is far too early to create an encompassing theoretical framework for transitions towards sustainable consumption and production systems, this paper will take stock of what has achieved through those workshops, and will sketch the contours for such a framework, as well as some elements of a research agenda for the next 5-10 years. Part of this framework are technological innovations; top-down and bottom up governance, socio-technical experiments; cultural changes, challenging the economic growth paradigm, new metrics and incentives, non-scientific and emotional aspects, and non-traditional knowledge systems. One of the aims is to enrich the socio-technical transitions framework with a better articulated demand side; in other words to create a nexus between sustainable consumption and well-being research and socio-technical transitions research.

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#38 Investor motives vs. policies to promote investments in renewable electricity production: match or mismatch? - Ingrid Mignon, Anna Bergek

In accordance with the 20-20-20 targets set by the European Union in the climate and energy package (2009/28/EC), national policies aiming at increasing renewable electricity production have emerged among European countries. The tradable green certificate (TGC) is one of the policy instruments being used in e.g. Italy, the UK, Sweden and Norway, where the scheme was recently implemented. Previous literature has discussed the advantages and disadvantages of TGC systems, primarily from an economic efficiency point of view (del Río, 2005; Fristrup, 2003; Lemming, 2003; Morthorst, 2000). However, very little has been said about their effect on investors’ decision to invest. In a recent working paper, we have demonstrated that investors in renewable electricity production are a heterogeneous group and argued that policy makers’ misconception of who actually invests in renewable electricity production may have important implications for the design of effective policies. In this paper, we focus on the triggers of different type of investors’ decisions to invest in renewable electricity production. Based on interviews with different types of investors in renewable electricity production, i.e., farmers, IPPs, diversified companies, project developers, sole traders, economic associations and public non-energy organizations, we show that for many types of investors, profit maximization is not the primary motive of the investment, and that financial incentives, such as TGC, have a limited effect on investment decisions. We therefore argue that different investor categories require different kind of incentives. Based on a multidimensional framework that includes entrepreneurship, innovation adoption and institutional aspects, we identify a number of investor-related variables, which should be considered by policy makers when designing future policies to promote investments in renewable electricity production.

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#42 Business transition management: exploring a new role for business in sustainability transitions - Derk Loorbach, Katinka Wijsman

In our paper we seek to conceptually interpret business strategies related to sustainability from a transition perspective. We argue that there is an emergent trend of businesses and industries that move beyond optimizing the organization's individual performance, by mitigating negative environmental and social impacts, to fundamentally restructuring and rethinking existing businesses in light of broader societal changes. By means of the transition framework, we conceptualize the development of new sustainable business models as a new phase in corporate responsibility, in which societal sustainability challenges are translated into new socio-economic business models implying fundamental transitions within businesses. We then outline the basic contours of an approach that seeks to make business transitions to sustainable systems manageable in terms of influencing speed and direction of business transitions by adapting the transition management framework. We describe the framework of business transition management in a number of interlinked activities based on an experimental participatory case study of the transition in the Dutch roof sector.

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#85 Strategic Niche Management & Transition Experiments - Business Modeling and Changing the Socioeconomic Healthcare System - Hendrik Cramer, Geert Dewulf, Hans Voordijk

An aging population and increasing healthcare expenditures are pressuring today's healthcare system. Hence, transition experiments are needed in order to change the system. However, little is known on how to properly stabilize experiments to be able to actually change a system. Therefore, this study explores how local transition experiments change business models which in turn stabilize the experiments and hence advance the change of the socioeconomic healthcare system. It is demonstrated that transition experiments in community care, home care, and assisted living can change existing business models. Thereby, new business models emerge out of deepening, broadening and scaling up the transition experiments with the goal to continue the transition towards a more sustainable socioeconomic healthcare system. Strategic Niche Management is used as a theoretical background to study the
transition. Strategic niche management is an evolutionary theory in which the healthcare system can be viewed as a socioeconomic system which is pressured by an aging population while niches provide the space to experiment in order to deal with the pressure, trying to change the healthcare system accordingly. Nevertheless, new business models are not easily formed out of experiments. One of the difficulties is for instance the dynamics of networks or to reach consensus among the various stakeholders involved in the network. Consensus is needed to form a shared vision as well as a shared value proposition. Eventually, it can be argued that business modeling is a possible new approach to stabilize experiments and therefore advance the transition of socioeconomic systems.

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#201 Business Model-Resilience in the context of corporate sustainability transformation - Alexandra Palzkill

The transition to sustainability will not work without rebuilding the economy, i.e. changing its concrete production and consumption patterns. These changes are essentially triggered by corporate strategies [1, 2, 3]. Therefore, a great part of such a transition will be self-directed transformation processes within individual companies to reduce their environmental impact. Considering that such changes may be wide-ranging and substantial, the major challenge for companies is to identify “resilient” transformation strategies for their business models. In the socio-ecological research Resilience generally means the capacity of a system to adapt itself to processes of change and to shape these processes at the same time without compromising the structure and identity of the system itself [4, 5, 6]. For successful companies this conservation of their structure and especially their identity – as a brand – is particularly important to continue being successful. Therefore, Business Modell-Resilience can be understood as the ability of companies to adapt their business models in the face of external shocks or pressure, without losing their identity built by its core business model or its brand. A Resilience approach has not been applied with this perspective to the study of companies and their business models, yet. However, applying such an approach could be useful to better understand companies’ scope of action for self-directed transformation processes within established regimes and, more generally, it might provide new insights for strategic management research. The hypothesis of the paper is, that business models are in most cases more resilient than assumed but not indefinitely flexible. An empirical basis is needed, in order to classify different types of business model transformation and draw conclusions with regard to their Resilience. Exemplified by the fast food industry the paper will develop such an empirical framework.

