

Blueprints for Sustainable Infrastructure Conference

9-12 December 2008, Auckland, NZ

Accounting for Climate Change and Peak Oil in Planning and Infrastructure Development in South East Queensland

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Abstract

This paper examines the consideration of climate change and peak oil in planning and infrastructure development in South East Queensland (SEQ). It does so from the perspective of a consultant and former public servant who has worked on many intersecting plans and strategies, as well as many of the projects that have emerged from the planning processes. It discusses how the public policy treatment of climate change and peak oil has been evolutionary and followed an apparent sequential pattern: climate change mitigation, then adaptation, then peak oil. It also notes the intensifying pace at which climate change and peak oil are influencing planning and development in the region.

The examination goes into depth on several of the key policies and projects in which the author has been involved including the Brisbane City Council's (BCC) Climate Change and Energy Taskforce (CCETF), BCC's CitySmart initiative and the SEQ Regional Plan and the associated SEQ Infrastructure Plan and Program (SEQIPP). It also addresses project-level consideration of climate change and peak oil as it can be applied to projects such as those flowing from SEQIPP. It begins by describing some local context for planning, infrastructure and climate change in SEQ. The paper will then address planning and infrastructure development initiatives in relation to climate change mitigation, adaptation and peak oil.

Introduction

Climate change mitigation, adaptation and peak oil are three distinct issues:

- Climate change mitigation is any intervention to reduce the source of, or enhance the sinks for greenhouse gases (Garnaut, 2008);
- Climate change adaptation is an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (Garnaut, 2008); and
- Peak oil refers to the theory that, 'For fundamental geological reasons, global conventional oil production will reach a peak and then start an irreversible decline soon enough to be of concern' (Senate, 2007, p. ix).

Although distinct, these issues are also heavily interwoven. For example, one could argue that part of adaptation is about understanding the implications that strong greenhouse abatement policies could have on the community. Also, a peak oil response is similar to adaptation in preparing for future changes in resource availability and prices, but policy responses to peak oil generally also have benefits for greenhouse gas mitigation. These three interwoven issues are becoming increasingly influential considerations in planning and infrastructure development.

South East Queensland Context 1989-2008

I first came to SEQ in 1989 as an exchange student in Australian Environmental Studies. At the time, the population of SEQ was 2.1 million. Shops were not open on Sundays and professional men wore Bermuda shorts and long socks to work. (With climate change, the shorts may make a re-appearance.) Now the population of SEQ is approximately 3.0 million, and is growing at 2.5 per cent per year (PIFU, 2008).

This period was immediately after the World Expo and at the tail end of the National Party's stranglehold on the State Parliament; that is, the era of Sir Joh Bjelke-Petersen as Premier of Queensland. The Bjelke-Petersen Government's priority had been economic development, almost at any cost. Against the backdrop of the tumultuous world events of 1989 (e.g. Tiananmen Square, Berlin Wall, etc.) Queensland experienced something like a mini-enlightenment.

Wayne Goss became Premier in 1989 with a mandate for reform. Some of the Goss reforms were environmental, in response to the environmental lobby. At the time, large-scale public infrastructure developments were less popular and less affordable due to the recession. Climate change was not then a dominant issue, but the Intergovernmental Panel on Climate Change released its First Assessment Report in 1990.

Amid the recession and afterwards, 'microeconomic reform' and 'economic rationalism' became highly influential in the public sector throughout Australia. What were previously known as harbours or railways became 'assets' and 'government owned corporations' from which the government required a dividend. Not only did this sometimes drive-down infrastructure investment (to ensure dividends), but public sector attention focussed on the reforms themselves and not necessarily on the essential services that infrastructure delivered.

Meanwhile, as population continued to grow, people became less efficient in their use of infrastructure. For example, people travelled further on roads and vehicle occupancy dropped (Queensland Transport, 1997). People consumed more and more electricity per household, especially with the remarkable uptake of low-cost and effective split-system air-conditioners in the late 1990s (Aitken and Losee, 2006). Water efficiency was wholly neglected until the drought crisis hit the region in 2006. Relative to these factors – increasing population and decreasing efficiency – there was underinvestment in infrastructure.

