

# The peak oil and oil vulnerability discourse in urban transport policy: A comparative discourse analysis of Hong Kong and Brisbane

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## Abstract

The nexus of transport, energy and household expenditure garnered increasing academic attention during the period of increased oil prices during the decade from 2000 to 2010. Peak oil emerged as a widely discussed 'storyline' advocated by a globally connected discourse coalition. This study explores the effects of the peak oil discourse in influencing urban transport policy. Two distinct cases are examined in this paper: high density and public transport dominant Hong Kong; and, low density and car dependent Brisbane. Data was obtained from interviews with stakeholders, public documents and media concerning the period between 2003 and 2015 when oil prices were high. This study combines analytical tools from Kingdon's multiple streams framework and Hajer's discourse analysis to assess the effects of the peak oil discourse in Brisbane and Hong Kong. While different urban settings are likely to be major differentiators in the responses of participants from the two cities, higher oil prices have bolstered the voice of 'affordability' storylines that have emerged in both cities. Yet only Brisbane exhibited official usage of 'peak oil' storylines. Counter storylines are found to have been adopted by opposing discourse coalitions, either focusing on the need to develop and deploy technical solutions which can resolve 'peak oil' or to simply 'wait-and-see'. The framing of the issue of heightened oil prices can be seen as acting as a political catalyst, as evidenced by the rise of fall of the response to 'peak oil' and 'oil vulnerability' in Brisbane. As oil prices crashed after 2015, the affordability pressure on urban transport also reduced. When oil prices are low, policy makers or interested stakeholders should expect to adapt other storylines that feature climate and economic resilience which promote sustainable transport and measures to reduce oil vulnerability, no matter how car, or oil, dependent a local environment is.

Keywords: oil vulnerability; energy-related economic stress; peak oil; discourse analysis; storylines; multiple streams framework

## 1. Introduction

As evidenced by the volatility in energy prices during the past decade, there is growing concern about finite energy sources from fossil fuels. By the turn of the 21<sup>st</sup> century, awareness had grown regarding the risks inherent in society's dependence on oil, especially to fuel private automobiles. The recent period of extremely high oil prices between 2000 and 2010 attracted widespread attention. The notion of peak oil re-emerged, focusing on the uncertainty of reserves and limits to future oil supplies (McGlade, 2012; Simmons, 2005). This period is of interest because high oil prices brought forth a number of trends, including, 1) a re-evaluation of car dependence and its related urban form (Aftabuzzaman and Mazloumi, 2011; Shove et al., 2015); 2) a push to produce previously uneconomic unconventional sources of oil, such as shale, and tar sands; 3) alternative energy sources for transport which also became economically competitive, creating calls for a transport energy transition (Li and Loo, 2014). In many jurisdictions, there is a mismatch of aims between policy makers who attempt to restrict car use by the implementation of sustainable transport policies for the car-owning public, or for those aspiring to car use who are averse to changing their expectations (Hickman and Banister, 2014). While there is increasing policy focus on reducing car dependence and oil use in the transport sector, progress was constrained by the enormous lock-in of socio-technical systems of car related infrastructure in the society (Newman and Kenworthy, 2015) and the strong aspiration to drive by the car-owning masses (Sperling and Gordon, 2009). During the oil crisis of the 1970s, oil supply shortages prompted various governments to ration fuel, limit speed on highways and establish strategic petroleum reserves. Yet, with the risk of energy shocks receding during the 1980s and 1990s during an oil glut, there was less research interest in this topic. Oil prices increased tremendously in the 2000s, and this has led to heightened research and public debate about the issue of oil vulnerability, in particular in the transport sector, as internal combustion engine (ICE) powered vehicles are dominant and there are high levels of car dependence in many countries. The discourse regarding 'peak oil' regained attention, created a global following and organisations were established to raise awareness of the idea and its implications. With increased public debate around the problem, governments in many cities also used the term to justify transport policy adjustment (Lee and Scott, 2007; Maribyrnong City Council, 2009; Smith, 2010; Sunshine Coast Regional Council, 2010). However, what is less understood is how the term entered the agenda of transport policy and planning, and what the results of that entry have been.

This paper aims to investigate how the discourse about peak oil entered policy making and problem framing in two cities – Brisbane and Hong Kong – during this critical period. The study assembles and analyses qualitative data to compare the experiences in addressing oil vulnerability in two contrasting cities in the Asia-Pacific region: Hong Kong and Brisbane (the state capital of Queensland, Australia). Because of the high levels of car dependence, Brisbane has been a pioneering city in researching and developing policy measures targeting oil vulnerability (Dodson and Sipe, 2015). Hong Kong is known for

its extreme compactness and high public transport mode share, offering 'natural defences' against oil vulnerability. While geographic and cultural differences can partly explain such disparity, deliberate action and policy are imperative in creating more sustainable and less oil vulnerable means of transport. Yet the 21<sup>st</sup> century's higher oil prices have generated political, public and academic attention on policies that attempt to reduce oil vulnerability in Brisbane. This is one of the reasons why authorities and researchers in Brisbane focus more on reducing oil vulnerability, thus recognising it as an issue, compared with those in Hong Kong.

The contributions of this paper can be summarised as: 1) providing in-depth cross-cultural understanding of how oil vulnerability and energy-related economic stress in transport are understood, in both car dependent and non-dependent cities; 2) to apply multiple, but theoretically consistent policy analysis frameworks to analyse how the peak oil discourse has resonated in Hong Kong and Brisbane; and 3), to reveal ways in which political and societal contexts shape transport policy outcomes and the implications for policy actors in advancing their agenda priorities. This requires acumen of policy actors to connect the 'streams of problems, policy solutions and politics' (as per Kingdon's (1984) multiple streams approach), and to engage in 'winning discourse arguments' (as per Hajer's (1995) argumentative discourse). These approaches will be explained in greater detail in Section 3.

This paper consists of seven sections. Following the introduction, Section 2 outlines the existing literature about the emerging study of 'energy-related transport stress' research in urban transport. Section 3 summarised the urban transport context of Hong Kong and Brisbane's oil vulnerability. The theoretical framework and the discursive methodology of this study are presented in Section 4. The results are elaborated in Section 5, followed by a discussion in Section 6 and lastly, Section 7 concludes the paper.

## **2. Existing scholarship of oil vulnerability and 'energy-related transport stress'**

From the early 2000s until 2015, a period of higher and unstable oil prices sparked public and scholarly debates about the need to address vulnerabilities caused by volatile oil prices. Increased attention on oil and energy in transport research has sought to develop better understanding and identify possible solutions (Anable et al., 2012; Banister et al., 1997; Gilbert and Perl, 2007). In Australia, a notion of 'oil vulnerability' has emerged as Dodson and Sipe (2005, 2007, 2008) used visual mapping analysis to reveal the spatial extent of car dependence, social disadvantage and household affordability (based on mortgage debt levels) in Australian cities. They referred to these combined variables of oil vulnerability as *the "potential exposure of households to adverse socioeconomic outcomes arising from increased fuel costs"* (Dodson and Sipe, 2007, p. 46). It was found that a disproportionately higher impact of higher oil prices is more likely to be borne by those living in outer suburbs, due to high car ownership, lower income

levels and higher mortgage indebtedness, with inner urban cores being less impacted. Other studies also used oil vulnerability as an umbrella term for the wider vulnerabilities caused by the use of oil (Kerschner et al., 2013; Roupas et al., 2009). This issue is exacerbated by concerns of peak oil, the geo-politics of a continued supply of oil (e.g., the use of plastics, carbon emissions, food production, etc.) (Brecha, 2013; Coventry, 2013; Neff et al., 2011). In the context of transport, oil vulnerability refers especially to car dependence, in particular to the extensive use of vehicles fuelled by oil.

With readily available data sources and ease of use, this census-based spatial indexing approach was soon adopted by a number of researchers looking at cities in Canada (Arico, 2007), Australia (Fishman and Brennan, 2009), and the United States (Sipe and Dodson, 2013), demonstrating the transferability of this method. In later studies, advances in methodology were seen to take account of commuting distance and trip volumes derived from journey to work data (Li et al., 2015; Runting et al., 2011). Sophisticated simulation and modelling techniques, such as spatial agent-based microsimulation (Lovelace and Philips, 2014) and minimum energy activity modelling (Rendall et al., 2014), have recently been experimented with in this area. The notion of vulnerability has also been expanded to look at the adaptive capacity (the level of resilience), exposure (oil use patterns) and sensitivity (the ability to absorb higher prices) to oil price increases (Leung et al., 2015). Oil vulnerability, however, is not the only concept used to denote energy-related economic stress in transport. A plethora of terms and frameworks have been developed to understand social disadvantage related to transport, urban form and energy price increases, volatility, and uncertainty. As noted by Mattioli (2014, 2015), terms such as 'transport poverty' (Lucas, 2012) from the UK, *précarité énergétique* (energy precariousness) from France and *energiearmut* (energy poverty) from Germany, have also been used to study the impacts of higher oil prices on cities.

