Towards a Light Handed Regulatory System for Promoting Grid and Off Grid Small Power Producers (SPP): An Update on the Tanzania SPP program

AFTEG and the African Electrification Initiative (AEI)

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Outline

– Small Power Producer (SPP) – project examples

– Overview of Tanzania SPP regulations
  • Tanzania Legislative Framework
  • Goals, definitions
  • Table of SPP documents
  • Tariffs for different SPP cases
    – Main grid, mini grid, wholesale and retail sales
  • Required permissions and approvals, procedures for application; process rules

– Current situation: challenges and successes
  • PPAs, generators in the pipeline
  • Challenges
  • Thai/Tanzania technical assistance
Pilot Sisal Biogas Plant 150 kW–HALE -TANGA - TANZANIA
Processing of Sisal Leaves

Production of 1 ton of dry fibre generates about 24 tons of sisal waste
Micro hydropower

- 40 kW
- Mae Kam Pong, Chiang Mai, Thailand
Rice husk-fired power plant

- 9.8 MW
- Roi Et, Thailand
Biomass (wood chips)

- 1 MW
- Landhanavi, Sri Lanka
- Wood is grown specifically for electricity production
Wind
Solar Photovoltaic (PV)

- 1 MW
- Chachensao, Thailand
Tanzania SPP Legislative Framework

• National Energy Policy, 2003
• Rural electrification policy statement
• Energy and Water Utilities Regulatory Authority Act
  – Establishing EWURA
• Rural Energy Act (2005)
  – Establishing REA & REF
• The Electricity Act, 2008
Legislative Framework, cont

- Energy Policy Statement No. 36

- Establish norms, codes of practice, guidelines and standards for renewable energy technologies, to facilitate the creation of an enabling environment for sustainable development of renewable energy sources
Legislative Framework, cont

The Electricity Act (2008) provides for SPPA and SPPT

❖ Definitions

❖ **Standardized Small Power Purchase Agreement (SPPA):** Means agreement between utility entity and a developer entered for purposes of selling power to the grid not exceeding 10 MW but not less than 100 kW.

❖ **Standardized Small Power Purchase Tariff (SPPT):** Means the tariff agreed on in the SPPA

❖ License exemption for projects less than 1 MW (generation or distribution)
A goal: Light-handed regulation

1. Minimize amount of information that is required.
2. Minimize the number of separate regulatory requirements and decisions.
3. Use standardized documents, and make use of documents used by other agencies, to the maximum extent possible (reduce need for case-by-case negotiation)
## Table of SPP documents

<table>
<thead>
<tr>
<th>Process Guidelines (roadmap)</th>
<th>Main grid</th>
<th>Mini-grid</th>
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<tbody>
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<td>✓ Guidelines for Developers of Small Power Projects (SPP) in Tanzania</td>
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<td>◊ Rules for Developers of Small Power Projects (SPP) in Tanzania</td>
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<tr>
<th>Interconnection Guidelines</th>
<th>Main grid</th>
<th>Mini-grid</th>
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<tr>
<td>✓ Guidelines for Grid Interconnection of Small Power Projects in Tanzania (Parts A, B, C)</td>
<td></td>
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<th>Standardized PPA</th>
<th>Main grid</th>
<th>Mini-grid</th>
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<tbody>
<tr>
<td>✓ Standardized Power Purchase Agreement for Purchase of Grid-Connected Capacity and Associated Electric Energy Between Buyer and a Small Power Project</td>
<td>✓ Standardized Power Purchase Agreement for Purchase of Off-Grid Capacity and Associated Electric Energy Between Buyer and a Small Power Project</td>
<td></td>
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</tbody>
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<tr>
<th>Tariff methodology</th>
<th>Main grid</th>
<th>Mini-grid</th>
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</thead>
<tbody>
<tr>
<td>✓ Standardized Tariff Methodology for the sale of Electricity to the Main Grid in Tanzania Under the Standardized Small Power Purchase Agreements.</td>
<td>✓ Standardized Tariff Methodology for the Sale of Electricity to the Mini-grids Under the Standardized Small Power Purchase Agreements</td>
<td></td>
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</tbody>
</table>

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<thead>
<tr>
<th>Tariff calculations for year 2009</th>
<th>Main grid</th>
<th>Mini-grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Detailed Tariff Calculations under the SPPA for the Main Grid for year 2010</td>
<td>✓ Detailed Tariff Calculations under the SPPA for the Mini-grids for year 2010</td>
<td></td>
</tr>
</tbody>
</table>

