

Asset Management: Optimisation vs Innovation

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Introduction

- ❖ Since the revolutionary concept of using engineering techniques to ensure that the cost of consuming assets is borne in some way by the users, what was once rocket science has become mundane
- ❖ Standard practice has taken over from innovative thinking and asset management has become simplified to a point that is probably exacerbating intergenerational inequity; the very thing that it was intended to cure
- ❖ This paper asserts that the core asset management skill is in understanding dynamics and creating new opportunities that have a positive impact for ratepayers

Introduction

- ❖ Depreciation is a substantial burden upon ratepayers and is often considered as a “fixed overhead”
- ❖ Dynamics of depreciation and renewal of any asset(s) can vary depending on:
 - asset type (technology change over time)
 - scope (individual to collective renewal programmes)
 - current replacement economics
 - future inflation
 - future demand
 - life of asset
 - demographics etc

Introduction

- ❖ The paper has been written with the assistance of Peter Hebden at New Plymouth District Council where the application of innovative thinking and creative solutions borrowed from different fields has delivered significant downward pressure on charges to ratepayers and once again wrestled asset management away from bean counting to science.

Peter runs the asset management team and is an econometrician

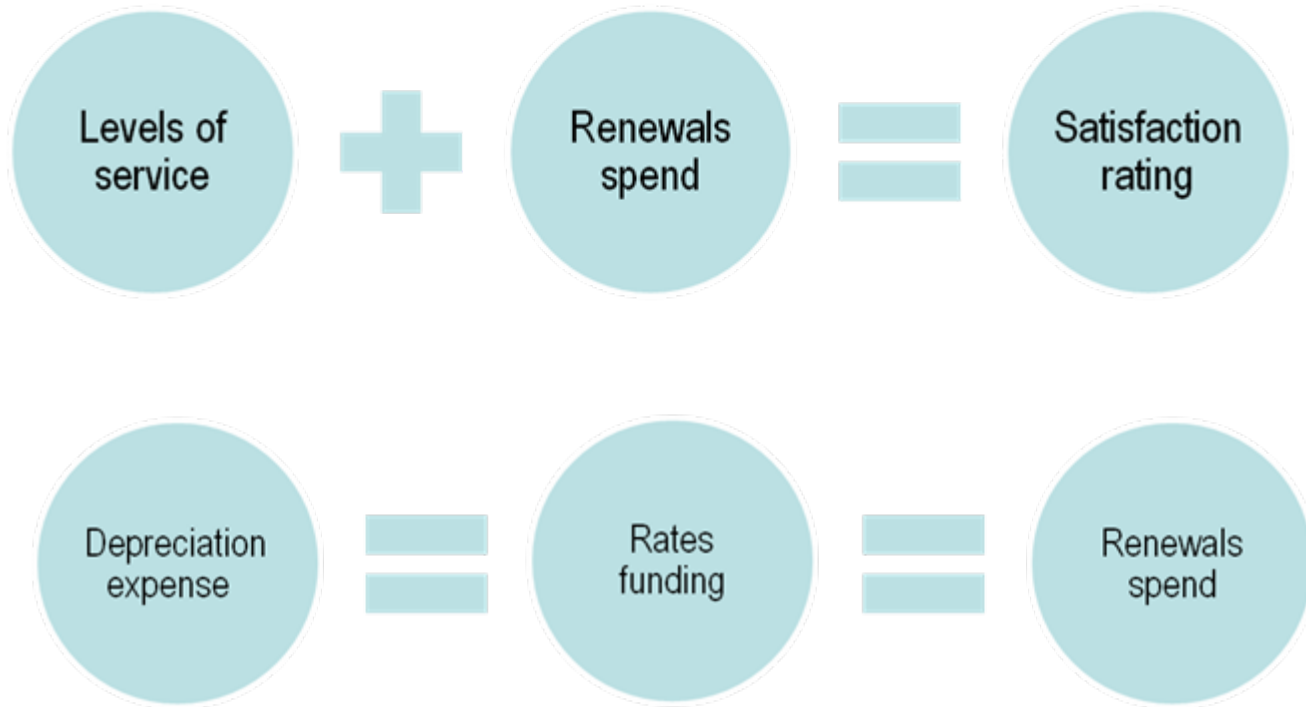


What's happening now?

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Basic Premise (Current)

Levels of Service, Depreciation and Renewals

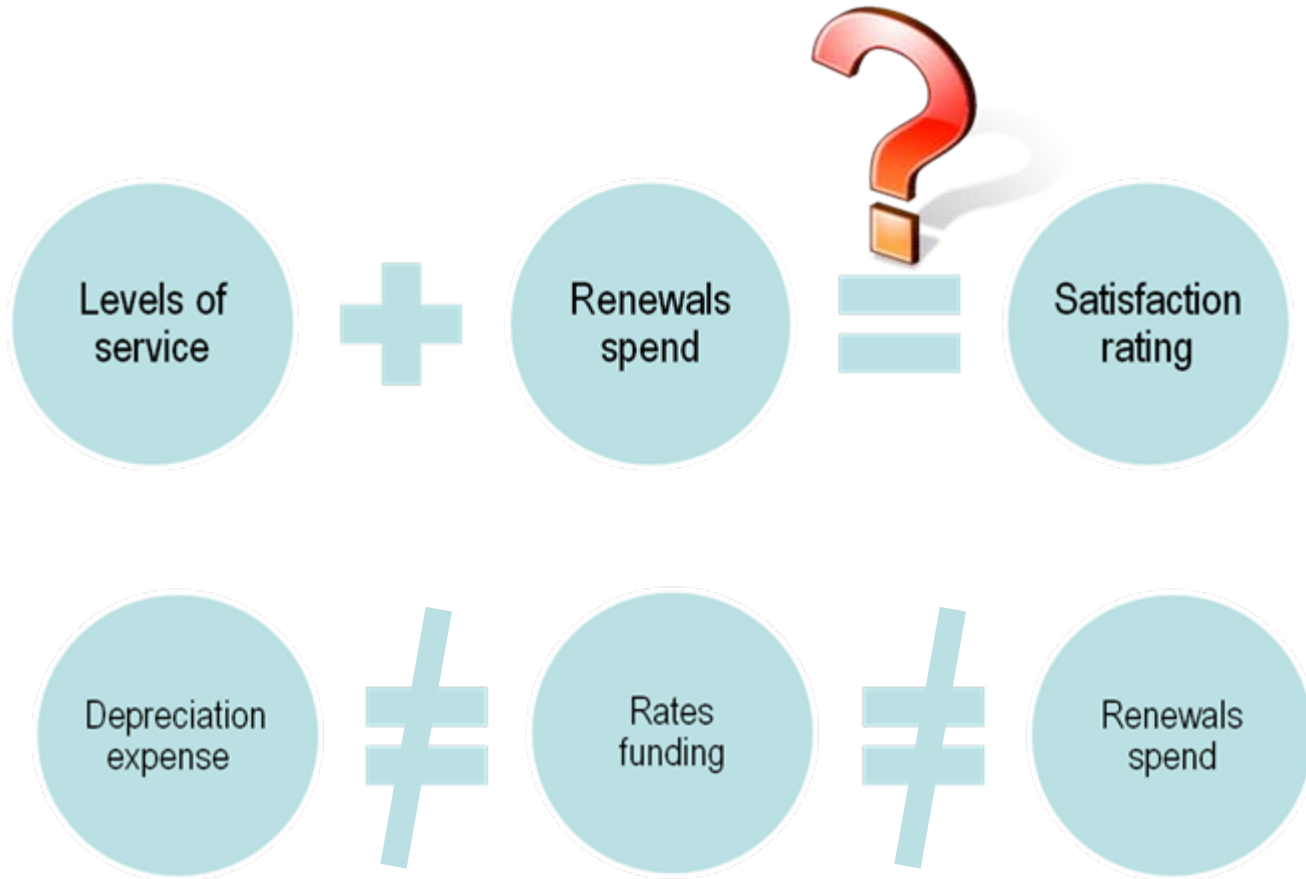


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Basic Premise (Future)