The State Government and local governments began ramping-up infrastructure investment in the early 2000s to 'catch-up' (Queensland Government, 2008a). Neither controlling population growth nor maximising efficiency was seriously considered. In the main, the

pattern of development and infrastructure investment through the 1990s and early 2000s failed to take into account:

- The implications of development for greenhouse gas emissions;
- Potential impacts from a changing climate; and
- The peak oil phenomenon.

I would summarise the current situation as follows. Infrastructure development has intensified. Nonetheless, despite a range of plans that claimed to be integrated (e.g. integrated transport plans, integrated water management strategies) thinking about infrastructure development has not necessarily become more sophisticated, and the supply-side mentality has continued to prevail. For example, the ‘water grid’ has been the government’s headline response to the drought crisis, but unlike electricity, water is heavy and expensive to move long distances uphill (Queensland Government, 2008b). Also, the government has continued to characterise new road projects as ‘congestion-busting’, without acknowledging their tendency to increase total private motor vehicle travel. Climate change has become a public policy priority, but peak oil has emerged as the new ‘inconvenient truth’. Despite the attention to climate change as an issue, it has remained mostly disconnected from infrastructure planning both in terms of mitigation and adaptation. This may have reflected the special policy challenges presented by climate change and peak oil; that is, they are issues that have the potential to impinge on affluent, high-consumption and carefree lifestyles that governments are motivated to promote.

In the latter part of this period, several specific planning initiatives emerged. Confronted with the contentious and gnarly problems of climate change and peak oil, Brisbane City Council established an independent taskforce to map out some new directions. It then began implementing some of the outcomes of the taskforce through its City Smart initiative. The Queensland Government also commenced moves to account for these issues in the planning mechanisms that applied to the State’s largest urban area. As these policy foundations settled-in, opportunities began to emerge to apply climate change and peak oil considerations to infrastructure project delivery.

Specific Planning Initiatives

BCC’s Climate Change and Energy Taskforce

BCC convened an independent Climate Change and Energy Taskforce (CCETF) in August, 2006, ‘To ensure Brisbane is adequately prepared to respond to and address the challenges of climate change, increasing energy consumption, rising petrol prices and peak oil’ (Maunsell AECOM et al., 2007, Appendix A). Council appointed eminent Professor Ian Lowe to chair the taskforce, which also included Jim McKnoulty, John McEvoy and Dr Patrice Derrington (replaced by Scott Losee in November 2006). The CCETF proceeded by a series of meetings and interactions with Councillors. Community involvement occurred through an online forum. The terms of reference included the production of an action plan, which was published on March 12, 2007, as the *Climate Change and Energy Taskforce Final Report – A Call for Action* (Maunsell AECOM et al., 2007). CCETF findings included an assessment of the city’s vulnerabilities and a narrative scenario of Brisbane in 2030. The taskforce developed eight strategies, with 31 main recommendations and 118 sub-recommendations (Losee, 2007).

Council published *A Call for Action* in full on its website and invited comments from the community to the online forum over one month. It then held a special meeting of full Council to debate the recommendations (BCC 2007a). Council then formed *Brisbane's Plan for Action on Climate Change and Energy*, which essentially constituted CCETF recommendations that were endorsed by Council (BCC 2007b). This Plan for Action was placed on the website for a further 30 day period of consultation.

Green Heart – CitySmart

CitySmart was established by Brisbane Lord Mayor Campbell Newman as an umbrella program under which Council could proceed to implement many sustainability-related actions including many proposed by the CCETF. BCC's CitySmart website describes the program thus (BCC, 2008):

CitySmart is Brisbane City Council's program to make Brisbane Australia's most sustainable city. Brisbane residents have already shown the world that we lead the way in water saving, by meeting our water target of 140 litres per person per day. Now, we are joining in a campaign to be a carbon neutral city by the year 2026. Currently, each Brisbane household emits 16 tonnes of greenhouse gas each year. The city is going on a journey to reduce our greenhouse gas emissions to 10 tonnes per household per year, by the year 2012. But research has shown that to stop climate change, each person on the planet should be emitting no more than one tonne per year. This is our final carbon footprint target – one tonne for everyone.

