

Presentation overview

- Summary of country energy data (based on detailed country reports)
- Brief look at the status of
 - RE technologies such as Hydro, PV, Wind, Biomass
 - EE technologies including for cooking energy
- EAC Energy Sector
 - EAC Secretariat
 - Regional Centre for RE&EE (to be established soon)

Few Figures from member countries large differences in population and density

Partner state	land area (1000 km ²)	population (millions)	pop density (people/km ²)	pop growth (%)
Burundi	25.0	8.7	312	2.5
Kenya	580.7	38.6	68	1.3
Rwanda	24.2	10.7	406	2.9
Uganda	199.8	32.9	165	3.2
URT Tanzania	883.7	43.6	49	2.7 *)
URT Zanzibar	2.7	1.3	530	2.8 *)
*) <i>data national Census 2012</i>				

GDP/ capita; USD 270 – 820

Installed Gen Capacity (MW) and the different sources of power

<i>Partner State</i>	<i>Hydro</i>	<i>Thermal</i>	<i>Nat gas</i>	<i>Geothermal</i>	<i>biomass / others</i>	<i>Totals</i>
Burundi	32	21			2	55
Kenya	745	463		189	31	1,428
Rwanda	59	40			1	100
Uganda	690	150			21	861
URT Tanzania	556	485	431		19	1,491
URT Zanzibar		30				30
Total	2,083	1,189	431	189	74	3,965

- Hydro traditional source but non renewables increasing
- Kenya 2016: +5000 MW (Geothermal 1650, wind 630, natural gas 1050 and coal 1900)
- Tanzania 2035: ,7600 MW (hydro 3000, coal 3800, gas 2300, wind and biomass 260)

Access to Electricity varies widely between countries and urban/rural

Partner State	Electrification rate %	Urban %	Rural %
Burundi	3.6	3.3	0.3
Kenya	28	54	22
Rwanda	16	na	na
Uganda <i>grid connected</i>	14.9	52.4	6.9
<i>solar</i>	10.6	3.3	12.1
URT Tanzania	18.4	na	4.6
URT Zanzibar	38.4	70	16

- *Sub Saharan Africa average 32% → EAC low!*
- *Electricity per capita: South Africa 4700, Kenya 157, Tanzania 100 (kWh/cap/year)*

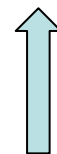
Consumer tariffs increased rapidly over last years in most countries (US\$/kWh)

Partner State	Lowest	Highest
Burundi	0.04	0.16
Kenya	0.02	0.23
Rwanda	0.22	0.22
Uganda	0.04	0.21
URT Tanzania	0.04	0.20
URT Zanzibar	0.04	0.25/0.50

➤ Tanzania/Tanesco requests + 67%

➤ higher tariffs :

- Financial viability of new RE
- energy efficiency measures



Primary energy balance; biomass by far largest source in all countries (68%- 96%)

Partner State	Bio mass	Petroleum products	Elec tricity	others
Burundi	96	2	1.3	0.7
Kenya	68	22	9	1
Rwanda	86	11	4	
Uganda	88.3	9.7	1.4	
URT Tanzania	88.6	9.2	1.8	0.5
URT Zanzibar	74.7	20.6	4.7	

- Biomass: mostly wood and charcoal for cooking/ heating
- Petroleum for transport etc and some for electricity production
- Electricity from hydro and geothermal.
- Others: Some bagasse for electricity generation

Hydro Power still most important source of renewable energy



- Large hydro main source of electricity generation for decades (reduced to 50% now)
- New large dams planned in Uganda, Tanzania and Rwanda/Burundi/ DRC
- Small Hydro Power of up to 10 – 20 MW large potential using PPP and FiT approaches
 - Burundi; 250 MW over 14 sites,
 - Kenya; 3,000 MW (300 sites with 600 MW)
 - Rwanda; 100 MW, many small sites
 - Uganda; 192 MW 6 sites listed
 - Tanzania; 480 MW through potential sites of <10 MW

