Retrofitting the built environment 'to save' energy: Arbed, the emergence of a distinctive sustainability transition pathway in Wales'

Abstract

Combining insights from research on systems innovation and sustainable transitions with multi-level governance perspectives, this paper examines the 'Arbed' domestic housing retrofit programmes in Wales. In so doing, the paper demonstrates the critical role of sub-national government in the emergence of a distinctive sustainability-oriented pathway for domestic end-use energy demand reduction in Wales, and highlights the multi-level governance challenges involved. The governance processes contributing to this purposive transformation (e.g., policies and institutions; a 'shared' normative vision; network building; competencies, resource mobilisation, etc.) are illuminated and how they simultaneously cut across multiple spatial scales is discussed. Rather than simply viewing such transition arenas as simple sites of experimentation, the paper argues that sub-national sustainable energy transitions and pathways are shaped by pressures and opportunities that are mediated by unique place and context-specific conditions that exert influence on the mobilisation of resources, governance capabilities and actor-networks.

Keywords: Retrofit, sustainable energy, transitions, Wales, Arbed

1. Introduction

It is now widely recognised that climate change must be tackled if planetary environmental conditions are not to be further jeopardised. While climate change is an inherently global issue,

its effects are felt differently in different places. As governments seek to reconcile environmental protection with multiple pressures and demands, complex architectures of political power and spaces of governing have emerged. The pressures associated with tackling climate change and reducing carbon emissions, it is argued, have given rise to a rescaling of environmental governance in which the regional level is of growing significance (Gibbs and Jonas, 2000; Morgan, 2004; While et al., 2010).

Alongside this, we have witnessed a renewed interest in the spatial transformation of the state, and the importance of economic competitiveness rationalities in influencing new political geographies. This debate, predominantly in the fields of economic geography, regional development studies and innovation, has focussed attention on the region as an emerging political-economic unit, with increasing autonomy of action both at national and international levels, (Asheim and Gertler, 2005; Cooke and Morgan, 1998; Gertler, 2003; Morgan, 1997; Scott, 1998; Storper, 1997). Economic geographers, regional and innovation theorists have all argued that the sub-national level of governance of regions is an ideal territorial scale of economic organisation and political intervention. However, some scholars have criticised the narrow focus of the discourse of competitiveness and economic metrics vis-à-vis regional productivity performance (Bristow, 2005, 2010; Morgan, 2004; Smith et al., 2003), pointing to the ecological imperative of promoting more sustainable forms of economic growth and development (see for instance Healy and Morgan (2012). This requires a broadening of the problem framing (Smith et al., 2010), seeking to link the notion of innovation with the broader goal of sustainable development in a systematic way that looks beyond discrete policy and technological innovations to whole systems change.

Nevertheless, although the subnational level of the region is increasingly being articulated as a key strategic space for the management of economy-environment tensions, often, the spatial

scale in innovation and environmental governance has been treated in hierarchical and discrete terms. Such an account of the global, national, regional and local scales simply as nested spatial containers undermines the complexity of innovation and environmental processes and overlooks the relationship that occurs across and between these levels (Bulkeley and Betsill, 2005; De Laurentis et al., 2014; While et al., 2010). As a result, some authors have highlighted the need to recognise the multi-level governance challenge that coordinating sustainability transitions requires (Truffer and Coenen, 2012). Fruitful contributions in this direction come from a more relational view of scale (Bathelt and Glückler, 2011; Bathelt et al., 2004) in regional development studies and from the multi-level governance perspective developed in policy studies in the 1990s. To this end, the work undertaken by Bulkeley and colleagues (Bulkeley, 2005; Bulkeley and Betsill, 2005; Bulkeley and Betsill, 2013) is important as it seeks to understand whether the multi-level governance perspective can sufficiently capture the processes in place to govern climate change at an urban level, examining the way in which resources, competencies and powers are distributed both 'vertically' between different levels of government and 'horizontally' through multiple overlapping and interconnected spheres of authority (Hooghe and Marks, 2001). This paper engages with these strands of literature seeking to identify the role of the regional scale in processes of sustainable development in particular when sub-national government might lack full legislative powers or financial resources (Haughton and Morgan, 2008).

This paper therefore contributes to improving our understanding of the role of sub-national government and governance in shaping transitions and pathways towards sustainable energy.

It does so presenting the case study of the Arbed schemes led by the Welsh Government (hereafter WG), which have sought to reduce domestic energy demand and promote the diffusion of micro-renewables as part of a broader transition towards sustainability in the built

environment. The case study is interesting at it has the merit of allowing to unpack the multi-layered nature of governance processes, in the UK, highlighting how Wales is attempting to promote a distinctive sustainability transition pathway. Analytically, sub-national governments can be considered to exemplify relevant qualities of regions - hence the terms are used in the paper interchangeably. Wales, for the purposes of this paper, is considered a sub-national government situated between local and national levels with a varied degree of powers and competencies at subnational level, but with a limited capacity to exercise authority and shape energy policy at other scales. The paper also introduces the term 'pathways' to capture the multiplicity of routes through which systems of energy transition may change and to focus attention to the intentionality of their construction entailing a different set of roles for subnational governments. While the language of pathway presented here in the paper points towards the co-evolution of actors and infrastructure in transition processes, following Hargreaves and Burgess (2009: 20) pathways can be defined in the way they 'seek not only to discover if different futures are technically and economically feasible but how such futures might plausibly be brought about by different social actors'. This points towards the possible linkages between the term vision and pathways and according to Mc Dowall and Eames (2006), pathways specifically refer to the way in which a future vision is outlined and storylines worked back from the vision to the present.

In this respect, the case is relevant as it shows an attempt to deliver a large scale transformation of the built environment in Wales, highlighting the complexity of the multi-level governance challenges that coordinating sustainability transitions entails. The governance processes contributing to this purposive transformation (e.g. the role of policies and institutions; a shared normative vision; network building; competencies and resource mobilisation; etc.) are illuminated and how they simultaneously cut across multiple spatial scales is discussed. These interactions, we argue, have led to the development of a sustainability-oriented pathway for

retrofitting in Wales that is distinctive from the market-led pathway (exemplified by the Green Deal) promoted by the UK government. Against the national trend, the WG has framed retrofitting as a vehicle to promote a wider sustainability agenda - a 'just transition'. As the differences with the market-making process promoted at national (UK) level unfold, so the paper offers an opportunity to improve our understanding of the role that sub-national governments can play in sustainability transitions; moving away from the dominant theme of transition research that sees such arenas as simple sites of experimentation. In so doing, we ask:

- What are the conditions that produce and reproduce distinctiveness in transitions pathways at the regional level?

- How best can we understand emergent regional transition pathways in the context of multi-level governance?

- What role, in particular, have sub-national and local governance actors and processes played in constituting and perpetuating such pathways?

