

Institution: University of Lincoln		
Unit of Assessment: 13 – Architecture, Built Environment and Planning		
Title of case study: Urban Energy Infrastructure: Policies in Post-Disaster Christchurch, NZ		
Period when the underpinning research was undertaken: 2013 - 2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s): BYRD Hugh	Role(s) (e.g. job title): Professor of Architecture	Period(s) employed by submitting HEI: 14 Feb 13 to date
Period when the claimed impact occurred: 2016 - 2020		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact <p>Professor Byrd's international research has yielded new insights into the impact of infrastructure technologies on society, particularly energy technologies and infrastructure resilience. Through a series of original research, evidence-based reports to the United Nations and broader media activities, Byrd's research has informed policy concerning climate change in New Zealand (NZ), with the NZ Government introducing new legislation (Climate Change Response (Zero Carbon) Amendment Act 2019), and a new NZ Climate Action Plan. Beyond NZ, Byrd's work has influenced the development of United Nations Declarations and an Action Plan, supported the work of Greenpeace and widened public engagement on urban energy infrastructure issues.</p>		
2. Underpinning research <p>Professor Byrd joined the University of Lincoln in February 2013 bringing a legacy of working with the UN which continued when- that year - the University became a member of the UN research network (https://unhabitat.org/sites/default/files/documents/2019-05/big_blue_book_single_page.pdf p.97) one of only 5 member universities in the UK. Maintaining a teaching only (non-research) role in NZ, Byrd's research is undertaken only through Lincoln, and since 2013 has focused on disaster mitigation and climate change in the Pacific. Capitalising on his global connections, Byrd started an international collaboration with sociologist Associate Professor Steve Matthewman at the University of Auckland (UoA) to investigate the impact of infrastructure technologies on society, focusing on the resilience (or lack of) in urban infrastructure, in particular energy technologies.</p> <p>Byrd and Matthewman's research has been particularly focused on identifying, and critiquing, the interplay between urban infrastructure and political response. In November 2013 Byrd and Matthewman published research critical of energy policy in NZ [3.1] illustrating how, despite NZ's reputation, it was neither 'clean and green' nor resilient. Following this in 2014, they published research on energy infrastructure failures across the world [3.2] with Altmetric data placing this in the top 5% highest of all research outputs scored.</p> <p>In 2014, Byrd and Matthewman were successful in obtaining a small grant from the British Academy with the aim of investigating Government plans for the rebuilding of Christchurch (following its destruction by earthquakes) with particular emphasis on the potential for a low-carbon built environment. The research identified a series of flaws within the Government's plans, triggering a successful application for a significantly larger research grant from the Royal Society of New Zealand in 2015. Initial research in this study resulted in an invitation to jointly author the 'State of New Zealand' Report [3.3] for the UN, addressing climate change, which was produced on behalf of the NZ Government and presented at the third bi-decennial United Nations conference (UN General Assembly Resolution 67/216).</p>		

The significance of their research insights led to a 2017 invitation to publish their work in a book produced by the Centre for Advanced Urbanism, Massachusetts Institute of Technology [3.4]. Following this, and continuing their critical investigations into urban infrastructure, Byrd and Matthewman authored a 2019 report critical of the NZ Government's approach (2008-2017) [3.5]. Having identified the importance of, but systemic flaws within, distributed renewable energy, Byrd and Matthewman's research shifted focus to the solar potential of energy in urban areas, an appropriate technology for the rebuilding of Christchurch. In December 2020, with political opportunities refreshed by a landslide victory for the Labour Party in the NZ General Election, Greenpeace NZ invited Byrd and Matthewman to present research [3.6] on the barriers to adopting a low-carbon built environment – including solar options - to their political affiliates, an initial step towards influencing policy makers in the new government.

3. References to the research

- 3.1 Byrd, Hugh and Matthewman, Steve (2013) 'Renewable energy in New Zealand: the reluctance for resilience'. In: *Renewable energy governance: complexities and challenges*. (57). Springer, pp. 137-153. ISBN 9781447155942, 9781447155959.
https://doi.org/10.1007/978-1-4471-5595-9_8
- 3.2 Byrd, Hugh and Matthewman, Steve (2014) 'Exergy and the city: the technology and sociology of power (failure)'. *Journal of Urban Technology*, 21 (3). pp. 85-102. ISSN 1063-0732
<https://doi.org/10.1080/10630732.2014.940706>
- 3.3 Byrd, Hugh (2016) *Addressing climate change [section 3.1 of The State of New Zealand Report for UN Habitat III]*. Technical Report. University of Auckland, Auckland. Available on request.
- 3.4 Byrd, Hugh (2017) 'The power of suburbia'. In: *Infinite suburbia*. Princeton Architectural Press, New York, pp. 604-614. ISBN 9781616895501. Available on request.
- 3.5 Byrd, Hugh and Matthewman, Steve (2019) Rebuilding Christchurch's Infrastructure: an analysis of political mismanagement. In: ICDEM 2019: 21st International Conference on Disaster and Emergency Management, March 5-6, 2019, Rome, Italy. Available on request.
- 3.6 Byrd, Hugh and Matthewman, Steve (2021) 'Decentralised Power (electrical: carbon, justice and inclusiveness.' Presentation to Greenpeace NZ. Available on request.

4. Details of the impact

This research has led to a series of impacts within New Zealand and internationally, for green activism and in broader public awareness raising.

