Sustainable Energy Solutions: South African Initiatives

ReSource Breakfast

15 August 2013, Killarney Country Club

Photo Credit: NJR ZA (2010)

Sustainable Energy Solutions: South African Initiatives

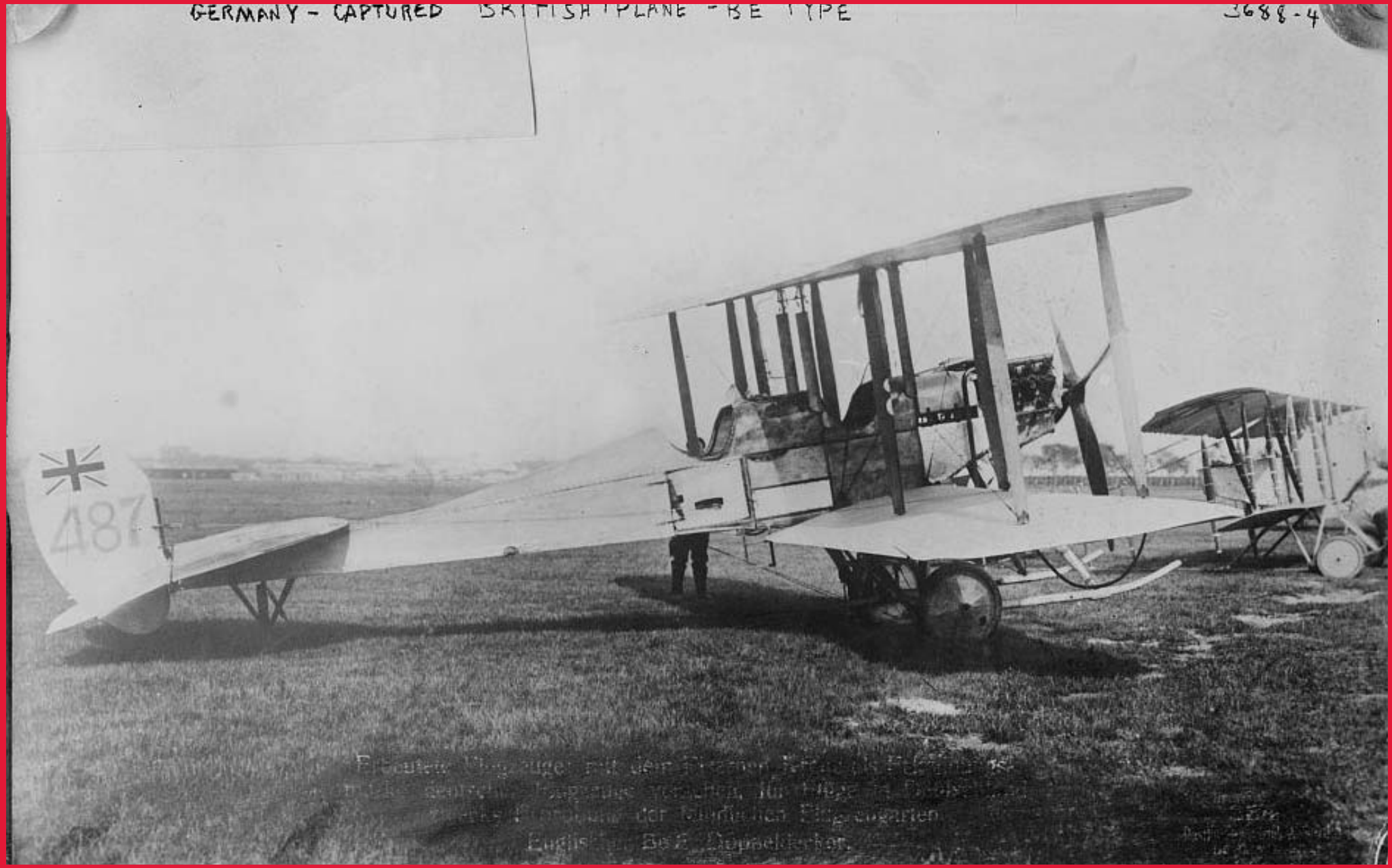
Alex McNamara
Principal Consultant: Camco South Africa

1. Context

Past ≠ Future

The world, a hundred years ago:


