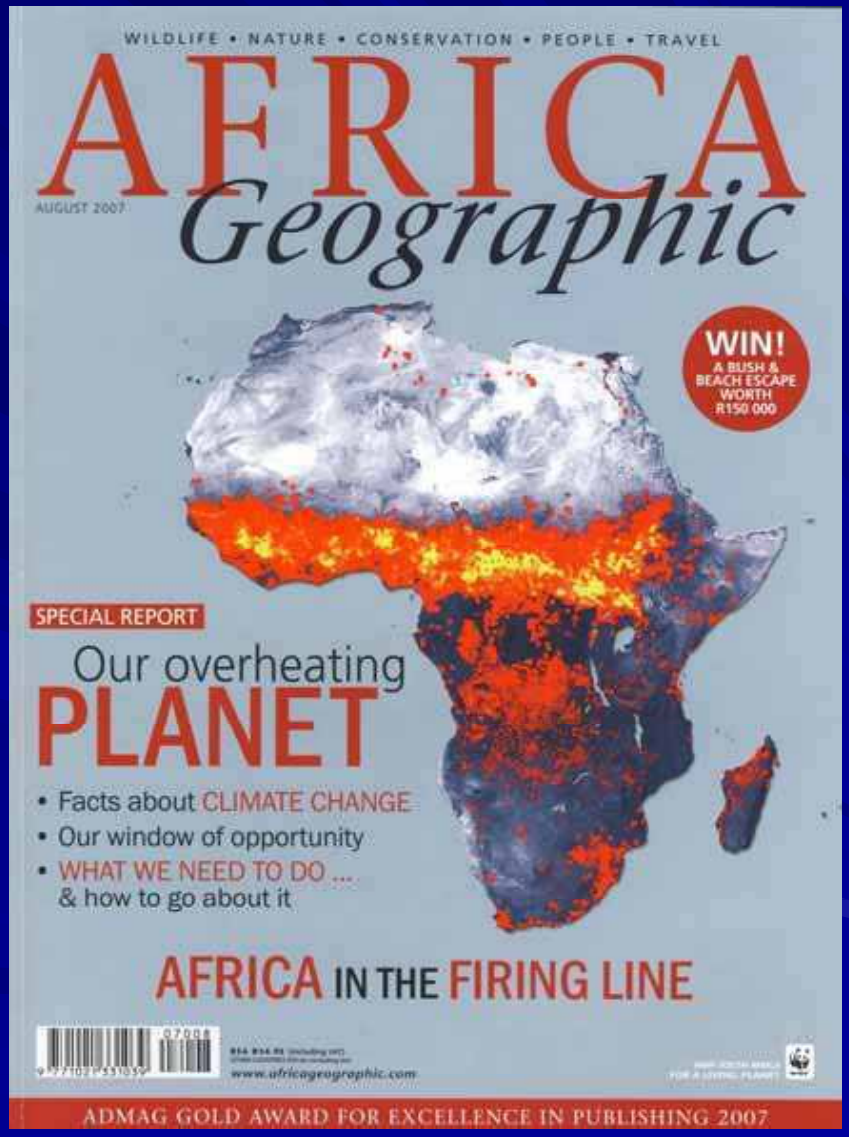
Energy Alert 2008

HAS THE CLIMATE CHANGE DEBATE DISTRACTED US FROM OTHER IMPORTANT ISSUES?

John Ledger

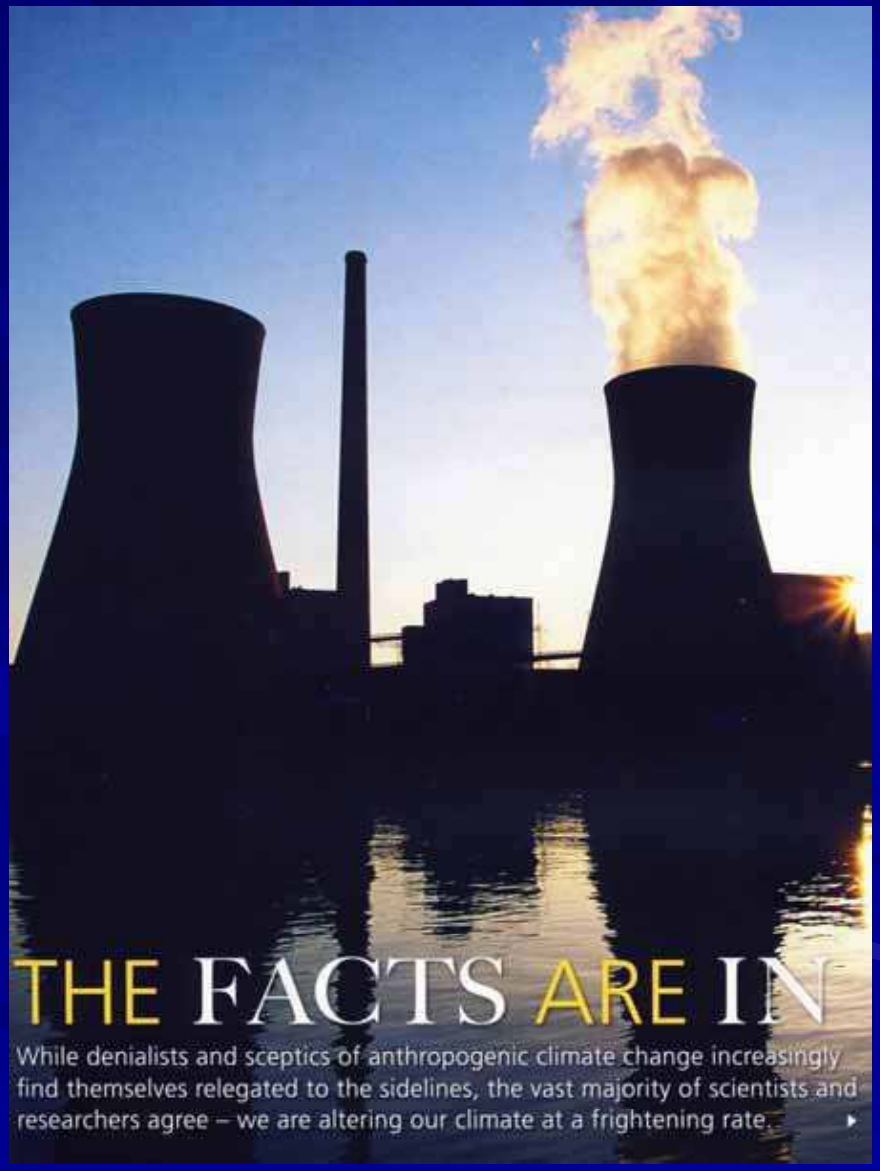
Global Warming – All the Rage

- Climate change and related subjects take up a disproportionate amount of human energy and attention
- Other important issues have dropped off the agenda
- Some basic flaws in climate science have been papered over

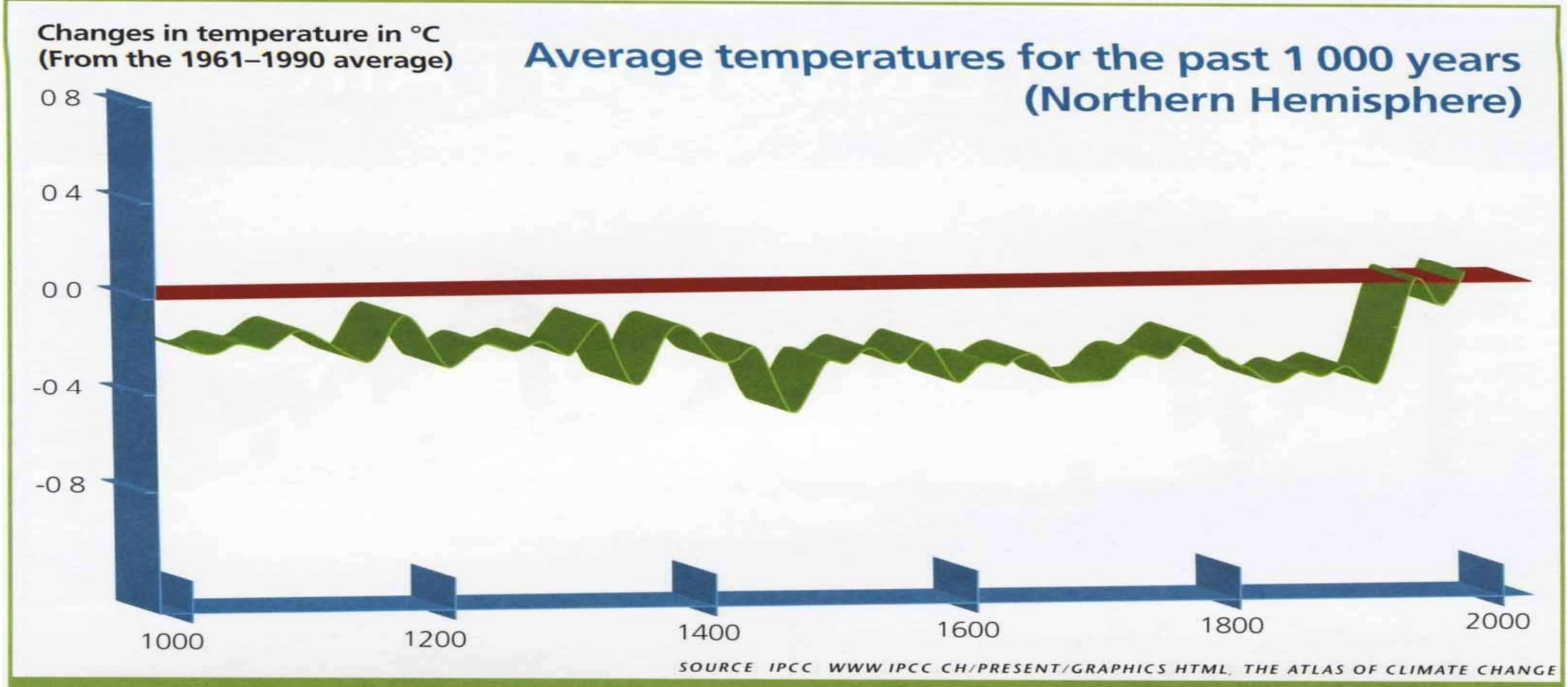


Global Warming – All the Drama

- The polarization of opinions on climate change has resulted in a divided scientific community.
- Modern temperature records show clearly that temperatures have been rising
- What is not clear is the role of human activities



