
REVIEW ARTICLE

‘GREEN-COLLAR’ JOBS: EMPLOYMENT IMPACTS OF CLIMATE CHANGE POLICIES

Alicia Pearce and Frank Stilwell

Now that the Australian government is committed to introducing policies to mitigate climate change it is timely to consider the likely consequences. While it is doubtful that the current policy proposals, focussing on an emissions trading system (ETS), will be sufficient to create a transition to an ecologically sustainable economy, they can be expected to have some impacts on jobs – their number, type and location. These job impacts will be important because they will affect people’s living standards and therefore the social and political acceptability of the policies. Looking beyond the current ETS proposals, it is also pertinent to consider what else could be done – through industry policies, skills development strategies and regional planning – to create more ‘green’ or ‘green-collar’ jobs.

The employment consequences of mitigating climate change are gaining keen attention in other countries. In the USA, for example, the Apollo Alliance was formed in 2004 by a group of business, environmental, labour and community groups and has been actively campaigning for policies to promote clean energy and ‘green-collar jobs’¹. Important research is being undertaken by labour organisations in Europe (Dupressoir *et. al.* 2007). In Australia signs of growing concern are also starting to appear. On October 30, 2008 the Australian Council of Trade

1 The term Apollo was selected to indicate a similar vision and technological challenge to that of the earlier Apollo space program in the USA: www.apolloalliance.org/about.php

Unions and the Australian Conservation Foundation issued a joint report called *Green Gold Rush* that presents a positive view of the potential employment opportunities that could result if Australia becomes a global leader in fostering 'green-collar' jobs (ACF and ACTU 2008).

These ambitions need to be backed by political economic analysis of the employment effects of environmental economic policies. However, as noted in a recent study undertaken by the CSIRO for the Dusseldorp Skills Forum and the Australian Conservation Foundation, the information that we currently have about potential areas of employment growth is incomplete, anecdotal and inconsistent, and has been produced in large part for use in 'marketing specific skills or trade networks' (Hatfield-Dodds *et.al.* 2008:19). There is a lack of information about where new jobs might be concentrated and on the industries and regions that are vulnerable to job losses. This article reviews the current state of research and policy work on these issues, including likely areas of job growth and decline, regional labour market implications, problems with the conceptualisation of 'green-collar' jobs and some public policy challenges. First, however, it is useful to set the current flurry of concern in broader historical context.

Origins and Development of the Policy Challenge

There have been three distinctive waves of concern about environmental issues and their economic implications during the last half century - beginning in the 1960s, 1980s and 2000s. What differentiates the latest of these waves is the sustained momentum, culminating in the commitment to environmental economic policy change.

Publications such as Rachel Carson's *Silent Spring* (1962), Paul Ehrlich's *The Population Bomb* (1969), and *The Limits to Growth* by the Club of Rome (Meadows *et. al.* 1972) laid the foundation for the first wave of modern environmental awareness. Specific policy responses followed in some countries, such as the banning of particular pesticides and sporadic attempts to limit population growth, but there was little change in policies affecting the pattern and rate of growth of economic activity. In Australia the Federal Treasury sought to refute the need for any such

general policy response by issuing a report called *Economic Growth: is it worth having?* (1973) and answering its own question strongly in the affirmative, dismissing environmentalist critiques. In practice the environmental concerns were largely set aside by policy-makers as economic downturn during the 1970s shifted attention back to conventional economic and employment growth priorities.

The second wave of concern followed the establishment in 1988 of the Intergovernmental Panel on Climate Change under the auspices of the United Nations environment program and the World Meteorological Organisation. The Australian government responded positively at first, setting up a national climate change program, including the National Greenhouse Advisory Committee of scientific advisors, a Prime Ministerial working group to assess the necessary reduction in emissions and a series of ecologically sustainable development (ESD) working groups in which non-governmental organisations were involved². However, the flurry of concern was not maintained beyond the early 1990s and few practical policy changes followed. As Clive Hamilton (2001, 2007) has shown, a powerful lobby formed by opponents of climate change mitigation policies exerted a strong blocking influence. The Coalition government led by John Howard declined to ratify the international Kyoto Protocol of December 1997. This left Australia, together with the United States, in a conspicuously laggard position in relation to the growing international concerns with the awesome prospect of climate change.

