

Africa Infrastructure Country Diagnostic

Sharing Results & Shaping Messages
USAID Workshop
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World Bank

A multi-stakeholder effort

African Development Bank



African Union



Agence Française de Développement



Department for International Development



European Union



The New Partnership for Africa's Development



Public-Private Infrastructure Advisory Facility



Sub-Saharan Africa Transport Project



The World Bank



AICD objectives

- 📄 To achieve a substantial improvement in our knowledge base of infrastructure in Africa so as to better
 - Evaluate past interventions
 - Prioritize current finance
 - Provide a baseline to monitor future progress

AICD salient features

- 📄 A two year US\$4m effort 2006/08 led by Infrastructure Consortium for Africa
- 📄 Covers 24 SSA countries (Phase I) and 5 key network infrastructures
- 📄 Examines current spending, investment needs and sector performance
- 📄 Produces databases, analytical reports, and policy document

Country and sector coverage



Sector coverage

- ICT
- Irrigation
- Power
- Transport
- WSS

Key Message #1

**Infrastructure is central to
Africa's growth agenda**

Infrastructure critical to Africa's past and future growth performance

- 📄 Infrastructure contributed 99 basis points to per capita growth 1990/05, compared to 68 from structural policies
- 📄 Almost entirely attributable to ICT revolution, while power remains a drag
- 📄 Raising all countries to level of Mauritius could add 2.2 percentage points to per capita growth

Yet Africa's infrastructure lags well behind that of other developing regions

	Sub-Saharan Africa LICs	Other developing regions LICs
Paved road density	31	134
Total road density	137	211
Mainline density	10	78
Mobile density	55	76
Internet density	2	3
Generation capacity	37	326
Electricity coverage	16	41
Improved water	60	72
Improved sanitation	34	51

Source: Preliminary results AICD 2008

Key Message #2

**Investment needs about
double those estimated by
Commission for Africa**

Overall price tag of US\$75 bn dominated by power sector with US\$43 bn

	Capital expenditure		Operating expenditure	
	US\$bn. pa over 10 years	Percentage GDP	US\$bn. pa over 10 years	Percentage GDP
ICT	0.8	0.1	1.1	0.2
Irrigation	0.7	0.2	-	-
Power	23.2	4.2	19.4	2.4
Transport	10.7	1.7	9.6	1.5
WSS	2.7	0.4	7.3	1.2
Total	38.1	6.6	37.4	5.3

Source: Preliminary results AICD 2008

Moreover unit costs of building infrastructure assets are on the rise

📄 Since 2006, multilateral development agencies report cost escalations of 35% (on average) for road projects in Africa

📄 A number of factors are to blame

- Domestic inflation
- Tight construction market
- Oil price hikes
- Inadequate competition

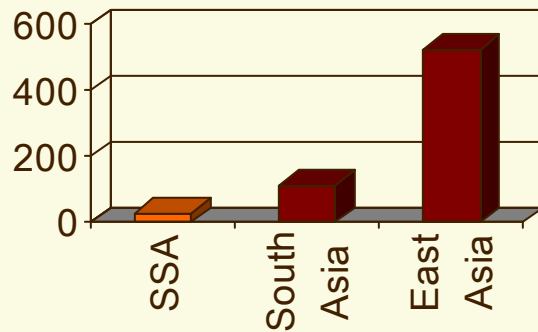
Key Message #3

**Power is by far Africa's
largest infrastructure
challenge**

On every indicator SSA power sector way behind other developing countries

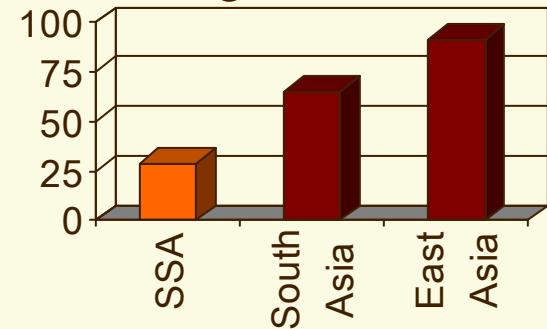
Generation capacity

(MW per million population)



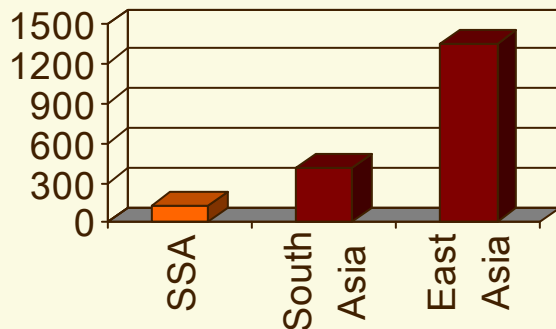
Electrification rate

(Percentage of households)



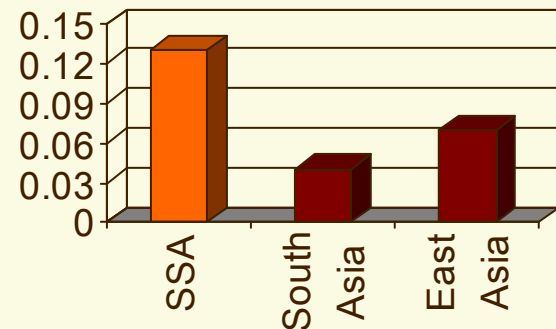
Electricity consumption

(kWh per capita per year)



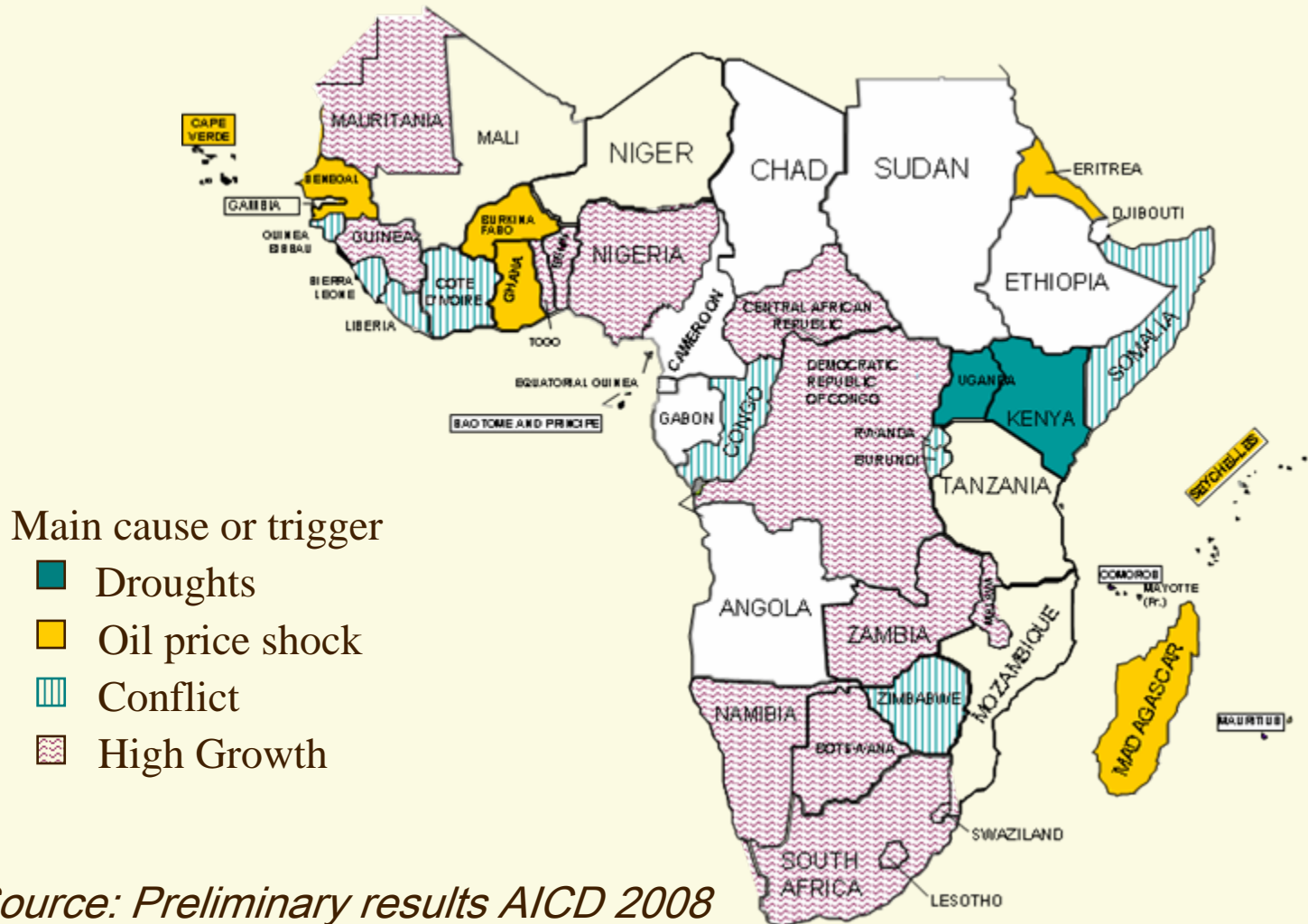
Power prices

(US\$ per kilowatt-hour)



Source: Preliminary results AICD 2008

More than 30 countries face power crisis triggered by various causes



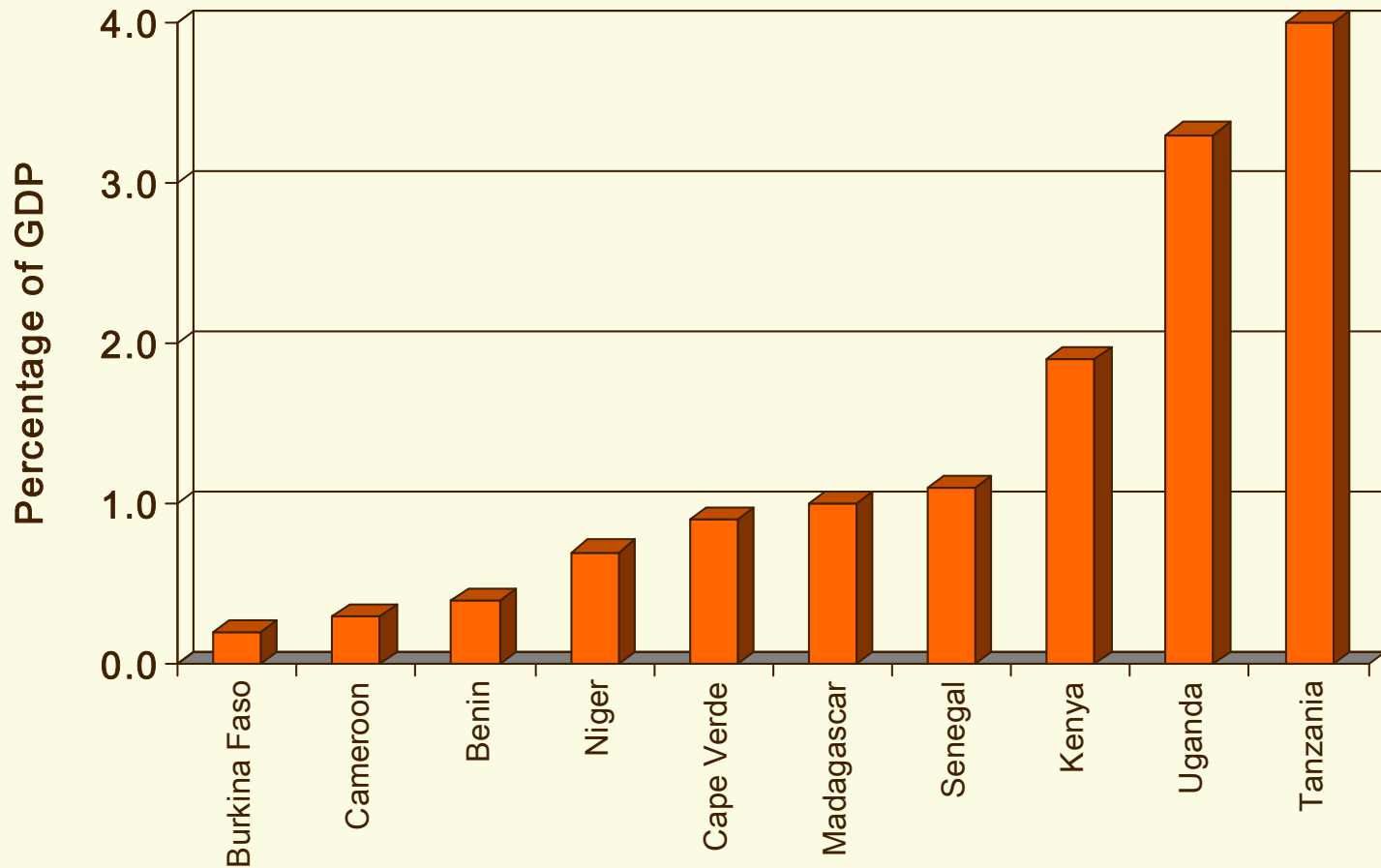
Source: Preliminary results AICD 2008

Many have responded by leasing high cost emergency generation capacity

	Emergency capacity (MW)	Percentage total capacity	Cost as percentage GDP
Angola	150	18	1.0
Gabon	14	3	0.5
Ghana	80	5	1.9
Kenya	100	8	1.5
Madagascar	50	36	2.8
Rwanda	15	48	1.8
Senegal	40	17	1.4
Sierra Leone	20	133	4.3
Tanzania	180	20	1.0
Uganda	100	42	3.3

Source: Preliminary results AICD 2008

Widespread power outages have high economic costs and dampen growth

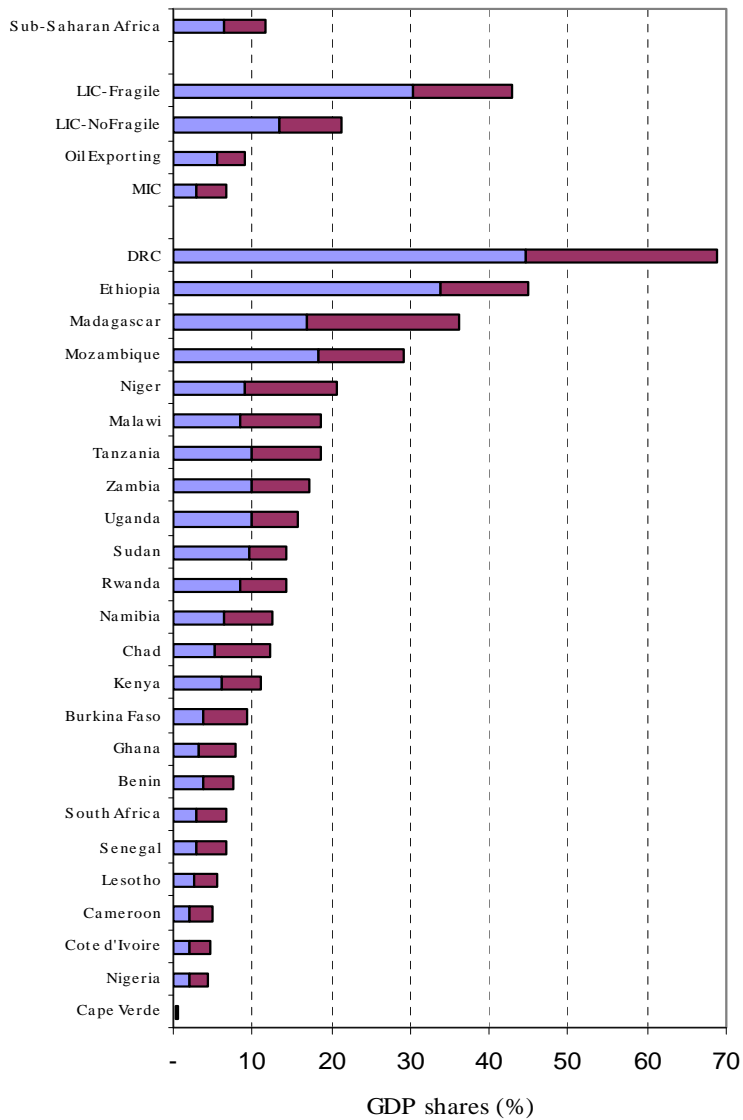


Source: Preliminary results AICD 2008

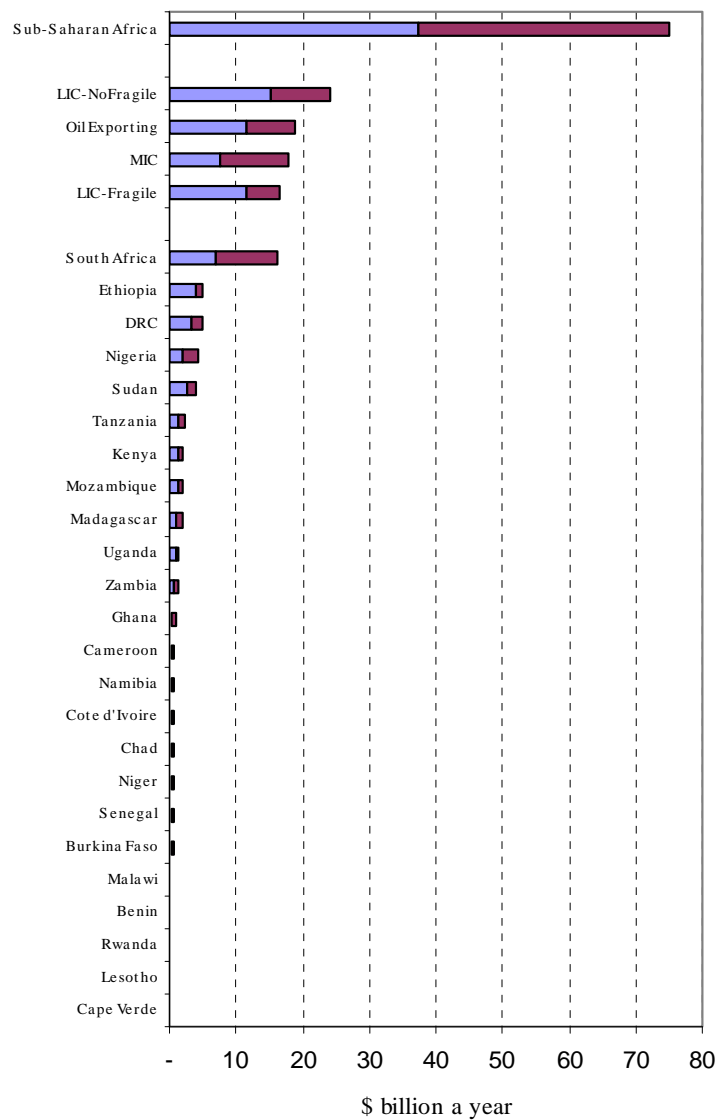
Key Message #4

Fragile states face the largest burden and the biggest financing gap

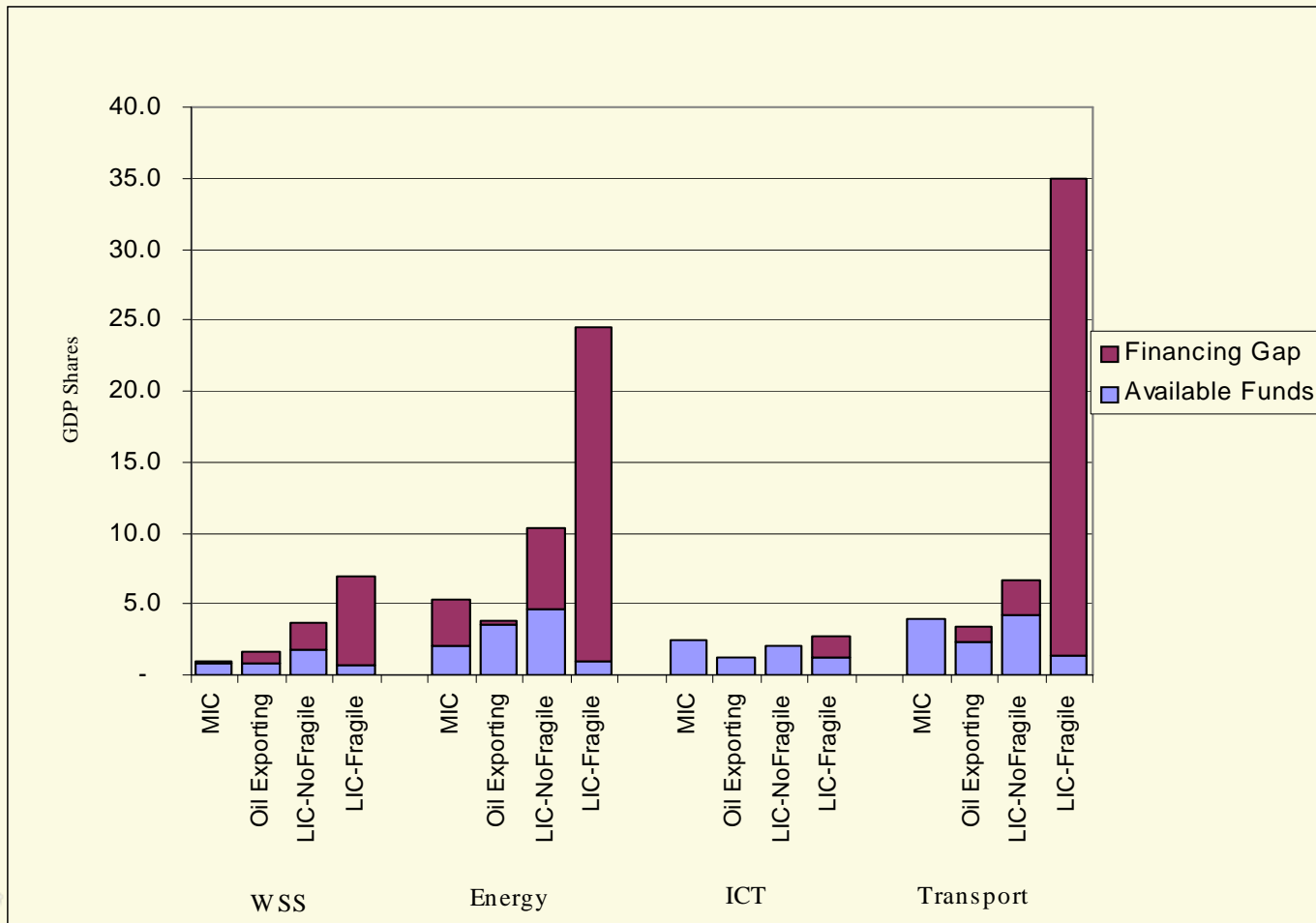
Aggregate infrastructure needs (GDP shares)



