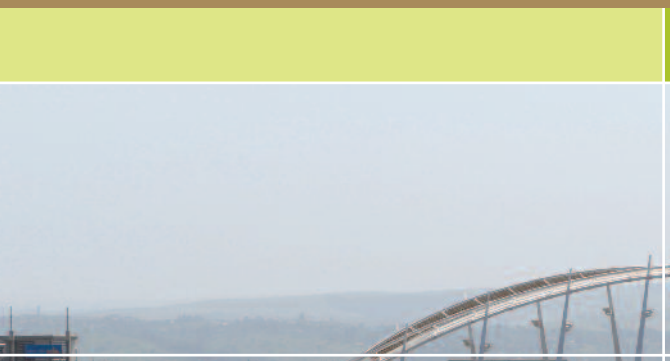
The Municipal Infrastructure Investment Framework (MIIF 7) for South Africa

Round 7 (2009 – 2010): A capital investment perspective



cooperative governance & traditional affairs
Department:
Cooperative Governance and Traditional Affairs
REPUBLIC OF SOUTH AFRICA

DBSA
Development Bank of Southern Africa

THE MUNICIPAL INFRASTRUCTURE INVESTMENT FRAMEWORK (MIIF 7) FOR SOUTH AFRICA ROUND 7 (2009 – 2010): A CAPITAL INVESTMENT PERSPECTIVE

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June 2011

Information Management Unit
Development Planning Division
Development Bank of Southern Africa
Midrand, South Africa

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First published in 2011 the Development Bank of Southern Africa, Development Planning Division,
Information Management Unit, 1258 Lever Rd, Midrand, 1685

June 2011

ISBN 978-1-920227-11-1

This document may be ordered from:
DBSA Knowledge Centre
Development Bank of Southern Africa
PO Box 1234
Halfway House
1685
South Africa

Telephone: +27 11 313 3911
Telefax: +27 11 318 1949
Website: http:///www.dbsa.org

Foreword

Funding infrastructure is a challenge. Municipalities are primarily responsible for establishing the infrastructure needed for delivering services and addressing the principal welfare issues of citizens whose behavior and decisions have important consequences. The South African government has committed its municipalities to remedying service backlogs by 2014. But in South Africa, estimates indicate that the cost of building, upgrading, rehabilitating and expanding the required water, transport, power and township infrastructure approaches and even exceeds R473 billion.

The capacity of traditional sources of finance for municipal delivery of services is exceeded by the demand for capital to fulfill this role. An expanded programme for procuring investment in, building, operating and renewing infrastructure within the realistic financial bounds of municipalities, while broadening the available funding portfolio, needs careful technical preparation. Moreover, theoretical modelling shows that borrowing of the order of R242 billion over a period of ten years, starting more than three years ago in 2007, is needed to keep pace with the dramatic challenges of the delivery of services. Such circumstances make it difficult to determine which dimensions and what sectors are most important for investment planning and in achieving greater service stability.

From as early as 1993 the Development Bank of Southern Africa (DBSA), in terms of its long-established mandate and to help make sense of or comprehend current transformations in the domestic infrastructure landscape, progressively has developed a recurrent Municipal Infrastructure Investment Framework (MIIF). The MIIF sets about proposing how investment in, and the management of, municipal services promotes the wider development objectives and economic growth.

Formulating the MIIF 7 continues to be a collaboration and partnership between the DBSA and the Department of Cooperative Governance (DOCG).

Since 1998 each recurrent stage or 'round' of the MIIF has been expanded to include a rural domain and apply a financial model, the municipal services financial model (MSFM) to calculate capital requirements in relation to the national operating account collectively.

Round 4 (2003 – 2006): Integrates the National Fiscal Framework Review of the National Treasury in assessing the financial status of distinct sub-categories of municipalities (A, B1–B4, C1 and C2).

Round 5 (2007 – 2008): Updates the national scale assessment with an emphasis on supporting improved municipal planning for infrastructure. Financial models, guidelines and training materials were consolidated and developed for Infrastructure Investment Planning (IIP).

Round 6 (2008 – 2009): Commenced larger-scale roll-out in supporting municipal IIP. Case studies were undertaken for 18 municipalities that demonstrated techniques adopted in the context of affordable and sustainable service delivery.

A Municipal Infrastructure Investment Framework (MIIF 7) for South Africa, Round 7 (2009 – 2010): A capital investment perspective is complemented by seven sector reports, on each of the sectors: housing (human settlements), water services, electricity, municipal solid waste, roads, public transport and municipal public services. The findings from each sector report have been discussed with the relevant national departments.

The MIIF also incorporates a training programme on infrastructure investment analysis, using the Municipal Service Financial Model (MSFM), and includes an update of the training material as well as further training sessions.

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Acknowledgements

Since its conception the Municipal Infrastructure Investment Framework (MIIF) has co-opted and relied on the knowledge of experts in their fields and this most recent round, Round 7, is no exception. Many have contributed to the making of this edition, making it the most ambitious since 1993. We wish to acknowledge, in addition to the many people involved in the process prior to Round 7, the special assistance and advice of those who have helped significantly to improve on earlier versions and make this current edition a valuable resource.

Our work on this project has benefited tremendously from the direction, guidance and collaboration of the Department of Cooperative Governance, the National Treasury and the associated national sector departments.

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Abbreviations

ASGISA	Accelerated and Shared Growth Initiative for South Africa
BER	Bureau for Economic Research
Cogta	Department of Cooperative Governance and Traditional Affairs – see DOCG below
DOCG	Department of Cooperative Governance. Formerly Cogta.
	The two abbreviations are used interchangeably with reference to the stage of the MIIF process
DOE	Department of Energy
DoHS	Department of Human Settlements
DOT	Department of Transport
DPD	Development Planning Division
DWA	Department of Water Affairs
EDSM	Electricity Demand-Side Management
EPWP	Expanded Public Works Programme
GEAR	Growth, Employment and Redistribution
GFS	Government Finance Standard of the Natonal Treasury
IMU	Information Management Unit
INEP	Integrated National Electrification Programme
MIG	Municipal Infrastructure Grant
MSFM	Municipal Services Financial Model
NDPG	Neighborhood Development Partnership Grant
PDG	Palmer Development Group
PTISG	Public Transport Infrastructure and Systems Grant
RDP	Reconstruciton and Development Programme
RTISG	Road Transport Infrastructure Systems Grant
SANRAL	South African National Roads Agency Limited
VIP	Ventilated Improved Pit

Executive Summary

The Municipal Infrastructure Investment Framework (MIIF) is an initiative of the Department of Cooperative Governance (DOCG) and the Development Bank of Southern Africa (DBSA) to assess the infrastructure investment needs of municipalities. The Municipal Infrastructure Investment Framework (MIIF 7) for South Africa comprises of:

Part 1: The updating of the Municipal Services Financial Model (MSFM) developed for infrastructure investment analysis; the application of this model in two municipal case studies to build on the experience with the practical application of the model.

Part 2: An update of the national financial analysis of the capital and operating account implications associated with the delivery of affordable and sustainable municipal services that address current backlogs and anticipated demand over a ten-year planning period (this report).

Part 3: The preparation of seven sector reports dealing with issues of housing and infrastructure investment in the following sectors: housing (human settlements), water services, electricity, roads, public transport, municipal solid waste and municipal public services. Accounts relating to the engagement with the relevant national sector departments are included.

Part 4: Ongoing support for the infrastructure investment analysis training programme, including the metros, local municipalities and service providers.

Part 5: Ongoing engagement relating to the establishment of geographical information systems (GIS) based municipal services access monitoring system.

Looking more broadly at the MIIF as a whole, as it has evolved over the past decade, the objectives are to:

- assess the amount of capital that is required to meet the municipal infrastructure delivery targets of government and to assess the options for ensuring that sufficient finance is available
- ensure that the infrastructure programme is financially sustainable, which implies that there is sufficient operating revenue to cover the operating and maintenance costs of infrastructure-related services
- support municipalities in the application of infrastructure investment analysis, linked to statutory municipal planning processes.

As with the previous rounds of the MIIF, this analysis is based on the application of the MSFM, which has been updated to take new policy developments into consideration and to make it more user-friendly. Further, the analysis takes into consideration the widely differing circumstances that exist across municipalities in South Africa. To this end, local municipalities have been divided into four sub-categories (A, B1 to B4)[1] and district municipalities into two sub-categories (C1 and C2)[2].

MIIF 7 places particular emphasis on interpreting the results of the financial analysis from the point of view of each of the main infrastructure sectors. Further effort has been made to continue the process of engaging with municipalities to build their capacity to undertake effective infrastructure investment analysis primarily through improvement and application of the training programme. The success of this ongoing support is becoming evident as several municipalities are voluntarily applying the MSFM to inform their own budgeting process[3].

1 In most of the analysis the reference point is the local municipality with the activities of the local and district municipality taken together.
2 This means that viability is assessed for local and district municipal activities together.
3 For example, eThekwini, Cape Town, Nelson Mandela Metro, Gamagara, Umsombvu and Theewaterskloof district municipality.

Table A: Backlogs with respect to levels of service

Service	Source and notes	Backlog (% with services below adequate)
Housing	The Department of Human Settlements currently defines the backlog with respect to housing as an informal dwelling and 30% of traditional dwellings. It has a range of figures for the actual number with MIIF using a figure of 2,140,000 households[4].	17% of households.
Water supply	The Department of Water Affairs based on its database.	9% of households.
Sanitation	The Department of Water Affairs based on its database.	24% of households.
Electricity	The Department of Energy, based on its database.	27% of households.
Solid waste	2007 Community Survey includes access to solid waste services. The figure for the backlog is based on the assumption that a properly managed 'on site; disposal and communal landfills in rural areas are 'adequate'.	7% of households.
Roads	The Department of Transport's survey of 2007 indicates surface type and condition.	14% of rural access roads are earth surfaced. 75% of access roads in rural and urban areas are in poor condition.
Public services	No good data available so rough estimate presented here	12% inadequate in urban areas; 65% inadequate in rural areas.

Status quo

With regard to **capital expenditure,** municipalities budgeted to spend approximately R41 billion in 2009/10, in comparison with R30 billion in 2006/07. These figures represent a continued increase in capital spending budgets over the last three years. Adjustments for funding of housing 'top structure' in these budgets and provision for funding by service providers, (mainly Eskom and water boards) brings the total amount currently budgeted for expenditure on municipal infrastructure to R46 billion.

For **capital finance,** municipalities are budgeting for 53% to be covered by grants, much the same as for 2006/07. But the level of commitment to borrowing has increased from a proportion of 18% in 2006/07 to 26% in 2009/10[4]. The remainder (21%) is to come from other contributions and internal sources of funds (reserves and transfers from the operating account). The willingness to borrow is concentrated in the metros. Of the total amount on municipal budgets for borrowing of R10.7 billion, R7.9 billion (or 74%) relates to the six metros.

The total loan book for debt financing of municipalities is estimated by National Treasury to be R32 billion.

Turning to **operating expenditure,** municipalities budgeted to spend R139 billion in 2009/10. This has increased over the last three years at 12% per year, in nominal terms, well above the average figure for inflation over this period of 7.7%. With R13 billion added for service providers (mainly Eskom), this amounts to a total of R152 billion of expenditure on municipal services.

These expenditure figures are based on municipal budgets which are often constrained by low revenues and do not reflect what should be spent to properly operate and maintain infrastructure related services. As shown in this report, current levels of expenditure should in fact be higher than those given in budgets and summarised above, particularly in economically weaker municipalities (B4 and C2s).

With regard to **operating revenue,** in the case of municipalities, the aggregate municipal budgets show the revenue profile as follows:

- tariffs: 44% (up from 41% in 2006/07)
- property rates: 20% (up from 17% in 2006/07)
- transfers (subsidies and grants): 25% (same as in 2006/07
- other sources: 11% (down from 17% in 2006/07)

4 These figures are real percentages of the relevant budgets and therefore represent a real growth in the commitment to borrowing of 8%, neglecting the impact of inflation.

It is notable that the grant dependency of municipalities has not increased over the past three years. Even through the level of transfers from the national fiscus has increased this is in proportion to the total amount of revenue budgeted by municipalities.

Targets and related service level strategy

The figures on backlogs shown above indicate the considerable challenge remaining to provide all South Africans with at least a basic level of service[5]. In order to plan for meeting this challenge, government has established a set of targets aimed at providing basic services to all. Although these targets were previously fairly variable by sector, they are now aligned with the housing target, with the goal of having basic services to all South Africans by 2014.

The target has evidently been set without reference to what is affordable. That it is not feasible is illustrated in the analysis described in this report and is recognised by many government officials. Nevertheless, the base scenario modelled for this report applies this 2014 target as the MIIF is intended, inter alia, to be a tool to assess the viability of a national infrastructure programme.

Results of base scenario analysis – capital account

In order to meet the targets, with the service level mix given for the base scenario, the capital expenditure requirements, using the national municipal finance model, are as follows:

Table B: Total capital expenditure: base scenario compared with MIIF 5 figures (2009/10)

Figures in R millions	MIIF 5	MIIF 7
Water supply	11 942	13 897
Sanitation	13 904	9 656
Electricity	19 259	10 717
Solid Waste	1 792	1 420
Roads	15 429	29 868
Sub-total 'Big 5' services	**62 327**	**65 559**
Public services	3 794	1 810
Public transport	5 392	7 432
Public places	3 122	1 549
Economic infra and buildings	2 933	1 660
Admin buildings and systems	2 522	5 136
Sub-total other infrastructure	**17 763**	**17 587**
Total	**80 089**	**83 146**

These figures are calculated on the basis of a set of unit costs and make provision for services to non-residential consumers. The figure for MIIF 5 is included to show the trends over the last three years. Both figures are for 2009/10 with the MIIF 5 figure taken as the third year projected at the time (Year 0 was 2006/07), escalated at the increase in the CPI over three years. Although the totals estimated in this table are comparable, there is considerable variability in the trend for each service. This is explained in some detail in the main report with the main points being:

- The MIIF 5 projection curve was rapid for the first three years, with much greater increases required than has been the reality. This would imply that predicted expenditure based on the MIIF 5 curve should be much higher than MIIF 7 figures, largely as indicated for sanitation, electricity and solid waste.
- However, in the case of water supply, the improved unit cost analysis provides much higher bulk water unit costs than those applied in MIIF 5.
- The road lengths provided by the Department of Transport result in the increase in costs above MIIF 5 projections.
- In the case of infrastructure for municipal public services, a much improved basis for costing has been included as part of MIIF 7. But the indications are that

5 See the main body of the report for definitions of 'basic' and 'adequate' services.

the unit cost figures are low, which partly explains the difference with the MIIF 5 figure.
- With regard to the remaining infrastructure, primary reliance is made on municipal budgets with no attempt to 'model' expenditure. Figures for MIIF 7 should, therefore, be representative of what it happening in reality[6].

Table C: Capital finance mix applied in the model: base scenario

	Modelled amount of capital required[7]		Split in capital required
	MIIF 7	MIIF 7 %	MIIF 5 %
Housing subsidies (infrastructure)	2 100	3	10
MIG	11 300	14	15
Other grants and subsidies	1 700	2	12
Development charges	5 000	6	0
Service provider funding	10 400	13	10
Internal funds	6 300	8	8
Borrowing requirement	46 300	56	46
Total	83 100		

Of course the obvious point needs to be made that the modelled expenditure for 2009/10 of R83 billion is far higher than the R46 billion currently on the budgets of municipalities and their service providers.

Figures for the mix of capital finance required to cover these capital costs, as applied in the model, are given in table below:

Points of note relating to the figures in this table are:
- There is less available from housing subsidies for infrastructure.
- The proportion of grant funding is reducing, but this relates mainly to the ending of the grant for stadiums for the 2010 FIFA World Cup.
- MIIF 7 has introduced developer contributions as a funding source to be modelled with estimates included of the amount which can potentially be raised.
- The proportion of service provider funding is increasing, based on the modelled position with regard to the responsibility of service providers.
- The borrowing requirement is increasing as a proportion. However, it needs to be stressed that this is a residual amount, left after all other sources of funding are deducted from the capital requirement. The reality is that the ability of municipalities to borrow is well below the level reflected in the table.

For **borrowing position** estimates, municipal borrowing ability is included in the main report. Based on a range of assumptions, the indication is that a realistic maximum amount that can be borrowed by municipalities (excluding service providers) in the current environment is R18 billion a year, compared with the current amount budgeted by municipalities of R10.7 billion a year. Relating this to the modelled requirement of R46 billion indicates that the funding gap is of the order of R24 billion. Thus the envisaged infrastructure programme is clearly not achievable and alternative scenarios must be addressed.

To conclude, when examining these capital account results it is important to note that the situation is highly variable across municipal sub-categories, with the funding gap being by far the most serious in B4 municipalities (and their district partners).

Results of base scenario analysis – operating account

Turning to the operating account, the financial model provides for the long term financial viability of this investment programme to be assessed through projecting the anticipated operating cost and anticipated revenue. For costs, the figures are based on cost benchmarks associated with proper operation and maintenance of the services[8]. In the case of revenue, the estimates are based on assumptions relating to free basic services, affordability, cross subsidy levels and trends with respect to operating subsidies (primarily equitable share).

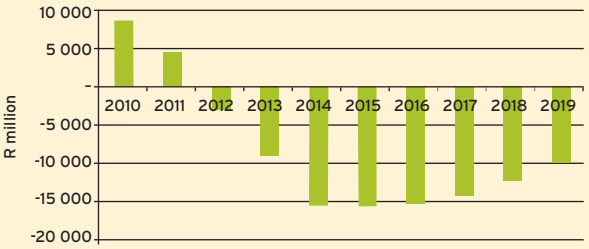
6 One exception is public transport where municipal budgets are adjusted upwards taking public transport grants into consideration.
7 Figures rounded off for ease of reading.
8 In fact these benchmarks have been 'tuned' to some degree, as described in the main body of the report.

With respect to **operating expenditure,** the level of expenditure currently is modelled to be R177 billion in 2009/10, somewhat above the R152 billion taken from current budgets (by 16%). The reason for this higher amount in the model relates to the assumption that many municipalities (particularly those serving economically under-developed areas) are not spending what they should to provide a proper service to consumers. The modelled figure increases to R320 billion in 2019/20, with an average increase in real terms of 6.8% per year. The extent to which this level of increase is achievable is debatable, but it is what is needed to increase service coverage to those presently under-served and provide for economic growth. It is also strongly influenced by increases in the price paid for bulk electricity.

With regard to **operating revenue,** the indication from the modelling for all municipalities together is that there should be sufficient revenue to cover expenditure. In fact, a surplus of about R9 billion is indicated. This is far better than the number estimated for MIIF 5, which was a deficit of R5 billion. The improved position relates to the increases in transfers, property rates and trading service income well above what was estimated for MIIF 5. The trading service income is most significant and this relates to the level of improvement in household income profile, particularly in rural areas[9].

Looking at the nett position on the operating account, however, the trend is negative, as the rapid rollout of services to poor people takes place (see Figure A below).

Figure A: Modelled deficits on operating account over a 10 year period: base scenario



The projected deficit increasing to R15 billion in 2014 is not as bad as that predicted in MIIF 5, mainly because of the better economic circumstances assumed for MIIF 7. However, the situation is highly variable across municipal sub-categories, as noted in the main body of the report.

In interpreting these figures, it should be noted that municipal service delivery in the South African context is complex and there are a wide variety of factors impacting on these numbers. Therefore, they should purely be seen as indicative. The operating account results are strongly influenced by a number of factors, the most important being:

- Assumptions around affordability: the extent to which consumers will be willing to pay for municipal services.
- The extent to which municipalities are actually able to collect the revenue due to them: In this respect the MIIF 7 results are quite optimistic as they assume that, with a free basic services policy and affordable bills for those who do not get services free, the level of collections will be high. However, in municipalities with weak capacity collection, levels may well be very low.
- The relationship between property rates revenue and economic growth: The base scenario is based on the assumption that property rates revenue will increase at the rate of economic growth.

Variations from the base scenario

As noted above, there are a wide range of factors which affect the aggregate capital and operating account of all municipalities in the country. The factors are identified in the main report and a sensitivity analysis is undertaken. The full set of results is given in Table 6.5 of the main report. The results are summarised as follows:

- The viability improves markedly if service levels are kept low: much lower than provided for in the base scenario and lower than service levels that are currently being selected by municipalities. Capex in Year 1 of the modelling period (2009/10) can be reduced by 26% from R83 billion to R61 billion. But there is a price to pay mainly with respect to rural roads, which will continue to deteriorate.
- Economic growth will make a big difference. If the real growth over the next 10 years increases from an average of 3.8% (applied in the base scenario) to 6%, the operating deficit in 2016 will decrease by R10.6 billion to a deficit of R2.4 billion.
- The extent to which economic growth is equitable also has an impact. The base scenario assumes that growth benefits the poor as much as the rich. If, at the other extreme, the poor do not benefit at all then municipalities will be R8 billion worse off in 2016.

There are many other factors that will have a lesser impact, some of which have been tested with results given in the main body of the report.

9 The data on household income, post census, remains relatively uncertain, particularly when broken down by municipality. But most research does indicate a reduction in poverty over the last decade. Increased revenue to rural municipalities stems from the increased equitable share to reduce poverty and this will translate into improved revenue for municipalities.

Key findings

The MIIF is intended to assess what is possible with respect to delivering basic services to all South Africans in a sustainable way. The findings in this regard can be stated as follows:

- The targets set by government for removing backlogs are over-ambitious, and capital constraints will prevent the target of getting services to all by 2014 being met.
- These capital constraints exist in the context of severe institutional capacity constraints, particularly in the capacity of technical staff.
- However, it is possible to define a more realistic scenario by extending targets, accepting the limitations of servicing people in scattered rural settlements, lowering service levels where possible, and accepting that low volume rural roads will not be properly rehabilitated.
- With this more realistic approach, higher levels of grant finance (about R8 billion more a year) and higher levels of debt finance to economically stronger municipalities is required to make it work. While this will be difficult to achieve it is not impossible.
- Considering the position on the operating account, the assessment based on the models is that municipalities are, in aggregate, currently in a position where they can cover their expenditure with revenue, assuming they properly collect rates and tariffs due to them with bills set at affordable levels based on assumptions described in the main body of the report. This is a more promising result than that found in the MIIF 5 analysis three years ago.
- Looking forward, all but the metros will have difficulty in maintaining viability with the ambitious service delivery programme assumed as part of the base scenario. In order to maintain viability, service levels will need to be reduced somewhat, property rates revenues must keep pace with economic growth and, most importantly, economic growth rates of the order of 4.5% are needed for the country as a whole.

This last point means that without relatively high levels of economic growth, municipalities as a whole will not be able to meet even relatively modest service delivery objectives defined in the more realistic scenario.

Finally it is acknowledged that the MIIF is primarily a financial/technical analysis and does not deal directly with institutional and financial aspects. Yet it is recognised that little can be achieved if there is not good leadership and governance to make the right decisions on investment priorities and appropriate allocation of resources. The MIIF places emphasis on estimating expenditure and assessing the capital finance and operating revenue requirements to cover this expenditure. But this must be backed up by a commitment by government at all spheres to follow through with this and actually allocate the resources and manage the implementation and ongoing operation and maintenance of infrastructure.

1. Introduction

The Municipal Infrastructure Investment Framework (MIIF) is an ongoing initiative to review the investment requirements for the municipal sector and assess the financial status of municipalities in the future, based on projected investments. The MIIF 7 is in its seventh round of review and this report presents the main findings of the financial analysis undertaken in 2009/10.

The overall objective of the framework is to:

- assess the amount of capital required to meet the municipal infrastructure delivery targets of government and to assess the options for ensuring that sufficient capital finance is available to cover this capital cost
- ensure that the infrastructure programme is financially sustainable. (This implies that there is sufficient operating revenue to cover the operating and maintenance costs of infrastructure-related services.)

The assessment can be referred to as a national infrastructure investment analysis. It takes into consideration the wide range of circumstances that exist across municipalities in South Africa. To this end, local municipalities have been divided into four sub-categories (A, B1 to B4) and district municipalities into two sub-categories (C1 and C2)[10].

The analysis for the MIIF 7 is based on the application of a financial model, the municipal services finance model (MSFM), developed specifically for this purpose. The MSFM has been updated progressively since it was originally set up in 2004, to provide for additional features, to improve its performance and to make it more user-friendly.

Aside from the financial analysis described above, the objective of this round of the MIIF 7 has been to make the results of the analysis more useful to individual municipal service sectors. For this reason, this main report on the MIIF 7 is complemented by seven sector reports, one each on the following sectors: housing (human settlements), water services, electricity, municipal solid waste, roads, public transport and municipal public services. The findings from each sector report have been discussed in relation to the relevant national department.

The MIIF 7 also incorporates a training programme on infrastructure investment analysis, using the MSFM, and the MIIF 7 includes an update of the training material as well as further training sessions.

A note on terminology relating to future financial numbers

This report uses the term 'real' figures to mean figures expressed in constant rand values at 2009/10 prices. The term 'nominal' is used to refer to figures that include changes in price that occur due to inflation. In an inflationary environment, the nominal expenditure in future will be higher than the real expenditure required. For example, if inflation during 2010/2011 is 5% then real capital expenditure of R1 million in 2010/11 is equivalent to nominal capital expenditure of R1.05 million (R1 million x 1.05).

1.1 The objectives and scope of the MIIF

Government has committed itself to removing the backlogs in the provision of infrastructure to all in South Africa at least by the year 2014 (the fifth year of analysis covered by this report). Government is committed to doing this in such a way that ensures that municipalities, which are at the forefront of providing infrastructure, have the capacity to operate and maintain this infrastructure while remaining financially viable.

The MIIF is intended to describe the manner in which these objectives can be met, encompassing:

- the extent of infrastructure to be provided
- the capital expenditure required to provide this infrastructure
- the methods of financing this capital expenditure, including capital grants and the municipal infrastructure grant (MIG) in particular
- the operating expenditure required to ensure that the infrastructure provided is properly operated and maintained
- the methods of raising revenue to cover this operating expenditure, drawing on the provisions of the municipal fiscal framework
- the monitoring system required to assess progress with respect to infrastructure delivery
- the assurance that systems and management capacity are in place in municipalities to manage the infrastructure, with the emphasis on a municipal infrastructure asset management strategy.

The framework also addresses issues and the constraints that will have to be overcome if the objectives of government are to be met.

The MIIF has evolved over time to accommodate the rapidly changing municipal environment, the

10 For details of this classification see section 1.4 below.

availability of improved information and the new objectives of government. It is recognised that this evolution will continue and the MIIF will be updated regularly in future.

1.2 Ownership of the MIIF: stakeholders

Although the Development Bank of Southern Africa (DBSA) and the Department of Cooperative Governance (DCOG) have taken the lead in preparing the MIIF, the framework in fact serves all of government, including:

- other national government departments that are responsible for infrastructure-intensive sectors that align with local government functions. These are the departments of human settlements, water affairs, energy, transport, environment affairs, and sports and recreation
- National Treasury, which has a direct interest in municipal finances
- provincial departments of local government that are responsible for monitoring and supporting local government
- all municipalities, the agencies directly responsible for providing municipal infrastructure
- the South African Local Government Association (SALGA), the national body representing all municipalities.

The MIIF is also of interest to the private sector and civil society, as private organisations have an interest in providing infrastructure through partnerships with local government and private-sector capital finance is central to the success of the national municipal infrastructure programme. Civil society, the organisations representing the interests of communities, clearly has an interest in the way infrastructure is to be delivered and the associated financial arrangements.

1.3 The scope of municipal infrastructure

Municipal infrastructure is defined in broad terms as 'the capital works required to provide municipal services'. Here the term 'works' is taken to exclude readily movable assets and land not directly required for the construction of municipal infrastructure. It includes all the activities necessary to ensure that the works are delivered effectively, such as feasibility studies, project planning and capacity building to establish sound operational arrangements for the works[11].

This definition excludes vehicles, such as conventional trucks or specialised vehicles such as fire engines. But it includes the mechanical and electrical equipment that is required for water and wastewater treatment works and electrical substations.

In the case of **housing,** the infrastructure required to provide a housing product is included as part of municipal infrastructure. But it needs to be noted that some of this infrastructure – internal infrastructure for high income housing and commercial property developments – is delivered by the private sector, with the municipality only having an oversight function. Such infrastructure essentially passes into the municipal realm once the property development is complete and the internal infrastructure is handed over to the municipality.

The **capital costs** associated with the provision of municipal infrastructure include the cost of providing new infrastructure and rehabilitating any infrastructure that has reached the end of its design life. Maintenance of such infrastructure, which is associated with repairs undertaken during the design life of the infrastructure, (that is, repairs that are not associated with replacing major components of the infrastructure) is not a capital item. This expenditure is reflected on the operating account.

A **municipal service** is the service provided by a municipality as it is experienced by the consumer. Many, but not all, municipal services require infrastructure, notably water supply, sanitation, roads and stormwater, and electricity[12]. In all cases, the service does not involve the provision of the capital works associated with infrastructure only. Sound operation and maintenance arrangements, including customer interface arrangements, are also required for the proper provision of the service.

11 This definition is consistent with that used in the municipal infrastructure grant (MIG) policy.
12 Municipal health is an example of a municipal service that does not necessarily require infrastructure.

Table 1.1: Description of different components of infrastructure

	Water supply	Sanitation (wastewater)	Electricity
Bulk infrastructure	Pumping systems to extract water from the resource, the water treatment works, bulk treated water storage, and pumping systems and pipelines required to transfer water to distribution reservoirs located at settlements	Major sewer outfalls which leave settlements, wastewater treatment works and pipelines and channels which return treated effluent to the river or groundwater	Power generation stations, powerlines which transfer power to settlements and associated switching stations and transformers.
Connector infrastructure	Distribution reservoirs and pipelines leading from these reservoirs to the blocks of plots	Outfall sewers, sometimes including local wastewater pumping stations which link the blocks to the bulk outfall	Powerlines and associated switching stations and transformers which link the bulk system to settlements
Internal infrastructure	Pipelines located within a block of plots, including the connections to plots with meters. In rural areas the block of plots is replaced by the village and the connections may only be to public standpipes	Sewers within a block of plots, including the connections onto the plots. In the case of on-site sanitation options this includes the VIP, septic tank or other 'on-site' technology. In the case of 'site and service' options using water borne sanitation this may include the toilet and privy	Powerlines[13] within the blocks which directly serve each plot or dwelling.

