



Department
of Energy &
Climate Change



Africa New Energies

Giving Namibians Universal, Clean, Affordable Electricity through Solar
Presentation to Department of the Environment & Climate Change

Africa New Energies Overview

- ▶ Company founded by Brendon Raw and Stephen Larkin with the vision to provide Southern Africa with clean and affordable universal electricity access through solar
- ▶ Ten years of research and development into solving Africa's electricity challenges
- ▶ Funded in 2011 by UN-affiliated African Innovation Foundation to find a solar solution to solve Namibia's electricity shortage

Who we are



Stephen Larkin
CEO



Brendon Raw
CIO



Shakes Motsilili
Community relations



Roy Emmerich
Smart grids



Harald Schutte
Solar cookers



Anton Cartwright
Carbon Credits



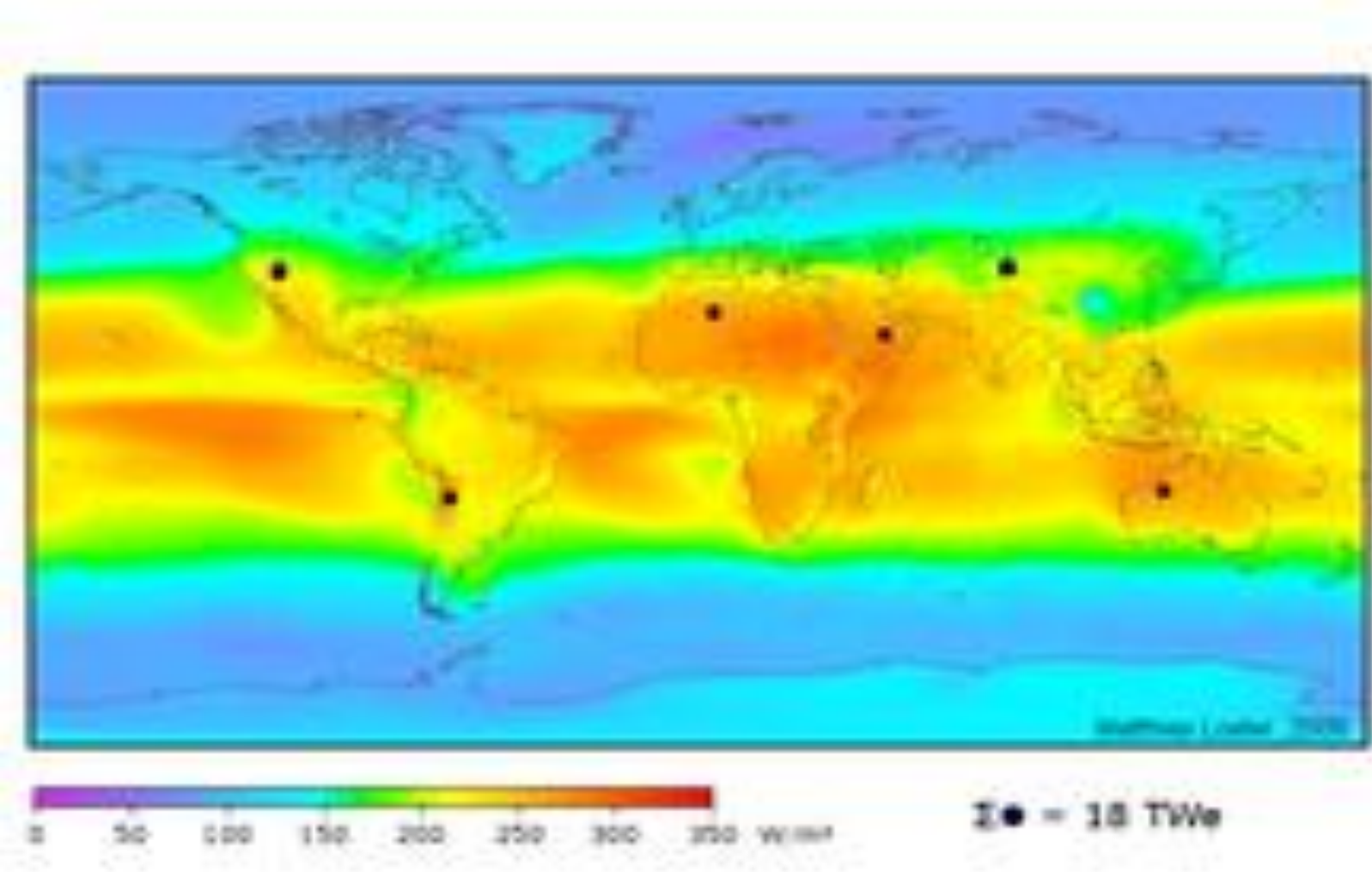
Dr Detlof von Oetzen
Pico solar

Organisations involved



Why Namibia and why solar?

Namibia has some of the highest irradiation levels in the world



Neuma Energy Recommends...

- ▶ Recommended three prong strategy
 - ▶ Off-grid Pico solar generation access to the 63% of peri-urban and rural Namibians who do not have electricity
 - ▶ Demand-side micro-generation, battery storage and spinning capacity provision for middle-income households, farmers and small businesses
 - ▶ Stranded natural gas to Solar strategy for utility-scale base-load replacement of imports from South Africa and Zimbabwe

Why is this important to UK PLC & DECC?

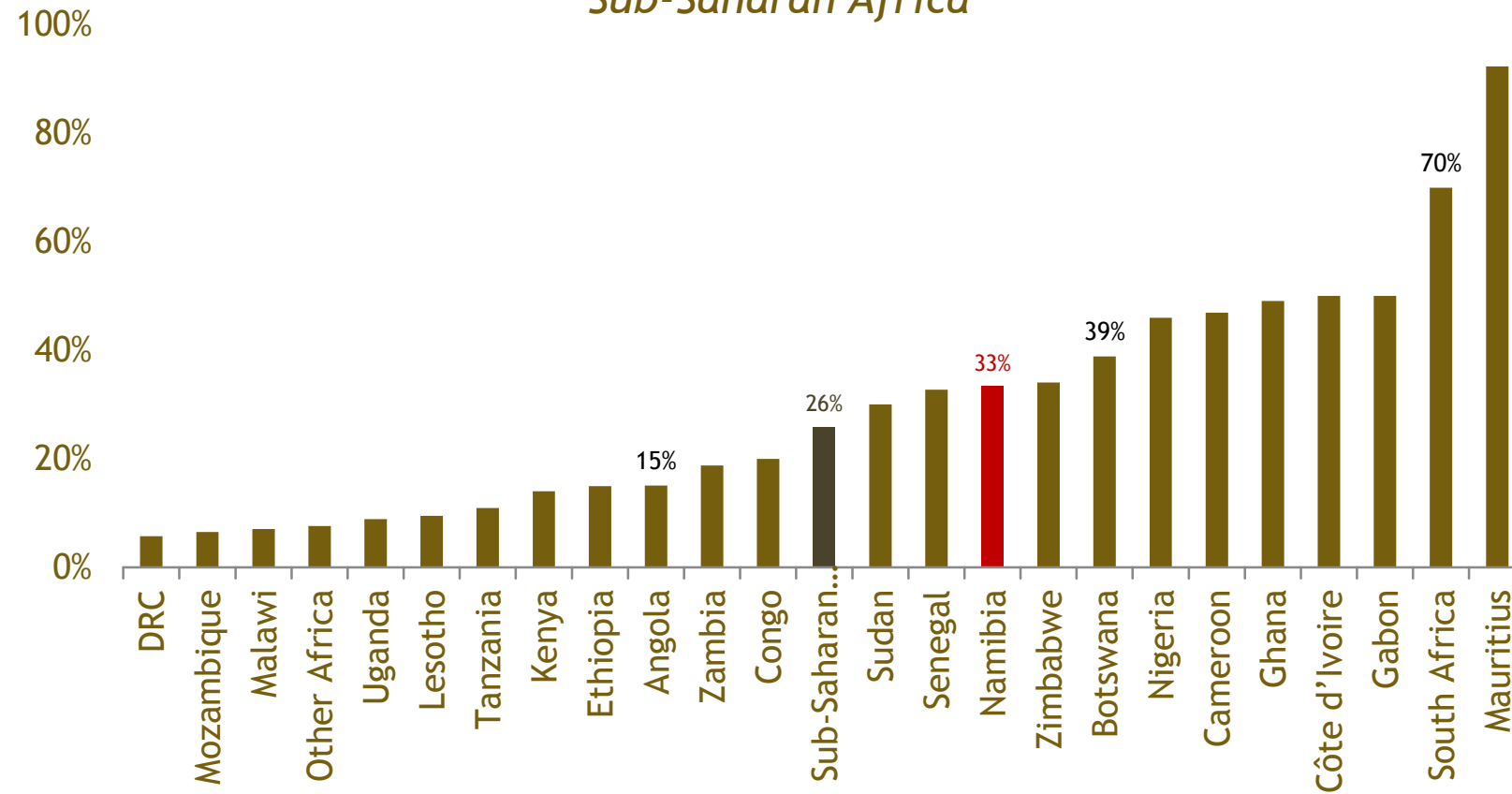
- ▶ Carbon is a global problem and global solutions are needed in the places where it is cheapest to reduce it
- ▶ The hardest carbon strategies involve developing countries, especially those that are resource intensive such as Namibia
- ▶ Each intervention offers vast, repeatable social, financial & environmental benefits
 - ▶ Pico solar offers a socially & financially sustainable solution to deforestation
 - ▶ The virtual smart grids offer a cost effective way for middle income households globally to move over to affordable low carbon generation
 - ▶ The natural gas to solar strategy offers an instant carbon saving of 1.4 million tonnes per year - on a relatively small natural gas plant
- ▶ While Namibia is a small country, this strategy was designed to be replicable
- ▶ Africa requires \$1 trillion electricity infrastructure investment, which can be mobilised via London
- ▶ Gives UK PLC a chance to exploit Commonwealth relationships to develop a competitive advantage in renewables