Aggregate infrastructure needs (\$ billion a year)



Energy and transport in fragile states are by far the most significant gaps



Source: Preliminary results AICD 2008

Key Message #5

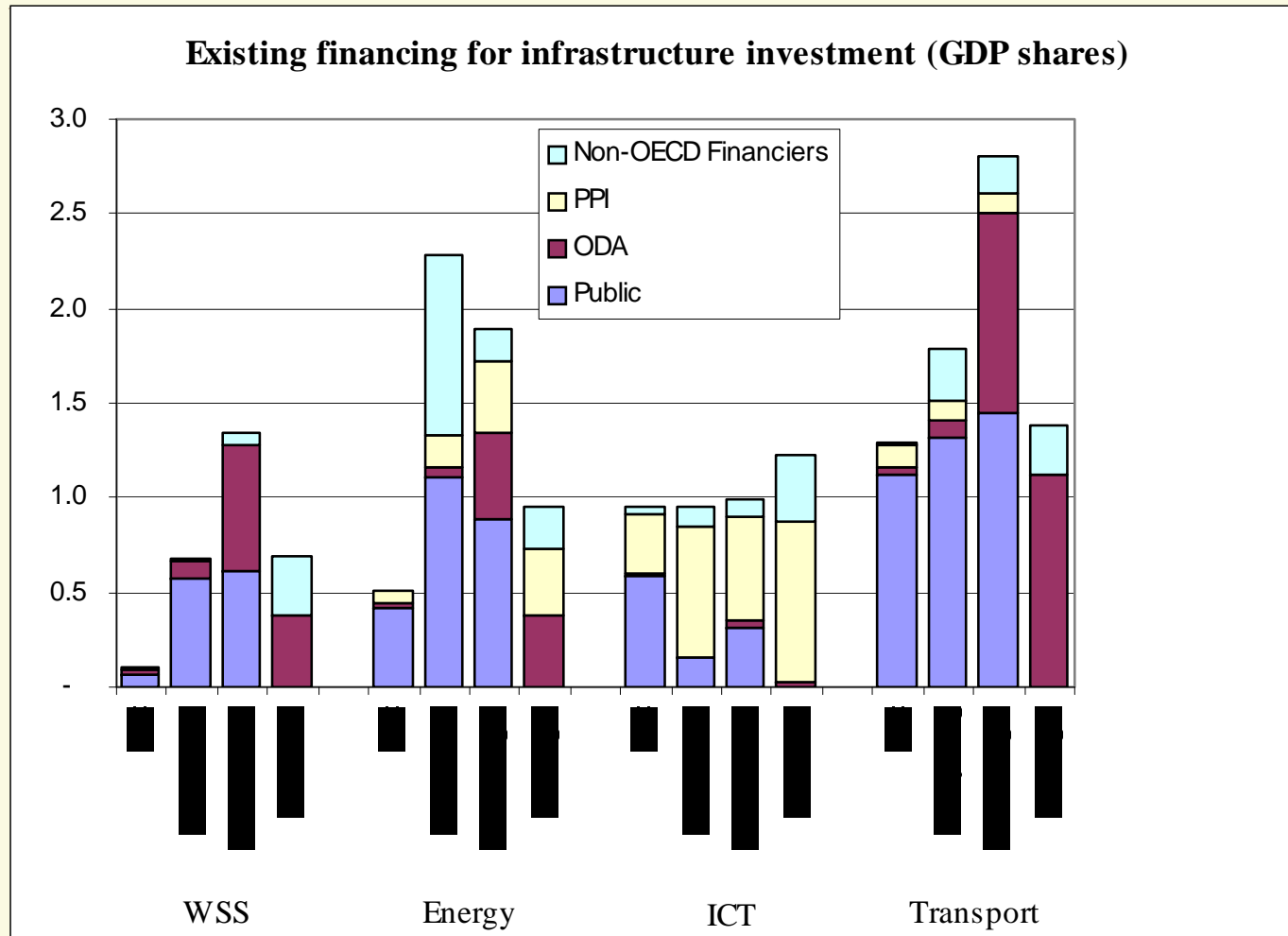
Domestic resource mobilisation is much larger than previously realised

Existing spending close to US\$50bn, two thirds of which funded by Africans

Annualized Overall Spending Flows					
% GDP	Public On&Off budget	Private	Non-OECD financiers	ODA	Total
MIC	8.86	0.52	0.06	0.09	9.19
Oil Exp.	5.54	0.95	1.35	0.24	798
LIC-Non-Fragile	8.74	1.03	0.53	2.21	12.52
LIC-Fragile	3.44	1.21	1.14	1.90	3.89
Average SSA	7.70	0.77	0.67	0.59	9.48
Total SSA US\$bn	35.15	4.80	4.22	4.07	48.25

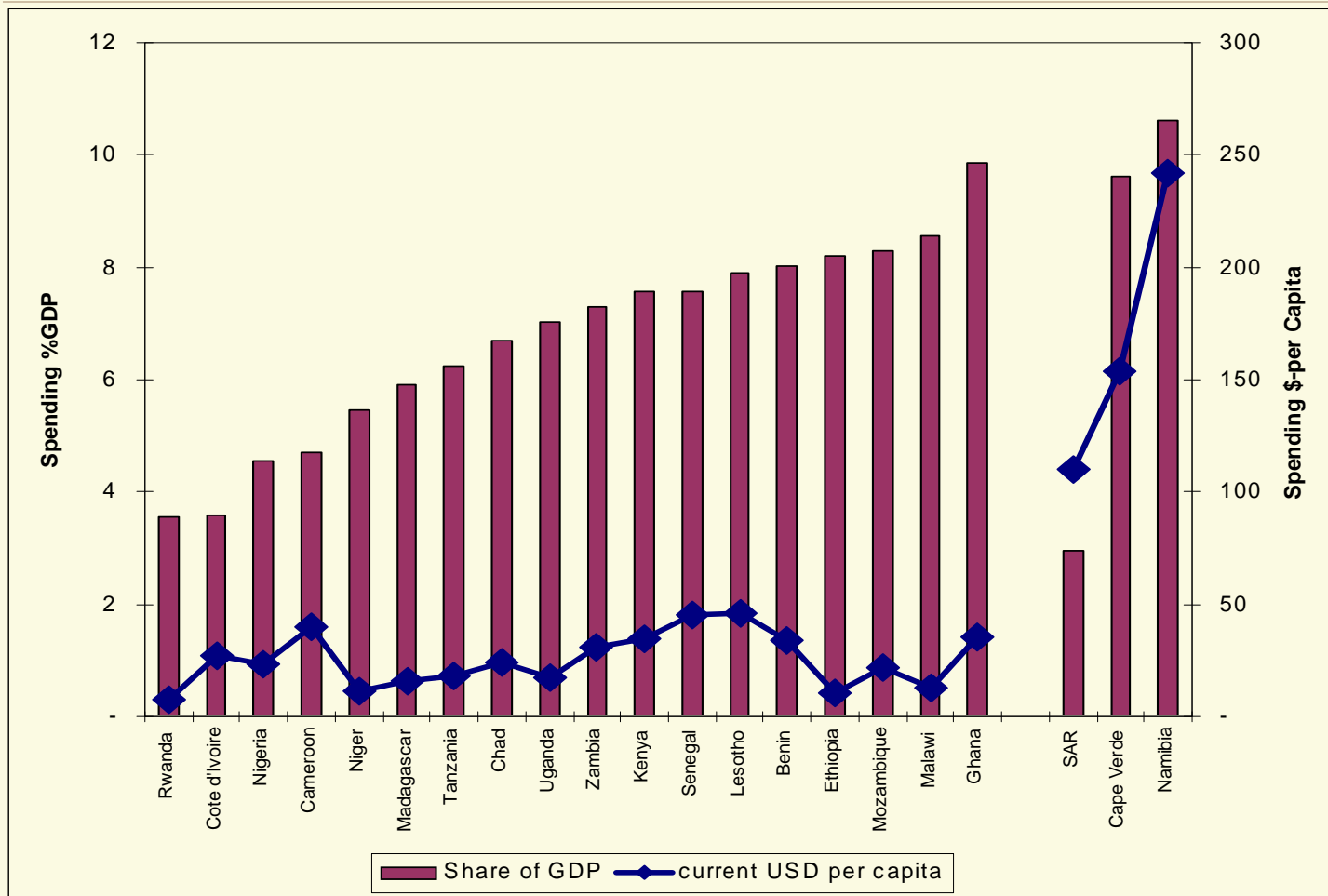
Source: Preliminary results AICD 2008

Evident patterns of concentration according to source of investment finance



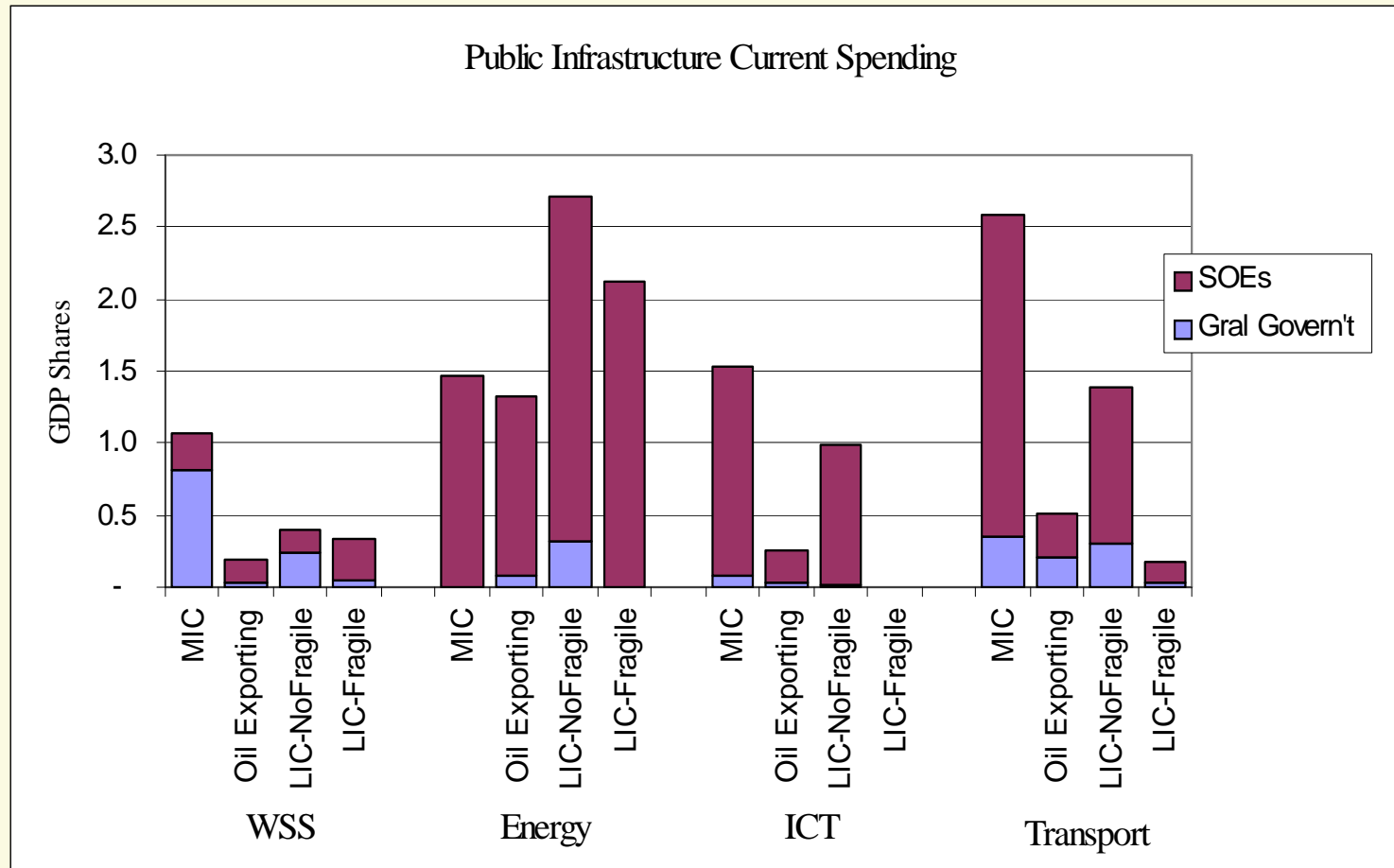
Source: Preliminary results AICD 2008

Public spending absorbs 6-8% GDP, but represents only US\$20-40 pc pa



Source: Preliminary results AICD 2008

About half of this is current spending primarily executed by SOEs

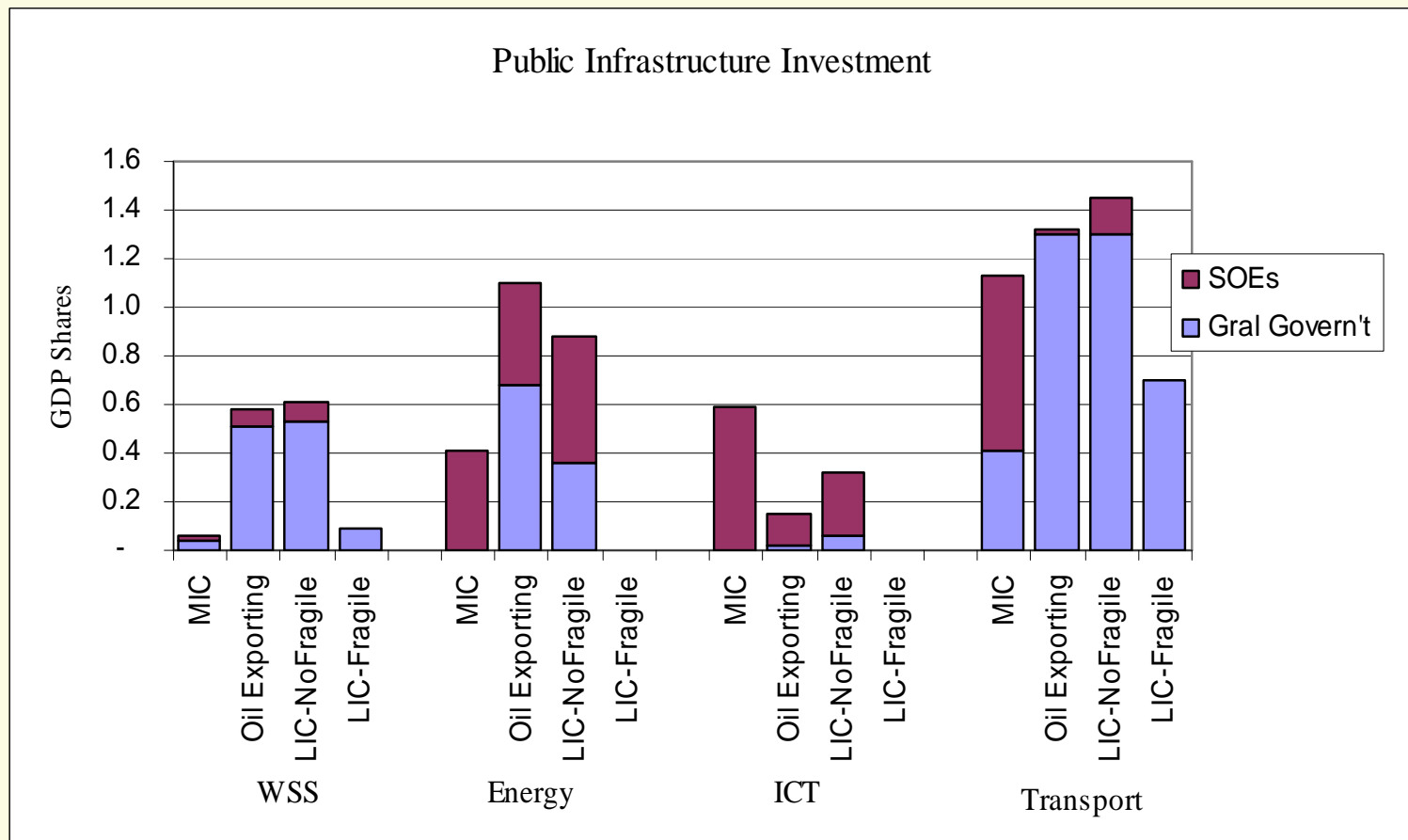


Source: Preliminary results AICD 2008

Key Message #6

There are major flaws in the public investment process led by Central Government

About 3-4% of GDP is public investment primarily executed by central government

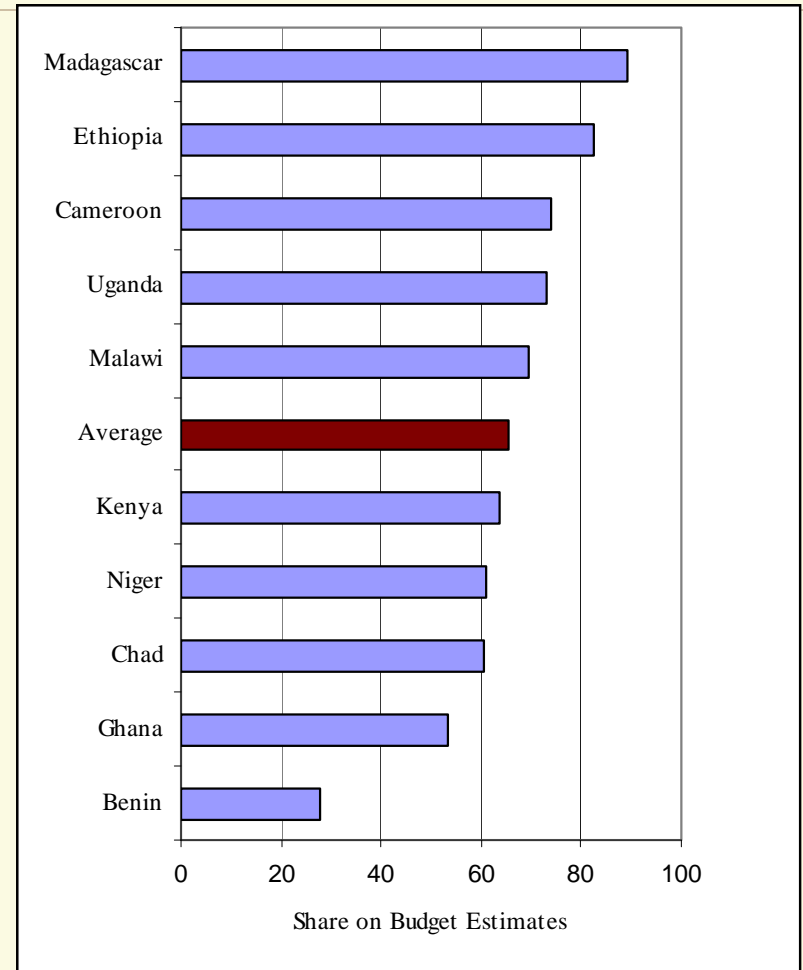


Source: Preliminary results AICD 2008

Around a third of budgeted capital spending on infrastructure goes unspent

☞ Potential gain of US\$3.3 bn pa from raising capital budget execution ratios

☞ Key problems are poor planning, project selection, tardy project preparation, inefficient procurement, annual budgeting