Levels of Service, Depreciation and Renewals



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Basic Premise

Levels of Service, Depreciation and Renewals

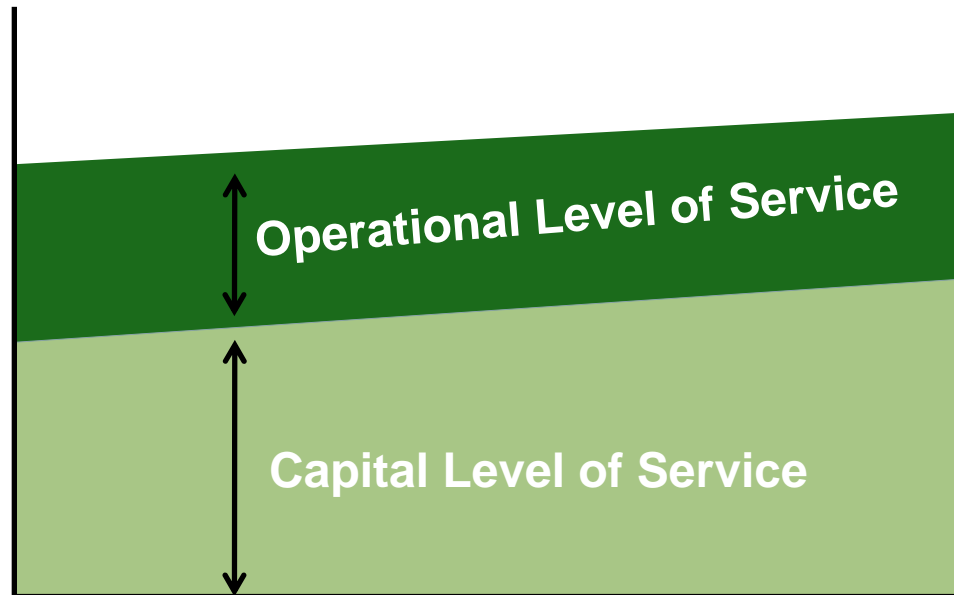
- ❖ Key element of asset management is determining the cost of operating and maintaining the asset network to provide agreed Levels of Service
- ❖ Need to account for the consumption and therefore loss in value of assets over time and to provide for the replacement of these assets to maintain Levels of Service
- ❖ Depreciation is an accounting concept that ensures the balance sheet measures consumption and loss in value of assets over time
- ❖ Renewals expenditure is the actual cost of bringing assets back to full use to provide required Levels of Service
- ❖ Currently depreciation is being used to approximate renewals expenditure and, when funded, to provide cash to fund these renewals

Optimised Depreciated Replacement Cost

- ❖ An example of how not to calculate optimised depreciated replacement cost



Levels of Service – Operational vs Capital



Levels of Service – Operational vs Capital

❖ Operational Levels of Service

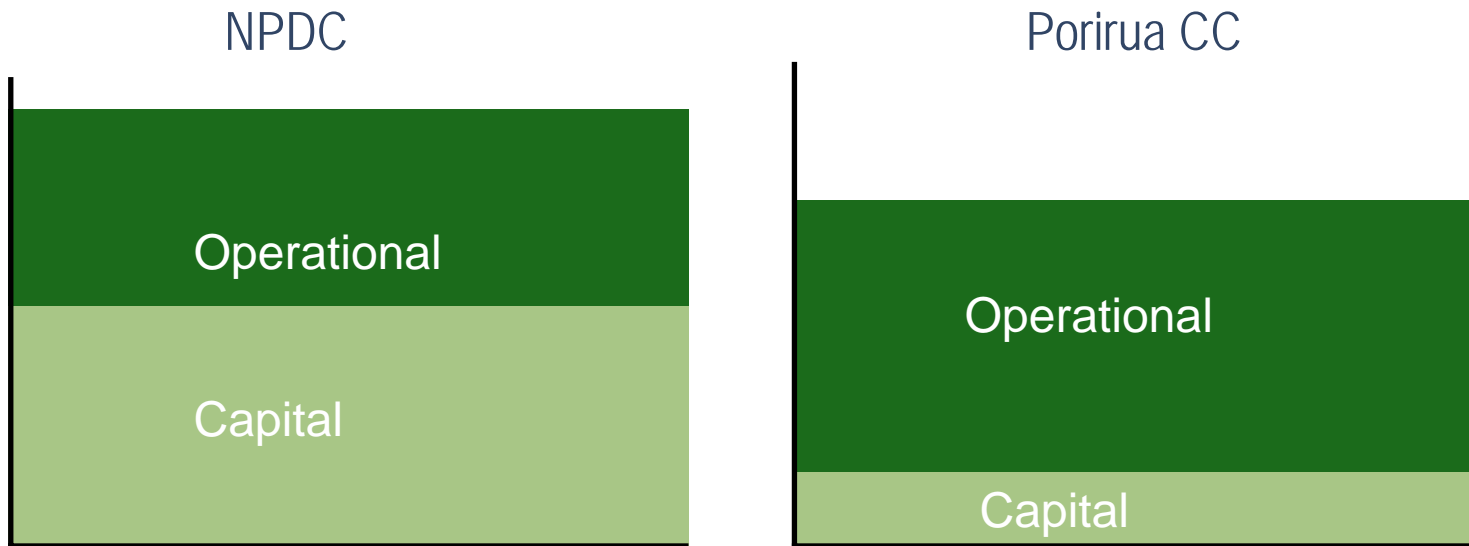
- Including operational and maintenance expenditure items
- Funded through user charges and rates
- Generally controlled by the operational manager of the service who has discretion to change these Levels of Service within certain parameters

❖ Capital Levels of Service

- Including renewals and new capital expenditure
- Funded through rates for renewals and loans or other sources for new capital works
- Usually managed by a 'projects' team divorced from the operational management and requiring specific approval before changes to Levels of Service are made

Levels of Service – Operational vs Capital

- ❖ Each Council makes choices to balance Operational and Capital Levels of Service to provide the overall agreed Level of Service
- ❖ For example:



Depreciation

- ❖ Depreciation is a device invented by accountants to ensure that an entity's balance sheet (financial position) measures the consumption and loss in value of assets over time
- ❖ Funding of depreciation essentially props up the balance sheet by injecting cash into the balance sheet that "pays for" that loss in value and so the balance sheet remains largely static over time
- ❖ This is to stop us oldies having a good time and leaving our children poorer (either in monetary or lifestyle terms)
- ❖ If depreciation is funded, essentially we're supplementing reduced value in our assets with cash
- ❖ The depreciation charge is an operational cost therefore directly affects rates if it is funded (whether 100% or partially)

Depreciation and Balance Sheet

New Asset	
Asset	100
<hr/>	
	100

Depreciated Asset	
Asset	100
- Depn	-20
<hr/>	
	80
Cash from Funded Depn	+ 20
<hr/>	
	100

Depreciation and Renewals

- ❖ What we do with the cash collected is up to the governing body
- ❖ Generally Councils think they use this cash to fund renewals of the relevant asset
- ❖ This is meant to ensure that the Levels of Service can remain consistent over time
- ❖ For Councils that use depreciation to fund renewals it is important that the calculation of the depreciation charge is not a simple accounting equation, but rather a considered forecast on what it will cost to continue to provide a consistent Level of Service while the community requires this (including at the end of life of an asset).
- ❖ And, if we're clever about this, we can finally take control of this important position from the beanies

How has this approach evolved?

Accounting	Engineering
<ul style="list-style-type: none"> ❖ Accounting method of depreciation to account for consumption of the asset has become the asset management and financial standard 	<ul style="list-style-type: none"> ❖ Engineering method of providing for renewal of the asset is to forecast the actual cost at end of life of asset (in 10 – 100 yrs) to replace it supplemented by O &M costs to keep LOS consistent
<ul style="list-style-type: none"> ❖ For no other reason than the engineers didn't sort it out before the accountants decided on the method of depreciation that assumes that when assets expire the wealth of the council does not decrease 	<ul style="list-style-type: none"> ❖ The loss of "value" or "consumption" of the asset has nothing to do with it
<ul style="list-style-type: none"> ❖ This can be a simplistic model that is unrelated to real life 	<ul style="list-style-type: none"> ❖ Got onto it too late so the accountants set the ground rules

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Core Problem

- ❖ Depreciation and renewals funding are two different concepts which are being approximated at present
- ❖ Depreciation is an accounting requirement
- ❖ Funding renewals is to ensure Levels of Service requirements are met consistently
- ❖ Therefore depreciation is a poor estimation of the cost to keep Levels of Service the same over an asset's life
- ❖ In fact the charging of depreciation should be eliminated and replaced with that mix of renewals and O & M that keep Levels of Service consistent

