



African Energy Commission



**Assessment of Future Deployment of
Renewable Energy Technologies in Africa:
*Priorities & Strategies***

**Dr. Hussein ELHAG
Executive Director**

**IRENA INITIATIVE FOR AN AFRICA CLEAN ENERGY CORRIDOR
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Outline

- **Background: The Africa Solar Energy Study**
- **Renewable Energy Resource Assessment**
- **Future Electricity Supply and Demand Projection**
- **COMESA-ECA-SADC Power Grid & Interconnections**
- **Africa Regional Electricity Corridors**
- **Priorities and Strategies for Enhancing RETs**
- **Conclusion**

The Solar Energy Study for Africa

(Legal Framework)

Resolution of the 14th AU Summit of January 2010: **(Assembly /AU/Res.2 (XIV)) on Solar Energy in the Sahara: Decides the following:**

- **REQUEST** all countries which have part of the Sahara within their territories to consider that the solar energy potential in this part of our Continent is a precious asset which should be managed for the benefit of our Continent;
- **REQUEST** the Commission to conduct a study on the solar energy issue at technical experts' level to backstop efforts to harness solar energy and to report to the Assembly at its Ordinary Session in January 2011 through the Executive Council and the Permanent Representatives Committee on the financial implications for the implementation of this Resolution.

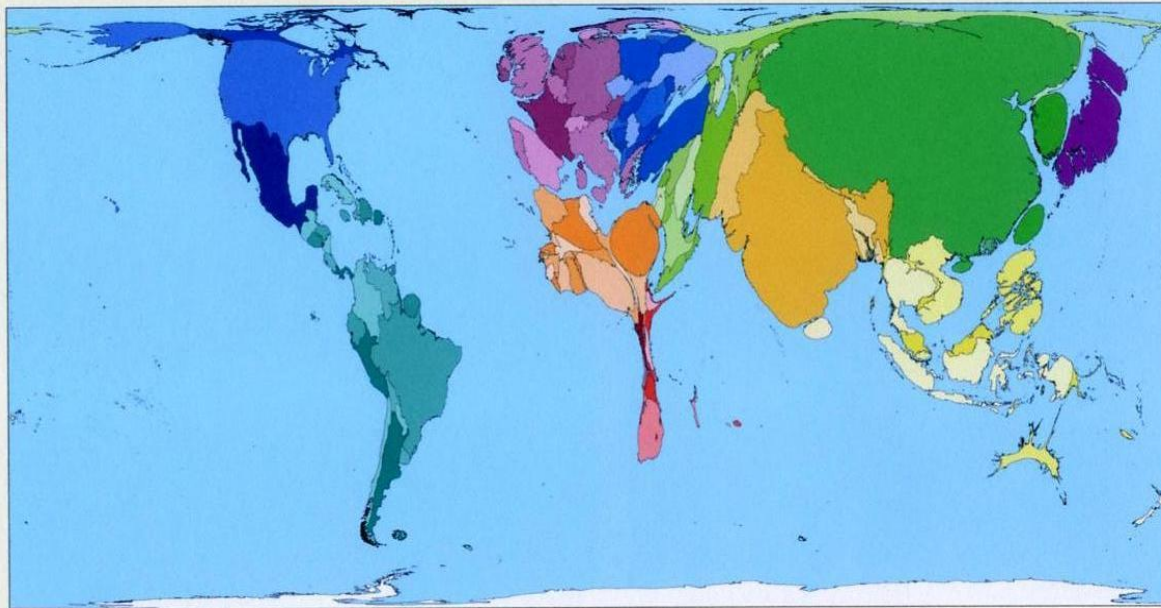
Countries/Sub-regions Covered in the Phase I of the Study



Access to Electricity: The Main Driver

Electricity Access

The University of Sheffield, M The Leverhulme Trust Geographical Association
 Produced by the SASI group (Sheffield) and Mark Newman (Michigan)



This map shows where people who have electricity supplied to their homes live. Electricity access includes that sourced from a publicly used grid and self-generated electricity (possibly from solar, wind or hydroelectric sources). This map shows access, not the quantities of electricity used.

The percentage of people with access to electricity in their own homes is over 97% in Eastern Asia, Eastern Europe, North America, Western Europe and Japan. 7 of the 10 territories with the lowest access to electricity are in Southeastern Africa.

Electricity in homes can be used to power lighting, heating, cooking, radios, televisions, computers, washing machines, and other appliances.

Territory size shows the proportion of all people with some electrical power in their homes living there.



Land area

Technical notes

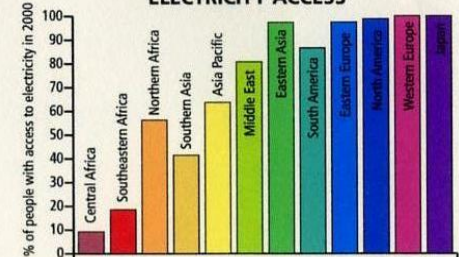
- Data are sourced from the World Resources Institute's 2005 Earth Trends.
- Territories for which data have been estimated are not shown in the table.
- See website for further information.

