

Economic analysis of water services aggregation Final Report

WICS has set out its analysis in four parts...



Introduction

- Investment requirements
- Scope for efficiency
- The potential impact of aggregation
- Conclusions



water industry COMMISSION FOR SCOTLAND

- The Water Industry Commission for Scotland (WICS) is the economic regulator of the Scottish water industry.
- Since regulation was first introduced in Scotland in 1999, the industry has gone from being a very poor performer to being amongst the (if not the) best in the United Kingdom. It has invested in excess of NZ\$30 billion in water quality, environmental performance and growth (at 2002 levels of efficiency) and proven that public ownership is no barrier to meeting and exceeding the standards set by the privatised companies in England.
- Average Scottish household bills for the Three Waters are currently NZ\$750. WICS projects that bills could increase to NZ\$1,000 to NZ\$1,100 by 2040 after the industry invests a further NZ\$12 Billion (at current Scottish efficiency levels) in improving water quality, environmental performance and addressing climate change. Total investment over this forthcoming twenty year period will be around a further NZ\$40 Billion.
- There are no Government subsidies customers cover the full cost of providing water services. The industry does borrow when it is prudent to do so. Typically, such borrowing has amounted to around NZ\$200 million a year.

WICS is working with the DIA to assess whether there are economic benefits from water services aggregation in New Zealand... Before turning to the analysis, it is important to note that the full potential of Three Waters reform depends on many factors beyond amalgamation...



- Experience from a wide range of jurisdictions suggests that the following factors will be critical:
 - Clarity of required outcomes
 - The governance and design of the three waters service delivery vehicles
 - Scale
 - Management
 - Robust and empowered water quality and environmental regulation
 - Independent economic regulation

- However, this accumulated experience also suggests that there are other factors that do not automatically impact reform outcomes either positively or negatively:
 - Ownership
 - Competition (either 'for' or 'in' the market)

Taking these factors in turn... Firstly, clarity in specifying outcomes...



- For the foreseeable future, there are likely to be more demand for improvements than resources available to fund them (this still applies in Scotland where reform is now twenty years old). New Zealand will also likely face (as did Scotland in the early days) issues associated with the capacity to plan and operate; and of the supply chain ability to deliver.
- One of the most immediate challenges will likely be difficult political decisions about charging:
 - Should there be 'postage stamp' pricing?
 - How much regional variation in charges is acceptable?
 - Should charges be cost reflective? Or should there be a social cross-subsidy?
 - How will charging policy impact on creating the right incentives to deal with adaptation to climate change?
- There will also be a need to establish initial priorities: for example, adapting to and mitigating climate change; responding to, and facilitating, growth; drinking water quality; rivers versus estuaries versus seas etc.
- These choices both about charging policy and priorities will likely need to be reviewed periodically. The experience from Great Britain shows that these are choices that, realistically, can only be taken by Central Government, with input from local Government and other stakeholders.
- Experience suggests that placing a duty on regulators to make these decisions will likely result in sub-optimal decisions. Two issues have to be considered:
 - Is it appropriate for regulators to take essentially political decisions? What would be the basis of their legitimacy in this regard?
 - Do economic regulators have a good track record of balancing (potentially competing) objectives, some of which it may be very difficult to quantify. In the United Kingdom, for example, there appears to be greater priority accorded to new investment at the expense of a pro-active asset management and replacement programme.
- Finally, there are some issues that only Government has any real ability to address: seismic risk; reputational issues (a pristine environment facilitates tourism and agricultural exports).

Taking these factors in turn... Second, governance, design and scale of the three waters delivery vehicles...



- Three waters services are delivered under long term licences in England and Wales. There was some evidence of an absence of long term thinking immediately post privatisation licences were initially for 25 years and could be terminated (with ten years notice from year 15). There was clear evidence that asset repair and refurbishment was not a priority, given the time remaining on the licence.
- Some water entities in England and Wales overstretched themselves. For example, Welsh Water established its own consultancy business, invested in hotels and in an electricity distribution business. Others set about challenging Veolia and Suez in the international market for concessions.
- There were consistent issues with transfer pricing between regulated and non-regulated subsidiaries.
- Management of the regulated entity was not always empowered to take decisions responses were often reserved to the holding company Board limiting the immediate influence of the economic regulator.
- In Ireland, Irish Water's ability to progress (it was created in 2013) has been limited by several factors, including the design of the three waters delivery. For example, the 31 local authorities continue to provide the three waters service through contracts. There are no household charges. The economic regulator appears to be essentially advisory. These factors have all combined to limit performance improvement.
- In Scotland, there is no licence, but Scottish Water's powers are set in statute. Importantly, the whole entity is subject to economic regulation so while there are still potential issues with transfer pricing, these can be dealt with effectively by the regulator. Regulation of the entire entity ensures that the regulator is dealing with a management fully empowered to deliver the agreed regulatory contract.
- Whether by licence or by statute, the focus of the regulated entity has to be on the delivery of outcomes that are required by Government and the respective regulators. Excellence in delivery is critical to the reputation of the organisation and those that are responsible for its governance and management.

Taking these factors in turn... Third, attracting and retaining good management...



- All of our regulatory modelling excludes factors that are under the direct control of management.
- This is because the quality of management can have a quick and material impact. The merger to create Scottish Water allowed for a strong new team to be established under highly experienced leadership. Given that the regulatory regime was still quite immature, this was clearly an important catalyst for early improvement in performance.
- It is striking how much the performance of companies in England has ebbed and flowed under different management regimes several companies have been both towards the top and bottom of the performance league tables (relative costs and levels of service). These include six of the ten largest water and sewerage companies: Thames, United Utilities, Welsh, Northumbrian, Southern, and South West.
- The private industry in England pays much higher salaries to its leaders than are paid in Scotland. Even so, there has been a consistent political pressure to restrict pay of the senior management of Scottish Water further ('should not be paid more than the First Minister'). The Scottish Government has effectively resisted pressure to cap salaries, remove bonuses and other perks of the management of Scottish Water.
- Scotland has benefitted from having a talented senior management team that is motivated by public service rather than financial gain. The CE of Scottish Water receives a basic salary of just over NZ\$500,000 and can earn a bonus of up to 40%, depending on the organisation hitting its performance targets. Total senior management (top 50) bonuses could reach about NZ\$3,000,000 in aggregate (about 0.15% of annual expenditure). This compares with CE packages in England of in excess of NZ\$4m annually.
- Government steadfastness on remuneration issues and this public service commitment have been critical. In the absence of these factors, Scotland could have a significant leadership retention problem.

Taking these factors in turn... Fourthly, effective regulation...



- Regulation has to be independent of Government insofar as how it delivers on its statutory function. It should always, however, be clear that its role is to ensure that standards required by Government are delivered effectively (and within budgets).
- Regulation requires to be resourced effectively (a levy payment from the regulated entity can be effective at creating an appropriate tension).
- The water quality and environmental regulators should advise Government on standards and the rationale for change. This advice should include both suggested deadlines for compliance but also what may be possible.
- The water quality and environment regulators should sign off on delivery of agreed and targeted investment outcomes. They should also publish their thoughts on the performance of the three waters service delivery entities.
- The economic regulator should be charged with setting prices that reflect the 'efficient cost' of service delivery that it is reasonable to expect. Such price setting exercises should be transparent, engage stakeholders on the material issues and involve customer and community voices. They should be for a minimum period of five years but experience also suggests that charges setting needs to be consistent with the achievement of the long-term outcomes desired by Government.
- The economic regulator should monitor progress against the 'regulatory contract' that results from a price setting exercise and report on progress by the regulated entity against that contract.
- The economic regulatory process will have to be based soundly in detailed information collection and analysis because the opportunities to use markets to explore the potential of dynamic efficiency are very limited in the three waters.
- An effective regulator will need to access information on a regular basis that is both more extensive and more detailed than the RFI process has been. This regular information would likely be supplemented by tailored additional requests from time to time and in advance of a price setting exercise.

Experience suggests that neither ownership nor facilitating competition are critical to success...



- Private ownership is rare in the water industry and even where private capital is relied upon there are typically constraints on behaviours built into licences or contracts (though these are not always triggered or as effective as might be considered desirable). For example, one important area of tension between WICS and Scottish Water has been the regulator's frustration that Scottish Water could enforce its PFI contract rights more forcefully.
- But the observable and measurable success of Scottish Water (at least matching the performance of the best companies in England) suggests that public ownership cannot ipso facto prevent leading edge performance from being achieved. Nor is Scottish Water totally unique in its relative success. The public Eau de Paris is at least as effective as other municipalities/ regions in France. Similarly, the water industry in the Netherlands is in public ownership and consistently performs well in international comparisons. Bad public governance (like bad private governance) will likely result in performance falling short.
- There is no evidence that long term private concessions perform better than alternative governance approaches. There is an extensive literature on failing concessions (to which Scotland could add with its wastewater PFI projects). When capital needs to be deployed in such arrangements, there is an extensive track-record of disputes relating to the residual value of assets that were created during the life of the concession (precisely because extended asset lives typically exceed the length of even the longest concession contract). Some short term concession arrangements can work, but those that are successful typically appear to focus only on operations.
- Interestingly, Welsh Water moved away from a concession/ sub-contract approach when it could not meet the targets being set by its economic regulator (it now meets them comfortably).
- An analysis of the three waters value chain makes it difficult to identify areas where 'in the market' competition could work except perhaps for 'retail services' to non-households. If there is to be any social policy role in how charges are set for households, household retail competition would be highly unlikely to be effective.

WICS considers that there is no obvious reason why New Zealand should not be able to match or improve on the performance of the UK water industry...