The third wave has been quite different from the previous two, leading to more substantial policy responses. Key turning points have been the former US Vice President Al Gore's *An Inconvenient Truth* (2006), Sir Nicholas Stern's report to the UK government on the economic effects of climate change (2006) and the fourth assessment report of the leading world scientists on the Intergovernmental Panel on Climate Change

2 One pioneering research report undertaken at that time looked at new opportunities for industry development potentially arising from the embrace of sustainability (Larcombe and Cole, 1991). On a more conceptual plane, important books and articles developed the rationale for going beyond the crude 'jobs versus the environment' position (eg. Eckersley 1995; Crowley 1996, 1999). At the activist level, 'green bans' veteran Jack Munday and others formed Environmentalists for Full Employment.

(2007). The Stern Review is particularly important from an economic perspective because it shows that the costs of inaction are demonstrably greater than the costs of remedial action.

In Australia the reports of the official review headed by Professor Ross Garnaut (2008, 2008a) have confirmed the latter position, emphasising the severity of the climate change problem and putting the case for a 'cap and trade' approach to limiting carbon emissions through the introduction of an ETS. The federal government's Green Paper (2008) showed its willingness to adopt this policy stance, while also watering down the policy to cater to particular sectional interests.

Having an ETS, rather than a carbon tax or direct regulation, as the principal policy initiative is controversial, as are the exemptions that the government has foreshadowed and the low target set for emissions reduction by 2020 (Breen 2008, Stilwell 2008). Whatever its merits and demerits and whatever its particular form, however, it is clear that an ETS is now 'the main game in town'. So-called climate sceptics remain, but it now seems inevitable that market-based carbon emissions reduction policies will actually be implemented Australia-wide for the first time. More substantial policies will also need to follow when the limited effectiveness of the ETS becomes evident.

These are circumstances in which all economic participants – particularly the institutions of capital, labour and the state – need to consider the implications of transition to a more ecologically sustainable economy. A rapidly growing literature addresses the issues. The CSIRO's recent publication on *Transitions* (Newton 2008) is illustrative. The volume brings together an impressive array of expertise to review the challenges and issues surrounding sustainability, exploring pathways towards sustainable urban development. However, it does not address the issues of labour redeployment, either as a result of changed energy-generation and pricing policies or as a result of flow-on effects to industry resulting from other climate-related changes. As Carla Lipsig-Mummé (2008:5) notes, the report of the Garnaut Review was similarly silent on these employment issues. Now that climate change mitigation policies are squarely on the agenda, the challenge is to redress this neglect by developing a political economic understanding of their likely impacts on jobs in different occupations, industries and regions.

Winners and Losers

There are both threats and opportunities in labour market responses to climate change policies. We can anticipate that some industries and occupations will suffer job loss as the Australian economy is driven towards becoming more sustainable, while others can anticipate gains. Simply, we can anticipate that employment will tend to fall in industries whose product prices will be higher after the introduction of an ETS, while job growth can be expected in industries whose products become *relatively* cheaper. However, inertia in the forms of technology that are used in industry and in the buying habits of consumers will moderate the rates of change. Complex inter-industry links, of the sort that can be modelled using input-output analysis (CSIRO 2005), will also influence which industries are impacted most strongly.

One sector of the economy that is likely to be quite quickly affected is manufacturing. The Australian Manufacturing Workers' Union has produced a significant report on the relevant issues and principles that need to be faced (AMWU 2008). Building on this initiative, there is a need to develop a disaggregated analysis of prospects for the different industries within this broad sector.

The recent report by the ACTU and the ACF outlined six key industries – renewable energy, energy efficiency, sustainable water systems, biomaterials, green buildings and waste recycling – where there are strong prospects of growth in green-collar jobs. An additional half a million jobs by 2030 is indicated (ACTU and ACF:2008). However, this is not a straight projection: it is an indication of what could be possible if government policies create and boost markets for these industries. Other key sectors of the economy in which employment could expand include transport, agriculture, research and innovation, business services and 'green' accounting (Hatfield-Dodds *et al.* 2008). The impact of climate change mitigation policies on the retail sector is likely to be important too, but could be negative in areas where the loss of existing high-paying mining and electricity-generating jobs creates cascading effects on local service industries. Whether impacts on the tourism sector are positive or negative will also depend on how travel patterns respond to changing energy prices and environmental policies.