Wind power important world wide but only just starting in the region



- Regional progress
 - Kenya: 5 MW in Ngong Hills, 300 MW in Turkana under progress, total 2,000 MW planned for 2030,
 - Tanzania: wind studies in progress, 2 sites of 50 – 100 MW under preparation (financing)
 - Zanzibar: studies in preparation for 40 MW
- Not suitable for base load: up to 20 % of total mix
- Suitable locations can be far from urban centres (Turkana)
- Capital costs are high. Wind power requires attractive feed in tariffs to be financially viable
- Need to get more resource data on wind power

PV Solar is popular for small applications Larger on grid systems starting



- **Costs** are coming down (but batteries can double kWh costs!)
- **Scalable** from pico (with battery) to mega (on grid)
- Not suitable for **base load**: only part of energy mix (20%?)
- **Grid connected**:
 - Rwanda 250 kW since 2008, 10 MW under preparation by private developer,
 - TZ: SSPAs signed for 2 times 1 MW plants
 - Roof mounted systems with net metering not yet taken off
- **Pico/ small PV** increasing used for lighting
 - Uganda reports 12% of rural households using PV,
 - Tanzania 2% in REA survey
 - Kenya 200,000 HHs reported
 - Supporting M-pesa technologies make difference
- **Net metering** systems; not yet but Kenya advancing

Examples

- **Bagasse** from sugar for electricity; used in region and expanding
- **Wood**
 - Tanwat produces 1,5 MW from wood waste
 - SAO Hills preparing for 6 MW from wood waste
 - Mafia Island 1 MW using coconut wood and residues
 - Symbion developing 3.5 MW using bambo plantations in Kigoma
- **Agric Waste** used by HIMA cement in Uganda to replace 70% of heating oil (coffee husks etc)
- **Biogas/ Syngas** from agric waste such as from flowers, sisal and rice husks
- **Biofuels:** ethanol and bio diesel only on limited scale so far

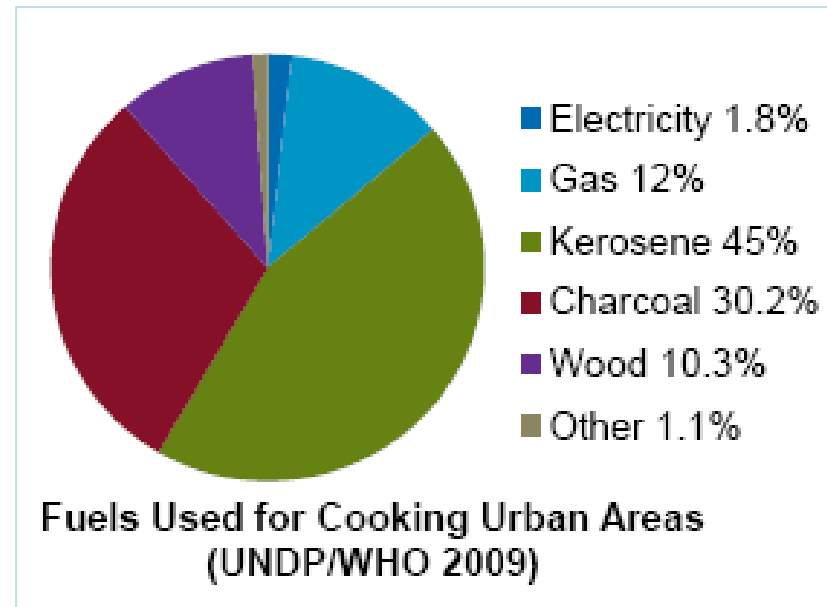
Energy Efficiency reduces peak loads and reduces investments in generation etc

- **Energy Saving Lights** for quick impacts.
 - 800,000 CLFs in Kampala reduce peak load by 30 MW
 - CFL programs in all EAC countries
- **Solar Water Heaters**
 - Rwanda program provides subsidies to HHs, target 12,000 units by 2015
 - Kenya starting program (regulations are developed)
- **Building codes** for new construction can reduce energy use by 40-50%, existing building 20- 30% (UN-Habitat program). Some Energy audits in building and industries are carried out but follow up less clear

