5 Steps to a municipal Energy efficiency plan

NERSA estimates that R50 billion was lost to the South African economy from the 2007/08 blackouts. There is the very real danger that this could happen again. With winter approaching and new electricity supply not yet online, there is an urgent need to take up the cheapest and fastest solution: **electricity efficiency.**

Families in Zanemvula are already enjoying the benefits of solar hot water

BY ZANIE CILLIERS (SEA)

South Africa is extremely electricity inefficient; ranking second only to Russia out of the world's 30 largest economies in using the highest amount of electricity to produce a unit of Gross Domestic Product. South Africa also currently ranks as the world's 12th highest emitter of carbon dioxide. This means substantial electricity efficiency opportunities exist. And substantial job opportunities can be created through efficeincy implementation, especially in the low- and semi-skilled sectors. A national target of 10% electricity efficiency by 2012 has been set by government, with municipalities recognised as key implementers.

For municipalities traditionally in the business of selling electricity, efficiency requires a whole new approach and set of 'services'. Increasingly municipalities are embracing efficiency as it offers the cheapest and quickest 'on line' solution to distribution and grid capacity constraints and security of supply. It also offers 'easy wins' in terms poverty alleviation and environmental commitments to low carbon development paths.

To really reap the efficiency benefits, municipalities need to move beyond ad hoc, or pilot, projects and towards strategic, mass roll out of interventions. In order to achieve this, an energy efficiency tool has been developed by Sustainable Energy Africa to assist municipalities in developing a strategic, 3-year electricity efficiency response plan. Using verified data and assumptions, predominantly from Eskom, the tool provides a simple analysis of electricity savings impacts, capital costs and payback times for the implementation of *established* efficiency interventions. Armed with this, municipalities can prioritise interventions and raise finance towards achieving a definite target. Using data currently available from large South African cities, the tool shows that they have the potential to save up to 20% of electricity consumed.

Key energy efficient technologies

Solar water heaters: 5% of the country's electricity consumption is used by the residential sector alone for water heating. Solar water heaters (SWHs), on average, result in a 66% savings on water heating. The payback time has decreased to 4-5 years, since Eskom's increased SWH subsidy. Nelson Mandela Bay Metro has already installed over 1000 in a low-income settlement called Zanemvula.

Ceilings: A ceiling keeps the indoor temperature cooler in summer and warmer in winter. In areas with cold winters, ceilings reduce heating costs by at least 50%. Most low-income households are currently without ceilings and use a large portion of their income for energy needs.

A family in Joe Slovo BNG show village admiring their new ceiling.

Low-flow showerheads: Low-flow showerheads save on two valuable resources: they reduce water use by 50% and in so doing reduce water heating requirements. The payback costs for a low-flow showerhead range between 1-3 months. eThekwini municipality is raising awareness about low-flow showerheads by installing them in public areas such as their beach front where people can try them out for themselves.

Efficient lighting: Installing efficient lighting is one of the most cost-effective methods of reducing energy consumption. Efficient lights, such as CFLs and LEDs, save 70-90% of electricity compared with inefficient lights. They also last much longer; reducing maintenance costs.

STEP 1

Gather electricity consumption data by sector (residential, commercial, etc). Tariff data from the electricity department is probably the best source of data for this, as tariffs are often split along sector lines, i.e. residential tariff, commercial tariff, etc. The data should preferably be from the most recent complete year available.

STEP 2

Establish an annual electricity consumption baseline by inserting the collected data into the consumption data breakdown table of the tool.

STEP 3

The tool will automatically **summarise the potential costs and savings impact of 100% penetration of the best known efficiency interventions** in each sector. The assumptions behind these impacts have been reviewed by energy efficiency experts and are available in separate worksheets.

STEP 4

Municipalities prioritise interventions and set penetration targets, based on the potential impacts highlighted in the previous step, e.g. 5% penetration of solar water heaters by year 1; another 10% by year 2, etc. *Note: costs given are for capital cost only, not implementation.*

STEP 5

Develop a business and implementation plan for each key intervention highlighted in the previous step. The tool provides insight into the costs and anticipated savings impacts. The business plan will need to identify a lead department for each intervention and where finance for implementation will be raised. In many instances the actual cost of implementation will be borne by the private sector and households, but the municipality has a key role to play to promote the efficiency activity amongst the relevant stakeholders.

NOTE: Municipalities should bear in mind that the EE savings calculated beforehand may be greater than the end result due to the rebound effect. This occurs when receivers of the EE technology either revert back to the old inefficient technology, or use the savings realised to invest in other energy-consuming pursuits.