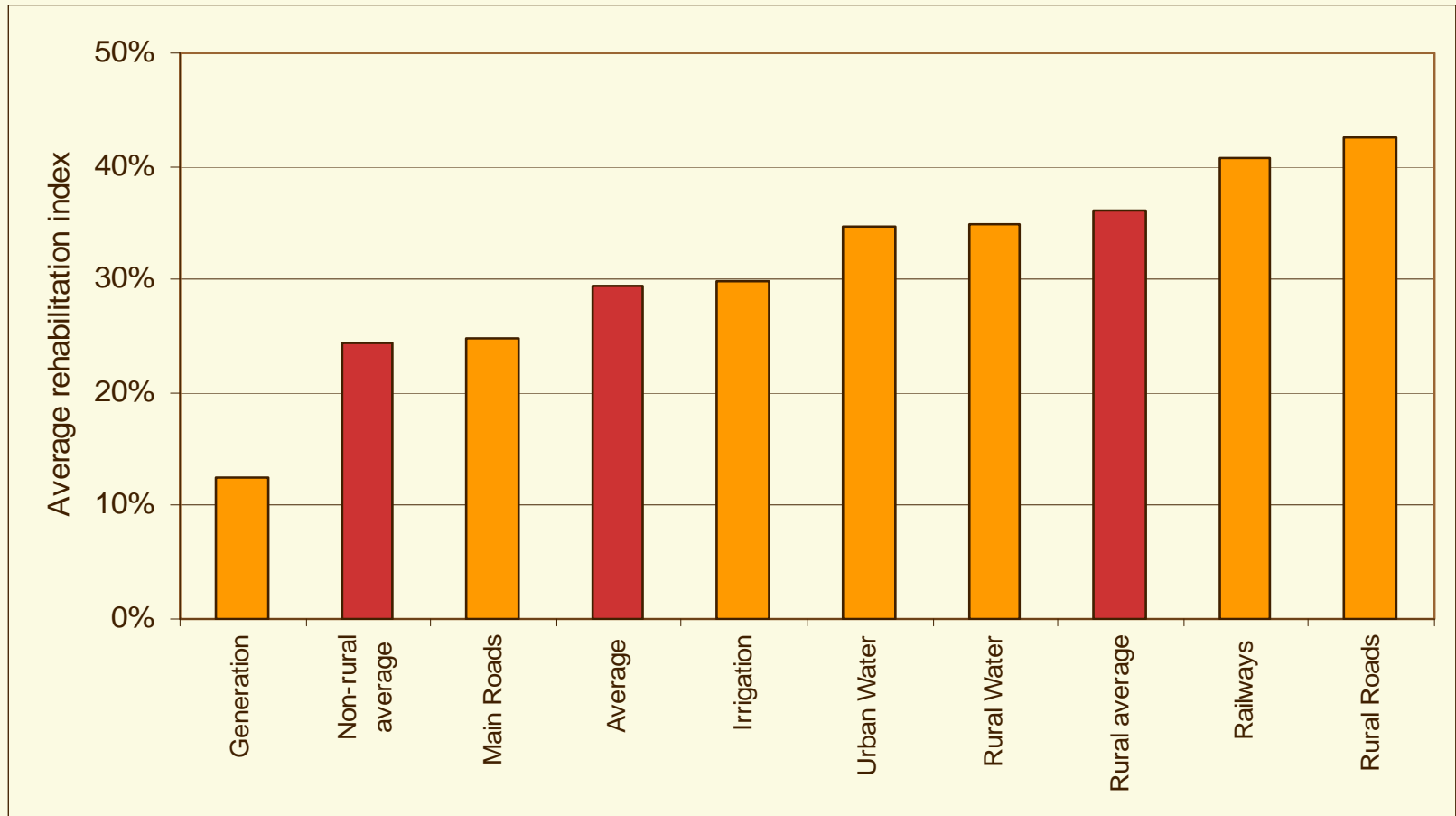


Source: Preliminary results AICD 2008

Key Message #7

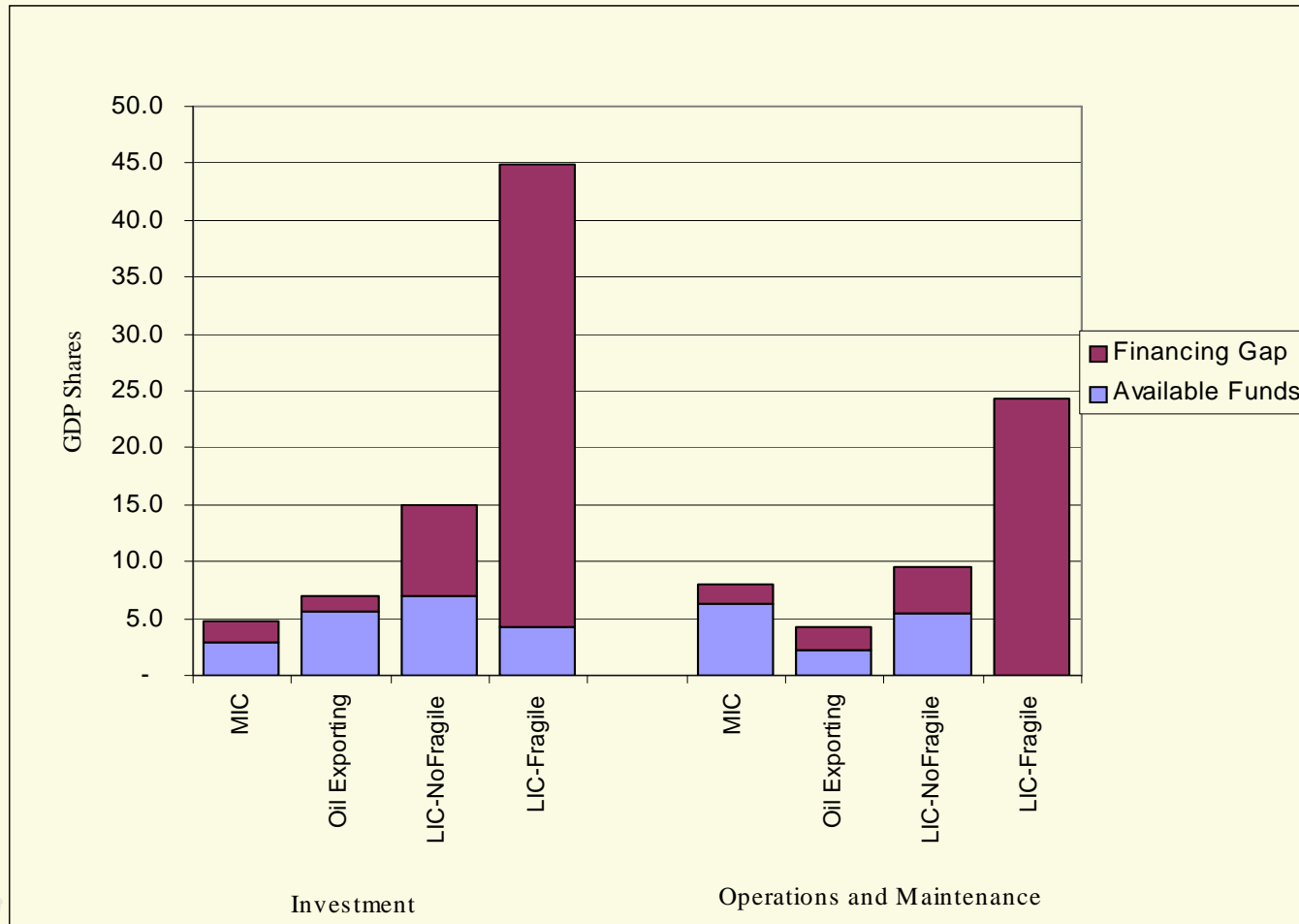
**Maintenance spending is vital
but remains seriously
under-funded**

Large rehabilitation needs bear testimony to problem of under-maintenance



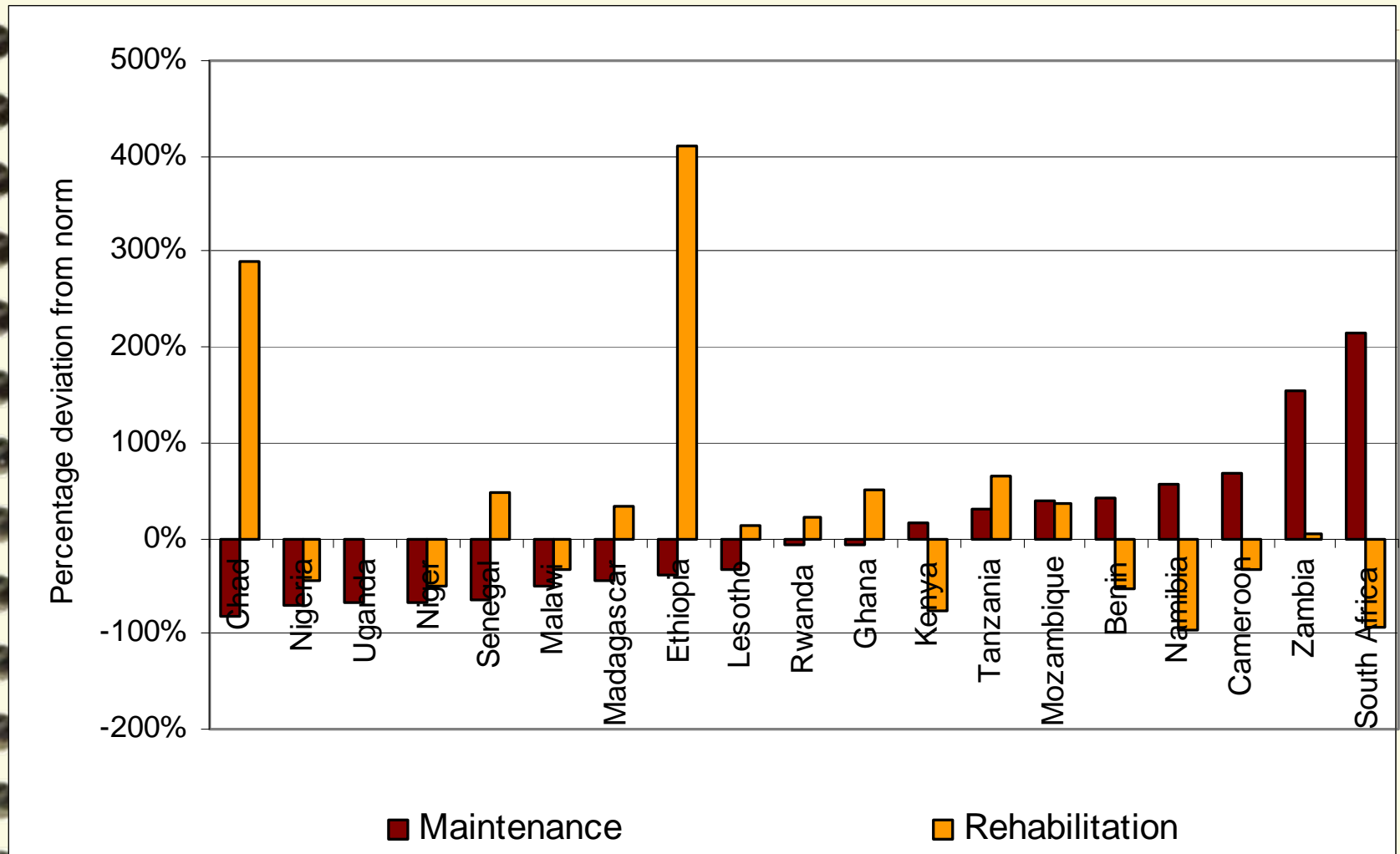
Source: Preliminary results AICD 2008

Thus financing gaps are not only about investment, but also about maintenance



Source: Preliminary results AICD 2008

50% (25%) of countries fail to cover (routine) critical road maintenance requirements



Source: Preliminary results AICD 2008

Countries with road funds and high fuel levies do better at funding road maintenance

Percentage of road maintenance requirements met			
Macro		Institutions	
- MIC	+80%	- RF & RA	-11%
- LIC (aid)	-12%	- RF only	-3%
- LIC (oil)	-28%	- RA only	-69%
Geography		Financing	
- Flat & arid	+12%	- Low levy	-19%
- Rolling & humid	-24%	- High levy	+28%

Source: Preliminary results AICD 2008

Key Message #8

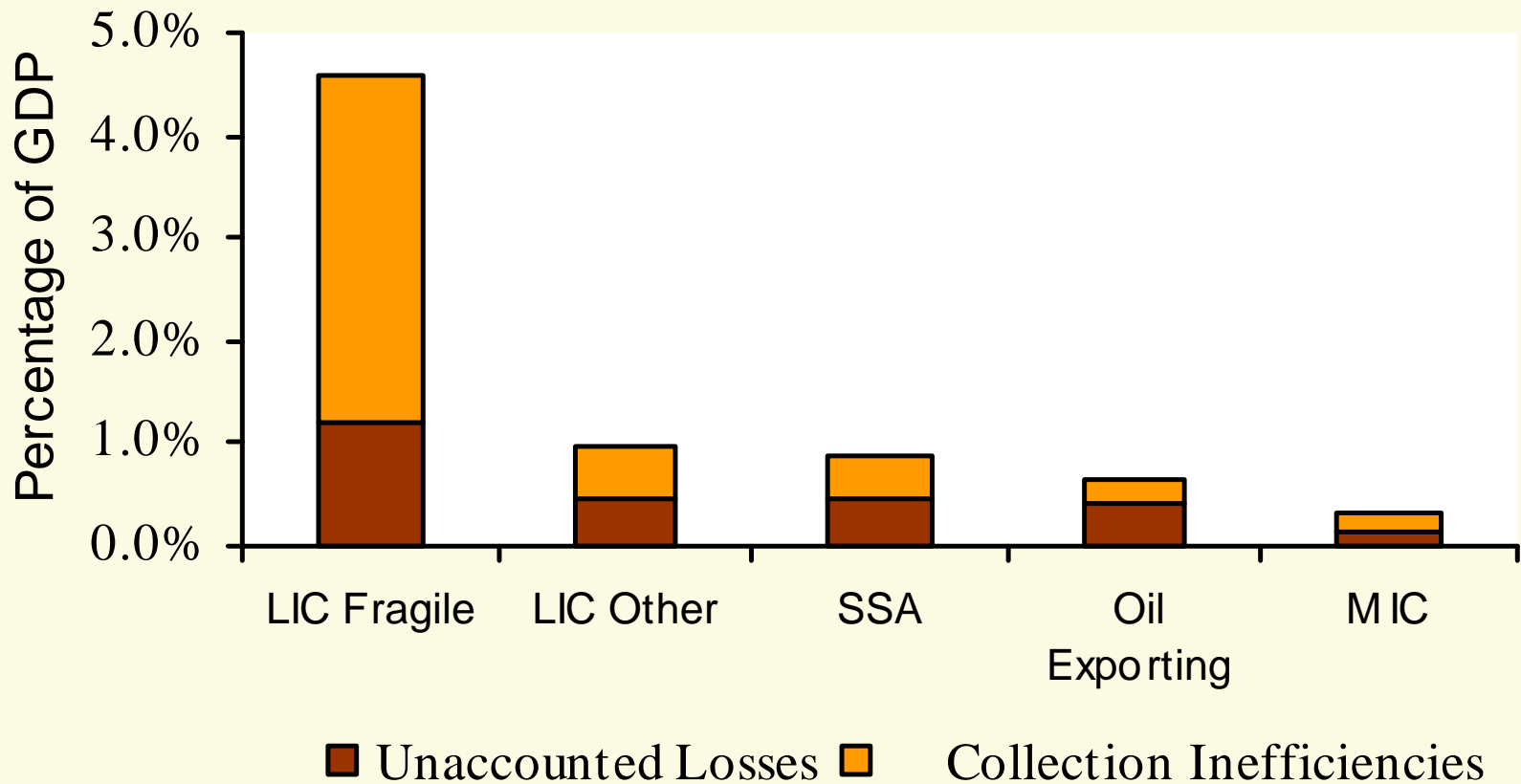
The cost of inefficiency is very high and demands further institutional reform

Inefficiency of SOEs represents a substantial waste of current resources

US\$bn pa	Cost of distribution losses	Cost of uncollected revenues	Cost of under- charging for services	Total
WSS	0.5	0.4	1.9	2.8
Power	1.2	1.3	2.0	4.5
Total	1.7	1.7	3.9	7.7

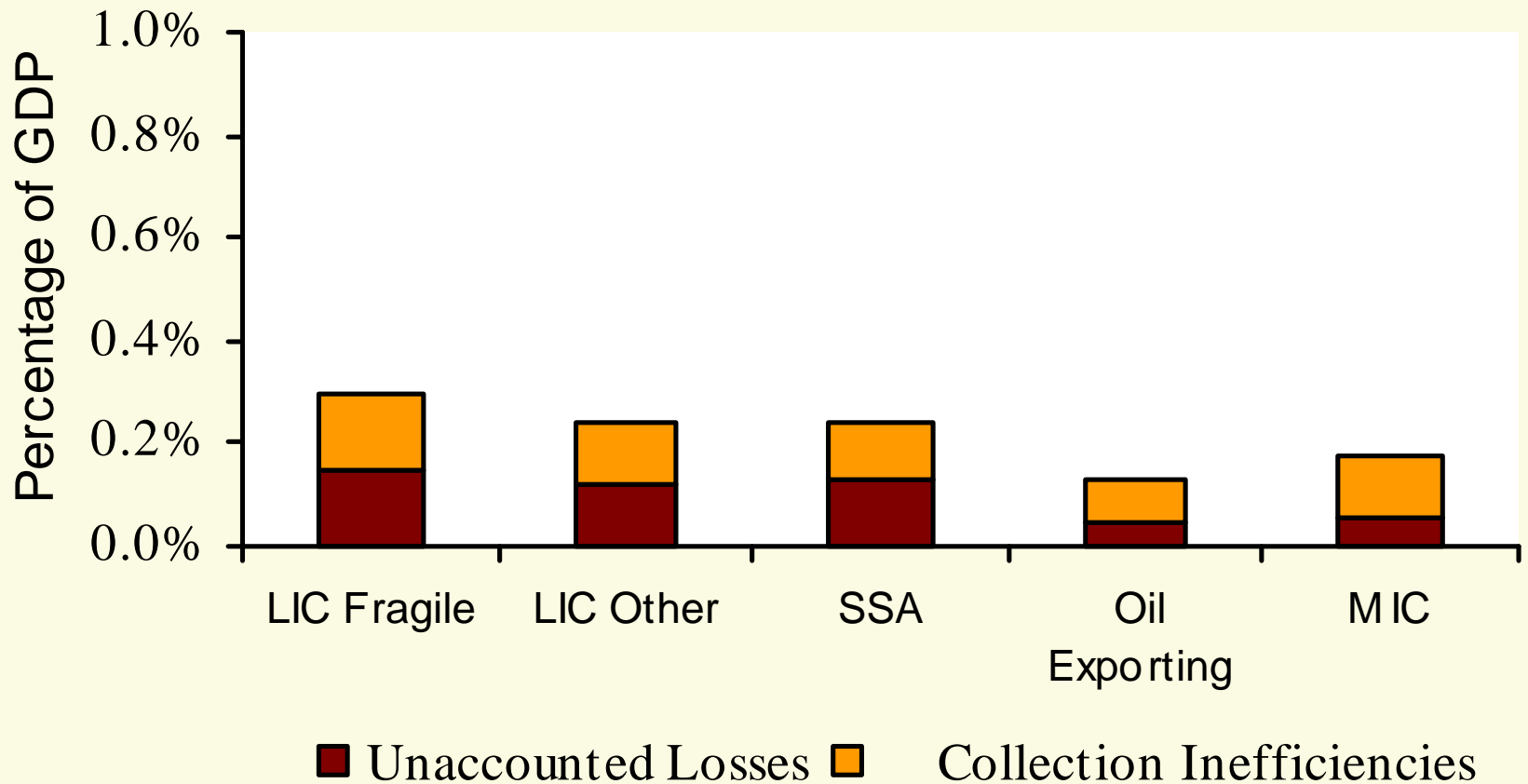
Source: Preliminary results AICD 2008

In the case of power utilities the cost can exceed 1% GDP in several countries



Source: AICD preliminary findings, 2008

For water utilities, the problem is serious at enterprise level but less of a burden on GDP



