

The Regional Dimensions of the 'Transition to a Low-carbon Economy': The Case of Australia's Latrobe Valley

Sally Weller

To cite this article: Sally Weller (2012) The Regional Dimensions of the 'Transition to a Low-carbon Economy': The Case of Australia's Latrobe Valley, *Regional Studies*, 46:9, 1261-1272, DOI: [10.1080/00343404.2011.585149](https://doi.org/10.1080/00343404.2011.585149)

To link to this article: <https://doi.org/10.1080/00343404.2011.585149>



© 2011 The Author(s). Published by Taylor & Francis.



Published online: 19 Aug 2011.



Submit your article to this journal [↗](#)



Article views: 1569



View related articles [↗](#)



Citing articles: 5 View citing articles [↗](#)

Policy Debates

The Regional Dimensions of the ‘Transition to a Low-carbon Economy’: The Case of Australia’s Latrobe Valley

SALLY WELLER

Centre for Strategic Economic Studies, Victoria University, PO Box 14428, Melbourne VIC 8001, Australia.
Email: sally.weller@vu.edu.au

(Received June 2010; in revised form April 2011)

WELLER S. The regional dimensions of the ‘transition to a low-carbon economy’: the case of Australia’s Latrobe Valley, *Regional Studies*. Translating concern about climate change into practical, effective and politically feasible policy action is a key challenge for contemporary governments. In Australia, the government’s failure to launch ‘the transition to a low-carbon economy’ is reshaping the political landscape. This article argues that progress has stalled because politicians emboldened by the moral challenge of climate action, but schooled in market-based policy solutions, have not acknowledged or made provision for the regional impacts of the economic transformation they propose.

Regional development Industrial restructuring Decarbonization Australia

WELLER S. 向低炭经济转移的区域尺度：以澳大利亚为例，区域研究。将对于气候变化的考量转化为实际有效且政治可行的政策行动是当前政府的主要挑战之一。澳大利亚政府部门向低炭经济转型过程中的失败正在重塑其政治景观。本文认为，这一进程受阻是缘于面对气候议程的道德挑战，政客们将解决方案寄托于以市场为基础的政策却未意识到、或为经济转型的区域影响作出规定。

区域发展 产业重构 降炭 澳大利亚

WELLER S. Les aspects régionaux de la ‘transition à une économie à faibles émissions de carbone’: étude de cas de la Vallée de Latrobe en Australie, *Regional Studies*. Traduire l’inquiétude quant au changement climatique en actions à la fois pratiques, efficaces et réalisables du point de vue politique, constitue un défi primordial pour les gouvernements d’aujourd’hui. En Australie, l’incapacité du gouvernement à lancer ‘la transition en une économie à faibles émissions de carbone’ remanie le milieu politique. Cet article affirme que l’on freine le progrès parce que les hommes politiques, enhardis par le défi moral d’agir en faveur du climat, mais rompus aux solutions déterminées par le marché, n’ont ni fait attention, ni prévu les retombées régionales de la transformation économique proposée.

Aménagement du territoire Restructuration industrielle Réduction des émissions de carbone Australie

WELLER S. Die regionalen Dimensionen des ‘Übergangs zu einer CO₂-armen Wirtschaft’: der Fall des Latrobe Valley in Australien, *Regional Studies*. Die Sorgen wegen des Klimawandels in praktische, wirksame und politisch durchsetzbare politische Maßnahmen zu verwandeln gehört zu den wichtigsten Herausforderungen für die heutigen Regierungen. In Australien wird die politische Landschaft aufgrund der Fehlschläge der Regierung bei der Einführung des ‘Übergangs zu einer CO₂-armen Wirtschaft’ neu geprägt. In diesem Beitrag wird argumentiert, dass der Fortschritt ins Stocken geraten ist, weil die Politiker – ermutigt durch die moralische Herausforderung von Maßnahmen gegen den Klimawandel, aber geschult in marktorientierten politischen Lösungen – die regionalen Auswirkungen der von ihnen vorgeschlagenen wirtschaftlichen Umgestaltung nicht zur Kenntnis genommen bzw. berücksichtigt haben.

Regionalentwicklung Industrielle Umstrukturierung Entkarbonisierung Australien

WELLER S. Las dimensiones regionales de la 'transición a una economía hipocarbónica': el caso del Valle de Latrobe en Australia, *Regional Studies*. Traducir la preocupación sobre el cambio climático en medidas políticas que sean prácticas, eficaces y políticamente viables es un reto fundamental para gobiernos contemporáneos. En Australia, el fracaso del gobierno al tratar de introducir la 'transición a una economía hipocarbónica' está transformando el panorama político. En este artículo argumentamos que el progreso se ha estancado porque los políticos, alentados por el reto moral de las medidas climáticas, pero educados en soluciones políticas basadas en el mercado, no han sabido reconocer ni han tenido en cuenta las repercusiones regionales de la transformación económica que proponen.

Desarrollo regional Reestructuración industrial Descarbonización Australia

JEL classifications: H77, R12, R38, R58

INTRODUCTION

Translating concerns about climate change into practical, effective and politically feasible policy action is a key challenge for contemporary governments. Some argue that the technocratic framing of climate imperatives forecloses political debate and thrusts policy responses into the realm of the 'post-political' (SWYNGEDOUW, 2010, p. 214). In Australia, however, the federal government's failure to launch 'the transition to a low-carbon economy' is reshaping the political landscape. At the outset of writing this article, Australia was poised to implement a carbon trading scheme that would have brought it into the club of 'carbon-control' economies. During the article's development, the fragile consensus favouring a 'top-down', national and market-based carbon-control solution collapsed, claiming in its wake the careers of both the then Prime Minister and then Opposition Leader.¹ As this final draft goes to print, the political debate has backtracked, carbon control is (temporarily) off the agenda, and a wider range of policy options are being entertained. This issue is exposing tensions between the federal government, business and environmental interests, as well as between the federal government and Australia's six state government policy jurisdictions. As a consequence, national networks of power are shifting in spatially differentiated ways.

This article examines the Australian government's unrealized commitment to shift the economy to a new low-carbon trajectory. Its central contention is that Australia's political paralysis has arisen not because of a lack of political will, but rather because politicians emboldened by the moral challenge of climate action but schooled in market-based policy solutions have not adequately acknowledged or made provision for the regional impacts of the economic transformation they propose.² The analysis adopts a regulationist perspective, examining the politics of carbon-control policy development as a debate about the nature of the proposed transition. It contrasts the costs, benefits and distributional implications of rapid restructuring with those of a slower evolutionary transformation. The article contends that the Australian policy impasse cannot 'move forward', in the sloganeering of incoming Prime Minister Gillard, until decarbonization policies incorporate convincing strategies to minimize their adverse regional effects.

