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Extractive Industries and Sustainable Job Creation

Clean Energy for Sustainable Development

By

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Outlines:

- INTRODUCTION
- VISION FOR RENEWABLE ENERGY
- SITUATION OF THE ELECTRICITY SECTOR
- BASIS FOR RE - DEVELOPMENT
- POTENTIAL PROJECT AREAS
- OUTLOOK
- CONCLUSION

INTRODUCTION

Sudan has an abundant renewable energy resources such as wind, solar, biomass small hydropower and geothermal resources. The RE resources are distributed geographically almost allover the Sudan.

Utilizing these resources will help improving the energy mix in addition to the other environmental and economical benefits.

Renewable energy can be utilized in many ways and applications such as: at household level, mini and micro grids, water pumping as well as in the national grid

INTRODUCTION

Solar diesel hybrid systems has great economical benefit in remote locations such as mini grids, harbors, mines, oil fields …

Exploiting renewable energy resources will create jobs in the remote areas, hence help stabilizes the rural people in their areas and reduce migration to cities.

VISION FOR RENEWABLE ENERGY

Take the Chances

Utilize RE sources to provide energy all over the country.

Jobs creation.

Fuel saving.

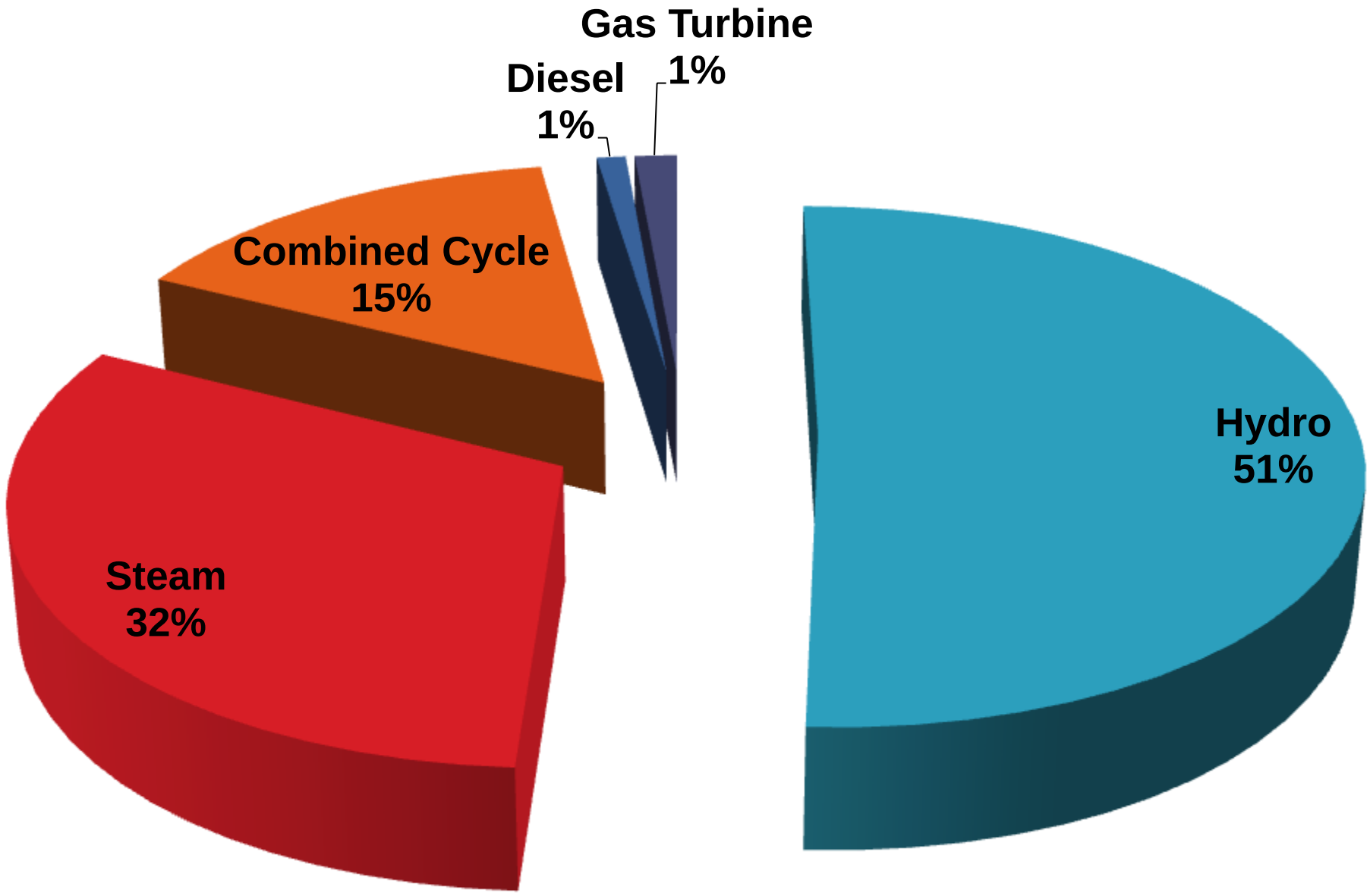
Technology transfer and capacity building. Promote local manufacturing.