Reticulated services are divided into components that apply differently for each type of reticulated infrastructure, as Table 1.1 shows.

The major reason for the separation of internal infrastructure is that this is typically funded as part of a housing package in urban areas. The separation is often not applied in the electricity sector, where the division is often made only between reticulation and bulk, where reticulation infrastructure includes internal and connector infrastructure as defined here.

Some important issues relating to the interface between relevant agencies need to be recognised:

- In the case of water supply, this is reliant on the availability of water resources which often require infrastructure (dams or well-fields, for example) to make the water continuously available. Strictly speaking, this infrastructure is not a municipal responsibility. But municipalities sometimes develop their own water resources, even though there is no national funding available for this. Larger dams and raw water transfer systems are typically developed by the Department of Water Affairs or water boards or others acting on behalf of the department. In the case of the MIIF 7, the term 'bulk infrastructure' excludes water resource development.
- In the case of electricity, the division between bulk and reticulation has recently been the subject of considerable debate, as it represents the division between what is a national function (with parastatal Eskom as provider) and a local government function.
- In the case of roads, there is a remedial understanding of the dividing line between provincial roads, roads which are the responsibility of district municipalities, and those which are the responsibility of local municipalities.

1.4 Institutional arrangements

The main issues in relation to institutional arrangements that are relevant to the MIIF 7 are considered to be:

- the relative responsibilities of national and provincial government
- the division of the responsibilities for roads between provincial and local government
- the division of responsibilities between district and local municipalities

13 The electricity sector does not often recognise the 'internal infrastructure' component of the system..

- the recognition of asymmetry across municipalities
- service authority and provider relationships, which are particularly important in the case of electricity as these are currently subject to change
- the role of the private sector.

Each of these is dealt with briefly below.

Inter-governmental interfaces

In many cases, the provision of municipal infrastructure is possible effectively only through cooperative effort among the three spheres of government. Examples relating to the physical provision of infrastructure have been given above.

- the provision of bulk electricity is the responsibility of national government, through its service provider, Eskom.
- the development of water resources is a national function.
- In the case of roads, the municipal road network is linked to that provided by provinces and national government.

There are also policy and regulatory relationships:

- National departments are responsible for policy and legislation for each sector and for matters associated with the way infrastructure is managed and financed by municipalities.
- Provinces monitor and support the activities of municipalities.
- National departments have regulatory oversight of water services, electricity and solid waste disposal.

Finally, the provision of municipal infrastructure is strongly dependent on grant finance from the national fiscus, both for capital works and for supplementing operating revenue. Many municipalities, particularly districts and more rural (B4) local municipalities, are reliant on such transfers.

The division of responsibilities for roads between provincial and local government

The division of responsibilities related to roads between provincial and local government remains uncertain in some provinces. This needs to be resolved if there is to be increased investment into roads and improved maintenance.

Problematic issues in relation to the division of responsibilities between district municipalities and local municipalities

Currently, one of the most difficult institutional issues facing local government is the division of responsibility between district and local municipalities. Key issues in this respect for each sector are:

- For water services, the location of the water services authority function has been introduced asymmetrically across the country: the district municipalities are responsible for this function in less developed areas and local municipalities are responsible for it in more developed areas. However, in cases where the district municipality is the water services authority, service provider relationships are not yet resolved.
- For electricity, the function is currently split between the district municipality and the local municipality within the boundary of many local municipalities, creating a patchwork. However, the responsibilities of the district municipality as the source of authority are not really recognised. Eskom acts as the provider with a large degree of autonomy in these areas and with little reference to local government.
- The division between district roads and those which are the responsibility of local municipalities is uncertain in most districts.

These matters need to be resolved if municipal infrastructure is to be provided effectively.

Recognising asymmetry across municipalities

This round of the MIIF 7 is based on the same concept applied in the previous round, in which the analysis recognises the significantly different circumstances that exist in municipalities across the country and the related differences in their financial viability. This has been done by considering seven sub-categories of municipality, as follows:

- A: metros: 6
- B1: secondary cities: the 21 local municipalities with the largest budgets.
- B2: municipalities with a large town as core: 29
- B3:municipalities with relatively small populations and a significant proportion of urban population but with no large town as core: 111
- B4: municipalities which are mainly rural with, at most, one or two small towns in their area: 70
- C1: district municipalities that are not water services providers
- C2: district municipalities that are water services providers.

These categories have been used in previous policy initiatives for the Department of Cooperative Governance (DCOG) and National Treasury.

For the purposes of modelling, to assess specific issues associated with water supply and sanitation, the analysis has also been run with the split of

municipalities based on the role of the water services authority.

- A: metros: all metros are water services authorities.
- B1: secondary cities: all B1s are water services authorities.
- LW: all other local municipalities which are water services authorities. (mainly B2s and B3s but with some B4s included).
- DW: all municipalities served by district water services authorities. (mainly B4s but with some B2s and B3s included).

The difference between a service authority and service provider

From the point of view of the MIIF 7, the differentiation between the service authority and service provider is important.

The service authority is the sphere of government (or tier of local government) identified as being responsible for the function in the Constitution, supplemented by the Municipal Structures Act (1998), with the latter dealing with the division of municipal functions between district and local municipalities. From the point of view of the MIIF 7, these are some of the important features of the service authority:

- The authority is responsible for planning and resource allocation.
- Grant funding paid from the national fiscus, including the equitable share, must be directed to the services authority.
- Financial sustainability must be addressed at the service authority level.

A service authority may also be the service provider, or it can appoint one or more external service providers to render the service on its behalf. This may be another sphere or tier of government[14], a municipal entity, a parastatal body, a community-based organisation or a private organisation. Where such an appointment is made, the service authority may transfer funding, including capital or operating grants received from the national fiscus, to the services provider; if a sound contract is in place.

Eskom and the water boards (both parastatal bodies) are the most significant external service providers. Eskom supplies electricity to approximately 40% of all users, while the 14 operational water boards supply water to approximately 50% of the population of South Africa.

Public-private partnerships

When a municipality appoints a private firm as the service provider, this is typically referred to as a public-private partnership. The nature of the partnership may be that of a concession or lease, the difference being that a concession agreement requires the private firm to raise capital.

The issues associated with public-private partnerships have been well addressed in former drafts of the MIIF 7 and in other government policy documents and guidelines, and need not be repeated here. Public-private partnerships are encouraged where they can bring efficiency of operation and benefits to consumers.

1.5 The economic and social impact of municipal infrastructure

Infrastructure has a major impact on economic and social development. The benefits to individual households and enterprises of having access to a good standard of infrastructure, which is well managed infrastructure, are substantial. These are summarised below[15].

Impact on development

Infrastructure services play an important role in development, supporting growth in economic output, opening up opportunities for poor people and contributing to environmental sustainability. However, infrastructure investment must be properly directed if the benefits are to be maximised. It is also important that economic benefits are not over-emphasised at the expense of social benefits.

Economic linkages

Businesses cannot function effectively without infrastructure as they require water and electricity for production purposes, wastewater and solid waste systems to remove waste from their places of production, and roads to allow their employees to get to work, bring in supplies and transport their goods to markets. The availability of infrastructure tends to concentrate economic activity in larger settlements where the availability of work and social opportunities also leads to a concentration of people.

Social linkages

Developmental infrastructure concerns more than just economic growth. One measure of its empowering effect is its contribution to reducing poverty. The vulnerability of poor people can be

14 In this case the function is said to have been delegated to the other body.
15 There is a full description of this written by the DBSA and included as an annexure in the MIIF 2004 financial report.

countered by redressing low levels of income, hazardous living and working conditions, social powerlessness and isolation. For example, energy provision can ensure a better work and study environment, access to information through the media, and more time for productive activities. Another example is how improved transport can provide access to markets, employment opportunities, social and medical services, education opportunities, and friends and family.

Employment generation during implementation

As part of its economic development strategy, government has committed itself to a major public works programme; the expanded public works programme (EPWP), which includes an infrastructure component. This programme places strong emphasis on the use of labour-based methods to be applied to the construction of infrastructure, with municipal infrastructure being the area where the greatest benefits can be achieved.

An infrastructure strategy has been developed for the EPWP. It is linked to the MIIF 7 and uses the MSFM model to generate employment numbers. The EPWP intends to create 900 000 full-time employment opportunities or its equivalent through the provision of infrastructure between 2009/10 and 2013/14. Just over 503 000 of these full-time employment or opportunities equivalent are to be created at the municipal level[16].

The national spatial development perspective

This framework provides an overall picture of the economic development opportunities with the greatest potential in the country from a spatial perspective. This includes the identification of nodes, where provincial and national government are to pay specific attention due to the economic opportunities in these locations. The MIIF 7 analysis is not spatial but does provide the 'envelope' for investment decisions that can be used in planning initiatives such as spatial development frameworks (SDFs) and integrated development plans (IDPs) and which should take the national spatial development perspective (NSDP) into account.

The financial viability of municipalities

From the point of view of the MIIF 7, the relationship between economic growth and the financial viability of municipalities is most significant. Growth in the local economy that is served by the municipality impacts on the municipality's finances in several ways:[17]

- It improves household incomes, which means households are better able to pay for the services provided by the municipality.
- It increases the value of property in the municipal area, which allows the municipality to increase revenue from property rates.
- The demand for services by businesses and higher income residential consumers increases and, as these consumers are able to pay at levels above the cost of the service, the revenue raised through tariffs for these services increases and gives the municipality greater opportunity to cross-subsidise low income residential consumers.

1.6 The implications of the MIIF 7 for local municipalities

The MIIF 7 is an inter-governmental initiative involving all three spheres of government and both tiers of local government. Local government is at the frontline of the municipal infrastructure programme, as municipalities are responsible for planning for municipal infrastructure, implementing projects and managing the resulting infrastructure in the long term.

The national framework will only be effective if it is applied locally. This means that each municipality should be encouraged to carry out effective infrastructure investment plans as part of their IDPs. Such plans must include a financial analysis along the same lines as that applied nationally, to ensure the viability of the programme at the local level. This means that ideally, municipalities should undertake financial modelling themselves.

Supporting this devolution of financial modelling as part of the process of implementing the MIIF 7, requires a major effort by national government departments. This is illustrated in Figure 1.1.

16 As reported on http://www.epwp.gov.za/index.asp?c=SectorInf, accessed on 31 March 2010.

17 Note that the DBSA has developed a companion model to the MSFM, which is referred to as the regional economic model (REM, which deals specifically with economic growth in various economic sectors and provides more detailed economic information for the MFSM.

1.7 Relationship of the MIIF 7 to the consolidated infrastructure programme

National government has recently introduced a new programme aimed at improving infrastructure delivery, referred to as the comprehensive infrastructure programme (CIP). This is intended to look holistically at the way infrastructure is managed by municipalities. The relationships between the MIIF 7, CIPs and the other planning processes required by municipalities are illustrated in Figure 1.2.

Figure 1.1: The national framework applied at local government level

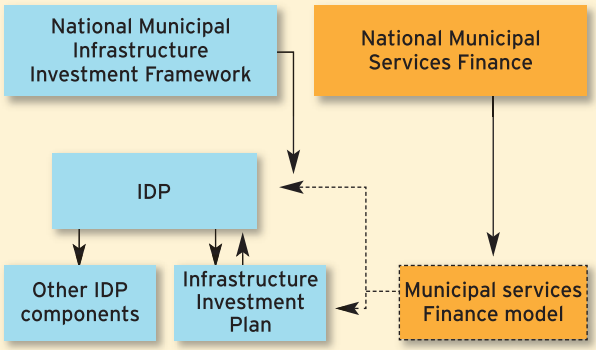


Figure 1.2: Planning integration diagram for municipalities

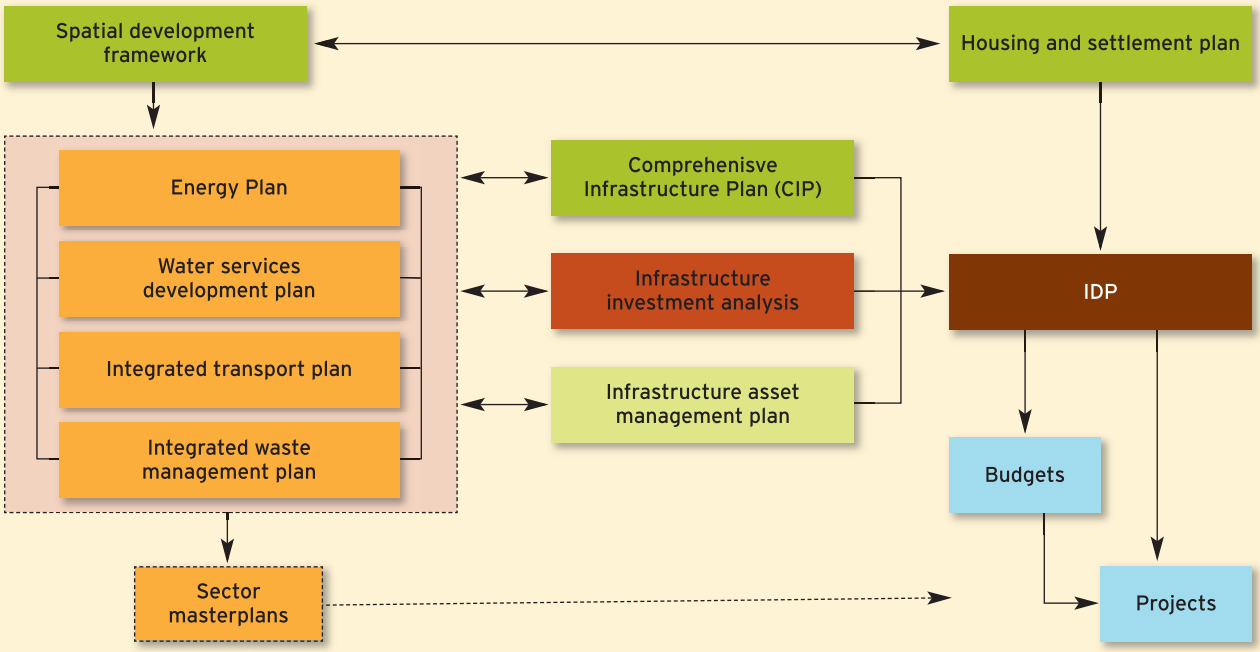


Figure 1.2 shows where infrastructure investment analysis at the local level relates to sector plans and the integrated development plans, with the MSFM being a tool to achieve infrastructure investment analysis. The consolidated infrastructure programmes relate to sector master plans and apply these at the more local level. At the national level, the MIIF 7 provides an overall assessment of the viability of the infrastructure programme and also of the financial resources required to make the programme viable.

1.8 Inclusion of housing in the model

Since MIIF 5, 2007, particular attention has been paid to housing as a driver of the need for infrastructure.

The housing process in South Africa is intricate and some broad assumptions have had to be made for the modelling of the financial aspects associated with housing. These assumptions are summarised below.

- The model deals primarily with housing for those having low-income because public finance is used to provide such housing. In the case of housing for high-income earners, financing is assumed to be out of the public realm. However, such housing generates a need for bulk and connector infrastructure, which is a municipal responsibility. Further, the latest version of the MSFM does provide a feature for assessing the demand for housing broadly, including high-income housing.

- In the case of new housing, provision is made for three housing types: single dwelling units; medium-density housing, which is typically in the form of multiple dwelling units, with 'three-storey walk-ups' being a typical example; and incremental housing, where the services and land component of the project are dealt with separately from the top structure. In the case of incremental housing, the option for having a lesser subsidy for the top structure is included.
- In the case of existing housing, the major categories provided for in the 2001 Census are included: informal single dwellings, informal backyard dwellings, traditional dwellings, single formal dwellings and medium density formal dwellings[18].
- Housing is considered as a package, which includes internal infrastructure[19].
- The model provides for targets for increased coverage of 'adequate' housing to be set.
- In urban areas, as people get access to housing, they are transferred from the urban informal settlement category to the urban formal category. This includes the formalisation of housing *in situ,* which includes the provision of services and top structure to households in an informal settlement.
- In the case of capital expenditure, the model provides for the housing package to be assessed separately, including new internal infrastructure, land and the top structure.
- On the capital finance side, the model provides for infrastructure finance to be assessed separately from land and top structure finance.
- In the case of infrastructure finance, the mix of finance options are: the MIG, housing subsidies, funding by the property owner (typically though bond finance) and funding on the municipality's own account either through the use of internal reserves or borrowing[20]. The inclusion of property owner funding covers that group in the lower income sector that is able to access housing subsidies but is also able to afford some contribution, possibly with the assistance of a private finance institution.
- In the case of land and top structure, provision is made for funding from housing subsidies, property owner funds and municipal funds[21].

1.9 Analytical methodology

In order to develop the MIIF 7, it is particularly useful to have a financial model that undertakes the calculations and allows for the testing of the impact of the many factors (tested through a set of scenarios) on which an investment programme is based. The model needs the data which will allow the combined capital and operating accounts of all municipalities in the country to be assessed. Recognising the great variability in the financial position of municipalities in South Africa, the analysis also needs to ensure that the MIIF 7 will be effective across the range of circumstances of individual municipalities. The model therefore needs to be applied in a way that can allow these various situations to be assessed.

Dealing with district municipalities

In the case of district municipalities, they have highly variable service obligations and it is held that modelling them separately is not particularly useful. The models are therefore run for metros and the four local municipality sub-categories as identified in section 1.4, which cover institutional arrangements. These models are run for all municipal services, including those for which the district is the authority. In other words, outside the metros the models reflect the situation of the local municipality plus its district partner.

It is possible to run the model for district services only, but this has not been done for this round of the MIIF 7.

1.10 Modelling features and structure

The MSFM was developed as part of the fourth round of the MIIF, in 2004/05, to allow individual municipalities to be modelled in such a way that their full operating and capital accounts can be projected over 10 years. This model has been adapted to apply to the country as a whole, to provide a picture of trends over periods of 10 years for the aggregated municipal operating and capital accounts, in terms of both expenditure and income. It looks at the six functional groupings shown in Figure 1.3.

18 This is a simplification, with the minor housing categories provided in the census added into the main categories given here.
19 While this is considered to be an important feature of a sound housing delivery process, there has recently been a trend to consider top structure separately.
20 The extent to which housing subsidies can be used for internal infrastructure is a controversial issue currently, as discussed later in this report.
21 Obviously there will be few municipalities that can afford to allocate funding to the top structure but this is possible in principle.

The model provides for four settlement types, in order to allow for different service level costs associated with particular settlement conditions and for different service delivery programmes for each settlement type. For this exercise, the four grouped geography types used in Census 2001 were used:

- urban – formal
- urban – informal
- rural – informal (communal areas, formerly called tribal areas by StatsSA)
- rural – formal (mainly commercial farming areas with property held with freehold rights).

The model also caters for different service level decisions for households living in the various geography or settlement types.

The MIIF 7 provides for the following full package of services:

- water supply and sanitation, referred to as water services
- electricity
- municipal waste management or refuse services
- roads and stormwater
- public services (for example, community halls, parks, recreational facilities)
- special infrastructure, which includes:
  - economic infrastructure and buildings for projects that can be run as independent financial entities (for example, a conference centre, a market, an abattoir). This does not include economic networks, which is a broader definition that includes transport and communication networks, which are separated out and included in other categories.
  - public places that are not buildings but require capital works, for example, a pedestrian mall or public square
  - municipal public transport infrastructure
  - administration buildings and systems.
- governance, administration, planning and development facilitation (GAPD)[22] which typically includes:
  - governance: councillor remuneration and the overheads associated with council affairs including the secretariat to the council
  - administration: the municipal managers office, treasury and other administrative functions such as office administration, human resources, legal and information technology services
  - planning: IDPs, strategic plans, spatial plans and land use management including building plan approvals[23].
  - development facilitation: local economic development planning including relationships with private sector enterprises; management of property developers, regulation of business activity including licensing.

The combination of these functions is aggregated to get the overall totals in the MSFM.

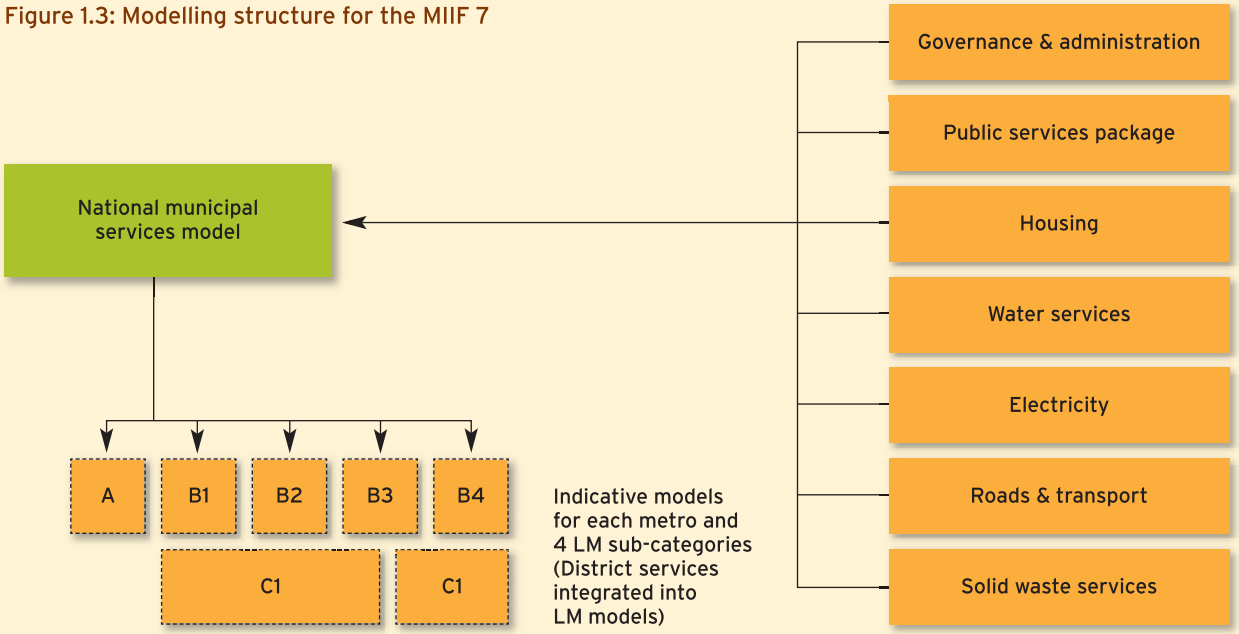
Further, the modelling structure is set up to allow for each of five types of municipality to be modelled in such a way that all the municipalities in each type are aggregated into a single indicative model for the type of municipality, together with its district partner. The MSFM can thus be disaggregated into the five indicative models which, between them, total the results of the national model.

The structure is illustrated in Figure 1.3 on page 16.

22 It will be evident in the analysis that follows that GAPD expenditure is a large part of total operating expenditure by municipalities. However, this grouping of activities is not well understood and further work is needed in the future to improve this understanding in order to promote greater efficiency.

23 Sector plans such as the water services development plans are typically part of the sector department's cost centre.

Figure 1.3: Modelling structure for the MIIF 7



Capital and operating costs are estimated in the model, using typical unit costs for each type of service and each level of service. In this round of the MIIF 7, extensive work has been undertaken to gather and verify average unit costs per service (see Annexure B).

In the case of the **capital account,** the model includes all capital expenditure on municipal services, including infrastructure for households which are not poor and for non-residential consumers. However, it excludes internal infrastructure for residential properties provided to those who do not receive a housing subsidy, as this infrastructure is funded by private developers and included in the house price. It is therefore off the municipal budget, outside the public realm and the financial arrangements are largely beyond the influence of the municipality.

'Special' infrastructure (public transport infrastructure, economic infrastructure, major public space re-developments and administration buildings) are provided for in the model but require 'off model' estimates of costs as they are specific to each municipality and there are currently no cost benchmarks that allow costs to be estimated generically.

On the capital finance side, the model provides for current capital subsidy arrangements and assumes that municipalities will have to finance the capital expenditure through such subsidies, complemented by their own sources of finance, primarily borrowing.

In the case of the **operating account,** the revenue side of the model is based on what consumer units can be expected to pay for services, given their income levels recorded in the latest national household surveys and expected patterns of consumption for various services. The patterns of consumption are based, in turn, on given income levels and various assumptions on tariff structures, including provision for cross-subsidisation. This cross-subsidy, taken together with the equitable share finance received from the national fiscus, is assumed to cover expenditure incurred in providing free basic services to the poor[24].

1.11 New features added to the MSFM

The model has been adapted and improved as part of the MIIF 7, with some of the work also undertaken for National Treasury in 2008/09 as part of a World Bank funded project to assess the capital finance options for municipalities. These improvements include:

- The addition of **developer contributions** as a source of capital funding. Development charges are the amounts charged by a municipality to developers to cover all, or part of, the cost of providing bulk and connector infrastructure associated with the particular property

24 While the model has a feature to provide for debt write-off in the case of non-payment of bills by consumers, the assumption is made for revenue projections that bills will be set which are affordable and that there will be good systems in place to ensure bills are paid. Therefore bad debt levels are set at zero in the analysis reported here. Obviously revenue can be easily adjusted if a different view is taken.

development. The model assumes that these charges will only be applied to high income housing developments and commercial and industrial property developments[25].

- The inclusion of a demand management feature, which allows for the level of demand for water and electricity to be varied into the future, based on assumptions relating to the impact of price increases and/or other conservation strategies. This feature also includes waste reduction associated with waste minimisation strategies. The model allows for costs of demand management and waste minimisation initiatives to be included.
- Improved features to provide for solid waste recycling.
- New roads and stormwater costing features and roads asset value calculation methodology.
- Output graphs showing relative capital spend on backlog removals, growth related expenditure and rehabilitation.

Rehabilitation, a new feature, was added to the model to provide for rehabilitation backlog, as part of the National Treasury/World Bank capital finance assessment initiative.

New conceptual work has been done on estimating rehabilitation expenditure requirements, but this has not been incorporated into the model at this stage.

2. Parameters applied in the model

2.1 Population, households and household growth

Current population estimates from the DBSA's demographic unit are used. The figures, sub-divided into four settlement types are given in Table 2.1 for the base year (2009/10).

Consistent with MIIF 7 analysis over the past five years, the situation with housing and infrastructure in five municipal sub-categories is investigated, recognising the highly variable situation across municipalities in South Africa. The population and household splits for these municipalities are given in Table 2.2.

In making projections, household growth is obviously a parameter and the DBSA demographic model results, adapted by PDG, are used to give the following inputs in Table 2.3.

Table 2.1: Population and household assumptions for the model[26]

	Population in base year	Average household size	Number of households in base year
Urban-formal	26 129 774	3,88	6 735 000
Urban-informal	4 862 303	3,88	1 253 000
Rural-informal	14 998 007	3,88	3 865 000
Rural-formal	3 777 942	3,88	974 000
	49 768 025	**3,88**	**12 827 000**

Table 2.2: Population split by municipal sub-category

Municipal category municipalities	No. of estimated 2009	Population	Split %	Total
A	6	17 818 619	36	4 949 000
B1	21	8 540 408	17	2 290 000
B2	29	4 171 499	8	1 118 000
B3	111	6 129 700	12	1 630 000
B4	70	13 107 799	26	2 840 000
Total				**12 827 000**

25 The models calculate the maximum contribution as the total cost of providing bulk and connector infrastructure. A factor is then applied to reduce the maximum amount given the difficulties of reaching this theoretical maximum. 50% is used for the model runs reported here.

26 Note that a constant household size has been assumed as there has not been reliable enough data on the variation of household size by settlement type to apply variable figures across settlement types.

Table 2.3: Household growth projections

		2009 %	2014 %	2019 %
Urban	High income	0,7	0,6	0,5
	Low income	3,0	2,7	2,0
Rural-informal	High income	0,3	0,3	0,3
	Low income	0,3	0,3	0,3
Rural-formal	High income	-0,5	-0,5	-0,5
	Low income	-0,5	-0,5	-0,5
Average growth rate		**1,38**	**1,25**	**0,94**

It is worth noting that these results assume the ongoing depopulation of rural formal areas and slow growth in rural informal areas. These numbers allow for the relatively high growth rates of urban households predicted by most demographers. (Metro growth rates are taken at 2.2% declining to 1.5% over 10 years.)

2.2 Households and consumer units

In assessing access to services, the term household is typically used as the unit receiving services. However, a municipality is typically not able to recognise a household and hence the systems for assessing backlogs need to take other consumer groupings into consideration. The following definitions are relevant:

Household: Census 2001 uses the following: A group of persons who live together and provide themselves jointly with food and/or other essentials for living, or a single person who lives alone.

Plot (or erf): A piece of land defined by boundary coordinates, which is reflected on a general plan and is owned by a juristic person whose ownership rights are registered in the deeds office. Alternatively, a piece of land, part of a larger parcel of land owned by a municipality, which is marked out by the municipality with the intention that this land will be registered and transferred to the occupant(s).

Dwelling unit: A structure, with perimeter walls and roof, used as a place in which a person or group of people live. This may be a single, free-standing unit, or a group of units attached to each other, referred to as attached dwelling units.

Consumer unit: A group of people living on a plot or in an attached dwelling unit which is treated as one unit by the municipality from the point of view of providing services. (A single electricity connection, for example). In other words, this is the unit which a municipality can recognise physically and is the unit to which a bill is sent (or which is identified as billable in the municipal financial system where a bill would be uneconomic to render).

The model uses these terms as follows:

- Consumer units (CUs) are used as the unit to which the residential plot package is provided, with the plot package consisting of water supply, sanitation, electricity, the street outside the property and solid waste removal service. The plot package is analogous to the internal infrastructure as defined earlier in this report.
- Households are used as the basis for providing public services and for making comparisons between municipalities.
- The model provides for consumer units to be calculated from households using a ratio: number of households per consumer unit[27].

27 Despite its importance, there is not good national data for this ratio. A recent survey in Johannesburg indicates that there are 2 households per consumer unit in many townships in the city. Evidence elsewhere indicates that this can be as high as 5 households. A figure for the country as a whole is taken as 1.3 for urban areas but this is only a rough estimate.

