

Energising South African Cities & Towns



A LOCAL GOVERNMENT GUIDE
TO SUSTAINABLE ENERGY PLANNING



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CITIES & ENERGY

Introduction

CITIES RUN ON energy – it forms the very lifeblood of a city’s functioning. The critical role that energy plays in economic development, social welfare, and environmental sustainability is being increasingly recognised, such that local governments all over the world are planning and implementing more sustainable approaches to their energy production and use.

By the year 2020, more than half of the developing world population is expected to live in cities. Cities consume 75% of the world’s resources and produce 75% of the world’s wastes, while occupying only 2% of the earth’s surface. In Africa currently only 34% of its people live in cities but those cities are responsible for 60% of its GDP. This means that cities, while they are great consumers, also have the power and the responsibility to initiate and manage a much more sustainable development path.

A major obstacle to achieving a more sustainable city system lies in the way energy is perceived: at present energy consumption, rather than the level of energy services, is seen as the indicator of development. By

taking energy consumption as the measure of development, energy planners are often concerned simply with increasing fuel and electricity supplies based on existing patterns of energy use, rather than with identifying and sustaining the level of energy services required to satisfy human needs.

Poverty and Energy

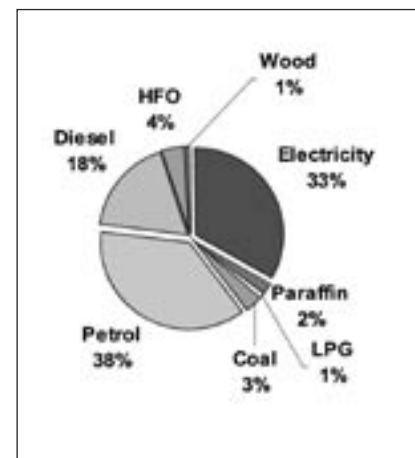
Energy is central to the satisfaction of basic nutrition and health needs. It is required for services such as cooking, lighting and heating, which constitute a sizeable share of total low-income household expenditure (between a quarter and a third) in developing countries. People in poverty expend significant time and effort (standing in queues, gathering wood) to obtain energy sources that tend to be polluting, hazardous and unhealthy. But simply increasing the number of people connected to the electricity grid will not address poverty issues related to energy as it is the level of energy services (such as water heating) that needs to be improved: water can be heated much more efficiently by the sun (by a solar water heater) than by an electric geyser or on a stove; indoor air temperatures can be managed much more effectively through installing a ceiling than by a coal stove or an electric heater, fans or air-conditioning.

Local authorities and energy

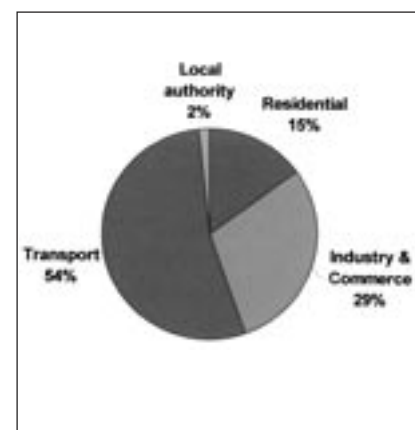
Local authorities are not only big energy users and significant distributors of electricity, but are also ideally placed to influence the energy use of others, as they are major employers

*‘Waste is not waste until it is wasted’ – ICLEI
(in reference to waste-to-energy project)*

Energy consumption by energy source City of Cape Town

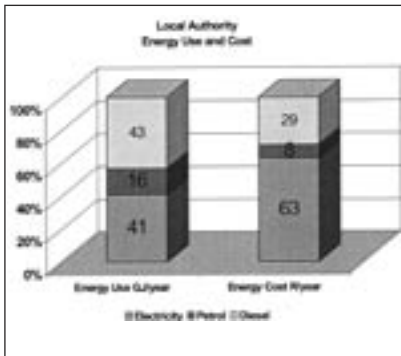


Energy consumption by sector City of Cape Town

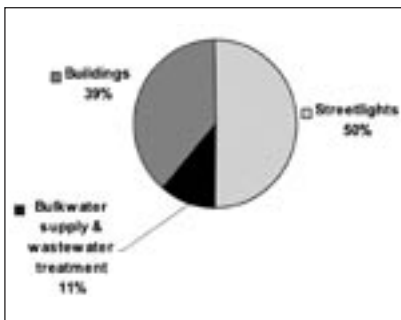


‘Policy can be formed largely as a result of the unstructured interaction, in an ad-hoc fashion, of the large, organised stakeholders – energy suppliers, large energy consumers and political constituencies... The resultant energy policy will reflect the dominant social, political and economic forces of the day. Social and developmental goals and policy on energy sector externalities such as the environment will probably not be well mediated by this process.’ – Botswana Energy Plan 2003

Example of local authority energy use and cost



Example of local authority electricity consumption by sector



and the primary planners and service providers in the city. Energy costs also draw precious budgetary resources from other important municipal functions such as education, public transport and health care.

Energy is a variable cost, which can be controlled by cutting down on wasteful energy consumption – greater energy efficiency means lower financial energy costs and improved competitiveness.

Local authorities that manage their energy consumption effectively are also less vulnerable when energy prices rise. Using less energy means reduced local pollutants and carbon emissions as well.

Whatever the size or type of the local authority and the city or town

'The average travel time for a trip in 1999 took 33% longer than it did for the same trip in 1994' – Joburg Economic Development Plan

it manages, everyone stands to gain from being more energy efficient. It delivers not only cost savings in the short-term, but is important for the longer term financial viability and competitiveness of local government, business and industry taking into account factors such as reputation, risk management, carbon management and environmental responsibility.

City management is complex, and cities worldwide are in crisis, financially and in terms of increasing inequity. An energy strategy is an excellent management tool that reaches beyond the boundaries of 'the energy sector' – it presents an opportunity for local government to take hold of its leadership role and to lead by example.

INTEGRATED ENERGY PLANNING

IEP targets optimal efficiency and service provision in the energy sector. This includes consideration of the broader concerns of the entire economy, not just a 'least financial cost' focus.

Key characteristics of IEP for cities:

- All energy sources and energy-related activities are considered as a whole system
- Demand-side focus – since this is the reason for the existence of the energy supply industry
- Demand-side management (DSM) is considered prior to supply-side solutions
- Supply-side options are evaluated in the light of the demands
- Environmental and social costs are clearly considered
- Energy sector linkages with the economy are included

Due to budget constraints, national government proposed removing 20 commuter rail sets from a city's lines – this would have put 17 000 people on to the road in 3 000 minibus taxis.

Through its Energy Strategy Process, Cape Town has already identified R12.8m of annual energy savings through implementing efficiency measures in its waste water management system, lighting in its buildings and fleet management – maximum payback period for these is five years.

WHAT IS SUSTAINABILITY?

THE UNITED Nations World Commission on Environment and Development defines sustainability as development that 'meets the needs of the present without compromising the ability of future generations to meet their needs'.

Today's urban systems draw resources from the environment, often compromising the earth's ability to regenerate those resources in the process. In many ways the world economic system encourages wasteful consumption, by paying scant regard to the worth of non-renewable resources, their scarcity, and by not taking into account future clean-up costs.

What can your local government do to build a sustainable city?

A sustainable city draws from the environment those resources that are necessary and that can be recycled perpetually or returned to the environment in a form nature can use to generate more resources. However, building a sustainable

city can be daunting, as it requires that decisions be based on an equitable accounting of all costs borne today and in the future – this may require quite far-reaching institutional change.

But it is important to start somewhere. Every more environmentally sustainable decision and action taken now will contribute to building a sustainable city in the longer term. Let it never be said that we didn't even try.

A sustainable energy plan

A sustainable energy plan integrates long-term energy planning into the local policymaking framework.

The impacts of our energy consumption practices cannot be reversed overnight, so sustainable energy planning must be an ongoing, dynamic activity.

Sustainable urban energy systems encompass more than energy efficiency and conservation. These systems are diverse, flexible, self-reliant and renewable, and such planning requires careful development,

THE SUSTAINABLE ENERGY PATH

- Reduce dependence on fossil fuels
- Introduce cleaner fuels
- Increase use of renewable energy
- Focus on energy efficiency
- Economic development based on efficient resource use
- Efficient public transport using cleaner energy sources

nurturing, implementation and review. It involves strong support from the community and partners at all levels. Sustainability involves recognising that the natural environmental systems on which we depend must be allowed not only to survive, but to thrive.

SUSTAINABLE CITIES...

- Use energy effectively in achieving other local goals, such as affordable housing, efficient transportation systems, economic development and job creation.
- Protect and maintain quality of life by reducing environmental problems associated with the use of hazardous and unhealthy sources of energy and the inefficient use of energy.
- Contribute to energy security by reducing vulnerability to predicted oil shortages and price increases.
- Ensure that its citizens have appropriate access to energy services and energy information to reduce poverty.
- Develop programmes and policies to ensure that energy resources and their impacts inform all development decisions.

KEY ELEMENTS OF A SUSTAINABLE SYSTEM

- **Consistent.** The short-term actions are compatible with long-term goals and the viability of the system.
- **Renewable.** The system depends on renewable resources and operates using environmentally benign technologies.
- **Diverse.** The more diverse and appropriate your system, the more able it is to adapt to change.
- **Inclusive.** All elements of the system, including people, are valued and used for the good of both the individual parts and the whole.
- **Interdependent.** Each element of the system is both dependent on and depended on by several other elements; the greater the interconnection, the stronger the system.

PLANNING

for a sustainable future

ALTHOUGH NATIONAL initiatives are essential for developing many of the strategies, technologies and regulations needed for sustainability, local planning efforts are the building blocks of a sustainable

'Although it was national governments that signed the Climate Change Convention, the real global leadership for reducing carbon emissions and energy conservation is coming from municipal leaders' – UNEP

energy future. This section explains why, gives examples of what cities can do to promote a sustainable future, and outlines the process for developing a sustainable city energy plan. Cities must be the primary planners for a sustainable future.

Local activities and systems determine many of the most important aspects of sustainability, including land use, transport systems, waste disposal, water services, electrification, building codes, schools, housing and public buildings.

As these are part of our daily lives, it is easier to organise community and city action than national action. There is also more flexibility and uniqueness at the local level, and this allows for flexible and creative solutions.

Strategic planning

Strategic planning processes at the city level are a good way of identifying, ranking and implementing energy and environmental policies and programmes that promote urban sustainability.

Strategic planning is a systematic way to identify and accomplish priority actions.

Unlike simple goal setting, strategic planning focuses on implementation and the allocation of limited resources to critical issues.

Set measurable goals

It is important in this pioneering process to set measurable goals.

An important challenge will be to empower city employees and citizens to develop the means to accomplish goals.

To do so, you must create a vision for a sustainable energy future. Think about what you want to achieve. Put words to your broad vision and describe the end results in some detail – include such things as lower energy bills, less air pollution, reduced solid waste, better public transport, less traffic congestion, more people cycling to work every day, more local jobs, and so on.

Tangible targets

Make your vision tangible by setting targets you hope to meet by a specific date.

These energy targets can include access to energy targets, energy efficiency targets, and air quality targets, for example.

Setting such targets will focus community effort and provide a benchmark for evaluating success.

The planning process

This planning guide uses a 10-step process as a framework.

The next sections, from pages 6–21, will guide you through these systematic planning steps. The case studies provide extra guidance.



PHOTOGRAPH OF JOHANNESBURG. © WALTER KNIRR

THE 10-STEP PROCESS

1. Designate a lead office & find a champion
2. Establish partnerships
3. Find the hooks: review the vision, goals & policies of your city and country
4. Conduct an energy audit of your city
5. Analyse your information & develop a draft plan
6. Build support – your participation process
7. Finalise the plan
8. Implement your plan & finance projects
9. Review & evaluate your plan
10. Publicise the benefits

This is not a linear process, of course. Many of these activities take place all along the way. The flow diagram on page 22 suggests a dynamic view of the process.