Industries most likely to be negatively affected by climate change mitigation policies are those with high power and resources usage, and those directly involved in the energy supply chain. Workers employed in coal mining and electricity generation are particularly vulnerable, as noted in a study of the Hunter region which is heavily dependent on those sectors (Bill *et al.* 2008). Other industries like aluminium refining, which have relied on low-priced electricity to remain viable, are directly threatened by the rising cost of energy and the pending introduction of the ETS (Hetherington 2008). These industries are overwhelmingly concentrated in non-metropolitan areas where they are important to local regional economies. They are lobbying vigorously for special concessions under the ETS because they are exposed to international competition from producers in other countries that lack equivalent environmental economic policies.

Will the sectors where new job growth occurs more than compensate for the declines in the less ecologically sustainable sectors? Assessing the net effects in a complex process. The modelling commissioned from the CSIRO by the Dusseldorp Skills Forum and the Australian Conservation Foundation found that even quite a rapid transition to sustainability need have no negative overall impact on the total number of jobs (Hatfield-Dodds *et al.* 2008). Other econometric modelling has suggested that the medium term net impact of adopting energy efficiency measures in Australia would be to create more jobs nationwide than would otherwise be the case. The labour-intensive nature of making improvements in energy-efficiency is a key aspect of projections that emphasise the prospects of net employment growth (*cf* Allen Consulting Group 2003; Sadler, Diesendorf and Dennis 2004).

Energy Generation Jobs

The energy sector is one in which the impacts of carbon emissions reduction policies can be expected to be particularly pronounced. The Climate Institute has posed questions about what sorts of policies affecting this sector might effectively complement an emissions trading regime. Its preliminary modelling suggested that, in a range of possible scenarios, there would be around 5000 more jobs in the energy sector at

large by 2050 if steps were taken to reduce emissions, largely due to the labour-intensive nature of such activities (Climate Institute 2007). More ambitiously, the ACTU and ACF report suggests that policies stimulating renewable energy markets could form part of the wider strategy they propose for generating 500,000 new jobs for Australia (ACTU & ACF 2008).

While the reconfiguration of industries and jobs need not cause unemployment in the aggregate, there are clearly significant transition and adaptation issues. The highly regionalised nature of the energy generation industry poses particular challenges for planning how existing workers can be re-trained or re-distributed effectively into newer jobs and industries. The changes to the energy labour market will largely be dependent on the kinds of alternate energy solutions that Australia adopts. Reliance on an ETS leaves this issue open: under such a regime the pattern of energy supply is market-determined, not directed by government. Therein lies considerable uncertainty, including how that part of the expected revenue from an ETS that the government has set aside for the promotion of renewable energy will actually be used. All alternate energy outcomes are not equal when considering the number of new jobs generated and the location of these jobs.

The policy towards the coal industry is crucially important, given that industry's prominence in the nation's energy-production and export revenues. Diesendorf (2004) notes that the coal industry's local employment halved during the 1990s as a result of industry restructuring and automation. He estimates that, as of 2004, the wind power industry created more than twice the local employment that coal production created. Elsewhere, Diesendorf (2006) estimates that the wind industry could generate between 4 and 6 times the amount of employment in the coal industry if there were a strong political commitment backed by an injection of funding into the wind power industry, mandatory renewable energy targets (MRET) targets, and a high utilisation of local labour in manufacturing, installing and maintaining wind power generators.

A contrasting position is argued by Peter Colley (2008) who notes the crucial national economic role of coal exports and the high multiplier effect of highly paid coal mining jobs. He estimates that each job in coal mining supports 4-5 other jobs in areas such as 'maintenance and

engineering, retail, construction and in public sector jobs like education, hospitals and postal services' (2008:16). Whether this industry is sustainable in future depends crucially on the presently uncertain prospects for commercial application of technologies such as carbon capture and storage (CCS): without some such escape route for the industry, its scaling down and corresponding job losses have to be squarely faced.

The employment implications of other energy technologies also warrant consideration. Bio-mass energy is one option: the use of potential food crops for power generation creates more jobs per unit of energy generated than solar or wind energy (ERDC 1994). Saddler, Diesendorf and Denniss (2004) note that this might be a particularly useful for regional Australia, as many of the jobs created are necessarily located in rural areas. These jobs range from agriculture and forestry through to specialist engineering. A combination of wind and biomass generation has been mooted as an energy strategy involving high job growth (Diesendorf 2006). However, there are also significant ethical concerns about using potential food crops for this purpose, and environmental constraints – including water availability – significantly limit switching from mining to agriculture to meet energy needs.