Table 2.4: Comparative figures for households and consumer units

	Number of households in base year	Number of consumer units in base year	Settlement type split %
Urban-formal	6 734 000	5 181 000	53
Urban-informal	1 253 000	985 000	10
Rural-informal	3 866 000	3 336 000	30
Rural-formal	974 000	805 000	8
Total	**12 827 000**	**10 307 000**	

Table 2.5: Assumed economic growth rates for base model run

	2010 %	2011 %	2012 %	2015 %	2019 %
Urban-formal	3,9	4,8	5,5	5,2	5,2
Urban-informal	3,9	4,8	5,5	5,2	5,2
Rural-informal	0,5	1,5	2,0	1,6	1,6
Rural-formal	0,5	1,5	2,0	3,1	3,1
Average	2,7	3,7	4,4	3,8	4,0

2.3 Economic growth

Economic growth is also a driver of the demand for housing: higher economic growth rates have the potential to move people out of lower income bands and make them more able to afford housing without subsidies. For the base run of the models, the five-year national growth estimates given by the Bureau for Economic Research, which are widely regarded as being sound, are used. These projections are for five years and take into consideration the economic recession faced by South Africa, and most of the rest of the world, between late 2008 and early 2010.

Certain assumptions have had to be made about how this growth is distributed between urban and rural areas, as this strongly influences the relative economic growth in each municipal sub-category. In the case of metros, the growth rates are taken as 1.2% above the national average, a figure which is based on the example of eThekwini, where detailed economic modelling results have been made available by the municipality. The assumed figures are given in Table 2.5.

Figures beyond 2012 are speculative and the assumption is made that growth will flatten after 2012.

But it is not only economic growth, measured as gross value added (GVA) in this case, which matters. It is also the extent to which this growth benefits the poor. In order to assess this, the model has a feature where growth can be tested at two extremes:

- equitable growth, where the benefits impact equally on all income groups
- inequitable growth, where the benefits accrue to higher income households (those who already have jobs).

2.4 Poverty measures

Household income is used as the measure of poverty in this analysis, as this information can be easily accessed from StatsSA, based on household surveys. The following cut-offs are used:

- The poverty cut-off for providing free basic services is taken at R800 per month in terms of household income. The impact of changing this cut-off can be assessed using the model. (See sections on projections).
- A household income of R3,500 per month is used as the cut-off for low-income households, consistent with the approach taken in allocating housing subsidies.

The model separates households into two groups: low income (below R3,500 per month) and high income. For the sake of simplicity, no middle income group is used and it is assumed that the high income household group as a whole can cross-subsidise low income households.

The relative proportion of high income to low income households served by a municipality is one of the most important parameters determining the viability of the municipality. The proportion of services provided to non-residential consumers is also important, as it indicates economic strength and the

extent to which revenue can be generated from sources other than households. However, in most municipalities this latter proportion is strongly correlated with the proportion of high income households as it is the income earners in these households who work in the businesses which form the majority of the non-residential sector.

Therefore it is instructive to assess historical trends with regard to the proportion of households in each bracket. This is illustrated in Figure 2.1 for metros and Figure 2.2 for B4 municipalitie.

Figure 2.1: Trends with respect to proportion of households in main income brackets for metros (Category A municipalities)

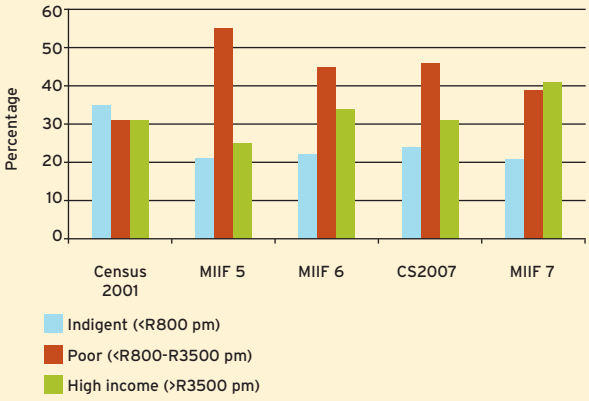
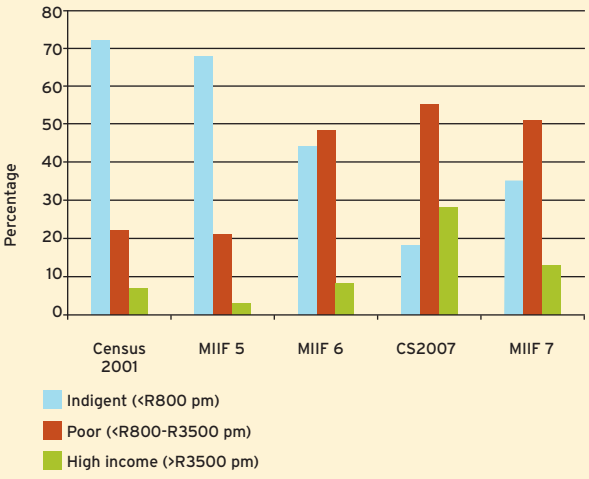


Figure 2.2: Trends with respect to proportion of households in main income brackets for sub-category B4 municipalities



In interpreting these graphs, it is important to note that the figures are given in nominal Rands (at price levels occurring at the time). Although adjustment for inflation could be made, this would obscure the fact that the cut-off of access to housing subsidies, which is also applied in the models as the low income cut-off, has not changed since 2001. It remains R3,500 of household income per month.

It is evident that in the metros, the number of indigent households (earning less than R800 a month) has remained more-or-less constant since 2007, when data for the MIIF 5 was collected. However, the proportion of poor households has declined and the proportion of high income households has increased. The increase in the proportion of households in the upper brackets is to be expected as there has been considerable economic growth over the period since 2001 and, also, the real value of the bracket's upper limits has declined over time. The fact that the indigent group has remained more constant is possibly related to in-migration of poor people or a more structural situation, where households in this poorest group do not benefit from economic growth.

In the case of B4 municipalities, the data indicates that there have been quite dramatic changes in the income profile of people living in these mostly rural areas, with the number of indigent households dropping from 70% in 2001 to just over 30% in 2009. However, it is important to note that this evident change is only as good as the data available from StatsSA. In fact, the data from the 2007 Community Survey has not been considered sound enough and the figures used for the MIIF 7 are adjusted by the MIIF 7 project team to give something that is considered more realistic for B4 municipalities.

The reason for the improved economic position of B4 municipalities is likely to be related to the rapid increase in the level of social grants available to poor households in South Africa. This has a substantial impact on the financial viability of municipalities, as illustrated later in this report.

The improvements in income distribution shown here are supported by the literature. A recent OECD study found that real incomes have risen by just less than 8% between 2000 and 2008 . The same study found that poverty shifts have been greater in rural than urban areas, with the overall rural share of poverty declining[28].

28 Leibbrandt, M *et al* (2010) *Trends in South African Income Distribution and Poverty since the Fall of Apartheid,* OECD Social, Employment and Migration Working Paper No. 101, available at www.oecd.org/els/workingpapers

2.5 Service levels and backlogs

Definitions

Municipal infrastructure: This is the physical facilities, comprising immovable assets which are required to provide a municipal service.

Municipal service: This is the service provided by municipalities in terms of their constitutional obligations, as experienced by the consumer of the service (households and businesses). The service requires infrastructure and the organisational arrangements required to provide, operate and maintain the infrastructure, including other equipment required (movable assets) and the interface between the municipality and the consumer.

Service level – presence of infrastructure: The term 'service level' is taken here to mean the experience of the residential consumer[29] (households) living in a particular dwelling with regard to the distance household members have to move to get access to the service, and the convenience with which the service can be used. This is associated with the physical presence of infrastructure at or near to the dwelling.

Service level – quality of service: This is an expanded interpretation of the term 'service level' as it implies that the infrastructure must also be functioning in a sustainable way. One way of assessing this is through surveys of consumers of the service as this gives the fullest picture of whether the service associated with the infrastructure is fully operational and delivering satisfaction to the consumer.

Basic service level: This is the service level defined by individual sector departments which is determined to be acceptable in terms of the health and safety considerations for specific settlement conditions. This implies that a basic service level may require a higher level of technology in the urban core compared to other types of settlements.

Adequate service level: This is a basic level of service.

Backlog: This is the number of dwellings (premises in which the consumers are living, regardless of whether these dwellings are formal or informal) which do not have access to a basic service level.

Housing

As noted earlier in this report the broad categories of housing are:[30]

- informal single dwelling
- informal backyard dwelling
- traditional dwelling
- formal single dwelling
- medium density housing in multiple dwelling units.

The last two categories of formal dwelling are universally considered to be adequate. However, in the case of the others, the current policy of the Department of Human Settlements is interpreted as follows:

- **Informal dwellings on formally serviced sites** where the household has security of tenure through ownership or a rental agreement is considered to be acceptable in the interim period up to 2014. This is provided that good progress is being made to replace these units with formal housing and that those municipalities that have the capacity to do so replace all of the informal dwelling units with formal ones.
- In the case of **traditional dwellings,** which apply mainly in rural areas, the policy at national level is not for all of them to be replaced by formal dwelling units by 2014. Based on the information available at the time this report was prepared, there is clearly some ambiguity about whether traditional dwellings are considered adequate and municipalities appear to have differing views on this.

Model provisions relating to service level

The model provides for the inclusion of a range of service levels for each municipal function or service. The range of service levels to be applied can be selected by the user but there are standard descriptions of service level which are applied by certain national sector departments. The model uses the data available from the census and sector departments with respect to service level, which is typically limited to the presence of infrastructure.

The situation for each of the major services follows:[31]

Water supply

The range of service levels applied by the Department of Water Affairs and aligned with census questions, with the exception of yard tanks which are

29 This definition can be expanded to include businesses.
30 In the census, there are more categories but those not given here are minor.
31 See the Department of Cooperative Governance's (DCOG) indigency policy for further discussions on basic service levels.

a new service level, in order of increasing level of service, are:

- no reticulation
- public standpipes below RDP standards, i.e. more than 200 meters from the dwelling
- public standpipes within 200 meters of the dwelling which is taken to the RDP standards
- yard taps: a metered water supply delivered to a single tap in the yard adjacent to the dwelling
- house connections: a metered water supply which is piped into the house, typically with several taps.

The model also makes provision for another free-format service level referred to as 'other'. This may be used for yard tanks,[32] for example.

The Department of Water Affairs reports only on the first two categories: those without infrastructure and those with infrastructure, but with a service level below Reconstruction and Development Programme (RDP) standards. It is assumed that the backlog is the sum of these two figures, and this is used to define a basic service level.

As there is not data available on the specific service level mix since the 2001 Census, assumptions have been made based on the census data, about the proportion of people with access to different 'adequate' service levels.

Sanitation

The following service levels are recognised by the Department of Water Affairs and used in census questions:

- no sanitation (no sanitation facility available to the household)
- a pit latrine not provided with ventilation and fly proofing
- a ventilated improved pit latrine or equivalent
- septic tanks
- full waterborne sanitation systems.

Again, the model provides for a free-format option for another service level, perhaps a simple waterborne sanitation system or a urine diversion toilet.

The first three options are not considered to be adequate sanitation systems and are therefore below a basic level of service. Therefore, those dwellings provided with this service level represent a backlog. However, it must be acknowledged that in many urban areas there is frequently a belief that anything less than waterborne systems represents a backlog.

Electricity

While there have been arguments to use the broader term 'household energy' as a measure of service level, the DoE has focused primarily on electricity. The census deals with access to electricity separately for lighting, cooking and heating.

For the purpose of the MIIF 7, it is assumed that if a dwelling has electricity for lighting, then there must be reticulation present or a solar home system must be in place. This is taken to be the cut-off for a basic service level. The model provides separately for solar systems and grid electricity and also differentiates between systems with 40 amp and 60 amp capacities. The reason for this is that each has different cost structures.

A free-format service level is also available in the model.

Waste management (refuse)

With regard to household solid waste collection, the census includes the following service levels which are assumed to be consistent with the thinking in the Department of Environment Affairs:

- no rubbish disposal
- kerbside collection less than weekly
- own refuse dump
- communal refuse dump
- communal bins
- kerbside collection at least weekly.

The first two service levels are held to be inadequate (below basic service level).

In considering service levels, the situation varies between urban (high-density) and rural (low-density) circumstances. The definition of a basic service level in a rural area is uncertain and more guidance is required from the Department of Environmental Affairs (DEA) on this.

However, it can be assumed that 'own refuse dump', which is taken to be on-site disposal of refuse may be adequate in a rural setting if properly managed by the household. However, in the model it is

32 A yard tank is a storage tank with approximately 200 litres of water in the yard adjacent to the dwelling, which is filled via water reticulation every day.

33 The extent to which the service is 'adequate' is in fact dependent on the level of management support which is provided in mostly rural settlements. There is no data on this.

Table 2.6: Structure of information available on roads

Road type		Road condition					
		Very good	Good	Fair	Poor	Very poor	Total
Paved	Freeways						
	Dual roads						
	Access roads						
	Other						
Gravel	Normal urban						
	Access roads						
	Unclassified						
	Tracks						
	Other						

assumed that this is adequate.[33] A communal refuse dump is considered to be above basic in a rural area, with the assumption being that it is properly managed by the municipality or community.

Considering urban contexts, the model provides for an additional differentiation between kerbside collection and collection from communal bins; both are considered to be at or above basic. There is currently no way of differentiating between the numbers which have these two service levels. However, kerbside collection is taken to be dominant.

Roads and stormwater

Roads and stormwater drainage are considered together as the stormwater drainage conduits are typically aligned along roads and the infrastructure is typically built together. However, a separate item is included to provide for bulk stormwater infrastructure.

Service levels can be set both in terms of the distance an individual has to walk from their dwelling before getting to a road, and the type of the road they reach that is nearest to them.

Although this has not been formalised[34], the view held by the Department of Transport and the Department of Cooperative Governance (DOCG) is that all dwellings should be within 500 meters of a road. This probably needs to be qualified to exclude households living in very low density scattered settlements. With regard to the type of the road, the Department of Transport (DoT) applies the norm that all roads should be of an engineered standard.[35]

New statistics are now available from the national DoT for road lengths in the country. While this information is somewhat contradictory, as discussed later in this report, what data there is on road conditions is based on the visual condition index (VCI) and is structured as shown in Table 2.6.[36]

At this stage, the MIIF 7 is based on the assumption that the length of roads in the country is sufficient, with the exception of urban informal areas which have not yet received services funded through a housing subsidy. In terms of new roads required the model deals with this group as a backlog.

The model follows the structure of the above Table 2.6 and provides for service levels to be assessed, using two means:

- Road surface type with three categories: paved, gravel surfaced and earth surface (graded). 'Tracks', 'unclassified' and 'other' gravel roads are assumed to be non-engineered and have an earth surface.
- Road surface condition: while the standard visual condition index provides for five conditions, the model is based on a simplification with three categories: good, adequate and poor, with the latter being below basic. This means that roads in a poor condition represent a backlog.

Public services

Public services are newly categorised in the model based on National Treasury's government finance statistics (GFS) standards. This provides for the following five groupings:

34 The roads infrastructure strategic framework for South Africa (RIFSA) does not include service level benchmarks.
35 It may be appropriate for this to be stated in terms of the time during an average year that the road remains passable; or the recurrence interval between floods which will overtop the road.
36 Department of Transport. 2007. Assessment of Municipal Road Network. Unpublished report.

- community and social services
- sports and recreation
- housing
- public safety
- health.

These categories include several sub-functions that are not municipal responsibilities: housing, libraries and primary health care. In order to properly account for these services, libraries and primary health care are recorded separately in the model. In the case of housing, the GFS clearly takes it to be a public service. However, this is ignored in this round of the MIIF 7, as it is argued that housing is accessed by a specific household living on a specific property and is, therefore, not a service provided to the public in general.

Over the past two years, there has been an improvement in the level of information available regarding service levels for municipal public services.[37] However, there are gaps in this information and the existing information is not consolidated in one place. Therefore, as part of MIIF 7, a municipal public service workbook was developed which consolidates all the available information and provides a structure for service levels for the individual services which make up each component of public services. For example, in the case of open sports fields, the workbook sets up a hierarchy of fields, from a simple grassed playing field, with no specific attention to drainage, to a full athletic stadium with seating stands, and so on. An indicator is provided of the appropriate number of people serviced by each type of sports field, essentially defining a 'full' service level. The facility is then costed and a cost per person served can then be calculated.

However, while this new information represents a step-up in understanding municipal public services, the information on service levels is very detailed and not really suitable for incorporation into the MSFM. Therefore the structure applied in the MSFM previously is retained, with a 'macro' position taken for each component of municipal public services, and with service levels defined as inadequate, basic or full. This provides a structure for service levels but the data is not currently available for this grouping of services.

Governance, administration, planning and development facilitation

The extent to which municipalities apply effective governance, administration, planning and development facilitation (GAPD) functions, is little understood currently. However, research undertaken for the MIIF 7, and for the municipal fiscal framework, indicates the importance of understanding this grouping, as levels of operating expenditure on GAPD are proportionally high. Under both these frameworks a set of expenditure based benchmarks is established.

With the limited understanding of appropriate levels of GAPD spending, it is difficult to predict future trends. For example, there may be an argument that the metros are spending at appropriate levels or perhaps could achieve efficiencies. On the other hand, it is likely that many municipalities in underdeveloped areas are not spending sufficiently on GAPD.

2.6 Current service levels and backlogs

Housing

The model requires assumptions to be made about the share of households in each type of dwelling, and by settlement type (urban/rural and formal/informal). Given the decision by the national Department of Human Settlements (DoHS) to use the General Household Survey 2008 data as a starting point for its estimates, the national shares per dwelling type from the survey's data have been used. However, the data does not disaggregate by settlement type, while the Census 2001 does. Thus the Census 2001 shares per settlement type have been applied to the General Household Survey 2008 data to come up with base assumptions on access to housing types for 2009 (see Table 2.7). Based on these percentages and the application of the same formula for defining housing need as that used by the DoHS,[38] a total of 2,140,446 households require adequate shelter. This figure falls squarely within the department's low and high estimates of 2,140,000 and 2,260,000 households.

37 *Sport and Recreation South Africa. Norms and Standards for Sport and Recreation Infrastructure Provision and Management.* 30 November 2008. Available at: http://www.srsa.gov.za

38 Households living in shacks in backyards plus households living in informal settlements plus 30% of households living in traditional dwellings. See discussion above.

Table 2.7: Access to housing types in base year (2009)

		Informal single dwelling %	Informal backyard %	Traditional dwelling %	Medium density %	Formal dwelling %
Urban-formal			10	1	12	78
Urban-informal	43	2	5	2	43	
Rural-informal	12		28		65	
Rural-formal	5		12		74	
Total	**8**	**5**	**10**	**6**	**70**	
Number of households	1 045 000	689 000	1 349 000	833 000	9 008 000	
Total need for adequate shelter	1 045 000	689 000	406 000			

Table 2.8: Backlogs for water supply[39]

	Census 2001: Water backlog %	Department of Water Affairs 2007: Water backlog %	Department of Water Affairs 2009: Water backlog %
A	11	6	2
B1	19	9	4
B2	25	13	10
B3	23	9	4
B4	61	30	25
All	**27**	**13**	**9**

Table 2.9: Backlogs for sanitation

	Census 2001: Sanitation backlog %	Department of Water Affairs 2007: Sanitation backlog %	Department of Water Affairs 2009: Sanitation backlog %
A	19	12	11
B1	34	23	20
B2	37	23	21
B3	47	30	27
B4	80	54	44
All	42	27	24

Water supply and sanitation

Data on estimated access to water and sanitation in 2009 was received from the Department of Water Affairs, by municipality and Department of Water Affairs (DWAF) settlement type.

Inadequate access to water was defined as a standpipe further than 200 meters from the dwelling, or less. Inadequate access to sanitation was defined as an inadequate pit latrine (i.e. not a ventilation improved pit (VIP)) or less. Note that chemical toilets were defined as inadequate.

Table 2.8 shows the total backlog in access to water by households, according to Census 2001, the Department of Water Affairs 2007 data and 2009 data, per municipal sub-category.

Table 2.9 shows the total backlog in access to sanitation by households, according to Census 2001 and the Department of Water Affairs 2007 and 2009 data, per municipal sub-category.

39 While there are concerns about the Department of Water Affairs' methodology (as there are with all current backlog calculation methodologies) the department's figures are taken here as they are considered to be the best available.

Electricity

According to the Department of Energy, in 2008, 73% of households were connected to the grid. Statistics for the households served and backlogs as a proportion of households per municipal category[40] are provided in Table 2.10.

The backlog figure of 27% of households is higher than the Community Survey 2007 data, which reported that 80% of households use electricity for lighting, suggesting that the backlog would be 20%. The Department of Energy (DoE) figures have been used in the model.

Roads

The latest national level data available for municipal roads is a database on road length and condition compiled by the South African National Roads Agency Limited (SANRAL) on behalf of the national Department of Transport (2010). The total road lengths for national, provincial and metro roads were provided to SANRAL by the provincial and metro road authorities. This data set considers metros to be the 6 official metros and the 3 aspirant metros. The road length data for the remaining 228 municipalities has been calculated by subtracting the national, provincial and metro lengths from the total. However, there remains an estimated 140,000 km of unproclaimed road that have not been assigned to any road authority. As these roads are not currently an official municipal responsibility, they have been excluded from this analysis, resulting in a total municipal road length of 405,000 km. It must be noted that only 14% of the total municipal road length was captured in the data from the sample of 50 municipalities. Thus, 86% of the municipal road length is based on an estimate.

Table 2.10: Backlogs for electricity

Municipal category	2009 data used for MIIF 7				Compare with MIIF 5 (2007 data) %
	Total households	Households served	Backlog 2009 (households)	Backlog 2009 (% of households)	
A	4 641 858	3 689 064	952 794	21	22
B1	2 159 096	1 648 860	510 236	24	26
B2	1 060 494	801 113	259 382	24	28
B3	1 617 109	1 190 932	426 176	26	31
B4	2 970 266	1 721 017	1 249 250	42	46
DMA	22 911	15 561	7 349	32	
Total	12 471 734 [41]	**9 066 547**	**3 405 187**	**27**	**32**

Table 2.11: Road lengths by surface per municipal sub-category, according to the Department of Transport (2010) roads database (adjusted by the MIIF 7 project team)

	Paved	Gravel	Graded[42]
A	39 851	9 441	3 077
B1	12 356	25 000	16 200
B2	7 288	42 000	7 000
B3	8 003	40 000	6 982
B4	21 875	141 000	25 000
Total	**89 373**	**257 441**	**58 259**

40 Municipal categories- A: metropolitan; B1: secondary cities; B2: large town with urban core; B3: small town as urban core; B4: rural town with no urban core; C1: district which is not a water service authority (WSA); C2: district which is a WSA.

41 The total households figure reported by the Department of Energy differs from the total households figure used in the MSFM (12,793,837) which is based on Community Survey 2007 household sizes.

42 The Department of Transport database does not distinguish between graded and gravel roads, so the percentage of graded roads from MIIF 5 has been used.

The previous best available data was the national Department of Transport's Assessment of the Municipal Roads Network, undertaken in 2007, which was used in the MIIF 5. A comparison between these two data sets (Tables 2.12 and 2.13) shows a 12% difference in the metro road length and a 75% difference in the total municipal road length. The greatest discrepancy is in the length of gravel roads in non-metro municipalities, which is where most of the uncertainty regarding road length and responsibility lies.

It is clear that a large degree of uncertainty still exists around the actual length of the municipal road network, which is compounded by the large number of unproclaimed roads. As the DoT 2010 database is the best available source of data, this data set has been used in the model.

Some interesting statistics can be abstracted from this data in Table 2.14:

The finding from this analysis is that B4 municipalities have a high level of obligation to manage roads in comparison with other municipal sub-categories. These roads may only be required to carry low volumes of traffic but nevertheless require proper maintenance and rehabilitation.

Waste management

StatsSA's Community Survey 2007 reveals that, as expected, service levels are highest in the metros, with an estimated 89% of households having kerbside waste removal. On the other end of the spectrum, the low capacity, rural municipalities (B4s) experience the lowest access levels. Overall, 61% of households had access to kerbside removal, 2% communal dumping and 29% relying on-site disposal. An estimated 7% of households have no or inadequate access to waste disposal.

Table 2.12: Metro road length comparison

	Department of Transport 2007	Department of Transport 2010	Difference %
Paved	38 442	39 851	4
Gravel	6 185	12 519	53
Tracks	2 016		
Total	**46 643**	**52 369**	**12**

Table 2.13: Total municipal road length comparison

	Department of Transport 2007	Department of Transport 2010	Difference %
Paved	86 730	89 373	3
Gravel	118 483	316 619	118
Tracks	26 694		
Total	**231 907**	**405 992**	**75**

Table 2.14: Road length statistics normalised per household

Sub-category	Length/Households/Metres		
	Paved	Paved and gravel	All surfaces [43]
All	7,0	27,0	31,6
A	8,1	10,0	10,6
B1	5,4	16,3	23,4
B2	6,5	44,1	50,3
B3	4,9	29,4	33,7
B4	**7,7**	**57,2**	**65,9**

43 All surfaces' is the total of all roads which includes, paved, gravel and earth surfaced roads.

Table 2.15: Current access levels

	No. or inadequate %	On-site disposal %	Communal dumping site %	Kerbside removal %
A	3	5	2	89
B1	5	23	2	69
B2	7	28	2	63
B3	8	33	2	56
B4	16	71	1	12
DMA	7	52	6	35
National	**7**	**29**	**2**	**61**

Source: StatsSA Community Survey 2007

Note: 'No or inadequate' includes: no rubbish disposal or other. 'Onsite disposal' refers to own refuse dump. 'Kerbside removal' refers to a refuse removal service that is provided by either the local authority or a private company at least once a week, as per the community survey response categories. Households receiving waste removal less than once a week make up only a small proportion of the total households reflected under kerbside removal (less than 2% nationally).

These results are very different from those available in 2007, used for MIIF 5, which indicated that the extent of kerbside removal was only 41%.

Municipal public services

As noted above, the MIIF 7 includes new information on service levels for municipal public services. But the basic structure for costing, with inadequate, basic and full service levels is retained for the MSFM. However, there is insufficient information available in a nationally consistent structure to allow for reasonably accurate data relating to service levels to be gathered. Therefore, assumptions have had to be made, as Table 2.16 follows:

2.7 Service level targets

The model provides for service level targets to be set, including targets for removing backlogs. These relate to the future and therefore represent a variable that can be changed to model alternative scenarios.

2.8 Capital costing methodology and unit costs

The model estimates the cost of all services provided to both residential (low and high income) and non-residential consumers. However, only costs that are the responsibility of the municipality as the authority are taken into the totals. This means two things where the municipality uses an external service provider, whether this is Eskom, water boards or a private operator, the costs are included in the model. This is because it is the responsibility of the municipality to ensure that these services are provided. This is done as follows:

- For operating account information, estimates are made of service provider expenditure and revenue, and this is added to municipal figures to give total expenditure and revenue for all service provision in the municipal area.
- For capital expenditure, the model estimates that all capital expenditure and Capex incurred by service providers needs to be deducted to get municipal Capex:

Table 2.16: Assumed access to municipal public services 2006/07 (all households)

	Libraries and environmental health			Other public services: Community and social services Sports and recreation Public safety Primary health care		
	Inadequate %	Basic %	Full %	Inadequate %	Basic %	Full %
Urban-formal	0	20	80	10	40	50
Urban-informal	5	25	70	15	55	30
Rural-informal	25	25	50	75	20	5
Rural-formal	25	25	50	60	30	10

- With respect to capital finance, provision is made for capital finance provided by service providers.
- Capital costs of internal infrastructure provided to high income households and non-residential consumers are excluded as these are incurred by private developers and financed by them. However, the cost of operating municipal services provided to this group is included.

The model is based on unit costs of providing services to **consumer units,** in the case of the plot package, which is essentially delivered individually to each consumer unit, and **households** in the case of public services and GAPD.

This MIIF 7 included a major update of capital cost information both for engineered infrastructure (water, sanitation, electricity, roads and solid waste) and for municipal public services.

Costing plot-based engineered infrastructure

In the case of plot based engineered infrastructure provided to individual consumer units, the cost information was gathered through two processes:

- The project team working on the MIIF 7 participated in the process to update the Department of Cooperative Governance (DCOG)' municipal infrastructure 'industry guide.[44] In this case, unit cost information was adapted from previous information in the industry guide by the authors of the guide.
- As part of MIIF 7, a new capital **costing analysis workbook** was developed and populated with new data collected by a team of three engineering consultancies: PD Naidoo and Associates, Aurecon and Moedi. (See Annexure B for results of capital costing).

Costing municipal public services

With regard to municipal public services (sometimes referred to as social infrastructure) a new costing methodology was developed as part of MIIF 7, based on the service level structure described earlier in this section. This is contained in the municipal public services costing workbook, which develops capital costs per household for each public service category.

Costing other infrastructure

In the case of public transport infrastructure, economic infrastructure, public places and administration buildings, there are currently no expenditure benchmarks available. So estimates were made based on the limited amount of information available from case study municipalities.

Unit capital cost trends

Tables of unit costs used in the models are given as Annexure B to this report. The tables also show a comparison between unit costs used in MIIF 5 and MIIF 7, which represents a three-year increase with data collected for 2006 and 2009 respectively. Some trends are shown in Table 2.17 opposite.

The fact that these figures are nominal (at prices occurring at the time) needs to be noted. Over these three years, the change in the construction price index[45] was 26%. This means that based only on inputs to the construction industry, one would expect a cost increase of 26%. Cost increases of greater than this amount are related to factors other than input costs.

In interpreting these results, it needs to be kept in mind that the MIIF 5 estimates were based on a small sample of projects and are subject to inaccuracies. Where there are really big increases, the result is more likely to be related to poor estimates for the MIIF 5 rather than actual increases of this scale. This is particularly true for the bulk water costs, where the figures available in 2006 were evidently not realistic. Taking this into consideration, the results do indicate some increases that are based on changes other than input prices. The more significant of these are:

- water supply internal infrastructure for high income areas
- bulk water supply systems
- on site sanitation systems, typified by VIPs
- bulk and connector sanitation infrastructure
- electricity systems generally
- paved rural access roads.