Dr Mann's Hockey Stick - 1998



The hockey stick

In 1988, using many indicators of former temperature regimes such as tree rings, ice cores and coral samples, climatologist Michael Mann and his colleagues published the now famous 'hockey stick' graph. It was the first comprehensive attempt to work out the average temperature in the northern hemisphere over the previous 1 000 years. It shows that, whereas temperatures held steady with a slight declining trend for most of the period, there was a sudden and substantial rise from the second half of the 20th century. Despite many attempts to discredit Mann's work, some even pointing to fraud, the hockey stick is widely regarded as being pretty close to the mark

Dr Mann's Hockey Stick Critics

- Top graph is tree ring proxies using Mann's methodology
- Lower graph is the same data using the "correct" methodology (according to the critics)
- They say the hockey stick is a product of the statistical methodology

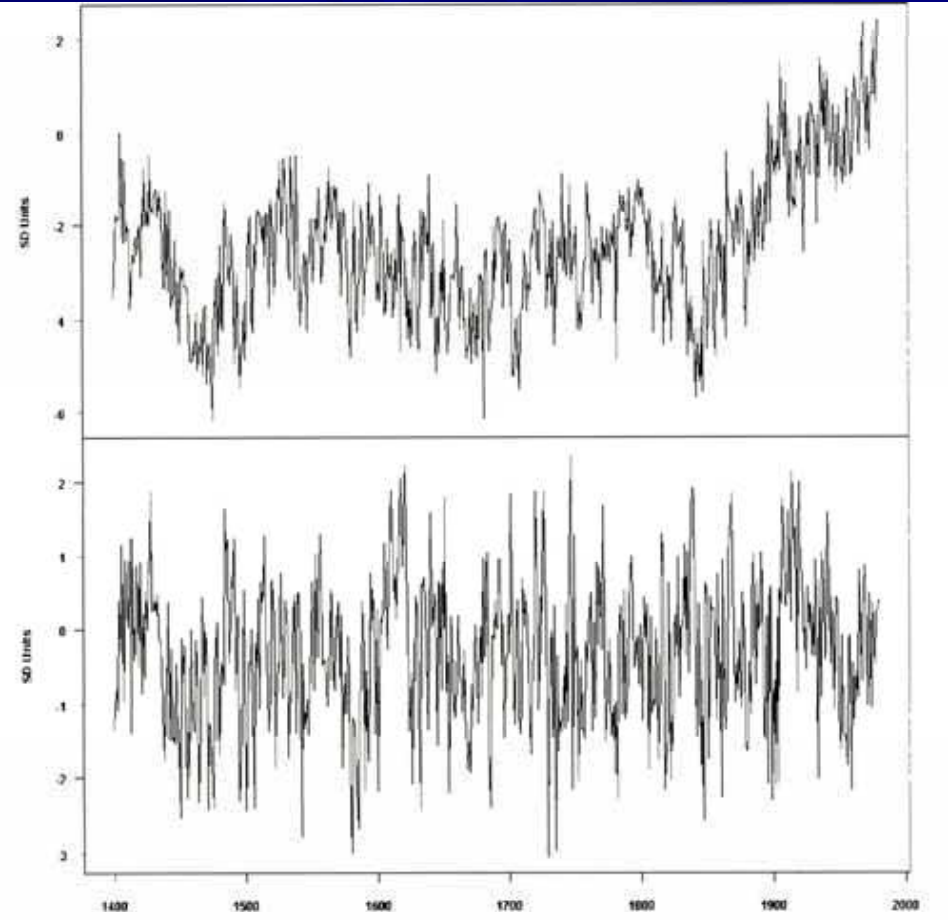


Figure 4.3: This is a recomputation of Figure 3 from MM05b. The North American Tree Network PC1 is a proxy featured prominently in MBH98. It is a PCA reconstruction of a series of tree ring proxies using the MBH98 methodology. The upper panel is the PCA reconstruction using the MBH98 data transformation. The lower panel is the reconstruction using the centered PCA methodology.

IPCC's view of temperatures in 1990 before the Hockey Stick publication in 1998

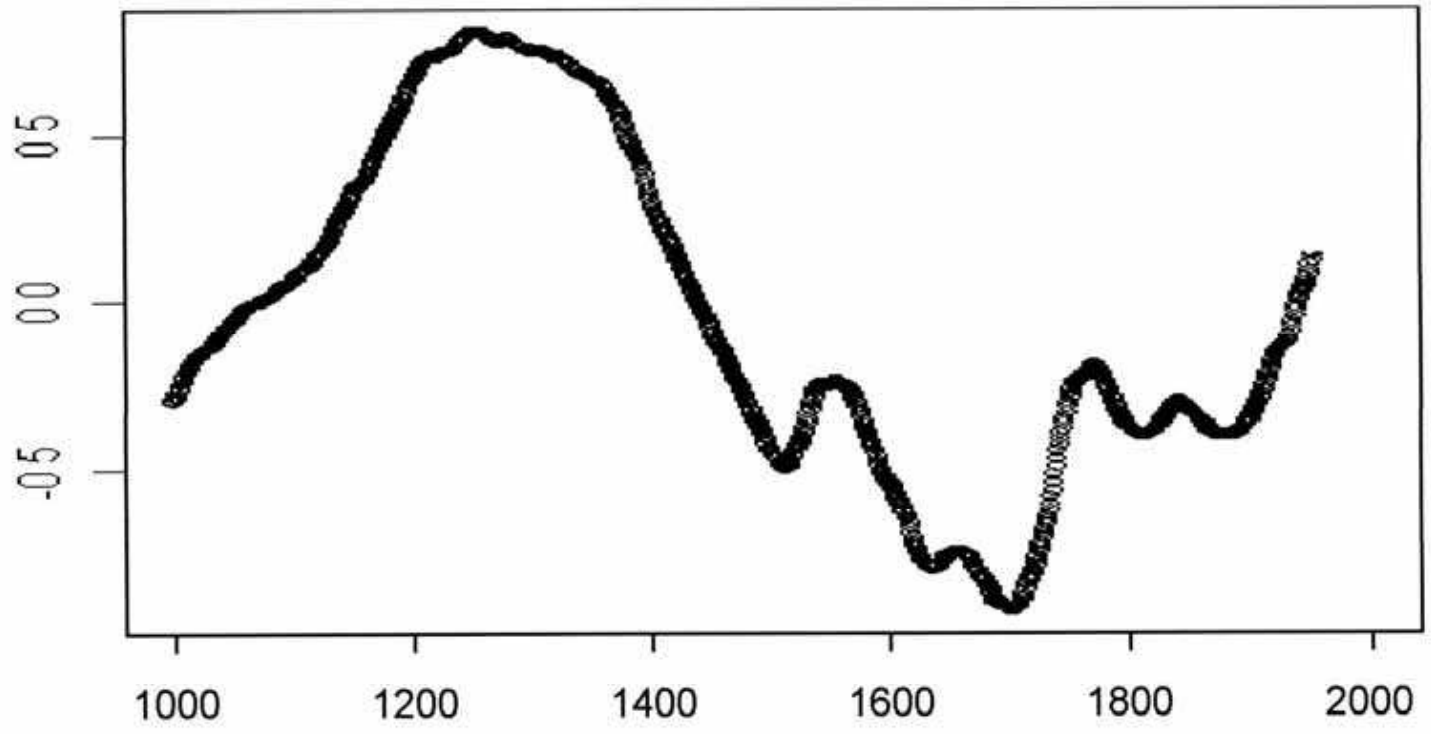
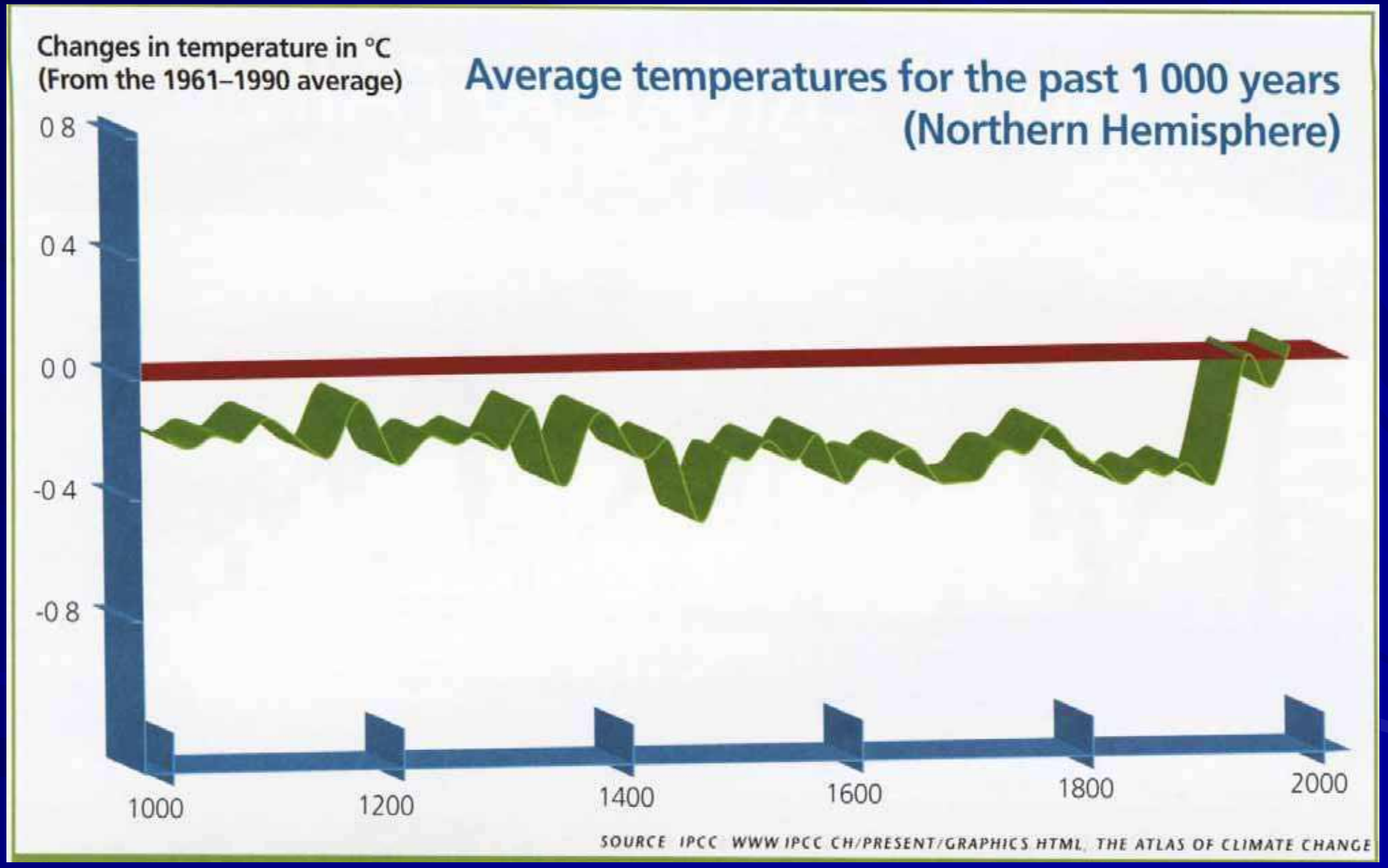


Figure 4.5: Here we have digitized the temperature profile as presented in the IPCC Assessment Report 1990. The early period between 1100 to about 1400 of above average temperatures is known as the Medieval Warm Period and the period from about 1500 to 1900 is known as the Little Ice Age.

IPCC's view of temperatures now



Medieval Warm Period Censored?

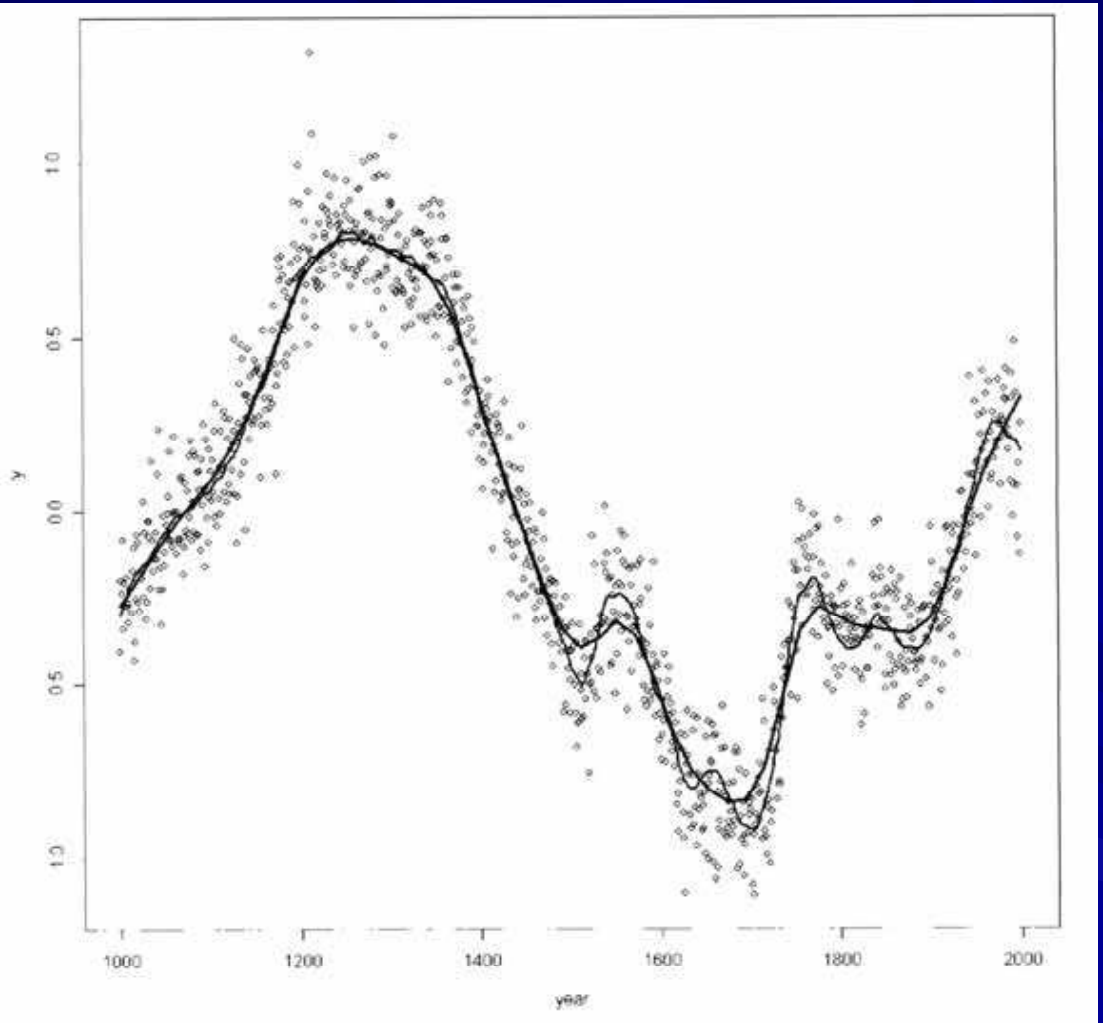
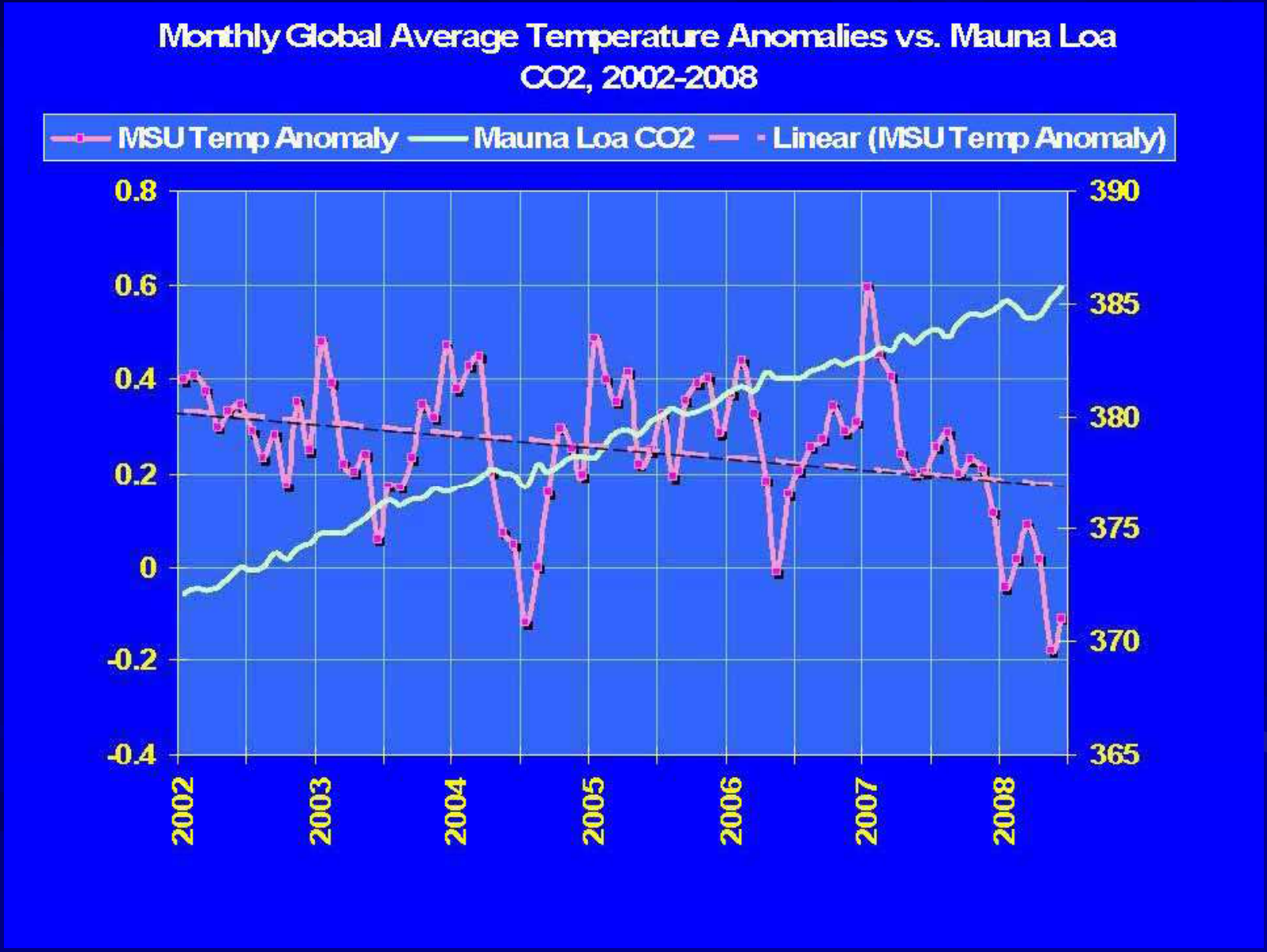
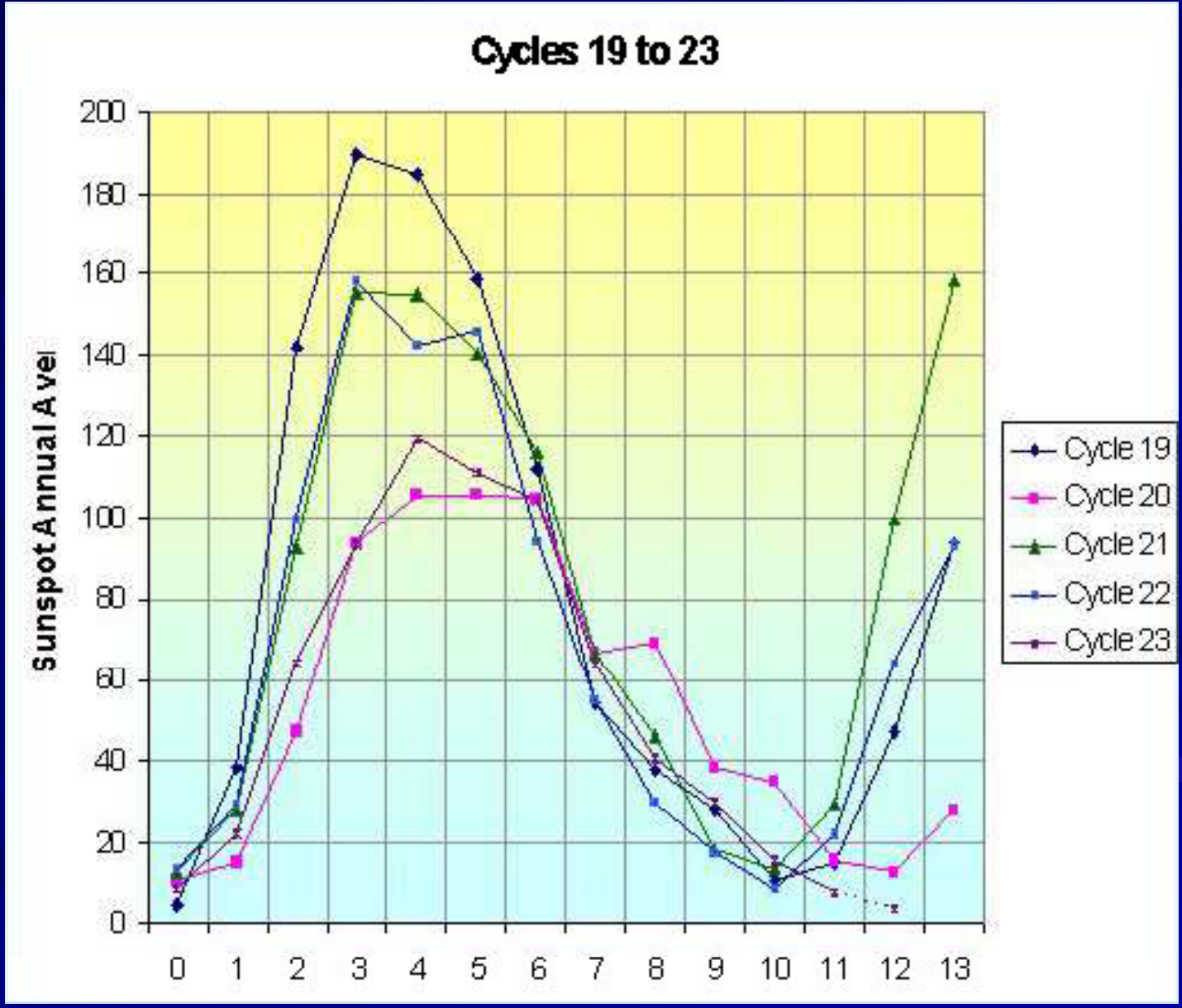


Figure 4.7: In this illustration, we created a different pseudo-proxy scenario by taking 70 copies of the Figure 4.5 profile and adding independent white noise processes to it. We then applied the CPS methodology to these pseudo-proxies to obtain another 'reconstruction' of the Figure 4.5 profile.

Another view: www.icecap.us



Another view: www.icecap.us