- At the start of the reform process in Scotland, there was a lack of general optimism in 'political and civic' Scotland that the industry could match or exceed the performance of the privatised companies in England and Wales. There was a sense that falling a little short would be an acceptable price top pay for the industry remaining publicly owned.
- However, this ignored several factors:
 - Scotland was able to learn what it was possible to expect from a well-performing three waters industry precisely because service levels, investment delivery and efficiency were all markedly better in England and Wales.
 - Scotland's relatively small size facilitated communication between service providers, regulators and policy makers (they could and still do get together in one room!).
 - National pride in our environment and water were strong motivations for improvement.
- Scotland was therefore able to avoid some of teething problems, which had slowed progress in England (e.g. insufficiently demanding efficiency targets, overly generous price caps).
- As a final step before embracing more radical reform, Scotland used PFI/ Concession arrangements. These were quickly seen to be very expensive relative to what was being achieved in England. This experience and other examples suggest that sub-contracting markets are not necessary for (and may be detrimental to) success.
- From a New Zealand perspective, confidence can be taken from the fact that Scotland has made many mistakes. We have paid insufficient attention to asset replacement; had too much focus on borrowing; and insufficient focus on the long term outcomes that are being targeted. The reform process will have taken 41 years by 2040 when we project that we should achieve steady state...



• As such WICS concludes that there is no obvious reason as to why, as a minimum, New Zealand could not match Scottish Water's performance - and do so more quickly. 2050?

This project is the analytical equivalent of holding up a mirror...



- In drawing its conclusions, WICS has used data from the Request for Information, Annual Reports and Accounts and the Long Term Plans of each council to develop a comprehensive database of:
 - revenue and other sources of income;
 - current operating costs;
 - interest costs, and by extension debt levels, associated with the Three Waters;
 - reported asset values;
 - Appropriate levels of allowance for economic depreciation; and
 - investment in maintaining assets relative to depreciation.
- WICS has adopted a number of assumptions, which may understate the impact on costs of Councils on a standalone basis. These include:
 - Lower estimates for new operating costs as a percentage of

improvement capital expenditure;

- A lower level of relative capital expenditure inflation than is typically reported in New Zealand; and
- There is no additional allowance to cover new activities that may in future be required of the Three Waters activities within Councils, such as, for example, the costs of expanding procurement and investment delivery activities.



As such, WICS considers that its analysis is likely to understate the likely benefits of amalgamation to those paying for Three Waters Services.



What WICS has learned from its review of the information provided by Councils under the Request for information...



Issue	Description	Observation					
Financial sustainability of the Three Waters activities	Borrowing by Councils compared to total net new investment (total investment minus depreciation).	 From 2017 to 2020: 28 councils reported net new borrowing to be higher than net new investment. Adjusted to account for economic (rather than accounting) depreciation, 41 councils have incurred higher net new borrowing than net new investment. 					
Changes in operating costs over time	The change in operating costs, taking account of new operating expenditure incurred as a consequence of new investment.	From 2017 to 2020, operating costs in New Zealand* increased by around 20% in real terms.Operating costs increased in 54 Councils:Decreased in 12 Councils by:• 0-10% in 11 Councils,• 0-5% in 3 Councils,• 10-25% in 16 Councils,• 5-10% in 5 Councils,• 25-50% in 19 Councils,• >10% in 4 councils.					
Approach to economic depreciation	Councils provided information about the lives and replacement cost of their asset in the J Tables of the Request for Information.	 Only 4 councils report short-medium-life assets to be 20% or more of all their assets. Fo Scottish Water they are 30%. 28 councils report a weighted average asset life for short-medium-life assets greater than 30 years - international benchmarks would suggest around twenty years. 63 councils report a weighted average asset life for short-medium-life assets greater than the international benchmark, 20 years. 					



What has WICS learned from its review of the information provided by Councils under the Request for information...continued



lssue	Description	Observation				
Investment relative to economic depreciation	The level of investment by Councils in replacing and refurbishing existing assets.	 4 councils report investment expenditure to replace and refurbish assets of less than 30% of the economic depreciation, implied by their response to the J Tables. 22 councils report investment expenditure to replace and refurbish assets of less than 50% of their implied economic depreciation. 33 councils report investment expenditure to replace and refurbish assets of less than 60% of their implied economic depreciation. 51 councils report investment expenditure to replace and refurbish assets of less than 80% of their implied economic depreciation. 				
Revenues relative to operating costs, depreciation and interest charges.	Revenue should cover depreciation, operating costs and interest for the Three Waters activity to be sustainable. If it does not, future customers will pay more and, most likely, receive less.	 7 councils have three waters revenues, which do not cover their operating expenditure and interest costs. There is no coverage of any depreciation; 21 councils have three waters revenues, which do not cover their operating expenditure, interest costs and 50% of the economic depreciation. 43 councils have three waters revenues, which do not cover their operating expenditure, interest costs and full economic depreciation. 				
Debt levels relative to Three Waters revenue.	Councils face a borrowing cap that limits debt for a Council to 2.5 times its revenue. Three Waters debt often exceeds 2.5 times Three Waters revenue.	 25 Councils have Three Waters debt that is greater than 2.5 times their Three Waters revenues. 				

WICS has amended its approach in the light of the Request for Information...



Issue	What WICS did in Phase 1	How WICS has refined its analysis for Phase 2				
Costs/benefits of reform	WICS presented the results of the analysis using projected average household bills in 2050 for individual councils, versus amalgamated entities.	WICS has presented the results based on Net Present Cost per connected citizen per year. This shows the economic costs facing citizens within individual councils versus amalgamated entities without considering how the investment is financed. WICS also provides projected average household bills (although these come with a health warning!)				
Growth investment	WICS modelled growth investment based on extending connection rates across New Zealand to 95%. WICS also modelled a scenario based on existing growth rates (Base Case Mark II). In neither scenario was there any investment in responding to new property growth.	WICS has modelled growth investment based on information provided by the Councils in Section G of the Request for Information.				
Connected population	WICS used information from Water New Zealand on estimated connection rates and an average household size of 2.3x.	WICS used information from the Councils provided in Tables A1 and A3 of the Request For Information. WICS has used the average household size reported by Stats New Zealand (2.7x).				

WICS has amended its approach in the light of the Request for Information...continued



Issue	What WICS did in Phase 1	How WICS has refined its analysis for Phase 2		
Asset values	WICS noted that the asset value per connected person appeared low. WICS therefore modelled projected bills with (Base Case) and without (Base Case Mark II) a floor on asset values per connected citizen of NZ\$15,000.	WICS has used the reported asset values and lives from information supplied by the Councils in Table J1 of the Request for Information. The average asset value per connected citizen has increased from NZ\$15,350 to NZ\$19,400.		
Efficiency	WICS only considered the scope for reductions in operating costs. For amalgamated entities, WICS modelled efficiency based on different thresholds for entity size. Entities of more than 800,000 connected citizens received the maximum efficiency challenge.	 WICS has considered overall efficiency based on costs incurred and service delivered. To do so, it has employed a series of tried and tested econometric models. WICS has also adapted these models to include observations from the New Zealand Three Waters industry. WICS has also taken account of evidence from the Great Britain water industry on economies of scale and has applied this evidence in setting the scope for efficiency both for individual Councils and for the potential amalgamated entities. 		
Special factors	Not considered	Through the RFI process, WICS has engaged with councils on their council specific factors that should be accounted for in comparisons. WICS has taken such factors into account in establishing the scope for efficiency. WICS' allowance is three times higher than was allowed for in Scotland notwithstanding the lower cost of employing an individual on an otherwise equivalent salary. WICS allowance adjusts for the material factors affecting New Zealand councils including extreme rurality and location, additional costs of engaging with Iwi communities, seismic resilience and high tourist population in several councils.		
Modelling assumptions	WICS assumed inflation of 2% and a nominal interest rate of 4%	WICS has adopted inflation of 2.2% and a nominal interest rate of 3.5% based on estimates from the DIA's commercial and financial advisors		

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Reflecting on investment to improve levels of service and compliance...



- The experience from Scotland is that the main drivers of enhancement investment include:
 - Deteriorating water quality in surface water bodies (e.g. due to high concentration of peatlands, sheep and livestock, use of pesticides, changes in rainfall patterns) and resulting discolouration.
 - Improving customer service.
 - Cryptosporidium and managing trihalomethane risks.
 - Making rivers and estuaries swimmable.
- The reported ambition for water and aquatic environment quality in New Zealand appear to WICS to be broadly in line with current and future expectations of both the Scottish and Westminster Governments. WICS notes that the level of investment required to deliver the improvements achieved to date has been consistently under-estimated.
- Given the broad geographical similarities to Scotland, the same drivers (and more) are likely to apply in New Zealand. For example:

- New Zealand has significant livestock farming and, in many areas, peaty ground conditions - which seem likely to impact raw water quality. Climate change will be similarly impactful.
- Farming and organics in the raw water will likely lead to issues of cryptosporidium and trihalomethanes having to be addressed.
- New Zealand has an ambition to achieve swimmable waters by 2040.



WICS has used statistical models, which incorporate the cost information of organisations that have addressed these and other challenges, such as the management of groundwater sources.

Accordingly, WICS has adopted three separate approaches to estimating total investment needs - and cross-checked these with the G Tables provided by Councils...



- Approach 1 is based upon relationships between historical enhancement and growth investment in Great Britain and various geographical indicators.
 - WICS established 7 robust statistical relationships, which projected investment of between NZ\$49 Billion and NZ\$69 Billion for service improvement and a UK level of growth (about half of New Zealand's projected growth).
- Approach 2 is based upon relationships between regional enhancement and growth investment in Scotland and various geographical indicators.
 - WICS established a further 7 robust statistical relationships, which projected investment of between NZ\$73 Billion and NZ\$99 Billion for service improvement and a Scottish level of growth (about half of New Zealand's projected growth).
- Approach 3 is based upon the observed gap in asset value per connected citizen between New Zealand and Great Britain/Scotland.
 - WICS' modelling suggested projected investment of between NZ\$52 Billion and NZ\$57 Billion for service improvement alone. These models, by definition, do not include growth.
- **Cross-check with Council information provided in the G Tables:** WICS has reviewed carefully what Councils have said about their enhancement and growth investment needs in the RFI. There were a wide variety of approaches adopted.

