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The State of Energy Access in East Africa

African Science Academy Development Initiative (ASADI) VI Conference

Theme: Improving Access to Energy in sub-Saharan Africa

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Access to Modern Energy - Focus Areas

- Energy for Cooking and Heating
- Household Energy for Lighting, Information & Communication
- Energy for Rural Institutions and Social Services – Healthcare, Education & Water
- Energy for Productive Use/Income Generation – Market centres, agro-processing, irrigation, off-grid M&SME



Energy for Cooking and Heating

	HH	U	R	Firewood/ Biomass	Charcoal	Kerosene	LPG
Kenya	8m	2.6m	5.4m	<ul style="list-style-type: none"> 90% R; 10% U Efficient stoves - 4% penetration Deficit btw demand and sustainable supply projected to increase to ~63% by 2020 	<ul style="list-style-type: none"> 80% U; 30% R Efficient stoves – 47% penetration ~2.4 million tons of charcoal/year produced; >90% unsustainably 	<ul style="list-style-type: none"> 45% U; 3% R 	<ul style="list-style-type: none"> 12% U; 1% R Per capita consumption of LPG ~1.5 Kg (Senegal ~12.0 Kg)
Tanzania	7.4m	2.4m	5m	<ul style="list-style-type: none"> > 90% of the cooking resources By 2000, wood-fuel consumption >60m m³/yr Efficient stoves - 4% penetration Forests declining by 12% per year, 99% for cooking fuel 	<ul style="list-style-type: none"> 85% or population in Dar accounts for 50% of country's consumption Efficient stoves – 40% penetration ~ 2 million tons/year 	<ul style="list-style-type: none"> 10% U; 1% R 	<ul style="list-style-type: none"> ~ 70,000 gas containers circulating Per capita consumption of LPG ~0.16 Kg
Uganda	5.3m	0.9m	4.4m	<ul style="list-style-type: none"> 89% R; 23% U Efficient stoves - 9% penetration 	<ul style="list-style-type: none"> 8% R; 66% U ~ 0.54 million tons/year 	<ul style="list-style-type: none"> 1% R; 4% U 	<ul style="list-style-type: none"> 1% R; 7% U Per capita consumption of LPG ~0.18 kg



Household Energy for Lighting, Information & Communication

	HH	U	R	Kerosene	Battery Based Systems	Diesel	Electricity	Solar PV
Kenya	8m	2.6m	5.4m	▪ 86% R; 46% U	▪ 1m HH using car batteries charged at >3,000 charging stations	▪ 3% R	▪ 51% U; 4% R	▪ ~140,000HH ▪ ~18,000-25,000 home systems sold/year
Tanzania	7.4m	2.4m	5m	▪	▪	▪	▪ 38% U; 2% R	▪ ~10,000 home systems sold/year
Uganda	5.3m	0.9m	4.4m	▪ 55% of total population	▪	▪	▪ 8% U; 1% R	▪ ~9,000 systems sold/year (incl. institutional)



Energy for Rural Inst. & Market Centers

	Schools	Health Clinics	Market Centers	Un-electrified	Diesel (Isolated Power Stns)	Solar PV
Kenya	<ul style="list-style-type: none"> ▪ 20,299 Pri; ▪ 4,215 Sec 	<ul style="list-style-type: none"> ▪ 5,170 HCs 		<ul style="list-style-type: none"> ▪ > 95% Pri sch ▪ > 3,000 Sec. sch ▪ 1,512 HCs ▪ 2,500 Market Centers 	<ul style="list-style-type: none"> ▪ 11 IPSs, ▪ 12 more planned 	<ul style="list-style-type: none"> ▪ 150 Sec schools
Tanzania	<ul style="list-style-type: none"> ▪ 2,715 rural gov sec. 	<ul style="list-style-type: none"> ▪ ~3,000 HCs 		<ul style="list-style-type: none"> ▪ 99% rural gov sec ▪ 95% HCs 	<ul style="list-style-type: none"> ▪ 13 IPSs 	
Uganda	<ul style="list-style-type: none"> ▪ 17,674 Pri ▪ 4,223 Sec 	<ul style="list-style-type: none"> ▪ 3,127 HCs 	<ul style="list-style-type: none"> ▪ 5,225 parishes 	<ul style="list-style-type: none"> ▪ 95% Pri sch ▪ 92% Sec sch ▪ 52% HCs 	<ul style="list-style-type: none"> ▪ 5 IPSs ▪ 4% HCs 	<ul style="list-style-type: none"> ▪ 37% HCs