This paper is principally based on research undertaken as part of the wider xxxx funded xxxx xxxx project (2010-2014). Documentary analysis and extensive in-depth interviews with a broad range of actors (local government officers, civil servants, private sector companies, community groups and charities) engaged in retrofit activities in different parts of the UK (Cardiff, Manchester, London and other core cities) revealed quite different motivations and framings of the retrofit agenda over time and in different governance contexts and amongst different social interests (De Laurentis et al., 2016; Eames et al., 2014a). In particular, the Welsh case study, presented in this paper, builds from interviews with stakeholders at local and regional levels and an extensive literature review of policy documents and strategies at local, national and international levels. Twenty-five in-depth interviews were conducted during July to October 2010 in the field of retrofitting the built environment in the South Wales

region. Each interview focussed on issues such as: guiding vision(s) and priorities; policy drivers and pressures for change; capacities and capabilities to act; energy efficiency technology and skills; the learning and scaling up opportunities of current and prospective retrofit initiatives in the city regions.

The paper is structured as follows. Section 2 will look to role of sub-national governments in sustainability transitions, seeking insights from the governance, governing and transition literatures. Section 3 will outline the changing UK policy context with respect to energy efficiency and retrofitting of the built environment. Section 4 briefly considers the process of devolution and development of WG policy for domestic retrofit. Section 5 will explore our case study of the Arbed retrofit schemes and discuss what insights can be gained through the lens of the multi-level governance and transition literatures. Finally, in Section 6 we return to the research questions outlined above, drawing a number of conclusions with respect to: i) the particular case of Arbed in Wales; and, ii) wider insights for understanding the emergence of distinctive regional responses to climate change pressures and sustainability transitions pathways.

2. *Understanding the role of sub-national governments: insights from governance, governing and transitions literatures*

In recent years, the sustainable transformation of the built environment (hereafter sustainable retrofit[1]) has been increasing recognised as a major policy challenge. A key characteristic of this is a shift in focus from discrete changes in individual policies or technologies to a systems approach. This new focus brings with it a number of challenges, among them conceptualising – and, indeed, governing –

---

[1]Sustainable retrofit is here defined as the 'directed alteration of the fabric, form or systems which comprise the built environment in order to improve energy, water and waste efficiencies'. In particular, the main focus is on incremental and disruptive improvements to the built environment - through (inter alia) a combination of systemic technological and social (institutional governance and behavioural) changes - operating across the building, neighbourhood and city-regional scales (Eames et al., 2013).

long-term change in the face of uncertainty (Frantzeskaki and de Haan, 2009). The challenges extend to include making decisions across a myriad of domains and actors and applying a long-term orientation to short-term policy intervention (Loorbach and Rotmans, 2010). The literature puts forward a number of models to purposively trigger and govern structural transformation in major societal subsystems, resulting in greater sustainability throughout society (Meadowcroft, 2009). One of such approaches, the transition management model for governing transition, advocates creating a 'transition arena' of interested parties, and the use of visions, experiments and reflexive governance to express selective pressures and channel resources.

The transition management process is cyclical in nature. The first role of the transition arena is to structure the problem at hand and create vision - or, indeed, set of visions - of desirable future(s). Further to this, coalitions and relationships between relevant actors are developed; actors and resources are subsequently mobilised around 'experiments' in new technologies or modes of provision. Progress is then monitored, evaluated and learnt from. Managing, then, is not a process of command and control but of searching, learning and experimenting (Rotmans and Loorbach, 2008). Visions, in this context, are participatively created frames of reference for describing and addressing a problem (Späth and Rohracher, 2010), helping simplifying the essential components of a broader discourse into something that is meaningful and compelling to a wider audience (Smith and Kern, 2009). Since framings of low carbon concerns can be manifold and contradictory, it is often the participative constitution of visions that serves as a basis for dominant framings of the problem at hand (Hodson and Marvin, 2012). They can also act as a locus around which to collect actors, who are more likely to adhere to a compelling vision (Smith and Kern, 2009) and who can in turn mobilise external actors to change through motivating narratives (Lawhon and Murphy, 2012). Here, visions are useful in that they enable policy makers to attract, retain and motivate actors to realise change. Furthermore, they can be

thought of as a representational space that enables decision makers to orientate change and direct learning processes (Hodson and Marvin, 2012).

In this conceptualisation of transition governance, the state can be seen as a 'stimulator-controller-director' (Lawhon and Murphy, 2012) whose role includes generating momentum for change by bringing together the transition arena, a panel of relevant experts to plan and manage actions for change, orchestrating experiments in protected niches and guiding the direction of change through the use of constant monitoring and evaluation processes, reflexively altering short-term policy for long-term ends. Transition management, however, has been criticised for underestimating the 'messiness' of politics, giving insufficient attention to issues of contestation and normativity (Lovell, 2007; Shove and Walker, 2007). Firstly, sustainability discourse is subject to conflict and as such 'managing' a transition will not be a matter of identifying one optimal future and moving towards it, but rather a process of negotiation between an array of desirable futures. Power, then, is important in determining which future is best articulated and coordinated. Secondly, decisions throughout the governance process – from identifying systems to identifying futures and policies – will be inherently subjective. These processes of power negotiation and subjective decision-making raise the question of 'whose sustainability' will be pursued (Meadowcroft, 2009).

This brings to the fore two sets of issues that are of relevance for this paper. Firstly, transition needs to be seen as a process of contestation and problematisation that is bounded up in context-specific configurations of actors, shaped by institutional and network configurations at different scales and by capacities to enact that change at various level of governance (see for instance Hodson and Marvin (2010); Uyarra and Gee (2013)). Accounts of governance, understood in terms of the re-structuring of the state, from a situation of state dominance in the management of public functions to more multi-actor forms of partnership and networks

(Jessop, 1995; Rhodes, 1996) are useful here. This implies not only that 'governments' exist at a range of different geographical levels of scales, but also that they are increasingly interdependent and involved in a continuing process of negotiation across a range of policy fields. State responsibilities have moved in three directions 'up' towards supranational organisations and institutions; 'down' towards regional and local levels and 'out' with a stronger reliance on semi-public and private institutions (Pierre and Peters, 2000).

Multi-level governance has provided a coherent framework to investigate the material and discursive struggles occurring at urban and regional levels in exploring the politics of climate change (Bulkeley and Betsill, 2005; Bulkeley and Betsill, 2013) and renewable energy (Smith, 2007), respectively. In these contributions, the multi-level governance framework has proved useful to investigate formal and informal divisions of responsibility and resources and, in particular, to understand how opportunities and contradictions emerge in the interpretation and implementation of particular conceptions of sustainability and the relevant scope for urban and regional responses (Bulkeley and Betsill, 2013).

However, as Bulkeley et al. (2007) stressed, very often the focus of the governance literature has been to identifying and describing new institutional arrangements rather than on explaining why these arrangements and structures are being produced. This takes us to the second issue of relevance for this paper. We argue that accounts of transition processes needs to contend more directly not only with accounts of how policy is made and implemented but with the structures, processes and the multiple nature of governing that informs and blends into particular objectives and entities to be governed. Bulkeley et al. (2007) raise this particular issue in their account of the mode and practices of governing waste in the North East of England. The authors have sought to distinguish between, and then integrate 'governance' and 'governmentality' approaches. On the one hand, they argue that analysis of governmentality can provide useful insights in how governing takes place, how problems are defined and on the

specific mechanisms, techniques and procedures that political authorities deploy to realise and enact their programmes. On the other, they argue that the a-spatial account of governmentality can be enriched through governance approaches; in particular, those that highlight the institutional contexts within which governamental rationalities and mechanisms are deployed, translated and contested. In their approach they identify 'modes of governing' defined in terms of objectives and components. These include: a governmental rationality, and associated objectives and programmes (policies); governing agencies; institutional relations between the agencies involved; technologies of governing; and the entities, which are governed. Any one-policy area will consist of multiple modes. This is the result of problems defined and solutions sought by different constellations of actors, rationalities, technologies, institutional relations, and entities that are brought together in the act of governing (Bulkeley et al., 2007). Through the account of policy change in the arena of municipal waste, Bulkeley et al. (2007) illustrate how the modes of governing approach provides a framework for analysis that capture the dynamics of governing waste and the multiple means through which this is achieved.

