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The University of Manchester
Sustainable Consumption Institute

Understanding and governing transitions: Three socio-technical lessons from PATHWAYS project

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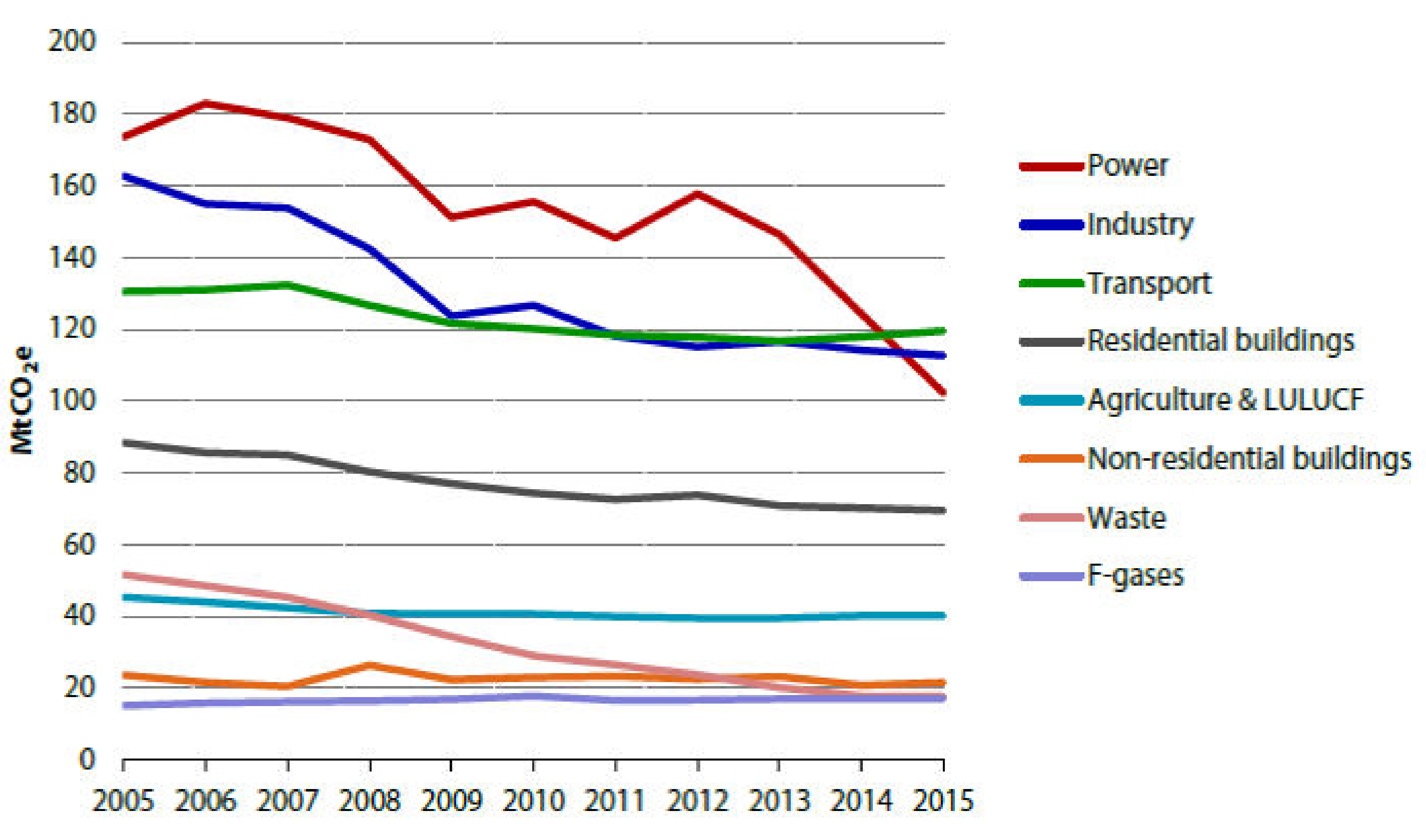
1. **Transition momentum low, except electricity → greater policy urgency required**