The centrepiece of the program is the 'I Love BNE' logo (Figure 1). The program is confined to 'feel good' public education and financial incentive initiatives; that is, 'carrot' not 'stick' policies (see Clarke and Cardwell, 2008, for further examples of the programs).



Figure 1. Brisbane City Council's CitySmart Program Green Heart logo.

SEQ Regional Plan

The City of Brisbane is the Capital of the State of Queensland and the largest municipality in Australia. However, as a conurbation, Brisbane operates within a wider metropolitan area and region. Brisbane is located at the centre of the SEQ Region, which includes ten other local governments (after the 2007 local government amalgamations). Strategic land use planning for SEQ is now directed by the SEQ Regional Plan, which was first introduced in 2005 (Queensland Government, 2005). It was the descendent of regional planning processes that began with the SEQ2001 process in 1991, again in that early 1990s mini-enlightenment. SEQ 2001 then begat the Regional Framework for Growth Management. The complement to the 2005 Regional Plan was the SEQ Infrastructure Plan and Program (SEQIPP). The government reviews SEQIPP annually and it has just completed a major three-yearly review (Queensland Government, 2008a).

Mitigation

Mitigation actions are directed at ‘solving the problem’ of climate change. The fact that so many of our modern activities are associated with greenhouse pollution (especially through our use of fossil-fuel energy) means that there is ample opportunity to make reductions, but very significant reductions have the potential to have very significant lifestyle implications. Society’s alternatives are to (a) de-couple greenhouse emissions from lifestyle; (b) change lifestyles; or (c) do some of both.

Based on its terms of reference, the CCETF had been under the impression that its main emphasis was to be on adaptation policies. However, there was strong interest in mitigation, especially from the community, and BCC had a respectable track record in delivering greenhouse abatement activities. The taskforce therefore made numerous recommendations in relation to reducing greenhouse gas emissions. Twenty-three of the taskforce’s recommendations related to greenhouse gas mitigation and sustainable energy. These included actions addressing:

- Buying and promoting renewable energy;
- Carbon offsetting and carbon sink development;
- Public transport, walking and cycling and alternative fuels; and
- Urban form and planning.

To consolidate a position to propose to Council, the taskforce plotted an emissions trajectory for Council’s consideration. In view of Australia’s affluent place in the world, the CCETF argued that a 90 per cent reduction on 1990 levels by 2050 would be the appropriate target for Brisbane. Since it was such an immense reduction, the taskforce suggested Council simply adopt a zero emissions target for 2050 to crystallise the size of the task at hand. I have plotted the CCETF’s trajectory together with the Australian Government’s trajectory (60% reduction on 2000 levels by 2050) in Figure 2 - the data is largely illustrative. It is apparent that the trend growth in the City of Brisbane’s emissions is far steeper than that which applies to

Australia. This is due to intense urban population growth and the absence of any dampening effect land use changes or biosequestration might have in other parts of Australia.