Other renewable energy sources offer more attractive long-term prospects, both for sustainability and employment. A report from the Climate Action Network notes that at July 2007, the wind industry directly employed just under 1000 workers, the biomass industry 900 workers, and the photovoltaics industry around 1300. Based on this starting point, a 'conservative' estimate is that a 25% renewable energy target by 2020 would deliver 16,600 new jobs and enough renewable energy to meet Australia's household needs. As the report states:

Despite the early stage of development of the renewable energy in Australia there are already nearly 5000 people employed in the industry, and an estimated 12,000 employed in solar water heating and energy efficiency. Boosting renewable energy to 25 per cent would result in well over 33,000 clean energy jobs by 2020, even before counting the significant numbers of jobs that would accompany aggressive energy efficiency policies (Rutovitz 2007).

Internationally, modelling of projections like these is more comprehensive. Kammen, Kapadia and Fripp (2004), for example, project a range of labour market scenarios for the USA, based on the expectation that 20% of electricity generation will come from different combinations of renewable energy by 2020. They focus on jobs arising from energy creation and distribution in two clusters – construction/manufacturing/installation and operation/maintenance/fuel processing. Modelling the differing scenarios shows the distribution of job numbers between the two sectors. Each scenario shows at least a doubling of the overall number of jobs compared to the ‘business as usual’ fossil fuel scenario. It should be noted, however, that this study assumes that most of the manufacturing will be undertaken within the host nation, rather than relocated in other nations: international cost comparisons for production, transportation and distribution are likely determinants of this latter aspect of the employment outcome in practice.

Specific industry groups have also sought to project the global prospects for their sectors of employment. The European Photovoltaic Industry Association (in conjunction with Greenpeace International) undertook modelling of the worldwide solar power industry with three scenarios, depending on the degree of political commitment to, and investment in, the solar technology. Under its advanced scenario, the study estimated that by 2030 there was potential for 6.33 million jobs worldwide in the photovoltaics industry (Greenpeace and EPIA 2007). Similarly, a 2006 report into the worldwide wind industry modelled different scenarios for wind power development and investment. Under its most advanced scenario, the report indicated the potential for between 2.1 million jobs worldwide by 2030, and 2.8 million by 2050 (Greenpeace and GWEC: 2006).

Regional Impacts and Adjustments

In which localities will the employment effects be most pronounced? This is an important concern, given the spatial structure of labour markets. Regional case studies of the impacts of climate change within individual nations are relatively few and far between. A notable exception in Australia is the Newcastle researchers’ study of the

prospects for the Hunter Valley region (Bill *et al.* 2008). This study was commissioned by Greenpeace Australia Pacific to explore the potential for turning the Hunter into 'Australia's Renewable Energy 'Silicon Valley'' (2008:12). The report models the whole-of-local-economy effects of this transition from coalmining to green energy generation, using input-output analysis to account for the effects of inter-industry linkages, indirect employment and multiplier effects.

Seeking to gain a fuller understanding of how industry changes or losses impact on a region, the report produced by the Newcastle team also considers evidence on the community spillover impacts of industry close-downs in a diverse range of historical case studies. It usefully analyses some key features of the impacts of industry closure and the sorts of dislocations regional communities are faced with in a transition to sustainability. It notes that reducing the number of high-wage jobs will erode wage levels in other sectors where there is a relatively immobile, regionalised labour force (Bill *et al.* 2008).

Employment spillover effects have also been considered in Per Capita's analysis of the aluminium industry (Hetherington 2008), which was commissioned by the Australian Workers' Union. The report considers the value to the community of refinery jobs in a series of regional centres whose economies are heavily dependent on the continuing presence of these large employers providing jobs with above-average wages. It finds that, on average, an aluminium job is worth \$89,000 to the broader community, with \$25,000 of this through welfare, health and community services benefits or savings, which the author terms 'social value' (2008:17). This report makes a variety of policy recommendations aimed at bolstering the aluminium industry's ability to profitably continue under new economic conditions in which environmental policies are implemented. It does not consider what might replace aluminium manufacturing as a regional jobs provider. Not surprisingly, the high level and intensity of electricity consumption makes the future of this industry a particularly key issue for environmental critics (e.g. Kaye 2008).