Whilst such diversity of terms has fostered academic debate and has appeared in many government policy initiatives globally, most scholarly studies used these concepts as a way to study urban issues such as the spatial patterning of urban form, transport and energy use (Mattioli, 2014; Mattioli et al., 2016; Mayer et al., 2014; Motte-Baumvol et al., 2009). However, there have been few studies about policy responses to oil vulnerability. Notably, these studies tend to focus on jurisdictions that have a higher level of car ownership and dependence, particularly Western industrialised countries (Australasia, Europe and North America). An understanding about whether oil vulnerability poses risks to other regions, such as in Asia, is relatively scant. Meanwhile, a number of qualitative studies have been produced on the perceptions of private car use versus public transport (Beirão and Sarsfield Cabral, 2007; Steg, 2003), and there have been local studies on car dependence in Hong Kong (Cullinane, 2002) and in Australian cities (Hensher, 1998). However, the wider issue of energy and oil use has not been addressed, in particular, how is the problem of oil vulnerability framed? What are the social and political context of the development of energy-related transport policies? Discussions about these issues are yet to be seen in

the literature. In this paper, we attempt to use a discursive framework to examine the different responses of the case study cities during the period of higher oil prices.

### **3. Problem framing and discourse analysis in transport policy**

Traditionally, policy making and its studies and analysis are derived from a positivist epistemology which follows a positivist view of science. This is also known as the rationalist view, in which policy can be understood as ordered, linear stages starting from problem identification, and going through policy formation, and implementation (Jann and Wegrich, 2007). This approach assumes an objective, value-free stance to reality and knowledge which are increasingly challenged by the emerging worldviews of critical theory and constructivism, which view the world and knowledge production as subjective, contingent, and mediated by values (Guba and Lincoln, 1984). The rationalist view also tends to overlook the complexities and uncertainties of policy processes that are in reality chaotic and random in nature. It is increasingly evident that policy makers do not view a problem in a purely objective way but through a lens which is coloured by their own 'history, traditions, attitudes and beliefs' (Howlett et al., 2009). A post-positivist 'linguistic' turn of public policy research has put great emphasis on the role of discourse in policy making (Bacchi, 2000; Dryzek, 2005; White, 1994). In this view, language is not natural. The way in which a problem is framed is particularly important as it forms public opinion, and also the agenda of various actors in policy making (Fischer, 2003; Gasper and Apthorpe, 1996). Problem framing is an important aspect of more recent policy analysis models, for instance, the prominent example of Kingdon's (1984) multiple streams framework (MSF) which aims to reveal the complex dynamics of agenda setting and policy adaptation.

The MSF sees policy making as resulting from independent streams of inputs, namely 'problems, policies and politics'. When these streams converge, there is a window of opportunity that opens in which political support for a solution can initiate its application to solve a problem (Parsons, 1995; Zahariadis, 2007). 'Policy entrepreneurs' are key agents in this process because of their capability in joining these streams to policy initiation. Policy entrepreneurs invest considerable time and resources to promote ideas or draw attention to problems in the hope of precipitating change. While the MSF is quite versatile in a large range of settings and promotes consensus building, it has been criticised for downplaying the argumentative nature of policy making (Brunner, 2008; Peters and Zittoun, 2016; Sabatier, 1999), and not being able to explain policy implementation (Jann and Wegrich, 2007). Nevertheless, Kingdon's view of how policy issues can gain attention is relevant for how energy issues, such as peak oil and higher fuel prices, could be framed and used to initiate change in policy making. Previously, Kingdon's work showed how the public transport lobby failed to gain support for its preferred goals in the United States during the 1970s, when reducing automobile dependence was framed as a solution for congestion alleviation (instead of

building more highways) and environmental protection (to reduce air pollution). Instead, public transport lobby was able to gain some support as the issue was reframed as contributing to energy security (after the oil crisis in 1973), but later lost attention and resources as oil prices dropped in the 1980s to the 1990s.

Another way to understand framing in policy making is the 'argumentative' turn of public policy analysis pioneered by Hajer (1993), who systematically defined the role of discourse and proposed a method of analysis in his research on the politics and policy of acid rain in the UK and the Netherlands. To him, discourse analysis is the examination of argumentative structure in either written or spoken statements, in which these utterances can provide an important tool to understand the meaning of policy actions (Hajer, 2006, p. 66). Hajer views discourse as a *"specific ensemble of ideas, concepts and categories that are produced and reproduced and transformed in a particular set of practices and through which meaning is given to physical and social realities"* (Hajer, 1995, p. 44). Policy debate can be seen as attempts to maintain or challenge the discursive order, as various actors see a problem in their own way, and attempt to influence others to believe the same. To understand discourse, Hajer put forwards the concepts of 'metaphor', 'storyline' and 'discourse coalition'. 'Metaphor' is a notion that stands for something else. A key example used by Hajer is 'acid rain', which is simpler two-word term that encompass the complex chemical process of industrial air pollution causing elevated acid levels in precipitation, and the associated environmental impacts (e.g.: dying trees and killing fishes). Some other examples of the use of metaphors in the environmental field are the 'spaceship' analogy of Earth or the 'greenhouse' effect of the atmosphere (Myerson and Rydin, 1996, p. 26). Metaphors are important in helping the wider public to conceptualise an issue (for the case of acid rain, the indirect effects of air pollution) and empowering those does not possess a complete technical knowledge to engage in policy discussions with a simpler metaphoric term (Huiteima, 2003, pp. 40–43; Macnaghten, 2003).

This problem identification through metaphor justifies the subsequent stage of discursive deliberation, the creation of a 'storyline'. It is defined as: *"A condensed statement summarising complex narratives"* (Hajer, 1995, p. 61). Hajer sees the storyline as being central to understanding discourse, as elaborated by Kurki et al. (2015, p. 3) it *"creates, maintains, and transforms the discursive order by positioning subjects and structures"*. Focusing on the storyline then enables the highlighting of the influence of a discourse coalition, which refers to *"a group of actors that, in the context of an identifiable set of practices, share the usage of a particular set of storylines over a particular period of time"* (Hajer, 2006, p. 70). Through storylines, knowledge is clustered and actors are positioned so that coalitions can be formed amongst the actors within a policy domain. The storyline acts not only as a 'discursive cement' that keeps a discourse coalition together, it also helps to reduce the complexity of a certain phenomenon which makes the problem more manageable. Moreover, it helps to gain attention and acceptance of more actors and puts the issue into the centre of public debate. It also affects the production of knowledge, as now those who claim to have knowledge (i.e., scientists, environmentalists or politicians) can illustrate how they can

resolve the problem. Actors are united through this shared discourse, and through these storylines and their socio-political resonance, the discursive construction of reality becomes an important source of power when discourse hegemony is achieved, and institutionalisation is in place to attain substantial authority (Hajer, 1995). Discourse coalition analysis provides the opportunity to understand the social dynamics of problem formulation, and thus how policy can be initiated or changed. While Hajer's discursive analysis focuses more on the argumentative tactics behind policy adjustment, these forces feed the flow of ideas and issues into Kingdon's multiple streams framework, making it possible to connect both frameworks. The coupling of these analytical concepts has been theoretically advanced by Winkel and Leipold (2016).

Transport policy can also be viewed as the outcome of competing discourses and storylines as in prior research (Vigar, 2002). Parallel to Hajer's (1993) discourse analysis of acid rain, peak oil and high oil price are seen to signify the structural problem of oil dependence. Similarly, 'peak oil', 'car dependence' and 'reliance on fossil fuels' might be constructed as an element of a metaphor of an unsustainable industrial society and globalisation (Bliss, 2005). In this study, we examine whether 'peak oil' is employed as a storyline during the period of higher oil prices from 2003 to 2015, by stakeholders in Hong Kong and Brisbane to promote policy change that could address oil dependence in urban transport. In this study, we analyse peak oil and oil vulnerability policy development in both Hong Kong and Brisbane. The key concepts of MSF and Hajer's approach are used in tandem.