UNDERSTANDING THE NEEDS OF THE USERS

The importance of a demand-led approach

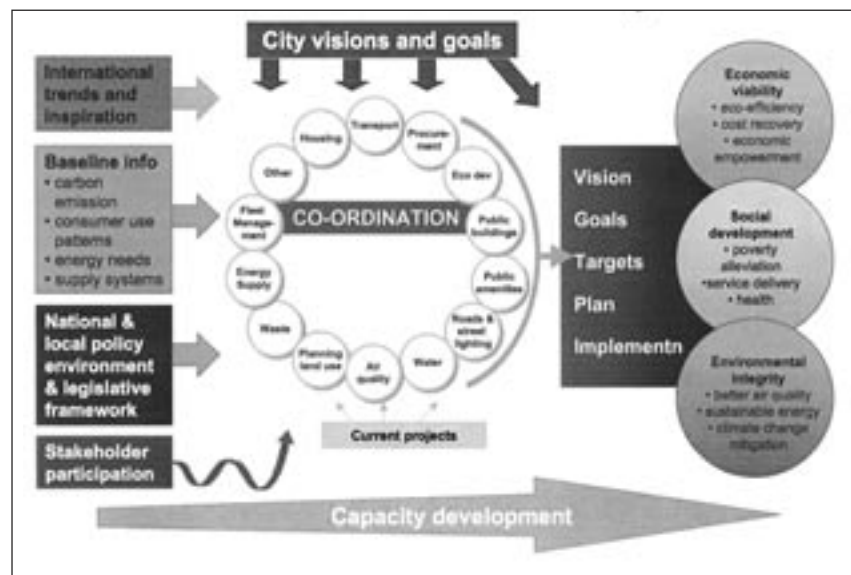
In South Africa, energy sector assessment or planning has in the past been driven by supply-side industries.

Supply-side information is also often relatively easy to collect (from the supply companies/utilities), whereas demand-side information gathering usually takes considerably more effort.

However, there are many economic and social benefits that can arise from first considering and understanding the demand-side picture. In fact, planning for a sustainable future cannot happen without it. This avoids various deficiencies that arise from a predominantly supply-side approach:

- Disproportionate focus on the needs of the supply industry. While this industry clearly has legitimate needs, this focus can lead to inadequate consideration of the needs of the customers or consumers (ie, the demand-side), who are in fact the reason for the existence of the supply industry. Safety and health concerns, for example, are better identified by a demand-side focus.

Local Authority Energy Strategy



Economically efficient fuel switching alternatives are also best identified by first looking at the demand-side.

- Potential for (and history of) misjudging future demand – Eskom’s historical electricity generation surplus is an example of this.
- Limited perception of suppressed demand. An example is households that could afford a particular energy service, such as a

solar water heater, if proper financing was available. A supply-side focus would tend to miss such opportunities.

- Reduced attention to efficiency and demand-side management options, including behaviour change – both of these require an understanding of the demand-side.

This means that you need a good demand-side database in order to develop energy strategies and evaluate their implementation.

DESIGNATING A 'LEAD' OFFICE & NURTURING A CHAMPION

EVERY CITY department must get involved in planning the city's sustainable future. This guarantees that all staff support the concept and understand what it means for the way in which they work.

An in-house advisory group or steering committee can also help build commitment, but there must be leadership and direction coming from one primary office. Champions (people with commitment, charisma

and power) play a vital role in capturing people's imagination and getting buy in. Try to find both political and official champions. You will also find that champions emerge along the way – grab them!

Be strategic about selecting your lead office: it could be the office of the mayor, IDP/strategic planning or environment, for example. There are opportunities for co-operating: one

department could lead the development of the energy plan, while another department – or several – could lead the implementation.

In addition to an overall champion, you might need a champion for each sector (residential, transport, electricity, commercial and local authority). Together they can form a City Energy Partnership. A sector can be led by a suitable external organisation as well.

ESTABLISHING PARTNERSHIPS

PARTNERSHIPS bring expertise, resources, support and information. As energy is cross-cutting, it needs a partnership approach, so at the outset you need to develop these with organisations and even other cities and networks (see also Step 6, Building Support).

When thinking about partnerships, ask yourself what NGOs, community groups, businesses, utilities and other associations can support your planning? Which groups can help build your in-house capacity and provide additional expertise?

Are there parastatal, national, provincial or local technical resources that can assist you in your planning and implementation efforts? Possibilities include NGOs, energy efficiency programmes and climate change programmes (local and international).

LOCAL ACTIONS THAT SUPPORT SUSTAINABILITY

- *Become role model energy consumers in the operation of municipal facilities, vehicle fleets and mass transport.*
- *Regulate and plan for efficient energy use through local land use that affects the patterns of residential, commercial and industrial development.*
- *Work with local utilities to set targets for renewable energy and energy efficiency systems.*
- *Promote carpooling, cycling, the use of public transport and walking through land-use planning, parking management, improved bicycle and pedestrian access and public transport provision.*
- *Institute local government fleet km per litre standards to promote fuel efficiency.*
- *Plan and implement a public and staff education programme, publicising the benefits of individual lifestyle and business changes.*

QUESTIONS TO ANSWER BEFORE YOU GET STARTED

1. *What city department should lead your planning activities?*
2. *Should you pass a city council resolution to kick off planning activities? Or wait until you have tangible goals and objectives to discuss?*
3. *What city departments might be the most active participants in the process?*
4. *Who will you approach to be your planning and implementation partners?*

FINDING THE HOOKS

Reviewing city vision, goals & policies

AN IMPORTANT PART of your sustainable energy plan is to link it to city goals and issues. This makes the energy strategy relevant and ensures buy-in. Most of the city's goals and issues will have an energy component, even though it might be hidden, as energy is key to the delivery of all basic services and is thus pivotal to all the services that a local authority provides. There is always a 'hook' on which the sustainable energy strategy can hang – it's simply a matter of finding it and making the connection clear.

MAKING CONNECTIONS

Your city may have adopted formal energy or environmental goals, which may be in your city's strategic plan, development plan or city vision. This strategic plan usually outlines goals concerning land use, transportation, housing, energy and the environment, all of which have specific energy links. If you are lucky, your city might have a strategic environmental policy within which sustainable energy easily falls.

Even if your city has no stated environmental or energy objectives, you can often link the proposed energy goals with poverty, economic and health concerns.

For example, your city probably has poverty alleviation and adequate housing high on its agenda, and lower energy expenses can contribute toward this goal. Economic development is a main objective for all cities, and creating an enabling environment for green electricity production and local

independent power producers can contribute to that goal. Improving access while reducing traffic congestion and air pollution are usually top priorities, and strategies for reducing individual car use (and petrol and diesel use) while improving public transport can help meet these energy-related objectives.

Look out for these types of connections. Every energy-efficiency strategy can help meet at least one or two other goals for your city and its residents.

Your city might also have other programmes that could support the development of a sustainable energy strategy. Look at international programmes emerging from the WSSD and its predecessors, such as the Agenda/Action 21 programme and the Healthy Cities and Cities for Climate Protection campaigns.

Poverty alleviation or sustainable development programmes that are run in partnership with national or provincial government, community or environmental organisations, local and national universities or utilities would all provide a hook for the sustainable energy strategy.

FINANCIAL SUSTAINABILITY

Your local authority probably also has the internal goal of becoming more financially sustainable and saving energy in municipal activities will contribute to that.

Your municipality might already have a programme that monitors energy use in government facilities or fleet management programmes. Use these to build your sustainable energy strategy.

BE STRATEGIC

It is usually better to dovetail projects, processes and goals that feed your energy plan. Do be strategic, though, and select programmes that are strong and well-placed.

IDENTIFYING ISSUES

You will be able to start identifying energy issues as you collect data and engage in public participation.

Filter these energy 'issues' through local, national and international imperatives so that you can prioritise and develop energy goals that meet local needs.

Focus-group workshops are a good way of identifying important issues and links between energy efficiency and other primary local issues. Such workshops will also give your plan increased visibility and build support for the future. Ask participants to identify and rank the energy links associated with major city issues. They can help draft energy policy statements and specific recommendations for each statement.

CHECKLIST WHEN IDENTIFYING GOALS AND ISSUES

- *Become familiar with your city's strategic objectives or vision.*
- *Analyse the energy component of the city's goals.*
- *Identify relevant role players to involve in identifying issues and developing the sustainable energy plan and goals.*
- *Develop a list of demand-side and supply-side energy related issues in your city and filter it through your city's strategic vision.*

ENERGY IMPERATIVES

Local, national and international

INTERNATIONAL TRENDS

Millennium Development Goals

World leaders agreed on the Millennium Development Goals (MDG) in September 2000. The MDG are a set of eight time-bound and measurable goals and targets for combating poverty, hunger, disease, illiteracy, environmental degradation and discrimination against women. First on the list is poverty eradication, and the seventh goal aims to ensure environmental sustainability. Energy has a specific link to both of these.

Among the indicators for targets are GDP per unit of energy use (as a proxy for energy efficiency) and carbon dioxide emission per capita (Plus two figures of global atmospheric pollution: ozone depletion and the accumulation of global warming gases)

World Summit on Sustainable Development

The WSSD in 2002 set five key commitments for energy.

- Diversifying energy supply and substantially increasing the global share of renewable sources in order to increase renewables' contribution to total energy supply.
- Improving access to reliable, affordable, economically viable, socially acceptable and environmentally sound energy services and resources.
- Removing energy market distortions including the restructuring of taxes and phasing out of harmful

subsidies and supporting efforts to improve the functioning, transparency and information about energy markets with respect to both supply and demand, with the aim of achieving greater stability and ensuring consumer access to energy services.

- Establishing domestic programmes for energy efficiency with the support of the international community.
- Accelerating development and dissemination of energy efficiency and energy conservation technologies, including the promotion of research and development.

Many countries felt that the WSSD outcomes were too weak and thus set up the Johannesburg Renewable Energy Coalition (J-REC). In Bonn in June 2004, willing countries will set targets and programmes for renewable energy contribution to their energy mix.

Kyoto Protocol

In December 1997, more than 160 nations met in Kyoto, Japan, to negotiate binding limitations on

greenhouse gases for the developed nations, in response to the objectives of the Framework Convention on Climate Change of 1992. The outcome of the meeting was the Kyoto Protocol, in which the developed nations agreed to limit their greenhouse gas emissions, relative to the levels emitted in 1990. South Africa signed the convention in June 1993 and ratified it in August 1997.

An important dimension to climate change is its link with development. Patterns of energy consumption, land use and demographic growth are all key drivers of both development and climate change. Tackling climate change must be compatible with advancing the aspirations of the world's poor.

NATIONAL TRENDS

Energy is a national issue, and the links between energy and social welfare, economic development and environmental integrity are apparent at a policy level.

National legislation

The Energy White Paper's goals include using an integrated resource planning approach to energy; economic development; access to electricity; management of the health and environmental impacts of energy generation; and being vigilant of paraffin poisoning and transport health impacts. Cabinet is now considering the Energy Bill.

The White Paper on the Promotion of Renewable Energy & Clean Energy Development focuses on the Independent Power Producer (IPP) framework, renewable energy targets,

REGIONAL ENERGY DISTRIBUTORS: WAY FORWARD

Implementation of REDs is estimated for 2005. An EDI holdings company has been set up, and although various reports on proposed structures and responsibilities for REDs have been completed, there is no detail on the rights and responsibilities of local authorities in their areas of jurisdiction. Local authorities will be on the RED boards, however.

financing and legislative framework, and promotes local manufacture of renewable technologies.

The Electricity Distribution Industry (EDI) Restructuring Bill is before cabinet and seeks to transform the current fragmented EDI structure into a series of Regional Electricity Distributors (REDs). The NIRP (National Integrated Resource Plan) is prepared by the National Electricity Regulator (NER), based on Eskom's Integrated Electricity Plan.

Energy also featured as a priority at the 51st national conference of the ANC in December 2002. At the conference they resolved:

- that the process of rationalising electricity distribution should continue, ensuring viable and affordable electricity supply for all regions and the progressive achievement of universal and affordable access, on the foundation of a minimum free basic electricity service to all households.
- that all proposals for restructuring energy generation and distribution should be analysed objectively to assess likely impact on employment, the cost of investment in new capacity, electricity for households and formal business, and the environment,
- to support the introduction of cleaner technologies for burning coal as well as alternative energy sources,
- that research into renewable energy technologies must be conducted, and it must include potential for local ownership and community participation,



Above: Devastating shack fires are regular occurrences in coastal cities where people rely on paraffin for cooking and where wind velocities are high.

- to take concrete steps to combat pollution arising out of coal value chain activities by setting clean targets in the context of sustainable development without increasing cost to the poor,
- to support the principle that decisions on nuclear energy must be based on a comprehensive and transparent environment impact assessment,
- to ensure safety measures in energy generation, manufacture and usage, especially of paraffin.

LOCAL POLICY IMPERATIVES

From international to local imperatives it is quite clear that poverty and sustainability are priority issues for any South African city, and that every city has a lot to gain from a sustainable energy development path.

Each city has strategic goals or a vision. Energy will usually play a pivotal role in ensuring that those goals are met. It is important that a city's energy objectives reflect and fulfil a city's strategic objectives.

