Renewable Energy for Namibia

or

How to **Invest in the** the **Future**

for the Investors' conference
31. 10. 2007

by
Harald Schütt
Renewable Energy & Energy Efficiency Institute
@
Polytechnic of Namibia
with the support of the RE community in Namibia

R E E E I

Renewable Energy and Energy Efficiency Institute

@

The Polytechnic of Namibia

Tel +264 61 207 2154

reeei@polytechnic.edu.na

This Presentation:

- What's the Problem ?
- Energy Efficiency FIRST
- Renewable Generation
- Technology: In the box or out of the box?
- European Solutions for African Problems ?
- Perspectives
- What can you do ?
- What does all that mean for Namibia?
- What do WE need ?

Current Energy Situation

MICRO-ECONOMIC IMPLICATIONS

Decreasing living standard, health, educational standard of citizens

Increased homelessness and informal housing

Increased influence of property speculators through auctioning of houses causes price rise

Increasing number of families whose houses are auctioned

Increased defaults on municipal debts

Decreasing number of people to foot the bill of increasing cost for electricity and other services

Decreased household cash flow

Inflated household energy expenditure

Current Energy Situation

MACRO-ECONOMIC IMPLICATIONS

- Increased dependency on electricity imports
- Increased export of money
- Reduced quality and reliability of supply
- Increased frequency of rolling blackouts "Power shedding"
- Limited supply can have negative impact on foreign investment, health care, vital infrastructure
- Revenue loss due to reduced productivity
- Very limited economic growth rates, high unemployment
- Adverse impact on the realisation of Vision2030

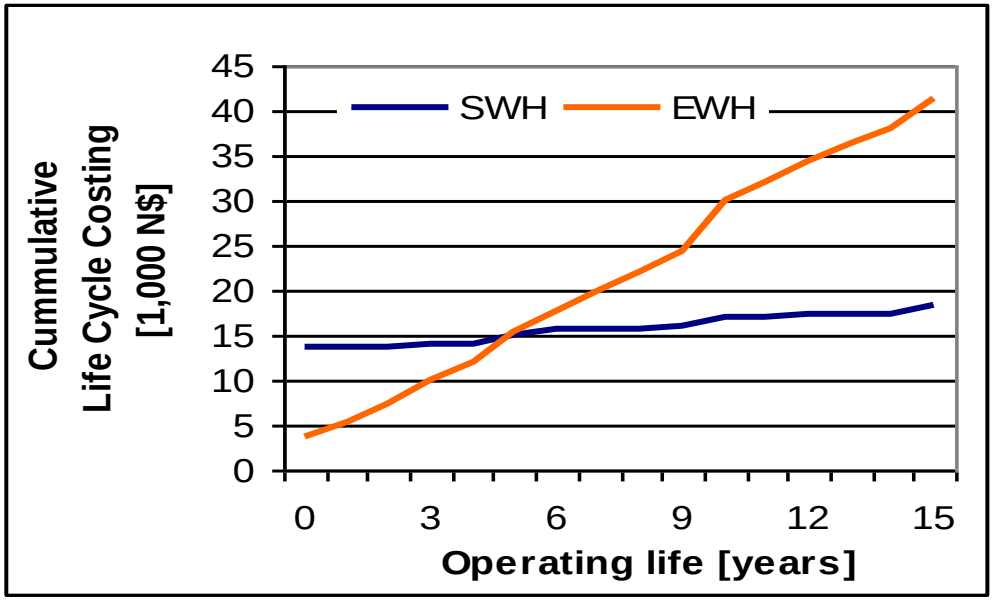
Short-term Solution: Energy Efficiency

SOLAR WATER HEATERS = 100-186 million Nam$ annually

The new Cabinet directive has made it clear that GRN and Parastatal buildings will ONLY be equipped with SWH. This will increase the market considerably !

Local production shall be encouraged, says Cabinet.

We know how to produce them locally.



If you build a new house now and include the investment for SHW in the mortgage, you save money from the first day

Short-term Solution: Energy Efficiency

LIGHTS

In small households, up to half of the electricity cost is on lights.

55% of el.-customers in Windhoek are in arrears with payments.

Incandescent Light Bulb
- 40 W to 100 W
- Efficacy: 12%
- Life time: about 6 months

Compact Fluorescent Light (CFL)
- 7 W to 20 W
- Efficacy: 80%
- Life time: about 3 years
- Break even period: 3 months

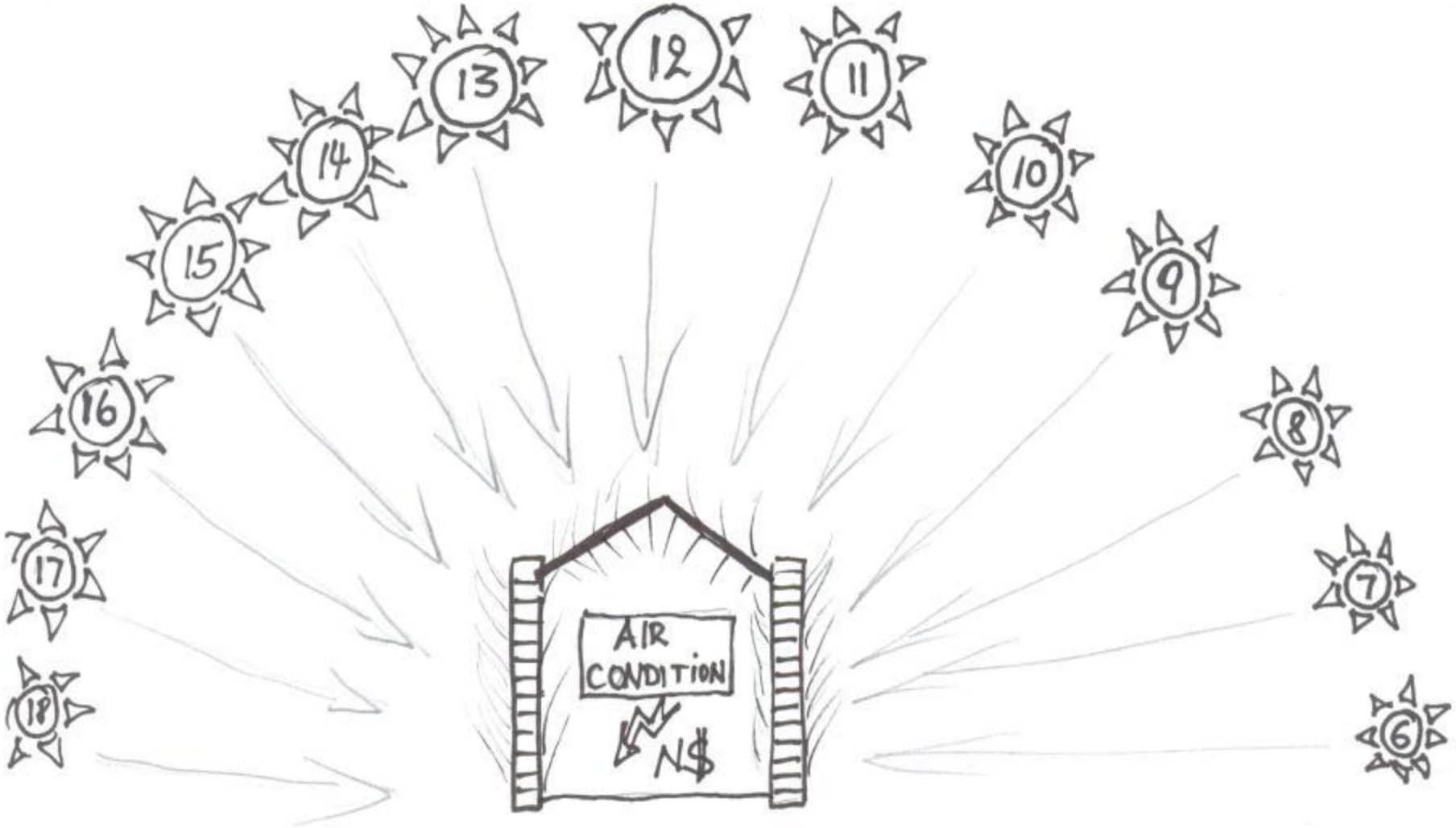
Short-term Solution: Energy Efficiency

BUILDING DESIGNS

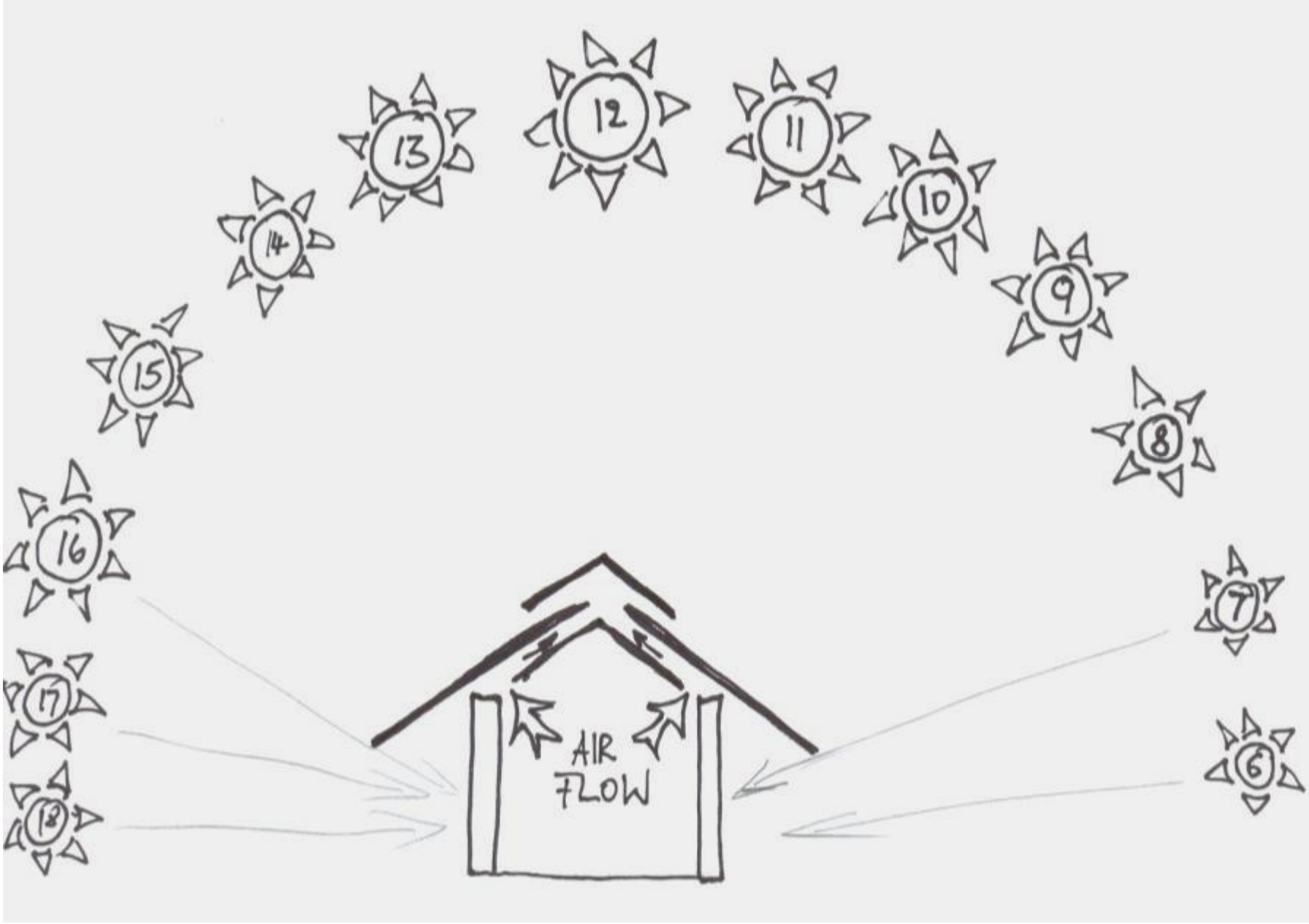
Habitat Research and Development Centre, Windhoek (project by MRLGHRD)

Claudius Kandavazu Street, close to A. Shipena School

Energy Efficiency

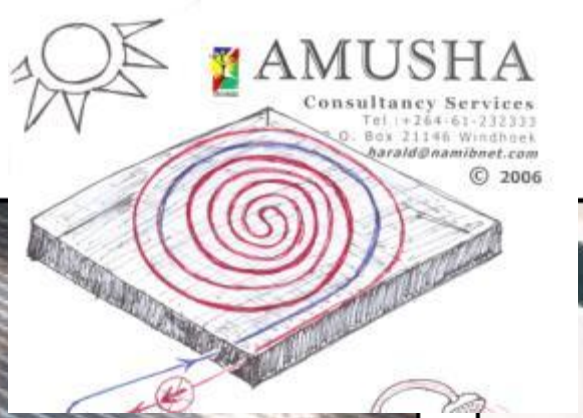


Energy Efficiency



Energy Efficiency

Energy Efficiency



Hot Water Collectors "made in Namibia" can also be used to power you floor heating !!

