The Impact of RE & EE on the National Economy
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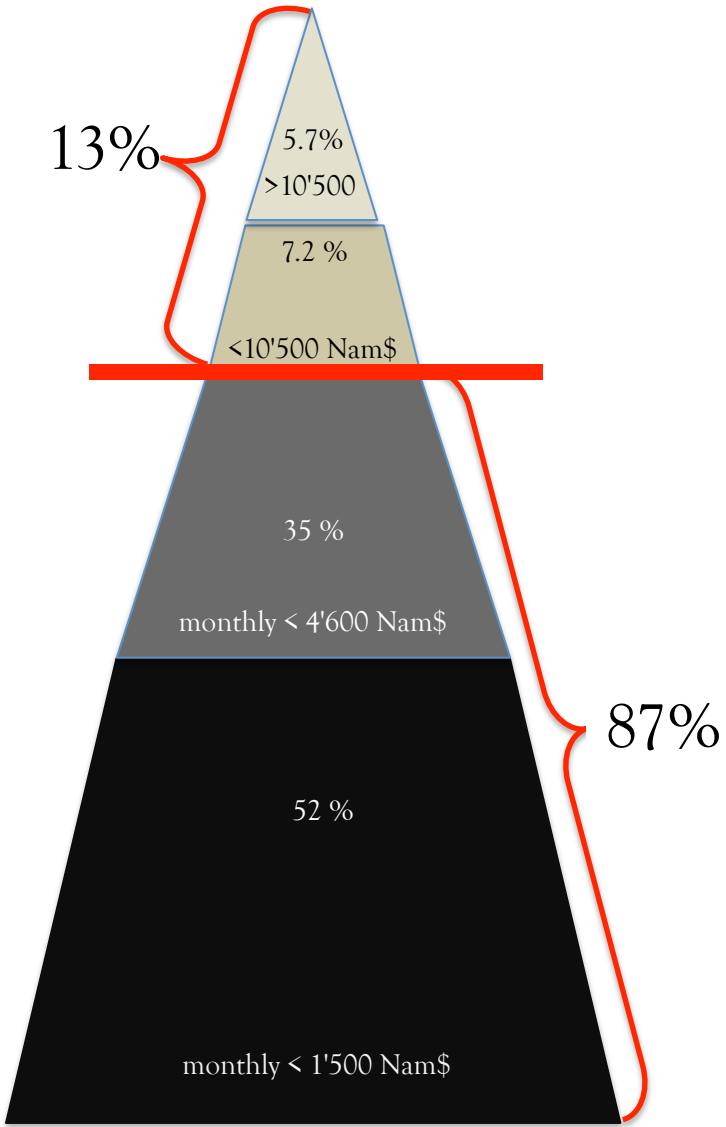
"The problems that exist in the world today cannot be solved by the level of thinking that created them." –

(Albert Einstein)

People and Wealth in Namibia

Monthly income for how many

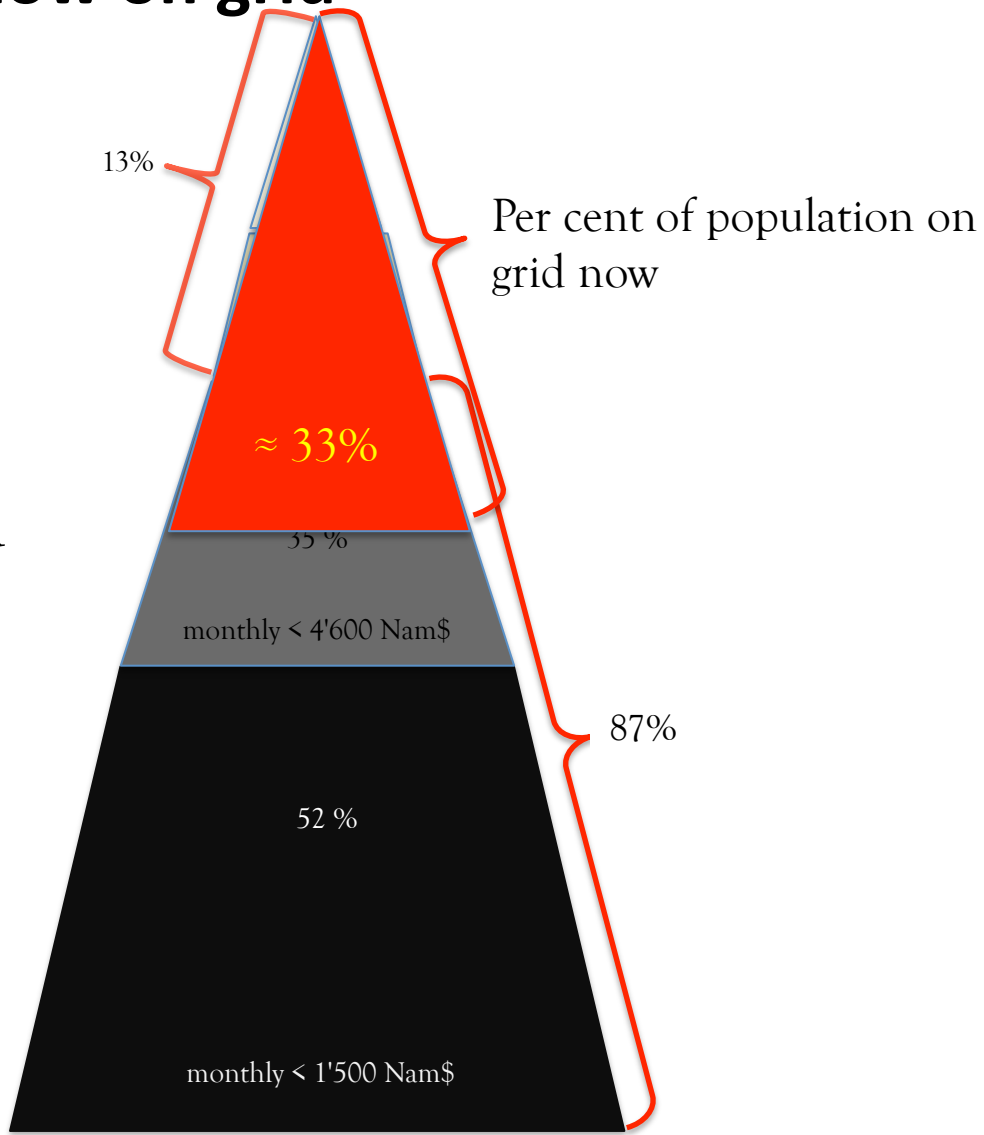
Source: BoN 2009



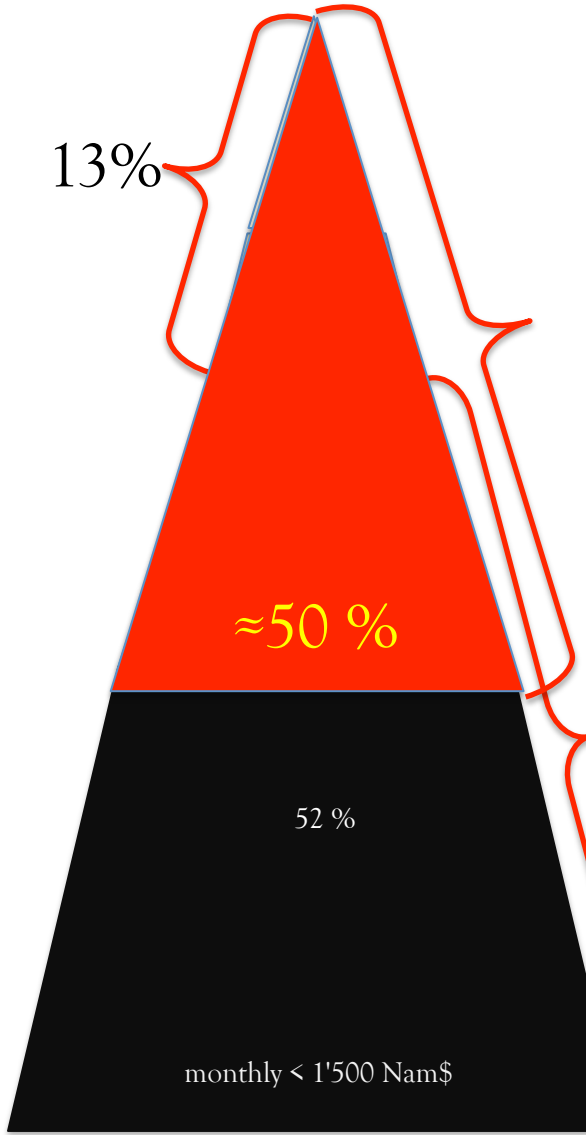
People and Wealth in Namibia

Electricity users now on grid

How many people will still be able to afford grid-electricity when inflation bites and prices rise ? ! ?