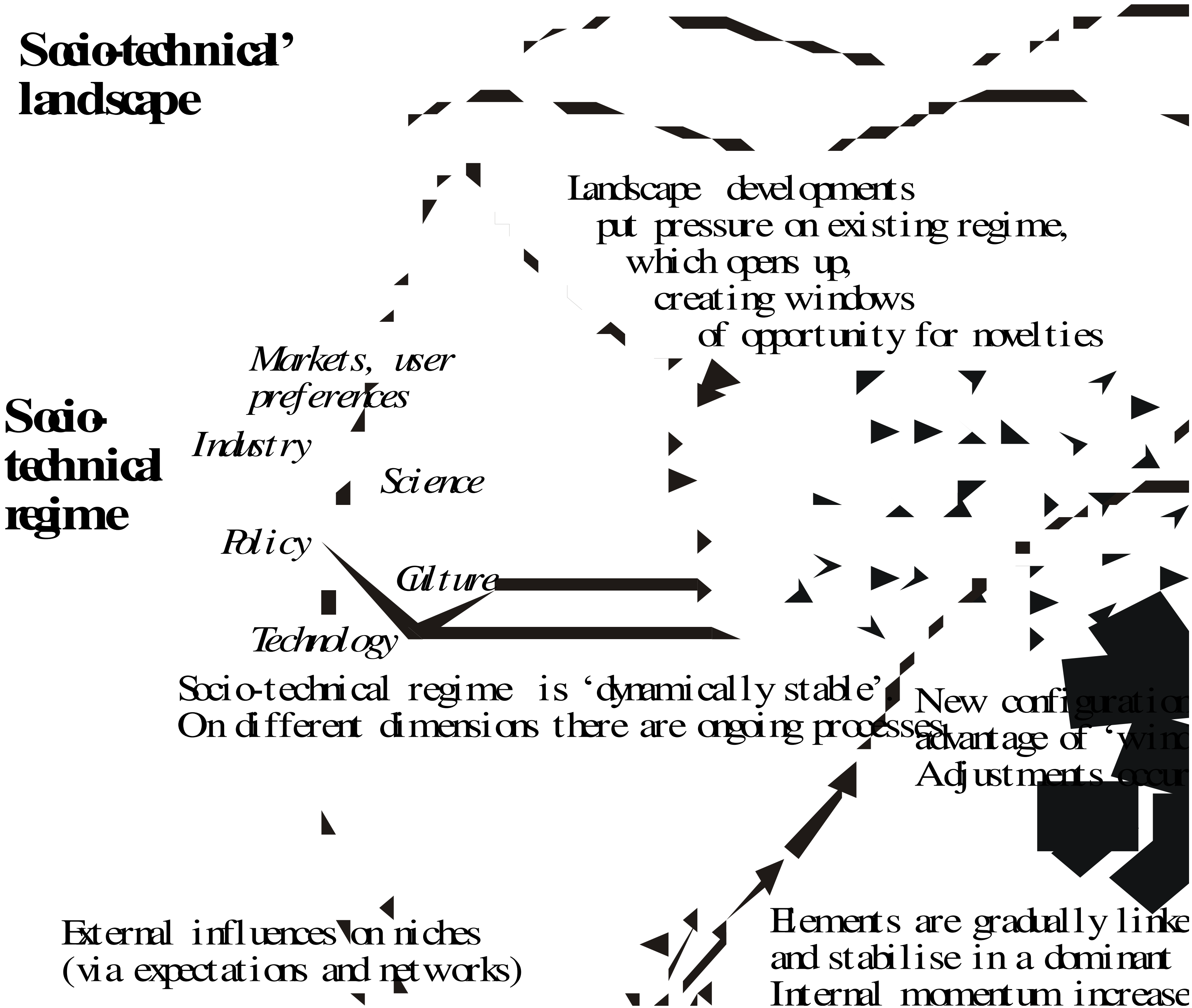
2. **Focus policy on specific transition challenges**