Diversify the energy supply and the energy security.

Save the environment

SITUATION OF THE ELECTRICITY SECTOR

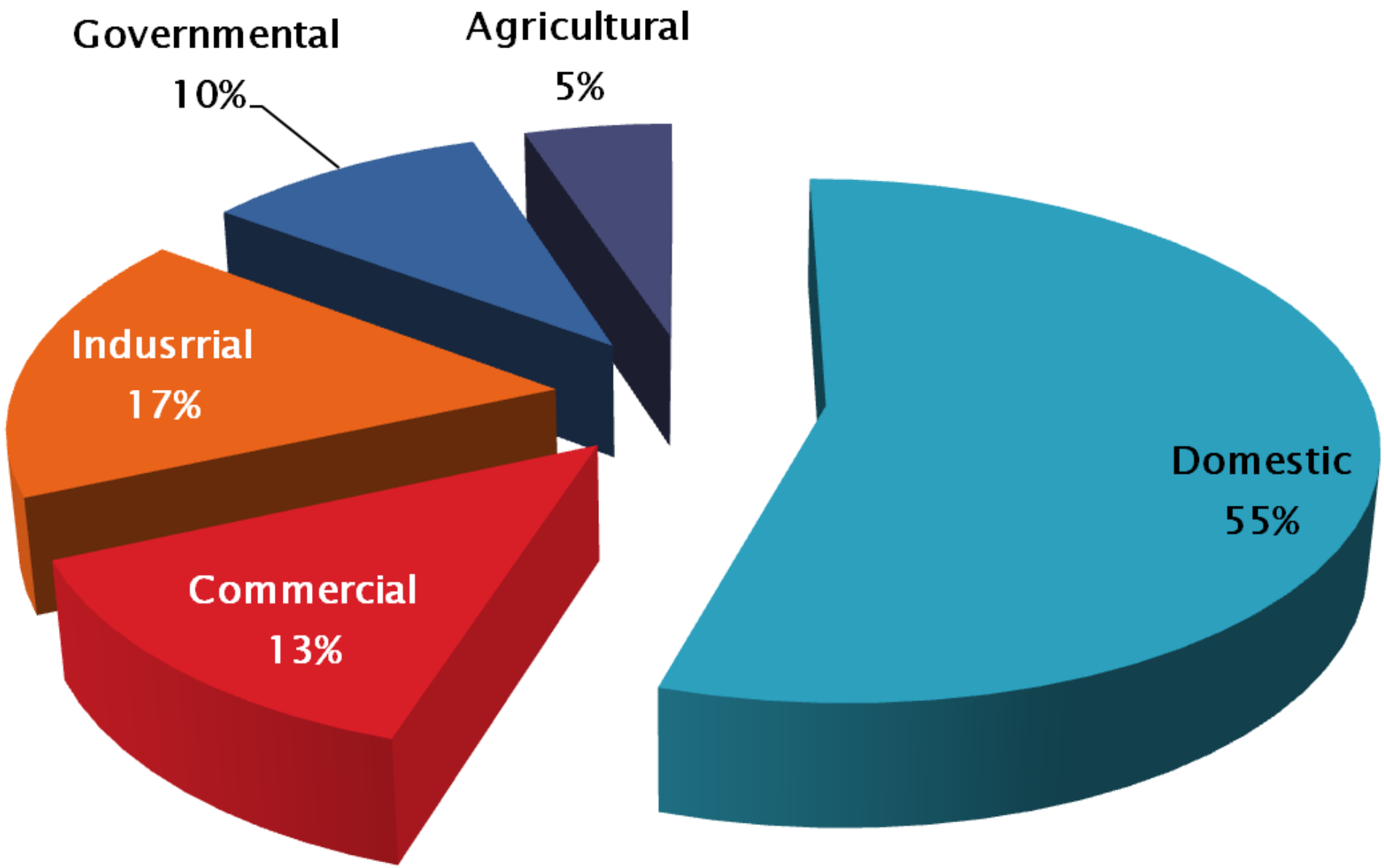
Generation Installed Capacities: June 2015