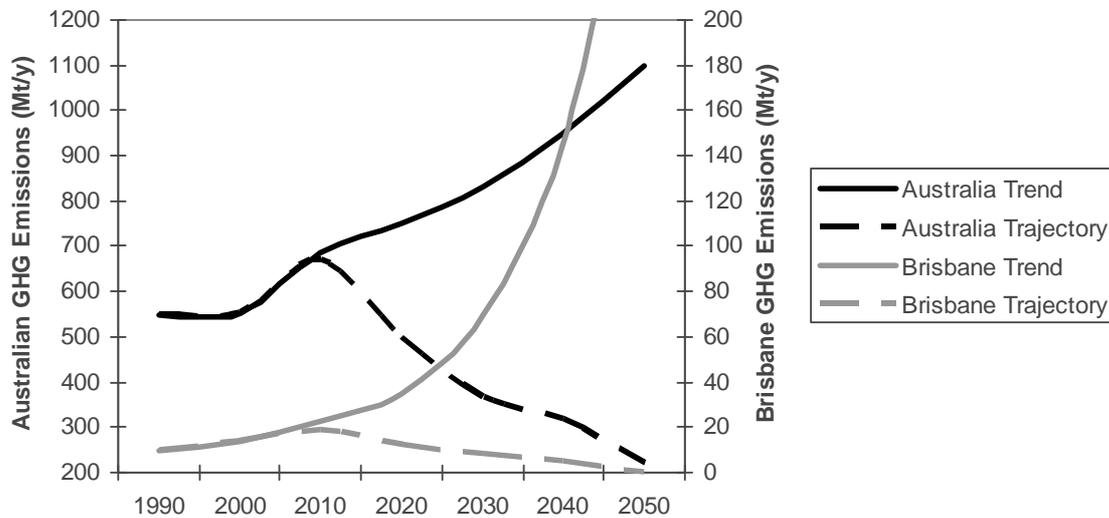


Figure 2. A comparison of greenhouse emissions trends and target trajectories between Australia and Brisbane. Note steeper trend in Brisbane (n.b. left hand axis applies to Australia, right hand to Brisbane).

Council established certain principles to guide its response to *A Call for Action* (BCC, 2007a). These included amongst other things that actions should be understandable to the community, focus on households and emphasise information, education and leadership over regulations and disincentives. The CitySmart initiative fully reflects this position (Clarke and Cardwell, 2008). Some key examples of its programs are CitySmart vans that travel to shopping centres and weekend gatherings to sell sustainable products; activities for school children and a subsidy for domestic electricity smart meters. The focus on ‘soft-sell’ policies like public education was also reflected in the climate change content of the first SEQ Regional Plan.

A look back on the SEQ Regional Plan from a greenhouse mitigation perspective reveals that it is clearly dated despite the few years that have passed. The specific mentions of greenhouse gas emissions occurred within the atmosphere section (Queensland Government, 2005, p. 32) and made some broad statements about improving energy efficiency, transport systems and land use practices, as well as community awareness. The plan also proposed annual greenhouse gas emissions as one performance indicator. Nonetheless the plan’s objectives to contain urban settlement, encourage transit-oriented developments and enhance public transport are high priority greenhouse mitigation priorities for land use policy. Maunsell AECOM has been working with the Department of Infrastructure and Planning to review priorities and suggest strategies and policies in relation to climate change. Mitigation is a lower priority than adaptation in this exercise because core land use issues like an efficient urban form are critical for mitigation and will continue to be addressed, but the land use implications of adaptation are very significant and were barely mentioned in the first Regional Plan. However, the government’s associated investment in infrastructure under SEQIPP has provided some opportunities to begin to integrate mitigation in project delivery.

Maunsell AECOM has helped deliver several of the large-scale infrastructure projects flowing from SEQIPP. The \$333 million Inner Northern Busway (Queen St to Roma St sections) and the \$700 million Trackstar rail upgrades and extensions were both delivered as alliances. The alliance model has proved useful in promoting sustainability and Maunsell developed a green energy and carbon offsetting approach for the busway and established greenhouse abatement measures for Trackstar.

Applying carbon management to infrastructure project developments is different from the typical corporate emissions approach because the project entity (e.g. alliance team) delivering the project is essentially short-lived, there is a cluster of emissions associated with construction, and then the ultimate project makes significant long-term positive or negative impact on region-wide emissions. We are continuing to develop our methods to apply to projects, but they normally entail three components:

- Emissions from construction (e.g. project office electricity, diesel consumption and embodied emissions in concrete);
- Emissions due to landscape changes (tree removal and planting); and
- Emissions over a set nominal period of operation (e.g. 30 years).