LOWEST ACCESS TO ELECTRICITY

Rank	Territory	Value	Rank	Territory	Value
171	Dem People's Republic Korea	20.0	191	Madagascar	8.0
171	Cameroon	20.0	192	Kenya	7.9
178	Eritrea	17.0	193	Mozambique	7.2
179	Cambodia	15.8	194	Democratic Republic of Congo	6.7
180	Nepal	15.4	195	Myanmar	5.0
181	Burkina Faso	13.0	195	Malawi	5.0
182	Angola	12.0	195	Lesotho	5.0
182	Zambia	12.0	198	Ethiopia	4.7
184	United Republic of Tanzania	10.5	199	Uganda	3.7
190	Togo	9.0	200	Afghanistan	2.0

percentage of population with electricity access in 2002*

ELECTRICITY ACCESS



“Have you ever thought about what you would have to give up or how much work and effort you would have to dedicate to daily activities if electricity did not help you?”

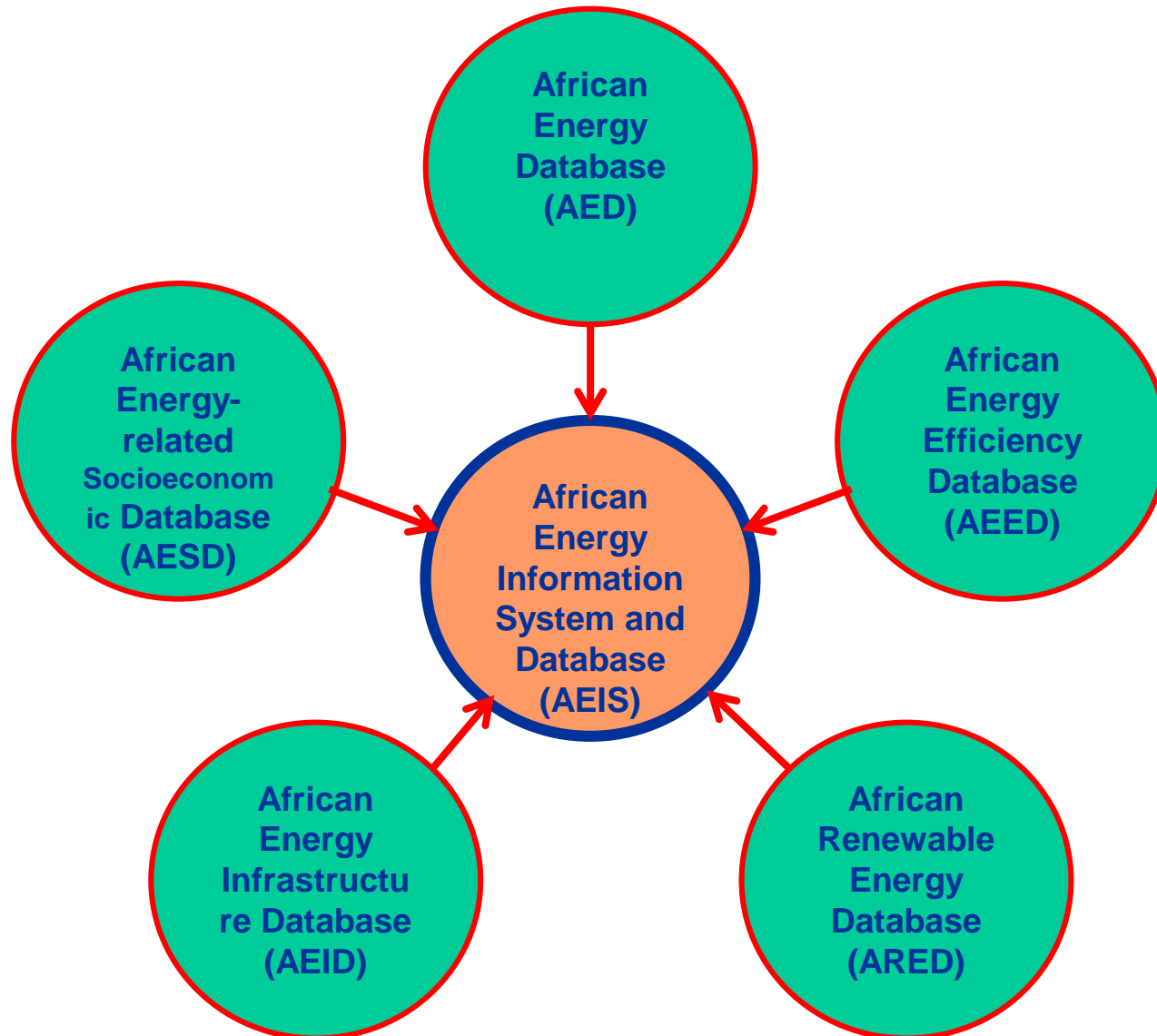
Prazká Energetika, 2005

Countries/Sub-regions of Eastern and Southern Africa

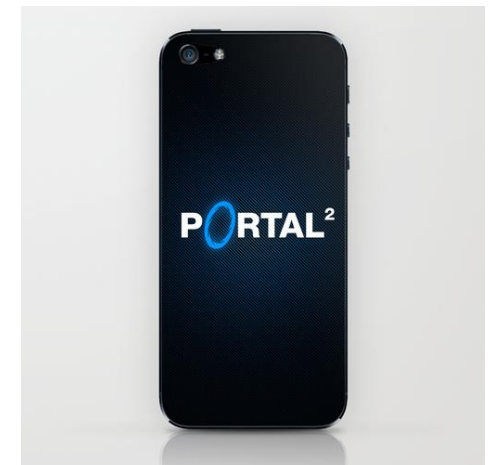
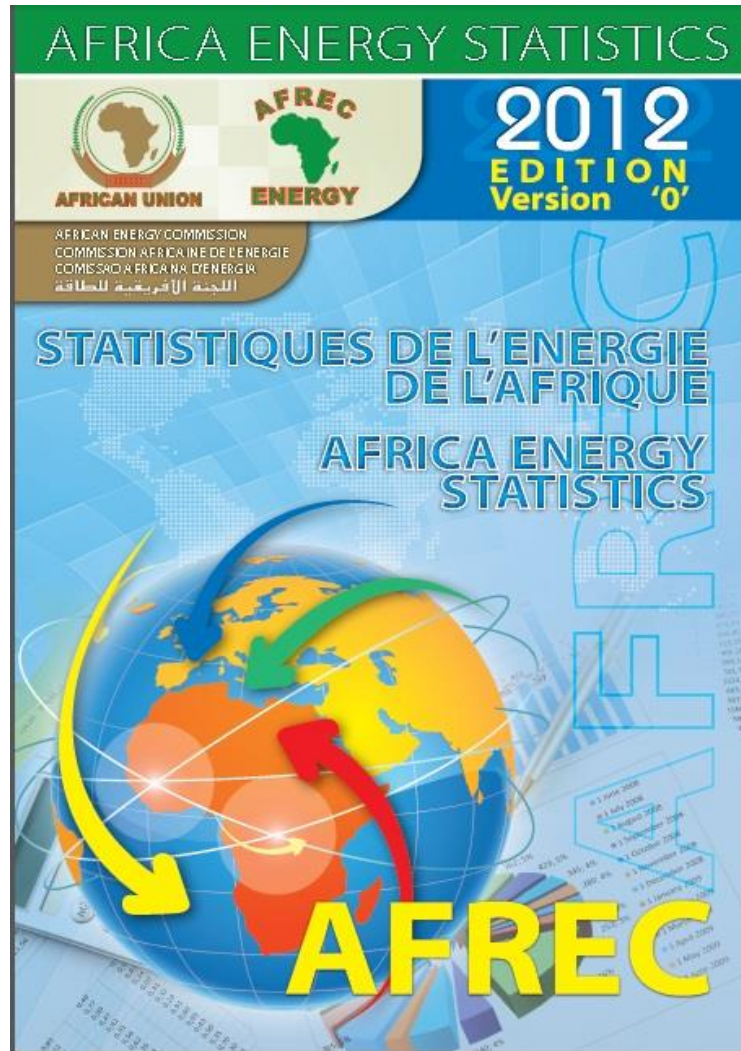