Some views from the Wegman report

- Q - How central is the work of Dr Mann and his associates to the consensus on the temperature record?
- A – The work has been politicized by the IPCC and other public forums and has generated an unfortunate level of consensus in the public and political sectors and has been accepted to a large extent as truth. Within the scholarly community and in certain conservative sectors of the popular press, there is at least some level of skepticism.

The relationship between increasing temperatures and weather is far from clear – indeed ambiguous. All "unusual" weather is simplistically ascribed to climate change. Politicians and journalists generally have no understanding of the long term variability of rainfall and temperature

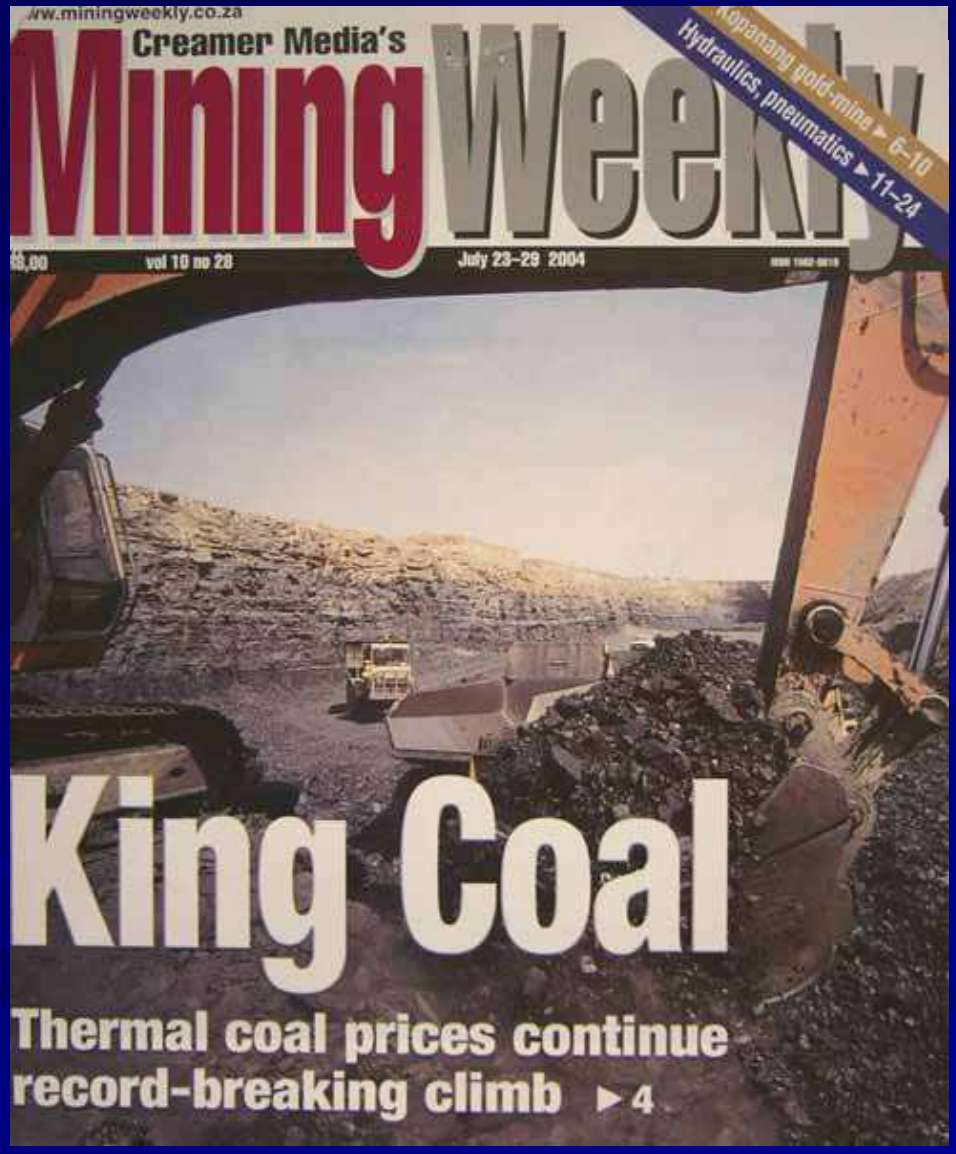
Has South Africa's Climate Changed?