In the case of bulk and connector infrastructure, the increases indicated for water, sanitation and electricity will be influenced by the fact that (a) resources are becoming scarcer, meaning that bulk

44 The Department of Cooperative Governance (DCOG). *The Municipal Infrastructure Grant (MIG). An Industry Guide: Infrastructure Service Delivery Level and Unit Cost.* October 2009. (Draft version 1).

45 The construction price index represents a weighted average of the price increases for labour, construction materials, fuel and plant. It represents the change in the cost of inputs to the construction industry.

Table 2.17: Trends in unit capital costs

Service	Infrastructure component	Indicative percentage increase (nominal) %
Water supply	Communal standpipes	-10
	Yard connections – low income	25
	Yard connections – high income	110
	Regional bulk schemes	250
	Local bulk supplies	530
Sanitation	Ventilation improved pits (VIPs)	40
	Internal reticulation for waterborne sanitation	0
	Bulk and connector infrastructure	100
Electricity	Solar panels for 5 Amp systems	50
	Distribution infrastructure for 20/40 Amp connections,	40
	Distribution infrastructure for 60 Amp connections,	25
Roads	Distributor roads – paved	5
	Urban access roads – paved	30
	Rural access roads – paved	65
	Access roads – gravel	-15
	Access roads – graded (no surface layers)	30

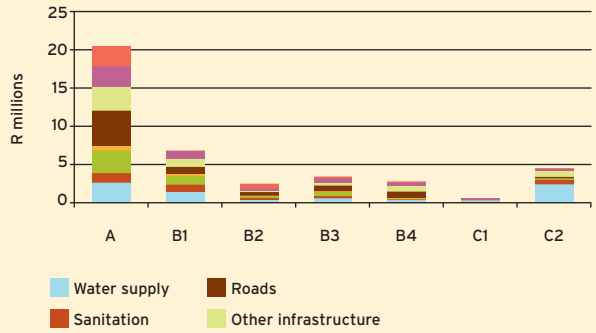
and connector lines get longer, and (b), in rural areas the settlements that require servicing are more remote, with bulk and connector lines serving progressively fewer people.

The impact of these cost increases on the total capital requirement is discussed in later sections of this report.

2.9 Current levels of capital expenditure

Capital budget figures for all municipalities are collected annually by National Treasury. The figures for 2009/10 are used for this analysis and are shown in Figure 2.3 for each municipal sub-category.

Figure 2.3: Capex budgets by municipal sub-category: 2009/10

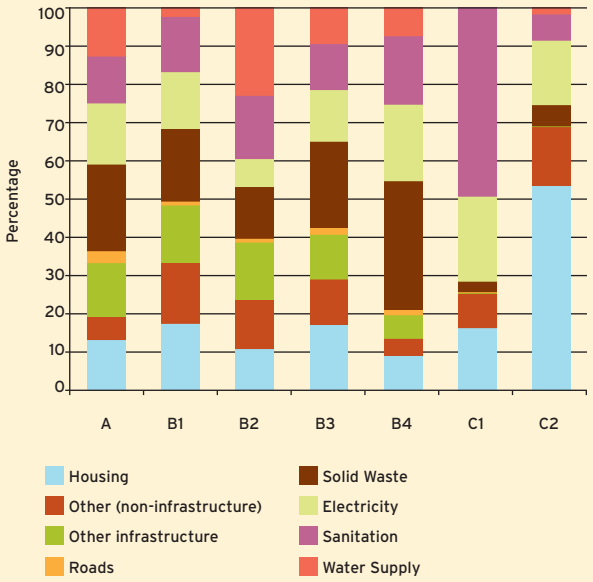


The total budgeted capital expenditure in 2009/10 is R41 billion. With adjustments to take housing top structure expenditure into consideration, the amount becomes R39 billion. This can be compared to:

- the 2006/07 figure of R30 billion
- the 2003/04 figure of R17 billion.

The increase from 2006/07 to 2009/10 is 37%, which is well above the CPI increase of 25% for this period. Figure 2.4 shows splits in expenditure.

Figure 2.4: Split in Capex budgets by municipal sub-category



Expenditure by parastatal bodies needs to be added to these figures. Data on these items could not be accessed for this analysis and, therefore, the following assumptions are made:

- water boards: approximately R1.4 billion[46]
- Eskom: approximately R5.8 billion[47]

It is therefore estimated that total capital spending on municipal infrastructure, which includes municipalities and service providers, is currently of the order of R46 billion (2009/10).

2.10 Sources of capital

Again using the municipal budget database kept by National Treasury, the profile of capital finance from municipal budgets is reflected in Figures 2.5 and 2.6.

Figure 2.5: Budgeted capital finance sources by municipal sub-category: 2009/10

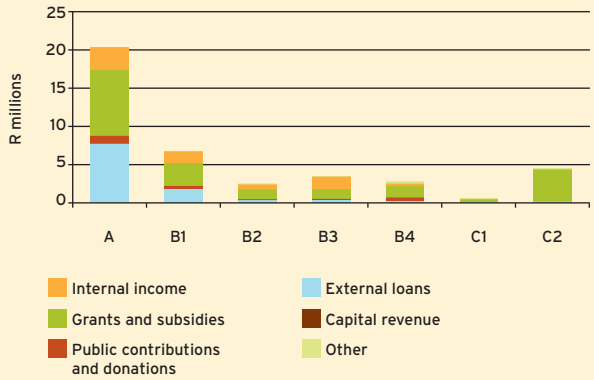
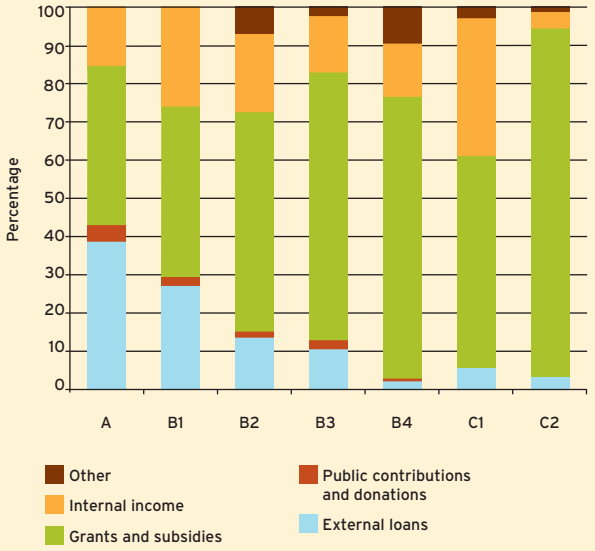


Figure 2.6: Capital finance: splits by municipal sub-category



The high dependence on subsidies is indicated in this figure, particularly outside the metros.

These figures exclude capital finance from service providers. External service providers (most notably Eskom and the water boards) raise their own finance to cover their capital expenditure.

Capital grants

Capital subsidies provided for under the national medium term budget are summarised in Table 2.18 on page 32.

46 The most recent data available from National Treasury is for 2009. Of the amount of R1.4 billion Rand Water accounts for almost 70%.
47 Data for 2009/10 not available, so assume equal to actual expenditure in 2008/09.

Table 2.18: Capital grants allocated for municipal infrastructure

Direct capital grants							
R millions	2008/09	2009/10	2010/11 Allocation	Forward estimates (Divison of Revenue Bill 2010)		Average annual increase over 3 years	
				2011/12	2012/13	Nominal %	Real %
MIG	9 091	11 107	12 529	15 069	18 322	21	14
INEP (electricity)	589	933	1 020	1 097	1 151	6	0
EDSM (electricity)	–	175	220	280	–		
NDPG (social infrastructure)	182	551	1 030	1 190	1 182	7	1
PTISG (public transport)	2 920	2 418	3 699	4 425	4 125	6	0
RTSIG (rural public transport)	9	10	10	11	12	10	3
World Cup stadiums grant	4 295	1 661	302	–	–	–	–
Drought relief	9	54	228	–	–	–	–
Total	17 095	16 909	19 038	22 072	24 792	14	8

Indirect capital grants							
R millions	2008/09	2009/10	2010/11 Allocation	Forward estimates (Divison of Revenue Bill 2010)		Average annual increase over 3 years	
				2011/12	2012/13	Nominal %	Real %
NDPG (social infrastructure)	54	111	125	100	105	-8	-14
INEP to Eskom	1 148	1 478	1 752	1 770	1 914	5	-1
Schools and clinics electrification	90	149	–	–	–		
Regional bulk water grant	450	612	893	1 675	1 849	44	36
Schools and clinics water & san	186	350	–	–	–	–	–
EDSM (electricity)	0	75	109	119	–	–	–
Rural households infrastructure	0	0	100	350	750	174	158
Total	1 928	2 775	2 979	4 014	4,618	25	17

Note:
1. Figures taken from DORA 2010.
2. The 'real' increase is calculated based on a average rate of inflation of 6% from 2010/11 to 2012/13.

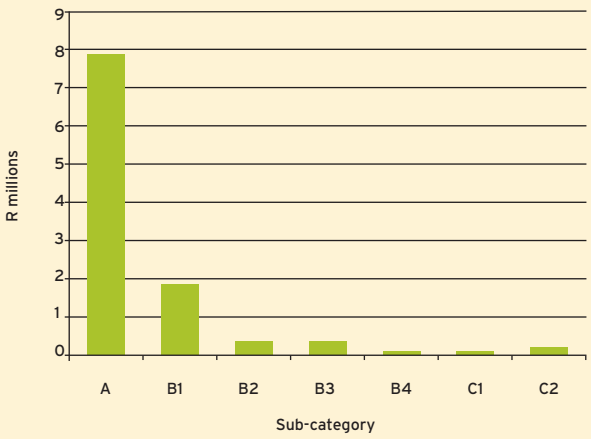
The key figures from the table to note are:

- MIG funding is increasing at a real rate (i.e. excluding inflation) of 14% per year.
- The regional bulk infrastructure grant is increasing rapidly.
- The rural households' infrastructure grant was introduced in 2010/11. This is a grant in-kind intended to cater for the rollout of on-site water and sanitation to un-served rural households where connected services are not viable or appropriate.

Borrowing

Based on municipal budgets, the borrowing profile of municipalities looks as follows:

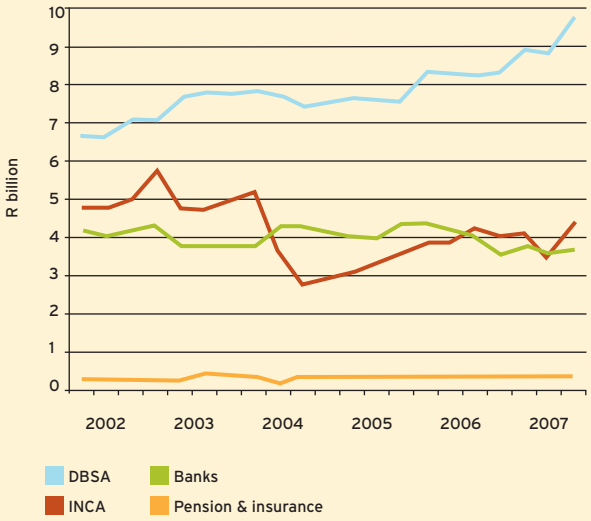
Figure 2.7: Borrowing profile for municipalities from 2009/10 budgets



The total amount that municipalities budgeted to borrow for 2009/10 is 10.7 billion, with the majority (R7.9 billion) from metros, indicating their dominance with respect to 'indicated willingness to borrow'. In the case of B4 and C2 municipalities, they are evidently interested in borrowing small amounts, according to their budgets but it is unlikely that they will actually be able to do so as their credit ratings are likely to be too low.

Considering the actual supply of funds, a recent (2007) assessment undertaken by National Treasury is instructive:

Figure 2.8: Trends in the supply of funds to municipalities



The total loan book at the end of 2007 was R23 billion. New data on the current total loan book of municipalities is awaited from National Treasury, with preliminary indications being that this is of the order of R32 billion at the end of 2009. Assuming about R1 billion of existing loan reductions over the period 2007 to 2009, the indication is that actual borrowing has been at the level of R4 billion a year. This is well below the budgeted figure for this year of R10.7 billion and it can be assumed that some of this budgeted amount is unrealistic. (Municipalities are over-optimistic about their capacity to spend)

Taking the figure of R32 billion and assuming that the split in this loan book between municipal sub-categories is more-or-less in proportion to the amounts in the aggregate budgets for each sub-category, gives the following:

Table 2.19: Assumed split in current loan book

Municipal sub-category	Assumed split %	Estimated current loan book (R billion)
Metros	74	24
B1	18	5,5
B2	3	1,0
B3	4	1,2
B4		
C1		
C2	1	0,3
Total	100	32

2.11 Operating unit costs

Operating unit cost information can only be sourced from municipalities that are deemed to be operating and maintaining each service properly. This information has been gathered from MIIF 7 case studies, primarily those done for MIIF 5 and 6, and from the budget figures in the National Treasury municipal budgets database.

The National Treasury database represents an important source of information relating to expenditure, but it currently has limitations, as municipalities have, historically, not had to report on expenditure by function.[48] Therefore the split of expenditure has to be estimated based primarily on case studies.

GAPD costs remain an area of particular concern due to the large proportion they contribute to total expenditure and the poor understanding of cost benchmarks. While improvements in understanding this cost grouping were made as part of the MIIF 5, there is still further work to be done. For this report, reliance is made primarily on case studies to get reasonable figures.

2.12 Current levels of operating expenditure

The 2009/10 budgets for all municipalities total approximately R139 billion.[49] This can be compared to the 2006/07 figure of R102 billion, indicating an increase in nominal terms of 36% over these three years (12% per year). This is well above the 25% increase in CPI for these three years.

The split in expenditure is shown in Figures 2.9 and 2.10 on page 34.

48 This is changing as new reporting formats required by National Treasury will require costs to be reported by function and this will allow for improvements in the assessment of unit costs.

49 From National Treasury's municipal database.

Figure 2.9: Budgeted operating expenditure by municipal sub-category: 2009/10 (with district expenditure added to expenditure of local municipality partner)

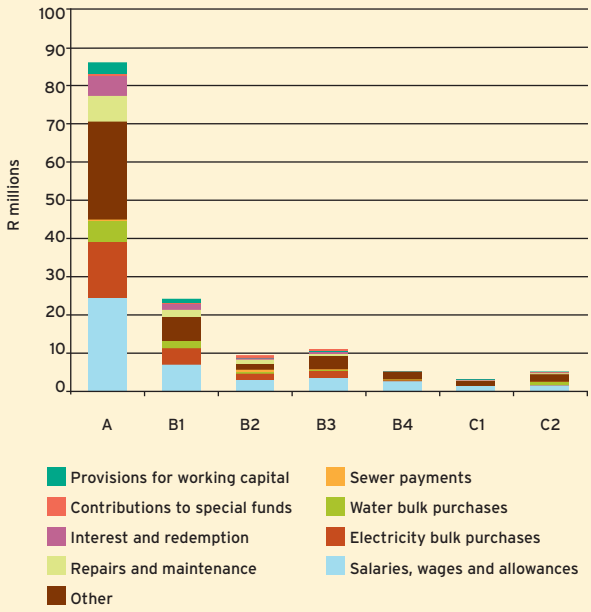
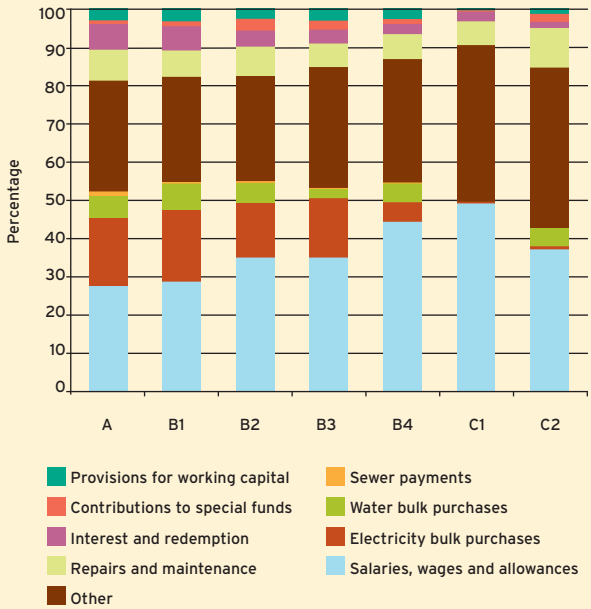


Figure 2.10: Split in operating expenditure by municipal sub-category[50]



Expenditure incurred by other non-municipal service providers needs to be included and is estimated as follows:

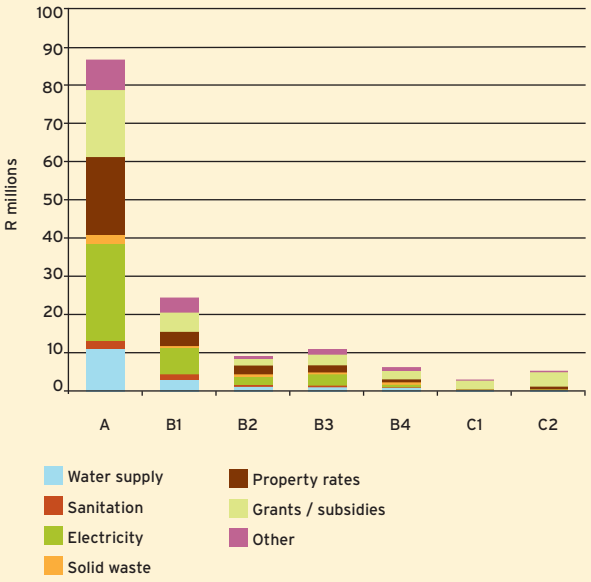
- water services providers (retail only): guessed at approximately R0.5 billion.
- Eskom: R12 billion.[51]

Therefore, operating expenditure on municipal services (including all municipal overheads and service provider expenditure) is of the order of R151.5 billion for 2009/10.

2.13 Operating revenue

Based on an assessment of aggregate municipal budgets kept by National Treasury, revenue is estimated at a total of R146 billion for 2009/10. This is disaggregated by municipal sub-category as shown in Figures 2.11 and 2.12.

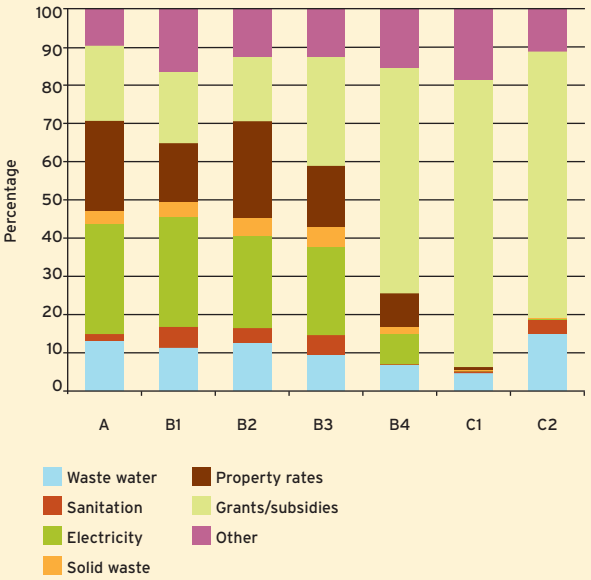
Figure 2.11: Budgeted operating revenue by municipal sub-category: 2009/10



50 There is considerable debate about benchmarks for expenditure on salaries, and repairs and maintenance. However, this is a very complex topic as there are so many variables that influence these percentages (The extent to which bulk services are included, the extent to which work is contracted out being good examples and the extent to which operating and maintenance activities are mixed are good examples).

51 This data was sourced from the Eskom annual report for 2008/09. Note that the figure used in the 2004 round of MIIF was R20 billion, which was way over-estimated. Data on Eskom accounts was not sourced in this previous round of the MIIF.

Figure 2.12: Split in operating revenue



The dependence of B4 local municipalities and districts on grant finance (including the equitable share) is obvious.

Operating revenue received by other, non-municipal, service providers needs to be added to the municipal figure. This should include retailers only (those receiving revenue direct from consumers). Amounts are estimated as follows:

- water services providers (retail; only): Guessed at R0.5 billion.
- Eskom: R14.3 billion.

Therefore, total revenue raised for municipal services by municipalities and service providers is of the order of R160.8 billion.

Operating grants

The current provisions for operating transfers to municipalities, taken from the Division of Revenue Bill, 2010, are summarised in Table 2.20.

Table 2.20: Operating transfers to local government (Division of Revenue Bill 2010)

R millions	2008/09	2009/10	2010/11 Allocation	Forward estimates (Divison of Revenue Bill 2010)		Average annual increase over 3 years	
				2011/12	2012/13	Nominal %	Real %
Equitable share	25 560	21 050	26 676	30 268	33 370	12	6
Fuel levy (metros)		6 800	7 542	8 531	8 958	9	3
RSC replacement (districts)		3 306	3 492	3 672	3 864	5	-1
Municipal systems improvement	200	200	212	225	236	6	0
LG Financial management	180	300	365	385	404	5	-1
Water services operating grant	1 002	871	662	380	399	-22	-27
World Cup Host City operating grant	–	508	210	–	–	–	–
EPWP Phase 2 incentive	–	202	623	1 108	1 163	37	29
In kind							
LG financial management grant	50	–	–	–	–	–	–
Water services operating grant	329	243	146	–	–	–	–
Total	27 321	33 480	39 928	44 569	48 394	10	4

3. Resource and waste balances

The MIIF 7 includes greater attention to the extent to which resources, specifically energy and water, are used, and the waste streams entering the environment, specifically wastewater and solid waste. Some of the results are given below.

3.1 Energy utilisation in the form of electricity

Information is available on the amount of electricity utilised in the municipal realm. This includes, mainly, domestic (residential), commercial and smaller scale industrial supplies. Larger scale industries and mines, are not included as part of municipal supply and are supplied directly by Eskom; they are often referred to as industrial customers (KICs).

Some detail on the structure of municipal electricity use is given in the sector report on electricity. The position is summarised in Table 3.1.

The MSFM has a feature which projects energy requirement into the future. This is based on:

- unit consumption rates for domestic consumers, which can be varied with time
- the current proportion of electricity sold to non-residential consumers. This amount is projected using a relationship to economic growth
- estimates of electricity losses.

Table 3.1: Electricity balance figures for the country as a whole

(million kWh pa)	Municipal service providers	Eskom	Total	% split
Total electricity delivered to customers	88 000	36 490	124 490	86
Residential customers	28 000	16 056	44 056	31
Non-residential customers	60 000	20 434	80 434	56
Total losses	10 120	4 610	14 730	10
Apparent losses	4 400	1 844	6 244	4
Technical losses	5 720	2 766	8 486	6
Total electricity required (entering system)	**98 120**	**46 103**	**144 223**	**100**
% split	**68**	**32**	**100**	

The model allows for current electricity use to be tuned to be equal to macro figures for the country as a whole, shown in Table 3.1. Future projections are based on this current position.

3.2 Water utilisation

Water resources associated with water services that are defined as municipal represent approximately 27% of the water resources used in the country.[52] The MSFM has a feature to estimate the amount of municipal water required using the same methodology as for electricity. The current total estimate (2009) is given in Table 3.2.

If technical losses are excluded, the total is 3,400,000 Ml per year. This can be compared to figures from the DWA for the year 2000, which, together with growth in water demand escalated.

Table 3.2: Estimate of current total municipal water requirement

Category	Volume (Ml pa)	% split
Water recorded as delivered to consumers	2 811 681	70
Residential customers	2 086 990	52
Non-residential customers	724 691	18
Non-revenue water	1 205 006	30
Apparent losses	602 503	15
Technical losses	602 503	15
Total requirement	4 016 687	100

Note: Figures for non-revenue water are rough estimates only as is the division between technical and apparent losses.

3.3 Wastewater return flows

Wastewater return flows are estimated in the model by taking water supply figures and using return flow factors based on the literature and case study results. Based on the volume of water delivered to consumers, provided above, the total national return flow of wastewater amounts to 2,283,000 Ml per year.

3.4 Waste management

The solid waste balance is discussed in some detail in the municipal solid waste sector report. There is a significant difference between figures given in the national waste management strategy, which amounts to 24 million tons per year, and the model results, which amount to 16 million tons per year. The model results appear to correlate well with case study figures and so they are accepted as part of the MIIF 7 findings.

4. Looking forward: establishing scenarios

4.1 Two scenarios based on service level strategy

There are a wide range of variables that influence the cost of municipal services and the way such costs are financed on both the operating and capital account. The service level package that is offered to customers is taken as the basis for separating two scenarios,[53] premised on alternative service level strategies:

- **Base scenario:** A mixed service level, which is considered to be close to what is happening currently at the municipal level.

52 No data is available on municipal water use specifically. The percentage quoted here is the percentage water use by the domestic sector, which equates roughly to the municipal sector. Source: Department of Water Affairs (2009) Water for Growth and Development Framework (Version 7).

53 The term 'scenario' is typically used to deal only with circumstances outside the control of the body doing the planning (national government in this case). However, it is used here in a less rigorous way to include parameters that can be influenced by government.

- **Lower service level scenario:** One where service levels are kept as low as possible in order to promote the viability of the programme. In order to flatten off the required level of spending, the targets for meeting service backlogs are all extended to 10 years.

The service level packages assumed are given in Table 4.1.

Table 4.1: Service level packages assumed for scenarios

Service	Base scenario Rural	Urban	Lower service level scenario Rural	Urban
Housing	All informal housing formalised. Traditional housing remains unchanged as a percentage.	All informal housing single dwellings and backyard formalised.	Informal housing reduced by half. Traditional housing remains unchanged as a percentage.	Informal single dwellings and backyard informal housing reduced by half.
Water supply	All new services based on public standpipes.	New incremental housing and RDP type housing get yard connections.	As for base scenario.	New incremental housing and RDP type housing get yard connections.
Sanitation	All new services based on VIPs.	VIPs used with incremental housing; full waterborne with other housing types.	As for base scenario.	New incremental housing and RDP type housing get VIPs.
Electricity	5% solar home systems; all the rest get metered connections.	All get metered connections, 70% with 60 Amp.	10% do not get electricity; 5% solar home systems; all the rest get metered connections.	All get metered connections, 10% with 60 Amp.
Solid waste	90% of low income households apply a properly managed 'on site' disposal system or a communal landfill. Remainder have a higher service level (kerbside or communal bin).	95% of households get a kerbside collection service in formal areas. In informal areas 50% low income households get kerbside and remainder a communal bin collection service.	Same as for base.	Same as for base.
Roads	Improvement in district road conditions (not less than 5% in poor condition). Rural access roads which are paved increases by 2% of rural access road length . Earth roads reduced by 2% of access road length. Condition of roads improves so that the percentage in poor condition is above 5%.	Improvement in district road conditions (not less than 5% in poor condition). Urban access roads which are paved increases by 4% of access road length. No earth roads. Condition of roads improves so that the percentage in poor condition is above 5%.	No improvement in district road conditions. No paving of rural access roads. 10% of rural access roads remain as earth roads. Rehabilitation requirement reduced by half from the ideal amount.	No improvement in district road conditions. No paving of urban access roads. (percentage of urban roads which are paved remains constant). Rehabilitation requirement reduced by half from the ideal amount.
Public services	50% have basic service; rest get full service	25% have basic service; rest get full service	75% have basic service; rest get full service	50% have basic service; rest get full service
Public transport			No change (numbers small)	No change as public transport is assumed to be a priority
Public places, economic infrastructure, administration buildings and systems			No change as actual budgets used for these estimates with no clear motivation to change	

4.2 Demographics

Predicting changes in population is a complex matter and is influenced by several factors, including:

- education
- the prevalence of HIV and AIDS
- migration from rural to urban areas, as urban women tend to have fewer children
- immigration.

It also needs to be noted that household size is unlikely to be stable over time. In fact, there are clear indications that household size will decline with time, partly driven by the fact that families have fewer children and partly by the fact that as housing become more widely available, households divide more readily to access new housing.

Projections in the models with regard to population are based on an assessment of various demographic models, as discussed in section 2.1, with the following figures applied.

Table 4.2: Population growth projections

Year	Annual growth rate
2009	1,38
2014	1,25
2019	0,94

These figures are used for all the scenarios with the detail relating to differences in urban and rural growth as applied in Table 2.3.

4.3 Economic growth

Economic policy

Economic policy in South Africa is currently based on the Accelerated and Shared Growth Initiative for South Africa (ASGISA), which was adopted by government in February 2006. It can be seen as an update or extension of GEAR after a decade of some successes on the economic development front, but also of some unfulfilled expectations and concerns.[54] More recent policy debates have centred on the extent to which growth, measured in terms of gross value added, will also translate into jobs in order to avoid the spectre of 'jobless growth'. This requires an emphasis on labour intensive businesses and a move away from a reliance on mining and minerals processing as economic generators.

With regard to rural development, South Africa is facing a decline in the proportion to which agriculture contributes to the economy and this, in turn, has been a contributor to the decline of economic opportunities in rural areas. Nevertheless, the importance of rural development is recognised by government, and this is reflected in the establishment of the new national Department of Rural Development (DRD).

Application of economic development factors in the MIIF 7

Economic growth figures proposed by the Bureau of Economic Research (BER) are used, as these have quite wide acceptance in South Africa. Figures which are used in the **base scenario** for the MIIF 7 analysis are repeated below:

- growth rate for 2010: 2.7%
- growth rate for 2014: 4.4%.

For the second part of the 10-year analysis period, the assumption is made that economic growth remains at 4%. The variability of economic growth across settlement types is discussed in section 2.3, on economic growth, with specific figures given in Table 2.5.

For the base scenario, economic growth is also assumed to be fully equitable, meaning that all household economic groups benefit equally. In other words this is based on the assumption that economic growth, measured by GVA, will be matched by growth in remuneration earned by all income groups.

Two other scenarios are tested:

- a **low growth scenario,** with economic growth dropped to 2%.
- an **inequitable growth scenario,** where economic growth continues to increase to 4,4% in 2014 and beyond, but where this growth only benefits those who are currently in the high income group. This is a fairly extreme situation but is included to show the impact of inequitable economic growth.

4.4 Target date for removing backlogs

The national municipal infrastructure programme is influenced substantially by the target time set for removing backlogs, to give everyone at least a basic service level, with the service level mix (above basic level) at the target year defined as described in section 4.1, on service level scenarios.

