

Transition Pathways Project Workshops

Transition pathways: Branching points in future pathways

Loughborough, 8th November 2011 and London, 21st November 2011

Summary of working outputs

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Introduction

These two workshops were held to investigate current and future branching points in the projected low carbon transition pathways. They involved a range of participants, including energy industry, policy and civil society stakeholders, who worked in small, mixed groups to address the questions posed. The aims of the workshops were:

1. To explore the Transition Pathways Project's approach to governance, actors' 'logics' and the 'action space' – where are we now?
2. To analyse proposed 'branching points' for transition pathways, explore stakeholder responses and risk mitigation strategies.
3. To provide critical feedback on the analytical approach to branching points.

Transition Pathways – Where are we now?

The two workshops began by addressing the question of 'Where are we now?' in relation to the governance 'logics' and the concept of the action space used in the transition pathways work.

A hypothesis was proposed to the participants that "Market logic has been dominant for last 20 years, but we are now moving towards a mixture of government logic for low carbon generation and market logic for high carbon generation (e.g. through the Electricity Market Reform process). Civil society logic helps to frame decisions, e.g. relative weight of public concerns over low carbon, security of supply and affordability, but impact on any particular decision is very indirect." Participants were asked:

- Do you agree with this hypothesis?
- If so, do you think that the current mixture of government and market logics is stable?
- What are the implications of this for how governments, energy companies and civil society groups might work together in the future?

While there was general agreement with the hypothesis, several energy industry participants felt that the current Electricity Market Reform process was already moving the UK towards a government driven logic, at least for low carbon generation technologies. Energy industry participants were generally confident that the market could deliver whatever it was required to do, as long as the direction, policy environment and incentives were clear and stable. They argued that liberalised energy markets had originally been designed to ensure affordability and security of supply, and had successfully delivered this, but they recognised that the agenda had changed to emphasise low carbon alongside the two other objectives (the so-called 'trilemma'). They were confident that the market would deliver this if the incentives were right and the capital investment timescale was suitable. Other participants argued that the government has had to intervene as it became clear that the market logic could not deliver on the objectives of low carbon, security of supply and managing network risks. Most participants emphasised the need for high levels of investment, but that the main large-scale

low carbon options of offshore wind, new nuclear power and coal or gas with carbon capture and storage (CCS) all carried significant technological and/or market risk, and so government needed to step in to ‘de-risk’ investments.

There were differing views on the role of civil society. Some felt that civil society had so far had relatively little direct role, but others thought that civil society was beginning to have a more significant impact. Civil society could act locally or nationally to block all three large-scale options (CCS, nuclear and offshore wind), and the issue of affordability of energy services had rapidly risen up the political agenda over the last year (e.g. recent Panorama programme). This implies that politics matters at different scales. At the national level, there are different views on the importance of the green agenda within the Coalition government, and hence the differing views and relative weight of political leaders in the Department for Energy and Climate Change and the Treasury can have significant impacts. Several industry participants emphasised that, from their perspective, stability in government policies is very important to set relations of trust and provide the setting of confidence to investors. Politics also matters at the regional scale, with devolved governments in Scotland and Wales pursuing more aggressive low carbon policies and choosing, for example, renewables over nuclear power. Micro-politics also matters, in relation to decisions over particular technology choices. Energy companies are increasingly engaging with NGOs – they agree on the targets that should be achieved, but disagree on the pathways that should be followed to reach these targets. It was felt NGOs have begun to engage more pragmatically with the companies and with the planning process in recent years, so that NGOs are supporting particular schemes that fit with their wider objectives, whilst still strongly resisting other schemes.

Other issues raised included the increasing importance of a wider European perspective, both in terms of the influence of European moves on harmonising liberalised markets, on energy and climate policies, and the fact that most large energy companies in the UK are now part of larger multi-national European energy companies. It was argued that the UK is having to move faster than other European countries because much of the UK’s current coal and nuclear generating capacity is reaching the end of its life and needs replacing within the next 10 years. However, because multi-national energy companies could choose to invest in other countries rather than in the UK, they are able to use this argument to lobby for stronger incentives for investment in the UK. It was also argued that the wholesale and retail electricity markets face very different tensions, and that it is necessary to retain separation of wholesale and retail markets in order to keep incentives for demand reduction working.