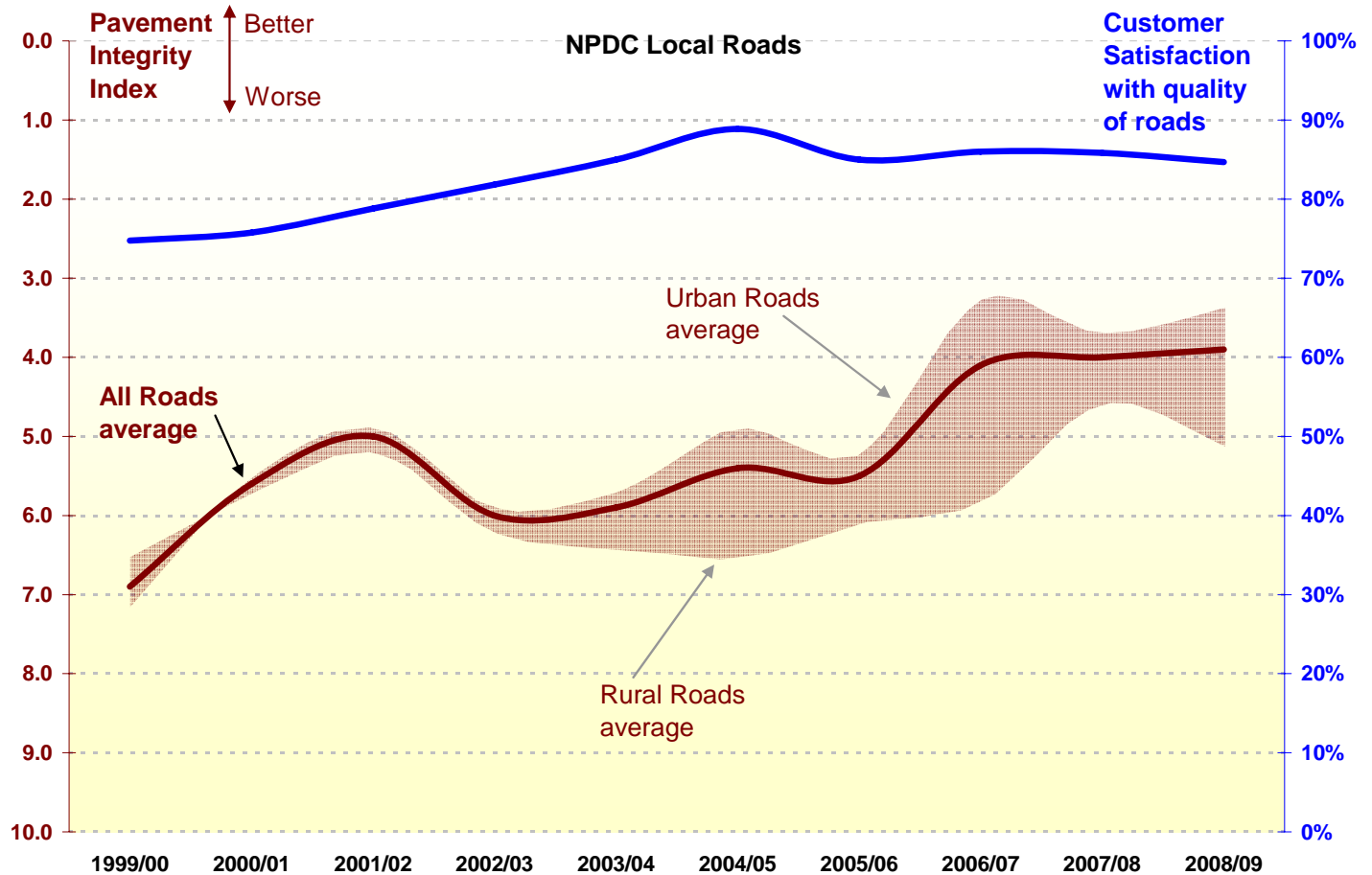
Depreciation is the wrong answer

- ❖ The major elements making up the depreciation charge are:
 - Remaining Life = original design life – age of asset, or
= condition assessed remaining life
 - Replacement Cost = today's cost (not the cost of the original installation) based on the valuation of the asset today to provide continuing **Levels of Service**
- ❖ Simple really. Too simple.
- ❖ Simple things like this can markedly affect rates as most Councillors around NZ are finding out

Levels of Service requirements

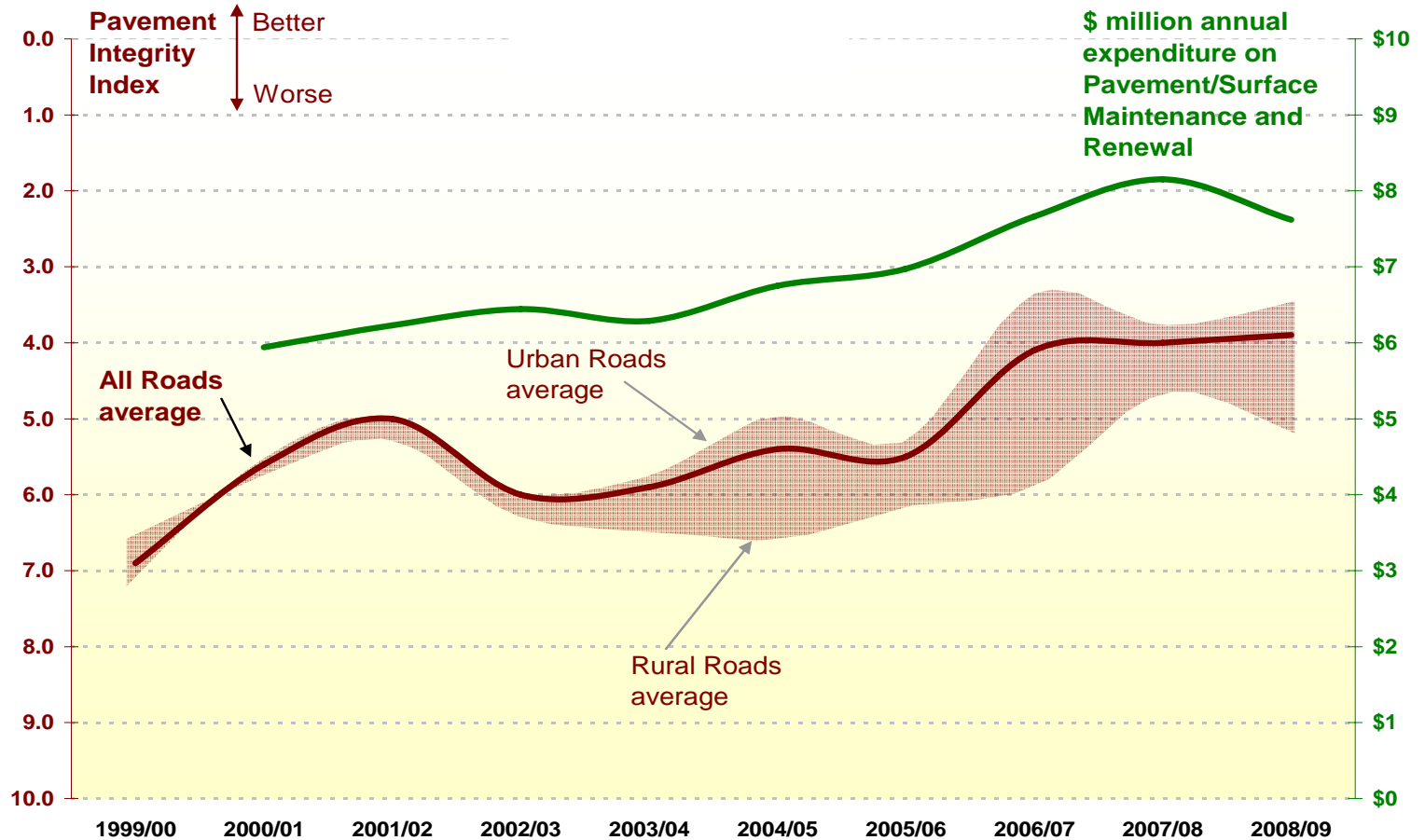
- ❖ How do we know what Level of Service we should be aiming for?
- ❖ Public satisfaction levels should be the key indicator, not solely an engineer's opinion
- ❖ However, increasing Levels of Service does not always correspond to increase in public satisfaction
- ❖ There are a number of signals from the community regarding satisfaction with Levels of Service, including:
 - Elections every three years
 - Surveys
 - Customer "enquiries"
 - Submissions to consultation