People and Wealth in Namibia

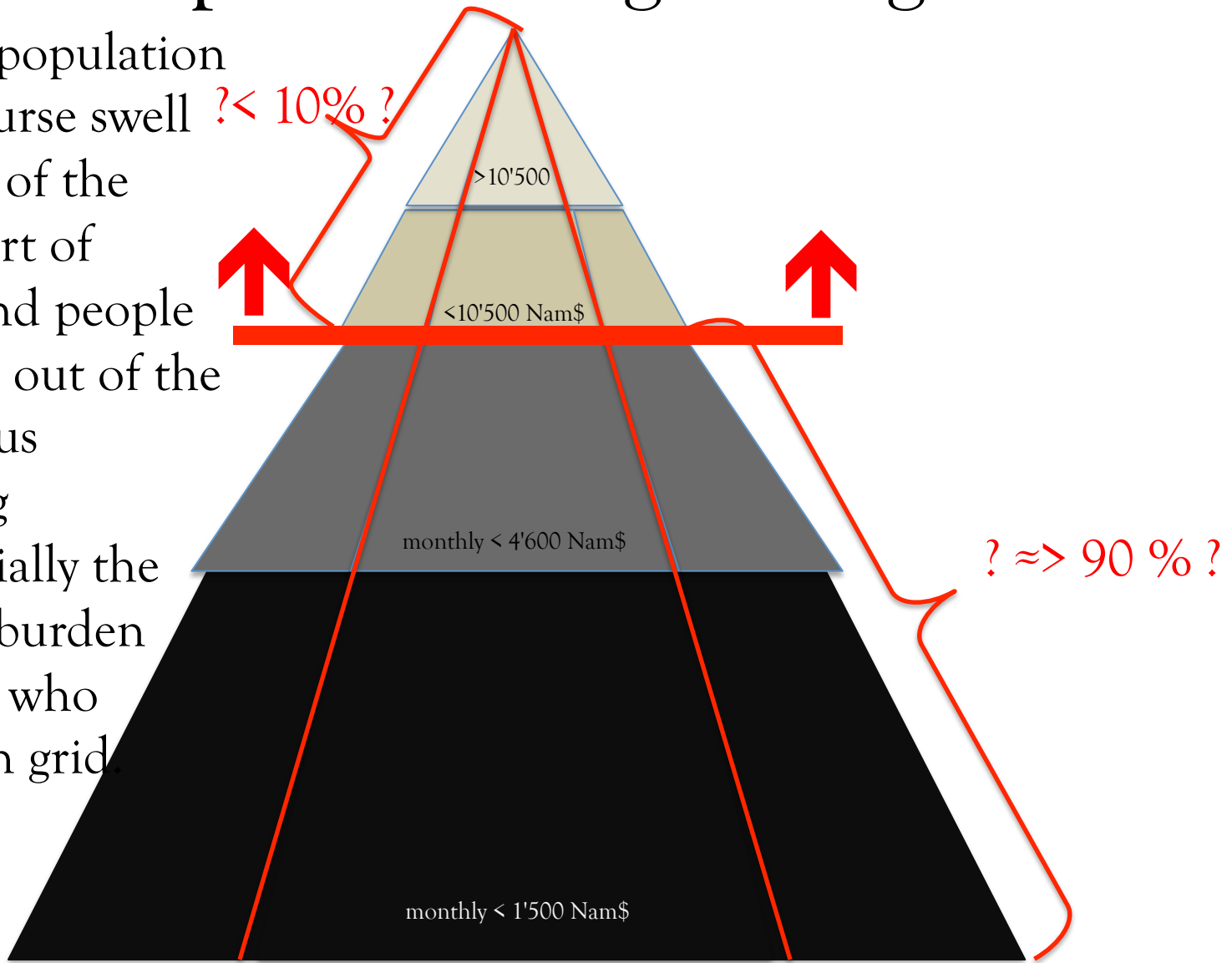


≈ Per cent of population to **directly** benefit from REFiT and Net-metering **plus** all **secondary jobs** created

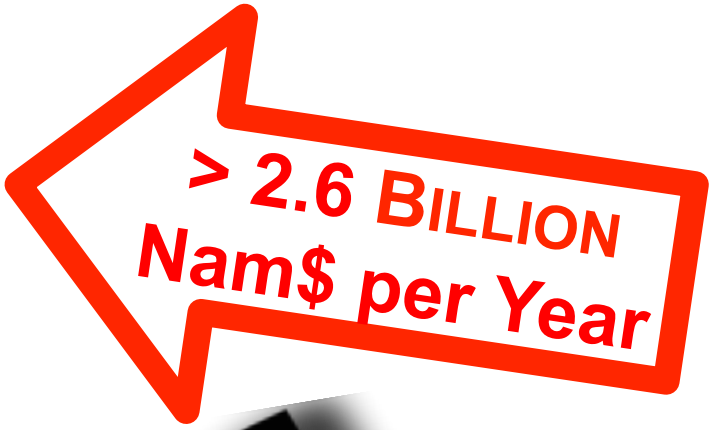
People and Wealth in Namibia

Population is growing !

Growing population will of course swell the ranks of the poorer part of society, and people who drop out of the system thus increasing exponentially the financial burden for those, who remain on grid.



Structure of Supply now = 2015



Import

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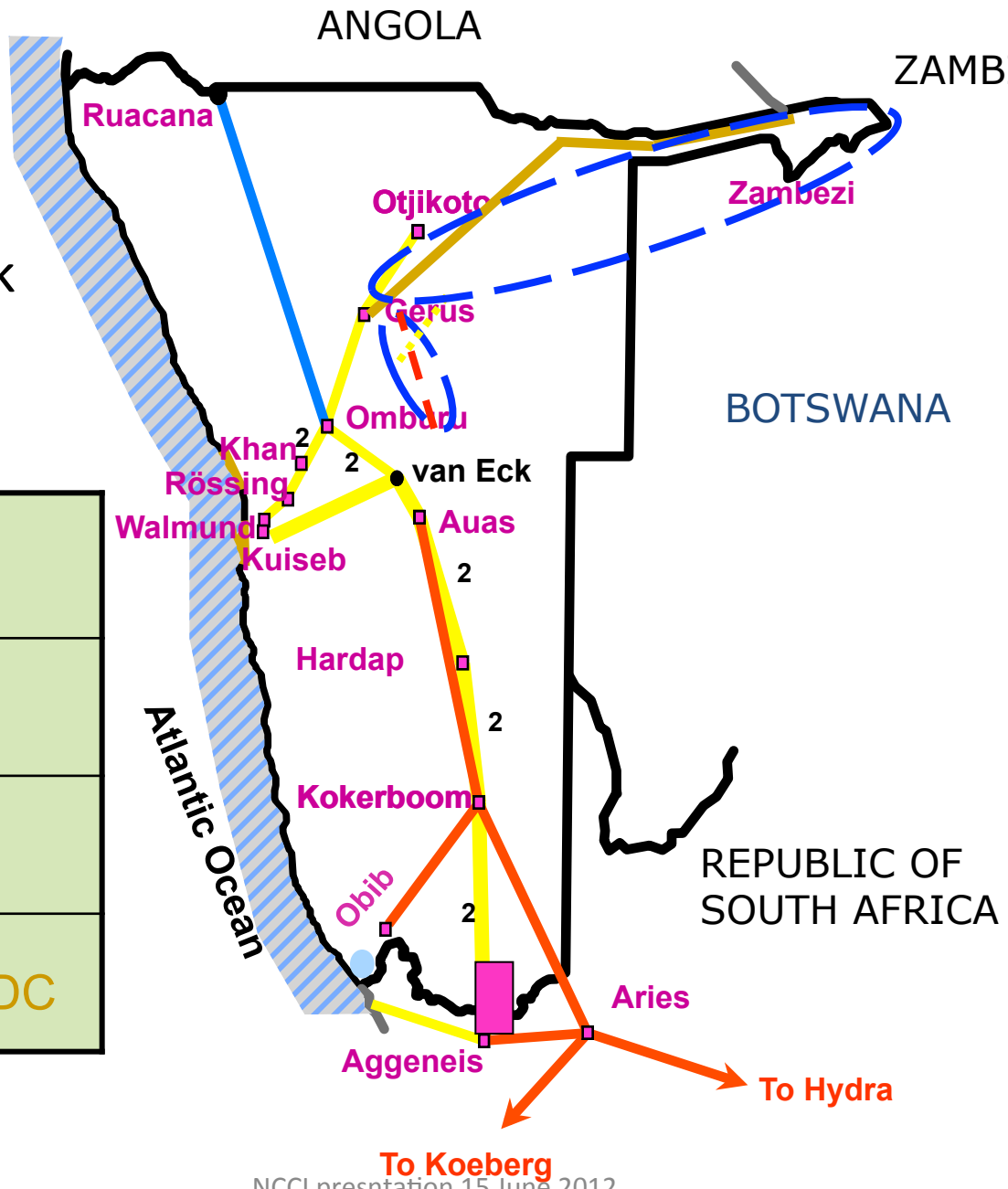
NamPower

