

CONSEQUENCE OF WASTE LEVY REVOCATION: CASE STUDY QUEENSLAND, AUSTRALIA

Reza Forghani¹, Willy Sher², Sittimont Kanjanabootra³ and Yuri Totoev⁴

University of Newcastle, Australia

ABSTRACT

Since 1994 several regulations and policies have been enacted in Queensland to protect the environment and biodiversity of the state. The Department of Environment and Resource Management (DERM) in Queensland introduced a waste levy in 2011 to manage and reduce waste disposal. Unexpectedly, this levy was revoked in 2012 having been in operation for only seven-months. This change has affected the environment and is likely to continue to do so in the future. It therefore warrants further investigation. A study of behaviour and trends in waste generation and disposal will inform decisions about waste management after such an unexpected policy change. This paper reviews the status of waste generation and disposal before and after this change. It discusses the problems and challenges of waste management that have occurred after the withdrawal of the levy. Data were gathered from the Queensland government's annual reports. These were systemically reviewed and relevant statistics were analysed to understand the trend of waste management between 2007 and 2015. Analysis of these data indicates that the repeal exerted extra pressure on Queensland's waste management infrastructure and has led to increased construction and demolition waste disposal in the short term. This study highlights the need for rational waste management regulations to protect the environment and to increase the efficiency of waste management.

Keywords: Waste levy, Construction and demolition waste, Queensland.

INTRODUCTION

The tremendous amount of waste disposal in landfill leads to several environmental and social issues. Contamination of soil and ground water, greenhouse gas emission and loss of valuable resources are examples of these issues (Deloitte, 2015; KPMG, 2012). Also, construction and demolition (C&D) waste causes ground water and soil contamination (Yuan, Shen, & Li, 2011). One approach to control these issues and to preserve environmental resources is to attach a cost to waste disposal. This cost (generally implemented as a waste levy) has been used in many countries including Europe and Australia (Martin & Scott, 2003; Morris & Read, 2001). The regulations and policies of each country determine the rate of waste levy applied. In Australia, responsibility for waste management is delegated to state governments. Accordingly, every jurisdiction has its own waste management policies and regulations (Edge Environment, 2011) and as a result, a wide range of fees for waste levies can be seen throughout the country. Waste levies have a long history. For example, In the 1971, the first waste levy was introduced in Sydney, New South Wales, at AU\$0.51 per tonne (CIE, 2011a) and was expected to reach AU\$120 per tonne in 2015 (KPMG, 2012). In 2011, the Department of Environment and Resource Management introduced the first waste levy in Queensland, to preserve national resources and reduce waste disposal. According to the act in question, the waste levy was applied at the rate of AU\$35 per tonne for commercial and industrial (e.g. waste from manufacturers and shops) and construction and demolition waste (e.g. waste from civil works) and AU\$0 for municipal solid waste (e.g. waste from household). Around 34 areas, covering the majority of the population in Queensland, were included in the new waste management plan. It was decided to revise the rate of the waste levy every three years. The Department of Environment and Resource Management identified several potential benefits for the introduction of this levy. For instance, it was hoped the levy would increase the efficiency of waste management, preserve natural resources and provide revenue to fund local governments to improve waste management and infrastructure (DEHP, 2014; DERM, 2010a, 2010b, 2011; *Draft Sunshine Coast Waste Strategy 2015-2025* 2014; Shadforth & Dawkins, 2010; MRC, 2013; Randell, 2014; Lawrence, Boase & Smith, 2012). Unexpectedly, the waste levy was revoked in 2012 (after only seven months operation) to support business by reducing costs (*Draft Sunshine Coast Waste Strategy 2015-2025* 2014; MRC, 2013; Randell, 2014). In the following year (2012-13), the amount of C&D waste disposed in Queensland increased dramatically (by nearly 25%). Two main reasons have been identified for this growth: firstly, waste from New South Wales (with a higher waste levy) was transferred to Queensland; secondly,

C&D waste stockpiled in 2011-12 was disposed of. Other possible reasons include the increased amount of C&D activity that occurred in this period, and improvements in waste reporting (EHP, 2014a). In general, in 2012-13, disposal and the amount of C&D waste in Queensland increased significantly. It is therefore clear that the revocation of the C&D waste levy significantly affected waste management practices in Queensland.