- South Africa has the longest set of rainfall data for the continent.
- There is no evidence at all of any noticeable departure from long-term (21 year) cycles of dry and wet years.
- Climate change proponents say the projections they have made will only start being felt at the end of the 21st Century
- Why should we believe them?

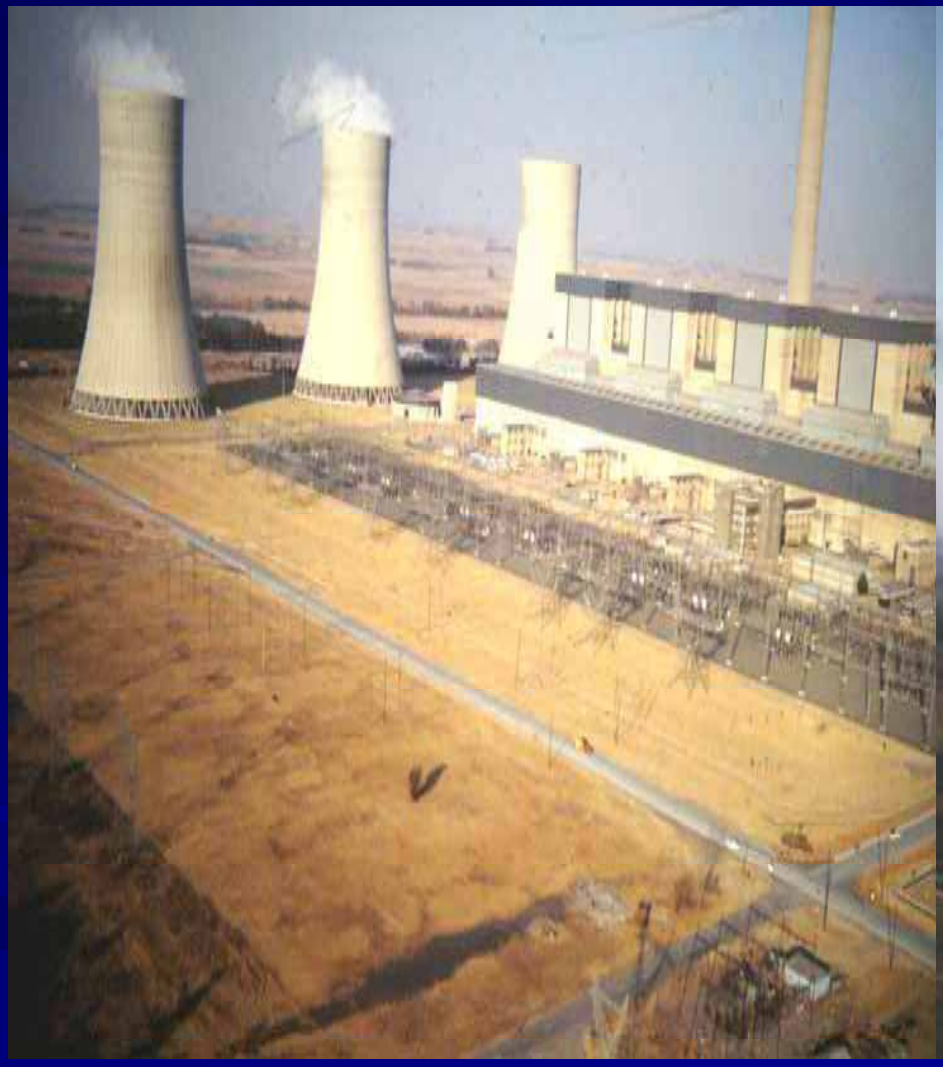
Has the Obsession with Global Climate Change blinkered us to other problems?

- The reliance of our economy on electricity?
- The reliance of our economy on oil?
- The declining agricultural sector?
- The growing human population?
- The depletion of marine resources?
- The degradation of fresh water ecosystems?

South Africa's Electricity 88% from Burning Fossil Fuel



Giant Coal-fired Stations Mpumalanga Highveld



South African Energy Mix – 2005

Base load generation

- 13 coal-fired stations: 32,066 MW
- 1 nuclear power station: 1,800 MW

Peak load generation

- 6 hydro-electric stations: 600 MW
- 2 gas turbine stations: 342 MW
- 2 pumped storage schemes: 1,400 MW

The Environmental Cost of Electricity from Coal

- For every Kilowatt hour (kWh)

- 0.54 kg of coal is burnt
- 1.4 liters of water is used
- 160 gm of ash produced
- 0.98 kg of Carbon Dioxide released
- 8.46 g of Sulphur Dioxide released
- 4.21 g Nitrous Oxide released

Sustaining economic growth

Buoyant SA still looking to break more records

The bullish sentiment on the JSE is not limited to foreign buyers, who may be reassessing their exposure to the country, write **Chris Needham** and **Heather Formby**

'There is a huge amount of confidence inside South Africa, which has no doubt pushed the market upwards'

Sunday Times April 17 2005 p3

Erwin clears the decks for growth

Public enterprises set to launch sale of the century, writes **Brendan Boyle**

PUBLIC Enterprises Minister Alec Erwin plans to sell at least 26 non-core state businesses worth over R8-billion in the next 18 months.

And in his budget speech to Parliament on Friday he formally announced the replacement of the chief executive of state arms company Denel, Victor Moche, and of Public Enterprises director-general Eugene Mokeyane.

Eskom chairman Rueul Khoza will stand down in June after eight years at the helm of the continent's biggest power utility, Erwin said.

The shake-up at the top in the parastatals is part of a move by the government to turn the seven remaining state-owned enterprises into engines of economic growth and social development.

Erwin, sent to Public Enterprises last year to manage the shift in economic policy from

SELLING UP, BUYING IN

Planned sales by the Department of Public Enterprises:

- Transnet – 13 non-core entities worth R7.7-billion
- Eskom - 14 non-core units worth R200-million
- Denel – non-core assets worth R730-million
- Safcol – 9% shareholding in five restructured forestry entities to staff
- Aventura – all remaining state-owned interests
- Property – an undisclosed amount of land and properties owned by state-owned enterprises

State-owned enterprise investments on the way:

- Rehabilitation of Camden, Grootvlei, Komati power stations and construction of two peaking power stations to handle short-term loads – R15-billion
- Expansion and redesign of Durban's Pier One and widening of entrance at R2.9-billion
- Coega container terminal – R2.6-billion
- Cape Town container terminal upgrade – R1.4-billion
- Petroleum products pipeline from Durban to Gauteng, using up to 90 000 tons of steel – R3-billion
- Locomotives, wagons and equipment for Spoornet – R8-billion
- Orders for South African firms linked to the Airbus A400-M worth R3.2-billion
- SAA is weighing undisclosed investments in regional airlines
- Unspecified Eskom investment in PBMR nuclear power programme

Graphic: FIONA KRUGER

Sustaining economic growth ???

- Government refused Eskom permission to build new generating plant
- Said IPPs would provide new capacity
- But no IPPs interested in competing with Eskom's low prices
- At a very late stage, government announced programme to build new plant

Things start going wrong in 2007

- Koeberg – generator failure – Cape Town goes down – big time!
- Huge business losses due to power cuts
- No new capacity ready
- Major political row boils over power loss
- SA reminded that Eskom predicted that the country would run out of electricity in 2007

Things keep going wrong in 2008

- Serious load-shedding experienced in January 2008
- Traffic chaos as rolling blackouts affect lights
- Business and investor confidence sags
- Doubts about Eskom's maintenance capacity
- 3000 MW of PLANNED outages
- 5000 MW of UNPLANNED outages
- South Africans told to "use less electricity"
- **MINES CLOSED BY LACK OF ELECTRICITY!**

What is Eskom doing?