REDs/Municpalities

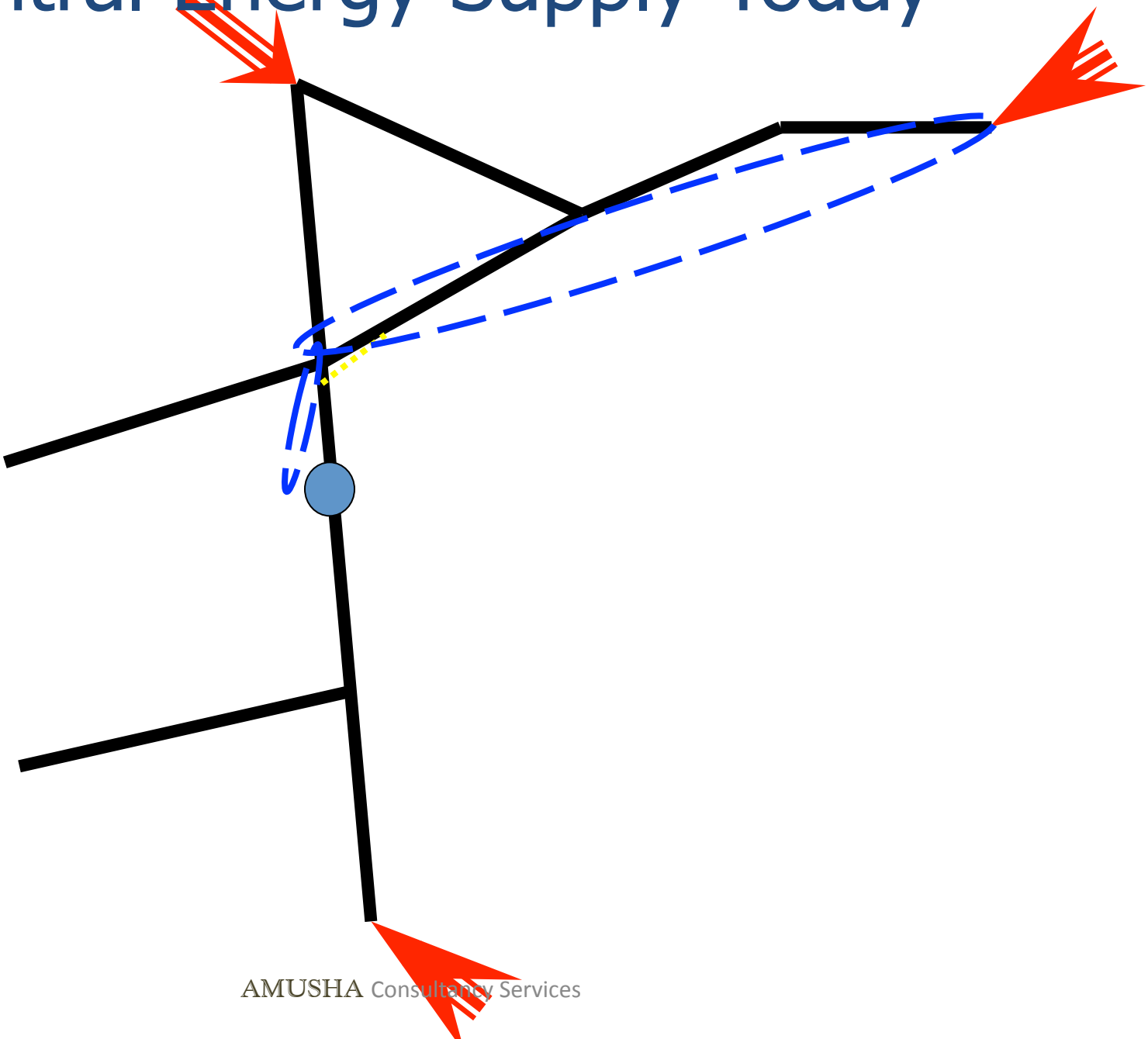
Users Users Users Users Users

Namibian Transmission Back bone

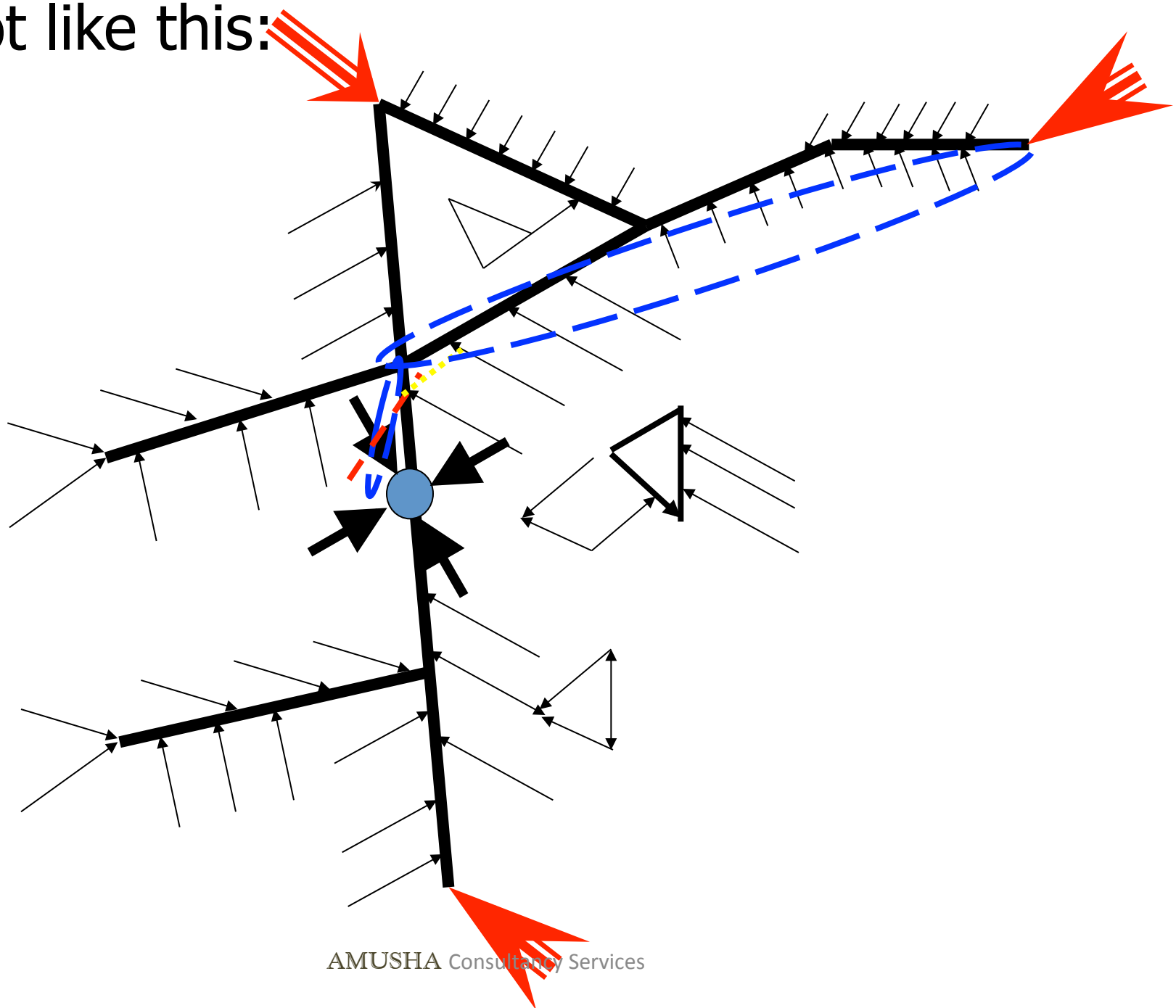


Red – 400kV
Blue – 330 kV
Yellow - 220 kV
Brown – 350kV HVDC

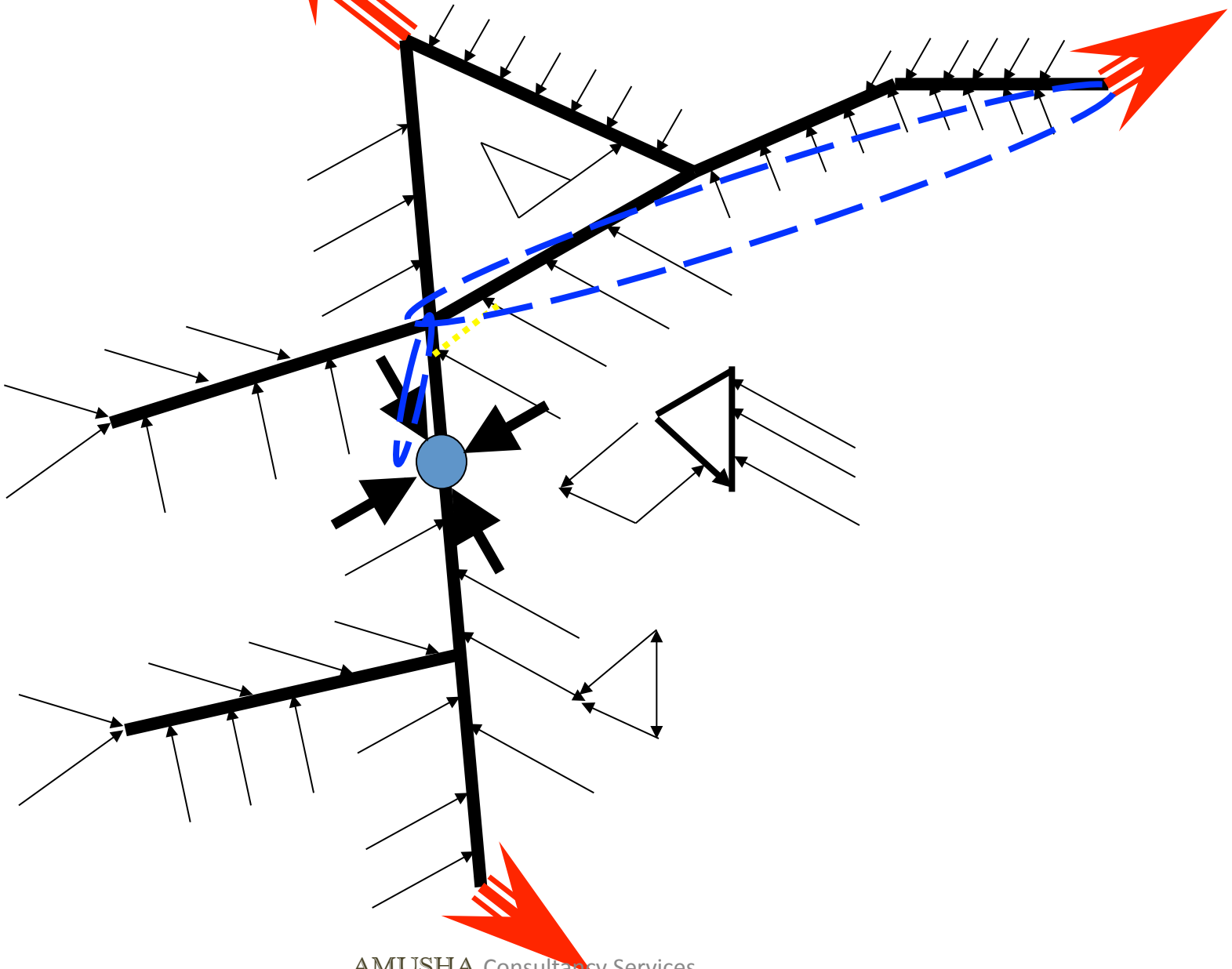
Central Energy Supply Today



Why not like this:



Or even like this



Solar Energy Potential

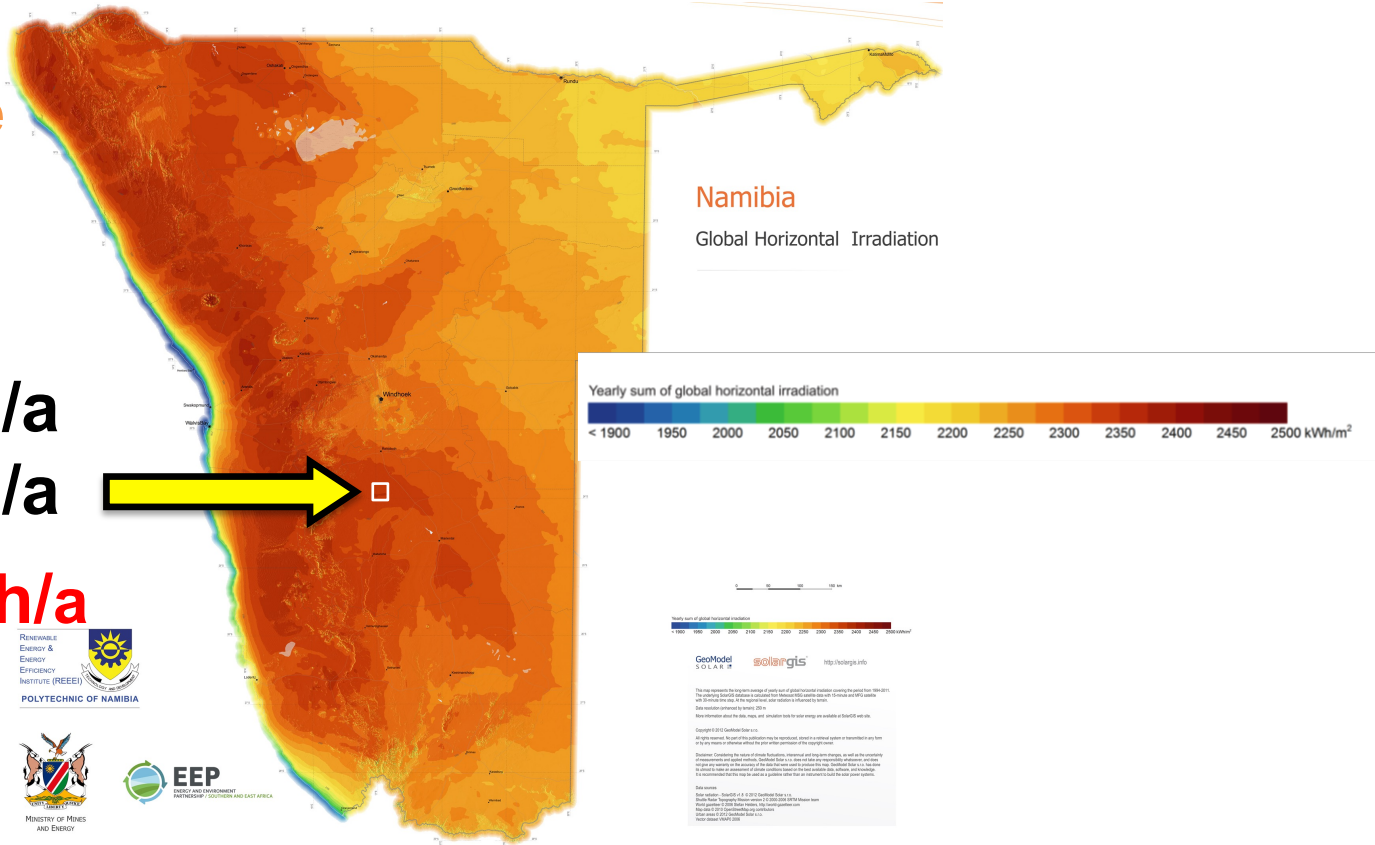
Namibia's Renewable Energy (RE) potential is substantial!