Following this approach, in this paper we highlight how different modes of governing follow a process of co-evolution alongside different interpretations of policy and practice in the unfolding of sustainable retrofit in the UK and Wales. This, as is shown later, has important implications for sub-national steering.

3. *Retrofitting the build environment*

As the long-term challenges of climate change have become ever more certain and institutionalised in a growing array of international agreements, EU and national legislation, so the need to decarbonise the built environment through 'retrofitting' existing buildings has gained increasing prominence (Dawson, 2007; Kelly, 2009; Sustainable Development Commission, 2010).

At a UK level, the Climate Change Act and related 80% emissions reduction target for 2050 have done much to focus attention on the need to reduce carbon emissions from the built environment (Eames et al., 2013). This is perhaps not surprising as emissions from buildings account for some 35% (with the residential sector responsible for 23% and the non-residential sector 12%) of total GHG emissions in the UK (Committee on Climate Change, 2010), and given low rates of turnover some 70% of the total 2010 UK building stock is expected to still be in use in 2050 (Better Buildings Partnership, 2010; Dixon et al., 2014).

We briefly describe the evolution and framing of retrofit policy and programmes at the national UK level, and in the following sections contrast this with the emergence of the Arbed programmes in Wales.

Over the last decade retrofit has been promoted across a range of national (UK) government bodies, policies and programmes: from the Decent Homes programme, to Building Schools for the Future (BSF), the Community Energy Saving Programme (CESP), the Carbon Emissions Reduction Target (CERT), Feed-in-Tariffs (FITs) for incentivising the uptake of renewable generation, the creation of Low Carbon Economic Areas (LCEA), and more recently Government's Green Deal and Energy Company Obligation (ECO). Prior to 2010, under the last Labour government, national UK retrofit policy could be seen as combining both social and economic framings. For domestic households in particular, the CERT and CESP schemes required the big energy companies to provide low cost measures 'free' to householders together with funding to tackle fuel poverty.

Post 2010, however, this agenda has shifted decisively with the Coalition government's 'flagship' Green Deal (as enshrined in the Energy Act 2011) framing retrofit primarily in economic terms as a process of market making: seeking to deliver financial innovations to address the market failures which are seen as inhibiting households and businesses from

investing in otherwise cost effective energy efficiency measures. In essence, the Green Deal provides both the legal framework and commercial mechanism for energy customers (householders and businesses) to receive loans to undertake energy efficiency improvements in line with the scheme's golden rule. The loan attaches to the property and the 'golden rule' requires that the repayments should not exceed the expected saving on the average energy bill (Eames et al., 2014b). Alongside the Green Deal, the new ECO was intended to replace the CERT and CESP, providing (significantly reduced) funding to tackle fuel poverty and the cost of measures falling outside of the golden rule (such as solid wall insulation). In practice, the design of the Green Deal has been heavily criticised and its implementation has proved highly problematic (DECC, 2014; Eames et al., 2014b; House of Commons, 2014).

4. *Devolution and domestic retrofit in Wales*

Located on the western periphery of the UK, Wales is a relatively small country of just under three million people. Together with a Welsh Government and an elected Assembly, further political and spatial boundaries are represented by the 22 local authorities. Regions do not formally exist in Wales although regions are identified for European funding stream purposes (such as West Wales and the Valleys and East Wales, in receipt of European Structural Funds investments). For the purpose of this paper, therefore Wales is considered a sub-national government situated between local and national levels with the capacity for authoritative decision-making, yet with a limited armoury of powers concerning energy and infrastructure.

Energy (in the form of Welsh coal) has historically played a central role in the socio-economic development of region. The rapid expansion of the Welsh coal and iron industries in the late 18th Century not only helped to drive mass immigration into South Wales, but also powering much of the global transition to a carbon economy. Welsh coal production peaked in 1913 (Jenkins, 1975), and in the following decades much of the region's economy based on heavy

industry suffered severe decline. Wales has also inherited a legacy of poor quality and 'hard to treat' residential housing. In 2006 solid wall properties and properties off the gas grid accounted respectively for some 35% and 37% of the total in Wales (c.f. 27% and 15% respectively in England) (Baker and Preston, 2006).

The process of establishment of a sub-national government in Wales was initiated by the 1997 referendum on devolution. The Government of Wales Act 1998 provided for the establishment of a directly elected National Assembly for Wales (hereafter NAW). Section 121 of this Act also established a statutory duty on the WG to promote and pursue sustainable development. Since 1999 a further process of progressive devolution saw the development of a sub-national government in Wales, a separate executive body (initially known as the Welsh Assembly Government and from May 2011 as the Welsh Government), together with a constitutional mechanism to enable certain legislative duties to be delegated from the UK Parliament to the Assembly. Devolution has given the WG control over twenty areas of devolved responsibility (including health, education, environment, housing, local government, economic development, support for innovation, rural affairs and culture) for which direct law making power were also transferred after a further referendum in March 2011. With respect to climate and energy policy however the picture is somewhat more complicated.

Energy policy remains largely a reserved matter, with responsibility resting with the central government in Westminster. Unlike Scotland, Wales does not have its own Climate Change Act, although Welsh Ministers do have a duty to report on climate change objectives, emissions, impacts and priorities to the Welsh Assembly. The WG does have devolved powers in a number of key areas relating to energy policy (e.g. some aspects of planning, local government, housing, environment, innovation and waste policy). In the years immediately following its establishment the Welsh Government, in line with its overarching duty to promote

sustainable development, set out a series of ambitious climate and energy policy targets and objectives, which in many cases exceeded then current UK and international commitments (De Laurentis et al., 2011).

<TABLE 1>

Source: Author's elaboration from Welsh Government's climate and energy policy documents

It was in this context that in 2009 the WG established the first Arbed scheme. Meaning 'to save' in Welsh, Arbed, that consisted of two phases, phase I and phase II set out to bring environmental, social and economic benefits to Wales through coordinating investments into the energy performance of Welsh homes. Table 2 summarises the timeline and the scale of the project in terms of resources and measures involved in the two phases.