Transition Management theory has enhanced the analytical understanding of emergence and evolution of radical innovations based on the co-evolution of socio-technical regimes, landscape and niches. Especially the structuration of regimes takes into account economic incentives structure e.g. in form of sunk costs in technical artefacts or investments in specific knowledge. Nevertheless the market structure – number of competitors, the level of competition between them - and its consequences on the development of niche processes have been a blind spot in most of the empirical studies. The relation between market structure and innovation has been intensively discussed in economic competition theory but so far widely neglected in the TM debate which in this way fails to explain relevant differences in niche dynamics of specific sectors. This paper analyses the influence of oligopolistic market structures with a focus on the regime-niche-interaction. It takes the example of the German waste management market which is characterized by the dominance of four international private companies holding more than 50% of the market and local monopoles of municipal waste companies. It analyzes effects on the causalities of niche developments, actor composition in the niches and their protection as well as on the radicalism of innovation. Based on the extensive analysis of six different innovation niches aiming at the prevention or high quality recycling of waste it can be shown that in oligopolies the analytical distinction between niche and regime gets fuzzy. Because the market entrance for external actors is extremely costly nearly all niches are either initiated by regime members or adapted by them in a very early stage of development. The regime is fully aware of inventions and often successfully tries to suppress them if they threat their business model. If the niche starts to gain momentum anyway the regime has sufficient resources to either copy or buy in the innovation. Regarding the waste sector the transition can be characterized more accurately by an ongoing “battle of the systems” instead of by a radical rupture in the regime, niches only react on occurring weaknesses in the system and fail to develop long term visions. Based on these findings the paper discusses the special challenges for the different steps in strategic niche management processes in oligopolistic markets, highlights the relation between market entrance costs and niche protection and ends with further need for research on the integration of competition theory into TM.

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In transitions, adaptive capacity is often referred to as a system’s inherent ability to deal with changes. However, what adaptive capacity exactly entails is poorly understood. Although both resilience and transitions scholarships use the concept in various ways, there is no consensus on how adaptive capacity can be assessed beyond static benchmarks, or understanding of how to utilise or strengthen it for transitioning. This paper proposes a definition of institutional adaptive capacity, framing the concept as a quality of a system, rather than a quantity. This framing can be used to assess the nature of institutional adaptive capacity, as an ability to transform or be resilient to change. This framework is applied to examine the institutional interplay in empirical cases of unmanaged transitions in Australian cities. Perth, Brisbane and Adelaide are undergoing significant shifts in water infrastructure and management paradigms in response to prolonged drought. These three cases offer a unique opportunity to examine potential transitions in real-time. The role of agency is central in this framing of adaptive capacity. Agency involves the use of informal institutions to question and challenge the formal institutions which uphold regimes. Within this institutional interplay is an inherent capacity to adapt: incrementally change the structure of governance systems to function differently. The cross-case comparisons presented here reveal how actors are utilising informal institutions to challenge the legitimacy of the regime, and develop new institutional structures. This institutional perspective offers analytical depth to enhance both research and practice of Transitions Management. This paper contributes to transitions management a systematic understanding how niche and regime actors can utilise the formal and informal institutions that make regimes what they are, to bring about transitional change.

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The importance of the landscape for societal transitions is widely recognised and is a central concept in the Multi-level Perspective. Transition studies have been considering the developments and events at the landscape level when analysing socio-technological transitions and drawing transition scenarios. Furthermore, theoretical work to date has been addressing the importance of the timing of landscape influences. This article further explores the nature of the landscape influences and how they interact with the regime. A typology of different kinds of landscape influences is presented which is applied by water policy researchers and policymakers in Melbourne, Australia. Specifically, this field research includes: (a)
generation of a list of landscape influences by extensive literature review on uncertain scenario factors, crises, shocks and surprises documented in climate adaptation policy reports, scientific reports and publications; (b) assessment of landscape influences by experts during an expert group session (focus group set up) and (c) assessment of landscape influences (relevance, plausibility, degree of impact, degree of influence) by policy makers of six city councils in Melbourne. Mapping landscape influences by looking at their intensity and duration this paper presents a refined view on concepts as ‘windows-of-opportunity’ and ‘timing’ from a transitions perspective, summarised in a typology. Letting go the idea that the landscape is immune to the changes brought about during sustainability transitions, we understand the interactions between the regime and the landscape better. Using these insights and the typology, assessments for urban water policy have been made for the Melbourne context which in turn refined the research findings presented here.

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#192 The structuration of socio-technical systems revisited – Assessing the institutional fit of technologies in the Australian urban water sector - Lea Fuenfschilling, Bernhard Truffer

The main purpose of this paper is to elaborate a deeper understanding of the structuration of socio-technical systems and its impact on technological change. The multi-level perspective (MLP) conceptualizes sustainability transitions as an interplay of three levels (niche/regime/landscape), which represent an ‘increasing structuration of activities in local practices’. However, up to this point, most empirical studies drawing on the MLP framework have delineated the levels in a rather intuitive way without explicitly assessing their degree of structuration.