Short-term Solution: Energy Efficiency

SUMMARY

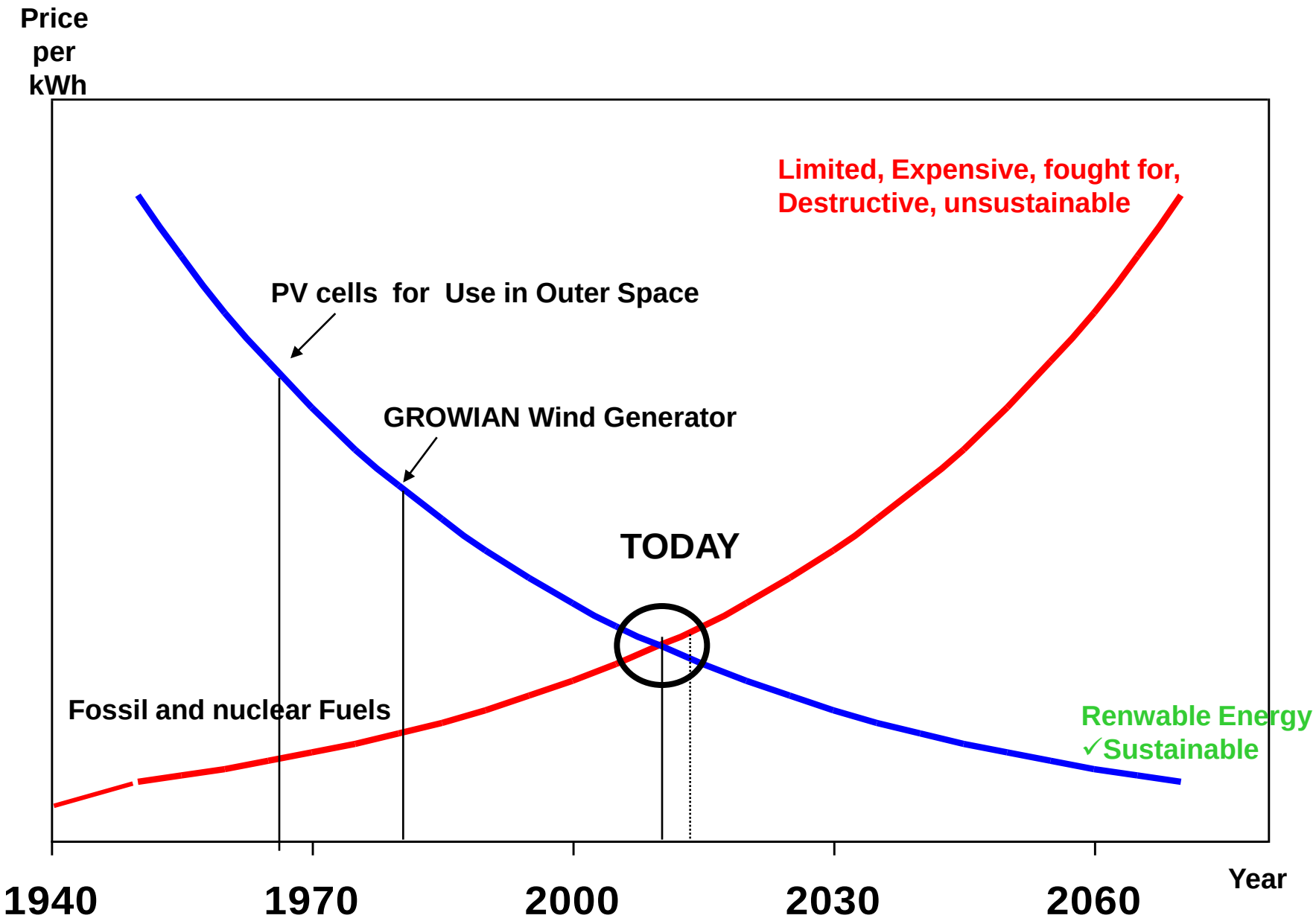
- Large-scale introduction of Solar Water Heaters would save Namibian household electricity consumers **over N$ 150million per annum**, which would be **available as disposable income**
- A Solar Water Heater saves almost 100% of electricity for hot water
- Energy Efficient Lights save 80% of electricity for lighting
- Energy Efficiency in Buildings save 70% of electricity used in buildings
- New technical solutions must be implemented such as
  - Solar floor heating
  - washing machines using solar heated water
  - "intelligent" fuse boxes and many others

These measures collectively save over 80% of household electricity expenses WITHOUT ANY restrictions or compromises on lifestyle, comfort, safety!

This means lots of cash to be circulated !

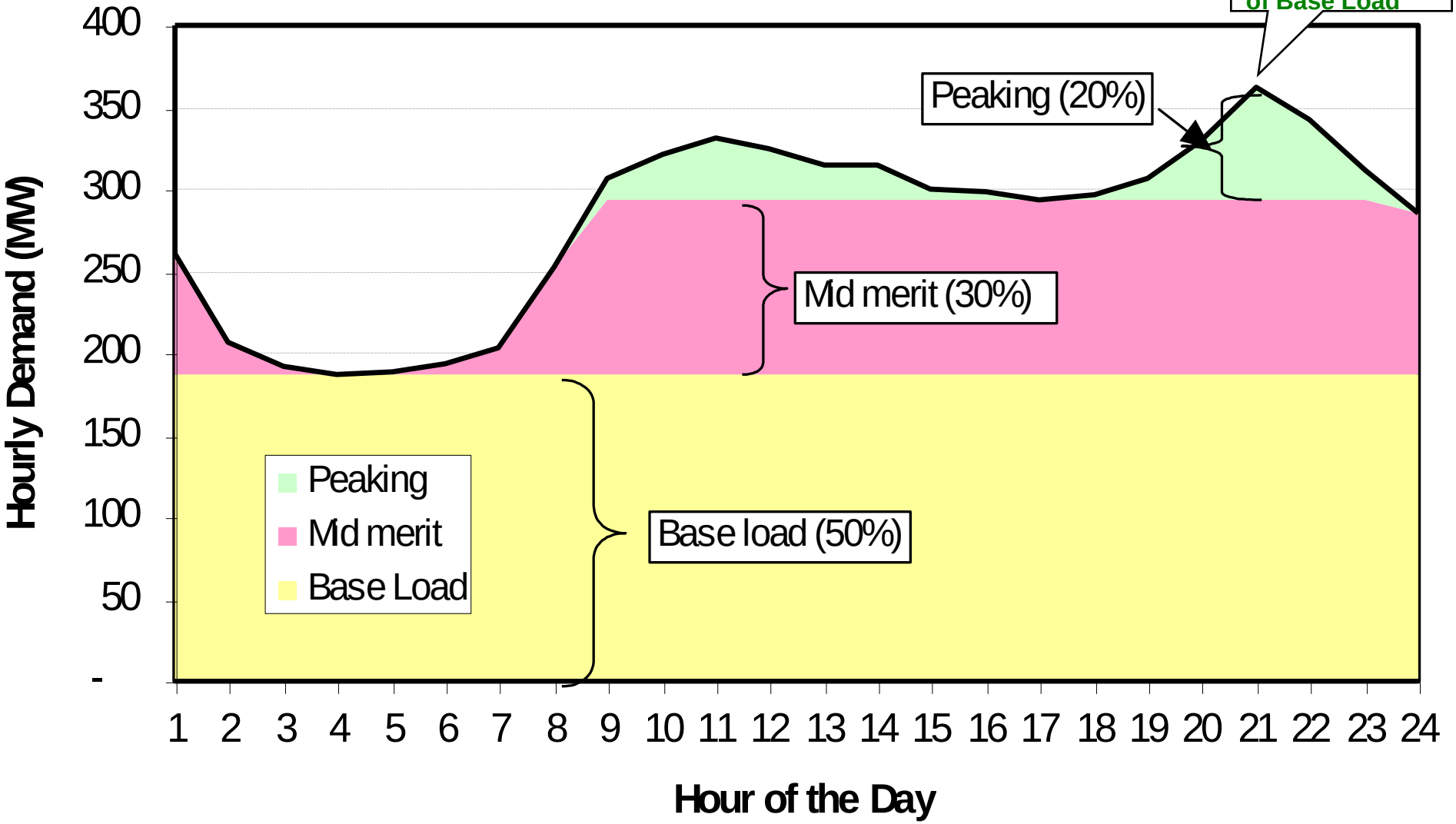
WHAT A MARKET !

Large Scale Power Generation



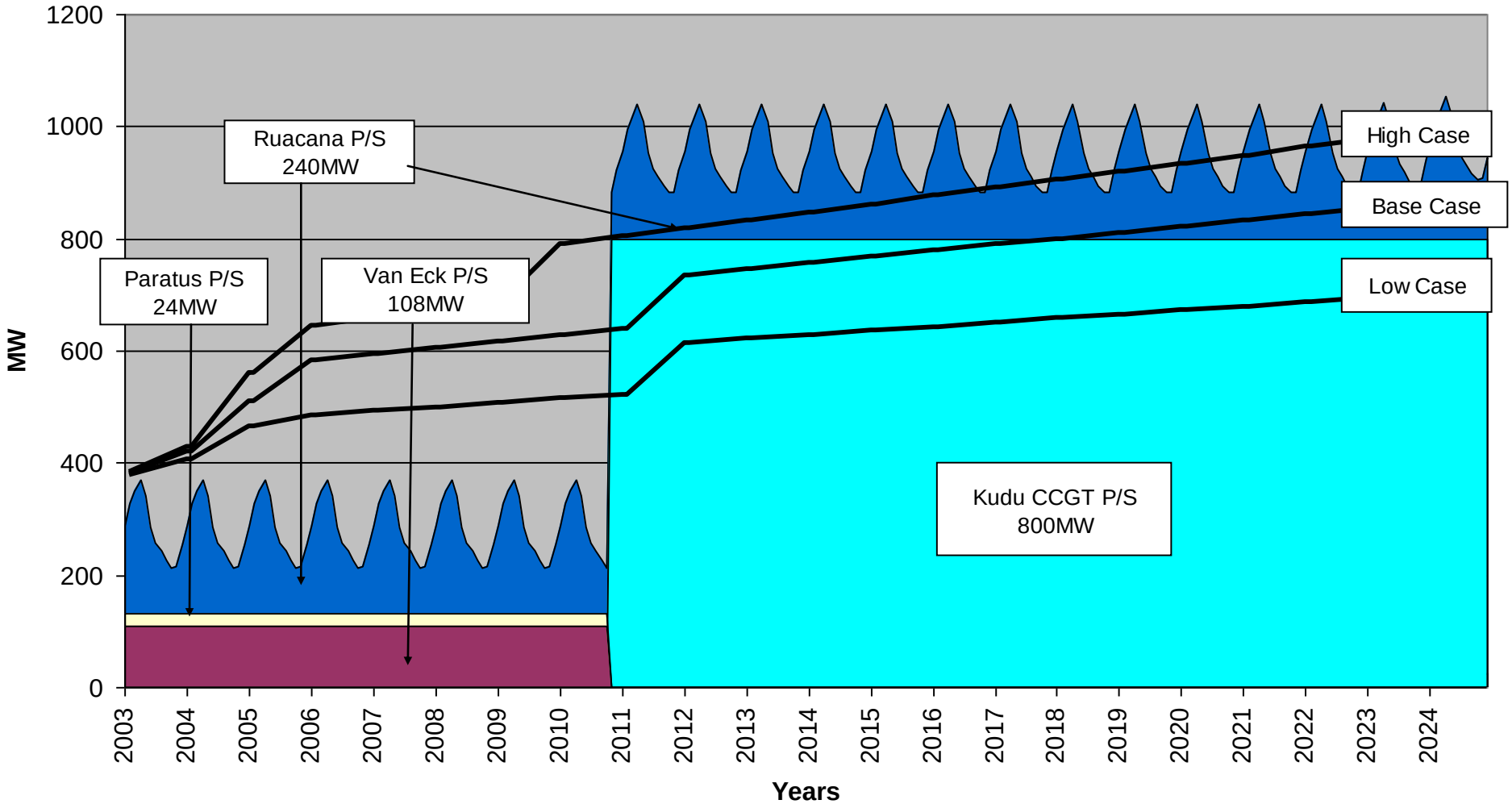
Generation

Typical Demand over a day in Namibia - illustrative purpose only



Generation

Graph of Projected Namibian Demand/Supply



Generation

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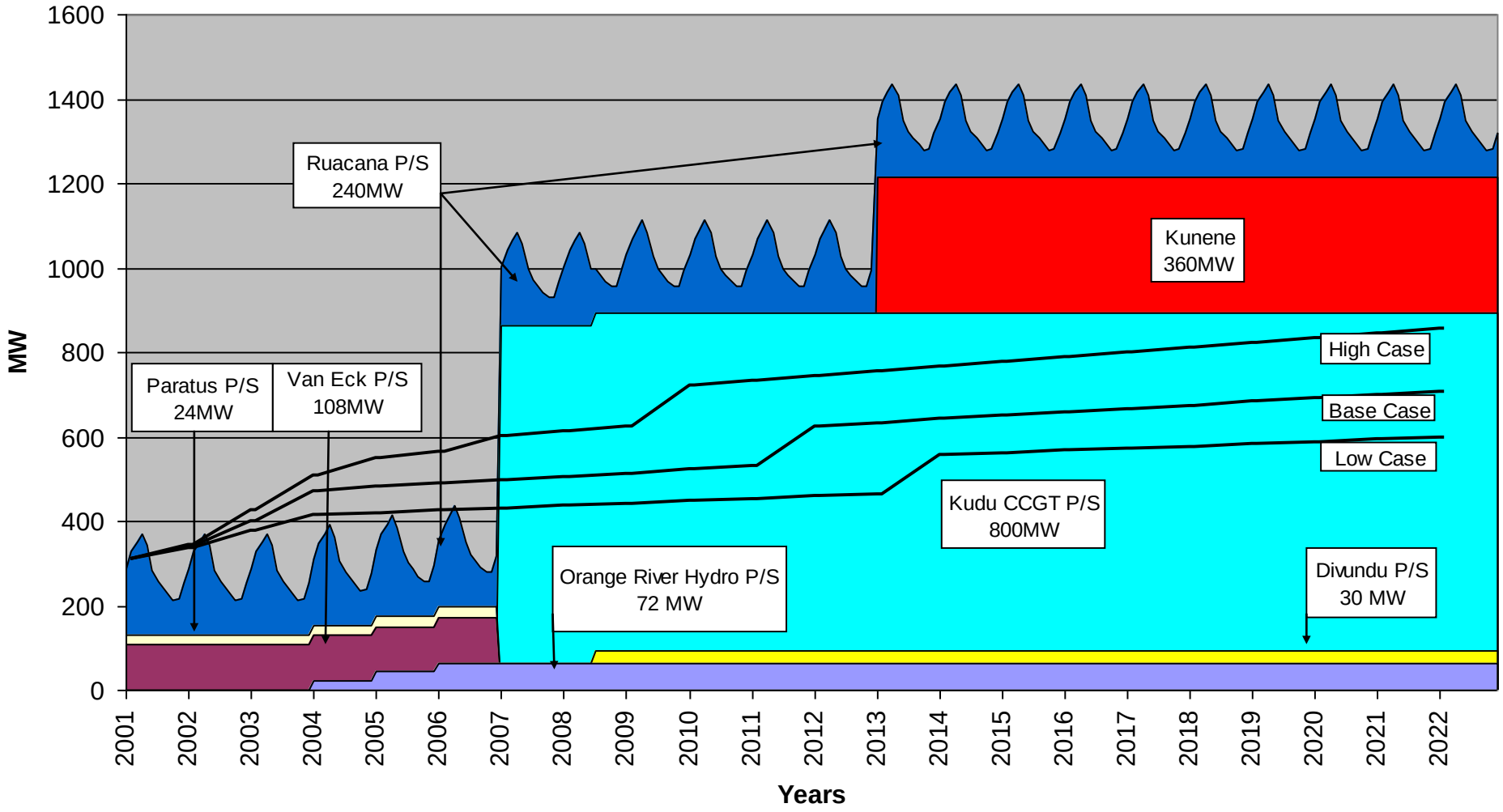


Money makes the world goin‘ round

- Contracts concerning energy supply are calculated for a time span of 20 years or more and are subject to international conditions:
  > The price for gas is pegged to the price for crude oil
  > Cash on the table in hard currency

- Who knows how much will be the barrel of oil in 2, 4, 6, 8 - 20 years?
  > Will it probably cost more than now or less ?
  > Does anyone in Namibia have control over it ?

- Who knows the exchange rate in 20 years ?