The objective of this paper is to review and analyze the effect of introducing and then revoking the waste levy on C&D waste in Queensland. To achieve this aim, waste management reports and regulations pertaining to Queensland were reviewed. Also, the impacts of the waste levy on the business sector were reviewed. C&D waste is first defined and statistics relating to C&D waste management before and after the waste levy were analyzed to understand the significance of these events. This paper specifically excludes municipal solid waste and commercial and industrial waste – these are outside of the scope of this work. Municipal solid waste was exempt from the waste levy, and has therefore been excluded from this paper. Furthermore, data relating to commercial and industrial waste were either not reported or reported superficially in 2010-11, additional works is required to extract reliable data for this type of waste (EHP, 2013). Lastly, a discussion and conclusion is provided.

METHODOLOGY

This paper is based on a systematic review of the Queensland government's C&D related reports and regulations. To strengthen discussion, documents and reports from other Australian jurisdictions and waste management strategies of regional councils in Queensland were also reviewed.

The Queensland government's reports and documents were published by the Department of Environment and Resource Management prior to 2012, and subsequently by the Department of Environment and Heritage Protection (which was established after the dissolution of the Department of Environment and Resource Management).

Relevant documents from aforementioned resources were collected. They were reviewed and C&D waste statistics were extracted. Several additional literature sources were also reviewed to clarify the definition and components of C&D waste. As previously mentioned municipal solid waste and commercial and industrial waste were excluded from this study. Data for the period 2007 and 2015 have been analyzed. Statistics for C&D waste management before and after introduction of the waste levy were analyzed by introducing trend lines for the recycling rate of C&D waste.

In order to determine the influence of waste levies on particular businesses (e.g. recyclers), relevant documents and reports were reviewed. These were mostly prepared for Australian businesses. Hence, they provide a realistic picture of the influence of waste levies in Australia.

Methods of introducing new waste management regulations were discussed, providing an Australian example. Impacts of introducing these regulations (e.g. introducing waste levy) in terms of the environment and business were also discussed.

EFFECTS OF THE WASTE LEVY

The waste levy is an enforcement tool enacted by governments to address the challenges of waste disposal (CIE, 2011a, 2011b). Whether or not this levy is an effective approach to waste and resource management is debatable. Managing the impacts of waste disposal, providing funds for waste management activities and promoting waste recycling are the main reasons given for introducing the levy (H. Partl, 2007). However, the efficacy of the levy in achieving these targets is not clear. Notwithstanding this uncertainty, it has been argued that waste levies encourage waste management and might reduce waste disposal as well as providing funds for more waste management activities (DERM, 2010b, 2011; *Draft Sunshine Coast Waste Strategy 2015-2025* 2014). Accordingly, waste levies and motivation for waste management are directly related. This means that economic factors encourage those generating waste to undertake waste management practices (CIE, 2011a). Also, in some Australian states such as New South Wales, no clear relationship between the illegal dumping of waste and the waste levy has been recorded (KPMG, 2012).

Although waste levies have been implemented in many countries for several decades, their impacts on business and industries are not well understood. Waste levies can have numerous direct impacts on businesses such as recyclers, but the wider impacts of the levy on the economy are much more complicated

to understand. For example, introducing a waste levy might increase revenue to recyclers (as they might obtain their materials at a lower price), but eventually recyclers still have to dispose of unrecyclable materials in landfills, which decreases their profit margin (CIE, 2011b). Another example indicative of the complexity of this issue is employment of workers in landfill and recycling facilities affected by changes in the levy (Deloitte, 2015). It has been observed that the waste levy might unfavorably affect recyclers. However, it is doubtful that the impact on recycling will be significant, because the rate of recycling might be low and / or the recycling process might be conducted by recyclers located outside of the levy zone (CIE, 2011b; Deloitte, 2015). In general, businesses and stakeholders are concerned about the waste levy (Partl et al. 2007), but it should be noted that the funds obtained by the levy could support the economy and could also improve waste management infrastructure and applications (Deloitte, 2015; KPMG, 2012).

In Queensland, support for businesses was the main reason given for revocation of the waste levy (DEHP, 2014). This indicates that this factor outweighed the other considerations.