Total Capacity 3,136MW

SITUATION OF THE ELECTRICITY SECTOR

Energy Consumed by Sector -2014



Source: SEDC Annual Report, 2014

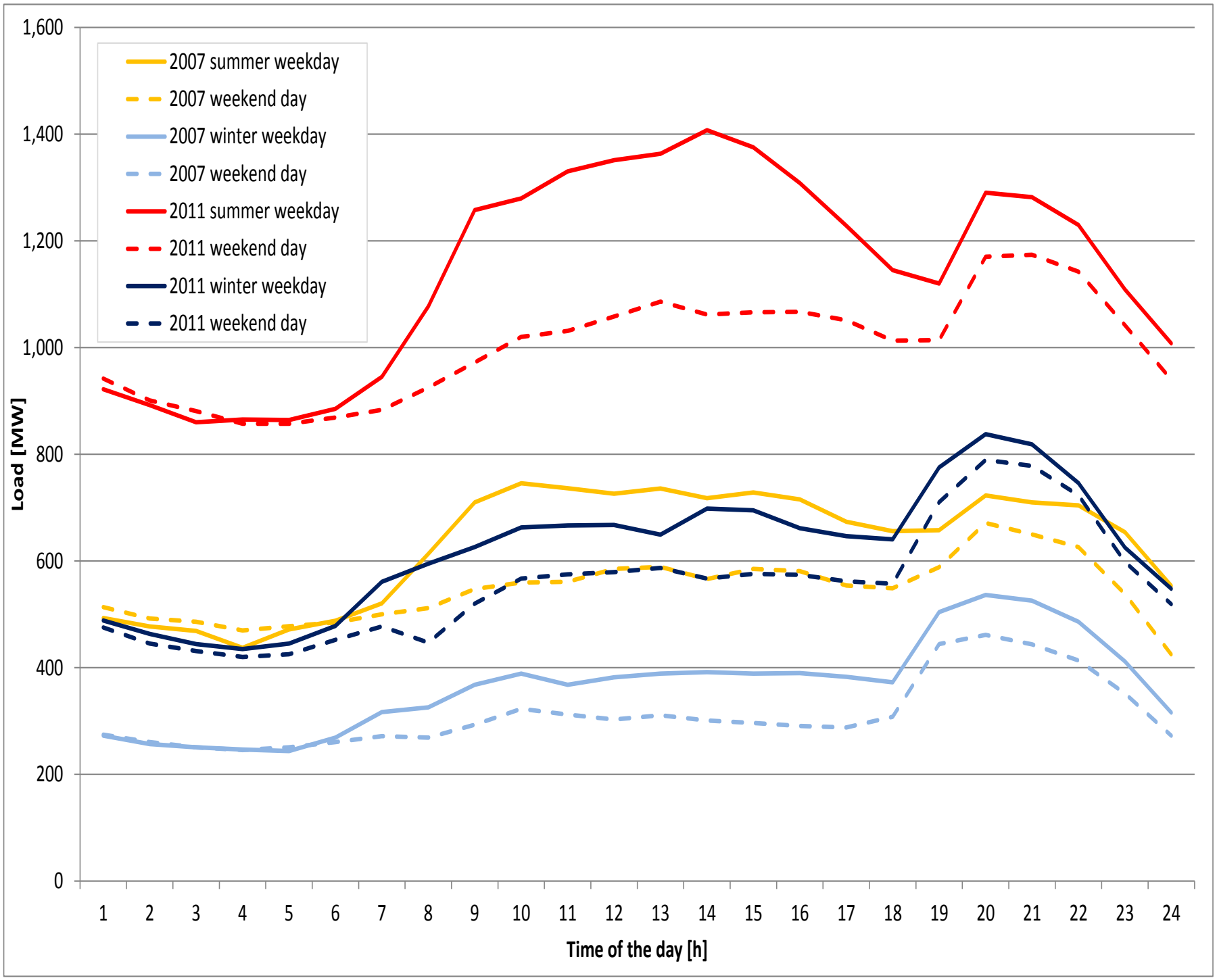
SITUATION OF THE ELECTRICITY SECTOR

Key figures

- National Electrification Ratio today: 38%
- Average Consumption per Capita: 285 kWh/year
- Annual increase in demand: 16-20% in the last few years

SITUATION OF THE ELECTRICITY SECTOR

Exemplary Daily Load Curves



SITUATION OF THE ELECTRICITY SECTOR

Summary

- Till now, most of the population in the country does not have access to electricity especially in rural areas

- The demand for electricity is rapidly growing. To satisfy the increasing need for power is a big challenge.