#### **4. The context of case study cities and data collection**

Both cities chosen in this paper are oil importing cities, but with different urban form and transport infrastructure designs. Previous assessments of transport energy use have been focused on large sample quantitative studies (Newman and Kenworthy, 1989; Kenworthy et al., 1999). In this paper, we chose a small city sample ( $n = 2$ ) but a more qualitative approach in order to better understand the framing of transport policy in relation to transport energy use. Currently, oil vulnerability research primarily focuses on car dependent cities in the Western world. Adding non-western cities would help to enrich the understanding of transport policy with a different cultural and geographic context. Hong Kong is often seen as a classic example of public transport success due to its compact urban form, yet there are other compact 'city-state'-like urban jurisdictions, such as Macao or Malta, that retain considerable levels of dependence on private motorised transport. A policy of public transport infrastructure and car restraint, undertaken deliberately in the 1970s, is seen as the key to Hong Kong's current success (Tang and Lo, 2008). Conversely, Brisbane was once a public transport city with a very large street-car tramway network, but this was abandoned and cars now dominate. Brisbane also fits within the type of large 'provincial cities' with similar geography and urban form, such as Vancouver in Canada and Portland in

the USA. Table 1 outlines the mode share of these cities, showing that Hong Kong is on the public transport side of the spectrum while Brisbane is on the private automobile side. In contrast to “large-N” urban studies, “small-N” research focuses on the local uniqueness of each city with in-depth qualitative research (Seawright and Gerring, 2008). Such uniqueness can also be highlighted with a deliberate selection of disparate cases. Another consideration in choosing these two cities is a practical one: the authors have extensive firsthand knowledge of both cities which allows deeper understanding of the policy background and reduces the possibility of outsider bias (Denzin and Lincoln, 2005; Dwyer and Buckle, 2009).

**Table 1: Mode share Hong Kong, Brisbane and other similar cities**

Mode Share	'City-state'-like jurisdictions			Large 'provincial cities'		
	Hong Kong	Macao	Malta	Vancouver	Brisbane	Portland
Data year	2011	2007	2010	2011	2009	2011
High occupancy vehicles (Usually more than 5 passengers, e.g. bus / tram / rail)	76.2%	31.2%	15.0%	14.0%	9.5%	4.4%
Active modes (Walk / cycle)	14.9%	27.9%	7.6%	12.8%	11.3%	13.3%
Low occupancy vehicles (Usually 5 passengers or less e.g. private cars / motorcycles)	5.7%	35.3%	74.6%	73%	79.1%	78.2%
Others (Not classifiable)	3.2%	5.6%	2.8%	0.2%	0.1%	4.1%

(Source: Hong Kong 2011 Census, Macao 2007 Travel Survey, Malta Household Travel Survey 2010. Brisbane Household Survey 2009, Portland Household Travel Survey 2011)

As with most major urban regions and cities in the world, both Brisbane and Hong Kong border adjacent urban areas. In the case of Brisbane, it is within an urban conurbation known as the South East Queensland (SEQ) region which stretches from the Gold Coast in the south to Noosa in the north. This area has experienced sustained high rates of inward migration thanks to a warm climate and relatively affordable living costs (Spearritt, 2009). Hong Kong is a former British colony and, since the handover of 1997, has become a Special Administrative Region (SAR) of China. It has maintained high levels of autonomy, with separate customs and immigration arrangements with China (Kirby, 1997). It borders Shenzhen and forms part of the Pearl River delta in Guangdong province. The delta is a global industrial powerhouse and is also rapidly growing, on a much greater scale and with a higher population than Brisbane. While it is possible to study both cities according to administrative boundaries, this approach is not ideal as there are considerable free moving flows of passenger travel beyond administrative boundaries, particularly for Brisbane. To allow meaningful comparison of these two cities, the scope of Brisbane includes the urbanised parts of the surrounding local government areas of Ipswich, Logan, Redland and Moreton Bay. We refer to Brisbane as the ‘Greater Brisbane Metropolitan Area’ instead of only Brisbane City Council’s administrative area. In the case of Hong Kong with its defined borders, studying the entire SAR as a discrete study unit is preferred. The key similarities and differences in these



cities are outlined in Table 2 to provide a brief background regarding urban land use, transport and energy use which is important in understanding oil vulnerability.

**Table 2: Key characteristics of Greater Brisbane and Hong Kong**

Characteristics	Hong Kong	Greater Brisbane
Total population (2011)	7,070,388	2,003,499
Urbanised population (%) (2011)	7,053,701 (99.8%)	1,930,767 (96.4%)
Total area	1,104 km <sup>2</sup>	5904 km <sup>2</sup>
Private vehicles per 1000 persons	50.08	613.40
Estimated transport energy use per person	6.5 gigajoules	31.6 gigajoules
Urban form and density	Compact and high	Dispersed and low
Society and culture	Dominant Chinese population and society but with significant British and Western cultural influences due to prolonged British administration. English widely used as business and official language.	A new world European society with dominant Western culture but also increasingly multicultural due to sustained global immigration. Indigenous rights and awareness also growing in recent decades.
Development expansion space	Constrained by natural geography with limited room to expand. Future large scale development most likely by sea reclamation or redevelopment of existing urban areas.	Room for further expansion but controlled by regional planning.
Planning governance	Hong Kong Special Administrative Region Government as a 'quasi-city state' (Kirby, 1997) with British-based planning legislation. Increasing cooperation with the mainland Chinese government on cross-border coordination.	4 local councils (Brisbane, Logan, Redlands and Moreton Bay) with strong Queensland State Government involvement under the <i>Southeast Queensland Regional Plan</i>
Borders	Immigration controls along the Hong Kong-China border.	No border to neighbouring areas.
Natural geography	Coastal city separated by a wider Victoria Harbour, numerous outlying islands, some highly populated and connected by bridges or tunnels.	Coastal city separated by Brisbane River, some outlying islands but largely undeveloped.
Built-up area percentage	14.9% (264 km <sup>2</sup> of 1,104 km <sup>2</sup> )	14.2% (840 km <sup>2</sup> of 5,904 km <sup>2</sup> )
Average per-capita income	US\$55,167	US\$47,124
British colonial settlement since	1842 (ended in 1997 due to sovereignty change)	1825 (Australia - federated in 1901)
Human Development Index	0.891 (very high)	0.933 (very high)
Motorised transport modes	Bus, rail, ferry, tram/light-rail, car.	Bus, rail, ferry, car.

(Source: Australian Bureau of Statistics, Hong Kong Census and Statistics Department, Brisbane City Council, Hong Kong Transport Department, UITP Millennium Cities Database for Sustainable Transport, United Nations)

To facilitate understanding of the two case study cities, purposive sampling in the form of semi-structured interviews with key actors in the urban transport domain were conducted (n = 15, see Appendix 1 for the details of interviewees, names and organisation of the interviewees, all of which are anonymised). Brisbane's interviewees included those who are working at the local government area in the Greater Brisbane Area. The range of interviewees, including government officials, academics, non-government organisations (NGOs) and transport operators, encompassed Hajer's (2006, p. 73) notion of 'helicopter interviews' with participants from different fields across the policy domain. The questions asked were aimed at obtaining the interviewee's perceptions and experiences of transport policy related to the period of higher oil prices, with a focus on peak oil and oil vulnerability.

We focus our study mainly on domestic urban passenger transport due to constraints of time and resources. However, other aspects of oil use, including freight transport, global trade, and even agriculture, were mentioned by the stakeholders during the interviews, demonstrating the wide range of the impact caused by higher oil prices. This paper follows a part of Hajer's (2006) discourse analysis method. The full version includes ten steps, which are:

1. Desk research
2. 'Helicopter interviews'
3. Document analysis
4. Interviews with key players
5. Sites of argumentation
6. Analyse for 'positioning effects'
7. Identification of key incidents
8. Analysis of practices in particular cases of argumentation
9. Interpretation
10. Second visit to key actors

Due to resource constraints, a second interview with the participants were not able to be conducted. Additional inputs included transport and land use policy, hansards, parliamentary reports and meetings of the legislative bodies of Hong Kong and Brisbane. Media reports also were used to examine how the debate about higher oil prices was conducted, as these are regarded as 'sites of argumentation' (Hajer, 1995). *NVivo 11* software was used to transcribe and analyse the data. This qualitative approach enabled direct engagement with stakeholders and provided an opportunity to explore this topic in greater detail and access previously unseen views or perceptions that are not observable through mere third-party data and quantitative methods such as vulnerability mapping.