Solar Energy Potential ~ 1 800 000 TWh/a

Total *ENERGY* use in 2011:
~20 TWh

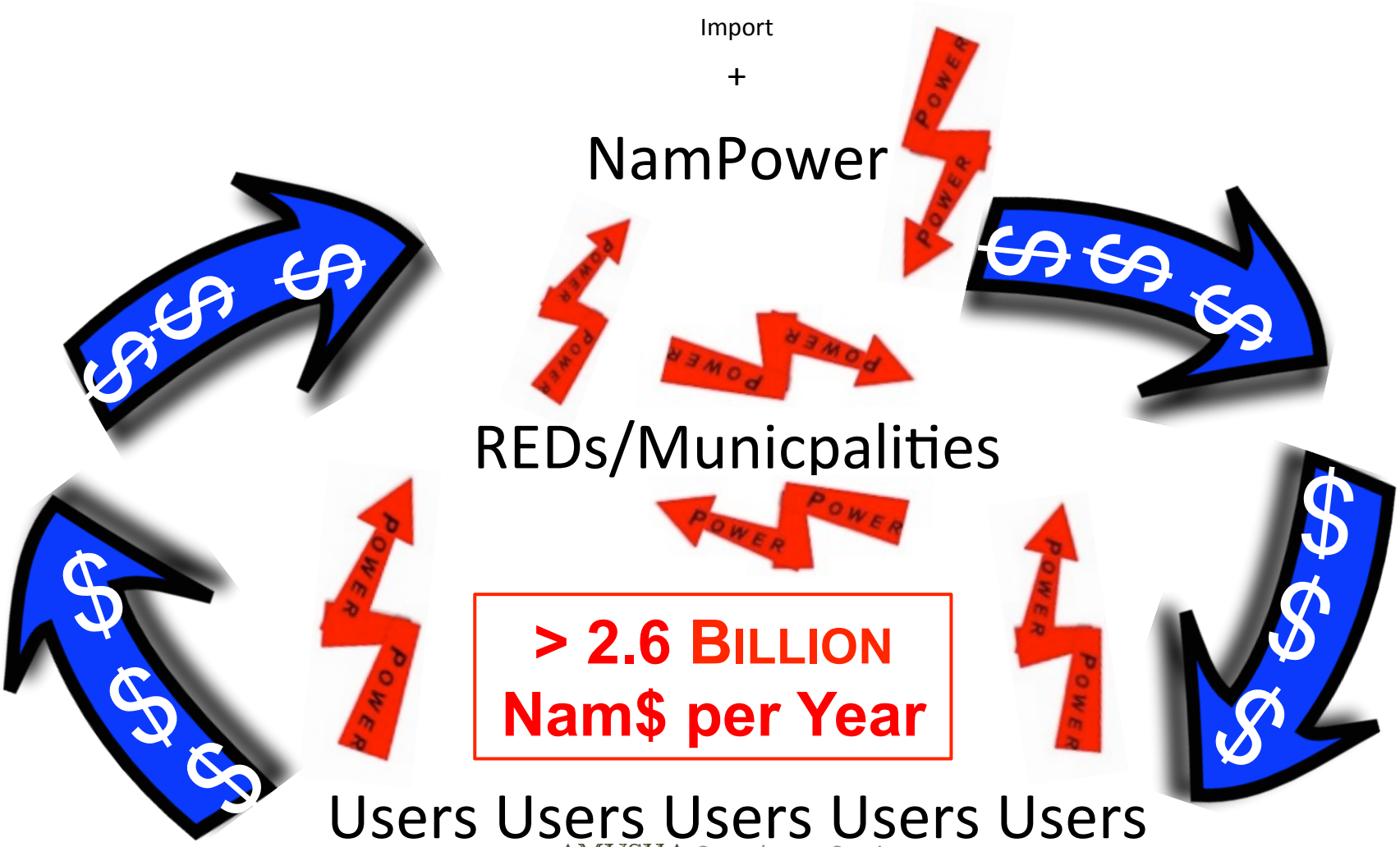
~ 1 800 000 TWh/a
~20 TWh /a

~1 799 980 TWh/a
for export



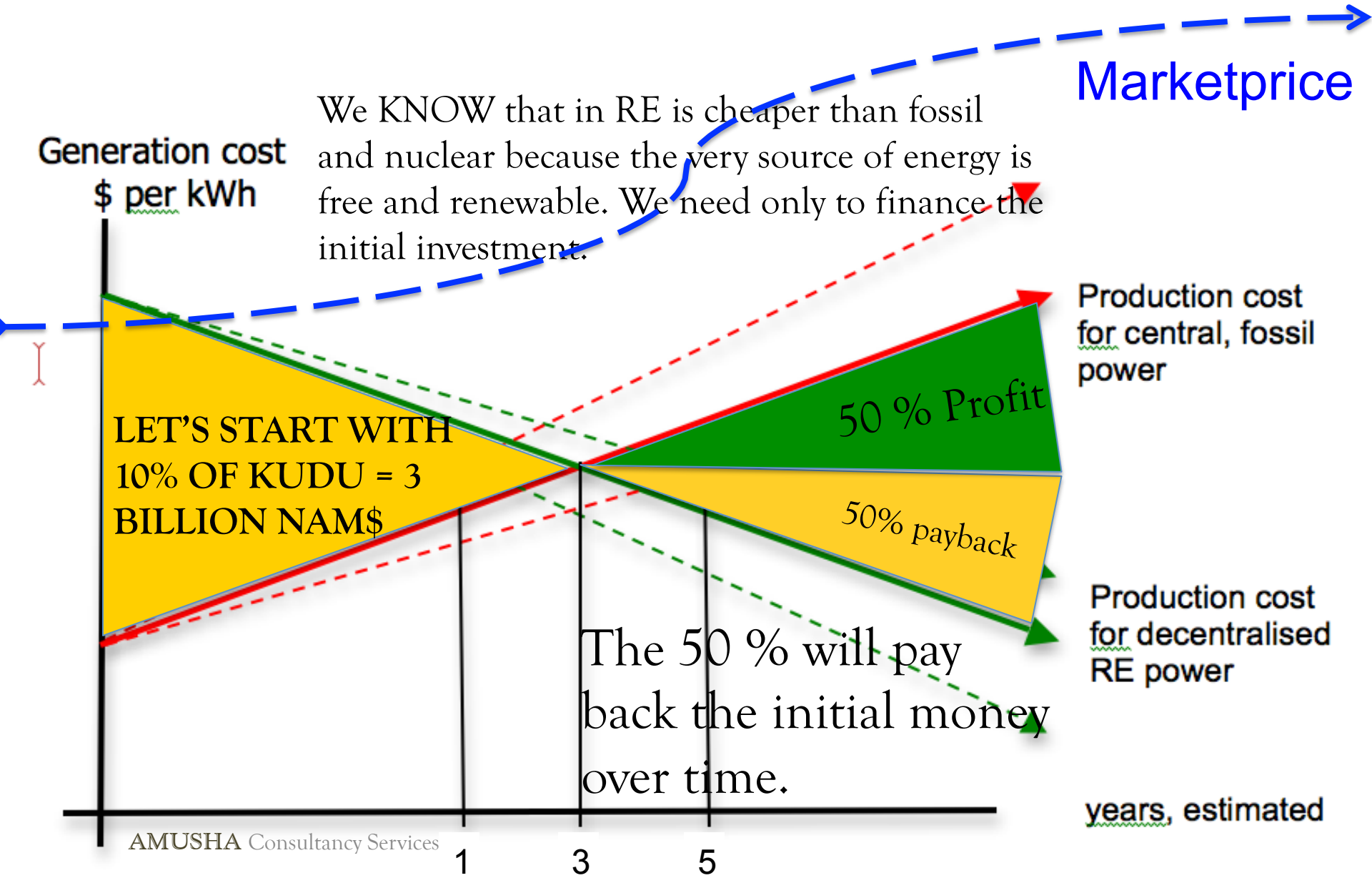
Source: Map by GeoModel Solar, provided by REEEI

Recommended Structure of Supply



The most important slide

How to Finance RE & EE in Namibia



What do we need ?

- “Generation” and “distribution” need to be separate and completely independent entities
- Grid management (= smart grid)
- We need a Renewable-Energy-In-feed-Tariff (REFIT) that makes it viable to invest in RE !
- Introduction of “life-cycle-costing” instead of “cheapest offer” and “never mind the running cost”.
- Independent Power Producers must be invited and encouraged rather than frustrated by complicated and lengthy negotiations
- CLEAR COMMITMENT FROM GRN FOR RE & EE
- => International support

What needs to be done ?

- Define and implement the New Role of NamPower:
  - Manage supply and demand on National Level
  - Manage transition from Namibia as an importing country to a Power exporting country
    - (earn income from selling Namibian RE-power to others, not by buying from them and selling with a mark-up to Namibians)
  - Support REDs and Municipalities an ECB in the implementation of new structures for Power supply.
  - Other tasks tbc

Conclusion

- The future has already started, the world is on the move because the old fossil systems simply **can**not deliver any longer, they are financially risky = unpredictable and detrimental to climate and environment in short: UNsustainable.
- Namibia has not (yet) done all the mistakes the industrialised countries have done and are paying for these days ! ! !
- Namibia must choose to **either** be part of the past by repeating the mistakes the fossil industrialised society has done

or be part of the future

- The future industrialised society will be based on Renewable Energy generation in conjunction with Energy Efficiency, because it is cheaper the generate on your roof than buy from the grid.
- RE + EE will also create jobs for Namibians by establishing value chains for the majority of the people rather than further concentration of wealth in the hands of the few

Conclusion

This country is at a crossroad:

- Either we go – and PAY– for the same mistakes that the old industrialised economies did, meaning we try to install a centralised, fossil based electricity supply system nationwide, which is even more problematic here than elsewhere because of our low population density and wide-spread poverty
- Or we smell the coffee and learn from new developments that our previous colonisers paid for dearly, meaning we opt for a de-centralised, Renewables based concept, that will produce electricity where we need it and keep the money circulating among Namibians instead of taking it out to benefit a few of us and finance development elsewhere.
- With Renewable Energy, the majority wins
- And we can win the war on poverty !

THANK YOU !

Which questions do you have ?

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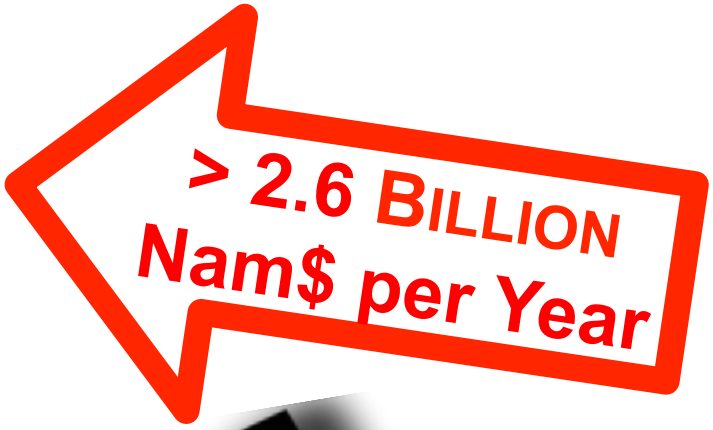
European Solution for African Problem

“The future is the time with less and less conventional energy available”

