CHAPTER 8

Challenges, Constraints and Best Practices in Rehabilitating Water and Electricity Distribution Infrastructure

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8.1 Introduction

Investment in infrastructure is one of the key levers through which the State can contribute to accelerated and shared growth, while the maintenance of existing infrastructure is equally important to ensure sustainable service delivery. Inadequate infrastructure maintenance not only has the potential to undermine service delivery but also contributes to increased backlogs and places a strain on public finances. Research conducted by the Financial and Fiscal Commission (the Commission) in 2011 found that municipalities invest on average five per cent of total operating expenditures on infrastructure rehabilitation (FFC, 2011). Furthermore, when budgets are constrained, a soft target for cuts is spending on infrastructure repairs and maintenance, because these cuts are not immediately visible and politically less sensitive.

This chapter aims to assess whether municipal spending on infrastructure asset care is adequate, in particular water and electricity distribution and reticulation-related infrastructure. Key research questions include:

1. What is the condition of municipal infrastructure?
2. Do municipalities spend adequately on infrastructure asset maintenance and renewal?
3. If there is under-spending on maintenance and renewal, what is the funding gap?
4. What are the causes of inadequate spending, if this is indeed the case?
5. In the event of under-spending, is this the case in specific categories of municipalities or in particular locations?
6. What measures can be proposed to address under-spending? For example proposing best funding or management practice models for adoption.

8.1.1 Objectives of the Study

The objectives of this research are:

• to investigate and propose the best funding models for maintaining and rehabilitating municipal infrastructure, specifically water and electricity distribution-related infrastructure

• to make proposals on potential incentive instruments government can employ to encourage greater investment in maintaining and rehabilitating municipal infrastructure.

8.1.2 Justification for the Research

The South African Institution of Civil Engineering's (SAICE) infrastructure report card for South Africa noted the following concerns about municipal infrastructure (SAICE, 2011):

- With respect to water: severe deterioration in the ageing of the bulk water infrastructure portfolio as a result of insufficient maintenance and neglect of ongoing capital renewal; serious concerns regarding funding in general for maintenance. Water infrastructure received a grade of D[80].
- With respect to sanitation: inadequate operation and maintenance capacity, particularly in minor urban areas. Sanitation infrastructure received a grade of E[81].
- With respect to electricity: local distribution is characterised by inadequate maintenance capacity and in many areas ageing and/or overloaded infrastructure. Electricity, particularly local distribution infrastructure, was awarded a grade of D.

Against this backdrop, President Zuma announced during the 2012 State of the Nation Address the government's intentions to spearhead massive infrastructure development across South Africa over the medium term (Zuma, 2012). However, deriving maximum value from this planned (and existing) infrastructure investment will require addressing the issue of poor maintenance and rehabilitation of local government infrastructure.

In addition, during the Commission's public hearings on the local government fiscal framework in October 2011, the challenge that municipalities have in maintaining existing and new infrastructure was raised as an area requiring further research. Stakeholders attending the public hearing were united in their view that poor maintenance of infrastructure in the local government sector is cause for concern and a major factor in suboptimal service delivery.

8.2 Literature Review

The literature reviewed included best practices manuals, various reports on the state of municipal infrastructure in South Africa, published strategies on municipal infrastructure asset care, municipal infrastructure asset guidelines, relevant asset accounting standards, published papers on funding models for municipal infrastructure maintenance and renewal, South African legislation (with specific reference to funding mechanisms allowed) and grant conditionalities with respect to asset care. A summary of the literature sources considered is included in Appendix 1.

8.2.1 South African Literature

During the period 2006–2008 much attention was paid to infrastructure asset management. The Department of Cooperative Governance (DCoG), which was then the Department of Provincial and Local Government (DPLG), published the Local Government Infrastructure Asset Management Guidelines 2007–2009 (Boshoff et al., 2006). This manual advocates, among others, that municipalities adopt a holistic, enterprise-wide approach to asset management and prepare asset management plans which quantify asset lifecycle needs in response to service needs, informed by a supporting implementation plan addressing funding and organisational capacity issues. Since publication, DCoG has not updated or actively promoted this manual. It appears that the depart-

[80] A grade of D- indicates infrastructure is not coping with demand and is poorly maintained. It is likely that the public will be severely inconvenienced and even endangered without prompt attention.
[81] A grade of E- indicates infrastructure has failed or is on the verge of failure, exposing the public to health and safety hazards. Immediate attention is required.

ment has since shifted its focus away from promoting the adoption of sound infrastructure asset management practice to obtaining clean audit results by 2014, an element of which includes robust asset registers.

In 2007, the Construction Industry Development Board (CIDB) published the National Infrastructure Maintenance Strategy (CIDB, 2007), but no documentary evidence exists of its implementation. In 2008, the Government Immovable Asset Management Act (GIAMA) came into being, but its scope excludes local government (South Africa, 2007). In the same year National Treasury released its Local Government Capital Asset Management Guidelines (National Treasury, 2008). These guidelines have not been updated despite developments such as the introduction of new accounting standards for assets and best practices. In August 2010, the International Standards Organisation (ISO) Technical Management Board established the ISO Project Committee 251 (PC251) with the aim of producing three new Standards for Asset Management by early 2014:

- ISO55000: Asset management – Overview, principles and terminology
- ISO55001: Asset management – Requirements
- ISO55002: Asset management – Guidelines on the application of ISO55001.

The literature on the state of municipal infrastructure generally laments the deteriorating condition of these assets, ascribes multiple causes to this condition and provides conflicting accounts for addressing the situation. Much of the findings and estimated amounts are based on anecdotal evidence, and there appears to be little rigour in estimating maintenance and renewal needs. As a case in point, a recent study by the Department of Water Affairs (DWA) revealed that over the next ten years, the capital requirement for the entire water sector is about R670 billion (in real terms) and the funding gap is R338 billion. However, the DWA valued its major water resource infrastructure at a current replacement value of R164 billion and municipal water and sanitation infrastructure at some R381 billion. The reported funding gap of R338 billion is therefore highly unlikely.

The literature also varies in the classification used, referring interchangeably to repairs, maintenance, rehabilitation and renewal, which is an error. Rehabilitation and renewal are capital asset activities that extend or prolong asset lives, the value of which must be added to community wealth in a municipality's statement of financial position, whereas maintenance and repairs are recurring operating activities. Different processes and funding mechanisms exist in planning and budgeting for, and spending on capital and operating activities.

Despite these inconsistencies and technicalities, all the available literature points to the need to intervene and improve the care of municipal infrastructure.

8.2.2 International Literature

According to Briceno-Garmendia et al. (2008), the government/public sector is the dominant funder of infrastructure in sub-Saharan Africa. However, governments care for and maintain public assets poorly, as highlighted by the urgent need for rehabilitation across many of these countries. As Briceno-Garmendia et al. note, "In environments characterised by weak fiscal management (non-

transparent and politically dominated budget processes), assets often are neglected. Because maintenance yields little observable immediate benefit and is easily deferred, its budgetary allocations often are not protected by the executive or Parliament" (2008:viii). In addition to the "invisible" yield that a focus on maintenance brings, spending on maintenance has low priority, particularly in developing countries, where high priority is attached to redistribution efforts and, often, large civil service wage bills (Heller, 1979). When budgets are under pressure, it is much easier and more politically acceptable to cut back on repairs and maintenance spending than to dismiss staff. Indeed, one of the main reasons for poor spending on maintenance is the disjuncture between those who decide on new infrastructure investment and those who are responsible for recurrent expenditure, such as spending on repairs and maintenance (Heller, 1979).

Given that in many countries, spending on maintenance is often sacrificed in favour of spending on aspects that will yield more political acknowledgement/brownie points, what can governments do to ensure that assets are adequately managed and cared for? For spending on maintenance to happen, two key conditions need to be fulfilled: (1) sufficient resources are available for this type of expenditure and (2) decision makers who are willing to allocate funds for this purpose (Ostrom et al., 1993:29). To address the problem of low spending on maintenance, Heller offers seven possible policy options, as outlined in Table 62.

Table 62: Policy Options for Ensuring Better Recurrent Expenditure

1	Restructure public expenditure programmes, diverting funds from investment to recurrent expenditure.
2	Cut back on less essential recurrent expenditure.
3	Increase tax effort of the public sector.
4	Increase the elasticity of the tax system.
5	Change the composition of the government's investment programme, so as to favour investments that will incur lower recurrent expenditure.
6	Modify the technology of projects to have higher present investment costs at the expense of lower future recurrent outlays.
7	Introduce fees for the use of project services.

Source: Heller, 1979:41.

In the South African context, especially around election periods when political parties are trying to attract votes, policy option 1 is unlikely, which may be to the detriment of the growth of the country. Rioja (2003) used a dynamic general equilibrium model to assess the effect of neglecting spending on maintenance in favour of spending on new infrastructure for a sample of seven Latin American countries. His findings indicate that, "more new infrastructure at maintenance's expense may not be beneficial to these countries" (Rioja, 2003: 2299).

As government (particular local government) is struggling with the challenge of non-payment, policy option 3 seems unlikely. The introduction of user fees (policy option 7) is a possibility, but South Africa follows a free basic services approach whereby indigent households are allowed access to certain levels of free services such as water. Again, as mentioned above, cost recovery at the municipal level has been a particular challenge. The problem arises as a result of an inability

to pay (poverty) as well as unwillingness to pay (because of poor service delivery and inadequate municipal administrative systems, particularly related to billing).

Writing on the water and sanitation sector, Yepes (1992: vi) advises that any strategy aiming to achieve better spending on maintenance should:

- Improve accountability.
- Develop and maintain responsive management and information systems.
- Improve analysis of investments and cost recovery.
- Improve training of staff.

Although Yepes' suggestions are more generic than those proposed by Heller (1979:41), they do resonate with many of the broad challenges hindering better service delivery in South Africa. For example, responsive management and information systems are critical for monitoring and evaluating service delivery and general public sector management. However, the lack of service delivery data is a cross-cutting issue. Similarly, another long-standing challenge in South Africa is staff training and general capacity, which is not specific only to the issue of asset management.

The dire nature of the situation with respect to infrastructure and asset management generally, is apparent when the following figures are considered (Wall, 2008):

- One in every 130 people in China is an engineer.
- One in every 220 people in Germany is an engineer.
- One in every 450 people in Australia is an engineer.
- One in every 3200 people in South Africa is an engineer.

Incentives can play an important role (Ostrom et al., 1993). Unlike individual capital investors or owners, who bear the cost of maintenance since they reap the associated benefits, decisions concerning the upkeep of public infrastructure maintenance are made by players who do not bear either the full cost or the benefits of maintenance. Therefore, for government to change the manner in which the public sector treats maintenance, the incentives driving the actions of decision makers will need to be altered.

8.3 Research Methodology

The study links to and supports the Commission's 2012/13 theme of "Fiscal levers for development". Key local government infrastructural objectives are sustainable service delivery through reliable infrastructure, ensuring the longevity of infrastructure and therefore community wealth and surety of basic services. Achieving these objectives will require adequate spending on the maintenance and rehabilitation of assets.

The research methodology is described below.

- The logical first step towards ensuring adequate spending on these lifecycle activities is to quantify the maintenance funding and rehabilitation investment requirements by:
  - Determining both the current replacement cost (CRC) and depreciated replacement cost (DRC) of municipal infrastructure assets. The current unit replacement costs per household (in municipalities where costs are established using the DRC methodology) were extrapolated to

all South African municipalities. The average DRC/CRC ratio was then applied to determine asset-carrying values (CRC less accumulated depreciation). The results were grouped by sector (e.g. water, sanitation, electricity, etc.). The full municipal infrastructure portfolios needed to be analysed, as the current finance benchmarks of 8–10 per cent of the operational budget refer to spending on total municipal maintenance, not just for water, sanitation and electricity.
- Calculating the maintenance requirements from the CRC values per sector per municipality, in line with best international practice.
- Calculating rehabilitation requirements, as an amount equal to annual depreciated (loss of value of assets), by dividing the CRC values by an estimation of average network lifespans. For metros, additional provisions were made for backlog rehabilitation (including the more comprehensive definition of asset renewal) by also considering the DRC/CRC ratio and the pace of infrastructure capital spending in recent years.