3. **Improve societal embedding and bottom-up learning**

1. Transition momentum low, except electricity → greater policy urgency required

Figure 1. Progress reducing emissions since 2012 has been almost entirely due to the power sector




Socio-technical' landscape
Landscape developments put pressure on existing regime, which opens up, creating windows of opportunity for novelties
Socio-technical regime
Markets, user preferences
Industry
Science
Policy
Culture
Technology
Socio-technical regime is 'dynamically stable'.
On different dimensions there are ongoing processes
New configuratio
advantage of 'win
Adjustments occur
External influences on niches
(via expectations and networks)
Elements are gradually linke
and stabilise in a dominant
Internal momentum increase

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

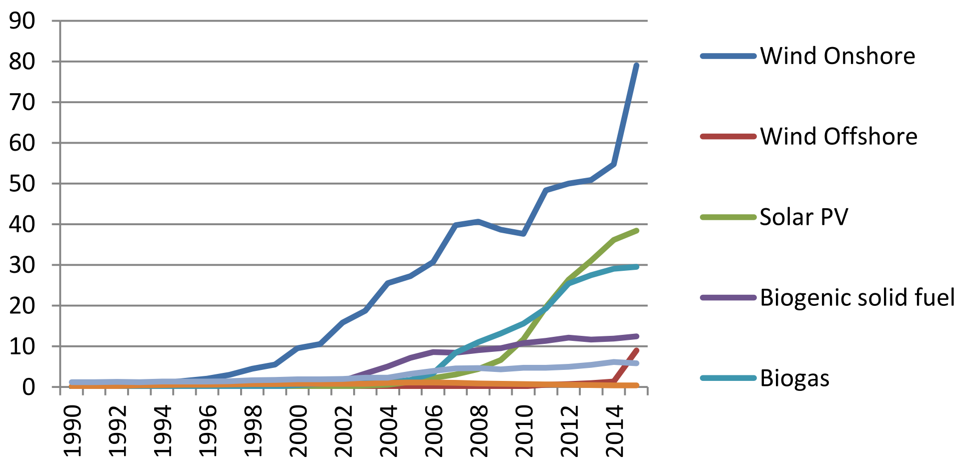
- **General assessments**

Internal momentum of niche-innovations

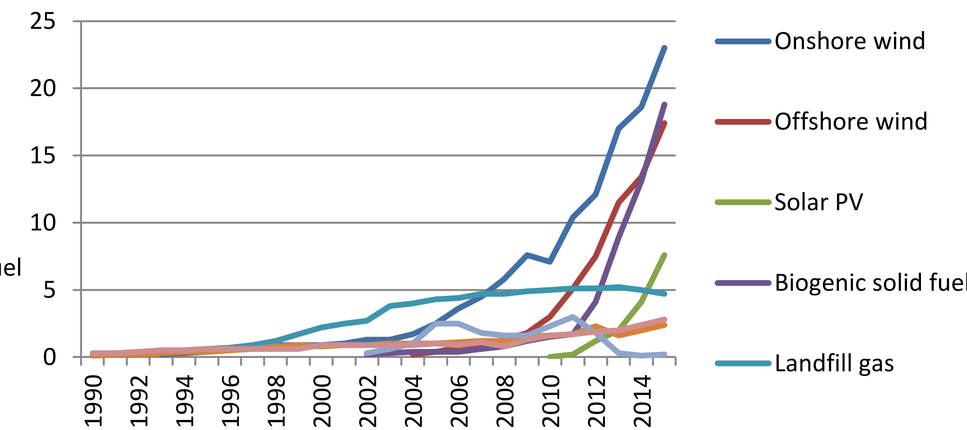
ELECTRICITY: is unfolding: 30% and 25% in DE and UK in 2015