FRENCH R.R. TRAIN
3174-7
15 — CHERBOURG - Train Transatlantique
Edition L. Ratti, Nouveautés et Confections, Cherbourg


GERMANY - CAPTURED BRITISH PLANE - BE TYPE
3688-4
487

1970s:

Photo Credit: Plug in America (2008)

Photo Credit: Base64 2008; Carol Spears

Photo Credit: Florian Gerlach (2007)

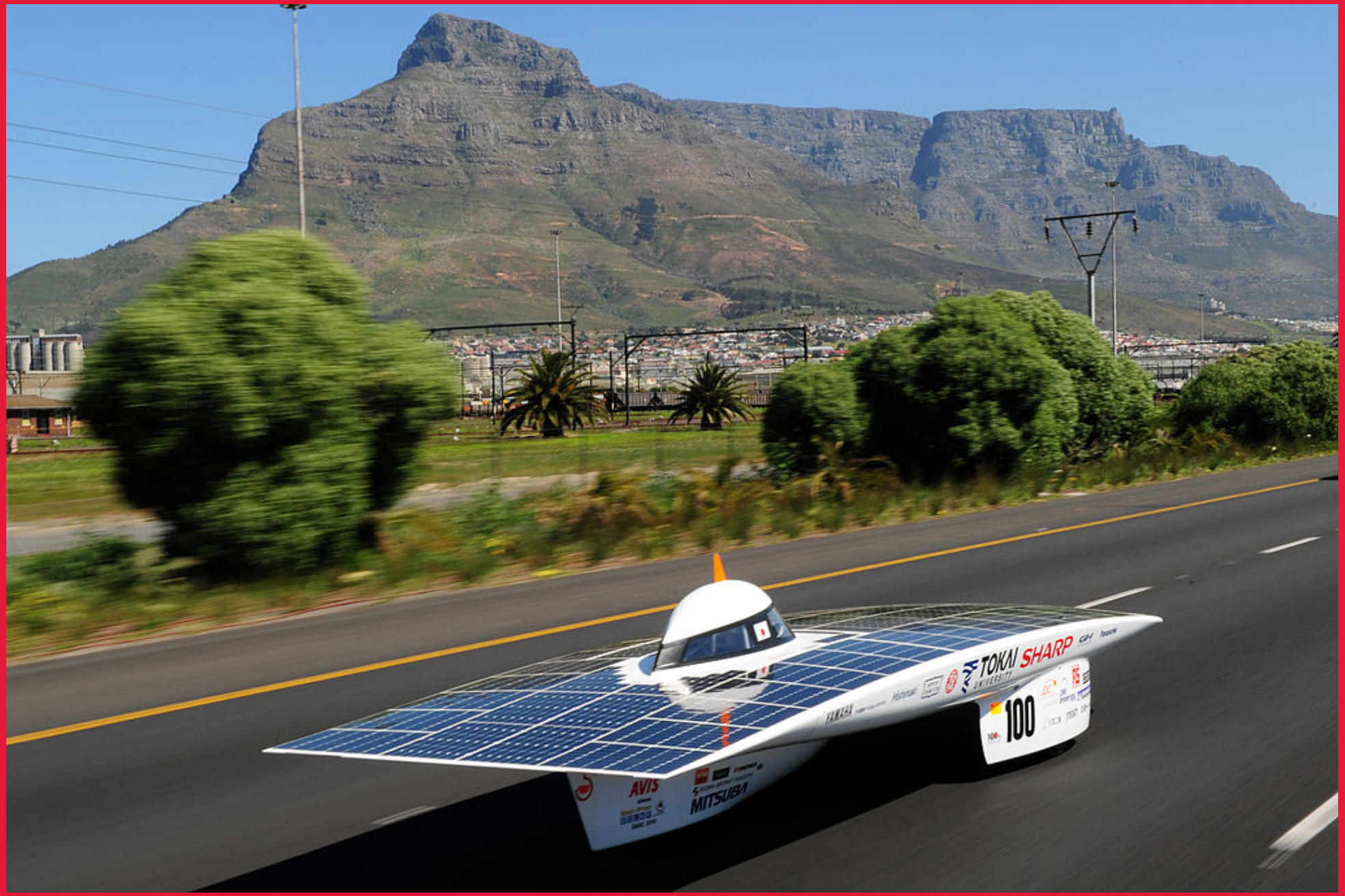


Photo Credit: Hideki Kimura, Kohei Sagawa (2010)


Hydrogen Fuel Cell Bus
60
100% STEAM
100% CLEAN
EMERGENCY EXIT
BOC
GIVE WAY
CITARO
Mercedes-Benz
ecobus
ZERO EMISSIONS
ECOBUS 3
Light up a little life.
Starlight Day
ZERO EMISSIONS

In other words:
the future is already here

and is happening faster every year!

