A UK Perspective on Energy Transitions and ‘Green Growth’

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KAPSARC Workshop:
A Framework for Technology & Fuel Transitions in Energy
12 November 2013, Riyadh
The UK Low Carbon Transition: A Timeline

- 1940s: energy utilities (coal, gas, electricity) nationalised
- 1987-1994: utilities privatised; ‘dash for gas’ (CCGTs)
- 2008: Department of Energy & Climate Change created
- 2008: Climate Change Act (all-party support)
  - State commitment: cut GHG emissions to 80% of 1990 levels
  - Independent Committee on Climate Change recommends 5-year carbon budgets (caps), 15 years into future
- 2009: Low Carbon Transition Plan; 2011: Carbon Plan
- 2013: Energy Bill – includes Electricity Market Reform:
  - UK carbon price floor for electricity
  - Feed-in-tariffs (CfDs) for low carbon electricity
  - Capacity market (auctions for new capacity, inc. storage & DSR)
  - Emissions performance standard for new fossil stations

Where next?
Transition Pathways: Consortium & Aims

- Interdisciplinary University Consortium
  - Universities: Bath, Cardiff, East Anglia, Imperial College London, Leeds, Loughborough, Strathclyde, Surrey, UCL
  - Funded by EPSRC & E.On UK (2008 - 2012)
  - ‘Realising Transition Pathways’ (2012 –16), EPSRC funded

- Aims:
  - Develop three transition pathways to a ‘more electric’ low carbon future in the UK, including heat & transport
  - Integrated ‘whole system’ assessments of pathways’ technical, economic, social & environmental implications
  - Inform thinking/decisions on low carbon transitions & ‘how to get there from here’

- Approach
  - Pathways reflect ‘co-evolution’ of technologies, institutions, strategies/policies & user practices
Focus on Actor Groups & Governance

- How three actor groups formulate energy system visions & interact across the energy action space.

- **State, Market & Civil Society** groups follow different ‘logics’ that frame their views of the world & of other actors; they seek to ‘enrol’ others into their way of thinking:
  - *Central Co-ordination* sees a dominant role for state actors to co-ordinate energy systems to deliver policy goals
  - *Market Rules* says energy policy objectives are best achieved by market actors competing in a high-level policy framework
  - *Thousand Flowers* sees citizens playing a leading role in how the energy system operates & is governed

- We used this to explore low carbon transition pathways to 2050; each pathway built around a logic.
Action-Space Approach to Governance – 3 Key Actor Groups: State, Market & Civil Society

- Choices depend on actors’ competing ‘logics’: messy, dynamic, interactive
- Action-space maps shifting relationships
- Via their *interactions*, each actor tries to ‘enrol’ the others in their logic
- The dominant actor – i.e. best ‘enroler’ - defines that period’s action-space
- Influencing the pathway & its branching points
- UK recent move from the market towards the state logic – a ‘hybrid’
- With questions about civil society’s role, especially in low carbon heat transition

*Source:* Jacquie Burgess & Tom Hargreaves – Transition Pathways Project (see Foxon, T.J. 2013)
The Action Space for Transition Pathways

- Market-led pathway: Market Rules
- Civil society-led pathway: Thousand Flowers
- State-led pathway: Central co-ordination

Past regimes → Action Space 1 → Future regimes
Three Core Pathways & Governance Modes

- Market rules
- Central co-ordination (state-led)
- Thousand Flowers
Three Transition Pathways for UK Electricity

1) **Market Rules**
   - Limited interference in market arrangements; high carbon price
   - Large companies dominate; big technologies in ‘highly electric’ future – inc. coal/gas with CCS, nuclear power, offshore wind
   - 80% generation linked to high-voltage in 2050: grid reinforcement

2) **Central Co-ordination**
   - Central government & Strategic Energy Agency commission tranches of low-carbon generation from big companies
   - Via large-scale centralised technologies
   - Cooperation & tensions between key actors

3) **Thousand Flowers:**
   - More local, bottom-up diverse solutions led by ESCOs (big & small), local communities & NGOs: closer engagement of end-users
   - Local leadership in decentralized options (50% share)
   - Key technologies: onshore & offshore wind, renewable CHP & solar PV; ‘smart grid’ technologies to handle power flows
High level challenges for the UK Transition

◆ Balancing the Policy Trilemma:
  – Reduce carbon emissions (UK territorial & life-cycle)
  – Maintain energy security (supply-demand balance, supply diversity)
  – Affordability, equity & competitiveness of energy services (investment & system costs; customer bills; trade)

◆ Systemic factors:
  – Technical feasibility
  – Institutional Flexibility
  – Social acceptability
  – Environmental impacts
  – Economic impacts - Who benefits? Who pays?

◆ Evolving governance: where will the current State/Market hybrid go?
Energy transitions & ‘green growth’ depend, inter alia, on the interplay within & between 3 ‘trilemmas’:

– Energy system governance trilemma
  » The roles of the market, the state & civil society

– Energy policy objectives trilemma
  » Climate & Environment; Energy Security; Equity, Affordability & Competitiveness

– Technology & growth trilemma
  » Technological dynamism; wide range of general uses; users improve own technologies, find new uses

The interplay of these trilemmas will exert major influences on energy transition & ‘green growth’ pathways & outcomes.
The Energy Policy Trilemma

- In the UK & other countries we have seen & will see changing priorities between these three objectives

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<tr>
<th>Energy Policy Space</th>
<th>Climate &amp; Environment</th>
<th>Equity, Affordability &amp; Competitiveness</th>
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<td>Energy Security</td>
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The Technology & Growth Trilemma

- General Purpose Technologies (GPTs) led to the sustained technical progress & growth of past industrial revolutions
- 3 attributes of GPTs (e.g. steam engine, electricity, ICE, ICT)
  - *Technological dynamism*: continued innovation - costs fall/quality rises
  - *Pervasiveness*: widely diffused & with many general uses
  - *Innovational complementarities*: users improve own technologies/find new uses

Technological Dynamism

Wide Diffusion & Uses

New & Improved uses
Bringing the trilemmas together

- Successful energy transitions & ‘green growth’ will be influenced by how a country handles these trilemmas
  - The ranking of its energy policy objectives
  - The logic & mode of governance it chooses & how it engages with key actors
  - The attributes of the energy supply & use technologies & practices it develops
- And by how these three elements interact with & feed back onto each other
Policy, Governance, Technology & Growth Spaces: 3 Trilemmas & a Tetrahedron
This reminds us to think about

- What should policies aim for?
- Who aims & with what forms of governance?
- With what technologies & practices?

How might the interplay between energy policy, governance, technology & ‘green growth’ play out (locally, nationally, globally) in future pathways?
Conclusion

- Energy transitions & ‘green growth’ depend, inter alia, on the interplay within & between 3 ‘trilemmas’:
  - Energy system governance
    » Roles of market, state & civil society
  - Energy policy objectives
    » Climate & Environment; Energy Security; Equity, Affordability & Competitiveness
  - The attributes of energy technologies
    » Technological dynamism; wide range of general uses; users improve own technologies, find new uses

- The trilemmas will exert major long-term influences on energy transition pathways & their outcomes
  - With implications for energy policy & industrial policy
Sources & Notes

Note: This presentation draws on research by the author & colleagues in the Realising Transition Pathways project, funded by EPSRC (Grant EP/K005316/1) http://www.realisingtransitionpathways.org.uk/. He is responsible for all views stated.

Sources:


