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**Rural generation of income and energy
in Sub-Saharan Africa:
ecological potential – economic challenges –
entrepreneurial strategies**

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Overview

Situation:

Why is rural generation of energy and income needed in SSA?

What is the potential for local energy generation?

Complication:

What are the key investment and realisation challenges?

Increased demand from development

Economic, institutional and political



Urbanisation is taking place at scale in Africa with push and pull

Access –
energy,
market
linkages,
water

Climate
change &
variability

Rural
livelihoods are
less and less
sustainable

Migration patterns are
changing - and there
is an increase

Reduced rural
agricultural services

**Increased demand
for peri-urban and
urban basic
services**

Food insecurity

Water

Energy

Healthcare

Malnutrition

Economic loss

Livelihood loss



.. and energy access & quality in SSA is relatively low with high costs

560m people do not have access to electricity

= 74% compared to 28% in other developing countries

625m people do not have access to modern fuels

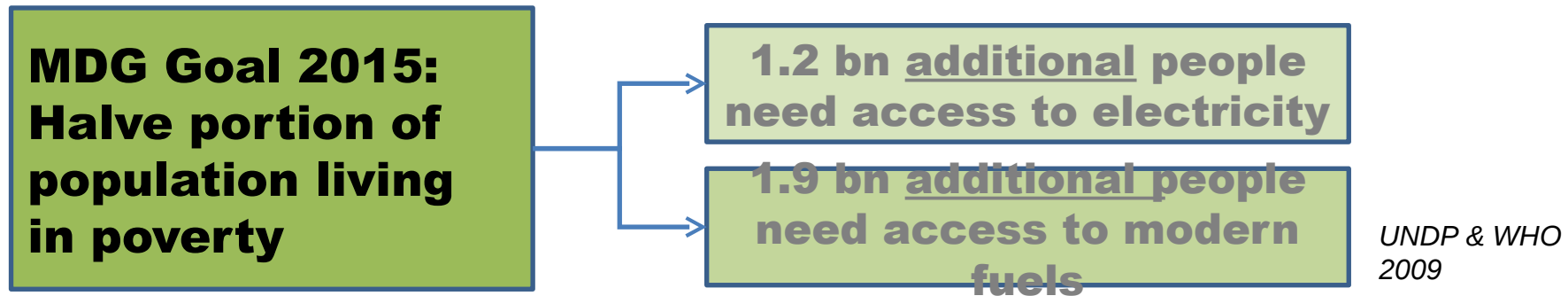
= 83% compared to 33% in other developing countries

2m deaths per annum (globally) caused by indoor air pollution (fuel burning for cooking & heat) and the burden of disease in Africa is particularly high

In 2009, South Africa produced 70% of all SSA's electricity



...presenting excellent opportunity for energy investment and scale



**At the same time as combating global
warming**

**Plus Africa's final electricity consumption
expected to double between 2007 and 2030 –
from 505 to 1012 TWh (IEA 2009)**

Public sector finance is hardly positioned to finance this



To scale, expanding electricity grids is cheapest option but RE is critical – particularly in rural and remote areas *(Deichmann et al 2010)*

IEA 2010 projections are for 33bn USD investment per annum – mostly in SSA

Achievable through:

- efficiency improvements
- demand management
- ***optimal generation planning***
- improved grid operations
- increased electricity trade across SSA