- **Any option for fossil generation will come with an INCREASING bill for fuel, whatever this fuel might be.**

INVESTMENT IN FOSSILE ENERGY IS A BLANK CHEQUE !

- Renewable Energy Technology gets cheaper with time and the very source of power is available in abundance.

- So, why invest in fossil energy knowing that it will become increasingly expensive ?

- If Namibia has the courage to go for new solutions NOW, we will be ahead of others and can later on not only sell the power but also the knowledge about how to generate, administer and distribute it.

Money makes the world goin‘ round

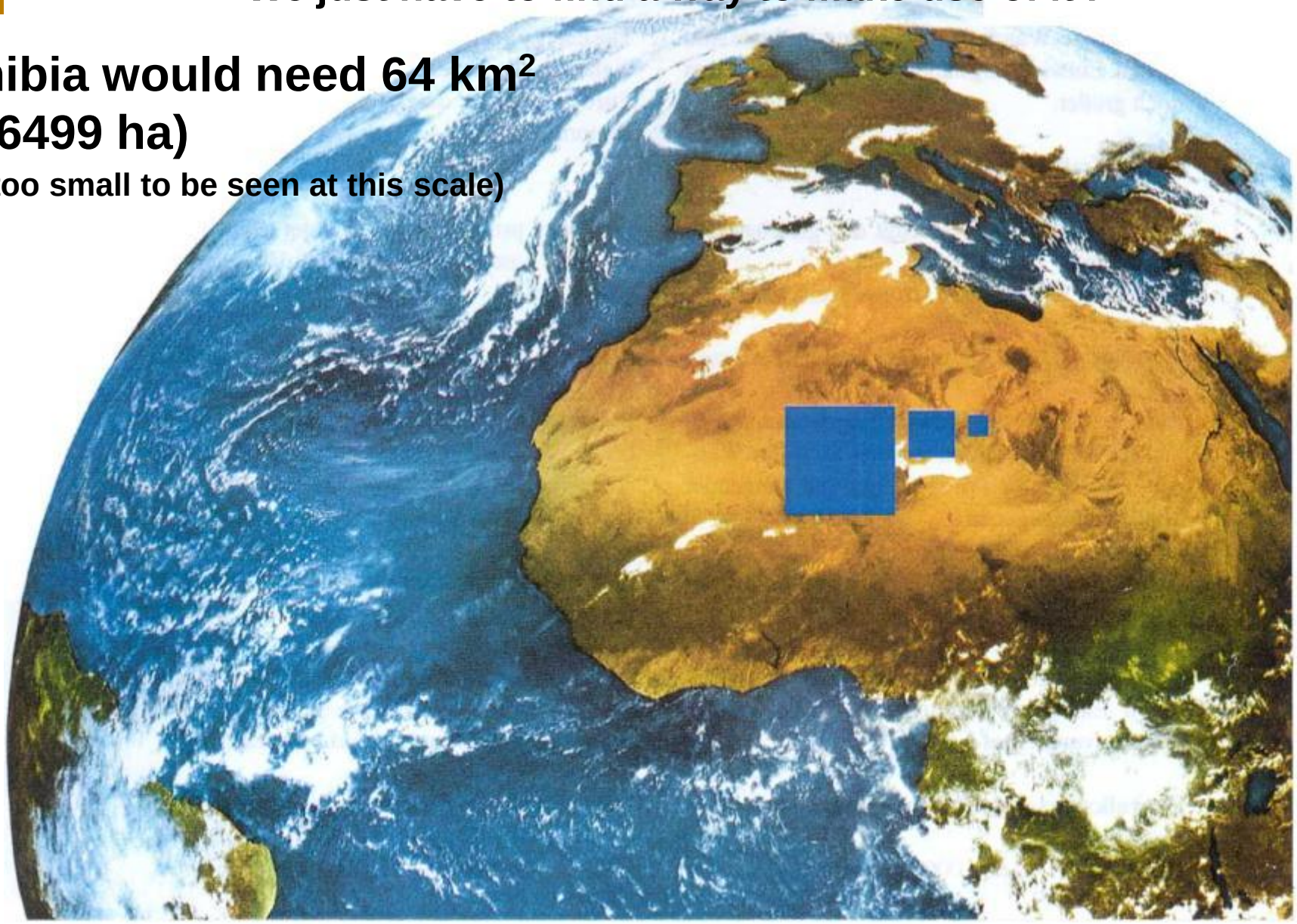
- At the moment, approx 35 % of the inhabitants of Namibia use electricity, this is just around 650’000 people.
  Approx half of them is in arrears with payments
- More and more houses are being auctioned because more and more people can not afford to pay for municipals services any more.
- Prices for electricity WILL RISE with REDs or without, but there will be fewer people who can afford it.
- That means, FEWER PEOPLE will have the means to purchase electricity and they will have to foot the HIGHER BILL for electricity since the price for infrastructure remains the same.

- The solution is to reform the way we use and generate electricity.
  - when energy gets more precious,
  we must stop wasting it !
- Every house, every farm can be a power station.
  We must just create a tariff structure that makes this economical so that private capital will invest in it.
- Large scale generation of electricity through renewable sources is in the long run more economical and will enable Namibia to have real economical growth

Our mother Earth receives in access of 15,000 times the energy we need

We just have to find a way to make use of it !

Namibia would need 64 km^2
(6499 ha)
(too small to be seen at this scale)



An image of the earth from Meteosat.
The three rectangles in North Africa show the areas needed to cover a certain energy demand when surfaced with solar cells.

For Namibia it would look like this

Large Scale RE Power Generation

Ambitious Renewable Scenario:

840 MW Total Renewable Generation

100 MW Wood Gas (1000 - 1500 Farmers) (50 - 200 KW)

40 MW Wind Park, used machines

100 MW Wind Parks new (various places along the coast)

100 MW Solar Photovoltaic (PV) feed-in

50 MW Solar Photovoltaic (decentralised systems)

300 MW Solar Thermal feed-in

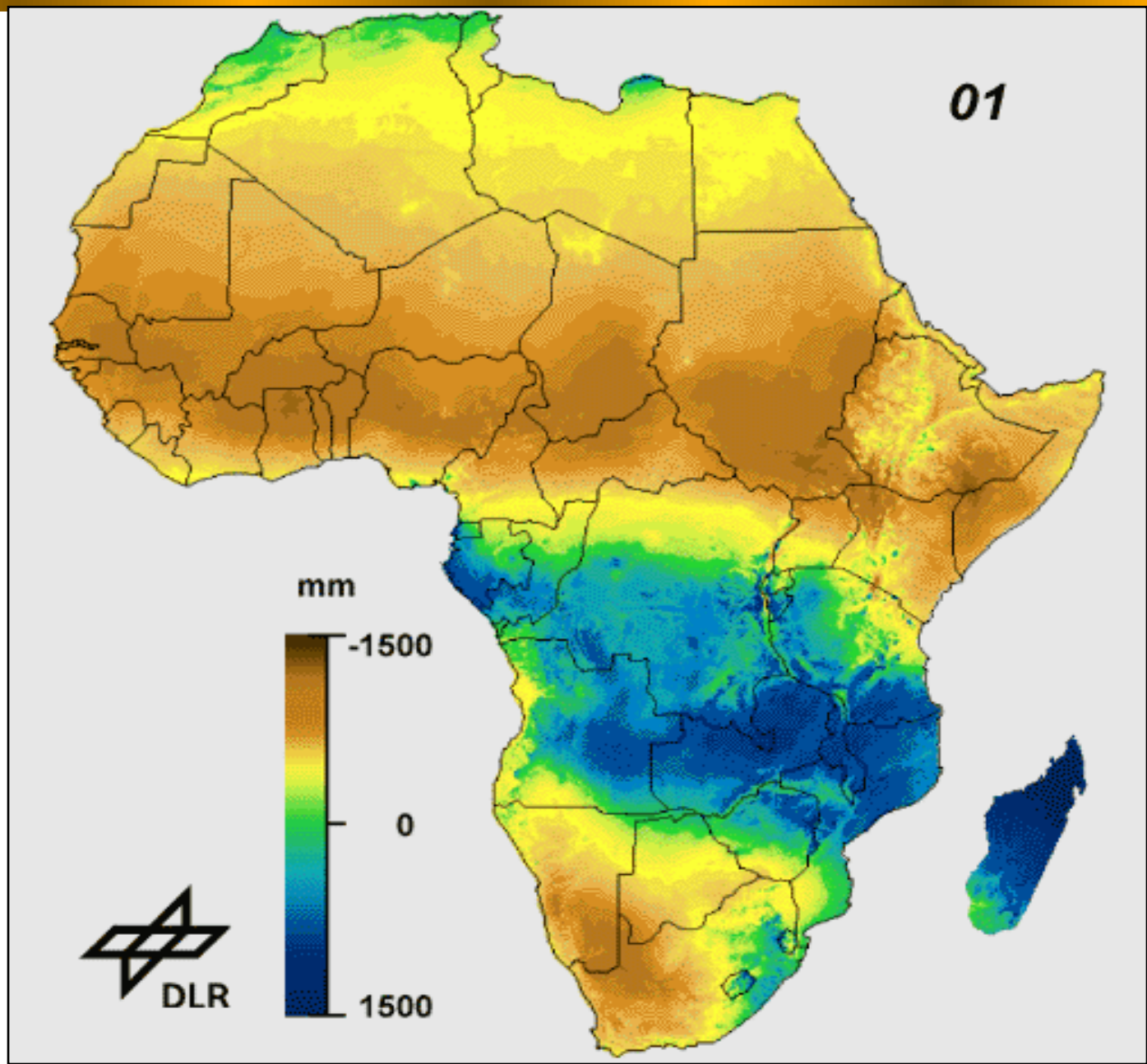
150 MW Solar Thermal (decentralised in SWH and Heaters)

This can realistically be implemented within ten years from now

Rain Patterns in Africa

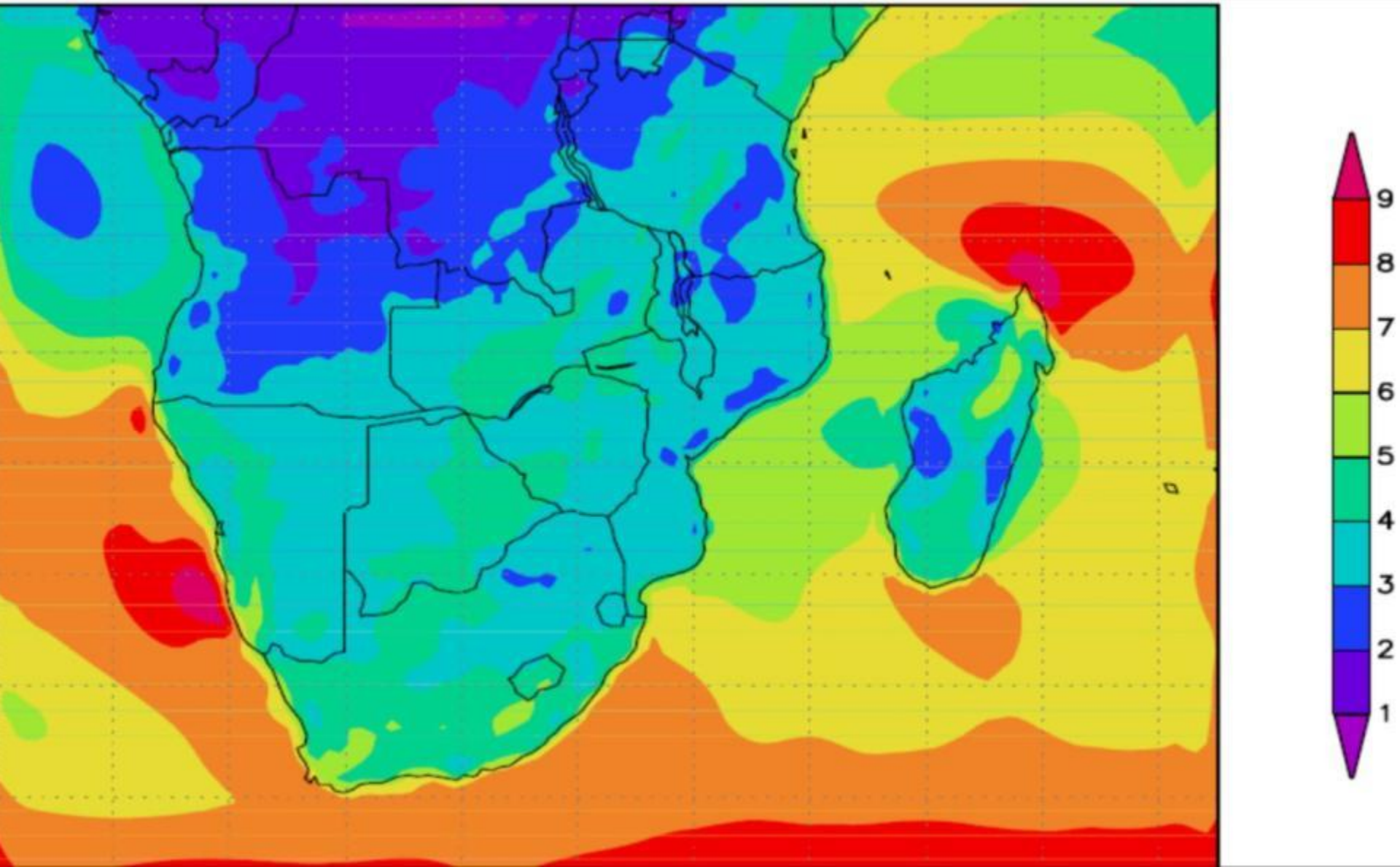
Should Namibians base their National economical future on commercial farming of crops or livestock?

Why not farm energy ?