<TABLE 2>

Source: Author's elaboration from WHQ (2011) and WG (2013)

5. *Arbed: governing transition and multi-level governance*

The Arbed scheme has the ambitious objective of bringing environmental, social and economic benefits to Wales through coordinating investments into the energy performance of Welsh homes (WG, 2011a). The promise of a cross-cutting sustainability agenda meant that, at the outset of the scheme, an important task was to construct a narrative sufficiently coherent and compelling to persuade heterogeneous actors to work together on retrofitting aims. Indeed, the project documentation itself states that its objectives are drawn from no less than nine policy documents (WG, 2011b). In particular, the narrative around the Arbed scheme included:

i. Increasing the energy efficiency of existing homes in Wales and reducing carbon dioxide emissions;

ii. Reducing the impact of fuel poverty on people in Wales;

iii. Creating jobs and economic opportunities for Welsh residents and businesses in the design, manufacture, distribution, installation and maintenance of domestic energy efficiency measures;

iv. Two supporting aims of creating an evidence base for future phases of retrofitting at scale.

While addressing a number of cross-cutting objectives (social, economic, environmental) through a unifying set of activities (providing job and savings, both monetary and carbon, through retrofitting houses), the scheme also defined a number of entrenched problems – poor quality housing stock, low levels of economic activity – and reframed them as a vision for undertaking '*largest of its kind*' (Consultant 14) change and a win–win situation.

5.1 Creating visions for change and assembling local actors

Although the Arbed scheme was never explicitly framed as a Transition Management process, and the WG has never used the language of transition management, strong similarities with the transition management approach can be seen across phases I and II of the Arbed scheme. In both phases, we can recognise a cyclical process of vision creation, assemblage, experiments and evaluation. Recalling Smith et al. (2010)'s roles for visions, it can be seen that the vision around Arbed: (i) presented an achievable aim, i.e. retrofitting existing homes for energy efficiency with a focus on regeneration areas; (ii) created a heuristic for understanding complex issues: synthesising and simplifying aspects of the complex sustainable development discourse into a single vision, including drawing key objectives from a large number of policy documents and different organisations and levels of government that allowed for *'a natural synergy*

between ambitions' (Consultant 14); (iii) developed a stable frame for target setting and evaluation: providing measurable proxies for progress made, i.e. emissions reduced, bills saved, fuel poverty reduced, along with a requirement for data collection and ongoing evaluation.

Hence, distilling sustainable development objectives into a practicable scheme served as an important purpose in mobilising actors. While the Arbed aims and objectives were delivered through partnership working between a government team (two people in phase one, four in phase two), local authorities and social housing providers, the network constituted around the design and delivery of the project also included: the Energy Saving Trust Wales, the Building Research Establishment (a UK research based consultancy with strong expertise in the built environment), the Community Housing Cymru, a charity representing over 70 housing associations and community mutuals in Wales, and the Welsh Local Government Association (WHQ, 2011). As well as aligning actors exterior to government, it also brought together a number of departments within WG including the Climate Change and Water Division, Strategic Regeneration and Housing Divisions (Heath, 2010). This allowed: to bring together people *'wanting to do the same thing but not been able to speak each other's language' (Consultant 14)'.*

The project highlighted the agency of the WG, its leadership role in creating a shared vision, mobilisation of resources and building an actor network. Such 'governance by government*' à la* Hisschemöller et al. (2006) provided a visible act and a measurable effect of government interventions contributing to build consensus around environmental issues such as energy efficiency aligning them with economic (micro-generation and green jobs) and social (tackling fuel poverty) benefits. The Arbed team also provided an objective knowledge available in support of specific actions . Table 3, for instance, highlights the role that the WG has played in project selections, in promoting learning and monitoring form best cases, in allowing for

financial flexibility mixing various funding streams, and in providing a compelling enough vision to align different actors' interests).

<TABLE 3>

Surveying, selecting and procuring measures, materials and installers were conducted predominantly at scale, facilitating economies in procurement, allowing the project team to act as a knowledge transfer 'hub', disseminating best practice and supporting learning. Such partnership working ensured that each individual scheme undertaken under the wider project – led by six separate councils and twenty two individual housing associations (WHQ, 2011) - was aligned with the project's objectives.

The Arbed scheme provided a 'transition arena' for housing providers (Hunt and De Laurentis, 2014), increasing understanding and awareness of retrofit activities. Retrofitting became embedded into the existing routines and practices of social housing maintenance. The scheme was also successful in engaging with alternative voices representing often under-represented groups such as residents and the unemployed and created an opportunity for communities to become more engaged with issues such as climate change and energy efficiency.

This exercise in network building was important in two key ways: bringing together disparate competences and expertise and allowing access to complementary funds. With regard to the former, aligning competences, the project was able to make use of policy capabilities at the WG level, local knowledge and priorities at the LA level and practical capacity at the delivery end, among others. These competences were an important resource with regard to planning and implementing the scheme successfully, especially given tight time frames and a limited evidence base.

5.2 Interaction across levels of governance

It could be arguedthat as decisions on the Arbed scheme were largely made within the WG and local Welsh organisations (LAs, Has and RSLs) the subnational level represented the key strategic space in which institutional, social and physical relations interacted to shape the emergence of this distinctive Welsh pathway.

Nevertheless, on closer inspection it is clear that multiples scales of governing have played a role in shaping local capacity and resources to retrofit the built environment in Wales. Firstly, this is evident in the way pressures, targets and drivers for sustainable retrofit in Wales sit within a broader landscape of national and international policies and targets for carbon emission reductions. Secondly, the sustainability agenda in Wales is necessarily informed by a long history of externally funded regeneration efforts, which arguably fostered a culture of state dependency for much of the 20th century, with repercussions for priority areas in policy (WAO, 2005) and governance setting. Since from the outset of Arbed, it was believed that '*the full potential of energy efficiency schemes can be realised if these schemes are embedded into Wales' broader economic development and regeneration agenda*' (Consultant 14).

Thirdly, the multidisciplinary nature of the Arbed programme was instrumental in accessing funding streams at international, national, regional and local levels. The Strategic Capital Investment Fund through which the WG (2008) primarily funded Arbed phase 1 was dedicated to the delivery of 'cross-cutting projects', making the inter-departmental working of the programme crucial. Furthermore, by working with social housing providers the programme was able to leverage other funding streams (e.g. the Welsh Housing Quality Standard funding available to social landlords to improve their housing stock to meet the new national standard, and the Homes Energy Efficiency Scheme which offered grants for energy efficiency improvements (now the Nyth scheme). Importantly, Arbed helped social housing providers and LAs to access CERT and CESP funding from (UK) utility provider obligations. Indeed, the

programme provided a mechanism whereby Arbed account-managed its grantees on the one hand and major energy companies on the other to leverage funding at scale through the utility provider obligations.

Accessing European resources has also been important to the evolution of Arbed. As noted above, following a recent change that allowed Member States to redirect up to 4% of their European Regional Development Fund allocation to energy efficiency and renewable energy measures in existing housing, Arbed II was supported by the ERDF and match funded by WG. This had a repercussion for priority areas of policy and have also resulted in an enhanced leadership role for local authorities. .

In these respects, Arbed's integrative vision of sustainable development offered an opportunity for 'building actor networks' and 'focussing financial capital and other resources' (Smith et al., 2010). This has allowed for identifying a plausible future that is technically and economically feasible and how this can be brought about by different social actors (cfr. Hargreaves and Burgess, 2009). The next session highlights how as discussed, the emerging regional pathway cuts across multiple spatial scales.