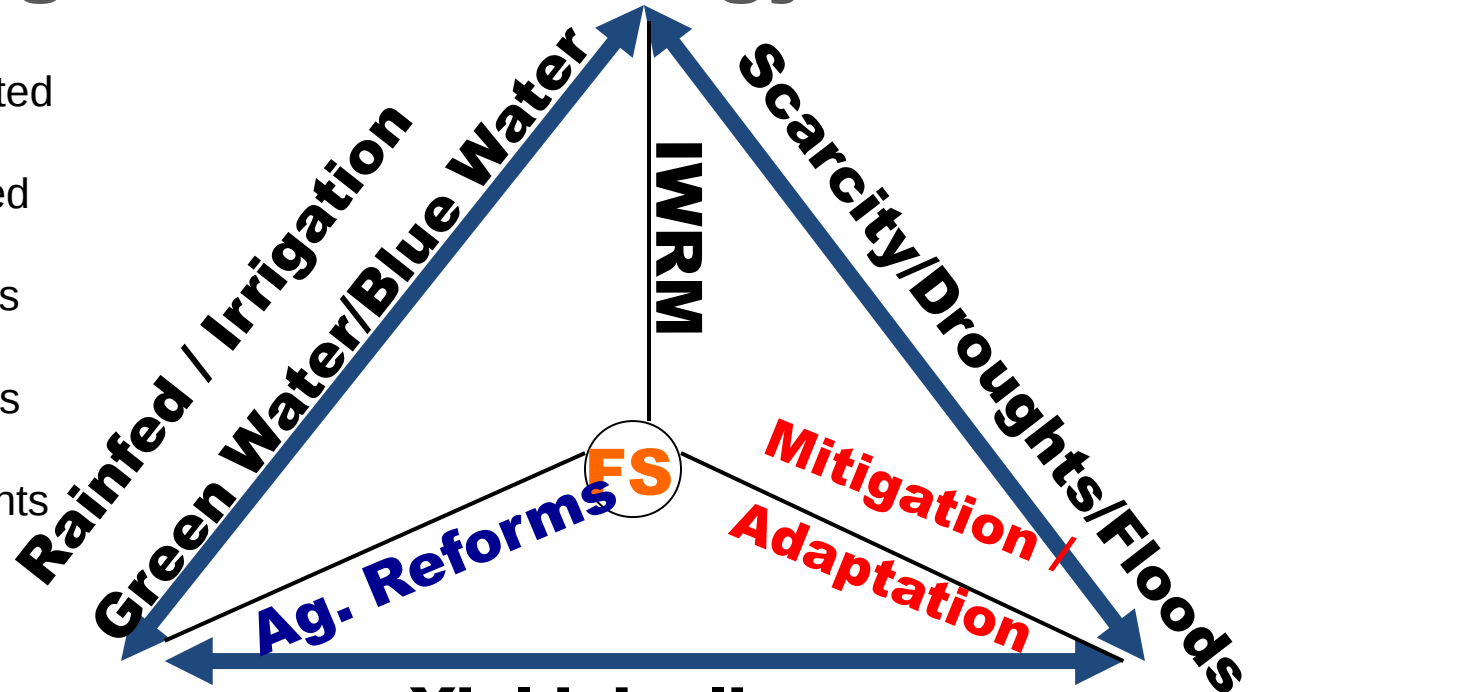
Requires:

- Replicable mini and off grid solutions – mini, hybrid



But scaled demand for development is an added complication – water, agriculture & energy nexus

- Widespread poverty
- 3.5% arable land irrigated
- 70% drylands degraded
- High deforestation rates
- Flooding of fertile deltas due to sea level rise- population displacements



AGRICULTURE

ENERGY

Yield declines
Crop and livestock losses
Change in agricultural geography
Biofuels



And of course there are nuanced systemic challenges...

Average cost of electricity in SSA doubles other developing countries

Generating capacity not keeping abreast with population growth

**S
Y
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M**

- Policy & Political will
- Regulatory environment
- Pricing
- Regulatory environment
- Agreements (PPAs, trade etc)
- Power Pools
- PPPs
- PPA's – clear criteria, meet hybrid market needs
- Investor friendly
- Political will
- Transparency
- Adequate investment
- PPPs; community based
- RoI?
- Evidence & CBA
- Impact on GDP?
- Understanding of hybrid market

Informed: Understand population density and distance from the grid



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As well as strategies and solutions for scaling up faster...