The article focuses on the likely impact of Australia's now shelved carbon-control policy solution – the Carbon Pollution Reduction Scheme (CPRS) – in the coal-dependent electricity production centre of the Latrobe Valley, a locality in the southern Australian state of Victoria. The Valley's industries are especially vulnerable to adverse outcomes as emissions reduction policies are implemented (GARNAUT, 2008). Single extreme cases such as this are useful analytically because they highlight the intricacies of the issues, expose their theoretical disjunctures and disconfirm the assumptions on which policies have been formalized (EMIGH, 1997). This example calls into question the predictions of large-scale equilibrium-based quantitative modelling of the likely effects of carbon-control policies. The research on which the article is based involved thirty-five interviews with energy firms, contractor firms, unions and local government representatives in the Valley as well as interviews with representatives of relevant Victorian state government departments. The interviews were conducted in October and November 2008, during the consultations that took place after the release of the federal government's consultative Green Paper on the proposed CPRS (COMMONWEALTH OF AUSTRALIA, 2008a) but before its policy blueprint White Paper (COMMONWEALTH OF AUSTRALIA, 2008b) had been finalized. The interviews aimed to provide a 'bottom-up' perspective on the local effects of the CPRS by assessing its likely influence on research and development activity, plant renewal, infrastructure, economic diversification and industrial location. The interview data were used to evaluate the predictions of 'top-down' econometric modelling of the CPRS's expected outcomes, costs and benefits. In addition, the research analysed finely disaggregated statistical data to assess the importance of coal-based electricity production activities to the Valley's employment structure and labour market.

The article's theoretical contribution lies in its expansion of WHILE *et al.*'s (2010) regulation-oriented 'eco-state restructuring' perspective to assess the social, spatial and temporal implications of strategic carbon-reduction projects. By focusing on how the timing of policy change governs the nature of regional transition, the article foregrounds the conflicts and power struggles that accompany the policy change process. The discussion aims to reorient debates toward the practicalities of *how* to make an equitable transition to a low-carbon economy. To that end, the analysis contrasts the spatial relocation expectations of a

restructuring approach (MASSEY, 1984; STORPER and WALKER, 1989) with evolutionary economic geography's emphasis on *in situ* path-dependent development (MARTIN and SUNLEY, 1998).

The article is structured as follows. The next section introduces regulation-oriented, restructuring and evolutionary approaches and explores their relevance to the challenges of a policy-led transition to a low-carbon economy. The third section describes Australia's policy assessment process and explains its failed attempt to introduce a market-based carbon-control strategy. This provides the context for the fourth section, which uses the example of the Latrobe Valley to show that market-based predictive modelling overestimates regions' capacity to accommodate rapid change and underestimates the risk of adverse outcomes. The paper concludes that opposition to pollution reduction measures in Australia is grounded in (largely un-articulated) concerns about the distribution of costs and benefits for regions, sectors and communities. The 'way forward' therefore lies in incorporating distributional policies to address the regional consequences of decarbonization.

RESTRUCTURING, LOCK-IN AND REGIONAL TRANSFORMATION

Geographers have struggled to identify 'conceptual frameworks that situate environmentalism within the wider modalities of state regulations' (WHILE *et al.*, 2010, p. 77). To theorize the full range of possible change processes that a transition to a low-carbon economy might entail, WHILE *et al.* (2010, p. 80) (also GIBBS, 2006) proposed examining the process from a regulation-oriented perspective they called 'eco-state restructuring', which they defined as

the reorganisation of state powers, capacities, regulations and territorial structures around institutional pathways and strategic projects, which are ... viewed as less environmentally damaging than previous trajectories.

The strength of this approach is its capacity to examine questions of economic, social and ecological reproduction at the regional scale, where economic development processes play out in practice.

Regulation theory provides a means to understand how states manage their environmental and economic goals through policy strategies. To rehearse a now well-known summary, regulation theory views the state and society as inseparable and mutually reinforcing elements of a governing regime's accumulation strategy (AGLIETTA, 1979). An accompanying hegemonic 'mode of social regulation' establishes the formal and informal rules that enable the system to reproduce itself. However, system stability is fragile and constantly challenged by internal contradictions. Periods of relative stability are therefore punctuated by crises that are simultaneously economic, social and political in nature. In an effort to avert impending turbulence and secure

the next round of capitalist growth, states embark on sets of related policy reforms. These 'strategic projects' (JESSOP, 2002) are inherently spatialized and tend to favour some industries and regions while disadvantaging others (JONES, 1997). In a world of political contestation, strategic projects are not always achievable in political or practical terms. In practice, they are subject to constant revision, and produce complex mixtures of intended and unintended outcomes as well as generating unpredictable rates of change. State projects are prone to failure; the more complex the issues and the more radical the reform objectives, the higher the likelihood of failure (JESSOP, 2003). Actual developmental paths are therefore uncertain, volatile and crucially dependent on states' capacities to maintain political support for their reform programmes. To avert crises that threaten their legitimacy, states must acknowledge and alleviate the adverse consequences of their strategies (OFFE, 1975).

Spatialized versions of regulation theory provide a robust lens through which to analyse and debate carbon-control policies. From this perspective, the transition to a low-carbon economy is a state strategic project intended to avert a crisis in capitalism's relationship with nature. The strategy's objective is to stimulate innovation, spur the shift to a new socio-technological paradigm and usher in a new 'low-carbon' accumulation strategy. For WHILE *et al.* (2010, p. 86), understanding states' eco-restructuring strategies requires an understanding of how they 'come to ground' in regional economies. This scale of analysis can illuminate the ways that environmental re-regulation is sometimes co-opted to the cause of neo-liberalism (KEIL, 2007), show how its spatially differentiated outcomes can exacerbate social and spatial inequalities (BAILEY, 2007), and reveal its capacity to stimulate complex and territorially specific political responses (CASTREE, 2010).

WHILE *et al.* (2010, p. 81) associate the idea of a transition to a low-carbon economy with a distinctive 'carbon-control' phase of eco-state development; a phase in which states regulate to control emissions via non-negotiable targets, often harnessing market forces to stimulate the replacement of high emission fuels with renewable energy sources. In this article, in contrast, the notion of a transition to a low-carbon economy is viewed as a 'fuzzy' concept with shifting meanings that depend on the discourses in which it is embedded. For green activists, it invokes the expectation of enforceable targets and a rapid shift to renewable energy sources, but for business groups the same phrase envisions a 'business-as-usual' transition of incremental technical innovation and efficiency improvements. From a regulationist perspective attuned to the politics of change (JENSON, 1990) this lack of analytical clarity can be understood as a means of enabling potentially conflicting groups to agree on broad goals (reducing emissions) and to instead debate questions of means. The agreed need for a transition to a low-carbon economy then frames the issue in a way that forecloses debate about the

actual nature of the transition process and the uncertainties of its pace and spatial patterning. The infinite variety of possible transition paths lies between two extremes: on the one hand, an incremental and evolutionary change process that would maintain social stability, but perhaps at the cost of an unacceptably slow rate of decarbonization; on the other hand, a deep restructuring process that mobilizes both capital and labour across regions but risks throwing the strategic project and its sponsoring government into crisis. These opposing views reflect different understandings of the mechanisms driving restructuring or renewal.