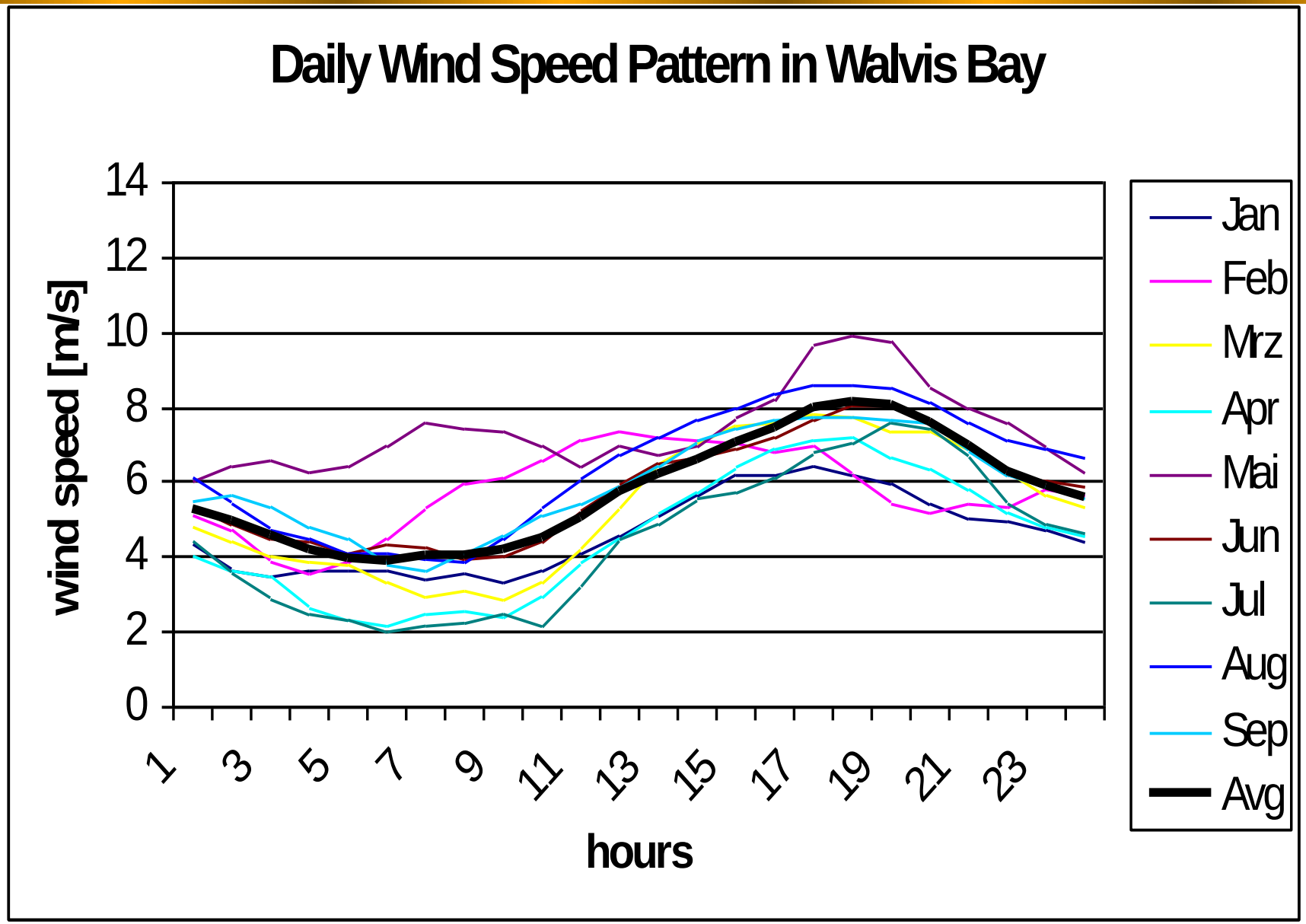


Wind Generation

Windmap of Southern Africa



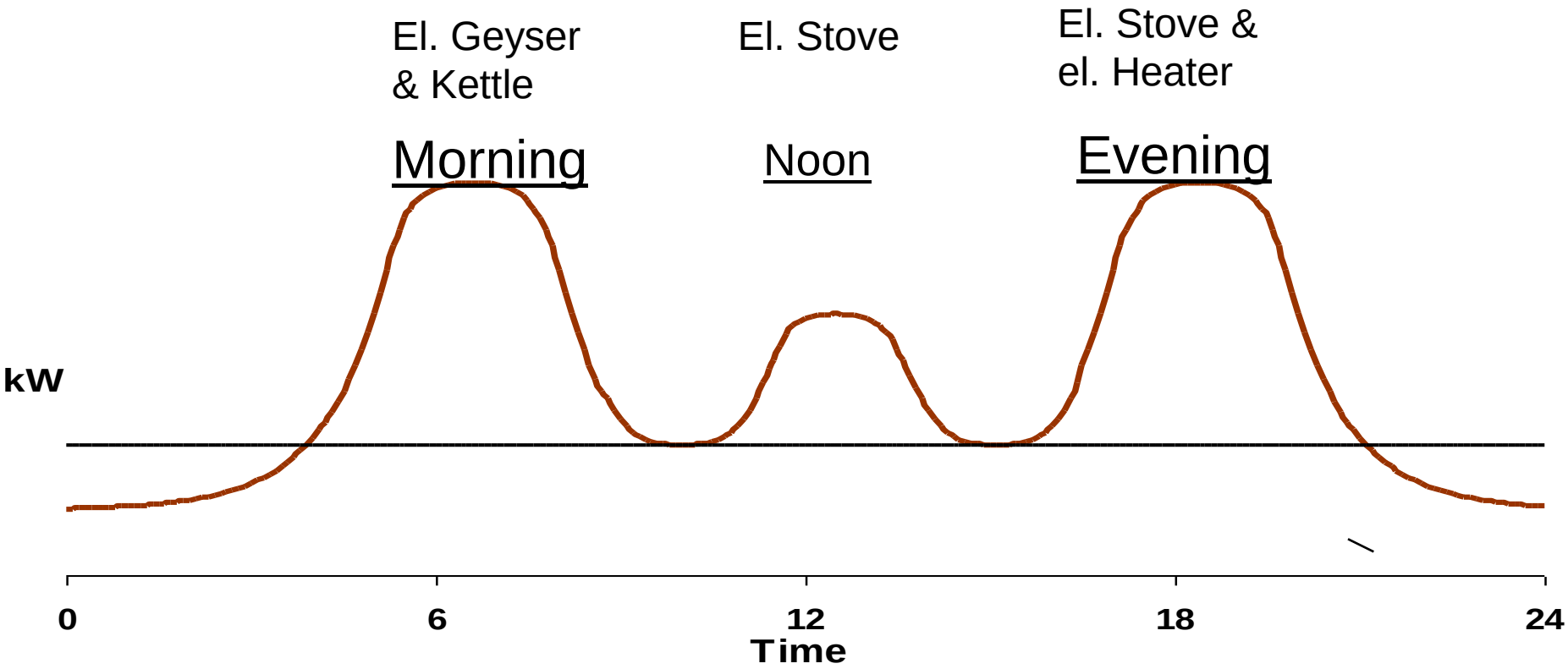
Wind Generation



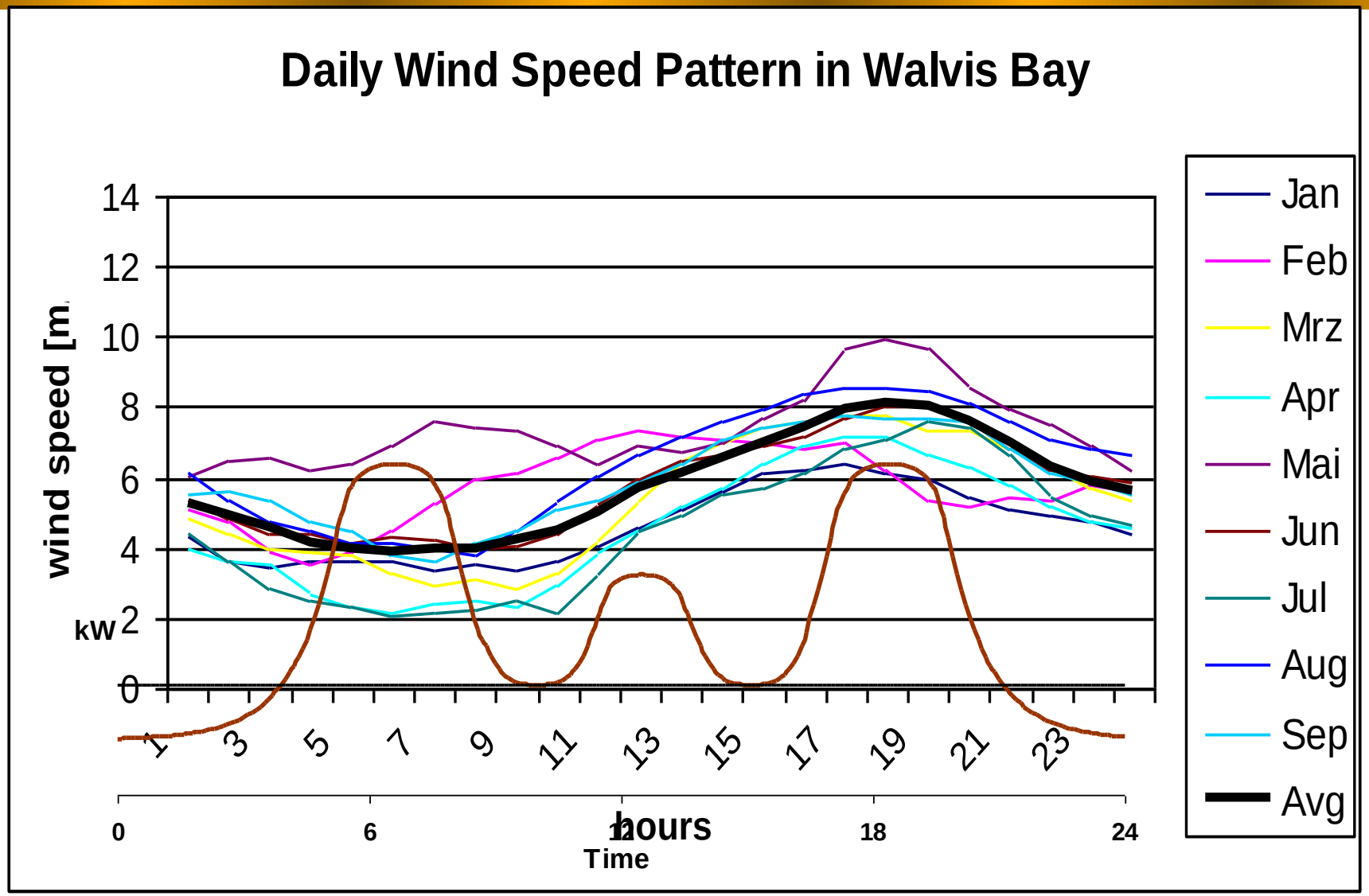
Wind Generation

Typical Household

- Consumption/day : 16kWh Energy
- **Average** Energy : 16kWh/24h = 0.666kW



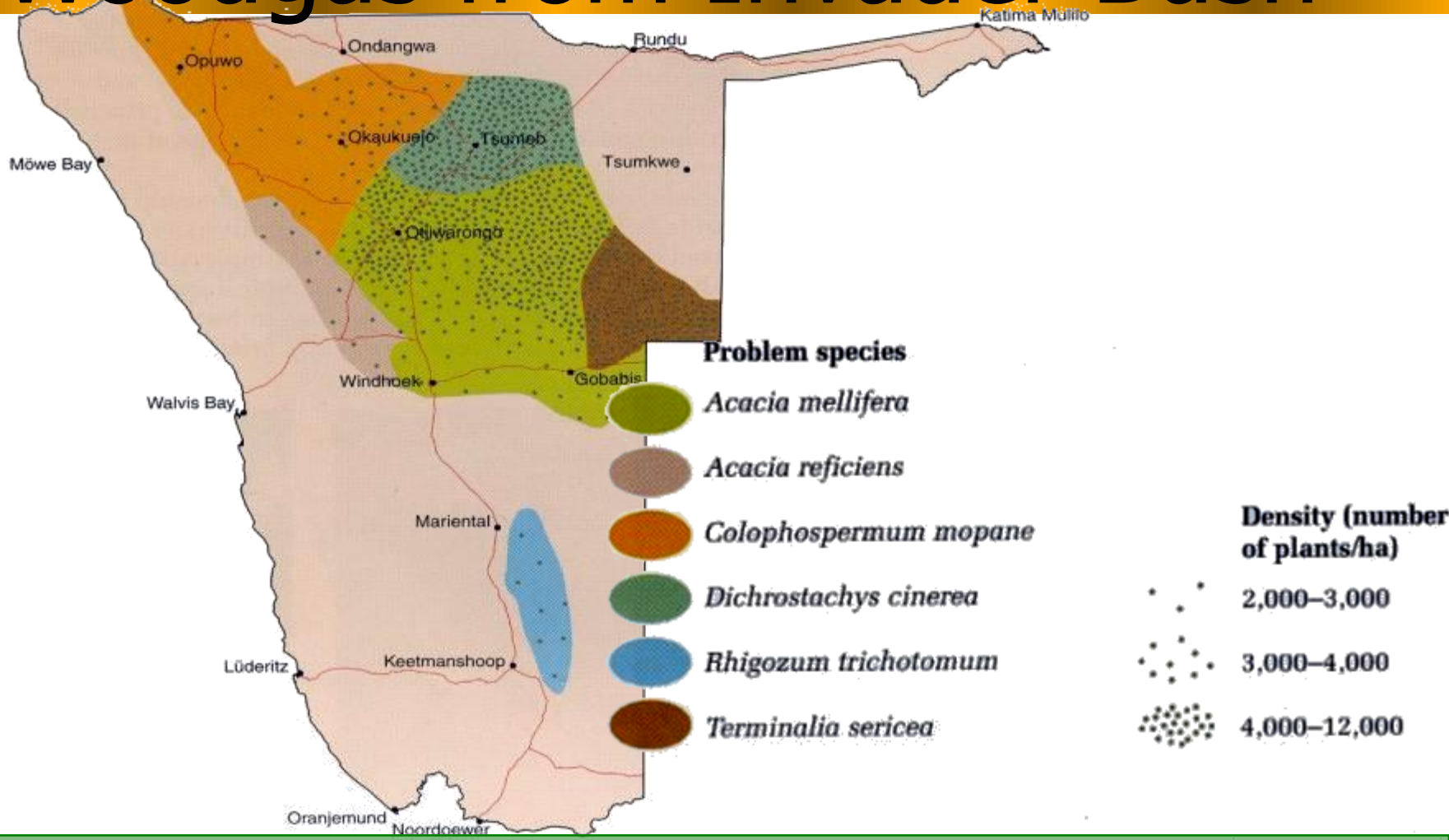
Wind Generation



Wind Generation

Walvis Bay wind turbine generates enough electricity for **50 to150 households**

Woodgas from Invader Bush



Bush encroachment

- covers an area of ~**26 million hectares**
- causes losses to the national economy more than **N$ 700m/a**