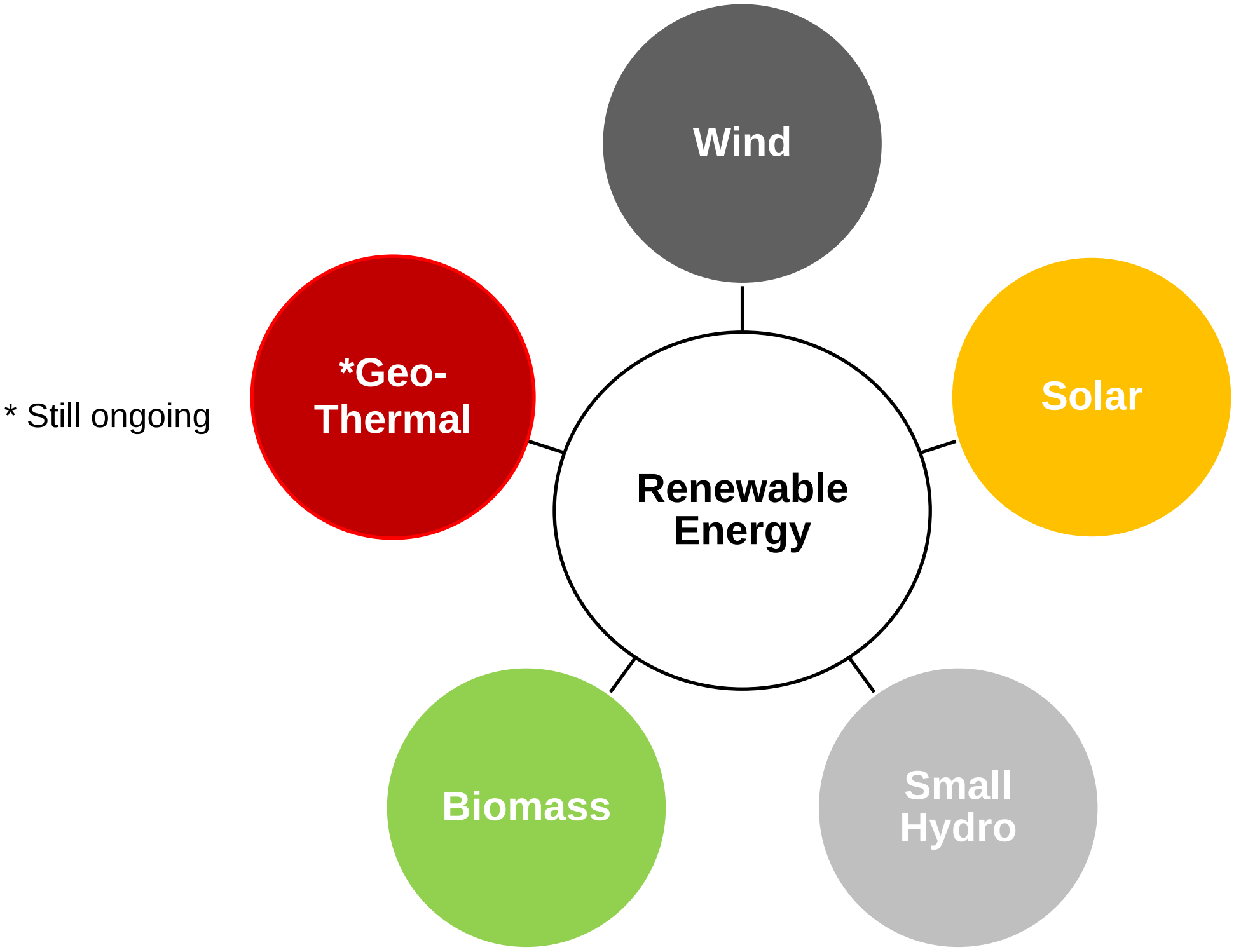
In order to bridge the gap
fast implementation of renewable energies might help to overcome the situation

BASIS FOR RE - DEVELOPMENT

- Main Activities:
- Setup a basis for RE development (e.g. Resource Analysis)
- Development of National Renewable Energy Masterplan (REMP)
- Project Development for Wind and Solar Applications

