Socio-technical analysis of electricity transitions, applied to UK and Germany: Internal niche momentum and regime lock-in

Professor Frank Geels
Manchester Business School

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Socio-technical system in electricity

Electricity production
- Fuels (gas, coal, nuclear, biomass, water)
- Power generators (utilities, project developers, independent generators)
- Other resources (finance, knowledge, people, skills)

Electricity grid (high voltage transmission, local distribution)
- Regulator (Ofgem)
- Public debates about new power cables
- National Grid, Transmission Network Operators (TSO), Distribution Network Operators (DNO)

Domestic electricity consumption
- EU and national policies:
  - Emissions Trading Scheme
  - Climate Change Act
  - Renewables Obligation
  - Contracts for Difference
  - Levy Control Framework
- Households
- Appliance manufacturers
- Cultural conventions
- Public debates about consumer sovereignty, affordability, fuel poverty

Public debates about
- costs
- energy security
- climate change
- energy security
- climate change
Renewable electricity expansion in DE and UK: 30.1% and 24.7% in 2015

Looks similar, but very different underlying patterns in RET-deployment
Landscape developments put pressure on existing regime, which opens up, creating windows of opportunity for novelties.

Socio-technical regime is 'dynamically stable'. On different dimensions there are ongoing processes.

New configuration advantage of 'win'. Adjustments occur.

Elements are gradually link and stabilise in a dominant. Internal momentum increases.

External influences on niches (via expectations and networks).

Markets, user preferences

Industry

Science

Policy

Culture

Technology

Socio-technical landscape
Research strategy

• Assess internal momentum of 6 niche-innovations
  a) techno-economic
  b) socio-cognitive
  c) Policy and politics

• Assess degree of lock-in/stability of existing regimes (continued investments, actor commitment, policies, economic performance)
Results

• In-depth case studies (reports/deliverables)
  D2.1. Momentum of niche-innovations
  D2.2 Stability of existing regimes
  D2.3 Integrated socio-technical assessment
  D2.4 Comparative analysis UK and DE
  D2.5 Socio-technical scenarios

• General assessments
Internal momentum of niche-innovations

<table>
<thead>
<tr>
<th>Pathway A</th>
<th>Pathway B</th>
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<tbody>
<tr>
<td><strong>Germany</strong></td>
<td><strong>Pathway B</strong></td>
</tr>
<tr>
<td>CFL and LED lighting:</td>
<td>High</td>
</tr>
<tr>
<td>Offshore wind:</td>
<td>Medium</td>
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<tr>
<td>Smart meters:</td>
<td>Low</td>
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<tr>
<td><strong>UK</strong></td>
<td><strong>Onshore wind</strong>: Very high</td>
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DE more on pathway B

UK more on pathway A
**Stability and tensions in existing regimes**

<table>
<thead>
<tr>
<th>Regime</th>
<th>Lock-in, stabilizing forces</th>
<th>Cracks, tensions, problems</th>
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<tbody>
<tr>
<td>German electricity generation regime</td>
<td>Weak</td>
<td>Strong</td>
</tr>
<tr>
<td>German electricity networks regime</td>
<td>Moderate</td>
<td>High</td>
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<td>Moderate/strong</td>
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Conclusions

Germany:
• **Pathway B**: new entrants replace incumbents (leading to strong regime tensions)
• Rapid RET expansion requires grid expansion, which faces social acceptance problems
• Substantial societal engagement (‘bottom-up’), but concerns about costs and downfall of incumbents (‘too big to fail’) weakened government support (reduce EEG, auctions)

UK:
• **Pathway A**: incumbents gradually reorient towards RET, causing less tensions (except for coal phase-out)
• Grid transformation mostly incremental, due to strong lock-ins
• Less societal engagement; more top-down, technocratic; transition costs highly politicized, leading to major reversals and slow-down