In this paper we offer a new perspective on the structuration of a socio-technical system by introducing concepts of neo-institutional theory. We draw on the literature on institutionalization to provide a better understanding of how structures become established and to what extent the different degrees of institutionalization influence the diffusion of practices. Furthermore, we use the institutional logics approach to analyze the specific content of structures in a system and their interrelation. We maintain that the niche/regime dichotomy of structures falls short in accounting for the diverse institutional pressures active in a system. Instead, we argue that systems entail a continuum of differently institutionalized, competing elements that belong to distinctive institutional logics. New technologies can be analyzed regarding their fit with these logics, which allows to assess possible transition pathways in a more detailed and systematic way. To illustrate the merits of our approach, we analyze an extensive public inquiry about the future of the Australian urban water sector. Using a mixed method approach, we identify all relevant institutional logics over time and assess their degree of institutionalization. In a second step, we evaluate the fit of these logics with different technological options. In doing so, we show how prevailing logics within the socio-technical system affect technological change and thereby shape potential pathways towards sustainability in the Australian urban water sector.

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The Danish urban water sector regime is at present passing through a critical process of re-configuration. The increasing visibility of water related problems due to climate change, increasing urbanization and water systems aging have created a large attention of the local and global society on service quality and standards. This situation has developed in a large variety of external pressures and internal dynamics with important consequences for the existing regime. At the micro scale, research development, local organizations and small entrepreneurial companies are pushing towards a variety of more sustainable urban water management (SUWM) approaches. In SUWM the role of water within the urban space is connected to a larger multiplicity of social and ecological values than the sole physical and economical attributes characterizing the traditional regime. At the macro scale a large number of legislative and institutional changes are occurring: municipalities are due to implement two important European Directives: the Water Framework and the Flood Risk Directives, with the aim of improving surface water quality and mitigating flood risk respectively. At the same time, as part of an international trend, the municipal water utilities were transformed in corporatized companies, nationally regulated via benchmarking and service prize caps. In this context the urban water sector regime is defined as a complex adaptive system in evolution approaching the “take of phase” whose outcomes are not yet clear. In particular, the acceleration phase has not started as the regime is passing through a still difficult re-configuration process whose criticalities are not deeply understood. Scholars have highlighted the importance of building regime capacity for transitioning to SUWM. This paper explores the criticality of such process in the Danish case, compares it to other cases and suggests strategies for building regime capacity towards sustainability.

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This paper presents a case study of a new adaptive, multi-level governance approach for river basin management designed to stimulate social learning and to be adjusted based on lessons learnt and changing political and economical context. The floods of 1993 and 1995 in the Netherlands and climate
change triggered a paradigm shift in flood management. The 2.3 billion Euro flood safety programme Room for the River was launched to increase flood safety by giving the rivers more room instead of merely enforcing the defence systems. This programme is studied as a major stepping stone in the transition to integrated flood risk management, integrating spatial planning and flood risk management and stimulating multi-level and multi stakeholder decision making. The local measures that make up the programme have a strong spatial planning component and thus the underlying processes require stakeholder participation and narrow collaboration between central and regional authorities. Additionally, the programme aims to stimulate innovative contracting and early involvement of private companies. This research analysed how the programme was organised to draw lessons on governance. It comprised: 60 qualitative interviews, a survey amongst professionals (>150) and politicians (>50) and extensive document analysis. First results indicate that the governance modes of Room for the River were designed with flexibility to accommodate these new and transitionary approaches. A flexible framework was adopted based on social learning that stimulated adjusting collaborative working and decision making processes based on lessons learnt. Moreover the governance approach could adapt to the changed economic situation and changing political views on integrated flood risk management, climate change, innovative contracting and management of large scale infrastructure projects. The social learning approach proofed effective in programme delivery and especially in stimulating these broader transitions.

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#106 The transition from piped to alternative drainage systems - Richard Ashley

In the developed world the advent of sanitation systems accompanied the industrial revolution (Geels, 2006) and has now effectively protected public health and welfare for more than 100 years. Now, especially in a time of austerity, the whole life costs of these systems for managing stormwater in particular are being questioned as of doubtful sustainability. Yet, the prevailing regime is to carry on using large sewers and in London for example, a replica of the interceptor sewers built more than 150 years ago is now under construction (Brown et al, 2011). Extensive research over the past few decades has shown that contrary to being a problem requiring disposal away from towns, stormwater is a resource providing a multiplicity of benefits in urban areas (NRDC, 2011). This paper draws on research undertaken in Sweden, UK and Australia to show that traditional piped drainage systems are wasteful of resources (not only stormwater but also in construction and use) compared with alternative systems, fail to engage communities in opportunities they offer and are incompatible with contemporary needs in the cities of the future. The reasons for the reluctance of the dominant regime to change are explored using de Haan’s theoretical foundation (de Haan, 2010) and ideas for how to change policy and practice presented.