BASIS FOR RE - DEVELOPMENT

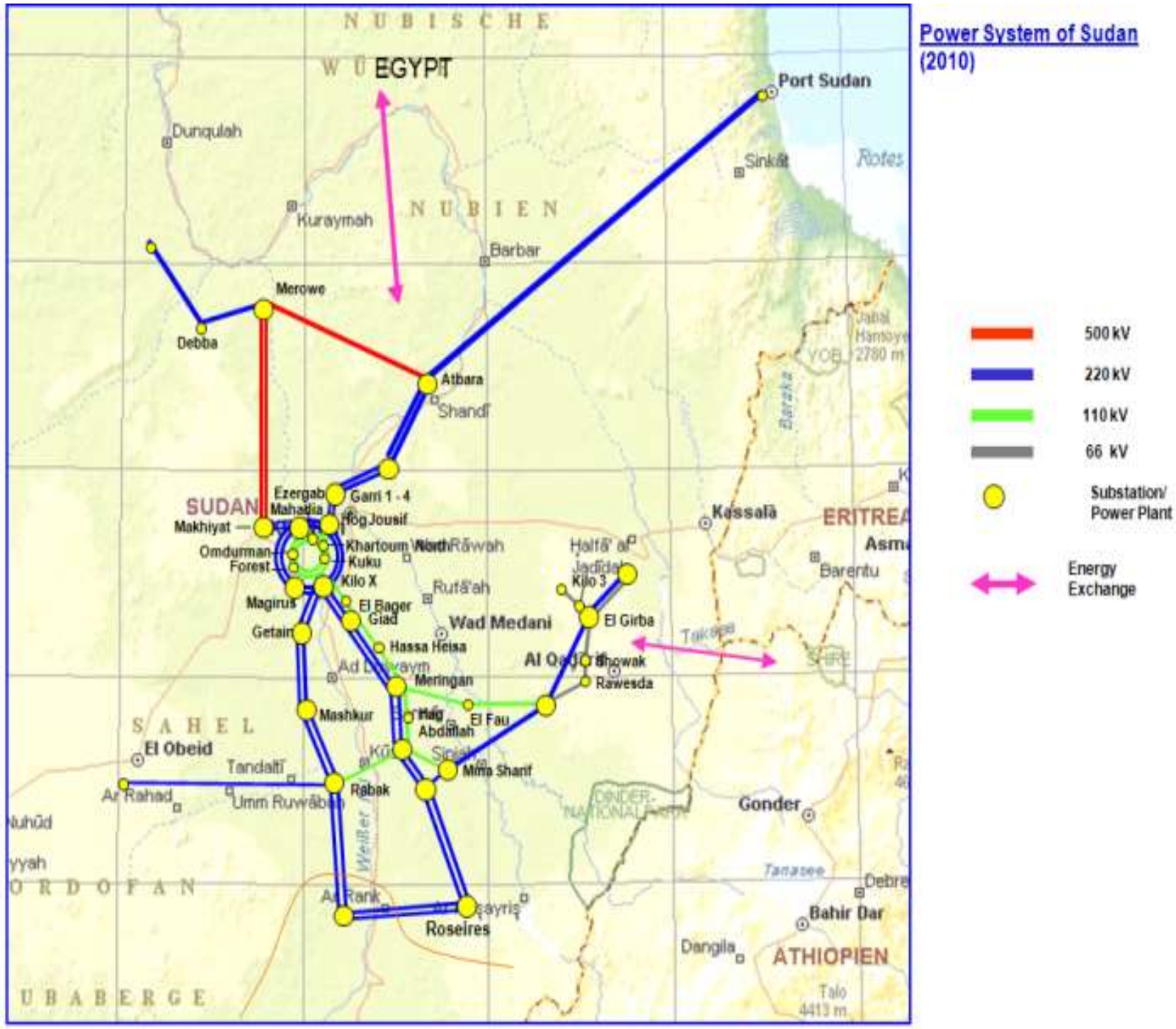
Resource assessment for the REMP



* Still ongoing

BASIS FOR RE - DEVELOPMENT

Technical and economical barriers analysis



BASIS FOR RE - DEVELOPMENT

Summary

- Sudan has rich renewable sources
- Existing infrastructure appears to be sufficient for RE Implementation.

