

The governance of infrastructure transitions

Jim Watson Research Director UK Energy Research Centre

Land of the MUSCOs expert workshop, 9th May 2013



- Why infrastructure transitions?
- Lock-in and the challenges of change
- The governance of infrastructure transitions





"The stakes are high. Failure to develop and implement a vision for our infrastructure will mean the UK falls behinds its competitors, loses out both economically and socially, and could miss its carbon reduction targets"

Mark Wolpert, Govt Chief Scientist

CST report: National Infrastructure for the 21sr century (2009)



Why infrastructure transitions? 5 technological revolutions (Perez, 2010) UNIVERSITY of Sussex



Technological revolutions, recessions and golden ages



			TURNING				
		INSTALLATION PERIOD	POINT	DEPLOYN	MENT PERIOI	\mathbf{O}	
GREAT SURGE		Bubble prosperity	Collapse & Recessions	"Golden Age"	prosperity	Maturity	
1 st	1771 Britain	Canal mania	1793–97	The Great British leap			
2 nd	1829 Britain	Railway mania	1848–50	The Victorian Boom			
3 rd Brit	1875 tain / USA termany	Bubbles of first globalisation	1890–95	Belle Époque "Progressive	(Europe) Era" (USA)		
4 th	1908 USA	The roaring twenties	Europe 1929–33 USA 1929–43	Post-war Golden age			
5 th	1971 USA	Internet mania and financial casino	2007 /08 -???	Global Susta "Golden Age	inable ?"?		

Technological revolutions and changes in lifestyles



DEPLOYMENT PERIOD LIFESTYLE						
Age of Steam, Coal, Iron and Railways	1850s-1860s	Urban, industry-based VICTORIAN LIVING in Britain				
Age of Steel and Heavy Engineering	1890s-1910s	Urban, cosmopolitan lifestyle of THE BELLE EPOQUE in Europe				
Age of the Automobile, oil and Mass Production	1950s-1960s	Suburban, energy-intensive AMERICAN WAY OF LIFE				
Each style became "the good life" redefining people's desires and guiding innovation trajectories						
Age of global ICT	2010s-20??s	Will the developed and emerging countries develop a variety of ICT-intensive and "glocal" SUSTAINABLE LIFESTYLES?				

Source: Perez, 2010

Why infrastructure transitions? Lock-in and inertia



"Large scale technology, such as electric light and power systems, incorporate not only technical and physical things such as generators, transformers and high-voltage transmission lines, but also utility companies, electrical manufacturers and reinforcing institutions such as regulatory agencies and laws ..." **Thomas Hughes (1989) American Genesis**



Why infrastructure transitions? Features of lock-in and inertia

- Norms and routines of engineers, developers, supply chains
- Business models and market arrangements
- Economies of scale and positive network externalities
- Network infrastructure (e.g. grids, roads, pipeline networks)
- Institutions for coordinating and reproducing systems
- Consumer habits and social practices
- Political power and access to decision-making

Collectively, these related processes will make the desired shift to more sustainable infrastructures more difficult

The Infrastructure Transitions Research Consortium

University of Sussex



ITRC Fast Track Analysis (2012) Governance analysis

- Review of historical infrastructure transitions in the UK to draw lessons, and identify key trends and common features
- Analysis of how current governance arrangements impact on infrastructure provision
- Examination of governance implications of three transition strategies (capacity intensive, capacity constrained and decentralised)



ITRC Fast Track Analysis (2012) Governance conclusions



- Significant differences between ITRC sectors, especially with respect to scale of governance
- Complexity of governance increased due to liberalisation
- But liberalisation has benefits (e.g. greater transparency) lacksquare
- Economic regulation of networks has improved efficiency, ulletbut has not fostered innovation until recently
- Governance usually has multiple objectives: trade-offs between these objectives are inevitable
- UK governance does not focus enough on interdependencies. Not enough evidence on positive / negative impacts

Analysing interdependencies Two ITRC case studies





Water-electricity interdependencies: Renewable energy in the water sector

Electricity-transport-ICT interdependencies: Smart grid demonstrations



Analysing interdependencies IS Types of interaction (Raven & Verbong) University of Sussex Competition Symbiosis Integration Spill-over



Some findings so far Water-electricity case



- Nature of interdependencies has changed over time
- Functional <u>symbiosis</u> before privatisation
- During privatisation period, links became stronger:
 - Stronger symbiosis due to regulations on water quality
 - Some <u>spill overs</u> in economic regulation (e.g. RPI-X)
 - Integration via mergers, though these became less attractive
 - Common environmental regulator (Environment Agency)
- Post privatisation, <u>competition</u> started in a small way: renewable electricity generation by water companies
- But policy for two sectors not always co-ordinated, and led to conflicting signals for water companies
 Sussex Energy Group
 SPRU - Science and Technology Policy Research



Thanks

http://www.ukerc.ac.uk

https://twitter.com/watsonjim2