CITY OF TSHWANE'S 8-POINT VISION

1. economic growth and development
2. democratic, responsible and equitable governance, providing efficient and effective delivery
3. integrated and compact city
4. poverty alleviation by making essential services and facilities accessible
5. safe and secure environment
6. strengthening of status as South Africa's capital city
7. building of Tshwane's international status
8. care for cultural and natural resources

CONDUCTING A CITY ENERGY AUDIT

A VITAL STEP in developing your sustainable energy plan is to collect energy information about your city. This process is referred to as an energy scan, an energy audit or developing a State of Energy Report for your city. Use your review of your city and the country's vision, goals and policies to help decide what information you should prioritise. Remember that this is the beginning of a process, so while your information may be far from perfect now, engaging in this process will ensure that the quality of the data improves year by year.

Summarise your information into an overview of demand and supply: total energy use and emissions by sector and by energy source.

Collecting energy information will serve several functions:

- It helps you identify the energy-use areas that are most important in your city.
- It tells you the size and shape of the resource-related problems facing the city.
- It identifies non-sustainable trends resulting from current market forces, social conditions, government procedures, regulations and programmes.
- It begins the process of discovering the hidden, yet important, details about the form and function of your local government
- It identifies organisational mechanisms and partners that can help implement various strategies.
- It provides the base data for evaluating and tracking your city's progress.

THE ENERGY AUDIT

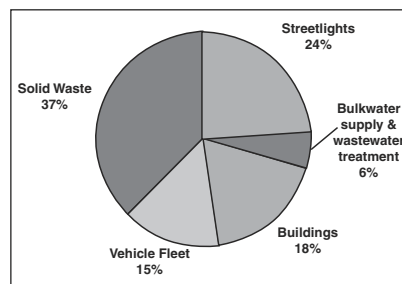
Apart from basic data on your city's climate, geography, population, economy, housing, businesses, industry, etc, your focus will be on energy demand and energy supply information in your city.

ENERGY DEMAND INFORMATION

Residential

Energy-use profile for different groups and areas; electricity connections; energy use, prices, expenditure; access to energy sources; health and safety information; quality of housing (relating to energy efficiency); end-use patterns: percentages of total energy (wood, electricity, natural gas, paraffin) used for specific end-use (lighting, space/water heating, cooking, cooling); end-use percentages by dwelling type.

Total eCO₂ emissions by sector City of Cape Town



NO TIME FOR A LENGTHY ENERGY AUDIT?

At a minimum, you need to know the kinds and quantities of energy used in your city, how much these energy resources cost, and a breakdown of the big energy users and resources used.

Industry and commerce

Output; employment and energy use by sector; relative energy intensity; emissions.

Transport

Modal split, trip length and time, cost and subsidies, energy use and emissions by mode.

Local authority

Energy use, cost and emissions by energy source and sector (see pie chart).

Energy demand projections

Current growth rates in energy consumption from all sectors; estimates of use at future target date.

CO₂ equivalent

Calculate the CO₂ equivalent for relevant sectors, subsectors and overall.

ENERGY SUPPLY INFORMATION

All supply to the city

Coal, liquid fuels and gas, electricity.

Energy sources

Electricity production (fossil fuels, hydro, nuclear, other), level of dependence on oil, coal, renewable energy sources, natural gas, etc.

Solid waste

Tons of waste generated/recycled, city recycling goals.

Sewage

Millions of litres per day.

CURRENT ENERGY PROJECTS

Identify all current projects across all sectors.

QUESTIONS TO ASK WHILE GATHERING DATA

1. Find out why the agency or group collects the information. This may uncover opportunities for future co-operation. For example, if they are planning a survey soon, will they include questions that could help your work?
2. Ask how the information is collected as clues to data's reliability. Who collects the information? Do they use direct measurements or rely on reports or forms sent in by others? Do they drive around and count? Do they take a sample and make a projection? How accurate do they think the numbers are? How did they determine the accuracy? Compare different sources where possible.
3. Ask the group or agency if there have been changes in the methodology and if any are planned – changes in the methodology can skew your results and make it difficult to establish trends. Are you talking to someone who is actually involved or is this a second-hand interpretation?
4. How far back has the agency been tracking the information? This is important to your ability to establish a common base year for all your data.
5. Ask who, if anyone, analyses the information. Do city staff members analyse the data? Do they see any trends? If they calculate any projections ask if they use simple extrapolation or a more complex algorithm.
6. Don't be afraid to ask stupid questions. Ask lots of questions about the meaning of the numbers, the units and any assumptions behind them. Jumping to conclusions can be dangerous to your results.
8. Get a copy of any published or draft reports. Keep a separate library of environmental audit and data support materials.

FINDING THE INFORMATION

The questions below will help you determine where you can get the information you want.

- Who pays for, or taxes, the resource? Following the money is always a good place to start.
- Who manages or plans the resource? Think about the agency or company that records, permits, inspects, controls, builds, repairs or delivers the resource.
- Who else is interested in this information? There may be other groups that have collected some of the data you need. Good places to start include related city departments, environmental groups, universities, and the local chamber of commerce.
- Use figures from an area larger than your city to estimate the numbers you want. Be explicit about the assumptions in your estimates.

HOW MUCH DETAIL DO YOU NEED?

It pays to err on the side of having too much information. As you gather the data, consider its accuracy. Find out how the data was generated. Examine the assumptions and methodology. Do they make sense?

On a single topic, such as housing or population, you may gather data from two different sources. Do the results agree, or are there discrepancies?

A deeper understanding of how the data was generated can tell you a lot about its accuracy.



GATHER FACTS THAT ENHANCE COMMUNITY UNDERSTANDING

Simple facts make the project real to city leaders and the community. How much do average households spend for home energy or on transport? How much air pollution is caused by local energy use? What health problems are caused by local energy use? Gather some of this information and show the facts and figures in graphic form, such as a pie chart or graph.

PROBLEMS YOU MAY ENCOUNTER ... BUT CAN OVERCOME IN TIME!

- No data or inaccessible data
- Energy supply info is good but demand (user) info is poor
- No centralised collection of data on energy
- Data not collected in the units you need
- Data by region, not by city
- Good data on one sector for one year, but for no other sectors for that year
- Very basic information on facilities may be lacking
- Different departments don't communicate with each other

ANALYSING YOUR DATA & DEVELOPING A DRAFT PLAN

An example of Energy Issue ranking

Energy Issue category	Ranking
Energy and poverty alleviation Access to energy by poor Affordability of energy	HIGH
Health Safety Pollution	HIGH
General environmental sustainability	HIGH
Renewable energy	MEDIUM
Energy efficiency	MEDIUM
Cheap energy & economic competitiveness Job creation	MEDIUM
Transport system effectiveness & efficiency	NORMAL
Nuclear	NORMAL

This process is then used to rank the City’s issues, for example:
Energy Demand ranking

Section 3: Demand Overview		Ranking
Issue 3.1:	Energy related data for CCT necessary for planning and strategy development is lacking. This is particularly the case for demand-side data, although supply-side data is also lacking.	MEDIUM
Issue 3.2:	There is no department within CCT currently responsible for energy-related data collection, nor a designated location for storing and accessing such data. This is related to the fact that energy is a crosscutting issue, and does not fit neatly into the portfolio of any one department.	MEDIUM

Section 4: Households		Ranking
Issue 4.1:	The cost of meeting a household’s energy needs is a significant burden on poor households and a major contributor to poverty.	HIGH
Issue 4.2:	Access to convenient, appropriate, affordable, clean and safe energy sources is limited for many poorer households. It must be recognised that even electrified households use a range of energy sources for a variety of reasons. This multiple fuel use should be supported and promoted as appropriate. Gas is particularly inaccessible to poor households. The cost of retooling is often a barrier to converting to other energy sources. A ‘best energy mix’ approach should inform energy supply and management for all households in Cape Town.	HIGH
Issue 4.3:	Energy is a significant contributor to poor health (poor nutrition and respiratory health) in poor households. This is due to poor indoor air quality or lack of adequate access to energy to cook food or keep warm.	HIGH

YOU HAVE BEEN GATHERING a lot of information and developing relationships with many people. Now it’s time to start putting the two together.

Firstly, you need to identify the critical energy issues under each sector. Secondly, you need to rank these issues according to your city’s particular priorities.

For example, the prioritisation of Cape Town’s energy issues was based on the ranking system illustrated at left. The different sectoral issues were then ranked as in the example centre and below left.

Thirdly, on the basis of this list, you need to develop your draft plan of what needs to be done to promote a sustainable energy future within your city context. To do this, list the possible measures or options and identify those that will yield the greatest benefit. These are the options you will ultimately include in the plan, as well as details of projects being undertaken in your city; these can provide a springboard for the implementation phase. Make your motto ‘Be ambitious but realistic!’

The matrix

You might find it useful to develop a matrix to compare options using the following factors:

- compatibility with city goals,
- the costs of programme implementation,
- funding availability,
- social benefits,
- potential for energy efficiency,
- potential for programme replication,

ENERGY VISIONS, GOALS, TARGETS & MEASURES

ENERGY VISION 2: A leading African city in meeting its energy needs in a sustainable way, and thus fulfilling its constitutional obligations and global responsibilities in this regard.

GOAL	Focus area	Target	Measures
Increasing renewable and clean energy contribution to the energy supply mix, and reducing dependence on unsustainable sources of energy (starting with the most financially viable options – the ‘low hanging fruit’)	Residential	10% of households to have solar water heaters by 2010	<p>SHORT-TERM (2 YEARS)</p> <p>Promote the use of solar water heaters via provision of information on costs, savings and environmental benefits.</p> <p>Compile standards and codes for the installation and performance of solar water heaters.</p> <p>LONG-TERM</p> <p>Establish solar water heater financing scheme.</p> <p>All City-owned housing to have solar water heaters installed.</p>

ENERGY VISION 4: A city with an efficient and equitable transport system, based on public transport and compact planning, to enable all residents to enjoy the benefits of urban life.

GOAL	Focus area	Target	Measures
An energy efficient public transport system – (1) encouraging efficient public transport use and (2) discouraging inefficient private vehicle use.	Transport	<p>Rail, bus and taxi transport share of total transport modal split increased by 10% by 2010.</p> <p>Numbers of private vehicles commuting into city centre decreased 10% by 2010.</p>	<p>SHORT-TERM (2 YEARS)</p> <p>Establish local government – provincial government metropolitan Transport Authority to ensure co-ordinated planning and efficient allocation of funds.</p> <p>Ensure that rail transport receives priority attention to ensure a high standard of service.</p> <p>Steadily improve facilities at public/private interchanges.</p> <p>LONG-TERM</p> <p>Rapid bus transport corridors to be identified and implemented.</p> <p>Dedicated bus and taxi lanes – identify and implement on all major commuter routes.</p>

- the availability of data,
- environmental benefits,
- economic development benefits including savings and job creation,
- support of city’s growth paths (eg tourism, manufacturing),
- contribution to sustainability.

To confirm whether your options contribute to sustainability, review these key elements of a sustainable system: consistent, renewable, diverse, inclusive and inter-dependent (see page 3).

There are several analytical and quantitative tools to assist with analysis. These can help clarify the options available to urban policy makers who are planning for a sustainable future. Tools include cost-benefit analysis, strategic environmental assessments, scenario planning, economic impact

tools, end-use potential analysis and integrated resource planning.

Your draft plan

Your draft plan will grow from this analysis, and can be in the form of scenario planning using ‘business as usual’, as well as high-road scenarios, such as ‘20% renewables by year 2020’ – and a middle-road scenario if it suits your purposes.

Your high-road scenario can be based on targets such as:

2020 energy vision

- 20% private car use reduction
- no days exceeding WHO air quality standards
- 20% real reduction in CO₂ emissions
- 20% renewables

- all housing to have ceilings and efficient lights
- mandatory green building standards for all new buildings over a certain value
- poverty tariffs – all households have access to basic electricity

Energy straw dog

Your draft plan could also take the form of a ‘straw dog’ – a plan presented as a basis for discussion and input, set out as per the example above.

- Energy vision statements – based on the city’s vision
- Energy goals – linked to each vision statement
- Targets – linked to each goal
- Measures – what can be done to achieve these goals
- Projects – existing and potential.

BUILDING PUBLIC & INTERNAL SUPPORT – your participation process

DEVELOPING AND implementing a sustainable energy plan is pioneering. You will need to educate the public, city staff and political leaders on the plan's value. You will need help getting tasks done. You will need financial resources. And you will need allies. Accomplishing all this requires internal support and wide-range public support, and building that support is one of the most critical aspects of your planning effort. Remember your participation process starts the first time you start interacting with city staff or the public around the sustainable energy plan.

Participation is the key to an effective plan. This may be challenging as most people, businesses and municipal departments view energy policy as secondary to their everyday activities.



Minister of Minerals & Energy, Phumzile Mlambo-Ngcuka, at the launch of National Energy Efficiency Week 2003.

