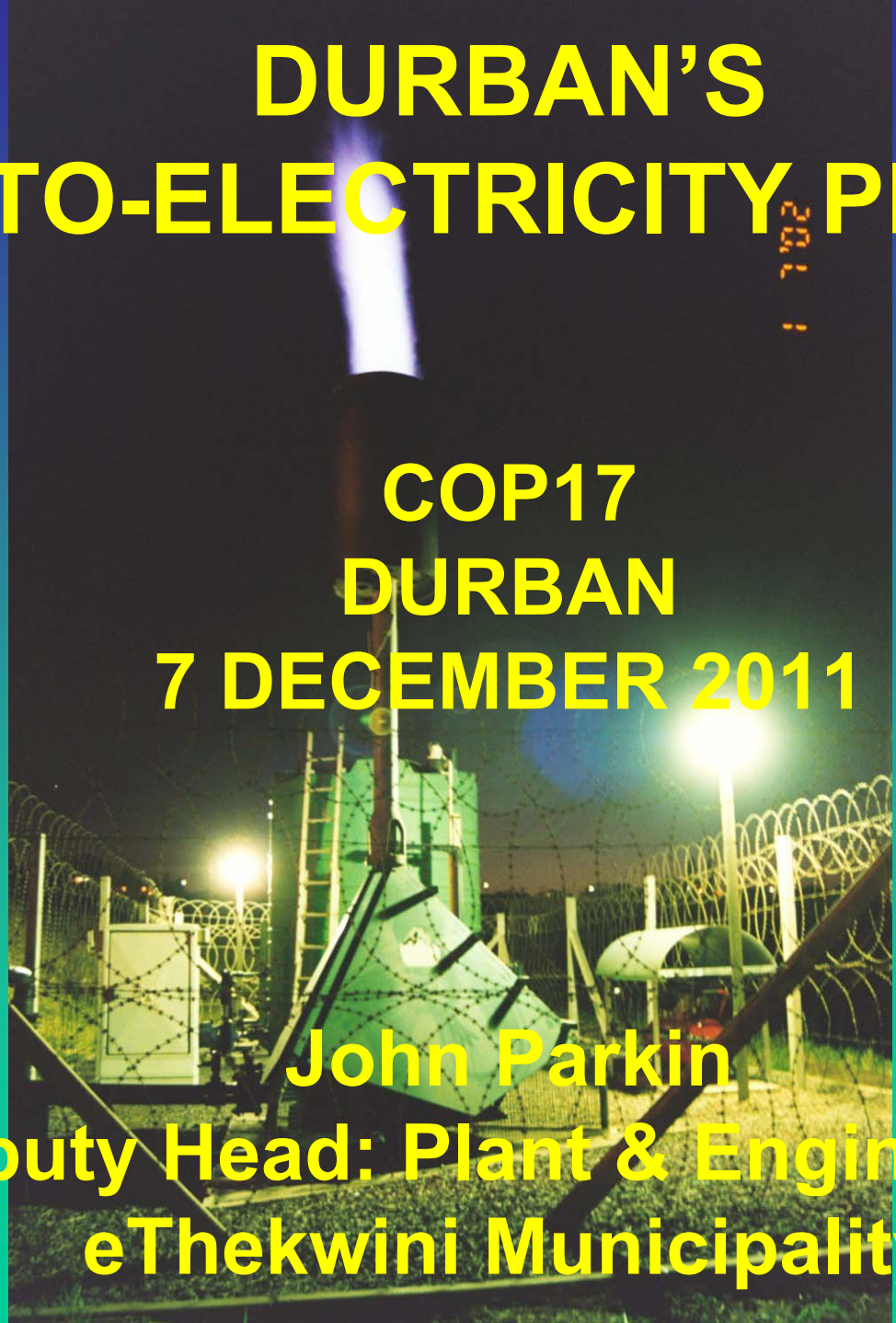
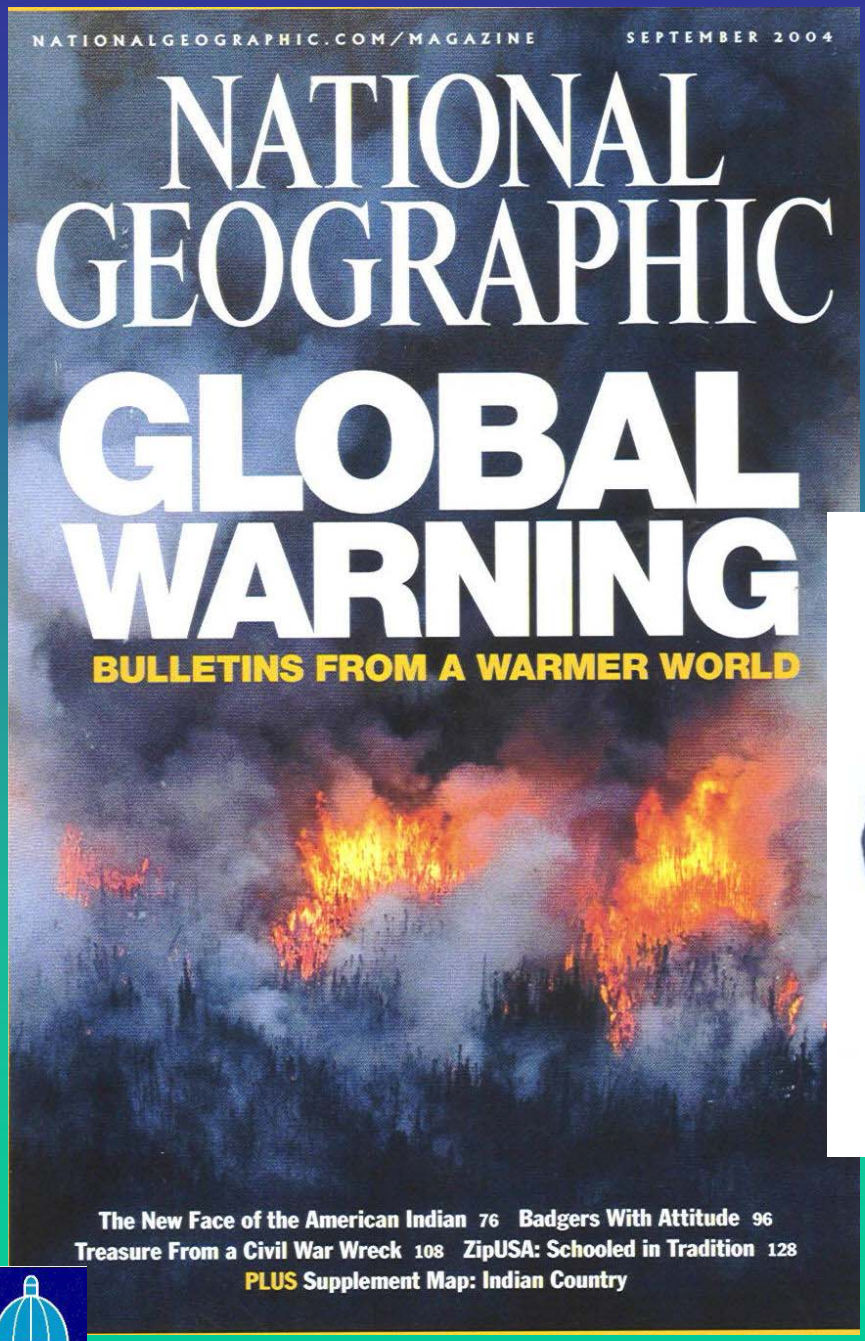
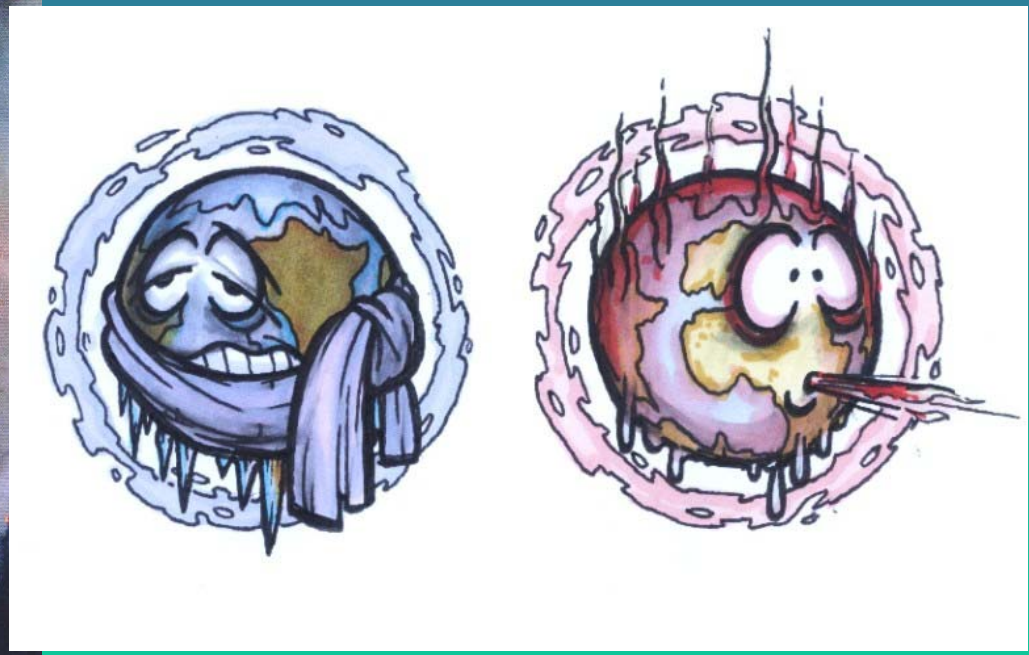
DURBAN'S GAS-TO-ELECTRICITY PROJECT