For this modelling exercise, data was obtained from asset management projects performed by i @ Consulting, (the appointed technical advisor for this project) for their municipal clients, the results of which were audited.

- Actual and budgeted municipal maintenance and rehabilitation figures obtained from National Treasury were compared against the benchmark maintenance and rehabilitation requirements as modelled. The results were analysed and funding gaps (to the extent that they existed) determined for both maintenance and rehabilitation.
- Literature was reviewed to establish the best infrastructure maintenance funding models and incentive schemes employed elsewhere.

8.4 Results

8.4.1 Value of Municipal Infrastructure

According to the International Infrastructure Management Manual (NAMS and IPWEA, 2011), the value of public infrastructure should be based on CRC, which means the value of replacing an existing asset with a modern asset of equivalent capacity. It is a commonly accepted "fair value" method allowed for in Generally Recognised Accounting Practice (GRAP) that applies to all three government spheres in South Africa.

At the end of June 2012 the CRC of municipal infrastructure was R1.156 trillion. DRC is a measure of the current value of an asset, based on its CRC less an allowance for deterioration of condition to date, based on the fraction of remaining useful life/expected useful life. Simply put, DRC is a measure of asset-carrying value. The DRC of municipal infrastructure is estimated at some R565.85 billion. These figures were arrived at by dividing the CRC and DRC values, obtained through assessments from over 40 municipalities in South Africa, by the number of households in each municipality. The CRC and DRC cost packages per household were then applied to all municipalities in South Africa, with adjustments made for the ratio of DRC/CRC per type of municipality and per sector.

Electricity, water and sanitation, the asset portfolios that are the focus of this study, collectively account for 56 per cent of municipal infrastructure replacement value, as Table 63 (page 200) shows.

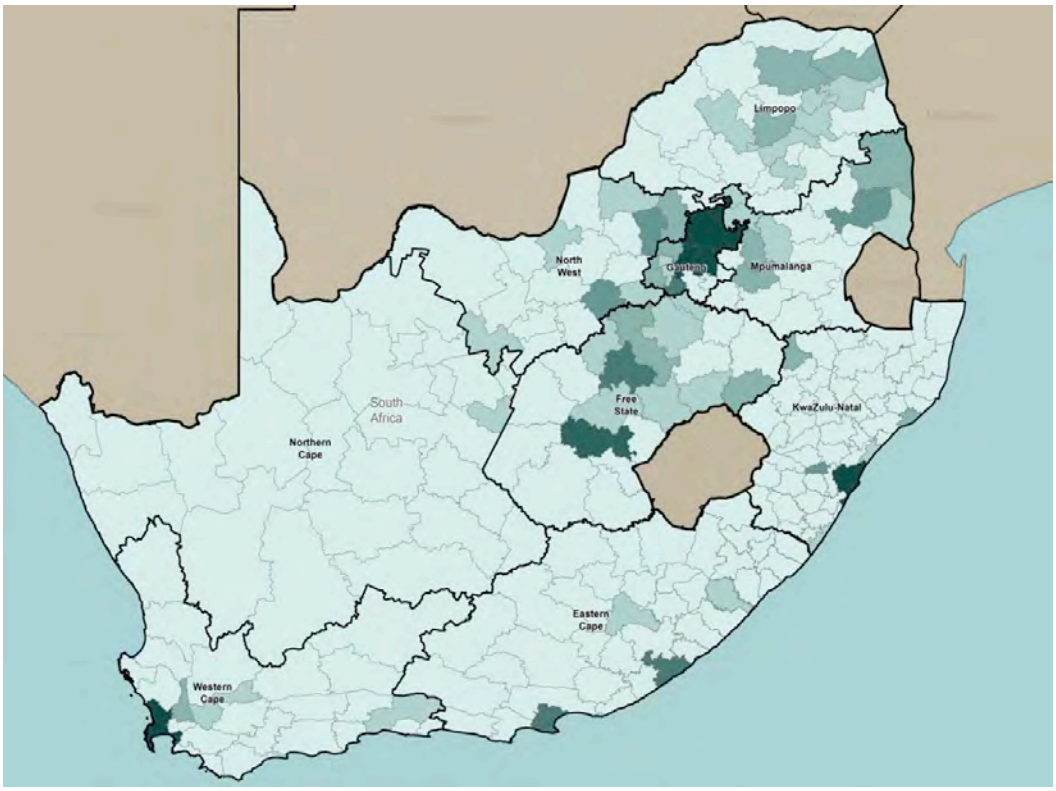
Table 63: Deemed Value of Municipal Infrastructure as at 30 June 2012

Asset class	CRC	DRC	Value as % CRC of total municipal portfolio
Roads and stormwater	385, 392, 106 000	186, 938, 883, 250	33%
Water and sanitation	254 ,319 ,938, 000	126, 736 ,833, 330	22%
Electricity	398, 282, 940, 000	194, 006,152, 800	34%
Community facilities & operational buildings	118, 621, 919, 500	58,165,679,475	10%
Totals	1, 156, 616, 903, 500	565, 847, 548, 855	100%

Source: Own Calculations.

Figure 23 provides insight into the spatial distribution and clustering of municipal infrastructure values. As can be expected, the highest concentrations of municipal infrastructure are found in metropolitan areas, notably Gauteng, Cape Town and eThekwini. Lower levels of clustering are found in the remaining metropolitan areas and secondary cities, followed by the old homeland areas and mining areas.

Figure 23: Spatial Distribution of Municipal Infrastructure (DRC 2012 values in R'million)



Total DRC (Rand in millions)

0 - 1 250
1 251 - 2 500
2 501 - 5 000
5 001 - 10 000
10 001 - 15 000
15 001 - 30 000
30 001 +

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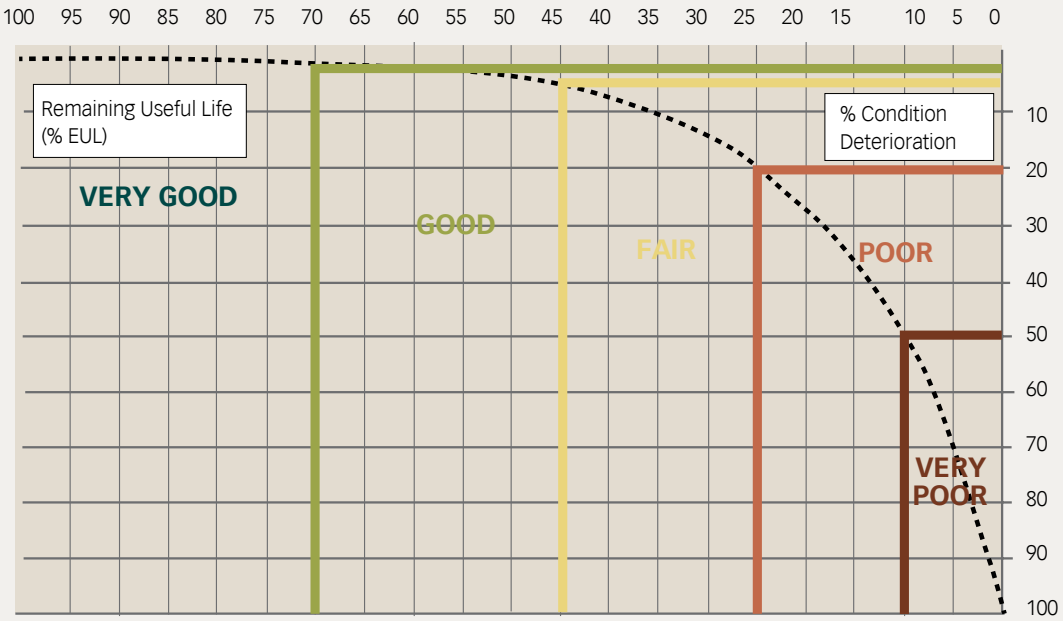
8.4.2 Condition of Municipal Infrastructure

Provided a consistent condition grading model is used and the infrastructure health grade is known (i.e. the condition distribution), this data can be combined with the CRC to determine a reliable estimate of the DRC of the infrastructure portfolio. In this case the parabolic deterioration[82] condition grading model was used (Figure 24).

Figure 24: Assumed Deterioration of Infrastructure



The relationship of the infrastructure health grades and the DRC (expressed as a fraction of CRC – with residual values (RV) omitted where applicable) is summarised in Table 64.

Table 64: Relationship of Asset Portfolio Health Grade and DRD

Infrastructure Health Grade	Portfolio Health description	(DRC-RV)/(CRC-RV)
1	Very Good	60% or more
2	Good	55%
3	Fair	50%
4	Poor	45%
5	Very Poor	40% or less

An infrastructure health grade of three generally indicates that the portfolio on average is in a "fair" condition, where 50 per cent of life remains. Beyond that, at grade four, the asset portfolio on average is considered to be in a "poor" condition, where 45 per cent of life remains. Therefore, as a general rule, infrastructure assets with a DRC/CRC of more than 0.5 or 50 per cent are con-

[82] Different condition grading models apply to specific assets. At asset portfolio level, the parabolic condition grading model is considered most appropriate for long-life infrastructure and is employed in asset-deterioration modelling by (among others) the DWA for its major water resource infrastructure, the Ekurhuleni Metropolitan Municipality and Johannesburg Water.

sidered to be in good health, requiring mainly proper maintenance. In addition to maintenance, infrastructure assets with a DRC/CRC of less than 0.5 or 50 per cent (indicating that more than half the value of the asset has been used up) are typically deemed to carry a renewals backlog and require a structured programme of capital renewal. Renewal entails replacing or rehabilitating an asset, which are capital budget activities that materially extend the useful life of assets. Renewal activities are required to maintain community wealth as captured in assets and assuming that infrastructure services will be provided in perpetuity (and therefore the infrastructure life will be perpetually extended to maintain service capacity).

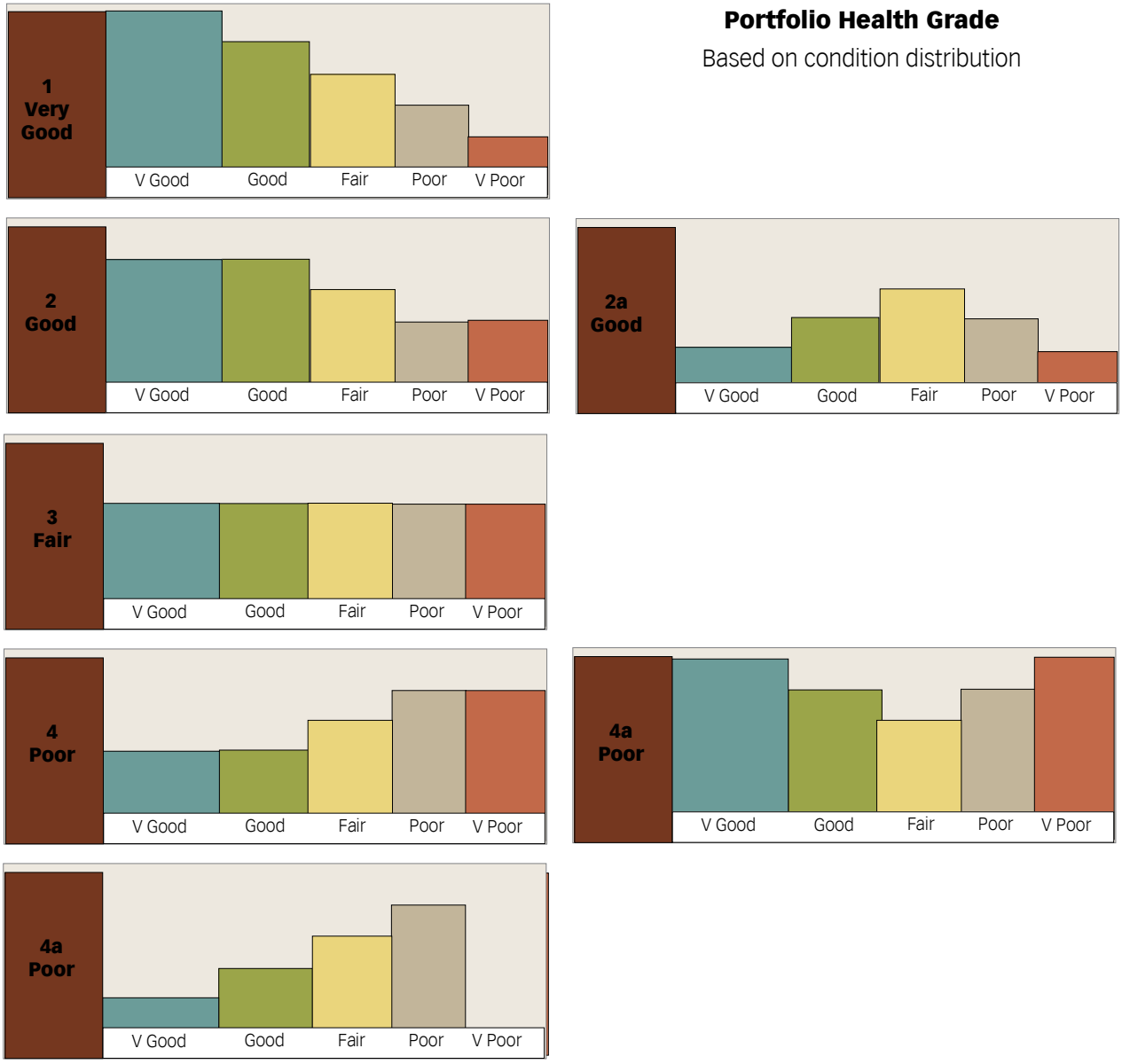
Table 65: Condition of Municipal Immovable Asset Portfolios