Levels of Service requirements



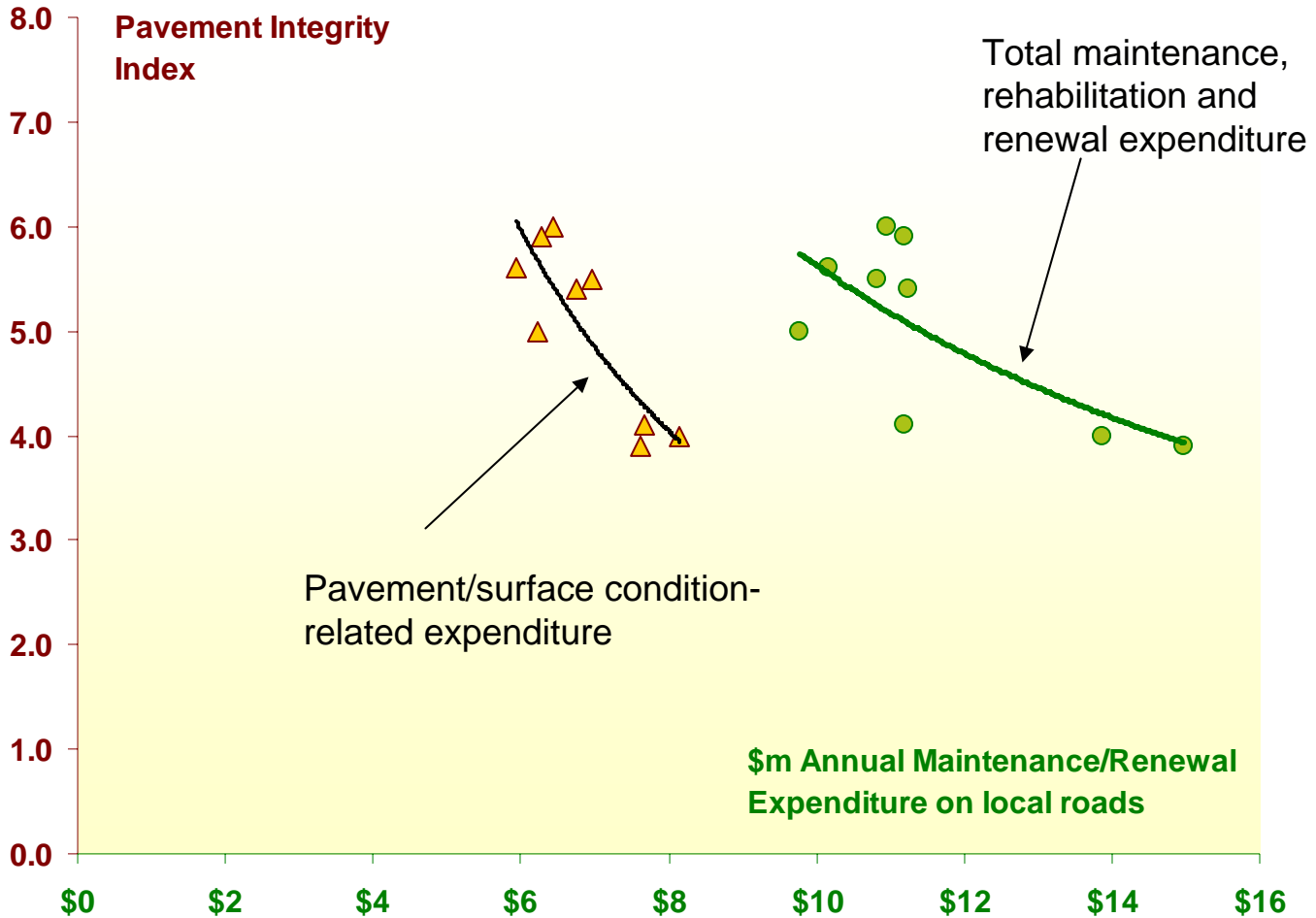
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Levels of Service requirements



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Although this relationship is not “hard-wired”.. it is ‘strong’ (“statistically significant”)



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Levels of Service changes

- ❖ Often Levels of Service change
- ❖ The problem is not usually with the Level of Service as such but with the changes, otherwise we would not have two sets of communities happy with completely different Levels of Service

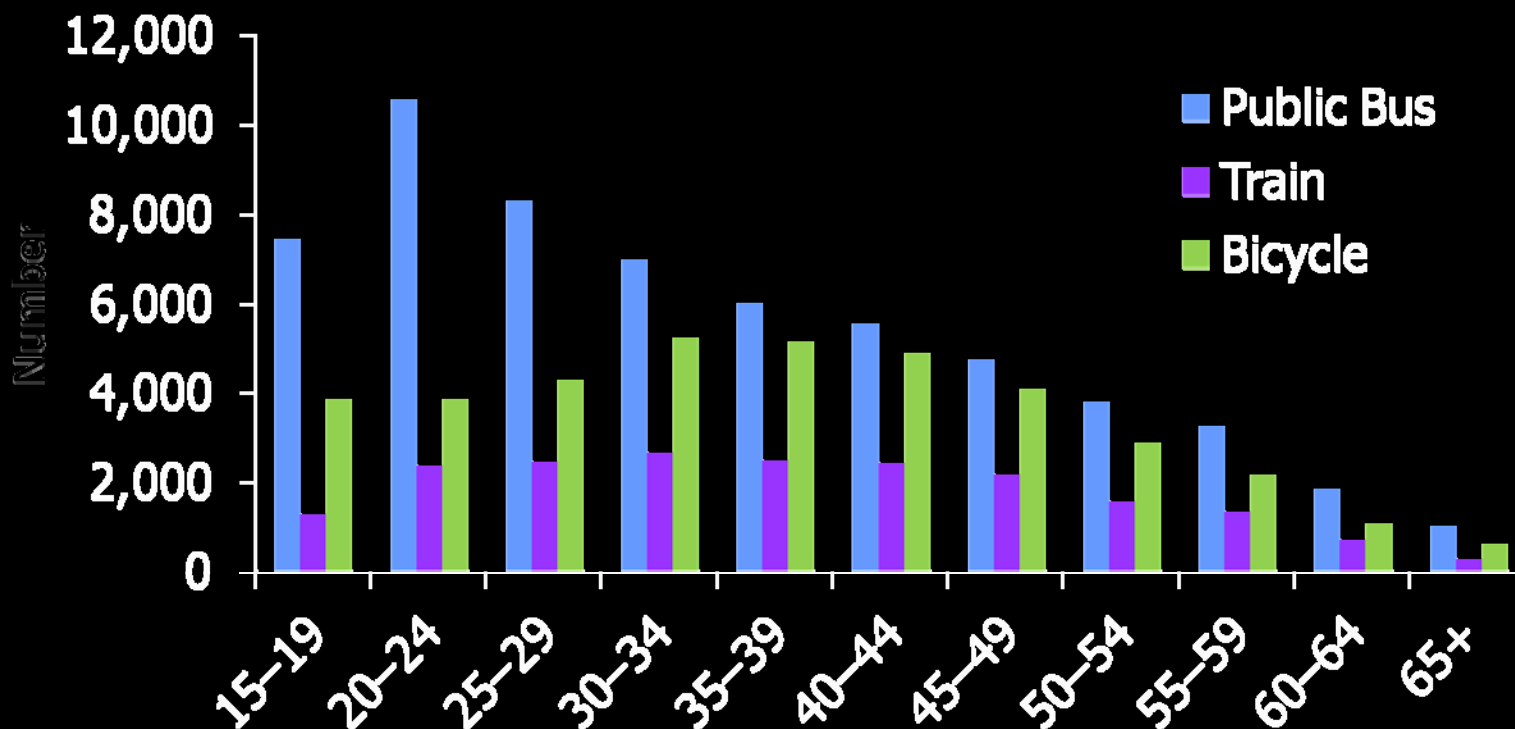
Levels of Service changes

❖ For example:

- Growth - It is highly likely over the life of an asset that growth will occur. Whether this is planned or not, history tends to show that land use planning is a short term predictor of what will actually happen. Why?
 - Roads get built or improved
 - Other parts of the community may become more or less attractive to live in
 - Developers challenge the District Plan
 - Political imperatives change
- Demographics - Changes in demographic patterns in coming years will result in an ageing population which leads to greater Levels of Service being provided to this group