Emissions due to landscape changes are normally highly insignificant, but those who are new to mitigation commonly believe that tree-planting will have a far greater effect than it does. Therefore, we have found it best to include landscape change analyses. Figure 3 illustrates a carbon footprint analysis we completed for a transport infrastructure project that compared six alternatives. We used a nominal 30 year period to combine consideration of construction-related emissions with long-term operational implications.

Adaptation

Adaptation is about coming to terms with the reality that the climate is changing and planning ahead for the consequences of the changes. Unfortunately, there is considerable uncertainty about how the climate is changing, so we must plan amidst scientific probabilities, uncertainties and the outputs of complex models. One approach is to develop rich, descriptive scenarios about possible futures (i.e. stories), and use these to flesh-out suitable adaptation measures.

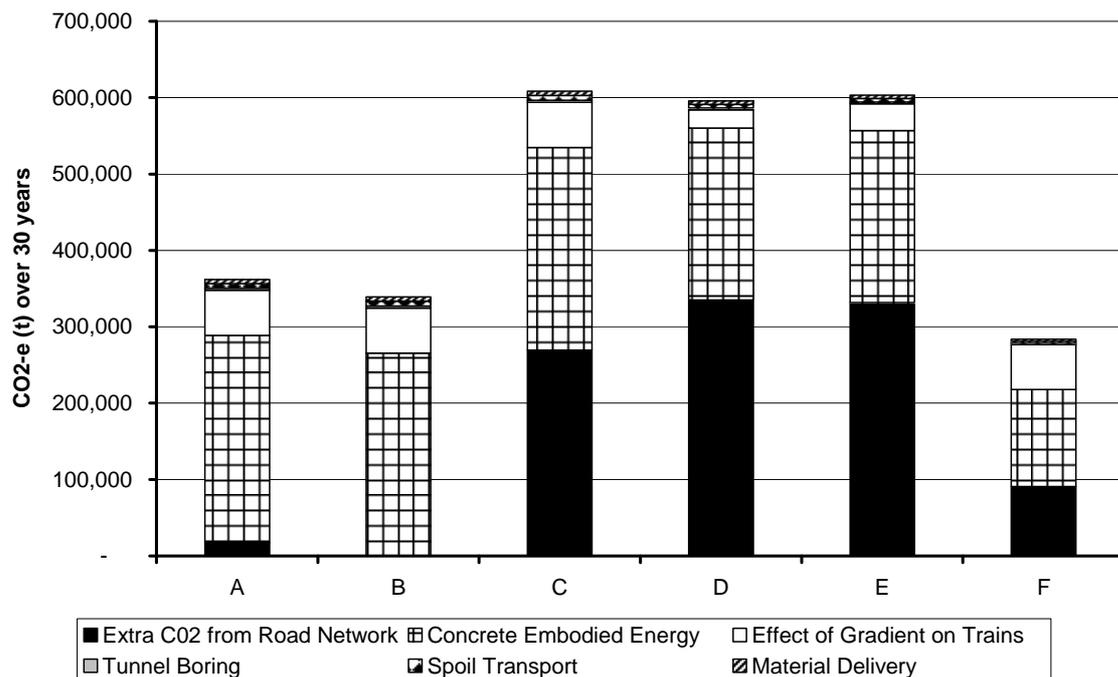


Figure 3. Example carbon footprint for a transport infrastructure proposal comparing six alternatives. The ‘extra’ CO₂-e was the increment above Option B which had the least impact on road network emissions. This approach was used because the modelled road network emissions would have otherwise swamped all other components. The use of a 30 year period allowed for combining emissions from operation (road network and effect of gradient on trains) and construction emissions.