Asset class	CRC	DRC	DRC/ CRC ratio	Accumulated depreciation	Annual depreciation
Roads and stormwater	385,392,106,000	186,938,883,250	49%	198,453,222,750	13,488,723,710
Water and sanitation	254,319,938,000	126,736,833,330	50%	127,583,104,670	5,595,038,636
Electricity	398,282,940,000	194,006,152,800	49%	204,276,787,200	8,762,224,680
Community facilities & operational buildings	118,621,919,500	58,165,679,475	49%	60,456,240,025	4,033,145,263
Totals	1,156,616,903,500	565,847,548,855	49%	590,769,354,645	31,879,132,289

Table 65 provides an indication of the DRC/CRC ratio of various municipal infrastructure portfolios. When condition is used as the basis for renewals, the results show on average no renewal backlogs in water and sanitation and a one per cent (R8.8 billion) backlog in the electricity portfolio. While fairly reasonable (given that condition is the basis), these results are unsatisfactory for two reasons. (1) They do not intuitively agree with empirical evidence. (2) They ignore the fact that the required condition of infrastructure is not principally a function of absolute condition, but rather the condition grade required to meet minimum service standards (e.g. reliability and quality of supply). This is particularly true of water and sanitation and electricity assets, where the reliability and quality of supply are regulated through the Water Services Act and the National Regulatory Standards for Electricity respectively.

Adopting an infrastructure health-grade model (Table 64) can resolve the matter of the DRC/CRC results not pointing to a significant renewals backlog, which contradicts empirical evidence. Each infrastructure health grade assumes a particular condition distribution typically encountered at municipalities. For example, a portfolio dominated by new assets, or one comprising mostly old assets in poor condition, or a number of permutations in-between.

Figure 25: Illustrative Condition Distribution of Infrastructure Health Grades



In isolation, the infrastructure health grades do not provide answers to the renewals backlogs based on required standards. Therefore, a model for determining renewals backlogs that takes into account both condition distribution and service standards is presented in the following sub-section.

8.4.3 Renewals Backlog

When does a renewals backlog occur? A renewals backlog is considered to exist when the condition of the infrastructure has deteriorated below the level considered to be acceptable. Consequently, determining a renewals backlog requires a clear understanding of the point at which the condition or performance standards become unacceptable. This may vary per sector and for assets of different criticality. Reliable and relevant data on the current status of the portfolio is necessary.

A number of key parameters need to be effectively defined when establishing a model to assess the nature and extent of infrastructure renewals backlogs at municipalities.

Infrastructure typically relies on a number of assets that need to be functionally linked to be able to provide services to end-users. For example, roads linked to bridges and stormwater facilities, and water pipes linked to pump stations, reservoirs and treatment works, etc. For practical purposes, the vast majority of these assets can reasonably be expected to be needed indefinitely, to be able to provide service to end-users in the municipality in the future – although processes need to be in place to identify and suitably plan for the exceptions (such as landfill sites, or areas that are declining).

Therefore, in developing a model for municipal infrastructure renewal, it is essential to identify and monitor separately the condition of each of the significant elements of such infrastructure. Indeed, the latest accounting standards (GRAP) require municipalities to do this where the financial implications are significant. For example, in the case where elements of significant value – say more than 10 per cent of the value of the parent asset – are replaced at different times (in terms of practical and financial expedience). In addition, municipalities may also elect to identify separately other items from a risk management perspective – lower value items that may be significant from a performance point of view (such as road markings). These significant elements are referred to as "components", and their identification is an essential departure point. A similar requirement typically applies to public buildings, where various elements, which may jointly be reasonably considered to be significant, will require periodic replacement separate to the entire facility.

Maintenance is often considered to embrace all the activities required to keep an asset operational after commissioning. However, importantly, this model separates the routine (planned or unplanned) actions, which need to be undertaken for a component to achieve its EXPECTED useful life to support the functionality of an asset (or system of assets in the case of infrastructure), from those actions that give new life to the component (such as replacing or refurbishing the component).

This means that municipalities must define the expected lifecycle interventions throughout the life of each main component type (typically differentiating between the treatment of assets with different criticality) and the associated expected useful lives (where applicable, differentiating between different attributes such as pipe materials, or road surface type) – good practice is to document these in the form of lifecycle strategies per asset type. All the actions required for a defined component to reach its expected useful life must be considered operational expenditure (including ones that are implemented on a cycle larger than one year – including say the painting of a building every six years) and are collectively considered to be "maintenance".

Renewals are the interventions that are required at the end of the life of a defined component to restore its initial service potential (in terms of capacity, performance and life expectancy). This typically implies some form of replacement (or refurbishment), which is considered capital expenditure and should be consistent with the lifecycle strategies adopted by the municipality. In the past, the lines between capital renewal and maintenance were blurry. Moving forward, these

definitions need to be stringently applied when budgeting and allocating expenditure, in order to manage and use more effectively the available funds, in line with the planning and strategic asset management models. A component whose capacity or performance needs to be improved significantly (to support the asset or system of assets) is referred to as an "upgrading" intervention. Sometimes combined interventions offer opportunities to optimise the timing or nature of the associated expenditure (for example, an old pipe replaced with a new and larger pipe). In practice, these interventions should be reviewed case by case but are not considered further in this model. A component's lifecycle strategy will state the type of maintenance to be applied during the life of the component; the triggers for renewal (which may be expressed in terms of condition, performance, capacity, or cost of operation – consistent with the levels and standards of service adopted by the municipality – and may vary depending on criticality); the typical renewal treatment (optimised solutions may also be assessed for high value assets); the expected useful life from new (a median, noting that these will be regularly reviewed for each individual component based on its specific operational environment); the assumed deterioration pattern; and any safeguarding, operational and/or de-commissioning requirements.

Renewals backlog refers to the renewals actions (which are capital in nature, as described above) that have not been addressed in line with the municipality's lifecycle strategies, are implicitly outstanding and are required as a future action. The renewals backlog is typically expressed in current-day rand and consists of the capital renewal interventions that have not yet been expended to meet the condition and performance standards adopted by the municipality. The renewals backlog is determined using the value of optimised interventions, where applicable and where data is available; in the absence of such data, the CRC less residual value (based on recognised valuation techniques) should be used. Correctly applied, this approach recognises that the replacement of an asset or component may be more expensive, or cheaper (in real terms) than the initial greenfield construction – a number of guidelines are available on this topic.

Naturally all municipalities are different, and so the key characteristics that can materially influence the renewals backlog are considered to be:

- The nature of the asset portfolio in terms of type, replacement value and extent of infrastructure (which is influenced by the levels of service adopted by the municipality), as well as its condition and criticality distribution.
- The standards adopted by the municipality and reflected in the lifecycle strategies as the renewal triggers (for example, a maximum of five per cent of arterial and distributor roads in a condition worse than fair and, for other roads, a maximum of ten per cent worse than very poor).

Unfortunately most municipalities continue to value assets based on costs, not revaluation, and consequently do not, at this stage, have reliable componentised replacement cost data available, nor robust condition data. Over time this situation should change as municipalities are encouraged (and perhaps supported) to adopt the more rigorous revaluation basis. In the meantime, a model can be used for strategic guidance, based on parameters determined at a number of municipalities where robust fair valuation exercises have been undertaken, generally for establishing costs associated with adopting GRAP.

All municipalities should be implementing ongoing capital renewals programmes, the tempo of which should ideally be in line with its target standards. For practical purposes, the tempo should be fairly consistent from year to year, with priority being given to critical assets. In practice, institutional and financial resources are often constrained – and this is when backlogs typically emerge. Therefore, in addition to the ongoing renewals programmes, a renewals backlog needs to be addressed and arrangements explored to ramp up future renewals programmes so that backlogs do not re-emerge.

Determination of the renewal needs per sector

In the absence of definitive and consistent data on the condition of assets, the respective values and criticalities, and minimum condition standards, the renewal needs per sector per municipal area have been estimated using the parameters and model described, as developed by Louis Boshoff of i @ Consulting.

1. CRC values were determined using a model that ascribes infrastructure values per sector per household (based on a number of detailed valuations at a range of municipalities) and the number of households and service availability.
2. An Infrastructure Health Grade Model was established (see Table 64) that accounts for typical condition distribution patterns and relates portfolio health and DRC.
3. Data on the condition distribution of infrastructure is not available for all municipalities. And, data that is available has not always been prepared using the same models. Data is, however, available on the levels of capital expenditure (both on new/upgrading and capital renewals) over the past 10 years, and this data was used in the model as a key determinant of the likely condition distribution infrastructure in municipalities. For each municipality and sector, the average annual capital expenditure on new assets and capital renewal over the past 10 years (corrected for escalation) was compared to the value of its asset portfolio and its annual depreciation respectively, and graded as high, medium, or low levels of expenditure (Table 66 and Table 67).

Table 66: Expenditure Grading Model

Expenditure Grade	Expenditure Description	New/Upgrading	Renewals
1	High	>2% CRC	>60% Ann Dprn
2	Medium	0.51 to 1.99% CRC	31 to 59% Ann Dprn
3	Low	<0.5% CRC	<30% Ann Dprn

Table 67: Matrix Linking Expenditure Grades to Deemed Infrastructure Health Grades

Deemed Infrastructure Health Grade		New/Upgrading Expenditure		
		High	Medium	Low
Renewals Expenditure	High	1	2	2
	Medium	2	3	4
	Low	4	4	5

The model was calibrated against a number of municipalities where detailed assessments of infrastructure value and condition have been carried out. Using this data, and the models indicated above, the value of assets in each condition grade can be determined.

To be able to establish the renewals backlog, the current status of the portfolio (as determined above) needs to be known, as well as where the line is drawn for a standard of service that is considered unacceptable. Consequently, if exacting standards are required, the renewal backlogs will be relatively high; alternatively, if poor standards are acceptable the backlog will be considerably less. The required standard is often linked to the criticality of an asset. For example, the condition of a critical water pump station should not be allowed to deteriorate to a point where the risk of failure is high, whereas it may be acceptable for a less important pump to be repaired after it has failed.

A criticality distribution (typical to most municipalities) has been assumed across the water/sanitation and electricity sectors, based on detailed assessments undertaken at several municipalities.