COP17
DURBAN
7 DECEMBER 2011

John Parkin
Deputy Head: Plant & Engineering
eThekwini Municipality





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PROOF OF GLOBAL WARMING

GAS PRODUCTION

“A rule-of-thumb is that 6 – 10m3 of landfill gas will be produced per ton per year for 10 – 15 years from placement”

(Robert Eden, et al; 2002)

- Roughly 500Nm^3/hr from every 1 mt of waste.

- 1MW electricity from every 700Nm3/hr of gas

AFRICA'S FIRST LANDFILL GAS CDM PROJECT

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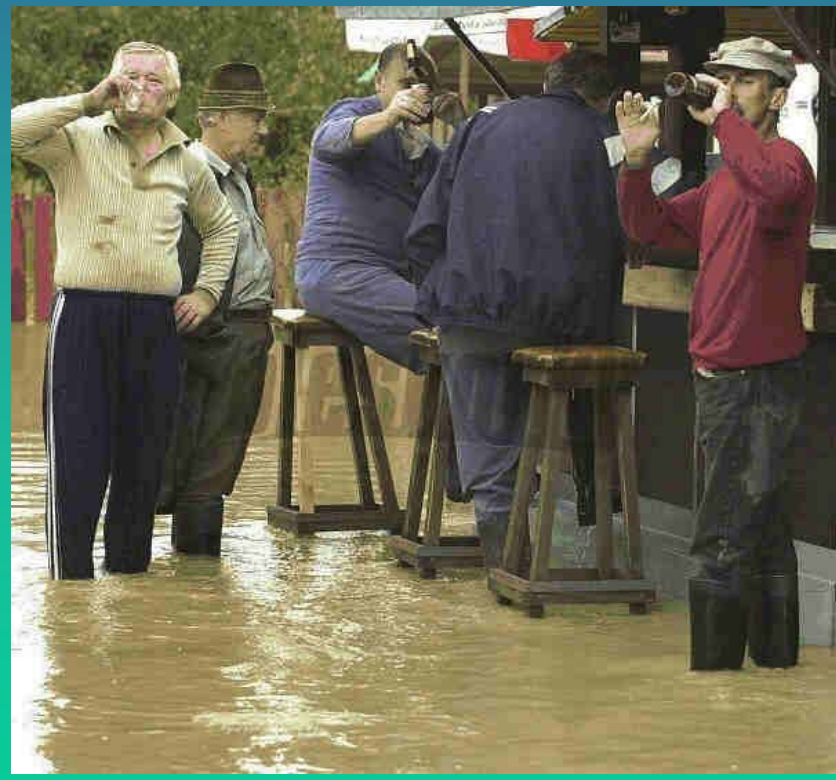