✓ = Approved and available at: [www.ewura.go.tz/sppselectricity.html](http://www.ewura.go.tz/sppselectricity.html)

◊ = Awaiting final approval and gazetting (public consultation completed)
# Tariffs determined by SPP type

<table>
<thead>
<tr>
<th>Selling wholesale (to DNO*)</th>
<th>Connected to main grid</th>
<th>Connected to isolated mini-grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>Case 2</td>
<td></td>
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</tbody>
</table>

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<tr>
<th>Selling retail (directly to final customers)</th>
<th>Connected to main grid</th>
<th>Connected to isolated mini-grid</th>
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</thead>
<tbody>
<tr>
<td>Case 3</td>
<td>Case 4</td>
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</tbody>
</table>

* DNO: Distribution Network Operator (currently TANESCO)
Tariff Case 1: Selling Wholesale to Main grid

\[ C_{case1} = \frac{C_{lrmc} + C_{srmc}}{2} \]

Where \( C_{lrmc} \) is the long run marginal cost as defined by Tanesco’s long-term power plan; and \( C_{srmc} \) is the budgeted cost of thermal generation in the next year.

Note: the actual calculations are somewhat more complicated, taking into account:

- Transmission losses
- Seasonality
- Price floor & cap

They are available in: *Standardized Tariff Methodology Under the Standardized Small Power Purchase Agreements* available from EWURA. Order 08-015 on Dec 30.2008

<table>
<thead>
<tr>
<th>Tariff – case 1: Main Grid</th>
<th>Tariff 2009 (TZS/kWh)</th>
<th>Tariff 2010 (TZS/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Average</td>
<td>85.49</td>
<td>110.30</td>
</tr>
<tr>
<td>Dry season (Aug – Nov)</td>
<td>102.58</td>
<td>132.36</td>
</tr>
<tr>
<td>Wet season (Jan-Jul and Dec)</td>
<td>75.94</td>
<td>99.27</td>
</tr>
</tbody>
</table>

Note: $1 US = 1497 TZS (November 2010)
Tariff Case 2: selling wholesale to a mini-grid

\[ C_{\text{case2}} = \frac{C_{\text{LmrcGrid}} + C_{\text{AveMini}}}{2} \]

Mini-grid SPP receives the average of Tanesco’s main grid and mini-grid avoided costs.

- \( C_{\text{LmrcGrid}} \) = long run marginal cost for grid-power (adjusted for losses)
- \( C_{\text{AveMini}} \) = average incremental cost of mini-grid power (levelized cost of electricity from a new mini-grid diesel generator).

<table>
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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tariff (no seasonal variations)</td>
<td>334.83</td>
<td>368.87</td>
</tr>
</tbody>
</table>

Note: $1 US = 1497 TZS (November 2010)
Tariff Cases 3 (isolated) and 4 (main grid): selling at retail to end use customers

- Tariff is proposed by SPP generator, subject to EWURA review
  - Less oversight demanded in cases in which community is in agreement with proposed tariff
  - Where possible, EWURA draws on financial analysis submitted to REA for rural electrification subsidy
Necessary permits, clearances and procedures for application

1. Land title or lease
2. Resource Rights (e.g. water rights from River Basin Water Office)
3. Letter of Intent (LOI)
4. Business license, tax registration, etc.
5. Building Permit
6. Environmental and Social Clearance (NEMC)
7. Power Purchase Agreement (PPA)
8. EWURA license

Sequence is important to avoid competing claims on project sites.
Where we are now...

• Completed
  – All documents passed public review and most are approved for use.
  – Several PPAs signed with TANESCO and licenses applied
## SPPs In Operation