## **5. Peak oil as a global discourse coalition**

The concept of peak oil was first coined by geologist M. King Hubbert (1956), who studied oil production patterns and found that oil wells and reserves follow a pattern of a bell-shaped curve. The study of peak oil became stagnant until the period of higher oil prices in the 2000s. The appearance of the term 'peak

oil' became more frequent among mainstream English language media and academic publications (Bailey et al., 2010; Bardi, 2009; Becken, 2014). This is largely associated with the emergence of a globally connected discourse coalition that produces and spreads knowledge about this issue. The *Association for the Study of Peak Oil (ASPO)* was begun in order to unite a number of similar minded experts in the oil industry, and the message rapidly disseminated on websites such as *theoildrum.com*, *peakoil.com* and *energybulletin.net* in the early 2000s. With increased interest, locally affiliated groups of ASPO appeared across the globe. For instance, *ASPO-Australia* was founded in 2005 and *Peak Oil Hong Kong* was established in 2007 (Chen et al., 2007). Peak oil advocates frame the issue of higher oil prices in relation to increased oil demand from rapidly industrialising giants such as China and India, and the lack of transparency of oil reserve data to justify urgent action to reduce oil use (Brecha, 2013; Hirsch et al., 2007; Li, 2007). In the case of transport, solutions included the provision of public and active transport, better urban planning to reduce travel distance or demand, car restraint policies and seeking alternative fuel to replace oil. Sustainable transport policies could be promoted without the peak oil storyline, as there are other benefits such as fewer carbon emissions to address climate change, alleviation of air pollution and a reduction in the impact caused by mass car usage, for instance, road trauma, lack of exercise and obesity, and reduced visual amenity of car-based infrastructure, such as highways and parking spaces (Banister, 2003; Barter et al., 2003; Chapman, 2007; Eliasson and Proost, 2015; Hensher, 2008; Hickman and Banister, 2014; Litman, 2011). However, the use of peak oil storylines was more apparent in car dependent cities between the periods of the 2000s and 2010s. The following subsections explore how differently the peak oil storyline is employed in Hong Kong and Brisbane, respectively.

### 5.1 The peak oil storyline in Hong Kong

From the data collected, we were able to analyse the discourse of peak oil largely utilised by academic and NGO groups in Hong Kong. The explicit mention of the term 'peak oil' is absent in the official transport policy. For public responses to the issue of higher oil prices, the official response of the Hong Kong government is mainly to monitor the situation and to provide information for users (for instance, price watch initiatives on fuel prices) (Hong Kong Government Information Services, 2014). In view of the realities of rising oil prices, the Hong Kong government sees oil prices hikes as merely market fluctuations, not a structural oil dependence risk. Also, the issue is viewed as being beyond the government's control, as seen from a comment from a politician:

*Of course, there are things that we cannot change, including the international oil price. This is a relatively important issue and is related to international politics, geopolitics and the impact on the economy, which are beyond our control.*

(Hon. Kwok Ka-Kei, Independent, Legislative Council member, 2008)

The political reality is that this 'let the market decide' and a 'wait-and-see' approach is largely pragmatic and sees the issue of oil price as beyond the control of local level governments and at the mercy of international markets. Peak oil has not been used widely in Hong Kong as a discourse in explaining the period of higher oil prices. One respondent who expressed stronger interest in peak oil in Hong Kong commented:

*I do not think there is any research in peak oil and the knowledge and sense of a looming energy crisis is not prevalent in Hong Kong.*

(Peak oil advocate interviewee, 2015).

This does not mean there is a complete lack of knowledge about peak oil among Hong Kong's policy makers, as revealed from an interview response by a government official regarding peak oil:

*I have heard a bit about peak oil. But in Hong Kong people rarely mention it. They tend to assume oil will keep flowing to Hong Kong from the Middle East and it is not a concern at all.*

(Hong Kong government official interviewee, 2015).

Beyond urban transport, the term 'peak oil' appeared in a number of NGO's submissions to government policy consultations regarding ecological footprint and biodiversity (Cheung and To, 2014) and to oppose the construction of a third runway (Hong Kong Airport Authority, 2014). These submissions suggested that energy needs to be considered in policy making. Apart from this, it appears that the peak oil discourse is only present outside government policy making, and its advocates present as a fringe group. Those who represent persons affected by higher oil prices, such as the motorists' lobby, mostly do not connect the issue to a wider resource depletion issue. They tend to link the issue of higher oil prices to affordability and financial strains of people who are required to pay for fuel, such as professional drivers and people living in areas that depend on oil-based fuel for transport, for example, those living on outlying islands (Hong Kong Legislative Council Secretariat, 2005). The responses of the participants and documentary data collected in this study suggested that people were mostly interested in asking the government to reduce fuel taxes or to provide subsidies. In Hong Kong, no official policy document was found publicly which dealt with higher oil prices specifically in the period between 2003 and 2015.

## **5.2. The peak oil storyline in Brisbane**

Conversely, in the case of Brisbane and Queensland, oil prices became a serious issue in the early 2000s. Peak oil gained widespread media attention and government response at the same time. A

number of stakeholders were involved in Brisbane's local and state government bureaucracy around that time, and advocacy groups concerned with peak oil existed within their organisations.

*There was a background paper on peak oil and energy for Brisbane City Council in 2005. We worked with senior bureaucrats who were working on a vision for the council. Looking at long-term strategic challenges globally and for Brisbane, it included climate change, peak oil, nanotechnology, ageing population, globalisation and so on. Then they did the classical risk assessment of all of those. Peak oil came out as the most urgent and impactful in the short to medium term, way back in 2005.*

(Brisbane government planning officer interviewee, 2015)

Peak oil interest groups were also evident inside transport agencies, as demonstrated by a comment from a transport planner:

*In there (the transport agency), it was a big thing. People were wearing badges saying 'peak oil', some people were having a very strong interest in it.*

(Former state government transport planner interviewee, 2015)

This reveals that the peak oil discourse has a certain acceptance in Brisbane and its advocates are forming a discourse coalition that is able to influence policy making. Further, the Labor Government which was in power in Queensland from 1998 to 2012 was more attuned to the storyline of peak oil. At a state level, a public committee named the 'Impact of Petrol Pricing Select Committee' was instigated to investigate the issue of fuel price increases in Queensland in 2005. While the official purpose of the committee was to investigate the economic competitiveness of ethanol, peak oil was used as a storyline in a majority of the submissions to explain the issue of increasing oil prices. About the same time, the 'Oil Vulnerability Taskforce' was set up. The term was included in subsequent regional planning and transport policies (Queensland Government, 2009). Interviewees suggested that discussions about peak oil were spearheaded by Andrew McNamara, a Queensland member of parliament with a strong interest in peak oil, who can be seen as a 'political entrepreneur' in Kingdon's multiple streams framework. The following statement was made by him in a parliamentary question time.

*The future availability of fossil fuel and alternative energy supplies is one of the main sustainability issues facing society today. The significance of this issue means that Queenslanders and people all around the world will need to address the increasing price and diminishing availability of oil in coming years.*

(Hon. Andrew McNamara,  
Queensland Minister for Sustainability, Climate Change and Innovation, 2008)

The notion of peak oil and the solutions for it were also becoming institutionised. Funding was allocated to devise whole-of-government coordination to implement the policies and recommendations identified by the Oil Vulnerability Task Force in the Queensland Budget in 2008. The Office of Sustainable Transport was established to devise policies to promote sustainable transport. However, within the opposing discourse coalition, the issue of peak oil and car dependence were not seen as being so urgent. Key actors on the opposing side are those on the conservative spectrum of politics, in particular the Liberal National Party (LNP) in Brisbane and Queensland's political scene, led by Brisbane's then mayor, Campbell Newman, who was later elected as Premier of the State of Queensland. When asked about oil vulnerability at a local meeting, Newman replied:

*Whether they run cars on wood-shavings, tea leaves or canola oil, people will continue to drive.*

(Campbell Newman,

Former Lord Mayor of Brisbane, 2006, as cited in *The Courier Mail*, (Clarke, 2006))

During Campbell Newman's reign at the Brisbane City Council, especially after his re-election in 2008 securing majority control in Council, greater powers were gained by his government. This allowed his government to promote pro-road and pro-car policies as evidenced by the construction of the 'TransApex' bypass tunnels under Brisbane's city centre along with a diminished focus on public and active transport. Some interviewees in Brisbane even suggested that discussions about peak oil and oil vulnerability were being discouraged in Council. This resulted in the resignations of many public servants who held strong views on energy and sustainability issues. This later had an effect on state-wide politics, as Campbell Newman ran for the position of Premier of Queensland and was elected in 2012. Officially, in Queensland the storylines of peak oil and oil vulnerability in state transport receded in transport and land use planning policies after 2012. Instead, massive road building projects were embarked upon under the storylines of 'flood-reconstruction', 'dangerous roads due to the neglect of previous government', 'economic growth' and 'state building'. These policies lasted until 2015, when the Labor Party returned to power. Yet as oil prices reduce, in Brisbane the issue of peak oil no longer appears to be a pressing matter. From a retrospective view, the effectiveness of the peak oil storyline in transport policy appeared limited with a legacy of only "*to adding a little paragraph of oil vulnerability in the regional plan*" (Brisbane academic interviewee, 2015) and public servants feel "*we are not actually doing anything and I feel we were incapable of doing anything.*" (Brisbane Local government officer interviewee, 2015). While little is being done to modify the transportation system in Brisbane city, statewide biofuel policy gained traction in 2014 as it is supported by the LNP State Government. Even after Labor regained power in 2015, this policy continued with the support of rural interests and bipartisan support. A biofuel mandate was approved in December 2015, and is expected to be in force in 2017. Analysis of the submissions has shown that the biofuel industry used arguments about energy security.