Table 68: Assumed Asset Criticality Distribution

Asset Criticality	Water and Sanitation	Electricity
Critical	15%	20%
Important	15%	25%
Non-critical	70%	55%

To illustrate the central importance of defining minimum standards (in this case of condition), the backlogs were calculated, expressed as the minimum percentage of assets of the various levels of criticality that may be permitted to deteriorate to poor and very poor condition.

Table 69: Three Scenarios of Minimum Standards

Criticality	Maximum % in Poor and Very Poor Condition		
	#1 Optimum	#2 Suboptimal	#3 Absolute Baseline
Critical	0	5	10
Important	5	10	20
Non-critical	20	30	45

The three scenarios are characterised as optimum (desirable), suboptimal (can be considered acceptable under duress), and absolute baseline (where there could reasonably be cause for widespread concern and anxiety).

Figure 26 is based on the above models and illustrates the relative trade-off between the renewal backlogs that a municipality needs to tackle, given current health status and depending on its future aspirations for standards.

Figure 26: Relationship of Renewals Backlog Based on Standards Deemed Acceptable (Water and Sanitation)

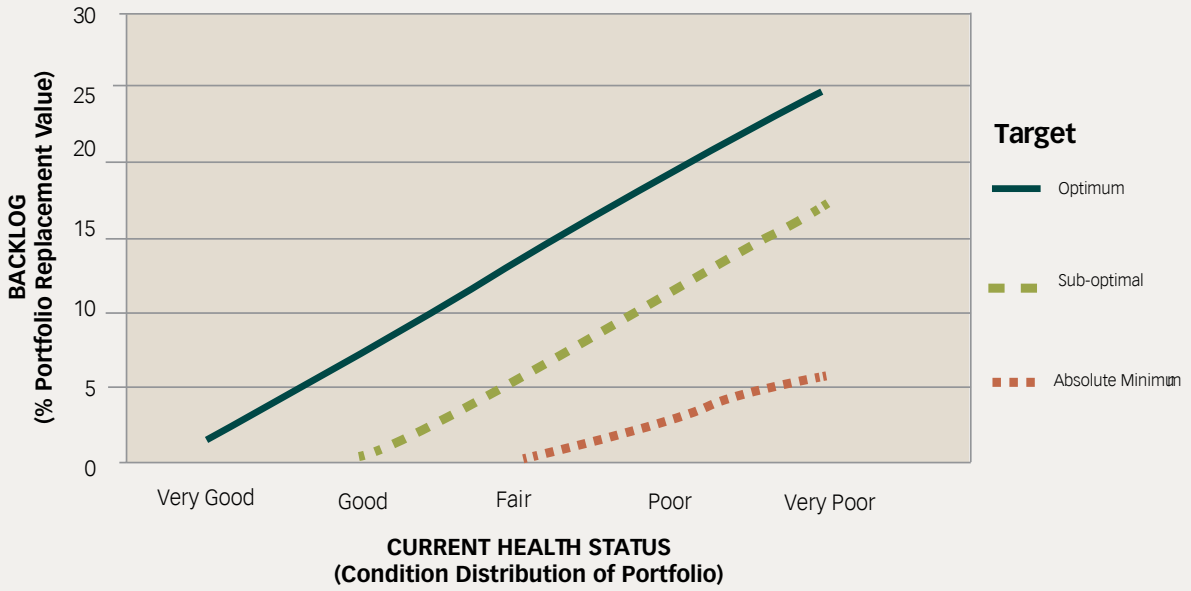
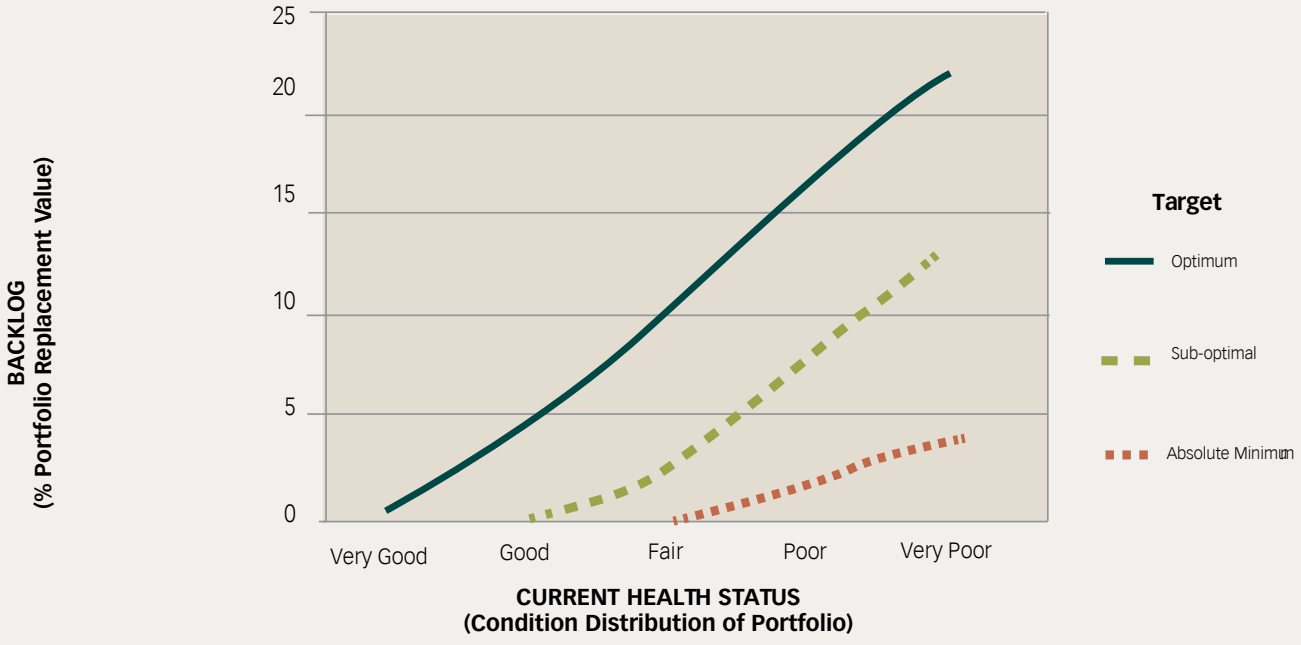


Figure 27: Relationship between Renewals Backlog Based on Standards Deemed Acceptable (Electricity)



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The inertia of a growing capital renewals backlog is evident from Figures 26 and 27. If municipalities aspire to anything resembling optimum standards of infrastructure, they have to invest early in significant and consistent capital renewal programmes. Otherwise, pulling out of the downward trend will become increasingly challenging (both financially and capacity-wise). Even municipalities with infrastructure currently in a "fair" state of health are in deep trouble and committed to a path of worsening standards, unless they make a very significant investment to turn the tide. In this scenario, and depending on the target standards, municipalities will need to invest 10 per cent of the replacement value of all existing infrastructure to address the backlog in water and sanitation and 13 per cent for electricity (a higher figure due to the relatively higher criticality of the equipment). It should be noted that these investments, which are required to address backlogs, are over and above the amount being spent on ongoing capital renewals.

Estimated capital renewal backlogs (water and sanitation, and electricity portfolios)

Applying the model to the water and sanitation, and electricity sectors provides some insight into the nature and extent of the capital renewals backlog in local government (Table 70).

Table 70: Summary of Estimated Capital Renewal Backlogs

Target Condition Standard		Water and Sanitation			Electricity		
		Amount	% CRC	Years[6]	Amount	% CRC	Years
1	Optimum	R 39 billion	19%	10	R 41 billion	22%	11
2	Sub-optimal	R 19 billion	10%	5	R 25 billion	11%	7
3	Absolute Baseline	R 4 billion	3%	1	R 8 billion	5%	2

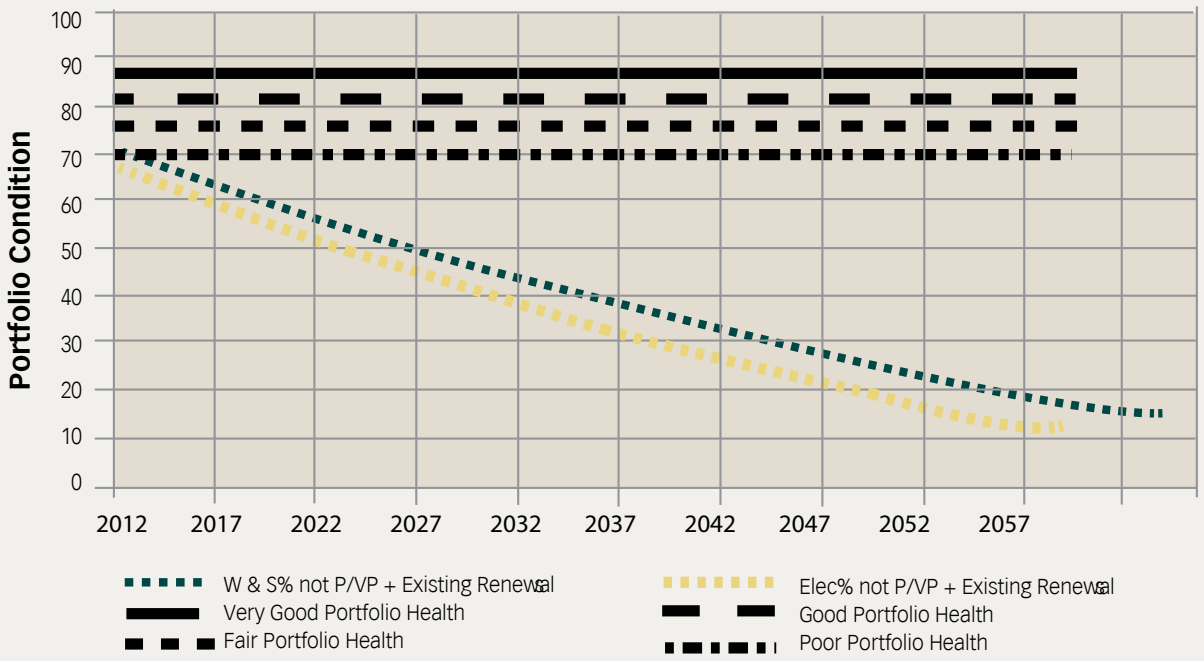
The amounts exclude portions of the networks provided by external service providers (Water Boards and Eskom). The years' backlog indicated in the table are based on the average annual depreciation (assuming that the infrastructure has been fair-valued).

Table 70 indicates a backlog of R20–R40 billion in each of the sectors in municipalities (depending on the target standards). This may be compared to depreciation (of fair value) of around R4–R5 billion per year per sector. Based on the data at hand, current levels of investment in capital renewals are R600–R800 million per year (about 10 per cent of the total capital expenditure). Therefore to turn the tide towards a position of tolerable infrastructure standards will require a capital renewals programme – specifically to address the backlog – of a magnitude higher than current budget allocations (at least R4 billion per annum) sustained for a period of five to ten years. This is in addition to the need to ramp up ongoing provisions for capital renewal, to a level that depends on the portfolio health of each municipality. However, the level should not be less than half the depreciation of fair value, as otherwise the backlog can be expected to recur (estimated to be another R2–R3 billion per year nationally per sector).