Therefore, it is critical that local energy programmes be linked to their goals. Energy programmes should share common concerns and help support achieving broader city and community goals. For example, air quality, housing affordability and traffic congestion concern nearly everyone. Solutions to each of these issues can be found in energy efficiency.

IDENTIFYING STAKEHOLDERS

There are internal and external people you will need to interact with in order to develop a good energy plan for your city. Make a list of all stakeholders from whom you will need to source information and get buy-in. When talking to city staff or external organisations remember that organisations don't make decisions – people do. Develop relationships with them. Remember that you can learn from them.

LOCAL GOVERNMENT STAFF

Make a list of local government departments and agencies that you think should care about sustainability. If this is difficult, try tracing energy or other resources through the city and local government. Every department touched by this should be on your list.

ASSESSING LOCAL GOVERNMENT AND PUBLIC SUPPORT

After talking to each department, list your strongest allies and what projects you may be able to do

together. Deciding how to proceed and maintain your momentum may require a different strategy with each ally. Your approach also will depend on the politics and structure of your local government.

You also need to assess the conflicts or barriers you have with departments that are or may be non-supportive. Your aim might be to save electricity while the electricity department might feel that it is their objective to sell more electricity. City staff involved in transport might feel that they do not have the necessary power to create change. Other staff might just feel overworked. Barriers generally fall into four categories, and each is discussed below:

Information

Local government staff may lack information or have the wrong information. Send them the right information or use the mediums they will read.

Institutional

Government processes often create disincentives to change. These institutional barriers are the most difficult. To overcome them requires a firm commitment from top decision makers. Talk to your strongest supporters about how to obtain this commitment.

Personal

The risks inherent in change may be personally threatening to city staff. This may not have been explicitly stated, but the tone of the responses may give clues to the hidden reasons.

Examples of co-operative projects

Department	Their goals	Your goals	Joint project
Traffic management	Reduce congestion	Save energy	Promote off-peak work hours
Fleet management	Reduce expenditure	Save energy	Promote vehicle efficient procurement
Housing	Affordable housing	Save energy	Put in ceilings in low-income housing
Housing	Affordable housing	Save energy	Promote solar water heaters
Traffic lights	Reduce maintenance costs	Save energy	Promote the use of Light Emitting Diodes
City general services	Reduce operating costs	Save energy	City facility energy-saving programme
Air quality department	Reduce air pollution emissions	Save energy	Promote carpools, public transport, alternative fuels
Street lighting	Reduce costs of lighting	Save energy	Promote longer lasting energy-efficient lighting replacements

Financial

City departments may not have the budget to perform the work. Look for areas where your projects could help meet their needs.

INTERACTING WITH STAKEHOLDERS

Set up task teams and/or advisory boards and/or partnership teams

A task team is an effective way to get people with specific technical expertise involved in the planning process. Examples of task teams that relate to energy include housing and household, business and industry, government, transportation and energy supplies (renewable resources).

Assess whether an internal or a multi-stakeholder (consisting of external organisations as well) team is best for your context. Advisory boards consisting of community and business organisations are one option and a City Energy Partnership made up of key organisations from across the city, is another.

Do informal networking

An informal network lets you know what's really going on in the environmental and business sectors of your city. It is an excellent way to access the expertise, influence and support of local community groups. Likewise, it puts you in a position as a resource for these organisations.

Often you can act as a facilitator for bringing together diverse interest groups that have common goals.

Meet with key leaders

Often the best way to build support is to sit down one-on-one and listen to the concerns and goals of other groups and organisations.

Meet with key leaders of businesses, utilities and interest groups to tie their specific needs to the energy and environmental issues in your community.

Show these key leaders how promoting sustainability and energy efficiency can help them achieve their goals. Don't try to convert them. Listen to their needs and organisational objectives, then tie them in with yours.

Conduct public or focus group meetings on the draft plan

There are also likely to be city departments, city task teams, university departments, provincial government, business groups, energy specialists and community groups with responsibility or interest in energy and environmental matters. Link up with these groups. They will be supporters and will have projects, reports and information to help your effort.

Another way to assess key issues in your city is to conduct focus group workshops with government, community and business leaders. Include policy makers and programme managers from city departments such as housing and community development,

planning, public works, transportation, buildings and electricity. Also invite the leaders of outside organisations and business groups such as the transport authorities, utilities, economic development bodies, relevant community-based organisations and chambers of commerce.

Go to people and groups at their regularly scheduled meetings and outline your proposal. Provide general information on energy issues as it might be new to them and address their comments.

When you have a completed draft energy plan, hold at least one public meeting with good media coverage to provide an overall wrap up of the consensus-building process.

Public participation meetings will provide you with:

- early opportunities to discover allies and work together on difficult issues,
- public ownership of the process,
- a willingness to support subsequent implementation,
- improved community esteem through awareness, education and empowerment.

Without a public participation process during the planning process, you may encounter:

- unanticipated opposition at the public hearing or adoption stage,

Market the benefits of energy efficiency such as cleaner air, lower costs, and less traffic that are relevant to your audience.

- little or no support for the adopted plan and implementation,
- failure to identify issues community members consider important.

Use public relations and media events

Use the media to publicise focus group workshops, public meetings and the overall planning process.

Consider developing a regular newsletter that tracks your progress developing goals, objectives, and implementation strategies. The newsletter also should feature the people who are involved in the sustainable city plan. Newsletters keep people informed and help build broad community support.

Occasional press events are also essential. Feature energy related projects that are already under way and that bring together some of the proposed goals of your sustainable energy plan. Low-income energy-efficiency programmes, mass transit programmes or recycling efforts provide tangible success stories.

Staying visible

Other ways to stay visible include:

- connecting your planning process to other important city events,
- explaining sustainability in the simplest words possible, such as

In 1979 Portland, Oregon was the first major US city to adopt an energy conservation policy. Then years later, changes in local energy and environmental conditions caused local leaders to examine links between energy use and housing, transportation, solid waste, air and water quality and business development.

Hundreds of citizens and every city department were involved in developing a 1990 energy policy with a broader goal of achieving a sustainable energy future.

‘meeting today’s needs without compromising the future’.

If your community isn’t ready for the word ‘sustainability,’ use other words that link together energy and environmental issues and economic development.

It is usually a good idea to develop a draft sustainable energy plan with proposed energy goals to start the discussions. Public participation processes can be expensive, so try to link the development of the plan with the Integrated Development Plan or other community processes run by the municipality.

Identify and use champions

Successful programmes typically have one thing in common: they are endorsed by key leaders in the community. These leaders become champions for the energy plan.

You need to identify and use appropriate champions.

Suggested champions include city council members, community leaders, environmental leaders and business owners.

Useful education and public awareness tools

You will need some tools to help explain and convince others of the need for and benefits of your sustainable energy goals.

Some effective methods are presentations using slides or overhead transparencies, a collection of articles on sustainability or how other cities are benefiting from similar efforts, educational exhibits to take to meetings or put in building entrances and other public places.

Before reaching for a camera, though, think about your audience, what message you want to send, and the best way to send it.

To make your message more powerful, use simple language and good graphics that tell a story or illustrate a point.

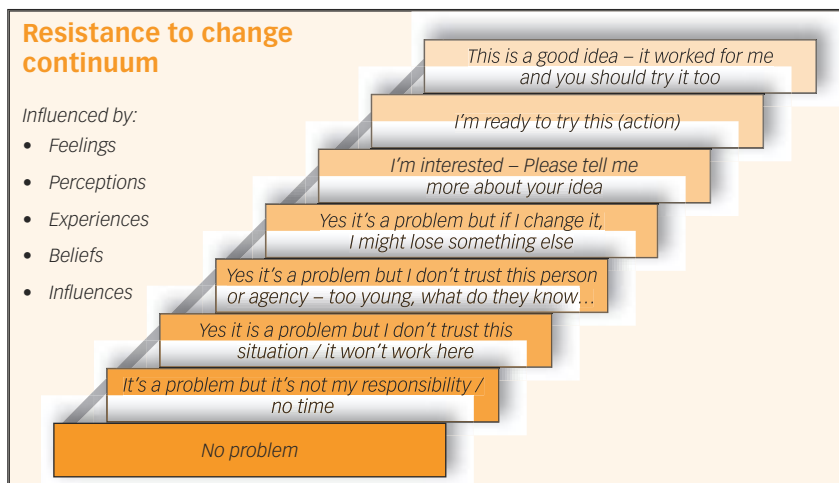
Resistance to change

As you identify supporters of your energy plan, it is equally important to identify those city departments and others who will not be supportive, as non-supporters can hinder your progress.

Usually you’ll find that non-supporters are people who are resistant to change. Some of them will simply need the right sort of information that make the energy links relevant to them, although others need more work and you will need to work up the resistance-to-change continuum.

When you do come across non-supporters, work closely with them to understand the nature of the conflict or barrier between your efforts and their goals.

Common ground usually can be found for at least some areas of your planning effort.



FINALISING THE PLAN

FROM YOUR participation process, you will now have a lot of input on your draft plan or your different scenarios. You will have a list of possible and current projects and programmes to be considered, and you will also have analysed their advantages and disadvantages.

Now your city must decide on a set of reasonable objectives that can be implemented.

Your next step will be to identify priority projects that fit in under these objectives.

IDENTIFYING PRIORITY PROJECTS

There are several approaches you can take to select priority projects, and the approach that works best will depend on the nature of your city. Remember that it is very important to value what is being done already – show that you are already on the road.

Each programme option has both benefits and costs that are a mix of economic, social, political, environmental and implementation impacts. The process of deciding which impacts to rank or how to assign more weight to one factor over another is a political one.

Decision-makers often balance costs with political acceptability to find the path of least resistance. This can lead to development which is unsustainable. Rather consider the following criteria:

Analyse direct and indirect economic benefits

Evaluate the cost of programme options in energy Rand savings, business generated, jobs created and tax revenue generated. Also consider indirect economic benefits, such as avoided health costs, avoided fires and destruction of dwellings and material corrosion from pollutants; reduced impacts from rising energy costs; and less risk of energy supply interruptions; job gains and support for local industry development; devolution of economic power.

Evaluate energy sustainability

Using the key elements of sustainability, evaluate programme options for their contribution to a sustainable energy system. You might want to pursue some options even though they are expensive and do not have significant short-term economic benefits, particularly if they are critical to making other projects happen. You may be able to access climate change financing for projects which have high upfront capital costs and/or longer payback periods.

Prioritise projects

When identifying priority projects, describe and quantify the related impacts and benefits to a reasonable level of detail. It is possible to use a lot of your limited resources determining those impacts. To conserve resources, quickly sort and quantify

the easy options. Assess the relative impacts of the difficult ones by ranking or scoring programme options on a simple scale, such as 1–5. Base the score on your own or a group's opinion, supported with data from the energy scan (see pages 4–5, Planning for a Sustainable Future).

Sorting options

Sorting options and identifying priority projects may seem to be a formidable task, but the analysis you just completed should help you considerably. And you also will have help from others. Many of the answers will become apparent as you develop your support in and out of local government. If your support-building efforts have been successful, the solutions and political willingness will be there.

It is important to stay in close contact with your supporters. Together, you will be developing and changing implementation strategies along the way.

ADOPTING THE FINAL PLAN

As soon as you have a high level of agreement (which you should have after all your support-building efforts), take your sustainable energy plan to your city council for formal adoption.

Inform the media and provide an opportunity for formal recognition of individuals and businesses that worked on the plan.

IMPLEMENTING & FINANCING THE PLAN

IMPLEMENTING THE PLAN

So you have a plan adopted ... Now what do you do? Even with a list of priority and current projects, you have limited resources and must decide how much effort should be spent and in which direction. Here are some approaches to consider. Each has its advantages and limitations. Use this information to help in implementing the plan. Remember to take advantage of current projects – where possible use them as a springboard to implementation

BE PRACTICAL, BUT AVOID SHORT-TERM THINKING

Do what will be easily accomplished given the support and resources available at the moment. This involves looking for connections between your interests and those who make financial decisions. Also, select the projects that fit your city's long-term goals.

A risk with this approach is that you can fall into short-term thinking. If so, you may never achieve a sustainable system because the things that need doing are either too expensive, too difficult, or too risky. Short-term thinking not only creates environmental problems but also most often entrenches poverty and unsustainable livelihoods: the one-(badly built) house-on-one-plot low income housing developments on the outskirts of cities are a perfect example of this.

LONG PAYBACK PERIODS

A hurdle you will encounter in some projects is the long payback periods which often do not suit the way in which city or, for that matter, national politics work. Nevertheless, it is possible to obtain funding and programmatic support for these types of interventions. Be careful of using up your resources on easy-to-implement cheaper projects (or 'low-hanging fruits') at the expense of projects that are more difficult to implement, but have greater impact and for which you can obtain funding.