	Pathway A		Pathway B	
Germany	CFL and LED lighting:	High	Onshore wind:	Very high
	Offshore wind:	Medium	Solar-PV:	High
	Smart meters:	Low	Bio-energy:	Low
UK	CFL and LED lighting:	Very high	Smart meters:	High
	Offshore wind:	High	Solar-PV:	Low
	Bio-energy:	Medium		
	Onshore wind:	Medium		

DE more on pathway B



UK more on pathway A



HEAT/BUILDINGS:

- Sweden far progressed
- Low momentum in DE and UK

	Pathway A	Pathway B
Sweden	Heat pumps: Medium Waste heat recovery: Low/medium Small-scale biomass: Low Individual metering and billing: Very low	District heating: Low Low-energy housing: Very low
Germany	Heat pumps: Low Small-scale biomass: Medium Solar thermal: Low	Low-energy/passive house: Low/medium Smart metering: Low/medium
UK	Smart heating controls and meters: Medium Low energy retrofits: Very low	Solar thermal: Low Small biomass: Very low District heating: Very low Heat pumps: Very low

MOBILITY:

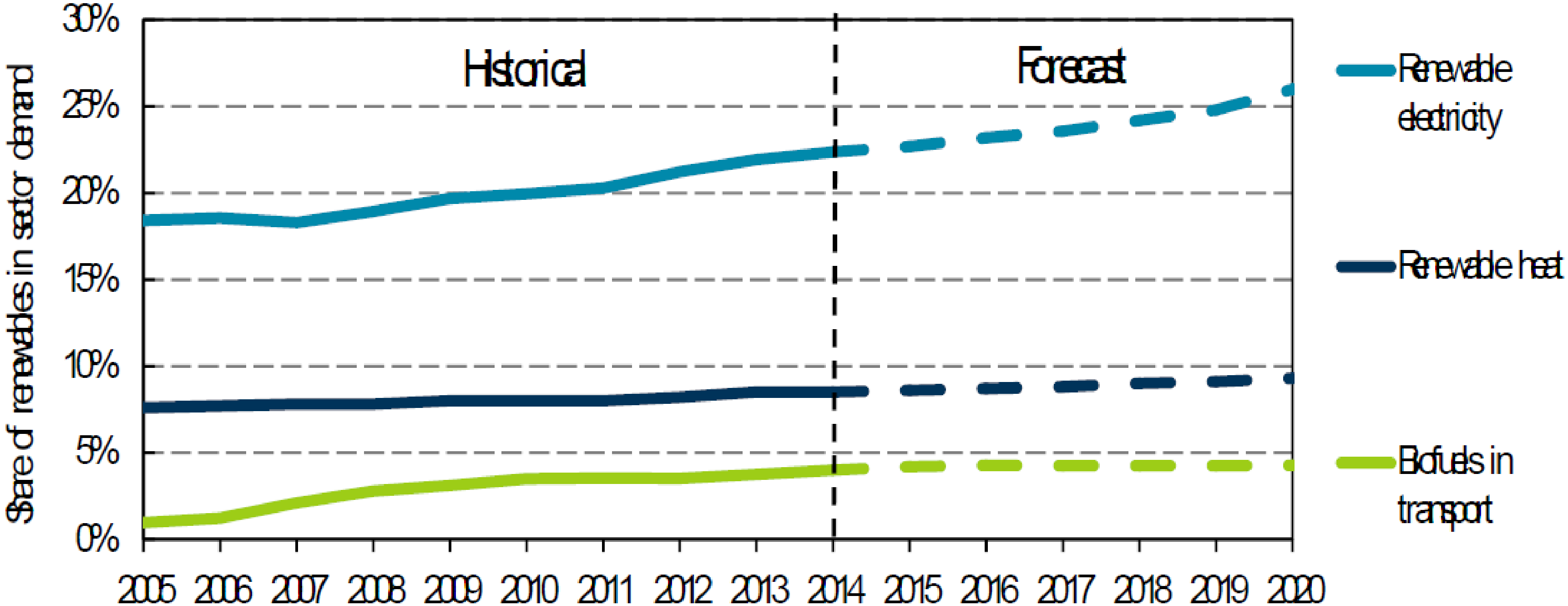
- Some momentum in HEV and BEV: Pathway A
- Low momentum on more radical niches: Pathway B