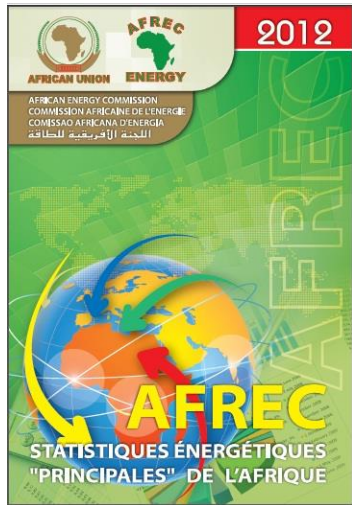
East Africa	Southern Africa
Burundi	Angola
Comoros	Botswana
Djibouti	Lesotho
Eritrea	Madagascar
Ethiopia	Malawi
Kenya	Mauritius
Rwanda	Mozambique
Somalia	Namibia
South Sudan	Seychelles
Sudan	South Africa
Tanzania	Swaziland
Uganda	Zambia
	Zimbabwe



Structure of the AFREC's African Energy Information System and Database (AEIS)

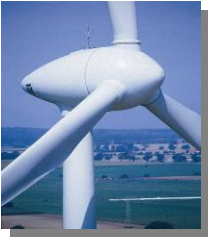
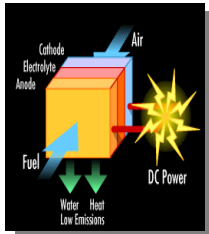


Energy Data Dissemination Tools



Renewable Energy Resources Available in East and Southern Africa

Fuel cells / Hydrogen

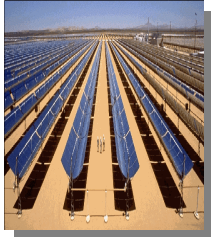


Wind technology



Photovoltaic

Solar thermal



Geothermal

RET available for application in the African Energy Sector and Electric Utilities



Biomass & Waste



Hybrid systems



Hydropower



Methodology for Electricity Demand Projection up to 2050

Two methodologies:

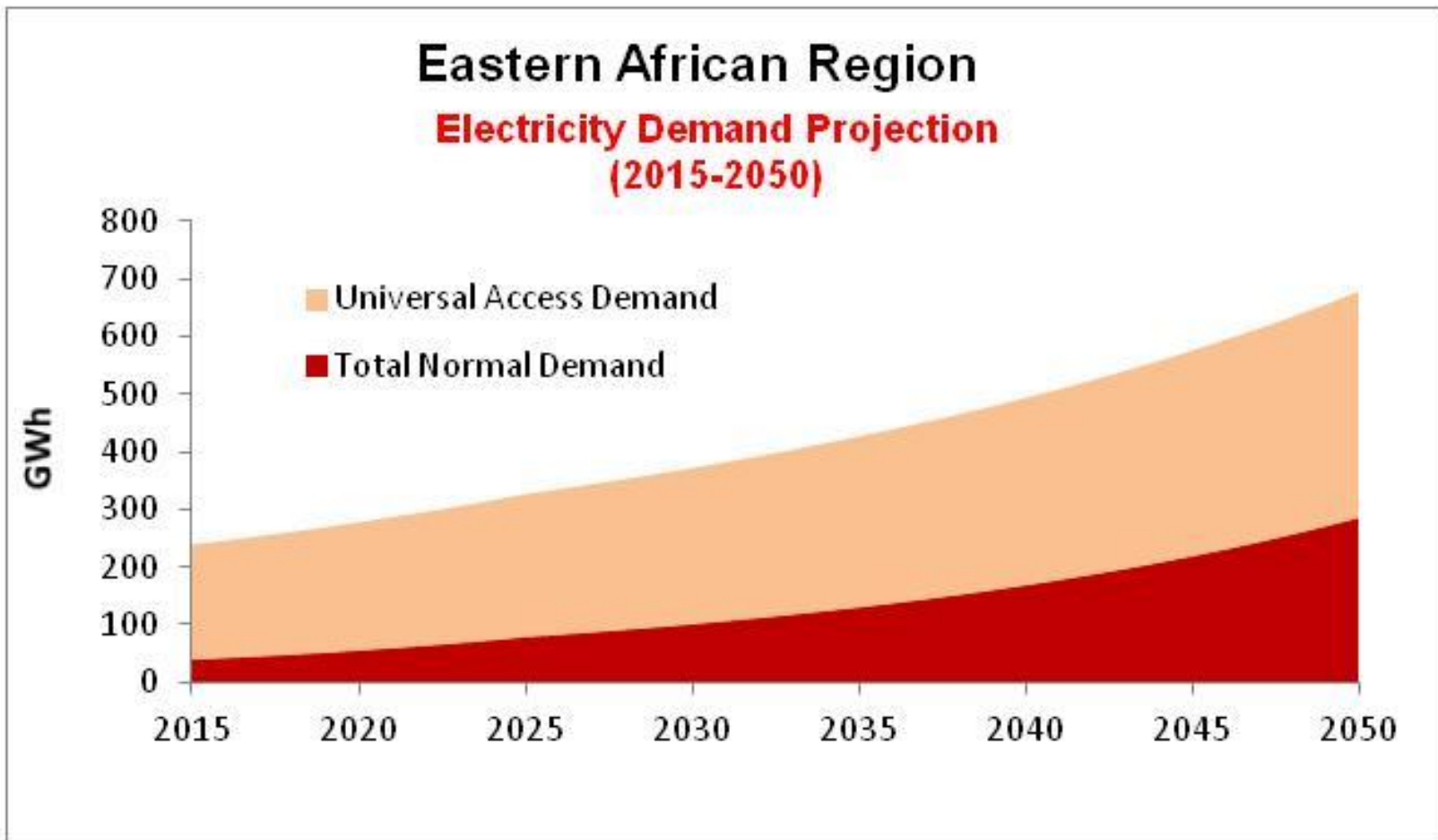
(1) Common Demand Projection (Business as usual):

- Steady growth rate (%) with few variable factors.
- Always suppressed to fit with the government's ability to provide equivalent supply generation.