Rate of deterioration of infrastructure

For planning purposes, the pace of infrastructure deterioration can be modelled based on the expected useful life of infrastructure considered industry norms (for example, 15 years for a small pump or 50 years for a transformer). However, in practice, the assets are often pushed to the limit – with severely constrained capital budgets and stretched maintenance. Figure 28 illustrates the pace of deterioration, based on an additional 25 per cent of useful life being achieved over and above target norms. It shows the sharp decline in average portfolio health that can be expected,

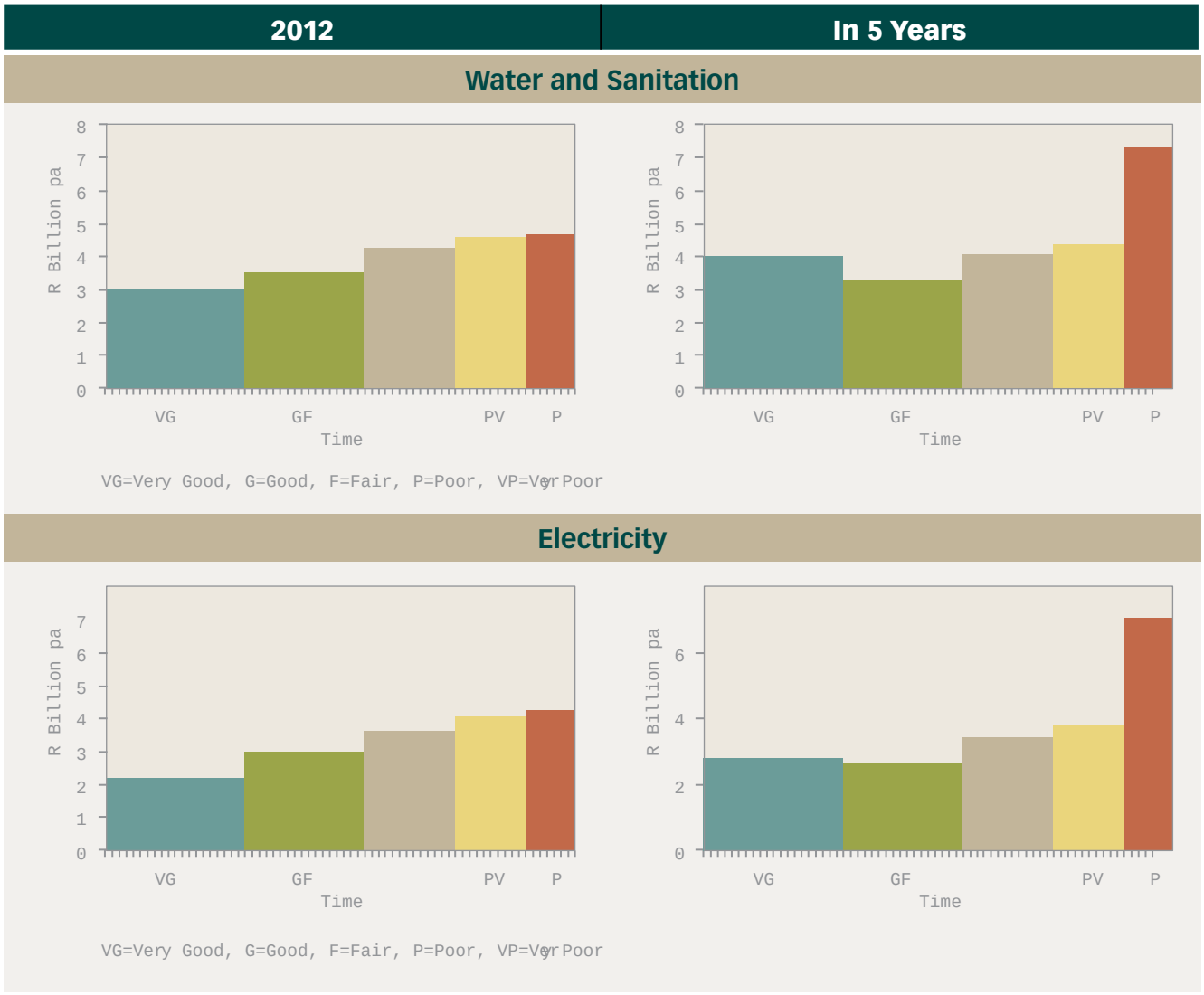
Figure 28: Deterioration of Infrastructure Portfolio Condition at Current Investment Levels



given current levels of funding, and highlights the urgency of implementing a significant renewals programme. Of great concern is the need for an immediate injection (of some R12 billion according to Table 70) to avoid plunging below the "absolute baseline" (representing widespread concern and anxiety) within the next five years.

Figure 29 illustrates the condition of water and sanitation, and electricity infrastructure in both 2012 and what can be expected in five years' time, based on current investment levels and continued deterioration of the portfolios. In this scenario, the portfolio health further deteriorates from poor to very poor and the capital renewals backlog deepens, with a consequent need for an even more considerable capital renewals programme to restore acceptable standards.

Figure 29: Condition Distribution of the Infrastructure Portfolios Now and in Five Years (Given Current Investment Levels)



Concluding notes on capital renewal needs

A clear distinction has to be made between "maintenance" activities that help infrastructure assets reach their expected lives, and the "capital renewal" required at the end of the life to replace (or re-construct) the items. At some point, maintenance is quite simply not enough. A model was indicated that defines capital renewal – although data is not available to directly measure its extent in a reliable fashion. Therefore, proxy data was assembled, based on detailed assessments undertaken at a number of municipalities that ranged from small rural ones to metros. The model clearly illustrates the poor state of health of infrastructure in municipalities and estimates the nature and extent of the capital renewals backlog. A dedicated programme to address backlogs in capital renewal needs to be established urgently, to turn the tide towards achieving acceptable and sustainable infrastructure standards in municipalities. The expenditure required needs to be greater than current levels and must be sustained for a period of more than five years. This is in addition to the need to make ongoing provision for regular capital renewals, so that the backlogs are kept to manageable levels and acceptable standards of condition are maintained.

8.4.4 Maintenance Needs

Benchmark provisions

Maintenance includes those actions required for an asset to achieve its expected useful life. Maintenance can be planned or unplanned. Planned maintenance includes measures to prevent known failure modes and can be time- or condition-based. Repairs are a form of unplanned maintenance to restore an asset to its previous condition after failure or damage. Expenses on maintenance are considered operational expenditure.

In South Africa, finance officers benchmark maintenance provisions as a percentage of the operating budget. The percentage used differs depending on whether it is applied by the Institute of Municipal Finance Officers (IMFO), National Treasury or a particular municipality, but typically ranges between five and ten per cent of the operating budget. While this practice focuses some budgetary attention on maintenance, it is fundamentally flawed. Maintenance needs are a function of the nature, extent, service commitments (e.g. committed response times to asset failures, such as attending to a burst water pipe of a diameter greater than 80mm within two hours) and compliance requirements. In contrast, the current method used by finance officers assumes that a municipality will generate sufficient revenue and has balanced cost and revenue streams. This is not true in the local government space, where the system of intergovernmental transfers means that assets are created without corresponding increases in municipal revenue, partly because much of the infrastructure created is of a non-revenue generating nature (e.g. community halls, libraries and recreation facilities), while much of the infrastructure with revenue potential (e.g. electricity and water) is subsidised and characterised by limited cost recovery.

The International Infrastructure Management Manual (NAMS and IPWEA, 2011) advocates that maintenance budget needs (and also renewal budget needs) should be estimated as a percentage of CRC, to be further refined based on network-level lifecycle strategies, the cost structure of the municipality, statutory requirements (e.g. annual hydraulic testing requirements, which is a form of predictive maintenance), asset criticality, risk appetite and asset failure information (cost of operations, utilisation, capacity and condition). In the event that the real asset maintenance needs exceed the available budget, the deficit should, in terms of accounting practice, be recorded as deferred maintenance.

Likewise, international best practice (as advocated in the International Infrastructure Management Manual) holds that asset renewal needs should be estimated against the CRC of an asset. Accounting standards also require depreciation to be calculated against the cost, not the carrying value, of the asset. Hence asset values, and specifically replacement costs, assume particular importance when estimating asset lifecycle needs. As a standard rule, the accumulated depreciation provides an indication of the asset renewal needs. Thus, in order to retain the community wealth vested in assets, municipalities should annually spend as much on renewals as the depreciation charge for that financial period. Table 71 outlines benchmark provisions against which the actual performance of municipalities can be measured.

Table 71: Benchmark Municipal Infrastructure Maintenance Needs

Asset class	Current replacement cost	Depreciated replacement cost	Annual maintenance
Roads and stormwater	385,392,106,000	186,938,883,250	4,239,313,166
Water and sanitation	254,319,938,000	126,736,833,330	4,577,758,884
Electricity	398,282,940,000	194,006,152,800	10,355,356,440
Community facilities and operational buildings	118,621,919,500	58,165,679,475	2,491,060,310
Totals	1,156,616,903,500	565,847,548,855	21,663,488, 800

Adequacy of maintenance provisions

The international norm for maintenance provisions is about two per cent of CRC per annum, although this ranges from sector to sector: from as low as 1.1 per cent for community facilities and operational buildings to as high as 2.6 per cent for electricity. Budgeted maintenance provisions increased substantially, from R6.44 billion in 2005/06 to R16.99 billion in 2011/12, an increase of 255 per cent.[83] Maintenance spending weakened from above 80 per cent in the period 2003–2008, to as low as 75 per cent in 2008/09, subsequently improving to 78 per cent in 2011/12. Average maintenance spending from 2005 to 2012 was 79 per cent of budgeted expenditure.

Over the corresponding period, the total amount not spent on maintenance – what should be referred to in annual financial statements as deferred maintenance – was R16.46 billion. This is equivalent to the 2011/12 maintenance budget, which means that one year's maintenance is foregone every six years.

However, if measured against the accepted international benchmark, then municipalities should have spent R21.66 billion on maintenance in 2011/12. This translates into an annual budget gap of R5.27 billion and a spending gap of R8.94 billion.

[83] Figures have not been adjusted for inflation.

Table 72: Municipal Maintenance History 2005/06–2011/12 (current prices at the intervals recorded, measured in R'000)

Repairs and Maintenance per Province		Jun-05	Jul-06	Aug-07	Sep-08	Oct-09	Nov-10	Dec-11
	Final Budget	621.313	692.622	895.83	907.459	1,061,327	1,241,284	1,451,755
EC	Actual	562.425	665.918	652.909	822.062	889.56	1,025,268	1,181,679
	Benchmark							2,089,960
	Final Budget	234.946	290.018	211.86	371.231	425.522	487.752	559.084
FS	Actual	185.065	207.98	244.669	298.528	289.929	317.691	348.112
	Benchmark							2,500,042
	Final Budget	2,147,414	2,463,834	2,773,475	3,679,083	4,181,321	4,752,121	5,400,841
GAU	Actual	1,486,222	1,729,375	2,268,495	2,837,889	2,827,947	3,224,750	3,677,231
	Benchmark							6,407,358
	Final Budget	1,473,815	1,661,526	2,069,306	2,524,814	2,945,287	3,435,784	4,007,967
KZN	Actual	1,180,030	1,314,667	1,789,413	2,231,214	2,753,341	3,217,932	3,760,917
	Benchmark							3,653,090
	Final Budget	218.527	271.486	314.623	307.84	341.681	379.242	420.932
LIM	Actual	202.136	244.619	274.775	346.39	379.861	438.76	506.791
	Benchmark							1,488,155
	Final Budget	218.159	279.959	325.441	423.664	526.617	654.588	813.656
MPU	Actual	220.448	231.699	304.761	397.597	425.108	513.781	620.951
	Benchmark							1,264,230
	Final Budget	114.816	120.33	105.344	109.937	111.518	113.122	114.749
NC	Actual	73.195	83.653	94.067	130.577	136.088	150.408	166.235
	Benchmark							384.358
	Final Budget	126.98	173.311	193.757	256.515	301.131	353.508	414.994
NW	Actual	123.991	137.951	193.664	209.485	201.325	233.972	271.914
	Benchmark							1,201,038
	Final Budget	1,280,644	1,251,409	1,676,497	1,877,803	2,246,282	2,687,068	3,214,349
WC	Actual	1,185,341	1,310,069	1,217,137	529.64	1,381,721	1,737,476	2,184,827
	Benchmark							2,675,252
Budgeted all		**6,436,615**	**7,204,494**	**8,566,133**	**10,458,346**	**12,140,686**	**14,104,469**	**16,398,327**
Spent all		**5,218,853**	**5,925,931**	**7,039,890**	**7,803,382**	**9,284,880**	**10,860,039**	**12,718,657**
% budget spent		**81%**	**82%**	**82%**	**75%**	**76%**	**77%**	**78%**

No category of municipality managed to spend their maintenance budget. District municipalities budgeted above but spent close to benchmark requirements. Metropolitan municipalities budgeted more or less on a par with benchmark requirements but underspent on maintenance. Local municipalities budgeted about 42 per cent and spent only 33 per cent of what was required.