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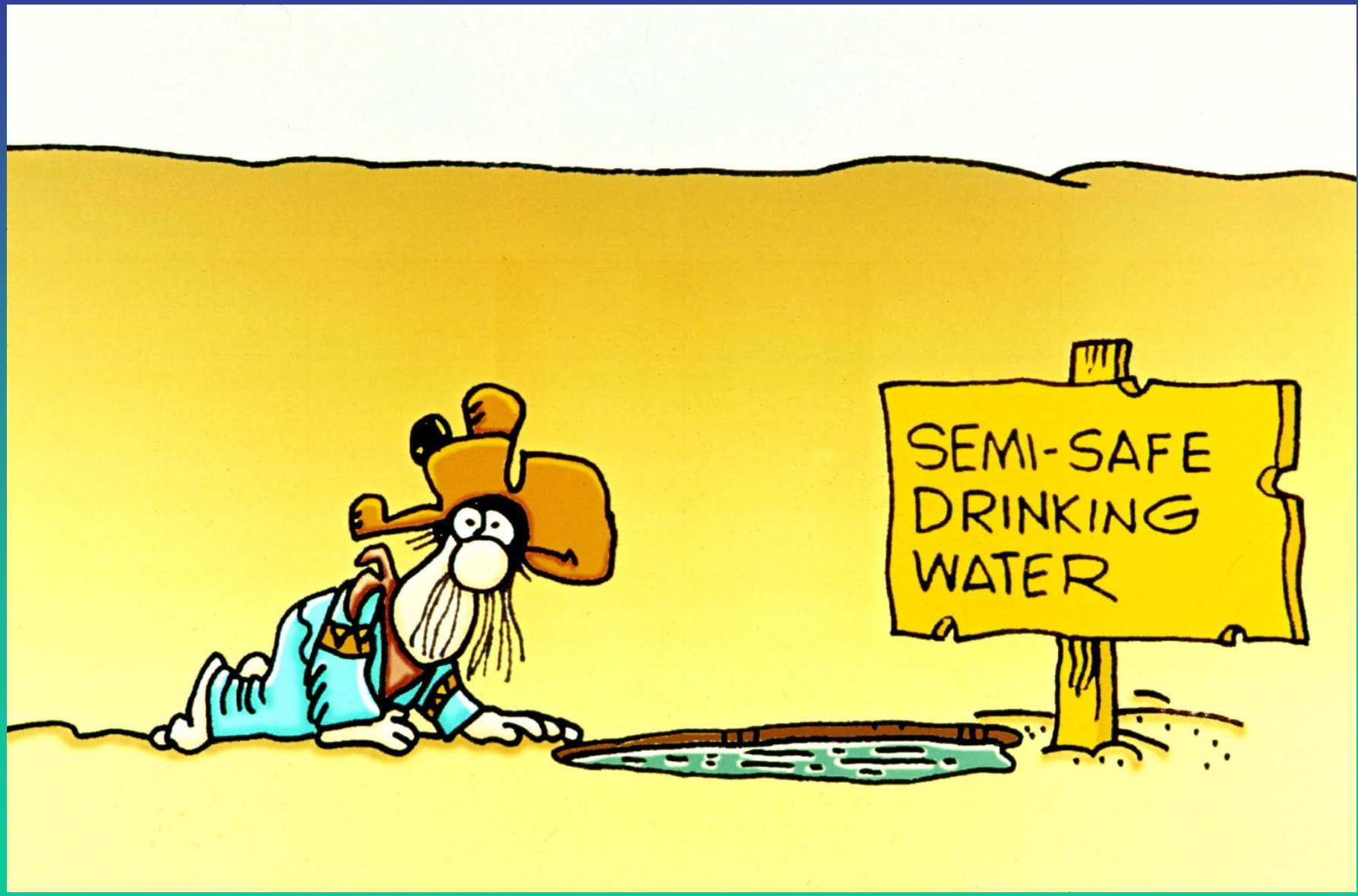
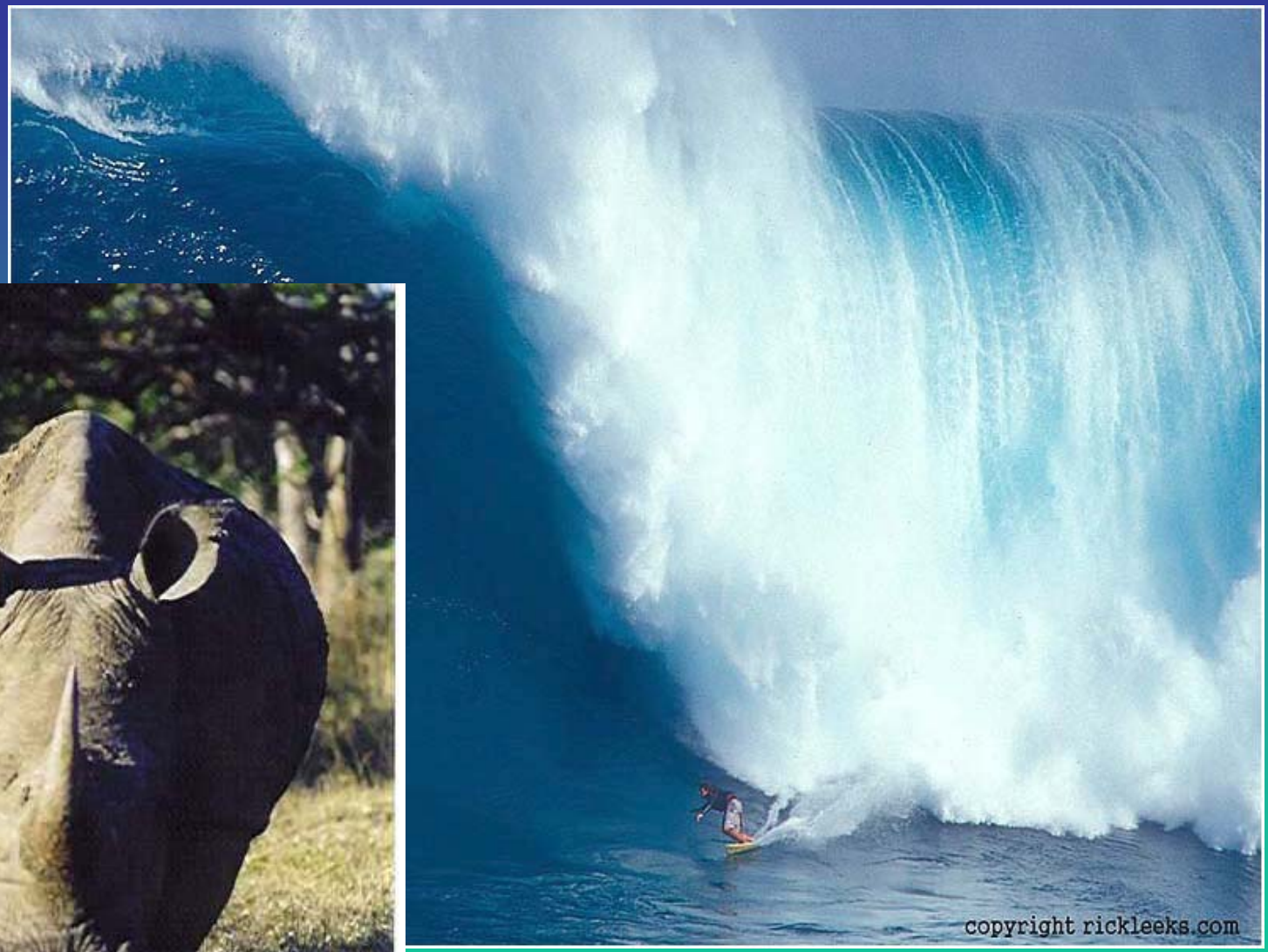

SEMI-SAFE
DRINKING
WATER



