

# Infrastructure Resilience: Engineering Lifelines Groups

## *Situation*

New Zealand and Indonesia sit astride active tectonic plate boundaries and have similar geological and geomorphological conditions. As a result, they experience a similar range of natural hazards, from volcanic eruptions, earthquakes and tsunami, to landslides and flood events. Both major and routine disaster events<sup>1</sup> can damage critical community infrastructure such as roads, water supply, electricity and telecommunication networks, as well as to major transport hubs like ports and airports. Damaged infrastructure takes considerable time and resources to repair, and can impede other recovery efforts and activities. As this infrastructure is necessary to help sustain life, the key elements are often referred to as 'lifeline utilities'.

Previous disaster events have shown the many interdependencies in the lifelines sector. For example, in a widespread electricity failure, fuel stations may not be able to pump fuel, port operations will cease, wastewater pump stations will not work perhaps resulting in flooding and telecommunication and water supplies can be disrupted.



*Top image: Christchurch (NZ) central city area during the magnitude 6.3 earthquake on February 22, 2011.  
Lower images: Damage to lifeline utilities in New Zealand following major earthquakes.*

## *Achievements*

In New Zealand, lifeline utilities (electricity, water, telecom, roads etc.) have certain legislative requirements, such as being able to function to the fullest possible extent during and after an

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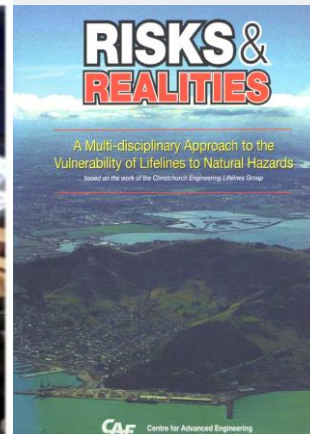
<sup>1</sup> For example, see <http://www.radionz.co.nz/news/national/339574/auckland-flights-cancelled-due-to-jet-fuel-shortage>

emergency, and to establish relationships with Civil Defence Emergency Management (CDEM). To help meet these requirements, representatives from key lifeline utilities have formed regionally-based forums called Lifelines Groups. The Groups also include natural hazard scientists, emergency managers and other professionals. These Groups undertake projects to improve infrastructure resilience by assessing the impacts of hazards on critical infrastructure, and improving coordination between lifeline utilities. The emphasis is on pre-event planning, rather than post-event recovery operations. The benefits of these Groups for lifeline providers include:

- The ability to understand the impact of hazards on *other* utilities that they rely on, and the flow-on effect to their own services.
- The opportunity to improve communication, by establishing 'pre-event' relationships.
- To improve their ability to keep functioning after a major disaster, and reduce the time taken to restore their usual level of service (i.e. improve their resilience).

An example of a positive community outcome which resulted from the work of a Lifelines Group in New Zealand is shown in the box below.

A Lifelines report, *Risks and Realities*, prepared for the city of Christchurch, led to the local electricity distribution utility (Orion) commencing a seismic strengthening program that commenced in 1996 and progressed systematically each year.



New structural assets and existing strategic structural assets, e.g. sub-transmission lines and zone substations, were designed to withstand a 500-year seismic event with little or no service disruption. The seismic strengthening component of this program cost \$6 million. This investment is estimated to have saved Orion \$30 to \$50 million in direct asset replacement costs following major earthquakes in November 2010 and February 2011.<sup>2</sup> When societal benefits are considered the balance between costs and benefits is even more pronounced.

## Challenges

The social and legislative environment within which lifeline utilities operate is quite different in Indonesia than it is in New Zealand. However, there is potential for different sectors to collaborate to improve the resilience of infrastructure within a district or province. As part of the StIRRRD project, initial discussions regarding the formation of lifeline forums were held in Kota Bengkulu and Agam Regency.

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<sup>2</sup> Resilience Lessons: Orion's 2010 and 2011 Earthquake Experience. Independent Report, Kestrel Group September 2011

Common challenges for Lifeline Groups include coordinating activities amongst members, reaching a common understanding of hazards and risks, and a reluctance to share commercially sensitive information (e.g. the capacity and criticality of cell phone towers) Another challenge can be finding an agency to act as the convener of a lifeline group - in New Zealand this role is normally undertaken by the local CDEM Group (the equivalent in Indonesia is the Provincial BPBD office). To be effective, any such group should include representatives from a broad spectrum of lifeline utility sectors. In Indonesia many private or publicly owned companies may be involved in providing these services. The group needs to determine the expectations of its members in terms of working together to improving resilience.

### *Opportunity/solution*

A holistic approach to risk reduction must include robust collaboration between key infrastructure and utility providers. Some districts within the StIRRRD<sup>3</sup> project have made good progress in creating effective DRR forums, although these generally comprise local government (OPD) agencies. There is potential within Indonesia to either build on existing DRR forums, or to create specific Lifeline Groups with a focus on improving both the resilience of lifeline utilities, and coordination between agencies. Districts which are experiencing rapid growth may see an opportunity to develop Lifelines Groups, to coordinate and build resilience within an expanding infrastructure network.

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<sup>3</sup> Strengthened Indonesian Resilience: Reducing Risk from Disasters