Figure 30: Budgeted vs. Actual vs. Benchmark Maintenance per Category of Municipality

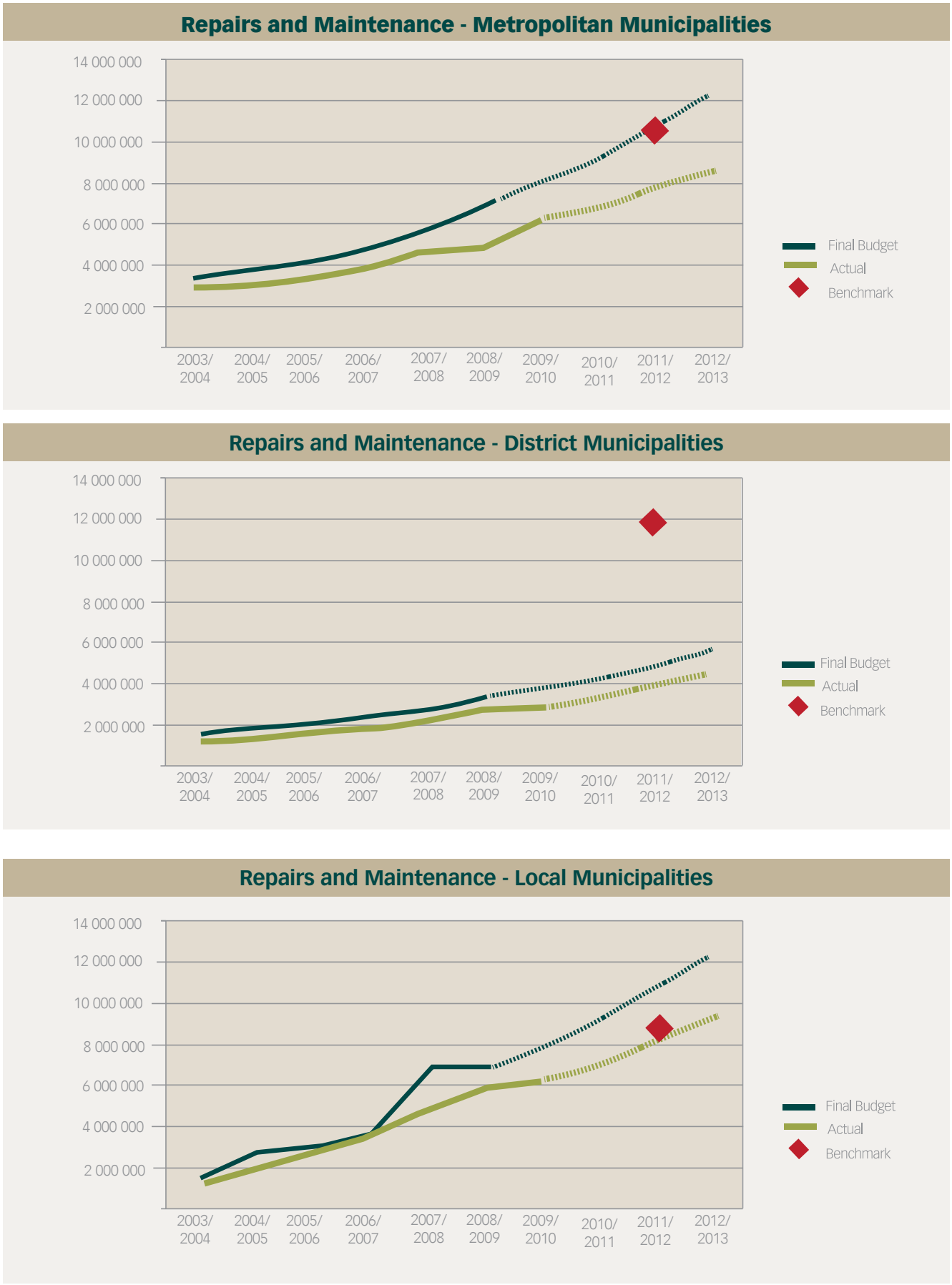
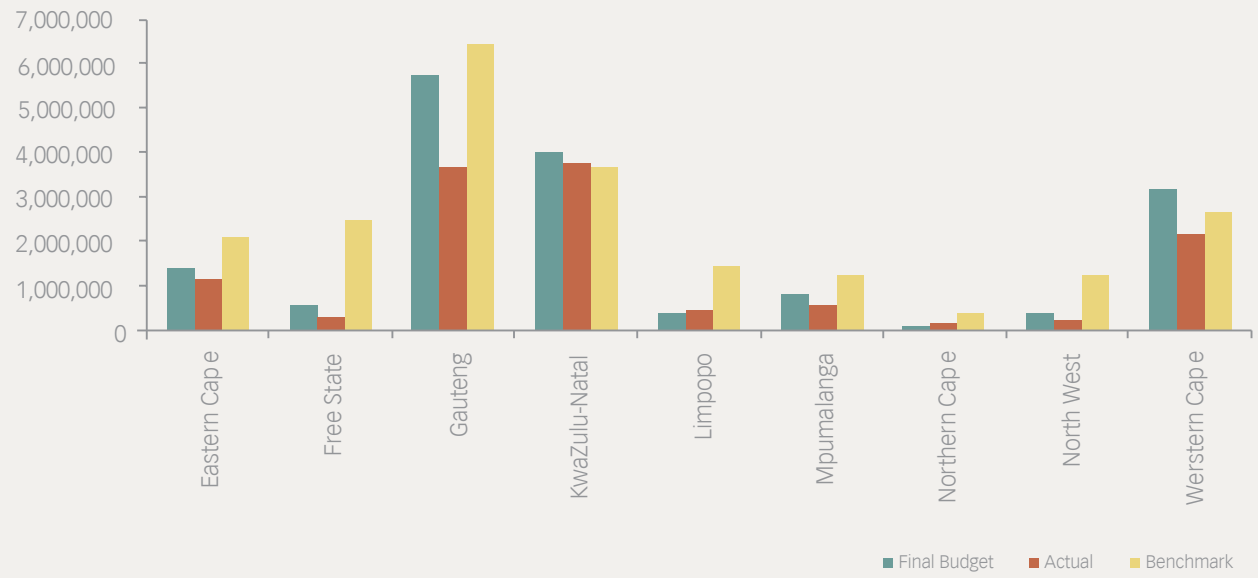


Figure 31: Maintenance Provisions and Spending Per Province 2011



It should be noted that the revised local government equitable share (LES) formula now makes provision for funding maintenance, which is allocated 10 per cent of the basic services component. There is no way to enforce that the money is spent on the identified items, as the LES allocation is discretionary. However the following alternatives exist:

- Update the Municipal Planning and Performance Management Regulations (established in terms of Section 43 of the Municipal Systems Act) to include reporting on repairs and maintenance. Municipalities are legislatively bound to report regularly on the performance areas outlined in terms of this regulation. Updating these regulations to include reporting on maintenance and renewals can assist the oversight of municipal operations.
- Consider establishing an incentive grant for municipalities to reward spending on items (such as maintenance and renewals) that assist in ensuring, among other things, the long-term sustainability of a municipality.

Cautionary note on asset maintenance and renewal figures

Care must always be taken when reading and interpreting figures on asset maintenance and renewal. Real spending on asset maintenance may be higher than reported, since the cost of maintenance staff (if any) is typically included elsewhere, under staff costs. Furthermore, maintenance is recorded as a lump sum in annual financial statements and includes spending on all assets, including movable assets (e.g. vehicles and machinery) and other assets (e.g. social and staff housing and investment properties). The benchmark provisions provided in this chapter are limited to immovable infrastructure assets, community facilities and operational buildings. The benchmark maintenance provisions also represent optimised costs, which is not the case in local government (as shown in the next section).

Renewal is often funded from the operating budget due in part to ignorance on the correct classification of maintenance versus renewal, and in part to the difficulty in securing capital funding for renewal. Therefore, on balance, the maintenance funding gap reported in this chapter is probably

a reasonable estimate. Annual depreciation is greater than the total capital budget of local government intended for new asset creation, upgrading and renewal. So, even if all capital were employed for asset renewal, a growing renewals backlog would still be there.

Municipal infrastructure spatial vulnerability

The condition of municipal infrastructure is vulnerable in particular locations because of a number of factors. For example, coastal infrastructure is generally subject to higher levels of corrosion than inland infrastructure. Likewise, infrastructure in certain areas may be at greater risk due to flooding and a basket of other natural and human causes. The spatial vulnerability of municipal infrastructure can result from:

- Significant population increase or decline in a particular municipal area. Where higher-than-average population growth is recorded, financial and administrative resources struggle to cope with infrastructure development pressures to the detriment of asset care. Where significant population decline occurs, the infrastructure and asset-care needs remain constant, but there are fewer households to pay for asset-care activities (whether directly through service charges or indirectly through the equitable share allocation based on the number of households).
- Significant economic growth or decline in a particular municipal area. Substantial economic growth generally requires economic infrastructure before such growth materialises. Where this is the case, municipalities are likely to direct scarce capital and limited administrative capacity to enable growth, again to the detriment of asset care. Where significant economic decline is experienced, the customers' ability to pay for services normally declines, property rates' potential decreases, outstanding debtors decrease, and so municipalities may have to trim their asset-care programmes.

Figure 32 presents average annual changes in population in municipal areas across South Africa for the period 2001–2011.[84] Areas highlighted in green show population decline, yellow presents neutral growth, and red high population growth.[85] The movement in population between municipal areas and provinces is significant. The urbanisation trend is continuing, with metros (in particularly Gauteng, Cape Town and eThekwini) receiving economic migrants who require municipal infrastructure services (and housing). Robust economic towns (typically secondary cities) and towns with mining activities are also experiencing strong population growth.

[84] Past two Census results.

[85] Ranging between 0.1 per cent (marginal positive population growth) to 1.1 per cent (upper limit of average national population growth).

Figure 32: Population Shifts 2001–2011

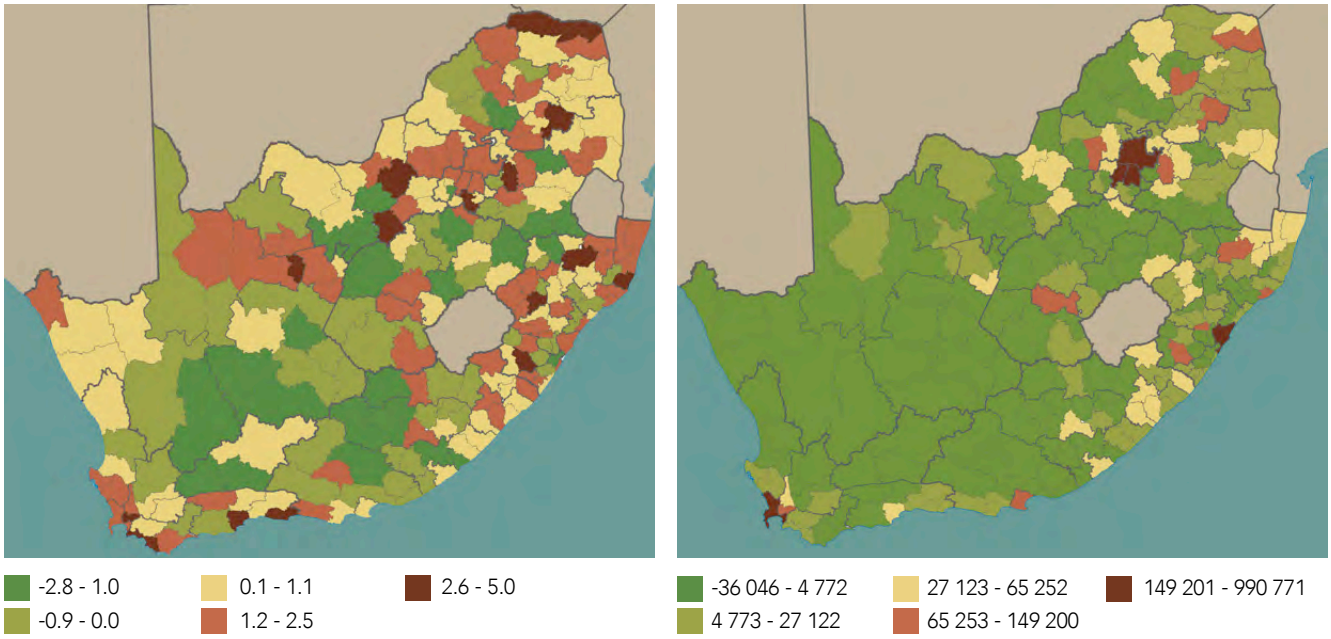


Figure 33 shows the growth in gross value added (GVA) in municipal areas across South Africa. The areas in dark green, covering much of the surface of the country, have had very slow growth in GVA since 2001. In these areas, the local economies under-perform compared to the national economy and residents are on average becoming poorer.