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UNSUSPECTING & NAIVE

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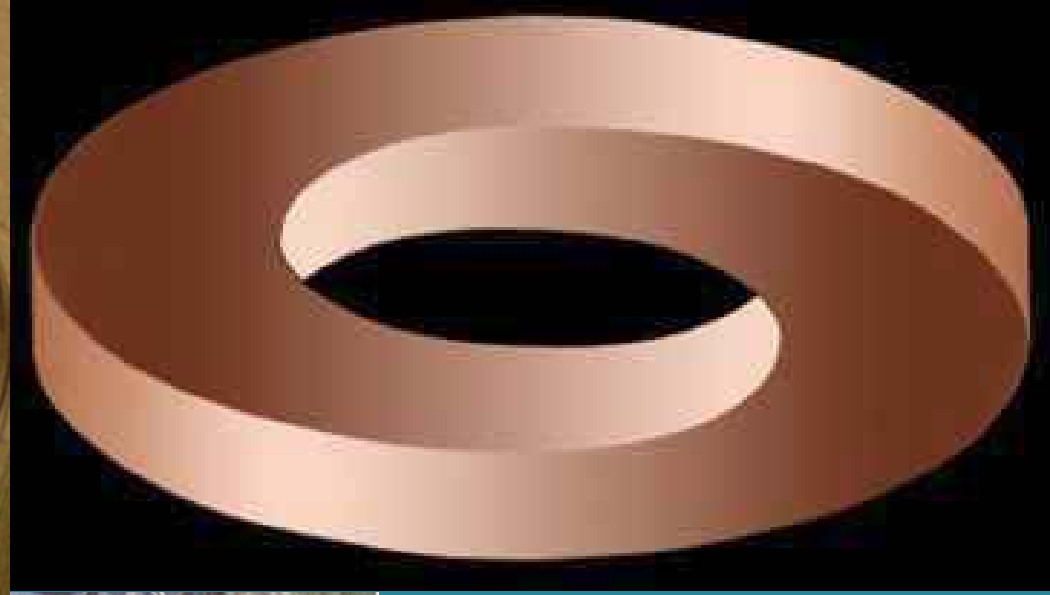