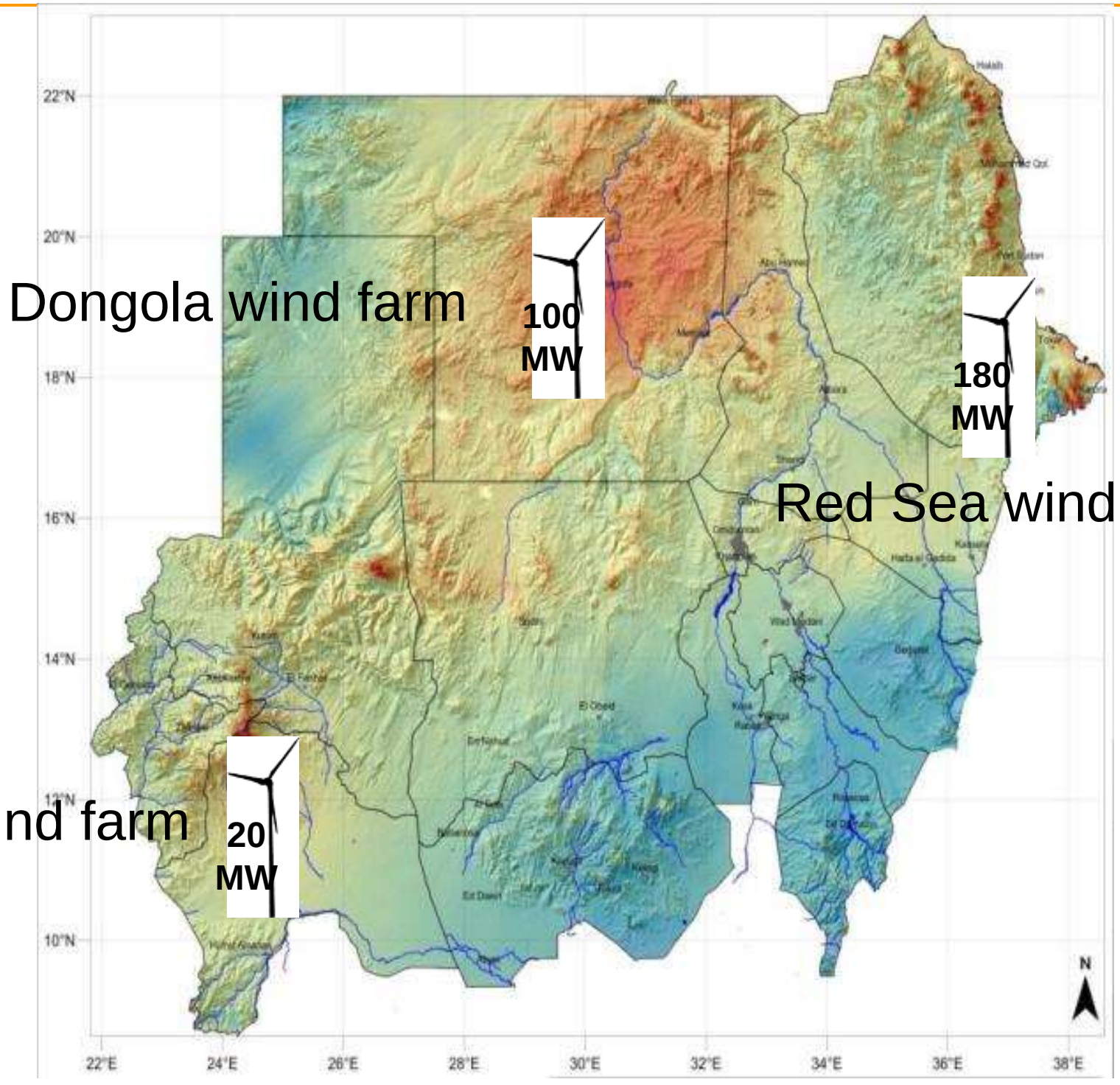
Where projects can be implemented ?

POTENTIAL PROJECT OPPORUNITIES

- Based on Analysis of:
  - Resources
  - Capacities / Infrastructure
  - Technology