Structure of Supply now = 2015



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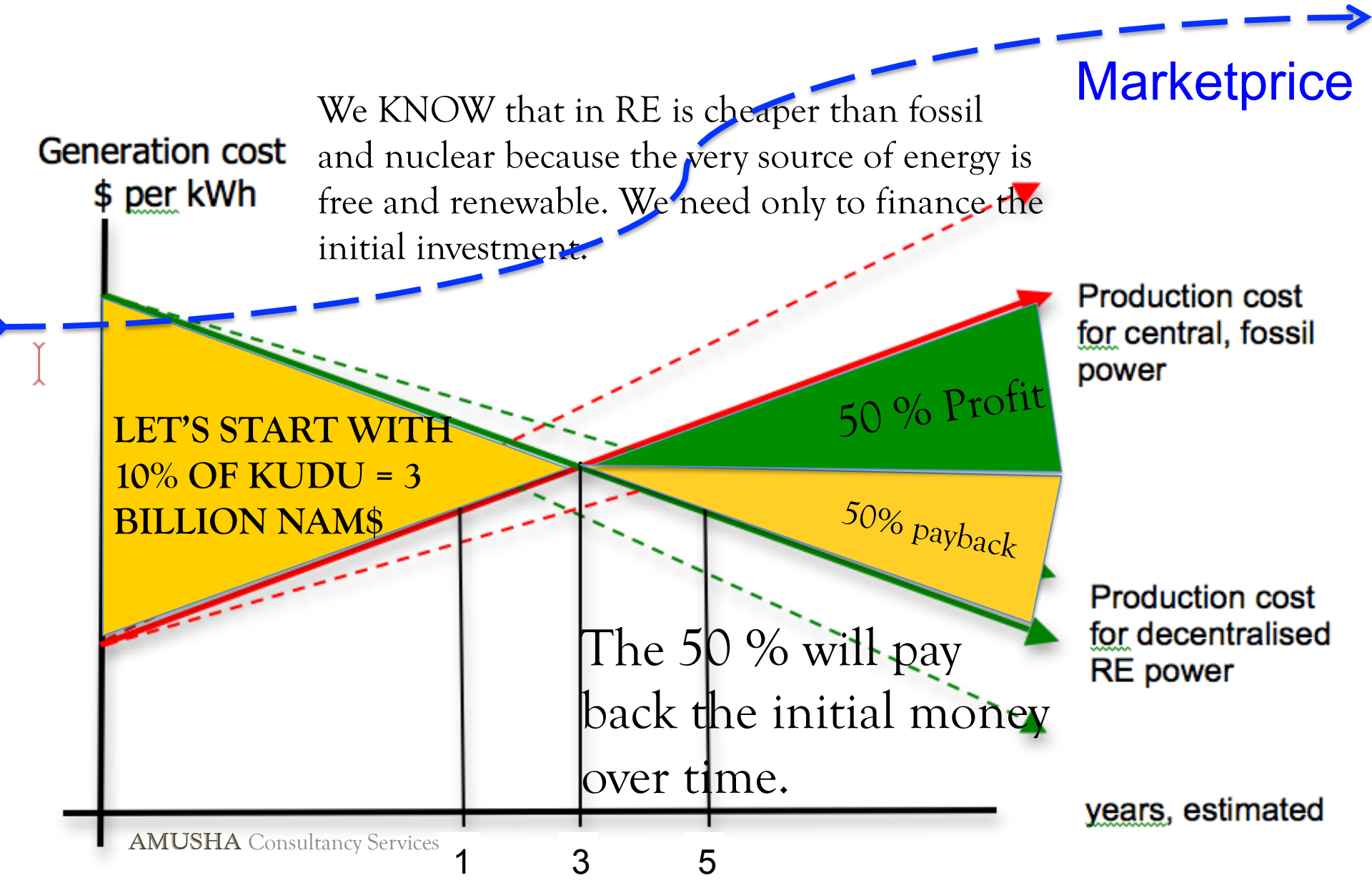
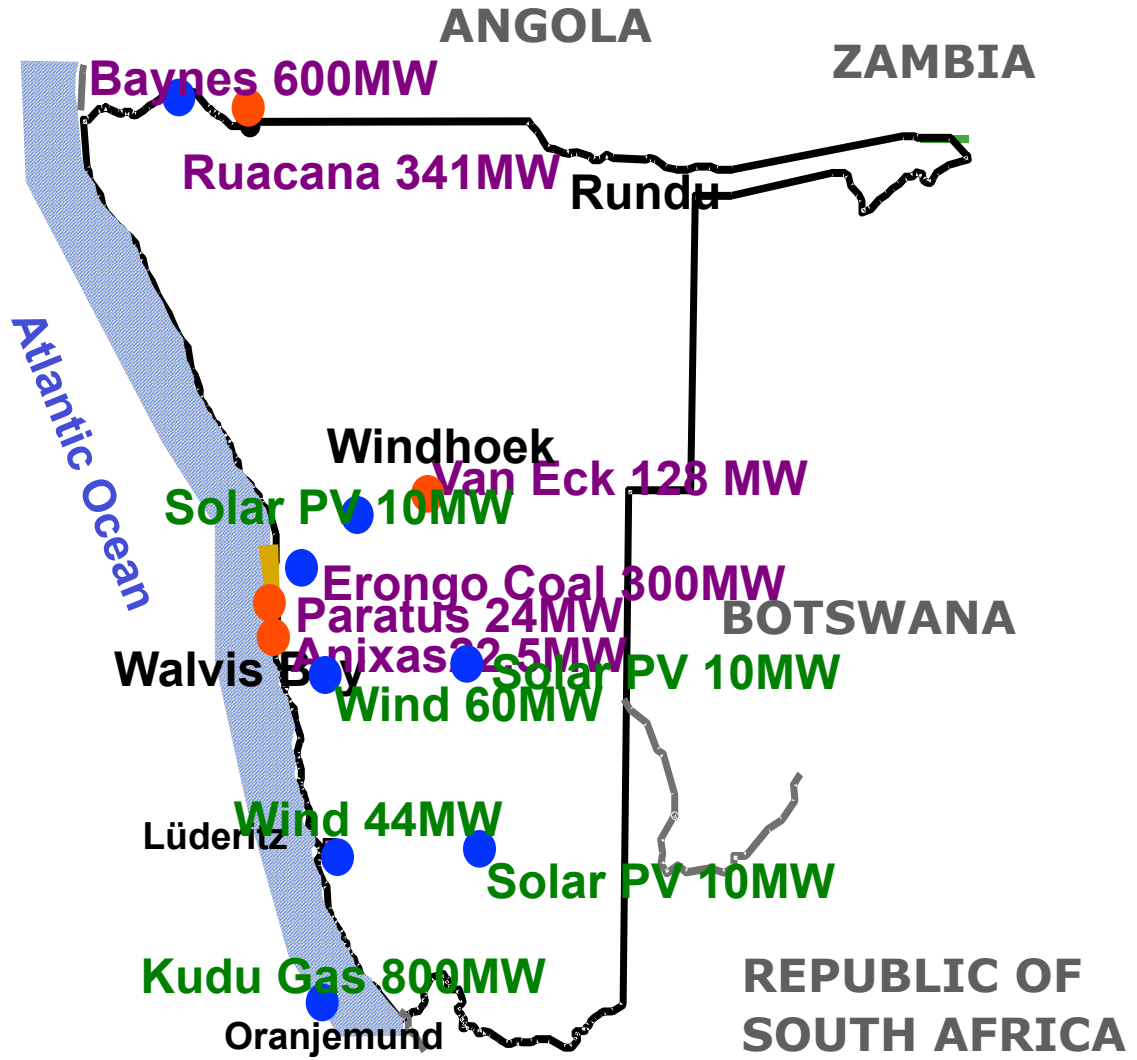
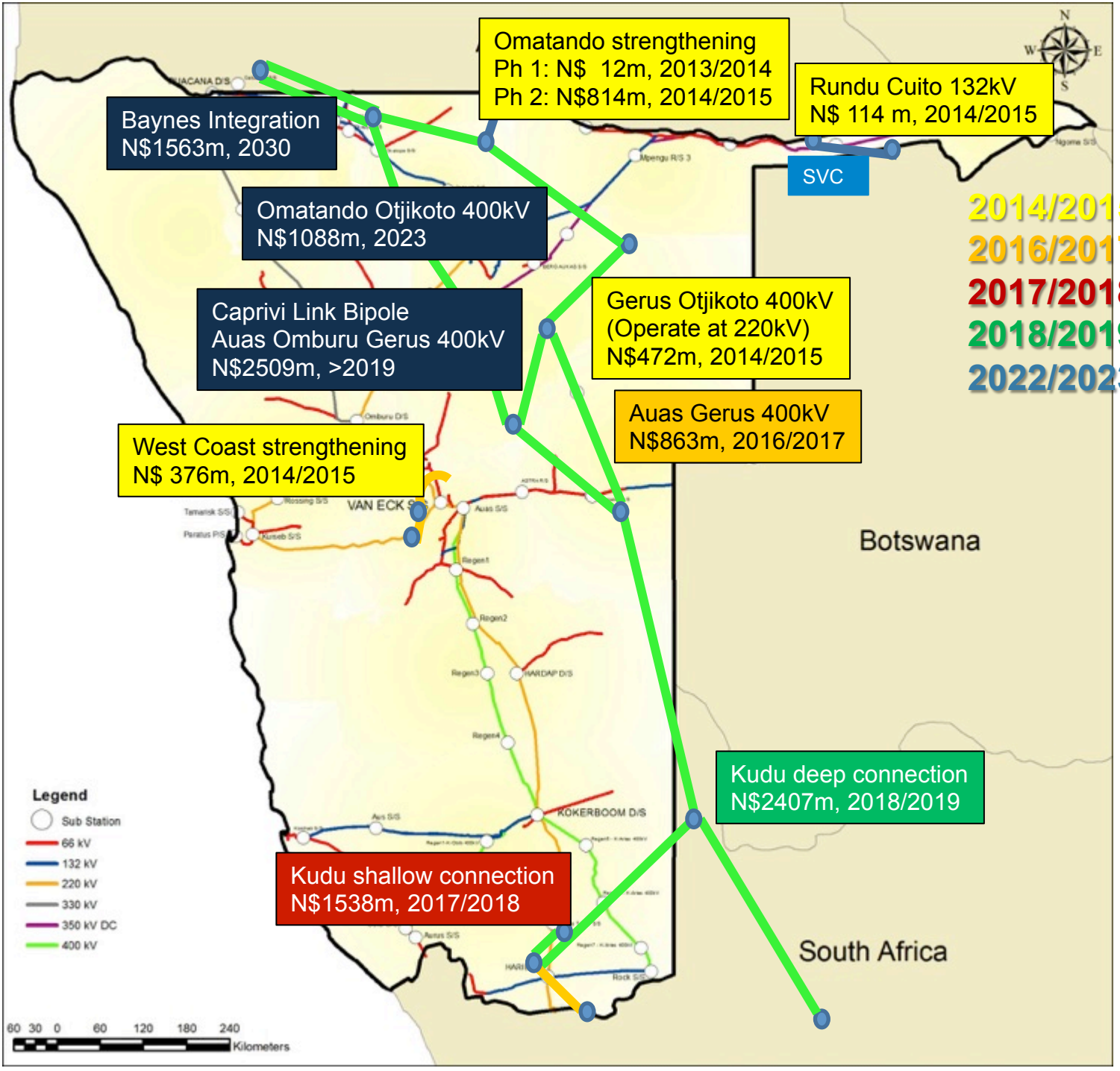
How to Finance RE & EE in Namibia



Power Stations in Namibia



Ruacana Hydro Run-of-the-river
Van Eck Coal fired Emergency and Standby
Paratus and Anixas Diesel & HFO Emergency and Standby
Existing Power Stations Planned Power Stations


Omatando strengthening
Ph 1: N$ 12m, 2013/2014
Ph 2: N$814m, 2014/2015
Rundu Cuito 132kV
N$ 114 m, 2014/2015
Baynes Integration
N$1563m, 2030
SVC
Omatando Otjikoto 400kV
N$1088m, 2023
2014/2015
2016/2017
2017/2018
2018/2019
2022/2023
Caprivi Link Bipole
Auas Omburu Gerus 400kV
N$2509m, >2019
Gerus Otjikoto 400kV
(Operate at 220kV)
N$472m, 2014/2015
Auas Gerus 400kV
N$863m, 2016/2017
West Coast strengthening
N$ 376m, 2014/2015
VAN ECK S
Botswana
Kudu deep connection
N$2407m, 2018/2019
KOKERBOOM D/S
Kudu shallow connection
N$1538m, 2017/2018
South Africa
Legend
Sub Station
66 kV
132 kV
220 kV
330 kV
350 kV DC
400 kV
60 30 0 60 120 180 240
Kilometers