This modelling reflects the levels of growth in population experienced in Great Britain. WICS now adjusts this for the growth expected by Councils in their Request for Information submissions...

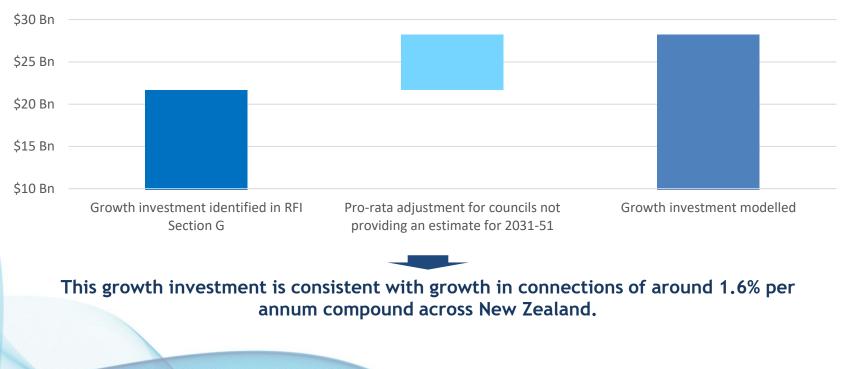


- In Scotland, growth expenditure has resulted in numbers of connections increasing by annual growth rate of between 0.6% and 1.2% over the period since 1996 or a compound annual growth rate of 0.8% over the period.
- This compares with Council projections of compound annual growth in connections that range between 0% and 3.8% per annum in the next ten years or a weighted average of 1.6%.
- The projected growth investment per property connected is around NZ\$25,000 with a range of NZ\$1,000 to NZ\$120,000. Some councils have reported average growth investment per new connected property of less than NZ\$10,000. This appears to be very low.
- Costs below NZ\$10,000 per connection are likely to be well below the long run marginal cost of a connection. The long run marginal cost is the cost of adding a connection unit and retaining the same headroom and resilience as was previously available (ie there is no detriment to existing customers or to the aquatic environment). The reported costs are potentially consistent with short run marginal cost of connections - but this leaves open how and when the future costs of restoring resilience and addressing the potential detriment to existing customers or to the aquatic environment will be met.
- For prudency, and to ensure that investment requirements are not overstated, WICS has accepted the reported costs of Councils. The Steering Committee should, however, be aware that these reported costs may be on the low side given the 30 year timeframe of this analysis.

The RFI suggests growth investment of over NZ\$28 Billion...

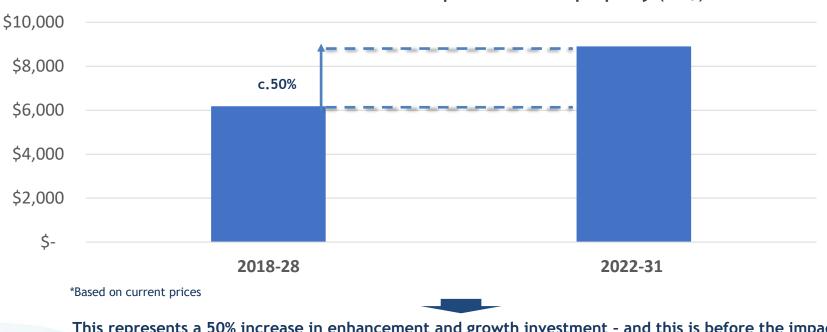


Projected Growth Investment over 2022-51 (NZ\$ Billion; Real Prices)



Turning to Council estimates from the RFI. Section G suggests a 50% uplift over 2022-31 compared to the previous LTP period ...





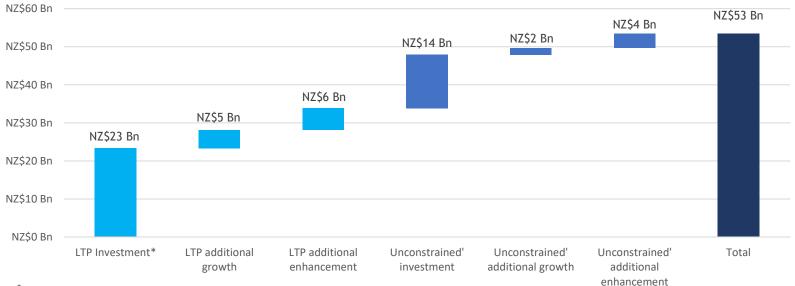
Growth and enhancement investment per connected property (NZ\$)*

This represents a 50% increase in enhancement and growth investment - and this is before the impact of Taumata Arowai appears to have been reflected in the investment plans of Councils.

The RFI suggests that around NZ\$53 Billion of Growth and Enhancement investment is required over 2022-51...



Enhancement and growth investment (2022-51)*



Note to figure*

- WICS has adopted estimates in full from Councils that provided forecasts for the period through to 2051, despite evidence that they contained substantial optimism bias. All investment included is based solely on the information provided by individual Councils and projecting forward based on each particular Council's G Tables submission.
- LTP investment: investment reported in the 'LTP G tables'. This includes forecasts for 2032-51 based on asset management plans, if included with the LTP estimates for 2022-31.
- LTP additional growth: additional growth investment for councils that provided estimates in the 'LTP G tables' but did not provide estimates for the 2032-51 period. This assumes that the same level of growth investment from the LTP continues over 2032-51.
- LTP additional enhancement: additional enhancement investment for councils that provided estimates in the 'LTP G tables' but did not provide estimates for the 2032-51 period. This assumes that the same level of enhancement investment from the LTP continues over 2032-51.
- 'Unconstrained' investment: additional investment reported in the 'Unconstrained G tables'
- 'Unconstrained' additional growth: additional growth investment only for councils that provided estimates in the 'unconstrained G tables' but did not provide estimates for the 2032-51 period. This assumes that the same level of growth investment continues over 2032-51.
- 'Unconstrained' additional enhancement: additional enhancement investment only for councils that provided estimates in the 'unconstrained G tables' but did not provide estimates for the 2032-51 period. This assumes that the same level of enhancement investment continues over 2032-51.

WICS has applied two adjustments to these modelled answers...



- The first adjustment is to alter the modelled results to reflect differences in Councils' projections of new connections relative to what has been delivered within growth expenditure in the United Kingdom.
 - As noted previously, typically growth expenditure has resulted in numbers of connections increasing by annual growth rates of between 0.6% and 1.2% over the period since 1996 - or compound annual growth rate of 0.8% over the period.
 - This compares with Council projections of compound annual growth in connections that range between 0% and 3.8% per annum in the next ten years - or a weighted average of 1.6%.
 - For approaches 1 and 2 (based on GB information), WICS has adjusted the modelled enhancement and growth investment for the difference between the growth in connections projected by the councils and

that observed in Great Britain (0.8% per annum).

- Approach 3 (the asset value approach) does not take account of growth - it simply compares the cost of providing three waters services to today's connected citizens. As such, WICS applies the full growth investment in New Zealand in this approach.
- The second adjustment relates to a cap of NZ\$70,000 per head across any council area.
 - Reviewing the evidence from the more remote areas of Scotland and its islands would suggest average expenditure (across that Council area) of around NZ\$70,000 per connected citizen at the current level of capital expenditure efficiency in New Zealand.
 - This limits the modelled potential exposure of the most rural Councils.

The growth adjustment and per connected citizen cap have the following effect on the modelled ranges of enhancement and growth investment...



	Approach	Estimate from models (Unadjusted)	Estimates after adjusting for differences in Growth	Estimates after applying a cap of NZ\$70,000 per connected citizen
1	Great Britain comparative models	NZ\$49 Bn – NZ\$69 Bn	NZ\$63 Bn – NZ\$83 Bn	NZ\$57 Bn – NZ\$77 Bn
2	Scotland only comparative models	NZ\$73 Bn – NZ\$99 Bn	NZ\$87 Bn – NZ\$113 Bn	NZ\$77 Bn – NZ\$100 Bn
3	Asset value comparisons	NZ\$52 Bn – NZ\$57 Bn	NZ\$81 Bn – NZ\$85 Bn	NZ\$77 Bn – NZ\$81 Bn
4	Information included in Councils' response to the Request for Information.	NZ\$53 Bn	Not applicable	Not applicable

In its Phase 1 analysis, WICS drew on reported asset values to understand likely future levels of replacement investment...



- During Phase 1, WICS noted that there appeared to be clear evidence that reported asset values were low:
 - Implications of capital expenditure inflation;
 - Experience drawn from the response to the Christchurch earthquakes; and
 - Observed contract rates compared to the rates implied in valuations.
- Notwithstanding these observations, WICS used the reported asset values in making its estimates for the likely annual average expenditure on asset replacement.
- WICS used extended asset lives in converting these asset values to an average annual requirement for replacement expenditure the level of economic depreciation. For example, WICS adopted a 30 year average life for the short/ medium category and 100 years for the long life category.
- In Scotland, 18-22 years is considered to be appropriate for short/ medium life assets. Only sewers, drains, reservoirs and dams have asset lives in excess of 100 years.
- As such, the Phase 1 analysis (lower values and longer lives) was likely to have substantially understated the required level of economic depreciation in New Zealand.
- This has been confirmed by analysis of Councils' responses to the Request for Information.

The RFI provided updated information on asset values and lives and confirms that previous estimates of economic depreciation were too low...



- The average asset value per connected citizen has increased by around 25% from NZ\$15,350 to NZ\$19,400 in the Councils' response to the RFI. Only six councils did not report an increase in asset values per connected citizen.
- Reported asset lives are, however, much higher than observed by external benchmarks based on studies from Europe and Australia despite ground conditions and seismic activity in New Zealand. For example:
 - the range for short/ medium life assets is 27 to 50 years; and
 - the range for long life assets is 77 to 112 years.
- The reported split of assets for short and medium life assets ranges from 2% to 30%. The weighted average share of short and medium life assets is around 10% across all councils.
- WICS considers it highly unlikely that short and medium life assets actually accounts for only around 10% of the optimised replacement cost of total assets. This 10% compares with the minimum 30% observed currently in Scotland. WICS has, however, used the 10%/90% split for the purposes of its modelling.
- WICS has also accepted the 30 year asset lives reported by Councils. WICS considers this to be potentially problematic given the 20 year average life observed in Scotland. Such a difference could understate the economic depreciation of short and medium life assets by around 50%. It would represent a further upward pressure on modelled costs.