There was general agreement that the current mix of government and market logics is unstable over foreseeable timescales, which is likely to create further uncertainty that could adversely affect the levels of investment needed. There were concerns of a ‘slippery slope’, whereby incentives for providing low carbon generation and capacity to ensure security of supply (probably through new gas fired generation) squeeze out market competition in generation. It was felt that there is a danger that political drivers for maintaining energy security (“keeping the lights on”) and affordability could reduce the pressure for investment in the amount of low carbon generation likely to be needed to meet carbon budgets in the 2020s. These uncertainties make it more difficult for large energy companies to invest in low carbon generation in the UK, compared to opportunities in other countries. There was a suggestion that the UK government sees significant investment in gas fired generation as a fall-back option for keeping the lights on, which would be consistent with carbon targets up to 2020, but would cause difficulties in meeting carbon budgets after that. This could lead to a new ‘dash for gas’, similar to that which occurred in the 1990s.

Branching points and potential responses

Branching points are defined as points at which choices made by actors, in response to internal or external pressures (both positive and negative), determine whether and in what way the pathway is followed. Some branching points challenge the logic of the pathway.

For the purposes of exploring these branching points, it was proposed that choices made by actors at these points could lead to one of three responses:

- a) Logic of pathway is reinforced - pathway continues same trajectory;
- b) Logic of pathway is challenged – pathway branches to a new trajectory with a mixed logic;
- c) Logic of pathway is severely challenged – pathway fails.

For each branching point, participants were asked to address the questions:

- Do these represent plausible responses by different actor groups?
- What might be effective strategies to mitigate risks (or promote opportunities) arising from these branching points?
- What feedbacks to other technological or social changes might lead to virtuous or vicious cycles?

1) Market Rules:

Branching point: CCS assessed in 2020 to be commercially unviable, due to concerns over costs, technology performance and public acceptance:

- a) Market actors decide to continue investing in CCS development, driven by expectations of large export markets for successful CCS technology;
- b) Market mechanisms judged to be incapable of delivering large-scale low carbon technologies, so branch to Central Co-ordination pathway;
- c) Widespread scepticism of achieving carbon reduction targets and energy security concerns lead to renewed investment in unabated generation.

It was argued that, in some ways, this branching point is already occurring, with the recent announcement that the final CCS demonstration plant to be supported under the UK government's CCS competition, at Longannet in Scotland, is not going ahead, due to concerns over the returns on investment. Other proposed CCS for coal-fired generation demonstration projects, such as E.ON's plan at Kingsnorth, had already been shelved because of investment and planning concerns. It was felt that the investment needed (about £1 billion for CCS) isn't going to come from the private sector, without major government incentives to make it plausible. The absence of a properly functioning worldwide carbon market means that first mover advantage and IP issues aren't really seen as being significant incentives. This means that the risk-reward ratio for investment in CCS is not good. Several industry participants felt that it would have been better if firms had been allowed to share knowledge between them about different demonstration projects, i.e. an 'open book' competition, rather than a 'closed book' competition, run according to a market logic.

2) Central Co-ordination:

Branching point: Strategic Energy Agency fails, due to ineffectiveness and lack of stakeholder 'buy in':

- a) Government proceeds to nationalisation of key electricity industry assets, due to public concerns over carbon targets and energy security;

- b) ‘Bureaucratic interference and incompetence’ blamed for failure – move back toward market mechanism, but delays in investment decisions and time lost in moving towards carbon targets;
- c) Lack of co-ordination and failure to deliver leads to ‘two-tier’ price-driven electricity system, in which richer customers get better service and poorer customers face intermittent black-outs.