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#170 Approaches to resilience for Water Sensitive Cities - Fjalar de Haan, Berry Gersonius, Briony Ferguson, Taneha Bacchin, Richard Ashley, Rebekah Brown

The concept of water sensitive cities emphasizes resilience to uncertain futures, which may arise from combinations of city dynamics such as urban growth, densification, climate change and variability and economic development. This paper further develops the resilience concept from a water sensitive city
perspective and demonstrates its application through a comparative assessment of three urban water cases. Here, resilience is considered as the ability of the urban water system to adapt to continue to function as expected and deliver on broader societal objectives, e.g. supply water, protect public safety, maintain waterway health and provide urban amenity, despite any manner of system shocks and surprises. In other words, maintaining and enhancing ‘functional resilience’ is a central tenet of the concept of water sensitivity. In urban water systems, however, individual structures at particular scales (e.g. large-scale engineering structures or tightly regulated institutions) can be resilient in a different manner, in that they maintain their structural identity even when they no longer achieve the desired functionality. Sometimes transformations are necessary to reduce this ‘structural resilience’ in order to gain functional resilience under changed conditions — although incremental adjustments will in many cases be sufficient to maintain or enhance resilience. Not all approaches to enhance the performance of urban water systems add to functional resilience and some might even undermine the ability to function to meet societal needs in the face of future challenges. This paper reviews cases of urban stormwater management in Australia, the Netherlands and Brazil, as examples of such different approaches and how they affect the system’s resilience. The cross-comparison of these cases provides insight into how different types of incremental and transformational change in urban water management might enhance or impair the functional resilience of the system, with implications drawn for how resilience within a water sensitive city may be achieved.

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#240 Drivers and barriers to decreasing environmental pressures from decentralized large technical systems - institutional changes and technological dependencies in the case of Swedish on-site sewage systems from 1930-2010 - Are Wallin, Mathias Zannakis

The case of on-site sewage systems (OSSs) is an example of a decentralized large technical system and one of many policy-areas facing challenges on how to achieve technology transformation towards decreasing environmental pressures. In Sweden, the 700.000 OSSs are of great concern because they contribute substantially to Swedish nutrient loads and the potential for reductions in nutrient loads from OSSs is large. This paper analyzes the historical development of OSSs in Sweden, by contrasting the building up of institutions, technological change and the resulting environmental outcome in terms of the nutrient capture capability of Swedish OSS. The development of Swedish OSSs is described as following three trajectories. First, in 1945–1960 hygiene concerns, large-scale home improvement programs and
aspirations for higher living standards led to a large-scale transformation of OSSs. During this period almost half of all countryside homes got piped water and wastewater and changed from dry toilets to water closet. Thus, most of the transformation of OSSs occurred during a period when the water-based sewage systems were not constructed to achieve environmental protection. Second, environmental concerns and the strengthening of environmental legislation led to stricter regulations and slowly increasing nutrient capabilities in the late 1960s (institutional displacement). Third, since the late 1960s and onwards the OSS field has been characterized by institutional layering, meaning that new rules have been attached to existing ones. Although this has implied the strengthening of regulation, both homeowners and environmental inspectors have had problems interpreting and relating to these rules, and homeowners have not changed OSSs at a large-scale. Consequently, nutrient capture capabilities of OSS are low compared to what is necessary from an environmental perspective. We suggest that this is partly due to unintended environmental consequences of the early transformation, and the succeeding lack of effective mitigation measures because of institutional layering.

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#244 Looking for the citizens - Lene Alsbjørn

A growing number of professionals within the water sector are looking for the citizens to play a more active part in the transition towards more resilient cities regarding flooding and draught caused by changing rain patterns. However active citizens may be hard to find as a dominant role of more passive users seem to have developed during the last decades mainly focusing on levels of service and price. This paper takes up the challenge to go looking for active citizens in the handling of storm water. As cities in both Denmark as well as globally experience climate change perform in a growing series of monster rain and storms, professionals in both municipalities and utility companies have begun to formulate a need to develop new approaches and solutions in storm water handling. Visions are developed of green-blue structures integrating climate robust cities with increasing urban quality such as new recreational qualities and better conditions for biodiversity. Many of these visions imply a more active citizens’ role as part of building up the degree of adaptive capacity in municipalities and utilities. The citizens may be crucial in more ways: To strengthen the citizens’ knowledge and acceptance of new approaches as well as investments and price settings; to integrate the citizens’ local knowledge about flooding in the city; and to promote more flexible and adaptive processes. However, more active citizens and stronger collaborations between citizens and the water professionals break with the existing constellation of expert professionals and passive users in the dominant regime. The difficulties of enacting new roles and relations corresponds well with the perspectives of established pathways that are developed in literature on sustainable transitions, where socio-technical regimes have gained momentum with certain constellations of technology, user preferences, regulations, infrastructure and productions systems etc. (Geels 2005). The Multi Level Perspective emphasises users as an important social group in the development of water supply (e.g. Geels 2005), and in Strategic Niche Management, development of user practices are pointed to as an important activity in niche development (e.g. Schot & Geels 2008). Based on a review of user and citizens perspectives in the transition literature, this paper explores the perspectives on the roles of citizens and users in relation to the existing storm water regime and the developing niches. Our aim is to
contribute to the understanding of transition processes by unfolding perspectives on citizens’ participation in urban transitions. The paper draws on a newly initiated project on transition towards climate resilient cities focusing on the innovative potentials of activating the knowledge and works of citizens. It reports from an initial survey of the perspectives of regime professionals in municipalities and utility companies on roles and relations and their strategies towards approaching more active citizen roles. It builds on a series of qualitative interviews and studies of planning documents.