- The following potential project opportunities have been identified

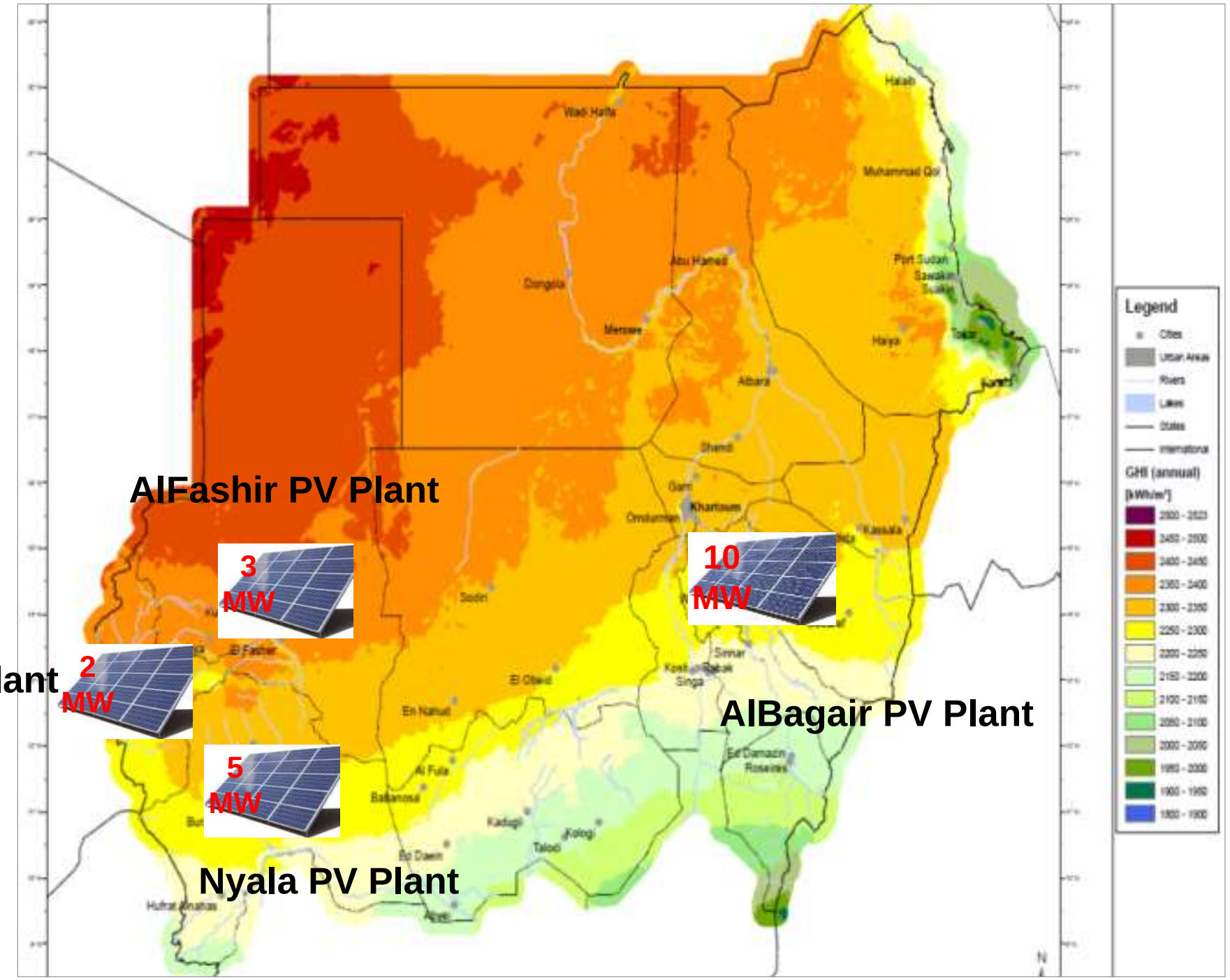
POTENTIAL PROJECT AREAS - WIND



Average Wind Speed:

4.2 – 8.5 meters/second at 80 meters above ground level

POTENTIAL PROJECT AREAS - PV



5.8 – 7.2 kWh/m²/day

POTENTIAL PROJECT AREAS –
RURAL ELECTRIFICATION

Feasibility Study for Rural Electrification Using Biogas

- Sudan is an agricultural and pastoral country.
- Most of the population live in rural areas and they do not have access to electricity (29% rural electrification)
- A study for the feasibility of rural electrification (micro grids) using biogas from animal and agriculture wastes is ongoing. Depending on the outcome of the study, three pilot projects will be implemented in different areas.

POTENTIAL PROJECT AREAS –
RURAL ELECTRIFICATION

Rural Electrification Program

The project aims to provide the electricity service to the households in rural areas far from the grid installing Solar Home Systems

- Target: 1.1million 50-100-200W solar home system(SHS)
- Period: 2013-2031
- 5.5 million, 26% of population in rural areas
- Budget: ≈ 600million US $

PROJECT OPPORTUNITY FOR HYBRIDS

Hybrid Solutions, Power Generation for Remote Business

+

PROJECT OPPORTUNITY FOR HYBRIDS

Hybrid Solution, Power Generation for Remote Business

Where does a hybrid system apply:

- Every base load diesel genset, e.g.
  - Mining Sector
  - Oil fields
  - Remote Towns and Communities
  - Remote Manufacturing Facilities
  - Military
  - Tourism
  - Regions with non-reliable Grid supply

Source: Intersolar, ComAp a.s.

PROJECT OPPORTUNITY –
MINING AND OIL SECTOR

Assuming 10MW power plant for oil or mining plant

Parameter	Unit	Value	
Proposed PV plant size	MW	2 MW	
Energy from diesel system (without solar system)	MWh	52,560	*
Energy generated from solar field	MWh	3,504	
Annual fuel saving	Ton/year	876	
Annual saving	$	529,104	**
Payback period	**Years**	**5.7**	***

* Assumed capacity factor of 60% diesel system

** Based on gas oil price 604$/tone (international price)

*** 1.5m$/MWp

PROJECT OPPORTUNITIES

Summary

- Sudan in general is in an excellent position to take the advantage of its renewable sources on and off-grid .

