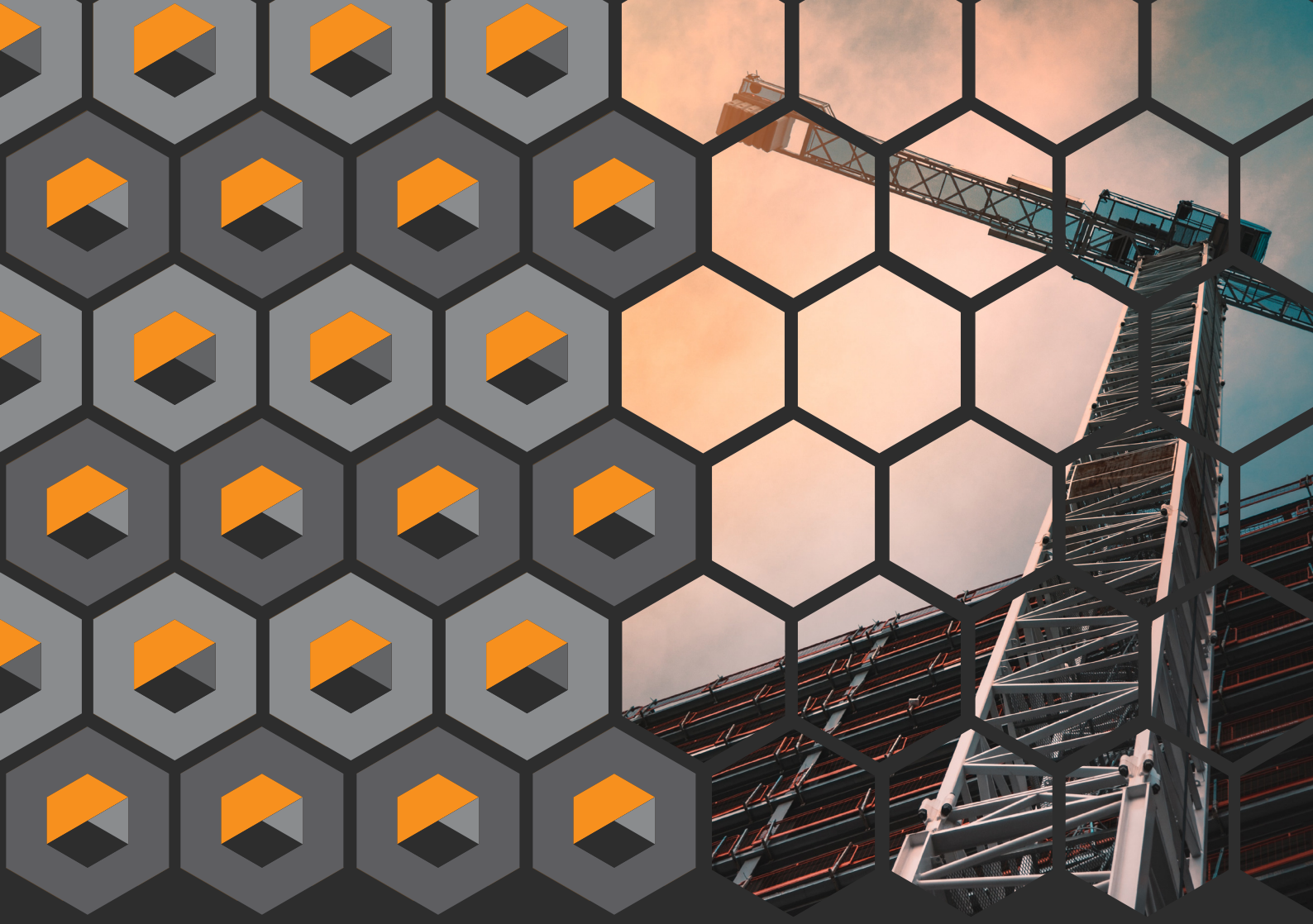