Considering that nearly 40% of the waste generated in Queensland is C&D waste (EHP, 2016), any change to the manner in which this type of waste is managed will have a significant impact on businesses such as recyclers.

WASTE MANAGEMENT IN QUEENSLAND

This section summarizes Queensland's regulations and policies about environmental protection. Also, a general definition of C&D distilled from relevant literature is provided. Lastly, management of C&D waste in Queensland is analyzed.

Regulations

Several policies and regulations have been introduced to protect the environment of Queensland from the tremendous amount of waste that is generated every year. The brief review of these regulations below provides a general perspective of waste management in Queensland.

The Environmental Protection Act (*Environmental Protection Act, 1994*) provides a framework to protect and maintain the environment of Queensland. It also aims to encourage sustainable development throughout the state. This Act is supplemented by series of regulations and policies with similar goals, such as reducing the impacts of waste on the environment, improving waste management and increasing the quality of life in the state (Table 1).

Table 1 Environmental Protection Regulations and Policies in Queensland

Regulation/Policy	Objective
The Environmental Protection (Waste Management) Regulation (2000)	to reduce the impact of waste and to provide integrated waste management.
Environmental Protection (Waste Management) Policy (2000)	to provide principles for execution of waste management strategies
Environmental Protection Regulation (2008)	to indicate and clarify environmentally relevant activities
Waste Reduction and Recycling Act (2011)	to reduce waste generation, to preserve natural resources, to reduce the negative effects of waste disposal, to share the responsibilities of waste management and to support the execution of national waste management regulations.

Sources: (*Environmental Protection (Waste Management) Policy 2000; Environmental Protection (Waste Management) Regulation, 2000; Environmental Protection Regulation 2008; Waste Reduction and Recycling Act 2011*)

C&D waste definition

For clarity, a definition of C&D waste is required. C&D waste is generated from three main activities: 1) civil works, 2) construction and 3) demolition of a building (Zezhou et al. 2014). Also, during the service life of a building a noticeable amount of waste will be generated if renovation activities are undertaken (Cochran & Townsend, 2010). Although these activities are the main source of C&D waste, some generate more than others. For example, generally, C&D of infrastructure generates more waste than C&D of a building (Zezhou et al. 2014). C&D waste involves numerous activities, making it difficult to arrive at a general definition. The definition of C&D waste used in this paper has been adopted from The National Waste Report (EPHC, 2010). It defines C&D waste as the waste material that is generated from civil, infrastructure and building construction and demolition activities.

Several materials can be identified as C&D waste (Table 2). However, a portion of these can also be found in municipal solid waste and commercial and industrial waste. In terms of weight, concrete, bricks, rock and soil are the major C&D waste materials (ACIL Tasman, 2008).

Table 2 Main C&D materials.

List of main components of C&D waste			
Concrete	Bricks	Soil	Ferrous metals
Asphalt	Plasterboard	Sand	Non-ferrous metal
Rubble	Rock	Timber	Paper/Cardboard
Excavation stone	Clay	Wood	Plastic
Fines	Textiles	Garden organics	Glass
Bitumen	Ceramics/ Tiles	Clean fill	Miscellaneous