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h3 – Barriers and Opportunities for Sustainability: Shaping Transition Pathways through Social Learning

#92 Striving for sustainable transition in water and land management: the function of pioneers to trigger change in an established socio-technical system - Katrin Daedlow, Benjamin Nölting

Implementing sustainable strategies in order to improve current water and land management practices requires the ideas, skills and strategies of actors willing to change customary but non-sustainable ways of resource use. In our paper we investigate how the potential use of fully treated sewage for agricultural and hydrological purposes can be introduced into an existing institutional and administrative framework which prohibits the discharge of treated sewage to other places than governmentally defined outlet channels. By doing this we apply an actor analysis together with a qualitative network study resting upon transaction costs economics. Based on 30 expert interviews in the German states Berlin and Brandenburg (North-East Germany) we identified six actor groups who play an important role in water and land management and either tend to support (thinking about benefits) or contradict (fearing costs) to this innovation in water resource use. These groups are: sewage and water board associations, land users, government and authorities, water and soil management associations, nature conservation, and politicians. Among them we found actors striving for many years to chance the established socio-technical system but who are hindered by strong administrative players who fear the risk arising from unknown consequences of material flows from treated water used in agriculture and water management. Increasing costs of leaving particular trajectories in current water and land management arise from decision making in previous times determining the behaviour and decision making of (potential) users of sewage water in present days. However, we also found, that pioneers persistently promoting re-use of sewage water are able to trigger off established structures and start discussions among involved actors resulting for example in scientific programs to investigate the innovation. Altogether, we describe the configuration of actors and actor groups for water and land management in the region, and, more specifically, for water re-use promoting or preventing the innovation. Finally, we identify factors such as centralisation and path dependency of infrastructures, cost pressure on water management, public regulation and governance, as well as uncertainty and risks which determine actors’ strategies and potential success of implementing or preventing the re-use of treated water.

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#210 The strengths and weaknesses of a programmed approach for governing a transition to integrated flood management in the Netherlands - Jeroen Rijke, Sebastiaan van Herk, Chris Zevenbergen, Richard Ashley

In the Netherlands and many other developed countries, flood management is transitioning from sectoral engineering approaches to more integrated approaches. Several researchers argue that the 2.3 billion Euro Room for the River programme (2006 – 2015) plays an important role in this transition, because it is the first program that breaks with a 1000 year trend of reducing the space for river to flow. Instead, it creates at 39 locations more room for the rivers. Furthermore, the programme is the first large scale infrastructure programme in the Netherlands that has adopted a multi-level governance approach in which the traditional hierarchical governance approach is replaced by an approach that combines centralised and decentralised steering processes: the decision frameworks of the programme for establishing improved water safety and landscape quality are set by the national government, whilst the 39 designs are prepared and decisions taken by local and regional stakeholders. Based on >50 face-to-face interviews and a survey (n>150), this paper explores the strengths and weaknesses of a programmed approach, such as is applied in Room for the River, to strategically navigate the transition to integrated flood management in the Netherlands. It was observed that centralised governance structures are successfully applied for the setting up of frameworks, knowledge management, influencing of national policy and legislation, and strengthening the authority of local stakeholders. Decentralised governance approaches are successfully applied for creating incentives for participation of local stakeholders, exploring problems and potential solutions, collaborative learning, creating broadly supported designs, and creating mutual trust amongst stakeholders. We conclude that the performance of the programme to establish integrated output relies on a combination of centralised and decentralised governance approaches, and timely switching between these. However, in terms of impact on a transition, we identify a risk of a transition backlash when the integrated approach is not adopted by new programmes such as the Delta Programme.

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#237 Pathways for Melbourne's Transition to a Water Sensitive City - Briony Ferguson, Niki Frantzeskaki, Rebekah Brown

This paper provides reflection on how the adaptation and application of the transition management approach for the urban water context in Melbourne, Australia, led to the identification of a range of transition pathways in response to the starting conditions of different municipalities, as well as future uncertainties. Challenging trends such as urban growth, densification and increasing population, as well as
climate change and variability, are putting pressure on urban water systems around the world. In
addition, growing community demand for urban amenity and green space has raised new expectations of
how water systems should serve society. These challenges are gaining wide recognition in Melbourne and
there is increasing acceptance by policy makers of the need for its urban water system to undergo a
transition towards more sustainable and integrated management, conceptualised as a water sensitive
city. The paper reports on the outcomes of how a participatory process, based on the transition
management approach, helped key water sector actors in Melbourne formulate a transition agenda and
identify possible transition pathways towards a water sensitive city. The transition management approach
was adapted to incorporate a consideration of uncertainties in landscape drivers, using context scenarios,
and future shocks and stresses in order to build resilience in the transition pathways. The adapted process
was implemented at a regional scale, in which seven municipalities with varying levels of experience and
performance in relation to sustainable water management participated.

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#245 Learning communities in storm water transition - Capacity building among water professionals -
Birgitte Hoffmann, Marina Jensen, Maj-Britt Quitzau

This paper presents an approach to innovation and capacity building in the storm water sector, and
contributes to the understanding of learning processes in the Multi Level Perspective on socio-technical
transitions. Innovative ideas that challenge the pipe based storm water paradigm are not easily
implemented. It is therefore surprising that water professionals in Denmark have changed their approach
to green infrastructures in just a few years. This process of transition was facilitated by a combined
innovation and capacity building project, and this paper presents learning from an assessment of this. The
key question of the paper is how green infrastructures have changed status from being marginal to
becoming a considerable element that many Danish municipalities now try to integrate in their storm
water approach, and the paper explores the strategies for developing ‘communities of practice’ to
support innovation and learning among the water professionals. The paper addresses the question posed
through an assessment of a large innovation project, 19 K, which involved 20 % of the Danish
municipalities and related private and public partners. The paper focuses on the learning processes taking
place, to provide more knowledge on how to support transition of large socio-technical systems like the
storm water sector. We explore the complex processes of innovation, networking, and learning across
municipalities and other partners and describe and assess the methods used. Theoretically, the difficulties
of changing large socio-technical system are captured by the Multi Level Perspective (MLP). This points to
learning processes as central for supporting niche development and integration, however, learning
processes in practice have not been addressed in dept by the MLP. The paper contributes to the theory by
exploring the complexity of interdisciplinary networking and learning by bridging to the concept of
‘communities of practice’.