- Building two big new coal power stations
- "De-mothballing" three old power stations
- Building Ingula Pumped Storage Scheme
- Built two OCGT units at Atlantis
- Building one OCGT at Mossel Bay
- Seeking proposals for new nuclear plant
- Building 100 MW wind farm
- Building 100 MW solar thermal plant
- Rationing power – 10% cuts for all?

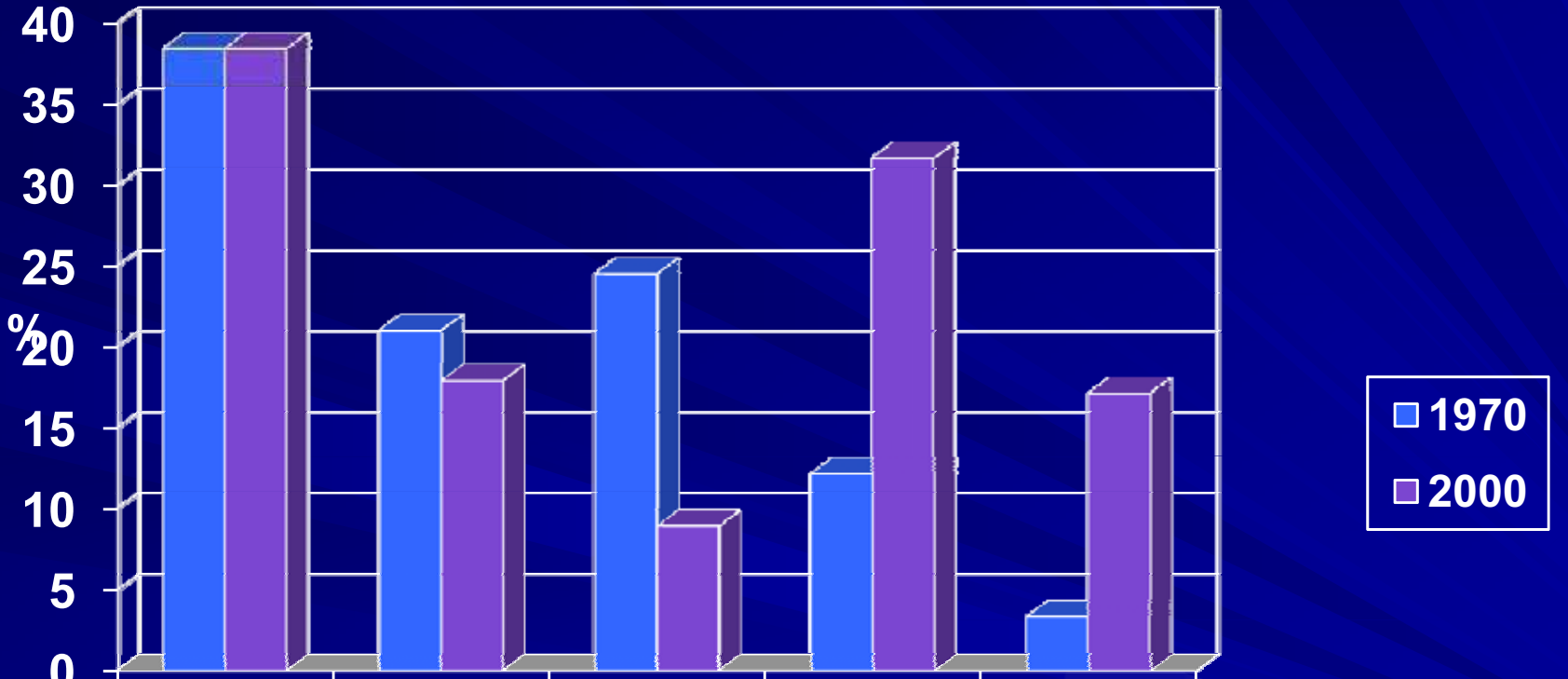
Eskom – spinning or winning?

The trouble with coal.....

- Medupi – 4 500 MW
- Kusile – 4 500 MW
- Camden – 1 600MW
- Grootvlei – 1 200 MW
- Komati – 1 000 MW
- Total – 12 800 MW of new fossil fuel burn
- Problem 1 – burning a valuable resource
- Problem 2 – global climate change
- Problem 3 – threats to biodiversity

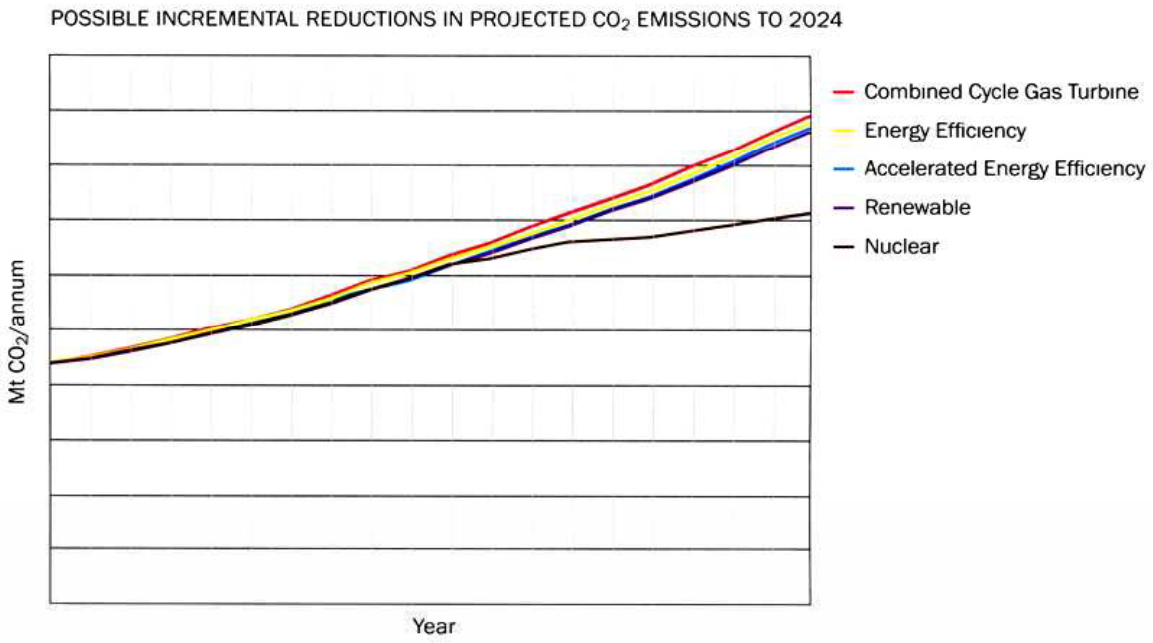
The trouble with coal? It's here to stay!

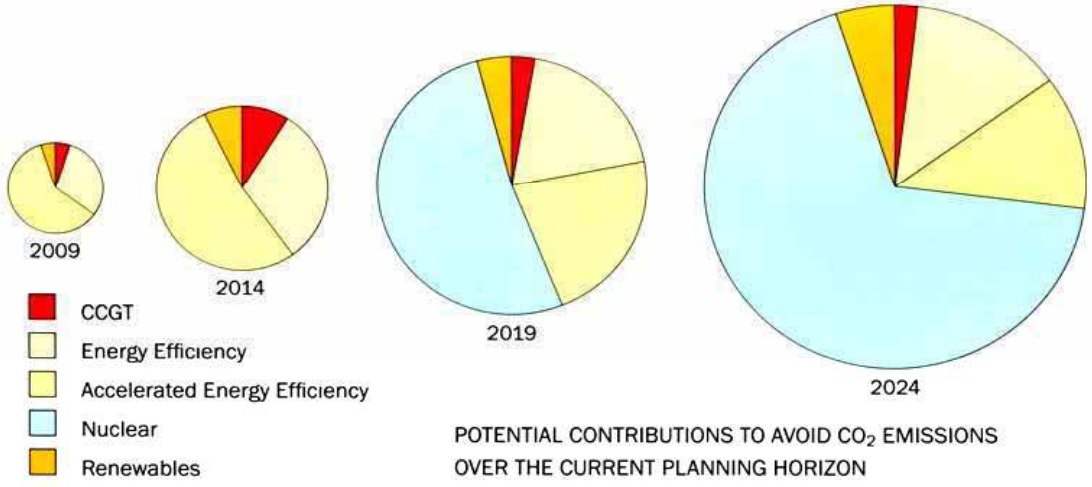
Global Electricity Generation 1970 - 2000



	Coal	Hydro	Oil	Gas	Nuclear
1970	38.4	21	24.5	12.1	3.3
2000	38.4	17.9	8.9	31.6	17.1

Eskom's Nuclear Plans





POTENTIAL CONTRIBUTIONS TO AVOID CO_2 EMISSIONS OVER THE CURRENT PLANNING HORIZON

These pages were written and paid for by Eskom.

