

SCIENCE POLICY RESEARCH UNIT

Value creation and capture for low carbon infrastructure

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Lecture outline

- Low carbon infrastructure:
 - Political economy
 - Systemic, inclusive definition of infrastructure
 - Value creation and capture
 - Business models for low carbon infrastructure
- Insights:
 - Investment gap for low carbon infrastructure
 - Institutional gap for infrastructure governance
 - Understanding value creation and capture, and resulting business models, can help to address these gaps

Sources

- iBUILD project (EPSRC, Universities of Newcastle, Birmingham, Leeds; 2013-2017)
 - Infrastructure business models for local delivery
 - Addressing social and environmental, as well as economic objectives
 - New forms of creation and appropriation of value, and new business models
- ICIF and ITRC/MISTRAL projects
- Papers
 - Foxon, T J, Bale, C S E, Busch, J, Bush, R, Hall, S and Roelich, K (2015), 'Low Carbon Infrastructure Investment: Extending Business Models for Sustainability', *Infrastructure Complexity* 2:4
 - Hiteva, R, Foxon, T J and Lovell, K (2017), 'Value creation and capture for a low carbon infrastructure', in Kuzemko, C. (ed.) *Handbook of international political economy of energy and natural resources* (in press).

Climate Change challenge for infrastructure

- Paris Agreement (2015)
 - Over 195 countries committed to limit climate change to 2°C above pre-industrial levels
 - Entered into force in November 2016, ratified by 143 countries
- UK Climate Change Act (2008)
 - Goal of reducing UK's carbon emissions by 80% by 2050
 - Carbon budgets now set up to 2032, with 57% reduction by 2030
 - Need for low carbon transition in energy and industrial systems
- UK Low Carbon Industrial Strategy Green Paper (2017)
 - Upgrading infrastructure to deliver performance and economic growth
 - Delivering affordable and clean growth for a low carbon transition
 - Lack of joined-up thinking?

Infrastructure investment in UK

- Governance since 2010
 - Infrastructure UK, now part of Infrastructure and Projects Authority
 - National Infrastructure Plan, now part of National Infrastructure and Construction Pipeline
 - National Infrastructure Commission, now developing a National Infrastructure Assessment
- Aims
 - Support sustainable economic growth across all regions of the UK
 - Improve competitiveness
 - Improve quality of life
- Investment Gap?
 - Aim for £300 bn of investment by 2020/21
 - Plan annual spend 1.0-1.2% of GDP on economic infrastructure up to 2050

Infrastructure governance

- Need to manage infrastructure investment within context of a low carbon transition
- Incorporate social and environmental values, as well as economic values, into decision-making and investment processes
 - Implications for how decisions are made and who is involved
 - Implications for business models
- Institutional gap?
 - Lack of deliberation, available information and wider democratic input into infrastructure decision-making processes
 - Could lead to short-sightedness and local community opposition
 - Lack of adequate forums for politicians, interest groups and local communities to engage in structure informed discussions

Systemic and inclusive infrastructure

- Infrastructure as system of systems
 - Interdependencies between energy, water, transport and waste systems
 - Carbon emissions associated with manufacture, use and disposal phases
- Inclusive infrastructure
 - Diverse set of actors, processes, technologies, knowledge and values
 - Value creation through local informal and semi-formal activities, such as knowledge sharing, hard to capture in cost-benefit analysis
- Systemic, inclusive approach:
 - Capture activities and linkages across scales and sectors
 - Look for opportunities for synergies
 - How low carbon infrastructure can be developed and maintained