1. Universal Access

Access - 2/3rds of Namibians don't have electricity

Percentage of population with electricity

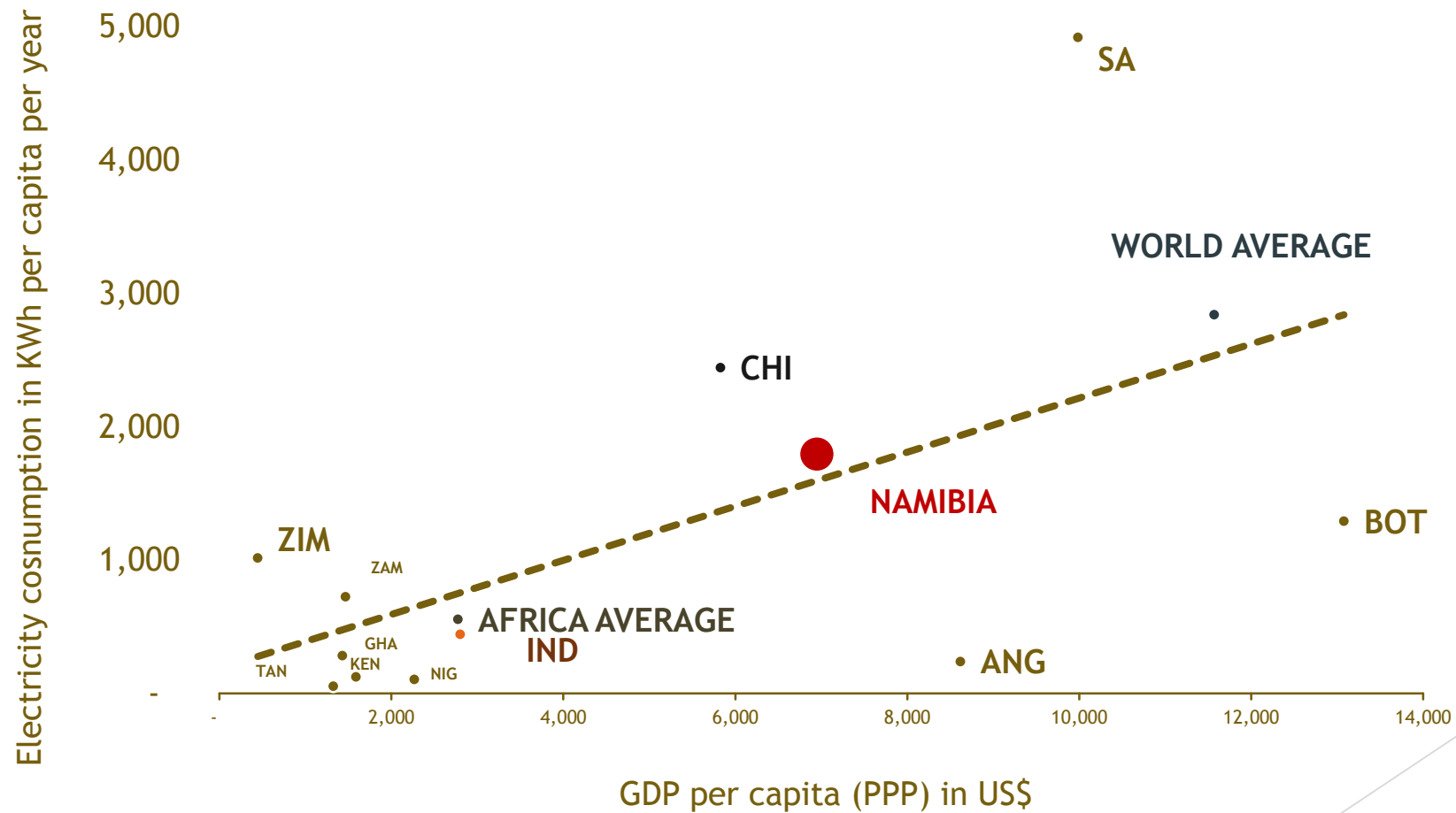
Sub-Saharan Africa



GDP growth needs electricity

Electricity provision - Namibia & her peers

Electricity consumption - KWh per capita per year



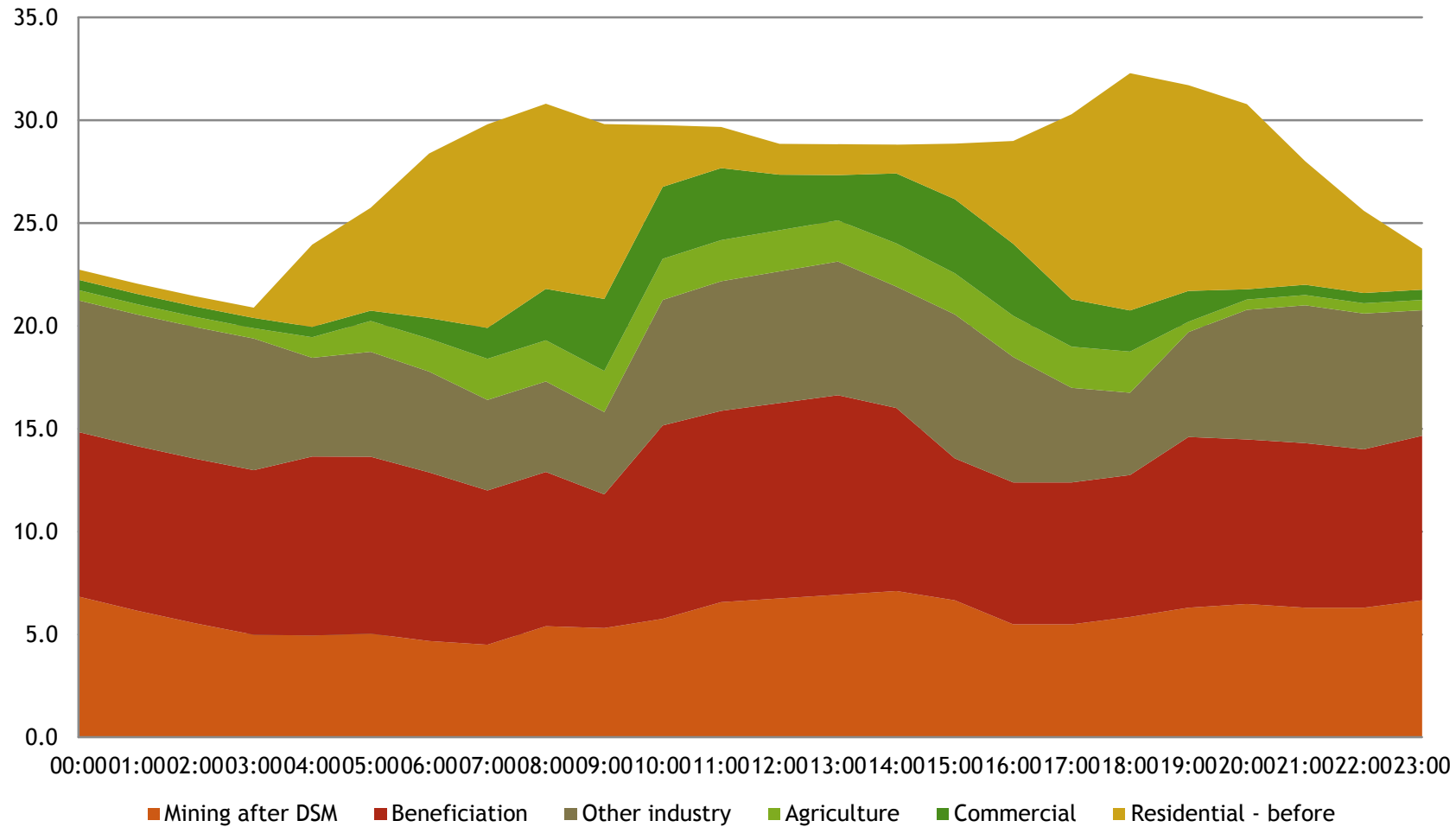
Universal Access: PICO generation solution