In its review of the funds flow statements of Councils in NZ, WICS examined asset replacement investment...



Council Group	Average annual expenditure per connected citizen*	WICS assessed economic depreciation per connected citizen**	% of economic depreciation	Average annual net new assets created per connected citizen
Metro	NZ\$124	NZ\$267	46%	-NZ\$150
Provincial	NZ\$128	NZ\$254	50%	-NZ\$50
Rural	NZ\$158	NZ\$253	63%	-NZ\$3
Larger rural***	NZ\$153	NZ\$237	65%	-NZ\$5
Smaller rural	NZ\$163	NZ\$266	61%	NZ\$1

*Now based on Annual Reports from 2015 onwards. **Based on the economic depreciation used in Phase 1. ***District council with a population of more than 10,000. Total asset replacement investment of around NZ\$2.8 Billion to NZ\$4.0 Billion per annum would be required, even if the optimistic current asset lives are accepted...



Asset category	Total modelled replacement expenditure 2020-2050							
	Approach 1		Approach 2		Approach 3		Cross Check	
	Low	High	Low	High	Low	High	Low	High
Existing short and medium life assets	NZ\$19 Bn	NZ\$19 Bn	NZ\$19 Bn	NZ\$19 Bn	NZ\$19 Bn	NZ\$19 Bn	NZ\$19 Bn	NZ\$19 Bn
Existing long life assets	NZ\$23 Bn	NZ\$30 Bn	NZ\$23 Bn	NZ\$30 Bn	NZ\$23 Bn	NZ\$30 Bn	NZ\$23 Bn	NZ\$30 Bn
Required short and medium life enhancement	NZ\$18 Bn	NZ\$24 Bn	NZ\$24 Bn	NZ\$31 Bn	NZ\$24 Bn	NZ\$25 Bn	NZ\$17 Bn	NZ\$17 Bn
Required long life enhancement	NZ\$4 Bn NZ\$5 Bn	NZ\$5 Bn NZ\$6 Bn	NZ\$6 Bn	NZ\$5 Bn	NZ\$5 Bn	NZ\$3 Bn	NZ\$3 Bn	
Total	NZ\$63 Bn	NZ\$77 Bn	NZ\$70 Bn	NZ\$86 Bn	NZ\$70 Bn	NZ\$79 Bn	NZ\$61 Bn	NZ\$69 Bn

To summarise WICS' conclusions: there were four discrete approaches to estimating the required investment for enhancement and growth...



	Approach*	Enhancement and Growth		Asset replacement and refurbishment**		Total investment***	
		Low	High	Low	High	Low	High
1	Revised approach used in Phase One	NZ\$57bn	NZ\$77bn	NZ\$63bn	NZ\$77bn	NZ\$120bn	NZ\$154bn
2	Modelling based on regional investment levels observed in Scotland	NZ\$77bn	NZ\$100bn	NZ\$70bn	NZ\$86bn	NZ\$148bn	NZ\$185bn
3	Asset value approach	NZ\$77bn	NZ\$81bn	NZ\$70bn	NZ\$79bn	NZ\$148bn	NZ\$160bn
4	Council G tables	NZ\$53bn	NZ\$53bn	NZ\$61bn	NZ\$69 bn	NZ\$115bn	NZ\$122bn

*WICS allocates New Zealand wide investment requirements by Council area using established statistical relationships and observed experience in the most rural parts of Scotland. These relationships work well with the exception of the most rural councils which is why we have sought to cap the estimated investment.

**Asset replacement and refurbishment expenditure is calculated based on the J Table responses of each Council.

***Numbers may not add due to rounding.

WICS has set out its analysis in four parts...



- Introduction
- Investment requirements
- Scope for efficiency
- The potential impact of aggregation
- Conclusions



WICS looks separately at capital and operating expenditure efficiency...



- It is important to start by defining efficiency: it is the act of spending less and receiving the same outcome, or of receiving a better outcome for the same level of spending.
- The focus of regulation is often on comparisons of cost because these are easier to measure - it is very difficult to measure the precise NZ\$ value of any increment in the level of service/ water quality improvement/ environmental compliance.
- For that reason, WICS chooses to rely on a series of tried and tested econometric models that measure the relative operating cost performance of different water services providers.
- The cost drivers in these models reflect the nature of the service area in terms of its geography, population, installed asset base and operational characteristics.
- The models have been updated to include New Zealand information on expenditure and cost drivers.
- WICS considers that the track record of evidence of consistent cost relationships is critical to the current long term analysis of the prospects for water reform in New Zealand.
- WICS has heard it suggested that New Zealand's productivity lags behind that of Great Britain. However, a review of productivity

suggests that New Zealand is no further behind Great Britain than Scotland was behind England in 2000. In this regard, it is useful to recognise that there was a strongly held view in 2000 that the Scottish Three Waters industry could never match the performance levels of the private companies in England, given Scotland's poor record on productivity compared with England.

- With regard to capital expenditure, WICS accepts that remoteness could make this more difficult, but, based on experience in the UK, considers that there is an opportunity to work with the international supply chain in a much more constructive way. The supply chain in the UK has had to deal with sharp downturns in work around each price reset and the associated inefficiency.
- Recent discussions with the international supply chain suggest strongly that there is a willingness to invest in New Zealand if it pursues reform of the Three Waters.
- A more collaborative approach, based around stewardship of assets, could reasonably be expected to offset (at least) any disadvantage from remoteness.
- Indeed, remoteness could become an advantage as installed capacity in New Zealand would not be easily (and profitably) transferrable to other jurisdictions.

Before turning to operating and capital expenditure....



• An important analytical note:

- A more detailed review of larger entities in New Zealand suggests that operating costs in New Zealand may well be higher than could otherwise have been achieved because asset replacement and maintenance expenditure has consistently fallen short of allowed for depreciation; and
- in considering the estimates of efficiency, there has to be a focus on the whole package (for example, the governance structure, the regulatory framework, the approach to financing, the level of capital expenditure that will have to be committed, and the potential for economies of scale and scope).

- WICS has modelled the scope for reducing unit operating costs and unit costs of capital investment. This is based on:
 - the **operating cost** reductions achieved in the United Kingdom post economic regulation.
 - the capital expenditure efficiencies achieved in the UK. These relate to: scale, contractual commitment, improved procurement and asset management processes and identifying opportunities for innovation.
- The modelling reflects the detailed information provided by Councils in response to the RFI.



Turning now to the scope for operating cost efficiency. In Phase 1, limitations on the information available required WICS to focus on unit operating cost comparisons...



- In Phase 1, WICS, in the absence of the more detailed information required for a full analysis, used a series of unit cost comparisons.
- WICS identified three broad scenarios for Phase 1 an option consistent with the improvement of leading companies in the UK (when subject to the regulatory 'hard budget constraint'); an option consistent with the larger, and better performing water only companies in the UK; and a final option that reflected the observed unit cost improvement of the smallest water only companies.
- WICS explicitly recognised that these unit cost comparisons were likely to understate the true scope for efficiency. WICS' earlier analysis for Watercare had clearly shown that the actual efficiency gap was larger than that revealed by simple unit cost comparison (not surprising given the importance of levels of service in understanding actual efficiency).

This Phase 2 analysis has used tried and tested regulatory models to establish the scope for operating expenditure efficiency... water industry COMMISSION FOR SCOTLAND

- In the mid-to-late 1990s, Ofwat developed models to measure relative operating cost efficiency for the water companies in England and Wales.
- To ensure that the comparisons were like-for-like, Ofwat sought to account for the operating characteristics of the companies that it regulated that were outside of the control of management.
- The models are based on well established relationships between factors such as population, geography, topography, assets and the level of operating costs.
- By controlling for such factors outside the control of management, any difference in costs between companies can reasonably be put down to (relative) ineffectiveness.
- The models have stood the test of time they remained largely unchanged when used by Ofwat between 1997 to 2009. The only minor change took place in 2008 when a cost driver changed in two of the models (water distribution and water resources and treatment). WICS has run both versions for New Zealand. It has also run an amended suite of models that include base data from the New Zealand Three Waters industry. There are only minor differences in the results between these different approaches.
- For its advice in 2001 and its Final Determination in 2005, WICS used these models to set an operating cost reduction target for Scottish Water.
- The models have also been applied in other jurisdictions, including Eire, Northern Ireland, New Zealand (Watercare), Australia (Sydney Water), The Netherlands and in other jurisdictions in Europe (work for the European Commission). The relationships between these factors and operating costs have been shown to hold in all these jurisdictions.
- WICS has also used an alternative model, developed in 2005 as an independent

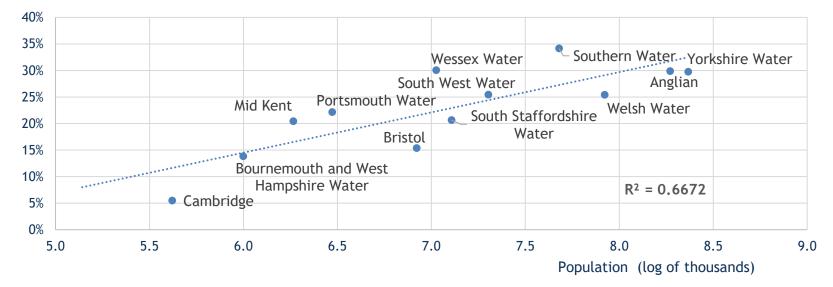
check on the suite of Ofwat econometric models.