Deep restructuring occurs when state-led shifts in accumulation strategies reconfigure industries and regions and relocate economic activity in space. Following MASSEY (1984), it can be surmised that the regional expressions of this form of transition would be shaped by each region's historically produced characteristics. As the economy transforms and new specializations emerge, firms' location decisions will be shaped by the relentless push and pull of transaction costs, differential access to resources and markets, the availability of specialized labour and decisions about industrial organization. To be sure, politics and power relationships, and the institutional frameworks they create, will shape how these forces play out in specific places (CHRISTOPHERSON and CLARK, 2007), but will do so within the underlying realities of regional differences in the costs of the factors of production. Outcomes in particular places will reflect how the 'stickiness' of sunk costs in existing technologies, infrastructure, institutions and immobile resources constrain the 'slippery' movement of mobile capital (MARKUSEN, 1996). If previous rounds of restructuring are repeated, this process will produce uneven outcomes as investment and employment shift to new, profit-maximizing locations. The evidence suggests that the more market-oriented the regulatory framework, the stronger the tendency for radical spatial change (PECK and TICKELL, 1995). Thus, a restructuring perspective anticipates that the transition to a low-carbon economy will produce deep changes in regional fortunes, generating winners and losers depending on where people live and what they do for a living. Fossil-fuel specialized regions, in particular, will face uncertain futures because once these competitive economic forces are in play, it seems almost impossible to reverse the process of disinvestment from declining regions (HUDSON, 1994).

In contrast, evolutionary economic geographical perspectives invoke the expectation of *in situ* revitalization and a gentler, stable and crisis-free transition. In this framework, socio-technological regimes evolve in place-specific ways and rates and produce place-specific social and technical trajectories (LUNDVALL, 1992). Here, multiple relatively small policy and practice reorientations within regional economies accumulate over time to produce radical reorientations of local developmental trajectories (SIMMIE and MARTIN, 2010). To effect an endogenous transformation, places must overcome

their existing institutional and socio-technical 'fixes' and purposefully graft new, redirected branches onto their developmental pathways. In old industrial regions, this bootstrap process can be triggered by reassembling institutional frameworks to open them up to new ideas, new technologies and new ways of doing. Regional transformation can fail if institutional or technological 'lock-ins' stifle innovation and inhibit attempts to redirect local developmental pathways (GRABHER and STARK, 1997). Lock-in has multiple expressions. GRABHER (1993) distinguishes three interconnected forms of institutional lock-in: the 'functional' lock-in of established inter-firm relationships, the 'cognitive' lock-in of established worldviews and the 'political' lock-in of existing power relations. HUDSON (1994) adds the deeply engrained social and cultural lock-in that can arise when communities become over-reliant on long-established paternalistic relations of production. FREEMAN and PEREZ (1988) (also UNRUH, 2000) show that technological lock-ins impel firms to persist with sometimes inferior products or processes and discourage them from adopting radically new technologies. HASSINK and SHIN (2005) describe how 'sunk' or non-recoverable investments in technologies, plant and equipment inhibit transformative change. In the case of the transformation to a low-carbon economy, DEL RIO and UNRUH (2007) show how renewable technologies have been locked-out of contention by a combination of technical, economic, infrastructural and institutional factors. These factors imply that theories of endogenous regional growth can overplay the capacities of local growth coalitions to instigate change and exaggerate their control over economic decisions. They can also underplay the influence of political conflicts that militate against the identification of shared regional strategies (MACKINNON *et al.*, 2009). For PIKE *et al.* (2010), the remedy is found in strategies that strengthen local networks, empower local actors, recognize a variety of possible growth paths and create spaces of collaboration in which future paths emerge organically. Still, externally imposed imperatives – such as those of emissions reduction policies – must challenge regions' capacities to find their own paths at their own pace.

These opposing perspectives agree that restructuring national economies toward low carbon trajectories will involve spatially uneven restructuring or renewal processes in multiple sub-national economies. To achieve its overall goal, the transition to a low-carbon economy must shift regional economies from their established developmental paths and establish them in new low carbon trajectories. In some places, emissions reduction will be accompanied by growth and innovation; in others, by decline and disinvestment. The crucial issue for policy is managing the change process in a way that achieves the desired outcomes and simultaneously retains political support for reform. As the case of policy development in Australia shows, the crucial issue is identifying a politically feasible pace and depth of regional change.

AUSTRALIA'S STATE STRATEGY OF TRANSITION TO A LOW-CARBON ECONOMY

From 2007 until its collapse in 2009, the Australian government's strategic approach to emissions reduction took the form of a plan to create a market for carbon through the introduction of a national Carbon Pollution Reduction Scheme (CPRS). This proposed cap-and-trade market solution would bring the cost of carbon pollution into economic calculation and enforce abatement targets. This approach is arguably the most efficient means of reducing emissions because it 'restore(s) an efficient economic equilibrium in a competitive market economy' in a more politically acceptable way than carbon taxes (KLINE, 2001, p. 97). According to its proponents, market-based policy instruments are the most efficient option because they generate a price-driven transformation without attempting to 'pick winners' and without trying to predict exactly what outcomes would be produced. Instead, market processes unleash Schumpeterian forces of destructive innovation that overcome the economy's inertia, unlock institutional and technical barriers to change, and stimulate the shift to a new low-emissions socio-technical system. In theory, the cap-and-trade framework enables the state to control the rate of change through its control of the carbon price (UNRUH, 2002).

The development of Australia's CPRS involved an institutional and scalar realignment of political forces. Australia is a federation formed in 1901 by previously independent state governments. Under the Australian Constitution, federal powers are in theory restricted to interstate and international matters. However, the federal jurisdiction has gradually increased its scope and authority (WELLER, 2007). Climate change issues are difficult because they span state and federal areas of responsibility. Moreover, this means that, in the Australian context, it is not possible for the national government to devolve responsibility for the implementation of difficult decisions to the regional scale (as in WHILE *et al.*, 2010). During the conservative Howard government's federal administration, Australia's climate strategies had relied on voluntary actions (PAPADAKIS and GRANT, 2003). In this context, the impetus for an Australian carbon market emerged from the federation's States and Territories, via the 2004 Inter-Jurisdictional Working Group on Emissions Trading (later the National Emissions Trading Taskforce; NETT, 2007). The federal Labor opposition then joined with the state and territory governments to commission the independent Garnaut Climate Change Review (GARNAUT, 2008).³ When the Rudd Labor administration came to power federally in 2007, the Garnaut Review became part of its programme as a joint Commonwealth-State project. This meant that the CPRS emerged from outside established national industry policy networks, which had in the past opposed 'carbon-control' policy

solutions (BULKELEY, 2001). GARNAUT (2008) presented a cap-and-trade carbon market not only as compatible with capitalist development, but also as the strategy that would drive the next round of capitalist accumulation and reposition the Australian economy for future international competitiveness (GARNAUT, 2008). Since this strategy attempts to 'establish a widespread appeal by arguing that certain forms of policy intervention can simultaneously result in both economic and environmental benefits' (MURPHY and GOULDSEN, 2000, p. 33), it can be understood as a version of ecological modernization.

