

Submission: Resilience principles for investment decision-making

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I have 20-years experience in engineering, natural hazard and climate risk and resilience work – for councils, infrastructure providers and others. I have developed guidance, risk methodologies, resilience scorecards, and been involved in projects such as NZ's first National Climate Change Risk Assessment.

This is a personal submission.

General comments on the draft resilience investment guidance

I support the Commerce Commission's objective of improving the quality and consistency of resilience investment decision-making across regulated infrastructure sectors. The guidance recognises many important concepts, including systems thinking, interdependencies, uncertainty, consumer outcomes and the need to consider operational and organisational responses alongside traditional engineering solutions. These are valuable objectives and reflect contemporary thinking on infrastructure resilience.

However, I have significant concerns that the draft guidance attempts to solve the wrong problem and, in doing so, creates a framework that is unnecessarily complex, difficult to apply consistently, and unlikely to improve investment decisions in practice.

Objectives

I support the Commission seeking to influence resilience outcomes through its regulatory role. However, its particular contribution should be to ensure that investment decisions are robust, proportionate and in the long-term interests of consumers. The guidance would benefit from making this distinction clearer and from focusing more directly on the evidence required to establish that a proposed investment is warranted.

The draft guidance appears to oscillate between two objectives: improving the resilience of New Zealand's critical infrastructure and providing a framework for assessing whether resilience-related expenditure should be funded through regulated prices. While these objectives are related, they are not the same.

The central challenge is uncertainty, not a lack of analytical methods

The fundamental challenge facing regulated infrastructure providers is that resilience investments are characterised by deep uncertainty. Future hazards, climate change, asset performance, infrastructure interdependencies, consumer behaviour, economic impacts and the effectiveness of interventions are all uncertain to varying degrees. While better information is always desirable, these uncertainties cannot necessarily be eliminated through increasingly sophisticated analytical methods.

The draft guidance responds by introducing an extensive set of principles and analytical considerations, including multi-hazard assessments, interdependencies, distributional impacts,

consumer engagement, risk tolerance, asset criticality, structured optioneering, uncertainty analysis and multiple decision-support frameworks.

Each of these concepts has merit individually. However, collectively they create an increasingly complex analytical process without demonstrating how this additional analysis will materially improve investment decisions. Beyond a certain point, there is a risk that analytical complexity is mistaken for analytical rigour.

Many of the methods described are inherently subjective, resource intensive and dependent on assumptions that cannot be validated. Requiring additional analysis does not necessarily improve decision quality; instead it may simply produce increasingly elaborate business cases around fundamentally uncertain information.

The likely consequence is increased compliance costs, longer approval processes and greater regulatory burden without corresponding improvements in resilience outcomes.

The guidance conflates resilience with risk management

A more fundamental concern is that the guidance appears to treat resilience as a separate analytical discipline, when much of the content is describing established principles of good risk management.

Most of the proposed principles involve:

- identifying hazards;
- understanding exposure and vulnerability;
- assessing likelihood and consequence;
- identifying critical assets and services;
- evaluating treatment options;
- prioritising investments; and
- managing uncertainty.

These are well-established elements of recognised risk management frameworks such as ISO 31000.

In practice, resilience is not achieved by applying a separate "resilience process". Rather, resilience is an outcome of understanding risk, selecting appropriate risk treatments and making sound investment decisions.

Explicitly positioning resilience within an established risk management framework would significantly improve the clarity of the guidance and avoid unnecessary duplication of existing organisational processes.

Vulnerability and risk tolerance metrics

I support the intent of recognising that infrastructure failures affect different communities in different ways, and that vulnerability and adaptive capacity should inform investment priorities. However, I am less convinced that community risk tolerance should be treated as a separate principle or analytical requirement. Risk tolerance is inherently dynamic, difficult to measure reliably, and highly sensitive to how consultation is undertaken and how trade-offs are presented. There is also a risk that willingness-to-pay surveys become a proxy for acceptable service levels, despite the guidance appropriately recognising that willingness to pay is not necessarily aligned with need or exposure.