Projecting impact of structural ageing

Public Bus, Train or Cycle to Work by Age

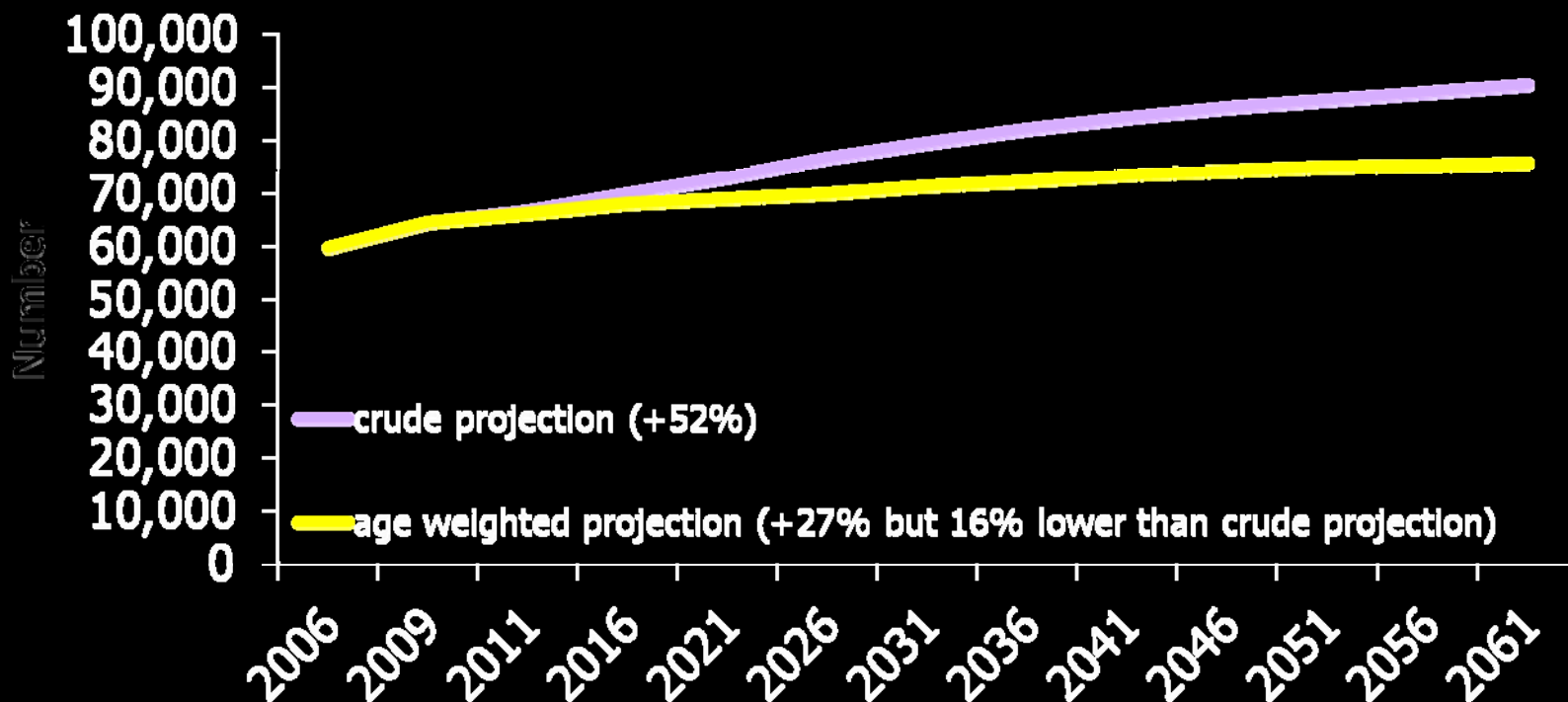


Source: Stats NZ TableBuilder
(Main means of travel to work)

Source: Natalie Jackson
Waikato University

Projecting impact of structural ageing

Public Bus to Work



Source: Stats NZ TableBuilder
(Main means of travel to work)

Source: Natalie Jackson
Waikato University

Levels of Service increases

❖ Levels of Service expectations continually rise as long as there is no great cost disadvantage, for example:

- **Model T Ford**

1908 \$850

1920's \$575 (one year's wages)

LoS – Basic

- **Falcon**

2010 \$50,000 (one year's wages)

LoS – Sophisticated

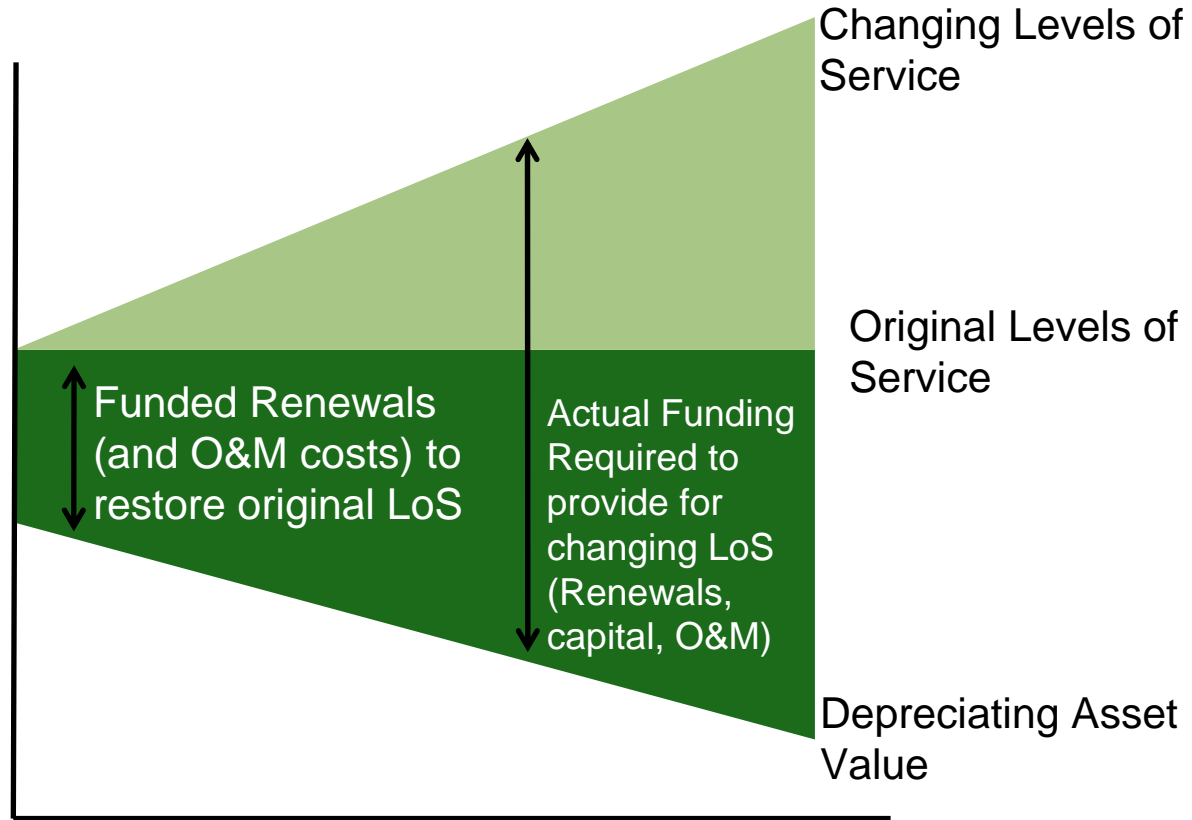
Levels of Service increases

- Air travel
- Milk

Levels of Service increases

- ❖ This same acceptance of increasing Levels of Service, as long as the direct cost is not raised significantly, exists in a lot of Council services, for example:
 - Swimming pools
 - Libraries

Levels of Service increases



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Levels of Service increases

❖ Either:

- We need to charge the real cost of the extras which creates a large amount of noise in the community, or
- We need to be very specific about how much the community is paying for the Levels of Service increase over what it would cost to continue with the current Levels of Service, and
- Let the community work out the cost/benefit that suits them

Levels of Service in Perpetuity

- ❖ Because we work under the general assumption that current Levels of Service are supplied forever we assume the assets that deliver these Levels of Service have to be replaced in perpetuity - why do we assume this?
- ❖ For example:
 - Will we always have roads?
 - Will we always need drinking water?
 - Will we always have libraries?