- Regulated companies that have felt disadvantaged have made extensive use of consultancy to raise doubts about the efficacy of the models but have, at least to date, not identified a material issue that suggests the models are anything other than robust.
- In a recent appeal to the Competition and Market Authority, Bristol Water contrasted the 'simple' quality and effectiveness of these models relative to the more complicated total expenditure models that are used today in England. This is despite Bristol Water never having received favourable answers from Ofwat's use of these models.
- During Phase 2, WICS' review of the academic literature suggests that there are clear benefits related to the scale of Three Waters service delivery. WICS has also been able to replicate academic conclusions by using ex-post evidence from the United Kingdom to confirm that larger entities have been more successful in reducing their operating costs than the smaller water-only companies. This analysis is explored on the next two slides.
- This success appears to be a result of economies of scale because other factors such as regulatory and corporate governance and management quality could not explain the observed differences. WICS' experience generally is that there are obvious scale benefits for asset management, managing regulatory requirements and, generally, in attracting and retaining top talent.

In assessing the scope for efficiency improvement, it is important to take into consideration the scale of organisations...



- There appears to be a clear pattern where smaller entities achieve a smaller gain in efficiency than larger entities.
- Companies serving less than about 800,000 people (not connections!) have done much less well they only managed to close between 10% and 50% of what the best performing larger companies have been able to realise.

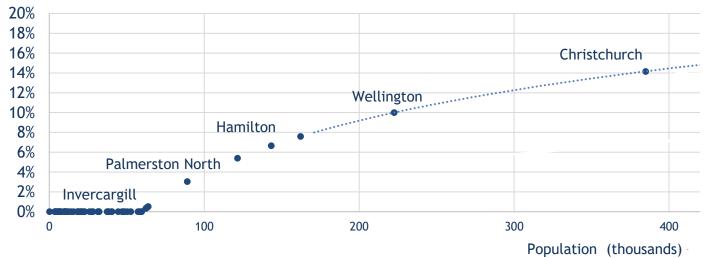


Improvements in companies' efficiency position over the period from 1994-1996

Given their scale New Zealand councils appear to have limited scope for improving their relative operating efficiency position...



- This scale modelling suggests that even reasonable sized councils will find it very difficult to manage a quickly increasing investment programme. Their costs could be expected to increase further.
- Only 11 Councils receive any efficiency challenge, irrespective of their currently observed level of operating expenditure.



Scope for improving companies' relative expenditure

For the individual council scenarios, WICS applies two adjustments - one adjustment for council size...



- The observed experience from Great Britain demonstrates that only entities of a scale of more than 60,000 connected citizens could be expected to achieve any reductions in operating costs, even if they were subjected to robust governance and regulatory frameworks.
- Of those councils of more than 60,000 connected citizens, only Watercare is of a scale comparable to even the smallest of the three water entities in Great Britain.
- As such, WICS has adjusted the assessed efficiency gap for each council serving more than 60,000 citizens based on their population served relative to that of Watercare.

Council Area	LGNZ classification	Population served (thous)	Log of population	Assessed catch-up based on observed experience
Auckland	Metro	1,758	7.47	100%
Christchurch	Metro	385	5.95	55%
Wellington City	Metro	223	5.41	39%
Hamilton	Metro	162	5.09	30%
Tauranga	Metro	143	4.97	26%
Dunedin	Metro	121	4.80	21%
Palmerston North	Metro	89	4.49	12%
New Plymouth	Provincial	64	4.16	2%
Hastings	Provincial	64	4.15	2%
Upper Hutt	Metro	63	4.14	2%
Rotorua Lakes	Provincial	62	4.13	1%
All other Councils		<60	4.1	0%

The second adjustment relates to the gains that could be expected in the absence of economic regulation and an effective financing and governance framework...



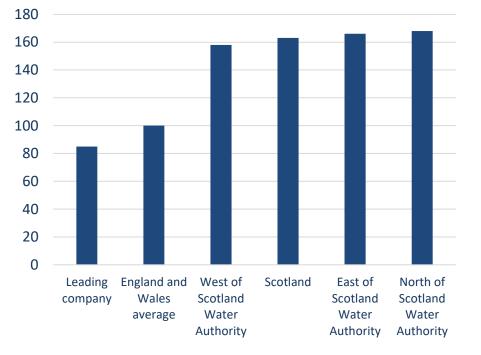
- WICS has sought to factor the absence of economic regulation, strong corporate governance and clear policy focus into its modelling.
- The scope for efficiency requires WICS also to make an adjustment for relative levels of service.
- Through the RFI process, WICS has tested the extent of the efficiency gap that the larger councils consider that they could close in the absence of reform. The answers ranged from 0% to 20%.
- Accordingly, and to be conservative, WICS has modelled Council outcomes on the basis that all individual councils of sufficient size could achieve the full 20% suggested by the most ambitious current Three Waters operator.
- This table summarises the adjustments for the efficiency challenge included in modelling the net present cost of Councils' cashflows given the investment challenge.

Council Area	LGNZ classification	Council size adjustment	Scenario 1: 20% of adjusted gap
Auckland	Metro	100%	20%
Christchurch	Metro	55%	11%
Wellington City	Metro	39 %	8%
Hamilton	Metro	30%	6%
Tauranga	Metro	26%	5%
Dunedin	Metro	21%	4%
Palmerston North	Metro	12%	2%
New Plymouth	Provincial	2%	<1%
Hastings	Provincial	2%	<1%
Upper Hutt	Metro	2%	<1%
Rotorua Lakes	Provincial	1%	<1%
All other Councils		0%	0%

When Scottish Water was formed, it was very inefficient when compared to the privatised companies in England and Wales...

- In 1999, WICS estimated that charges would have to be twice as high in the North of Scotland Water Authority as in the other two areas. History tells us that this estimate was very optimistic. Assuming efficiencies had been achieved, charges would have been almost four times higher! Confirmed optimism bias...
- The Scottish Government could not accept such charge differentials and opted to merge the three authorities to create Scottish Water. Scottish Water currently serves 5.2 million customers.
- The Scottish water industry's relative position in operating expenditure was poor back in 2002. It lagged 40% (against the average) and 50% (against the leader) behind the private sector companies in England.
- The efficiency gap with England and Wales was greater because this assessment covers only costs, not levels of service.

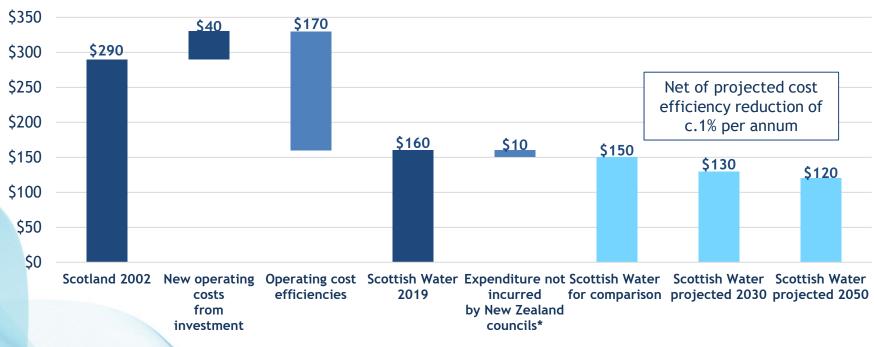
Relative operating cost efficiency in 2002 (England and Wales average efficiency rebased to 100)





Whilst the conclusions of the modelling can be unpleasant to hear, experience suggests that the modelling does provide an accurate mirror as to current performance. Scottish Water has subsequently reduced its operating costs by over 50% (and improved levels of service)...





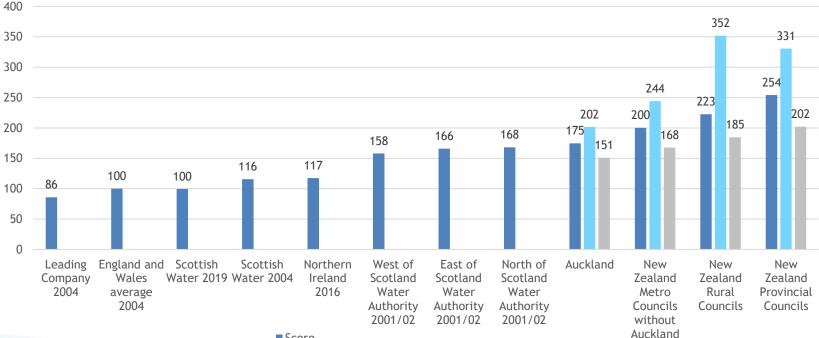
Scottish Water's operating costs (in 2019 prices)

* Includes cost of regulation and the cost of additional sampling.

The Three Waters Industry in New Zealand is in a broadly similar position as Scotland in 2002...



Relative operating cost efficiency (pre-special factor adjustment)



Score

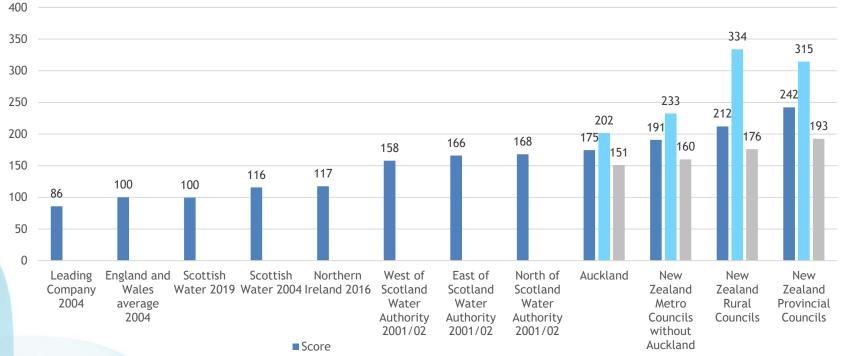
Maximum possible score based on the confidence grade

■ Minimum possible score based on the confidence grade

The Three Waters Industry in New Zealand is in a broadly similar position as Scotland in 2002...