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BITTEN OFF MORE THAN WE COULD HANDLE

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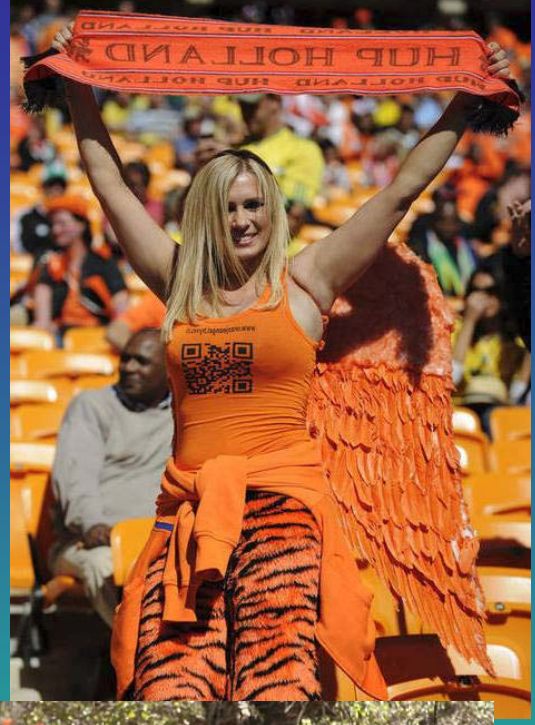
CHAMPION

PASSIONATE



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MARIANNHILL LANDFILL

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1 MW ENGINE

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BISASAR ROAD LANDFILL

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COMMISSIONED 6,5 MW JULY 2009

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The CDM Project Process

- PIN
- PCN
- Conditional Approval from DNA (DME)
- Base-Line Study
- Validation Report
- MP (Monitoring Plan)
- PDD (Project Design Document)
- Comment from Public and Stakeholders
- EIA Process and obtain ROD for Project
- Verification of Project
- Final DNA Approval
- Project Registration with CDM Exec Board

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LFG-to-Elec CDM Project Time Frames

First contact with PCF/World Bank	November 2001
MOU between eThekwini and PCF –	February 2003
Commence EIA's –	July 2003
Adhoc Approval for funds –	October 2003
ROD's for Mariannhill and La Mercy ("Component One") –	July 2004
Appeal against "Component One"	August 2004
Appeal response to Minister of DAEA for "Component One" –	September 2004

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LFG-to-Elec CDM Project Time Frame Cont

ROD Bisasar ("Component Two") –	October 2004
Started construction …. "Component One"	January 2006
Final Revised ROD for "Component Two" (Bisasar) –	August 2006
CDM Registration of Component 1 (Mariannhill & La Mercy) –	November 2006
Commissioning of Mariannhill & La Mercy Flares & Gens –	Nov~Dec 2006
Initial Verification of Component 1 –	January 2007

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LFG-to-Elec CDM Project Time Frame Cont

"Component Two" (Bisasar) Start Construction –	March 2007
Verification of "Component 1" Year 1	January 2008
Commissioning of Bisasar Rd Flare & Engines	March 2008
Registration of Component 2 (Bisasar Rd)-	March 2009
Commissioning of 6 MW Component 2 (Bisasar Rd)	July 2009
Verification Commencement	November 2009
Issuance	30 December ????

Calculated Emission Reductions (in tons)

Site	Methane Destruction	Electricity Generation	TOTALS
Bisasar Road	5,295,296	800,704	6,096,000
Mariannhill	1,112,568	112,344	1,224,912
La Mercy	488,972	24,511	513,483
TOTALS	6,896,836	937,559	7,834,395

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THE TEAM

- In House Project Management
- Legal Imbewu Environmental Legal Services
- Gas Specialist SLR Ltd (UK)
- Civil Consultants Wilson & Pass Inc.
- PCF World Bank
- DTI & DoE
- French Development Bank
- EIA Felehetsa / WSP Environmental
- External Verifiers (was SGS now DNV)
- CER Purchaser