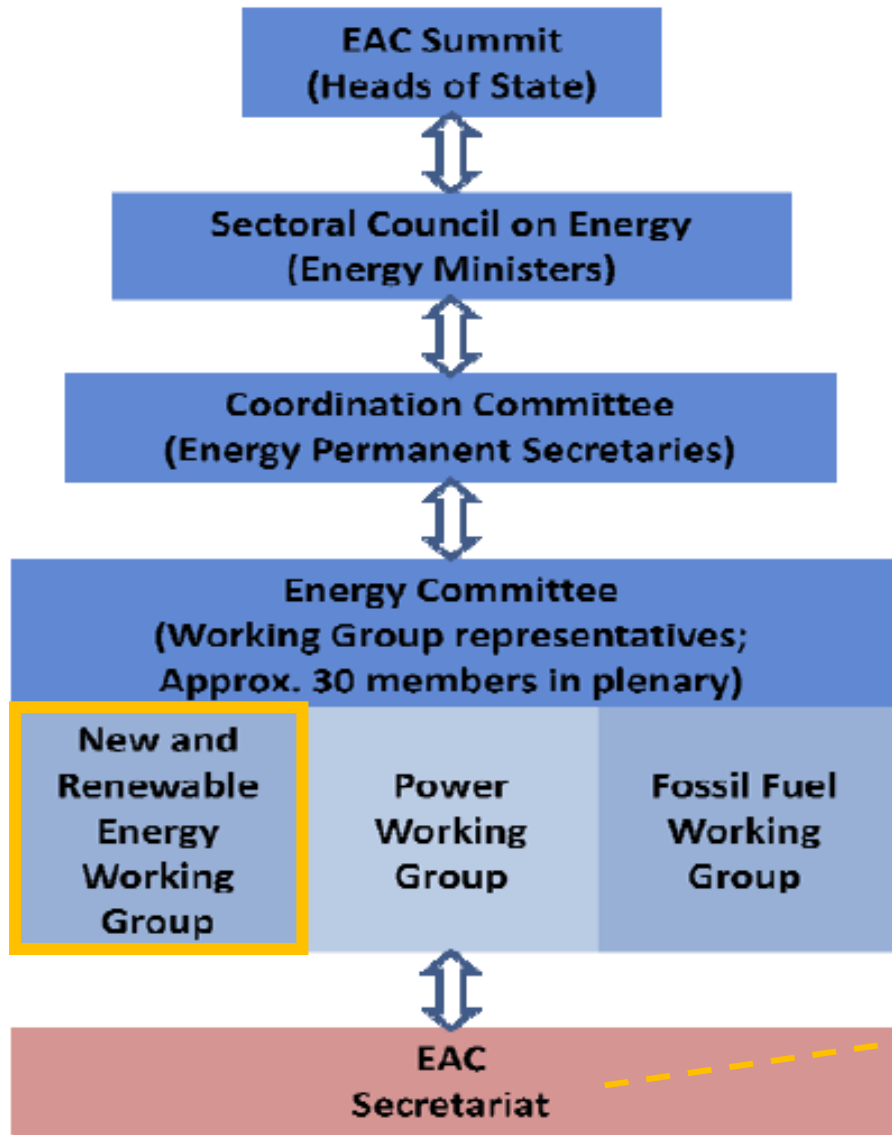
Biomass for cooking is largest energy user in all countries in region



- **Efficient Stoves:** many programs in region
- **Global Alliance** for Clean Cookstove: new initiative by UN, Governments and DPs
- **Health impacts** gaining more attention; 2 m pre mature deaths/year
- **Alternatives** to wood/charcoal? Kenya urban figures:
 - Kerosene 45%
 - Charcoal 30%
 - Gas 12%
 - Elect 2%
- Share of **electricity** going down !!!
- **Charcoal** consumption growing fast!
- Increase **sustainable wood** production
(requires change in mind set)