## 6. Using MSF and Hajer's discursive framework to understand problem framing, and links with policy and politics

The results show that the use of storylines varies based on local conditions arising from the social and political context. Public concerns about a particular issue are important in promoting transport change (Butler et al., 2015). This relates to Kingdon's (1984) idea of the coupling of various streams and which could be analysed alongside with the Hajer's discursive framework in the following analysis.

First, the MSF lens are viewed from the *problem stream*, as attention lurched to the problem of car and oil dependence in Hong Kong and Brisbane during the period of higher oil prices circa 2003 to 2015. This is followed by the *policy stream*, possible solutions to the problem were looked for. While there are ample ideas floating about in the 'policy primeval soup', the timing to connect those ideas with policies is most important. For Brisbane, a more receptive uptake of the peak oil storyline is largely due to the greater impact of higher oil prices and widespread car ownership/usage. This is relatively less in Hong Kong, but still attracts debate in Hong Kong, with calls for reducing fuel tax and increased scrutiny on the perceived monopoly of oil companies.

By analysing the material from published sources in conjunction with the interview data, the combined issues of fuel affordability and car dependence were used to explain why the issue of peak oil received attention at particular moments. These are analysed by looking at the key events of the case study cities, in particular, the release of the policy documents during the higher oil price period as shown in Appendix 2. With lower car dependence in Hong Kong, the narratives of peak oil were not used as storylines in Hong Kong's official transport planning practices from 1999 to now. By contrast, the peak oil storyline has been officially employed by the Queensland Labor Party government since 2005 to promote sustainable transport policies. Academic researchers and NGOs in Brisbane worked together to promote the idea of 'oil vulnerability' during the same time period (ASPO Australia, 2008; Burke and Bonham, 2010; Dodson and Sipe, 2005). It is apparent these actors in Brisbane are functioning as a discourse coalition, using the storylines of peak oil and oil vulnerability to promote a similar goal – the cessation of car and oil dependence. The differences in how peak oil was used to frame the problem of higher oil prices, the proposed policies and the level of success of policy change in the two case cities are shown in Table 3. For simplicity, the discourse groups are categorised as those who believe that peak oil is likely to happen soon, and those who do not or those who have no strong view. An illustrative network of discourse coalitions is summarised from the data collected, as shown in Figure 1.

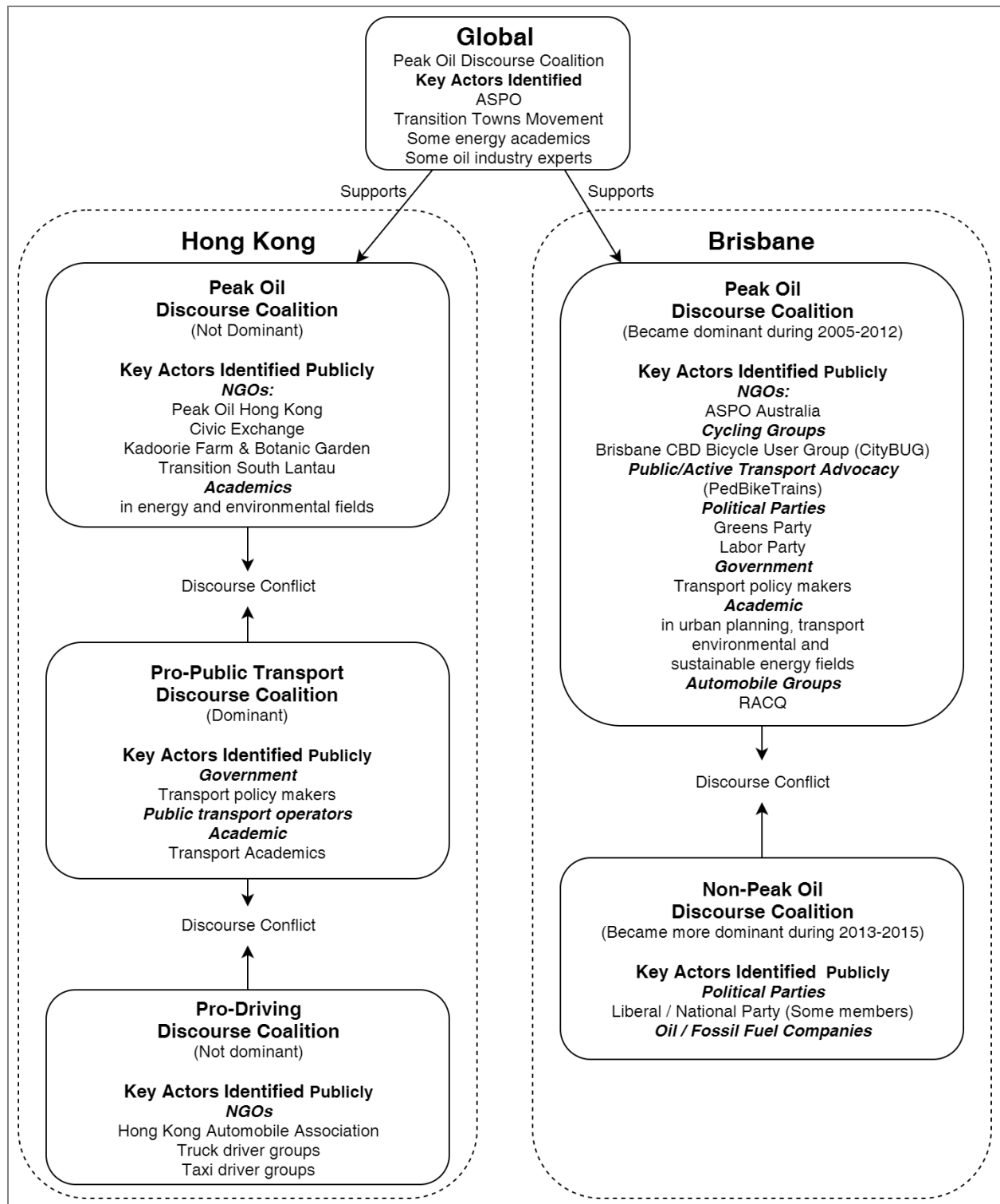
**Table 3. Different peak oil discourses with different problem framing and policies proposed**

Main discourse coalition groups	City	Key actors who tend to uphold such view.	The problem being framed? ( <i>problem stream</i> )	Proposed policies to deal with the 'problem'. ( <i>policy stream</i> )	Level of success in policy change ( <i>politics stream</i> )
Peak oil is likely to happen soon.	HKG	<ul style="list-style-type: none"> <li>Environmental groups</li> <li>Some academics</li> <li>Some NGOs/individuals</li> </ul>	Transport is mainly rail and public transport based. Impact of peak oil on Hong Kong's local transport scene is rather limited. However, higher oil prices could cause immense affordability impact on outlying island ferries and outgoing air travel.	Public transport is 'doing fine' in Hong Kong, but active transport, mobility substitution measures are currently underutilised and should also be promoted to further reduce oil use.	Limited success as Hong Kong is already having low car ownership and mode share, there is a lack of political support. Additional policies implemented were the development of the <i>Energy Saving Plan</i> and the promotion of electric vehicles.
	BNE	<ul style="list-style-type: none"> <li>Some government officials</li> <li>Progressive-leaning political parties (Green Party and Labor Party)</li> </ul>	Brisbane is highly car dependent and increase in oil prices will cause widespread affordability issues.	Drastic measures to reduce car use by public transport and active transport and also better urban planning.	Periodic success when Labor Party was in power. Whole-in-Government measures are briefly promoted from 2009 to 2012. In 2015, the biofuel mandate policy was successfully enacted with support from the two major parties and rural interest parties.
Peak oil is not likely to happen soon or no strong view on peak oil.	HKG	<ul style="list-style-type: none"> <li>Government</li> <li>Transport operators.</li> <li>Driving lobby groups</li> </ul>	Oil is important to transport and increased oil price is an issue for affordability.	Public transport is necessary for Hong Kong and should be continued to expand to meet travel needs. Favours energy transition of private transport and the promotion of electric vehicles, but it is more aimed at tackling air pollution and carbon emissions, but there is little a city level government can do. Favours continued monitoring of the situation and decision makers need more information to support their decisions.	This has been the dominant view in Hong Kong's transport policy makers and has been the on-going policy response to oil price changes.
	BNE	<ul style="list-style-type: none"> <li>Conservative-leaning political parties (LNP)</li> <li>Some Brisbane local government members</li> <li>Some transport operators</li> <li>Driving lobby groups</li> </ul>	Oil is important to transport and increased oil price is an issue for affordability.	Driving is still necessary and favoured by the public. Excessive government intervention will constrain individual choice. Favours control of oil price increase. Public transport is provided only when congestion is an issue.	Driving remain an important mode in Australia. Stringent policies to curb car use are unlikely as this may cause voter backlash. However policies that aimed for replacing oil use by biofuels were still acceptable and were successfully enacted.