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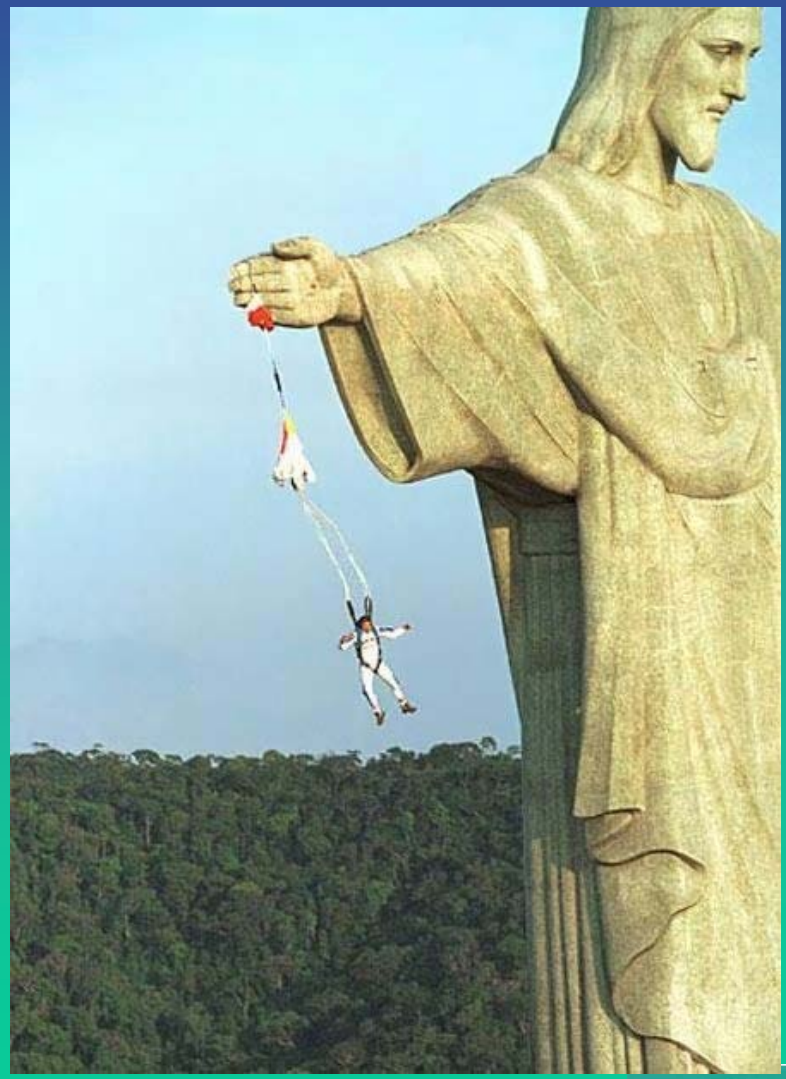
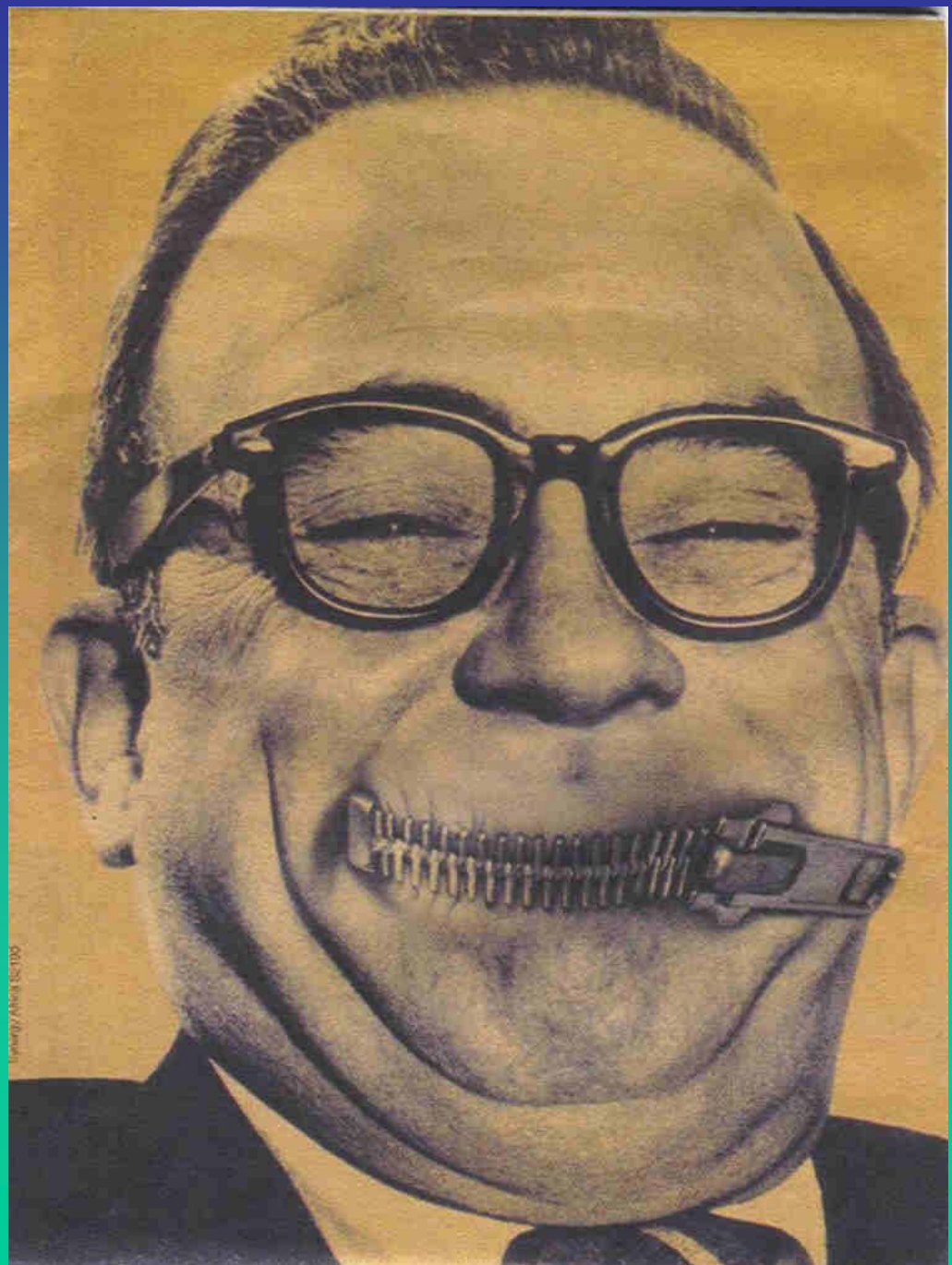
WHEN THINGS GO WRONG