Initiatives (Policy)

- Tax and Duty Exemptions (in principle) on Solar PV and LPG
- Gov. funded programs to electrify public institutions. Renewables i.e. solar/wind used as an option
- Solar Household PV System Subsidies –
 - **Uganda – consumer subsidies disbursed via financial institutions and made available only to solar PV loan applicants. 4.4\$/Wp for 31-50Wp systems & 5.5\$/Wp for 10-30Wp systems**
 - **Tanzania – similar approach with ~20% subsidy on systems. Using bulk approach targeting clusters of farmers, teachers through marketing or financial cooperatives**
- Electrification subsidies - Tanzania Energy Development Access Project (TEDAP) support facilities to project developers:
 - **Mini-grid projects – 500\$ for each new connection in rural energy projects**
 - **Maximum amount up to 80% of total investment cost**
 - **Commercial PV - Average of US\$ 2 per Watt-peak for solar PV installations**



Initiatives (Policy)

- Kenya - Policy intention to privatize/concession isolated power stations to reduce operating costs (unrealistic considering IPSs are currently cross-subsidized)
- Feed in tariffs for Renewables (conservative – based on avoided cost, do not consider future cost of fossil fuels). Also questionable whether FiTs promote or discourage rural electrification
- LPG cylinder sizes harmonized and regulators and valves standardized in Kenya. 2009 LPG regulations of 2009 make provision for establishment of an LPG cylinder exchange pool to regulate the exchange of LPG cylinders among the LPG marketing companies and make LPG more accessible
- Feasibility studies for small hydro and wind data collection



Initiatives (Projects)

- TZ SIDA MEM PV, EA UNEP/GEF, IFC Kenya PV Capacity Building, Uganda PREEEP (GTZ/DGIS) – Building capacity of the solar PV supply chain
- GTZ Stoves efficient wood stoves projects in Uganda (>150,000) and Kenya – Semi commercial approach based on building capacity of local stove builders
- **Key challenge with stoves projects – need to be developed with full consideration of cook needs i.e. pot sizes, food types, cooking position, portability**
- The Africa Biogas Partnership Programme (ABPP) btw HIVOS and SNV supporting national programmes on domestic biogas in 6 countries - Ethiopia, Kenya, Tanzania, Uganda, Senegal and Burkina Faso to construct 70,000 biogas plants (subsidy provided)
- GVEP - developing a sustainable and widespread industry of micro and small energy enterprises in Kenya, Uganda and Tanzania



Initiatives (Projects)

- The Energy and Environment Partnership Programme with Southern and East Africa - provides part-financing for (pre) feasibility studies leading to concrete investments and pilot and demonstration projects.
- RE Innovation funds/Incubators – Danida, DFID, World Bank
- Lighting Africa - World Bank Group (WBG) initiative which supports the private sector to develop, accelerate, and sustain the market for modern low cost off-grid lighting technologies



Innovations – Envirofit Cookstove





Innovation – Envirofit Cookstove

- Envirofit International Ltd., spinoff from Colorado State University's Engines and Energy Conversion Laboratory (EECL)
- Awarded a \$25 million grant from Shell Foundation in 2007 to design and distribute 10 million an efficient cook stoves
- Initial funding to support product development and early stage product commercialization.
- Sold >120,000 cookstoves in India to date, through its distributor/dealers and NGO/self-help group sales channels.
- >500 channel partners across southern India with ~1500 outlets
- Profits reinvested to expand product line and move into new markets.
- In-country operations are projected to break-even within 3 years of operations



Innovations – Moto Poa



- Moto Poa produces ethanol gel for TZ market,
- Import 18.000-20.000 tons of ethanol a year from SA (initially exempted from VAT)
- Produces 2000 tons/daily of ethanol gel.)
- Comesa Safe guard mechanism to protect Kenyan sugar industry comes to an end in Jan 2012
- Sugar industry will have to diversify



Way forward

- Institutionalize – i.e. activities like capacity building, supply chain development, awareness raising
- Commercialize – Entrepreneurs have to be involved for long term sustainability. Development grants are best put to use if they make provision of energy products and services attractive for businesses
- Conducive Policy and Regulations are ineffective without enforcement