It was argued that it is unlikely that the UK will move towards the re-nationalisation of key electricity infrastructure assets. It seems to be more likely to move towards a more regulated electricity industry, which also will have important repercussions. The government will contract for specific tranches of low-carbon generation and the state will introduce more control over the industry but won’t move towards ownership. In general, private companies prefer markets, as through market processes, they can establish their interests and can secure higher risk but higher return investments. Through this new regulatory regime, a new investment regime might be established, based on long-term contracts with a low but guaranteed return on investment. This would be less attractive to private energy companies, but might attract investment from insurance and pension companies. This would imply a change in the make-up of the ownership of the assets in the electricity industry, but could potentially tap into significant sources of finance needed for new low-carbon generation.

This could be a significant branching point, as it is hard to see how to branch back to a commercial market for generation, after branching to central co-ordination, unless there were a sufficiently high carbon price to stimulate low carbon investment. Several energy industry participants felt that there was a danger that this type of regulated market for generation would be less innovative, cf. regulated market for distribution networks following privatisation.

Risk mitigation strategies suggested include:

- Strategies to increase the capacity and security of the system. It is important to guarantee the resilience of the system to avoid blackouts.
- Policies for securing the affordability of electricity and for even distribution of energy consumption. Policies for overcoming fuel poverty, by economic transfers from outside the energy industry.
- Political stability regarding incentives for investment in low carbon generation.
- Stable and transparent energy market prices.

- 3) **Thousand Flowers: ‘Too much to carry’**, in terms of the range of actions that need to happen to keep the pathway on track:
 - a) Community groups take active ownership of local electricity networks to work together to overcome problems;
 - b) National government steps in to manage problems, and moves back towards centralised generation – branch to Central Co-ordination;
 - b2) Large energy companies step in to manage problems and take over community-led energy schemes – branch to Market Rules;
 - c) No-one in control of system, and patchwork of different local problems, resulting in targets being missed.

It was argued by several participants that Thousand Flowers represents a radically different pathway to that of current market-led or government-led pathways. It necessitates changes in the production and usage patterns:

- Challenges the 'big is beautiful' approach in the production side.
- Changes the role of DNOs.
- Gives emphasis to local grids. The architecture of the regime is very different both technologically, institutionally, economically and socially. Technologically, the physical infrastructure would change drastically, as it would resemble more closely the development of virtual networks on the internet rather than the current technological infrastructure, in which the 'super grid' provides the core of the problem solving strategies. Due to the different architecture of the physical infrastructure that the Thousand Flowers pathway would necessitate, it is likely to be difficult to branch to this pathway because existing technological infrastructures have momentum. However, once on this pathway, the significant changes occurring would mean that it would then be difficult to branch back to another pathway, because the whole architecture of the regime would have changed.
- The different physical infrastructure would require a distribution of production as well as different governance models and institutional arrangements, not only locally but nationally. The Thousand Flowers pathway requires new interface institutions and would challenge the roles of Ofgem and National Grid.
- Energy services might become like platforms on the internet rather than commodity delivery services.
- The concepts of ownership and control infrastructure networks would change. Local control and local ownership might become more important than centralised ordered regimes.
- Transnational networks could get more difficult in a Thousand Flowers pathway.
- New finance schemes with hybrid finance (market and local government investments) would be necessary.
- The Thousand Flowers pathway is more compatible with a de-industrialised future and more focused on consumer based energy services (domestic, transport, heating etc.) than the other pathways.

This pathway would be more community-led than individual-led. The vision and aspiration that local communities would bring to climate change mitigation solutions would influence activities and social practices, while local authorities would identify climate change mitigation targets. The local authorities could start to acquire new and crucial roles in the sociotechnical transition by coordinating the variety of actors that a Thousand Flowers pathway would involve. Participants argued that branching on to a Thousand Flowers pathway from a market-led or government-led pathway would be a significant challenge that needs investigating in greater depth.

Industry participants tended to agree that these potential responses are all plausible to some degree, though they all require major regulatory and behavioural changes, as well as new ways of providing technical and financial assistance to the civil society actors involved. However, they tended to favour response (b2), in which large energy companies change their business model to work within a Thousand Flowers framework. They would move towards investing in distributed generation, through providing technical help in partnerships with

local groups or individuals. Alternatively, small or medium sized companies may pop up doing this. However, the pathway in general, and option (b2) in particular, would require changes to governance and regulations, to create the possibility for new business models and new ways of doing things.