Levels of Service in Perpetuity

- ❖ If left solely to the engineers, we may get a repeat of Roman times:
 - over-engineered structures by providing a perpetual Level of Service
 - far exceeded the community's needs at the time
 - ineffective asset managers

- ❖ But under an accounting fantasy some of these bridges built in Roman times have no value

- ❖ Neither approach is right

Remaining life

Estimation of Life

- ❖ In some cases the original estimate for the assets useful life turns out to be completely wrong, for example:
 - Asbestos cement pipes with an original estimated life of 40 years and an actual life of closer to half this in some places
 - Cast iron pipes however were thought to last 80 years and many are still in the ground after 100 years
- ❖ Another factor to be considered is whether assets ever reach their expected life

Remaining life

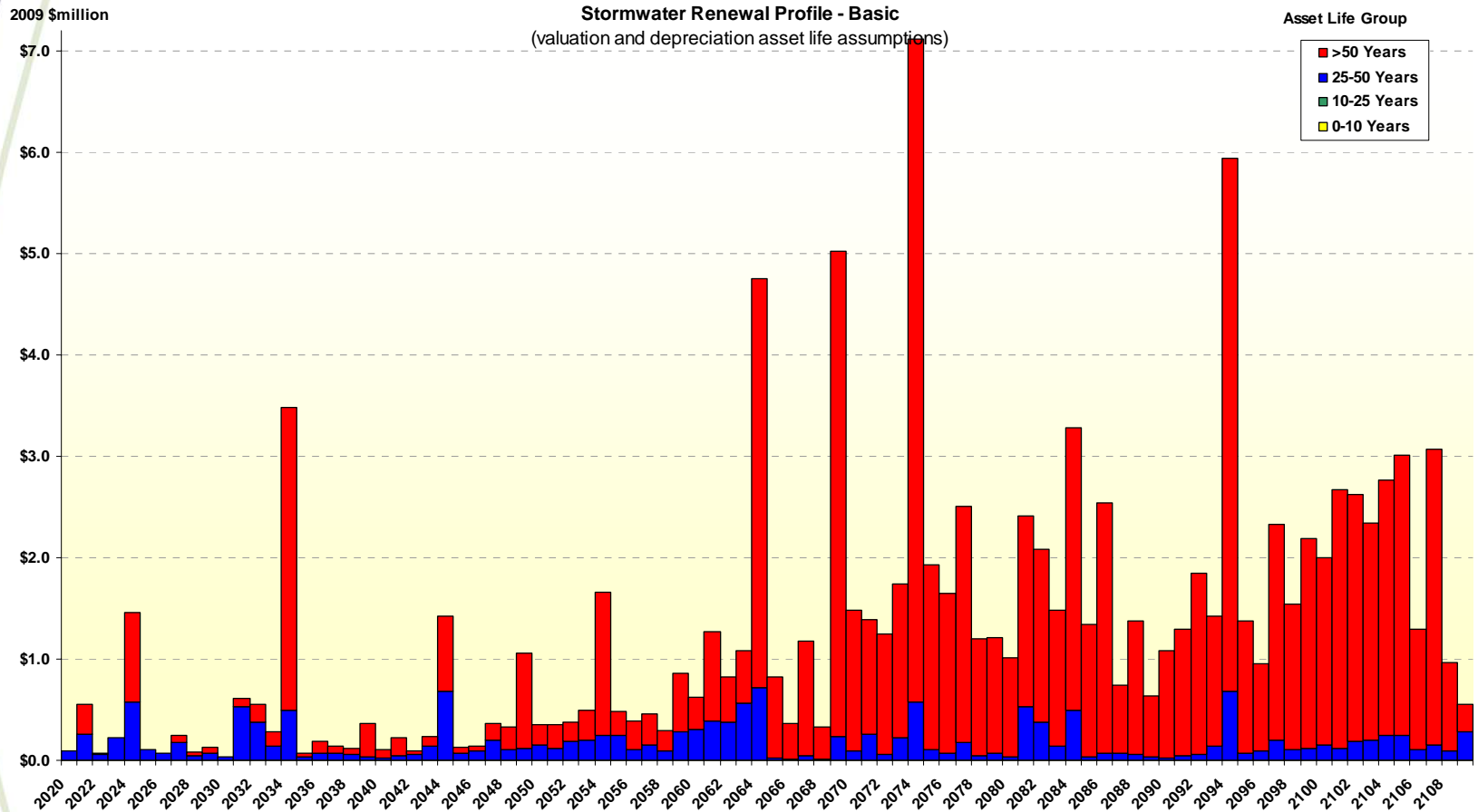
Method of calculation

- ❖ There are a number of ways of calculating remaining life
- ❖ The cost and timing of renewals required is a reasonably random variable and therefore funding can vary significantly

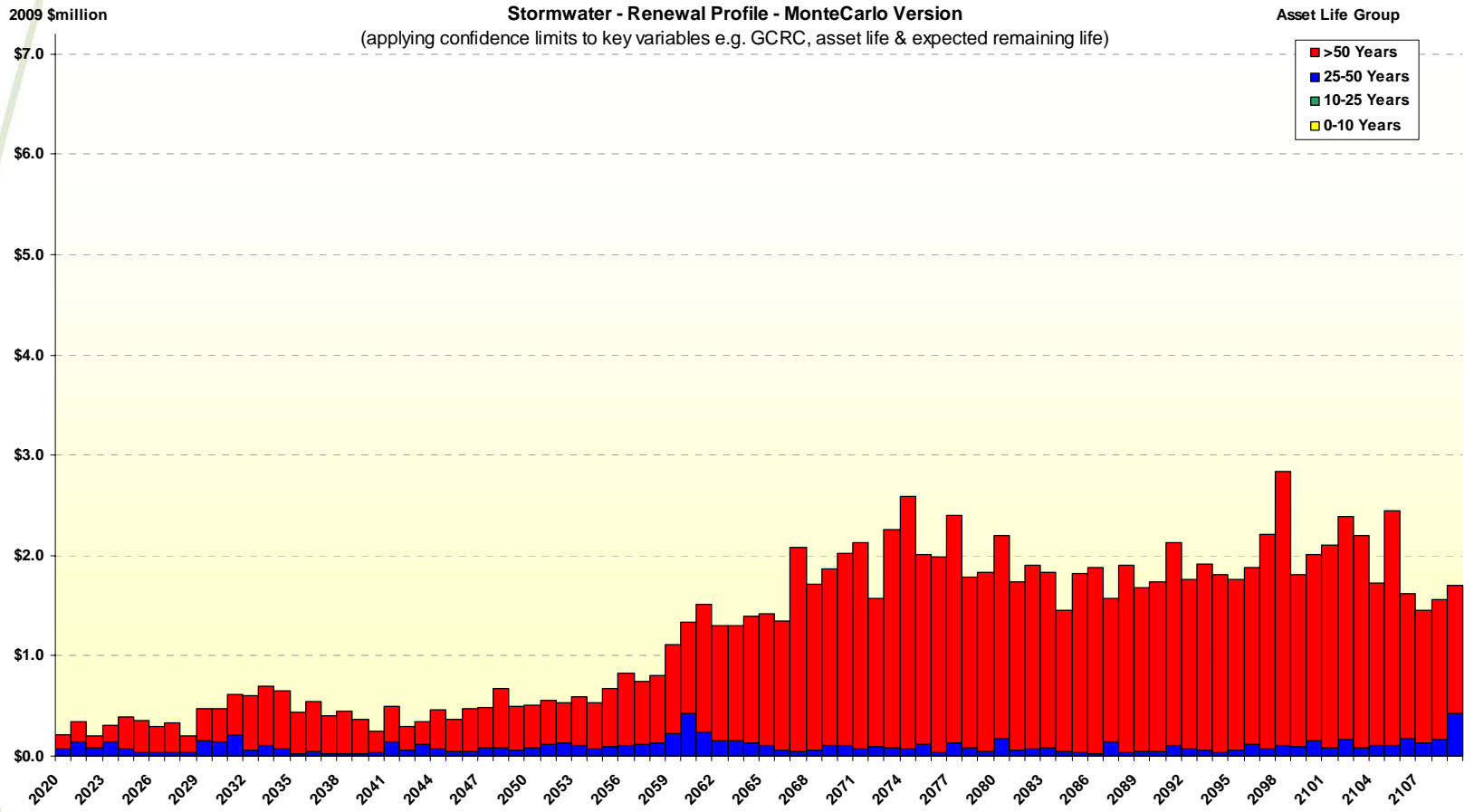
Remaining life

- ❖ Monte Carlo analysis and factors used
- ❖ Introduction of confidence limits and intervals to core assumptions, namely :
 - Current replacement costs
 - Asset life
 - Asset remaining life
 - Inflation