Looking beyond these local studies, differing methods have been used to assess likely regional impacts. In the US one particularly interesting research project, sponsored by the Green Jobs for America campaign, has

been undertaken by the Political Economy Research Institute (PERI) at the University of Massachusetts. It seeks to identify the sectors in which there is prospect of employment growth in the new environmental economic conditions. The emphasis is on identification of opportunities for particular occupational groups in different areas. The report gives labour snapshots for twelve US States. It seeks to demonstrate that the majority of jobs created by 'greening' industry will draw on existing skills and occupations in new configurations. According to the report:

For example, constructing wind farms creates jobs for sheet metal workers, machinists and truck drivers, among many others. Increasing the energy efficiency of buildings through retrofitting relies, among others, on roofers, insulators and building inspectors. What makes these entirely familiar occupations 'green jobs' is that the people working in them are contributing their everyday labors toward building a green economy (PERI:2008).

This reasoning is evidently intended as a reassurance to the labour movement that the embrace of responsible environmental policies poses no threat – indeed, that it opens many more employment opportunities. A similar orientation is evident in the new Australian report from the ACF and ACTU (2008). Concurrently, these studies raise a fundamental issue about industrial and labour transitions to sustainability – the definition of what constitutes 'green-collar' employment.

The Problem of Defining 'Green' Jobs

The use of the terms 'green jobs' or 'green-collar jobs' has obvious appeal to those who are concerned to emphasise opportunities, rather than threats, arising from climate change mitigation and other environmental policies. It makes for a snappy title to an article such as this. However, the interpretation of what constitutes a green-collar job remains contentious. In much of the available research there tends to be an implicit assumption that it is any job that results from the implementation of 'green' policies, such as increased energy-efficiency. However, as the Worldwatch Institute notes:

defining the energy efficiency sector is a vexing problem, since most of the relevant forms of employment are embedded in a broad range of existing industries such as vehicle manufacturing, construction, lighting, heating and cooling equipment, electronics, appliances and so on (Worldwatch 2008: xvii).

Annandale *et al.* (2004) define green jobs as occurring across a spectrum, from innovations reducing the impact of 'dirty industries' to jobs that are developed primarily to address specific sustainability measures. They note the tensions in designating what are green jobs in particular instances, e.g. in a recycling plant that produces emissions. These authors consider that, given these tensions, the simplest definition of a green job may be one which 'reduces the negative impact made on the environment, relative to the *status quo*' (2004:81). In a similar vein, the study by the University of Newcastle researchers considers that green jobs in renewable energy comprise both existing and new jobs in areas as diverse as 'manufacturing, installation, maintenance and servicing, operations, transport and delivery of goods, sales, research and design' (Bill *et al.* 2008:7).

The Newcastle researchers also add social criteria to their interpretation of green jobs, designating these jobs as necessarily 'secure, well-paid and environmentally-friendly' and producing a list of what they regard as necessary government supports for workers and industries transitioning to sustainability (Bill *et al.* 2008:11). This theme of green jobs as socially just as well as ecologically sustainable is echoed in other publications (ACF and ACTU 1994; Evans 2007; Pollin and Wicks-Lim 2008; Worldwatch 2008). The importance of integrating the ethical and economic aspects of climate change mitigation policies is thereby given a broad working class perspective, emphasising areas of employment growth that are skilled, well paid and sustainable. This preoccupation clearly reflects the fact that much of this literature emanates from labour and progressive organisations concerned with their future direction in a changing environment.

Some studies from US labour sources also posit green-collar work as a means of countering the shift towards off-shoring of jobs, emphasising the desirability of maintaining localised, trades-based work of the kind typically considered blue-collar, where traditional union power is still

strong (Green Jobs for America Campaign 2008; Pollin *et al.* 2007). Economic nationalist and protectionist tendencies are evident in some of this campaign material, responding to the problem of the ‘race to the bottom’ that arises when employment is relocated in nations where standards of environmental and labour regulations are relatively lax. In Australia the proposal to introduce ‘green tariffs’ reflects a similar concern to ensure that imported goods do not have an unreasonable market advantage because they originate in countries where producers do not have to meet the full environmental costs (AMWU 2008).

These attempts to position the prospective growth of green-collar jobs within a social justice agenda reflect the broader concerns of the labour movement. As Phil Angelides, the head of the US-based Apollo Alliance, argues, a green-collar job ‘has to pay decent wages and benefits that can support a family. It has to be part of a real career path, with upward mobility. And it needs to reduce waste and pollution and benefit the environment... You don’t want to call something a green-collar job that doesn’t have the wages or background to support it’ (Walsh 2008). However, while the trade union movement is understandably concerned with both sustainability and quality of jobs, those latter concerns – with wages, security and conditions – are obviously not restricted to ‘green-collar’ jobs. It may be useful to think in terms of three principles: first, whether the job is environmentally sustainable; second, whether it is a ‘quality’ job in the sense of being well-paid and secure; and third, when it replaces another, non-‘green’ job, whether it is located in the same community and targeted to the same worker. Where these concerns with environmental issues, job characteristics and location come together is in the strategic aspects of managing transitions.