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h4 - The Role of Context for Developing and Governing Sustainability Transitions in UWS

#8 Addressing Arsenic Mass Poisoning in West Bengal: Process tracing for past three decades - Joyashree Roy, Abhijit Das

About 100 million people in West Bengal (India) and Bangladesh (the neighbouring country) are now exposed to very high levels of naturally occurring arsenic in the groundwater, which is major safe water source for drinking. This has been rightly called in 2003 in National geographic the largest case of mass poisoning in the history of mankind. The World Health Organization recommends a maximum contaminant limit for arsenic in drinking water of 10 µg / liter; while the individuals in the exposed populations are drinking water with arsenic as high as 800 µg / liter. Despite public knowledge of arsenic-bearing drinking water for the past 30 years, less than 1% of the exposed population has access to arsenic-remediated drinking water. There is urgent need to make a system transition in social practices and invention and deployment of new technology in response to the very grave problems confronting arsenic affected villages of West Bengal. These villages face water and health crises on top of their overall poverty and malnutrition. In the current situation, we expect the crises to worsen and this can lead to profound social tensions and turmoil. The need for rapid but lasting solutions, rather than short term fixes, is urgent. The system transition encompasses technology invention and innovation (new technologies, and resulting commercially available products and processes), their selection and adoption by consumers (integration in user practice), and the broader process of social embedding (e.g., regulation, markets, infrastructures and cultural symbols). “Users” in a social context give life to inventor/s’ creativity expressed through design of a piece of hardware/equipment commonly called “technology.” This should in no way give an impression that we are outlining a simple linear two social actor model: inventor invents and user uses. There are multiple actors in any social context who act and react through their decisions to create a sequence of events and the resultant “process”, which finally determines the outcome in favor or against a new technology and its role in transition from the incumbent socio-technical regime. Independent researchers detected arsenic in groundwater of West Bengal as early as 1983. In most areas, this groundwater remains the main source for drinking and irrigation. Subsequently, numerous reports across multiple disciplines concluded that clinically and sub-clinically affected population are spread over at least 50% of the districts in West Bengal. At the least 36% of West Bengal population is at elevated health risk from arsenic exposure. Public demand for arsenic safe water to attain better health has emerged through various forms of public grievances and social conflicts between local inhabitants and the Government. The local communities have staged mass deputations to the government officials, and expressed their strong dissatisfaction by various methods including hunger strikes, rallies, and even boycotting of government campaigns for polio vaccination. News media have occasionally reported on morbidity and mortality incidents, written editorials, and published expert interviews, all to draw the government’s attention and raise public awareness about the health impacts emphasizing the need for special and urgent action for a lasting solution. Economic cost analysis show the benefit to West Bengal of social embedding of arsenic remediation through policy and economic incentives. A review of decisions and actions by multiple actors in the past three decades shows that the
response to alarms raised by experts began with the creation by the state government, in 1983, of the first technical committee to understand the science and recommend actions. Subsequently, in 1994, the state government created the Arsenic Task Force, with a goal to implement arsenic-remediation based on scientific knowledge, and through coordination of existing multilayered actors within existing institutional structures (e.g. the West Bengal government’s Health Department, Public Health and Engineering Department, village panchayats, academic and research institutes, and international agencies interested in poverty alleviation through health and hygiene). Between 1994 and 2007, the state government undertook technology selection and purchase decisions through public call of tenders for implementing arsenic-remediation, financed by both national and international institutions, and implemented and deployed by private technology-marketing companies and NGOs. The deployment model was more of a linear expenditure model than a circular reinforcing investment model. Official statistics using the headcount measure show 59% of the population has been provided with access to arsenic safe technological installations of various categories between 1984 and 2007 mobilizing national and international finance, 87 testing laboratories are spread over the affected districts. Furthermore, the proposed “master plan” design, to be effective from 2012, will cover 100% of the population. Reality check shows otherwise. Tracing the event sequence over the past three decades, and a careful sample survey shows that almost 95% of installed new arsenic remediation units/hardware (e.g. hand pumps with ATUs attached) are defunct, (i.e., not operational, wasted investments) due to lack of appropriate social engineering. Offsite private company/NGO operators had been initially contracted for a fixed period to undertake replacement of arsenic adsorbent-media and conduct backwashing of adsorbent columns. Their engagement was short-lived in the deployment model missing a feedback loop. So government implementers, engineers, and designers are now trying to follow the routine age-old practices of centralized pressurized piped water systems or deep-aquifer tubewells, blocking their minds to new developments. However, both technological fixes are failing to gain user acceptance in practice. Apparent failure (because inadequately designed social engineering is not commonly understood or reported) of government led contract programs has created a mind block among various social actors towards any future government-initiated business models relying on public private partnership (PPP). With the current mind block, users continue to be seen as “beneficiaries”, not as customers, and integration with social practice is thrown by the wayside. The dominant part of the socio-technical system in transition is gradually sliding back to offering the choice of drinking water from either the local arsenic-bearing hand tubewell, or remotely and unreliably tested deep tubewell. We see public policy making a complete 1800 turn to near pre-1983 socio-technical regimes, with coevolution of public health policy and public health engineering driving to the same old dead-end. This can be identified as maladjustments that will aggravate crises. Process analysis also shows that deployment efforts for arsenic remediation were not systemic, and ignored user practice integration and social embedding, in what appears to be a rushed attempt to get a quick solution through expenditure on hardware purchases and deployment. Users perceived the program and treated the new technology as user-unfriendly. A small number of short term success stories do exist that include some social innovation through user participation as consumers, either through the leadership of the technology provider or at the initiative of individual champions. However, none of these niche experiments demonstrate systemic, planned social embedding. This lacuna might jeopardize transition to a lasting sustainable solution.