5.3 A locally distinctive mode of governing?

We now turn to highlighting how Arbed is relevant in understanding how different interpretations of policy and practices that emanate from the international, national and sub-national levels can co-exist and how international and national priorities are mediated and achieved through different means and rationalities at sub-national level. Retrofitting, by its very

nature, occurs in existing social, governance and physical structures and these influence the way changing political priorities, pressures and economic drivers are experienced, interpreted and acted-upon (De Laurentis et al., 2016). Although the nation-state is important so also are various other levels and scales of governance.

In order to unfold this process, table 4, adopts the 'modes of governing 'approach developed by Bulkeley and colleagues (2007), summarising the main characteristics of attempts to promote retrofit at scale by the UK government and the main differences between this and the retrofitting agenda promoted and implemented in Wales. As argued above two distinctive rationales are emerging. International and European agreements, together with the UK government's own 2050 targets, have given rise to an increased awareness of the need to reduce carbon emission from the built environment. This has resulted in the development of a number of government policies and programmes and most recently, in a context of wider austerity measures, a dominant economic rationale has emerged. This sees energy efficiency as more of a commodity and, insofar as the energy efficiency measures can pay for themselves, the funding of energy efficiency is shifted from society[2] to private individuals (Guertler et al., 2013; Rosenow and Eyre, 2012). The Green Deal exemplifies this: an innovative market mechanism with the ultimate goal of establishing a vibrant market in energy efficiency. Competition amongst Green Deal providers was expected to drive take-up and a host of new business actors from the big supermarkets to DIY stores were expected to enter the market: 'we want as many providers getting involved as possible because that's what will give consumers the best deal' (DECC, 2011).

Initially some 22 organisations were listed as Green Deal providers, including energy service companies, energy suppliers, housing providers and insulation installers. The 'governing

---

[2] Before 2012, the main means of funding and delivering home energy efficiency improvements has been via obligations on energy utilities, paid for via a levy on gas and electricity bills and public subsidy programmes.

agencies' extended to include consortia made up of banks, consumer and business groups, local authorities etc., as well as the investor community as retrofit activities capital is privately financed (Dowson et al., 2012). Actors such as the Energy Saving Trust and the Carbon Trust, although still present in their guidance and advisory roles, have seen their core public funding removed, and their formal supporting roles significantly reduced.

The Green Deal was not originally designed to provide subsidies for retrofit work and was not intended for alleviating fuel poverty, rather the focus was on 'able-to-pay' households (Guertler, 2012). The energy company obligation (ECO) provides additional funding for low-income households and hard-to-treat properties. The (UK) government funded fuel poverty programme (Warm Front) ended in 2013, and therefore the industry funded ECO has become a replacement for both carbon saving and fuel poverty programmes, but with substantially reduced funding (money received by the fuel poor in England has been cut by 26% between 2009 and 2013 according to ACE (2012).

Following from the discussion above, the differences between the two modes of governing sustainable retrofit become apparent. In Wales, the rationale of governing energy efficiency and carbon emission reduction in the built environment translates into improving and sustaining people's quality of life, the wellbeing of people and communities, embedding social justice and equality for all. As an interviewee put it, '*we've chosen to put our money in poorer communities (…) I'm not sure Green Deal really offers very much to those groups (Welsh Government Official 22).*

Such a social rationale requires a more inclusive approach: the governing agencies involved extend to include community interest companies, communities, local businesses and the unemployed.

Organisations such as Energy Saving Trust Wales and Carbon Trust Wales have continued to provide support and have maintained, and in some instance, increased their level of funding.

The focus is shifted from the individual house, a priority in the Green Deal, to targeting the '*right area first*', the '*worst performing stocks*' and targeting vulnerable communities. In these instances, energy efficiency activities are delivered through public funding generated from a number of national (obligations on energy utilities), European (ERDF), subnational (Welsh Government Strategic Capital investment fund) and local (housing associations and local authority funds) sources. In essence, the WG has pursued a divergent sustainable energy pathway that better reflects the resources, existing infrastructures and path dependencies in the regional context.

Table 4: Governing sustainable retrofit

< TABLE 4>

Source: Authors' elaboration following (Bulkeley et al., 2007)

What can be concluded from this account is twofold. Firstly, the narrative of the Arbed project and the retrofitting of the built environment in Wales provided a motivating 'vision' to draw together actors and resources and enable change. The governance of Arbed incorporated the translation and articulation of a problem – often drawing together abstract, intangible discourses into a salient, understandable argument for a broader audience – and the rallying of resources including actors, capabilities and capital. Secondly, the case study highlights the role the WG has played in shaping and steering this distinctive regional pathway. In Wales, the problematisation of energy systems around energy efficiency, as a means to address fuel poverty and equality, has shown that institutional arrangements, infrastructures and actors, at sub-national and local levels, have been critical 'in mediating the ways in which central

government programmes are enacted and implemented and in defining what it is which will be governed' (Bulkeley et al., 2007).

6. Conclusions

In this paper, we have used the Multi-Level Governance and Transitions literature as a frame for exploring the role of sub-national government in sustainability transitions. We have drawn on some of their central tenets of these literatures to show that, in the case of Arbed in Wales, the agency exercised by sub-national government has demonstrably made a difference to the pathway adopted. Returning to the three questions posed in Section 1, we can summarise the contribution of this paper as follows. Firstly, we have highlighted the conditions that produce and reproduce distinctiveness in transitions pathways at the regional level. The case study demonstrates how focussing attention on the ways in which problems are framed, how policies are formulated and implemented, resources mobilised and governance enacted by sub-national government is critical in producing and reproducing distinctiveness in transition pathways at a regional level. The case study also illustrates how such processes of transition are mutually shaped, or co-constructed, by the actors involved and the specific contexts in which they are situated.

The paper highlighted how, against the national trend, the WG embraced retrofitting as a vehicle to promote a wider sustainability agenda that can be conceptualised as a 'just transition'. Such distinctiveness compared to the UK approach, best embodied by the Green Deal market-making scheme, reflects the WG's statutory duty to pursue sustainable development. With sustainable development as a guiding principle, actors have found themselves not only obligated to consider sustainable development ramifications of policy choices, but embedded in an institutional culture in which sustainable development is valued.

The evolution of the distinctive sustainability oriented pathway was shaped by capabilities and resources distributed across different levels of governance and government in order to address the entrenched problem of poor quality housing and fuel poverty.

Secondly, in order to fully understand the emergence of this regional transition pathway, there is then a need to understand the multi-level governance context within which it is embedded. In particular, we have shown how regional, national and European institutional contexts have all contributed to this co-evolutionary process, mutually constituting the way resources of different kinds are deployed, translated and contested. The ambitious WG's targets and the Arbed programme were not created in isolation. Rather, they should be seen in the context of EU and UK targets and priorities. As energy efficiency and carbon emission reduction become an arena for problematisation and action at diferent spatial levels, the paper has shown that the sub-national institutional arrangements, local and regional infrastructures and actors have been critical in mediating the ways in which such multi-level drivers and policies are enacted and implemented. Arbed was constituted across different levels of both government and governance, across the EU, UK, Welsh and local levels. Although Welsh and local actors and networks represented the key actors in the emerging pathway, these different levels of governance have also been important. Energy efficiency activities have been delivered through public funding generated from a number of national, international, regional and local resources. In the Arbed case, funding has necessarily been a key factor in deciding which opportunities and constraints were faced, with programme actors necessarily adapting to new circumstances. Moreover, while the scheme managers mobilised multiple budgets, to drive innovation, this produced something of a short-termism paradox, exemplified by the tension between short term devices and long term objectives (cfr. Sjöblom, 2009). The regional pathway of achieving sustainable development and reducing carbon emission in the built environment implies a long term path of continuity that requires constant governance work to keep programmes of change

on track. The delay in allocating funding from phase I to phase II highlighted the problems that governing a long term regional pathway can often entail: the friction of coordination and continuity.