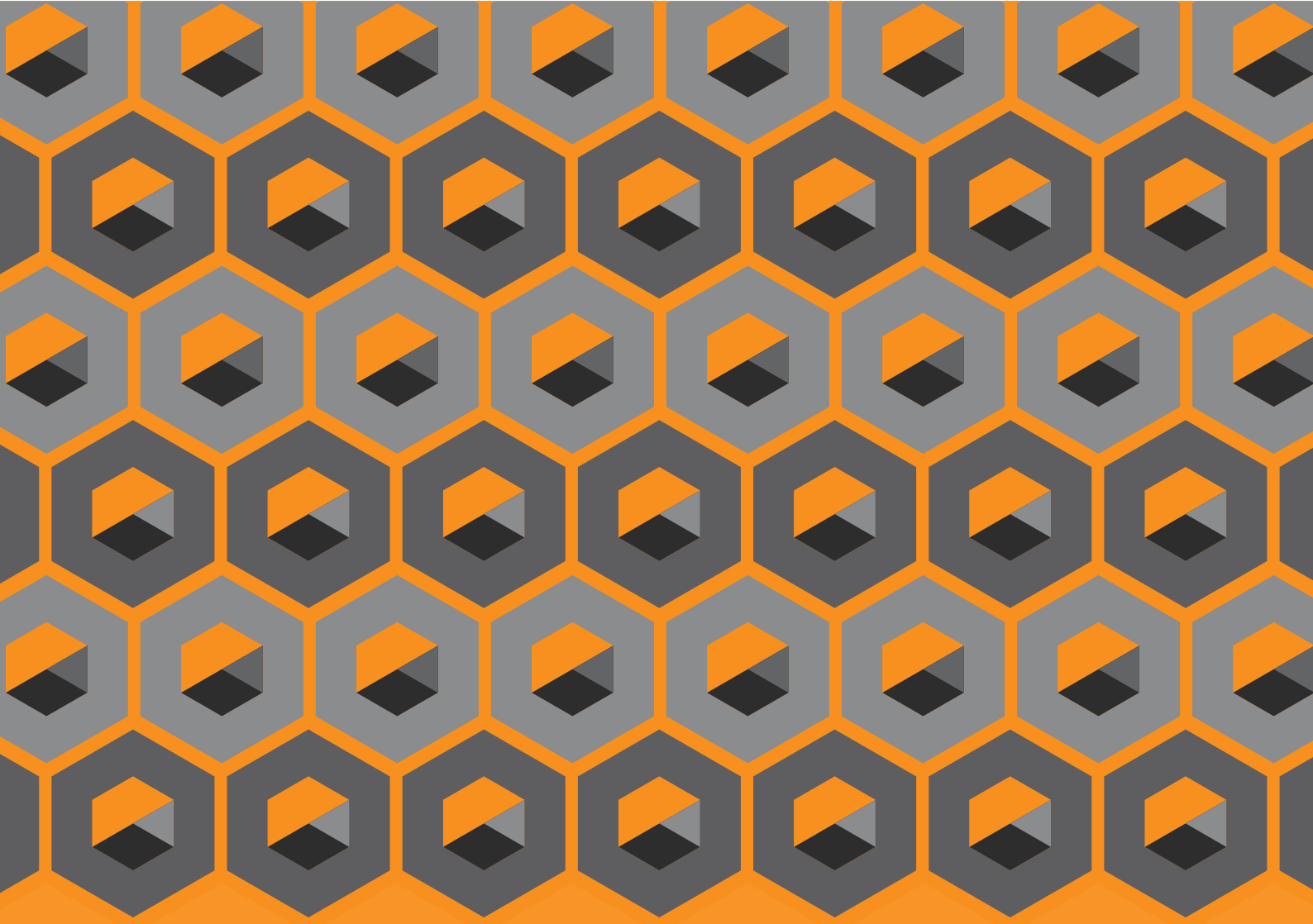