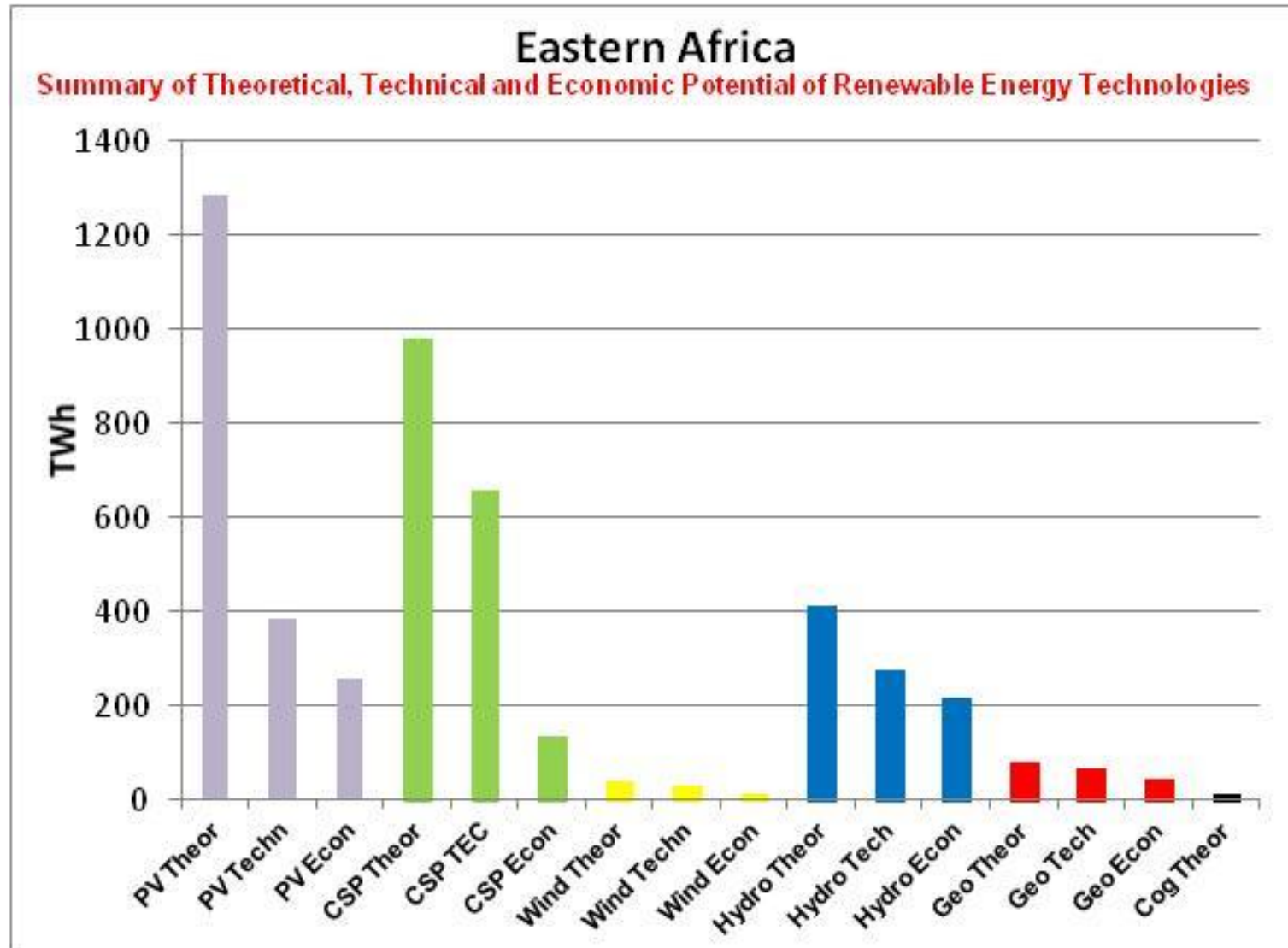
(2) Universal Demand Projection (Actual demand for universal coverage)

- Steady growth rate (%) which addresses the shortage of access to electricity and reflects the population growth rate.
- Projection is made to fill the gap in electricity access rate to reach 100% by 2050 at latest or earlier than that for countries of high electrification rate.
- More realistic than the SE4ALL universal access target by 2030.

Electricity Demand Projection for the Eastern African Region



Theoretical, Technical and Economic Potential of Renewable Energy Resources



Projected Electricity Supply vs. Projected Demand: East Africa

Technical Potential of Renewable Energy Resources in the Eastern African Region (GWh)

