Durban Landfill Gas to Electricity
CDM Project
AMEU Conference, Durban
October 2007

by

Roy Wienand
(eThekwini Municipality, Durban, SA)
Contents

This will be a 20 minute picture ride through our experience over the past 5 years from 2002 to 2007.

These were the major steps in getting a landfill gas to electricity, CDM project going in Durban SA when no one else had done it yet.
DANGER - LANDFILL GAS
kunobungosi besisisingadala
umlilo kulesizinda
semsucuza
THE WARMING WORLD!
EXCLUSIVE
Seven new projects set to receive ongoing tax break

FEATURES
- Automotive industry Page 7
- Paper, pulp and board Page 18

NEWS FOCUS
Big value-extraction focus at $1bn Dubai airport project

HOT STUFF
South Africa and carbon trading
Global warming: be afraid

It takes a planet to adapt

- **CHINA**: The government is committed to sourcing 10% of the country's energy from renewable sources such as wind and solar power by 2010. Trees line many roads throughout the country. They are part of a government project aimed at preventing desertification, especially in the fertile Yellow River region.

- **JAPAN**: Geothermal stations supply 15% of all power used in their area. Tokyo Railway's 5,000 series generates electricity from its braking system and it uses 40% less energy than conventional models. Technology is used to harness solar power from the warmth stored in the sea. Ocean thermal energy conversion uses the difference in temperature between upper and lower layers of water to drive a power-producing cycle. A power station has been built on a dormant volcano. Hot magma heats cold water deep underground to produce huge quantities of steam, which drives turbines.

- **INDIA**: A water-harvesting programme in Rajasthan means the wells do not run dry while the hills are green owing to retention of the water in the soil.

- **MEXICO**: To overcome emissions which result from millions of people commuting to work over vast distances, earthquake-proof, energy-efficient flats, decent water transport are being put in place. The aim is to stop their urbanisation sprawl.

The top picture shows the Upsala Glacier in Patagonia, Argentina, as it appeared in 1928. Above is the same glacier in 2004.

**Pictures: REUTERS**

**Thesaurus**

Contrasting images demonstrate the extent to which climate change has caused ice to melt away over 100 years. The top picture shows the Upsala Glacier in Patagonia, Argentina, as it appeared in 1928. Above is the same glacier in 2004. Pictures: REUTERS

- People rely directly on the mountains for water for themselves and their cattle. So do many game parks teeming with animals. Elephants driven out flooding, the planting of crops will become more difficult. About 150,000 people die each year from the side-effects of global warming - ranging from which carry a lifeline of water to the wine and fruit farms, and feed the electricity industry. These water channels are heavily dependent on snow melt

- Japan

- **CALIFORNIA**: This American state has introduced a law stating renewable energy must be the source of 20% of electricity sold by 2017. Only cars with multiple passengers and low emissions are now allowed access to a dedicated lane which traffic moves freely.

- Hollywood Freeway in downtown Los Angeles. Legislation has been passed to Reid greenhouse gas emissions from new motor vehicles as of 2008. Sun and wind account for most of the heating and cooling of the Colorado Court building in Santa Monica. Photovoltaic exterior panels also export such power into town's grid.

- **INDIA**: A water-harvesting programme in Rajastan means the wells do not run dry while the hills are green owing to retention of the water in the soil.

- **MEXICO**: To overcome emissions which result from millions of people commuting to work over vast distances, earthquake-proof, energy-efficient flats, decent water transport are being put in place. The aim is to stop their urbanisation sprawl.

**Mexico**

- Sun bouncing off corn and tomatoes, together with...
Can we survive change?

At a climate change conference in Pietermaritzburg, experts predicted what South Africa can expect as global warming changes life on the planet. Myrtle Ryan attended

Our natural heritage heads south

HURRICANE Katrina highlighted the fact that disaster management is often neglected, said Prof. Colleen Vogel, a climatologist attached to the University of Witswatersrand’s School of Archaeology, Geographical and Environmental Studies.