The CCETF report included ‘Michael’s Story’, a fictional narrative created for a 60 year old resident of Brisbane’s bayside in 2030 (Maunsell AECOM et al., 2006, pp. 12-14). We say that this is the first Maunsell report to include a work of fiction. The CCETF also identified and assessed Brisbane’s vulnerabilities to climate change in the areas of temperature, ecosystems, drought, storms, sea level rise and storm tides (storm surge). The report included maps illustrating possible inundation from storm tides. The taskforce organised its recommendations under a series of strategic approaches. One of those was ‘preparedness for change, emergencies and surprises’ and another was ‘communication and education’, which recommended actions to contribute to community resilience. In all, the CCETF made 43 recommendations in the climate change adaptation area.

Council established CitySmart to organise the implementation of a range of CCETF mitigation measures, but for the most part, the program did not pick-up the adaptation recommendations, except perhaps by encouraging the shade values of trees, and some climate change messages associated with educating about the rationale for mitigation. Maunsell AECOM has been partnering with BCC (June-August 2008) to deliver internal workshops and staff and councillor engagement activities to build-up the climate change adaptation ‘literacy’ within the organisation. The policy approach to adaptation is less mature than mitigation within BCC, and also generally in SEQ planning.

The first Regional Plan contained really only one slim reference to adaptation, in policy 2.3.4: 'Assess the impact of potential climate change in preparing planning schemes and land use strategies' (Queensland Government, 2005, p. 32) and no assistance or guidance was provided to local governments on how to undertake those assessments. Even still, to do this properly would have required considerably greater effort that has been evident in local and regional plans since 2005. The Department of Infrastructure and Planning has recognised this shortcoming and Maunsell AECOM is working with the department to collect and synthesise policy priority information from line agencies and local governments, and begin to shape more effective inclusions on climate change for the next regional plan. In fact, the Queensland Government has re-named its ministerial environment portfolio to 'Climate Change and Sustainability'. We are also working closely with the Gold Coast City Council to assist them in preparing a climate change strategy that emphasises an adaptation approach for that highly vulnerable coastal conurbation. This will be useful in ascertaining appropriate strategies with a land use dimension that can be included in the Regional Plan. The community will have to live with the settlement patterns set by regional plans for centuries, and the associated infrastructure will serve the community for fifty plus years. These are timeframes that extend well into periods of significantly changed climates according to scientific predictions.

For infrastructure projects, planning issues such as climate change adaptation are usually identified in impact assessment studies (or possibly pre-feasibility studies). In this framework, they have tended to be presented as part of the 'description of the environment' components; that is, a description of the current climate. Sometimes these documents attempt to discuss future climate changes, but thus far they have tended to mix-up issues of air quality, climate change and greenhouse gas emissions. Maunsell AECOM has begun to change the way these impact assessment and planning studies handle these considerations. For example, for a freight rail study, we have added descriptions of likely future climatic conditions based on primary research by the CSIRO and the Bureau of Meteorology, together with an identification of risks and adaptation strategies. For a passenger rail study involving tunnelling, we flagged areas for adaptation considerations including materials selection, design standards for extreme events and material degradation, altered maintenance regimes and changed technology to ensure performance in different climatic conditions. The Queensland Government now requires an assessment of climate change considerations to accompany major Cabinet Submissions. Consequently, the scoping work we have included in planning studies has become immediately useful for our State Government clients and decision makers.

Peak Oil

As distinct from climate change adaptation, where there are numerous climatic variables changing, peak oil is about the change in one economic variable, namely oil price, and the direction of that change would be upwards. The CCETF report identified that this one change would have multiple flow-on implications throughout the economy and society.

Peak oil was a major focus of the CCETF's work. This may be partly because there was so little public policy attention given to the issue at the time, but it seemed to have so many potential implications for a local government like BCC. For example, BCC ran a bus service with hundreds of diesel buses. It also continued to build and maintain roads throughout the city and was the driving force behind the North South Bypass Tunnel, an investment in road infrastructure exceeding one billion dollars.