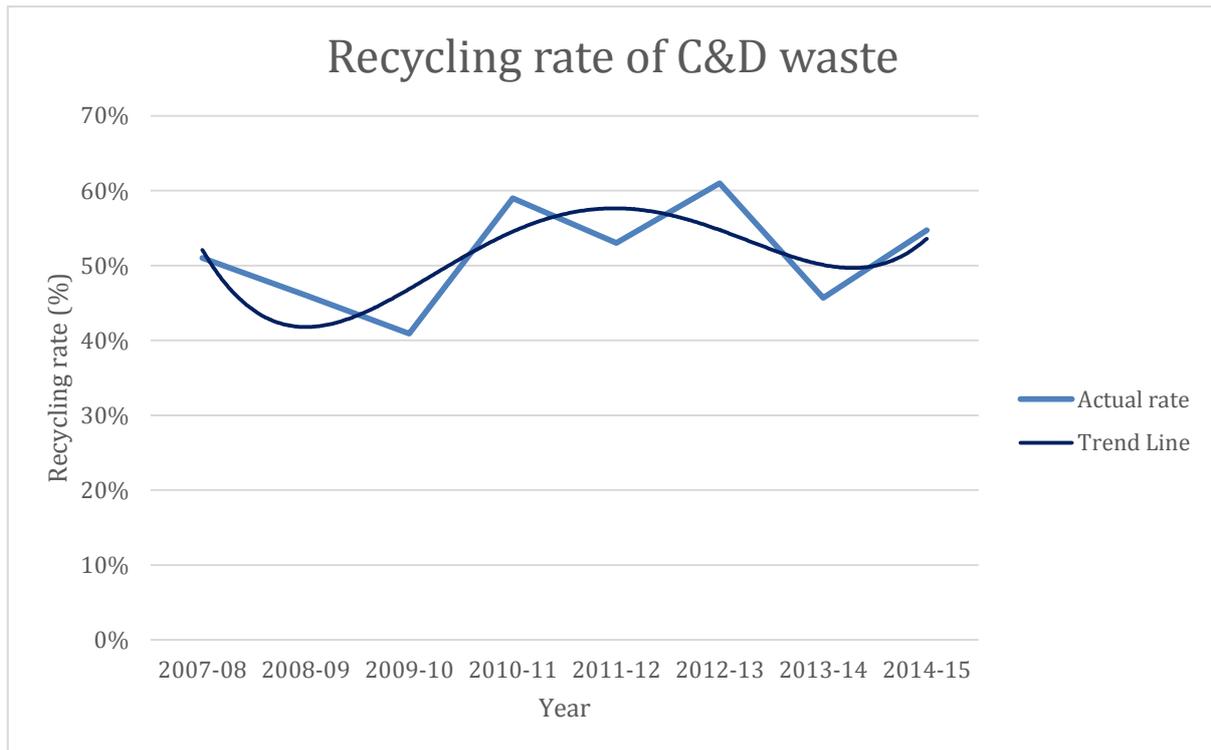
Sources: (Poon, Ann & Ng, 2001; Peng, Scorpio & Kibert, 1997; de Brito & Saikia, 2012; DECC, 2007; Perryman, Green & Lethlean, 2016; Heinrich, Rawson & Colby, 2013; Smith, O'Farrell & Brindley, 2011; Behera, 2014; Sim, 2007, 2008; Sustainability Victoria, 2013)

C&D waste is mostly categorized as solid inert waste (EPA, 2009; Productivity Commission, 2006). Treatment of inert waste in landfill is relatively simple and costs less than for other types of waste. Also, it can be used to carpet the surface of landfill sites (EPHC, 2010). Inert waste is mostly free of dangerous substances and has less impact on the environment compared to other wastes (EPA, 2009).

C&D waste statistics

The recycling rate of C&D waste in Queensland between 2007 and 2015 is given in the Figure 1. The rate in 2007-08 was 51%, and decreased to around 41% in 2009-10. It increased significantly to 59% in 2010-11 and then decreased to 42% in 2011-12. In the following years the rate was 61% (2012-13) and 42.7% (2012-13). In 2014-15, the rate was 54.7%. As shown in Figure 1, the rate has not been steady. A trend line representing the recycling rate of C&D waste is also provided in Figure 1. This shows a pattern that fluctuates on a near six-yearly basis. The maxima of this graph is between 2010 and 2013 which spans the duration of the waste levy.