	Pathway A	Pathway B
UK mobility	(Plug-in-)Hybrid Electric Vehicles: Medium Battery Electric Vehicles: Medium Inter-modal Ticketing (Smart Cards): Low Biofuels: Low Hydrogen Fuel Cell Vehicles: Low	Inter-modal Ticketing (Smart Cards): Low Car-sharing: Low Urban Cycling/Sharing Schemes: Very low Compact Cities: Very low
Dutch mobility	(plug-in) Hybrid electric vehicles: High Battery electric vehicles: Medium Biofuels: Medium Compact cities; Medium Hydrogen fuel cell vehicles: Very low	Car sharing: High

Decent momentum in electricity production (but grids much slower)

But low momentum in transport and heat (also IEA, 2015)

→ Requires much more policy drive



2. Focus policy on specific transition challenges

1) Models: from present to future goals
2) Socio-technical (MLP): last 10 years to present: unfolding trajectories
3) Projects: present on-the-ground experiences

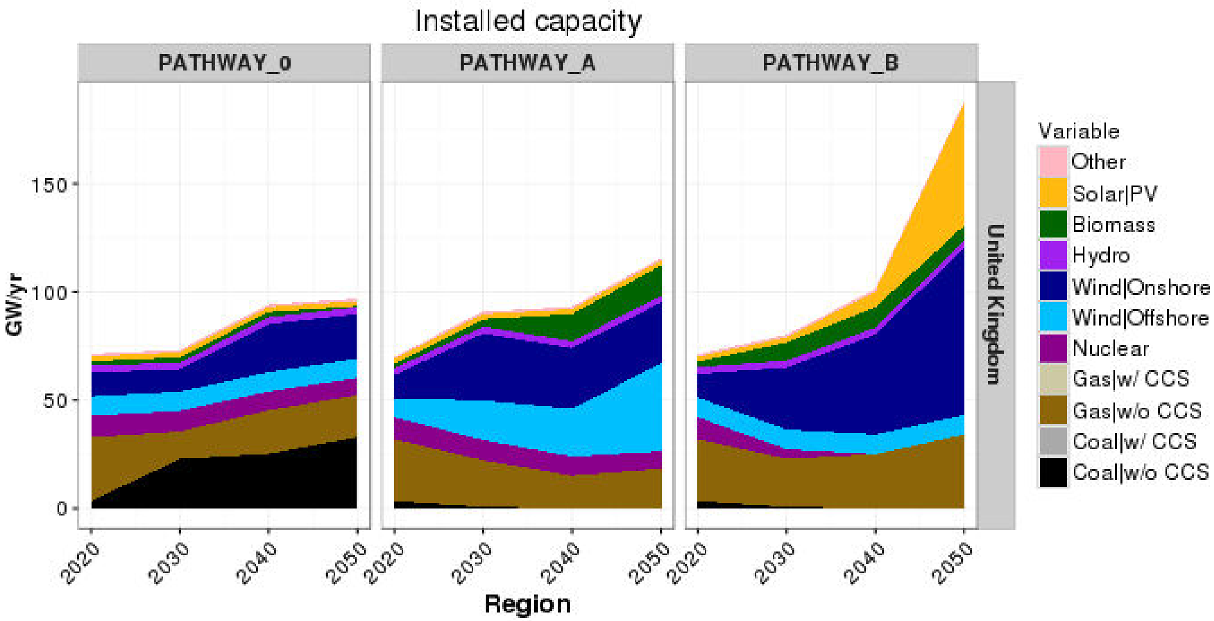
→ What are the bottlenecks or **transition challenges for ‘bending the curve’**

Key constraints for energy system transformation (Loftus et al. 2015)