Given these rapid changes,
there are important reasons
for business to take
sustainable energy seriously

Renewable energy supplied 22% of global electricity in 2012

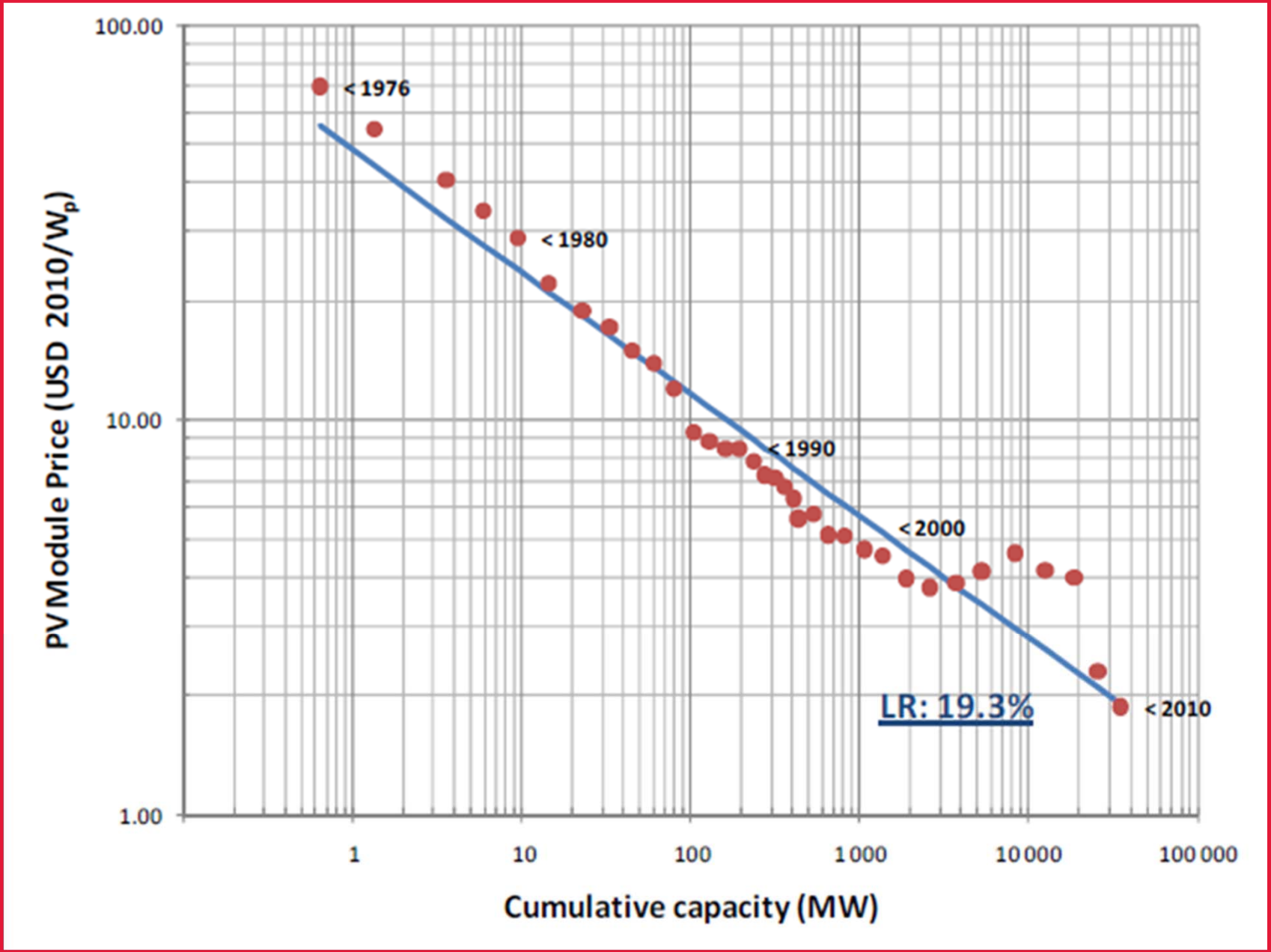
REN21 (2013)