In my view, community vulnerability, adaptive capacity, critical customers and distributional impacts are best considered as factors influencing the *consequences* of service disruption within a broader risk assessment, rather than as separate principles requiring independent analysis. This would simplify the framework while retaining an appropriate focus on consumer outcomes.

A simpler decision framework would better achieve the Commission's objective

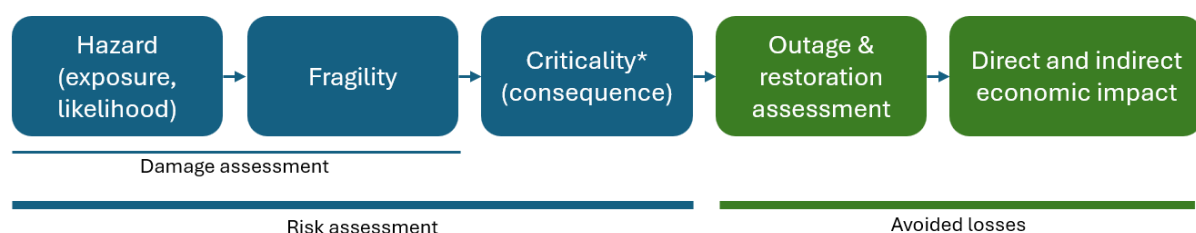
If the primary purpose of the guidance is to support the justification of resilience investments, I consider the framework could be substantially simplified.

A practical decision-making framework could be based around five questions:

- 1. What are the highest priority risks to service delivery?** Identify and prioritise material risks using established risk assessment methods.
- 2. Which assets, systems or services contribute most significantly to those risks?** Identify where intervention will provide the greatest reduction in risk.
- 3. What practical options are available to reduce those risks?** Consider engineering, operational, organisational and community-based interventions.
- 4. What reduction in expected future losses is likely to result?** Estimate avoided losses, recognising uncertainty and using proportionate methods appropriate to the scale of the investment.
- 5. Is the proposed investment proportionate to the expected reduction in risk?** Demonstrate that the proposed investment represents a reasonable response to the level of risk and expected avoided losses.

Within this framework, concepts such as interdependencies, criticality, distributional impacts, consumer preferences and uncertainty remain important. However, they become inputs into decision-making rather than separate analytical principles that every project must explicitly address.

A revised conceptual diagram might look something like this:



**Criticality / consequence should include a range of factors including number of people affected by outage, critical interdependencies impacted, social vulnerability, operational factors, restoration difficulty, environmental, reputational, financial impacts.*

Greater emphasis on proportionality is required

Although proportionality is mentioned throughout the guidance, it is not sufficiently embedded within the proposed framework.

The analytical expectations presented may be appropriate for nationally significant investments involving substantial expenditure. However, they are unlikely to be practical or cost-effective for smaller resilience projects or routine capital investment decisions.

Without clearer guidance on proportionality, there is a risk that providers devote increasing effort to preparing complex business cases rather than implementing resilience improvements.

The guidance should explicitly recognise that the depth of analysis should be commensurate with:

- the scale of investment;
- the significance of the risk;
- the consequences of failure; and
- the degree to which additional analysis is likely to influence the investment decision.

Terminology should be clarified and used more consistently

The guidance would also benefit from a much clearer conceptual framework.

Throughout the document, terms including “risk”, “resilience”, “criticality”, “fragility”, “vulnerability”, “reliability”, “risk tolerance”, “risk-bearing capacity”, “consequence” and “service performance” are introduced, sometimes interchangeably and sometimes without clear distinction.

The relationships between these concepts are often unclear, making the guidance difficult to follow and increasing the potential for inconsistent interpretation.

In particular, the guidance could be clearer around:

- hazards;
- risk;
- resilience;
- criticality; and
- investment decision-making.

Several of the proposed terms become circular as a result. For example, criticality, interdependencies, distributional impacts and community risk tolerance are all presented as separate concepts, when in practice they are simply factors that inform an understanding of risk and the selection of appropriate risk treatments.