Decentralised power – reduced state monopoly & improved performance

Reduce/remove subsidies

Reduce costs of generation – and tariffs

Increase targets – access and share of renewables – reduce inefficiencies

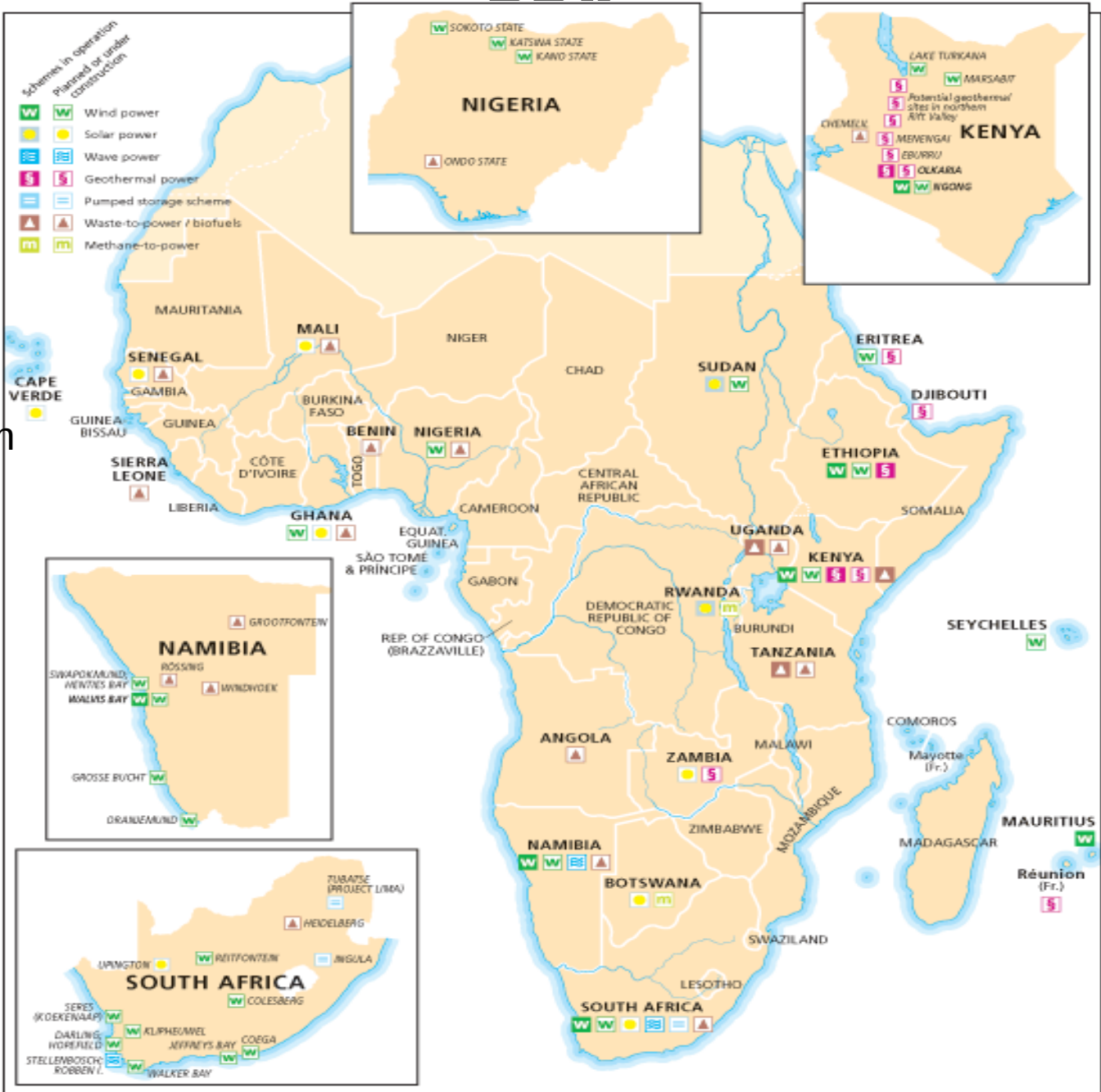
Strengthen the business case – evidence base

Use and strengthen the regulatory environment and use continental structures: RECs, NEPAD, Power Pools