The BRICS countries now account for 36% of total global renewable power capacity

REN21 (2013)

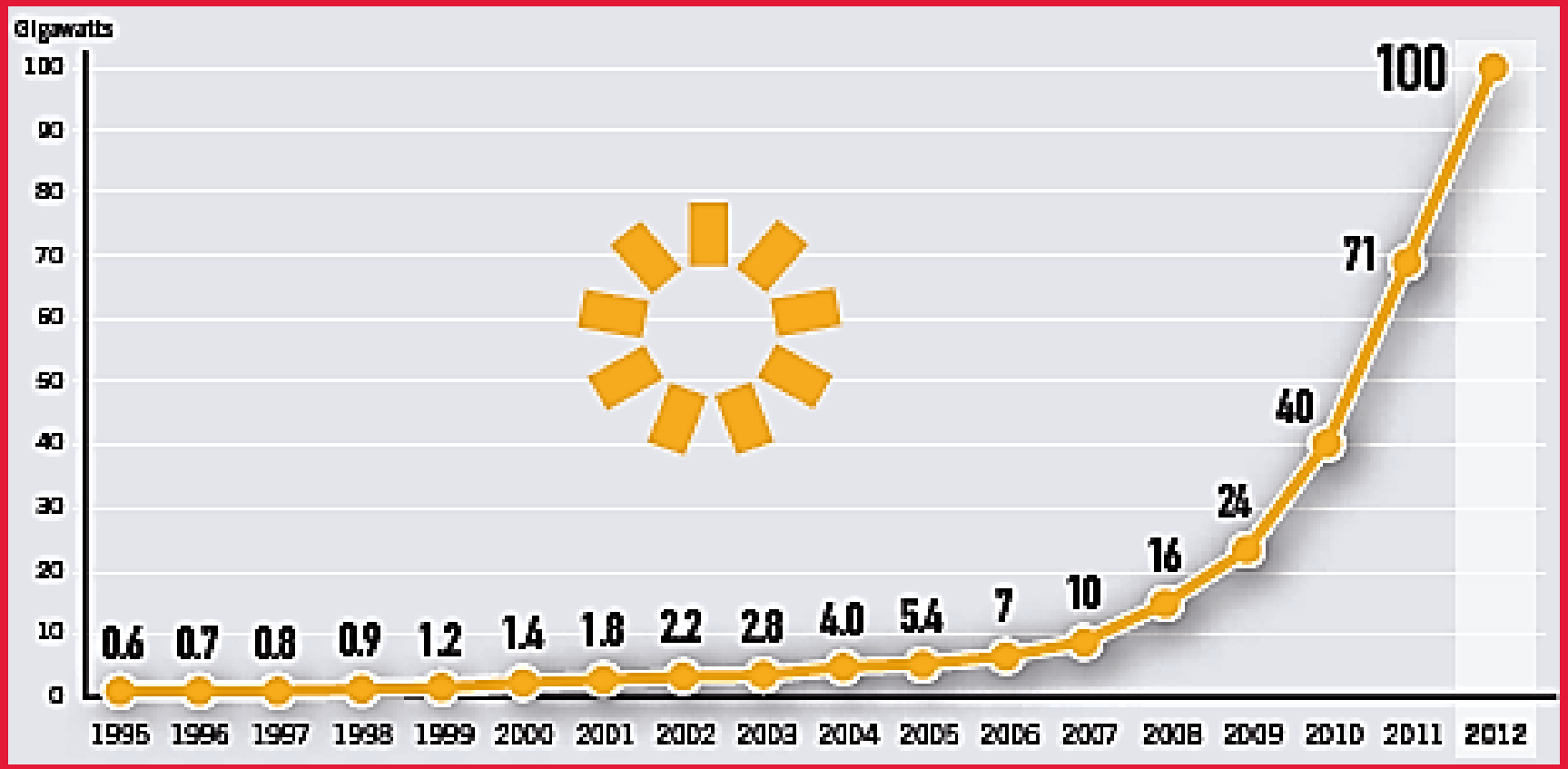
In the US, there are now more people employed in solar rather than steel