ADMINISTRATIVE CHALLENGES

- MFMA & SCM don't deal with out of ordinary processes
- EIA Process problematic
- Registration by UNFCCC Ex Board long, tedious & pedantic
- Inconsistent decisions by Ex Board
- No direct access to Ex Board
- Monitoring Onerous, Expensive
- Language is often a barrier
- Drawn out process
- Whole process is costly
- DOE accreditation

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TECHNICAL CHALLENGES

- Lack of Expertise & Resources
- Extreme weather conditions
- Excess leachate; poorly run site
- Manufacturers supplying incorrect equipment
- Lack of sharing information
- Lack of Experience / Technical Ability

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OPERATING CHALLENGES

- Service Suppliers lack of Expertise
- Cost of Spares & oil
- Cost of Services
- Availability of Spares
- Need good Quality Assurance
- Monitoring: correct procedures
- Logging of raw data & interpretation
- Verification

LEASONS LEARNED

- Be wary of “Experts”
- Easier to deal with Technical challenges than Political & Administrative issues
- Running of Landfill is as important as the Extraction Process
- Carry out a pre Verification Inspection, saves a lot of stress at verification but not time
- Add 10 months to any time frame given
- Cash flow is a major problem

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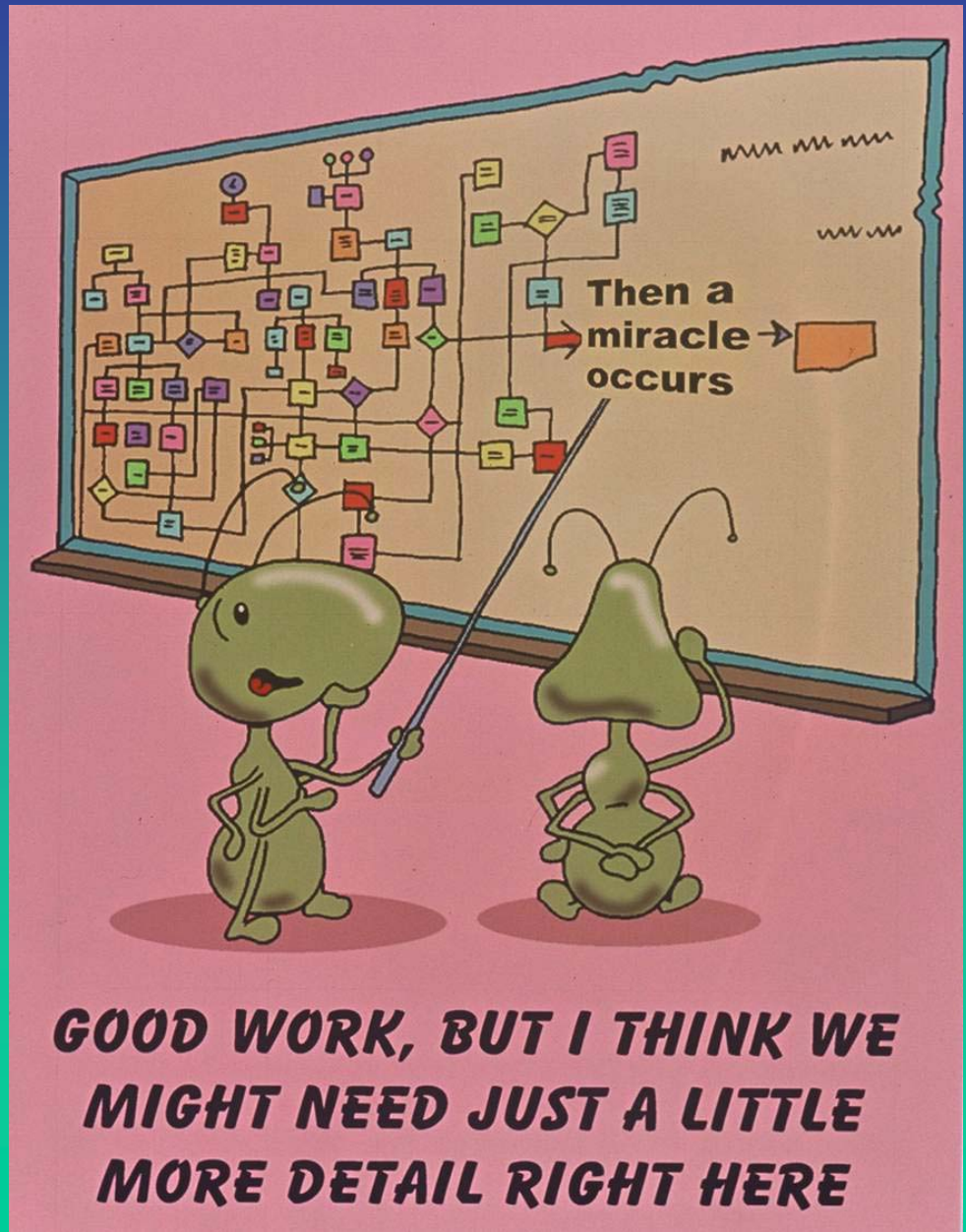
WE'RE STILL LEARNING