In Australia, detailed cost-benefit assessments of major policy changes are dominated by the powerful calculative practices of general computable equilibrium (GCE) econometric modelling. Although the key contributors to the policy debate (the federal and state governments, various industry groups, major firms and think tanks) each commissioned their own modelling of the CPRS, most used slightly different versions of the same models. These models represent the economy's sub-sectors mathematically, as a series of simultaneous equations that resolve as the factors of production revalue after a policy shock. In essence, the models operationalize neo-classical assumptions about the role of prices in equalizing supply and demand. Capital is assumed to flow toward sectors offering the best returns on investment, while labour reallocates to its most efficient use. The outputs plot a continuous transition trajectory toward a new equilibrium where prices reflect the unfettered interaction of supply and demand. Predicted short- and longer-term effects vary depending on the assumed direction and rate of change and on the assumed capacity of different markets to 'clear' (that is, return to equilibrium). The models are stylized. Economic agents are assumed to respond to price signals in a straightforward manner. There are no institutional barriers, local allegiances or technical lock-ins to inhibit the action of market forces or close off inter-industry flows of capital and labour. The transition is smooth and complete. The models are static, timeless and spatially blind; they cannot examine the process of change, identify a developmental path or enumerate the practical interventions required to achieve target outcomes. In this framework, the regional 'structural adjustment' process is extrinsic to the carbon-reduction policy framework.⁴ Adjustment costs are minimized by removing regulatory barriers or market failures that impede the flow of factors to their most efficient use (INDUSTRIES ASSISTANCE COMMISSION (IAC), 1993).

In GCE-based cost-benefit assessments, the counted costs of policy change are restricted to the direct cost implications of the policy under review. In the case of the CPRS, for example, these include increasing energy prices for consumers, the loss of asset value for some high-emission firms and loss of export markets for others. Only in specific circumstances would these

direct losers qualify for *ex post* compensation. Structural adjustment theory dictates that the form of compensation should not compromise the policy objective or impede the revaluations that underpin a market-based adjustment process (GARNAUT, 2008). The indirect effects of policy change – such as regional disinvestment, firm closures, job losses, downward pressure on wages and the cost to households of relocation – are not direct costs of the policy and therefore should not qualify for compensation. In fact, since inter-regional adjustment is one of the principal means through which capital and labour are reallocated and revalued, in theory this policy framework welcomes the deep regional transformations envisaged by restructuring theory. However, in practice, the federal government's consultative Green Paper on the CPRS (COMMONWEALTH OF AUSTRALIA, 2008a) allowed for the possibility of some compensation. The later White Paper (COMMONWEALTH OF AUSTRALIA, 2008b), which was drafted in response to the concerns raised in public consultations over the Green Paper proposals, offered compensation to those who would be direct losers of CPRS policies: electricity generators, trade exposed industries and low income households. It also offered token 'structural adjustment' payments to adversely affected regions.

Before the White Paper compromise progressed into policy, legislation needed to pass both Houses of the federal Parliament. This required the support of either the environmentalist Green Party – which at the time held the balance of power – or the business-oriented opposition parties. As it turned out, it was the compensation package that exposed the fragility of political support for the market-based CPRS strategy. For the Greens, the CPRS did not go far enough and would not produce the deep emissions reductions needed to halt global warming. Moreover, its generous compensation to 'big polluters' would stifle the process of creative destruction that was needed to drive innovation in low emissions technology. Although the opposition position was to support the CPRS, many segments of its business constituency were bitterly opposed to it, primarily because of its likely impacts on the competitiveness of trade-exposed industries. Opposition support for the scheme also evaporated after a coup in the shadow cabinet that ousted the opposition leader and carbon-trading advocate, Malcolm Turnbull. With no hope of being passed through Parliament, the CPRS was deferred indefinitely. After the Government's retreat, industry lobby groups revised their positions and many rejected the CPRS outright. Prime Minister Rudd, the champion of the CPRS, was then ousted by his Cabinet colleagues and replaced by Prime Minister Gillard, a politician known for her capacity to negotiate workable compromises. Soon after, in the August 2010 election, voting split regionally: urban constituencies punished the Government for abandoning the CPRS and voted 'Green', but regional voters shifted their

support to regional advocates of more moderate policies. Making social and regional costs extrinsic to the CPRS framework had created the illusion of an efficient and equitable policy framework, but the underlying promise of adverse distributional effects could not be suppressed. Examining how the CPRS might 'come to ground' (WHILE *et al.*, 2010, p. 86) in a vulnerable region reveals the importance of these unacknowledged social costs.

'COMING TO GROUND' IN THE LATROBE VALLEY

The vulnerable region of the Latrobe Valley is located in Australia's south-eastern state of Victoria; about two hours' drive east of the state capital city of Melbourne (Fig. 1). Its half a dozen townships are home to about 73 000 people. The Valley is found in the centre of an agricultural region known as Gippsland, which is an imagined place, and an administrative region, but not a governmental jurisdiction.

The Valley's distinctive geography arises from its rich and abundant deposits of brown coal, or lignite, which is found so close to the land surface that it can be mined by open cut methods. In the post-Second World War years, this unusually inexpensive source of energy fuelled Victoria's then successful manufacturing-based import replacement accumulation strategy. The Valley still produces more than 85% of the electricity used by Victoria's industries and 5 million residents. Although its reserves could supply the State of Victoria with electricity for the next 400 years, brown coal has high water content and generates higher emissions than other fossil fuels (this characteristic also makes it chemically unstable and unsuitable for export). Of all places in Australia, therefore, the effects of policies that put a price on carbon will be felt most acutely in the Valley (GARNAUT, 2008). Actual outcomes will be a product of the strategies and behaviours of the Valley's communities, its electricity supply industries and the Victorian state government.

The Valley communities

The Valley communities are a product of state-led development. The Victorian government began constructing the Valley as a centre of electricity production in the 1920s, when it established wholly state-owned power stations adjacent to the Valley's coal reserves. As production and employment grew, subsidized housing, regulated wages, unionized workplaces and state-provided social infrastructure combined to create a prosperous Valley community that epitomized the 'male breadwinner and dependent family' model of the (then) Australian dream. In this secure context, the Valley developed a perhaps exaggerated reputation for militant unionism.⁵ One legacy of this history is the Valley's deeply gender-segmented labour market.