Cost degression of solar photovoltaic (PV) power, 1976-2010



Source: IEA (2011) Renewable Energy: Markets and Prospects

Solar Photovoltaic (PV) Global Capacity, 1995 - 2012



Source: REN21 (2013) Renewables 2013: Global Status Report

In Africa, grid-connected solar PV has already become competitive with diesel-generated power

IRENA (2012)

2. What are the Solutions for Sustainable Energy in South Africa?

Most Cost Effective Options (1)

- Monitoring and targeting (M&T) of energy use
- Process optimisation
- Energy efficiency
- Power quality correction

Most Cost Effective Options (2)

- Fuel switching (e.g. to gas or biomass)
- Use of heat pumps
- Fuel efficient vehicle fleet purchasing
- Fleet and logistics optimisation
- Regular vehicle maintenance

Most Cost Effective Options (3)

- All these options reduce emissions and costs over relatively short periods of time
- Payback period usually 6 months to 3 years; but can be up to 5 years
- Many options also save water and reduce waste streams, thereby enhancing climate resilience

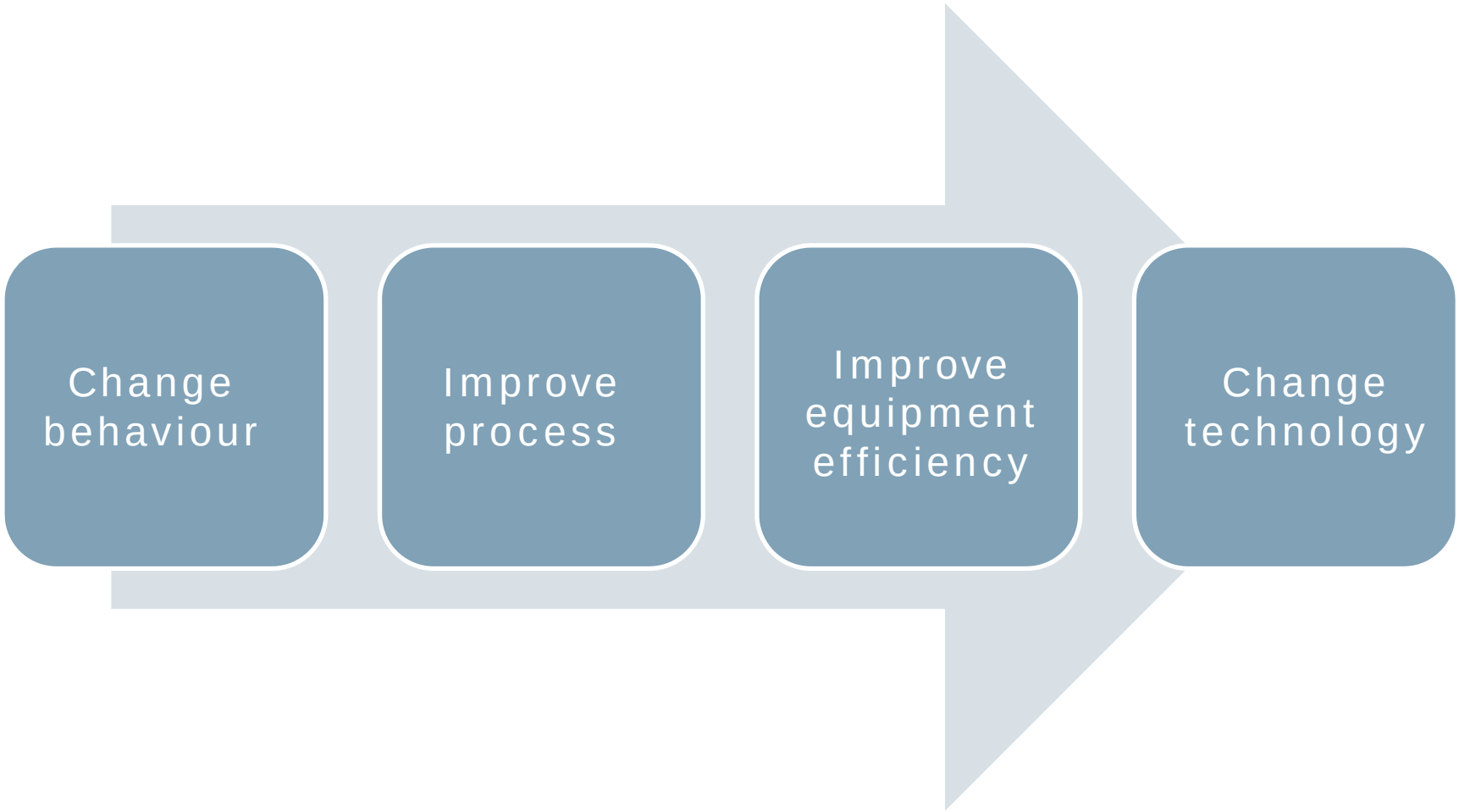
Other Potentially Cost Effective Options