Develop community based financial and maintenance models,

And many Renewable Energy Projects in

SSA

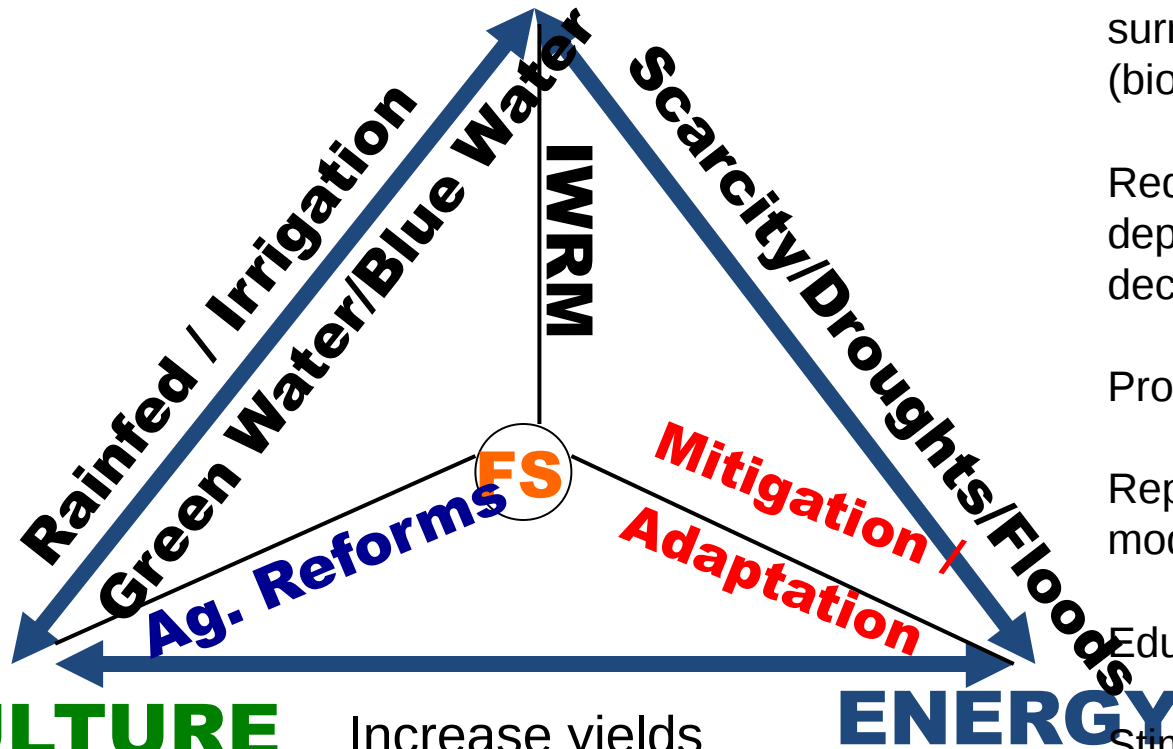


Wind
Solar & PV
Bagasse for
cogeneration
Geothermal
Biomass –
waste to
energy



Where targeted, integrated energy

solutions are key
WATER



Mini-hybrid grid solutions for irrigation and surrounding communities (biomass, cogeneration)