The power of pricing:

UNLOCKING SUSTAINABLE INFRASTRUCTURE INVESTMENT

pwc

OCTOBER 2023



Infrastructure investment plays a critical role in addressing a number of global challenges, including climate change and urbanisation. However, high costs and limited application of funding options pose significant affordability challenges. In this article, we look at how to broaden the funding base for infrastructure and consider the role of pricing in the optimisation of infrastructure usage.


WALLENIUS WILHELMSEN

The affordability challenge

Demand and use of infrastructure is driven by long term global megatrends:

Demographic and social change

Shift in global economic power

Rapid urbanisation

The Organisation for Economic Co-operation and Development (OECD) estimates that globally NZD$13.6tr of infrastructure investment will be required to meet climate change and development goals. That's NZD$2,000 per person per annum to 2030.[1]

This level of investment is driven by a series of global megatrends including the need to address climate change, demographic change, rapid urbanisation and a lack of resilience, which have created significant demand for new and upgraded infrastructure. Large scale projects, along with the disruption from geopolitical uncertainty and the pandemic have added supply chain and cost pressure.

Meeting this level of demand raises significant affordability, equity and funding challenges for current and future generations, at a time when government debt is already elevated due to the impact of COVID-19. We are seeing the devastating impacts of climate change related weather events on infrastructure networks, while trying to change the way we use those networks to mitigate the impacts of climate change. If we do not invest, our infrastructure networks will not withstand the impacts of climate change.

Conversely, with infrastructure and related services contributing approximately 80% of all CO2 emissions, we cannot afford to simply build more to meet our increasing needs.

1 Source: PwC Global Infrastructure Challenge, April 2023

Climate change and resource scarcity

Current infrastructure projects predominantly fall into two categories:

1. Those that are funded through user pricing and have established regulatory frameworks in place to balance the need to facilitate investment while protecting users from unnecessary charges. Examples include many energy and telecommunications projects.

2. Those that rely on traditional funding and financing approaches such as government debt repaid through general taxation. Examples include transport and water network projects.

Given the predicted level of investment required to meet demand based on current usage behaviours, traditional approaches to funding infrastructure are unlikely to be sufficient.

Three options exist to manage the required level of investment, including:

1. Committing greater levels of government expenditure to infrastructure investment and maintenance
2. Reducing the need for future investment through making better use of existing infrastructure
3. Introducing greater levels of private finance to infrastructure projects

Technological breakthroughs

Increasing the proportion of government spending that is committed to infrastructure projects requires difficult trade-offs in the provision of other government services, making it unlikely that this is a problem that we can simply build our way out of.

Exploring opportunities to make better use of existing infrastructure is potentially the lowest cost way to manage an infrastructure deficit. If demand across networks can be smoothed and network loss (such as through leaking pipes) can be reduced, then future investment can be directed to projects of highest value.

While private capital currently finances approximately 20% of infrastructure projects[2], clearly identified revenue streams and overall affordability for taxpayers and users will be critical in attracting investors to support our future infrastructure needs.

Both managing existing infrastructure and increasing private investment point to a need to rapidly progress policy on the application of infrastructure pricing tools.

2 Source: PwC Global Infrastructure Challenge, April 2023

Infrastructure challenges in New Zealand

Like many countries, New Zealand faces significant challenges balancing its response to these megatrends including addressing our existing infrastructure deficit, making better use of the infrastructure we do have, adapting to climate change impacts, decarbonisation, and meeting the growing and changing demands of users.

The cost of maintaining existing infrastructure and replacing what has been destroyed by recent weather events, such as Cyclone Gabrielle, is significant. The devastating impact of these extreme weather events has also highlighted the importance of network resilience and the need to plan ahead to avoid similar impacts in the future.

In Budget 2023, the government announced an initial NZD$6bn investment in a National Resilience Plan which recognises that "we need to futureproof our infrastructure for New Zealand's growing and changing population and climate change events, and to make use of developing technology available to us" with a stated intent to further fund the Plan in future Budgets.

While this was enabled by a recent change in the calculation of the government's debt ceiling, we cannot finance our way through this challenge by accumulating more debt for future generations. We must broaden the funding base for core infrastructure such as water and transport services, particularly if we are to make use of private capital to finance these investments.

Te Waihanga, New Zealand's Infrastructure Commission, quantified this challenge in its infrastructure strategy Rautaki Hanganga o Aotearoa 2022 – 2052, published in 2022. The figure over page replicated from this document, illustrates the infrastructure challenge for New Zealand.

Source: Te Waihanga

The infrastructure funding challenge

Rautaki Hanganga o Aotearoa estimates that New Zealand currently spends 5.5% of Gross Domestic Product (GDP) on public infrastructure. To fully address its infrastructure needs, New Zealand would need to commit almost 10% of GDP over a 30-year period, equivalent to NZD$31bn per year and almost double what we currently spend. Achieving this level of investment will require significant additional borrowing, increased user charges, and/or reduced funding for other essential services.

This increase reflects a number of factors which are contributing to our infrastructure funding challenge:

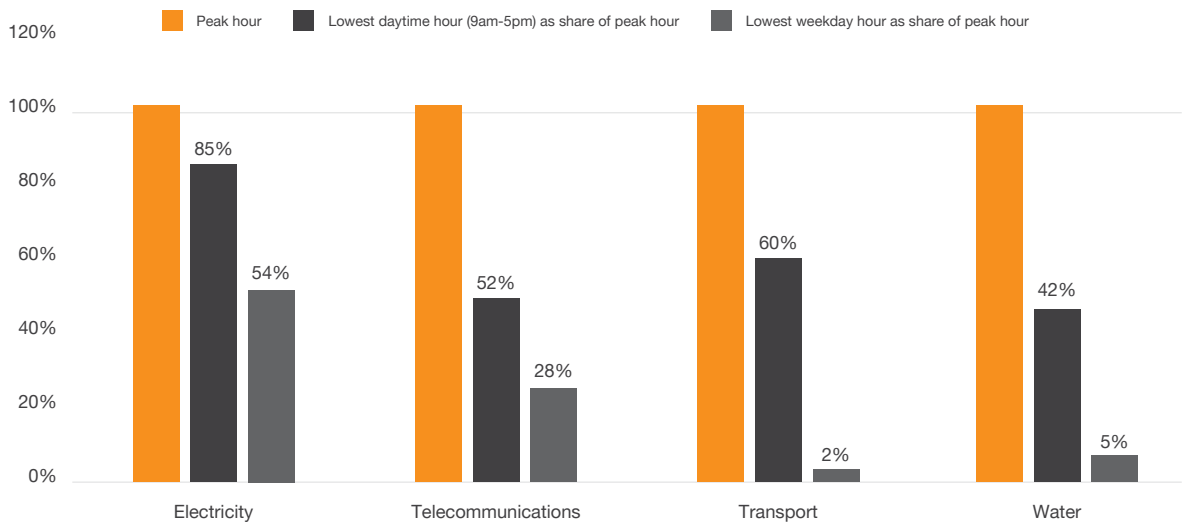
- under investment in existing infrastructure (an additional 0.7% of GDP)
- meeting new demand for infrastructure services (an additional 2.7% of GDP)
- renewing our existing infrastructure as it ages and reaches the end of its service (an additional 4.6% of GDP)
- absorbing the rising costs of materials and labour (an additional 1.6% of GDP).

Affordability and funding solutions

When considering the impact of delivering this level of investment, it is clear that we cannot afford to simply build our way out of this challenge. Instead, we must consider ways to make our infrastructure future more affordable for New Zealanders. We can do this by reducing the amount we need to invest in infrastructure by improving our use of existing infrastructure, carefully considering which projects we invest in, incentivising efficient and socially beneficial investment, network configuration and use, and broadening our sources of funding for core infrastructure to ensure costs are more equitably allocated to those who benefit.

Te Waihanga has rightly identified making better use of existing infrastructure as being key to ensuring future affordability. The increasing cost of building for peak demand is a significant component of future investment forecasts which could be avoided if users had better information, and incentives, to shift demand across our infrastructure networks. The graph below illustrates the level of capacity across New Zealand's infrastructure networks which could be better utilised to avoid future investment.

Degree of peakiness



Source: Te Waihanga

Lessons from competitive markets

In economically regulated infrastructure sectors like telecommunications and energy, competitive market standards play a pivotal role in pricing. Telco and energy suppliers respond to market signals when setting prices, while regulatory oversight ensures fair practices in segments with weak competition, such as asset-based networks.

However, the water and transport sectors operate with less commercialisation, relying on public funding and limited user contributions. Market prices are less prevalent in these sectors, and user charges may not fully capture the associated costs or benefits.

Drawing lessons from competitive markets can provide valuable insights for pricing in infrastructure sectors. In competitive markets, pricing aligns the supply of goods or services with the demand for them. Implementing well-designed infrastructure pricing strategies can contribute significantly to the efficient investment and use of infrastructure, by:

- **Generating demand response**
  Pricing mechanisms can address congestion, optimise asset utilisation, and indicate economically viable investments in additional capacity.
- **Informing users and suppliers**
  Effective pricing provides users and suppliers with valuable information regarding cost and service level options.
- **Promoting value for money outcomes**
  This includes achieving the lowest lifetime cost of service and facilitating user and taxpayer affordability.
- **Ensuring equitable cost recovery**
  Infrastructure costs are distributed fairly among different generations of users, geographic regions (urban and rural), user groups (households and businesses), and income groups (low and high).

Ultimately, infrastructure providers must invest in the right assets at the right time while meeting user demands and service requirements. Efficient pricing strategies can help achieve these outcomes.

However, it is important to recognise that markets may fail or not fully account for the costs or benefits associated with infrastructure investments. For instance, the long-term health and environmental costs of relying heavily on private vehicles as the primary mode of transport are often not reflected in the prices of vehicles, fuel, or parking. Addressing such failures may require pricing policies, including public subsidies, to account for broader social benefits or equity considerations.