- Cogeneration / trigeneration
- Renewable energy (e.g. solar, biomass, biogas, hydro and wind)

Value of an Energy / Water Audit

- Emission and cost reduction opportunities vary in size and complexity by industry and sector
- **Energy audit** should outline a number of potential interventions, e.g:
  - Lighting and HVAC, changes to compressors, pumps and chillers, through to variable speed drives and M&T systems
- Similar **water audits** can also be undertaken

The Sustainable Energy Process



3. Sustainable Energy Solutions: South African Case Studies

Lighting Example – Gauteng

- **Energy Efficient Lighting System Implementation:**
  - T8 fluorescent lights replaced by T5 lights in 36 buildings
  - Location: Gauteng
  - Project developer: ESCO
  - Forecast electricity saving: 103 483 MWh per annum
  - Forecast emission reductions: 102 891 tons per year
  - Payback period: 3 years

Source: GEEF and IDC Case Studies

Biogas Example – Northern Cape

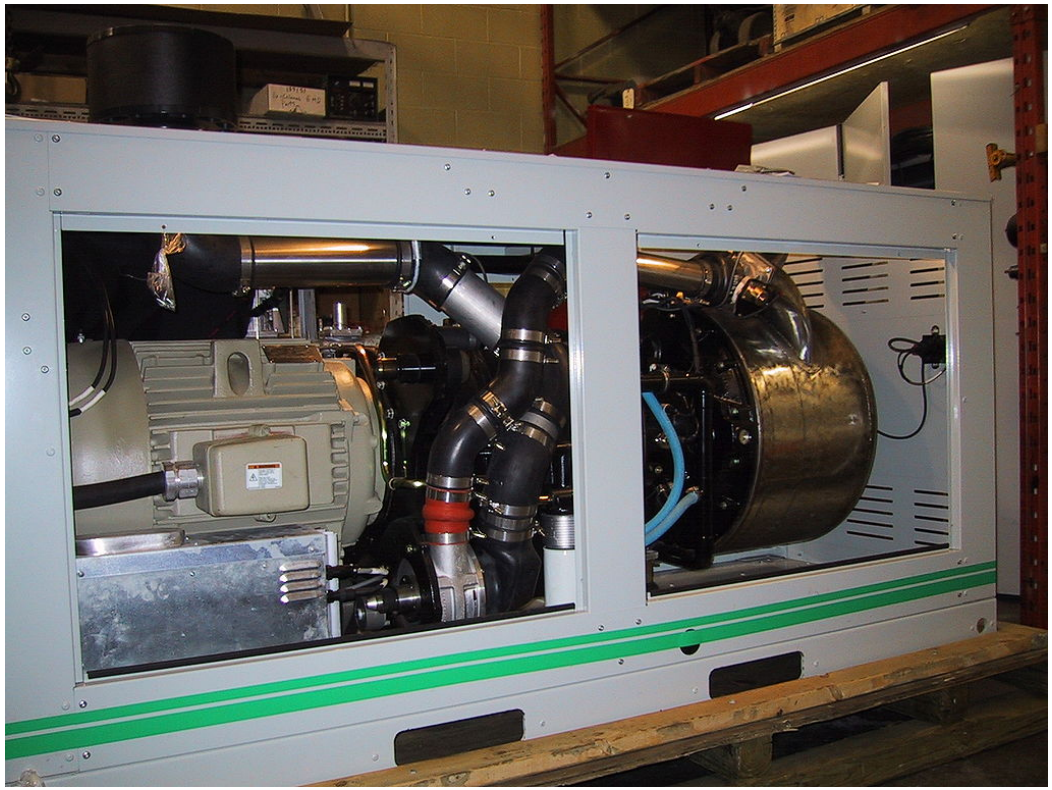
- **Biogas Power Generation at Abattoir:**
  - Biogas system installed to provide energy from waste for electricity, heating and cooling
  - Location: Northern Cape
  - Energy savings:
    - 760 MWh electricity saving per annum
    - 1 250 MWh heat saving per annum
  - Payback period: 5 years

