



Flexible planning for an uncertain future: Applying adapting pathways thinking to the water sector

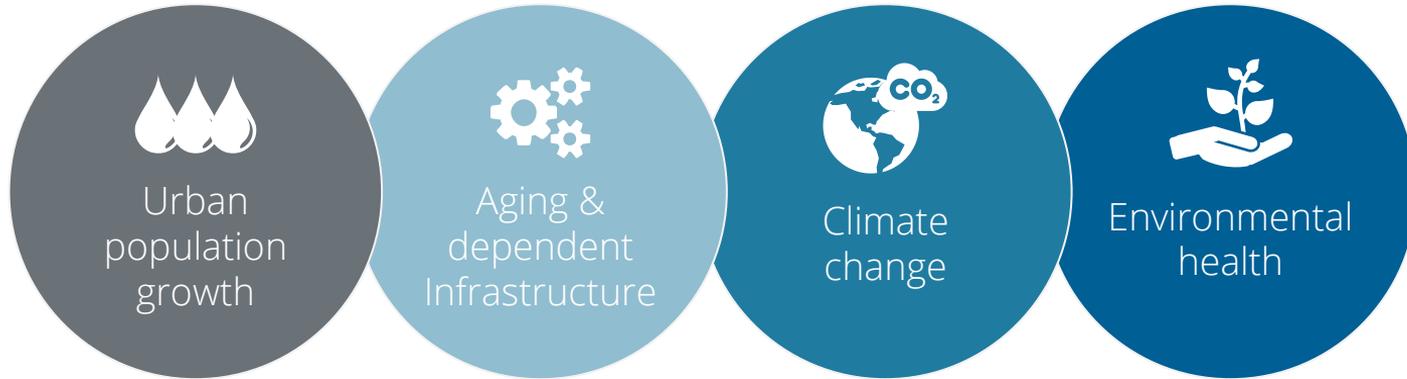


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Decision-making in the urban water sector is subject to an increasing challenges

Ensuring secure, reliable & cost-effective management of the water cycle is critical to support economic growth & to meet community's growing expectations for liveable & healthy environments. However, decision making in the urban water sector is subject to an increasing number of challenges.



Failure to address resilience puts Australia's water sector at risk, potentially imposing significant economic, social & environmental costs.

For example climate change is likely to significantly increase the cost of delivering water services across Australia



Climate change may make drought spells more frequent & severe, & less likely to follow historical inflow data.



Additional supply & demand measures may be required to ensure reliability



Potentially significant economic, social and environmental costs on water utilities, customers + broader community



Economics enables comparison of economic, environmental & social costs & benefits



Cost of additional water supply to manage increased demand &/or likelihood of drought



Social & economic costs on residents & businesses from water restrictions or shortfall