CITY ENERGY SUPPORT UNIT
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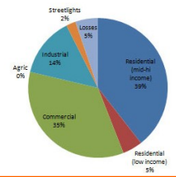
Municipal Electricity Consumption Breakdown (2007/2008)

*Only fill-in coloured cells

	MWh	%
Residential (mid-hi income)	6 388 588	39%
Residential (low income)	743 576	5%
Commercial	5 613 048	35%
Agric	109	0%
Industrial	2 244 213	14%
Streetlights	360 036	2%
Losses	847 870	5%
Total	**16 197 440**	**100%**



Summary of potential impact of EE interventions

	Technology	Behavioural	Total	Cost of Intervention per unit (retrofit)	kWh Saved over lifespan	c/kWh Saved
Residential (5% of total consumption)						
EE Lighting (mid-high inc)	3.6%	0.6%	4.1%	R 25.20	480	**5.25**
EE Lighting (low inc)	0.7%	0.9%	1.7%	R 25.20	480	**5.25**
Geyser thermostat adjusting (10 degrees)	0.0%	1.0%	1.0%	R 0.00	1848	**0.00**
Aerated Shower Heads	1.8%	0.0%	1.8%	R 230.00	5070	**4.54**
Geyser Blankets	1.9%	0.0%	1.9%	R 110.00	2560	**4.30**
SWH	10.7%	0.0%	10.7%	R 14 500.00	20000	**72.50**
Hot Boxes	0.1%	0.0%	0.1%	R 119.00	2044	**5.82**
Ceilings in RDP houses-gypsum	0.1%	0.0%	0.1%	R 1 600.00	23600	**6.78**
Ceilings in RDP houses-isoboard	0.2%	0.0%	0.2%	R 2 587.50	38000	**6.81**
Sub Total	**19.1%**	**2.5%**	**21.5%**			
Commercial (35% of total consumption)						
EE Lighting	1.6%	1.1%	2.7%	R 172.00	360	**47.78**
HVAC	4.2%	2.1%	6.2%	R 950.00	325	**292.10**
Sub Total	**5.8%**	**3.2%**	**8.9%**			
Industrial (14% of total consumption)						
Efficient Motors	0.5%		0.5%	R 14 700.00	90560	**16.23**
Variable Speed Drives	0.4%		0.4%			
EE Lighting	0.3%	0.1%	0.4%	R 890.00	1030	**86.41**
HVAC	0.0%	0.0%	0.1%	R 950.00	325	**292.10**
Sub Total	**1.3%**	**0.1%**	**1.4%**			
Streetlights (2% of total consumption)						
HPS Streetlights	0.8%		0.8%	R 1 150.00	300000	**0.38**
Sub Total	**0.8%**	**0.0%**	**0.8%**			
Total	**26.9%**	**5.7%**	**32.6%**			

Action Plan 2011/12

	Target 2009/10 (Percentage of total)	Cumulative Target (percentage of Total)	City electrical efficiency gained	MWh saved/annum	Number of Units Required	Cost of Units	Funding source
Residential (5% of total consumption)							
SWH	15%	40%	1.60%	259 313	129 656	R 1 880 017 705	
Aerated Shower Heads	10%	30%	0.16%	25 960	5 120	R 1 177 677	
Geyser Blankets	5%	20%	0.10%	15 716	42 973	R 4 727 056	
EE Lighting (mid-high inc)	20%	60%	0.82%	133 317	833 232	R 20 997 436	
EE Lighting (low inc)	20%	60%	0.33%	53 508	334 424	R 8 427 491	
Geyser thermostat adjusting (10 degrees)	20%	80%	0.19%	31 432	119 060	R 0	
Hot Boxes	5%	15%	0.01%	1 163	5 690	R 677 062	
Ceilings in RDP houses-gypsum	0%	0%	0.00%	0	0	R 0	
Ceilings in RDP houses-isoboard	20%	60%	0.03%	5 101	2 685	R 6 946 663	
Sub Total			**3.24%**	**525 509**		**R 1 922 971 089**	
Commercial (35% of total consumption)							
EE Lighting	20%	70%	0.32%	52 201	435 011	R 74 821 929.84	
HVAC	10%	25%	0.42%	67 357	1 035 520	R 983 743 748.34	
Sub Total			**0.74%**	**119 558**		**R 1 058 565 678**	
Industrial (14% of total consumption)							
Efficient Motors	10%	30%	0.05%	8 752	966	R 14 207 236.23	
Variable Speed Drives	15%	40%					
EE Lighting	20%	60%	0.06%	8 968	13 060	R 11 623 410.99	
HVAC	15%	35%	0.01%	1 111	17 078	R 16 224 497.54	
Sub Total			**0.12%**	**18 831**		**R 42 055 145**	
Streetlights (2% of total consumption)							
HPS Streetlights	30%	90%	0.23%	37 264	373	R 428 532.85	
Sub Total			**0.23%**	**37 264**		**R 428 533**	
Total (2011/12)			**4.3%**	**701 162**		**R 3 024 020 445**	
Cumulative Total (2009/12)			**12.7%**	**2 056 830**		**R 7 985 167 404**	

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For information on **implementing** energy efficient technologies in your municipality visit
http://www.cityenergy.org.za/implementation