TRANSITIONS IN THE UK GAS NETWORKS: PAST EXPERIENCES & FUTURE CHALLENGES

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(1) Overview

Britain's urban gas networks began to develop in the early 1800s and have experienced several significant transitions over the past two centuries. The gas network now faces new challenges from its role in a low carbon transition. Studies of UK pathways that might meet the greenhouse gas reduction targets for 2050 (Foxon 2013; Davies et al. 2013) suggest that the low-pressure gas mains networks might need to be decommissioned by 2050, that the UK may need to shift away from natural gas as a residential heating fuel, with heat provided by electric heat pumps or biomass boilers, etc. Other studies have explored the possibility of decarbonising gas (e.g. biogas injection and hydrogen injection or full conversion to hydrogen). None of the alternatives to gas is either straightforward or costless and the transition from gas is highly contested.

(2) Methods

The paper seeks to set the challenges for the gas network against the perspective of five historical transition experiences and an examination of how the gas industry engaged with and responded to them, the role of different modes of governance and the willingness of customers (civil society) to accept change. The origins of the gas industry Britain's urban gas networks began 200 years ago at the start of the 19th century and the Gas Light and Coke Company (GLCC) was established by Act of Parliament 1812. As Tomory (2012), shows, the industry's development was helped by Britain's available scientific knowledge and mechanical skills and its growing coal-based economy. The GLCC established a path-breaking integrated and tightly-coupled network before the railways, drawing on experience and legal forms and models of existing networks (canals & water supply). From these early origins, there was a 1st transition to widespread supply in town networks through the country. By the mid-late 1800s there was a proliferation of firms, with a mixture of profit/ seeking private firms and municipally-owned but revenue seeking firms. The 2nd transition, from 1877–1914, concerns commercial and technological responses by the gas industry to pressures at the end of the 19th Century (Arapostathis et al. 2013, Foxon et al. 2013). It saw the creation of a new markets for manufactured gas, in a market-led transition. After 1880, the regime actors faced pressures: competition from newly invented incandescent electric light, low load factors and negative customer perceptions of gas. In this period (1880-1914) the industry sought to address these pressures both by broadening its customer base (through the use of hire purchase and slot meters) and to widen the range of energy services from lighting to cooking and heating. By 1914 gas customers had more than tripled, to 7 million, and included growing numbers of working class users It has also been suggested that the adoption by the industry, after initial reluctance, of the much more efficient Welsbach incandescent gas mantle at the end of the 19th Century, is an example of the 'sailing ship effect' (Geels, 2002; Pearson & Foxon 2012) or 'last gasp effect', i.e. the tendency for efficiency and other improvements in the competitive positions of incumbent but obsolescent technologies to be stimulated by competition from new technologies. The transition was led by private and municipal companies, actors operating according to a market 'logic'.

The 3rd transition was from 1915-1945. By World War II, the industry was dominated by 'town gas' from coal and had 800 private & municipal firms. By the late 1930s: the industry was the largest in Europe and had 11 million customers, but its competitiveness was precarious. It was fragmented, with small scale firms and uncoordinated relative to electricity. In 1941a senior industry figure said it was 'incoherent' and must expand or be left with a 'limited & costly supply of gas', struggling to compete with other fuels. The 4th transition experience concerns the post-World War II

challenge of a 'town gas' system based on an expensive feedstock (coal) and with growing market competition from electricity, oil and coal (Arapostathis et al. 2013, Foxon et al. 2013). The now state-owned company experimented with the Lurgi process, with reforming oil and with importing LNG, and eventually made a bold move to North Sea natural gas. This involved a major reorganisation of the industry and its actors, the development of a national terminal and pipeline network and the challenging conversion of 40 million gas-using appliances. Here, the government-led nature of the transition enabled a high level of co-ordination between different actors and the imposition of change on some unwilling actors, such as householders, to achieve a transition that government and industry agreed would be beneficial for society. At key points, the government-led system had allowed experimentation in niches as to the most desirable alternative source of gas. This experimentation assisted the transition pathway to natural gas. The 5th transition concerns the privatisation and eventual liberalisation of the gas industry in the late 1980s, when the state-owned company was sold off in the first major energy privatisation in the UK.

(3) Results

The paper outlines, explores and draws together these transition experiences. It aims to show whether and in what ways the experiences, their modes of governance, their technological trajectories and path dependence offer insights into the technical, social and financial challenges faced by UK gas networks in the low carbon transition.

(4) Conclusion

The paper will show how an examination of key transition experiences along the pathways followed over two centuries by British gas networks helps appreciate the challenges faced by key network actors in the current transition to low carbon heat and other services traditionally supplied via the gas networks.

Selected Sources

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