FOCUS ON OPTIONS WITH THE GREATEST IMPACT

Identify options that are visible and show significant cost savings, while building a more sustainable

In South African cities, many municipal office buildings are high energy consumers. Jo'burg and Cape Town have conducted energy audits on some of their buildings and found that, with the support of the Energy Efficient Lighting Programme, they can achieve huge savings by making lighting more efficient (R 1,3m/year on the Cape Town City Council's building), while educating a large staff and so a fair portion of the city's citizens. Potchefstroom have built their new council offices as a demonstration of energy efficiency to the town's population.

urban system. You may well be able to tackle a range of different sectors simultaneously and so build a broad commitment and understanding of a sustainable energy future.

LOCATE FINANCIAL RESOURCES

Energy improvements are an investment that can help cities and communities improve their financial sustainability.

Fortunately, projects that provide the greatest benefit to long-term sustainability often are aligned with other environmental and social goals. If the projects meet several community goals and provide benefits to a broad group of residents, they'll be easier to fund.

For example, a local ceilings installation programme for low-cost housing may offer:

- energy savings for the household,
- reduced energy demand on the energy supplier,
- training and employment for residents,
- improved safety and health for residents,
- photo opportunities for local political and business leaders.

Those interested in funding such a programme may be the utility, government housing and even health and social service departments, international funders or an international buyer of carbon credits.

The Portland Energy Office proposed a 1% 'fee' on all city government energy bills. These 'fees' (totalling about \$70 000 per year) were used to hire an energy management co-ordinator for city facilities. That coordinator identified more than \$250 000 in energy savings in the first year.

Before looking for money, think about all the ways the energy projects will benefit the community and which agencies would be interested in those benefits. Financial help may be available through national and provincial government, local lending institutions, energy service companies, equipment manufacturers, or a combination of these. Remember, projects resulting in energy savings usually provide a return on investment that is far greater than one can get at the bank.

Third-party financing

Some local governments have used third-party financing to design and install energy-efficiency retrofits for local government facilities. The third-party usually funds the energy improvements. The local government pays the third-party over time through its energy savings, with the total cost less than the energy amount saved.

If you can build strong political support for your sustainable energy plan, you may be able to avoid digging and scratching every year for money. With sufficient support you may be able to acquire general funds or generate revenue from taxes or levies such as:

- carbon taxes on activities such as conferences,
- tax on parking spaces,
- taxes on electricity use by business and industry,
- carbon trading.

Be careful of regressive taxes – hitting hardest those who can afford them least. This will affect support among low income groups.

Grants and loans

Other financial techniques – fairly risk-free – are being made to work for local governments and cities: some are conventional tools, such as matching grants and revolving loan funds, modified to work for energy efficiency projects.

Others, such as performance contracts and public-private partnering, are more innovative.

Performance contracting

Performance contracting allows local governments to try projects without making any initial capital investment. It's a growing trend because everyone comes out ahead – businesses and government as well as the taxpayer.

Because your local government may represent substantial and attractive sales potential, local businesses may be willing to engage in innovative financing arrangements.

Under such an arrangement, a third party, such as an energy utility or the Development Bank of South Africa (DBSA), provides a service package that typically includes the financing, installation and maintenance of energy-saving capital improvements. The customer then uses the resulting energy savings to pay for the improvements.

Performance contracts are usually structured as a lease, but with

a guarantee that payments will not exceed energy savings. This minimises financial risk.

Help may also be available through local corporations looking for a good project to support.

When 'selling' your project to potential investors, emphasise not only the social and environmental returns, but also the potential financial returns. Focus on the business aspect, not only on the merits of the projects, and try to think like an entrepreneur.

It's also important to look at a balanced mix of grants, development investment funding and commercial lending, and to do your research well so that your first port of call is not to the wrong institution.

When approaching funders for larger projects, it can certainly help cross the risk threshold to look at the project as a ring-fenced entity.

GREEN FINANCING

Kuyasa, a micro-lending fund working in Khayelitsha, offers borrowers three times their savings for house improvements, but four times their savings for energy efficiency interventions. The Department of Housing is investigating establishing Green Finance funding mechanisms for all housing.

MONITORING & EVALUATING YOUR PLAN

YOUR PLAN should be a living document, with short-term plans being evaluated and updated every two or three years, and long-term plans every five years.

You evaluate the progress of your energy plan in order to:

- track and quantify what has been done, measured against your targets,
- measure positive results, which will help you maintain city support,
- detect problems and make necessary changes, and
- plant the seeds of future challenges.

An evaluation compares your objectives with your results. It asks, 'What did you aim for and plan to happen?' The evaluation process then measures those plans against what actually did happen! This measurement reveals the quantity and quality of your progress.

Monitoring

Remember that your evaluation can only be as good as your monitoring. Make sure that you have an effective and sufficiently resourced monitoring plan for the programme right at the beginning – and stick to it.

Most projects will require both quantitative and qualitative monitoring and evaluation.

Lack of good monitoring and evaluation has been an inherent weakness in most South African development programmes.

Evaluation

Evaluations fall into two categories:

- those that help improve the planning process, and
- those that help you decide whether to continue particular programmes and projects.

If your evaluation goal is to improve the planning process, you need to:

- identify the strengths and weaknesses in the planning process,

- determine which participants or groups are benefiting the most or least from the plan and its projects.

If your goal is to decide whether or not to continue a particular programme or project, you will want to:

- determine whether the programme is accomplishing its objective,
- analyse the cost/benefit ratio of the programme,
- decide if the programme is still appropriate,
- identify who should participate in the continued programme,
- reinforce the major points to the participants (a follow-up evaluation is a good way to reinforce the information covered in a programme).

Look for specific measurable results, such as energy saved, costs saved, poverty alleviation, environmental benefits, and lessons learned.

A GUIDE TO EVALUATION

- *Statement of goals*
- *Objectives described in measurable terms*
- *Achievement*
 1. *How far did we go?*
Quantitative
Progress towards targets (such as improved air quality, reduced vehicle km, increased public transport users, electricity connections, jobs created)
 2. *How well did we do?*
Qualitative
Benefits accrued (such as educational: knowledge acquired, skills developed, attitudes altered or reinforced)
- *Contingencies*
 1. *Unforeseen benefits outside our objectives*
 2. *Unforeseen problems*
 3. *Additional objectives discovered late in the process*
 4. *Change of intention or context during process that nullified or changed the initial objectives*

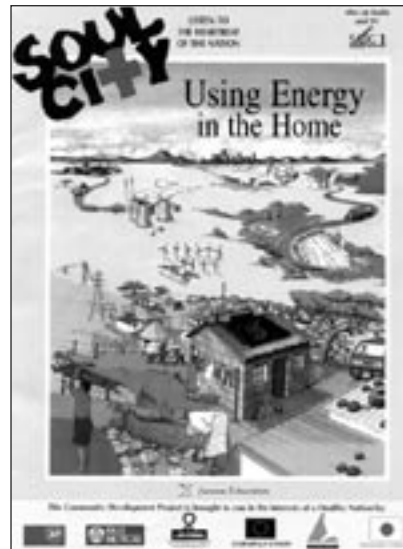
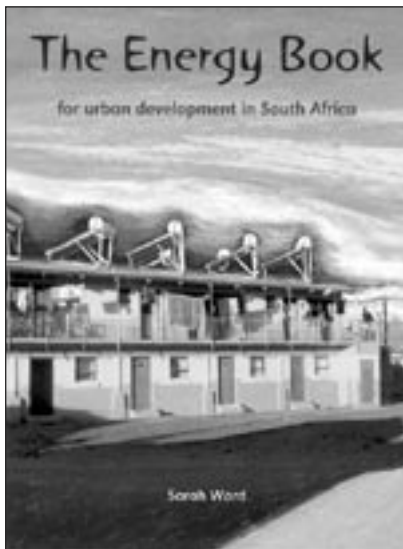
Responding

When your evaluation is complete, examine each project and make appropriate changes to improve your success. Be ready to adapt your approach and to let go of projects which are not working.

Go back to your efforts in developing programme options and investigate new methods of achieving your goals.

An evaluation is a great learning opportunity. Be open, be honest. Those activities that did not go 'according to plan' can often teach you more than those that went 'right'.

PUBLICISING THE BENEFITS & ENERGISING THE CITY'S PEOPLE



WHY DO you need to tell everyone about your project? To build support for your sustainable energy goals and to change people's behaviour.

Your city can save money and ensure the availability of resources for years to come. By you taking the initiative, your city can benefit from forward thinking. Build pride, enthusiasm and a feeling of empowerment while building a more sustainable future, and telling as many people as possible that you are doing it!

That's why education and publicity should be on your mind all the time – don't hold back!

Using projects

At every point a project can be used to build public understanding and support: use every chance and build on people's natural curiosity and on their need to save money.

Take a waste-to-energy methane extraction project, for example: it can be a means to building city staff and councillors' understanding about energy efficiency and best mix as well as waste management.

An energy audit and retrofit on council offices can educate staff about energy efficiency – information they will take home to their families, and children can take it to their schools.

Using the media

You have a vast array of communication methods at your disposal, and they don't all cost huge amounts

of money. Piggy-back on other media initiatives wherever you can. Use journalists' need for stories, apply for awards, make presentations to council portfolio committees, get onto the radio, distribute information with the council's monthly accounts.

Critical to maintaining and building further support is the fostering of a clear appreciation of the policy's benefits. This entails presentations, workshops, marketing, public relations and media events, which all add up to build trust and credibility, too.

Let people know that you've provided more service for fewer rands, and do practical demonstrations to show them how much money they can save. Set up pilot projects to show local authority finance departments how much can be saved.

A public education strategy is a vital component of any energy programme and activity: international and local experience shows that energy efficiency gains are derived 80% from education of users and only 20% from technology change.

CITY ENERGY STRATEGY PROCESS

Steps to a Sustainable Energy Plan for your city

SUSTAINABLE ENERGY BENEFITS

- **Energy security.** Dependence on imported fossil fuels leaves many countries vulnerable to disruption in supply and accompanying economic and development impacts. Increased use of efficient and renewables systems improves our energy security by boosting resource productivity, avoiding excessive dependence on imported fuels, developing local sources, and diversifying energy portfolios and suppliers.
- **Economic development.** Lack of access to sustainable energy constrains opportunities for economic development and improved living conditions. Renewables and energy efficiency systems increase GDP growth by improving economic and environmental performance, enhancing technological innovation and creating new commercial opportunities.
- **Social equity.** Access to and use of energy is marred by an uneven distribution among countries, and between rich and poor within them. Deploying distributed energy generation and modern renewable systems will help achieve a more equitable access to energy services and create new job opportunities.
- **Environmental protection.** Most current energy generation and use result in serious health and environmental impacts at local, regional, and global levels including climate change – this threatens human well being and ecosystems. Accelerating energy efficiency improvements and deployment of renewables results in significantly lower or zero environmental pollution.

