

**Panel 4****Towards a research programme:  
How to come from here to there**

**Chair:** Stefan Lechtenböhmer (WI)  
**Rapporteur:** Andy Gouldson (Univ. of Leeds)  
**Speakers:** Jan Rotmans (DRIFT)  
Jill Jäger (SERI)

**Major findings and main issues discussed****Jan Rotmans, DRIFT, The Netherlands**

There are many problems of persistent unsustainability – of which climate change is one. These tend to be ‘wicked’ problems that are complex, highly uncertain and deeply rooted in society and culture. Addressing them requires multi, inter and trans-disciplinary research and new research paradigms.

Sustainability science has been around for 10-15 years. It is controversial, not yet mature, and maybe is multiple sciences focused on one key theme, using science and technology within the quest for sustainability. It is heterogeneous in scope and approach – in Europe especially it is practice and problem oriented. It focuses on the design of processes that are open, inclusive, that search for and (re)constitute goals and that support learning and promote change. To further sustainability science, there is a need for theory and methods that are integrated, holistic and systems oriented rather than fragmented and specialised. Various communities do this sort of work. Process orientation leads to iterative processes in which stakeholders and researchers co-produce (and re-produce) a common view about the scope of the problem, develop a long term vision of how such a vision could (should?) be pursued and develop pathways towards that future.

But there are barriers to the development of sustainability science. The sometimes claimed loss of disciplinary roots and objectivity lead to claims that it isn’t real science, and this can impact on peer review of funding applications and paper submission. Structures that govern knowledge therefore need to change to enable this sort of work to happen. Links between science, society and policy then need to be improved, and there is a need then for demonstration projects on engagement and knowledge production, learning and evaluation - including on transitions to low-carbon societies. The status and profile of sustainability sciences (and scientists) then needs raising. Good practice needs developing, networks need strengthening etc. Funding opportunities and new evaluation criteria are needed for projects that are long-term, engaged, iterative and support transitions.

**Jill Jäger, SERI, Austria**

Transitions involve a fundamental change of structure, culture and practices in a societal (sub-) system. Breaking down old structures, cultures, practices is painful and transitions are therefore often something of a battlefield. A non-linear shift can also take decades – with periods of stability interspersed with periods of turbulence – we therefore encounter punctuated equilibria. Transitions then depend on co-evolution, emergence and self organisation – which means they are hard to plan or organise.

Maybe we are living in a period of transition now – where we could encounter a tipping point where change intensifies and accelerates. The battle between old and new paradigms has taken place for some time, old institutions are in decay, a new paradigm is emerging but isn’t clear yet. In this period there are multiple crises – which are manifestations of tensions within the system – which are also windows of opportunity. Within this period, niches of new activities and paradigms emerge and may cluster together to challenge and replace the existing regime. But we can expect the incumbent regime to do everything it can to assimilate or undermine emerging regimes – i.e. by pursuing incremental rather than radical change. Regime change can come from top-

down, bottom-up or some hybrid combination of the two. All of this is apparent when looking at climate change and the need for a low-carbon society. But it is important to draw a distinction between low-carbon societies (decarbonised forms of what we have already) and sustainable low-carbon societies (involving a more profound change in everything we produce and consume, a revolution based on new values).

Lessons from history tell us that institutional change is key – it's not all about technology - socio-cultural, organisational, behavioural factors are also critically important. Creating an innovation space for the front runners who can have a transformative effect is also key. Whilst it may be impossible to perfectly plan and manage transitions – it is possible to govern them in some ways and to some extent. This can be done by developing radical long term visions, goals and pathways, by creating breakthrough experiments with front runners, by developing innovation networks around front runners and by scaling up and out their experiences, accepting that there will be many failures along the way. But it is important to note that real change comes from within society and economy – government might facilitate only and shouldn't be depended upon.

Sustainability science can play a role in enabling transitions – but it is still a niche which is vulnerable and poorly organised and that lacks a unifying paradigm. There is a gap between science and policy. The community then needs to be supported and empowered – particularly through long term funding that learns from rather than punishes failures and that actively creates opportunities for co-production of knowledge by researchers and policy makers.

## Items for Future Research

To promote sustainability science,

- recognise that approaches such as sustainability science are needed to tackle complex societal problems such as climate change;
- raise the status of sustainability science as an area and sustainability scientists as professional researchers within it;
- think about the need to maintain links with – and therefore enable insights to be drawn from – key disciplinary debates to avoid reinventing the wheel;
- recognise the importance of inter-disciplinary approaches in funding calls and peer review processes; and
- recognise the need for, and create institutional opportunities for, longer term, exploratory, co-production of knowledge between science, policy and practice.

To promote transitions,

- by articulating visions of the future and pathways towards these visions, in some ways we can see transitions (and scenarios, pathways, etc) as opportunities to reclaim some influence on the future – this is a very distinct view from that of the 'runaway world';
- distinguish between low-carbon societies achieved through technological change and eco-efficiency and sustainable low-carbon societies that are based on deeper changes in values;
- recognise that we are in a period of change where there are tensions in the current system and opportunities for major change;
- recognise that change has to happen through fundamental changes in structures, cultures, practices – and that these have to happen from the bottom up, they can be encouraged but not forced;
- recognise the ways in which the incumbent regime will try to diffuse or assimilate demands for more radical change through incremental changes to itself;
- actively seek to encourage experimentation through the co-production of knowledge and welcome the

opportunity to make mistakes and learn from them; and

- actively seek to identify and understand the key features of success stories, and then to scale these up and out so that niches become niche regimes and then grow further.

## Policy Relevant Questions

- How could research policy (including funding mechanisms, peer review processes, university management and academic development) better support the development of inter-disciplinary areas such as sustainability science?
- How could research policy put long-term funding support in place that enables the processes of co-production of knowledge between science, policy and practice – and that takes risks, makes mistakes but learns, identifies success stories and scales them up?
- How can policy makers encourage transition towards sustainable low-carbon societies that goes beyond eco-efficiency measures and technological fixes?
- How could a wider social discourse somehow be encouraged – through wider governance structures involving public, private and civic actors – that creates and articulates desirable visions of the future and that evaluates the pros and cons of different transition pathways?