Source: AICD preliminary findings, 2008

Key Message #9

Africa's infrastructure is very expensive for a variety of different reasons

Africa's infrastructure services several times more expensive than elsewhere

	Sub-Saharan Africa	Other developing regions
Power tariffs (\$/kWh)	0.02-0.46	0.05-0.10
Water tariffs (\$/kWh)	0.86-6.56	0.03-0.60
Road freight tariffs (\$/ton-km)	0.04-0.14	0.01-0.04
Mobile telephony (\$/mo.)	2.6-21.0	9.9
International telephony (\$/min.)	0.44-12.5	2.0
Internet dial-up service (\$/mo.)	6.7-148.0	11.0

Source: Preliminary results AICD 2008

High road transport costs driven by high profit margins reflecting market power

	Roads in good cond'n (%)	Trade density (US\$m. per km)	Implicit velocity (km per hour)	Freight tariff (US\$ per ton-km)	Profit margins (%)
Western	72	8.2	6.0	0.08	80
Central	49	4.2	6.1	0.13	70-160
Eastern	82	5.7	8.1	0.07	70-90
Southern	100	27.9	11.6	0.05	20-60

Source: Preliminary results AICD 2008

High international call charges driven both by technology and market power

US\$	Percent cases	Call within SSA	Call to USA	Internet dial-up	Internet ADSL
Without submarine cable	67%	1.34	0.86	68	283
With submarine cable	33%	0.57	0.48	47	111
•monopoly on international gateway	16%	0.70	0.72	37	120
•competitive international gateway	16%	0.48	0.23	37	98

Source: Preliminary results AICD 2008

Key Message #10

Prices are nonetheless too low...but achieving cost recovery is complicated by equity considerations

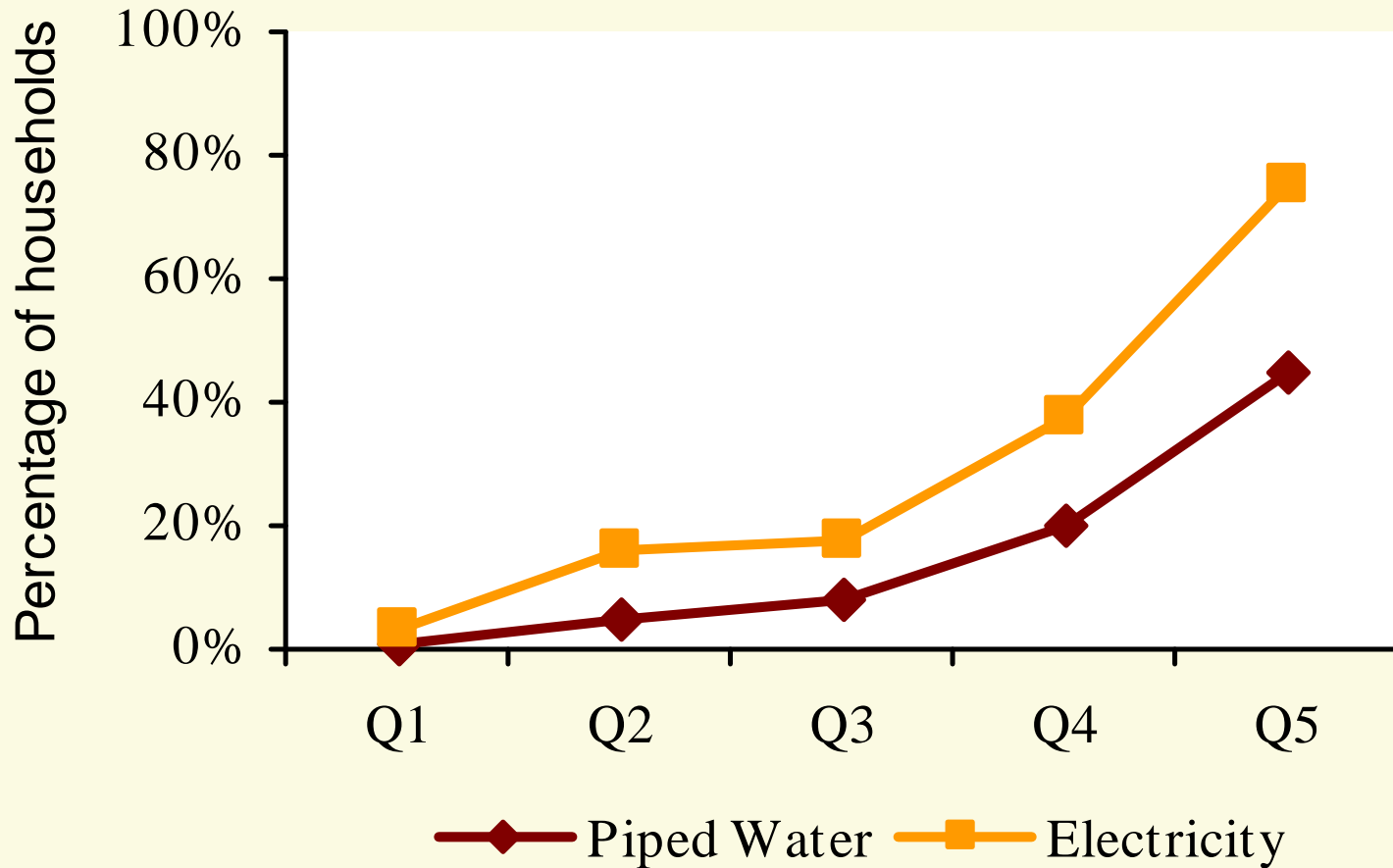
Higher user charges could also make significant contribution to closing gap

Potential gain of US\$5 bn pa from increasing cost recovery

% GDP	WSS	Energy	ICT	Transport	Total
MIC	0.36	0.01	-	0.06	0.43
Oil Exp.	0.08	0.50	-	0.12	0.69
LIC-Non-Fragile	0.27	0.82	-	0.24	1.33
LIC-Fragile	1.14	-	-	-	1.14
Average SSA	0.30	0.32	-	0.12	0.73

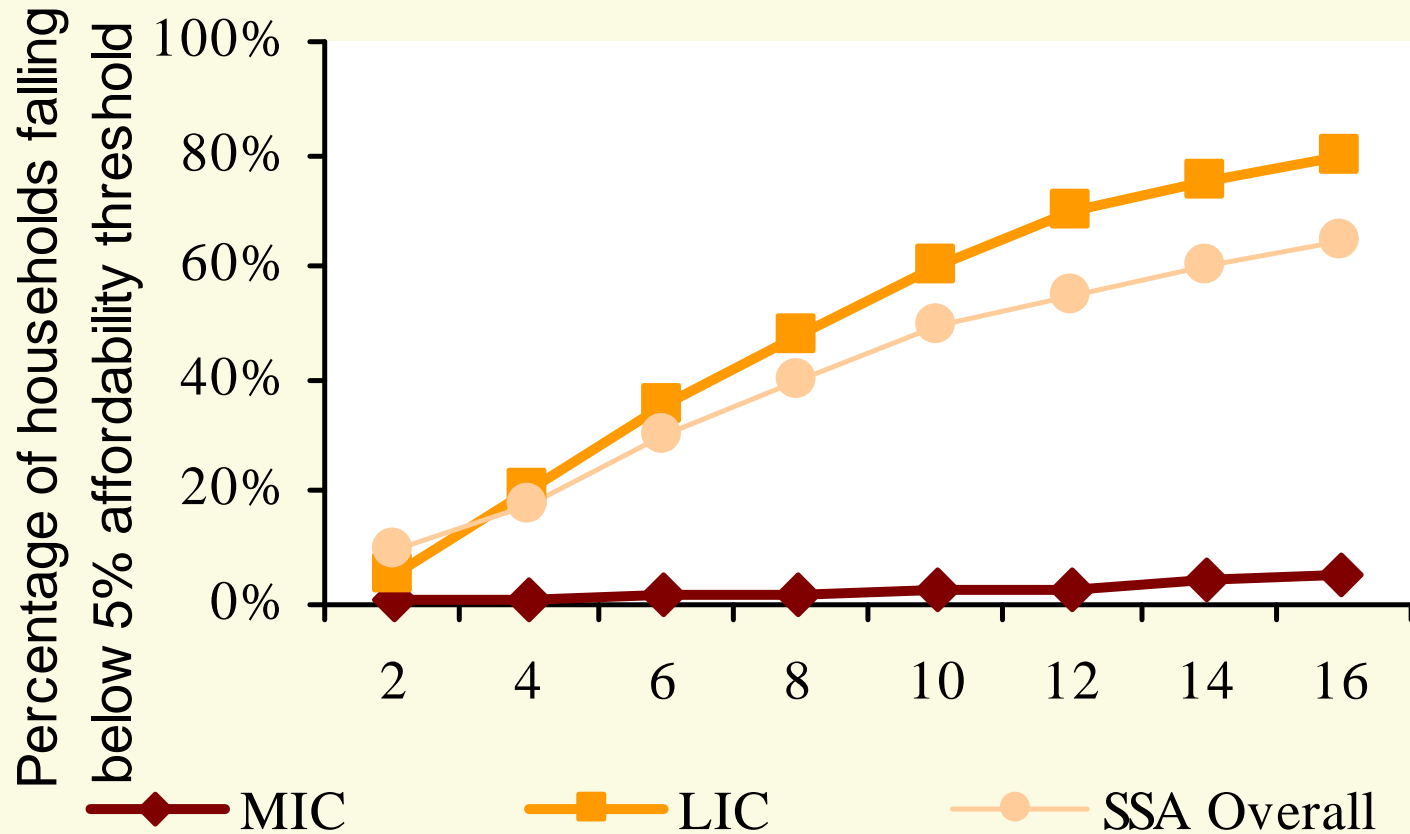
Source: Preliminary results AICD 2008

Around 90% of those with access to piped water or electricity belong to richest 60%



Source: Preliminary results AICD 2008

In LICs the majority cannot afford a cost recovery utility bill of \$10 per month



Source: Preliminary results AICD 2008

Conclusion

Both increased funding and improved efficiency are needed to bridge Africa's infrastructure gap

Overall financing gap of US\$35 billion of which 80% is energy

US\$bn pa	WSS	Energy	ICT	Transport	Total
MIC	0.10	10.71	-	-	10.81
Oil Exporting	1.94	2.43	-	3.95	8.33
LIC- NoFragile	2.35	7.63	-	3.38	13.36
LIC-Fragile	1.48	9.11	0.10	4.28	14.96
Africa	3.91	28.81	-	2.21	34.93

More than half of financing gap could (theoretically) be bridged via efficiency

Large share of gap can be bridged by efficiency measures

But substantial balance remains for further funding

May be some scope for technological innovation

	US\$ bn pa
Financing Gap	+35
• Reallocating expenditures	-8
• Raising capital budget execution	-3
• Reducing SOE inefficiencies	-6
• Increasing cost recovery efforts	-5
Remaining Gap	=13

Policy implications

1. Infrastructure is central to Africa's aid agenda
2. Recent scale-up in infrastructure finance needs to be at least sustained and even increased, but in the context of measures to improve efficiency
3. Major donor re-engagement required in the power sector
4. Incremental resources should be oriented towards fragile states
5. Assuring quality of domestically financed public resources is critical (particularly in oil states)

Policy implications

6. To improve public investment, donors need to engage with line ministries on budgeting, planning, appraisal and procurement processes
7. Donors need to devote greater attention to maintenance issues
8. Institutional reform remains essential to tackling inefficiency but should be broadened to take on SOE governance
9. Regional integration and stronger competition are critically needed to bring down costs
10. Greater scope for cost recovery in context of carefully designed sector social policies

A spiral-bound notebook with a textured, light brown cover. The word "Power" is written in a dark brown, sans-serif font in the center of the cover. The spiral binding is visible on the left side.

Power

Headlines power spending needs

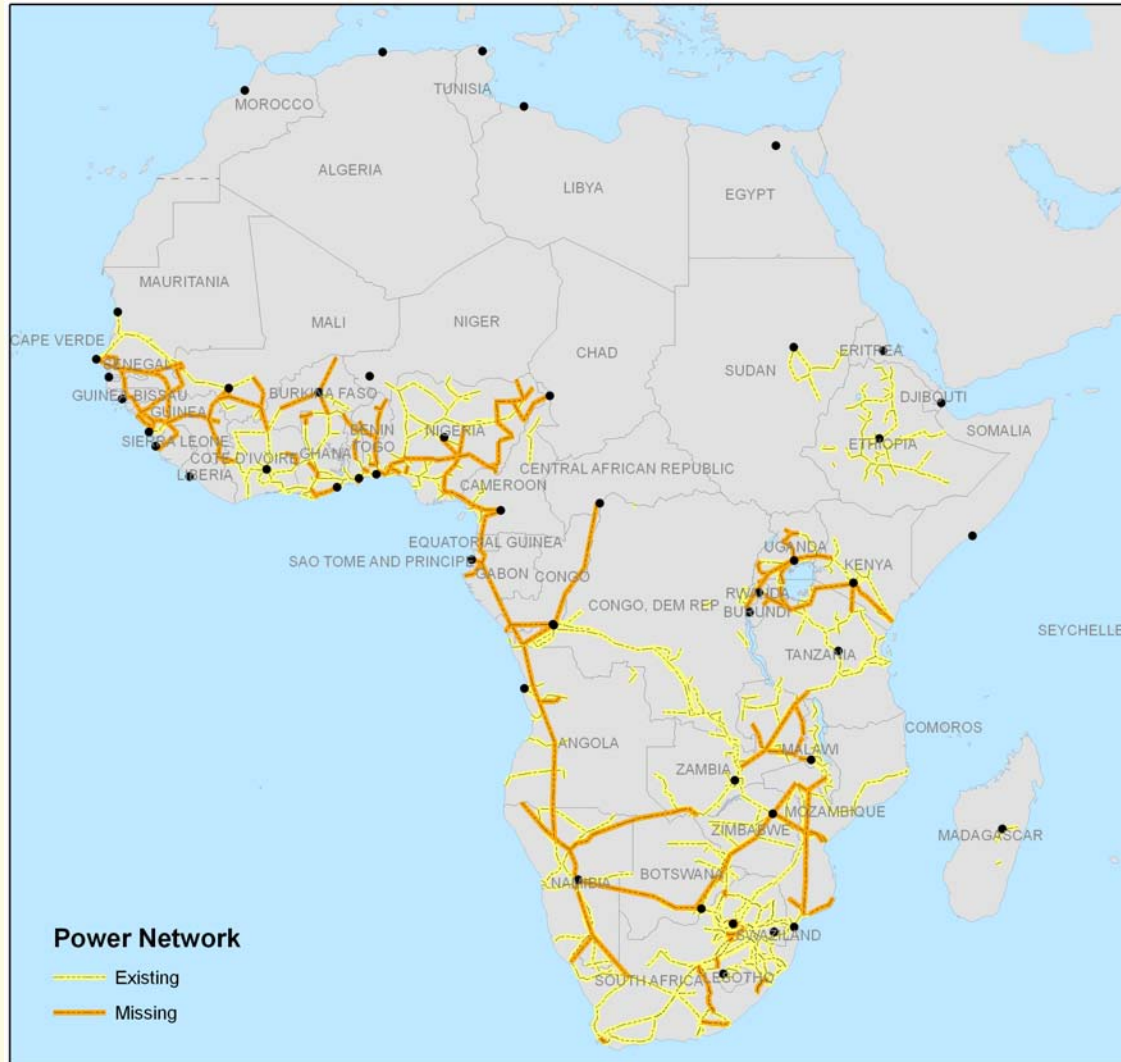
- ☞ Numbers driven mainly by generation and market demand rather than access
- ☞ Returns to regional trade are as high as 160% (SAPP), 33% (CAPP, WAPP) and 20% (EAPP)
 - Power export could be big business
 - Savings from power trade are material (US\$2bn pa)
 - Significant reduction in CO2 emissions
- ☞ Hydro share of portfolio sensitive to
 - Oil price
 - Climate scenarios

Very high power spending needs particularly in generation sub-sector

US\$bn. pa	TOTAL	INV	OPEX	GEN	T&D
CAPP	1.2	1.0	0.2	0.9	0.3
EAPP	13.2	6.6	6.5	10.0	3.2
SAPP	17.7	9.4	8.3	11.0	6.7
WAPP	10.5	6.9	3.6	5.6	4.9
Total	42.5	23.9	18.6	27.5	15.0