The CCETF helped legitimise peak oil as a municipal policy issue, and scoped out some initial policy responses. Some of these overlapped with climate change mitigation directly, such as reinforced emphasis that was required on walking, cycling and public transport modes of travel. The taskforce recommended a target of reducing mineral oil consumption for the city as a whole by at least 50 per cent by 2026 (this was not adopted by Council). In all, the CCETF made 14 recommendations specific to peak oil, not counting ones with multiple benefits including all transport planning related recommendations.

As with climate change adaptation, the CitySmart initiative did not have any specific mandate to address peak oil. At the time of writing, BCC still did not have any specific program related to peak oil, though awareness of the issue was growing among Councillors and staff. For example, Brisbane Mass Transit Investigation included a small section on peak oil (BCC, 2007b, p. 36). Similarly, the word 'oil' did not appear anywhere in the Regional Plan (though it was published three years before the CCETF report). Despite, or because of, being heavily involved in the design of transport infrastructure, Maunsell AECOM has made some efforts to address peak oil in its work on planning and infrastructure projects. This is usually confined to a discussion of the issue, but it will be possible to develop risk and vulnerability analyses and adaptation responses as we have done with climate change. We can also conduct sensitivity testing on fuel price in transport models. Of course, the value of this analysis depends on the quality of the behavioural data sitting behind the modelling.

Discussion

From the above examination of climate change and peak oil issues in planning at a local government and regional level in SEQ, it is apparent that policy for greenhouse gas mitigation is relatively mature, climate change adaptation is emergent and peak oil is not established. The suite of policy responses for greenhouse gas mitigation is well understood. The difficulty is that these policies can be sweeping and affect people's daily lives. The recent Australian experience with the public and corporate unease with the Australian Government's cautious introduction of an emissions trading system is instructive. Nonetheless, there are now some strong examples of how infrastructure projects can incorporate greenhouse gas mitigation. The Australian Government's title for its emissions trading system, the 'Carbon Pollution Reduction Scheme', has properly identified greenhouse emissions as environmental contaminants, alongside others such as sulphur dioxide, which should receive mitigative attention in infrastructure project construction.

Climate change adaptation measures have proven to be challenging for policy makers. One way of looking at adaptation would be that it does not necessarily involve anything new. The weather outcomes in future climates will not be things previously unseen. For example, an intense rainstorm may occur with greater frequency, but it will still be a rainstorm. The CCETF understood that its major emphasis was to be on climate change and peak oil adaptation, rather than mitigation. However, Council was far more reluctant to accept taskforce recommendations addressing adaptation and peak oil, than it was for those addressing mitigation. Figure 4 compares the degree of acceptance of recommendations across these three areas. This may be for a few reasons. First, mitigation had been a well understood policy 'space', whereas adaptation was a new perspective. Second, there were some worrying new challenges contained within adaptation actions that might even unsettle the public. Finally, for a government body to accept adaptation actions implies a degree of acceptance that climate change is happening and there remain people in elected and unelected

public office who adhere to a sceptical viewpoint. The same is true for peak oil. Although science of peak oil has been well established for many years, it has been ignored by the policy mainstream and peak oil advocacy (at the time of the taskforce), was associated with a certain 'lunatic fringe' (Urstadt, 2006). Council's public debate of the taskforce report provided some evidence of this through the following statement by one councillor (2007a):

I was alarmed when I read the draft report. The agenda seems pretty clear: to force an acceptance as inevitable the doomsday scenarios based on, from what I can see, computer modelling, and to embark on a sort of McCarthyist crusade against anyone who questions the new faith.