Eskom

Practical interventions

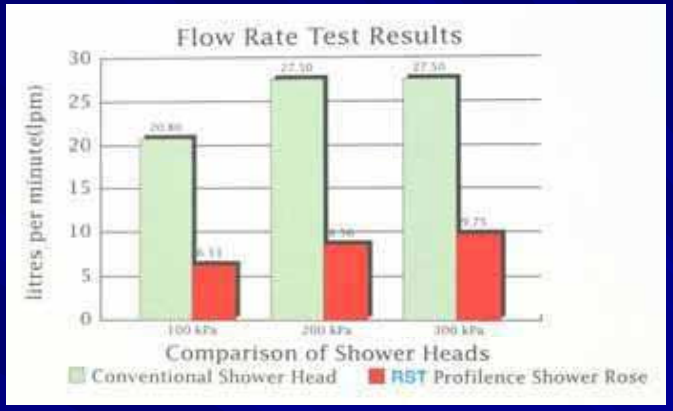
- Electricity will cost much more in future
- Individuals and companies need to use less – common rands and cents!
- We need to survive regular power cuts
- The problem will be with us for a long time
- We have an opportunity to start making better use of renewable energy
- Energy Efficiency – means using less

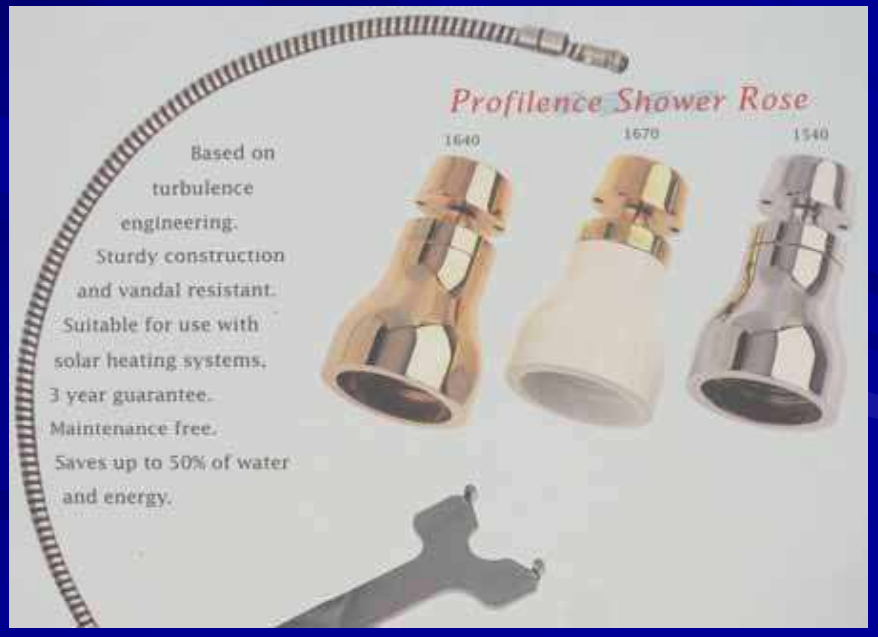
Energy Efficiency (EE)

- Lighting – Compact Fluorescent Lamps
- Lighting – LEDs - 3W = 11W = 60W
- Appliances – energy efficiency ratings
- Refrigerators – big consumers unless new
- Buildings – no cost, low cost interventions
- Buildings – design and insulation
- Behaviour – switch off lights, heaters etc
- Timers – for pumps and lights etc

Using less hot water means burning less coal – hi-tech showers

- Special design based on turbulence engineering provides significant savings while still giving excellent quality shower





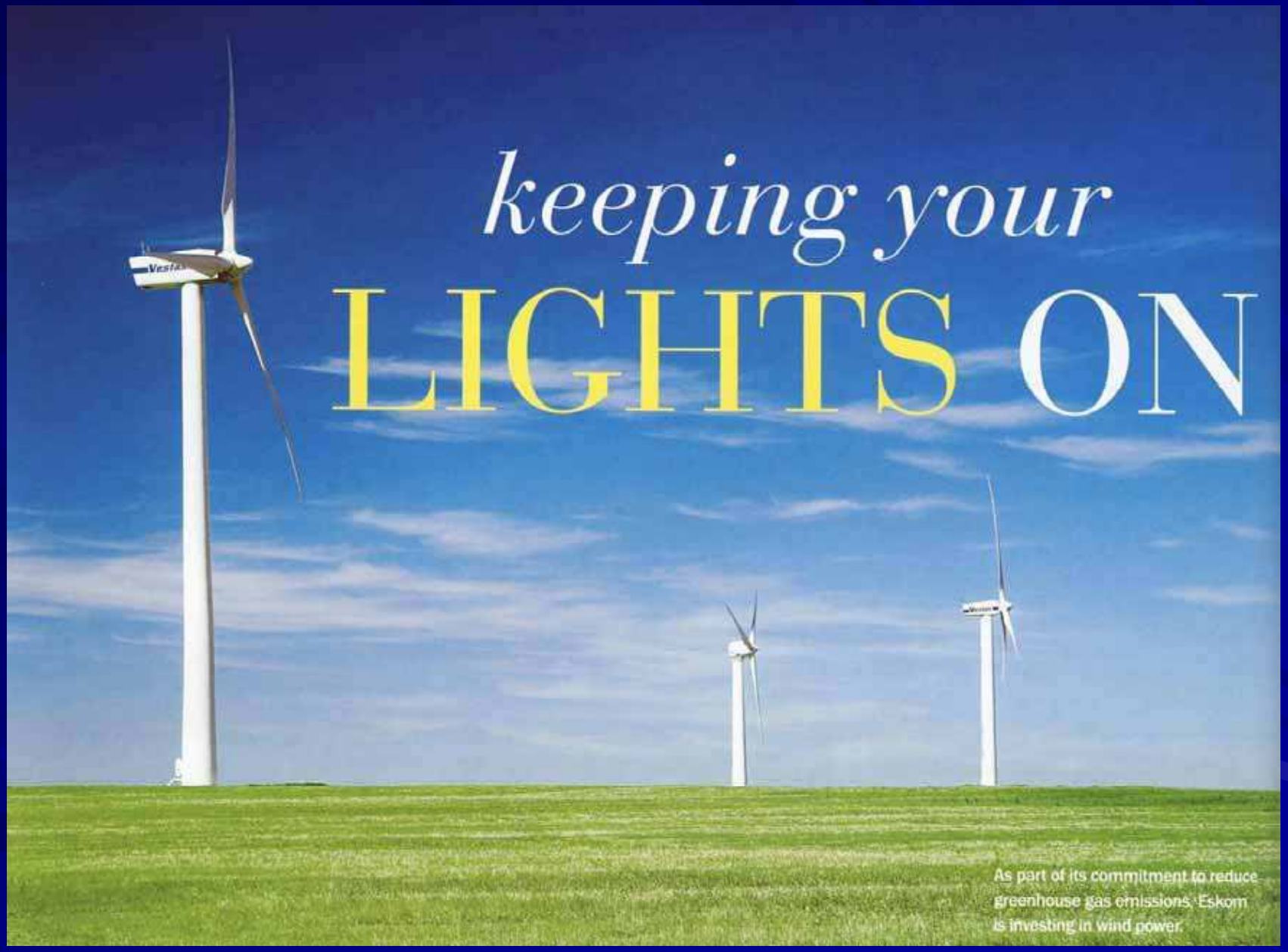
- Cost – about R350

Renewable Energy (RE)

- solar-thermal generation – big plants
- wind generation – uneven potential
- biogas – not practical on small scale
- photovoltaics - EXPENSIVE!
- solar cooking – HIGH POTENTIAL !
- biomass – very good for space heating !
- solar water heating – FIRST CHOICE !