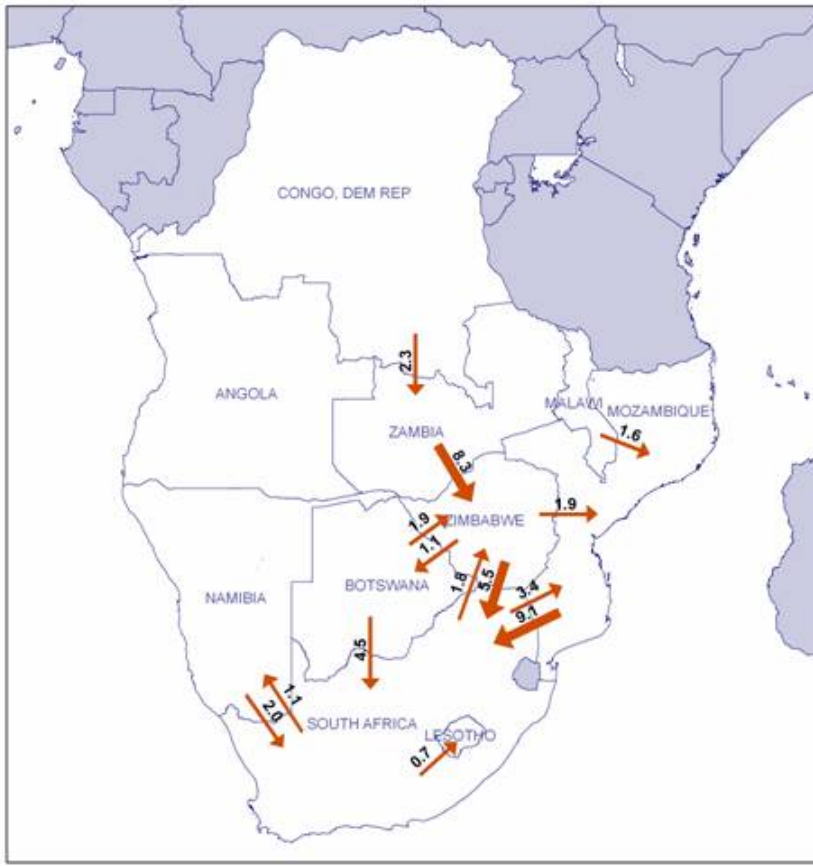
Source: Preliminary results AICD 2008

Regional power pools cannot function without major transmission investments

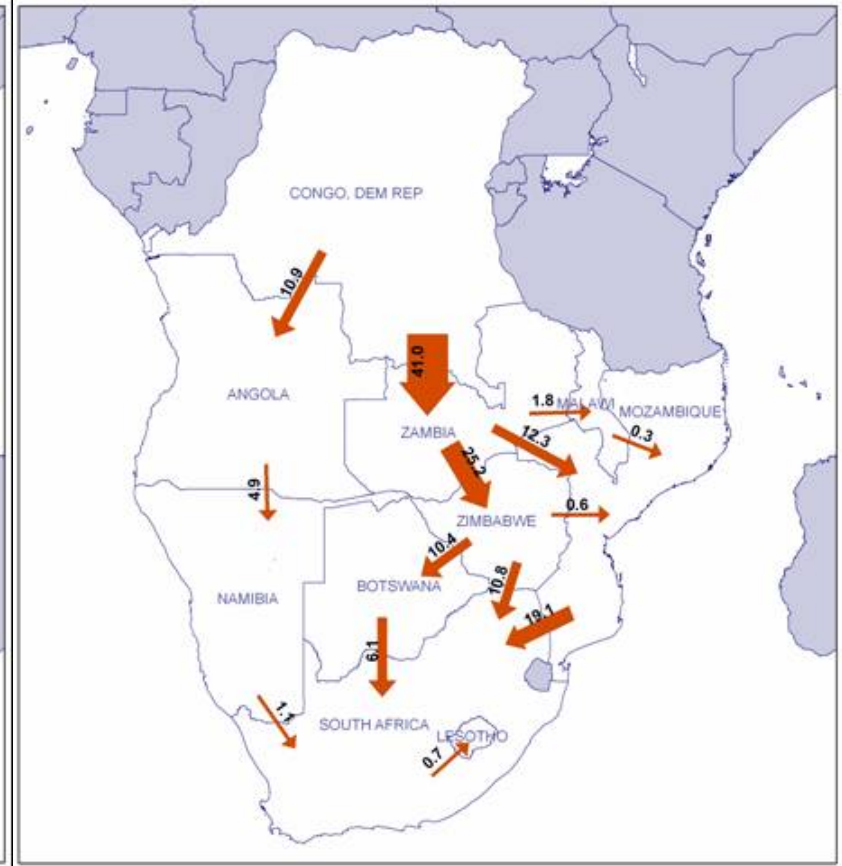


These would allow economically desirable cross-border power trade

(a) Trade stagnation

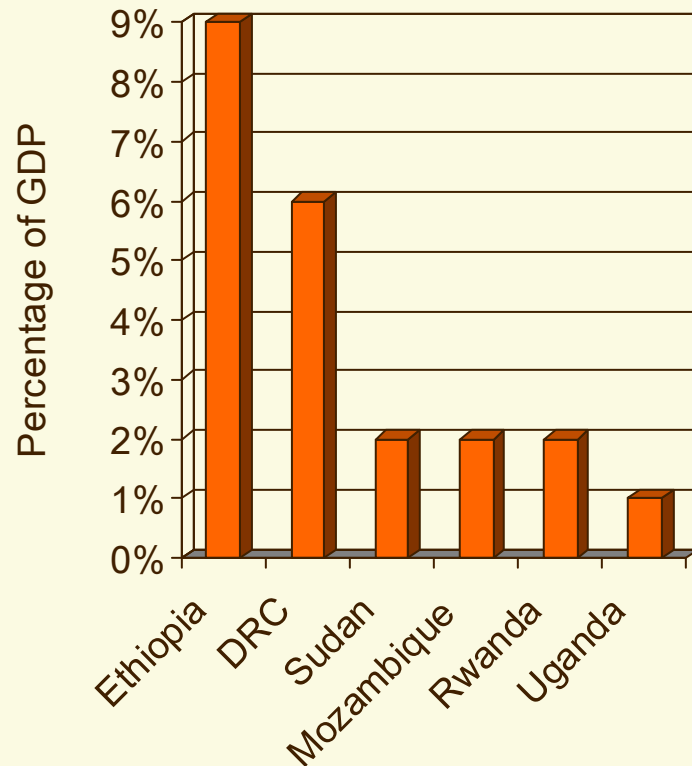


(b) Trade expansion

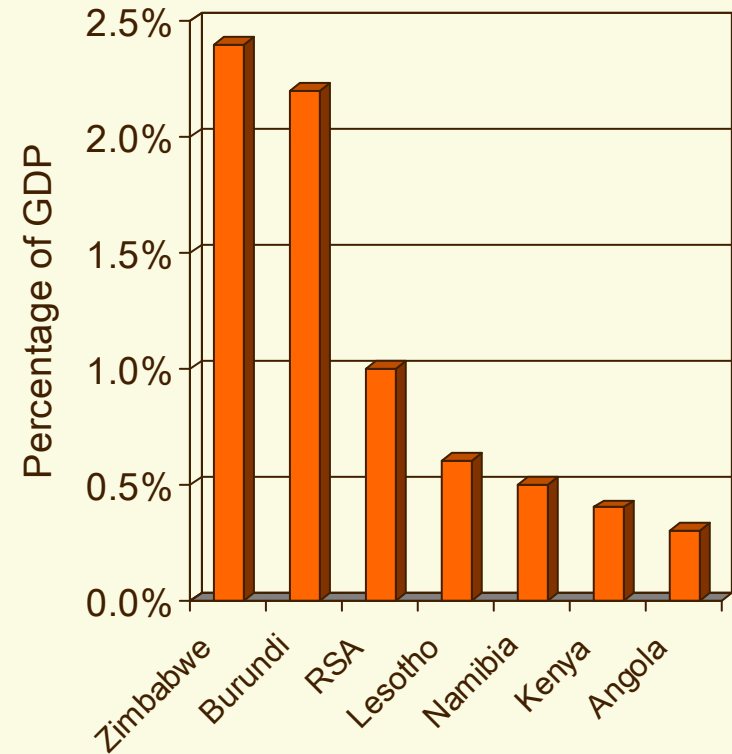


Source: Preliminary results AICD 2008

Both importers and exporters stand to gain significant economic benefits



Major Exporters



Major Importers

Source: Preliminary results AICD 2008

The power story

Dramatic situation in power sector

- A global outlier reflecting chronic problems
- Recent aggravations provoke crisis

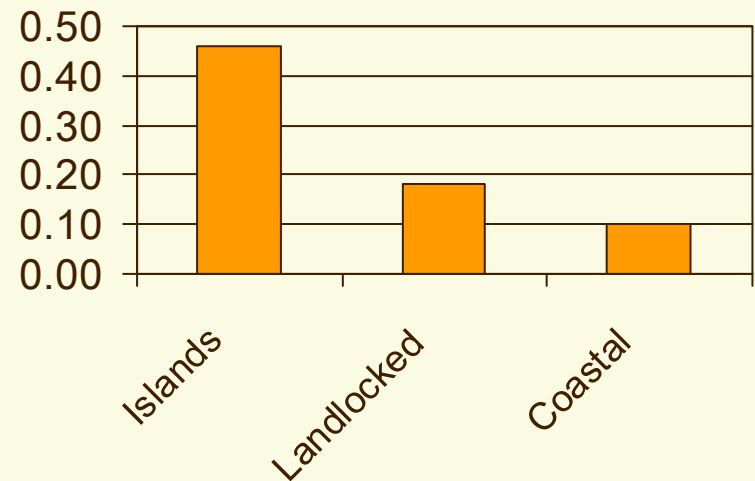
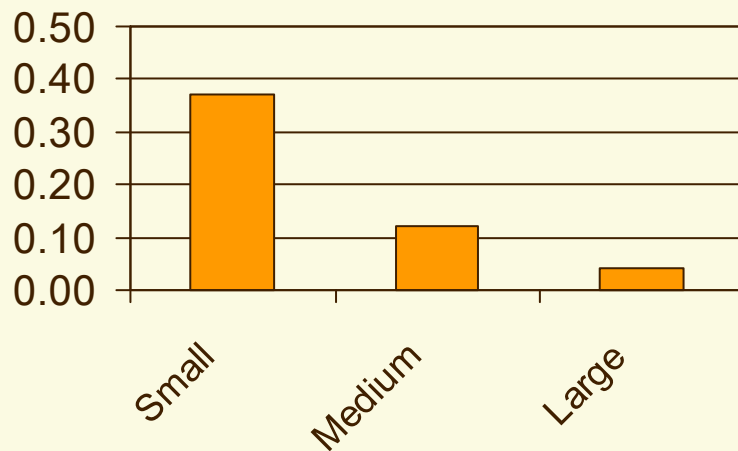
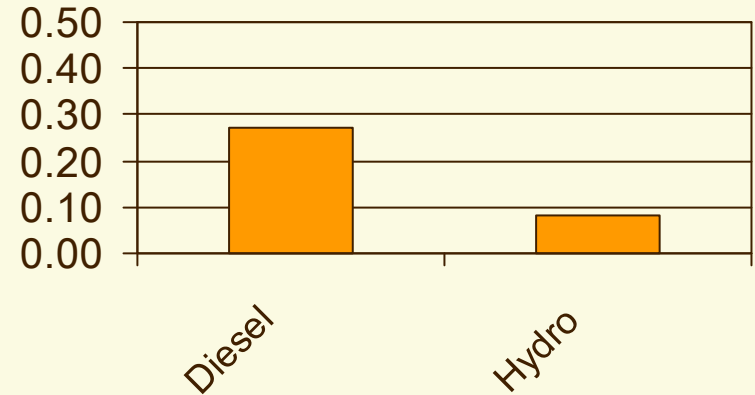
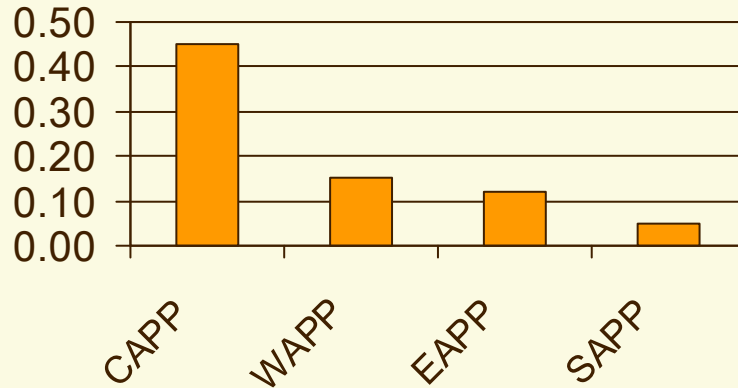
Underlying paradoxes to be addressed

- High prices but even higher costs: need to tap into cost-effective regional energy
- Widespread reform without expected results: need to adapt the model

Private sector mitigates production losses with costly own generation facilities

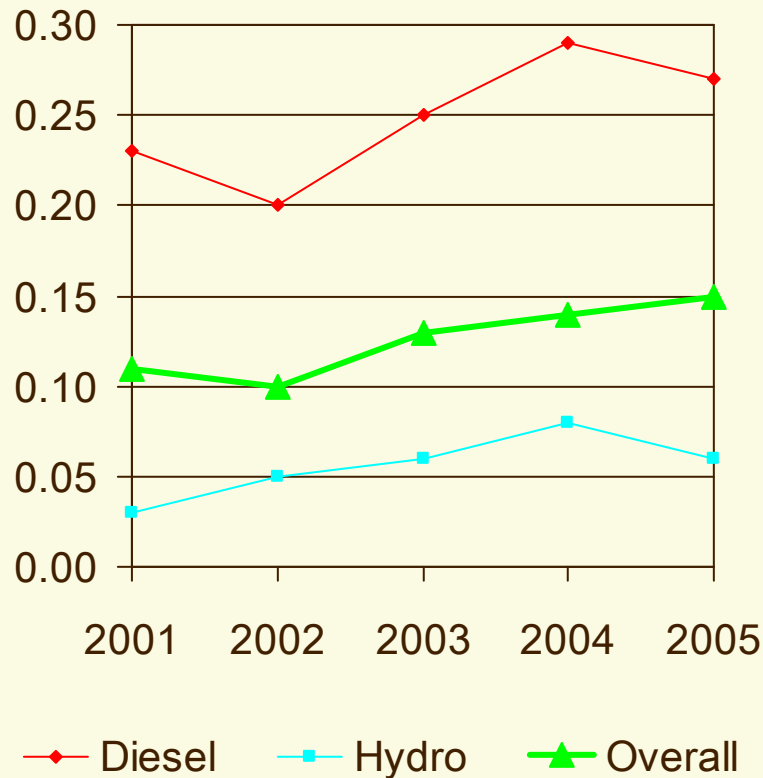
- 📄 Power outages lead to revenue losses of 5% (20%) for formal (informal) sector firms
- 📄 Own generation now accounts for 6% of SSA's installed capacity
 - but as high as 17% in ECOWAS and 45% in DRC
- 📄 Cost of running private generators put at US\$0.44 per kWh
- 📄 Firms with generators face VOLL at US\$80 per hour versus US\$290 for those without

Small scale and inefficient technology lead to huge operating cost penalties

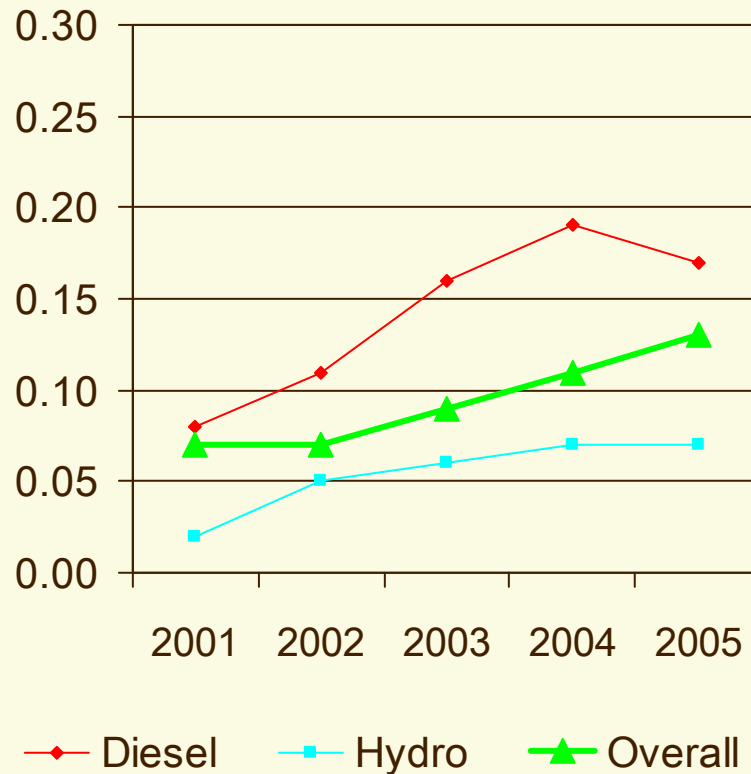


Source: Preliminary results AICD 2008

Prices have been rising but not fast enough to keep up with rising costs



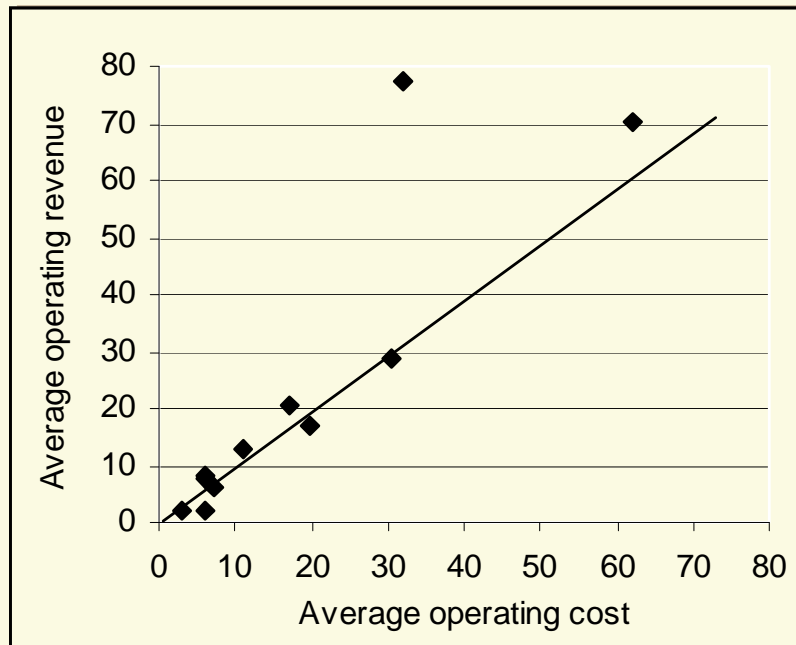
Average operating cost



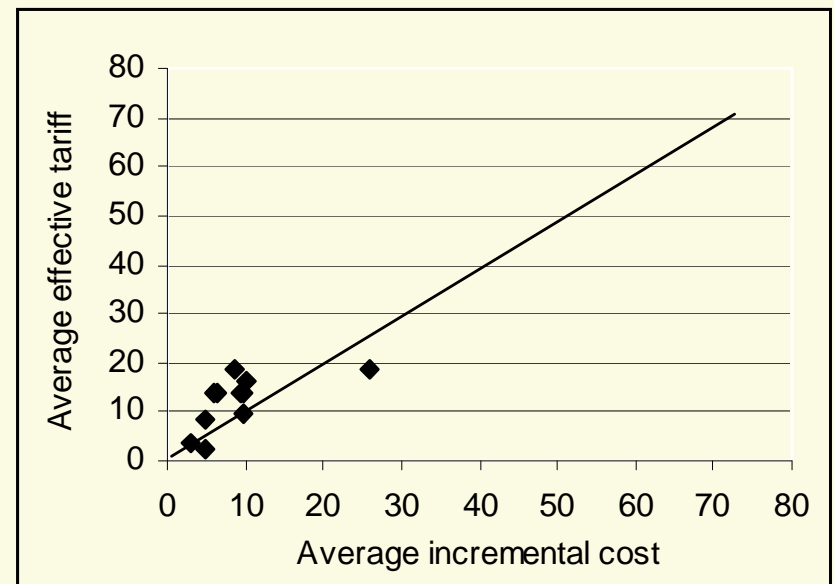
Average revenue

Source: Preliminary results AICD 2008

Cost recovery frustrated by low revenue collection and inflated costs



...but average tariffs compare favorably to average incremental cost



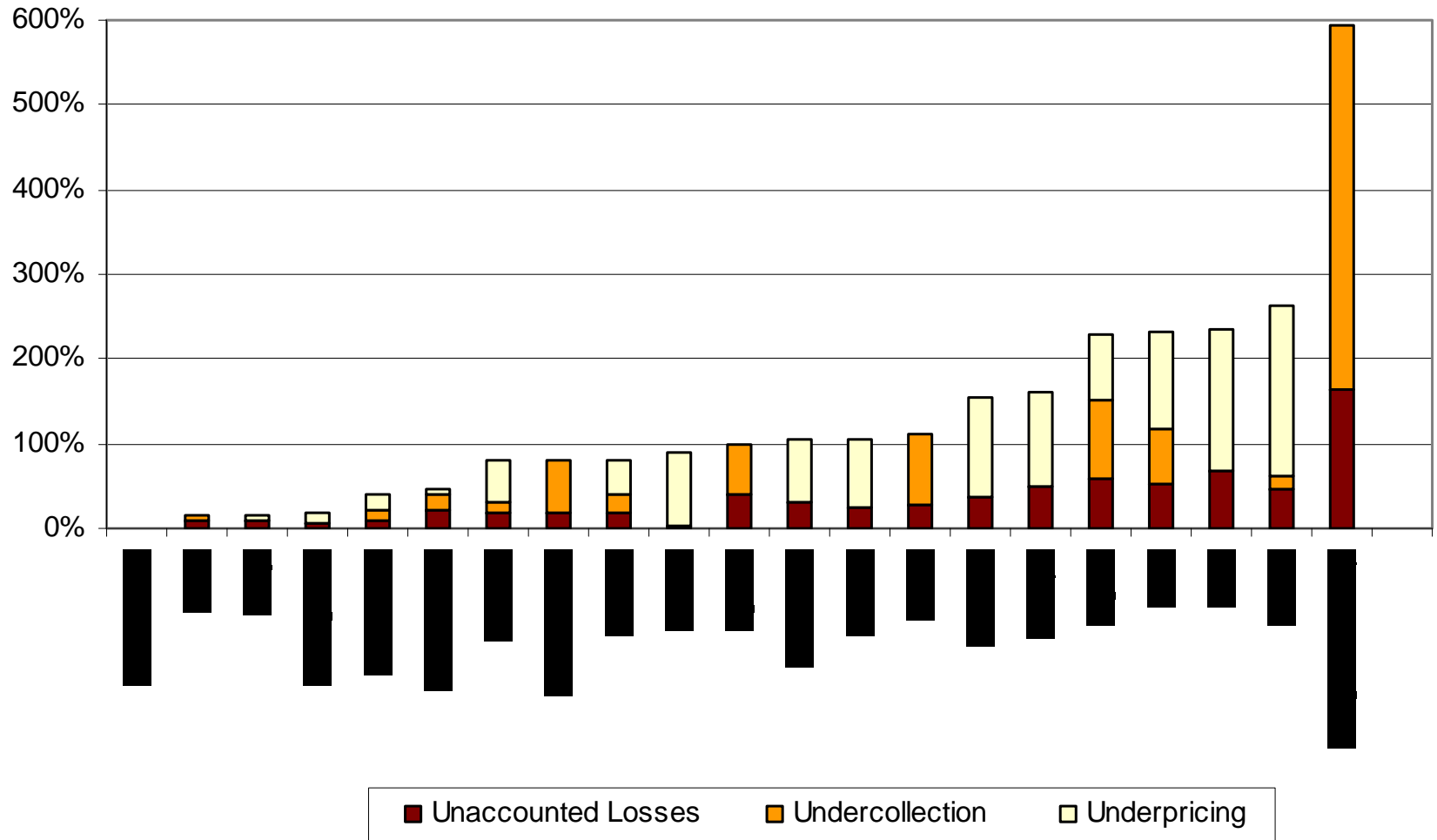
Average revenues track average operating cost quite closely...