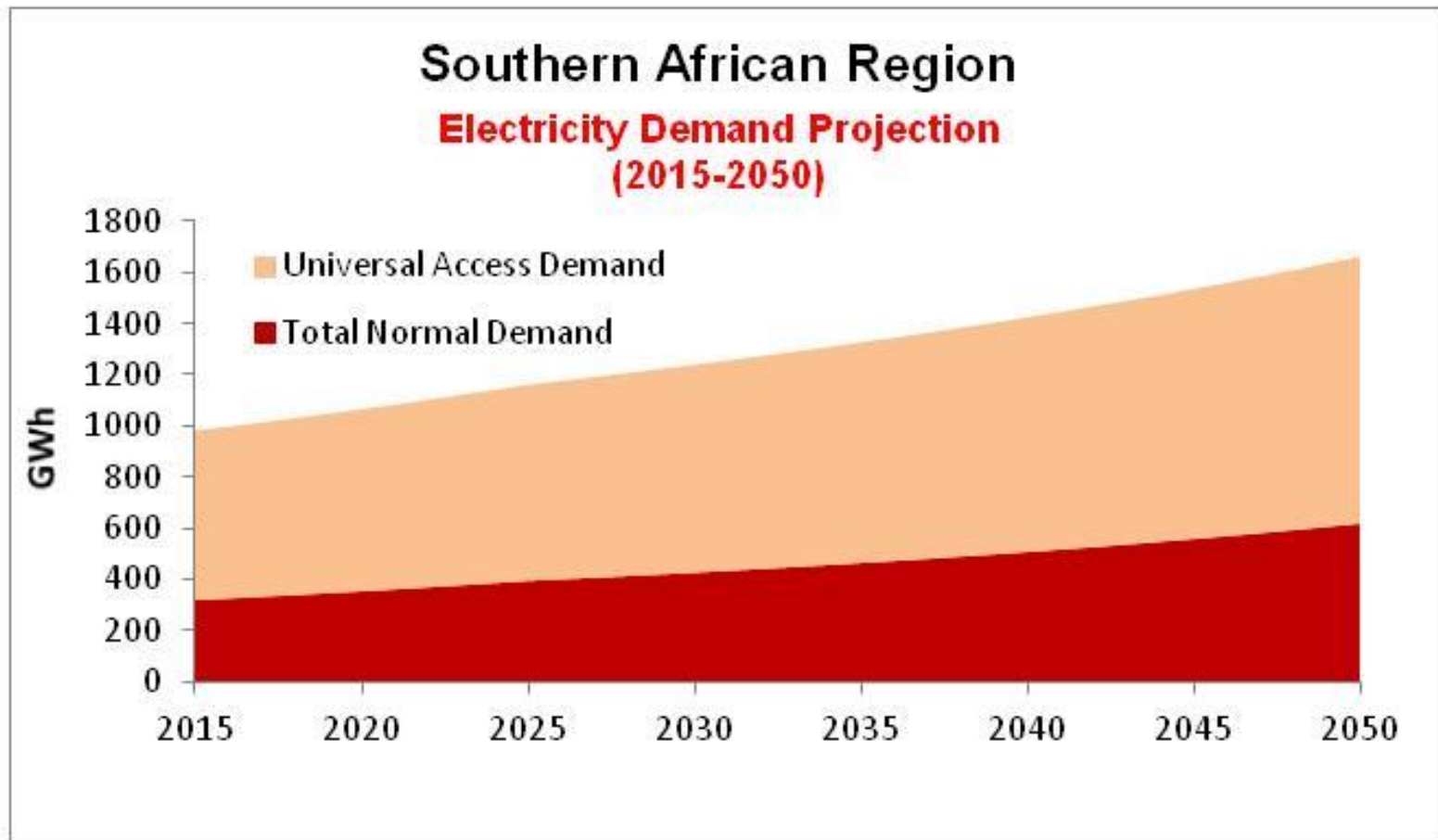
	Supply Side						Supply/Demand Ratio				
Country	PV	CSP	Wind	Hydro	Geothermal	Other generation	Total	RD-2050	Total/RD	UD-2050	Total/UD
Burundi	1219	0	90	1500	189	28	3026	9.230	327.792	20.649	147
Comoros	102	0	252	20	111	6	491	7.568	65	0.305	1612
Djibouti	1524	0	274	0	590	24	2412	2.390	1009	0.915	2636
Eritrea	7726	16483	361	1235	225	165	26195	1.241	21113	2.257	11608
Ethiopia	60460	128982	16425	190000	15890	451	412209	115.986	3554	61.579	6694
Kenya	31775	67787	2433	12301	37750	1591	153637	111.524	1378	108.143	1421
Rwanda	1154	0	114	1021	1220	645	4153	2.072	2005	3.864	1075
Somalia	72000	153600	8453	525	0	327	234905	0.684	343353	5.923	39661
South Sudan	35277	0	482	28654	3750	1350	69513	1.61	43176	4.322	16083
Sudan	122299	33507	986	22304	1950	1931	182976	174.33	1050	55.684	3286
Tanzania	41395	0	821	14314	3850	302	60682	56.114	1081	73.897	821
Uganda	10580	0	418	6523	2000	520	20041	46.809	428	136.897	146
Total (GWh)	385512	400359	31109	278397	67525	7340	1170242	529.558	-	474.434	-
Total (TWh)	386	400	31	278	68	7	1170	0.530	2210	0.474	2467
Ratio (%)	33	34	3	24	6	1	100				

Projected Electricity Supply vs. Projected Demand: East Africa

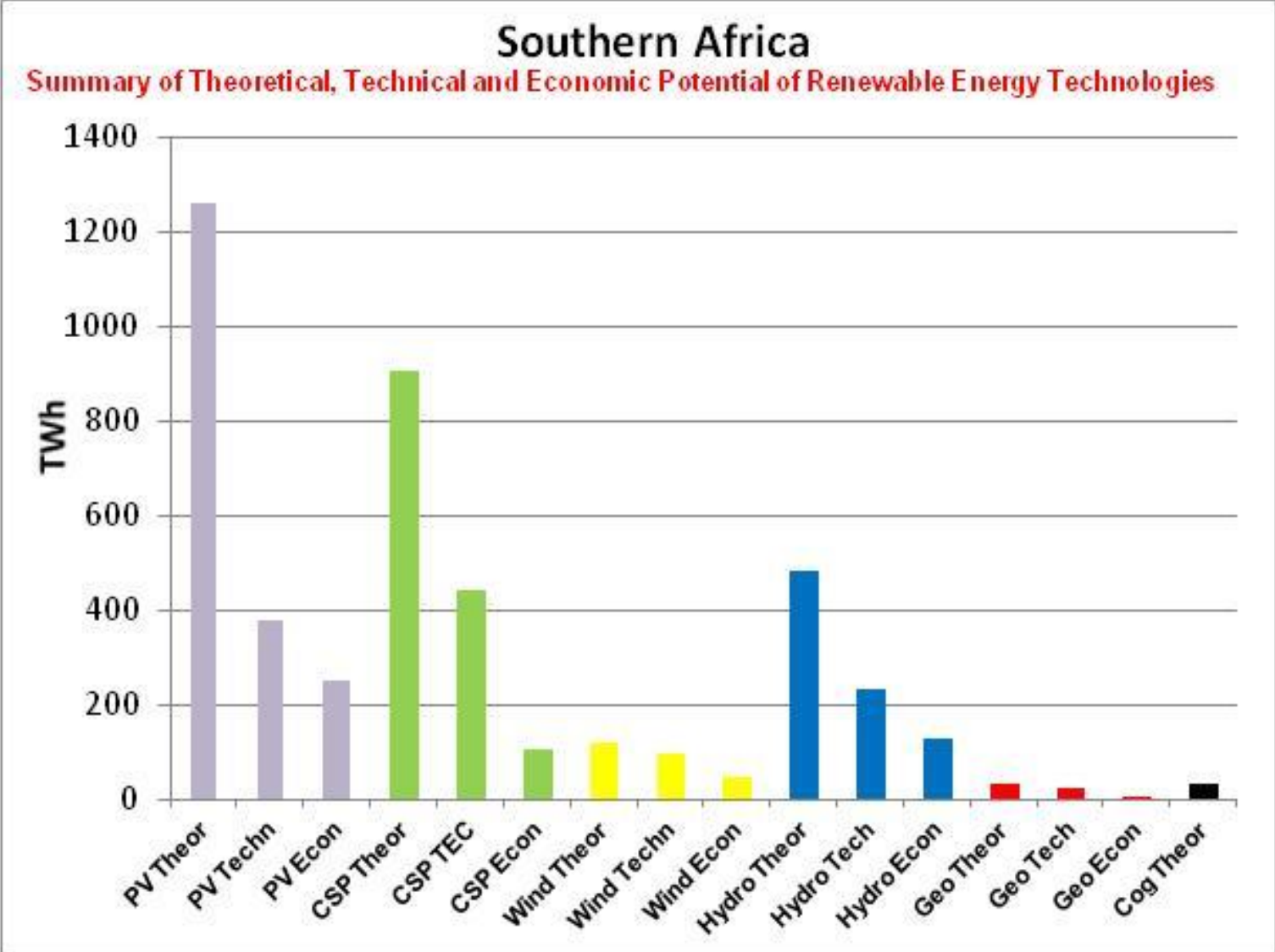
Technical Potential of Renewable Energy Resources in the Eastern African Region (MW)