The changing face of the programme across phases I and II also demonstrates how the creation and roll out of transition pathways is not static, but rather a dynamic process that is (co)evolutionary in nature and demonstrate how plausible futures can be brought about by different social actors Within the Arbed scheme, in response to changing funding avenues and their associated criteria, new actors where brought into the programme, whilst some of those integral in the first phase of the scheme were now excluded. This problematic lack of continuity was damaging to the retention of skills and collective learning, and from a transitions perspective we would have expected the capacity for collective learning to be central to the progression of a successful pathway. However, from a multi-level governance perspective, it perhaps suggests that successful pathways need to be flexible and responsive in the face of change across levels of government in order to remain resilient.

Finally, the paper suggested that the sub-national and local governance actors and processes played an important role in constituting and perpetuating a future vision for Wales and its distinctive regional pathway In the context of the Arbed scheme, the vision of a 'strategic' investment scheme to 'reduce climate change, help eradicate fuel poverty and boost regeneration' (WG, 2013) is a compelling and integrative frame that describes the problem: climate change, fuel poverty and economic deprivation; and proposes a solution: investment in domestic buildings. Around this, the WG has built networks of relevant stakeholders and directed experiments in the form of retrofit schemes across Wales. As argued, this assemblage has proven important in bringing together disparate competences and expertise and accessing complementary funding streams. While not acting as a Transition Manager per se, we have shown how the WG has played a critical role in steering and guiding this process, through the

creation of a shared vision, mobilisation of resources and building (maintenance and repair) of an actor network. The steer in coordination role on the part of the WG has undoubtedly been decisive in the emergence of a distinctive regional sustainability pathway in the case of Arbed in Wales. This raises the question as to whether some form of transition manager, or institution fulfilling this function, is a necessary requirement in all such cases.

Compared to the devolution settlements in Scotland, the WG has a more limited armoury of powers in which to shape sustainability pathways, especially in regards to energy and its infrastructure, with many relevant powers being retained by Westminster. This shortage of levers on the supply side (e.g. provision of renewable energy on a large scale) has arguably led to an emphasis on demand side approaches focussing on the way households use energy, providing a central role for retrofitting of the built environment. Within the field of retrofit, the paper has shown, appropriate powers are in place to influence change and, to some extent, the WG has shown competence and political will to set up policy priorities that differ from a more classical approach to energy policy which might put stronger emphasis on energy generation.

Both the transition management and multilevel governance literatures can be useful in understanding the opportunities and contradictions that can emerge in developing visions for sustainability and their interpretation and implementation in context-specific configurations of actors and networks, at multiple scales. The paper has also shown that sub-national governments can have relevant scope to develop further capacity and capability to envision and enact locally developed transition pathways. Whether, these regional transition initiatives can influence transition dynamics at multiple scales (see for instance Hodson and Marvin (2009) and Essletzbichler (2012)), is a matter to be analysed by further research.

List of References

ACE, 2012, "The impact of fuel poverty budgets in England", http://www.ukace.org/wp-content/uploads/2012/12/ACE-and-EBR-2012-11-Reduced-fuel-poverty-budgets-in-England-briefing.pdf

Asheim B T, Gertler M, 2005, "The geography of Innovation, Regional Innovation Systems", in *the Oxford Handbook of Innovation* Ed J Fangerberg, Mowery, D., Nelson, R (Oxford University Press, New York)

Baker W, Preston I, 2006, " Targeting energy efficiency resources in Wales. Report to the Welsh Assembly Government, " (Centre for Sustainable Energy, Bristol)

Bathelt H, Glückler J, 2011 *The Relational Economy. Geographies of Knowing and Learning* (Oxford University Press, Oxford)

Bathelt H, Malmberg A, Maskell P, 2004, "Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation" *Progress in Human Geography* **28** 31-56

Better Buildings Partnership, 2010, "Low Carbon Retrofit Toolkit: A Roadmap to Success"

Bristow G, 2005, "Everyone's a 'winner': problematising the discourse of regional competitiveness" *Journal of Economic Geography* **5** 285-304

Bristow G, 2010 *Critical Reflections on Regional Competitiveness: Theory, Policy and Practice* (Routledge, London)

Bulkeley H, 2005, "Reconfiguring environmental governance: Towards a politics of scales and networks" *Political Geography* **24** 875-902

Bulkeley H, Betsill M, 2005, "Rethinking Sustainable Cities: Multilevel Governance and the 'Urban' Politics of Climate Change" *Environmental Politics* **14** 42-63

Bulkeley H, Betsill M M, 2013, "Revisiting the urban politics of climate change" *Environmental Politics* **22** 136-154

Bulkeley H, Watson M, Hudson R, 2007, "Modes of governing municipal waste" *Environment and Planning A* **39** 2733-2753

Committee on Climate Change, 2010, "The Fourth Carbon Budget, Reducing Emissions through the 2020s. ", (Committee on Climate Change London)

Cooke P, Morgan K, 1998 *The Associational Economy: Firms, Regions, and Innovation* (Oxford University Press, Oxford)

Dawson R, 2007, "Re-engineering cities: a framework for adaptation to global change " *Philosophical Transaction A* **365**

De Laurentis C, Eames M, Wang Y, Hunt M, 2011, "Constructing Sustainable Regional Advantage: Low Carbon Innovation and the Built Environment in Wales", in *International Seminar on Regional Innovation Policies- Constructing Sustainable Advantage for European Regions* (Lund)

De Laurentis C, Hodson M, Marvin S, 2016, "Retrofit in Greater Manchester and Cardiff: Governing to Transform or to Ungovern?", in *Retrofitting Cities: Priorities, Governance and Experimentation* Ed M a M Hodson, S. (Routledge, Abingdon) pp 34-51

De Laurentis C, Morgan K, Eames M, 2014, "The role of regions in low carbon transitions dynamics: the 'Greening' of Puglia Region", in *9th International Conference on Regional Innovation Policies* (Stavanger)

DECC, 2011, "Homes and Economy to Benefit from Energy and Climate Policies Government", http://www.decc.gov.uk/en/content/cms/news/pn11_096/pn11_096.aspx

DECC, 2014, "More cash-back for people carrying out Green Deal home improvements",

https://www.gov.uk/government/news/more-cash-back-for-people-carrying-out-green-deal-home-improvements

Dixon T, Eames M, Lannon S, 2014, "Introduction: Part I, setting the scene for urban retrofit. ", in *Urban Retrofitting for Sustainability: Mapping the Transition to 2050* Ed T Dixon, Eames, M., Lannon, S. and Hunt, M. (Routledge, London)