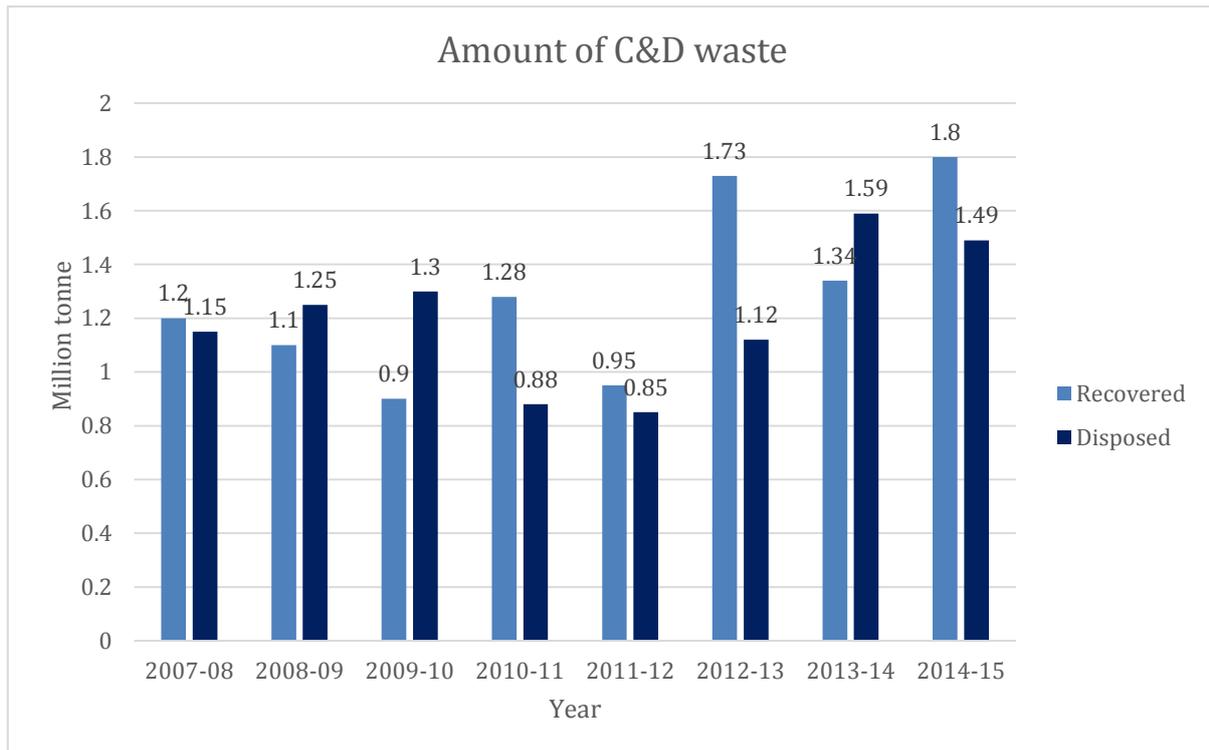
Figure 1 Recycling rate of C&D waste in Queensland.



Sources: (EHP, 2013, 2014a, 2014b, 2016; Randell, 2014)

The quantity of C&D waste recovered or disposed of between 2007 and 2015 in Queensland is given in Figure 2. During **recovery**, energy and materials are extracted from the waste (e.g. recovered timber recycled or used to produce for energy), while **recycling** involved the recovered material being used as a raw material for new products (AS/NZS, 1998). The amount of C&D waste recovered was 1.2 million tonne (Mt) in 2007-08, and decreased to 0.95 Mt in 2011-12. This increased significantly after 2011-12 and it has reached 1.8 Mt in 2014-15. Figure 2 shows the amount of disposed C&D waste before 2011 was over 1.1 Mt. However, this decreased to under 0.9 Mt during 2011-12. There was then a dramatic increase in the amount of disposed C&D waste, reaching around 1.49 Mt in 2014-15.