- ▶ Start with insulation, light and cell-phone charging
- ▶ 20 watt panel
- ▶ Battery & charge controller
- ▶ Pay As You Go credit model - via Mobile banking platform
- ▶ Funds purchase of iPad-like device
- ▶ Solar cooker - 60% carbon funded
- ▶ Roll-out
 - ▶ Grant funded pilot - 1000 homes
 - ▶ Crowd-funding to 10,000 homes
 - ▶ Natural Gas to Solar Funds 250,000 homes

2. The effect of peak demand on affordability

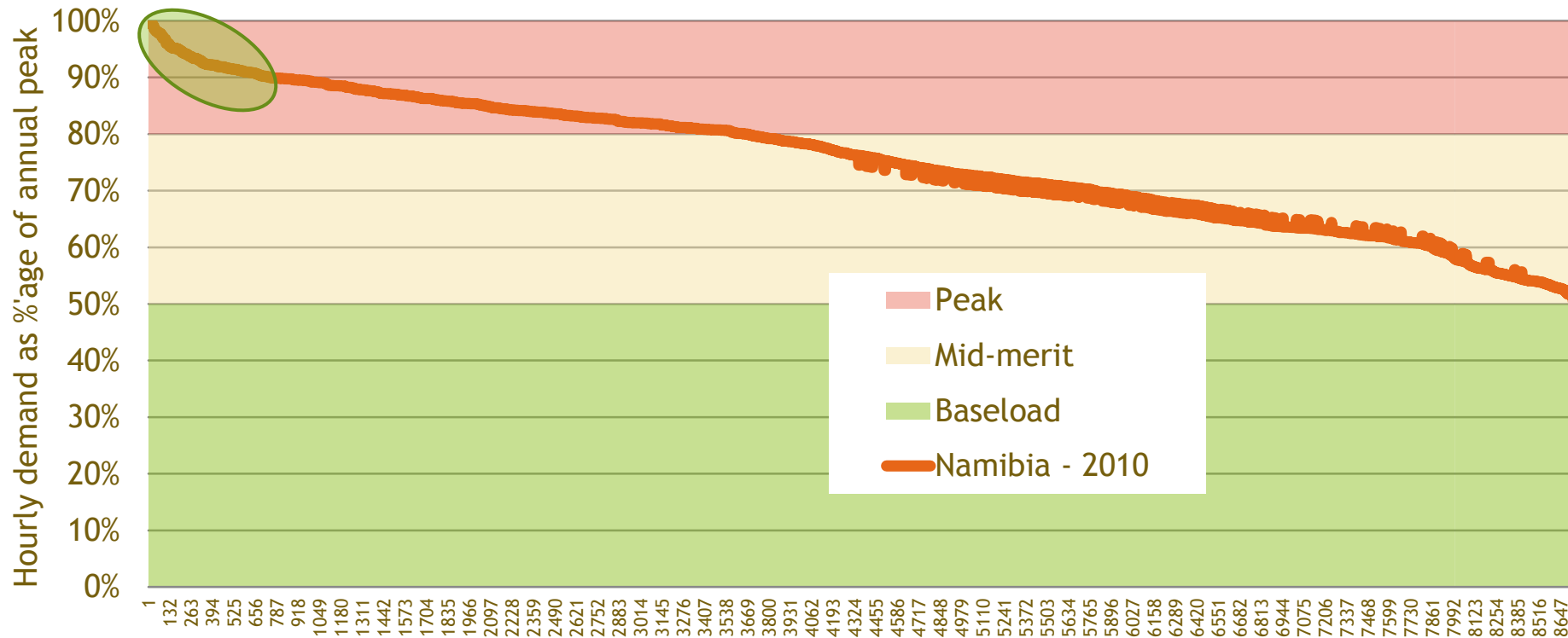
Need for residential demand side management

Southern African Demand



Where solar can be cost effective

"8760" Grid Load Factor Analysis
Namibia - 2010



*N'th highest hourly demand of the year (8,760 hours = 24 hours X 365 days)
1 = hour of highest demand, 8,760 = hour of lowest demand*

How Prophecy works



Technology development required

Step 1

- Solar remote monitoring unit developed with software

Step 2

- Theft proof integration for solar PV
- Add wind, and hybrids
- Solar water heating
- Battery storage monitoring
- Insurance tie-in

Step 3

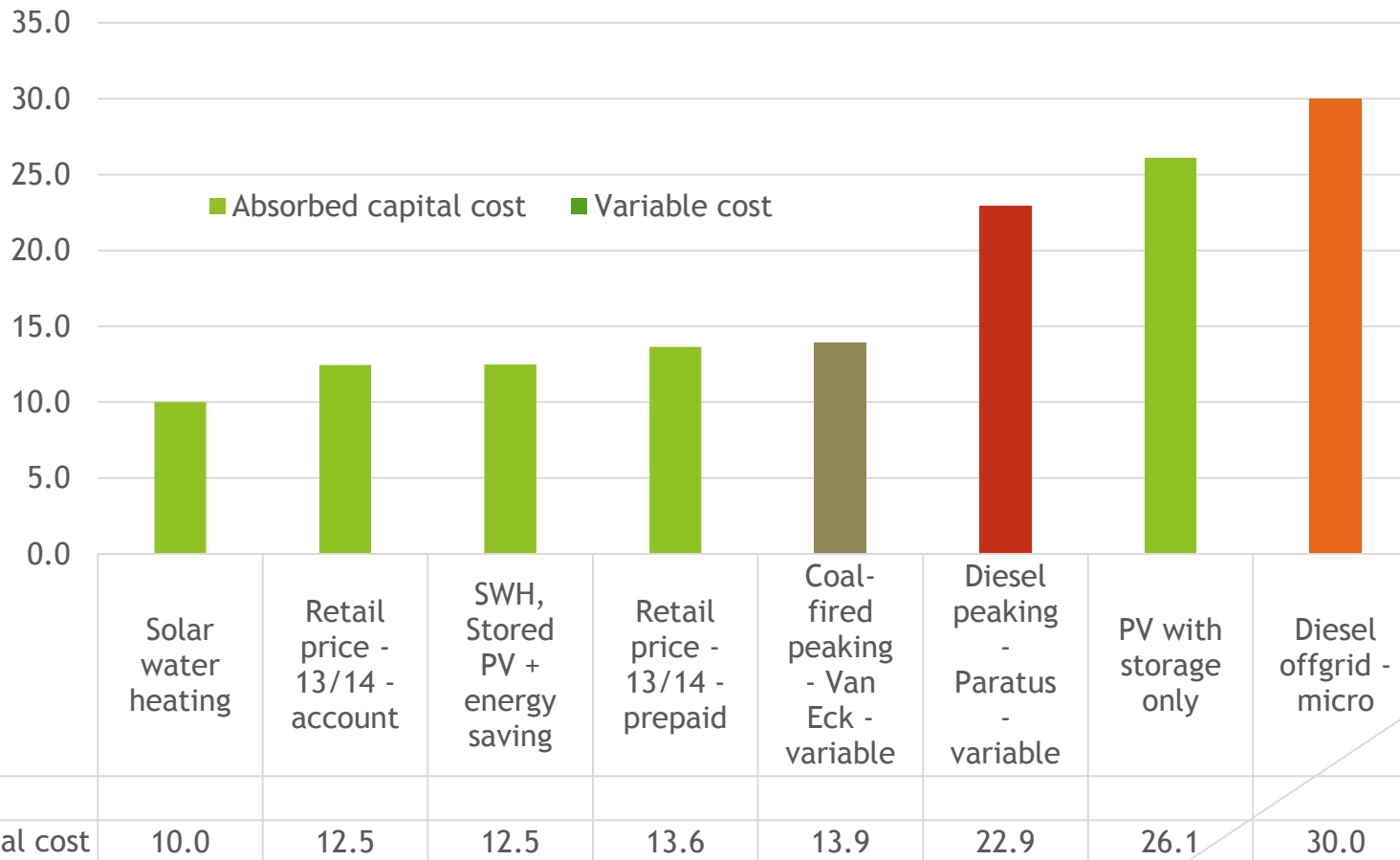
- Prepayment integration with mobile payments platform