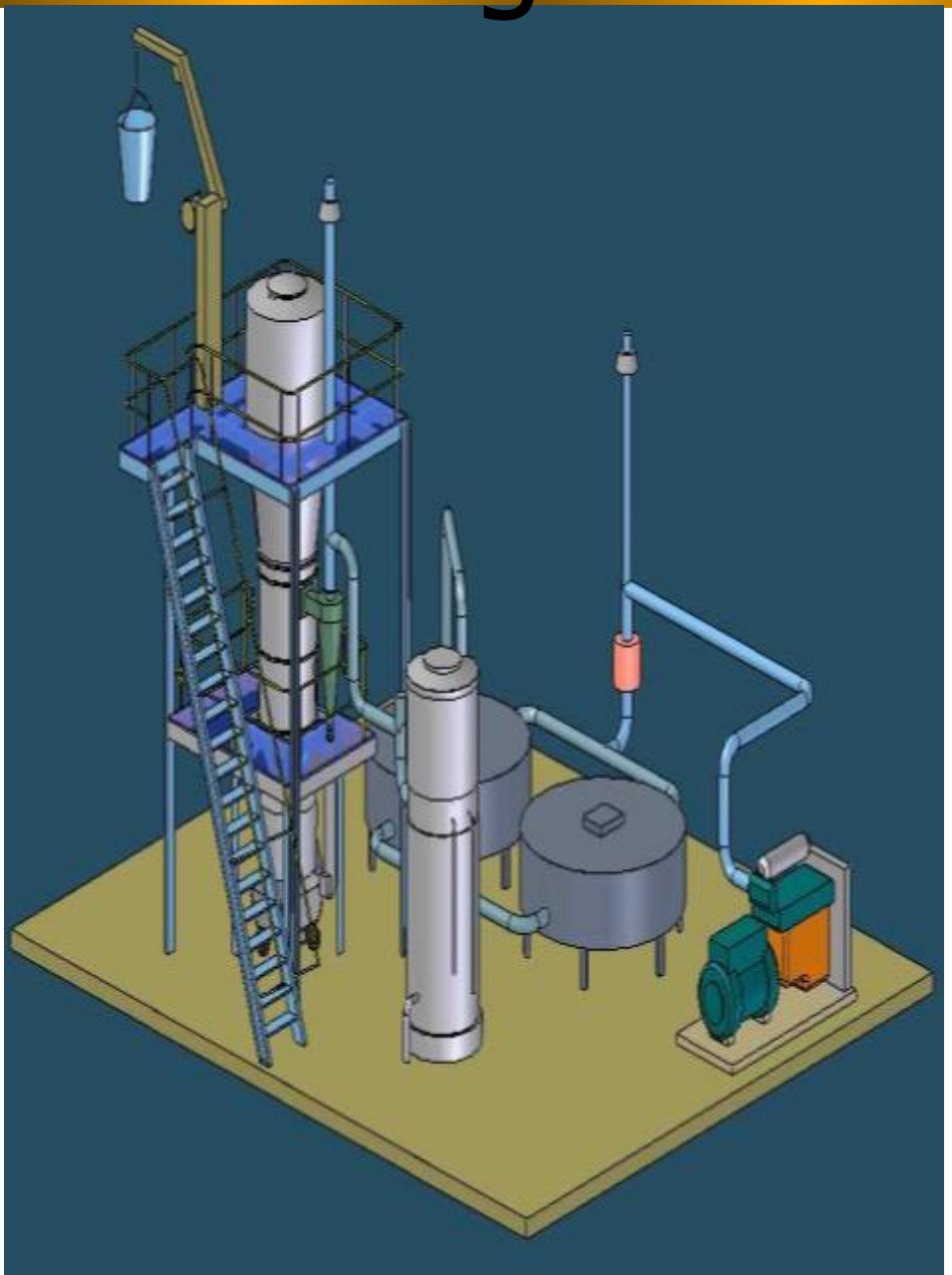
Woodgas from Invader Bush

A Pilot-Scale Woodgas Producer in Namibia

Huge gains from increased rangeland.
Thousands of jobs to be created
Farmers can become energy-farmers

Wood Gasifier Produced in South Africa

Woodgas from Invader Bush



Biodiesel

Small-scale Biodiesel Production Equipment

Biodiesel can be produced from all kinds of vegetable oils. Here someone recycles old oil from big kitchens. In Europe there are large plantations to grow plants for oil extraction. - A new source of income for Namibian farmers ?

Medium-scale Equipment for Commercial Production

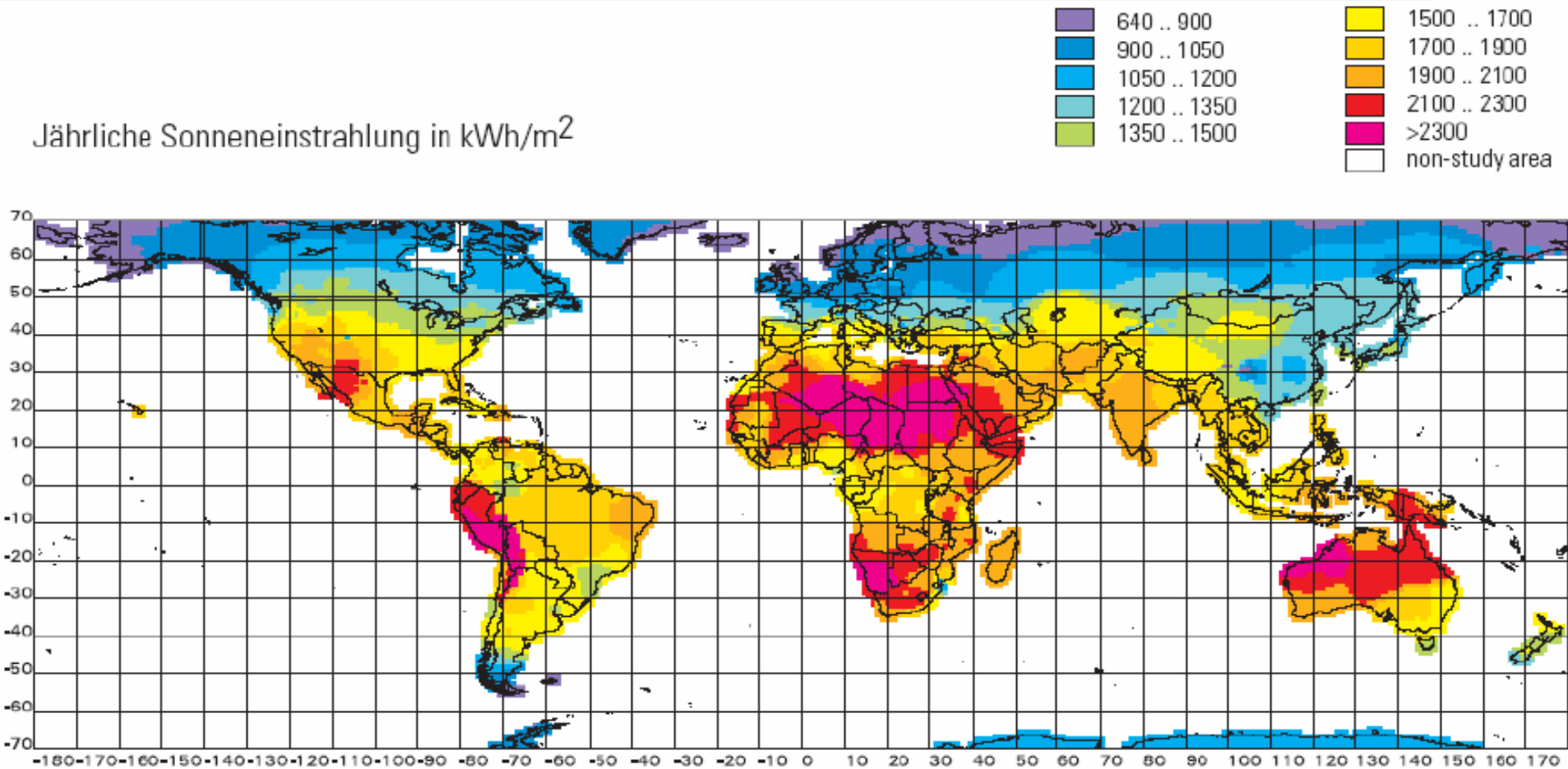
Biodiesel production is an industrialised process. Biodiesel can be mixed in or replace Diesel for many kinds of engines.

Biodiesel

Large-Scale Biodiesel Production Plant in Scotland

Solar Generation

Worldwide irradiance distribution (2)



Best sites (horizontal): **Namibia: 6.3 kWh/m²d, 2300 kWh/m²yr**
~3300 sunshine hours per year (of 4380)

Solar Thermal Generation

Solar Trough Technology (SEGS):
345 MW in action TODAY

Photovoltaic Generation

Other Technologies

Natural Gas for Driving (Kudu in the tank)

What, if we don't burn the gas but bottle it and drive our cars with it ?

Namibia would be independent from the international Oil Cartels, fuel would be obtained on Namibian territory by Namibian workers and sold in Namibian Dollars to Namibian Vehicle-owners.

The portion of the gas that is not needed for transport, can either remain for future generations or be sold to finance the investment in RE & EE or be used for other industrial purposes.

Namibians would benefit from rising oil prices, not pay for them.

European Solutions for African Problems ?

NAMIBIAN SOLUTIONS for NAMIBIAN PROBLEMS !

Other Technologies

Stirling Motor
(can be manufactured in Namibia)

Dish-Stirling technology, 30 to 50 kW per unit

No water needed

Must follow the sun precisely

Can use ANY source of heat:

- Sun - charcoal
- Veg oil - gas
- Geotherm. - etc.

Should be explored and adapted to Namibian conditions

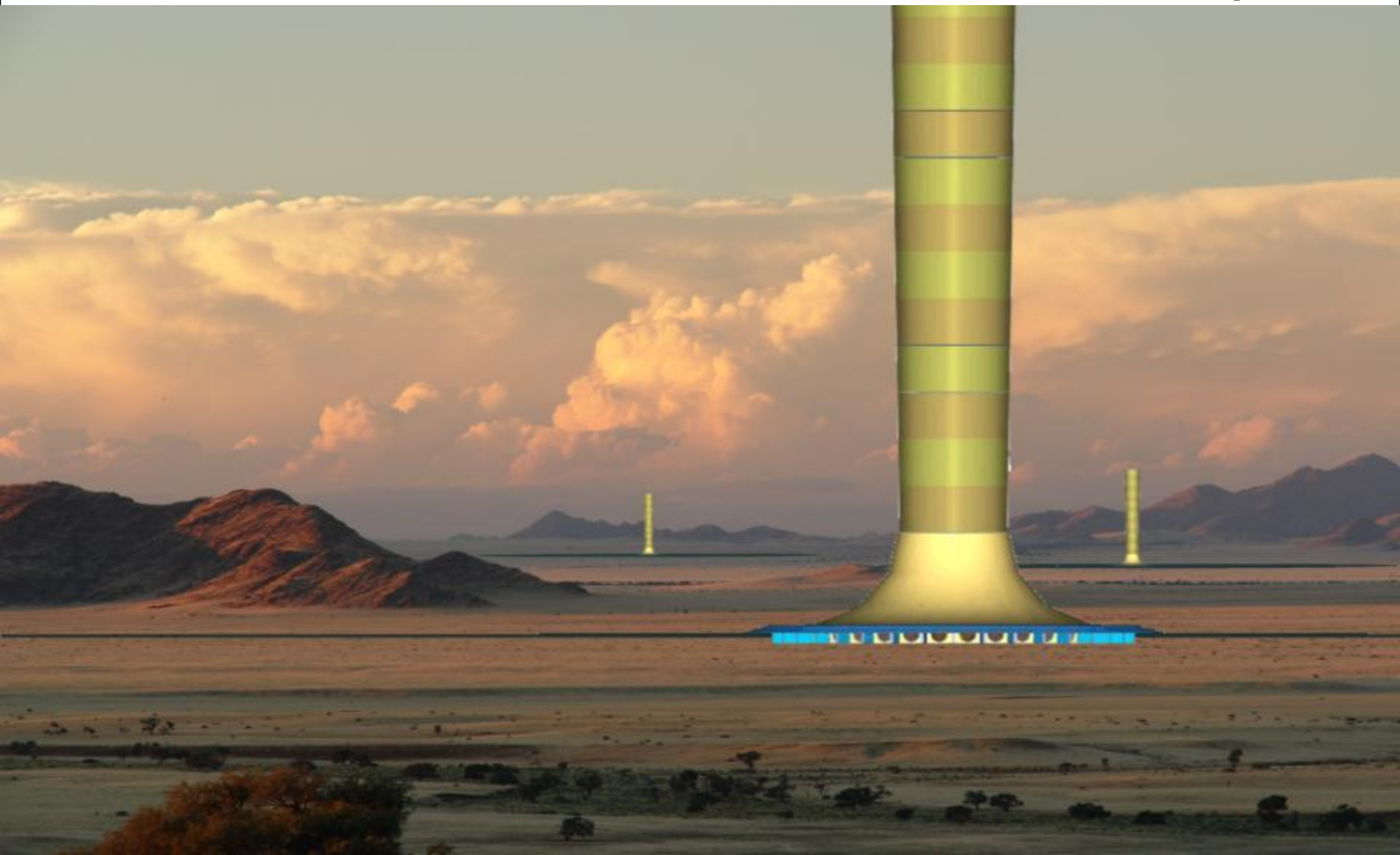
Other Technologies

Green Tower-Demo, Manzanares, Spain, 50kW:

Should be explored and adapted to Namibian conditions

Other Technologies

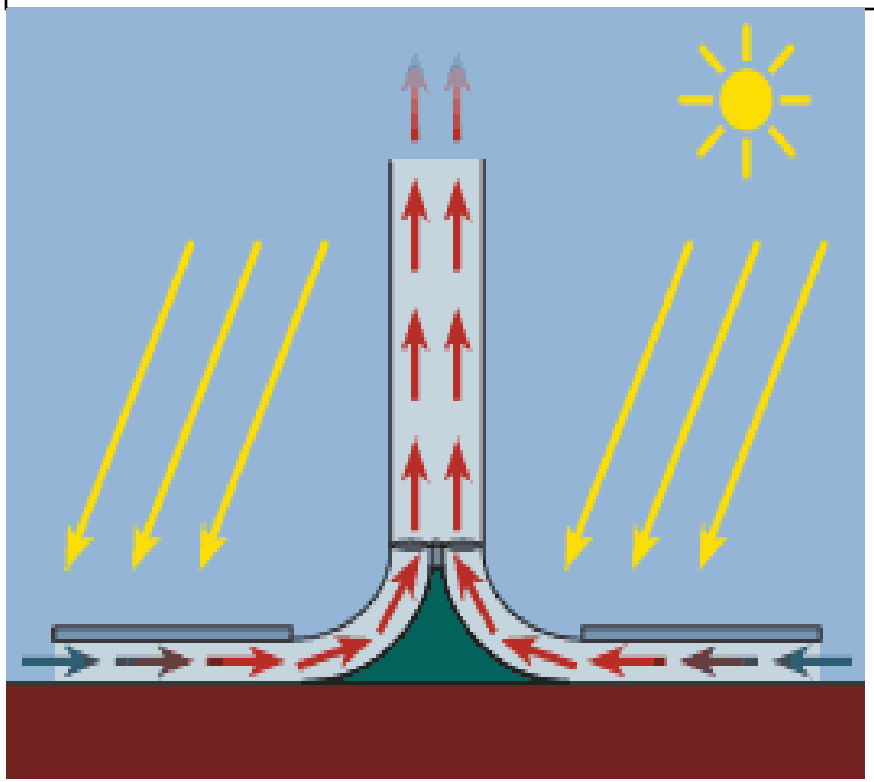
Green Tower in Namibia **?** 370 MW for 160 years