Note: HKG = Hong Kong, BNE = Brisbane



**Figure 1. Diagram illustrating the discourse coalitions regarding peak oil in Hong Kong and Brisbane and their relationships**



Using the MSF's *politics stream*, the political entrepreneurs in Brisbane had a greater success than Hong Kong in using the Peak Oil discourse to push forward policies attempting to reducing car and oil dependence. The discourse coalitions on peak oil and sustainable transport in Brisbane were about to be institutionalised by a 'whole-government response' to oil vulnerability and the setting up of the Office of Sustainable Transport. This ended with Labor's election loss in 2012, which saw the end of policies using peak oil as a key storyline. Documentary analysis indicated a cessation of the use of the terms 'oil vulnerability' and 'peak oil' for urban passenger transport in the Newman Government. Interview material also reviewed the ways in which civil servants were discouraged from raising peak oil issues under the Newman government. Only after the return of a Labor government in 2015, oil vulnerability re-appeared in the most recent *State Infrastructure Plan* in 2016.

Interviewees in both Hong Kong and Brisbane have identified that there are political barriers to addressing energy issues in transport. The political systems in Hong Kong and Brisbane are similar in some ways. They both have a unicameral parliament (the State of Queensland is an exceptional case in Australia as it does not have an upper house). However, Hong Kong has greater fiscal powers than Brisbane at the municipal local level, as taxation is independent under the existing arrangements as an SAR. However, Brisbane is unique in a way as the capital city of the most decentralised state in Australia but with a unified local government with a population much higher than the State of Tasmania (Caulfield and Wanna, 1995). Brisbane can be seen as being governed jointly by the Federal Government (which controls funding for infrastructure of national importance such as railways, highways and airports), the State Government (which controls the regional planning system and transport infrastructure) and several local governments which control local planning and transport operations. However, the Brisbane City Council has the greatest population share and greatest influence in local policy setting and fiscal revenue. For both cities, Hong Kong and Brisbane, policies promoted by the government are scrutinised by the legislative body which is democratically elected, as budgets and legislation require in-house voting. The difference is that Hong Kong has only one electable local level government - the Legislative Council (LegCo). No change in the governing party occurs in Hong Kong, as the 'pro-establishment' coalition have a constant edge in numbers over the 'pro-democratic' parties in controlling the LegCo, or in electing the Chief Executive under an electoral system design in a 'hybrid regime' (Lau and Kuan, 2002; Wong, 2015). With a tradition of 'executive-led' government, Hong Kong had a tendency to develop and implement technocratic-based transport policies even before the handover in 1997. The government and transport policy-makers generally sees Hong Kong as not car dependent nor oil dependent. Hence there was little political attention to the oil vulnerability problem. Nevertheless, a policy to promote electric vehicles (EVs) started in the 2009-10 policy address, The stated aim of EVs is to address air pollution rather than oil vulnerability (Hong Kong Department of Environment, 2016). It should be noted political pressure from the Hong Kong public can still affect policy proposals even with limited political

enfranchisement (Chow, 2014). An example was the failure of electric road pricing in the late 1980s due to fierce opposition from car owners and taxi / minibus drivers (Borins, 1988; Luk and Chung, 1997).

Competing priorities in transport policy organisations are observed in both cities, just as time is seen as an important consideration of policy priority in the MSF. An example of this is seen in Hong Kong, where oil-related affordability pressures were not perceived as being a pressing issue when compared with mega-infrastructure construction and affordable housing. One Hong Kong interviewee commented:

*But there are so many pressing issues. The high speed rail project is already a big mess now (construction delays and over-budget). There are also calls for more public housing and etc. I am very sympathetic to the government officials. I know that they want to work on energy policies and peak oil, but there are more pressing issues to be dealt with.*

(Hong Kong peak oil advocate interviewee, 2015)

Another issue raised by a Hong Kong transport advocacy stakeholder is the apparent lack of transport knowledge among the political class. Reflecting the comments of pro-car politicians who objected the recent renewed attempt to implement electric road pricing in Hong Kong, an NGO interviewee stated:

*“Also you can observe that the elected LegCo members only voice their concerns to the government when their voters are complaining ... or based on how the media is portraying a policy issue. But what I feel is some politicians in Hong Kong do not even have a basic grasp of the connection of transport policies and its social and environmental effects. As you asked about the policy barriers for addressing sustainable transport and oil vulnerability, I think the ignorance of some stakeholders is a major issue.”*

(Hong Kong NGO interviewee, 2015)

The disconnect between technical expertise and politics is also noted from a Brisbane advocate stakeholder:

*“The connection between the science and politics is very tenuous. The politician is more attuned to what they hear in their electorate because (it) can reflect the votes on polling day.”*

(Brisbane peak oil advocate interviewee, 2015)

In Australian society, it is more common to see driving ‘as a right’ which is built into voting preferences. This makes it very difficult for decision-makers to implement policies that can effectively address the problem of car dependence and energy use. Another academic stakeholder commented:

*If too many people are in cars and on the roads is the issue, then you would reduce it by reducing the cars on the roads and build better public transport. But they are facing the political backlash of people wanting to drive their cars. So it is paradoxical but you can't do anything about it without changing attitudes.*

(Brisbane policy research academic, 2015)

In contrast, another issue of resource depletion affecting South East Queensland between 2001 and 2011 was the 'Millennium Drought' which resulted in a concerted community response to the conservation of water. Rainwater tanks became popular and households voluntarily adjusted their behaviour, contributing to a rapid reduction in water use from 330L per day prior to the drought to 124L per day. Comparing such a difference in community response to a water and oil crisis, a government stakeholder commented that the water problem is more manageable and it is also more visible to the public:

*"The problem of oil vulnerability is too big. Australia imports about, I am guessing, 90% of its oil at the moment. What can we do about that? But for water? You can do more about it. Also, the people could see the dams drying up in the west of Brisbane. They could see it! It is tangible!"*

(Brisbane local government urban planner interviewee, 2015)

As oil prices fell after 2014, the previously opened policy window in Brisbane has now shut, despite the efforts made to influence policy during the increase in oil prices. The change in government just after the height in oil prices foreclosed on enacting policy changes that had made it onto the state government's agenda under the Labor government. Another opportunity to revisit preparations for oil vulnerability may come if oil prices rebound and electrification of the automobile fleet remains slow, or maybe it will simply fade from view. However, the policy window to enable the use of biofuels as a response in Queensland opened with the arrival in government of a more rural based party, the LNP from 2012 to 2015. Together with the support a third minority party - the Katter's Australian Party, that represents rural and sugar cane agriculture interests, the successful passage of the biofuel mandate policy was achieved. It is beyond the scope of this paper to look in detail at how pro-biofuel discourse coalitions acted as policy entrepreneurs to achieve their objectives. However, it is evident from the data collected that oil depletion and energy security are used as justifications to promote their aims, coupled with arguments to support 'local sugar cane agriculture'. This had bipartisan support in Queensland's state parliament and was seen as a policy solution with less political resistance.

In Hong Kong, policy actors are focusing on other issues for which the public demand government attention. A higher level of intervention in transport policy does not correlate with the appropriateness of such choice as it implies greater political obstacles to be met in its promotion or implementation.

(Chatterton et al., 2015). Such difficulty varies in jurisdictions, for instance, car restraint policies are more acceptable in Hong Kong but are less successful in Brisbane due to political barriers. In Hong Kong, the car lobby remained relatively small due to low car ownership. Nevertheless, it appears that Hong Kong does not rely on the peak oil storyline to promote rail-based development, electric road pricing and the development of electric vehicles. Other storylines such as easing congestion to address air pollution and carbon emissions are used to promote these policies, with specific studies to being conducted to justify investment in rail and public transport.