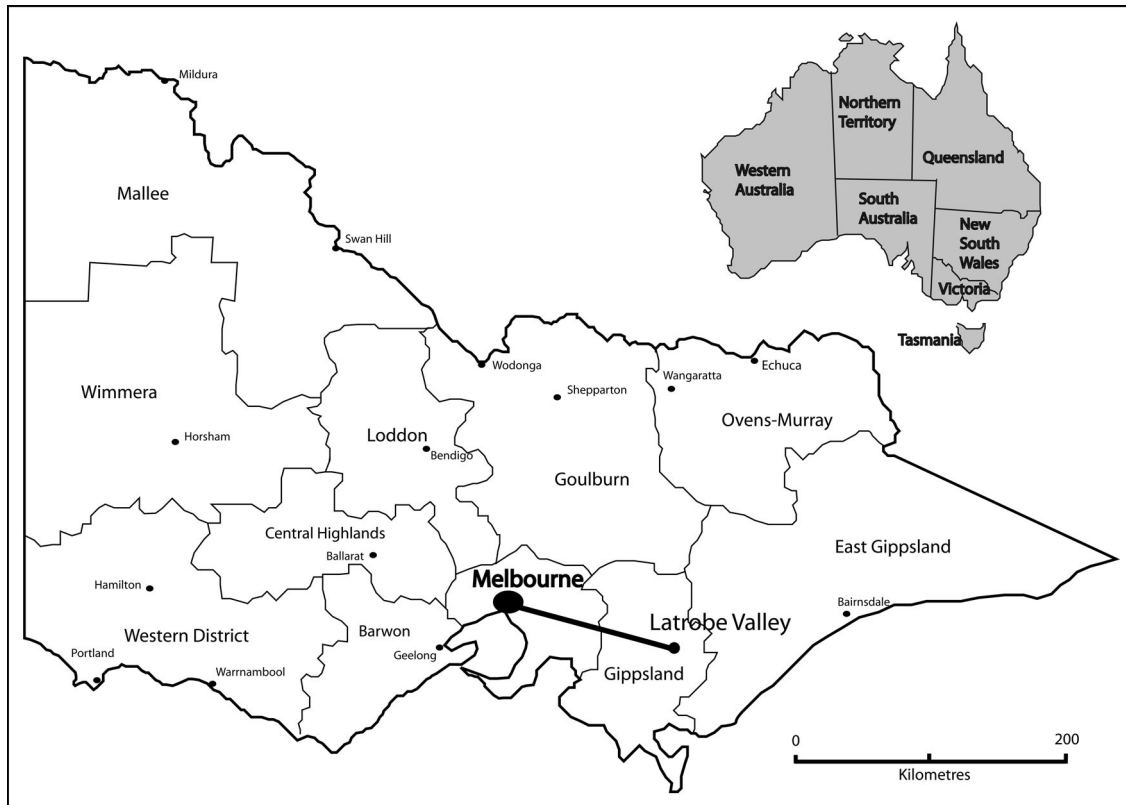


Fig. 1. Victoria's Latrobe Valley

Another is continuing tension between energy firms and local unions.

In the 1980s, principally to relieve Victoria's debt burden but also to reduce escalating costs, the monolithic state-owned energy producer, the State Electricity Commission of Victoria (SECV), was broken up into multiple quasi-competitive entities in preparation for privatization. The accompanying rationalization of employment saw the Valley's energy workforce decline by 46.2% between 1986 and 1994, from 20 420 to 10 997 workers in a local labour force of around 40 000 workers (PULLIN and HAIDAR, 2002). The Valley's four major power stations, then its transmission, maintenance and energy retailing activities were sold to private investors (FAIRBROTHER and TESTI, 2002). In the 1990s, as a direct consequence of these changes, the Valley suffered the multiple problems familiar to de-industrializing regions: high unemployment rates, low labour market participation rates, high rates of welfare dependence, depressed housing prices and abandoned commercial properties. The Valley's proud public service identity degenerated into a victim mentality (GIBSON and CAMERON, 2005). Over the last ten years, however, with the support of state and federal governments, the Valley economy has been diversified, mainly through growth in population-related services (health, welfare, education and retailing), forestry and the timber products sector. State government offices, a government call centre, a university campus and multiple state and federally funded community and social development services

have supported this new path. As a result, the Valley in recent years has renewed its robust sense of local identity (TOMANEY and SOMERVILLE, 2010).

The legacy of this history is that local attitudes to the transition to a low-carbon economy' are defined by the desire to avoid a repeat of the effects of the 1980s privatization process. The expectations of GCE modelling – that labour markets rapidly 'clear' and regions quickly return to stability – have little traction in this community. Nonetheless, when the CPRS was being debated, local green activists supported the rapid closure of the Valley's high-emissions power stations. Then, the local council's growth strategy was based on population in-migration and economic diversification with a view to repositioning its economy as a service centre for the greater Gippsland area. Since the collapse of the CPRS, the local vision has expanded to include the development of new energy and coal-related specializations – responses that open up multiple possible future paths (as in PIKE *et al.*, 2010). The hitch is that local government in Australia has minimal power to implement its vision. Local councils in Australia lack what WEISS (1998) calls transformative capacity: they have few responsibilities, are under-resourced and have no powers of taxation save for modest property rates. As a result, local growth coalitions, if they exist, tend to orient their activities toward lobbying for State and Federal funding (BEER, 2007). Importantly, local government in the Valley has minimal control over the activities of the power industry or the use of the

coal resource, both of which are regulated by the State government. As a consequence, the power stations' social 'licence to operate' does not require negotiation with local political actors. The principle of subsidiary – that policy should be enacted at the lowest level of government compatible with competent authority – favours the Victorian state scale. The Valley's future will depend on decisions at other scales: energy firms and the Victorian and federal governments.

The electricity production sector

After privatization, the Valley's power stations reorganized into sets of vertically integrated and quasi-monopolistic firms spanning coal mining, electricity generation, transmission and electricity retailing. The groups are lean: they share specialist resources and cooperate on common issues. Their employees are predominately former SECV colleagues. After privatization, profits from electricity generation did not meet buyer expectations (until recently, Victoria had regulated its electricity prices) and as a result, many planned upgrades were deferred or cancelled. A chronic lack of investor interest in the Valley's power generators is evidenced by ownership changes and declining asset valuations. One generator is now owned by a patched-together consortium of institutional investors. In reality, despite their privatization, the Valley's electricity producers have not operated in a truly competitive market. Rather, the Victorian government has manipulated access to resources to ensure an adequate return on investment in exchange for the delivery of an essential service.