Figure 33: Total Change in GVA 2001–2011

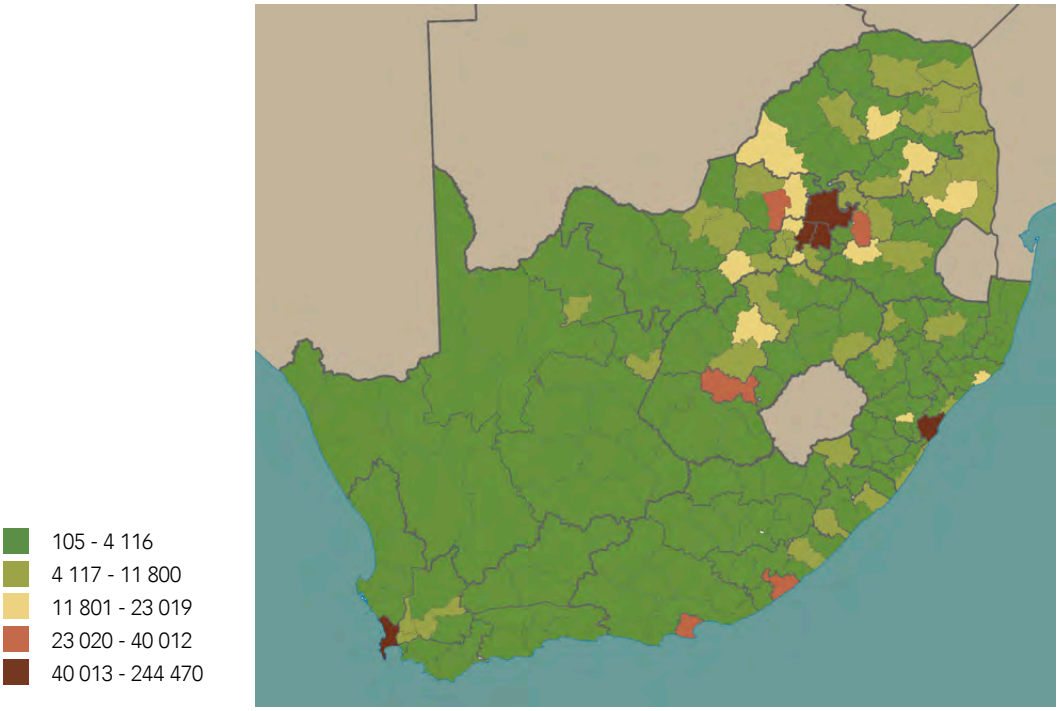


Figure 34 is a spatial representation of likely current and future municipal infrastructure pressure points, resulting from large-scale economic and/or infrastructure development.[86]

[86] Compiled from initiatives listed in the National Development Plan.

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Figure 34: National Development Plan Projects

8.4.5 Causes of Insufficient Spending on Asset Care

The results presented in the preceding sections indicate significant under-spending on both asset maintenance and renewals. However, given that municipalities tend to spend less than 80 per cent of their maintenance budget, it is questionable whether providing additional funding will have any meaningful impact at this point. A number of potential factors could have contributed to less-than-optimal maintenance spending: the recent recession, the deemed discretionary nature of maintenance and competing priorities, increases in bulk commodity prices (bulk electricity and water prices), skills shortages in technical professions, the quality of the regulatory regime and inadequate management practice.

Table 72 (see page 214) shows that budgeted maintenance provisions increased throughout the recent recession that started in 2008/09 and continue to increase. At more or less the same time, bulk commodity prices started escalating rapidly. The only real effect evident was a dip in spending performance. This can conceivably be attributed to less cash on hand, as consumers struggled to pay more for municipal bills while also dealing with the effect of the recession. Since then, maintenance spending performance has improved somewhat to about 79 per cent. Over the longer term, prior to the recession and bulk commodity price increases, municipalities spent at best about 82 per cent of their maintenance budgets.

Some municipalities may have suffered from an inadequate supply of technical skills and artisans, such as electricians and plumbers. While the country is acknowledged to have a shortage of

artisans, at local government level the opportunity for economies of scale in maintenance operations was made possible when over 780 municipalities were amalgamated into 284 municipalities in 2000 – the number has since reduced further, to 278. At the same time, the DWA transferred staff along with water supply schemes to local government. Many of these schemes have since been consolidated and are now less labour intensive. Whatever the case, a recent private initiative to repair potholes in Johannesburg showed that capacity does exist to deal with maintenance, and focused attention at reasonable cost can make a real difference.

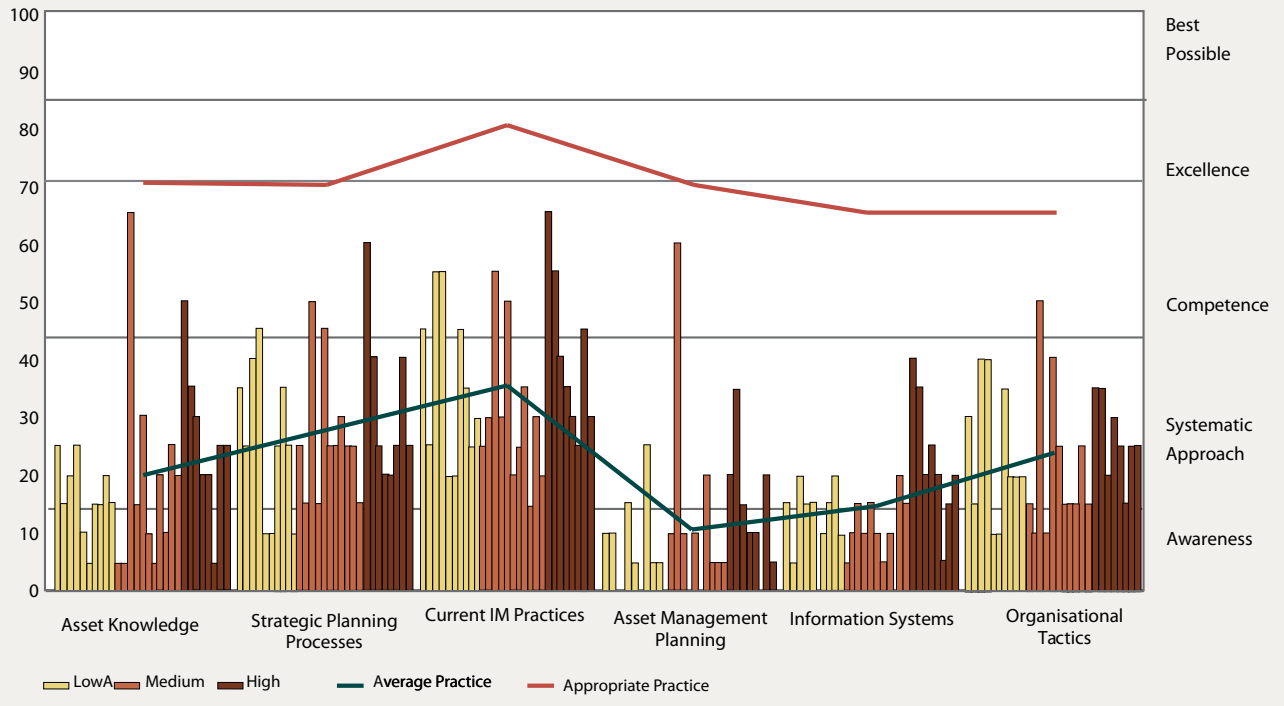
It appears that the quality of the regulatory regime and inadequate management may significantly contribute to the underfunding of maintenance and renewal activities.

State of asset management practice

Infrastructure asset management can be defined as: "The process of decision-making, planning and control over the acquisition, use, safeguarding, and disposal of assets to maximise their service delivery potential and benefits, and to minimise their related risks and costs over their entire life" (Boshoff et al. 2007:v).

What follows are summarised results of assessments of structured infrastructure asset management practice conducted at 29 municipalities.[87] The assessment contains 227 criteria across the categories of asset knowledge, strategic planning, current asset management practice, asset management plans, information systems and organisational tactics. These criteria are based on best practice, as advocated in the International Infrastructure Management Manual, and scoring has been calibrated to local conditions (local legislation, practice guides and standards).

Figure 35: Summarised Asset Management Practice Results for 29 Municipalities



[87] Representing more than 10 per cent of municipalities

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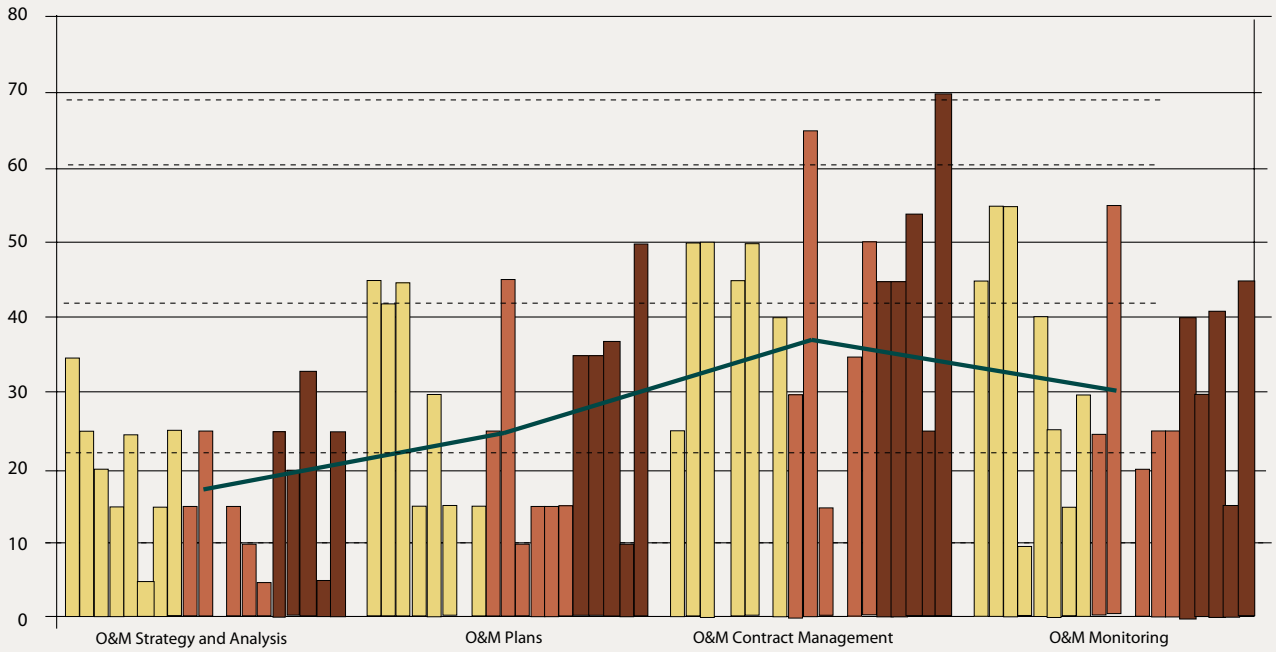
On average all municipalities (including high-capacity municipalities whose scores are represented in the red bars) score below 50 per cent in all categories of asset management practice. Of great concern is that, in many cases, municipalities are uncertain of the extent, location, composition, physical attributes and asset-care needs of their infrastructure assets and, hence, are not in a position to plan and budget properly for asset maintenance and renewal (Boshoff, 2009). Figure 36 drills down further into current asset management practice, focusing specifically on operations and maintenance practices.