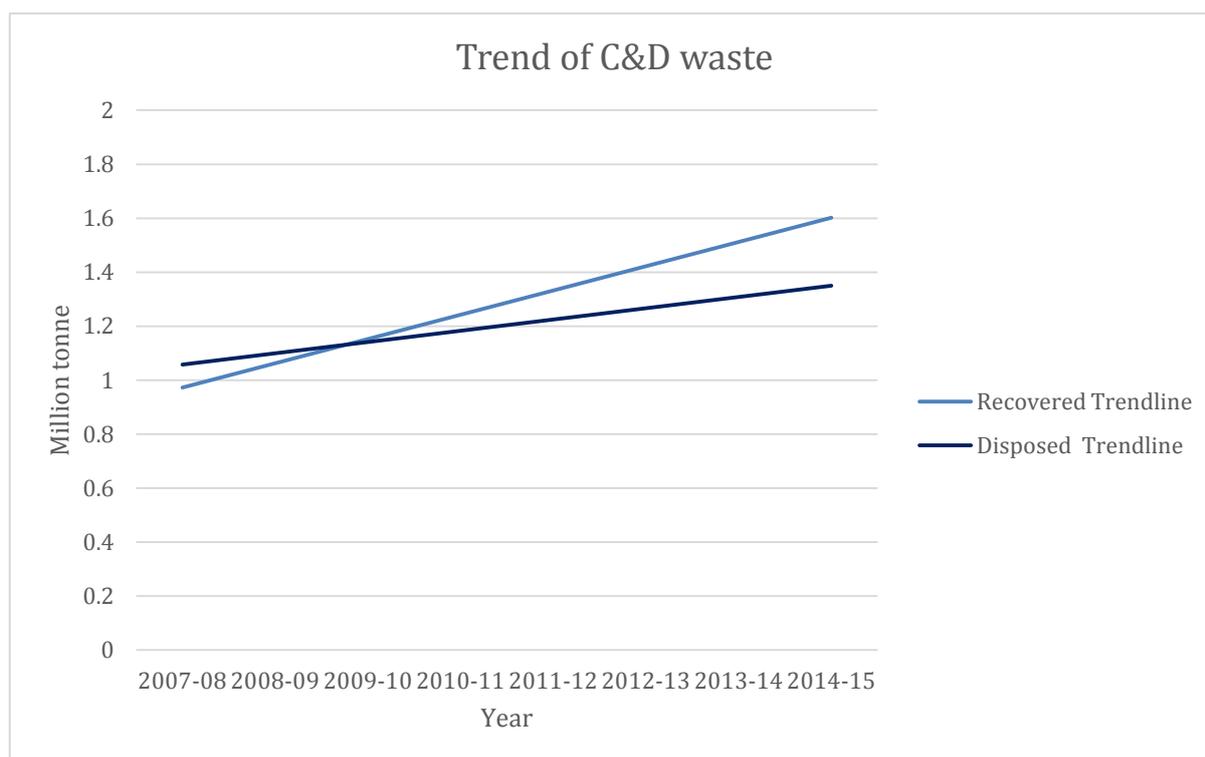
Figure 2 The amount of recovered and disposed C&D waste in Queensland.



Sources: (EHP, 2013, 2014a, 2014b, 2016; Randell, 2014)

The linear trend line of C&D waste disposal and recovery, based on Figure 2, is provided in Figure 3. Figure 3 shows that the amount of recovered and disposed C&D waste followed an increasing pattern. The gradient of the recovered trend line is greater than the gradient of the disposed trend line. These lines show an increase in the volume of C&D waste in the waste management system of Queensland.

Figure 3 Linear trend line of recovered and landfilled C&D waste.



Sources: (EHP, 2013, 2014a, 2014b, 2016; Randell, 2014)

DISCUSSION

As mentioned above, waste levies have been in force for several years in some Australian states. It was implemented in Queensland between 2011 and 2012 and subsequently repealed in the middle of 2012. This revocation resulted in a significant gap between the waste levy charged in New South Wales and that charged in Queensland (though this was in place for a short time only – seven months). The analysis provided here shows that the introduction and repeal of the waste levy had a significant impact on the process of C&D waste management in Queensland. Evidence of this issue is less obvious in recent years. According to recent statistics, the recycling rate of C&D waste is increasing gradually in Queensland, but generally the amount of C&D waste in the waste management system is increasing as well.

Several reasons have been reported (EHP, 2013) for the increase of C&D waste after the revocation of the levy (e.g. interstate waste disposal). One important factor is the way in which the transition period was managed. This appears to be very important in terms of absorbing the impact of the policy changes. Apart from the role of the levy in waste management, the manner in which environmental regulations are introduced and revoked appears to be as important as the regulation itself. Regarding this issue, it is suggested that a gradual change in levy might soften the consequences and could also help businesses and industry to better adapt to new regulations. An example of this gradual change can be seen in the state of Tasmania where a voluntary waste levy with low rate (AU\$2 to AU\$5 per tonne, depending on the area) has been introduced (Wardle, Pickin & Grant, 2014; Dimoliatis, Ortac & Gastaldi, 2015; Randell, 2014). Reaction to this levy has been reported as positive (Dimoliatis, Ortac & Gastaldi, 2015).

The waste management regulations in each jurisdiction are different making collaboration between jurisdictions challenging. Changes in legislation in one jurisdiction clearly impact those in adjacent ones. The benefits of compatible regulations are apparent from the discussion above. As a result, issues such as interstate waste disposal could be managed in a more streamlined manner.