Dowson M, Poole A, Harrison D, Susman G, 2012, "Domestic UK retrofit challenge: Barriers, incentives and current performance leading into the Green Deal" *Energy Policy* **50** 294-305

Eames M, Dixon T, Lannon S, Hunt M, De Laurentis C, Marvin S, Hodson M, Guthrie P, Georgiadou M C, 2014a, "Retrofit 2050: Critical challenges for urban transitions. Technical Report. ", (Cardiff University, Cardiff)

Eames M, Dixon T, May T, Hunt M, 2013, "City futures: Exploring urban retrofit and sustainable transitions" *Building Research and Information* **41** 504-516

Eames M, Lannon S, Dixon T, Hunt M, 2014b, "Financing, managing and visioning the urban retrofit transition to 2050", in *Urban retrofitting for sustainability: mapping the transition to 2050* Ed T Dixon, Eames, M., Lannon, S. and Hunt, M (Routledge, London)

Essletzbichler J, 2012, "Renewable Energy Technology and Path Creation: A Multi-scalar Approach to Energy Transition in the UK" *European Planning Studies* **20** 791-816

Frantzeskaki N, de Haan H, 2009, "Transitions: two steps from theory to policy. " *Futures* **41** 593-606

Gertler M, 2003, "Local Knowledge: Tacit Knowledge and the Economic Geography of context, or the Undefinable tacitness of being (there)" *Journal of Economic Geography* **3** 75-99

Gibbs D, Jonas A E G, 2000, "Governance and regulation in local environmental policy: the utility of a regime approach" *Geoforum* **31** 299-313

Guertler P, 2012, "Can the Green Deal be fair too? Exploring new possibilities for alleviating fuel poverty" *Energy Policy* **49** 91-97

Guertler P, Robson D, Royston S, 2013, "Somewhere between a 'Comedy of errors' and 'As you like it'? A brief history of Britain's 'Green Deal' so far", http://ukace.org/wp-content/uploads/2013/06/1-306-13_Guertler.pdf

Haughton G, Morgan K, 2008, "Editorial: Sustainable regions " *Regional Studies* **42** 1219-1222

Healy A, Morgan K, 2012, "Spaces of Innovation: Learning, Proximity and the Ecological Turn" *Regional Studies* **46** 1041-1053

Heath S, 2010, "Heath, S., 2010. Arbed: strategic energy performance investment scheme, presentation for CommunityHousing Cymru, November ", http://www.chcymru.org.uk/shadomx/apps/fms/fmsdownload.cfm?file_uuid¼310EE979-954A-4AD9-A7B0-B19D41C46EAC&siteName¼chc_dev_final

Hisschemöller, M., Bode, R., van de Kerkhof, M, 2006, What governs the transition to a sustainable hydrogen economy? Articulating the relationship between technologies and political institutions, Energy Policy, **34**, Issue 11, 1227-1235

Hodson M, Marvin S, 2009, "Cities Mediating Technological Transitions: Understanding Visions, Intermediation and Consequences" *Technology Analysis & Strategic Management* **21** 515-534

Hodson M, Marvin S, 2010, "Can cities shape socio-technical transitions and how would we know if they were?" *Research Policy* **39** 477-485

Hodson M, Marvin S, 2012, "Mediating low carbon transitions? Forms of organisation, knowledge and action. " *European Planning Studies* **20** 421-439

Hooghe L, Marks G, 2001 *Multi-level Governance and European Integration* (Rowman & Littlefield Publishers, Inc, Maryland)

House of Commons, 2014, "The Green Deal: Watching Brief (part 2), Third Report of Session 2014–15 Report, together with formal minutes relating to the report, HC 348 [INCORPORATING HC 1111, SESSION 2013-14]", Ed E a C C Committee (Stationary Office, London)

Hunt M, De Laurentis C, 2014, "Sustainable regeneration: a guiding vision towards low-carbon transition?" *Local Environment* 1-22

Jenkins G, 1975 *Wales, London (etc.)* (London, Batsford)

Jessop B, 1995, "The Regulation Approach, Governance, and Post-Fordism: Alternative Perspectives on Economic and Political Change?" *Economy and Society* **24** 307-333

Kelly M, 2009, "Retrofitting the existing UK building stock" *Building Research and Information* **37** 196-200

Lawhon M, Murphy J, 2012, "Socio-technical regimes and sustainability transitions: insights from political ecology." *Progress in Human Geography* **36** 1-25

Loorbach D, Rotmans J, 2010, "The practice of transition management: examples and lessons from four distinct cases. " *Futures* **42** 237-246

Lovell H, 2007, " The governance of innovation in socio-technical systems: the difficulties of strategic niche management in practice. " *Science and Public Policy* **34** 35-44

Meadowcroft J, 2009, "What about the politics? Sustainable development, transition management, and long term energy transitions." *Policy Sciences* **42** 323-340

Morgan K, 1997, "The learning region: institutions, innovation and regional renewal" *Regional Studies* **31** 491-503

Morgan K, 2004, "Sustainable regions: governance, innovation and scale" *European Planning Studies* **12** 871-889

Pierre J, Peters G, 2000 *Governance, Politics and the State* (Macmillan Press limited, Houndmills)

Rhodes R A W, 1996, "The new governance: Governing without government" *Political Studies* **44** 652-667

Rosenow J, Eyre N, 2012, "The Green Deal and the Energy Company Obligation – will it work?", in *9th BIEE Academic Conference - European Energy in a Challenging World: The impact of emerging markets* (Oxford)

Rotmans J, Loorbach D, 2008, "Complexity and transition management" *Journal of Industrial Ecology* **13** 184-196

Scott A, 1998 *Regions and the World Economy: The Coming Shape of World Production, Competition, and Political Order* (Oxford University Press, Oxford and New York)

Shove E, Walker G, . 2007, " Caution! transition ahead: politics, practice, and sustainable transition management.." *Environment and Planning A* **39** 763-770

Sjöblom S, 2009, "Administrative Short-Termism—A Non-Issue in Environmental and Regional Governance" *Journal of Environmental Policy & Planning* **11** 165-168

Smith A, 2007, "Emerging in between: the multi-level governance of renewabble energy in the English Regions" *Energy Policy* **35** 6266-6280

Smith A, Kern F, 2009, "The transitions storyline in Dutch environmental policy" *Environmental Politics* **18** 78-98

Smith A, Voß J P, Grin J, 2010, "Innovation studies and sustainability transitions: The allure of the multilevel perspective and its challenges" *Research Policy* **39** 435-448

Smith H L, Tracey P, Clark G L, 2003, "European policy and the regions: a review and analysis of tensions" *European Planning Studies* **11** 859-873

Späth P, Rohracher H, 2010, "'Energy regions': The transformative power of regional discourses on socio-technical futures" *Research Policy* **39** 449-458

Storper M, 1997 *The Regional World: Territorial Developmetn in a Global Economy* (The Guilford Press, New York)

Sustainable Development Commission, 2010, "The Future is Local: Empowering Communities to Improve their Neighbourhoods", (Sustainable Development Commission, London)