Country	PV	CSP	Wind	Hydro	Geo	Cogen	Total	Total GW
Burundi	22267	0	41	428	30	16	22782	23
Comoros	1862	0	115	6	17	4	2004	2
Djibouti	27840	0	125	0	92	14	28071	28
Eritrea	141120	4704	165	352	35	94	146471	146
Ethiopia	1104300	36810	7500	54224	2485	257	1205576	1206
Kenya	580367	19346	1111	3511	5903	908	611145	611
Rwanda	21070	0	52	291	191	368	21973	22
Somalia	1315068	43836	3860	150	0	187	1363101	1363
South Sudan	644329	0	220	8178	586	771	654083	654
Sudan	2233781	223378	450	6365	305	1102	2465381	2465
Tanzania	756070	0	375	4085	602	173	761304	761
Uganda	193240	0	191	1862	313	297	195902	196
Total Eastern Africa (MW)	7041314	328073	14205	79451	10559	4190	7477793	7478

Electricity Demand Projection for the Southern African Region



Countries/Sub-regions Covered in the 1st Phase of the Study



Projected Electricity Supply vs. Projected Demand: Southern Africa

Technical Potential of Renewable Energy Resources in the Southern African Region (GWh)

Country	Supply Side							Supply/Demand Ratio			
	PV	CSP	Wind	Hydro	Geo	Cogen	Total	RD-2050	Total/RD	UD-2050	Total/UD
Angola	68257	0	1095	65000	0	348	134700	201.176	670	42.210	3191
Botswana	38237	81573	484	0	0	645	120940	36.942	3274	9.545	12671
Lesotho	1662	0	10632	19862	0	927	33083	0.971	34080	3.888	8509
Madagascar	32140	0	2705	18000	3400	344	56589	6.505	8699	19.972	2833
Malawi	5190	0	1459	4862	17500	752	29763	6.940	4288	59.207	503
Mauritius	112	0	414	350	0	1760	2636	20.195	131	2.760	955
Mozambique	43887	93626	1862	37647	750	1458	179229	257.829	695	190.001	943
Namibia	45129	96275	3548	9000	0	375	154326	571.694	270	22.766	6779
Seychelles	25	0	876	0	0	717	1618	0.636	2544	0.143	11274
South Africa	80222	171141	71285	34500	666	8160	365973	518.612	706	326.058	1122
Swaziland	951	0	307	560	0	903	2720	3.350	812	4.405	618
Zambia	41206	0	729	22601	700	1587	66823	18.758	3562	144.041	464
Zimbabwe	21394	0	589	17500	565	2059	42107	53.549	786	66.152	637
Total (GWh)	378411	442614	95983	229882	23581	20036	1190507	1495.982	-	848.938	-
Total (TWh)	378	443	96	230	24	20	1191	1.496	796	0.849	1402
Ratio (%)	32	37	8	19	2	2	100				