- 4) **Across the three pathways: Disputes about development of ‘smart grid/smart control’**, do benefits go mainly to producers or consumers?
- a) Current market actors (large electricity companies) perceive the benefits to them of the smart grid, in relation to more effective management of the electricity system and so invest in smart grid control technologies;
 - b) The smart grid is seen more as an enabling technology to incorporate distributed generation and demand side developments, led by new entrants to industry, such as ICT companies;
 - c) Discordant visions of the smart grid and smart controls slow down developments and prevents the realisation of their benefits.

It was argued that the current targets for smart meters mean that we need to get on with it, e.g. with manufacture of smart meters based on current designs, which could lead to a possible lock-in into a minimal definition of ‘smart’, with benefits primarily to market actors. This might lead to a possible backlash against the perception of the market as the key beneficiary, as well as against issues of control and invasion of privacy. This might especially be an issue on the Market Rules pathway.

The role of different actors was also said to be significant. Distribution network operators were said to be conservative and might not see any benefit from smart grid, as a higher use of the network, ‘sweating their assets’, might not be attractive to them. For customers, who is promoting and selling ‘smart’ may be important in terms of trust and perception. If the state plays this role, it might be viewed to be intrusive, as with ID-cards. If the energy companies play the role, it might be viewed like a TESCO-Clubcard. If Apple were to play this role, it might be seen as an innovative way of using energy. Thus it will matter who sells it to how it is received. An aspect of ‘smart’ is that a more advanced or complex tariff will be needed and people would then need to sign up to this. The issue concerns not just a piece of ‘kit’ but also regulatory frameworks, again providing space for different perceptions of who might benefit.

For ‘smart’ to work in terms of reducing the need for expensive peaking plants, it was suggested that it must work technologically. Government software projects often have not delivered. Who can deliver it, government or company? Power companies may not know their customers well enough, so Apple or Tesco might be more likely.

The risk mitigation strategies were said to depend on how the problem is perceived. If ‘smart’ is initially seen negatively or apathetically as just showing how much money is being spent and not allowing customers to do anything about their spend, this perception might be changed by increasing what it is possible to do with the system. The possibility of doing this might differ between pathways. It was suggested that another approach might be to give customers a strong choice between smart technology or increased investment for which they would have to pay. This was said to be more likely in Central Co-ordination or Thousand Flowers, while quite unlikely in Market Rules.

Reflections on usefulness of the branching points approach

It was argued that while this is a useful way of thinking imaginatively about the future, thinking about the big picture was more important than getting bogged down in the details. It was mentioned that it is important to understand more clearly the dynamics of current developments, initiatives and roles, such as contemporary sustainable transport niche technologies that are supported by local authorities. Others felt that more in-depth analysis of the actors' perspectives was needed, e.g. how would the market react to a Thousand Flowers pathway? Do we know? What do the stakeholders from the private sector perceive as risks and opportunities? How would civil society react in a Central Co-ordination pathway? The extent to which different actors can be assumed to behave 'rationally' was also questioned.

Several industry participants said that the discussions were useful but an important issue was the need for more 'granularity' – what are the branching points? Not just digging in deeper. There was a need to flesh out the points raised (particularly under Market Rules) in more depth before any future discussions. Timescales are difficult – so it matters to identify what happens when and which types of participants might be engaged? It was also suggested that the global scale should be considered in more depth.

It was argued that it is necessary to try to examine future challenges from future perspectives, and not just from today's perspective. It was suggested that further integration of the insights from the project's historical analysis could be beneficial in thinking about how different actors' perspectives change over time.

Conclusion

This report indicates that the project team received valuable critical feedback from the workshop participants on the construction and presentation of the pathways (especially Thousand Flowers), on the branching points that had been identified and about the usefulness of branching points as an analytical device to aid imaginative, and on strategic thinking about potential future developments in a low carbon transition. In response to a participant's comment, the project team stressed that the value of the pathways and the branching point analysis lay in this analytical role, with no intention to employ them as predictive tools. These insights will feed into the research and policy papers that the project team are producing, and the report that will be presented at the final Transition Pathways dissemination conference in April 2012.