Lastly, the waste levy does not provide an efficient waste management program in itself (Martin & Scott, 2003). Whilst necessary, the levy does not comprise a comprehensive waste management strategy, so other programs (e.g. educational applications) need to supplement it.

CONCLUSION

The waste levy was introduced in Queensland in 2011 to protect the environment and the biodiversity of the state from the impacts of large amounts of waste disposal. The waste levy did not last long and was revoked in the next year to support businesses. This policy change had marked effects on the C&D waste management of the state. After revocation, considerable amounts of C&D waste entered the waste management system of Queensland. The main reasons identified for the growth of C&D waste are: interstate waste disposal, disposal of previously stockpiled C&D waste and increased C&D activities. This paper has investigated waste regulations and the status of C&D waste management before and after the introduction of the waste levy.

The impacts of the levy on business have been discussed. Although the levy might have impacted on business, the revenue obtained from the levy can be also used to enhance the economy and improve waste management infrastructures.

A clear definition of C&D waste from the literatures was described. In brief, C&D waste is mainly the result of civil work, infrastructure, construction and demolition activities.

C&D waste management statistics between 2007 and 2015 were analyzed. To understand the trend of C&D waste management, trend lines were created. According to the trend lines, the recycling rate of C&D waste was significantly affected by introducing and repealing the waste levy. Generally, after revocation of the levy the amount of C&D waste and waste management increased dramatically in Queensland. The review of statistics has shown that the influence of this policy change was very clear in the first year after the revocation but was less noticeable in later years. Currently the amount of C&D waste in Queensland is increasing.

REFERENCES

- A. Martin, & I. Scott. (2003). The Effectiveness of the UK Landfill Tax. *Journal of environmental planning and management*.
- ACIL Tasman. (2008). *Civil Works and Recycled Content: Economic assessment of options for increasing the use of recycled content in Western Australia*. Retrieved from
- AS/NZS. (1998). Waste management— Glossary of terms AS/NZS 3831:1998: Australian/New Zealand Standard.
- C. S. Poon, T.W. Ann, & L.H. Ng. (2001). On-site sorting of construction and demolition waste in Hong Kong. *Resources, Conservation and Recycling*, 32(2), 157-172.
- C. Wardle, J. Pickin, & B. Grant. (2014). *Tasmanian Waste Review*. Retrieved from Tasmania:
- C.L. Peng, D. E. Scorpio, & C. J. Kibert. (1997). Strategies for successful construction and demolition waste recycling operations. *Construction Management and Economics*, 15(1), 49-58.
doi:10.1080/014461997373105
- CIE. (2011a). *Impact of the waste levy on commercial and industrial recycling*. Centre for International Economics Canberra & Sydney: Office of Environment and Heritage.
- CIE. (2011b). *Impacts of the waste levy on recyclers*. NSW: NSW Office of Environment and Heritage.
- D. Dimoliatis, D. Ortac, & J. Gastaldi. (2015). *Tasmania Waste Levy Benefit Study*. Retrieved from Tasmania:
- de Brito, J., & Saikia, N. (2012). *Recycled Aggregate in Concrete: Use of Industrial, Construction and Demolition Waste*: Springer London.
- DECC. (2007). *Report into the Construction and Demolition Waste Stream Audit 2000-2005*. DECC.
- DEHP. (2014). *Queensland's Waste Reduction and Recycling Strategy 2010-2020* The Queensland Government.
- Deloitte. (2015). *Economic effects of the South Australian solid waste levy* Retrieved from South Australia:
- DERM. (2010a). *Queensland's Waste Reduction and Recycling Strategy 2010–2020*. State of Queensland.
- DERM. (2010b). *Queensland's Waste Strategy 2010 – 2020 Proposed Industry Waste Levy Consultation Draft*.
- DERM. (2011). *What Does an Industry Waste Levy Mean for Queensland?* Retrieved from
- Draft Sunshine Coast Waste Strategy 2015-2025* (2014). Sunshine Coast Regional Council: Sunshine Coast Regional Council.