Source: AREEP 2003

BUILD SUPPORT – YOUR PARTICIPATION PROCESS

1

Designate a lead office and find a champion

Get every city department involved, but there must be a lead – can be in the form of a City Energy Partnership

2

Establish partnerships

NGOs, business, utilities – look to energy efficiency and climate change programmes

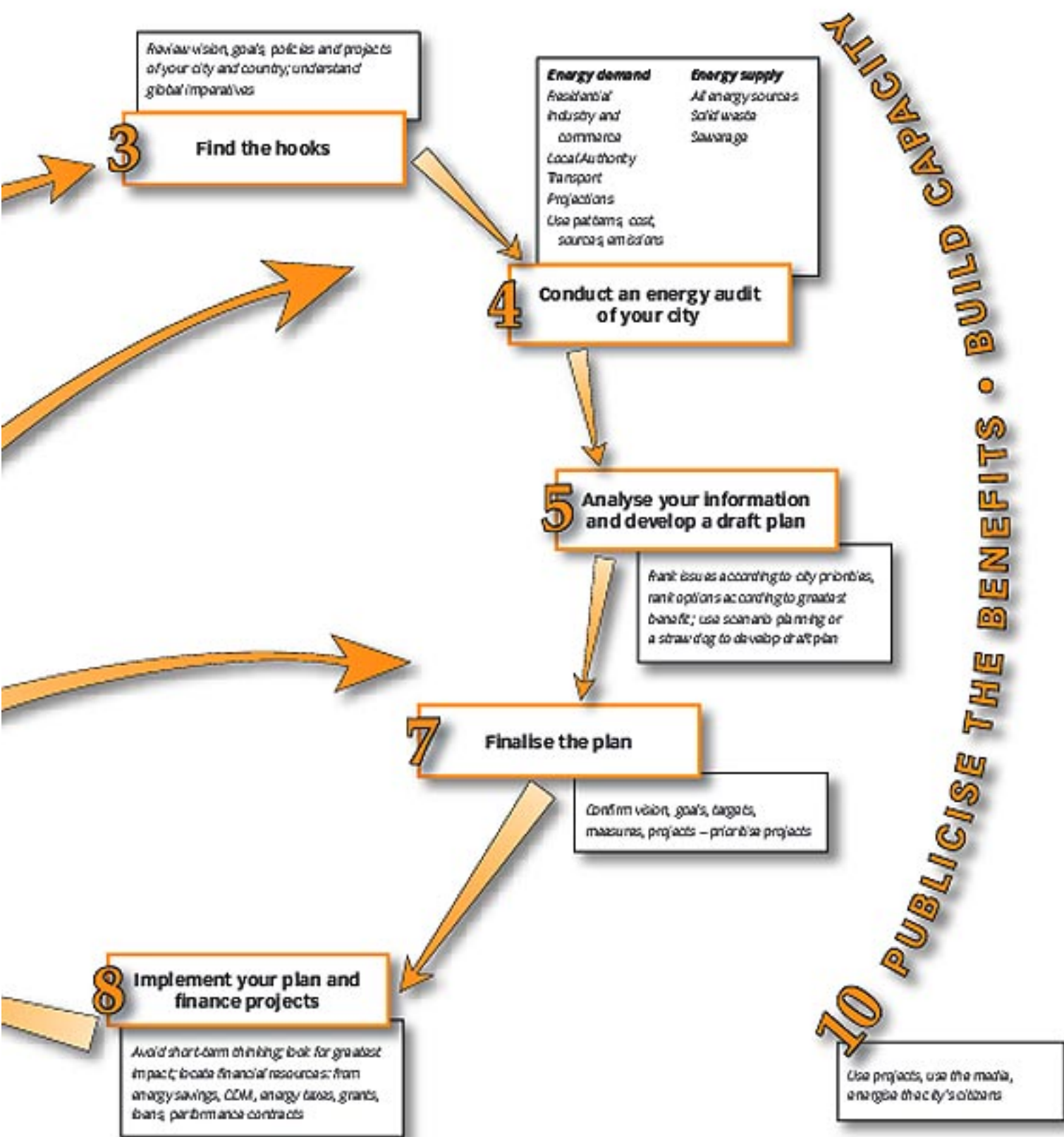
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Review and evaluate

monitoring > evaluation > response
make sure you build this into your planning from the beginning

6

Use every opportunity to build capacity and build support; identify key stakeholders, work with officials and with the public



GREEN ELECTRICITY

brings opportunities

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GREEN ELECTRICITY offers excellent opportunities for sustainable development within the context of global warming. It is electricity generated in a sustainable manner from renewable energy resources such as wind, solar, wave, geothermal and certain biomass and hydro energy.

The key is not only that Green Electricity is derived from renewable energy resources, but that it is generated in a sustainable manner.

Is Green Electricity relevant in a developing country like South Africa?

It is essential to provide basic access to energy services: electricity is part of the energy mix that is needed for social and economic development. This needs to be provided in the most sustainable way possible so that South Africans and the economy can remain competitive and healthy in the longer term.

Right now, South Africa needs to make decisions regarding new electricity generation capacity, as the country is expected to run out of peaking capacity within the next few years and baseload capacity within 5–7 years. Green power generation offers a real opportunity to move away from environmentally damaging and economically costly forms of electricity generation.

What are the benefits of Green Electricity?

Green electricity has unique advantages over conventional electricity.

- It is less damaging to health and the local and global environment.
- It provides more long-term employment than conventional energy systems.
- It can be implemented at any scale: from 1kW to 1GW.
- It can be implemented quickly, with shorter lead times (and therefore less risk).

WHAT DOES GREEN ELECTRICITY COST?

Green electricity costs about the same as 'normal' electricity, but the full costs of the latter are not included in the price we pay. These hidden costs are paid through taxes (eg, the costs of mining, nuclear accidents or oil spills) and the depletion of the quality of health and the environment.

So, the present cost of 'normal' electricity can range between 15–40 c/kWh, depending on the kind of tariff charged by the local supplier, whereas Green Electricity has been costed at approximately 50 c/kWh. This was the price approved by the NER for City Power to supply the main venues of the WSSD in 2002, and reflects the full costs of power generation from new wind farms in South Africa.

Overall the costs of Green Electricity will fall, with economies of scale and technical developments, while conventional electricity costs will rise, to reflect full costs of production and increased input costs for land, water and fuels.

- It offers empowerment opportunities because it can also be owned by individuals and SMEs.
- It can be implemented anywhere on (or off) the national grid and hence provide for more decentralised economic development.
- It offers an easy but meaningful way to demonstrate commitment to more sustainable operating policies and more equitable triple bottom line reporting.
- It assists government objectives of increasing the amount of renewable energy in the economy.

GREEN POWER FOR THE WSSD

AGAMA Energy together with project partners, including the NER, City Power and Green Generators, facilitated the supply of 845 MWh of Green Electricity to the UBUNTU Village and NASREC ExpoCentre for the duration of the World Summit on Sustainable Development in September 2002. The venues paid 50 c/kWh for this Green Electricity which was supplied by a diverse range of green generators including bagasse, small hydro, solar, wind and geothermal generators. The project was supported by USAID.

Arising from this pilot project, City Power – as a leading distributor of electricity in SA – has committed to supply Green Electricity to consumers in 2003.

What can local authorities do?

Local authorities in South Africa can have a big impact on climate change because they are responsible for the distribution of electricity to thousands of consumers, and are large consumers of electricity themselves.

Local authorities can also be leaders in getting their cities onto green power.

COMMUNITY ELECTRICITY SUPPLY

Models for developing a greener future

LOCAL COMMUNITIES all over the world are playing pivotal roles in shaping their energy futures, including electricity supply. Deregulated and decentralised energy sectors have resulted in increased local autonomy, which has enabled local governments, independent power producers and others to respond to opportunities, in some cases more readily and with further reaching effects than higher levels of government.

China: Decentralisation promotes renewable electrification

For more than 20 years China has seen remarkable development in the field of small hydro power (SHP). The country has over 43 000 SHP stations – more than 26GW of installed capacity, generating 87.1 billion kWh annually and employing 1,2 billion people.

The Chinese government has launched a series of programmes to promote SHP development in rural and urban areas. Unlike the centralised development model in other developing countries, most SHP development here occurs through decentralised management. Since the early 1960s, a series of preferential policies have been introduced to encourage local governments to develop local resources. As a result, SHP planning, construction, design and operation are undertaken by local governments. These policies have promoted the development of the SHPs' own supply areas, involving an integrated power generation, supply and distribution system.

Joint investment by individuals, community or private enterprises is encouraged with investment from

outside, including overseas markets. Moreover, government has ensured that the developer can get financial support from different levels of government and from banks in the form of soft loans and grants.

The City of Santa Monica

In 1999, Santa Monica City Council adopted a strategic energy plan that launched the city as a national leader in renewable energy: the Santa Monica City Council voted unanimously to exclusively use renewable electricity in all city-run facilities. It focuses on wind, solar and geothermal energy.

The city awarded a contract to a certified supplier to supply green power to facilities as large as the Santa Monica airport and as small as the public bathrooms on the beach. Its commitment to 100% Green Electricity increased the city's annual electricity costs by approximately 5%, but the additional cost was perceived as prudent and a reasonable investment in protecting environmental and public health.

Although not focused only on renewables, another related component of the strategic plan is the promotion of distributed electricity generation. These include photovoltaics (PV), wind turbines, fuel cells and natural gas microturbines that can provide site-specific supply of electricity while putting surplus power into the power grid. The city's Civic Centre is fed by PV as is the ferris wheel on Santa Monica pier. A PV system in conjunction with a natural gas microturbine supplies 90% of tenants' needs in a 44-unit affordable housing project

At the heart of Santa Monica's initiatives is a shared vision that

wasteful energy use causes negative environmental impacts and that comprehensive energy efficiency efforts will result in significant long-term economic benefits.

Santa Monica is working with other municipalities and organisations to push state energy legislation toward greater emphasis on renewable generation and local control.

Toronto's WindShare Co-operative kick starts a local wind industry

Toronto adopted a co-operative model to spur development of renewable energy in a province with no prior wind power projects.

WindShare, a project developed by the Toronto Renewable Energy Co-operative (TREC) and Toronto Hydro Energy Services is developing two wind turbines on the city's waterfront. These will be the first utility-scale turbines in an urban environment in North America. The WindShare project is intended to profile wind power as a solution to smog and global climate change and showcase a community-based initiative for renewable energy.

The impetus for WindShare came from TREC's founders, a neighbourhood community group, concerned that leaders in business and government were too slow to respond to pressing environmental issues. It was also conceived as a unique opportunity for citizens to generate green power in Ontario's new deregulated electricity marketplace. To date, the co-operative has more than 450 individual and corporate members who have invested enough to cover the first turbine's development costs and some for the second.

TURNING TRANSPORT towards sustainability

overview & case study

FOR SOUTH AFRICA'S transport sector, the road to becoming sustainable may seem long and arduous. Our current transport system is a mixture of unmaintained public transport inherited from apartheid and a chaotic, unregulated minibus system with an absence of safety standards and accountability.

Non-motorised transit barely factors into transport planning or infrastructure development. Those who can afford it rely exclusively on private cars.

Under-investment created a transportation void to be filled by 12–20 seat minibus taxis, which have become the central feature of South African urban transport, accounting for up to 50% of transport markets and competing with buses and trains on major routes.



However, mass discontent and political transformation in South Africa have opened the door for equitable and sustainable urban transportation policies. In 2000, the National Land Transport Transition Act (NLTTA) became the over-arching piece of legislation that governs land passenger transport in SA. The

Act places emphasis on more public transport and the integration of transport with larger city development plans, and it attempts to integrate local and national planning by requiring statutory transport plans from all municipalities, Provincial Land Transport Frameworks and a National Land Transport Strategic Framework.

THE BOGOTA MODEL

Ten years ago Bogota suffered, as do various South African cities, from heavy traffic congestion, no rail, no formal bus system and no plan for changes. Air pollution was choking the city, and many people were unable to reach vital destinations. However, from 1998 to 2000, under the leadership of the then mayor, Enrique Penalosa, innovative planning transformed Bogota into a leading model for sustainable urban design boasting what international experts agree to be one of the world's most innovative, efficient and accessible transportation networks.

Today Bogota has a Transport Authority which has brought about a structured bus lane network, bicycle ways, pedestrian routes and public spaces, resulting in a 40% reduction in car trips, an 80% reduction in accidents and a 50% reduction in pollution.

The Bogota model places emphasis on public over private interests. Bogota now boasts:

- *The world's biggest car-free day*
- *The world's longest pedestrian-only street, spanning 17 km, as well as hundreds of kilometres of sidewalks, many through the city's poorest neighbourhoods.*
- *Latin America's largest network of bicycle ways: 250 km long*
- *A world-class Bus Rapid Transit system*

At the heart of Bogota's transformations was Mr Penalosa's belief in the need to equalise all citizens' access to mobility. 'In Bogota, we chose to build a city for people, not for automobiles,' he explains. 'Cities built for cars' mobility suffer congestion, unsafe street conditions and leave many residents with poor access to jobs. Instead of these problems, we gave our citizens enjoyable public spaces and unprecedented mobility. Whereas in the past the residents of Bogota hated their city, these changes have instilled in them a sense of pride and hope that life will continue to improve.'

Transmilenio

The Bus Rapid Transit (BRT) system, Transmilenio, was launched in 2000 with the first phase comprising 40 km of exclusive bus ways, 57 bus stations, 305 km of roads for feeder buses, 29 plazas and sidewalks, and a control centre.

This system is as effective and reliable as any light rail system, at one tenth of what a light rail system of equivalent length would have cost. Another testimony to its efficiency is the fact that the system is not subsidised.



Above left: The Bus Rapid Transit (BRT) system, Transmilenio, in Bogota. Above right: Efficient and safe public transport is an urgent need in South African cities.

SUSTAINABLE NON-MOTORISED TRANSIT IN CAPE TOWN

Projects

The challenge to developing sustainable transport is that of implementation. A key requirement for effective implementation at the local level is an appropriate distribution of power to local authorities. As yet, this is not the case for rail. In terms of the NLTTA, commuter rail remains a national function.

Other promising developments suggest positive changes to come.

A Taxi Recapitalisation project has been introduced, and from 2006, the Minister may issue regulations specifying the types of vehicles to be used.

The Department of Labour is looking into working conditions in the taxi industry with a view to issuing a wage determination. And the Transport Education and Training Authority has a Taxi Chamber which is developing training programmes for the industry.