Relative operating cost efficiency (post-special factor adjustment)

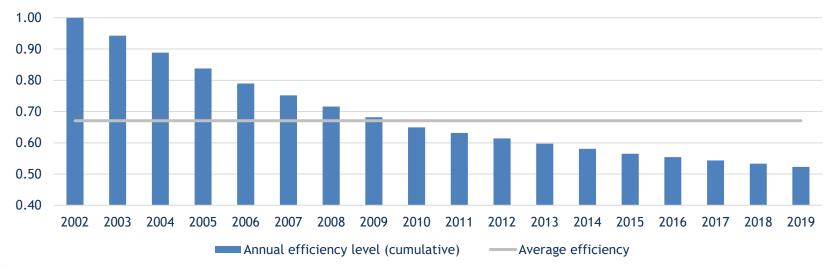


Maximum possible score based on the confidence gradeMinimum possible score based on the confidence grade

Scottish Water's investment unit costs are now over 45% lower than in 2002. Moreover, Scottish Water has committed to achieving an annual 0.75% real improvement in capital expenditure unit costs each year until 2040 - as such, costs will have reduced by 52% over 30 years...



Scottish Water investment unit cost efficiency (unit cost efficiency in 2002 rebased to 1)



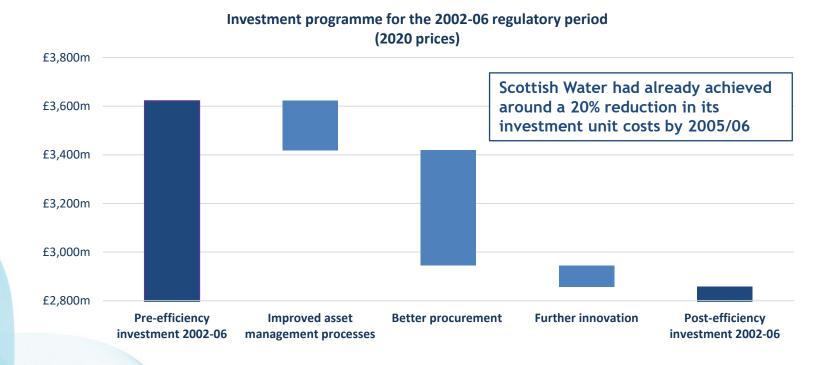
WICS has taken a necessarily high level approach to assessing the scope for capital expenditure efficiency...



- WICS has shown how the water industry in Scotland has improved its unit cost capital expenditure efficiency substantially over the last twenty years. Scottish Water's unit costs are now some 50% lower than in 2002 or around 30% on average over the period. This is broadly similar to the operating cost reductions that Scottish Water has achieved since 2002.
- In WICS' view, the improvement in capital expenditure efficiency is a function of several factors:
 - Economy of scale
 - Clarity of policy priority
 - Robust water quality and environmental regulation
 - Economic regulation and
 - Excellence in management.
- The first four of these factors are not currently in place in New Zealand. As such, WICS would suggest that it is reasonable to assume that the New Zealand industry's current capital expenditure efficiency performance is unlikely to be any better than that in Scotland in 2002 when Scottish Water was established.
- This has had two implications for our analysis of the Three Waters in New Zealand. WICS had to ensure that:
 - The modelled capital expenditure requirement had to reflect the improvement that was likely to be required; and
 - WICS had to judge how quickly the gap should be narrowed.
- WICS' modelling of required investment reflects the observed efficiency improvement of the Scottish water industry in terms of its unit capital expenditure. It seems reasonable to expect a reformed three waters industry in New Zealand to match the efficiency improvement of the industry in Scotland and by the water and sewerage companies in England and Wales. As such, the efficiency improvement required is the cost and quality differential in unit capital costs between what WICS estimates is currently achieved in New Zealand and what has been achieved in the UK.
- WICS has modelled scenarios where New Zealand matches the timescale of the observed improvement in the UK. This improvement is modelled from 2025. Councils, where of sufficient scale, receive a proportionate share of the potential scope for efficiency identified. Councils report a continuing pressure on capital expenditure inflation. WICS has capped the impact of capital expenditure inflation on Councils at 1% per annum. Amalgamated entities are expected to absorb this additional inflationary pressure.

The Steering Committee may be interested in how this capital expenditure efficiency began to be realized in Scotland. Looking back at the 2002-06 regulatory control period...





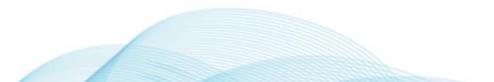
WICS has used standard regulatory practice to establish scenarios for considering amalgamation options...



- There appears to be no obvious reason why well managed and governed New Zealand entities could not match the performance of the British companies. Economy wide productivity in New Zealand is broadly comparable to Scotland.
- In considering the potential for operating cost reduction under the amalgamation scenarios, WICS has drawn on the function showing the operating cost reductions achieved by UK companies with similar potential economies of scale and scope:
 - Entities serving more than 800,000 connected citizens are required to close the full efficiency gap;
 - Entities serving between 60,000 and 800,000 connected citizens are required to close a pro-rata adjusted efficiency gap (based on a log function to account for economies of scale)
 - Entities serving fewer than 60,000 connected citizens receive are considered unable to close the assessed efficiency gap.
- WICS applies the operating cost reduction challenge from 2025 onwards. In line with regulatory precedent in Great Britain, WICS models that amalgamated entities close 60% of the

assessed efficiency gap in the first five-year period, 60% of the remaining efficiency gap in the next five-year period and close the remaining efficiency gap in the following five-year period. This means that the full efficiency gap is closed by 2040. In Scotland, the gap was closed in 8 years.

- In addition, and in line with regulatory precedent, WICS assumes that entities improve at a rate of 50% of New Zealand wide total factor productivity. This results in an ongoing total factor productivity challenge of 0.4% per annum.
- The scope for cost reduction will, however, require a commitment to a full package of reform: investment; financial freedoms, clarity in objective setting, empowered regulation and incentivised management.
- They also require management to face a 'hard budget constraint' and not have an easy 'out' from the scrutiny and pressure of both quality and economic regulation.



The aggregation of water services can deliver significant cost reductions. But do not confuse cost reductions with less jobs...



- Operational cost reductions came about through the integration of offices, support services and reduced employment costs.
- Each of the three waters entities in the UK have adopted slightly different operational models, organisational structures and approaches.
 - Some companies have pursued greater inter-connection (Wessex, Anglian, Yorkshire);
 - Others have sought deep partnership agreements with their supply chain, aligning capital and operating outcomes (Yorkshire, Welsh);
 - Scottish Water has invested in extensive and sophisticated telemetry.
- Capital investment efficiencies were achieved through consistency of work, economies of scale, and improved procurement processes, which delivered savings on input prices for power, materials, consumables and other contracted services.
 - Certainty of workflow has allowed the supply chain both to invest and reduce unit costs.
 - There has been a genuine commitment to benefit sharing and sharing the risks of innovative approaches.

- There have been both capital and operational savings achieved through asset rationalisation.
- Scottish Water has managed to retain and reward the highest quality staff, attracting talented senior management and building the required capabilities (for example on strategic asset management and water modelling). This has, in turn, allowed it to achieve additional capital investment efficiencies through improved asset planning and strategic asset management.
- In Scotland, Scottish Water's headcount has reduced by c.2,500 since 2002, BUT total direct employment across the Three Waters industry (Scottish Water and its supply chain) has increased - an estimated net increase of c.4,000 jobs. Operational jobs are still based in the communities that Scottish Water serves.
- It seems likely that, New Zealand could experience something similar.
- **BUT**, at the risk of repeating the point: effective reform is a package deal. It is strictly the set menu.



WICS has set out its analysis in four parts...



- Introduction
- Investment requirements
- Scope for efficiency
- The potential impact of aggregation
- Conclusions



WICS has calculated the net present cost per connected citizen per year of Councils on a stand-alone basis...



LGNZ classification	Net Present Cost of provisional LTP	Net Present Cost of provisional LTP to reflect J Tables		Cost of modelled ed citizen per ye		Net Present Cost of modelled sensitivity level of investment (Real terms)		
			Low	High	% Change on current LTP	Low	High	% Change on current LTP
Auckland	\$770	\$830	\$850	\$1,020	10%-30%	\$720	\$850	-5% to +10%
Other Metro	\$780	\$950	\$1,260	\$1,530	60%-100%	\$1,070	\$1,270	40%-60%
Provincial	\$870	\$1,000	\$2,060	\$2,300	140%-160%	\$1,680	\$1,860	90%-110%
Larger Rural	\$1,170	\$1,260	\$3,910	\$4,060	230%-250%	\$3,090	\$3,210	160%-170%
Smaller Rural	\$900	\$990	\$3,740	\$3,820	315%-325%*	\$2,960	\$3,030	230%-240%

*There is only a small range between low and high due to the cap on enhancement and growth investment per connected citizen applying to most Smaller Rural councils.

The modelled impact on average household charges even in current dollars could be very significant...



LGNZ classification	Current Average Household Bill	Average Househo	ld Bill in 2051 (I	Real Prices)**	Average Household Bill in 2051 if sensitivity level (-25%) of investment is modelled (Real Prices)			
		Low	High	% Change in real terms***	Low	High	% Change in real terms***	
Auckland	\$1,060	\$1,700	\$2,100	60%-100%	\$1,400	\$1,700	30%-60%	
Other Metro	\$1,030	\$2,800	\$3,500	170%-240%	\$2,300	\$2,750	125%-165%	
Provincial	\$1,210	\$4,600	\$5,100	280%-320%	\$3,550	\$3,950	190%-225%	
Larger Rural	\$1,390	\$9,200	\$9,500	560%-585%	\$6,850	\$7,050	390%-405%	
Smaller Rural	\$1,260	\$8,850	\$8,900	Around 600%*	\$6,600	\$6,600	Around 425%	

*There is only a small range between low and high due to the cap on enhancement and growth investment per connected citizen applying to most Smaller Rural councils.

** Dollar amounts are rounded to the nearest NZ\$50.

*** Percentages are rounded to the nearest 5%.

WICS has run twenty-nine amalgamation scenarios that range from 13 entities to one entity. WICS provides an example of each...