As a consequence of this history, the privatized generators have been slow to innovate and appear to lack the qualities that GRABHER and STARK (1997) identify with the capacity for endogenous renewal. They feature close inter-firm relationships, which tend to produce what FREEMAN and PEREZ (1988) call 'network externality' lock-ins. Their post-privatization financial arrangements, which are designed to maximize profits by leveraging debt on asset values, reduce their flexibility. In UNRUH's (2002) assessment, these conditions would reinforce the use of existing technologies and discourage innovation. There are no energy research and development facilities in the Valley, despite many of its technical problems being unique to its lignite fuel resource. Rather, local innovation has centred on adaptation to presenting threats, for example, by power stations reducing their reliance on (scarce) potable water. The privatized power stations have not invested in the local labour market either. Because the privatization process created a large pool of displaced but skilled labour that could be re-enlisted as required, there has been little need for training or workforce development. The power stations now operate with a minimum number of direct employees and use subcontracting and labour hire arrangements to bring in specialist skills as required. By 2006, therefore, only 6% of the

local labour force was employed directly in the electricity production sector (the power stations), but electricity-related activities still accounted for 23% of the Valley's total employment and almost one third of its higher income employment (WELLER *et al.*, 2009). This fragmentation has fuelled the growth of numerous small electricity-related service firms and transformed the Valley into a centre for specialized high-voltage services. Its flexible electricity control, transmission and maintenance labour force now services an Asia-Pacific market. This small-firm sector is locally embedded, and therefore more 'fixed' in place than the transnational firms that operate the power stations.

Because the Valley's coal-based power plants generate high emissions, change is inevitable. General Computable Equilibrium modelling undertaken in preparation for the CPRS predicted that local generators would face declining profitability as the carbon price increased and that they would eventually be forced out of the market. Assuming that a fully operational national market would enable power to be sourced from any location in Australia, the Valley's production would be replaced by new energy sources. However, GCE modelling assumes that generator firms will continue to operate as the carbon price rises, and that they will not exit until their plants become unprofitable. In reality, firms behave strategically. The transnational firms that own the Valley's power plants will make decisions about future investments well in advance of the actual impacts of policy changes. When the introduction of the CPRS appeared imminent, the generators' main concern was that it would compromise asset values, put power stations in breach of their debt covenants and induce technical insolvency (SIMSHAUSER, 2008). This immediate threat – and its extension into accompanying claims that increased sovereign risk would discourage future transnational investment in Australia – disappeared with the shelving of the CPRS.⁶ Since then, the long-term problem of lack of investment in the power sector has been attributed to the policy uncertainty surrounding the carbon price. This has produced an apparent 'investment strike' (KERR, 2009, p. 3) which has arisen, first, because firms are unable to assess the cost implications of different new technologies; and second, because they are reluctant to commercialize unproven technologies for fear that they may inadvertently lock-in to technologies that are subsequently overtaken by other options (the 'beta' video problem). Predictions about the likely effects of carbon price are complicated by multiple issues that are not considered in GCE modelling: as well as the uncertainty about technologies, there are institutional and regulatory issues with the structure of the national energy market, especially the relationship between 'baseload' and 'peaking' power sources; the effects of renewable energy targets (RETs); the effects of long-term contracts for major electricity users such as aluminium smelters; the intricacies of pricing within firm networks; and, uncertainties in the market as to

whether consumers will respond to a carbon price by paying more for electricity or by reducing consumption. Importantly, too, the CPRS would put control of the electricity production industry into federal hands, obliterating the sector's carefully nurtured relationships with State regulators.

Nonetheless, firms now view a price on carbon as both inevitable and necessary to stimulate a technology-led revival of electricity production. From their perspective, the actual price of carbon becomes the crucial determinant of the nature of the forthcoming industrial transition and its effects in the Valley. A low-carbon price (say A\$20 per tonne at current prices) would bring new investment without jeopardizing business-as-usual production. A high carbon price, on the other hand, would encourage investment in lower-emission fuels and in different places, and might trigger the premature exit of energy firms from the Valley. All this boils down to a question of whether the 'stickiness' of existing relationships, the quality of the Valley's electricity infrastructure and the skills of its local labour force are enough to justify a continuing presence of energy producers, with or without coal-based production. The Valley is not a suitable location for wind or solar power generation, but it may be feasible to reduce the emissions of coal-based production, convert generation capacity to natural gas (which is found nearby), or commercialize geothermal and wave technologies. Most of the energy firms that operate in the Valley already own assets elsewhere; they will make future investment decisions in their shareholders' interests.

The State of Victoria

The challenges facing the State of Victoria arise from its economy's reliance on cheap electricity, its sunk investments in an existing electricity infrastructure, its concerns about energy security and its responsibility for the social and regional consequences of federal policy. First, Victoria has a large manufacturing sector which is a major source of employment. Its competitiveness is predicated on an abundant supply of inexpensive electricity. If other states develop lower-emission electricity production capacity, as is likely that when a carbon price is implemented, Victoria's competitiveness and its capacity to attract investment will decline relative to other states. This would produce long-term adverse regional re-distributional effects. In addition, without some adjustment to state-federal funding agreements, carbon price-induced increases in electricity costs for schools, hospitals and government offices will put pressure on the State budget. Second, because most of Victoria's electricity originates in the Latrobe Valley, the state's electricity grid is dominated by the high-voltage corridor from the Valley to the urban centre of Melbourne. Whilst the federal government's CPRS policy framework allowed that revenue from the CPRS could be redirected to redeveloping the electricity

grid, the mechanism and timing for this redevelopment was never explicit. Third are concerns about energy security. In theory, as the carbon price pushes out the Valley's high-emission fuel sources, the national energy market will provide Victoria with electricity generated from natural gas and renewable sources in other parts of the country. However, inter-state connections are sparse and traverse long distances in inhospitable terrain. The failure of the national grid during Victoria's heatwave and firestorm in the summer of 2009 highlighted the political risks of relying on imported electricity. Fourth, if as an outcome of a carbon price, electricity production shifts from the Valley to other places, the structure of the federation means that the state will bear most of the cost of regional adjustment. Although econometric modelling assumes that the regional effects of policy change will evaporate over time as workers out-migrate to take up new jobs in new places, the experiences of privatization demonstrated that the Valley's 'sticky' labour market is unlikely to adjust in the manner anticipated by structural adjustment theory. In the 1990s, the absence of buyers in the Valley's depressed local housing market prevented unemployed residents from moving out, while numerous cheap rental properties attracted welfare dependent in-migrants from other places. This created costly and persistent social problems for the state government.

Although the state government supports the introduction of a carbon price, analysis of its effects highlights the spatially uneven risks of a market-based transition and the costs that the carbon price would add to the state's budget. Given these pressures, the imperative for the state is to manage its transition to a low-carbon economy in a way that avoids a crisis of local accumulation, minimizes adverse social outcomes and deflects adverse political repercussions. Yet stable outcomes and planned incremental changes are difficult to secure in a market-based policy structure. To prepare for a future carbon price, the state government has now committed its resources to direct measures that stimulate innovation, remove lock-ins and reduce emissions (VICTORIA, 2010). Much of this effort will focus on addressing the Valley's 'market failures' and encouraging its socio-technical system to transform before a carbon price comes into effect. In addition to investments in emissions-reduction technologies such as front-end coal drying, coal gasification and liquefaction, and end-of-pipe carbon capture and storage, the state is sponsoring projects to identify more sustainable uses of the Valley's coal resource and to identify new industries 'related' to the Valley's existing small firm specializations (such as in transmission, battery and renewable energy technologies). Effectively, the state is implementing a pre-emptive 'continuity' approach to change by removing the most offending aspects of the outmoded socio-technical system and directly confronting the lock-ins that stifle innovation (UNRUH, 2002). The state's strategy seeks to maximize utilization of its 'sunk' costs in the Valley, build on the existing

transmission framework and minimize social disruption in the Valley communities. Still, the potential for disinvestment from the Valley is ever present. The state's recent policy blueprint places responsibility for regional adjustment costs with the federal government (VICTORIA, 2010), but at the time of writing, the federal government had not accepted responsibility for the distributional consequences of its policies.