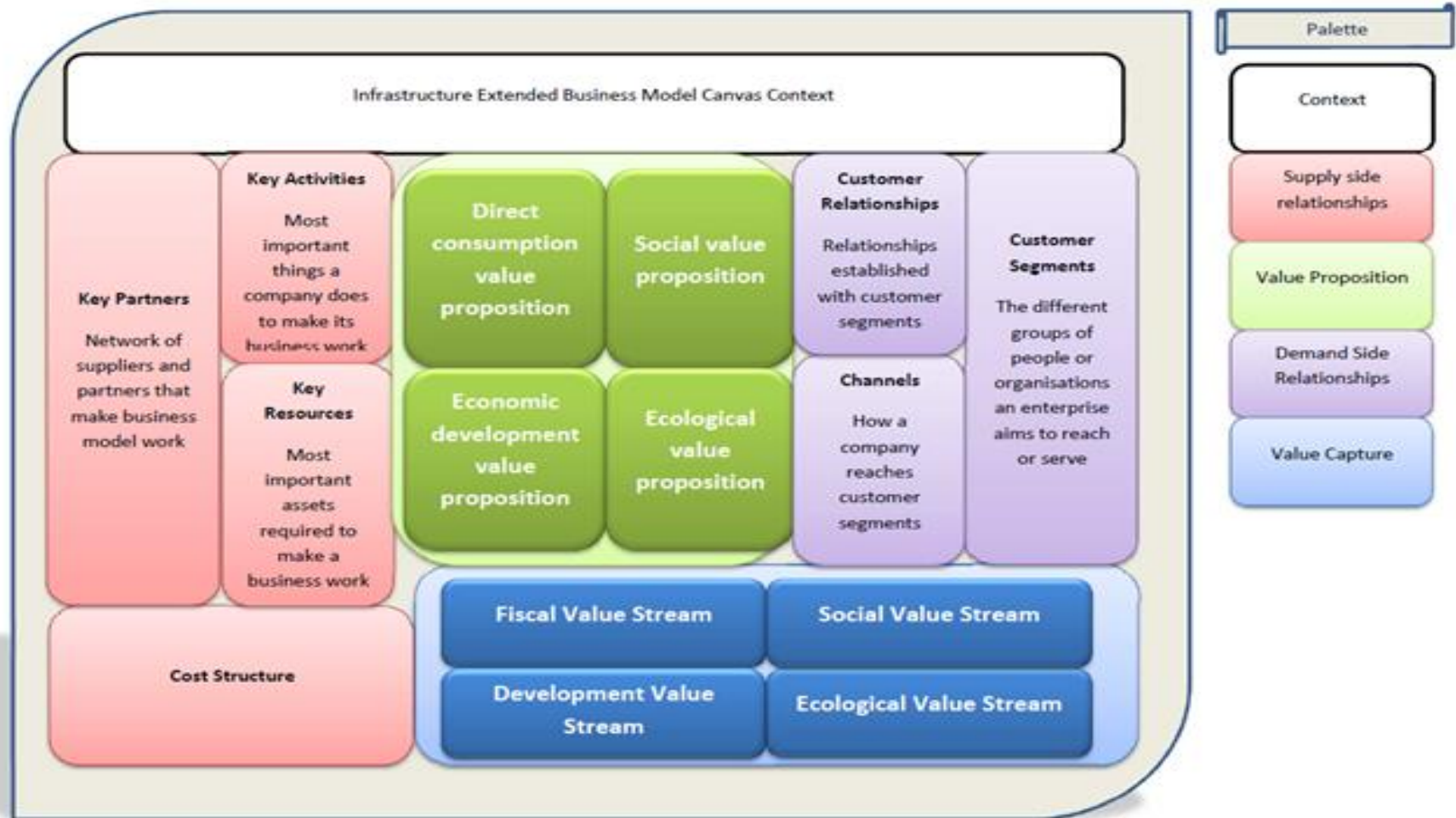
Business model lens

- Business model framework can help to address:
 - How value is created and captured, and who participates
 - Balancing divergent social, economic and environmental values
- Business model at firm level:
 - Processes, activities, resources and partners that help to create a value proposition for end users and participants
 - Revenue streams and relationships that enable value to be captured
- Broaden system context and types of value considered:
 - Economic value, e.g. reducing costs through improving efficiency
 - Environmental value, e.g. reducing carbon emissions
 - Social value, e.g. inclusive value associated with greater involvement of end users in influencing design of energy systems (Ofgem)
- Examine how low carbon infrastructure values can be created and captured

Building block of a business model

Key Partners <i>Network of suppliers and partners that make business model work</i>	Key Activities <i>Most important things a company does to make its business model work</i>	Value Proposition <i>The bundle of products and services that create value for a specific Customer Segment</i>	Customer Relationships <i>Relationships a company establishes with its Customer Segments</i>	Customer Segments <i>The different groups of people or organizations an enterprise aims to reach and serve</i>
	Key Resources <i>Most important assets required to make the business model work</i>		Channels <i>How a company communicates with and reaches its Customer Segments</i>	
Cost Structure <i>All cost incurred to operate a business model</i>			Revenue Streams <i>The money a company generates from each Customer Segment</i>	

Extended business model canvas



Transnational municipal networks

- Covenant of Mayors:
 - Launched in January 2008
 - after the introduction of the second European action plan for energy efficiency
 - Over 6000 signatory cities, towns or regions
 - Voluntarily commitment to reduce GHG emissions by at least 20% by 2020
 - Covenant signatories commit to adopting an integrated approach to climate change mitigation and adaptation
 - Required to develop baseline assessments & Sustainable Energy and Climate Action Plans (SEAPs) to cut CO2 emissions by at least 40% by 2030 and increasing resilience to climate change within 2 years of adoption
- Enable value creation and capture from low carbon infrastructure
 - Co-ordination of governance activities (bypassing national targets)
 - Aligning needs for energy saving and conservation with low carbon target
 - Knowledge transfer and learning & capacity building
 - Enable participation of citizens and users in decision making

Local supply and smart grids

- Local supply and smart grid networks
 - Could have significant contribution to carbon reductions
 - Links closely to local distributed generation and energy efficiency
 - Greater engagement by end users in energy supply and management
- Greater municipal involvement in smart grids and distributed generation
 - Contribute to local economic development
 - Create revenues that could be recycled to deliver social benefits
 - Reduce carbon emissions through faster and cheaper connection of renewable generation
- Institutional changes to enable more local value creation and capture
 - Developing new business models and relationships
 - Greater public involvement and participation
 - Potential for more participative and deliberative forms of engagement

Local municipal energy supply

A Power Grid of Their Own: German Village Becomes Model for Renewable Energy

By Renuka Rayasam

The tiny village of Feldheim, some 60 kilometers southwest of Berlin, was catapulted by chance to the forefront of the renewable energy movement. Now visitors from around the world are flocking to this otherwise unremarkable rural community to see if they can replicate its success.

Thousands of German Cities and Villages Looking to Buy Back Their Power Grids



What do Boulder, Colorado and Hamburg, Germany have in common?

Matthias B. Krause
October 11, 2013



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A Vattenfall power station in Hamburg. Photo: DPA

Hamburg buys its energy grid back for €400 million

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Reflections on infrastructure governance

- Focus on value creation and capture for low carbon infrastructure
 - Address investment gap, particularly at local level, by highlighting additional, complementary forms of value creation and capture
 - Address institutional gap, by increasing public engagement with, and participation in, infrastructure
 - Enables a wider range of values to be incorporated and balanced within local context
- Challenges existing infrastructure governance arrangements
 - Beyond top-down, technocratic approach
 - More integrated and inclusive approach
 - Many points of agency and activity
- Greater user engagement is key to delivering investment in low carbon infrastructure and changes in practices