The Challenges of Transition

Climate change mitigation policies, of the sort arising from the Garnaut Review recommendations, will evidently need to be accompanied by policies to manage processes of transition. Not everything can sensibly be left to ‘market forces’. In particular, a substantial political economic challenge is to ensure that workers are not forced to accept dramatic declines in income and the collapse of regional and local communities.

The Canadian Labour Council (2000) has sought to set out principles for such 'just transitions' to sustainable industry and economy, which includes a relationship between environmental sustainability and social sustainability as a key policy principle. It notes particularly the role of communities in this transition:

Just Transition programs must apply to public and service sector work, as well as resource and manufacturing industries affected by changes in industrial structures and environmental standards. While the whole society is responsible for industrial change, the key role rests with workers and their communities, who are the most affected, from one-industry towns to a whole region (2000:2).

These considerations indicate an important government policy agenda – developing industry policy, regional policy and labour market, education and training policies to facilitate the least troublesome transitions. It is also an agenda for the labour movement – developing strategies for change rather than simply trying to retain existing jobs. As already noted, there are already strong signs of this commitment from the ACTU and key unions like the AMWU.

There are important lessons to draw from the wider international experience about which policies and strategies are best suited for handling the transitions towards a 'greener' economy. Australia is relatively behind on the uptake of green power, compared with Germany, for example. Geoff Evans (2007) observes that policy principles that have helped in managing regional industrial changes in Europe have a potential application in Australia, with particular reference to a region like the Hunter which is heavily dependent on mineral-extraction and manufacturing industries. Evans advocates policy principles focussed on reducing the multiplier impacts of job-loss and ensuring smoother transitions through targeted regional development policies (Evans 2007: 187). He also notes previous instances where communities have been adversely affected by industrial downturn. These include the 1999 BHP steelworks closure in Newcastle and the 1999 Victorian Government Forestry Restructuring program, both cases in which policies were quite effective in dealing with the impacts of structural economic change on displaced workers and communities (2007:186).

Turning from managing decline to managing growth, an obvious challenge to ‘greening’ industry - and energy production in particular - is providing appropriately skilled personnel. While some studies emphasise the potential for blue-collar workers to be redeployed in green-collar industries (Bill *et al.* 2008; Pollin *et al.* 2007), more attention needs to be given to the specific types of skills required. Hatfield-Dodds *et al.* (2008) note the absence of this type of skills audit, along with a lack of systematic data-gathering on workforce skills bases. The Commonwealth Parliament’s Senate Education, Employment and Workplace Relations Committee has implemented an inquiry into current and future ‘green’ workforce skills and training needs as a step toward filling this gap³. The NSW government has also addressed the issue in a recent ‘green skills strategy implementation plan’, emphasising what a state government can do to foster opportunities for skills developments and vocational training (Department of Education and Training 2008).

Producing reports on possible policy developments is not the same as achieving outcomes, of course. As political economists, we also have to assess the capacity of the relevant institutions to implement effective policies in practice. It must be conceded that the Australian experience to date has not been encouraging. Australia has not had the tradition of systematic ‘interventionist’ industry and labour retraining policies that has existed in Sweden and other Scandinavian nations, for example. A proposal from the labour movement in Australia two decades ago – pre-dating concern about climate change – put the case for those sort of ‘interventionist’ industry development policies on more conventional socio-economic grounds. Although quite thoroughly argued, that initiative lacked the necessary political support within the ALP government and its principal policy recommendations were not implemented⁴.

There is no necessary reason to assume that the current focus on environmental concerns changes this situation fundamentally. Certainly, the proposed ETS will not do the trick since its ‘hands off’ market

3 See http://www.aph.gov.au/Senate/committee/eet_ctte/employ_climate/tor.htm for more detail.

4 See the retrospective analysis of *Australia Reconstructed* in issue no. 39 of this journal: June 1997.

orientation is the antithesis of a more social democratic approach to 'managing transitions'. A corporatist policy approach does not seem to be on the agenda either, since business organisations, government and the trade unions all eschew institutional engagements that are redolent of the Accord in the 1980s. Material circumstances, in conjunction with influential ideas, can transform what is politically possible though. In the current conditions of sudden economic downturn – as of October 2008 – there is widespread recognition that neoliberal economic policy has had adverse outcomes. The coexistence of economic and environmental crises opens up both the possibility and the necessity for alternative approaches. Indeed, the importance of linking policies for the immediate economic crisis to policies for longer-term sustainability has gained particular urgency.