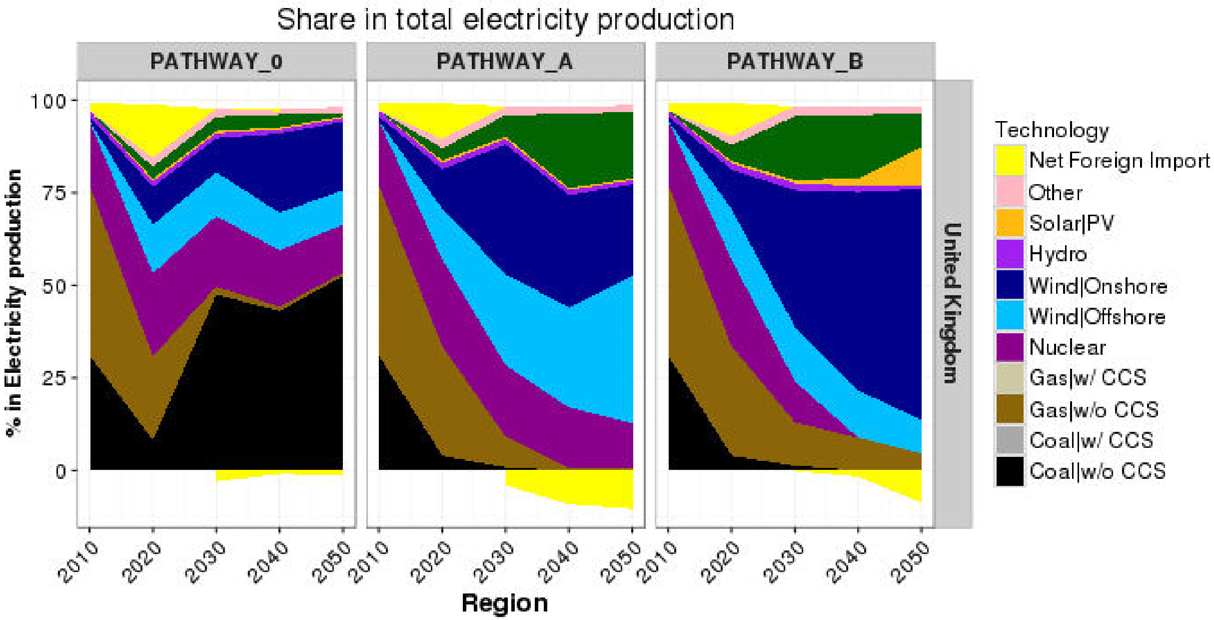
1) technology readiness
2) economic costs
3) integration issues (intermittency, infrastructure, storage, back-up)
4) social and non-cost barriers.: social acceptance, political commitment, sustainability, business models

→ Assess key constraints for specific domains and options

Loftus, P.J., Cohen, A.M., Long, J.C.S., and Jenkins, J.D., 2015, A critical review of global decarbonization scenarios: what do they tell us about feasibility?, *WIREs Climate Change*, 6(1), 93-112



Installed capacity in power generation in the UK



Power generation in the UK)

<u>Tensions with MLP-analysis</u>

Huge expansion of onshore (and offshore wind)

Substantial expansion of biomass after 2020 (including BECCS from 2030)

Major expansion of solar after 2040 (pathway B)

Export expansion after 2030

Substantial new nuclear build (to replace phase-out)