Step 4

- Integration with grid for peak shaving with SMS notification
- Vertical spinning capacity (ultra-short term supply to grid to smooth demand)

The cost of peaking power - residential

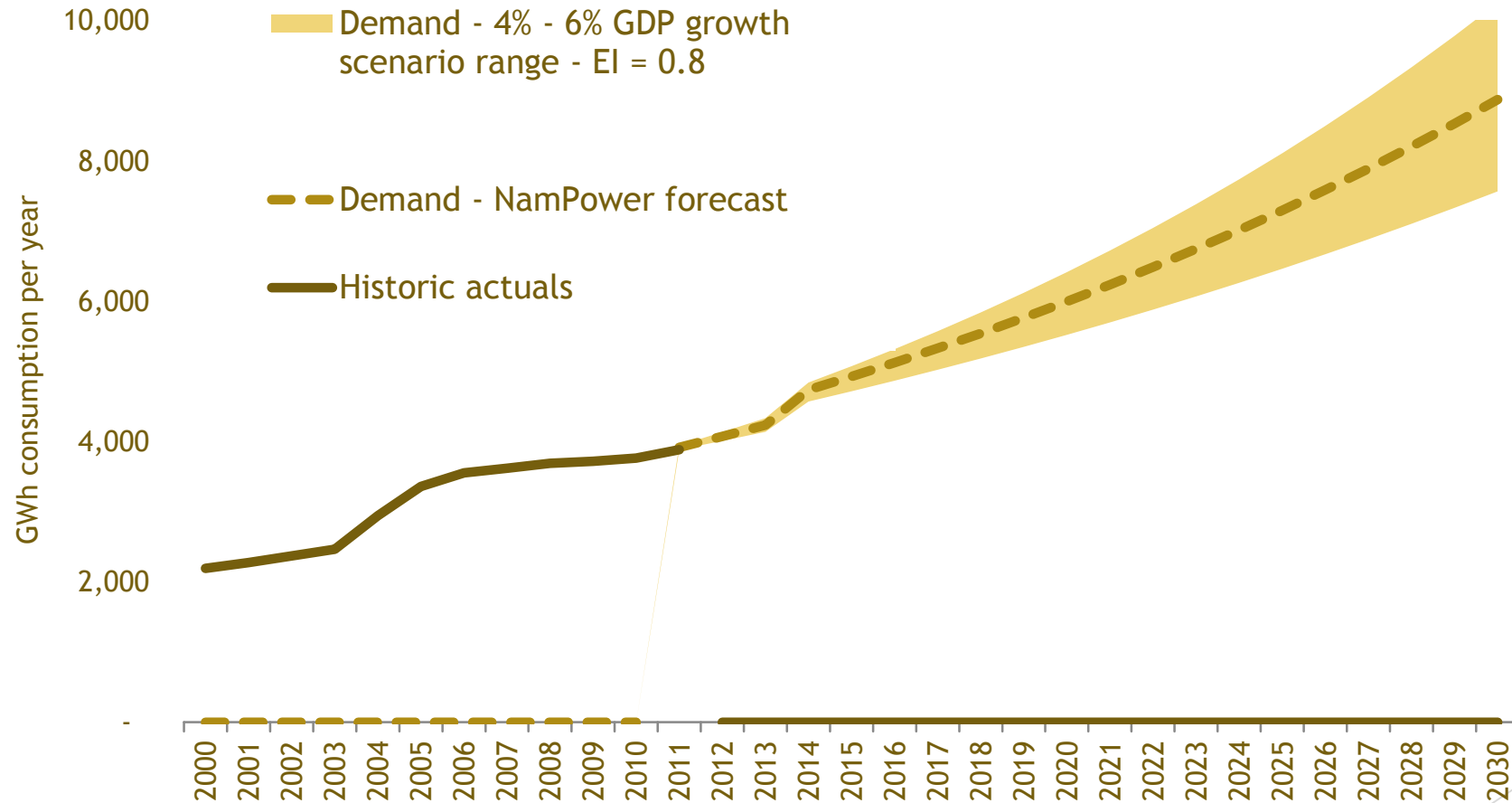
Peak electricity costs for Namibian residential customers vs cost of provision



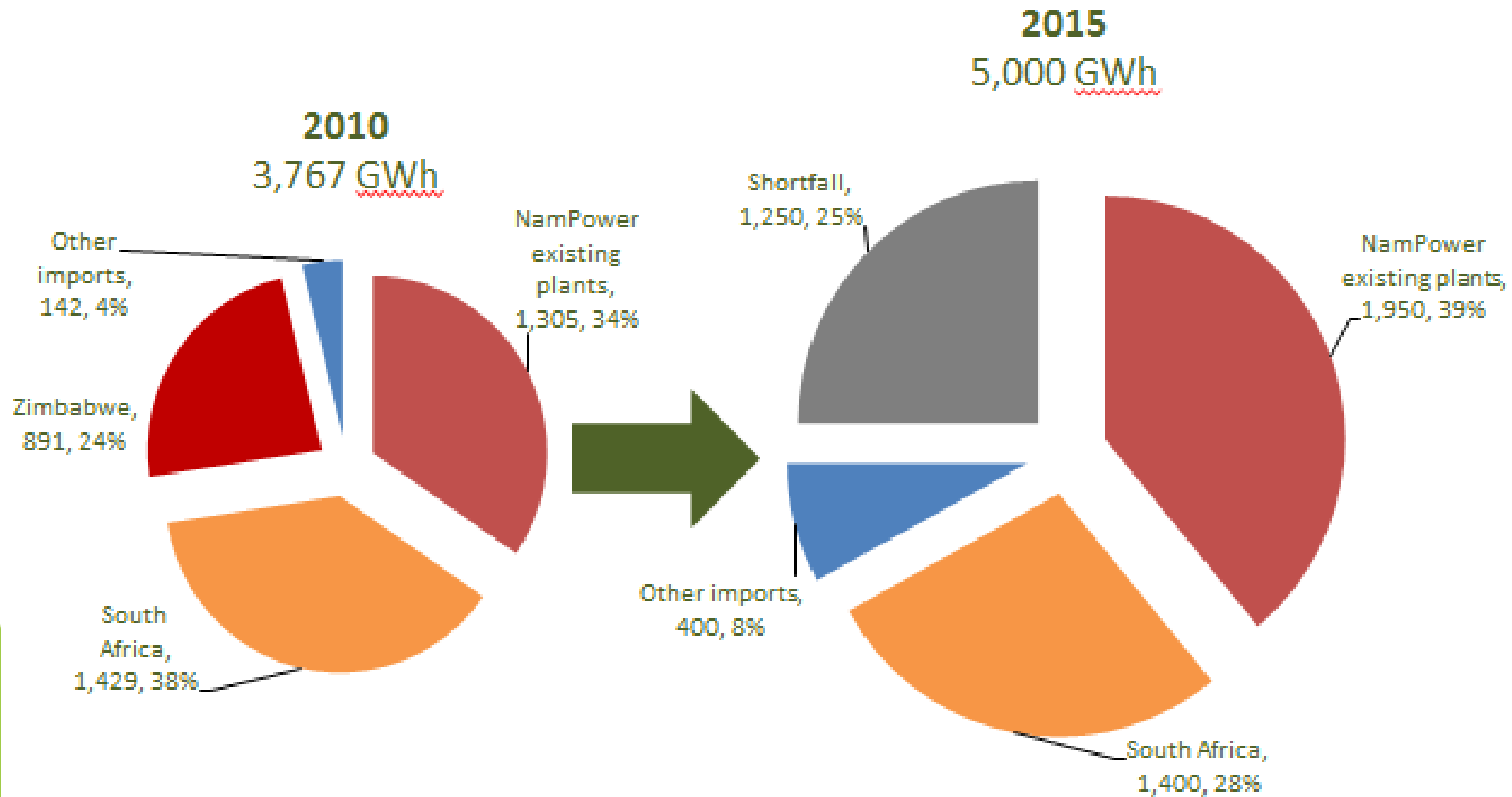
3. Energy security - baseload import substitution