Source: GEEF and IDC Case Studies

Waste Gas Example – KwaZulu-Natal

- **Chemical Industry Cogeneration:**

  - Use of waste gas as fuel for CHP plant
  - 4 x 1.7MW units installed (7.8MW)
  - Forecast electricity saving: 45 000 MWh per annum
  - Forecast emission reductions: 46 000 tons per year
  - Electricity bill saving: 20%
  - Facility can now operate at full capacity again
  - Payback period: 3.2 years



Source: GEEF and IDC Case Studies

Transport Example – Logistics Company

- **Green Trailer Project:**
  - Liner-trailer combination with aerodynamic and other modifications
  - Energy saving:
    - 10,6% fuel saving compared to regular fleet
  - Financial benefit: R8 500 per month per rig

Source: NBI (2011) Energy Efficiency Case Studies

Photo Credit: NBI (2011)

Solar Example – Western Cape

- **Solar Photovoltaic (PV) system:**
  - Grid connected rooftop PV system
  - Scope: 30kW peak installed capacity
  - Location: Western Cape
  - Forecast electricity saving:
    - 48.5 MWh per annum
  - Forecast emission reductions:
    - 50 tons per annum
  - Provides 25% of company annual electricity requirements
  - Payback period: 14 years

Source: GEEF and IDC Case Studies

Solar Example – Lease Model

- **Solar PV Rooftop Array:**
  - A Camco initiative
  - No upfront cost
  - Power provided at cheaper than Eskom rate
  - Location: Gauteng
  - Size: 35kW or above

Source: Camco Clean Energy

Photo Credit: Sideka Solartechnik (2011)

Conclusions:

- Many ways to save costs and reduce emissions in SA
- Number of cost-effective options increases every year

Questions and Discussion

Thank you

local**solutions**to**global**climate**change**issues

Alex McNamara
Camco Clean Energy (South Africa)
T: +27 (0)11 253 3400
M: +27 (0)79 699 3284
E: alex.mcnamara@camcocleanenergy.com

4. Lessons Learnt To Date

Lessons learnt to date

Data collection and analysis:

- Access to data can be a key concern – in relation to energy use, water use, carbon emissions
- Insufficient data hampers the setting of baselines and realistic targets
- Data is best accessed by operational employees within relevant areas, with compilation and co-ordination by H&S, sustainability employees
- Real time, automated Monitoring and Targeting (M&T) systems can help alleviate data collection burdens, and identify key saving areas

Lessons learnt to date

Identifying opportunities and setting targets:

- A scoping energy audit is a good place to start, in identifying a range of efficiency opportunities and their payback periods
- Targets and metrics must be well thought out at the outset – problematic if targets are set for metrics that are distortionary or that cannot be monitored!

Lessons learnt to date

Business risks and opportunities:

- Efficiency and optimisation is key to most businesses, and represents an overall cost saving measure
- Climate change is a business issue – it is about risk, value, assets, innovation, competitors and return
- There are substantial commercial opportunities available in the move towards a low carbon, resource efficient economy
- Efforts to address emissions can also improve climate resilience and reduce costs

Energy Efficiency Support in SA

- National Cleaner Production Centre (NCPC)
- Green Energy Efficiency Fund (GEEF)
- Industrial Energy Efficiency Project (DFID)

What about key options to support adaptation and climate resilience?

Key interventions

Cost effective options, especially key in higher risk operating environments:

- Water conservation and use of recycled water
- Effective flood plans
- Temperature monitoring and employee heat plans
- Fire risk assessments and plans
- Hazard monitoring and early warning systems

“Renewable energy technologies should no longer be considered only as high-cost, immature options, but potentially as a valuable component of any secure and sustainable energy economy, providing energy at a low cost with high price stability”

International Energy Agency (2011)

Benefits of an integrated approach

- Reduce energy and operating costs
- Enhance competitiveness
- Facilitate streamlined reporting
- Stimulate innovation
- Support investment and brand reputation
- Keep pace with competitors
- Attract the best talent in the market place