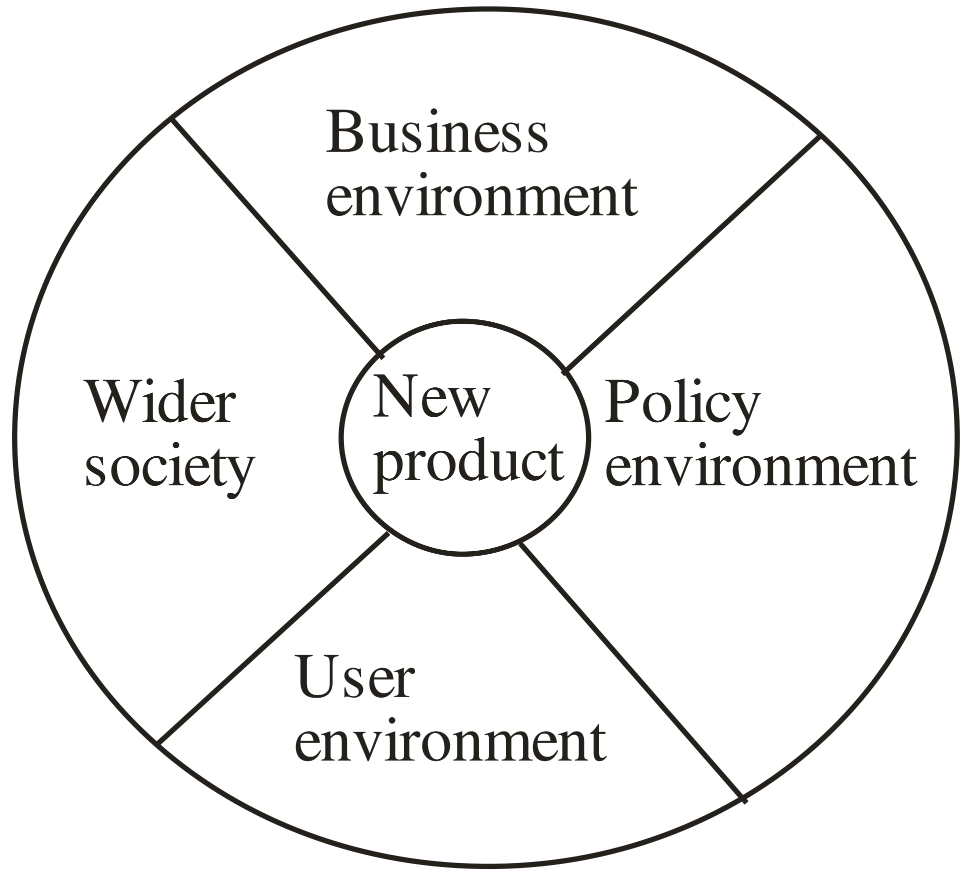
Specific constraints and policy challenges

Innovation	Constraints	Policy challenge
1. Biomass	* Policy plans * Social acceptance	* offer long-term post-2020 vision * address sustainability concerns (imports)
2. BECCS (biomass energy with CCS)	* Technology readiness * Economics * Social acceptance	* invest in R&D and demonstration projects (also CCS) * financial instruments (carbon tax, subsidy) * address sustainability concerns of imported biomass
3. Onshore wind	* Social acceptance * lack of policy and political will (moratorium)	* Develop positive discourse * force companies to better consult and pay compensation fees * clarity about post-2020 vision
4. Electricity grid expansion	* Integration * Social acceptance * lack of political will	* need for more flexibility (smart, storage); requires demonstration projects and financial instruments * consult with stakeholders and/or compensate * Institutional change to break up organizational inertia
5. Nuclear	* Economics * socio-political acceptance	* Hinkley C very expensive; better deal required for tax payer; but companies (EDF) want certainty, security
6. Import and export	Political acceptance.	Requires complete change in policy vision

3. Improve societal embedding and bottom-up learning

Diffusion require embedding in four environments

→ More than just techno-economic challenge



Upstream electricity mainly involves business and policy; works well with traditional instruments (finance + regulation)
* But there are various social acceptance problems

Heat/buildings, transport, food have greater direct role for consumers, cities, public debate, supermarkets, housing agencies.

→ Societal embedding requires more attention

- Cultural discourse: home improvement, quality of life, public space, diet/health
- Skills, learning: local supply chains, builders
- Motivating households, consumers: information + financial incentives, but also community projects, consultation/engagement

Societal embedding requires multiple governance styles

<u>1) Goal-rational (‘managerial’)</u>: visons, targets, cost-benefit calculation

<u>2) Deliberate (coalition building + discursive persuasion)</u>: political feasibility, legitimacy, buy-in

<u>3) Emergent (flexibility, engagement)</u>: learning, experimenting, local projects