Speaking about the impact of climate change on people, Vogel said vulnerability assessments were crucial when assessing aid. She cited a recent study in Zambia by the UK’s Save the Children Fund.

This study in two affected communities found that the government was planning more distribution, whereas the requirement was rather for sorghum and millet.

Also, because of the lack of jobs, money would have been preferable, said those interviewed, because this would have allowed the community to buy what they really needed.

For his part, the CSIR’s Prof Bob Scholes, an ecologist, has been working on the problems of global change since 1990.

Temperatures

"As the world warms, some species may become extinct,“ Scholes said. He gave an example of 20 species of butterflies, 97% of which had shifted between 26 and 29 km southwards since 1900.

"We now see hawksbills in Johannesburg, while Kruger Park has seen a disappearance of Hartlaub's painted stork,“ Scholes said.

"A survey into the aloe clitharea has found that the aloe populations are dying as it gets warmer. Only in the Drakensberg mountains, where it is cooler, are they surviving,“ Scholes said.

He spoke at a seminar in the University of the Witwatersrand’s School of Geographical and Environmental Sciences.

This is a photo of a scene in New Orleans, Louisiania. The scene was taken in 2001, showing the damage caused by Hurricane Katrina.
Mars
Thin atmosphere
(Almost all CO₂ in ground)
Average temperature: -50°C

Earth
0.03% of CO₂ in the atmosphere
Average temperature: +15°C

Venus
Thick atmosphere containing 96% of CO₂
Average temperature: +420°C

“There are lies, damned lies and statistics”

Benjamin Disraeli
CO$_2$ emissions from industrial processes

Source: United Nations framework convention on climate change (UNFCCC).
So the question is what can we do?
Don’t waste your waste. Turn it into energy.
Harnessing Methane Emissions
Gas Collector Wells in Landfill Site

Production of Landfill Gas (CH₄, CO₂)

Landfill Gas Pump & Flare Station

Destruction of Methane (CH₄)

Landfill Gas Engine and Electricity Generator

Generation of Electricity

Step-up Transformer

Supply to Municipal Electricity Grid

GE Jenbacher

Production of Landfill Gas (CH₄, CO₂)
So what are the main (Essential) steps in a CDM project?
GOOD WORK, BUT I THINK WE MIGHT NEED JUST A LITTLE MORE DETAIL RIGHT HERE
The Durban LFG-to-Elec CDM Project

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>First contact with PCF/World Bank</td>
<td>November 2001</td>
</tr>
<tr>
<td>Letter to the Mayor of from PCF/World Bank – Ken Newcombe (PCF) – Mayor Mlaba meeting at WSSD 2002 –</td>
<td>May 2002</td>
</tr>
<tr>
<td>Letter from DNA of Conditional Approval for CDM project – MOU between eThekwini and PCF –</td>
<td>August 2002</td>
</tr>
<tr>
<td>Report to full Council and EXCO on Project – Council Approval – Commence EIA’s –</td>
<td>November 2002</td>
</tr>
</tbody>
</table>
The Durban LFG-to-Elec CDM Project

- Started construction …. “Component One” - 
- Final Revised ROD for “Component Two” (Bisasar) - 
- CDM Registration of Component 1 (Mariannhill & La Mercy) - 
- Commissioning of Mariannhill & La Mercy Flares & Gens - 
- Initial Verification of Component 1 – 
- “Component Two” (Bisasar) Start Construction – 
- Delivery of 1st CER’s (“Component One”) - 

January 2006 
August 2006 
November 2006 
Nov~Dec 2006 
January 2007 
March 2007 
May 2008
Emission Reduction Purchase Agreement (ERPA)

DURBAN LANDFILL GAS TO ENERGY PROJECT

3,800,000

Emissions Reductions $tCO_2e$

Jul 31, 2004

[Signatures]