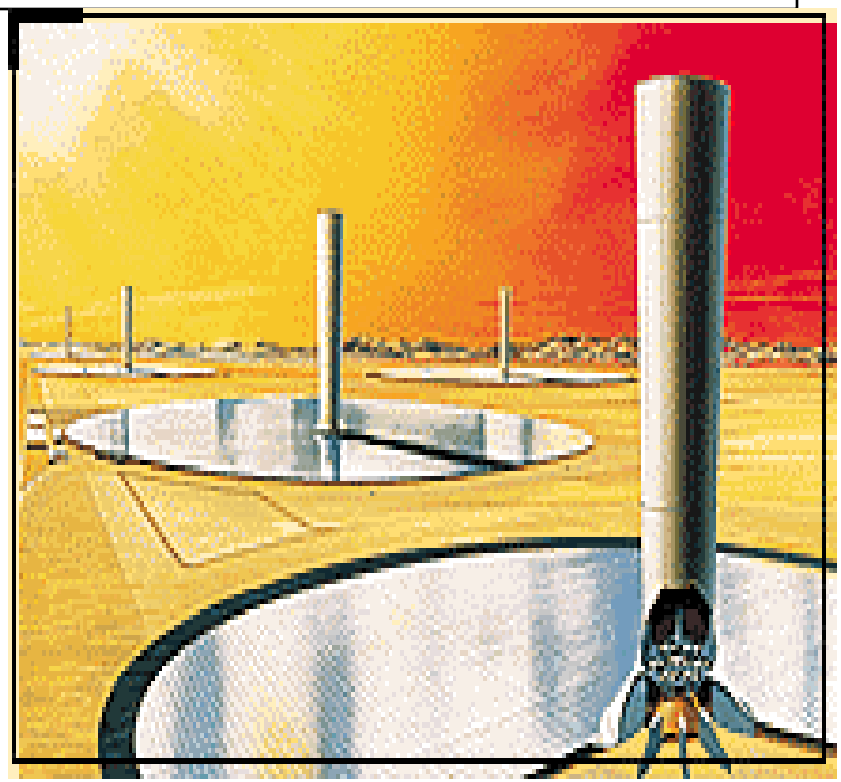


Other Technologies

Green Tower:

Up to 7 km diameter, 1500m high

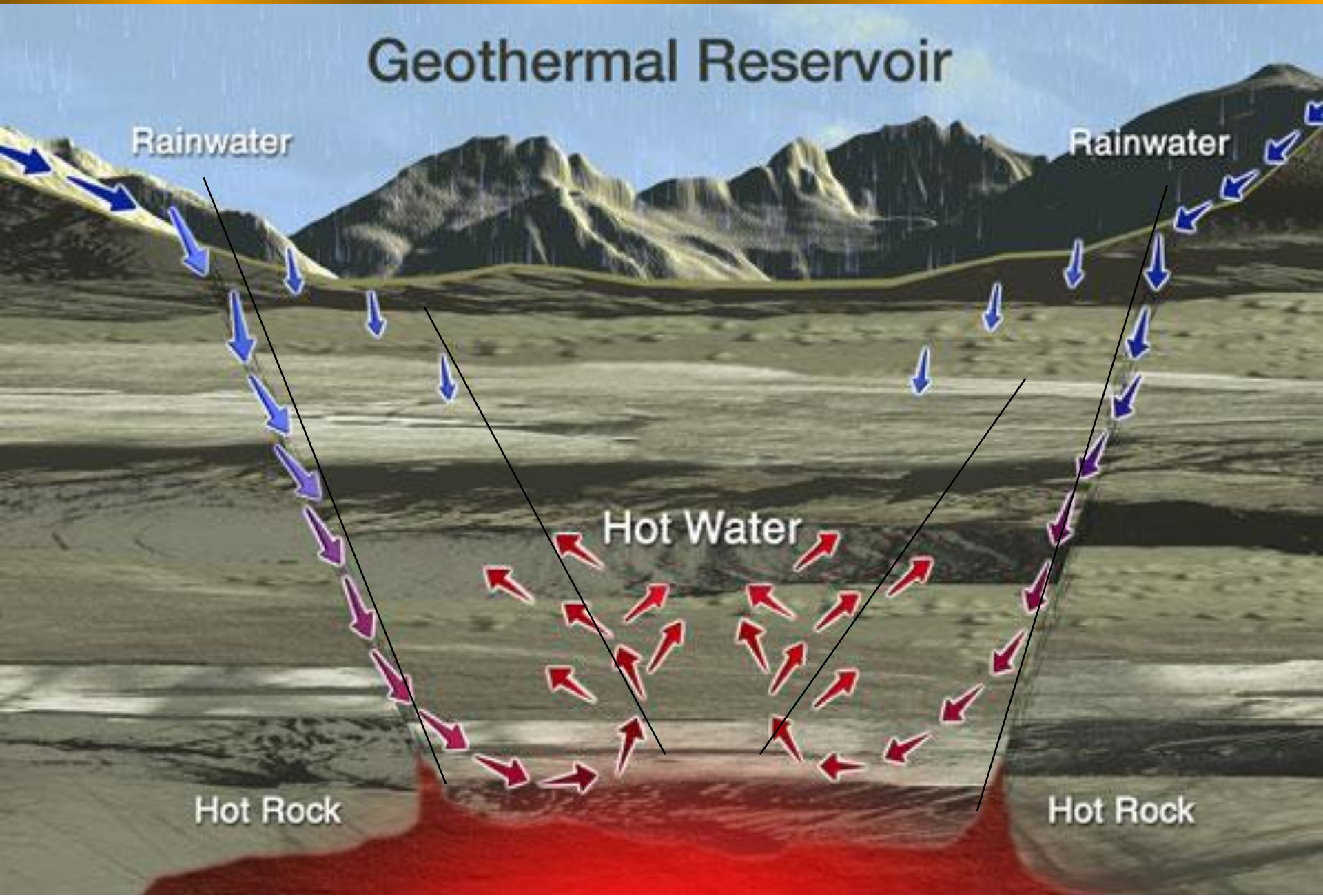




Artist's impression

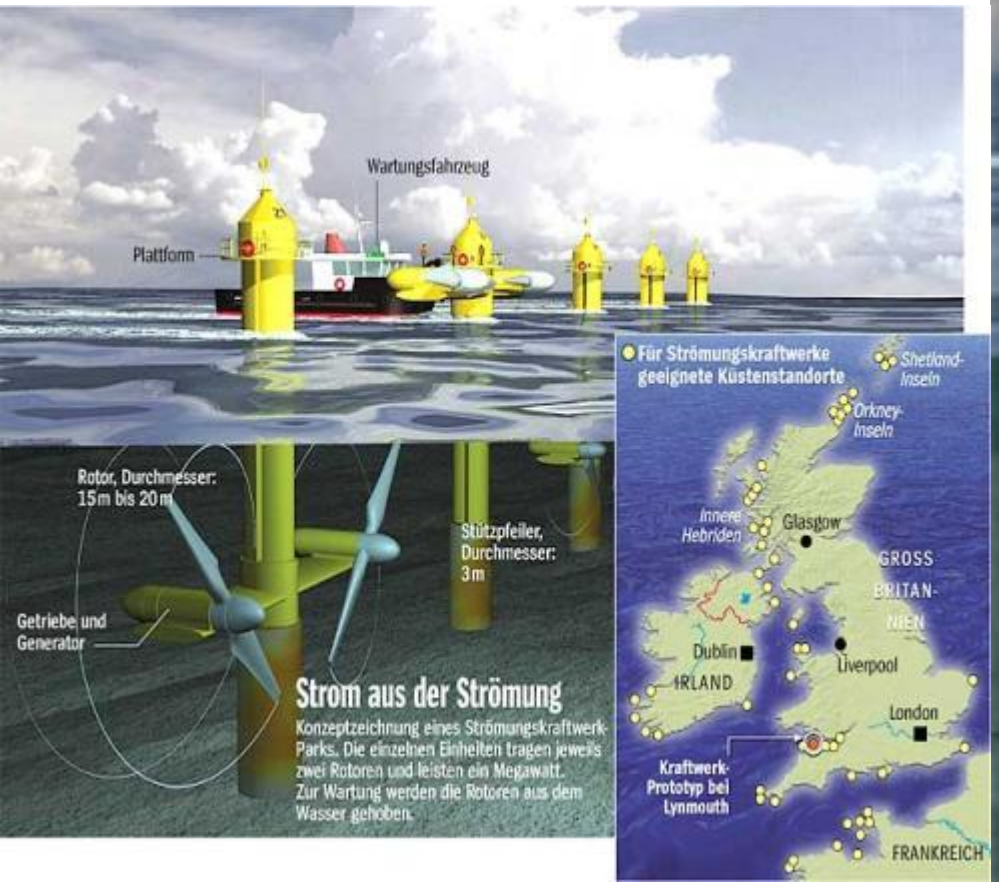
- Does not use water for operation
- Can be designed to run at night time