54 Information extracted from an unpublished paper by Prof Lieb Loots on economic development policy, 2007

For the base position, the targets that have been proposed by government for each sector department do vary to some extent, particularly for water supply. But the analysis is simplified to reach alignment with the housing backlog target, which states that **all informal settlements must to be removed by 2014** (taken as the financial year 2014/15). This implies that all households in urban areas must also have adequate water supply, sanitation, electricity, solid waste, roads and public services by this date.

With regard to services for **rural areas,** the target of removing all backlogs by 2014 is also applied.

An **extended target scenario** is also included where the targets are all moved out to 2019 (financial year 2019/20). This is applied together with reducing the service levels as discussed in section 4.1, on service level scenarios.

4.5 Other cost-side variables

In addition to service level mix and service level targets, output costs are obviously influenced by changes in the unit costs used in the models for estimating total capital and operating costs. These unit costs have been assumed based on the best possible information available at the time the modelling was undertaken. However, given the complexity of the task of providing and managing infrastructure, there is considerable variability, and the impact of change can be tested.

Aside from the accuracy of estimating costs, there are also certain strategies that can be applied to reduce costs. For example, the efficiency of Governance Administration Planning Development (GAPD) expenditure has a potentially large impact as the level of expenditure on this functional grouping is high (averaging 25% of total expenditure).

With regard to cost efficiency measures on individual services, much depends on the extent of development of the organisation. Newly developing organisations typically need to increase costs, while some long established ones may be able to reduce costs.

4.6 Revenue-side variables

In assessing viability, which is essentially an operating account issue, there are also some important variables on the revenue side:

- Obviously the amount of equitable share revenue transferred to municipalities from the national fiscus has a direct impact on the revenue available to municipalities.
- In addition to the equitable share itself, there is the Regional Services Council (RSC) levy replacement grant, which is added to the equitable share for all district municipalities. In the case of metros a fuel levy raised by national government is now included, and becomes a new transfer to municipalities.
- The amount of property tax that the municipality can raise is a major driver of viability.
- The poverty cut-off with respect to free basic services, initially set at R800 per month, has an impact, because if it is increased, the number of consumers who do not need to pay for services increases, thereby reducing revenue.
- Levels of surplus (amount charged above cost) paid by both high income residential consumers and non-residential consumers is an important driver of viability, as this provides revenue to allow cross-subsidisation of low income consumers.

4.7 Aggregating information for district and local municipalities

On the operating expenditure side for service delivery, the model calculates costs based on first principles, based on benchmark unit costs. These costs are regardless of the authority or service provider responsible for the service. In the case of GAPD, unit costs are calculated for each municipal sub-category on a per household basis. The figures for the districts then need to be added to those for local municipalities as the models deal with an aggregate situation, with both tiers working together to govern, administer, plan and act as development facilitators within their areas.

In the case of capital expenditure the models also estimate capital costs regardless of the authority responsible for them.

Finally, in the case of revenue, all operating and capital transfers allocated to the district and the local municipality are added together. This requires some assumption related to the sub-category of district which is partnered with the sub-category of local municipality.[55]

55 The per capita revenue from C1 districts was added to that for B3s and B2s while the per capita revenue for C2 districts was added to B4 per capita revenue.

5. Non-financial results: base scenario

The results for the modelling of the base scenario are given below.

5.1 Eradicating the backlog

One of the main objectives of the modelling is to assess the feasibility of getting rid of backlogs by providing basic services to all. The assumptions relating to the removal of backlogs for each service are given below.

Water supply and sanitation

The base scenario was populated with the targets specified in the current strategic framework for water and sanitation. This includes the elimination of the water and sanitation backlog by 2014 and includes the effect of new household formation during the period.

The trend with regard to the provision of basic services is shown in Figures 5.1 and 5.2.

Electricity

The base scenario assumes that all of the backlogs will be removed by 2014, which is generally consistent with those set by the Department of Energy.[56]

Waste management

The assumption is made that coverage with a basic level of service will be achieved by 2014. In the case of rural areas it should be noted that an on-site disposal of waste is not taken to be an adequate basic level of service for low income households. However, there is now an acceptance that this level of service needs to be taken as adequate in rural areas, providing it is properly managed (see section 5.2, on service level choices). The extent to which this improved management will be implemented is not yet evident, and therefore the backlog is based on all on-site disposals being inadequate for the base run. In reality, the situation will be better than this in rural areas.

Figure 5.1: Service level coverage for water supply: base scenario

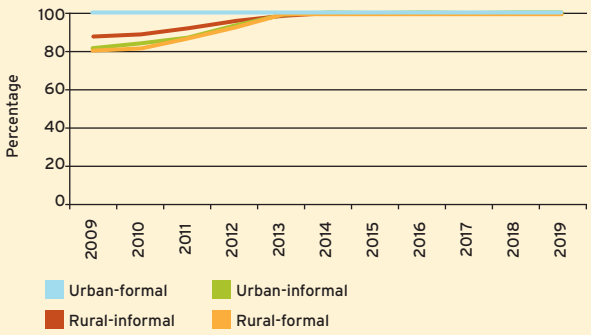


Figure 5.2: Service level coverage for sanitation: base scenario

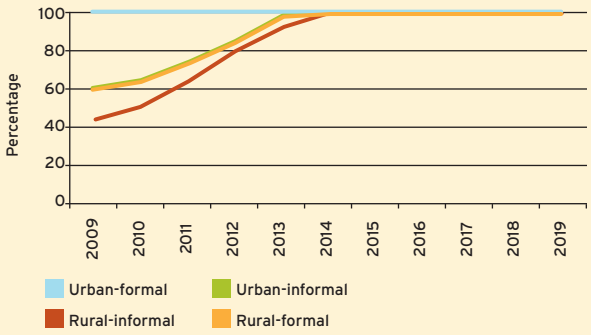


Figure 5.3: Service level coverage for electricity: base scenario

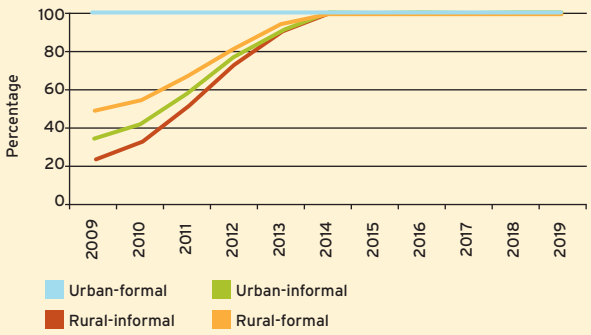
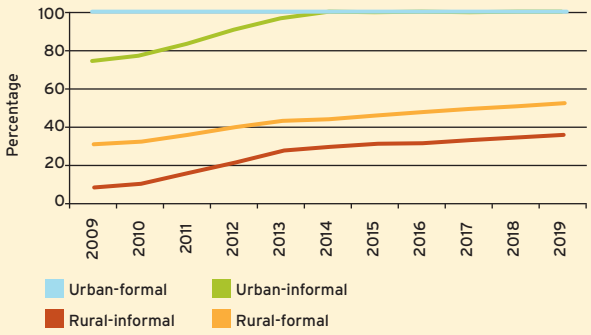


Figure 5.4: Service level coverage for solid waste service: base scenario



56 In fact it is highly unlikely that those in the most scattered settlements will be reached by this time. There are feasibility concerns relating to the servicing these areas within a 10-year timeframe.

Municipal roads

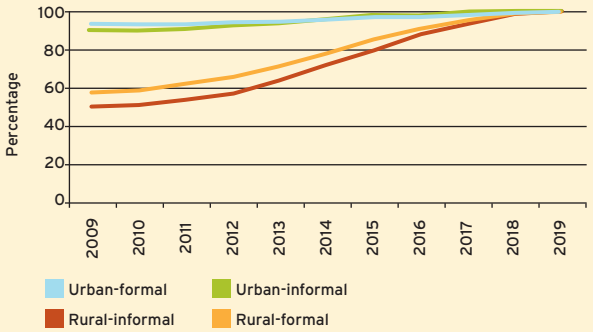
The modelling is based on the third draft of the Department of Transport's (DoT) road infrastructure strategic framework. This provides for three categories of municipal roads and establishes five conditions for a road.[57]

The term 'backlog' is not typically applied to roads. Emphasis rather is placed on the improvement of the condition of roads over time. This has to do partly with the type of road surface (paved, gravel or just earth or graded finish) and then the quality of the road surface. In dealing with quality, the model provides for 'good', 'adequate' and 'poor' road quality. However, due to the lack of good information on road condition, the analysis is not based on road condition with expenditure requirements for rehabilitation estimated based on road asset value.

Assumptions are made regarding the extent to which surface types will be upgraded from gravel and graded surfaces to higher standards, and on the improvement in the quality of surfaces. These are contained in Table 4.1.

Road quality is improved through road maintenance and rehabilitation, with maintenance being an operating account activity. Required rehabilitation expenditure is a function of the current road condition (poor, adequate, good), the value of each layer of the road (asset value) and the corresponding life span of the particular layer.

Figure 5.5: Service level coverage for public services: base scenario



Public municipal services

It is important to note that currently there is no agreed set of benchmarks relating to what defines an adequate public municipal service. The model is based on a conceptual level of spending to decide what an adequate service is and this does allow for a transition to be plotted, as shown in Figure 5.5. This is based on an average position for the package of public services.

5.2 Service level choices

The choice of the level of service to be provided to consumers is a most important one as service levels have a strong influence on the capital and operating cost. (See Annexure A at the end of this report for detailed tables outlining the service level choices assumed in the models.)

Housing

Housing service levels are based on an assessment of whether each type of dwelling or top structure is adequate or not. Taking a strict definition, informal dwellings (corrugated iron or timber, for example), backyard shacks, over-crowded dwellings and traditional dwellings are not considered adequate. However, the Department of Human Settlements has stated that it will not be possible to get everyone in the country into a structurally sound, weatherproof, formally constructed dwelling within the next 10 years. The emphasis is being placed rather on access to secure tenure and basic services. Therefore, for the purposes of modelling, assumptions are made about the extent to which inadequate top structures remain.

The model assumes that mostly single, RDP style dwellings will be provided in urban areas, with some higher density units and incremental housing.[58] In rural areas no higher density housing is provided, but incremental housing is more significant.

Water supply and sanitation

Moderate service level targets were used based on the view that this best approximates the outcome of decisions to be taken by municipalities on service levels. This results, for example, in a target of 57% of rural households with yard connections by the end of the 10 year period, and some form of on-site sanitation for 44% of the urban informal population which do not have access to waterborne sanitation

57 These five conditions have been replaced by three in this model: poor, adequate and good.

58 The term 'incremental housing is used to cover a range of housing 'products' which are based on progressive steps to provide security of tenure, services and 'top structure'. Further, the assumption is made that the top structure will not be provided to the household are a complete unit. Rather, the provision is made to provide financial assistance with top structure in one form or another.

Electricity

Electricity service level options are typically provided for as follows:

- solar home systems
- 40 Amp supply with ready-board typically pre-paid
- 60 Amp metered supply mostly with credit meters but with an increasing proportion of pre-paid meters.

All of these options are considered to provide a basic level of supply.

Currently, there are very few solar home systems installed. Therefore, electricity has been supplied using the other two service level options. Statistics are not available on the split between 40 Amp and 60 Amp supplies, and therefore assumptions are made relating to this split.

Waste management

The typical menu of solid waste service levels to households is as follows:

- disposal of waste by the household on-site by burying or burning
- disposal in small communal dumping sites, with households transporting waste to the dump themselves
- communal bins, emptied on a regular basis by the municipality
- kerbside collection, with the municipality (or a service provider appointed by them) collecting waste at least one a week from the road in front of the dwelling.

All of these options, if properly operated, are considered to be a basic service level in specific settlement conditions. The first two are only applicable in smaller rural settlements and the latter two apply to urban or peri-urban settlements.

The appropriate selection of service level is a factor in assessing the viability of a municipal solid waste service. For example, if kerbside services are extended to rural areas, costs will escalate rapidly. In the absence of national standards, assumptions have been made about the service level mix to be provided.

Municipal roads

As noted in section 2.5, on service levels and backlogs, the level of service for roads is related primarily to the type of road surface and the quality to which that surface is maintained. Little work has been done nationally on appropriate service level targets. For example, in the case of streets within settlements (class 5 roads) decisions need to be made with regard to the need to pave these streets. In addition, topography and climate will in practice be factors in selecting road surface type.

If traffic volumes are low and housing densities are low, gravel surfaced roads may well be appropriate and are much less costly with respect to capital costs. Another major driver of capital costs is the type of surfacing to be used on rural access roads (Class 6). The lengths in this case are large and appropriate selection of type of surface may have a large impact on capital costs.

Public services

As noted in section 2.5, on service levels and backlogs, the concept of service levels for public services is poorly defined at present in South Africa. It will always remain difficult due to the number and variability of the individual services that make up this broad grouping of public services. Nevertheless, the model provides a conceptual basis for dealing with public services with the change in service levels modelled as follows for the base scenario.

Libraries and municipal health

- In urban formal areas: 80% of households have access to a full service level and 20% to a basic service level.
- In urban informal areas: 70% of households have access to a full service level; and 30% to a basic service level.
- In rural areas: 50% of households have access to a full service level and 50% to a basic service level.

Other municipal public services

- In urban formal areas, 80% of households have access to a full service level and 20% to a basic service level.
- In urban informal: 50% of households have access to a full service level and 50% to a basic service level.
- In rural areas: 10% of households have access to a full service level and 90% to a basic service level.

5.3 Definition of poverty

There is currently a wide range of definitions of what constitute poverty. For the purpose of the MIIF 7, household income is used as an indicator as this is best aligned with assessments of affordability.

In using income level cut-offs, it needs to be kept in mind that the data which is available from StatsSA is reported, with R800, R1,600 or R3,200 cut-offs

for income bands. For the purpose of the **base scenario,** a decision has been taken to base the poverty cut-off on the level of R800. Although it is recognised that R1,100 is being utilised by some municipalities, the R800 level has been used in MIIF historically, recognising that this cut-off is also currently used as a poverty indicator applied in dividing the equitable share between municipalities.

5.4 Cross-subsidy potential

The viability of the national municipal infrastructure programme is strongly dependent on the amount of cross subsidy that can be generated. This is achieved by charging high income households and non-residential consumers at above cost and applying the surplus to fund services to the poor.

In considering the way this surplus is applied, the MSFM has been adapted to divide the electricity cost into the cost of bulk purchase of electricity and the cost of distribution (which includes customer relations, meter reading, billing, etc). This allows a separate surplus to be applied for bulk and distribution, something which is important in the current environment, which is seeing large increases in bulk electricity costs.

The **base scenario** assumes the following levels of cross-subsidy.

Table 5.1: Levels of surplus generated from high-income consumers[59]

	High inc residential %	Non residential %
Water	30	20
Sanitation	30	20
Solid waste	-10	-10
Electricity		
- Bulk	10	10
- Distribution	60	60
- Total	25	12

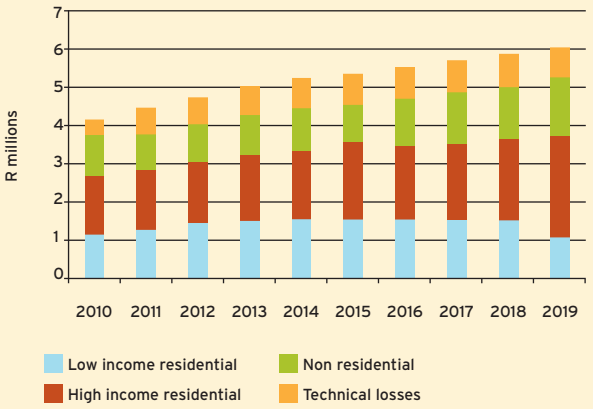
It is worth noting that the use of surpluses to cross subsidise low income residential consumers can only be applied within the service authority boundary at metro, district or local municipality scale. So, for example, surpluses generated in a metro cannot be used to cross subsidise poor consumers in another municipality that may have a lower average income consumer base.

5.5 Resource use and waste streams

The modelling allows for an assessment of trends in the use of resources and generation of waste streams over the 10 years of the model runs. The model has a simple feature for assessing the impact of demand management interventions (in the case of water and electricity) or waste minimisation interventions (in the case of wastewater and solid waste). Costs associated with demand management and waste minimisation can also be added in the model. However, as part of the base scenario this feature was only used for electricity, as noted in the discussion on electricity demand given below.

In the case of water supply, modelling finds that the bulk water requirement will increase by 45% over 10 years. This is driven in part by the shift in income distribution, which results in an increase in consumption by high income households. There is also a significant increase in water consumption by the non-residential sector, driven by economic growth.

Figure 5.6: Bulk water requirement: base scenario



The increase in water consumption results in a similar increase in wastewater generation (due to the use of constant return flows over the model duration).

Electricity consumption increases by 39% over the 10-year period. As for water, this is driven by increases in high income and non-residential consumption, with the latter playing a dominant role due to the large share of non-residential consumption in total consumption. Note that the growth in high income residential consumption is

59 As noted earlier in this document, the surplus is the amount charged to the consumer above the cost of providing the service. Surpluses are used largely to cross-subsidise poor consumers who pay below cost for the service they receive.

dampened due to the fact that some demand management has been assumed in the model scenario. In the early years of the model run, increasing consumption by low income households is also a factor for electricity as significant backlogs are eradicated.

Solid waste collected increases by 51% over the model run, once again driven by economic growth which results in improvements in income distribution (and thus increased consumption by high income households in total) and increases in waste generation by the non-residential sector.

Figure 5.7: Wastewater generation: base scenario

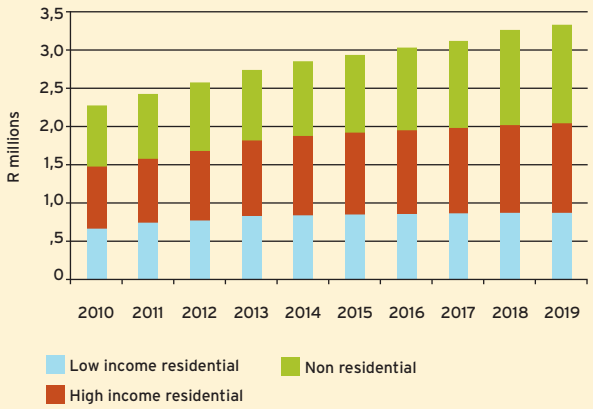


Figure 5.8: Electricity consumption: base scenario

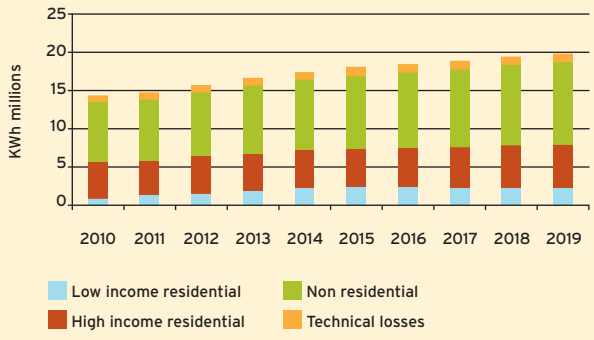
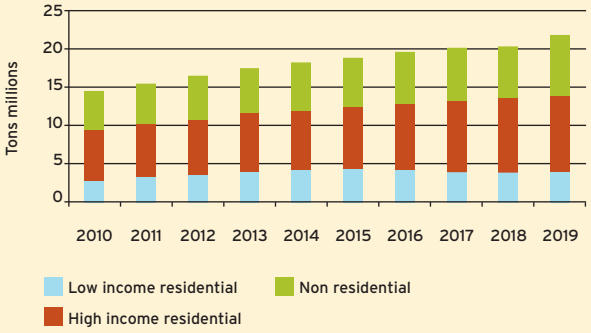


Figure 5.9: Solid waste generation: base scenario

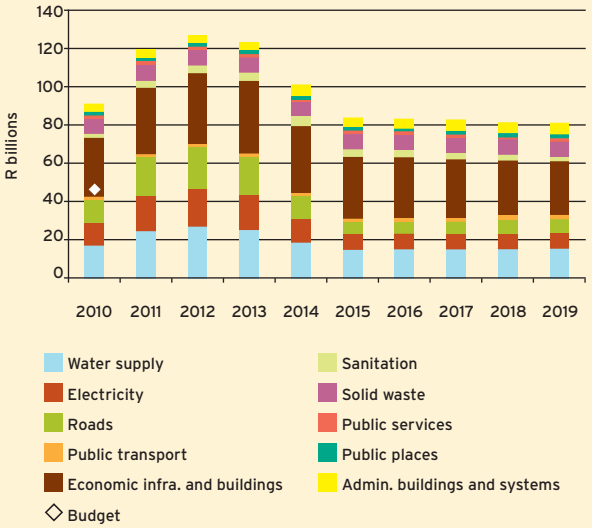


6. Results relating to capital finance: base scenario

6.1 Capital expenditure

Capital expenditure required is shown graphically below, assuming that housing backlogs are removed in five years:

Figure 6.1: Capital expenditure on infrastructure



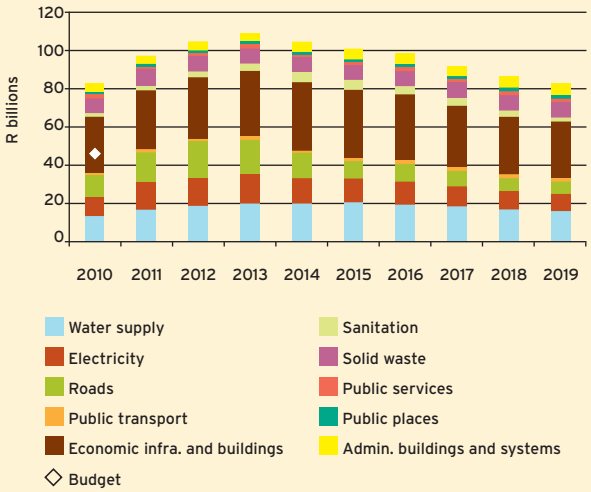
The expenditure for Year 1 of the analysis period is R91 billion, with the average annual expenditure associated with the above expenditure trend graph of R97 billion a year over 10 years (R974 billion in total). This can be compared with the expenditure budgeted by municipalities of R46 billion for 2010/11.

The shape of the cost curve shown in Figure 6.1 is based on two things:

- the assertion that housing backlogs are met within five years, which is very ambitious
- the use of an S curve to smooth the shape of the costs so they do not jump straight up from current levels and then drop straight down once backlogs have been removed.

If the housing target is eased to allow the backlog to be removed over 10 years the shape of the curve looks as follows on Figure 6.2.

Figure 6.2: Capital expenditure for base scenario but with housing target stretched



Comparison with MIIF 5 figures

Taking this latter set of results as a basis, the comparative position in 2007 and 2010 (the financial years 2006/07 and 2009/10) based on the modelling done as part of the MIIF 5 and MIIF 7 studies show Table 6.1.

In considering these relative costs, and leaving roads aside, there are two drivers at play when comparing MIIF 5 and MIIF 7.

First are changes in unit costs (see Table 17 and Annexure B). There have been significant increases in some unit costs, most notably for bulk and connector infrastructure for water and sanitation. This impacts on rehabilitation expenditure as well as expenditure for new infrastructure, because it results in higher estimates of the value of current assets. Together, this results in Capex in MIIF 7 being higher than in MIIF 5.

Second involves differences in numbers of consumer units served. The model makes use of S-curves and thus assumes that expenditure ramps up significantly from Year 1 in the model. In this case, the comparison is between the peak year of provision in MIIF 5, with the first year of provision in MIIF 7. The use of S-curves means that the number of consumer units that MIIF 5 assumed would be served in 2010 is at least double the number that MIIF 7 assumes will be served. The interplay between these two drivers differs for different services.

Table 6.1: Total capital expenditure: base scenario compared with MIIF 4 figures

	MIIF 5	MIIF 5	MIIF 7	Notes
Year in which estimate made	2007	escalated	2010	
Year in which figures apply	2010	2010	2010	
Water supply	9 477	11 942	16 949	Major increase in unit costs for bulk & connector infrastructure (e.g. 7 to 14 Rm/Ml/d capacity)
Sanitation	11 035	13 904	11 783	See notes below.
Electricity	15 285	19 259	12 001	Ditto
Solid waste	1 423	1 792	1 447	Difference not substantial
Roads	12 245	15 429	31 478	Big change in road lengths, from 230,000 to 405,000 km.
Sub-total 'Big 5' services	**49 466**	**62 327**	**73 658**	
Public services	3 011	3 794	2 190	Reduction in Capex related to new unit costs and targets. But unit costs probably too low and need to be reviewed.
Public transport	4 279	5 392	7 432	New agenda; figure for MIIF 7 based on the level of Public Transport capital grants provided plus provision for some funding from LG.
Public places	2 478	3 122	1 549	New figure for MIIF 7 based on municipal budgets.
Economic infra and buildings	2 328	2 933	1 660	Ditto
Admin buildings and systems	2 001	2 522	5 136	Ditto
Sub-total other infrastructure	**14 097**	**17 763**	**17 967**	
Total	**63 563**	**80 089**	**91 625**	

- For water, the significant increases in unit costs more than off-set the reduction in consumer units served and MIIF 7 Capex is higher than MIIF 5. (Expenditure on bulk and connector infrastructure is a significant portion of expenditure for water supply).
- For sanitation, electricity, solid waste and public services the reduction in consumer units served means that estimates for MIIF 7 are lower than those for MIIF 5.

For roads there is a different dynamic. Here the change in unpaved road lengths due to new data results in a much higher Capex estimate in MIIF 7.

To conclude on this MIIF 5 to MIIF 7 comparison, the total Capex figures are quite similar. However, to some extent this is coincidental as costs for some sectors have gone up relatively, while costs for others have come down.

Capital expenditure split by sub-category

Capital expenditure is split between municipal sub-categories as follows in Table 6.2 below:

Table 6.2: Split in modelled capital expenditure between municipal sub-categories for 2010/11[60]

	A	B1	B2	B3	B4	Total
Water supply	6 997	2 378	950	1 318	1 758	13 402
Sanitation	4 654	1 573	701	1 024	1 461	9 413
Electricity	3 896	1 650	796	1 202	2 357	9 902
Solid waste	866	266	113	122	41	1 408
Roads	4 333	3 095	3 783	4 664	13 758	29 634
Public services	952	317	151	211	202	1 833
Public transport	5 685	1 168	147	103	162	7 265
Public places	908	102	38	161	328	1 536
Economic infra and buildings	908	119	60	175	355	1 616
Admin buildings and systems	2 398	1 090	467	499	681	5 134
	31 597	**11 757**	**7 206**	**9 479**	**21 102**	**81 142**

Figure 6.3: Modelled capital expenditure figures by municipal sub-category

60 The totals in this table add up to slightly less than the total Capex from the national model due to the complexities associated with approximating the results from the five different sub-categories into one national model.

The dominance of roads, particularly in B4 municipalities, is evident. This rather skews the results and is therefore given specific attention in the setting up of alternative scenarios.

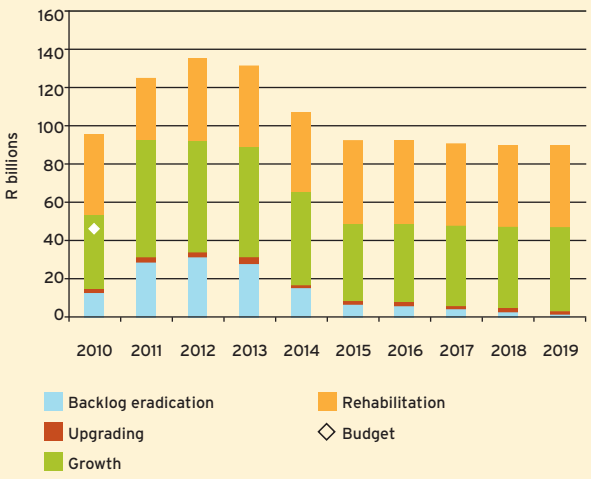
Further detail on each of the sub-categories, with a comparison between budget and modelled numbers, is given in Annexure C.

In considering the structure of capital expenditure, in the work done for National Treasury as part of the municipal infrastructure finance synthesis project, the subdivision of infrastructure spending into three main categories was investigated:

- Infrastructure relating to **backlog eradication:** internal, connector and bulk infrastructure required for those who currently do not have access to adequate services.
- **Growth related infrastructure:** includes bulk and connector infrastructure for non-residential consumer units, for high income consumer units and for new low income households (bulk and connector infrastructure for currently un-served low income households is included as part of 'backlog eradication).
- **Infrastructure rehabilitation:** capital expenditure on infrastructure which has reached the end of its useful life and requires construction work to return the piece of infrastructure concerned into a condition in which it can start its useful life once again.

The MSFM allows this split to be calculated with the results shown below:

Figure 6.4: Split of capital expenditure between backlog, growth and rehabilitation requirements: base scenario



The dominance of growth related infrastructure is evident in this scenario, which is based on fairly high economic growth. In the early years of the 10-year programme, the expenditure on infrastructure for backlog removal is also evident.

6.2 Capital finance: all municipalities together

The results for capital finance have the same overall shape, as the initial assumption is made that capital finance can be found to match capital expenditure (see Figure 6.5).