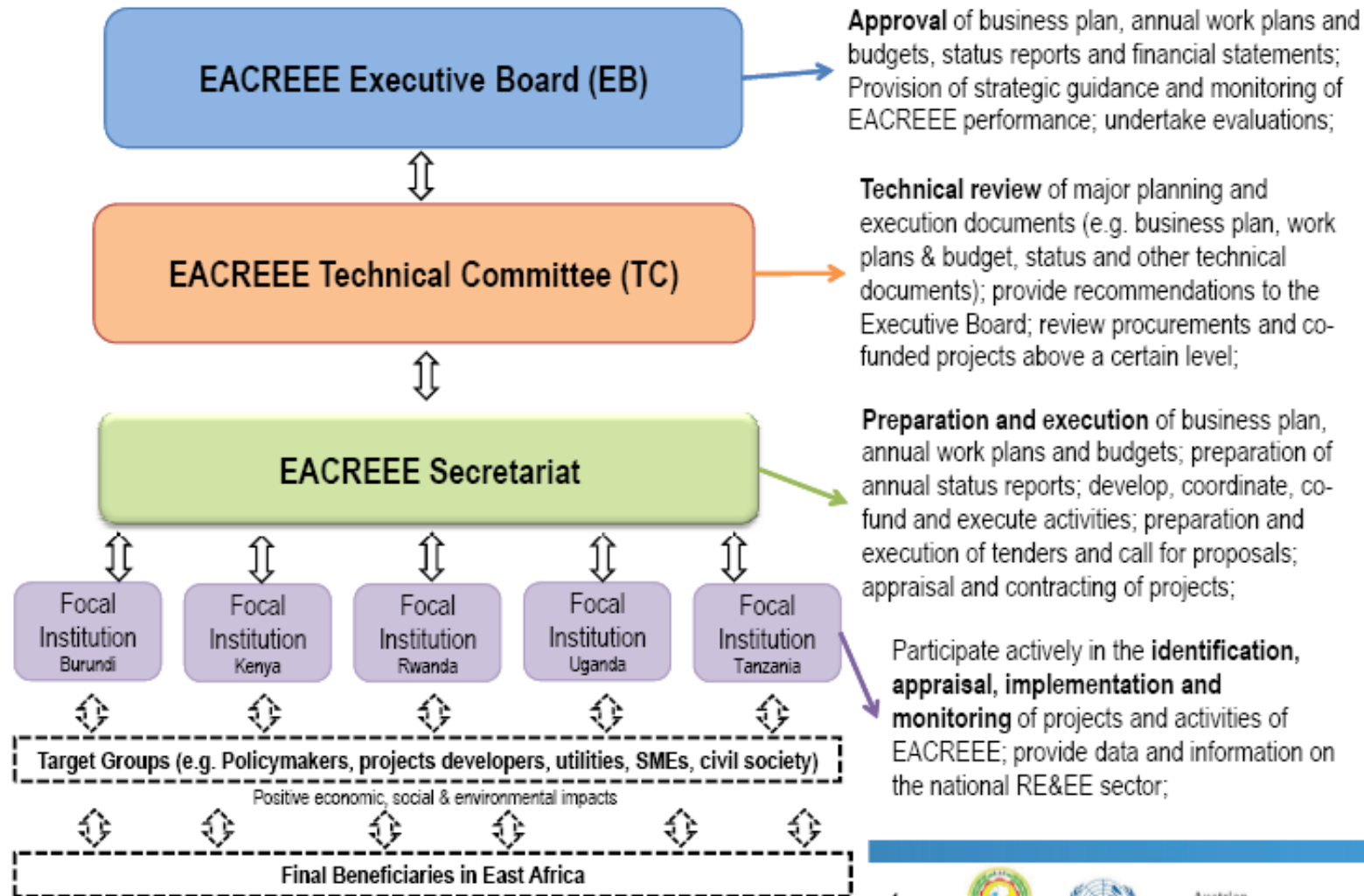
EAC Secretariat Energy Sector



Purpose:
supporting national
RE&EE strategies and
programs

Two staff: at Secretariat
1) Senior Energy Officer
2) Project Development Officer

Proposed Centre of RE&EE (to support EAC and member countries)



Challenges for regional cooperation on RE&EE

- Lack of regional RE&EE policy/strategies to guide governments as well private sector
- Capacity at EAC Secretariat (number of staff and procedures)
- Little funding for regional RE&EE activities from DPs
- Few proposals for good regional programs that add value to national priorities
- How to increase the involvement of the private sector in all aspects of RE&EE (supply, services, maintenance).

Thank you for listening...

.....questions? suggestions?