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Sustainability is about human needs, as for example, the Brundtland definition suggests: meeting the needs of the present without compromising the ability of future generations to meet their own needs. Transitions are about radical change in systems that are there to meet those needs: societal systems, be they urban water systems, energy or health-care systems. Therefore this paper proposes a new basis for the description and explanation of societal systems and transitions therein. Loosening up a bit the rigid multi-level perspective’s distinction between regimes and niches, this perspective views societal systems as being composed of several ‘constellations’ that represent different ways of meeting societal needs. In the example case of urban water systems, one constellation would represent centralised water supply and another would be decentralised stormwater harvesting. Although the former can be considered part of the regime and the latter, in terms of novelty and power, can be called a niche, it is more sensible to just view them both as meeting urban water-related needs in different ways. The paper builds from accepted theory from social psychology to develop a societal needs framework. The needs framework does not contradict the multi-level perspective, but rather refocusses from the technological innovation to the meeting of societal needs, which enables a more straightforward way of dealing with the normative notion of sustainability in its proper terms. To illustrate this framework it is applied to urban water systems and used to explain the sequence of transitions that many urban water systems in developed countries have gone through.

To date social research into the transitions towards sustainable urban water management (SUWM) has predominately been conducted in developed contexts, resulting in a significant lack of insight into the drivers and barriers in developing urban centres, which this research begins to address. The current urban water management practices in the majority of cities in the Asia-Pacific region are unsustainable both in regards to the security of water supply, and environmental degradation from wastewater and stormwater. Therefore, the region’s cities need to undergo dramatic and fast paced transformation: they need to transition to SUWM. This research project investigated this apparent need for transitions; the possible direction and guidance of these transitions, and barriers to urban water transitions in the rapidly growing urban centres of the Asia-Pacific region. Port Vila, Vanuatu, and Jakarta, Indonesia were selected as two case study cities representing the two extremes in the region regarding city size and degrees of development. Jakarta, with its population approaching 18 million, and Port Vila, with a
population of 60,000, face very different but equally as urgent challenges in their transitions to SUMW. The multi-level perspective is used as an analytical frame to do a cross-case comparison between Port Vila and Jakarta. Conditions undermining urban water transitions in both cities are revealed. Our cross-case comparison brings forward two starting insights: (a) We identify two possible transition pathways. In Port Vila, leapfrogging is an ideal and as yet plausible future development pathway whereas in Jakarta ongoing change can be characterized as a reconfiguration transition pathway (b) We contribute to transitions studies with a refinement of MLP as applicable to developing countries In both case studies semi-structured interviews with urban water managers were utilised to identify the potential future trajectories and barriers to transitioning towards sustainability. The results of these interviews are presenten, demonstrating the importance of leadership, timing and the need to develop institutional inertia to enable take-off. In doing so this paper provides early academic insight into sustainability transitions in the urban water sector in the rapidly developing context of Asia-Pacific and discusses how these transitions will differ from urban water transitions in the developed world.

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#190 Governing towards Sustainability? A comparative analysis of water governance in Zurich, Berlin and Leeds - Eva Lieberherr, Bernhard Truffer

In light of rising complexities confronting the water sector in industrialized countries, new governance modes, often involving public and private actors, have been increasingly promoted as sustainable solutions. The reasoning typically follows the argumentation that through the private sector’s know-how and economic-efficiency logic, cost-effectiveness and sustainability should be achieved. However, tensions may arise between public and private sector logics due to the former’s focus on common good goals, such as universal service delivery and environmental protection, versus the latter’s focus on profitability. The aim of this paper is to gain insights into how the trade-offs between these differing logics might potentially be offset in order to achieve economically, socially and environmentally sustainable water governance solutions. To accomplish this, we analyse diverging water governance modes in three urban regions, each exemplifying a different governance mode: Berlin, Germany involves a public-private mode, Leeds, England a private mode and Zurich, Switzerland a public mode. Preliminary findings indicate that in the private and public-private modes there are major trade-offs between common good goals and profitability, as compared to the public mode. However, we find that the private mode is able to offset these trade-offs to a greater extent than the public-private mode through implementing accountability measures, such as arms-length regulation, which both the public-private and public modes lack. Such findings shed light onto the strengths and weaknesses of different governance modes. As the strengths and weaknesses arguably either foster or hinder sustainability transitions, this research can inform transition studies.