1) Policy changes and new Climate Action Plan, NZ

In 2018 the New Zealand Government invited (via the Productivity Commission) submissions to its proposed Bill on a low emissions economy. Byrd's co-authored report (a short version of it is available on the Government's web site [5.1] informed the Productivity Commission's *Low Emissions Economy Report* in August 2018 [5.2]. There were approximately 70 presentations to the Commission and eventually the Climate Change Response (Zero Carbon) Amendment Act 2019 was passed. As a result of this, the Government is implementing most of the findings as policy and released a Climate Action Plan in 2019 [5.3]. Byrd and Matthewman's research, in particular on the rebuilding of Christchurch, had identified the importance of decentralised electricity production through solar energy, the use of electric vehicles and the consequences

this has for urban form. These issues appear in paragraphs 12.3, 13.4 & 16.2 in the published Climate Action Plan [5.3]. This impact is also referred to by Greenpeace NZ [5.4].

2) Influencing United Nations actions

Research on climate change [3.3] was submitted to the United Nations Habitat III conference in Quito (2016). Alongside reports from other countries, it formed the basis of the United Nations New Urban Agenda Declaration and Implementation Plan [5.5]. This report was produced by selected academics as the NZ Government (2008-2017) had withdrawn from reporting to the UN as it did not recognise anthropogenic climate change. The policy benefit of the United Nations New Urban Agenda is stated in its foreword, that *"It is a resource for every level of government, from national to local; for civil society organizations; the private sector; constituent groups."* [5.5, pg.iv].

Research on rebuilding Christchurch's infrastructure and political mismanagement [3.5] was presented at the World Urban Forum organised by the UN in February 2020 and attended by "ministers, mayors, business executives, community leaders, artists, writers, urban planners, award winning architects" with over 13,000 attendees from over 168 countries [5.6]. The report was exhibited in the main hall for maximum exposure and the recommendations, together with others presented at the Forum, contributed to the 'Declared Actions' of the United Nations [5.7]. This research [3.5] was also presented at the International Conference on Disaster and Emergency Management in Rome (2019) to an audience of international government and NGO representatives. The presentation served to expose and challenge NZ policy on an international stage and was awarded best conference paper for its content [5.8].

3) Supporting Greenpeace activities and challenge to existing policy

Byrd's presentation [3.6] to Greenpeace supporters - who have significant influence on policy in NZ - included his research on energy policy in the rebuilding of Christchurch, the solar potential of New Zealand cities, and the impact of electric vehicles. Greenpeace NZ has a long history of significantly influencing NZ Government policy as its roots are in the Green Party (the first Green Party to be established internationally), and The Green Party both headed the Climate Action Plan 2019 and won the key seat of Central Auckland in the 2020 elections. Reflecting the lobbying benefit of Byrd and Matthewman's work, the Senior Campaigner for Greenpeace noted how Byrd's research *'challenges current policies on energy and urban form but also provides vital independent, evidence-based information.'* noting how *'[Byrd's] research is contributing to the important debate about what policies New Zealand should be adopting with regards to energy and climate change.'* [5.4]

4) Supporting public understanding

Following academic publication on energy infrastructure failures across the world [3.2], this research was also published in the *New Scientist* (readership of 3 million per week) and the *Guardian* newspaper (readership 25.5 million per month) [5.9]. The publicity of this research helped shape public understanding of how issues of insecure energy supply impact on policy and was an important factor in obtaining subsequent research grants. In New Zealand, the research was made public through an interview on Radio New Zealand [5.9].

5. Sources to corroborate the impact

5.1 Byrd, Hugh and Steve Matthewman, Submission to [New Zealand] Productivity Commission on the Low emissions economy, 2018.

<https://www.productivity.govt.nz/have-your-say/view-submissions/inquiry/13>

<https://www.productivity.govt.nz/assets/Submission-Documents/e515ecb56f/DR-202-Professor-Hugh-Byrd-and-Associates-and-Professor-Steven-Matthewman.pdf>

- 5.2 *Low Emissions Economy Report*, New Zealand Productivity Commission, August 2018.
https://www.productivity.govt.nz/assets/Documents/4e01d69a83/Productivity-Commission_Low-emissions-economy_Final-Report.pdf
- 5.3 Government response to the New Zealand Productivity Commission Low Emissions Economy Report – Including: Government announces climate action plan, 3.8.2019; *Transitioning to a low-emissions future*; the *Government response to the Productivity Commission's Low Emissions Economy Report*, August 2019; Government action towards a low emissions economy; Pathway to a low emissions future in New Zealand; Driving the transition strategic overview paper (Cabinet paper).
<https://www.mfe.govt.nz/publications/climate-change/transitioning-low-emissions-future-government-response-productivity>;
<https://www.mfe.govt.nz/productivity-commission-report-government-response>
- 5.4 Testimonial letter from Senior Campaigner, Greenpeace Aotearoa.
- 5.5 Impact on policy of both the New Zealand Government and the United Nations. *United Nations New Urban Agenda Declaration and Implementation Plan*, 2017. <https://uploads.habitat3.org/hb3/NUA-English.pdf>
- 5.6 The Tenth Session of the Abu Dhabi, UAE World Urban Forum, 8-13th February 2020.
<https://wuf.unhabitat.org/node/145>
- 5.7 Impact on policy of both the New Zealand Government and the United Nations. '*Abu Dhabi Declared Actions*' from the *United Nations World Urban Forum*, February 2020. https://wuf.unhabitat.org/sites/default/files/2020-02/WUF10_final_declared_actions.pdf
- 5.8 ICDEM 2019 Best Presentation Award.
- 5.9 Selected media and social media coverage - Including *New Scientist*, *The Guardian* and interview on Radio New Zealand National.