From a wider perspective, an implication of this paper for policy makers is the issue of policy acceptance and transferability. It is common to see policy makers or discourse coalitions citing 'best-practices' of transport policy or solutions. However, the consideration of how policy options fit in a local context is also paramount. The qualitative approach, with critical theory and a constructivist worldview used in this paper, is able to unpack the local political and policy context. This section has explored the influence of peak oil discourse in recent transport policy development using Kingdon's and Hajer's frameworks. Like many other issues dealing with uncertainty and complex interests, policy makers will have to move beyond simply 'selling their policy' by putting forward their own beliefs and arguments. A further step to build discourse coalitions and to win support from the public is needed. Moreover it is sometimes necessitate to make compromise between various discourse coalitions, in addition to fortunate timing of the political mood and electoral cycles, in order to attain actual policy change.

## **7. Concluding remarks**

This study's contribution to understanding responses to peak oil discourse comes from examining in detail the experiences of two very different cities. It is hoped that this paper's in-depth analysis can help to reveal the dynamics leading to differing problem framing and policy outcomes in distinct geographic settings. There are some limitations to this study which could hopefully be addressed in future research. While a large amount of data has been collected for this research, it is also possible that certain key stakeholders have been omitted, in particular in Hong Kong, as there the issue of peak oil attracts less attention than it does in Brisbane. A more holistic analysis could be done if Hajer's (2006, p. 73) full ten steps of analysis were carried out. Implementation and evaluation of policies related to energy in transport should be also looked into in greater detail, which has been proposed in the 'Five-Stream' adaptation of the MSF (Howlett et al., 2016). This may, however, be challenging for the discourse about peak oil, as globally, as systematic implementation of 'oil-proofing' policies are yet to be seen.

Broadening the research to a greater range of transport policy issues where discourse coalitions emerge may be beneficial. A useful focus of inquiry may be those groups promoting shifts in the ways

governments fund and finance transportation, given the important technological, privacy and equity concerns that distance-based road pricing and similar options bring. Contextualising the experience of higher oil price during the 2000s to the 2010s is important in order to devise measures to reduce oil vulnerability, prevent future energy shocks and to hasten energy transition, which can also address climate change and achieve sustainable transport. Peak oil may not pose as much risk if an alternative power source for transport (e.g., electrification of private vehicles) arrives quickly enough. But there will inevitably be new transport problems and crises which emerge and that coalesce around new discourse coalitions. As this paper shows, transport policy is highly political in nature. It is evident that any policy has to deal with social and political pressure. This underscores the importance of producing a winning 'discourse' to gain hegemony and to facilitate policy change. In particular, policy actors who have an interest in promoting sustainable transport to highlight the issue of unsustainable energy use in transport and affordability issues caused by car use, need to be aware of how vested interests form and respond to discourse coalitions. While policy attention on a certain storyline may wax and wane, continued efforts to generate public debate and reliable knowledge are essential ingredients in developing sensible transport policy.

Research into urban transport's oil vulnerability and efforts to manage its associated risks in non-oil producing nations, in particular for the Asia Pacific region, remains worthwhile, as long as short term shocks such as conflict in the oil shipping lanes (e.g., the South China Sea) or major oil producing regions like the Middle East remain possible. Though engine and battery technology may 'solve' the oil problem, policy makers should not be complacent, as oil prices are volatile and difficult to predict (Baumeister and Kilian, 2015) and most industrialised nations are likely to remain oil importers for years to come.

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## Appendix 1: Details of the interviewees

### Hong Kong

Interviewee	Organisation Type	Date
Government official	Government department	17 April, 2015
Government official	Government department	17 April, 2015
Environmental academic	University	23 April, 2015
Transport academic	University	21 December, 2015
Peak oil advocate	Nil, interested individual	15 October, 2015
Sustainability advocate	Nil, interested individual	18 November, 2015
Transport policy researcher	Non-government organisation	28 December, 2015
Transport operator, operations manager	Transport company	27 March, 2015

### Brisbane

Interviewee	Organisation Type	Date
Transport planner	Local government, (previously state government)	3 December, 2015
Urban planner / advisor	Local government (previously state government)	16 January, 2016
Transport academic	University	23 November, 2015
Policy research academic	University	1 December, 2015
Peak oil advocate	Non-government organisation	5 December, 2015
Transport policy researcher	Non-government organisation	2 December, 2015
Transport operator, CEO	Transport company	27 March, 2015

## Appendix 2: Key events / policies concerning Brisbane and Hong Kong regarding fuel price, usage and transport policy

### Brisbane

Date	Event / Document	Author / Actor	Summary
1997	<i>1997 Integrated Regional Transport Plan</i>	Queensland State Government	Reducing fuel use was one of the targets of the plan. However, the main focus was on relieving congestion and reducing air pollution.
2001	<i>Transport 2007, an Action Plan for South East Queensland</i>	Queensland State Government	Supports the use of low-polluting fuels, which aimed at reducing transport-related emissions.
2000	<i>Regional Framework for Growth Management, 2000</i>	Queensland State Government	Aimed to “Champion energy conservation, the adoption of green energy, and alternative eco-efficient fuel sources, consistent with improving air quality in the region.”
2002	<i>Transport Plan for Brisbane 2002 – 2016</i>	Brisbane City Council, Local Government	Proposed multi-modal transport improvements with a focus to boost public transport ridership. The key goals of the plan were improving air quality and reducing greenhouse gas emissions.
September 2003	<i>Integrated Transport Planning Framework for Queensland</i>	Queensland State Government	Problem framing included a statement: “The community is also concerned about the impact of emissions from transport. Noise and air pollution are key issues for Queenslanders while rising greenhouse gas emissions are a global concern.”
May 2005	Queensland Oil Vulnerability Taskforce was set up	Queensland State Government	The aim of the taskforce was to “address concerns that future world supplies of oil for energy may diminish, to the detriment of Queensland’s sustainable future, and that ‘peak oil’ may be a world-wide phenomenon.”
June 2005	<i>South-East Queensland Regional Plan 2005 – 2026</i>	State	Proposed to create a more compact urban form that would reduce travel demands, thereby reducing energy usage and emission of pollutants.
2005	ASPO Australia founded	ASPO	ASPO’s claimed to be “a nationwide network of professionals working (as volunteers) to reduce our oil vulnerability.” and aimed to bring the probabilities, risks and opportunities that peak oil presents to the attention of decision-makers.”
2005	<i>Future Energy and Peak Oil – discussion paper</i>	Brisbane City Council, Local Government	A discussion paper that gathered the facts about peak oil and potential impacts on Brisbane city and the council. Urged the development of measures to address the issue.
2006	<i>Transport Plan for Brisbane 2006 – 2026 (Draft)</i>	Brisbane City Council, Local Government	Included a section outlining the background of peak oil and proposed to increase the use of ‘environmentally friendly fuels’. The council proposed strategies to “preparing for increased oil prices including purchasing CNG buses, investing in CNG refuelling facilities and trialling alternative fuels including bio-diesel which can be sourced from plant crops.” It viewed increasing public transport services as “an important way for the City Council to reduce the exposure of the community to price increases.”
April 2006	<i>Inquiry into petrol pricing in Queensland</i>	Queensland State Government	The committee considered the peak oil debate about the security of world oil reserves. It acknowledges there are compelling economic, environmental and public health arguments to curb the consumption of and dependency on petrol and diesel fuels for transport.
August 2006	Climate Change and Energy Taskforce was set up	Brisbane City Council, local	The stated aim of the taskforce was to advise the City Council on “how to prepare and respond to the challenges of, climate change, increasing energy consumption, rising