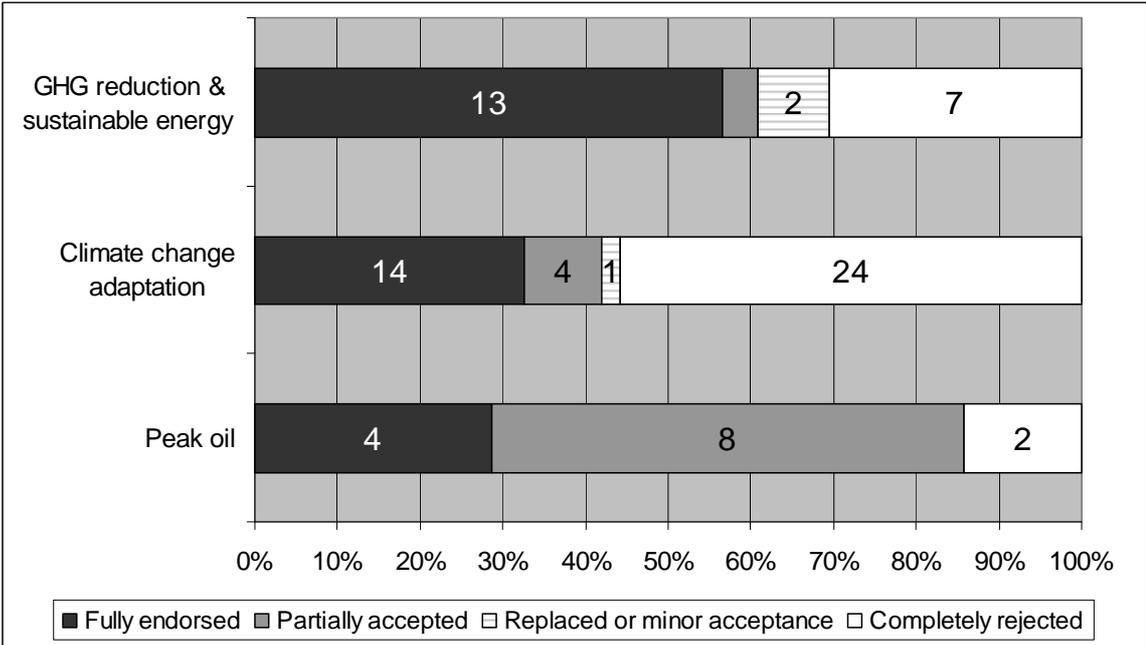


Figure 4. Degree of acceptance of Climate Change and Energy Taskforce recommendations by the Brisbane City Council. Note Council's relative comfort with mitigation versus adaptation and peak oil.

Conclusion

The modern affluent lifestyle we enjoy in countries like Australia is at present strongly linked to combustion of fossil fuels. To challenge this directly goes somewhat against the grain of democracy. Nevertheless, governments at all levels are increasingly accepting that strong actions are needed to reduce greenhouse gas emissions. Programs like BCC's CitySmart do still emphasise 'soft' policies like public education, but they still embody an acceptance that action is needed. This acceptance has also opened the door for including mitigation initiatives within infrastructure project delivery, where constructing infrastructure (like enforcement of regulations) is the 'pointy end' of serious government policy. Climate change adaptation has become the next big move by governments to respond to climate change, due to the logical link between accepting that emissions must be reduced and that the climate is changing. The fact that the climate is changing means that there will be significant implications that require a government response on behalf of the community. The next logical step is that if we are

building infrastructure that we expect to provide services for decades into the future, we must adapt our design and delivery approach to the climate in which the infrastructure will have to operate in the later stages of its service life. Like climate change, peak oil poses an immense challenge to our democratic governments, because society has become so dependent on this single resource over the last 100 years. The need for a peak oil response is obvious to those who understood the peak oil critique. Although the implications will be less catastrophic than climate change, there is something that is more obvious, more immediate and more direct about it. For example, the massive investment being made into infrastructure in SEQ includes a significant share that will primarily serve oil-dependent, private motor vehicles and arguably further entrench the region's vulnerability to peak oil impacts.

Acknowledgements

Although the content and opinions expressed in this paper are the responsibility of the author only, preparation of the paper and participation in the conference has been supported by Maunsell AECOM - a leading provider of design, planning and management services across Australia, New Zealand. With more than 42,000 employees, AECOM provides a blend of global reach, local knowledge, innovation and technical excellence in delivering solutions that enhance and sustain the world's built, natural and social environments. www.maunsell.com

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