Namibian electricity demand continues to grow

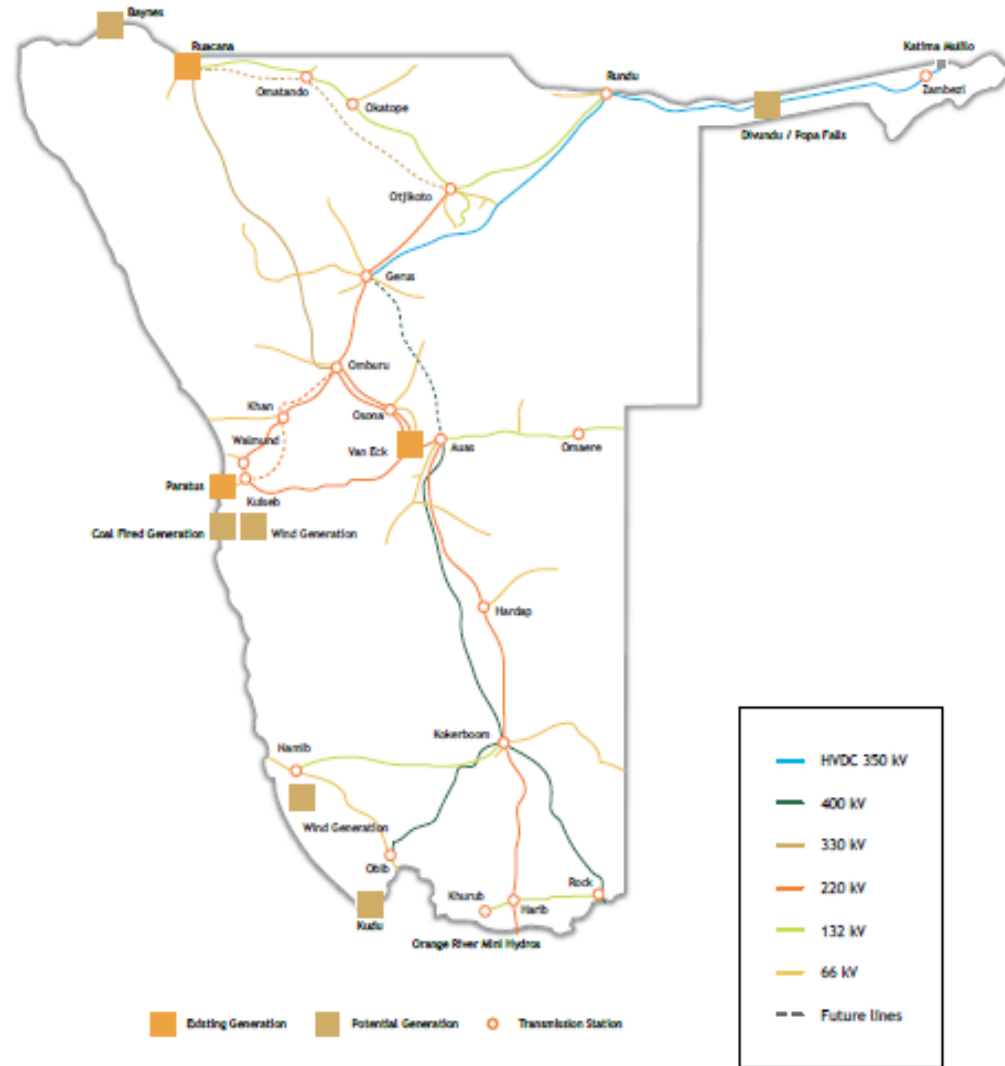
Namibian demand forecast scenarios



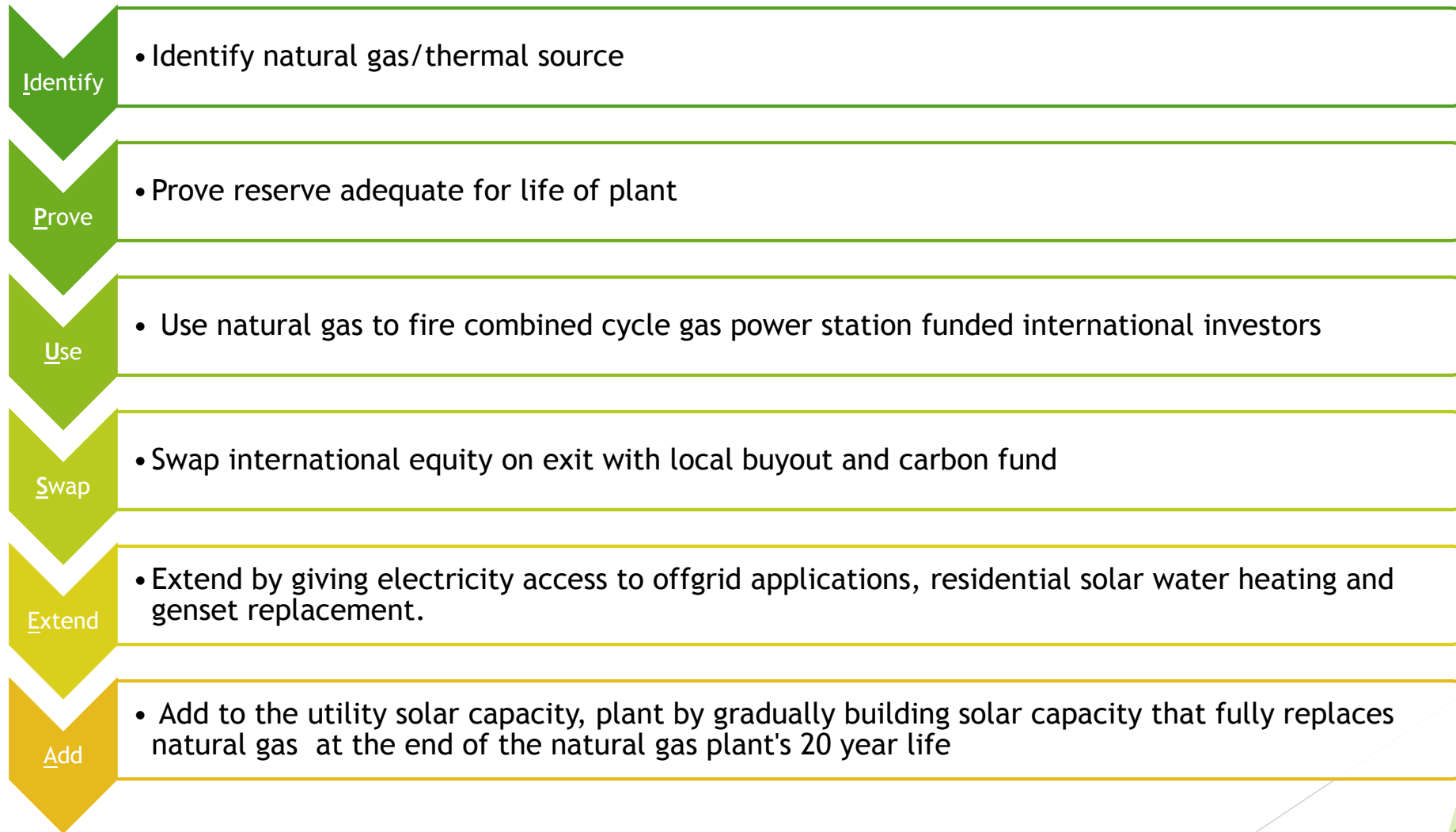
Creating a major shortfall.....