Remaining life



Remaining life



Intergenerational Cash Balancing

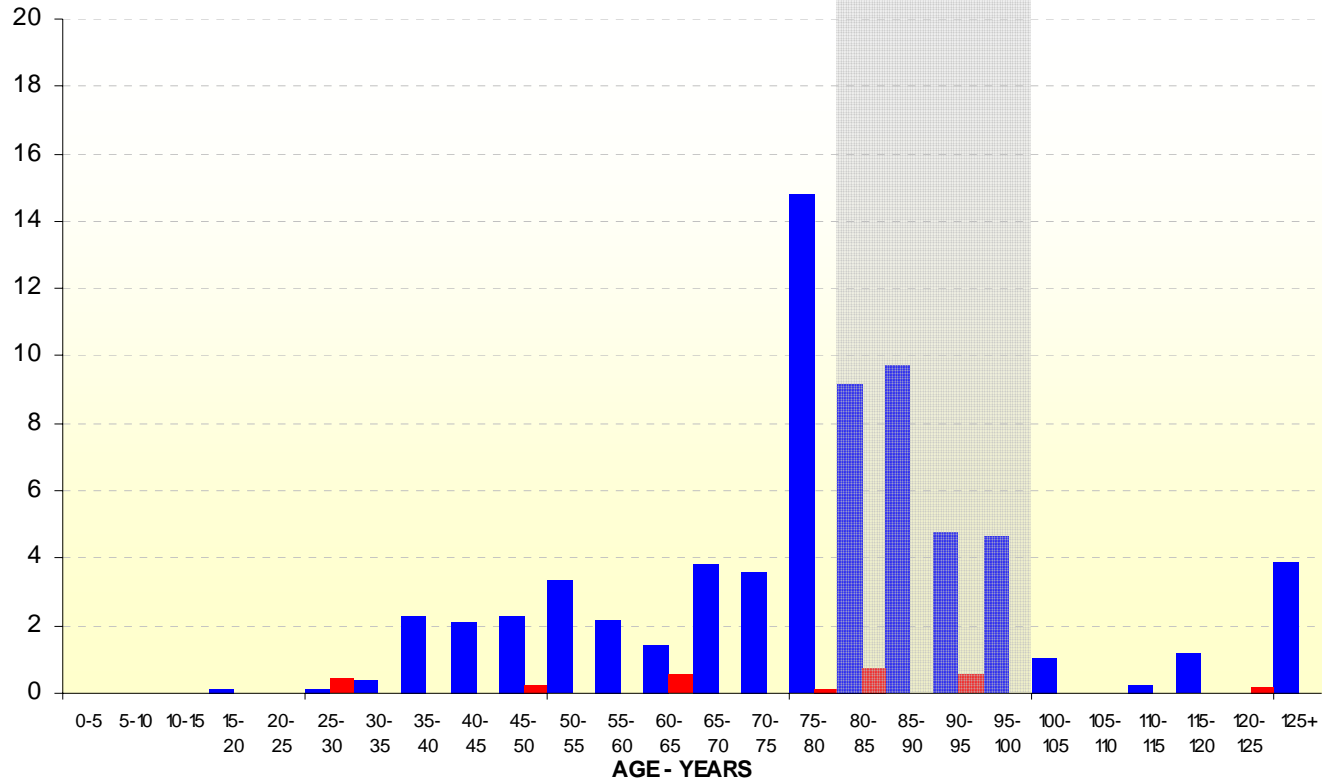
- ❖ In the early years of a long-life asset the error in estimating:
 - length of life and/or
 - renewals costs
- ❖ Can be greater than the depreciation/renewals/funding calculation
- ❖ It may be better to ignore the funding calculation until these assets are much further through their useful life