- Thirteen entities: 8 on North Island and 5 on South Island
- Eight entities: 6 on North Island and 2 on South Island
- Five entities: Waka Kotahi (3 on North Island, 1 on South Island and 1 straddling the islands)
- Four entities: Latitudinal Split Extended Catchment B (2 on North Island, 1 on South Island and 1 straddling the islands)
- Three entities: Hauraki approach (2 on North Island and 1 serving Wellington region and the South Island)
- **Two entities: Islands Separate** (one serving the North Island and one serving the South Island)
- One entity: serving the whole of New Zealand

In each scenario, WICS presents:

- Size of entity in terms of population served
- Net Present Cost (NPC) of future expenditure under the amalgamation scenario
- Estimated current average household bill under the amalgamation scenario
- Projected 2050 average household bill under the amalgamation scenario
- The projected bill change in real terms between now and 2050 under the amalgamation scenario
- Any Councils with an increased NPC under amalgamation, and the projected impact of amalgamation on 2051 bills for these Councils.

The results from the thirteen entity scenario (8 on North Island and 5 on South Island)...

Entity*	Population served	NPC per connected citizen per year	Estimated Average Household Bill: Current	Projected Average Household Bill: 2051**	Price change in real terms	Average bill as a percentage of the lowest bill in the scenario	Councils with a higher NPC through amalgamation***	Comparison of average household bills in 2051****
А		\$2,110	\$1,700	\$3,760	121%	495%	Whangarei	Whangarei: 6% lower under amalgamation
В	1,629,000	\$540	\$1,060	\$760	-28%	100%	None	Not applicable
C		\$1,060	\$1,410	\$1,660	1 8 %	218%	None	Not applicable
D		\$990	\$1,320	\$1,610	22%	212%		Kawerau: 34% lower under amalgamation
E		\$1,510	\$830	\$2,870	246%	378%		Napier: 14% higher under amalgamation
F	90,140	\$1,630	\$1,160	\$3,030	161%	399%	New Plymouth	New Plymouth: 12% lower under amalgamation
G		\$1,250	\$860	\$2,090	143%	275%	None	Not applicable
Н		\$750	\$930	\$1,190	28%	157%	None	Not applicable
1		\$1,730	\$1,480	\$2,790	89 %	367%		Nelson: 19% higher under amalgamation
J		\$3,750	\$1,540	\$7,890	412%	1038%	None	Not applicable
K		\$900	\$990	\$1,430	44%	188%	None	Not applicable
L		\$2,010	\$1,260	\$3,340	165%	439%	None	Not applicable
М	68,608	\$2,150	\$1,010	\$4,440	340%	584%	Invercargill	Invercargill: 16% lower under amalgamation





*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a higher NPC through amalgamation. **Real prices (current dollars)

***Higher NPC through amalgamation or the Council NPC is within \$50 of the NPC of the amalgamated entity.

**** Council worse off under this scenario.

Comparing the Net Present Cost and average household bills postamalgamation to councils on a stand-alone basis...



13 Ent	ity Scenario	average of cour	ncils (weighted ncils within each ouping)**	Post-amal	gamation**	Difference	e (NZ\$)**	Differe	nce (%)
Entity*	Population served	Net Present Cost (NPC) per connected citizen per year	Projected Average Household Bill: 2051	NPC per connected citizen per year	Projected Average Household Bill: 2051	NPC per connected citizen per year	Projected Average Household Bill: 2051	NPC per connected citizen per year	Projected Average Household Bill: 2051
А	96,853	\$2,790	\$6,500	\$2,110	\$3,760	-\$680	-\$2,740	-24%	-42%
В	1,629,000	\$930	\$1,910	\$540	\$760	-\$390	-\$1,150	-42%	-60%
С	364,799	\$1,820	\$4,260	\$1,060	\$1,660	-\$760	-\$2,600	-42%	-61%
D	276,769	\$1,630	\$3,660	\$990	\$1,610	-\$640	-\$2,050	-39%	-56%
E	173,606	\$2,310	\$5,630	\$1,510	\$2,870	-\$800	-\$2,760	-35%	-49%
F	90,140	\$2,100	\$5,090	\$1,630	\$3,030	-\$470	-\$2,060	-22%	-40%
G	216,782	\$1,990	\$4,850	\$1,250	\$2,090	-\$740	-\$2,760	-37%	-57%
Н	516,518	\$1,210	\$2,690	\$750	\$1,190	-\$460	-\$1,500	-38%	-56%
1		\$2,400	\$4,700	\$1,730	\$2,790	-\$670	-\$1,910	-28%	-41%
J	22,612	\$4,530	\$11,530	\$3,750	\$7,890	-\$780	-\$3,640	-17%	-32%
K	584,922	\$1,650	\$3,930	\$900	\$1,430	-\$750	-\$2,500	-45%	-64%
L		\$2,990	\$6,740	\$2,010	\$3,340	-\$980	-\$3,400	-33%	-50%
м	68,608	\$2,650	\$6,610	\$2,150	\$4,440	-\$500	-\$2,170	-19%	-33%
Weighted average	4,344,966	\$1,500	\$3,400	\$940	\$1,520	-\$560	-\$1,880	-37%	-55%



*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a higher NPC through amalgamation. **Real prices (current dollars). Rounded to the nearest NZ\$10.

The results from the eight entity scenario (6 on North Island and 2 on South Island)...

Entity*	Population served	NPC per connected citizen per year	Estimated Average Household Bill: Current	Projected Average Household Bill: 2051**	Price change in real terms	percentage of the lowest bill	Councils with a higher NPC through amalgamation***	Comparison of average household bills in 2051****
А	1,725,853	\$580	\$1,100	\$800	-27%	100%	None	Not applicable
		\$1,060	\$1,410	\$1,660	18%	208%	None	Not applicable
		\$990	\$1,320	\$1,610	22%	201%	Kawerau	Kawerau: 34% lower under amalgamation
		\$1,510	\$830	\$2,870	246%	359%	Napier	Napier: 14% higher under amalgamation
E	306,922	\$1,190	\$950	\$1,970	107%	246%	None	Not applicable
	516,518	\$750	\$930	\$1,190	28%	149%	None	Not applicable
G	723,682	\$950	\$1,080	\$1,420	31%	178%	None	Not applicable
Н	256,817	\$1,820	\$1,190	\$3,120	162%	390 %	None	Not applicable

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*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a higher NPC through amalgamation.

**Real prices (current dollars)

Higher NPC through amalgamation or the Council NPC is within \$50 of the NPC of the amalgamated entity. *Council worse off under this scenario.



Comparing the Net Present Cost and average household bills postamalgamation to councils on a stand-alone basis...



8 Enti	ity Scenario	of councils wit	(weighted average hin each entity ping)**		gamation**	Difference	e (NZ\$)**	Differe	nce (%)
Entity*	Population served	Net Present Cost (NPC) per connected citizen per year	Projected Average Household Bill: 2051	NPC per connected citizen per year	Projected Average Household Bill: 2051	NPC per connected citizen per year	Projected Average Household Bill: 2051	NPC per connected citizen per year	Projected Average Household Bill: 2051
Α	1,725,853	\$1,060	\$2,170	\$580	\$800	-\$480	-\$1,370	-45%	-63%
В	364,799	\$1,820	\$4,260	\$1,060	\$1,660	-\$760	-\$2,600	-42%	-61%
С		\$1,630	\$3,660	\$990	\$1,610	-\$640	-\$2,050	-39%	-56%
D		\$2,310	\$5,630	\$1,510	\$2,870	-\$800	-\$2,760	-35%	-49%
E	306,922	\$2,030	\$4,920	\$1,190	\$1,970	-\$840	-\$2,950	-41%	-60%
F	516,518	\$1,210	\$2,690	\$750	\$1,190	-\$460	-\$1,500	-38%	-56%
G	723,682	\$1,860	\$4,290	\$950	\$1,420	-\$910	-\$2,870	-49%	-67%
Н	256,817	\$2,910	\$6,700	\$1,820	\$3,120	-\$1,090	-\$3,580	-37%	-53%
Weighted average	4,344,966	\$1,500	\$3,400	\$870	\$1,350	-\$630	-\$2,050	-42%	-60%



*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a higher NPC through amalgamation.

**Real prices (current dollars). Rounded to the nearest NZ\$10.

The results from a five entity scenario (Waka Kotahi: 3 entities on North Island, 1 on South Island and 1 straddling the islands)...



Entity*	Population served	NPC per connected citizen per year	Household	Projected Average Household Bill: 2051**	real terms	of the	through amalgamation***	Comparison of average household bills in 2051
А	1,725,853	\$580	\$1,100	\$800	-27%	100%	None	Not applicable
В		\$880	\$1,370	\$1,230	-10%	154%	None	Not applicable
С	484,925	\$1,130	\$910	\$1,800	98%	225%	Napier	Napier: 29% lower under amalgamation
D		\$810	\$1,030	\$1,210	17%	151%	None	Not applicable
Е	864,350	\$1,060	\$1,060	\$1,650	56%	206%	None	Not applicable

*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a higher NPC through amalgamation.

**Real prices (current dollars)

***Higher NPC through amalgamation or the Council NPC is within \$50 of the NPC of the amalgamated entity.



Comparing the Net Present Cost and average household bills postamalgamation to councils on a stand-alone basis...



	tahi: 5 Entity enario		weighted average of h entity grouping)**	Post-amal	gamation**	Difference	(NZ\$)**	Differe	nce (%)
Entity*	Population served	Net Present Cost (NPC) per connected citizen per year	Projected Average Household Bill: 2051	NPC per connected citizen per year	Projected Average Household Bill: 2051	NPC per connected citizen per year	Projected Average Household Bill: 2051	NPC per connected citizen per year	Projected Average Household Bill: 2051
А	1,725,853	\$1,060	\$2,170	\$580	\$800	-\$480	-\$1,370	-45%	-63%
В	637,172	\$1,720	\$3,960	\$880	\$1,230	-\$840	-\$2,730	-49%	- 69 %
С		\$2,150	\$5,220	\$1,130	\$1,800	-\$1,020	-\$3,420	-47%	-66%
D		\$1,450	\$3,060	\$810	\$1,210	-\$640	-\$1,850	-44%	-60%
E	864,350	\$2,090	\$4,950	\$1,060	\$1,650	-\$1,030	-\$3,300	-49%	-67%
Weighted average	4,344,966	\$1,500	\$3,400	\$800	\$1,180	-\$700	-\$2,220	-47%	-65%

*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a higher NPC through amalgamation.