Adapting pricing strategies to meet the changing demands of infrastructure users

The pricing process involves determining the necessary funding levels and the means of recovering those funds over time. Economic regulation governs regulated infrastructure sectors such as electricity and gas transmission and distribution networks, as well as telecommunications fibre networks. In these examples, regulatory guidelines outline the maximum revenue that can be collected from users over a specified period, ensuring equitable distribution of costs through pricing.

While the infrastructure ecosystem is complex, there are similarities between sectors. This means that good practice pricing principles are transferable between sectors. Transport, water, energy, telecommunications and social infrastructure are characterised by:

- Long lived assets with the potential for significant impacts on communities (eg: transport corridors, stormwater catchments, social housing)
- Large upfront investments, ongoing operating and financing costs, resulting in high fixed costs and low variable costs
- Natural monopoly characteristics with limited opportunity for competition
- Services which are shared by multiple users over time
- Interconnected systems (eg: energy supporting telco, water, and transport services, co-location of horizontal infrastructure).

- Pricing principles can provide a valuable framework for infrastructure providers seeking to improve infrastructure funding and affordability. The principles, rather than fixed prices, support best practice approaches while allowing flexibility for adaptation. Pricing should consider practical constraints, specific network characteristics, demand dynamics and user requirements. It is important to note that pricing is not static, and transitioning to more economically efficient pricing must be managed carefully to avoid undue financial hardship for users.
- The infrastructure sectors currently employ a wide range of pricing approaches that evolve alongside changing markets and a deeper understanding of user and community preferences. Lessons learned in one sector can inform development of economic pricing in another sector. For instance, demand for copper based telecommunication infrastructure and gas pipelines is expected to decline as users shift to alternatives. In telco, this shift is driven by technology and service advancements, while in the gas sector, it aligns with New Zealand's efforts to reduce reliance on carbon-based fuels to address climate change impacts. Failing to adjust pricing now to signal the expected reductions in future demand may result in users in both sectors being disadvantaged by remaining connected to existing networks, as costs per user will inevitably increase as demand decreases.

Infrastructure pricing and equity

It is easy, at first glance, to assume that the introduction of infrastructure pricing tools will reduce equity of access to New Zealand's infrastructure. While it is important that equity of access remains a key tenet in the development of pricing approaches, it could be that infrastructure pricing acts as a catalyst to improving equity into the future.

For example, avoiding costly investment in building for peak capacity will free up investment for projects with higher community benefits – potentially allowing spending to be redirected to projects that deliver greater access for underserved communities. Similarly, if investment is only required to support users at peak times, there is a question of equity if those users who only use the infrastructure at off-peak times are required to contribute equally to the cost of that infrastructure.

There are also considerations regarding those users who do not have the flexibility to alter their use of infrastructure networks. This might be through constraints on their ability to alter their demand patterns (e.g. shift workers who must travel at peak times because they do not have an option to adopt flexible working arrangements) or a lack of viable alternatives (e.g. users who must travel by private vehicle because they live in a location which is not well served by public transport) and face a disproportionate cost because of this.

There are also arguments that centrally funded infrastructure provides a progressive subsidy to high income earners who have higher consumption habits. Infrastructure pricing has the potential to rebalance the allocation of cost to ensure that those who benefit the most contribute proportionately to the development and maintenance of that infrastructure.

It is important that equity considerations remain front and centre in the development of infrastructure pricing principles to ensure that all New Zealanders benefit from both existing and future infrastructure.

Challenges of funding our transportation and water infrastructure

Transport and water sector infrastructure in New Zealand is predominantly publicly owned by central and local government and is funded by taxpayers, ratepayers, user charges, and targeted levies. Building water and transport infrastructure is expensive, exposed to climate change impacts, and often needs to be constructed ahead of demand, resulting in delayed funding. The current funding models in these sectors involve a combination of targeted pricing (metered water charges, parking fees, train and bus fares) and non-targeted funding (uniform annual rates, general fuel levies, and road user charges). Considerable public funding is necessary to support these funding sources, ultimately borne by taxpayers and ratepayers.