Funding Plan 2014 - 2020

- **Capital requirements**
  - NamPower Balance sheet: N$13,1 billion (N$5bn will be debt)
  - IPPs financing (including Kudu equity and loans): N$15,6 billion
  - Total: **N$28,7 billion –> 40 –> 50 Billion ? ! ?**
- **NamPower source of funding**
  - Cash reserves
  - Cash generated from operations
  - Debt (DFIs, Bonds)
  - Shareholder (equity capital and revenue support if necessary)

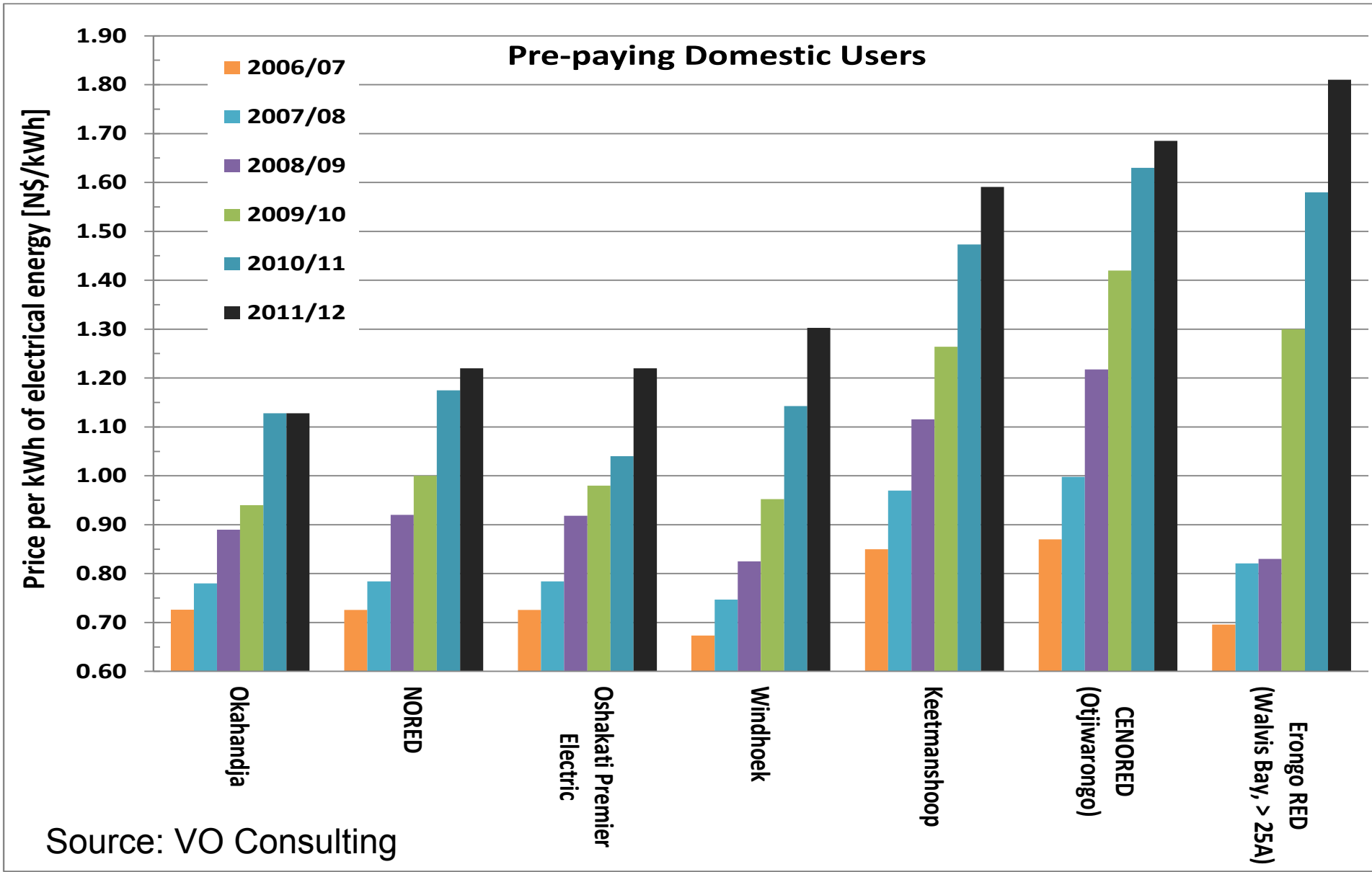
How to Finance RE & EE in Namibia

- Calculated over approx. five years, ANY renewable solution is cheaper per kWh than ANY fossil or nuclear generation
- In order to mobilise private capital, and prevent capital outflow, we must create favourable and secure conditions for investment in Renewable Energy = REFiT (Renewable Energy Feed-in-Tariff)
- For that, I propose a fund under a section 21 company that will subsidise every kWh produced up to the level of break-even for the producer = an insurance against losses.
- The producer must – in turn – pay 50% of the profits back to the fund to be used for
  - Other projects in RE and EE
  - Research and Development
    (find Namibian solutions to Namibian problems)
  - Bursaries, Training and Human Resource Development
  - Marketing and Information about RE & EE

  Start with 10% of Kudu-gas-to-power !

  The money will ultimately come back, because there is no end to the triangles! THAT would be productive usage of public funds !

The Bottom Line



Source: VO Consulting

The Bottom Line

Price increase for electricity calculation

Fill in your tariff (=price per kWh) here: **1.00**

then choose what you want to believe

Price increase per Year in %	2015	2016	2017	2018	2019
10%	1.00	1.10	1.21	1.33	1.46
15%	1.00	1.15	1.32	1.52	1.75
18%	1.00	1.18	1.40	1.65	1.95
20%	1.00	1.20	1.44	1.73	2.07
25%	1.00	1.25	1.56	1.95	2.44

The Bottom Line

Quick and rough cost calculation for Photo Voltaic in Namibia

Size	Number	Unit
Cost	203'160	Nam$
Capacity	10	kWp
Output	1'920	kWh/kWp/Year
time	10	years to be paid off

€ / Nam$
16.93

Nam$/kWp	€/kWp
20'316	1'200

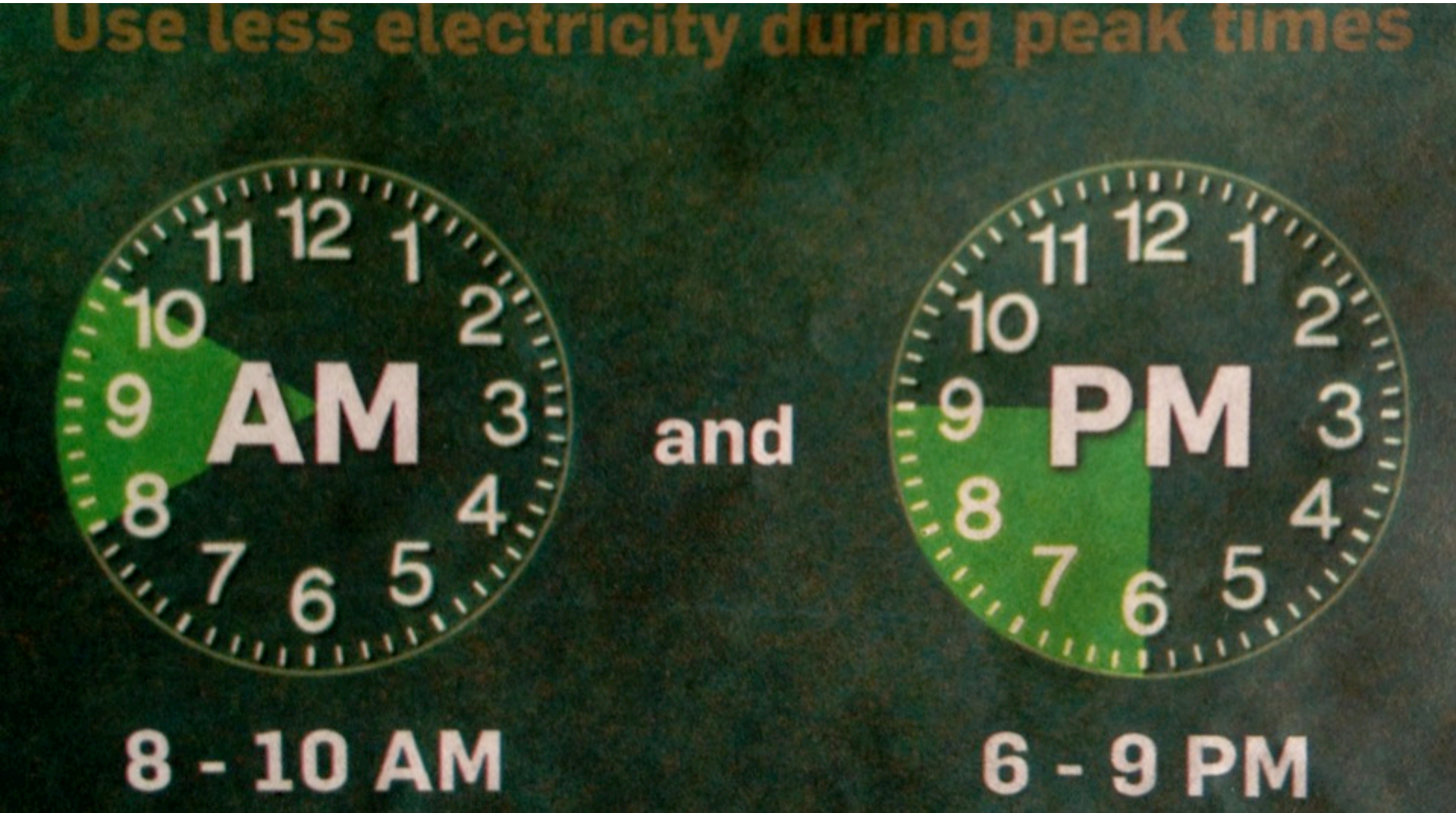
COST **1.06** Nam$/kWh **10** years **NO INCREASE, then FREE**