Conclusion

Over the past couple of years, various Australian organisations have undertaken or commissioned research into the likely effects of climate change mitigation and adaptation. Much of the research and modelling has been funded by NGOs who are advocating an agenda for environmental sustainability, including the Climate Action Network (Rutovitz 2007), Greenpeace (Bill *et al.* 2008, Rutovitz 2007), the Dusseldorp Skills Forum and the Australian Conservation Foundation (Hatfield-Dodds *et al.* 2008, Rutovitz 2007). Organisations within business, the labour movement and government are starting to look in more detail at the likely impacts of sustainability policies on labour markets and jobs, both in terms of threats and opportunities. There is also a growing number of international studies from which lessons may be drawn.

Significant gaps in our knowledge remain. More research is needed on the occupational, industrial and regional impacts of industry restructuring; the prospects for 'green jobs' in industries other than energy generation; local and regional policy challenges relating to labour redeployment and skills development; and the capacity of the organisations of business, labour and government to strategically manage

the processes of transition. The challenges of developing a ‘greener’ economy should now be central to the political economic agenda.

Alicia Pearce has been working as a researcher in Political Economy at the University of Sydney: aliciap@alumni.sydney.edu.au

Frank Stilwell is a Professor of Political Economy at the University of Sydney: f.stilwell@usyd.edu.au

References

- ACF and ACTU (1994) *Green Jobs in Industry Research Report*, Australian Conservation Foundation and the Australian Council of Trade Unions, Melbourne.
- ACF and ACTU (2008) *Green Gold Rush*, Australian Conservation Foundation and the Australian Council of Trade Unions Melbourne.
- Allen Consulting Group (2003), *Sustainable Energy Jobs Report*, prepared for the Sustainable Energy Development Authority, Sydney.
- Annandale, D., Morrison-Saunders, A. & Duxbury, L. (2004) Regional sustainability initiatives: the growth of green jobs in Australia, *Local Environment*, 9:1, 81-87
- Australian Government (2008) *Carbon Pollution Reduction Scheme: Green Paper*, Canberra, July.
- Australian Manufacturing Workers Union (2008), Making our Future: Just Transitions for Climate Change Mitigation, www.amwu.org.au/content/upload/files/report/making-our-future_0708.pdf.
- Bill, A., Mitchell, W. and Welters, R. (2008) *A Just Transition to a Renewable Energy Economy in the Hunter Region, Australia*, CofFEE, Newcastle.
- Breen, C., (2008) Carbon Trading and Market Solutions: Why they Won't Halt Climate Change, *Solidarity*, No. 5, July, pp. 20-23.
- Canadian Labour Congress (2000) *Just Transition for Workers During Climate Change*, April <http://canadianlabour.ca/updir/justransen.pdf>
- Carson, R. (1962) *Silent Spring*, Houghton Mifflin, Boston.
- Colley, P. (2008) Global Warming: we need ALL the solutions, *Australian Options*, No.53, Winter, pp.16-20.
- Crowley, K. (1996) Ecology and Social Change: Is Greener Employment Possible, *Just Policy*, Volume 8, November.