Remaining life

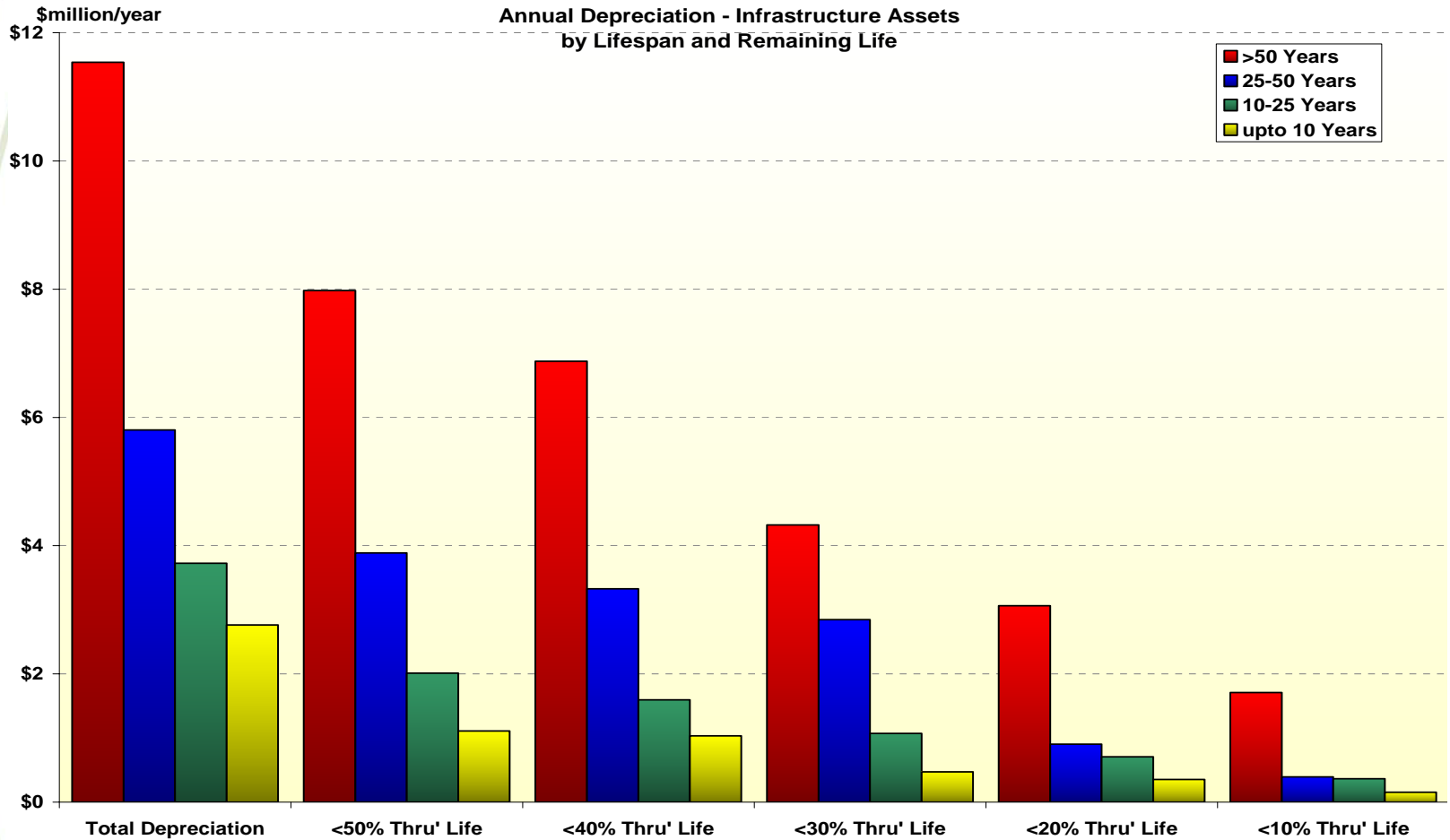
Length - Km

Water Reticulation : CI Mains Age Profile

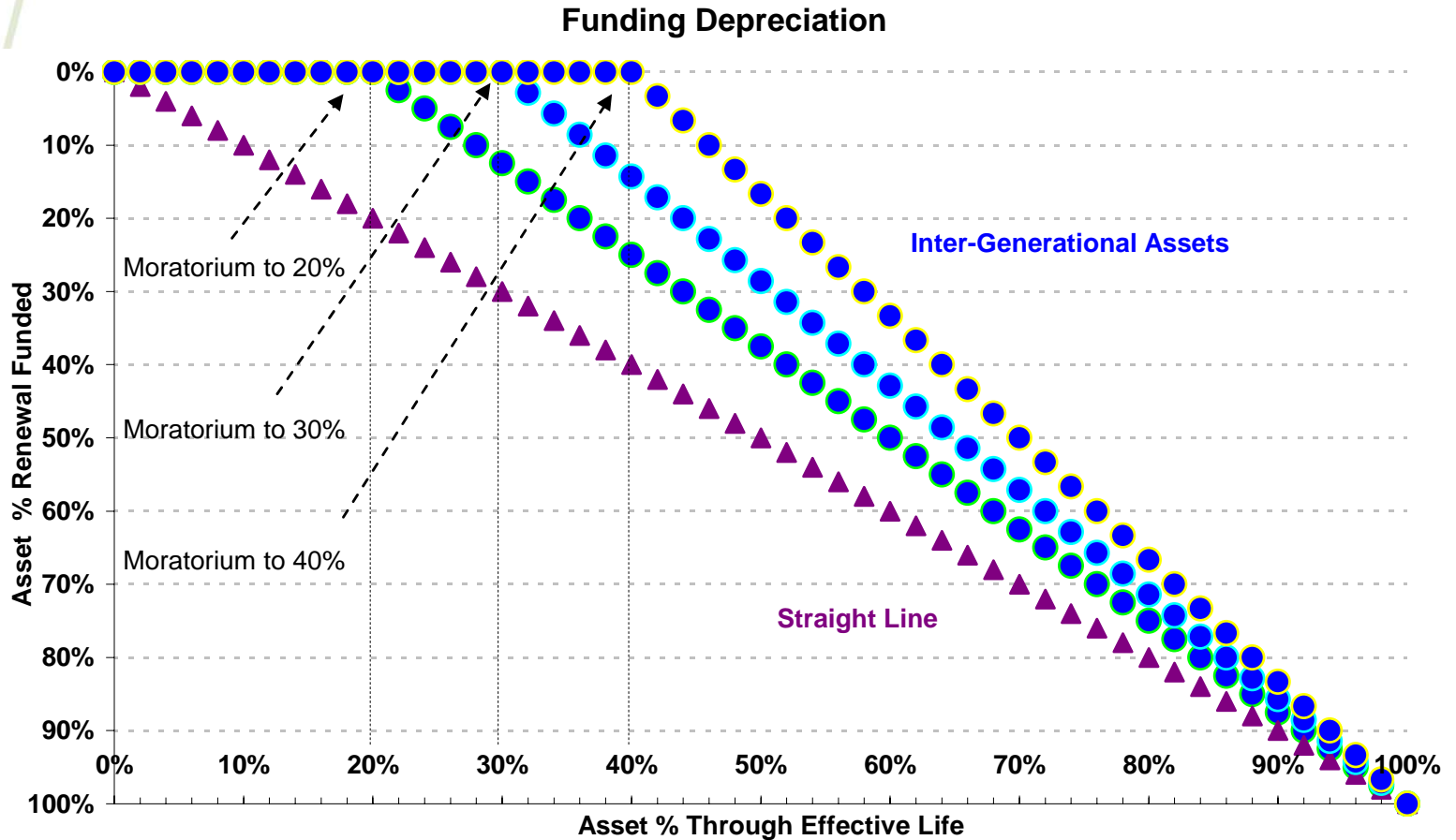
71 km in service
2km expired



Intergenerational Cash Balancing



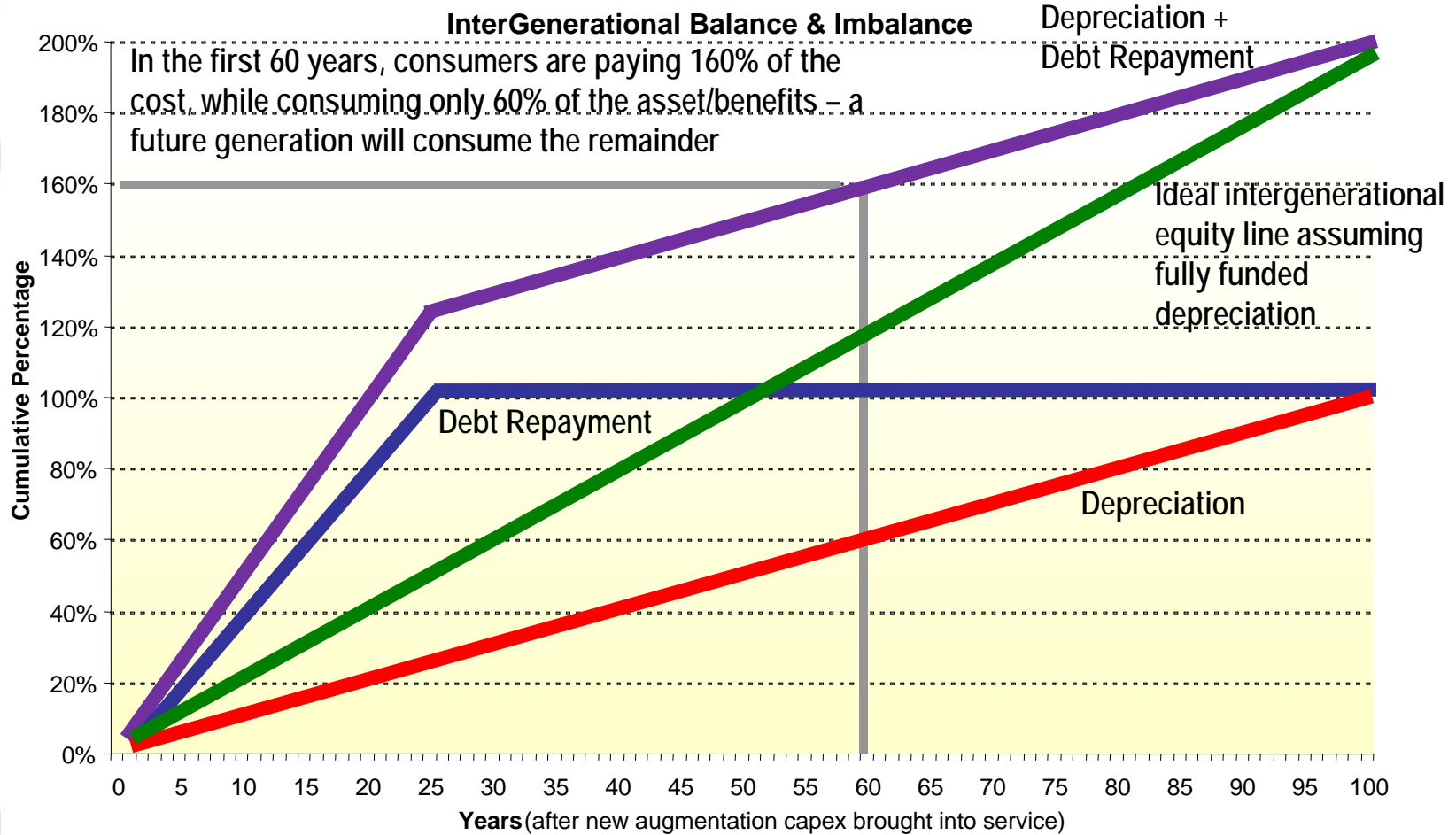
Intergenerational Cash Balancing



Intergenerational Cash Balancing

- ❖ Human lifespans are increasing... and will continue to do so e.g. through
 - ongoing technology and medical innovations
 - increasing awareness of and orientation around healthy lifestyles, etc.
- ❖ In NZ the life expectancy of an 18 year old adult was
 - c. 50-55 years in the early 1950s
 - c. 55-60 years in the early 1980s
 - c. 60-65 years today
- ❖ Lets assume that we tend to..
 - fund capital expenditure by raising debt
 - repay debt (and interest) over a 25 year term.....and
 - charge for depreciation on a straight line basis over the expected life of the asset
- ❖ If a 100 year life asset is brought into service under this model....

Intergenerational Cash Balancing



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Cost of replacement

- ❖ Assumptions made in terms of the type of material, inflation and cost of replacing the asset when it reaches its useful life are critical to calculating depreciation, renewals and therefore funding required
- ❖ By way of example, consider steel water pipes:
 - Steel 525mm mains pipe
 - Cost installed
 - 1930's - \$5/m
 - 1970's - \$20/m
 - Inflation assumption
 - 1970's - 10%
 - Replacement cost today calculated in 1970's - \$900/m
 - Actual cost - \$400/m
- Assuming rates of costs remain the same can be misleading as the past does not represent the future and the estimation gets worse as time gets longer so that NPVs are no good after 20 years

Summary of Issues

- ❖ Depreciation is an accounting device – not real life
- ❖ Depreciation funding can be a poor use of ratepayers money
- ❖ Levels of Service and their cost is what matters – and they inevitably go up
- ❖ Renewals and O & M funding not depreciation funding should be charged to users / ratepayers
- ❖ There are often huge margins of error in calculating
 - Depreciation
 - Renewals funding requirements
 - Age of asset uncertainty $\pm 50\%$
 - Inflation uncertainty $\pm 100\%$
 - ODRC not thought through
 - Demographic changes
 - Technology changes
 - LOS changes

Summary of Issues

- ❖ Intergenerational Equity is inconsistent
- ❖ Customer satisfaction is a good measure of LoS appropriateness
 - It does not necessarily continue to increase as spending increases
- ❖ Asset Management should be renamed Levels of Service Management
- ❖ And it should include marketing as one of its disciplines
- ❖ A Futures Committee should be set up by NAMS to get the science back into Levels of Service Management

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Where to from here?

- ❖ Financial and economics have BERL / NZIBR etc to predict the future
- ❖ LoS Managers have no equivalent
- ❖ Time for NAMS to set up a Brains Trust

NAMS
NLOSMS!!

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asset management



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procurement
alliance partnering
long term financial plan
asset management
waste management
governance
financial/feasibility modeling
economic development
sustainability