Power utilities lag well behind standard efficiency benchmarks for the sector

	Average Tariffs (US\$/kwh)		Average Distribution Losses (% production)		Average Collection (% of bill)	
	Average Effective Tariff	Cost Recovery Benchmark	Actual T&D Losses	Norm	Actual	Norm
Mean	0.12	0.20	23	10	84	100
Median	0.09	0.14	23	10	89	100

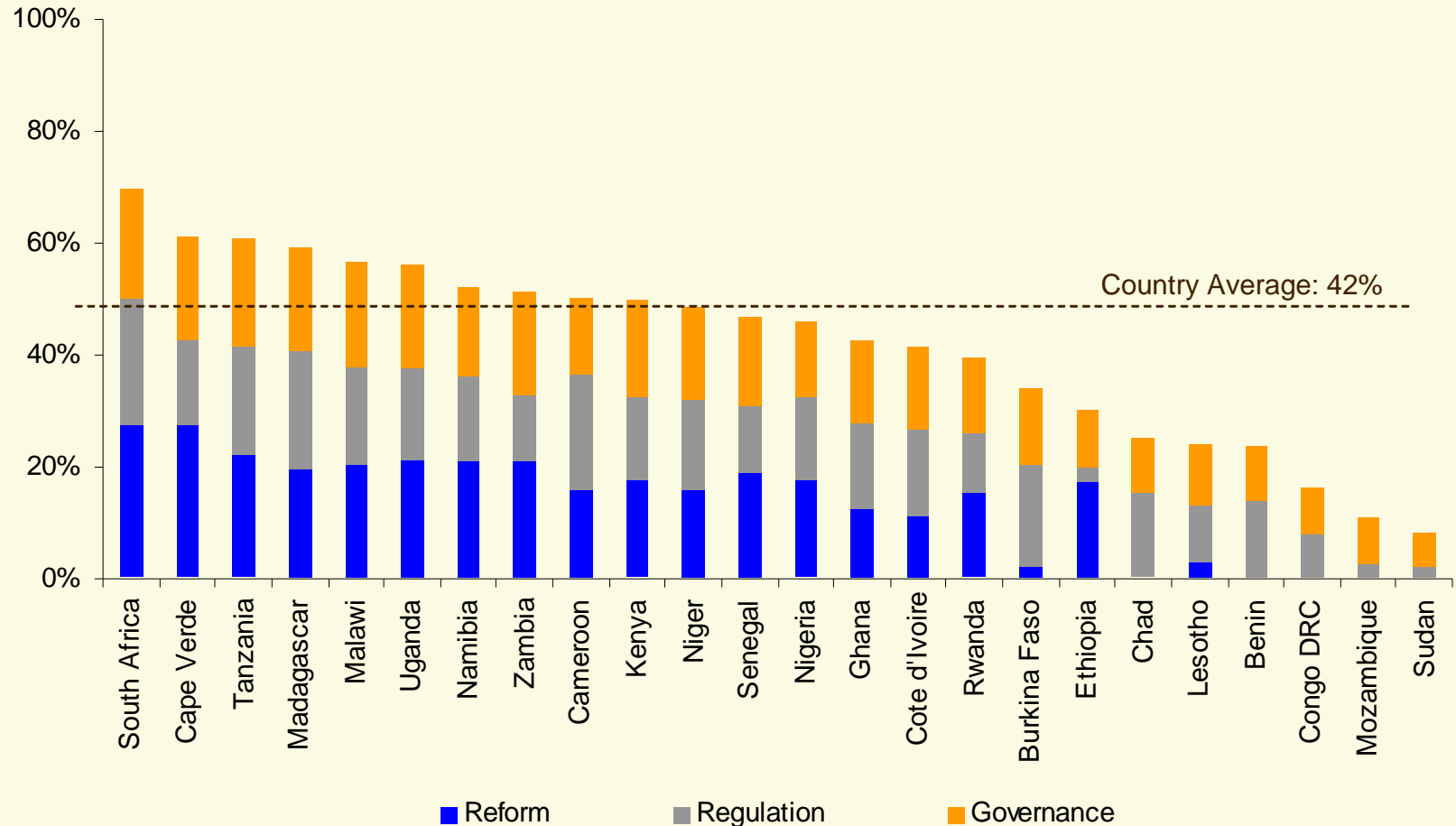
Source: Preliminary results AICD 2008

For power utilities overall losses can be up to 500% of revenues (or 4% GDP)



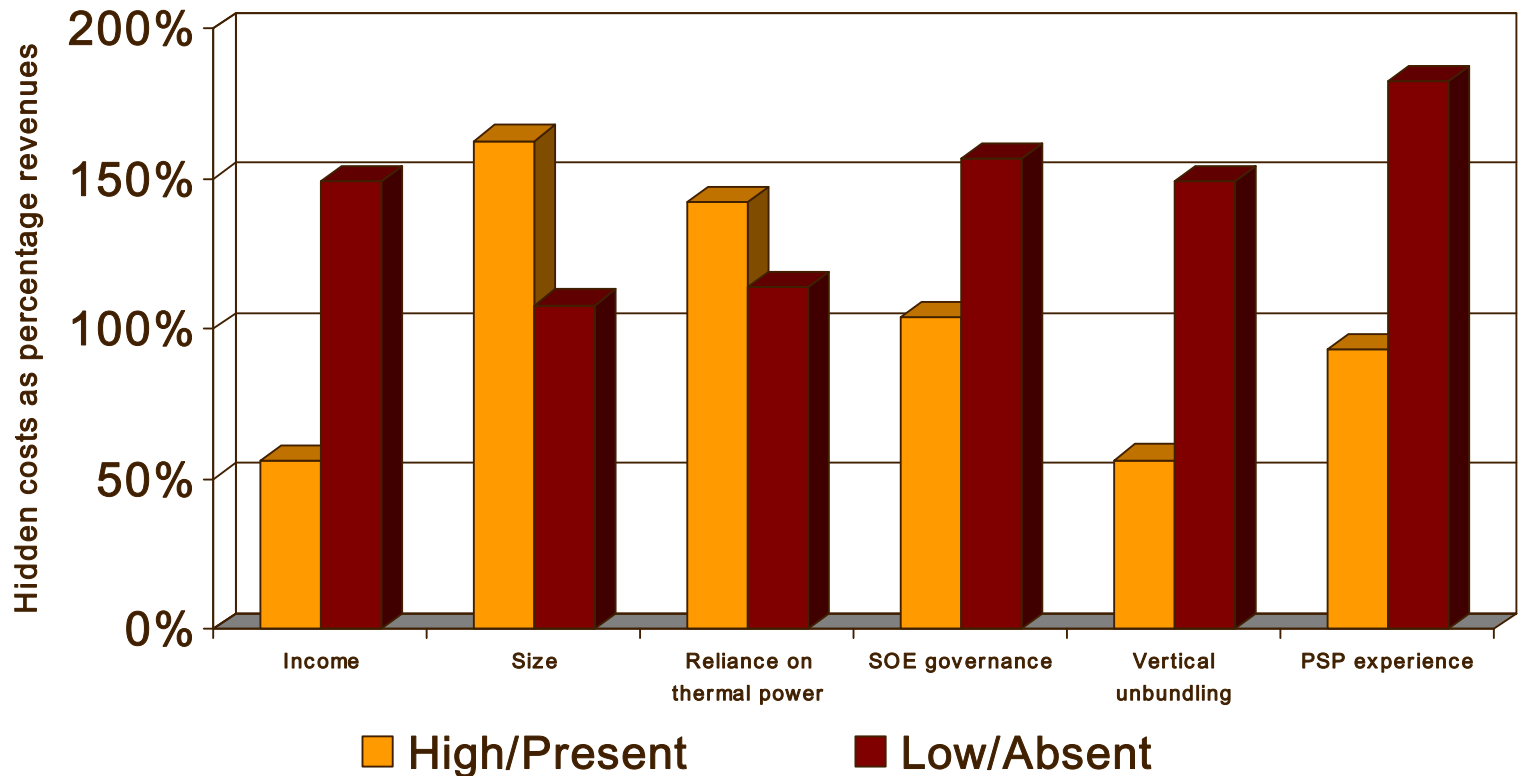
Source: AICD preliminary findings, 2008

Few countries are more than half way towards a modern institutional framework



Source: Preliminary results AICD 2008

Both PSP and good SOE governance have an impact on performance indicators



Power Utilities

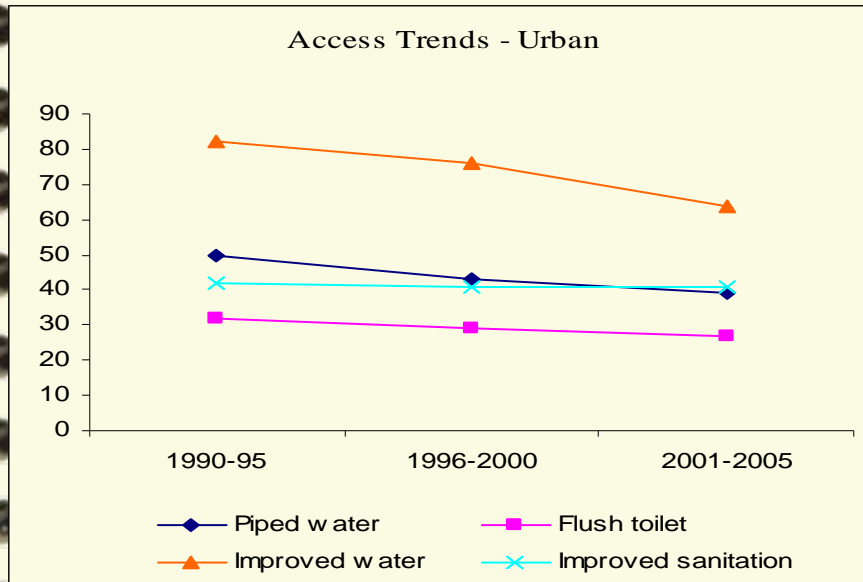
A spiral-bound notebook with a textured, light brown cover. The word "Water" is written in a dark brown, sans-serif font in the center of the cover. The spiral binding is visible on the left side.

Water

The water story

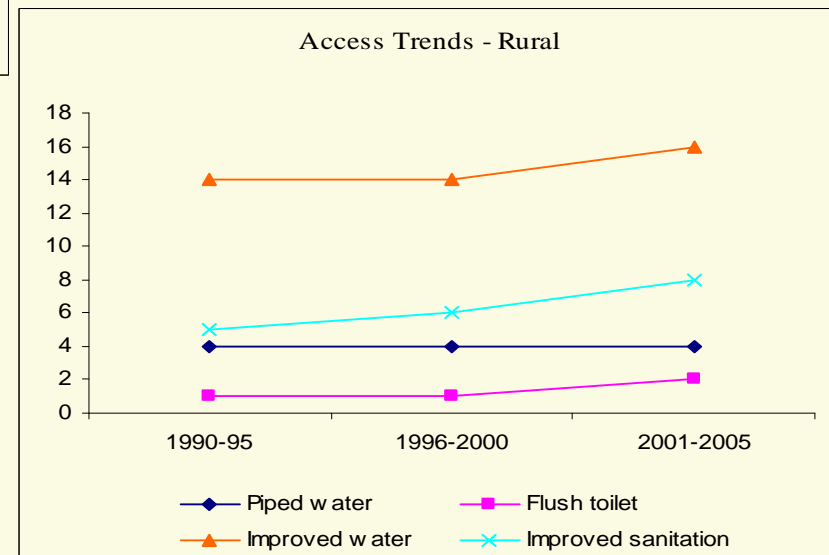
- Access to improved water is stagnant or declining, particularly in urban areas
- Boreholes are fastest growing form of supply
- Utility performance highly inefficient with significant economic costs
- Institutional reform has a long way to go but has yielded some results in efficiency
- Efficient utilities expand faster and provide higher quality services

Access to WSS is declining in urban areas and barely increasing in rural areas



Urban access trends fail to keep pace with demographic growth of 3.6% pa

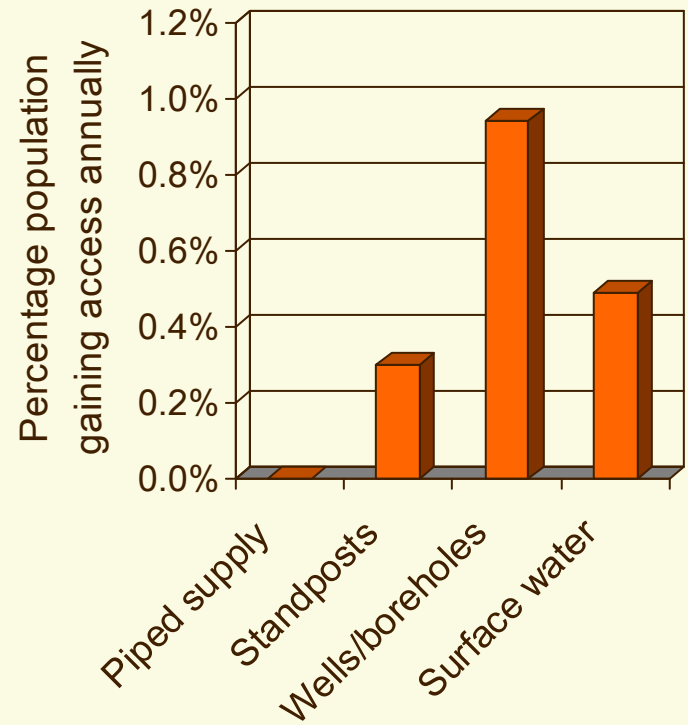
Very modest progress is being made in rural areas



Boreholes are the fastest growing source of water in both urban and rural areas

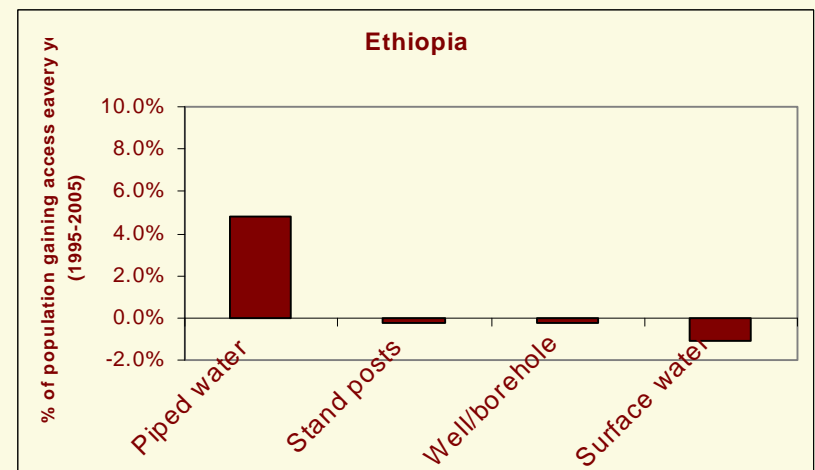
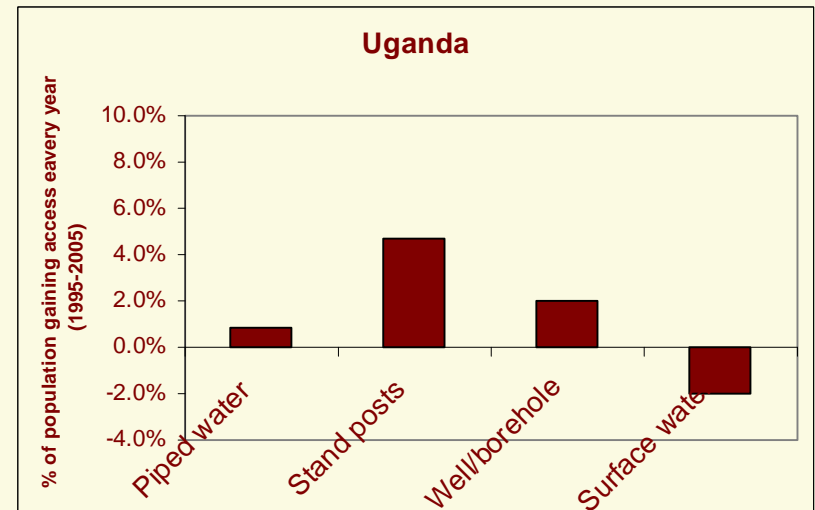
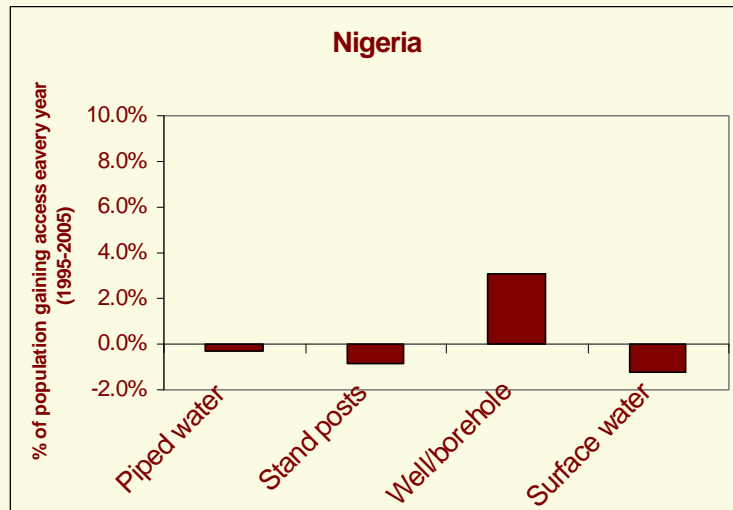