Figure 6.5: Capital finance for infrastructure: base scenario with 5 year housing target

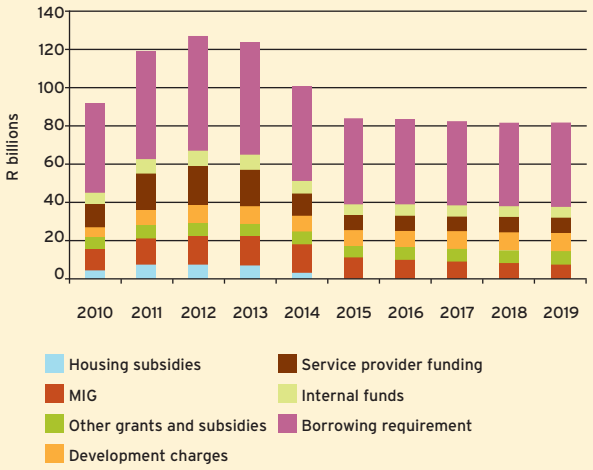
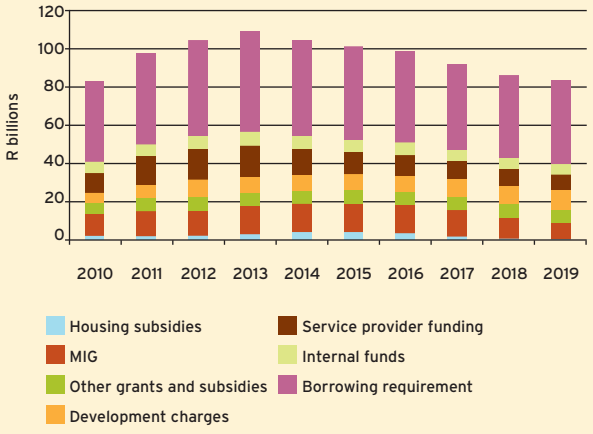


Figure 6.6: Capital finance projections from model: base scenario but with housing targets stretched



Each of the capital finance categories is discussed below:

Housing subsidies

The amounts of capital expenditure given in the figures include internal infrastructure required for low income households. Currently, capital funding for this infrastructure is provided for via the housing subsidy, through the integrated human settlements grant, and the model estimates the amount of housing subsidy that is applicable within the constraints of the housing code.

Municipal infrastructure grant

The model applies Municipal Infrastructure Grant (MIG) funding based on the policy that the MIG can be used only for basic infrastructure for the poor. The amount required increases to about R15 billion in 2014 and then falls off as the demand for infrastructure for the poor declines under this scenario of high economic growth.

Other grants and subsidies

Other capital grants, predominantly integrated National Energy Plan (INEP), public transport infrastructure and systems grant (PTISG) and the Neighbourhood Partnership Development Grant (NPDG) are included.

Development charges (developer contributions)

As noted in the introduction to this report, the MSFM has been updated to estimate the amount of capital finance that can be raised through development charges. These are the amounts charged to developers of high income residential and non-residential developments to cover the cost of providing bulk and connector infrastructure to these developments. The model calculates a theoretical maximum amount based on what it actually costs to provide one consumer unit with bulk and connector infrastructure. In the case of the base scenario, this maximum amount is halved to give the figures shown in Figure 6.5.

Service provider funding

Where a municipality has a service provider that is providing infrastructure on its behalf with the service provider also responsible for financing this infrastructure (with Eskom being the most significant example), this represents a source of capital finance that needs to be included in the total finance mix. The amounts provided for are estimated in section 2.9 on current levels of capital expenditure, and are dominated by Eskom as by far the biggest service provider in the municipal sector.

Municipal internal funds

Municipalities are required to generate internal reserves through transfers from their operating account, part of which is intended for capital investment. Most municipalities have such reserves.

According to municipal budgets for 2009/10, municipalities made provision for the use of R6.8 billion in internal reserves (see Figure 6.7). The model is tuned to this level of funding, with the amount increasing to R7.6 billion in 2013 and then levelling off. The extent to which such an increase is realistic is uncertain, but with a relatively high level of economic growth, it is considered feasible.

Borrowing assessment

Arriving at the capital finance estimates in the model involves the following:

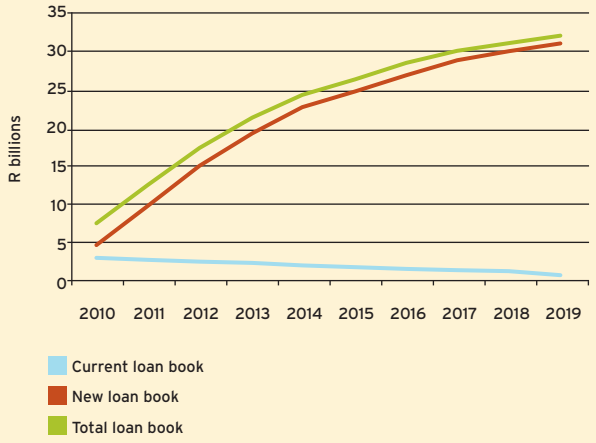
- calculating the capital required
- deducting all other sources of finance (described above) including grants, internal funds, development contributions and service provider funding
- assuming that the balance needs to be borrowed.

The result for the base scenario with a stretched housing target is that R42 billion has to be borrowed in the first year of analysis (2009/10). However, the extent to which the borrowing requirement is feasible is highly questionable. The model provides for this feasibility check by calculating the size to the loan book which builds up over time as further loans are taken out, and then assessing the interest payments required to maintain the loans, in aggregate.

The feasibility of borrowing (borrowing capacity) is based on credit rating and there are many ways in which the credit worthiness of a municipality can be assessed. The MIIF provides for a simple indicator that relates interest payments to operating revenue and that applies the benchmark that interest payments should not exceed 7.5% of revenue.

The results of the borrowing analysis for all municipalities in aggregate are shown in Figure 6.7 overleaf.

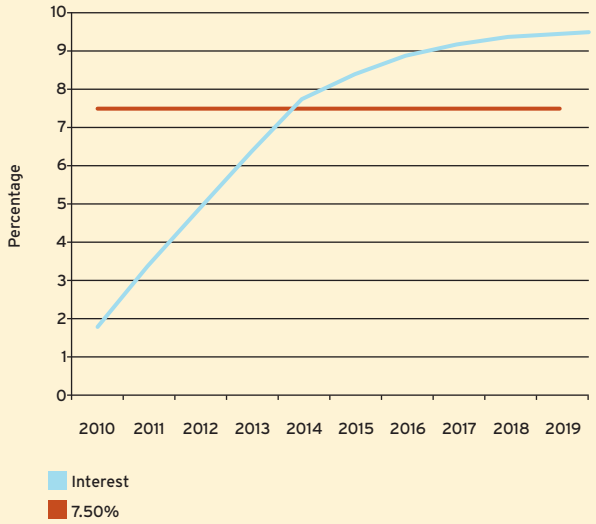
Figure 6.7: Estimated borrowing position for all municipalities (total loan book)



This represents a very large increase in comparison with MIIF 5, where the total loan book was estimated to be R160 billion in 2016. The reason for the higher loan book is that the total capital expenditure incurred over the full 10-year model run for MIIF 7 is significantly higher than that for MIIF 5 (R959 billion compared to R527 billion). While part of this is due to escalation, it is due largely to the higher expenditures on water and roads estimated in MIIF 7.[61] Grants and subsidies in MIIF 7 are not correspondingly higher than those in MIIF 5, and so there is a larger funding gap in MIIF 7 compared to MIIF 5. In theory, borrowing has to increase to fill this funding gap.

The relationship between interest payments and operating revenue is shown in Figure 6.8.

Figure 6.8: Estimated interest payments on long term loan account: all municipalities



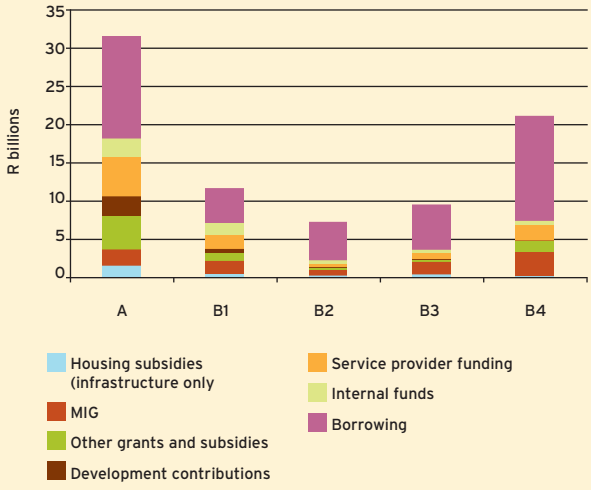
The indication from these results is that the proposed investment programme is non-viable with interest payments far exceeding the benchmark after 2014. However, the limitations of this analysis need to be recognised. It is not theoretically correct to assess the borrowing capacity of a number of organisations with very different characteristics as a group. For example, there are some within this group that can borrow substantially and others that cannot borrow at all. This is one of the main reasons that the MIIF 7 analysis includes a sub-division of municipalities into five sub-categories. And to get a realistic picture, the borrowing position needs to be disaggregated into these sub-categories in order to get a realistic picture.

6.3 Capital finance results by municipal sub-category

The capital finance situation for each sub-category is calculated in separate models. The results in each case are summarised in Table 6.3 opposite.

The figures are shown in Figure 6.9.

Figure 6.9: Split of capital finance requirements for municipal sub-categories: base scenario with stretched housing target



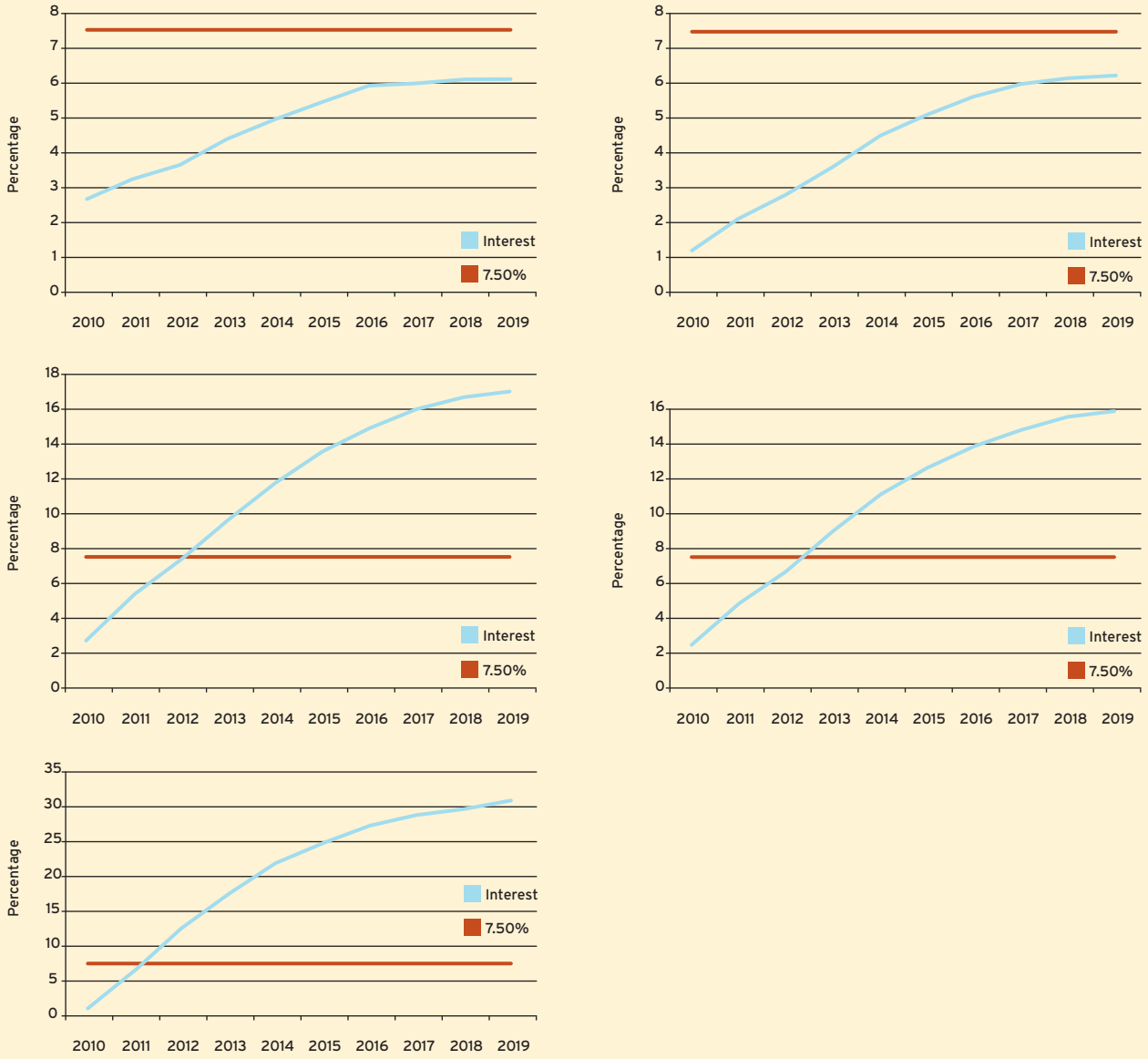
It is necessary to repeat the point about borrowing limitations made for the national model results: the fact that there is a borrowing requirement does not mean that municipalities can actually access these funds. There are limitations to the credit-worthiness of municipalities and this is illustrated by using the indicator of interest payments in relation to operating revenue. The results for each sub-category are shown in Figure 6.10.

61 With the higher water expenditure driven by significantly higher bulk unit costs and the higher roads expenditure driven by higher unpaved road lengths. See sections 2.8 and 2.6 respectively for a discussion of these factors.

Table 6.3: Capital finance split for municipal sub-categories: base scenario with stretched housing targets (Year 1)[62]

R millions	Municipal sub-category				
	A	B1	B2	B3	B4
Housing subsidies (infra only)	1 562	446	257	391	124
MIG	2 178	1 650	752	1 594	4 229
Other grants and subsidies	4 253	1 054	150	256	417
Development charges	2 602	657	162	94	80
Service provider funding	5 121	1 750	483	802	2 063
Internal funds	2 356	1 584	536	552	461
Borrowing	13 524	4 616	4 866	5 790	13 727
Total	**31 597**	**11 757**	**7 206**	**9 479**	**21 102**

Figure 6.10: Comparative borrowing positions of municipal sub-category based on the modelled results with no limitation to borrowing applied: base scenario with stretched housing target



62 Note that the total for all the sub-category models does not add up to exactly the same number as for the national model due to the complexity of adding results from models for municipalities with such different circumstances. Nevertheless the totals are close (within 5%)

The following set of steps assesses what the debt finance limitation is in practice:

- Assess what the average annual borrowing requirement is from the models. It will be different from the Year 1 figures given in Table 6.3 as the requirement changes from year to year.
- Assess what amount can be borrowed, based on the interest to revenue benchmark of 7.5%.
- Provide for a more cautious interest payment benchmark of 6%, based on the view of many South African financial analysts that the internationally recommended 7.5% figure is too high.
- Apply a judgement on the proportion of municipalities that have the management capacity to manage a loan book at the 6% interest level.[63] This factor reflects the limited number of municipalities (particularly smaller municipalities) that have the management capacity or appetite to borrow up to the benchmark ratio of 6%.
- Calculate a result that reflects a realistic borrowing limit.

The results of this assessment are given in Table 6.4 below.

While this analysis is somewhat speculative, it provides an illustration of the extent to which capital availability is constrained: of the R50.3 billion which is theoretically required, only R18 billion can realistically be borrowed per year. This will be difficult to achieve as the total municipal loan book is currently estimated at only R32 billion.

Taking this analysis one step further, the capital finance gap can be estimated in Table 6.5.

It is evident from this analysis that the currently envisaged programme to roll out infrastructure is not viable, as the funding gap is very large and there is no feasible way of filling it. Alternatives are investigated in the following sections.

7. Results relating to operating expenditure: base scenario

7.1 Operating expenditure – all municipalities combined

The modelling for the operating account under the base scenario is based on the following approach:

- Operating costs are calculated based on a set of benchmark unit costs associated with providing a single consumer unit with a specific level of service.
- These unit costs are tuned for each service to get the operating budget for the combined municipalities in the sub-category, using the figures in the National Treasury municipal budgets database. However, the tuning is only taken to a point where the figure reaches 50%

Table 6.4: Estimate of practical borrowing limitation by municipal sub-category

Figures in R million at constant 2009 prices	A	B1	B2	B3	B4	Total
Year 1	13 524	4 616	4 866	5 790	13 727	42 523
Theoretical requirement (average 10 years)	15 700	5 500	5 200	6 200	14 000	46 600
Adjust to 7.5% interest limit	15 700	5 500	2 500	3 500	3 400	30 600
Adjust to 6% interest payment	15 000	4 600	2 000	2 800	2 700	27 100
Municipalities with capacity to borrow at 6% limit	85%	70%	60%	40%	0%	
Practical ability to absorb debt	12 750	3 220	1 200	1 120	–	18 290

Table 6.5: Estimate of capital funding gap: base scenario

	A	B1	B2	B3	B4	Total
Borrowing requirement (Year 1)	13 524	4 616	4 866	5 790	13 727	42 523
Ability to borrow (See Table 2.15 above)	12 750	3 220	1 200	1 120	–	18 290
Gap	774	1 396	3 666	4 670	13 727	24 233

63 Note that the total for all the sub-category models does not add up to exactly the same number as for the national model due to the complexity of adding results from models for municipalities with such different circumstances. Nevertheless the totals are close (within 5%)

of the benchmark costs. In other words it is accepted that one sub-category of municipality may have costs which are realistic and as low as 50% of the benchmark. Below this, the costs are considered to be unrealistically low, probably associated with bad practice, and the figure of 50% is applied.

- Based on these operating costs tuned for the base year (2009/10), the model projects costs forward based on the expansion of services.
- The costs are projected assuming no change to the cost structure, with one exception: the recently announced increases in the bulk electricity tariffs are included as this represents a major shift in cost structure.

The tuning factors applied to unit costs are given in Table 7.1 as this indicates the extent to which the costs in a municipal sub-category deviate from the benchmark.

It is evident that costs decline as one moves from metros to B4s, in most cases. It is uncertain whether this is because smaller municipalities just have lower cost structures or whether they are not managing their services properly (i.e. not spending as much as they should do to deliver an effective service to consumers). It could well be a combination of these factors.

A specific point needs to be made about roads costing: for municipalities with a large proportion of rural roads, the level of spending is very low in relation to benchmarks and the costs are therefore kept at the level of half of the benchmark. This means that the costs in the model are higher than the costs currently being incurred by these municipalities.

Based on this approach to costing, the projection of operating expenditure for all the municipalities in the country is shown in Figure 7.1.

The increase in expenditure, in real terms (nett of inflation) is shown to rise from R177 billion a year to approximately R320 billion a year in 2019/20. This is an average annual increase in real terms of 6.8%, somewhat more than the 4.5% estimated under MIIF 5. However, much of this is due to the cost of purchasing bulk electricity. Also, it should be noted once again that the electricity expenditure includes Eskom's distribution activity. If electricity is removed, the increase is 4.5% per year which, in itself, is a very high level of real growth in expenditure.

7.2 Operating revenue – all municipalities combined

The model deals with operating revenue projections in the categories of:

- trading services
- property rates and other 'general' revenue
- operating transfers which are dominated by the equitable share.

Figure 7.1: Operating expenditure results for base scenario (Rm at constant 2009/10 prices)

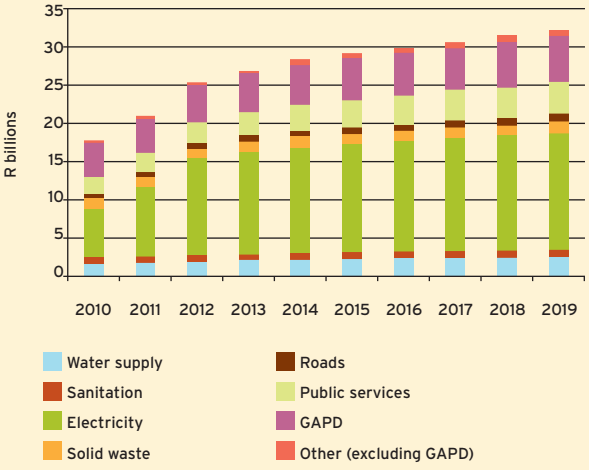


Table 7.1: Tuning factors applied to operating costs: base scenario

	A	B1	B2	B3	B4	National
Water supply	1.29	1.06	0.99	0.66	1.07	1.13
Sanitation	0.88	1.18	0.53	0.64	0.50	0.60
Electricity	1.75	0.83	1.31	1.05	1.57	0.82
Solid waste	1.06	1.05	1.31	1.04	0.44	1.09
Roads	1.73	0.70	0.50	0.5	0.5	0.75
Public services	2.00	1.20	1.00	0.85	0.50	1.60

Note:
1. Shaded cells indicate situations where tuning artificially limited
2. Figures for sanitation are difficult to separate from water supply for some municipalities. This could explain the low figure for sanitation in metros.
3. The figure for water supply in B4 municipalities is surprising as it is relatively high. This needs further assessment in the future.

The methodology applied for each of these groups is summarised below:

Trading services

The income from trading services is driven by affordability criteria in the case of low income households and by a concept of maximum surpluses in the case of high income residential consumer units and non-residential consumer units:

- A limit is set for the poorest households (so-called indigent) that are not required to pay anything for services (R800 a month for the base scenario).
- In the case of households that are still poor (earning below R3,500 a month) but are not indigent, the income from trading services is limited to what is considered an affordable amount assessed as a proportion of a household's income. (In the case of the base scenario, this is set at 8% for all trading services: water, sanitation, electricity and solid waste).
- In the case of high income households and non-residential, a surplus is defined which is the amount by which the revenue received from a consumer unit can exceed the cost of providing the service to that consumer unit, at the defined service level. The figures applied in the base scenario are given in Table 7.2.

The inclusion of a separation of surpluses (used for cross-subsidisation) applied to electricity into bulk and distribution should be noted. In the case of solid waste, the surplus is negative, considering the fact that the model assumes that public place and road cleaning (sometimes called 'cleansing') is taken as part of the service. Many municipalities are not able to cover this cost with tariffs, implying that some of the account needs to be funded from 'rates and general' income.

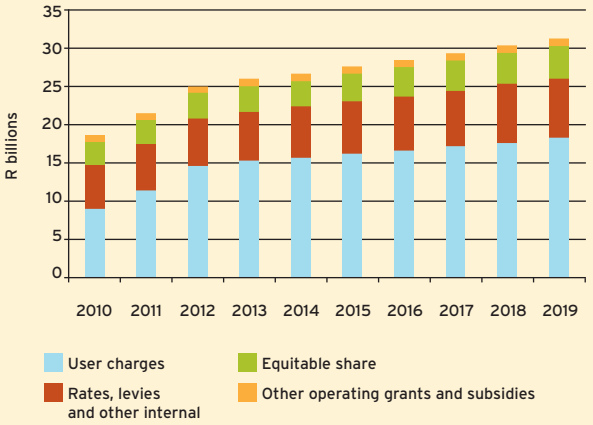
Property rates

The models take the current levels of property rates on municipal budgets for the base year (2009/10) as a starting point.[65] This is escalated at the rate of economic growth for the municipal grouping. As this increase has a major impact on the viability of municipalities, it is given greater attention in the sensitivity analysis later in this report.

Table 7.2: Surpluses applied to non-poor consumer units: base scenario (copy of Table 5.1)[59]

	High inc res %	Non res %
Water	30	20
Sanitation	30	20
Electricity		
distribution	60	60
bulk	10	10
nett	25	12
Solid waste[64]	-10	-10

Figure 7.2: Predicted sources of revenue for base scenario (Rm at constant 2009/10 prices)



Transfers into the operating account

The operating transfer provided for in the Division of Revenue Bill, 2010, is summarised in Table 2.20. As the table shows, the amounts are projected to increase at a real 4% over the coming three years. The model takes these figures for the first three years of the modelling period (de-escalated to take inflation into account) and then projects them forward at a rate of increase of 4% for the base scenario to give 'real' increases.

The projected operating revenue results are shown in Figure 7.2 above.

Looking at the relative levels of expenditure and revenue for each account gives the following results, shown in Figure 7.3 opposite.

Strictly speaking, the interpretation of operating account results for all municipalities in aggregate is not valid, as the situation is so variable across

64 Solid waste 'surpluses' are negative, as conventionally, the solid waste service includes public place cleansing and it is seldom that tariffs for the service to individual properties covers the cost of both the individual property collection and public place cleansing.

65 Note that the MSFM includes a feature to do a more sophisticated analysis of property rates, but this requires property valuation data sub-divided into property groups and residential property value bands. This information is difficult to obtain and, in the case of national scale modelling, it is not possible to obtain.

Figure 7.3: Operating account results for each municipal account (surpluses/shortfalls): base scenario

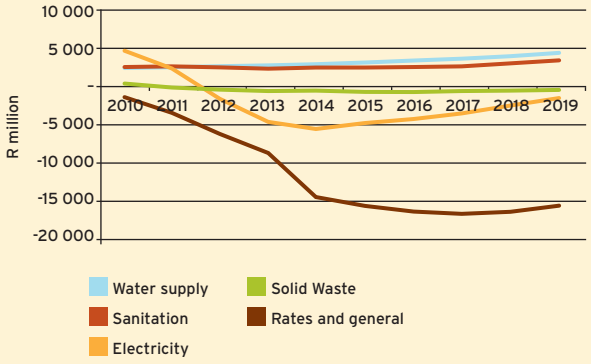
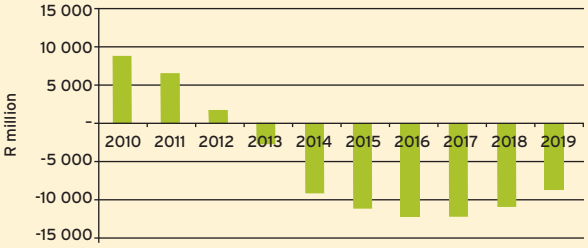


Figure 7.4: Modelled shortfall in operating revenue: base scenario



municipalities. However, some comment on these results can be made:

- Water and sanitation accounts can remain in surplus.
- For the solid waste account, revenue about equals expenditure.
- The electricity account starts at a surplus but goes rapidly into deficit as the high levels of increase in bulk prices kicks in. This trend is based on the assumption that municipalities cannot pass all of the bulk electricity increase onto consumers due to affordability limits. Further, the model assumes that as retail tariffs increase consumers will use less electricity. Therefore, municipalities are faced with a double bind.
- The national aggregate 'rates and general' account is in decline over the 10-year period, implying that the cost of providing the package of roads and municipal public services, together with GAPD expenditure, cannot be covered by property rates, other general sources of income and any transfers applied to these accounts.

Looking at the surplus or deficit position as a whole gives the following picture, shown in Figure 7.4.

The modelling shows a surplus in the early years of the model period, driven largely by electricity surpluses. However, this heads into a deficit which peaks at R13 billion in 2017/18. This result is better than the MIIF 5 results, which showed the deficit increasing to R25 billion. The better position reflected here relates to higher economic growth projections for MIIF 7 and larger levels of transfers from the national fiscus.

Over the 10-year period, average annual changes in figures in real terms (constant 2009/10 Rands) are as follows in Table 7.3.

Table 7.3: Annual trends relating to aggregated municipal services operating account

	Average increase per annum (real) %
Income from user charges increasing at (dominated by electricity):	8.1
Income from rates, levies and other sources increasing at:	3.3
Transfers (including fuel levy) increasing at:	4.6
Total revenue increasing at:	**5.9**
Expenditure increasing at:	6.8

It must be borne in mind that the national picture obscures the situation that will arise in different municipalities, due to their vastly different income-raising capacity and infrastructure backlogs. Some municipalities may be faced with significantly higher levels of deficit under this scenario, while others will be better off than the national aggregate situation given by the model. This is dealt with in the following sub-section.

7.3 Operating results for municipal sub-categories

Operating expenditure

The modelled figures for operating expenditure in Year 1 (2010/11) are shown in Table 7.4 below.

These results are shown graphically in Figure 7.5.

Operating revenue

The results from the models for Year 1 are shown in Table 7.5.

These figures are shown graphically in Figure 7.6.