Truffer B, Coenen L, 2012, "Environmental Innovation and Sustainability Transitions in Regional Studies" *Regional Studies* **46** 1-21

Uyarra E, Gee S, 2013, "Transforming urban waste into sustainable material and energy usage: the case of Greater Manchester (UK)" *Journal of Cleaner Production* **50** 101-110

WAO, 2005, "Regeneration in Wales since the 1950s: timeline and synopsis. A report by CAG consultants for the audit commission in Wales", (Welsh Audit Office, Cardiff)

WG, 2008, "Written – strategic capital investment framework",
http://wales.gov.uk/about/cabinet/cabinetstatements/2008/stratcapinvest/?lang¼en

WG, 2011a, "Arbed – strategic energy performance investment programme ",
http://wales.gov.uk/topics/environmentcountryside/energy/efficiency/arbed/?lang¼en

WG, 2011b, "Arbed Background ",
http://wales.gov.uk/topics/environmentcountryside/energy/efficiency/arbed/background/?lang¼en

WG, 2013, "Arbed – Strategic energy performance investment programme", (Welsh Government Cardiff)

While A, Jonas A E G, Gibbs D, 2010, "From sustainable development to carbon control: eco-state restructuring and the politics of urban and regional development" *Transactions of the Institute of British Geographers* **35** 76-93

WHQ, 2011, "Arbed: a housing provider perspective" *Welsh Housing Quarterly* **83** 8-9

Table 1 Climate and Energy commitments for Wales, selected

Reduce its use of carbon-based energy by 80-90%, resulting in a similar reduction in greenhouse gas emissions;

Make annual 3% reductions in greenhouse gas emissions in areas of devolved competence from 2011;

Become a net exporter of renewable electricity, renewably generate up to twice as much electricity annually as is consumed in Wales today by 2025;

Build all new buildings to meet 'zero carbon' standard from 2013;

Install one hundred thousand micro heating systems per year by 2020;

Install two hundred thousand micro electricity systems per year by 2020.

Table 2 Arbed Phase I & II: Timescale and measures

Arbed Phase 1

Developed by: the Welsh Government, Building Research Establishment and Energy Saving Trust

Timescale: between 2010 and 2011

Funding: £36.6 million from WG and £32 million leverage funding from (energy suppliers, housing associations, local authorities and gas distribution network providers)

Delivered by: WG, Community Housing Cymru and Welsh Local Government Association and social housing providers

Measure installed: over 7500 measures, including solid wall insulation, solar PV and hot water, heat pumps, fuel switching from coal or electric heating to high efficiency gas boilers

Reach: social housing stock; limited reach of housing in the private sector

Arbed Phase 2

Developed by: Welsh Government

Timescale: between May 2012 and May 2015

Funding: £33 million from ERDF funding and £12 million match funding from WG

Delivered by: two scheme managers, Willmott Dixon in the north and mid Wales and Melin Homes in south Wales.

Measure installed: Bids invited on an annual basis from local authorities to submit up to 2 scheme areas a year to be considered; 10-20 scheme per year; at least 4800 existing homes

Reach: private and social housing stock- *'about 55 to 45 % mix in tenure'* (I 22)

Table 3 Welsh Government's Agency in Arbed Phase 1 and Phase 2

Projects Selection:

'Social housing came back with projects, in essence they weren't the projects that we'd like, there was a lack of understanding across the sector' (Welsh Government Official 13)

'we had to spend three months redesigning the project proposals they put in, because essentially it was a, a lot of solar hot water panels on a lot of roofs, … (we said) find your worst stock, is there anything you can do around those old council properties, the non traditional construction, the sort of poured concrete or pre-cast concrete panel houses? We'll externally insulate them' (Welsh Government Official 13)

'(Arbed II) will be an unusual government scheme in that there will be a four person team sitting above the scheme manager to make sure it aligns with the objectives' (Consultant 14)

Finance:

'Making that come about by mixing various funding streams with various different tenures' Welsh Government Official 13)

'realign your Welsh Housing Quality Standard budget and maintenance programmes, where you get the fabric in a condition to receive external wall insulation, (Arbed) will cover the cost of the external wall insulation', (Welsh Government Official 13)

'the funding for phase 1 allowed that significant flexibility to manoeuvre things and go off to find suitable properties' (…) it was the flexibility afforded by the minister at the top of it that enabled that to happen' (Welsh Government Official 13)

'we have been lucky to be able to maintain quite a substantial level of investment in energy efficiency (here in Wales) and to secure European funding to take it forward for another three years (Welsh Government Official 22)

'These houses we could fund under ARBED because it was in a lower super output area, but the one next door was on the other side of the lower super output area. That proved quite difficult, but we were able to bring forward our own funding and we funded the houses

outside of the lower super output area, and ARBED funded the houses in it (Local government Official 12)

Learning and monitoring:

'participation and stakeholders engagement was also associated with the delivery of workshops, at which attendance was made compulsory for the grantees for Arbed'(Consultant 14)

'every three months they would have to submit exactly where they were, any funding they hadn't spent or wasn't on track for being spent would be taken away from them' (Consultant 14)

Lack of conflict:

'So by making the three strategic aims of ARBED, the economic, social and environmental completely equal, it enabled us to keep everyone happy, to bring everyone on board, and frankly to stop anyone arguing against it because no one could step forward and say oh we don't want to create jobs or we don't want to reduce climate change or we don't want to reduce fuel poverty. Any understanding of the ARBED programme needs to start from that premise, those three strategic aims' (Consultant 14)

'And the climate change stuff and the greenhouse gas emission reductions, it's almost a, it's almost a happy accident that the same thing that you're doing for fuel poverty also usually helps your sort of climate change impact' (Local Government Official 9)

'They understood that if they wanted money to improve their housing stock, they had to work with us to make sure that they were properly surveying the properties, that they were the best measures for reducing energy bills and reducing greenhouse gas emissions and that they were engaging local partners and working together' (Consultant 14)

'it's a very small team of people who are involved in those projects, and yes, people are seeing the value of it in ARBED phase one as winning all sorts of awards, and therefore hopefully people will think that it's an important thing to continue to fund in the future (Local Government Official 9)

'ARBED was the first pot of money that was around that would actually help you do insulated render systems, so it could really target your hard to treat homes, the non traditional properties, and they're always a struggle because you know they're, you know, you can't fill a cavity with insulation, you have to think about doing other things, which means it's more expensive' (Local Government Official 12)

Table 4

Mode	Components				
	Governmental rationality (policies and programmes)	Governing agencies	Institutional relations	Governmental technologies	Governed entities
e.g. The Green Deal	Dominant economic rationale: retrofit as a Market making mechanisms	Energy efficiency as commodity;	National government, Green Investment bank Private sectors Businesses, agencies and politicians	Contractual arrangements individual, customer-led	Individual households 'Golden Rule' Loan repayments attached to the property and not the individual	Businesses and households
e.g. Arbed	'Social rationale': to deliver Sustainable development	To promote sustainable development	Welsh Government, local authorities, Housing associations, Registered Social landlords, community interest companies private sector European Union, UK government	Solidarity; community groups; Focus on vulnerable communities and households	Area based; Whole house approach	Social housings, private houses