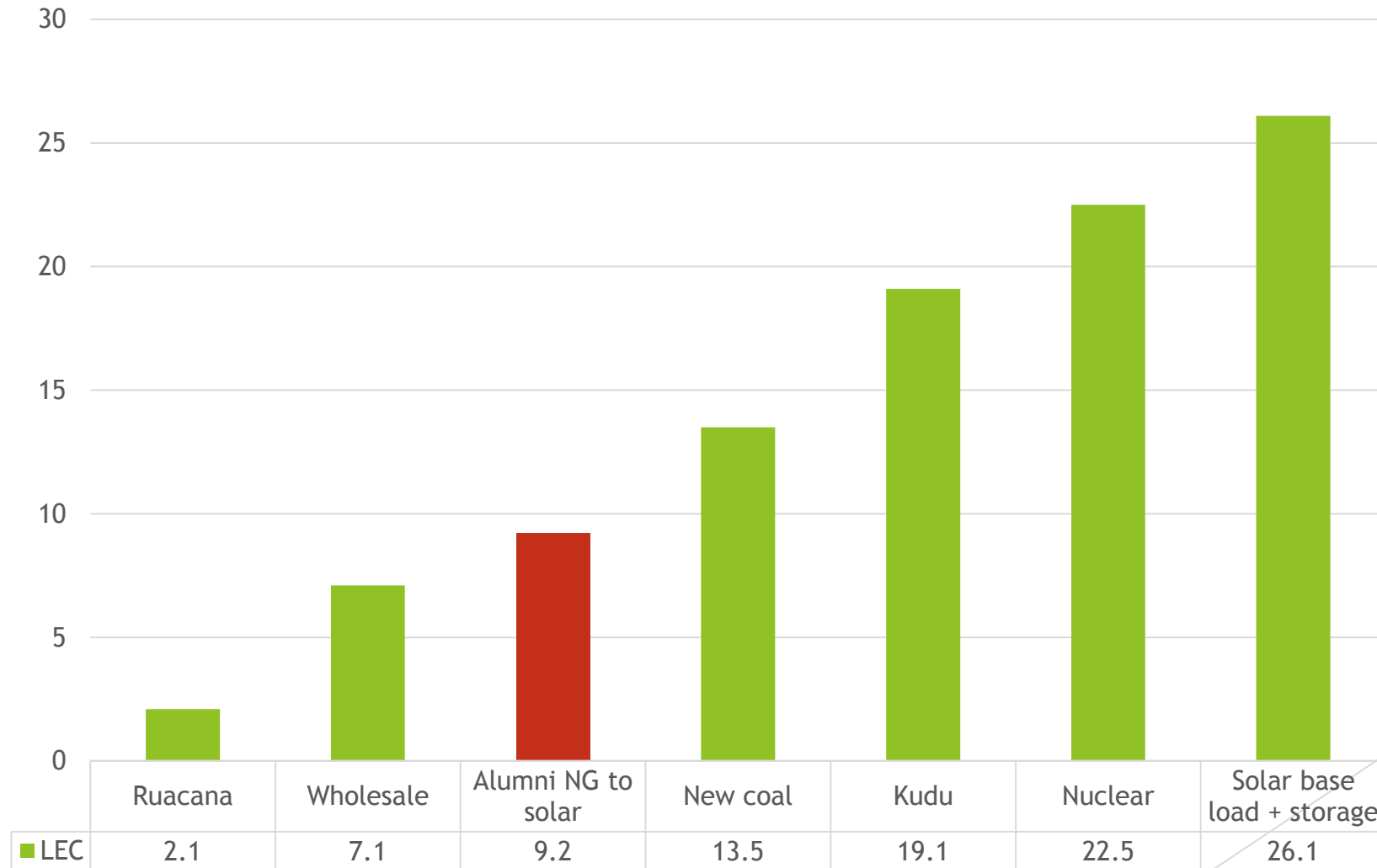
Namibia's grid - natural gas pipelines vs power generation