Increased heat related mortality / morbidity & energy costs

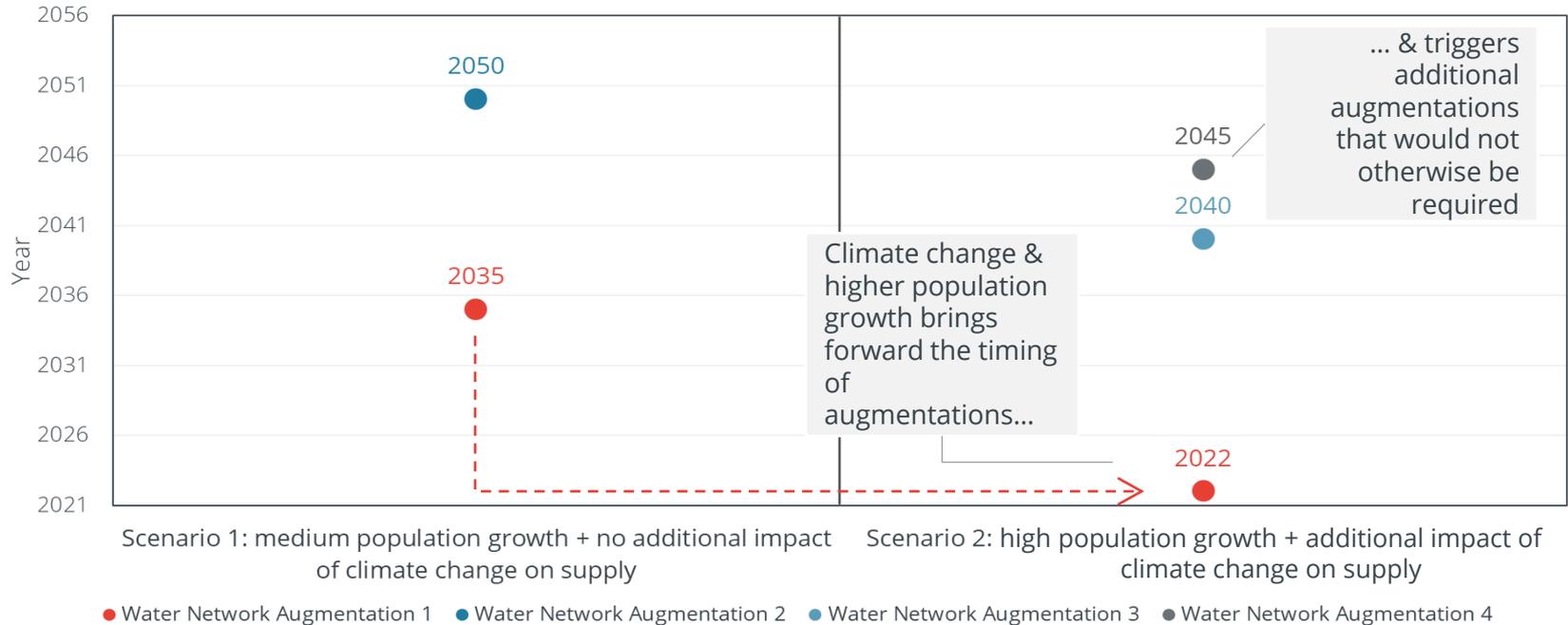


Environmental costs such as death of street trees & impacts on air quality



Reduced amenity and lost opportunities for recreation

This includes increased cost of providing water-related infrastructure



However, given uncertainty around the future climate change, demand & future water supply & demand options, **investing too much, too early can be costly**

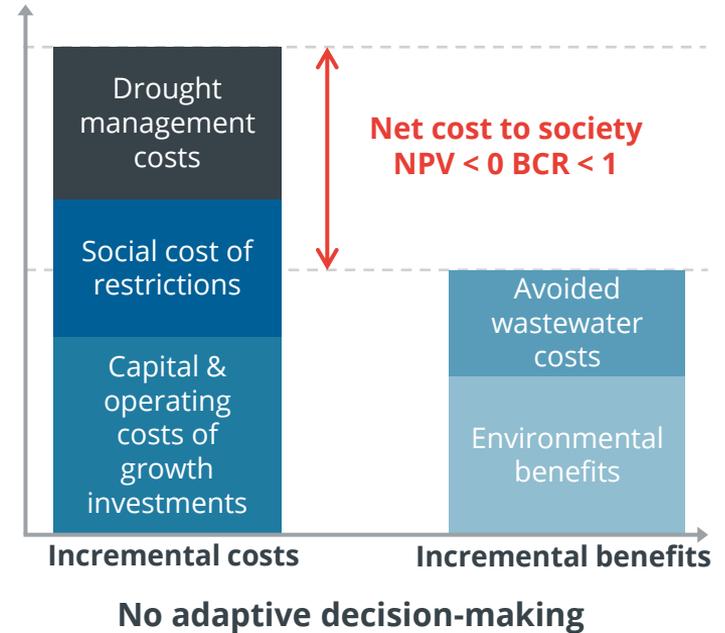
The historical approach to decision-making & investment evaluation is unlikely to be sufficient