Urban Areas



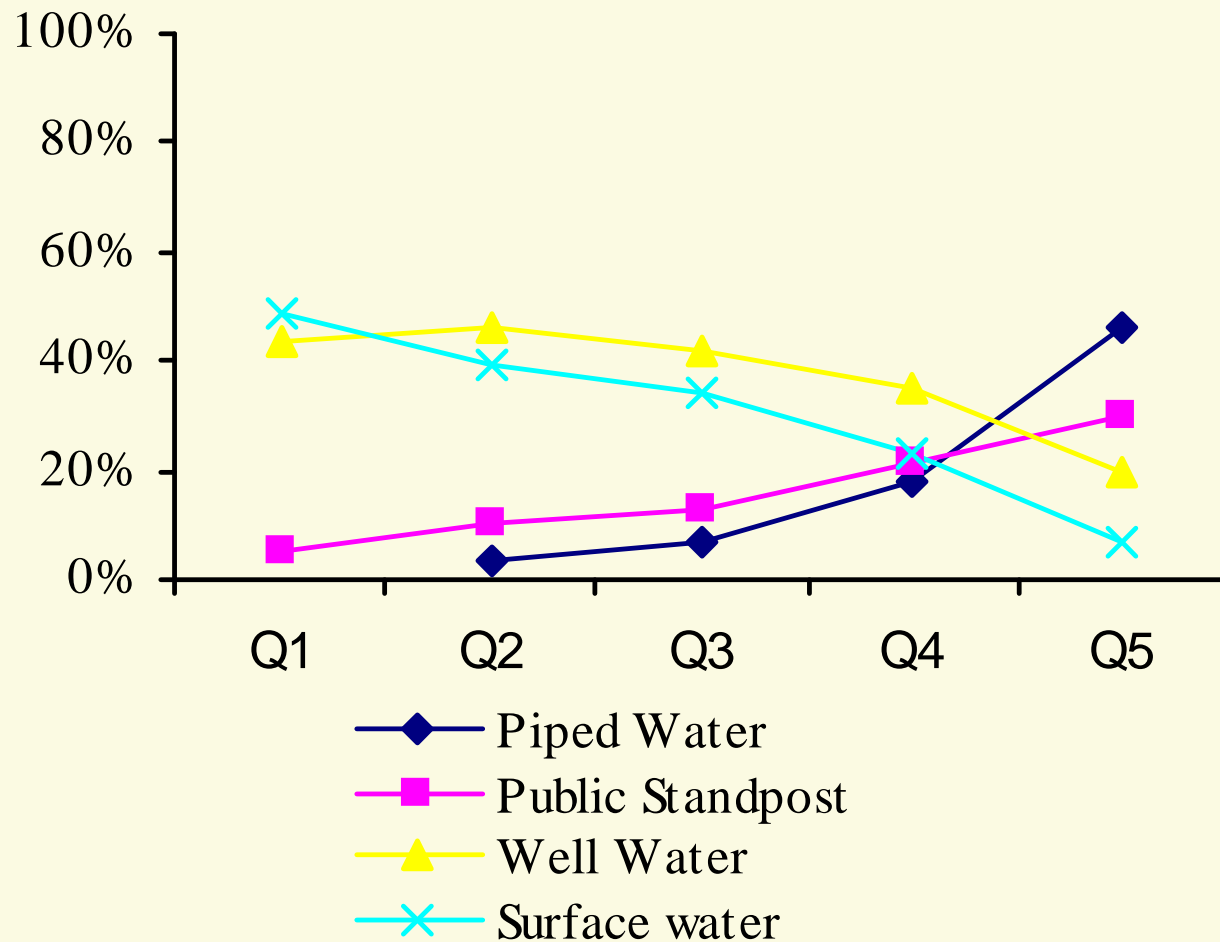
Rural Areas

But experiences differ dramatically from one country to another (e.g. urban)



Source: Preliminary results AICD 2008

Public standposts remain almost as much of a luxury as piped water



Source: Preliminary results AICD 2008

In rural areas, institutional reforms appear to be making the difference

📄 Many countries pursuing a rural water reform agenda comprising policy, fund, agency, cost recovery, mapping

📄 Countries with higher reform scores

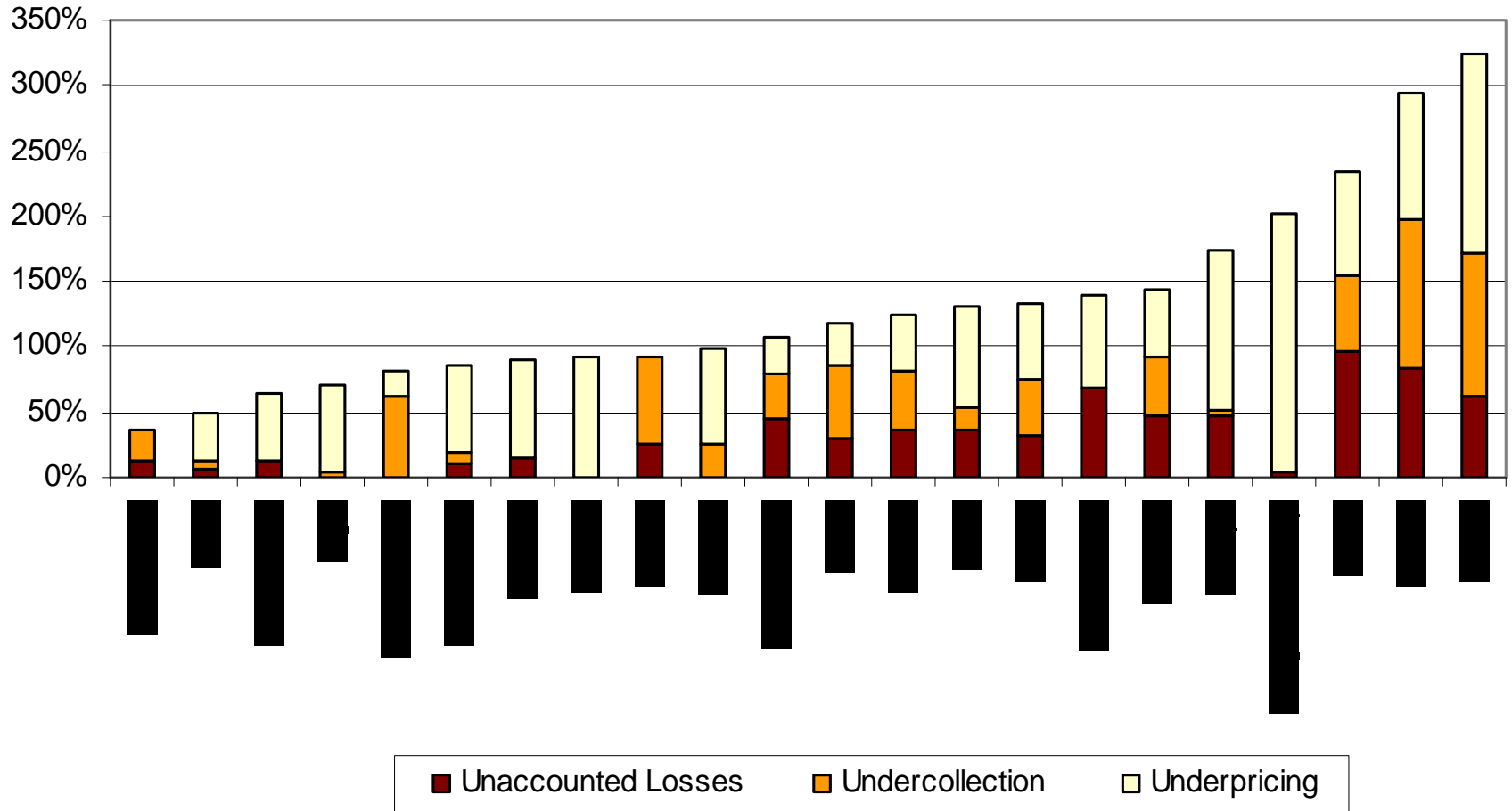
- Are expanding rural access more rapidly
- Have lower rates of system malfunction

In urban areas, water utilities lag well behind standard efficiency benchmarks

	Average Tariffs (US\$/m3)		Average Distribution Losses (% production)		Average Collection (% of bill)	
	Average Effective Tariff	Cost Recovery Benchmark	Actual NRW	Norm	Actual	Norm
Mean	0.67	1.06	35	20	69	100
Median	0.52	1.03	34	20	77	100

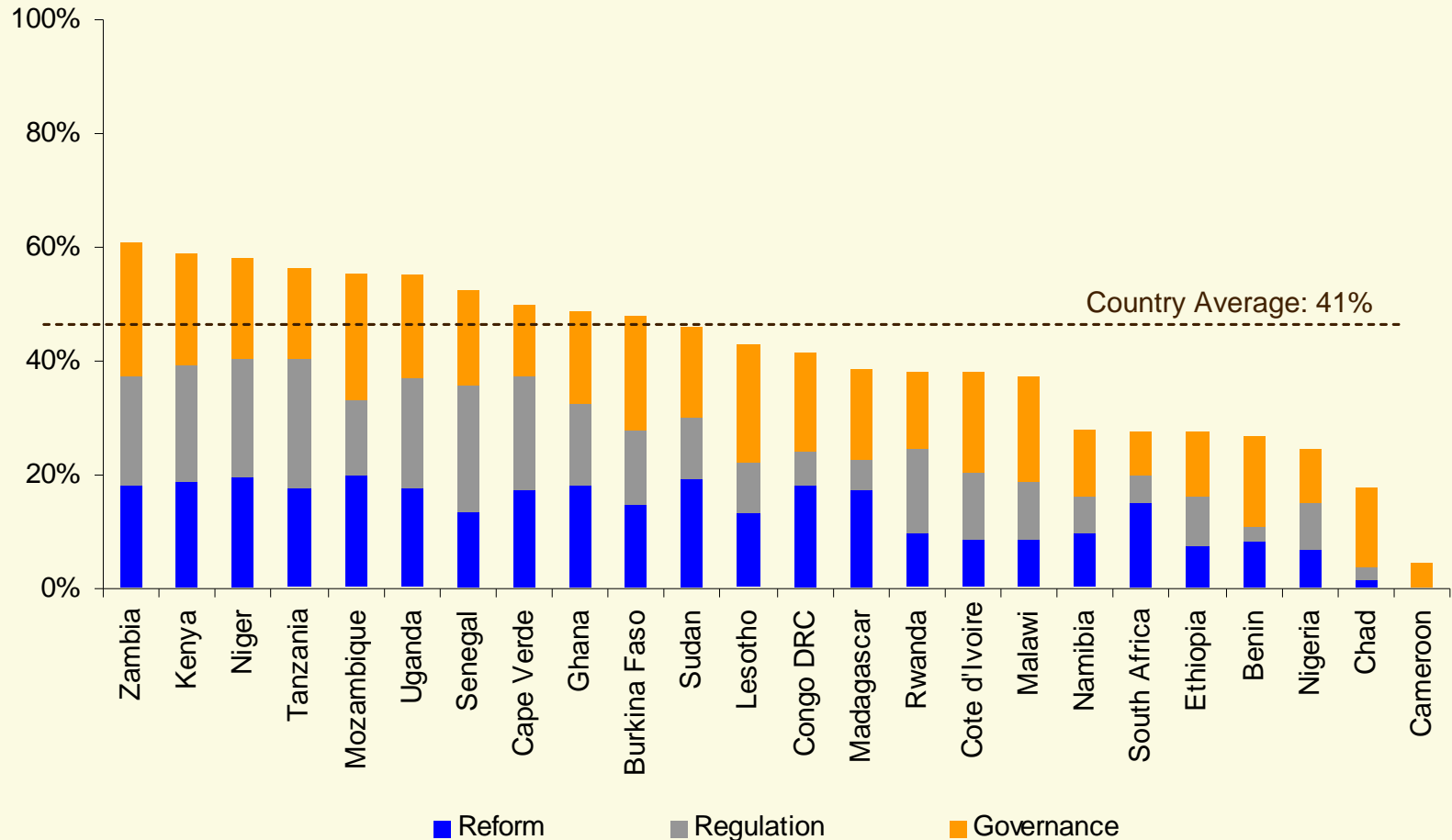
Source: Preliminary results AICD 2008

For water utilities overall losses can be up to 300% of revenues (or 1% GDP)



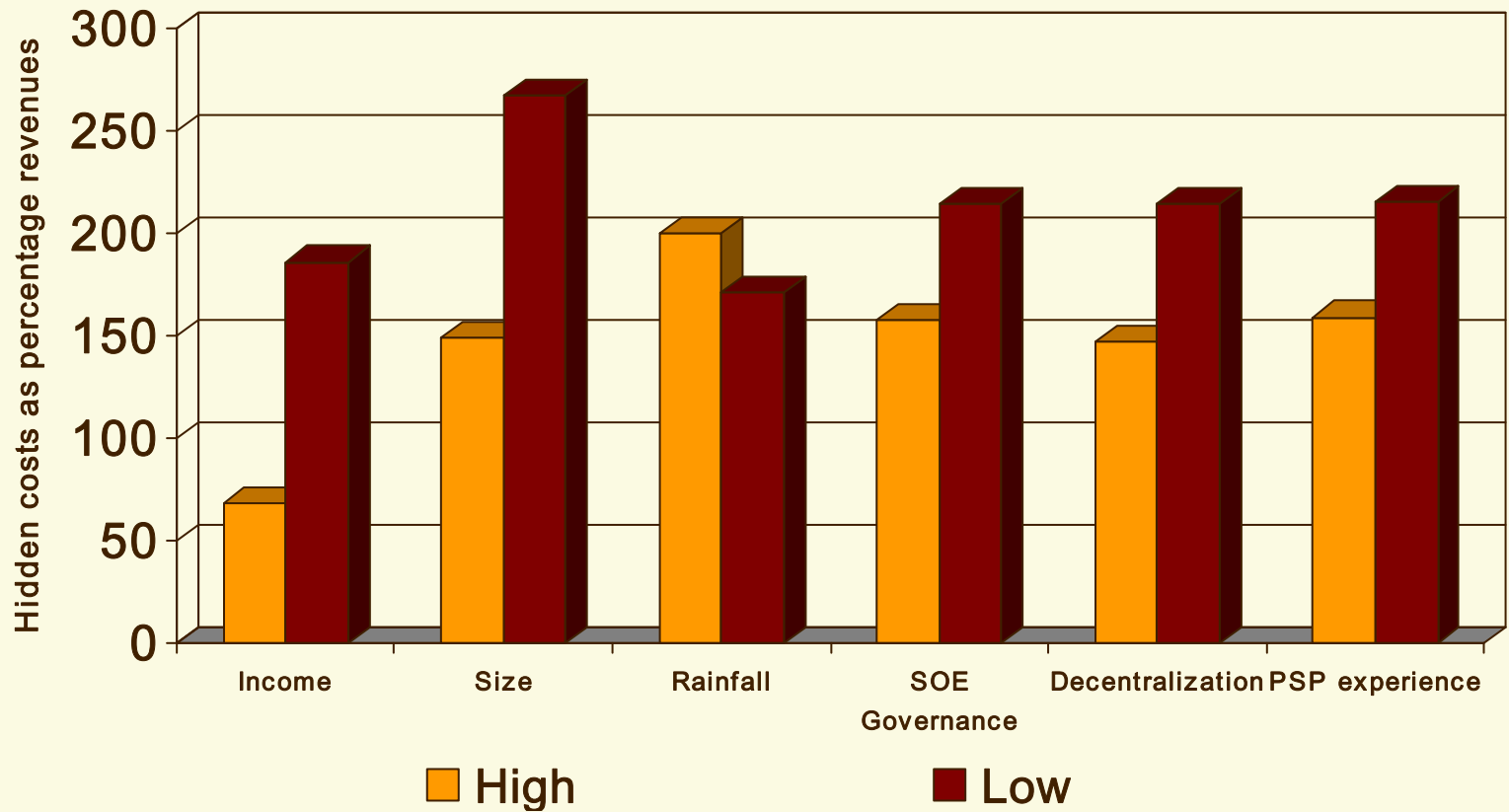
Source: AICD preliminary findings, 2008

Few countries are more than half way towards a modern institutional framework



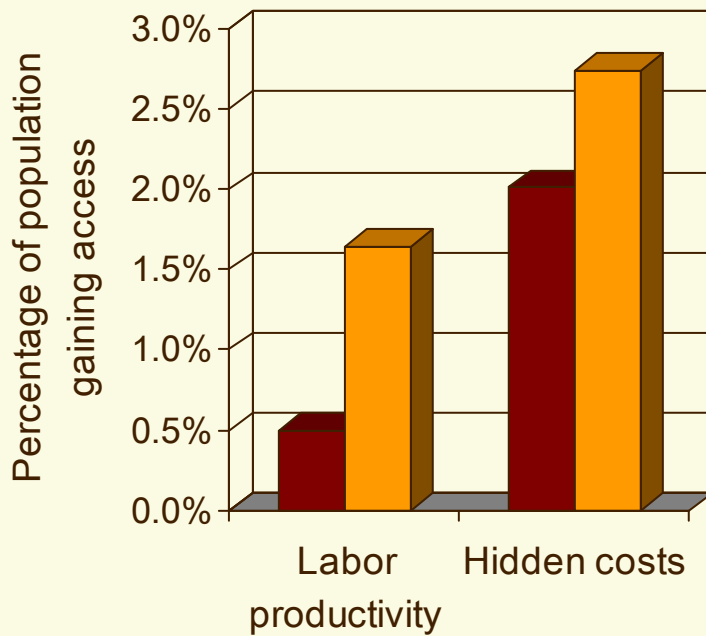
Source: Preliminary results AICD 2008

Good institutional frameworks pay-off in terms of lower levels of inefficiency

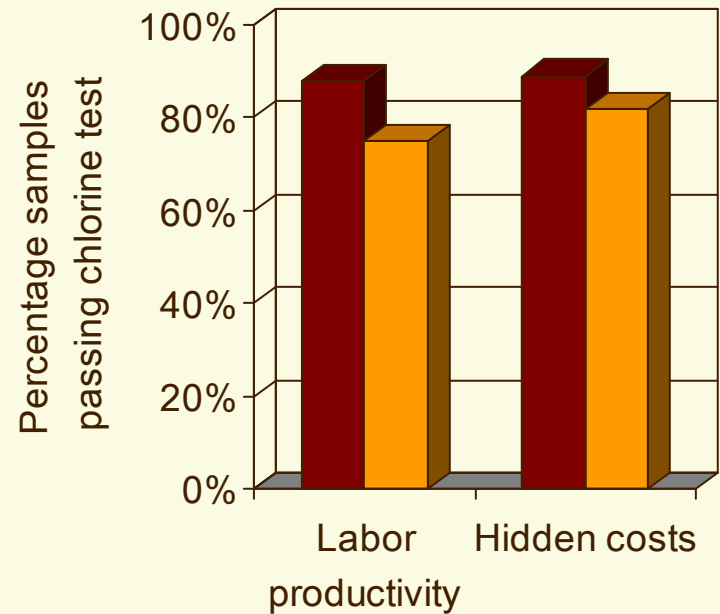


Source: Preliminary results AICD 2008

More efficient utilities expand faster and provide better service



■ Above average ■ Below average



■ Above average ■ Below average

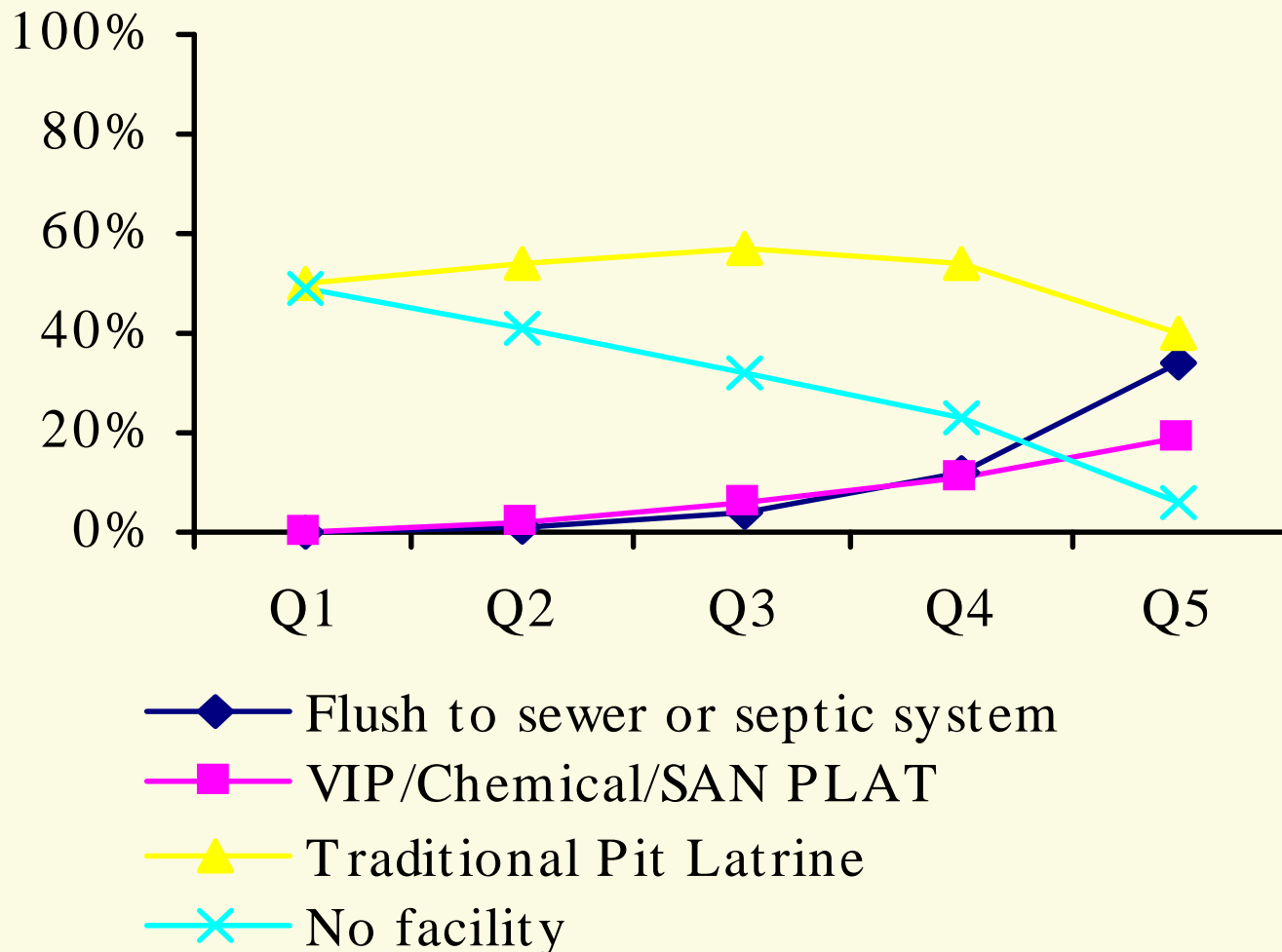
A spiral-bound notebook with a light brown, textured cover. The word "Sanitation" is written in a dark brown, sans-serif font in the center of the cover. The spiral binding is visible on the left side.