How does stranded natural gas to solar work

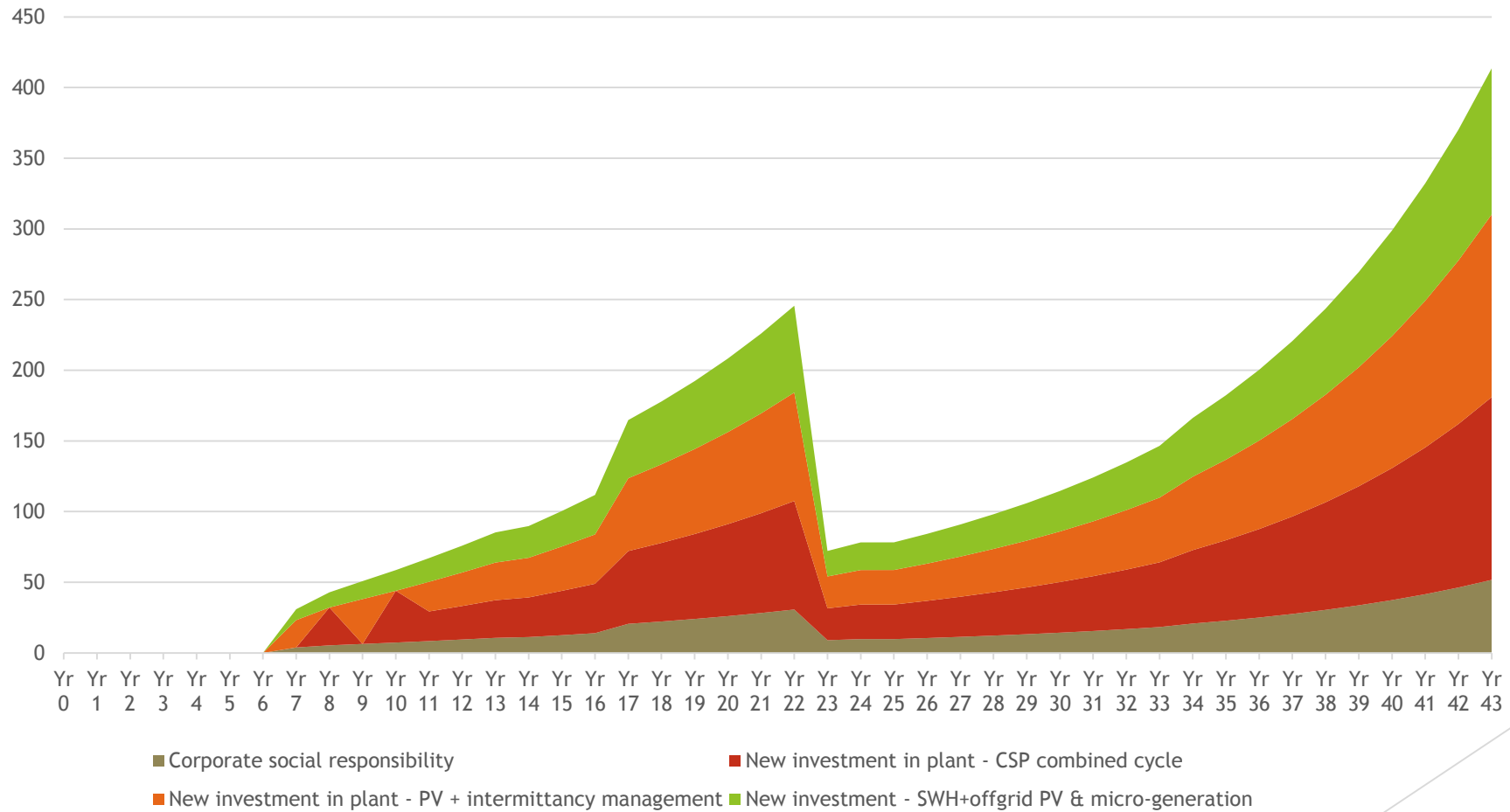


Levelised electricity cost of base-load alternatives

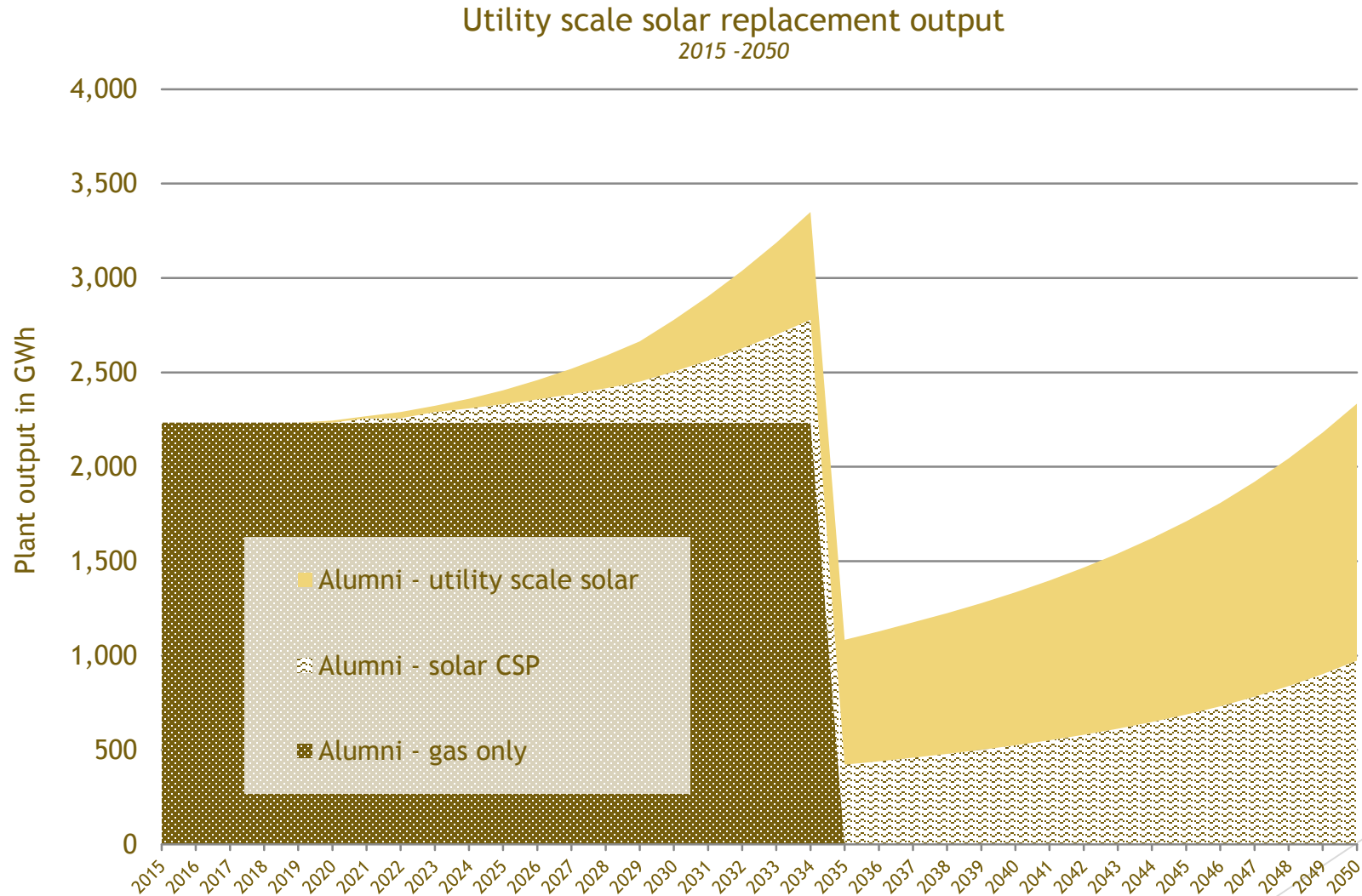


Funding the solar replacement

Carbon fund free cash available for investment



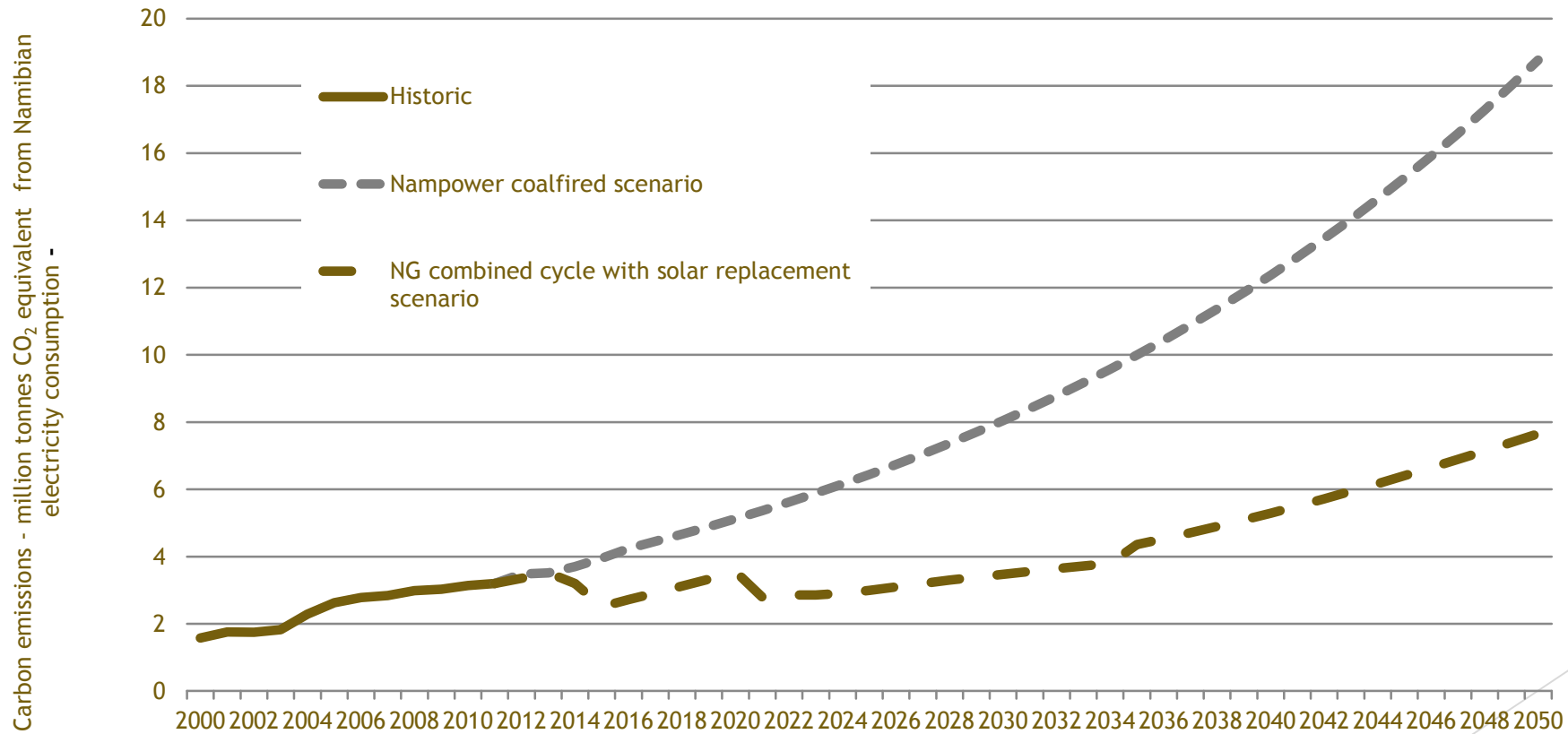
Namibia's grid - natural gas pipelines vs power generation