Solar thermal – big potential

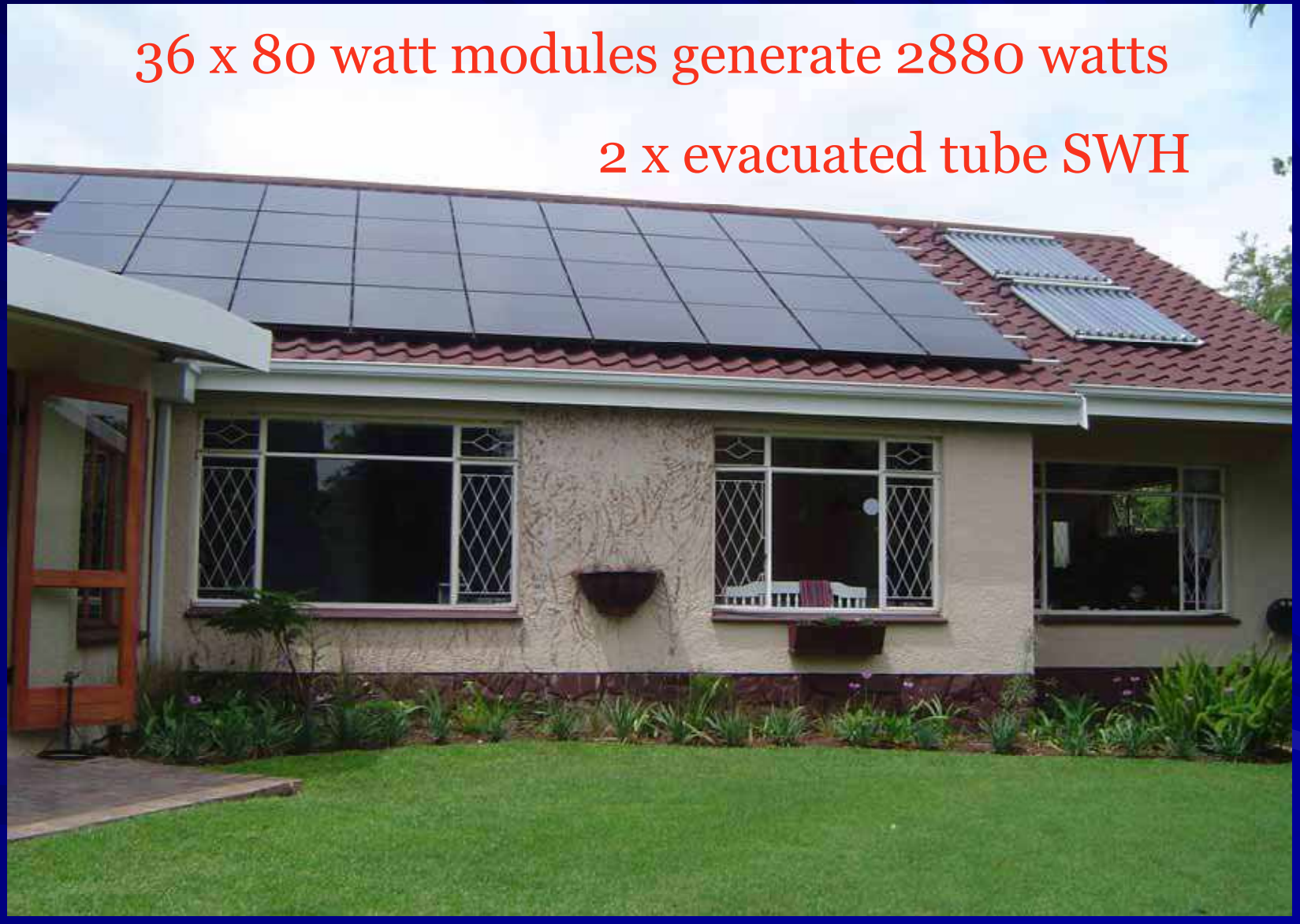
Wind


keeping your
LIGHTS ON
As part of its commitment to reduce greenhouse gas emissions, Eskom is investing in wind power.

Photovoltaics – electricity from light

- Continuing high demand from Germany and Japan for PV resources
- Global shortage of optical grade silicon
- This keeps prices high
- Feed-In Tariff working in Europe
- Large subsidies and legislation
- Too expensive for Africa at present except for off-grid applications.

Photovoltaics – Island Home



Photovoltaics – Island Home

- Yellow boxes control system
- Sunny Boy and Sunny Island from SMA
- 5 000 watt inverter
- Data logging & recording

Photovoltaics – Island Home

- Battery bank stores 19 200 watts
- LPG gas for cooking and backup water heating
- System cost R300 000

Photovoltaics – Worth Considering

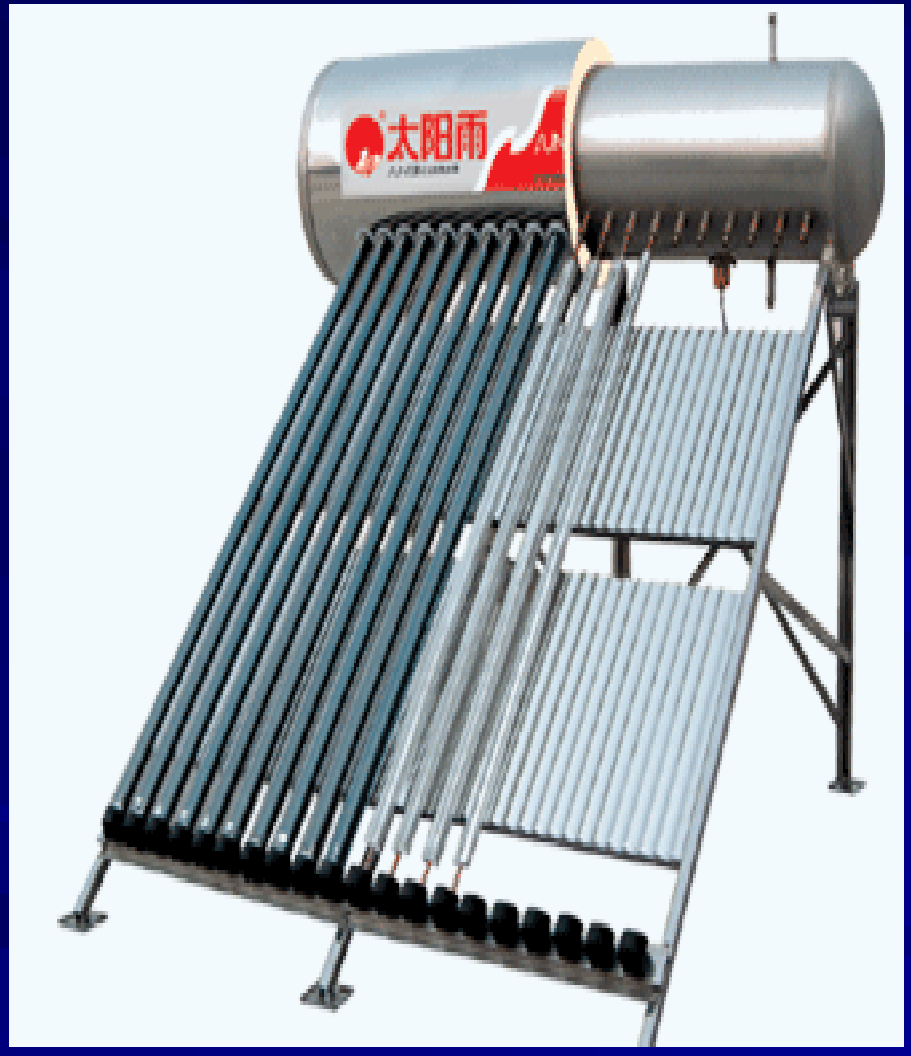
- World shortage of optical grade silicon will catch up in 2009.
- World production of photovoltaic modules should meet global demand in 2010.
- The prices of PV should start falling by then.
- BUT – these projections were made by the Sarasin Bank of Switzerland BEFORE the latest oil price increases!

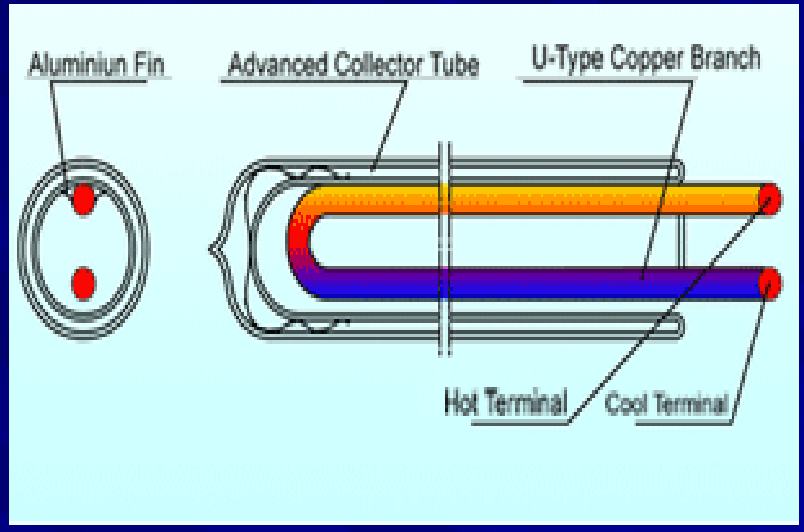
Solar Cooking
Sunstove and T16, right

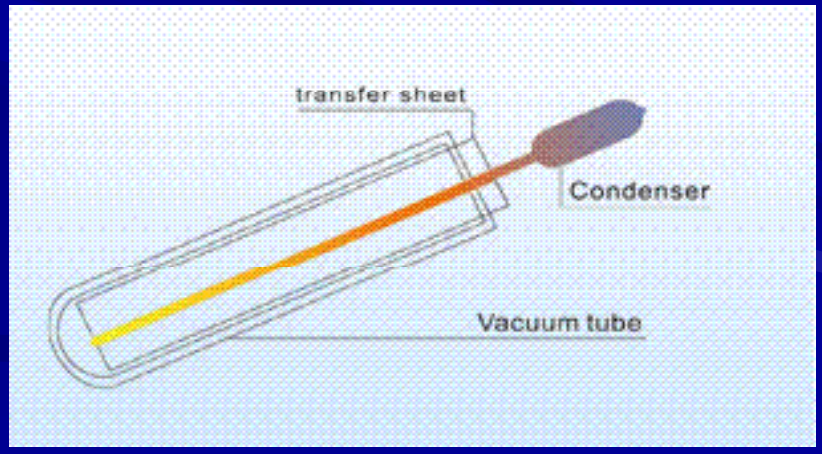
Solar Cooking
1.2 metre parabolic, hot bag

Solar Cooking
2 metre parabolic, Big Vrystaat Macrowave!

Evacuated Tube Solar Water Heaters







Flat plate solar water heaters