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SHOW ME THE MONEY

Project Review

- The capital and operating expenditures of the project are supported by two revenue streams:
  - **Sale of Carbon Credits**
  - **Sale of Electricity**
- **Without the sale of carbon credits, the project would not be financially viable.**

CURRENT STATS

- 7.5 MW Generation of Electricity
- Electricity Supply to 3 750 small houses
- Total LFG Flow ~ 4 200 Nm3/hr at 55% CH4
- 20 000 Tons CO2 equivalent destroyed per month

CASH FLOW

INCOME

- ELECTRICITY SALES
  R1 650 000 / month
- CARBON CREDITS
  R1 600 000 / month
- TOTAL
  R 39 000 000 / annum

EXPENDITURE

- CAPITAL EXPENDITURE
  TO DATE R114 000 000
- ANNUAL OPERATING
  R12 000 000

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Concluding Comments

-Landfill gas offers a viable renewable energy source only when linked to Carbon Finance or CDM (R0.65/kWh)

-VER's may be more viable than CER's due to over the top requirements of UNFCCC Process

-The EIA process has over-ripened this fruit – lost two years

- Lack of Technical Skills is restricting expansion in Africa

-Implementation of proven technologies is a must

-Distance from Europe is detrimental to fast reaction

-Exchange rate has a dramatic influence on cash flow

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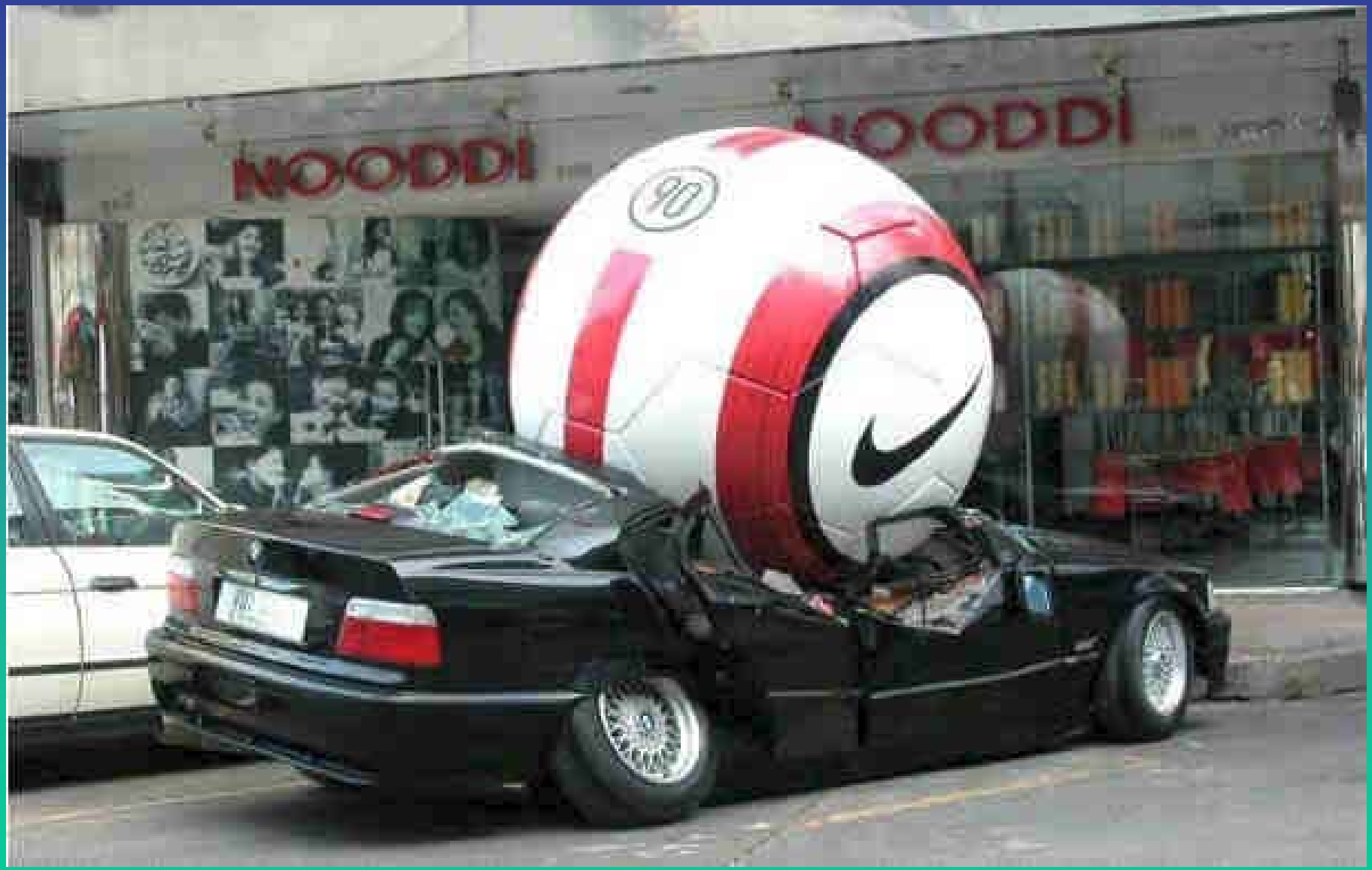
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EXCEEDED EXPECTATION

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THANKS

HOPE THINGS ARE CLEARER

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