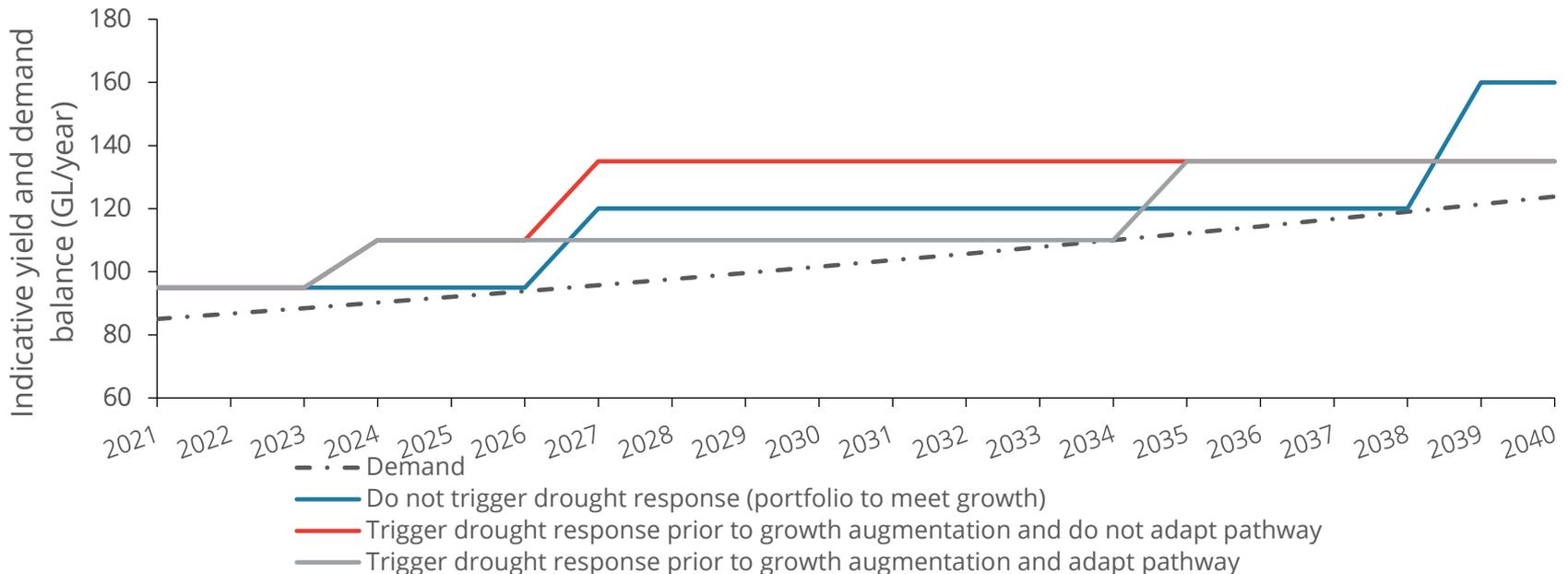
Traditional economic & financial analysis limit consideration of the value of flexibility by assuming little or no changes or deviation to the process.

e.g. historical approaches to managing water security have often assessed investments to manage drought & growth separately

Failure to consider the value of flexibility could lead to suboptimal outcomes for the community and can significantly increase costs.



Decision-making should recognise options can provide more/less flexibility to respond (adaptive decision-making)



However, historical approaches to managing water security have often assessed investments to manage drought & to manage growth separately

By valuing flexible decision-making, adaptive pathways analysis enables the identification of a range of decisions

We've applied adaptive pathways to a range of metropolitan planning processes throughout Australia across a range of uncertainties to enable the identification of different types of decisions



'No regrets'

Near-term options necessary to manage near & long-term constraints, that can adapt or respond to new information



'Wait & see'

Costly & potentially irreversible decisions that could foreseeably lead to decision 'regret'.



Opportunities to increase 'option value'

of the decision & any interdependencies.

Adaptive pathways analysis in practice



Identifying the key sources of uncertainty

Uncertainties may be future drought, water quality issues, community acceptance for IPR and recycled water demand.



Identifying options for responding to that uncertainty

E.g. building a large recycling plant today or building a small plant today and deferring the decision to expand (when uncertainty is resolved).