Projected Electricity Supply vs. Projected Demand: Southern Africa

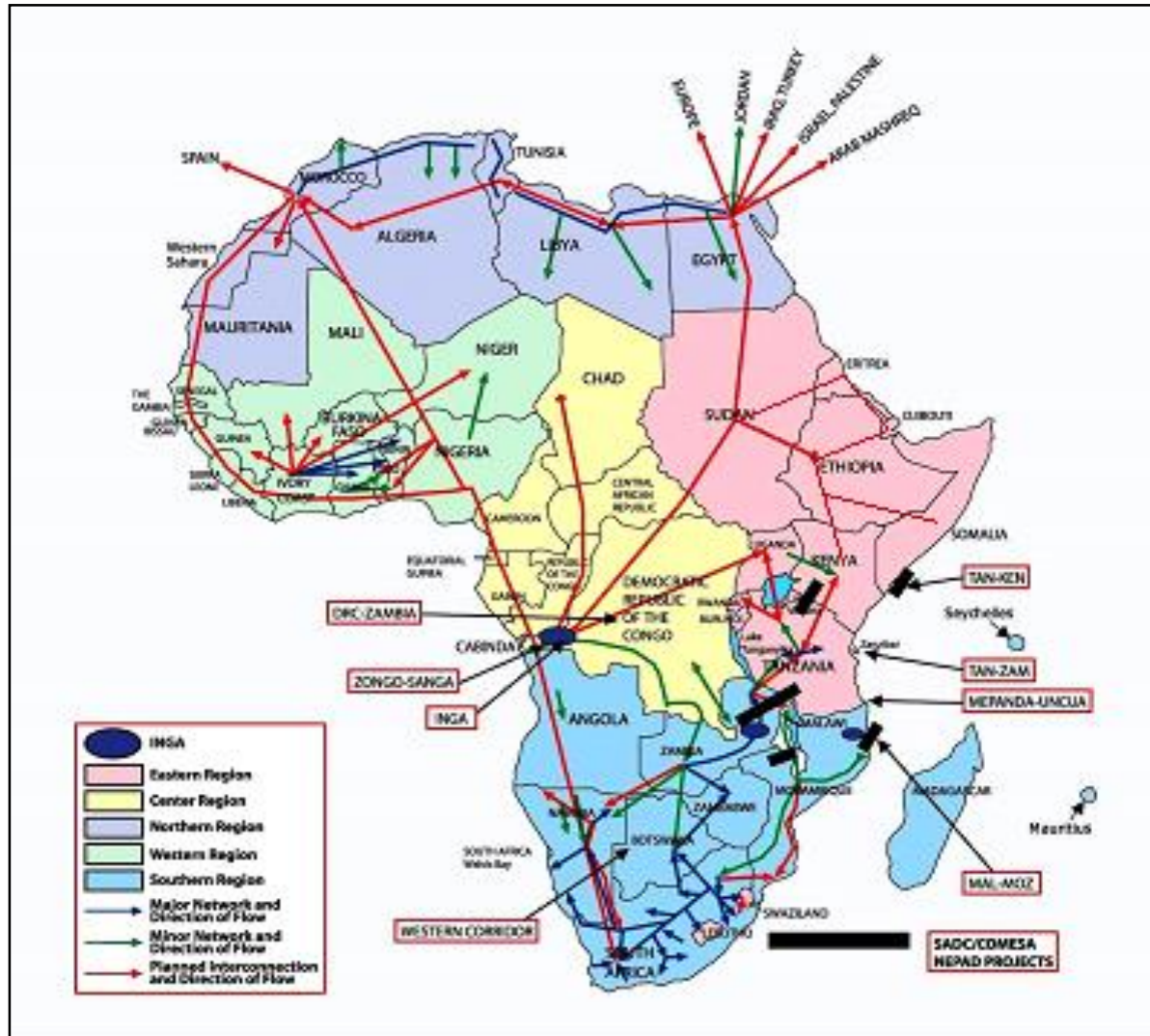
Technical Potential of Renewable Energy Resources in the Southern African Region (MW)

Country	PV	CSP	Wind	Hydro	Geo	Cogen	Total	Total GW
Angola	604670	0	500	18550	0	199	623919	624
Botswana	698400	23280	221	0	0	368	722269	722
Lesotho	30355	0	4855	5668	0	529	41407	41
Madagascar	587041	0	1235	5137	532	197	594141	594
Malawi	94787	0	666	1388	2737	429	100007	100
Mauritius	2040	0	189	100	0	1005	3333	3
Mozambique	801590	26720	850	10744	117	832	840853	841
Namibia	824268	27476	1620	2568	0	214	856146	856
Seychelles	452	0	400	0	0	409	1261	1
South Africa	1465244	48841	32550	9846	104	4658	1561243	1561
Swaziland	17364	0	140	160	0	515	18179	18
Zambia	752612	0	333	6450	109	906	760410	760
Zimbabwe	390757	0	269	4994	88	1175	397284	397
Total Eastern Africa (MW)	6269581	126317	43828	65606	3688	11436	6520454	6520

Main COMESA-ECA-SADC Tripartite Power Grid



Current and Planned Regional Electricity Interconnections in Africa



Priorities and Strategies for Enhancing Renewable Energy Technologies

- Creation of an environment conducive to RET deployment.
- Local manufacturing of RET is essential and imperative for rapid deployment.
- Expansion of renewable energy-based regional electricity markets and acceleration of transmission interconnections.
- More focus on renewable resource assessment in country and regional settings and detection of favourable sites for project development.
- Pave effective way to all key stakeholders including private sector, NGOs, academics and regional research institutions

Conclusion

- Renewable energy offers the most easy access to electricity in Africa, with limitless and infinite supply.
- Promote regional cooperation in renewable energy resources assessment, development and deployment.
- Technology development is necessary to make RET affordable to local users and regional communities.
- Promote regional efforts in use of industrial biofuels in the transport sector.

THANKS FOR YOUR KIND ATTENTION