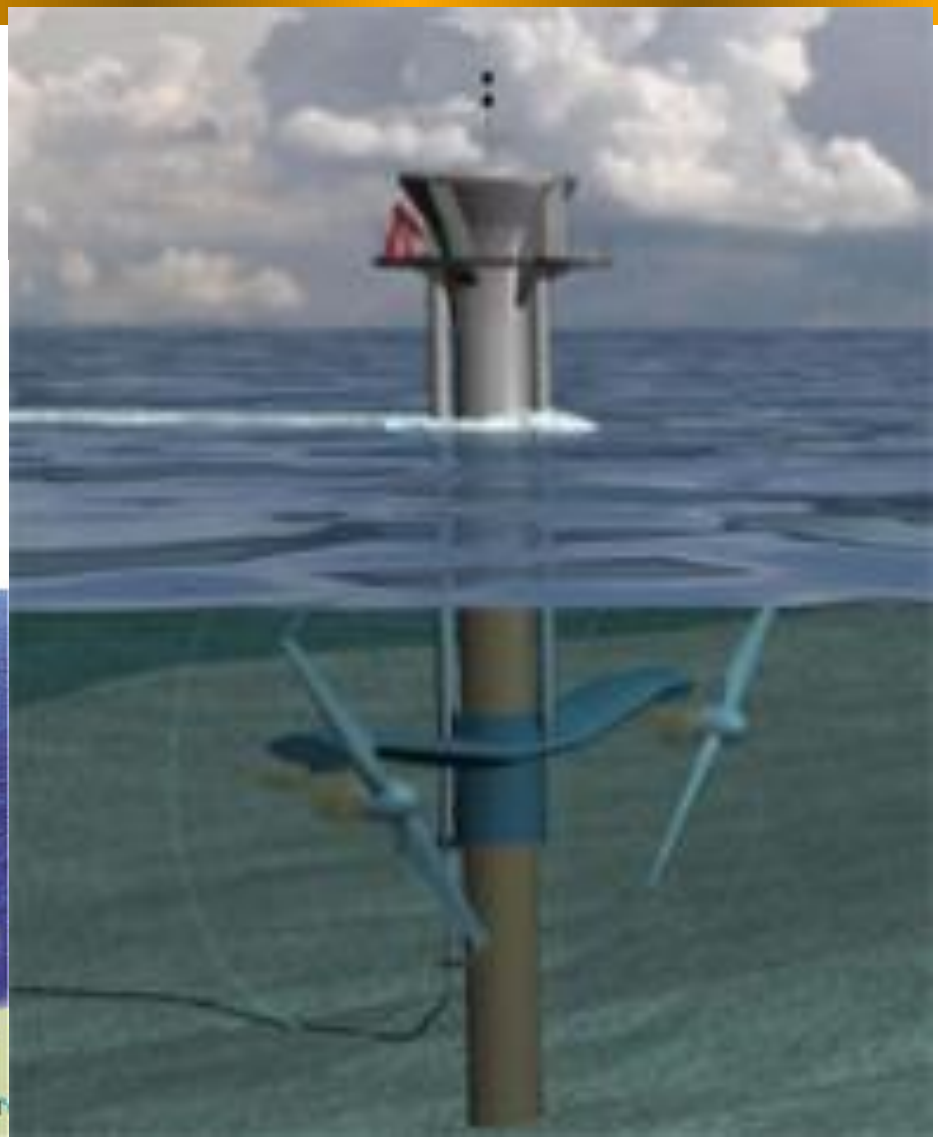
Other Technologies



Other Technologies

- Ocean stream generation

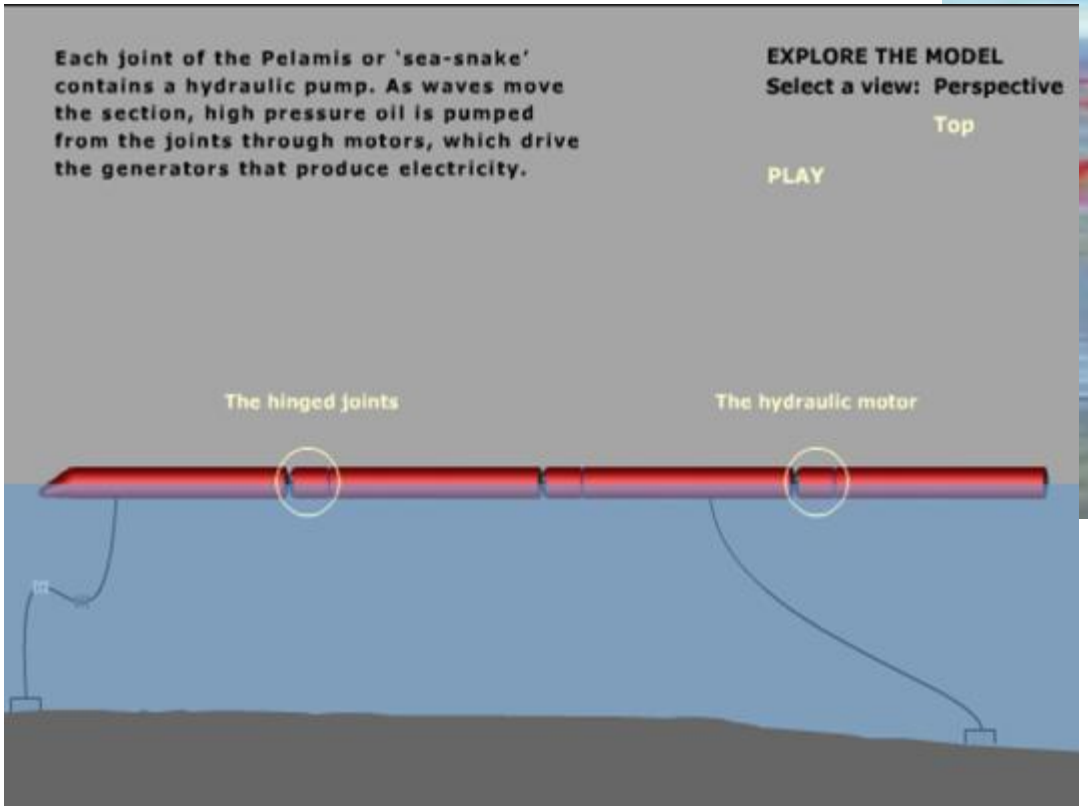




Should be explored and adapted to Namibian conditions

Other Technologies

- Wave energy



Should be explored and adapted to Namibian conditions

Large Scale RE Power Generation

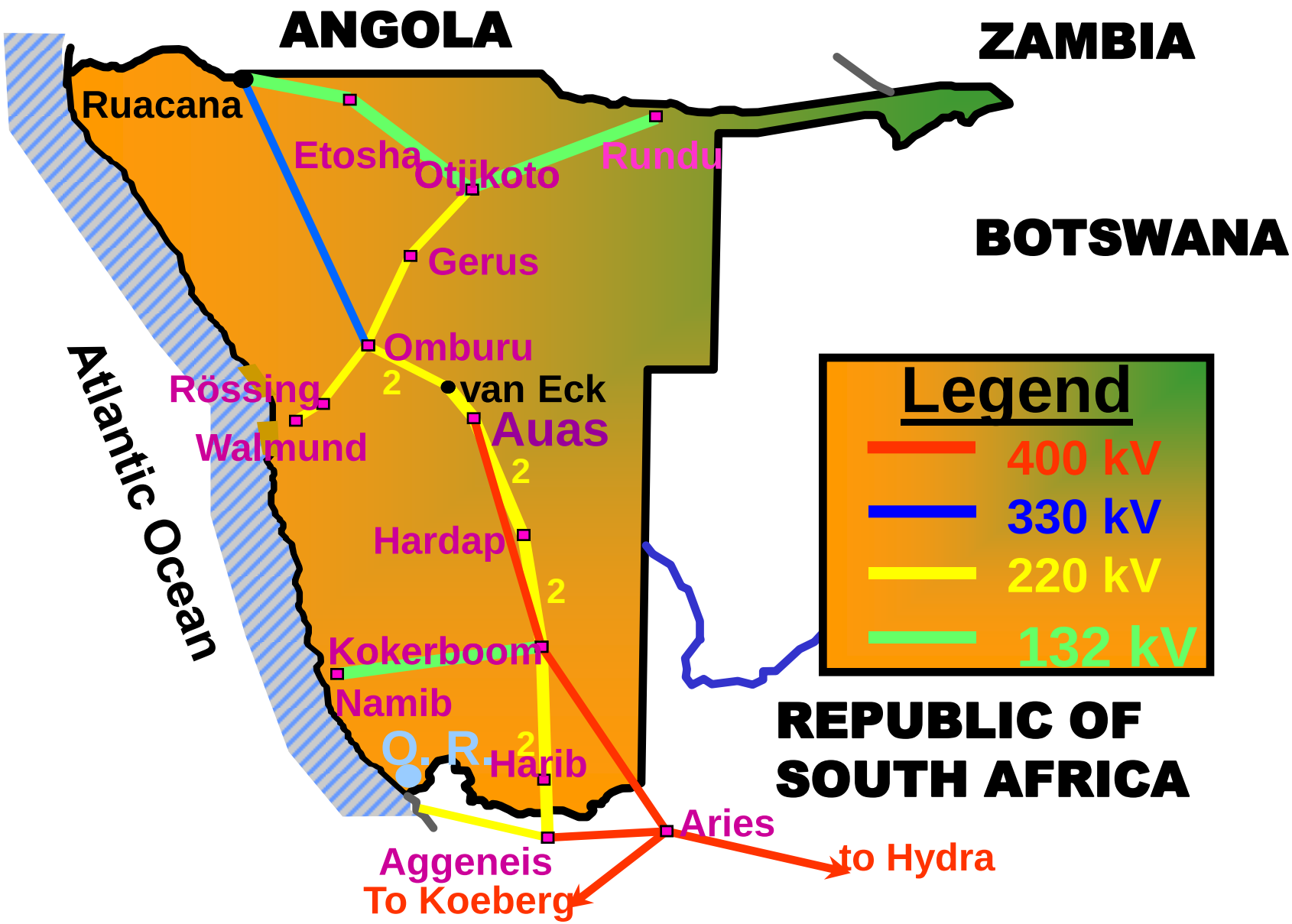
What must happen to make this happen?

CLEAR COMMITMENT FROM GRN FOR RE & EE

- Introduction of "life-cycle-costing" instead of "cheapest offer" and "never mind the running cost".
- Reliable, guaranteed feed-in tariff for energy farmers and other producers
- Start Solar Thermal NOW
  - SWH for All
  - Large Scale Generation of Electricity

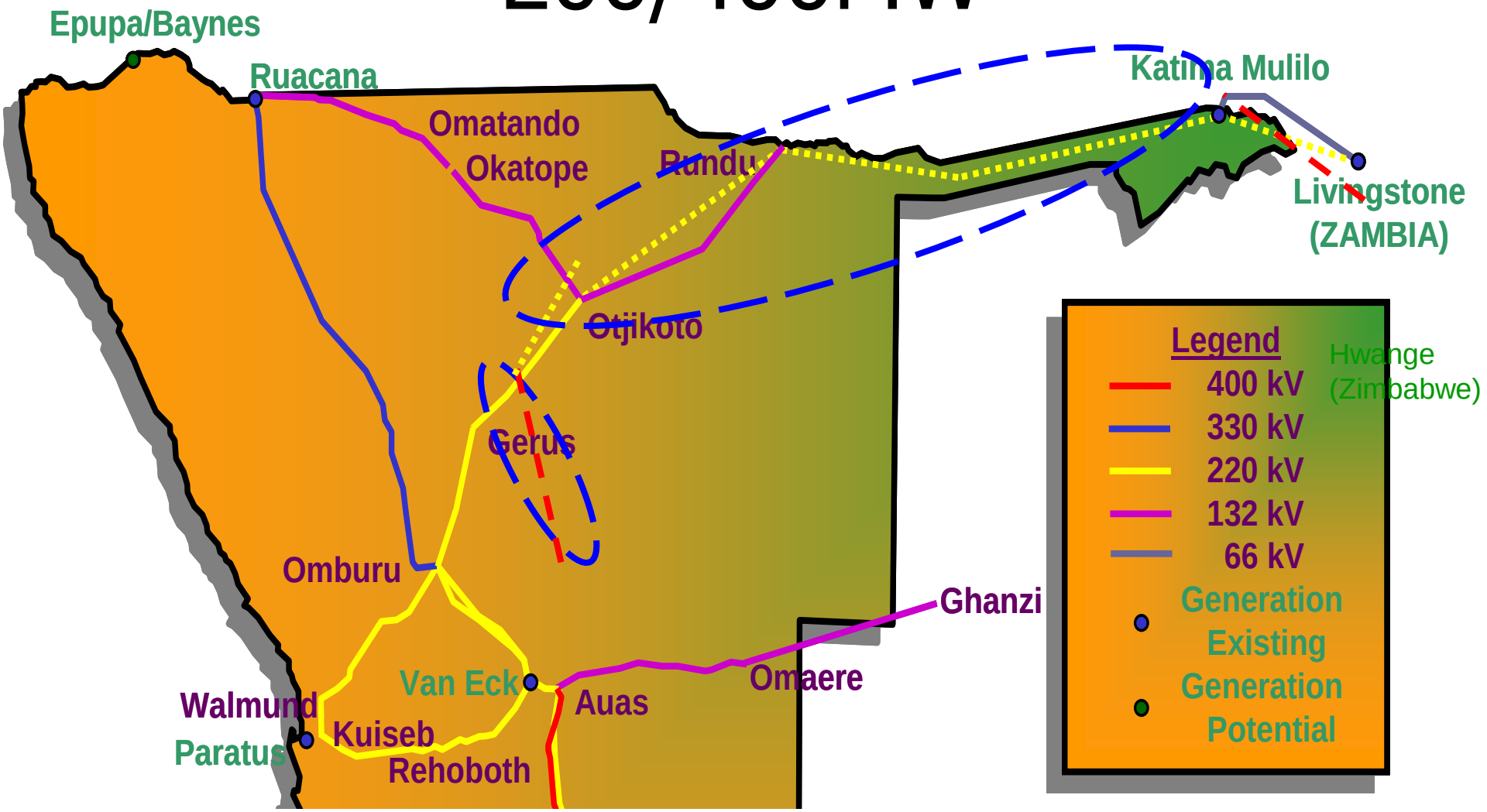
European Solutions for African Problems ?

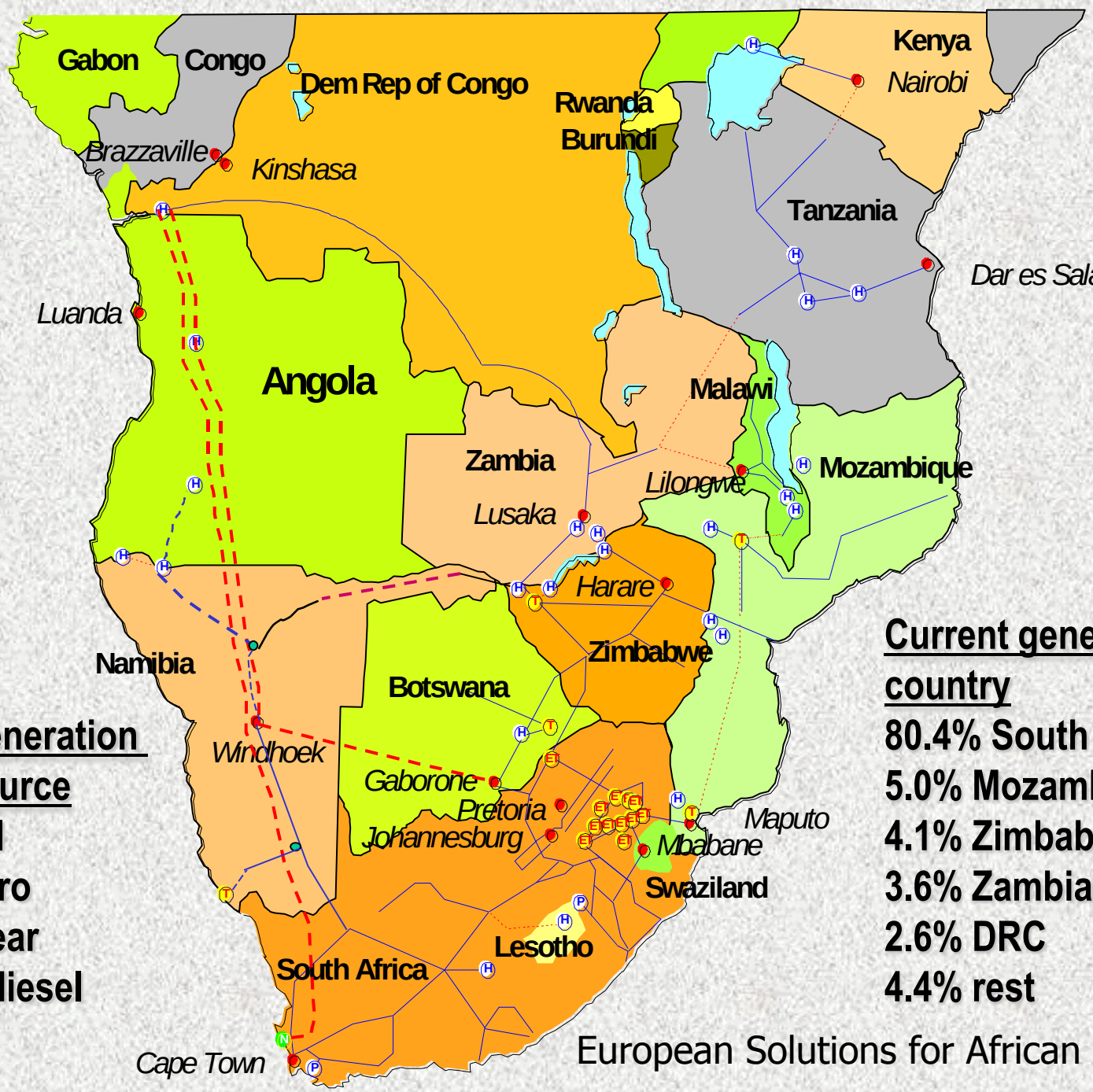
Central Energy Supply Today



Caprivi Link Interconnector

200/400MW





NamPower

Current generation by country

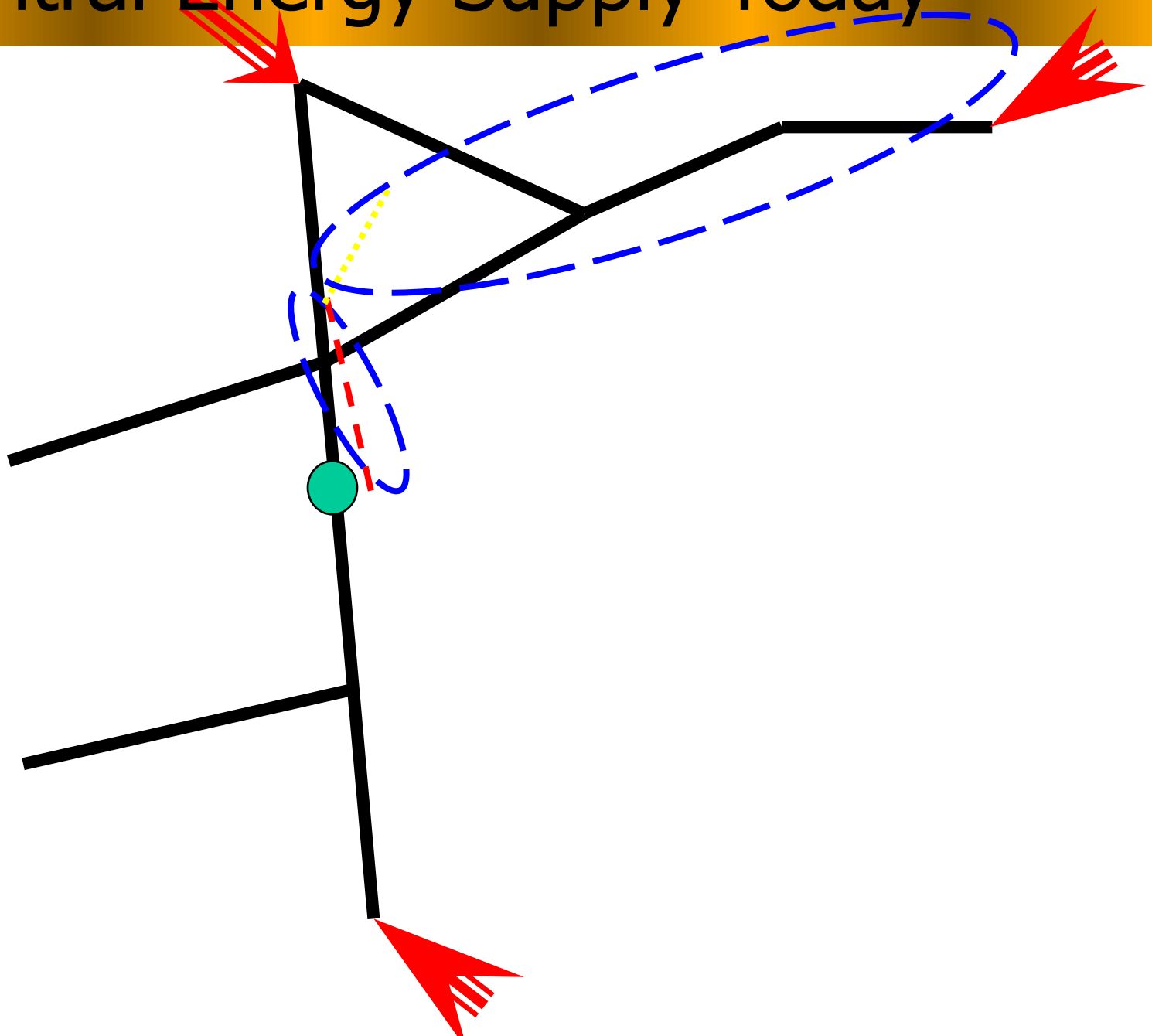
80.4% South Africa
5.0% Mozambique
4.1% Zimbabwe
3.6% Zambia
2.6% DRC
4.4% rest