WITHOUT STORAGE

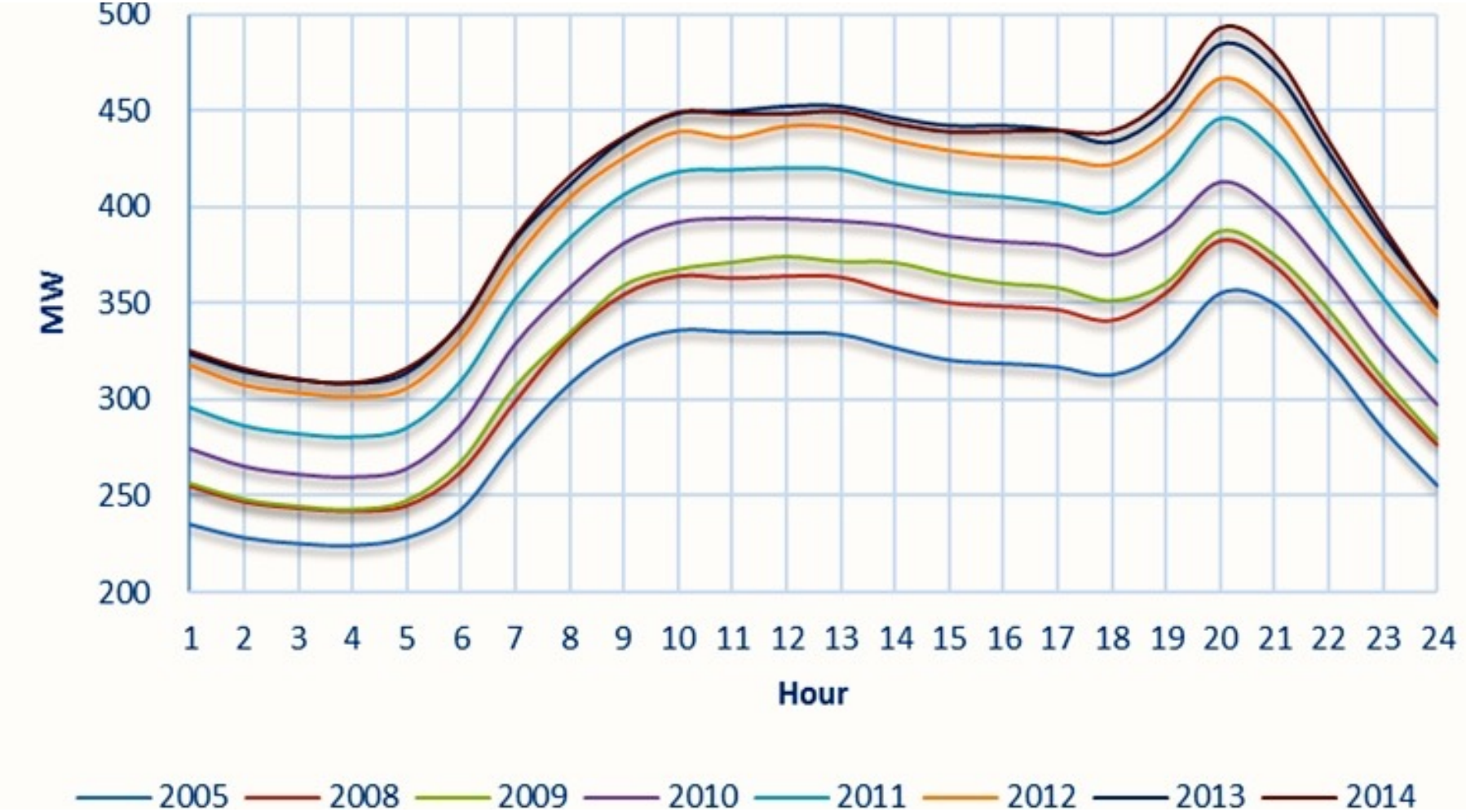
This does not include financing cost !

Neither O&M, nor panel degradation etc.

The Problem

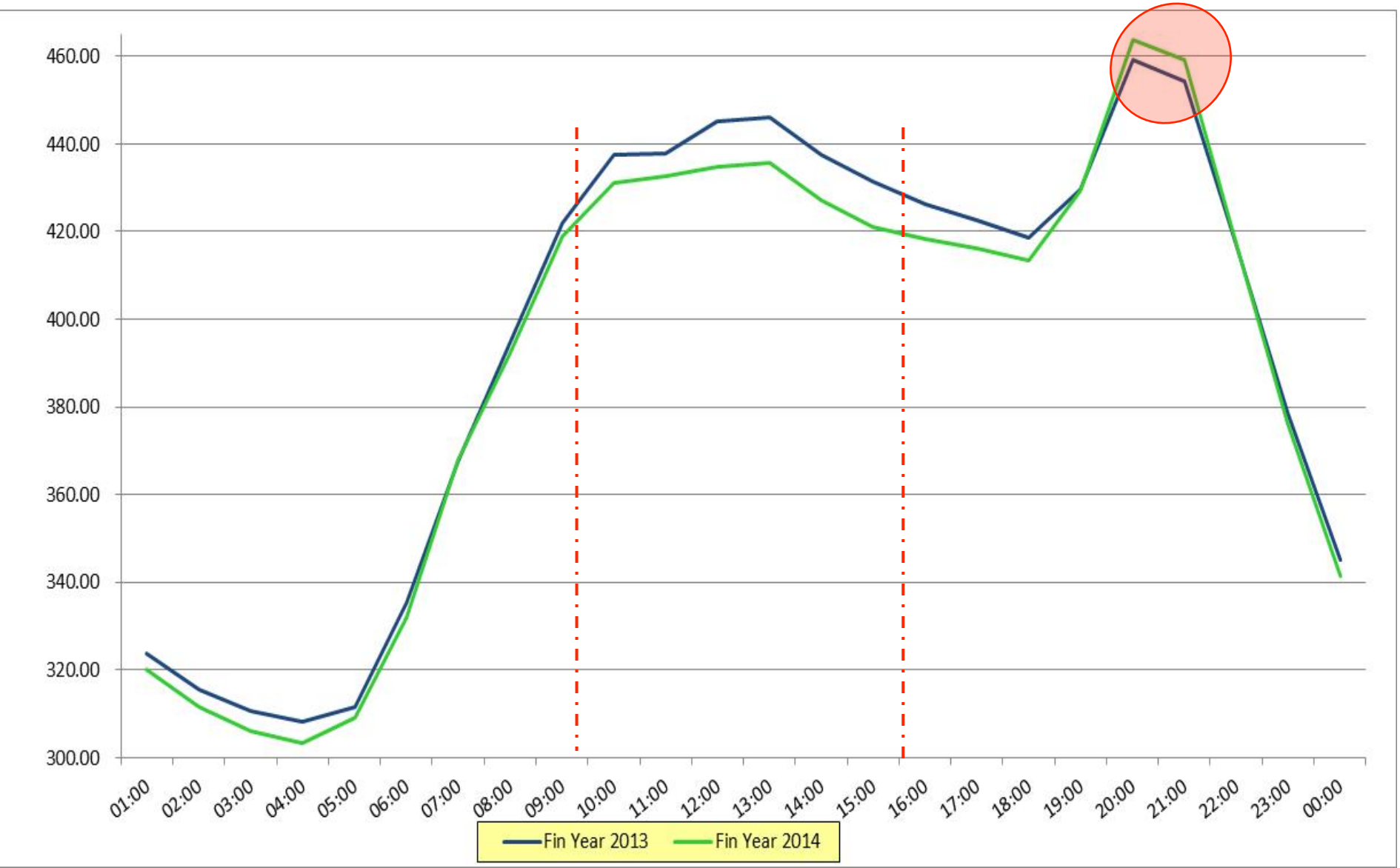


Average Load Curve Namibia



Source: ECB DSM Study Review, Draft March 2016“.

Current Impact of RE on NamPower Demand



For Investors

- Renewable Energy gives secure conditions:
  - No risk of price increases for fuel
  - No risk of fluctuating exchange rates
  - Calculable **high** output over 25 years and more
  - Increasing demand for energy and related services
  - Decreasing cost per kWh as capital cost is repaid

- PREDICTABILITY of Price for decades =
  = THAT will trigger FDI in many areas

What needs to be done ?

- **ENERGY EFFICIENCY FIRST !**
  - Reform of Building codes !
    - All buildings must be optimised towards energy use (=> massive savings in running cost)
    - Build them in a way that they don't get hot – instead of AirCon
    - Include PV in the roof structure from the beginning
  - Replace ALL electrical Water Heaters with SWH = 100'000 units nationwide
    - (Would make local production of SWH viable)
  - Roll out massive LED programme
  - Encourage replacement of electrical cooking with gas/direct Solar Cooking
- Smart Grid Management
- Assist Industry to modernise equipment and re-organise work-processes.
  - Time of use tariff to make power cheaper when the sun shines.
- Assist the Nation in investigating EE-Cooling
- Etc.

What needs to be done ?

- We need a drastic reform of our tax-system in such a way that some of the VAT and a portion of the income tax remains in the regions where they are generated for the municipalities so support their operations.
- The times, when they could use surplus margins from electricity and water to cross-subsidise their operations, are over.
- But that is another full presentation.