- Edge Environment. (2011). *CONSTRUCTION AND DEMOLITION WASTE GUIDE - RECYCLING AND RE-USE ACROSS THE SUPPLY CHAIN*. Australia: The Department of Sustainability, Environment, Water, Population and Communities.
- EHP. (2013). *State of Waste and Recycling in Queensland 2012*. State of Queensland.
- EHP. (2014a). *State of Waste and Recycling in Queensland 2013* State of Queensland.
- EHP. (2014b). *State of Waste and Recycling in Queensland 2014*. State of Queensland.
- EHP. (2016). *State of Waste and Recycling in Queensland 2015*. State of Queensland.
- Environmental Protection (Waste Management) Policy* (2000). Queensland.
- Environmental Protection (Waste Management) Regulation*. (2000). Queensland.
- Environmental Protection Act 1994*. (1994). Queensland.
- Environmental Protection Regulation* (2008). Queensland.
- EPA. (2009). *Waste Guidelines*. South Australia Environment Protection Authority.
- EPHC. (2010). *National Waste Report*. Retrieved from
- F. Yuan, L. Shen, & Q. Li. (2011). Emergy analysis of the recycling options for construction and demolition waste. *Waste Management*, 31(12), 2503-2511.
- G. Perryman, S. Green, & Lethlean, J. (2016). *Recycling Activity in Western Australia 2014-15*. Retrieved from Western Australia
- H. Partl, I. C., N. Hanke, R. Martin, S. Asker;. (2007). *Review of Solid Waste Levy*. Retrieved from South Australia:
- K. Heinrich, M. Rawson, & C. Colby. (2013). *South Australia's Recycling Activity Survey 2011-12*. Retrieved from South Australia:
- K. M. Cochran, & T. G. Townsend. (2010). Estimating construction and demolition debris generation using a materials flow analysis approach. *Waste Management*, 30(11), 2247-2254.
- K. Smith, K. O'Farrell, & F. Brindley. (2011). *WASTE AND RECYCLING IN AUSTRALIA- Incorporating a revised method for compiling waste and recycling data*. Retrieved from
- KPMG. (2012). *Review of the NSW Waste and Environment Levy*. Retrieved from
- L. Shadforth, & E. Dawkins. (2010). *Waste, Recycling And Resource Recovery: Jurisdictional Review Of Waste Pricing Policies And Application, FINAL REPORT*. Retrieved from Hyder Consulting Pty Ltd:
- M. Behera, S. K. B., A. K. Minocha, R. Deoliya, S. Maiti;. (2014). Recycled aggregate from C&D waste & its use in concrete – A breakthrough towards sustainability in construction sector: A review. *Construction and Building Materials*, 68, 501-516.
- Martin, A., & Scott, I. (2003). The effectiveness of the UK landfill tax. *Journal of environmental planning and management*, 46(5), 673-689.
- Morris, J. R., & Read, A. D. (2001). The UK landfill tax and the landfill tax credit scheme: operational weaknesses. *Resources, Conservation and Recycling*, 32(3-4), 375-387.
- MRC. (2013). *Waste Management Strategic Plan 2014 - 2018*. Mackay Regional Council (MRC).
- P. Randell, J. P., B. Grant,. (2014). *Waste generation and resource recovery in Australia Reporting period 2010/11*. Retrieved from
- Productivity Commission. (2006). *Waste management: productivity commission draft report: productivity commission*. Retrieved from Canberra: Australian Government;:
- R. Lawrence, A. Boase, & P. Smith. (2012). *Waste Reduction and Recycling Plan*. Retrieved from Waste Solutions Australia Pty Ltd:
- R. Sim. (2007). *Review Of Total Recycling Activity in Western Australia 2005/06*. Retrieved from Western Australia:
- R. Sim. (2008). *Review of Total Recycling Activity in Western Australia 2006/07*. Retrieved from Western Australia:
- Sustainability Victoria. (2013). *Victorian Recycling Industry Annual Survey 2011-12*. Retrieved from Victoria:
- W. Zezhou, Y. A. T. W., S. Liyin, L. Guiwen,. (2014). Quantifying construction and demolition waste: An analytical review. *Waste Management*, 34(9), 1683-1692.
- Waste Reduction and Recycling Act* (2011). Queensland.

Email contact: Reza.Forghani@uon.edu.au