Reduce large hydropower dependence – decentralised solutions

Productive use

Replicable financial models

Educated investors

Stimulate supporting entrepreneurial enterprises

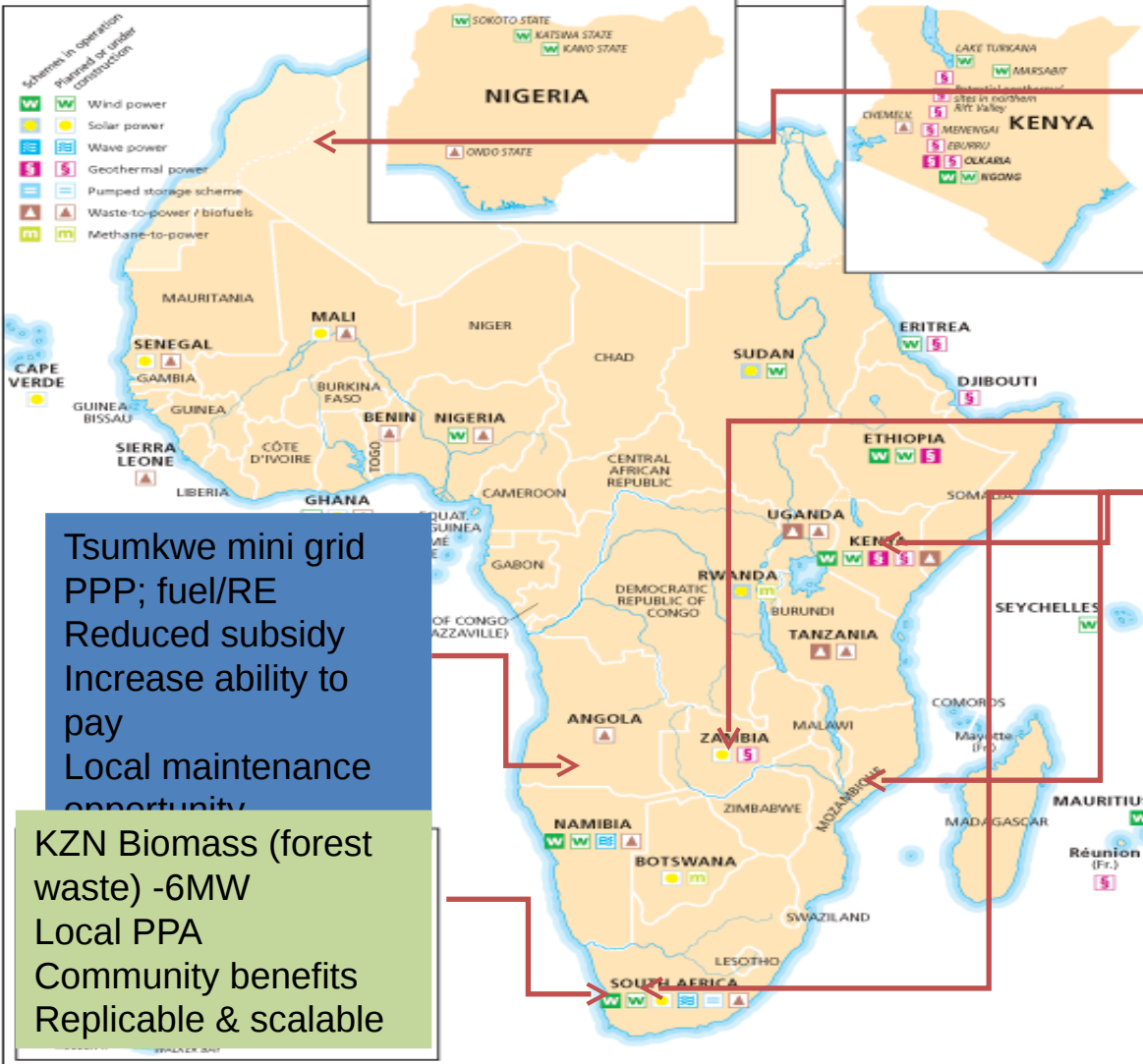
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Increase yields
Increase incentives for rural & scale agriculture
Increase food security
Reduce food prices

ENERGY



With replicable targeted, integrated working projects.



Solar powered irrigation
Malawi, Zambia, Ghana
- Still small scale – need larger scale solutions

Solar & off grid powered tourist ventures
KZN; Mozambique; Eastern Cape
· SWH & PV
· Diesel gen back up
· small wind
· biogas digestors

Tsumkwe mini grid PPP; fuel/RE
Reduced subsidy
Increase ability to pay
Local maintenance opportunity

KZN Biomass (forest waste) -6MW
Local PPA
Community benefits
Replicable & scalable

Cogeneration ex Bagasse
Local village electrification & powers the plant
Replicable & scalable



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... and common features of success

People centred solutions

Strong business case – framed in development

Local ownership

Clear financial models – with consumer buy-in

Reduced / no subsidies

Off grid/decentralised





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With risks *and* rewards of scaling fast



And so the motto holds..

Think Big

Start Small

Scale fast

Scale fast

Scale fast