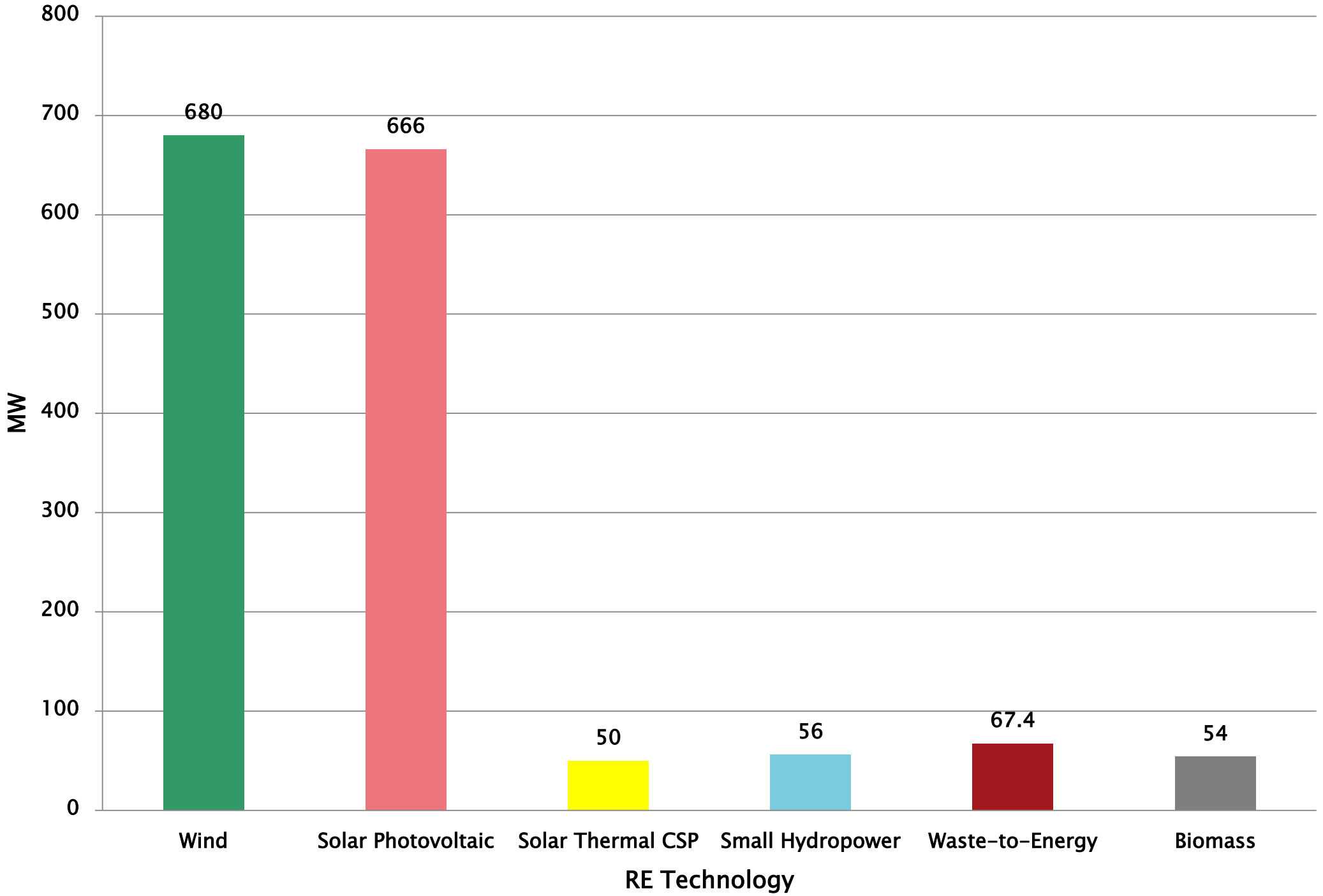
•Best chances for Hybrid System Applications.

• Particularly remote industries can profit from the rich sources. **E.g. Mines, Harbors, Farms, etc**.

•Big opportunity for private investment

WAY FORWARD

REMP, Capacity Distribution



WAY FORWARD

Total Targets

- 3.3 billion US dollars investment.

WAY FORWARD

Expected Jobs

Staff Requirements for O&M Services			
Technology	**Number**	**Capacity in MW**	**Expected Direct Jobs No.**
Wind onshore	-	680	**approx. > 20,000**
Solar / PV	-	666	
Biomass	-	54	
Solar Home Systems	1.1 Mio.	-	

More jobs will be created/improved as result from the availability and stability of electric power (indirect jobs)

WAY FORWARD

Environmental and economical benefits

- The total energy yield from the different Re sources is expected to be more than 4,500 GWh/year

- > 1.3 million tones of oil will be saved annually

- More than 1 million tones of CO_2 emission will be avoided annually

CONCLUSION

- Sudan has rich resources of renewable energy for RE-Applications;
- Fast implementation of RE applications appears technically feasible;
- ON and OFF Grid Areas/Business **(e.g. oil and mining sectors)** can profit from the movement toward RE-technologies;
- There is a big opportunity for private investment
- Positive impact on the employment market can be expected directly

Thank You!

Nov 26th; 2015