CONCLUSION

This article has cast the 2010 failure of Australia's carbon emissions policy as a failure to recognize the regional costs of the transition to a low-carbon economy. Viewing the transition from a regulation perspective attuned to the timing of policy change reveals that carbon-reduction policies have significant regional implications that have not been made explicit in the federal government's policy assessment process. Viewing the national transformation to a low-carbon economy as involving a series of regional transformations, and recognizing that these regional effects will have significant adverse consequences for some state jurisdictions, alters how the impacts of the Carbon Pollution Reduction Scheme (CPRS) are perceived. Whilst the inherently spatialized distributional effects of policies have not been prominent in the public policy debate, the spatially differentiated outcomes of the August 2010 federal election suggest that state and regional concerns were more important to the unravelling of political support for the CPRS than was recognized by commentators focused on emissions targets and climate science. The formal policy development process assessing the merits of a 'cap and trade' carbon-control regime assumed a structural adjustment process in which regional economies would magically return to a new 'equilibrium' after the carbon price policy shock. This framework counted the direct cost of the policy reforms, but ignored all the effects that reverberate through regional economies, labour markets, housing markets and households as firms rise and fall and jobs are created and lost. Without a more detailed understanding of these effects, it would be difficult to identify an optimal carbon price that would stimulate innovation but at the same time protect regional economies and communities.

This perspective explains Australia's retreat from carbon trading and the policy community's increasing support for a carbon tax, which would price carbon but also allow for planned change. In parallel with Australia's earlier internationalization strategy, then, it can be seen

that the market-led carbon-control solution failed because it appended a regressive redistribution policy to a progressive decarbonization policy. A better approach would be to view decarbonization policies as inherently redistributive and plan to improve the equity of outcomes at the same time as reducing emissions.

Acknowledgements – This paper draws on research funded by the Victorian Government (DTF Report 2008-94307) and a Victoria University 'Near Miss' Grant. The views expressed are solely those of the author and do not in any way reflect the views of the Victorian Government.

NOTES

1. Politically, this outcome arose because the policy proposals were too radical for conservative politicians and too conservative for radical politicians. It will be argued that this political effect expresses deep and spatially differentiated divisions over environmental policy. In the August 2010 election, urban voters abandoned the incumbent Labor administration in favour of Green Party candidates, largely because it had failed to implement carbon-control measures; but regional voters abandoned both the government and the opposition, largely in response to the perceived threat of carbon control. This delivered the balance of political power to a handful of independent regional representatives.
2. In 2007 in Bali, then Prime Minister Rudd cast climate change action as 'one of the greatest moral, economic and environmental challenges of our age' (RUDD, 2007, n.p.). Unsurprisingly, his leadership failed with his failure to implement a carbon-trading scheme.
3. Although in Australia the states are responsible for regional development and natural resource allocation, they cooperate with each other and the federal administration through the Committee of Australian Governments (COAG). Despite their political independence, the states rely on fiscal transfers from the federal government. This structure renders the federal government's capacity to dictate policy on carbon control as tenuous.
4. The Australian notion of 'structural adjustment' tends to be associated with deep restructuring rather than incremental change (cf. CHAPMAN *et al.*, 2004).
5. Under Australia's (then) system of centralized industrial regulation, industrial gains achieved by workers in secure sectors such as electricity production would flow on to workers in other industries and other places. This made places like the Valley important strategic sites for national union action (WELLER, 2007).
6. Here the notion of sovereign risk is defined widely as referring to all risks arising from the ability to governments – as sovereign bodies – to pass laws and regulations.

REFERENCES

- AGLIETTA M. (1979) *A Theory of Capitalist Regulation*. New Left Books, London.
- BAILEY I. (2007) Neoliberalism, climate governance and the scalar politics of EU emissions trading, *Area* 39, 431–442.
- BEER A. (2007) Regionalism and economic development: achieving an efficient framework, in BELLAMY A. J. and BROWN J. A. (Eds) *Federalism and Regionalism in Australia: New Approaches, New Institutions?*, pp. 119–134. ANU E-Press, Canberra, ACT.