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Historical transitions

#275 The transition to modern bioenergy: historical dimensions and strategic perspectives - Semida Silveira, Francis Johnson

Biomass is the oldest form of energy used by mankind, but in some ways it is also the newest, due to the tremendous diversity of applications that have emerged for deploying modern bioenergy systems around the world. Bioenergy can be explored in multiple scales, but carries a local dimension that links it to livelihoods and patterns of social organization. At the same time, other demands on biomass resources—food, feed and fibre—have been growing rapidly due to population and resource pressures. The historical evolution of biomass for energy therefore will differ from future paths based on the structural changes in end-uses in combination with the shift to biomass as a multidimensional resource. The role of biomass as a carbon sink also becomes a fundamental element of future biomass energy resource development. In this paper the strategic elements of bioenergy are examined by reference to the historical shifts in the way that biomass has been used for energy since the industrial revolution. The factors driving the shifts away from (traditional) bioenergy can then be considered in relation to the factors behind the shift towards (modern) bioenergy. The variables of special interest include the timeframe, changes in energy density and changes in carriers and markets. The approach is based on analysis of quantitative energy data sets for several countries and regions together with some key qualitative indicators. The transformative nature of biomass resources and their variation in scale and scope are also important elements in the transition process. The historical shift away from traditional biomass can offer clues as to how the return to biomass as an energy source will unfold in different world regions.

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#282 Transitions dynamics at the level of society as a whole. - John Grin

Much of transitions studies has focused on understanding transition dynamics with specific domains, such as mobility, agriculture or energy. This paper seeks to contribute to the further development of transition theory by exploring how transitions may occur across various domains. Empirically, the paper draws on how, during the 19th and early 20th century, Dutch society changed. Crucial drivers of that process were two major ‘container’ issues, economic stagnation and the ‘social question’, as well as the strong desire for emancipation from the dominance of the conservative-liberal governing elite by women, young men, labourers and church people. Especially from the latter groups, many initiatives emerged to deal with economic stagnation, the social issue or both. In the paper, some of these innovative, often experimental practices will be discussed so as to explore: How the emergence of these projects may
be understood on basis of the dynamics of these issues, the emancipation processes, transnational influences, material flows and the increasing influence of a modernist faith in progress; How the acceleration of the transition may be understood by analyzing how (i) the regime elements emerging around these experiments helped to promote follow-on innovations, also across sectors, thus changing the power relations and (ii) practices of production and consumption came to reinforce each other; How a deeper understanding of these acceleration mechanisms may be attained by investigating how experimental practices and regime elements from different domains became related in (a) time and (b) space so as to form assemblages that facilitated this acceleration. On basis of that analysis, some theoretical propositions and issues for further research will be formulated. This may help to embed transition theory better in critical-historicist approaches in social science, as well as in theories on space and spatial flows. It also may help to bridge Multi-level perspective (MLP) based approaches to studies rooted in the social theory of practice.

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#283 Governing private energy consumption for sustainable transitions? Programs and protagonists of an energy regime change in the household in the decade of the oil crises - Sophie Gerber, Karin Zachmann

In the autumn of 2010 the German Federal Government enacted the program of a so called “Energiewende.” This program set the agenda of a rapid energy transition toward a low carbon society that is based on two major pillars, renewable energies and efficient energy consumption. Neither the program nor its name “Energiewende”, however, is new. Thirty years ago, “Energiewende” was the title of a book whose authors argued that economic growth would not require more energy and that especially nuclear energy should be abandoned and the use of fossil fuels could be significantly curtailed. This book again was but one among many initiatives that aimed at restructuring the existing but in the wake of the first and second oil crisis severely shaken international energy regime. In the United States, President Nixon immediately reacted on the 1973 oil crisis in his “Speech on Energy Policy” and initiated “Project Independence”, which aimed at America’s energy independence until 1980 and included an appeal to every US citizen to save energy. Similar initiatives had been taken in Europe too. In Germany, research minister Horst Ehmke put forward an energy program and called for more rational energy consumption in 1973. The program embodied the first German overall energy policy concept and included the promotion of domestic energy sources and energy conservation. After the second oil crisis in 1979 private households got even more into focus than in 1973. The then research minister Volker Hauff prepared a draft for an Energy Consumption Act that included a system of rules for energy conservation and especially private energy saving, including a ban of electric stoves. Obviously, the invisible hand of the market was no longer trusted since the draft considered doing away with the highly esteemed freedom of consumer choice. The paper aims at disclosing transition governance and the beginnings of strategic navigation toward a low carbon society at the very moment when the high energy society was severely challenged for the first time. Thus, the proposed contribution will explore the actors and agendas of an energy transition in the arena of private households and consumption in the decade of the oil crises in Germany in order to offer a starting point for a transnational comparison.

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In moving towards fisheries sustainability we need to have historical data on past transitions and dynamics of these changes. Understanding how fishermen respond to these changes is critical in managing fisheries. The paper investigates these two issues – fishery system transformations and fishermen adaptivity (non-adaptivity) to these changes - in the Portuguese context. From the fishermen perspective we discuss an obvious example of resource users’ self-organization, fish Producers Organizations (PO), which bring together fishermen or fish farmers on a voluntary basis with the aim to ensure the best market conditions for their products. To present the case of historical evolution of the Portuguese fisheries (1936-1996), three transitional phases are acknowledged: corporative fisheries, ‘double’ transition and adaptive evolution. We use multi-level theory on transitions to identify variety of environmental, social, economic and political changes, as well as their interaction, which are recognized as main drivers of sector transformation. We hypothesize that the current performance and adaptivity of fish POs is, at least partly, the outcome of much longer-term interaction processes between mentioned scale levels. The paper concludes by formulating research questions for the future that concerns fish POs adaptive capacity and its possible contribution towards towards sustainability in the Portuguese fisheries.