Table 7.4: Operating expenditure results for each sub-category: base scenario (Year 1)

R million	A	B1	B2	B3	B4	Total
Water supply	8 845	2 916	1 162	1 366	2 291	16 580
Sanitation	3 764	1 524	524	697	840	7 350
Electricity	34 697	13 871	4 819	6 490	6 647	66 524
Roads	3 840	1 366	1 347	1 353	4 519	12 424
Solid Waste	2 995	1 083	637	682	208	5 605
Public services	15 579	3 273	1 290	1 478	813	22 434
GAPD	24 495	7 462	3 339	3 529	3 107	41 931
Other	1 836	730	177	765	130	3 638
Total Expenditure	**96 050**	**32 224**	**13 295**	**16 360**	**18 556**	**176 485**

Figure 7.5: Operating expenditure profiles for each municipal sub-category: base scenario (Year 1)

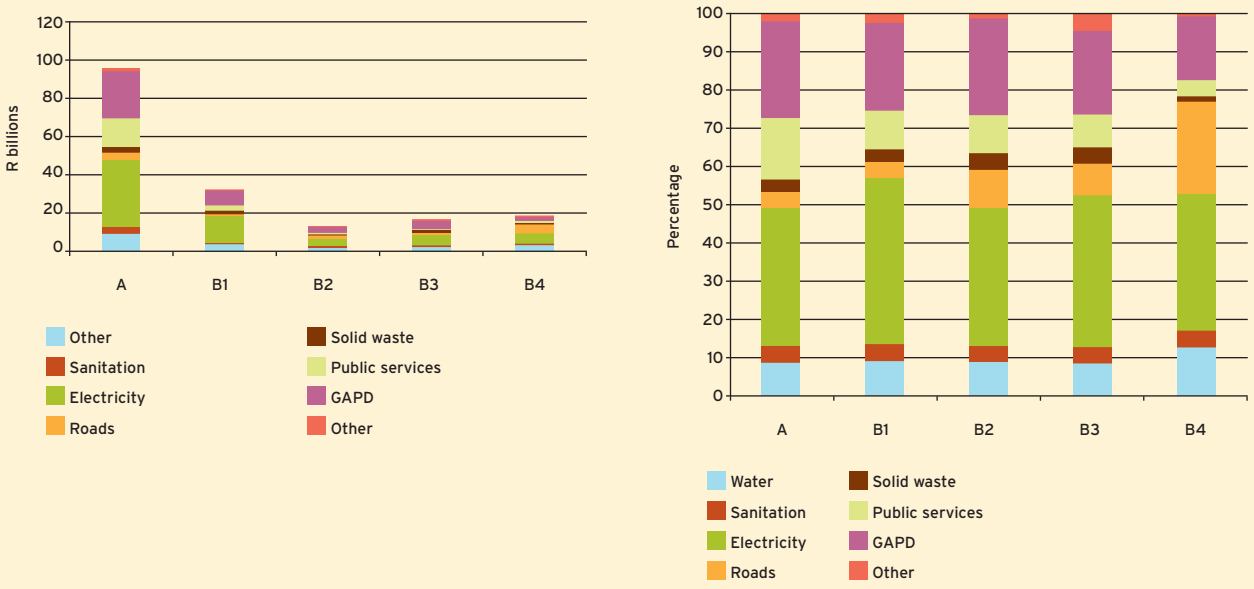


Table 7.5: Results for operating revenue from models for 5 municipal sub-categories: base scenario (Year 1)

R millions	A	B1	B2	B3	B4	Total
Water user charges	8 626	2 338	1 080	913	1 313	14 270
Sanitation user charges	3 603	1 238	477	449	258	6 026
Electricity user charges	36 854	14 241	4 657	6 224	4 270	65 931
Solid waste user charges	2 132	767	452	464	171	3 985
Rates, levies and other internal	36 973	9 441	4 269	4 079	2 692	57 454
Equitable share	6 440	4 741	2 334	4 386	9 558	27 460
Other operating grants and subsidies	5 930	416	164	466	883	7 859
Total revenue	**100 558**	**33 182**	**13 434**	**16 981**	**19 146**	**182 986**

Figure 7.6: Operating revenue profiles for each municipal sub-category: base scenario (Year 1)

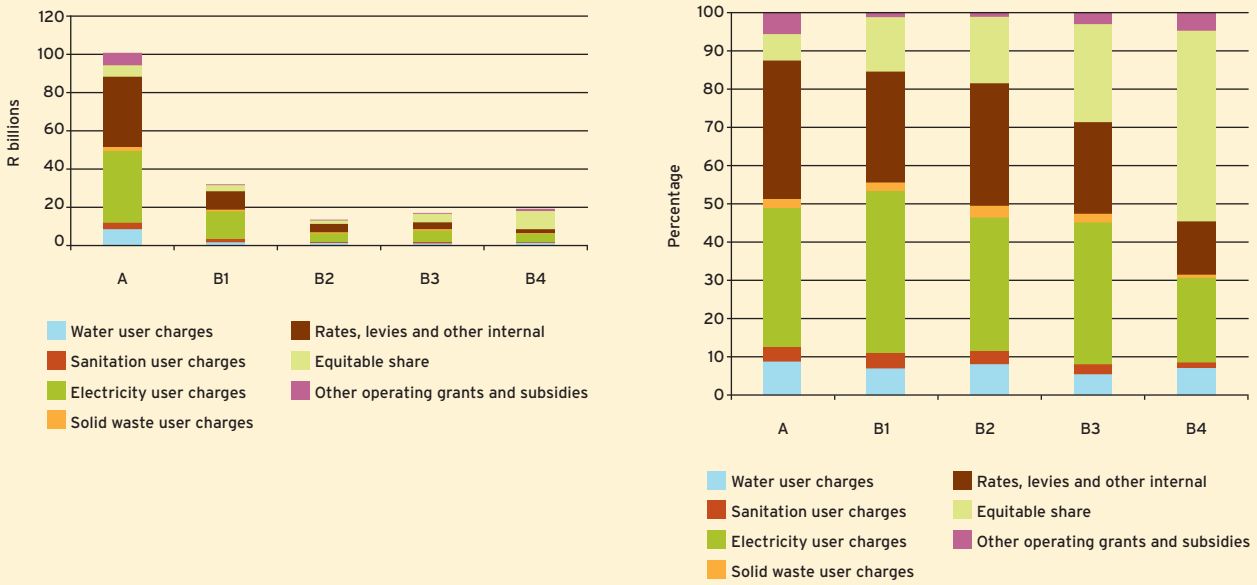
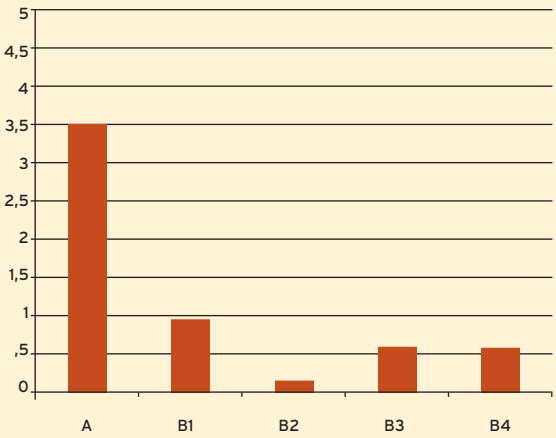


Table 7.6: Year 1 modelled result for the balance on each operating account

Balance on accounts	A	B1	B2	B3	B4
Water supply	-220	-578	-82	-453	-978
Sanitation	-161	-286	-47	-248	-581
Electricity	2 158	369	-162	-266	-2 377
Solid waste	-863	-316	-185	-218	-38
Rates and general	-2 846	-2 973	-1 720	-2 580	-4 995
Equitable share	6 440	4 741	2 334	4 386	9 558
Total	**4 508**	**957**	**139**	**621**	**590**

Note: These results show the position before the distribution of ES to each account

Figure 7.7: Modelled nett surplus/deficit on operating accounts for each municipal sub-category: base scenario (Year 1)



Nett surplus or deficit on operating account

The Year 1 modelled result for the balance on each operating account (revenue less expenditure) is given on the left:

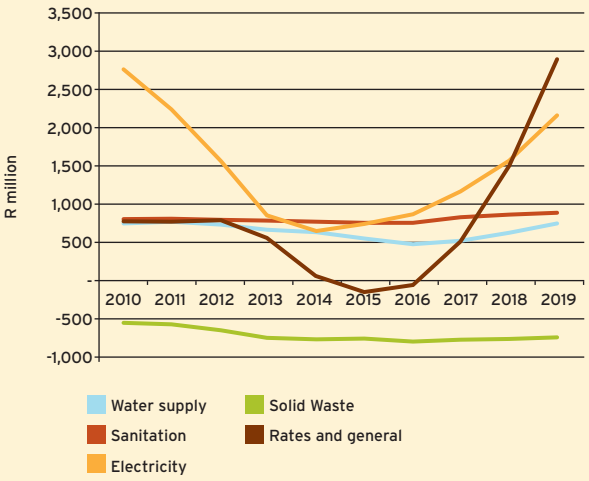
The total figures are shown graphically in Figure 7.7.

The relative position for each sub-category is similar to the position illustrated in the MIIF 5 analysis. However, the position of B4 municipalities is much improved. This is held to be due to a combination of the better economic circumstances in these municipalities, as described earlier in this report, and the large increases in transfers they receive.

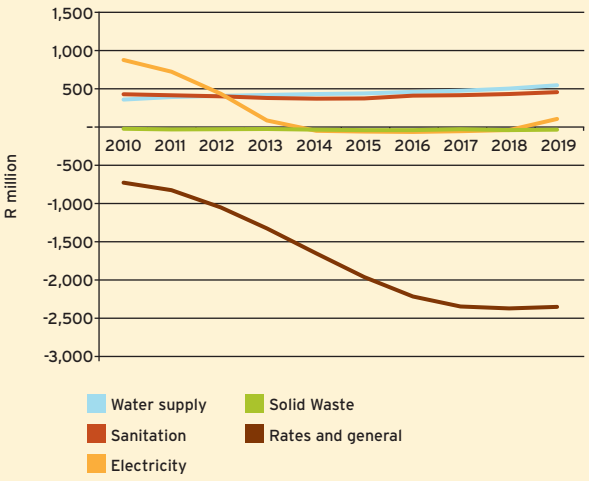
Looking at projected trends, a summary of the operating account trends for each of the five municipal sub-categories is shown graphically in Figure 7.8.

Figure 7.8: Operating account results by service for municipalities: base scenario

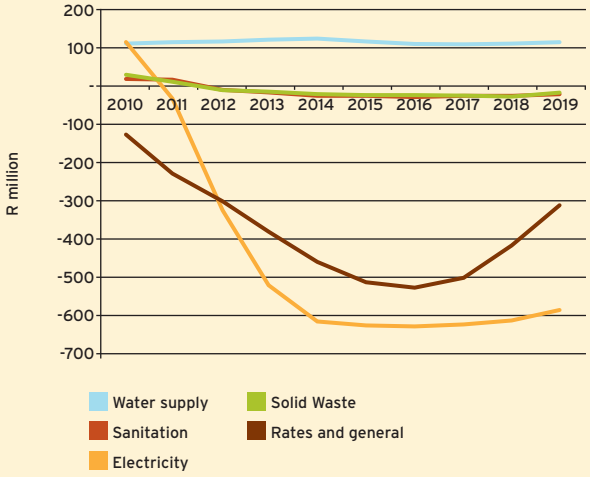
Category A municipalities



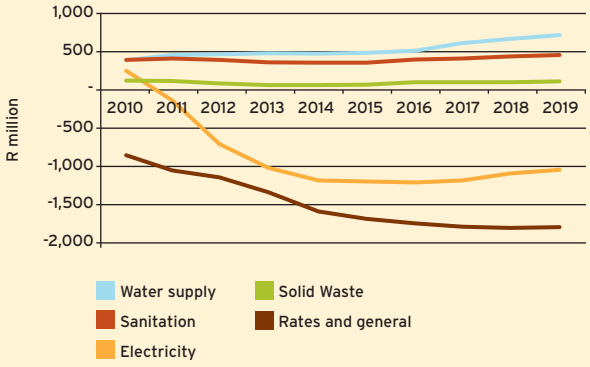
Category B1 municipalities



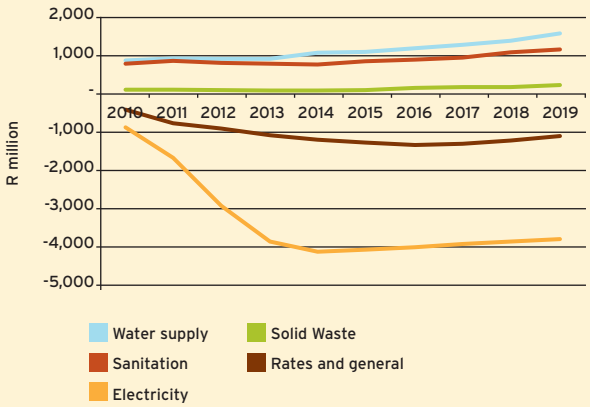
Category B2 municipalities



Category B3 municipalities



Category B4 municipalities: base scenario



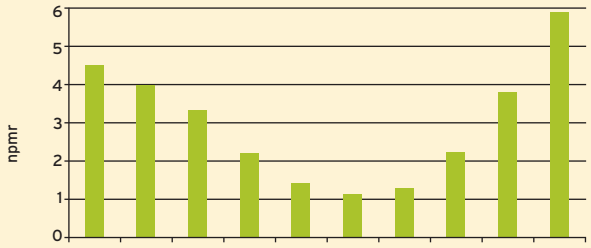
The following can be noted from these graphs:

- Metros currently make the biggest surpluses on electricity, with decreasing surpluses being made in smaller municipalities. B4 municipalities make a loss on electricity, largely due to the high cost of providing a service to remote rural areas. The surplus that is made on electricity decreases in all cases to a loss, due to the increase in the bulk electricity price and the inability to pass this on directly to the consumer.
- The trend with water is the opposite, with B4s making the largest surplus on water and metros just breaking even. Sanitation aligns very closely, except in the case of B2 municipalities, where water makes a significantly higher profit than sanitation. The reason for this is not immediately clear.
- Solid waste services mostly break even, with small surpluses being recorded for B3 and B4 municipalities.
- In all cases, the rates and general account makes a loss, indicating that the operating revenue (largely equitable share) for these functions is not covering the costs. This loss is strongly driven by the expenditure required on road maintenance, particularly in B4 municipalities. Metros are able to change this situation by Year 10, due to assumed stronger economic growth in these areas.

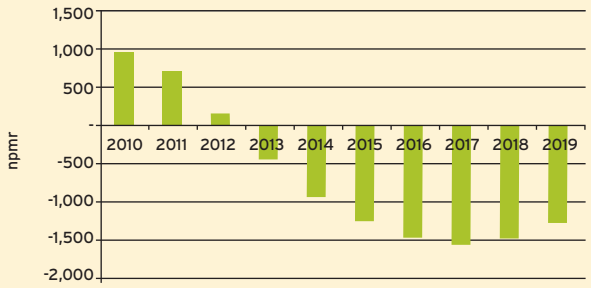
The overall trends with regard to surpluses of shortfalls on the operating account for each sub-category are shown in Figure 7.9.

Figure 7.9: Overall surplus or deficit trends on the operating account: base scenario

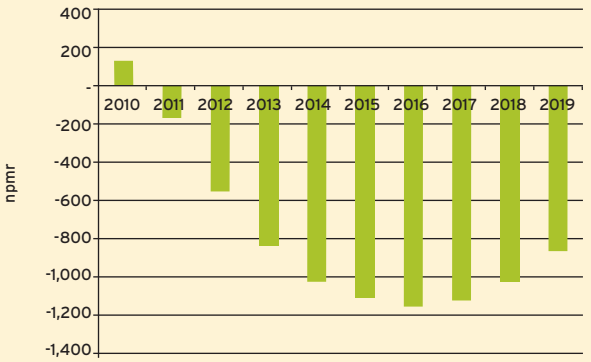
Category A municipalities



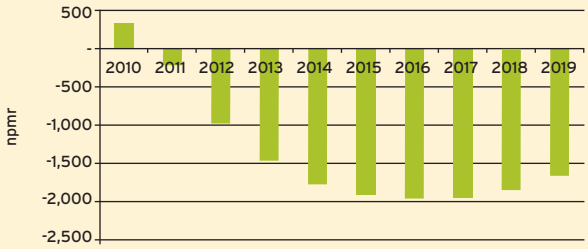
Category B1 municipalities



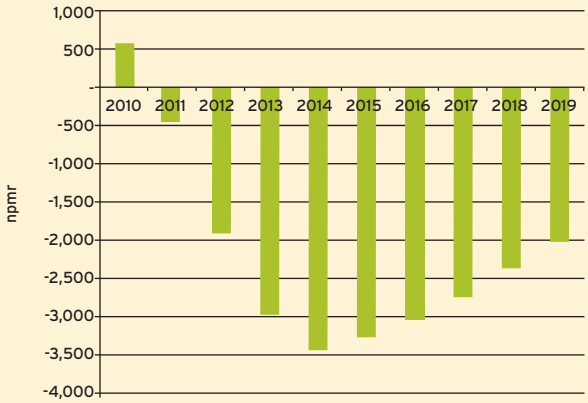
Category B2 municipalities



Category B3 municipalities



Category B4 municipalities



The results show a declining trend in viability as one moves from an A to a B4 situation. This is driven by results on both the electricity and 'rates and general' accounts:

- The situation with electricity is strongly related to the economic circumstances in the municipality, assuming relatively low levels of application of operating transfers (12% of equitable share funding is allocated to electricity in the base scenario models). The electricity deficits in B4 municipalities become substantial and are largely hidden, as Eskom is the service provider in these areas almost exclusively, and the deficit is covered through a national scale cross subsidy on Eskom's distribution account.
- With regard to the 'rates and general' account, the situation gets progressively worse from A to B3 municipalities, but is relatively good in the case of B4 municipalities which is a surprising result. This is probably related to the fact that there have been large increases in the transfers to these municipalities.
- The fact that most of the trends is upwards on the case of the later years of the modelled period is related to the fact that service level expansion slows, while economic growth remains high.

8. Alternative scenarios: sensitivity to changes

8.1 Lower service level scenario

This scenario is based on a lower target service level, as shown in Table 4.1. The capital expenditure profile for this scenario is shown in Table 8.1.

Key points relating to the impact of reduced service levels include:

- In the case of water supply, there is little possibility to reduce service levels as in the case of urban areas the majority of consumer units are already served. In the case of rural areas, a reduction in service levels below public standpipes is not considered to be acceptable.[66]
- Reducing sanitation costs implies the acceptance of 'on site' sanitation options in urban areas for low income households.[67]
- In the case of electricity, acceptance that 10% or households will not get access to grid electricity in rural areas is required. The level of access to solar power has not been changed, as the capital cost of household solar power is greater (on average) than that of grid electricity at present, and thus would have a negative impact on total capital expenditure. While solar energy will reduce long term operating costs, there is insufficient data to analyse this alternative at present.

Table 8.1: Capital expenditure estimates for Year 1: comparison between base scenario and lower service level scenario

R million for year	National base	National lower service level scenario	% of base scenario expenditure
Water supply	13 897	12 779	92
Sanitation	9 656	7 049	73
Electricity	10 717	7 189	67
Solid waste	1 420	1 415	100
Roads	29 868	15 400	52
Public services	1 810	1 770	98
Public transport	7 432	7 432	100
Public places	1 549	1 549	100
Economic infra and buildings	1 660	1 660	100
Admin buildings and systems	5 136	5 136	100
Total	**83 146**	**61 378**	**74**

Note: some reduction in expenditure on public transport, public places and economic infrastructure is also possible but will impact on the economic viability of municipalities, cities in particular.

66 It will, however, be important to consider non-piped water options for the most remote settlements but this is not considered in this run of the model.

67 Other options such as public toilet blocks have not been considered in this analysis.

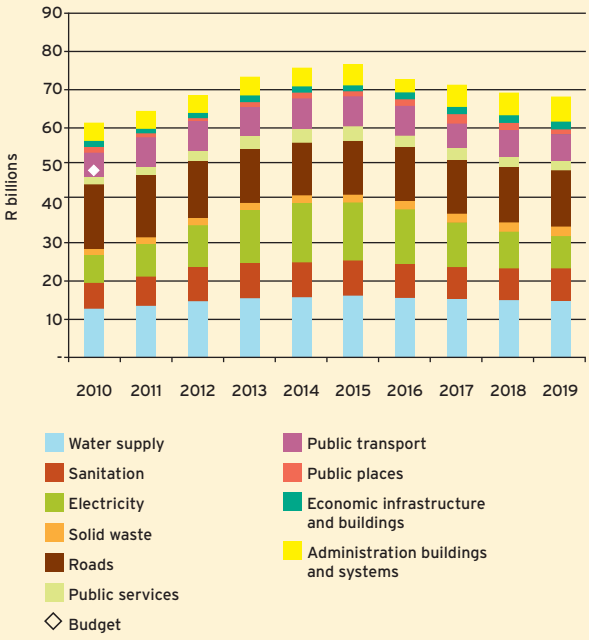
- The biggest reduction relates to roads, where the reduction in service level means a substantial reduction in the funding for roads rehabilitation, particularly in the case of non-surfaced roads. This implies an ongoing deterioration in these roads, primarily low volume rural roads.[68]
- In the case of public transport, the level of funding is not reduced, as this is seen to be an important new agenda, with the funding having a high impact on development.
- Finally, in the case of public places, economic infrastructure and administration buildings and systems, no change is assumed for the lower service level scenario, with figures being directly related to current municipal budgets.

If one applies the above assumptions to the indicative national model, the capital expenditure required in Year 1 reduces by 26%. In addition, the capital expenditure curve is flatter due to the stretching out of targets over the full model period. The resulting graph of modelled trends with respect to capital expenditure is shown in Figure 8.1. This can be compared with the same graph for the base scenario in Figure 6.1.

In relation to the current capital budgets, which are of the order of R46 billion the levels of expenditure are more reasonable but are still much higher than the amounts of money municipalities are putting onto their budgets.

The nett result is that the gap in capital funding is considerably reduced. In order to better understand this, it will be necessary to run the models for each sub-category with reduced service levels. This has not been possible for this report, but a simplified analysis is given here:

Figure 8.1: Capital expenditure profile for infrastructure: scenario with low service levels



Of course the assumption is that expenditure can reasonably be reduced from the base position by the percentages shown in the first row of Table 8.2. Further substantiation of this will require additional model runs, as mentioned above. However, assuming that the assumptions above are valid, the new funding profile for sub-categories will look different.

Table 8.2: Estimate of capital funding gap with lower service level scenario

	A	B1	B2	B3	B4	Total
Capex reduction assumed, to get overall reduction of R21 bn	85%	80%	75%	70%	55%	
Amount of capital reduction	4 740	2 351	1 802	2 844	9 496	21 232
New capital expenditure amount	26 858	9 406	5 405	6 635	11 606	59 910[69]
Borrowing requirement (figure from Table 2.16 adjusted down by capital reduction in row above)	8 785	2 265	3 064	2 947	4 232	21 292
Ability to borrow (from Table 2.15)	12 750	3 220	1 200	1 120	–	18 290
Gap			**1 864**	**1 827**	**4 232**	**7 922**

68 Note too the great variability in road length information. A better understanding of road lengths and the economic importance of low volume roads will help to improve the understanding of what it means to under-fund roads.

69 This figure differs by a small amount from the R61.3 billion in the national LLOS model run due to the complexity of sub-category analysis.

Table 8.3: Assumptions regarding capital split between municipal sub-categories with lower service level scenario

R million	A	B1	B2	B3	B4	Total
Housing subsidies (infrastructure)	1 562	446	257	391	124	2 780
MIG	2 178	1 650	752	1 594	4 229	10 403
Other grants and subsidies	4 253	1 054	150	256	417	6 131
Development contributions	2 602	657	162	94	80	3 595
Service provider funding	5 121	1 750	483	802	2 063	10 221
Internal funds	2 356	1 584	536	552	461	5 488
Borrowing	8 785	2 265	1 200	1 120	–	13 370
Gap	–	–	1 864	1 827	4 232	7 922
Total	**26 858**	**9 406**	**5 405**	**6 635**	**11 606**	**59 910**[70]

The result of this rough analysis can be summarised as follows: with the lowest reasonable service levels, the funding gap nationally is about R8 billion a year[71] of which R4 billion a year is in B4 municipalities and R2 billion each in B2 and B3 municipalities. This is based on the assumption that the borrowing levels given in Table 6.4 can be achieved.

It is assumed that this level of funding can be made available through the MIG. In fact, the medium term projections in the Division of Revenue Bill show the grant increasing by R7 billion by 2012/13 in nominal terms, which is the equivalent of R6 billion in real terms. However, over this period, the level of expenditure required will also increase by R7 billion in real terms. Therefore, the increase in MIG funding will need to be considerably greater than currently provided for in the Division of Revenue Bill.

Impact of road lengths

In section 2.5, the uncertainty relating to road lengths in the country is discussed with figures ranging from 232,000 km (applied in MIIF 5) to 406,000 km (applied in the base scenario for MIIF 7). If the former numbers are used with the data provided by the DoT in 2007, the results change markedly:

- Capital expenditure in 2009/10 drops from R83 billion to R70 billion.
- Operating expenditure in 2016 reduces by R6 billion a year.

It is clearly important to get to a much better understanding of road lengths in the country.

8.2 Sensitivity analysis relating to second level variables

Secondary level variables have been identified in sections 4.5 and 4.6, on cost-side and revenue side variables. The impact of each of these on the operating account has been assessed using the model, with the results shown in Table 8.4.[72]

70 Again note that this amount differs by a small amount from the R61.3 billion in national LLOS model run due to the complexity of sub-category analysis.

71 This amount will probably be a bit higher as the funding provided by service providers in the table is optimistic.

72 Note that changes in population growth have not been tested. The population growth figures used in the base model are relatively high so there will be some reduction of deficit if population growth is lower.

Table 8.4: Sensitivity analysis: impact of changes on viability

	Change investigated	Measure	From	To	Deficit 2016 Rbn	Deficit reduce Rbn
Base					-13.0	
1	Reduce service levels on 'Big 5'		Base	LLOS	1.8	14.8
2	Water conservation	Metered Res		-25%	-14.6	-1.6
		Non-Res, Other		-2% p.a.		
3	Reduce GAPD growth rate	Efficiency	0.5%	-1.0%	-9.8	3.2
4	Reduce road length	Km	406,000	232,000	-7.0	6.0
5	Reduce operating costs (See note 2)	Water Supply		75%		2.1
		Elec Reticulation		75%		3.9
6	ES not increasing in real terms		4.0%	0%	-18.6	-5.6
	ES increasing at 10% real		4.0%	10%	-1.4	11.6
7	Property rates not increasing		3.8%	0%	-21.0	-8.0
	Property rates increasing at 6%		3.8%	6%	-6.9	6.1
8	Poverty cut-off increased for FBS		R800 pm	R1 600 pm	-14.3	-1.3
9	**Surplus paid on water & sanitation**					
	- increased	High Inc Hhs	30%	45%	-10.6	2.4
		Non Res	20%	30%		
	- decreased	High Inc Hhs	30%	15%	-14.9	-1.9
		Non Res	20%	10%		
10	**Surplus paid on electricity**					
	- increased	High Inc Hhs	25%	35%	-8.2	4.8
		Non Res	12%	17%		
	- decreased	High Inc Hhs	25%	13%	-22.0	-9.0
		Non Res	12%	6%		
11	**Economic growth**	Decrease Rate	3.8%	2%	-25.6	-12.6
		Increase Rate	3.8%	6%	-2.4	10.6
		Inequitable[3]			-21.0	-8.0

Note:
1. This analysis is based on MIIF 7 *Model Run 2 - National model (Base scenario) with stretched housing target* - March 2010.
2. The decreasing of costs in the model needs to be treated carefully as the model will also decrease revenue which is based on a surcharge on costs.
3. In this case, growth is assumed to benefit only those who are not currently poor. This relates to the base scenario, where growth is assumed to benefit the poor and non-poor equally.

The last column provides the most useful figures to be used in interpreting these results on the operating account. It reflects the amount that the deficit will be reduced by (a positive number) or increased (a negative number).

Key conclusions from this sensitivity analysis are:

- Considering expenditure side variables, the lower service level scenario also offers major savings in the operating account (R14.8 billion in 2016). As noted previously noted, capital requirements are also substantially reduced.
- Due to the dominance of GAPD as an expenditure item, and with a lot of opportunity to generate efficiencies, particularly in metros, significant savings can be made. (The deficit can be reduced by some R32 billion in 2016 if costs can be reduced at 1% per year, instead of the increase of 0.5% assumed in the base scenario).
- Obviously the deficit will also reduce if other costs can be cut. A sample of cost reductions on water and electricity is shown in the sensitivity table. For example, cutting electricity distribution costs to 75% will reduce the 2016 deficit by R3.9 billion. However, as noted in the table, reduced costs in the model also lead to reduced revenue as the model assumes that high income households and non-residential consumers pay a surplus (used for cross subsidy) of a percentage on cost.

- On the revenue side, an increase in the equitable share allocation will obviously make a difference. The model currently provides for increases at 4% per year (real). In fact the equitable share is projected to increase in real terms at 6% over the coming three years, but it is not certain how sustainable this will be. If it is not increased at all, the deficit will increase by R5.6 billion in 2016. At a sustained level of increase of 10%, the deficit in 2016 will be reduced by R11.6 billion.
- Property rates are a major source of revenue for the metros and local municipalities and there are some potential opportunities for this source of revenue to increase with the introduction of the new Property Rates Act (2004). The model currently provides for this to increase at the rate of economic growth (3.8% average over the coming 6 years). If the rate is increased to 6%, then an additional R6.1 billion will become available by 2016. If, on the other hand, there is no real increase there will be a reduction in revenue of R8 billion.
- If the poverty cut-off for free basic services is increased from R800 per month household income to R1 600 per month, an additional R1.3 billion per year is required to compensate for this. This is a surprisingly small amount and is related primarily to the fact that this household income group is decreasing in size, in comparison with 2007 figures used in MIIF 5, for example.
- The opportunity to apply greater levels of cross subsidy exists. In the case of water supply and sanitation, increasing the surplus to be raised from high income residential consumers by 15% and on non-residential consumers by 10% will raise an additional R2.4 billion in revenue in 2016.
- The sensitivity to changes in the surplus charged on electricity is large due to the extent to which this sector dominates the revenue profile of municipalities and their service providers. Increasing the surplus on high income residential consumers by 10% and on non-residential consumers by 5% raises an additional R4.8 billion.
- The sensitivity analysis shows that economic growth has a major impact on municipal viability. If the growth rate is increased from the base position of 3.8% (in real terms) to 6% then the 2016 deficit will reduce by R10.6 billion.[73] If, on the other hand economic growth is only 2%, the deficit will increase by R12.6 billion.
- Finally, the impact of the type of growth which will be experienced over the coming years is considered. The base scenario is founded on the assumption that growth will be equitable with the poor benefiting equally to those who are not poor. Switching this to a situation where growth is completely inequitable, with only those who are currently not poor benefiting, reduces the revenue to municipalities in 2016 by R8 billion. Needless to say, if there is a combination of low economic growth with inequitable growth conditions, the impact on municipal viability will be severe.

9. Conclusions

At the outset it needs to be stated that this round of MIIF 7 has been focused on a financial analysis and does not deal with the organisational constraints relating to infrastructure delivery, which are severe.

Based on only the financial analysis reported in this document, probably the most significant conclusion that can be drawn from this round of the MIIF 7 is that the viability of municipalities at the lower end of the economic development scale, epitomised by B4 municipalities, has improved significantly over the past three years as the economic circumstances of rural households improves and the level of transfers to municipalities increases substantially. However, with the rapid rollout of services envisaged by government, the viability of all but the metros is not assured and this means that these municipalities cannot be expected to meet the targets set for them, even if based only on their operating account position in the future.

While the situation on the operating account remains a concern, the real problem with delivering infrastructure at anything like the rate needed is that there is just not enough capital. This applies to all municipalities, but is particularly severe in the case of B4 municipalities, where the backlogs are greatest. The importance of reducing service levels in order to best use what capital is available has been addressed in the report with conclusions relating to a realistic scenario given below.

Some more specific conclusions on various topics also follow.

73 Note that this increase includes an increase in property rates revenue which is linked to economic growth rates in the model.

9.1 Defining a more realistic scenario

The MIIF analysis has always had as its prime objective to show the impact on municipal finance arrangements of government policy. However, as demonstrated once again under the base scenario, it is far from possible to meet government targets as they are set at present. It is therefore becoming increasingly important to assess what is possible with the funding that is currently available. Therefore, the 'lower service level' scenario becomes important and is described in some detail in the main body of the report. Acceptance of this scenario means that:

- Not everyone will have a formal dwelling by the year 2020.
- Innovation must be addressed with respect to sanitation technologies.
- Grid electricity will not reach all rural areas.
- Low volume rural roads will remain in poor condition.