A single conceptual diagram illustrating the relationships between these concepts would substantially improve the usability of the guidance (refer above).

Economic impacts and avoided losses

I support the guidance recognising that the benefits of resilience investment should extend beyond the direct costs of damage to infrastructure. For regulated utilities, the value being protected is ultimately the service provided to consumers, rather than simply the physical asset. Accordingly, the

economic assessment should consider both direct asset losses and material consequences arising from loss or degradation of service.

However, I consider a clear distinction is needed between service impacts and wider economic impacts. Loss of service to consumers and reasonably identifiable consequential impacts should generally be considered where material to the investment decision. By contrast, wider or higher-order economic impacts—such as supply-chain effects or broader regional economic impacts—are considerably more uncertain, difficult to attribute and potentially subject to double counting.

The guidance discusses tools such as MERIT as a means of assessing wider economic impacts. MERIT may be valuable for major or systemically significant investments where cascading and economy-wide effects are likely to materially influence the decision. However, its inclusion also illustrates the potential for the economic assessment to become highly sophisticated and resource intensive. I do not consider that economy-wide modelling of this nature should become an implicit expectation for resilience investments generally.

I therefore do not consider that comprehensive quantification of direct and indirect economic impacts should be a default requirement. A proportionate approach would use direct losses and service impacts as the primary basis for estimating avoided losses, with consequential or wider economic impacts quantified only where they are material to the decision and can be estimated with reasonable confidence.

This distinction is particularly important given the inherent uncertainty associated with resilience investment. The objective should not be to produce an apparently precise estimate of the total economic consequences of a failure, but to provide sufficient evidence to determine whether the proposed investment is proportionate to the risk reduction and expected avoided losses.

In this respect, the guidance could usefully distinguish between:

- **Direct losses** – damage to infrastructure and the costs of repair or replacement;
- **Service impacts and consequences** – the economic and social consequences for consumers and users arising from loss or degradation of the regulated service; and
- **Wider or higher-order impacts** – effects propagating through supply chains, regional economies and other systems.

The level of analysis should increase only where these wider impacts are material to the investment decision. Tools such as MERIT may have a role for major, systemically significant investments, but should not become a default analytical requirement for routine resilience investments.

Alignment with international regulatory practice

Internationally, economic regulators have generally adopted a more principles-based approach to resilience.

For example, Ofwat's "Resilience in the Round" guidance establishes high-level expectations for resilience while deliberately avoiding prescriptive analytical requirements. Rather than creating a separate resilience decision-making framework, it encourages companies to integrate resilience within existing governance, risk management, asset management and business planning processes.

Similarly, Ofgem's regulatory approach emphasises proportionate, risk-based and forward-looking regulation, with regulatory expectations scaled according to the significance of the risks and the potential impacts on consumers.

The Essential Services Commission of Victoria's **PREMO** framework also provides a useful comparator. PREMO is not a resilience investment framework, but a regulatory pricing framework that assesses the quality and ambition of regulated water businesses' price submissions through five elements: **Performance, Risk, Engagement, Management and Outcomes**. Businesses are expected to demonstrate that they have appropriately managed risk, engaged with customers, justified expenditure and efficiency claims, and identified clear outcomes that customers will receive in return for the prices they pay. This provides a potentially useful alternative to the more prescriptive analytical framework proposed in the draft guidance.

These approaches recognise that resilience cannot be reduced to a single analytical methodology and that good governance and sound risk management remain the primary foundations of resilient infrastructure investment.

Overall comments

I support the Commission's objective of strengthening resilience investment decision-making.

However, I consider the current draft is more complex than necessary and risks encouraging increasingly sophisticated business cases rather than demonstrably better investment decisions.

A simpler framework, centred on understanding material risks, identifying practical interventions, estimating avoided losses, and demonstrating proportionate investment, would be easier to implement, more consistent with established risk management practice, and more likely to achieve the Commission's objective of improving resilience outcomes for consumers.