Sanitation

The sanitation story

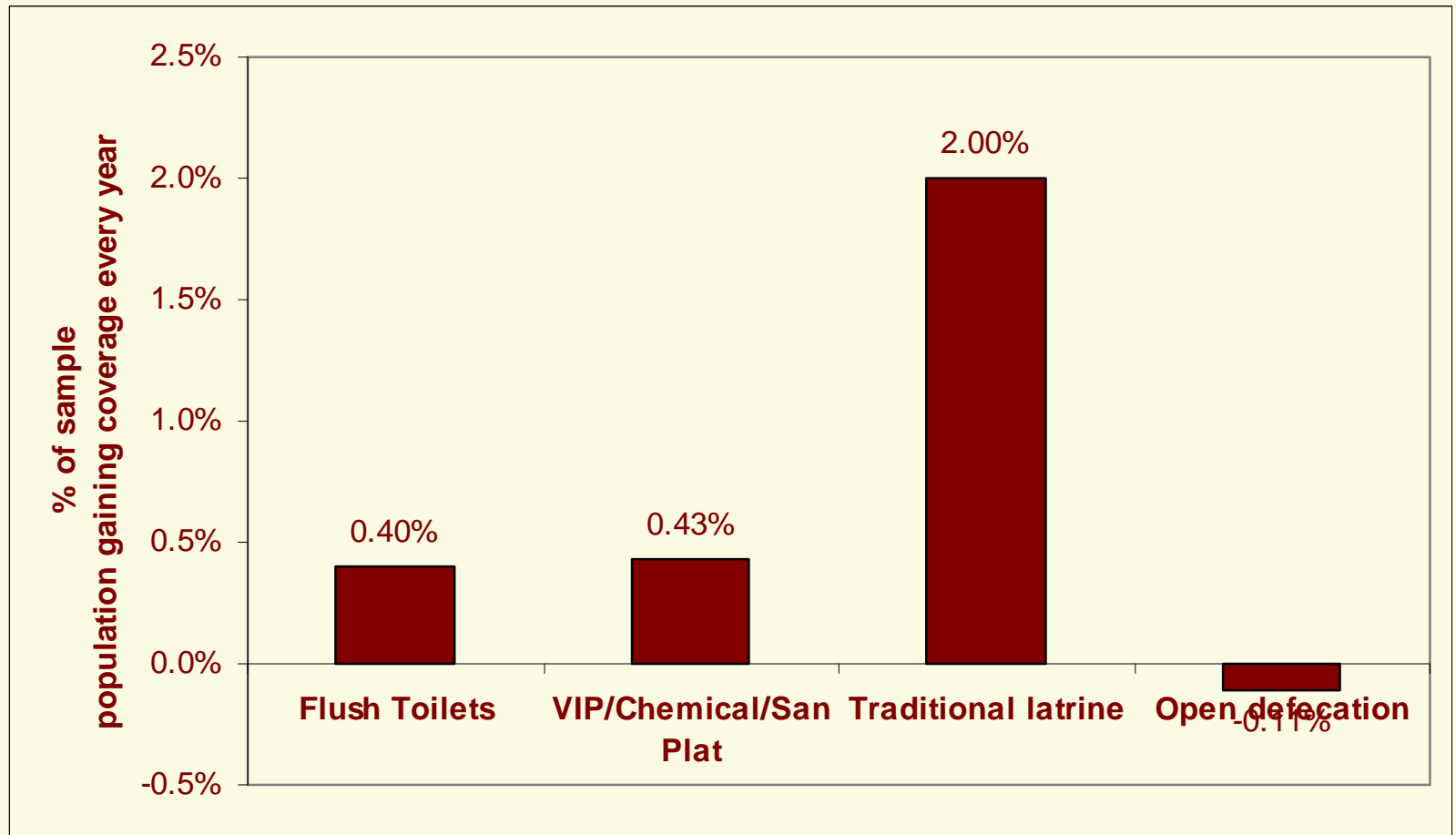
- 📄 Africa set to miss the sanitation MDG
 - 30% continue to defecate openly
 - 50% rely on traditional latrines of doubtful status
 - Improved latrines, septic tanks remain a luxury
- 📄 Sanitation profile differs markedly across countries with major policy implications
- 📄 Household investments in on-site sanitation are quite material relative to MDG needs

Improved latrines are as much of a luxury as flush toilets



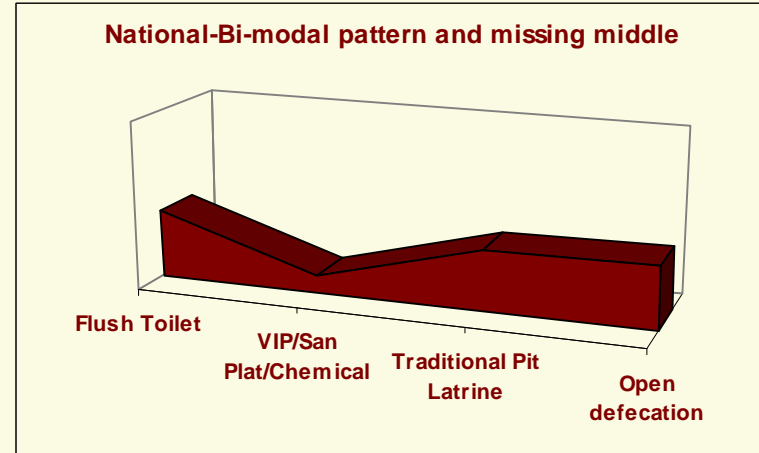
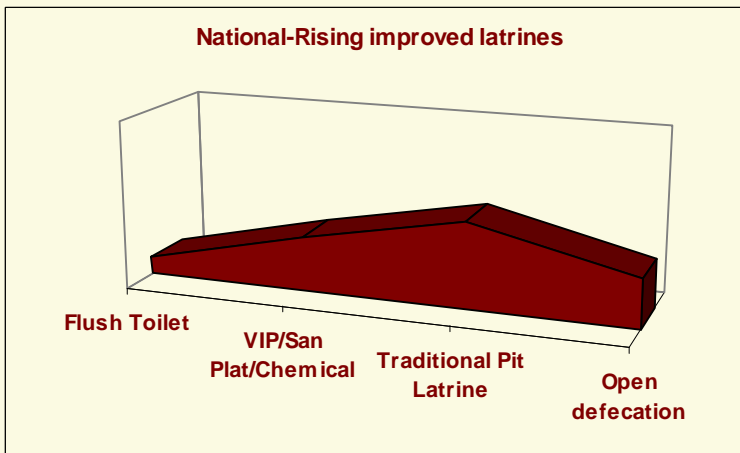
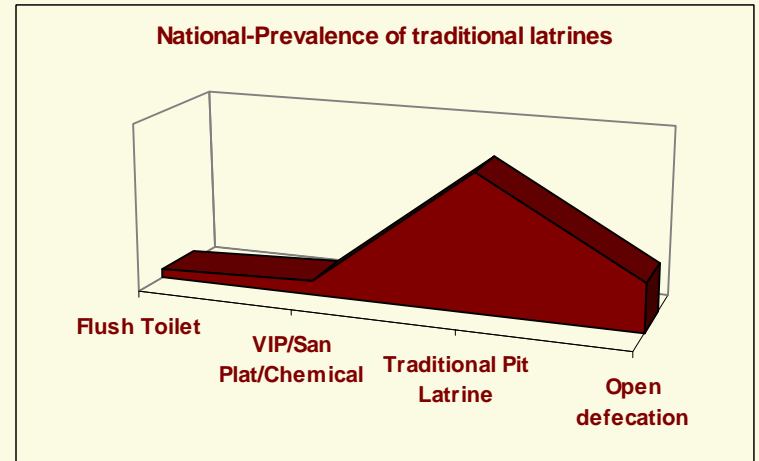
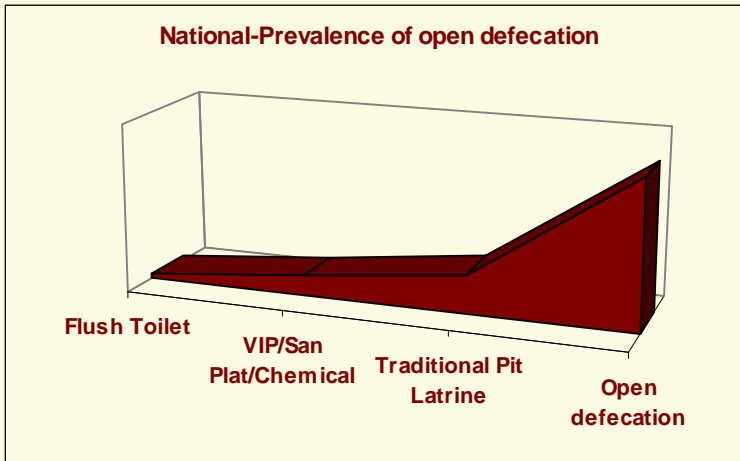
Source: Preliminary results AICD 2008

Traditional latrines are the most prevalent and fastest growing form of sanitation



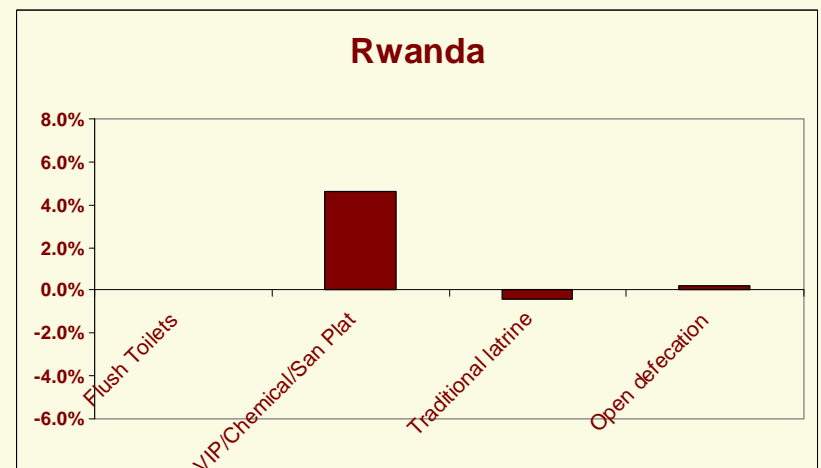
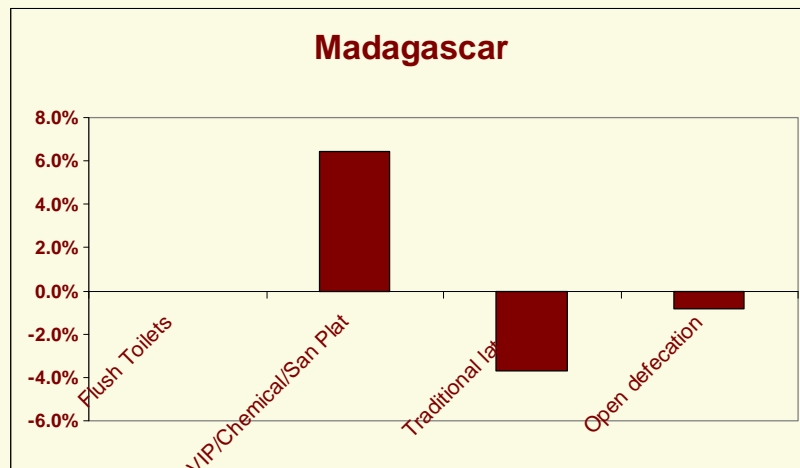
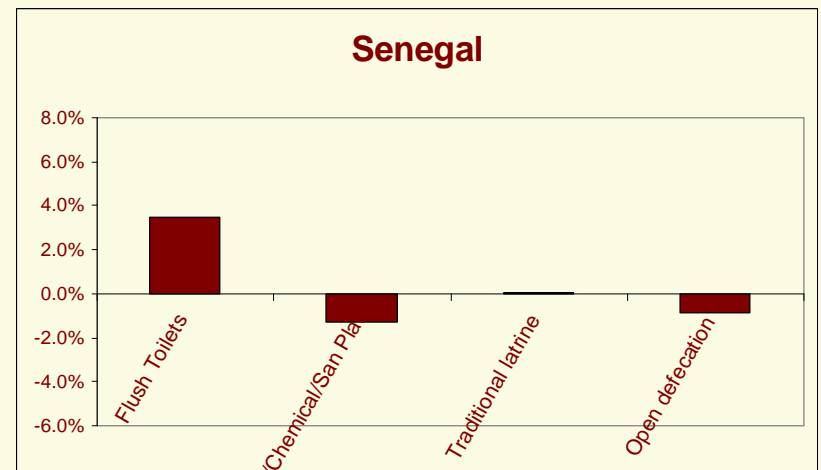
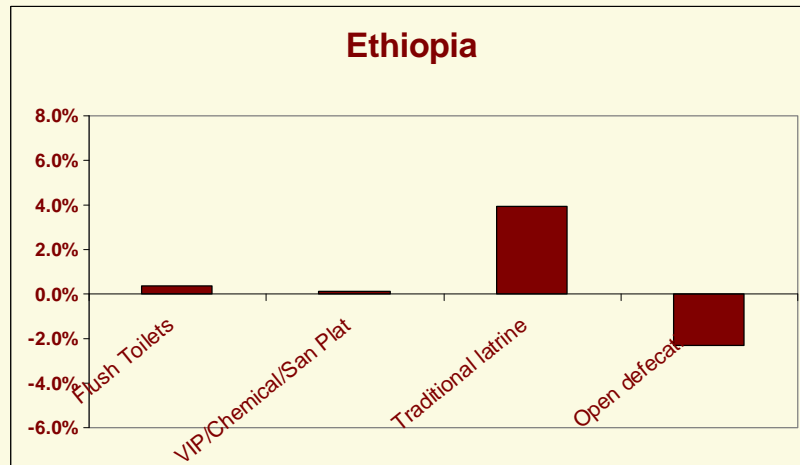
Source: Preliminary results AICD 2008

Sanitation challenge differs markedly across different African countries



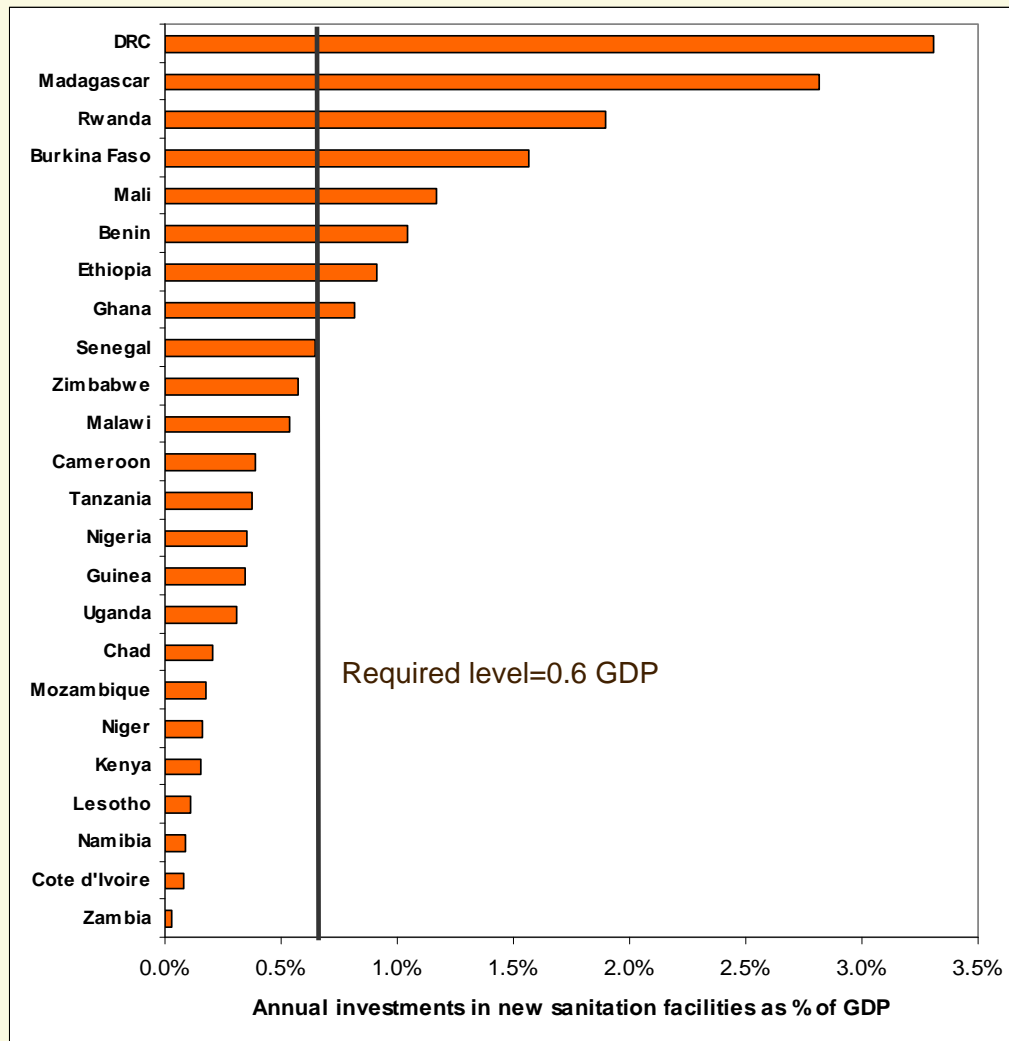
Source: Preliminary results AICD 2008

Different countries are working on different rungs of sanitation ladder



Source: Preliminary results AICD 2008

Estimated household spending levels on sanitation higher than expected



Africa Infrastructure Country Diagnostic (AICD)

thank you for your attention

For more information consult:

<http://www.infrastructureafrica.org>

Password: AICD