Building a decision tree that maps key uncertainties & options

Given the range of outcomes, incorporating every possible response is likely to be too difficult to map, let alone model. We recommend focusing on the most material.

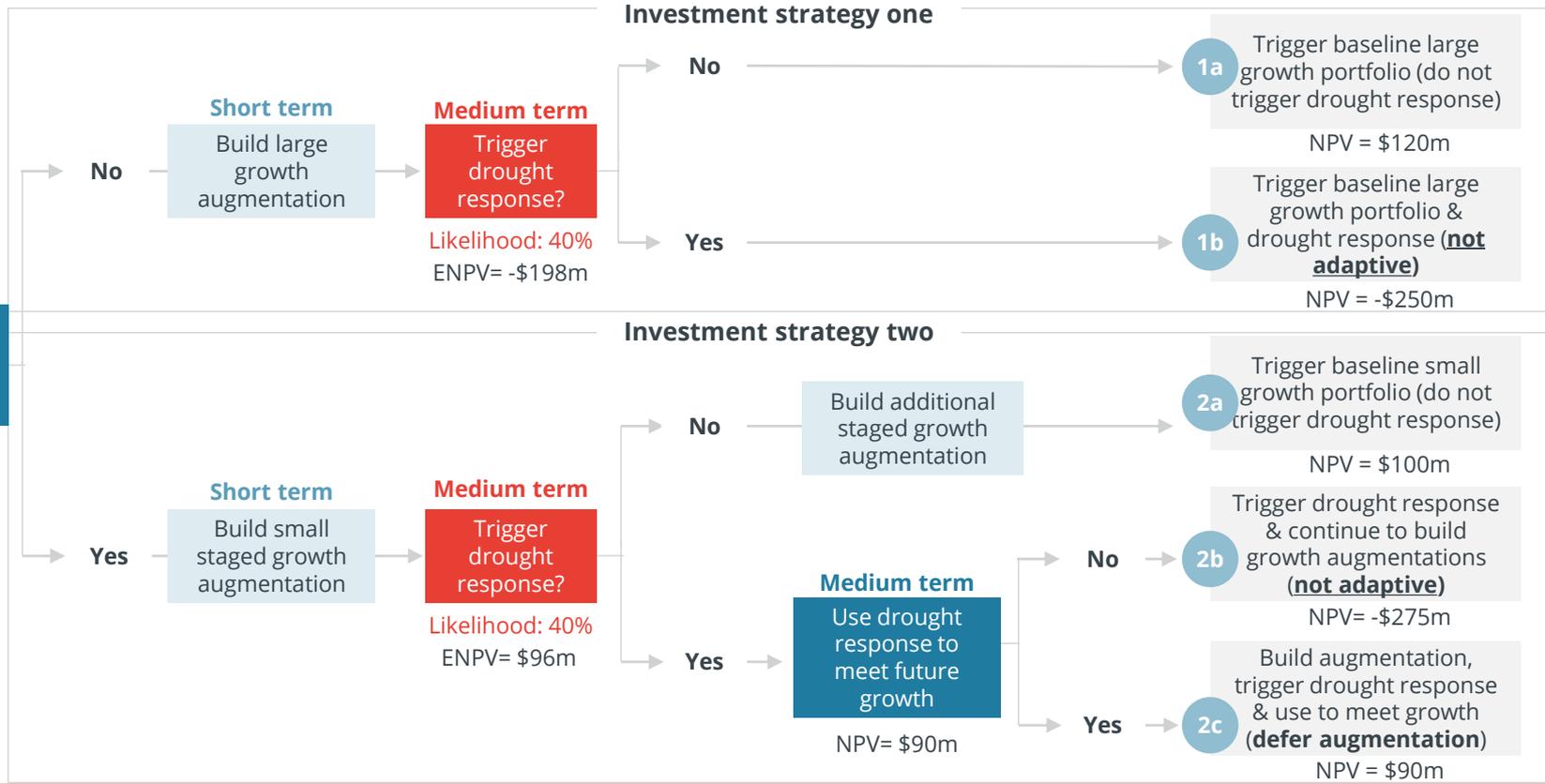


Calculating the expected present value of each branch

This will depend on the net present value of each scenario and the probability of the outcomes occurring.