- BULKELEY R. (2001) No regrets?: economy and environment in Australia's domestic climate change policy process, *Global Environmental Change* **11**(2), 155–169.
- CASTREE N. (2010) Crisis, continuity and change: Neoliberalism, the Left and the future of capitalism, *Antipode* **42**, 185–213.
- CHAPMAN K., MACKINNON D. and CUMBERS A. (2004) Adjustment or renewal in regional clusters? A study of diversification amongst SMEs in the Aberdeen oil complex, *Transactions of the Institute of British Geographers*, n.s. **29**(3), 382–396.
- CHRISTOPHERSON S. and CLARK J. (2007) *Remaking Regional Economics: Power, Labor, and Firm Strategies in the Knowledge Economy*. Routledge, London.
- COMMONWEALTH OF AUSTRALIA (2008a) *Carbon Pollution Reduction Scheme Green Paper*. July. Canberra, ACT (available at: <http://www.climatechange.gov.au>) (accessed on December 2008).
- COMMONWEALTH OF AUSTRALIA (2008b) *Australia's Low Pollution Future: Carbon Pollution Reduction Scheme (White Paper)*. December. Canberra, ACT (available at: <http://www.climatechange.gov.au>) (accessed on December 2008).
- DEL RIO P. and UNRUH G. (2007) Overcoming the lock-out of renewable energy technologies in Spain: the cases of wind and solar electricity, *Renewable and Sustainable Energy Reviews* **11**, 1498–1513.
- EMIGH R. J. (1997) The power of negative thinking: the use of negative case methodology in the development of sociological theory, *Theory and Society* **26**(5), 649–684.
- FAIRBROTHER P. and TESTI J. (2002) The advent of multinational ownership of the Victorian electricity generating plants, in FAIRBROTHER P. (Ed.) *Privatisation, Globalisation and Labour*, pp. 103–130. Federation Press, Sydney, NSW.
- FREEMAN C. and PEREZ C. (1988) Structural crisis of adjustment, business cycles and investment behaviour, in DOSI G., FREEMAN C., NELSON R., SILVERBERG G. and SOETE L. (Eds) *Technological Change and Economic Theory*, pp. 39–66. Pinter, London.
- GARNAUT R. (2008) *Garnaut Climate Change Review*. Melbourne, VIC (available at: <http://www.garnautreview.org.au>) (accessed on April 2010).
- GIBBS D. (2006) Prospects for an environmental economic geography: linking ecological modernisation and regulationist approaches, *Economic Geography* **82**, 193–215.
- GIBSON K and CAMERON J. (2005) Building community economies in marginalised areas, in SMYTH P., REDDEL P. and JONES A. (Eds) *Community and Local Governance in Australia*, pp. 149–166. UNSW Press, Sydney.
- GRABHER G. (1993) The weakness of strong ties: the lock-in of regional development in the Ruhr area, in GRABHER G. (Ed.) *The Embedded Firm: On the Socioeconomics of Industrial Networks*, pp. 255–77. Routledge, London.
- GRABHER G. and STARK D. (1997) Organising diversity: evolutionary theory, network analysis and postsocialism, *Regional Studies* **31**, 533–544.
- HASSINK R. and SHIN D.-H. (2005) Guest Editorial: The restructuring of old industrial areas in Europe and Asia, *Environment and Planning A* **37**, 571–580.
- HUDSON R. (1994) Institutional change, cultural transformation and economic regeneration: myths and realities from Europe's old industrial regions, in AMIN A and THRIFT N. (Eds) *Globalization, Institutions and Regional Development in Europe*, pp. 331–345. Oxford University Press, Oxford.
- INDUSTRIES ASSISTANCE COMMISSION (IAC) (1993) *Impediments to Regional Adjustment*. Report Number 35. IAC, Australian Government Publishing Service, Canberra, ACT.
- JENSON J. (1990) Representations in crisis: the roots of Canada's permeable Fordism, *Canadian Journal of Political Science* **23**(4), 653–683.
- JESSOP B. (2002) *The Future of the Capitalist State*. Polity, Cambridge.
- JESSOP B. (2003) Governance and meta-governance: on reflexivity, requisite variety and requisite irony, in BANG H. (Ed.) *Governance as Social and Political Communication*, pp. 101–116. Manchester University Press, Manchester.
- JONES M. (1997) Spatial selectivity of the state? The regulationist enigma and local struggles over economic governance, *Environment and Planning A* **29**, 831–864.
- KEIL R. (2007) Sustaining modernity, modernizing nature: the environmental crisis and the survival of capitalism, in KRUEGER R. and GIBBS D. (Eds) *The Sustainable Development Paradox*, pp. 41–65. Guilford, London.
- KERR P. (2009) Verve eyes coal-powered revival, *The West Australian*, **20 March**, 3.
- KLINE D. (2001) Positive feedback, lock-in, and environmental policy, *Policy Sciences* **34**, 95–107.
- LUNDVALL B.-A. (1992) *National Systems of Innovation*. Pinter, London.
- MACKINNON D., CUMBERS A., PIKE A., BIRCH K. and MCMASTER R. (2009) Evolution in economic geography: Institutions, political economy and adaptation, *Economic Geography* **85**, 129–150.
- MARKUSEN A. (1996) Sticky places in slippery space – a typology of industrial districts, *Economic Geography* **3**, 293–313.
- MARTIN R. and SUNLEY P. (1998) Slow convergence? The new endogenous growth theory and regional development, *Economic Geography* **74**, 201–227.
- MASSEY D. (1984) *Spatial Divisions of Labour*. Macmillan, London.
- MURPHY J. and GOULDSSEN A. (2000) Environmental policy and industrial innovation: Integrating environment and economy through ecological modernisation, *Geoforum* **31**, 33–44.
- NATIONAL EMISSIONS TRADING TASKFORCE (NETT) (2007) *Possible Design for a National Greenhouse Gas Emissions Trading Scheme: Final Framework Report on Scheme Design*. December. NETT, Canberra, ACT.
- OFFE C. (1975) The theory of the capitalist state and the problem of policy formation, in LINDBERG L., ALFORD R., CROUCH C. and OFFE C. (Eds) *Stress and Contradiction in Modern Capitalism*, pp. 125–144. D. C. Heath, Lexington, KY.
- PAPADAKIS E. and GRANT R. (2003) The politics of 'light-handed regulation': 'new' environmental policy instruments in Australia, in JORDAN A., WURZET R. and ZITO A. (Eds) *'New' Instruments of Environmental Governance: National Experiences and Projects*, pp. 27–50. Frank Cass, London.

- PECK J. and TICKELL A. (1995) The social regulation of uneven development: 'regulatory deficit', England's South East, and the collapse of Thatcherism, *Environment and Planning A* **27**, 15–40.
- PIKE A., DAWLEY S. and TOMANEY J. (2010) Questioning resilience: an evolutionary political economy of geographies of adaptation and adaptability, *Cambridge Journal of Regions, Economy and Society* **3**, 59–70.
- PULLIN L. and HAIDAR A. (2002) Industrial restructuring and labour collectivity in the Latrobe region, *International Employment Relations Review* **8**, 1–16.
- RUDD K. (2007) Prime Minister Kevin Rudd's Address to the UN Bali Conference on Climate Change, 12 December 2007, *AustralianPolitics.com* (accessed on 13 September 2010).
- SIMMIE J. and MARTIN R. (2010) The economic resilience of regions: towards an evolutionary approach, *Cambridge Journal of Regions, Economy and Society* **3**, 27–43.
- SIMSHAUSER P. (2008) The dynamic efficiency gains from introducing capacity payments in the National Electricity Market, *Australian Economic Review* **41**, 349–370.
- STORPER M. and WALKER R. (1989) *The Capitalist Imperative: Territory, Technology and Industrial Growth*. Blackwell, Cambridge, MA.
- SWYNGEDOUW E. (2010) Apocalypse forever? Post-political populism and the spectre of climate change, *Theory Culture Society* **27**, 214–233.
- TOMANEY J. and SOMERVILLE M. (2010) Climate change and regional identity in the Latrobe Valley, Victoria, *Australian Humanities Review* **49(November)**, 29–47.
- UNRUH G. (2000) Understanding carbon lock-in, *Energy Policy* **28**, 817–830.
- UNRUH G. (2002) Escaping carbon lock-in, *Energy Policy* **30**, 312–325.
- VICTORIA (2010) *Victorian Climate Change White Paper: The Action Plan*. July. Department of Premier and Cabinet (available at: http://www.premier.vic.gov.au/images/stories/climate_change) (accessed August 2010).
- WEISS L. (1998) *The Myth of the Powerless State: Governing the Economy in the Global Era*. Polity, Cambridge.
- WELLER S. A. (2007) Power and scale: the shifting geography of industrial relations law in Australia, *Antipode* **39**, 896–919.
- WELLER S. A., SHEEHAN P. and TOMANEY J. (2009) Carbon Pollution Reduction Scheme: Adjustment Strategy for the Latrobe Valley. Report prepared for the Victorian Department of Treasury and Finance, DTF Report Number D08-94037, January. Melbourne, VIC.
- WHILE A., JONAS A. E. G. and 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.