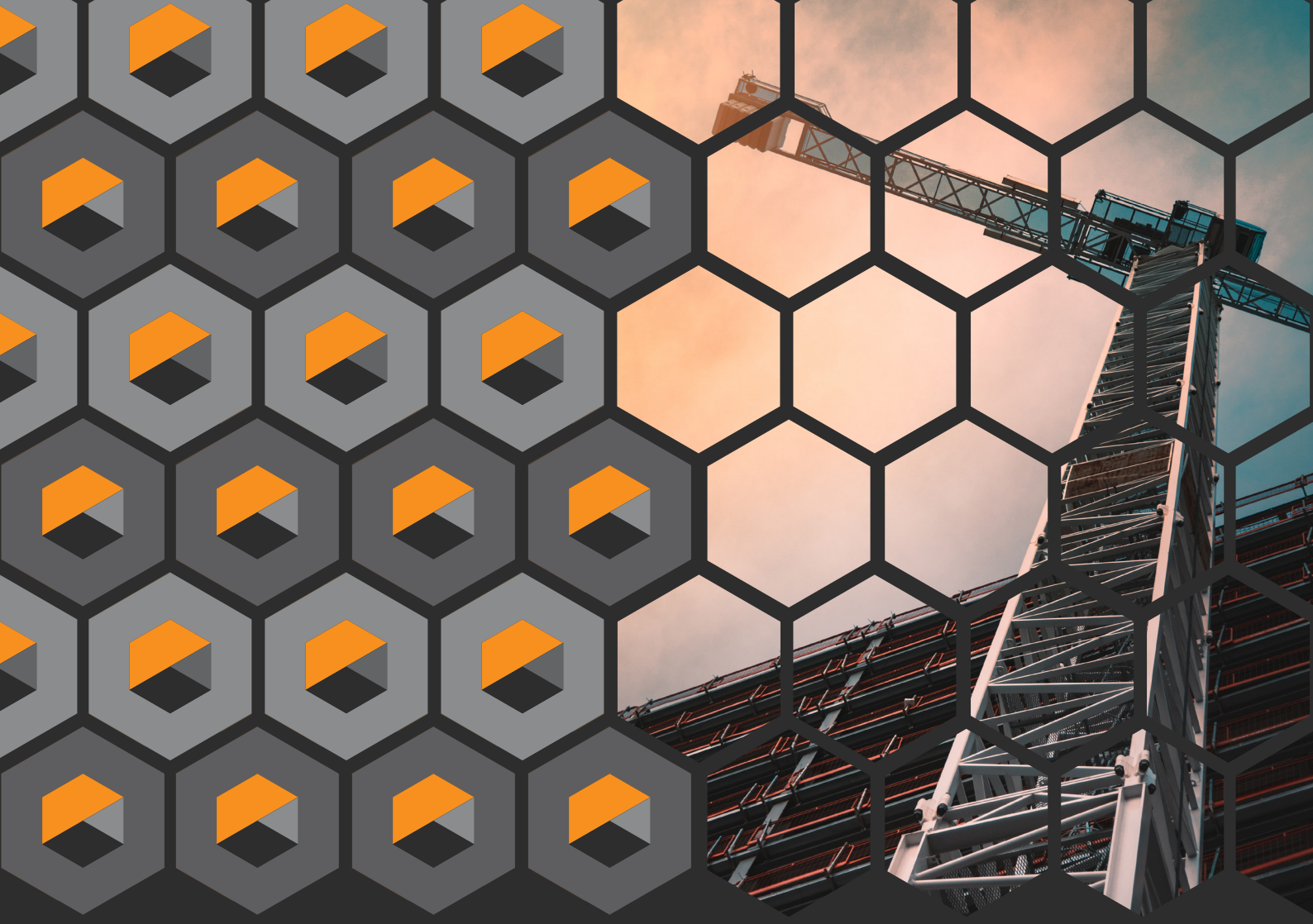
Increasing traffic congestion during peak times, particularly in urban areas, results in significant economic costs due to travel delays. Additional targeted pricing can have a role to play – for example toll roads where users fund the investment, or congestion pricing on key urban routes to help to manage traffic congestion.

Concluding questions

Consideration of pricing principles raise a number of important questions, including:

- How can we ensure that infrastructure investment is funded by those who benefit from it?
- How can we ensure that funding infrastructure incentivises investment in decarbonisation, climate adaptation and infrastructure resilience?
- How can we ensure that our investment today will meet the needs of future users of infrastructure?
- How can we ensure that low income households retain access to core infrastructure services?
- How can we ensure our infrastructure funding is equitable between regions, and between urban and rural communities?
- How can New Zealand broaden its funding base to access the capital needed for core infrastructure investments, while avoiding accumulating debt for future generations?
- How can pricing mechanisms in the infrastructure sector contribute to generating demand response, informing users and suppliers, promoting value for money outcomes, and ensuring equitable cost recovery?

The above questions must be addressed when considering investment in infrastructure to ensure equitable development and service delivery across both user groups and intergenerationally.



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