Current generation by fuel source

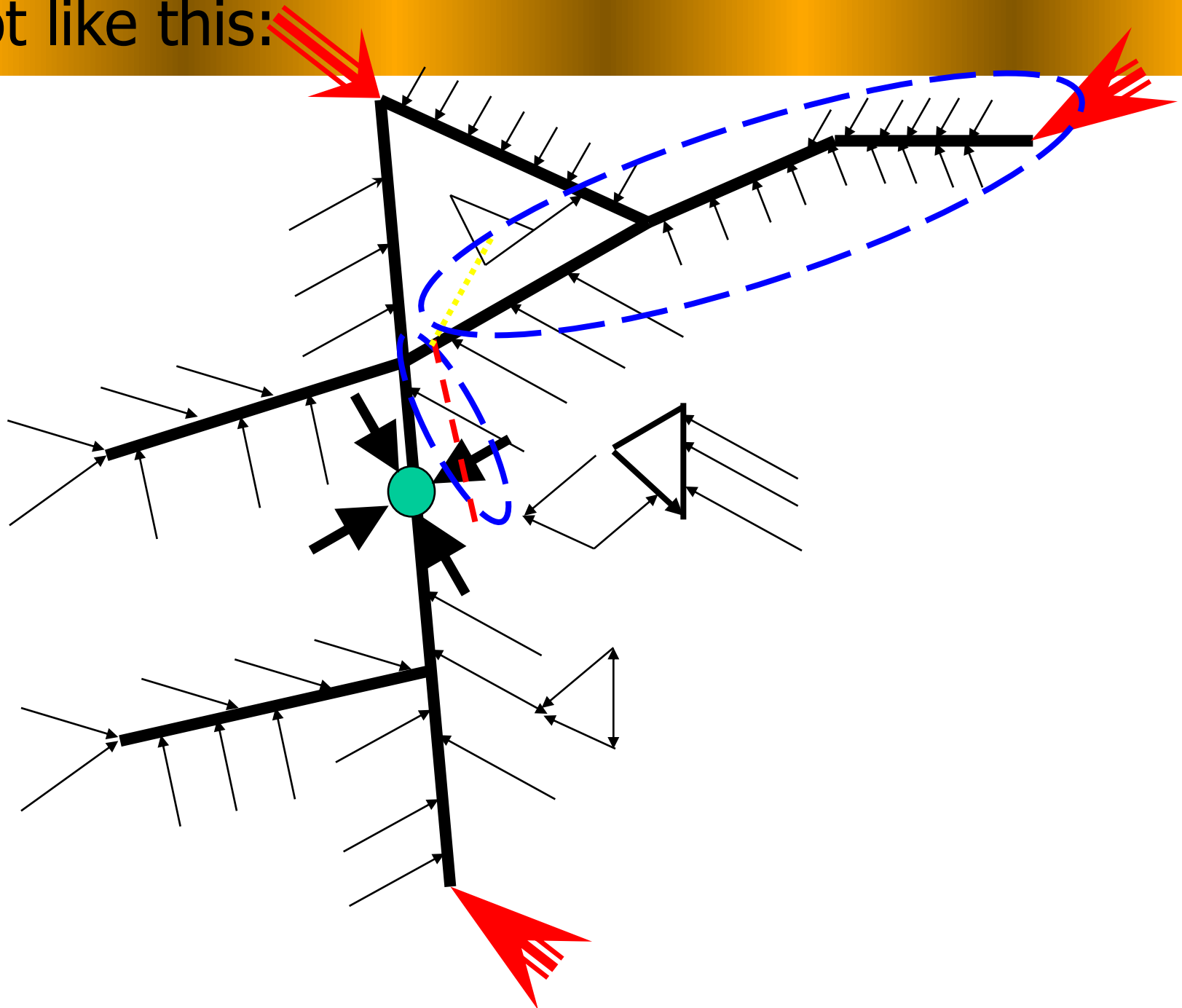
74.3% coal
20.1% hydro
4.0% nuclear
1.6% gas/diesel

European Solutions for African Problems ?

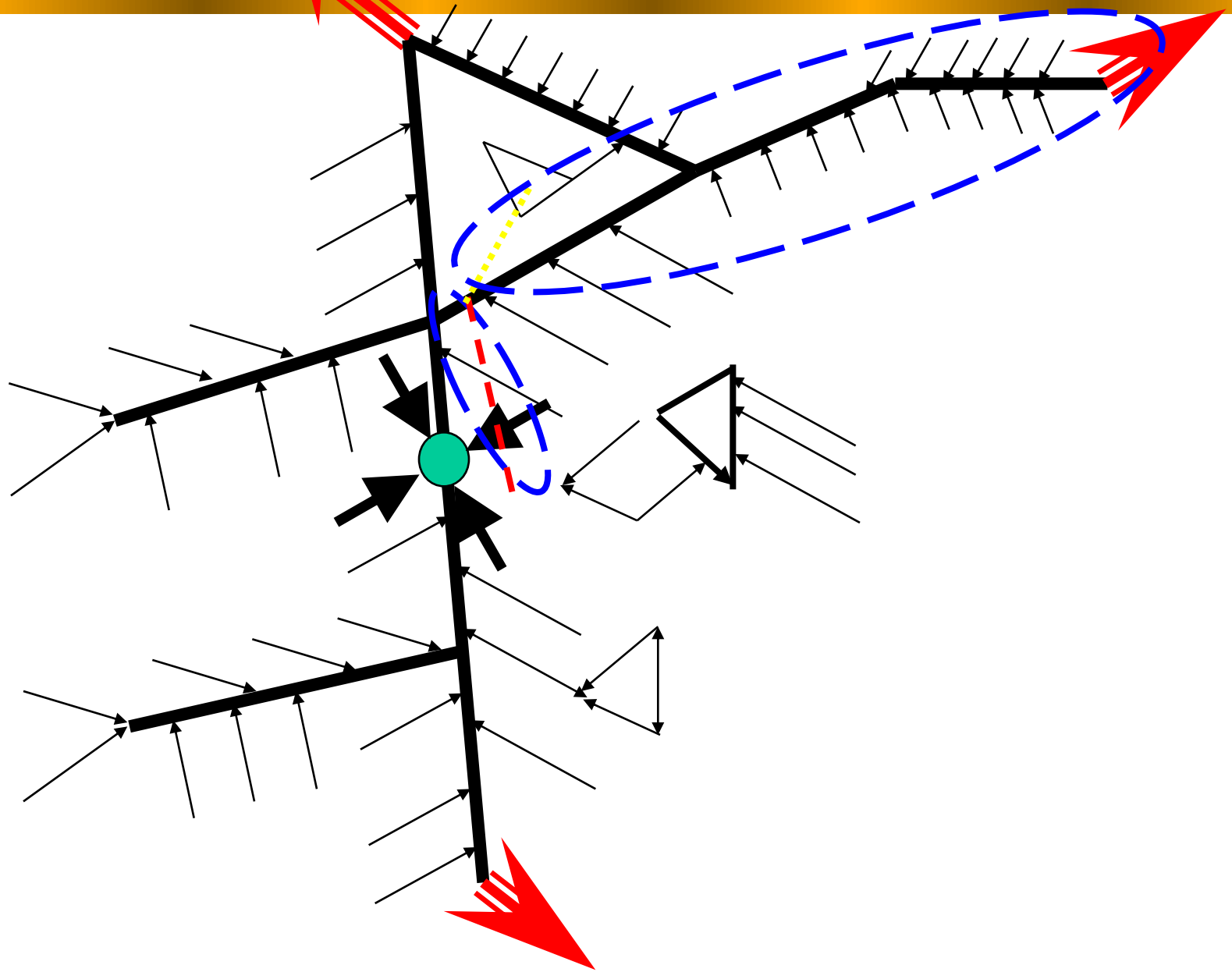
Central Energy Supply Today



Why not like this:



Or even like this



Why not:

- Become the first Country that lives 100% on renewable, sustainable energy
- Aim to export the power of electricity and the power of brain activity by becoming the Centre of Competency with regard to RE & EE ?
- Develop Walvis Bay to be a Centre of Excellence for Wind Power-Generators ?
  - First refurbish old ones
  - later manufacture new ones
- Re-open the Module Factory in Tsumeb ?

Why not:

- Have Solar Street Lights ?

Why not:

- Build our houses in a way, that they don’t get hot instead of saving a few Dollars for the construction but pay huge amounts every month for cooling and heating in the winter months
- Implement future oriented, new technical concepts that attract developers from all over the world ?
- Put Namibia on the world map of future generation(s).
- Rather invest in energy farmers who feed in the grid and create many jobs than erecting expensive, big and vulnerable grey elephants or kudus?

How not to manage the Future

We can **not** solve the problems we have today, when we apply the same way of thinking that has caused them.

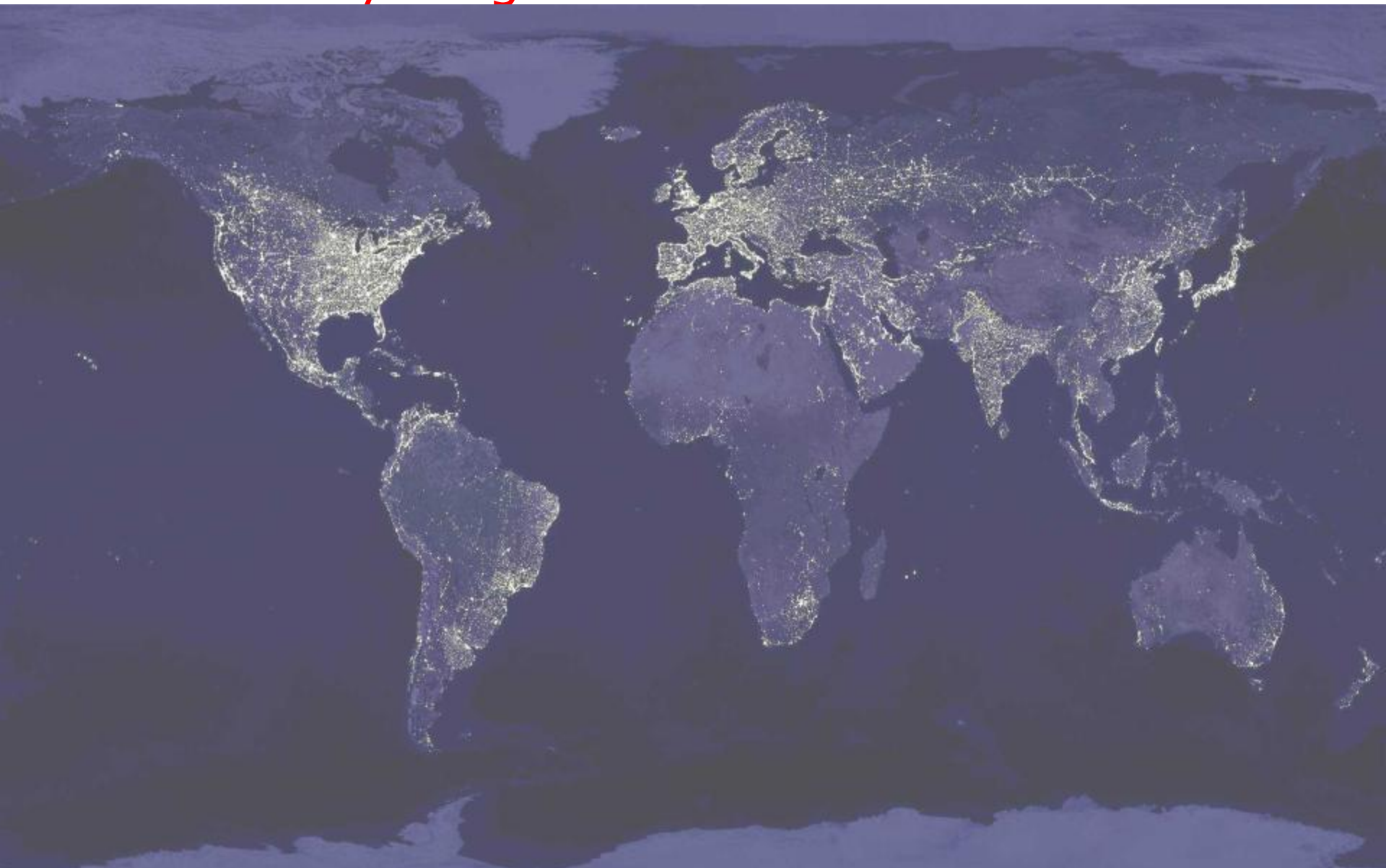
(Albert Einstein)

We need:

- Some real entrepreneurs who want to co-operate with the REEEI @ Polytechnic
- Banks who want to develop their strategies along the lines of future perspectives instead of ploughing old soils.
- European Solutions for African Problems ?
- Namibia **is** the land of the wide open spaces, we need you as investors to help explore them.
- You are welcome !

Is this really necessary ?

Don’t you agree that we can do better ?



The Future Has Already Started

Our Children Expect a Solution

Our Generation Has Created the Problem

Let‘s Make a Decision!

THANK YOU

Harald Schütt

AMUSHA Consultancy Services

for

Renewable Energy and Energy Efficiency Institute

@

Polytechnic of Namibia

Tel 061 207 2154 / 232 333 cell 0811 291 223

reeei@polytechnic.edu.na