Converting from coal to natural gas saves carbon

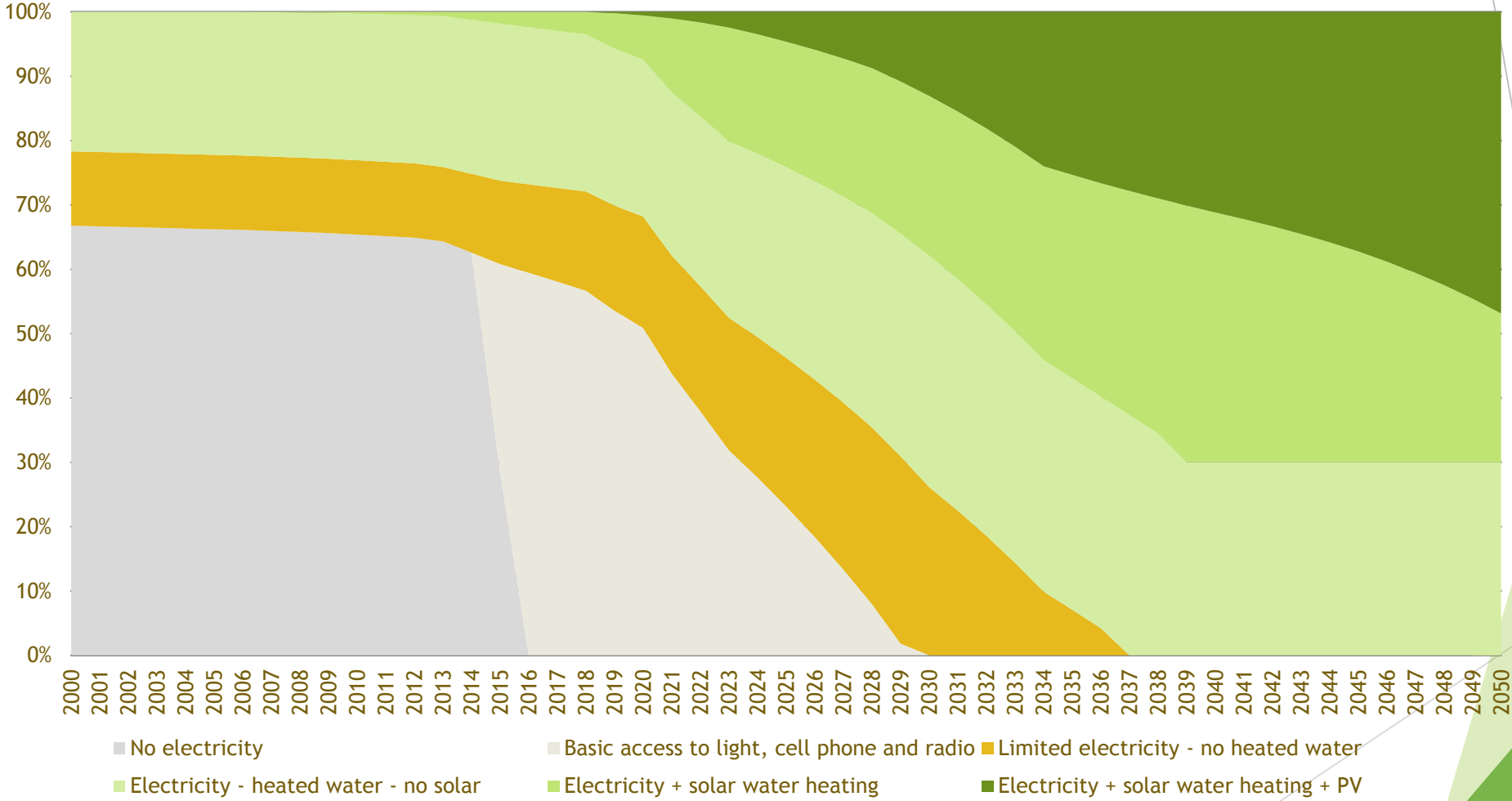
Namibian electricity sector carbon emissions - 2000 - 2050

Coal-fired + imports vs Natural Gas scenario - worst case



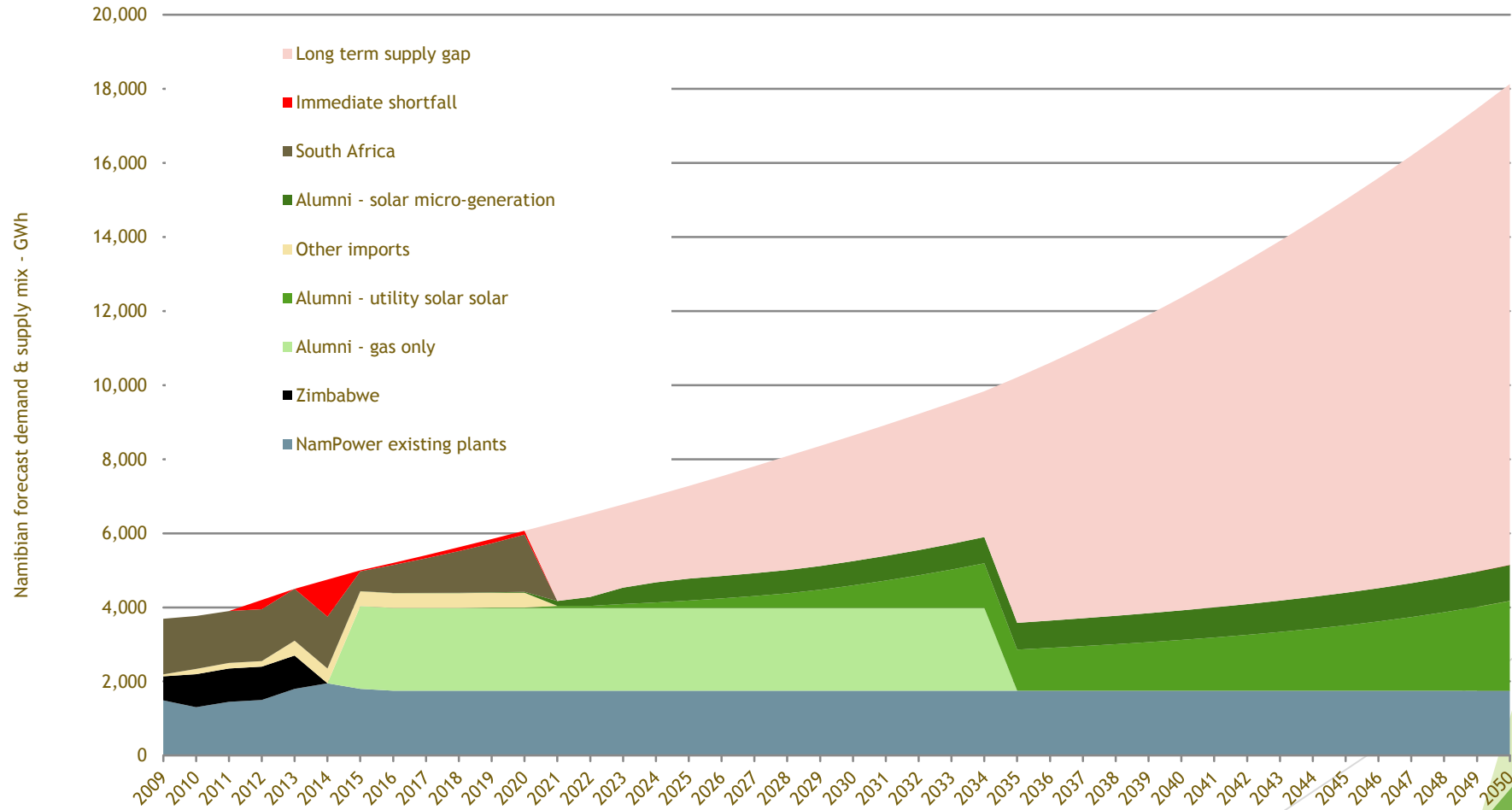
Neuma Carbon Trust - universal electricity access roll-out

Namibia - 2000 - 2050



Neuma Namibia Scenario - 2000 - 2050

300 MW natural gas combined cycle plant with solar replacement



Conclusion

Key problem: Avoiding theft

- ▶ Asset has a life of 25 years
- ▶ Asset financing requires insurance
- ▶ Theft is an unacceptable risk for insurers- so following interventions will be required
 - ▶ Theft proof remote security code hardwired into modified junction box on EACH panel
 - ▶ Bespoke Allen Keys for fixing panels
 - ▶ On roof installation only
 - ▶ Remote location monitoring & shut-down by GPRS triangulation
 - ▶ Community support and cross community roll-out

Conclusion and request for assistance

- ▶ Namibia is a microcosm of the rest of Africa in its electricity and carbon challenges
- ▶ Neuma has come up with three interventions to solve the three biggest problems
 - ▶ Pico generation strategy to give universal electricity access
 - ▶ Need pilot on 1,000 homes to give electricity access - cost £100,000 for bank integration & £100,000 for pilot
 - ▶ Peak shaving strategy with National Housing Authority
 - ▶ Need pilot on 100 homes to give middle income peak-shaving ability - cost £300,000 further R&D and £400,000 for pilot
 - ▶ Stranded Natural gas to Solar Roll-out
 - ▶ No money required as can be raised from the private sector, but need “non financial” help with banks

Thank You