- Crowley, K. (1999) Jobs and Environment: the 'double dividend' of ecological modernisation, *International Journal of Social Sciences*, Volume 26, No 7/8/9.
- CSIRO (2005) *Balancing Act: a Triple Bottom Line Analysis of the Australian Economy*; Report prepared by B. Foran, M. Lenzen and C. Dey of the CSIRO and the University of Sydney, Commonwealth of Australia, Canberra.
- Department of Education and Training, (2008), NSW Green Skills Strategy Implementation Plan, Government of NSW, Sydney.
- Department of Treasury (1973) *Economic Growth: is it worth having?* Australian Government Publishing Service, Canberra.
- Diesendorf, M., 2006, 'Can geosequestration save the coal industry?' in J. Byrne, Leigh Glover and Noah Toly (eds), *Transforming Power: Energy as a Social Project*, Vol. 9, Energy and Environmental Policy Series, pp.223-248.
- Diesendorf, M (2004) Comparison of Employment Potential of the Coal and Wind Power Industries, *International Journal of Environment, Workplace and Employment* Volume 1: 82-90.
- Dupressoir, S. et al. (2007) *Climate Change and Employment: Impact on Employment of Climate Change and CO2 Reduction Measures in the EU-25 to 2030*, European Trade Union Congress, Syndex, ISTAS, Social Development Agency, Wuppertal Institute.
- Eckersley, R. (ed) (1995) *Markets, the State and the Environment: Towards Integration*, Macmillan, Melbourne.
- Ehrlich, P. R. (1969) *The Population Bomb*, Sierra Club, San Francisco.
- ERDC (1994) *Biomass in the Energy Cycle*, ERDC, Canberra.
- Evans, G. (2007) A just transition from coal to renewable energy in the Hunter Valley of New South Wales, Australia, *International Journal of Environment, Labour and Employment* Vol 3, 3/4
- Garnaut, R. (2008) *Climate Change Review: Draft Report*, June.
- Garnaut, R. (2008a) *Climate Change Review: Final Report*, September.
- Greenpeace International and European Photovoltaic Industry Association (2007) *Solar Generation IV* <http://www.greenpeace.org/raw/content/international/press/reports/solar-generation-iv.pdf>
- Greenpeace International and Global Wind Energy Council (2006) *Global Wind Energy Outlook 2006*, Greenpeace and GWEC http://www.gwec.net/fileadmin/documents/Publications/GWEC_A4_0609_English.pdf
- Hamilton, C. (2007) *Scorcher: the dirty politics of climate change*, Black Inc. Agenda, Melbourne.
- Hamilton, C (2001) *Running from the Storm: the development of climate change policy in Australia* UNSW Press, Sydney.

- Hatfield-Dodds *et al.* (2008) *Growing the Green Collar Economy: Skills and labour challenges in reducing our greenhouse emissions and national environmental footprint*, Report to the Dusseldorf Skills Forum, June.
- Hetherington, D. (2008) *The Full-cost economics of climate change: Aluminium: a case study*, Per Capita, Melbourne, July.
- Kammen, D, Kapadia, K. and Fripp, M. (2004) *Putting renewables to work: how many jobs can the clean energy industry generate?* RAEL report, University of California Berkeley.
- Kaye, J. (2008) No Special Favours for Aluminium Smelters, NSW Greens, (mimeo).
- Larcombe, G. and Cole, M. (1991) *Energy and Environment: New Opportunities for Industrial Development*, Report to the Commission for the Future, prepared by energy Policy and Analysis Pty Ltd., June.
- Lipsig-Mumme, C. (2008) Jobs and Renegotiating Climate Change in a Warming World, *Australian Options*, No 54, Spring 2008.
- Meadows, D. H. *et al.*, (1972) *The Limits to Growth*, Report for the Club of Rome, Earth Island, London.
- Newton, P. (ed) (2008) *Transitions: Pathways towards sustainable urban development in Australia*, CSIRO, Collingwood.
- Pollin, R. and Wicks-Lim, J (2008) *Job opportunities for the green economy: a state-by-state picture of occupations that gain from green investments*, Political Economy Research Unit, University of Massachusetts, Amherst, June.
- Renner, M. (2007) 'Jobs in renewable energy expanding', Worldwatch Institute, <http://www.worldwatch.org/node/5821>
- Rutovitz, J (2007) *A Bright Future: 25% renewable energy for Australia by 2020*, Nature Conservation Council of NSW, Total Environment Centre, ACF, Greenpeace Australia Pacific, Climate Action Network Australia, Carlton.
- Saddler, H, Diesendorf, M. and Denniss, R. (2004) *A Clean Energy Future for Australia*, Clean Energy Future Group, Sydney.
- Stilwell, F. (2008) Sustaining What? *Overland*, No. 193, November.
- UK Treasury (2006) *Stern Review on the Economics of Climate Change*, Cambridge University Press, Cambridge.
- The Climate Institute (2007) *Making the Switch: Australian Clean Energy Policies*, preliminary research report, May.
- Walsh, B. (2008) 'What is a Green Collar Job, Exactly?' *TIME Magazine Online*, May 26, accessed 16/7/08 at <http://www.time.com/time/health/article/0,8599,1809506,00.html>
- Worldwatch Institute (2008) *Green Jobs: Towards Sustainable Work in a Low-Carbon World*, Worldwatch Institute with technical assistance by the Cornell University Labor Institute, for the United Nations Environmental Program (UNEP), Nairobi.