		government	petrol prices and peak oil.”
March 2007	<i>Climate Change and Energy Taskforce Report Completed</i>	Brisbane City Council, local government	The taskforce aimed to challenge conventional thinking on climate change and peak oil and to present a bold vision for the future of Brisbane. The taskforce produced a large set of recommendations ranging from transport, built environment and energy usage measures to reduce fossil fuel use in Brisbane.
April 2007	<i>Brisbane’s Plan for Action on Climate Change and Energy</i>	Brisbane City Council, local government	The <i>Brisbane Plan for Action</i> was endorsed by the Brisbane City Council in 2007, which included a range of actions to help address climate change and peak oil.
April 2007	<i>Oil Vulnerability Taskforce Report Completed</i>	Queensland State Government	The report outlined the areas of oil vulnerability in Queensland, ranging from transport to economic issues. It urged the government to develop an Oil Vulnerability Mitigation Strategy and Action Plan. The strategy should have three broad elements: 1. Reducing the consumption of liquid fossil fuels; 2. Encouraging the development and use of alternative fuels; and 3. Preparing for demographic and regional changes as Queenslanders alter travel, work and living habits in response to rising fuel prices.
November 2007	<i>South East Queensland Principal Cycle Network Plan</i>	Queensland State Government	It viewed that cycling as the “most energy efficient transport mode and responds to serious national and global issues such as climate change, peak oil, and obesity by reducing air pollution, our reliance on oil and increasing fitness levels of people that ride.”
2008	<i>Queensland Budget</i>	Queensland State Government	Funds allocated for ‘whole government response’ on oil vulnerability.
September 2008	<i>Towards Oil Resilience: A Community Information Paper and Oil Vulnerability Strategy / Action Plan for Queensland Research Paper</i>	Queensland State Government	The research paper outlined the equity implications of high oil prices for vulnerable Queensland industries (e.g., agriculture and air transport) and communities (e.g., low income areas). It also suggests, at a broad macroeconomic level, that Queensland’s rich resource endowments of gas and coal provide a natural hedge against increasing oil prices. (Not government policy, information paper only)
July 2009	<i>South-East Queensland Regional Plan 2009 – 2031</i>	Queensland State Government	The Plan acknowledged that car use in SEQ is growing. It states “with oil supply vulnerability, dependency on cars will cause financial stress to urban-fringe communities and vulnerable groups. The alternatives—public transport, walking and cycling—are more sustainable transport modes and must be made more viable and attractive.”
July 2009	<i>Office of Sustainable Transport Established</i>	Queensland State Government	The aim of the Office was to “develop transport policies that balance and integrate economic, environmental and social needs to deliver a sustainable transport system. Initial areas of focus for the office include climate change, building resilience to oil vulnerability and related issues.”
October 2009	<i>Rail Network Strategy Policy - Guidelines for Queensland’s Rail Network</i>	Queensland State Government	One of the objective was to exploit “any potential advantages to the competitiveness of rail implicit in future carbon/emissions trading and peak oil.”
2010	<i>Queensland Taxi Strategic Plan</i>	Queensland State Government	Acknowledged the “current taxi fleet is entirely dependent upon fossil fuels as an energy source. This meant that the taxi system is extremely vulnerable to rising oil prices.” Proposed to take-up more fuel efficient vehicle and engine technologies (for example, lighter vehicles and hybrids) and to adopt more fuel-efficient practices (e.g., eco-driving).

September 2011	<i>Queensland Cycle Strategy 2011 – 2021</i>	Queensland State Government	Stated that “cycling makes transport more resilient to oil shortages” and “by establishing cycling as an attractive travel choice, the vulnerability to reduced oil supply and rising oil prices can be minimised.”
October 2011	<i>Connecting SEQ 2031 An Integrated Regional Transport Plan for South East Queensland</i>	Queensland State Government	Acknowledged that “action is necessary to avoid the negative consequences of unsustainable transport patterns, like air pollution, congestion, excessive reliance on oil-based fuels, increasing greenhouse gas emissions and reduced access to essential goods and services.” And “any sustained increase in oil prices or chronic shortages of oil would increase the cost of living. This increase could also impact disproportionately on urban fringe communities and low income earners.” Proposed to “urgently improving the viability, capacity and priority of modes which are not reliant on oil-based fuels, especially electric passenger rail and non-motorised active transport.”
March 2012	Change in government in Queensland	Queensland State	Campbell Newman, former Brisbane Mayor, elected as Premier of Queensland with a majority in the Legislative Assembly.
December 2012	<i>Queensland Drive Tourism Strategy 2013 – 2015</i>	Queensland State Government	Fuel costs were seen as a challenge to the tourism industry.
February 2013	<i>Oil Shale Policy</i>	Queensland State Government	It “recognises the strategic importance of oil shale to contribute to energy security” and removed a memorandum to freeze oil shale development in Queensland in 2008.
2014	Consultation for the <i>Proposed Amendment to the Liquid Fuel Supply Act 1984</i>	Queensland State Government	The Act was made to “help develop an ethanol mandate to ensure a certain percentage of fuel sold in Queensland must be biofuel.” Biofuel industry submissions indicated support the Act as it would “reduce Queensland dependence on this foreign oil.” and “help transform the Queensland oil industry and prepare the economy to better weather the next oil price shock.”
March 2015	Change in State Government	Queensland State	Annastacia Palaszczuk elected as Premier.
December 2015	<i>Liquid Fuel Supply (Ethanol and Other Biofuels Mandate) Amendment Act 2015</i> was passed	Queensland State Government	The Act requires the fuel industry in Queensland to meet targets for the sale of bio-based petrol (3%), and bio-based diesel (0.5%).
March 2016	<i>State Infrastructure Plan</i>	Queensland State Government	Stated “a switch to more energy-efficient infrastructure models may have a positive economic impact by reducing reliance on imported fuels and reducing potential fuel supply chain interruptions or spikes in global fuel prices.” The plan proposed facilitating more freight on rail, and greater public transport patronage.

## Hong Kong

Date	Event / Document	Author/ Actor	Summary
1999	<i>The Third Comprehensive Transport Study</i>	Transport Department	Strategic transport policy with a focus on cleaner fuels, controlling congestion, air pollution and emissions.
September 2004	Statement from the Financial Secretary on rising oil price	Financial Secretary, Henry Tang	He stated that “The (Hong Kong) Government is closely monitoring international oil prices as the surge will affect the local economy, particularly the transport trade. The Government is monitoring retail prices and liaising with oil companies.”

June 2005	Change in Chief Executive of Hong Kong	Hong Kong Government	Donald Tsang elected as Chief Executive of Hong Kong.
September 2005	<i>Third Quarter Economic Report 2005: Impact of high oil prices</i>	Government Economist, Financial Secretary Office	It viewed Hong Kong's economy as highly service-oriented and not very oil-dependent, with fuel cost accounting for only around 2% of total business operating cost (or around 4% if labour cost is excluded) for the economy as a whole. Yet certain businesses like electricity and gas companies, transport operators, as well as restaurant and hotels, will be more affected by high oil prices due to the higher share of fuel cost in their total operating costs. Hong Kong has a very efficient public transport system that is heavily used. Hong Kong imposes relatively high taxes on the use of private motor vehicles and on petrol, thus encouraging the use of energy-efficient public transport.
September 2005	<i>Impact of Changes in Oil Price on Public Transport Services – Legislative Council Panel on Transport</i>	LegCo members, government, transport operators	Transport operators called for the removal of fuel tax. The government did not concede but offered specific measures to different operators, aiming to improve revenue and offset fuel costs. (e.g.: Relaxation of pick-up and drop-off restrictions for buses, minibuses and taxis).
2007	'Peak Oil Hong Kong' Established	Peak Oil Hong Kong	An advocacy group aimed to "lead informed discussion and promote awareness about peak oil in Hong Kong."
2008	<i>The 2008 – 09 Policy Address</i>	Chief Executive of Hong Kong, Donald Tsang	Fuel Prices included as a concerned issue from the public and to "protect consumer interests." Measures proposed included "tightening the monitoring of fuel prices through the petrol station tendering process". It also envisaged the development of a 'Low Carbon Economy' which is "low energy consumption and low pollution". It is aimed at meeting the challenge of climate change by measures to improve energy efficiency, use clean fuels, rely less on fossil fuels.
June 2012	Change in Chief Executive of Hong Kong	Hong Kong Government	Leung Chun Ying elected as Chief Executive of Hong Kong.
September 2014	<i>Railway Development Strategy 2014</i>	Transport and Housing Bureau	Opined developing the railway as a measure to "save land, minimise the reliance on road travel and reduce the use of energy. It will also help curb roadside pollutant emissions."
September 2014	<i>Focus Group Final Report on Sustainable Use, Ecological Footprint and Ecosystem Services Focus Group</i>	Independent academics	Suggested Hong Kong is currently unprepared for the effects of climate change and peak oil. However, it focuses on the reliance of oil in food production and transport. Calls the government to conserve and rehabilitate agricultural lands.
December 2014	<i>Report on the Study of Road Traffic Congestion in Hong Kong</i>	Transport Advisory Committee	Framed the issue of congestion as being caused by "excessive numbers of vehicles". Fuel savings can be achieved by improved traffic flow.
March 2015	<i>Background Study on the Promotion of Electric Vehicles (EVs)</i>	Central Policy Unit	Viewed EV's as 'zero emission' and a very clean mode of transportation that can significantly alleviate roadside air pollution and improve air quality in Hong Kong.
May 2015	<i>Energy Saving Plan for the Built Environment 2015 – 2025 +</i>	Environmental Bureau	Outlined the issue of energy use in Hong Kong. For transport is it largely energy-efficient due to high use of railways. Oil-powered modes has been gradually improving in terms of fuel-efficiency and the future lies in the further use of EVs. It did not explicitly mention oil price factors.

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