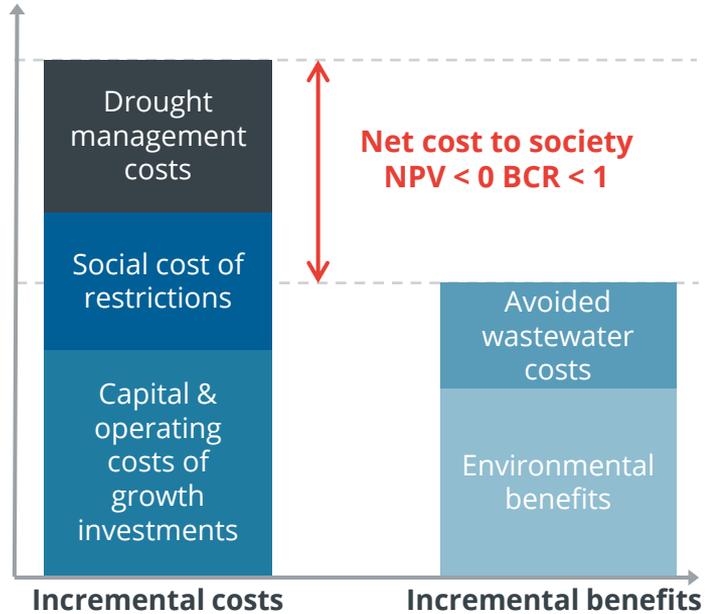


Failure to account for flexibility to respond to uncertainty can lead to suboptimal outcomes

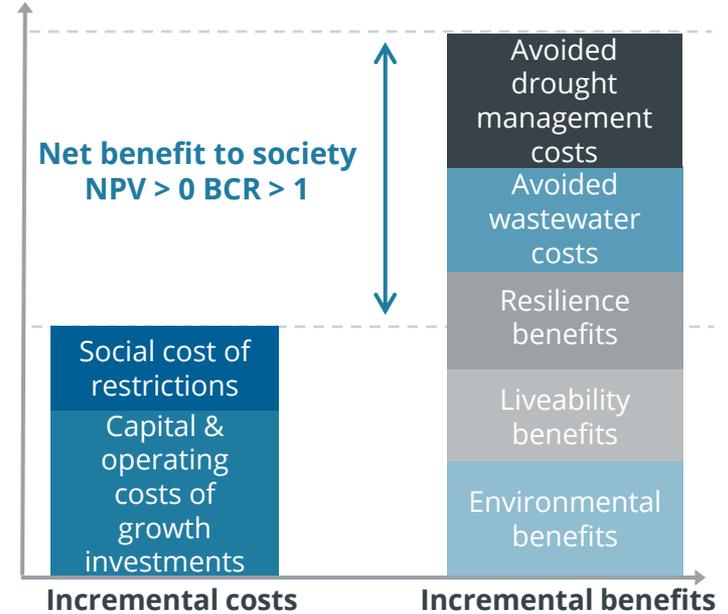


Investment strategy two leads to greater economic, social & environmental benefits for the community

Adaptive pathways analysis values flexibility



Investment strategy one
(no adaptive decision-making)



Investment strategy two
(adaptive decision-making)

Adaptive pathways analysis forms part of the decision-making toolkit



Failing to account for flexibility can lead to sub-optimal investment & risks inefficient allocation of scarce resources & funding.

While the use of adaptive pathways analysis is growing, traditional analysis still underpins most decision-making.

This is likely due to the incorrect perception that it is too time & information intensive & of limited practical use.



Adaptive pathways analysis is not required in every circumstance & is most helpful when:



Decisions can be broken down into multiple stages, where some/all stages are irreversible



Material differences in outcomes depending on uncertainty



The plan can be altered as new information comes to light

Decision-makers need a tool that considers & values flexibility.
Adaptive pathways analysis can form a critical part of this decision-making toolkit.



We apply economics to markets, organisations and policies