**Real prices (current dollars). Rounded to the nearest NZ\$10.



The results from a four entity scenario (Latitudinal Split Extended Catchment B: 2 entities on North Island, 1 on South Island, and 1 straddling the islands)...

NPC per Estimated Average bill as a Councils with a **Projected Average** Comparison of Population Price change in percentage of the higher NPC connected Average Entity* average household Household Bill: through served citizen per Household real terms lowest bill in the 2051** bills in 2051**** amalgamation*** Bill: Current vear scenario \$580 \$800 100% Not applicable 1,725,853 \$1,100 -27% А None 799,608 \$1,320 \$1,220 Not applicable В \$890 -8% 153% None 955.354 \$840 \$960 \$1.260 31% 158% Not applicable C None 864,150 \$1,060 \$1,060 \$1,640 54% 205% Not applicable D None

*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a higher NPC through amalgamation.

**Real prices (current New Zealand dollars)

Higher NPC through amalgamation or the Council NPC is within \$50 of the NPC of the amalgamated entity. *Council worse off under this scenario.



water industry





Scer	nario 30	Individual councils (v councils within eac		Post-ama	lgamation	Differenc	e (NZ\$)	Difference (%)	
Entity*	Population served	Net Present Cost per connected citizen per year	Projected Average Household Bill: 2051**	Net Present Cost	Projected Average Household Bill: 2051**	Net Present Cost	Projected Average Household Bill: 2051**	NPC per connected citizen per year	Projected Average Household Bill: 2051
А	1,725,853	\$1,060	\$2,170	\$580	\$800	-\$480	-\$1,370	-45%	-63%
В	799,608	\$1,840	\$4,300	\$890	\$1,220	-\$950	-\$3,080	-52%	-72%
С	955,354	\$1,640	\$3,730	\$840	\$1,260	-\$800	-\$2,470	-49%	-66%
D	864,150	\$2,090	\$4,970	\$1,060	\$1,640	-\$1,030	-\$3,330	-49%	-67%
Weighted average	4,344,966	\$1,500	\$3,400	\$780	\$1,130	-\$720	-\$2,270	-48%	-67%

*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a higher NPC through amalgamation.

**Real prices (current dollars). Rounded to the nearest NZ\$10.



The results from a three entity scenario (Hauraki approach: 2 entities on North Island and 1 on South Island)...



Entity*	Population served	NPC per connected citizen per year	Estimated Average Household Bill: Current	Projected Average Household Bill: 2051**	Price change in real terms	the lowest bill in	higher NPC	Comparison of average household bills in 2051
А	1,762,746	\$600	\$1,120	\$820	-27%	100%	None	Not applicable
В	1,601,721	\$830	\$1,070	\$1,190	11%	145%	None	Not applicable
C	980,499	\$1,060	\$1,110	\$1,610	45%	196%	Nelson	Nelson: 31% lower under amalgamation

*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a higher NPC through amalgamation.

**Real prices (current dollars)

***Higher NPC through amalgamation or the Council NPC is within \$50 of the NPC of the amalgamated entity.







Hauraki Approach: 3 Entity Scenario		Individual councils (weighted average of councils within each entity grouping)**		Post-amalgamation**		Difference	• (NZ\$)**	Difference (%)	
Entity*	Population served	(NPC) per connected Household		NPC per Projected Avi connected citizen Household I per year 2051**		NPC per connected citizen per year	Projected Average Household Bill: 2051	NPC per connected citizen per year	Projected Average Household Bill: 2051
А	1,762,746	\$1,090	\$2,230	\$600	\$820	-\$490	-\$1,410	-45%	-63%
В	1,601,721	\$1,660	\$3,900	\$830	\$1,190	-\$830	-\$2,710	-50%	- 69 %
C	980,499	\$2,130	\$4,920	\$1,060	\$1,610	-\$1,070	-\$3,310	-50%	-67%
Weighted average	4,344,966	\$1,500	\$3,400	\$780	\$1,120	-\$720	-\$2,280	-48%	- 67 %

*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a higher NPC through amalgamation.

**Real prices (current dollars). Rounded to the nearest NZ\$10.



The results from a two entity scenario (one entity serving North Island and the other serving South Island)...

Entity*	Population served	NPC per connected citizen per year	Estimated Average Household Bill: Current	Projected Average Household Bill: 2051**	Price change in real terms	percentage of the lowest bill	Councils with a higher NPC through amalgamation***	Comparison of average household bills in 2051
А	3,364,467	\$710	\$1,100	\$950	-14%	100%	None	Not applicable
В	980,499	\$1,060	\$1,110	\$1,610	45%	169%	Nelson	Nelson: 31% lower under amalgamation

*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a higher NPC through amalgamation.

**Real prices (current dollars)

***Higher NPC through amalgamation or the Council NPC is within \$50 of the NPC of the amalgamated entity.









	ds Separate: 2 Approach	Individual councils (weighted average of councils within each entity grouping)**		Post-amalgamation**		Difference (NZ\$)**		Difference (%)	
Entity*	Population served	n Net Present Cost Projected Average (NPC) per connected Household Bill: citizen per year 2051		NPC per Projected Average connected citizen Household Bill: per year 2051		NPC per connected citizen per year	Projected Average Household Bill: 2051	NPC per connected citizen per year	Projected Average Household Bill: 2051
А	3,364,467	\$1,350	\$3,030	\$710	\$950	-\$640	-\$2,080	-47%	- 69 %
В	980,499	\$2,130	\$4,920	\$1,060	\$1,610	-\$1,070	-\$3,310	-50%	-67%
Weighted average	4,344,966	\$1,500	\$3,450	\$780	\$1,090	-\$720	-\$2,360	-48%	-68%

*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a higher NPC through amalgamation.

**Real prices (current dollars). Rounded to the nearest NZ\$10.



The results from one entity serving the whole of New Zealand...



Entity*	Population served	NPC per connected citizen per year	Household	Projected		Average bill as a percentage of the lowest bill in the scenario	higher NPC	average household bills
А	4,344,966	\$780	\$1,100	\$1,110	1%	100%	None	Not applicable

*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a higher NPC through amalgamation.

**Real prices (current dollars)

***Higher NPC through amalgamation or the Council NPC is within \$50 of the NPC of the amalgamated entity.



Comparing the Net Present Cost and average household bills post-amalgamation to councils on a stand-alone basis...



One entity across New Zealand		Individual councils (v councils within each		Post-amal	gamation**	Difference	≘ (NZ\$)**	Difference (%)	
Entity*	Population served	' (NPC) per connected Household Bill'		NPC per Projected Average connected citizen Household Bill: per year 2051		connected Average		NPC per connected Average citizen per year Bill: 2051	
Α	5,643,859	\$1,500	\$3,400	\$780	\$1,110	-\$720	-\$2,290	-48%	-67%

*Coloured red if the entity has fewer than 800,000 connected citizens, or the entity contains a council with a high through amalgamation.

**Real prices (current dollars). Rounded to the nearest NZ\$10.



WICS has set out its analysis in four parts...



- Introduction
- Investment requirements
- Scope for efficiency
- The potential impact of aggregation
- Conclusions



WICS analysed the information provided by the Councils in response to the Request for Information in some detail...



- WICS would like to recognise the efforts of Council staff in completing the request for information. This was done to a generally good standard and in a very limited time (13 compared to the normal 22-24 weeks).
- The information provided confirms that collectively Councils are investing less in ensuring the sustainability of the Three Waters than they should. Despite adverse ground conditions and seismic activity New Zealand Councils report expected asset lives that are longer than Australian and British benchmarks.
- New Zealand faces a significant investment challenge. Councils can already identify over NZ\$50 Billion of enhancement and growth expenditure. Even within this significant uplift relative to recent investment expenditure, there is evidence of an optimism bias in the reports by Councils.
- Benchmarking suggests that around NZ\$60 100 Billion is likely to be required to improve levels of service, compliance and respond to growth. Growth is expected to be at double the level observed in Great Britain.
- There is considerable scope for efficiency across the Three Waters in New Zealand. In finalising its benchmarking, WICS has taken account of the special factor submissions of Councils. It has adjusted for the material factors affecting New Zealand councils including extreme rurality and location, additional costs of engaging with Iwi communities, seismic resilience and high tourist population. The adjustment is three times higher than was allowed for in Scotland notwithstanding the lower 'on' costs of employing staff in New Zealand.

- The scope for efficiency is only likely to be realised if there is a significant consolidation of service delivery. International evidence suggests that entities that supply less than 800,000 citizens would typically struggle to realise all the potential efficiency available.
- There is no set way in which efficiencies are best realised, but partnership working and investment in asset knowledge are likely to be important. There will be more jobs across the Three Waters sector if the reform proceeds and operations will always have a base in the communities they support.
- New Zealand is in broadly the same relative efficiency position as Scotland in 2002. New Zealand's relative productivity is no worse than Scotland's was in 2002. As such, assuming similar approaches to governance and regulation and effective management, there is no obvious reason why New Zealand cannot at least match what has been achieved in Scotland.
- WICS modelling suggests that fewer entities would result in less variation in average household bills across the country.
- WICS considers that its modelling likely understates the benefits of amalgamation and a wider reform of the governance and regulation of the Three Waters sector. Experience suggests that regulated companies consistently out-perform the expectations set by their regulators.





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