Prototype Carbon Fund

The Municipality of eThekweni, Republic of South Africa
Actual costs and income

- Component 1. Two sites of 1MVA and 500kVA
- Capital cost to date R 19 Million
- Approximate income for first year R 2.18 Mil based on $ 2.95 per credit from the PCF
- Payback is approx 9 years (very poor)
- But this was a pilot project, at very low carbon rates, and with no generation from the La Mercy
Projected costs and income

- Component 2. One site of 4MVA initially
- Capital cost approximately R 36 Million
- Estimated income pa  R 16.5 Million based on 8 euros per carbon credit from the open market
- Payback period approx 2.5 years
- Much better but still only estimates
The Durban Landfill-Gas-to-Electricity CDM project is financed by grant donor funding from:

DTI

[Department of Trade and Industry's Critical Infrastructure Programme (CIP)]

and loan funding from:

AFD

[Agence Francaise De Development]
Tight Times!!

The MFMA
(Act No. 56 of 2003)

“The sale of Immaterial Goods”
CDM PROJECT: OFFICIAL LAUNCH

THE ETHEKWINI MUNICIPALITY - WORLD BANK PROTOTYPE CARBON FUND'S DURBAN LANDFILL GAS TO ELECTRICITY CLEAN DEVELOPMENT MECHANISM (CDM) PROJECT

OFFICIAL LAUNCH OF THE COMMISSIONING OF THE MARIANNHILL AND LA MERCY LANDFILLS CDM PROJECT

Mariannhill Landfill Site
Conservancy Boma
Tuesday 20th March 2007
10h00 – 12h00

RSVP
Thandeka Meyiwa
Tel: +27(0)31 263 1371/2
E-mail: ThandeMe@dmws.durban.gov.za
Mobile: +27(0)76 033 23 79

Lindsay Strachan (Project Manager)
Tel: +27(0)31 263 1371/2
E-mail: Lindsay@dmws.durban.gov.za
Mobile: +27(0)83 631 2682
Durban landfills generate power

SAMANTHA ENSLIN

Durban – The eThekwini municipality will proceed with a project to generate electricity from landfill gas at Bisasar Road after the successful completion of two pilot projects.

Lindsay Strachan, the project manager of the clean development mechanism project, said yesterday: “We have environmental approval and are going ahead with the construction.”

The Bisasar Road project could generate up to 8 megawatts of electricity from landfill gas. Phase one will cost R40 million, partly funded by the sale of carbon credits.

Pilot projects at Marianhill and La Mercy cost R19.5 million and already supply 1.5MW of electricity. Revenue over their 14-year life will be R20.7 million from carbon credit sales and R13.2 million in electricity sales. Annual costs are R1.2 million.

eThekwini has signed for a R58.74 million loan with French development bank AFD. The trade and industry department will provide R17.7 million for critical infrastructure.

Bisasar Road is South Africa’s busiest landfill, handling up to 5 000 tons of rubbish a day.

The methane gas generated by the rubbish, a more potent greenhouse gas than carbon dioxide, is extracted at low pressure and blown into a flare unit to generate electricity.

Strachan said the sites would cut greenhouse gas emissions by 4 million tons over their life spans.
Electricity from landfill methane

Allan Jackson

This month sees the launch of phase one of a project which will reduce carbon dioxide emissions in the region by an estimated four million tons. The project is an initiative by DSW to convert harmful methane gas from its landfill sites into electricity instead of allowing it to enter the atmosphere and add to the greenhouse effect.

Project manager Lindsay Strachan from Durban Solid Waste (DSW) said that phase one and phase two of the project was expected to reduce emissions to the tune of four million tons of carbon dioxide over the life of the project.

Elsewhere in KZN, the uMntabane Municipality...
2010 .... and the legacy beyond
2010 .... and the legacy beyond
Thank you

Discussion / Questions