In term of non-motorised transport, the national department is partnering with Dutch experts to develop infrastructure guidelines. Much more needs to be done by local transport planners to cater for pedestrians and cyclists, a huge challenge given decades of institutionalised motorised biases.

Once public transport alternatives have been developed, travel demand management measures to restrict private car use and to redistribute resources to public transport will be required.

A number of cities, particularly in Europe, promote non-motorised transit by developing pedestrian paths and cycleways and offering incentives for using bicycles for commuting. In Copenhagen, for example, one third of the population commutes to work by bicycle; and in the Netherlands, bicycles are used for 27% of all trips. These forms of transit are widely viewed as sustainable because they substitute for automobiles, reduce traffic congestion and lower air pollution and noise.

In Cape Town, as in most South African cities, walking and cycling account for about 7% of the City's trips. Apart from the non-conducive city structure (great distances between work and home), this is because bicycle use in the City is widely perceived as unsafe.

South Africans aspire to drive a private motor vehicle rather than cycle to work, and women are discouraged from travelling by bicycle. A bias towards car-orientated engineering and planning results in bicycle and pedestrian facilities not receiving the attention that they deserve.

However, local planners and developers are beginning to recognise the potential contribution of non-motorised transit to achieving efficient, habitable and sustainable cities. In Cape Town the following initiatives have been introduced:

- *A City of Cape Town Cycle Path Masterplan provides for a metropolitan cycle path network that complements existing bicycle planning in local areas.*
- *The Shova Kalula Bicycle Transport Demonstration Programme in Khayelitsha promotes the use of non-motorised transport, especially among primary and secondary school students in the most disadvantaged rural and urban settings.*
- *Two organisations – Afribike and the Bicycle Empowerment Network (BEN) – promote the distribution of second-hand bicycles to low-income people in townships.*
- *Cape Town was recently chosen to host the 2006 Velo Mondial (VM) Conference, a popular international event dedicated to promoting bicycle use, thus providing a deadline for getting the City's bicycle plans implemented.*

HOUSING

Making healthier, more affordable homes

case study

THE KEY characteristics of energy efficiency in housing development are location close to places of work and other facilities and access to a good range of facilities and services in and around the development. Then there are issues of house construction, orientation and energy service provision.

The following case studies provide insights into how these issues have been taken up by some of the innovative housing projects in South Africa.

LWANDLE HOSTELS-TO-HOMES PROJECT

The Lwandle Hostel in Somerset West used to be a single men's hostel for the Gants food and canning factory. Gants closed the factory in the 1980s. Unemployment was high and poverty extreme, with whole families living in single bunk spaces. The community identified their needs from the development as jobs, privacy, toilets and hot water (in that order). In addition to community facilities, taxi ranks and

greening, the hostels were divided into family units with some provision for singles. Toilets and showers were installed with solar water heaters. The project, which started in 1995, has provided 967 units ranging from 12m² to 30m².

The project was funded through housing subsidies and other funds, providing for the units, sports centre, taxi rank and roads. A DBSA low-interest loan to the Helderberg Administration over 20 years covered the solar water heaters. Liebenberg and Stander managed the project.

Innovative components included:

- Community based construction employed eight local contractors and 400 residents + local materials and construction managers.
- Rental units are owned by the municipality – monthly rent from R114–R172.
- Toilet, basin and shower, shared by two family units, include solar

water heaters (no electricity back-up, providing for 'free hot water').

- Helderberg administration accessed a low interest loan to pay for solar water heaters.
- Extensive community facility, greening and 'place making' investment to build sense of place. Town square surrounded by double storey units.
- Additional communal toilets and showers are provided.

KUYASA A CDM HOUSING PILOT

The house of Elsie Tshabalaza, a pensioner in Kuyasa, Khayelitsha, sports a recently installed solar water heater (one of three versions used in the pilot), an insulated ceiling and energy efficient lighting, none of which she has ever contemplated purchasing with the R600 that represents her monthly income.

Elsie is one of 10 beneficiaries of a pilot demonstration project aimed at improving the energy efficiency



Above: Lwandle Hostels-to-Homes Project showing the solar water heaters.



Above: At Kuyasa, solar water heaters were installed at 10 houses.

PHOTOGRAPHS: MIKE SCHROEDER AND GORDON MC ALISTER

and thermal comfort of the basic RDP housing unit through these interventions, which also bring about a reduction in grid electricity and CO₂ emissions.

The project is part of a collaborative partnership between the City of Cape Town and an NGO, South-SouthNorth, working to build capacity for sustainable development and Clean Development Mechanism (CDM) projects among local and national project developers and host government institutions.

Carbon savings

The project activity mitigates climate change by avoiding nearly two tons of CO₂ per house per year, with an international carbon market value of around 3 US\$ a ton.

The personal benefits

Elsie Tshabalaza explained the benefits of these interventions to the SouthSouthNorth team: 'Things are much better. Since the ceilings have been installed, it is much warmer, and more beautiful than it was before.'

Elsie's house is 5°C warmer than the houses of her neighbours, and electricity savings of up to 40% have been experienced. Additional benefits include a reduction in household dust due to the insulated ceiling, and a reduced need for paraffin stoves and other unhealthy heat sources.

Other members of the community, frequently visiting the beneficiaries houses, look forward to the implementation phase, when the interventions are to be rolled out to 2 309 houses in Kuyasa. The project has increased awareness of energy efficiency and its relationship to affordability in the community at large, as well as with local politicians.



Above: The Moshoeshoe Ecovillage demonstration project.

MOSHOESHOE ECOVILLAGE DEMONSTRATION PROJECT

This demonstration project of 13 units in the Sol Plaatjie Municipality was completed in March 2002. It serves as a demonstration site for the larger Hull Street Project. The latter, which will consist of 2 500 units, resulted from a partnership between SIDA and the Sol Plaatjie Municipality. Moshoeshoe Ecovillage demonstrates the innovative eco-block concept with double-storey units around communal agricultural and open space. The circular design encourages interaction amongst residents and improves security through good street surveillance. The residents were provided with training in the different innovative components and actively chose to live here.

The project was funded by the Sol Plaatjie Municipality, SIDA and housing subsidies.

Innovative components included:

- Compact semi-detached and row houses: 1 unit adapted for disabled person; 3 and 4-unit row houses; 2 semi-detached houses.
- Rental units with option to buy after 4 years.
- Passive thermal design including roof overhangs and light coloured roofs; insulated ceilings.
- Renewable energy sources: Solar water heaters with electricity back up; grid-interactive solar and wind electricity in office building (2 units).
- Compact fluorescent light bulbs.
- LPG for cooking is provided on bulk supply contract from Easigas.
- Demonstrates eco-block concept (see project description above).
- Dry sanitation and urine diversion delivers water savings for irrigation; grey water will be recycled and rain water will be harvested.
- Plots of 50m² for urban agriculture; agricultural training will be provided; organic waste from faecal material will be used as fertiliser.

The residents of the project chose to live here, following community workshops about the innovative components (dry sanitation being the most contentious). The project and residents will provide residents of the much larger Hull Street Project with training and practical demonstration of the eco-block concept and stories from their own experience.

BUILDINGS

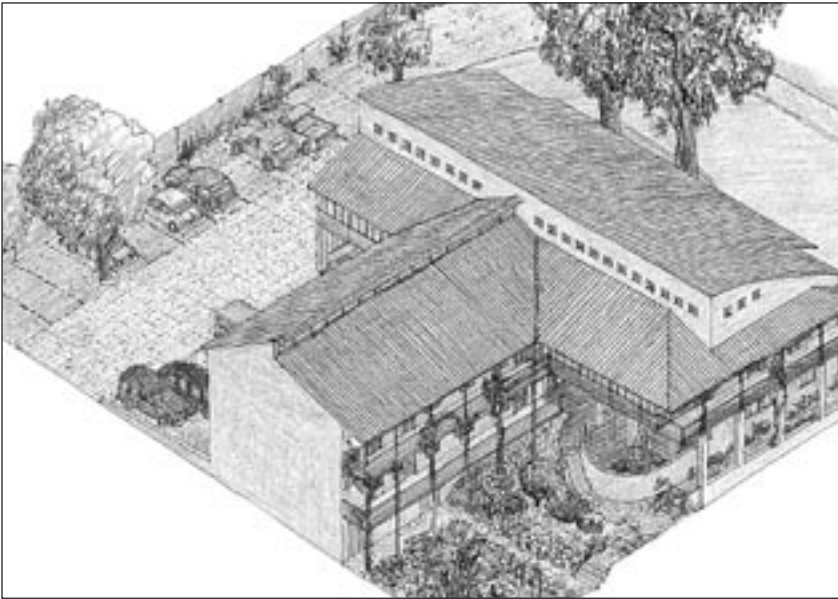
and energy efficiency in South Africa

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The South African construction industry is seeing substantial growth in the adoption of energy-efficient technologies and practices in commercial buildings. This is aided

by a rise in the number of energy services companies, some of which have international energy efficiency certification standards. Already a number of private developers and

property managers are implementing innovative energy efficiency projects through thermal design, solar technologies and energy-efficient appliances and materials.



Above: The Green Building at Westlake Business Park, Cape Town, provides offices for Sustainable Energy Africa and others. The aim was to create a 'future normal' comfortable and healthy office environment.

Its design, construction and functioning are based on the green principles of re-use, reduce and recycle, and it includes passive thermal principles, energy efficiency and environmentally sound material and services. Locally available materials with lower 'embodied' energy' were used where feasible. Bricks are 92% reconstituted composition, and hardwoods were avoided, and nearly all windows and doors are second-hand.

Rainwater is collected for the water-wise garden, solar panels will generate green electricity feeding into the grid, and waste will be separated for recycling. Alien trees cut down are used on site for garden retaining, mulching and paths.

Private sector

The CSIR's Green Buildings for Africa (GBA) programme is a commercially driven initiative that encourages property owners, managers and occupants to promote efficient and sustainable use of energy, environmentally conscious policy- and decision-making, and healthy working environments in their buildings. Benefits to clients include potential high returns with reasonable payback periods, healthy and safe working environments and reduced environmental



impacts. GBA will be implementing a national grading scheme, ranking participating owners and buildings according to their 'greenness'.

Public sector – local authorities

In the public sector, some municipalities are taking the lead in energy efficiency initiatives. Scoping studies show significant consumption and cost savings for minimal input. The International Council for Local Environmental Initiatives (ICLEI) Cities for Climate Protection (CCP) Campaign is helping to prioritise energy efficiency in buildings: eight South African cities have joined more than 500 other cities around the world in this campaign.

Buildings Evaluated According to SAEDES to Date

Building Estimated	Annual Savings – ZAR	Annual Savings – %
Existing Buildings		
Mutual Park – Cape Town	R820 000	9,2%
Admin Building – Pta University	R46 500	16%
Engineering Tower – Pta University	R87 000	14,6%
New Buildings		
Cape Town Int'l Airport (int'l section)	R8 000	1,4%
Chambers Potchefstroom City Council	R2 300	16,4%

OLD LANDFILLS

new energy potential

LIGHTING

A NUMBER OF SOUTH AFRICAN municipalities are retrofitting city lights to save money on their electricity bills and reduce carbon emissions. Since joining the Cities for Climate Protection (CCP) Programme of the International Council for Local Environmental Initiatives (ICLEI) in 2001, Potchefstroom City Council has demonstrated innovative planning in this regard. Using the grant funds provided by USAID and DEAT through ICLEI's contracts with them, the City of Potchefstroom has, among other measures, undertaken a multi-faceted upgrade of the airport's lighting.

The uniqueness of this project is its combination of energy efficiency measures and development of on-site green energy, which together significantly minimise the use of polluting fossil fuels. In the first phase of the project, the airport runway was retrofitted with energy saving light emitters, which provided energy savings in the first year of 25 581 kWh or R5 372. The annual saving on CO₂ emissions is 20,8 tons

Within a second phase, the taxiway was also retrofitted with a proper lighting system. Potential reductions in demand are projected to amount to 31 663 kWh/year, which is calculated to equal R6 649 per year in monetary savings. The projected annual saving on CO₂ emissions is 26,9 tons.

The success of this innovative plan to use both energy efficiency and green electricity supply to reduce the airport's reliance on fossil fuel is largely a result of local partnering. Various departments within the City collaborated with one another as well as with the Centre for Environmental Management at Potchefstroom University and Aero Energy, a private company, to produce the best solution and most effective means of implementation.

But despite demonstrated long-term savings and environmental and social benefits associated with reduced electricity consumption, municipalities do not always prioritise long-term gains over short-term costs.

A recent energy audit on a council building in Parow revealed that by replacing all incandescent lights with compact fluorescent lights (CFLs), it is possible to attain R20 000 savings per year in electricity costs, thus paying back the initial investment in CFLs more than twice.