However, the analysis indicates that, with some compromises of this nature, a realistic programme can be designed. In order for it to work there will also need to be a major step up in the availability of finance, which is addressed below.

9.2 Implications for capital finance mechanisms

Housing subsidy policy

Housing is a provincial function, and it has not been possible to do a detailed assessment of levels of housing subsidy allocation in total and the way housing subsidies are used locally. However, the intimate relationship between the development of housing and provision of infrastructure in urban areas is recognised. Housing is, in fact, a leading sector, and infrastructure planning and provision needs to follow housing developments. Further, a portion of the housing subsidy is currently allocated to internal infrastructure and, in this sense, it is used to finance municipal infrastructure.

The model currently provides for part of the housing subsidy to be used for infrastructure. If this changes, more MIG funding will have to be shifted towards internal infrastructure, which will obviously place more pressure on the capital accounts of municipalities.

Borrowing assessment

The borrowing assessment given in section 6.2 and shown in Table 6.4 indicates that the level of borrowing required to meet the capital requirements under the base scenario are way too high: R42 billion required per year for 2009/10. This needs to be seen in relation to the probable maximum amount which can be borrowed annually, which is roughly R18 billion. Even at this level of borrowing, which will require a huge effort to achieve, there will be a funding gap of an estimated R8 billion in 2009/10, increasing in the coming three years.

Development charges (developer contributions)

The analysis for this round of the MIIF 7 has taken development charges into consideration, with projections for the levels of capital finance from this source to increase to R8.5 billion in 2014. This will be a big stretch and will require a committed effort from government at all levels. New policy work is in progress to set up a consistent national approach to developer contributions.

Implications for the MIG

There are implications for the MIG both in terms of the total amount allocated nationally and the way this is split between municipalities. In the latter case, the separation of municipalities into sub-categories serves as a way of illustrating the impact of the 'horizontal' split between municipalities. It is clear from the above assessment, that MIG funding is going to have to increase dramatically if municipalities are to meet backlog targets overall, even with the lower service levels envisaged in the second scenario.

Looking at the horizontal distribution of MIG funds, the cities do still require MIG funding if they are to meet their targets. But the MIG formula needs to be amended to allocate future increases to a far greater extent to economically weaker municipalities.

With regard to the quantum of MIG funding, a rough estimate is included to suggest that the amount needs to be R8 billion more than the current amount provided for in the Division of Revenue Act in three years' time in nominal terms. (This equates to about R16 billion more than the current amount of R11 billion, in nominal terms).

9.3 Operating account implications

The assessment based on the models is that municipalities are, in aggregate, currently in a position where they can cover their expenditure with revenue, assuming that they properly collect rates and tariffs due to them, with bills set at affordable levels based on assumptions described in the main body of the report. This is a more positive result than that found in the MIIF 5 analysis three years ago.

However, looking forward, all but the metros will have difficulty in maintaining viability with the ambitious service delivery programme assumed as part of the base scenario. From the sensitivity analysis described in section 8.2, it is evident that change in a single variable will not bring about viability of the municipal infrastructure programme. What is needed is a combination of:

- Reducing service levels to somewhere close to the 'low' service level. This will require a change in the way service level decisions are taken at the municipal sphere
- An emphasis on cost efficiency, particularly with respect to GAPD in larger municipalities
- Increases in equitable share allocations continuing at at least 4% real increase per year
- Levels of surplus (used for cross subsidy) on electricity greater than the levels in the base scenario
- Rate of increases in property rates equalling the economic growth rate
- Economic growth rates reaching at least 4.5% and staying there.

This represents the national position. The situation in individual municipalities, represented in this analysis by sub-categories of municipalities, has been described in section 7.3. All the variables analysed here have not been tested on each sub-category but there are certain differences in the circumstances of each grouping, which will mean:

- At the high economic development end, where metros are located, economic growth, property rates income and electricity surpluses will dominate.
- At the low economic development end, where B4s are located, their viability will be dependent on the level of transfers. This is not to suggest that they do not have a daunting amount of work to do to raise the revenue which is due to them from high income residential consumer units and non-residential consumer units. In this regard, it is important to note that the model assumes that this revenue from consumers is, in fact collected. Further, it is certain that in estimating transfers to local government in the future, national government will not provide transfers to fund services to consumers who are nor poor.

9.4 Sector-specific conclusions

Water supply and sanitation

The sector report on water services is based on a different structure of municipal sub-categories in order to provide for an assessment structured by the Water Services Authority (WSA). The metro and B1 sub-category models still apply as all of these municipalities are water service authorities, but the remainder of the municipalities are divided into two groups:

- LW: all municipalities where the local municipality is the water service authority
- DW: all municipalities where the district municipality is the water service authority.

With regard to **capital expenditure,** the results indicate that all municipalities are budgeting too little for water and sanitation to provide adequately for the service delivery programme envisaged by government, as well as the proper rehabilitation of existing infrastructure. This is partly related to a **shortage of capital,** particularly in the LW and DW grouping, with an estimated shortfall of R6.3 billion per year under the base scenario (R3.5 billion for water and R2.8 billion for sanitation). This can be reduced to a shortfall of R4 billion, with a lower service level scenario, a figure which is aligned with the total capital shortfall for all infrastructure, of R8 billion.

Incidentally, an analysis is included in the water services report indicating that **water boards** are also under-providing for the capital required to expand bulk infrastructure and properly rehabilitate the existing infrastructure for which they are responsible. While this analysis is not comprehensive, it does raise issues about the future role of water boards.

In the case of the **operating account** the modelling indicates that it is possible for **water supply** accounts to remain in surplus for all sub-categories, with the major assumption being that systems are in place to raise revenue from those who are not eligible for free basic services assuming 'affordable' bills based on assumptions in the modelling. This is a striking result and is associated with the evident improvement in economic circumstances in rural areas and the impact of the rapid increase in the equitable share transfer.

The situation with **sanitation operating account trends** is not as positive, with the models indicating that LW and DW sub-category sanitation accounts will remain in deficit. Obviously this is based on certain assumptions relating to the amount of equitable share available for sanitation.

There are also major issues to be addressed with regard to **capital availability,** but this is related to the overall availability of capital. This is addressed in the conclusions above that are common to all sectors.

Electricity

The analysis in the report includes for all municipal infrastructure, regardless of the service provider responsible for this infrastructure. This means that electricity distribution that is the responsibility of Eskom is included in the analysis, with Eskom responsible for approximately 60% of users. While the extent to which the electricity is split is a strategic issue, this adds complexity to the modelling exercise as the service provider split between Eskom and municipalities at sub-category level is not easy to assess, due to the lack of data. In fact, the quality of the data in the sector overall, down to municipal level, is poor.

Certain assumptions have been made regarding the costs, consumption and provision of electricity by Eskom and municipalities to residential and non-residential consumers. Based on the existing backlog of 3.4 million households and the national target for backlog eradication by 2014, capital and operating account results have been modelled.

The results for the electricity account indicate that **capital expenditure** of R135 billion is required over the next 10 years, at an average of R13.5 billion per year. However, in the first year, the current levels of capital commitment, of R10.8 billion, is shown to be sufficient. The real issue therefore, is the extent to which access to capital finance can be improved over time. It is probable that capital constraints will mean that the service delivery target of getting electricity to all by 2014 will not be met. However, providing that there is acceptance that some rural areas cannot be reached by grid electricity, the evidence suggests that sufficient capital is available for targets to be met by 2019.

The modelled **operating account** for electricity as a service is positive, due to the assumption that service providers can pass on the bulk cost to consumers and that these user charges will be collected. In reality, this may not be the case as projected increases in bulk electricity costs will put pressure on municipalities' and Eskom's ability to increase and recover electricity rates. In addition, the operating account relies heavily on cross subsidisation from high income and non-residential consumers to low income consumers. The high surcharges on high income and non-residential consumers may not be realisable.

The operating account trends for electricity in the national model indicate that the electricity distribution sector as a whole should just be able to raise enough revenue (with some supplement from the equitable share) to cover operating expenditure. However, this is largely a reflection of the ability of metropolitan municipalities to raise a surplus on their electricity accounts. The situation in the other municipal sub-categories is in stark contrast, with the service in all B municipalities moving into deficit as the high increase in bulk costs kick in. The situation in B4 municipalities is of particular concern, with projected deficits of the order of R4 billion for this sub-category. Viability in this case will depend on the levels of cross subsidisation which takes place within Eskom, which is the dominant service provider in these B4 municipalities.[74]

The assumptions made regarding the impact of **bulk tariff increases** are important as they have such a big impact on revenue in a situation of rapid change in the sector. The models make a rough assessment of the extent to which demand will reduce with increased tariffs and of the extent to which municipalities (and Eskom) will be able to continue to apply the level of surpluses on the accounts to non-poor consumers that they do at present. In balance, the indication is that there will be a decline in revenue in relation to costs.

Roads

First, it needs to be recognised that although the Department of Transport is paying greater attention to municipal roads, there is still far too little information available on which to base national plans. Yet roads is the service with the highest capital requirement. If capital resources are to be conserved, roads are also the place where the greatest gains can be made in cutting capital expenditure, assuming that the consequences are accepted.

With the available information suggesting much higher road lengths than found previously, mainly in relation to non-paved roads, there are very large costs associated with rehabilitating these roads. In order to get a capital programme with costs even close to the capital finance available, the levels of rehabilitation on these roads will have to be very low and many will remain in poor condition, something which will impact on rural development opportunities.

74 The level of cross subsidy estimated using the MSFM in 2005 was of the order of R2 billion. Escalation and the impact of much higher bulk tariffs are responsible for the worse deficit.

Municipal public services

This round of the MIIF 7 included a substantial piece of work to update information on municipal public services, both in terms of improving the understanding of service levels and the capital costs associated with these service levels. This has allowed new unit capital costs to be generated and these are applied in the models. However, the final model results indicate the unit capital costs are too low and should be adjusted for future model runs.

With regard to the operating costs, the figures for unit costs in the models have worked well as benchmarks. In this regard, the figures in Table 7.1 are interesting in that they show that metros spend well above what could be called a national benchmark per household, while B4 municipalities spend well below this. Of course there are very different service levels across the range of municipalities, with the metros generally providing a level of service which is high by most standards.

A good illustration of the importance of municipal public services is that the aggregate municipal budget for these services is currently R22 billion, 15% of all municipal expenditure and more than water supply. Yet far too little work has been done on this important sector.

Governance, administration, planning and development facilitation

R41 billion a year is allocated to this grouping of activities by all municipalities in the country, 29% of aggregate municipal budgets. This amounts to an average of R272 per household per year,[75] with the variation across the country looking as follows in the table below.

There are some obvious conclusions that can be drawn from these figures:

- If there are going to be savings through efficiency gains, the metros should be targeted.
- In the case of economically weaker municipalities (epitomised by B4s and their district partners) they are in the building process and should be increasing expenditure in order to improve service delivery. The most obvious activity that requires expansion is financial administration. Without this, these municipalities cannot raise the revenue which is due to them from non-poor consumers.

Given the scale of activity included under the GAPD banner, there is clearly much work to be done to improve the understanding of this activity grouping and to get better expenditure benchmarks.[76]

9.5 Conclusions relating to information and monitoring

Although there have been some improvements with regard to information availability relating to municipal infrastructure and associated municipal services, the lack of information is still a serious constraint hampering effective understanding of what is happening and what needs to happen. Some conclusions in this regard are:

- While there have been two recent assessments of municipal road lengths, with the first one including road conditions, there remains great uncertainty about the scale of roads infrastructure, particularly with respect to non-paved roads. This uncertainty includes the allocation of responsibility for each road in the country. Yet roads are the largest component of municipal infrastructure and planning for their proper management is very important from a social and economic point of view. There is currently a process to improve the roads information base across the country.
- The fact that Eskom cannot readily provide information on electricity customers and sales by municipality seriously hampers planning for this sector, both locally and nationally. It is quite extraordinary that the electricity sector is subject to re-structuring informed by such poor information.

9.6 Closure

The MIIF 7 has traditionally been focused on an analysis of what is required to deliver on a set of very ambitious service delivery targets set by government. Consistently over the past 15 years it has shown that these targets are unrealistic and

Table 8.5: Expenditure on GAPD per household

Sub-category	A	B1	B2	B3	B4	All
Expenditure on GAPD per household per month	412	272	249	180	91	272

75 Note that GAPD activities also benefit non-residential consumers. The normalising of GAPD figures on a per household basis is nevertheless useful for comparison purposes.

76 Noting that some work has been done recently on this topic for district municipalities.

that the capital required to meet them is far too little. This has perhaps led to a 'feeling' that the analysis is too theoretical and that the numbers are so large that they can only be ignored.

The same conclusion is drawn here as part of MIIF 7: the targets will not be met as capital constraints are too great. However, the intention in this report has been to show that it is possible to design a more appropriate infrastructure investment programme that is based on more modest targets. This does require more capital than is available currently. However, it is realistic to envisage the required increases in grant finance and the big step up in debt finance to municipalities, combined with new efforts to implement a development contributions policy and improve the functioning of non-municipal services providers. But the most important driver of improved viability of municipalities will be improved economic growth. And here, there is a 'virtuous cycle' in that improved infrastructure is a contributor to improved economic growth.

While there are still such big issues to be faced, the developments over the past few years have been encouraging and most municipalities are on a positive trajectory, at least from a finance perspective. Several metros, in particular, have demonstrated what is possible.

Annexure A: Service level choices used in the analysis

Housing

Table A.1: Targets for eradication of inadequate dwelling (top structure) applied for base scenario

	Year	Informal single dwelling %	Informal backyard %	Over crowded %	Traditional dwelling %	Adequate low inc. %	Adequate high inc. %
Urban-Formal	2009	7	9	7	2	37	38
	2019	–	–	7	2	41	49
Rural-Informal	2009	10	–	9	27	43	12
	2019	–	–	9	27	50	14
Rural-Formal	2009	5	–	–	14	59	21
	2019	–	–	–	14	54	33

Table A.2: Dwelling (top structure) service levels applied for base scenario

	Urban	Rural Informal %	Rural Formal %
Single dwelling	80	60	60
Medium density	10	–	–
Incremental housing	10	40	40

Water services

Table A.3: Water supply service level targets – all households (base scenario)

	Year	No or inadequate %	Communal s/pipes< RDP %	Communal s/pipes>= RDP%	Yard tap	Full pressure low inc. %	Full pressure high inc. %
Urban-Formal	2009	–	–	10	30	5	56
	2014	–	–	9	30	5	56
	2019	–	–	5	30	7	58
Urban-Informal	2009	11	10	1	28	22	15
	2014	–	–	26	35	24	15
	2019	–	–	25	32	25	18
Rural-Informal	2009	8	10	30	19	19	14
	2014	–	–	47	19	19	15
	2019	–	–	45	19	19	17
Rural-Formal	2009	3	10	20	29	13	25
	2014	–	–	30	27	13	30
	2019	–	–	24	25	13	38

Table A.4: Sanitation service level targets – all households (base scenario)

	Year	No or inadequate %	VIP %	Other %	Septic tank low inc. %	Septic tank high inc. %	Full w/borne %	Full w/borne %
Urban-Formal	2009	–	4	–	0	4	40	52
	2014	–	3		2	4	40	52
	2019	–	–		2	4	40	54
Urban-Informal	2009	40	12	–	–	2	33	12
	2014	–	37		8	3	40	12
	2019	–	32		8	4	42	14
Rural-Informal	2009	55	20	–	–	2	11	12
	2014	–	68		6	3	11	12
	2019	–	64		8	5	11	12
Rural-Formal	2009	40	11	–	–	3	24	22
	2014	–	40		6	6	24	24
	2019	–	34		6	10	22	28

Electricity

Table A.5: Electricity service level targets – all households (base scenario)

	Year	No or inadequate %	Solar panel %	40 Amp %	60 Amp low inc. %	60 Amp high inc. %
Urban-Formal	2009	–	–	44	–	56
	2014	–		37	7	56
	2019	–		30	12	58
Urban-Informal	2009	65	–	18	2	15
	2014	–		75	10	15
	2019	–		72	10	18
Rural-Informal	2009	75	–	10	1	14
	2014	–		75	10	15
	2019	–		72	11	17
Rural-Formal	2009	51	1	22	2	25
	2014	–		63	7	30
	2019	–		55	7	38

Solid waste

Table A.6: Solid waste (refuse) service level targets – all households (base scenario)

	Year	No or inadequate service %	On-site disposal low inc. %	On-site disposal high inc. %	Communal dumping %	Communal bins %	Kerbside low inc. %	Kerbside high inc. %
Urban-Formal	2009	–	1	–	1	–	42	56
	2014	–	–	–	1	–	43	56
	2019	–	–	–	–	–	42	58
Urban-Informal	2009	10	15	–	4	–	57	15
	2014	–		–		35	50	15
	2019	–		–		35	47	18
Rural-Informal	2009	20	70	5	4	–	–	9
	2014	–	70	4	10		5	11
	2019	–	63	3	15		5	14
Rural-Formal	2009	9	60	–	3	–	3	25
	2014	–	55	5	5		10	25
	2019	–	47	8	5		10	30

Roads

Table A.7: Road service levels used in the model

Type of Road	Year	District distributor %	District collector %	Access roads (urban) %	Access roads (rural) %
Paved roads	2009	100	100	55	4
	2019	100	100	59	6
	2019	100	100	59	6
Gravel roads	2009	–	–	35	80
	2019			36	80
	2019			36	80
Graded roads	2009	–	–	9	16
	2019			5	14
	2019			5	14

Public services

Table A.8: Current and target service levels for public municipal services

	Year	Community and social services			Libraries			Sports and recreation		
		Inadequate %	Basic %	Full %	Inadequate %	Basic %	Full %	Inadequate %	Basic %	Full %
Urban-Formal	2006	10	40	50	–	20	80	10	40	50
	2011	–	20	80	–	20	80	–	20	80
	2016	–	20	80	–	20	80	–	20	80
Urban-Informal	2006	15	55	30	5	25	70	15	55	30
	2011	–	50	50	–	30	70	–	50	50
	2016	–	50	50	–	30	70	–	50	50
Rural-Informal	2006	75	20	5	25	25	50	75	20	5
	2011	–	90	10	–	50	50	–	90	10
	2016	–	90	10	–	50	50	–	90	10
Rural-Formal	2006	60	30	10	25	25	50	60	30	10
	2011	–	90	10	–	50	50	–	90	10
	2016	–	90	10	–	50	50	–	90	10

	Year	Public safety			Primary health care			Municipal health		
		Inadequate %	Basic %	Full %	Inadequate %	Basic %	Full %	Inadequate %	Basic %	Full %
Urban-Formal	2006	10	40	50	10	40	50	–	20	80
	2011	–	20	80	–	20	80	–	20	80
	2016	–	20	80	–	20	80	–	20	80
Urban-Informal	2006	15	55	30	15	55	30	5	25	70
	2011	–	50	50	–	50	50	–	30	70%
	2016	–	50	50	–	50	50	–	30	70
Rural-Informal	2006	75	20	5	75	20	5	25	25	50
	2011	–	90	10	–	90	10	–	50	50
	2016	–	90	10	–	90	10	–	50	50
Rural-Formal	2006	60	30	10	60	30	10	25	25	50
	2011	–	90	10	–	90	10	–	50	50
	2016	–	90	10	–	90	10	–	50	50

Annexure B: Comparison of MIIF 5 and MIIF 7 unit costs

Table B1: Water distribution costs (including connector costs)[77]

	Communal s/pipes >= RDP			Yard tap			In-house low income			In-house, high income		
R'000 per DU	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.
Urban-Formal	2 040	1 867	-8	3 801	3 436	-10	4 181	5 239	25	4 181	8 853	112
Urban-Informal	2 040	1 867	-8	3 801	3 436	-10	4 181	5 239	25	4 181	8 853	112
Rural-Informal	3 400	2 987	-12	6 082	5 498	-10	6 690	8 382	25	6 690	14 165	112
Rural-Formal	2 395	2 427	1	4 941	4 467	-10	5 435	6 810	25	5 435	11 509	112

	Non domestic		
R'000 per DU	Old Cost	New Cost	% diff.
Urban-Formal	10 871	17 707	63
Urban-Informal	10 871	17 707	63
Rural-Informal	17 393	28 331	63
Rural-Formal	14 132	23 019	63

Table B2: Bulk water supply costs[78]

	Bulk purchase of treated water			Regional scheme			Local source			Local bulk (eg borehole)		
R million/m3 '000/d	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.
Urban-Formal	3.85	16.08	318	3.85	16.08	318	3.08	14.36	366	1.93	14.53	655
Urban-Informal	7.70	16.08	109	7.70	16.08	109	6.16	14.36	133	3.85	14.53	278
Rural-Informal	11.55	16.08	39%	11.55	16.08	39	9.24	19.36	110	5.78	14.18	146
Rural-Formal	11.55	16.08	39%	11.55	16.08	39	9.24	22.02	138	5.78	15.56	169

	Non-reticulated improved source		
R million/m3 '000/d	Old Cost	New Cost	% diff.
Urban-Formal	–	3.23	
Urban-Informal	1.23	3.23	162
Rural-Informal	1.54	3.23	110
Rural-Formal	1.54	3.23	110

77 Costs based on CoGTA MIG Infrastructure Service Delivery Level and Unit Cost - 2009 v1.0 prices for terminal infrastructure, but adjusted to include professional fees, VAT, and distribution pipeline network.

78 Costs developed using the Municipal Summary Guide Costing Workbook v1.1, by national unit costs from consultant surveys to standard system designs for bulk networks.

Table B3: Bulk sanitation costs[79]

R million/m3 '000/d	Bulk and connector infrastructure for waterborne sanitation			Wastewater treatment Cost		
	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.
Urban-Formal	8.00	16.11	101	120	151	26
Urban-Informal	8.00	16.11	101	120	151	26
Rural-Informal	5.36	4.89	-9	113	113	–
Rural-Formal	5.36	4.89	-9	113	113	–

Table B4: Sanitation distribution costs (including reticulation)[80]

R'000 per DU	VIP			Simple w/borne			Septic tank			Full w/borne		
	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.
Urban-Formal	4 050	5 807	43	5 121	6 316	23	6 738	6 452	-4	7 315	7 481	2
Urban-Informal	4 050	5 807	43	5 121	6 316	23	6 738	6 452	-4	7 315	7 481	2
Rural-Informal	4 500	6 388	42	8 193	6 947	-15	7 411	7 097	-4	11 704	11 970	2
Rural-Formal	4 500	6 098	36	8 193	6 632	-19	7 411	6 774	-9	11 704	11 970	2

Table B5: Electricity connections (including connector costs)[81]

R per CU	Solar panel			20 Amp			60 Amp low income			60 Amp high income		
	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.
Urban-Formal	25 000	40 000	60	6 000	9 000	50	7 800	10 000	28	12 000	12 000	–
Urban-Informal	25 000	40 000	60	6 000	9 000	50	7 800	10 000	28	12 000	12 000	–
Rural-Informal	25 000	45 000	80	9 000	12 000	33	11 700	14 000	20	12 600	16 000	27
Rural-Formal	25 000	45 000	80	9 000	12 000	33	11 700	14 000	20	12 600	16 000	27

R per CU	Non res grid		
	Old Cost	New Cost	% diff.
Urban-Formal	50 000	5 000	–
Urban-Informal	50 000	50 000	–
Rural-Informal	50 000	50 000	–
Rural-Formal	50 000	50 000	–

79 Costs developed using the Municipal Summary Guide Costing Workbook v1.1, by national unit costs from consultant surveys to standard system designs for bulk networks.

80 Costs based on DWA Cost Benchmarks August 2009 and CoGTA MIG Infrastructure Service Delivery Level and Unit Cost - 2009 v1.0 prices for terminal infrastructure, but adjusted to include VAT, and internal sewer pipeline network.

81 From national consultant survey (2009) and municipal case studies

Table B6: Solid waste facilities[82]

	Landfill R / ton			Transfer R / ton pa			Recycling R / ton pa		
	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.
Urban-Formal	100.0	16	-84	–	1 000		–	2 500	
Urban-Informal	100.0	16	-84	–	1 000		–	2 500	
Rural-Informal	76.9	32	-58	–	1 000		–	2 500	
Rural-Formal	76.9	32	-58	–	1 000		–	2 500	

Table B7: New roads with open channel stormwater drainage[83]

	District distributor			District collector			Access roads (urban)			Access roads (rural)		
R per m	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.	Old Cost	New Cost	% diff.
Paved	6 963	6 893	-1	3 330	3 669	10	1 980	2 640	33	1 500	2 501	67
Gravel				2 231	1 112	-50	1 327	926	-30	1 005	926	-8
Graded				500	715	43	500	596	19	400	596	49

82 Estimates from local and international case studies
83 From national consultant survey (2009) and municipal case studies

Annexure C: Comparison of modelled results for capital expenditure with budgets for year 2009/10

Figures from the National Treasury municipal budget database for 2009/10 are compared with figures for the same year (Year 1 in the modelled period) with the base scenario[84] below, starting figures for each sub-category and then dealing with the national totals (which will differ a bit from the national model totals).

Table C1: Metros

	A		
Figures in R million	**Budget**	**Model**	**% Difference**
Water Supply	3 834	6 997	182
Sanitation	1 783	4 654	261
Electricity	4 161	3 896	94
Solid Waste	447	866	194
Roads	5 158	4 333	84
Public services	1 723	952	55
Public transport	296	5 685	1918
Public places	665	908	137
Economic infra and buildings	665	908	137
Admin buildings and systems	2 373	2 398	101
Total	**21 106**	**31 597**	**150**
Less public transport	20 810	25 912	125

Notes:

1. IT is evident that metros are under-providing for **water supply and sanitation.** This needs more detailed assessment but the likelihood is that there is insufficient budget being allocated to rehabilitation.
2. Under-provision for **solid waste** is indicated, something which is consistent across all municipal sub-categories. This does need checking to assess the accuracy of the unit costs.
3. The **public transport** figures on metro budgets appear to be wrong as they are way smaller than the PTIS grant allocation. The models also include for some capital contribution from the metros which is evidently not reflected on their budgets.
4. Low modelled public services figure is likely to relate to unit costs in the model which are too low.
5. Figures for public places and economic infrastructure and buildings should be tuned to be close to metro budgets.

84 It has not been possible given time and budget constraints to re-run all the indicative models with lower service levels but this can be done in the future.

Table C2: B1 municipalities (secondary cities)

Figures in R million	B1		
	Budget	Model	% Difference
Water Supply	1 481	2 378	161
Sanitation	1 157	1 573	136
Electricity	1 935	1 650	85
Solid Waste	47	266	566
Roads	1 302	3 095	238
Public services	909	317	35
Public transport	85	1 168	1368
Public places	68	102	150
Economic infra and buildings	68	119	176
Admin buildings and systems	1 082	1 090	101
Total	**8 133**	**11 757**	**145**
Less roads	6 832	8 662	127

Notes:
1. Comments relating to water supply, sanitation, solid waste, public services, public transport, public places and economic infrastructure and buildings apply as for metros.
2. In the case of B1 municipalities the low budgets in relation to modelled figures is likely to relate to high road lengths assumed in the models, based on DoT data, which is questionable.

Table C3: B2 municipalities

Figures in R million	B2		
	Budget	Model	% Difference
Water Supply	418	950	227
Sanitation	451	701	155
Electricity	988	796	81
Solid Waste	17	113	672
Roads	486	3 783	779
Public services	140	151	108
Public transport	–	147	
Public places	38	38	100
Economic infra and buildings	38	60	159
Admin buildings and systems	464	467	101
Total	**3 039**	**7 206**	**237**
Less roads	2 553	3 423	134

Note: the profile and comments are much the same as for B1 municipalities.

Table C4: B3 municipalities

Figures in R million	B3		
	Budget	Model	% Difference
Water Supply	715	1 318	184
Sanitation	494	1 024	207
Electricity	1 012	1 202	119
Solid Waste	56	122	219
Roads	863	4 664	540
Public services	168	211	125
Public transport	8	103	1291
Public places	161	161	100
Economic infra and buildings	161	175	108
Admin buildings and systems	498	499	100
Total	**4 137**	**9 479**	**229**
Less roads	3 274	4 815	147

Notes:
1. Comments relating to water supply, sanitation and solid waste apply as for sub-categories dealt with previously.
2. The roads situation is even more extreme than for B1 and B2 municipalities.
3. Taking roads out of the equation the indication is that B3 municipalities are in a worse situation than metros, B1 and B3 municipalities with respect to the level of capital spending they are budgeting, in relation to the modelled figures.

Table C5: B4 municipalities

Figures in R million	B4		
	Budget	Model	% Difference
Water Supply	2 029	1 758	87
Sanitation	606	1 461	241
Electricity	2 699	2 357	87
Solid Waste	29	41	141
Roads	1 166	13 758	1180
Public services	383	202	53
Public transport	80	162	202
Public places	328	328	100
Economic infra and buildings	328	355	108
Admin buildings and systems	680	681	100
Total	**8 328**	**21 102**	**253**
Less roads	7 162	7 344	103

Notes:
1. The profile here is not unlike that for B3 municipalities with the exception of water supply.
2. The water supply result is unexpected and further work is needed to assess this situation. This needs to be related to the results for the 'DW; sub-category modelled for the water services report which includes all municipalities where districts are the water services authority.
3. The situation for roads is extreme due to the very large length of roads identified in this sub-category by DoT.

Table C6: All municipalities agglomerated (totals of above 5 sub-categories)

Figures in R million	All		
	Budget	Model	% Difference
Water Supply	9 164	13 402	146
Sanitation	4 680	9 413	201
Electricity	10 797	9 902	92
Solid Waste	596	1 408	236
Roads	9 048	29 634	328
Public services	3 382	1 833	54
Public transport	470	7 265	1546
Public places	1 328	1 536	116
Economic infra and buildings	1 328	1 616	122
Admin buildings and systems	5 099	5 134	101
Total	**45 892**	**81 142**	**177**
Less roads	36 844	51 508	140

Notes:

1. Note: The results are related to the situation reported for the sub-categories and the aggregate position is discussed in the main body of the report.

Development Bank
of Southern Africa

Headway Hill, 1258 Lever Road, Midrand, South Africa. PO Box 1234, Halfway House 1685, South Africa
Telephone: +27 11 313 3911. Fax: +27 11 313 3086.
http:///www.dbsa.org