Figure 36: Summarised Results of Operations and Maintenance Practices



As Figure 36 shows, little is done by way of operations and maintenance strategies. The scores for operations and maintenance practices are below standard, based on initial operating manuals provided by contractors, but not generally applied in practice. The scores for operations and maintenance strategy, analysis and plans indicate that municipalities are not in a position to properly estimate asset maintenance needs. Municipalities in general attained the highest scores in the category of operations and maintenance contract management, which entails having arrangements in place for contractors to conduct maintenance activities, and to keep emergency spares on hand for reactive maintenance purposes.

Various sectoral reports confirm the existence of inadequate planning practice, although there are statistical differences in quantitative results due to the scope, sample and measurement techniques employed. For example, according to the National Energy Regulator of South Africa (NERSA, 2011:9), 86.7 per cent of municipalities with electricity distribution licences have maintenance budgets, although only 53.3 per cent have a National Rationalised Specification 082 maintenance strategy in place. With respect to water, the most recent Blue Drop (water) assessments indicate that 35 per cent of municipalities scored 50 per cent or less for asset management practice. The corresponding figure for sanitation asset management is 48 per cent.

Quality of legislation, the regulatory regime and municipal affordability

The GIAMA regulates the management of immovable assets of national and provincial governments in South Africa, but no corresponding legislation applies in local government – despite the sector boasting infrastructure assets with a replacement value exceeding R1 trillion; assets that are central to economic production and growth, as well as the nation's social upliftment and wellbeing. The Municipal Finance Management Act (South Africa, 2003) limits itself to the requirement that the accounting officer must develop, implement and maintain a system of internal control and safeguarding over assets. This is normally taken to mean that a municipality must implement, maintain and update an asset register, and take basic measures to safeguard the assets. The Municipal Systems Act (South Africa, 2000) provides for aspects such as infrastructure feasibility studies, investment planning and affordability assessments. Yet no piece of local government legislation adequately encompasses the scope of asset management, as defined in this subsection, required in terms of accepted international best practice or when measured by ISO asset management standards.

As noted in Section 8.2.1, in the period 2007–2008 both CoGTA and National Treasury published asset management guidelines. At the time, regulatory requirements for asset accounting were much simpler, and few case studies were available to enrich the guidelines and provide a proper South African context. Despite much development in the intervening years, neither of these guidelines was updated. When CoGTA (then DPLG) prepared the guidelines, a supportive system of capacity building and implementation monitoring was envisioned. This did not happen. To date, the skills deficit in asset management practice continues, with no defined prevailing local best practice and very little regulatory oversight. What oversight exists is limited to compliance with relevant accounting standards on assets.

The system of intergovernmental transfers has made it possible for municipalities to accelerate the rollout of services, in particular to the poor, through the creation of vast stocks of infrastructure and community facilities. Several capital grants require the submission of business cases that must, among others, prove that a municipality has the administrative and financial capacity to operate and care for the asset to be constructed. However, in practice this does not work. Applicant municipalities and the departments that consider grant business plans pay little attention to lifecycle considerations in the planning stages and less so to the accumulated effect of additional assets on a municipality's financial and administrative capacity. This is because the accumulated effect can only be assessed through a network-level asset management plan and a comprehensive municipal infrastructure plan. Most municipalities do not have these plans in place, although most recognise the need for them. As a result, municipalities create some assets that they are unable to care for, or create assets that result in available maintenance resources having to be spread more thinly, to the detriment of revenue-generating infrastructure.

The annual budget gap of R5.27 billion and spending gap of R8.94 billion (Table 73) is likely to increase. At the present rate of capital creation, the spending gap will increase by about R650 million per annum, while depreciation provisions will need to increase by over R1 billion per annum.

Table 73: Additional Maintenance Burden Created as a Result of Capital Expansion (R'000)

Sector	2011/12	2012/13
Electricity	4,774,726	4,552,177
Water and sanitation	8,941,959	8,209,072
Roads and stormwater	9,173,015	8,847,006
Other	9,992,692	10,633,823
Total capex	32,882,392	32,242,079
Additional annual maintenance burden created	657,648	644,842
Accumulated additional annual burden	657,648	1,302,490

8.5 Conclusions

1) Municipalities underspend on both asset both maintenance and renewals.

- Due to the crude manner of financial reporting, no consolidated data exists on maintenance spending per sector. Budgeting and spending on maintenance is reported as a single amount for a municipality as a whole.
- Municipalities underfund and under-spend on infrastructure maintenance: in 2011/12 municipalities under-budgeted for maintenance by some R5.27 billion. The total maintenance spending gap, measured as the difference between benchmark requirements and actual spending, is estimated to be in the order of R8.94 billion per annum.
- The measure employed to determine maintenance funding needs is flawed. The current measure (percentage of operating budget) should be replaced by the measure percentage of CRC.
- Infrastructure renewal (asset recapitalisation) is underfunded. The total annual capital budget of local government amounts to R32.88 billion (2011/12), while annual depreciation is around R31.88 billion. Assuming that one-third of the capital budget is directed at infrastructure renewal, the annual net depletion of existing asset value is in the order of R21.03 billion, not taking into account the probable renewals backlog of some R26 billion.
- The probable renewals backlogs for the water and sanitation sector, and electricity sectors are estimated at R20–R40 billion per sector, depending on the service standards required.
- The revised LES now factors in spending on maintenance as part of the basic services component.
- In terms of the general key performance areas (as prescribed in terms of Section 43 of the Municipal Systems Act) municipalities are required to report on aspects that relate broadly to what the LES intends funding, such as delivery of basic services. However, these key performance areas have not as yet been updated to be in line with the latest revision to the LES

2) Given current regulatory, planning and institutional arrangements there is limited value in increasing asset care funding provisions, despite the need to do so.

- At present, there is little point in increasing asset care provisions through fiscal measures, as the planning instruments for determining and allocating funding are largely non-existent.
- Municipalities on average spend 79 per cent of their maintenance budgets.

- Research indicates that the majority of municipalities do not have in place formal costed maintenance strategies or asset lifecycle strategies.
- The lack of formal asset management plans detailing lifecycle strategies and plans is the likely cause of under-spending on asset care. In the absence of these plans municipalities cannot properly budget for (or schedule) specific asset-care tasks and interventions.

3) In the absence of an intervention, the practice of asset stripping will become entrenched.

- While the maintenance and renewals backlog is mounting, and the condition of existing municipal infrastructure is deteriorating, additional assets continue to be constructed. The result is increased asset maintenance and renewal funding needs, often without a commensurate increase in municipal revenue.
- Based on present capital investment levels, maintenance funding will need to increase by around R650 million per annum, and additionally depreciation provisions will need to increase by over R1 billion per annum.
- Infrastructure and other community facilities created through the grant system are an operating and maintenance burden, as well as a future renewals burden, without a commensurate increase in operating revenue.
- The results are that maintenance and renewal needs and backlogs continue to grow, and asset stripping is becoming de facto practice because asset care is continually underfunded.

4) Local government asset management regulatory coverage is extremely limited and fragmented.

- In all three spheres of government, the current regulatory regime does not have in place the planning instruments, skills or discipline to assess the accumulated revenue and expenditure impacts of capital (in the context of asset portfolio-level lifecycle implications). Asset management performance is assessed through compliance with accounting standards that focus on form as opposed to substance.
- Local government is in dire need of legislation similar to GIAMA, but more extensive and up-to-date, that covers the wider scope of immovable assets in local government, developments in international asset management standards, supporting guidelines and skills development.

8.6 Recommendations

With respect to **maintaining and rehabilitating water and electricity distribution infrastructure,** the Commission recommends that:

- National Treasury, in collaboration with relevant stakeholders such as DCoG and the South African Local Government Association (SALGA) develops local government-specific infrastructure asset management legislation, similar to the Government Immoveable Asset Management Act at national and provincial level. The proposed legislation should:

  - Cover decision-making, planning and control over the acquisition, use, safeguarding, and disposal of local government assets, to maximise their service delivery potential and benefits and to minimise their related risks and costs over their entire life.

  - Define asset management practices appropriate to the different categories of municipality, given the nature, extent and complexity of infrastructure, the financial and administrative capacity of the municipality, and other relevant factors.

- National Treasury devises local government infrastructure asset management guidelines. These guidelines should be positioned within the broader system of capacity development and performance oversight. Technical assistance should be provided to municipalities to prepare and implement credible infrastructure asset management plans.
- Provincial and national authorities must increase scrutiny of the operating implications of capital funding so as to ensure that municipalities are able to adequately maintain and renew infrastructure.

8.7 References

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http://www.info.gov.za/speech/DynamicAction?pageid=461 &tid=55960.

Appendix 1: Suggested Reading

Author	Title	Date Published	Publisher	Place
Briceno-Garmendia, C.	Financing Public Infrastructure in Sub-Saharan Africa: Patterns and Emerging Issues	2008	The World Bank	Washington DC
City of Ekurhuleni	State of Energy Report – Ekurhuleni	2011	City of Ekurhuleni	Ekurhuleni
City of Tshwane/ Africon	State of Energy Report – Tshwane	2006	City of Tshwane	Pretoria
Creamer Media	Infrastructure Dialogues	2011	Creamer Media	Johannesburg
Department of Energy	Annual Report	2011	Government Printers	Pretoria
Department of Energy	Revised Strategic Plan	2011	Government Printers	Pretoria
Department of Public Works	The National Infra-structure Maintenance Strategy	2007	Construction Industry Development Board (CIDB)	Johannesburg
Department of Water Affairs	2012 Blue Drop Report	2012	Government Printers	Pretoria
Department of Water Affairs	2011 Green Drop Report	2011	Government Printers	Pretoria
Department of Water Affairs	Draft National Water Resource Strategy	2012	DWA	Pretoria
EDI Holdings	Approach to Distribu-tion Asset Manage-ment (ADAM)	2010	EDI Holdings	Johannesburg
Financial and Fiscal Commission	Submission for the Division of Revenue	2011	FFC	Midrand
Heller, P.	The Underfinancing of Recurrent Develop-ment Cost	1979	IMF	Washington DC
Heller, P.	Operations and Maintenance, Public expenditure Handbook: A guide to public policy issues in developing countries	1998	IMF	Washington DC
LGSETA	Sector Skills Plan	2005	LGSETA	Johannesburg
NAMS	International Infra-structure Management Manual.	Version 3.0, 2006. ISBN No: 0-473-10685-X.	INGENIUM – IPWEA.	New Zealand.
National Treasury	National Treasury Local Government Database	Latest	National Treasury	Pretoria
NERSA	Electricity Supply Statistics for South Africa	2006	NERSA	Johannesburg
Ostrom, E, Schroeder, L.	Institutional incen-tives and sustainable development	1993		

Author	Title	Date Published	Publisher	Place
Rioja, FK.	Filling Potholes: Macroeconomic effects of Maintenance versus New Investments in Public Infrastructure	2003	Journal of Public Economics	Atlanta
SAICE	Infrastructure Report Card for South Africa	2011	SAICE	Johannesburg
SALGA	National Benchmarking Initiative Report	2007	SALGA	Pretoria
South Africa	The Municipal Systems Act	2000	Government Printers	Pretoria
South Africa	Government Immovable Asset Management Act	2007	Government Printers	Pretoria
Wall, K	Focus Note from the 2008 DBSA Infrastructure Barometer: Maintenance, Saving Money	2008	DBSA	Johannesburg