National government

National government is also investing in energy efficiency. As part of the DME-DANIDA Capacity Building in Energy Efficiency and Renewable Energy (CaBEERE) Programme, energy audits were done on the Mineralia Building, offices of the Department of Minerals and Energy (DME) as well as the National Electricity Regulator (NER) building, both in Pretoria.

While all energy efficiency initiatives in South Africa to date are voluntary, they may eventually fall under a mandatory legislative framework. In 1999, the DME published a set of voluntary guidelines for commercial buildings – the South African Energy and Demand Efficiency Standard (SAEDES) guidelines. The intent of SAEDES is to reduce energy consumption and/or demand, thereby improving energy cost effectiveness within the commercial sector.

EKURHULENI METROPOLITAN Municipality (EMM) was the first municipality in South Africa to initiate a pilot project to use methane gas from a landfill solid waste site as an alternative fuel, in this case for refuse collection vehicles.

This pilot, commissioned in 1999, involved the extraction of methane gas from the Weltevreden landfill site, which generates about 216 988 tons of waste annually. It is one of five such facilities in Ekurhuleni metropolitan area.

The methane gas was purified in a methane purification plant and a fuel mix of 25% diesel and 75% methane was used in four refuse collection vehicles.

The project aimed to:

- inform EMM on the potential for using methane gas as an alternative fuel,
- demonstrate cost savings and reduced impact on the global environment,
- quantify methane potential from landfill sites,
- build capacity within EMM on technology and processes to implement this pilot project,
- explore possibilities of accessing funding for such projects through the Clean Development Mechanism.

Due to a number of problems experienced, some of which are listed below, the pilot was discontinued.

- Power reduction of approximately 20% when driving on methane-diesel blend.
- Additional time (10 minutes per day) was required by drivers at the end of the day to refuel with methane in addition to diesel refuelling in the morning.
- Breakdowns on the methane extraction system needed spares to be imported from Holland by the company that did the installation. No local supplier is yet available.
- Waste collection vehicles were in poor condition, which resulted in a significant number of mechanical breakdowns.
- Poor record keeping and therefore insufficient information collected for monitoring and evaluation of the system.

Despite these setbacks, the local authority concluded that there was sufficient evidence to support further development of this industry. A tender document is being prepared to develop a Feasibility Study in Landfill Gas Development of all Ekurhuleni's waste disposal sites.

ENERGY EFFICIENCY

in delivering water services

WATER DELIVERY is a fairly energy-intensive municipal service. Energy efficiency reduces the costs associated with water services and at the same time improves the capacity and reliability of the delivery system.

About 2–3% of the world's energy consumption is used to pump and treat water for urban residents and industry. This could be reduced by at least 25% through cost-effective efficiency actions.

In the developing world, energy consumed to supply water could eat up half of a municipality's total budget. In water systems in developed countries, energy is typically the second largest cost after labour.

In the process of improving overall water system efficiency, municipal water authorities should view energy and water consumption as linked inputs. Energy is necessary for moving water through the water systems, making it potable and removing waste. Each litre of water moving through a system represents a significant energy cost. Losses in the form of leakage, theft, consumer waste and inefficient delivery all directly affect the amount of energy required to deliver water to the consumer. Wastage of water leads to a waste of energy.

To develop and implement a water energy-efficiency strategy, municipalities usually need to involve people from a variety of government agencies and offices as well as other members of the community.

India

The Confederation of Indian Industry (CII) estimates that typical Indian municipal water utilities can improve water system efficiency by

25%. As energy accounts for 60% of the municipal water utility budget in India, this saving could be used to improve service.

The city of Indore was able to save 1,6 million rupees (US\$35 000) within the first three months of action, with no investment cost, just by improving the way existing pumps worked together. The city of Pune identified more than seven million rupees (US\$150 000) of energy savings opportunities after kicking off an energy efficiency programme.

Cape Town

In Cape Town a recent study has shown that the potential for electricity efficiency through aeration systems changes at Macassar and Zandfliet Wastewater treatment works would save R880 450 per year (at an investment cost of R3,4-million). The combined pay-back period is 3,9 years.

There would be emission reductions in excess of 5 179 tons of CO₂, 21 tons of NO_x, and 46 tons of SO_x per year. Electricity consumption reduction at Macassar will be 3 504 MWh and 2 300 MWh at Zandfliet.

The same study showed that scheduling and installation of variable speed drives in bulk water supply facilities such as at Witzands, Wynberg and Silverstroom would yield a cost saving of R1 956 966, R785 436 and R460 930 respectively, and emissions reductions in excess of 19 000 tons of CO₂, 84 tons of NO_x, and 168 tons of SO_x per year.

The Electricity consumption reduction at Witzands was calculated to be 13 050 MWh, at Wynberg 5 236 MWh and at Silverstroom 3 073 MWh.

Fortaleza, South America

In the central and northern parts of Brazil, low rainfall created a crisis situation for electricity supply in 2001 by limiting available power from hydroelectric plants. The City of Fortaleza in the northeast state of Ceará faced potential blackouts due to an estimated 20% electric power shortfall.

In an effort to reduce the impact of the electricity shortage, the state identified Fortaleza's water utility as a major potential source of electricity demand reductions.

The water utility is a key player in Ceará's efforts, both because it is one of the largest electricity consumers and because it holds so many opportunities to reduce electricity use rapidly through efficiency.

In 2000 the Alliance to Save Energy started working with Fortaleza in Brazil to:

- develop and implement a comprehensive water management strategy, including a management cell that is responsible for ongoing development and implementation of energy efficiency projects
- assess the potential for energy and water savings
- mobilise community-wide resources to participate in the development and implementation process of a comprehensive water management strategy

Fortaleza has dramatically reduced total energy use by 5 MW in its first year after adopting the energy efficiency goals, while actually increasing service connections.

ENERGY RESOURCES

for local authorities

The full list with all contact details and resource materials can be found on the SEA website (www.sustainable.org.za) and on the City Energy Strategies Conference CD.

Resource organisations

AGAMA Energy SA Tel: 27 21 701 7052;
Fax: 27 21 701 7056; glynn@agama.co.za;
www.agama.co.za

Alliance to Save Energy Tel: 12 02 530 2204;
Fax: 12 02 331 9588; info@ase.org; www.ase.org

City of Cape Town Energy Strategy
Tel: 27 21 918 7424; Fax: 27 21 918 7440; Osman.A
sma@capetown.gov.za; www.capetown.gov.za

Department of Environmental Affairs & Tourism – SA Climate Change & Ozone Depletion; Tel: 27 12 310 3436;
Fax: 27 12 320 1167; kmoroka@ozone.pwv.gov.za;
www.environment.gov.za

Department of Minerals & Energy – SA
Tel: 27 12 317 9566; Fax: 27 12 322 5224
dikgang@mepta.pwv.gov.za

Energie Cites – Europe Tel: 33 381 653680;
Fax: 33 381 507351; info@energie-cites.org;
www.energie-cites.org

Energy & Development Group Tel: 27 21 702 3622; Fax: 27 21 702 3625; admin@edg.co.za;
www.edg.co.za

Energy & Development Research Centre (EDRC), UCT Tel: 27 21 650 3230;
Fax: 27 21 650 2830;
harald@energetic.uct.ac.za; www.edrc.uct.ac.za

Energy Research Institute (ERI), UCT Tel: 27 21 650 3892; markh@eng.uct.ac.za;
www.eri.uct.ac.za

Energy Saving Trust Tel: 44 20 7222 0101;
Fax: 44 20 7654 2444; info@est.co.uk; www.est.org.uk

Groundwork – SA Tel: 27 21 448 8814 / 27 33 342 5662; ardiel@groundwork.org.za;
www.groundwork.org.za

Institute for Transportation and Development Policy (ITDP) Tel: 27 21 671 4655;
awheeldon@itdp.org; www.itdp.org

International Initiative for Environmental Initiatives: Cities for Climate Protection Campaign Africa www.iclel.org/africa/ccp

International Institute for Energy Conservation – Africa office (IIEC) Tel: 27 11 482 5990; Fax: 27 11 482 4723; iiec@iafrica.com

International Network for Sustainable Energy – Inforse Tel: 45 8622 7000; Fax: 45 8622 7096;
inforse@inforse.org; www.inforse.org

Renewable Energy & Energy Efficiency Partnership (REEEP) Tel: 44 20 70 008 4131;
Amal-Lee.Amin@reeep.org; www.reeep.org

South African Climate Action Network Tel: 27 11 339 3662; Fax: 27 11 339 3270;
activist2@earthlife.org.za; www.earthlife.org.za

South African Local Government Association (SALGA) Energy Technical Team Tel: 27 12 338 6750; rbaloyi@salga.org.za

South South North Tel: 27 21 425 1465; Fax: 27 21 425 1463; steve@southsouthnorth.org;
www.southsouthnorth.org

Sustainable Energy Africa – SA Tel: 27 21 702 3622;
Fax: 27 21 702 3625; info@sustainable.org.za;
www@sustainable.org.za

Sustainable Energy Society of South Africa (SESSA) Tel: 27 12 804 3435; Fax: 27 12 804 5691;
info@sessa.org.za; www.sessa.org.za

Resource documents

A User's Guide to CDM Pembina Institute, Feb 2003; info@pembina.org;
www.pembina.org

Climate Change and the Kyoto Protocol's Clean Development Mechanism Margie Orford, 2003, SouthSouthNorth

Climate Change Information Kit
www.unep.ch/iuc/submenu/infokit

Energy Savings in Cities – Issues, Strategies & Options for Local Governments UNEP's Latest Urban Management Series, 2003;
www.unep.org

Energising South African Cities & Towns, Sarah Ward and Leila Mahomed, 2003, SEA

Getting to Grips with Sustainable Energy SECCP, 2003

Green Fleets: Increasing Efficiency and Reducing Emissions Commuting in the Greenhouse: Automobile Trip Reduction Programs of Municipal Employees ICLEI

Landfill Methane Outreach Program United States Environmental Protection Agency; www.epa.gov/lmop

Sustainable Transport: A Sourcebook for Policy-Makers in Developing Countries GTZ, Germany; www.bmz.de

The Economic Significance of Cycling: A study to illustrate the costs and benefits of cycling policy
www.vnguitgeverij.nl

The Energy Book for Urban Development in South Africa Sarah Ward, 2002, Sustainable Energy Africa

Understanding Climate Change: A Beginners Guide to the UNFCCC
www.undep.ch/iuc/submenu/begin/beginner.htm

Resource websites

Best Practice Database (UNCHS)
www.bestpractices.org

Cities Alliance www.citiesalliance.org

City Environmental Reports on the Internet (CEROI) www.ceroi.net

Department for International Development (DFID) www.dfid.gov.uk

International City/County Management Association (ICMA) www.icma.org

International Development 21, University of Sussex www.id21.org

International Institute for Environment and Development (IIED) www.iied.org

International Society of City and Regional Planners (ISoCaRP) www.isocarp.org

International Union for Local Authorities (IULA) www.iula-int.org

IULA Association Capacity Building
www.iula-acb.org

Local Government International Bureau
www.lgib.gov.uk

MUNEE – Municipal Network for Energy Efficiency www.munee.org

Municipal Development Program: Eastern and Southern Africa
www.mdpsa.co.za

Municipal Development Program: West and Central Africa
www.pdm-net.org

One World Guides: the City
www.oneworld.org/guides/thecity

South African Cities Network (SACN)
Info@sacities.net; www.sacities.net

Watergy www.ase.org



SEED Advisors, SEED Links and SEA staff at a SEED Network Meeting. From left to right, back row: Juan Mostert (City of Tshwane), Colleen Crawford Cousins, Monwabisi Boo (City of Cape Town), Wendy Engel (SEA), Pamela Sekonyana (National Dept of Housing). Middle row: Debra Roberts (City of Ekurhuleni), Ronald Maguga (City of Joburg), Else Manale (National Dept of Environment and Tourism), Goldius Baloyi (SALGA), Jacob Dikgang (National Department of Minerals and Energy). Front row: Sarah Ward (SEA), Desmond Khumalo (GreenHouse), Fikiswa Mahote (Development Action Group), Leila Mahomed (SEA).



Sustainable Energy for Environment and Development (SEED) is a Sustainable Energy Africa programme. SEED aims to promote sustainable development through the integration of energy approaches and practices into urban development in South Africa. The programme develops partnerships with national and local government and with NGOs. It builds capacity in these organisations and provides training, supports information campaigns, demonstrations and implementation. SEA is working on developing City Energy Strategies with the partner cities. At a national and international level SEED supports exchange of experience, networking and policy development. SEED is funded by DANIDA and the partner organisations. This guide is part of the SEED Update series