<table>
<thead>
<tr>
<th>Project</th>
<th>MW</th>
<th>Type of Resource</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACRA Tanzania</td>
<td>0.3</td>
<td>Hydro</td>
<td>In Operation / Community based</td>
</tr>
<tr>
<td>TANWAT</td>
<td>2.34</td>
<td>Biomass -wood</td>
<td>Selling 1 MW (2010)</td>
</tr>
<tr>
<td>TPC Co-Generation</td>
<td>15</td>
<td>Bagasse</td>
<td>Selling 10 MWe to TANESCO (2010)</td>
</tr>
<tr>
<td>Katani Power Plant</td>
<td>0.3</td>
<td>Biomass - Waste</td>
<td>Operation - Pilot</td>
</tr>
<tr>
<td>Project</td>
<td>MW</td>
<td>Type of Resource</td>
<td>Status</td>
</tr>
<tr>
<td>---------------------------</td>
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<td>-----------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Sao Hill Energy</td>
<td>15</td>
<td>Biomass - wood</td>
<td>Applied Licence</td>
</tr>
<tr>
<td>Chipole – Own use &amp; sell to the grid</td>
<td>0.4</td>
<td>Hydro</td>
<td>In operation – additional 3MW planned</td>
</tr>
<tr>
<td>Mwenga</td>
<td>3.36</td>
<td>Hydro</td>
<td>PPA Signed with TANESCO</td>
</tr>
<tr>
<td>Ngomboeni Mafia</td>
<td>1.4</td>
<td>Biomass</td>
<td>PPA Signed with TANESCO. Under construction</td>
</tr>
<tr>
<td>Kilombero Sugar Co.</td>
<td>10.6</td>
<td>Bagasse</td>
<td>Applied Licence</td>
</tr>
<tr>
<td>Tanzania Sisal Board</td>
<td>0.5</td>
<td>Biogas</td>
<td>Applied License</td>
</tr>
<tr>
<td>Kitonga Mini Hydro</td>
<td>10</td>
<td>Hydro</td>
<td>Applied License</td>
</tr>
<tr>
<td>Andoya Hydro Electric Co.</td>
<td>0.5</td>
<td>Hydro</td>
<td>Business plan</td>
</tr>
<tr>
<td>Kilocha Hydro</td>
<td>12</td>
<td>Hydro</td>
<td>In discussion with REA</td>
</tr>
<tr>
<td>Kilombero Mngeta</td>
<td>3</td>
<td>Hydro</td>
<td>In discussion with REA</td>
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Where we are now...

• Completed
  – All documents passed public review and most are approved for use.
  – Several PPAs signed with TANESCO and licenses applied

• Ongoing
  – TANESCO in process of establishing SPP cell
South-south policy/technology transfer:

Technical Visits of Delegations

from the Tanzania to Sri Lanka and Thailand
Where we are now...

• Completed
  – All documents passed public review and most are approved for use.
  – Several PPAs signed with TANESCO and licenses applied

• Ongoing
  – TANESCO in process of establishing SPP cell
  – SPP Working Group composition and function
  – Discussions between EWURA and REA on how to coordinate better, done, but may be refined further.
  – Determine tariff review methodology for projects selling electricity at retail
5. Challenges / Opportunities
Challenges

Challenge

- Inadequate financial resources to support the initiative
- Inadequate private sector participation in investment
- High interest rates loans from commercial banks
- Land ownership and water rights for SPPs projects especially wind farms & mini-hydro plants
- Low Tariff and non-cost reflective

Response

- WB has established a facility, engage interest of other financial institutions
- Conducive Environment, rules and publicize
- Promote other sources mix grant and loans
- Include land ownership & water rights in RE Policy
- Adapt policy in future?
### Challenges .....cont.  2

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<tr>
<th>Challenge</th>
<th>Response</th>
</tr>
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<tr>
<td>Lack of experience of key project promoters with skills in project management</td>
<td>Capacity building (REA)</td>
</tr>
<tr>
<td>Lack of Renewable Energy Policy</td>
<td>Government needs to set policy targets, etc.</td>
</tr>
<tr>
<td>Lack of interest on the part of potential Off-takers (TANESCO)</td>
<td>Improving through regular discussions with utility</td>
</tr>
</tbody>
</table>
Reflections

- Renewable Small Power Projects can enhance efforts towards electrification of Rural areas
- Though generally expensive SPPs can be developed much faster hence increase capacity
- Private investments can be quickly organised and also benefit local entrepreneurs
- Light handed regulation will reduce regulatory burden hence benefit both investors and the country
- Good Policy, Cost reflective Tariff and well designed FiT can attract foreign and local investors
Thank you

For more information, please contact

mbawala@ewura.go.tz
chrisgreacen@gmail.com

SPP regulations available at:

www.ewura.go.tz/sppselectricity.html
What are the Guidelines for Developers of Small Power Projects in Tanzania?

• Audiences: SPP developers, EWURA, Tanesco, REA, bankers...

• Purpose: Guide to steps necessary to acquire necessary permits and clearances to develop and operate a SPP
  – Selling electricity to the DNO (Tanesco) main grid
  – Selling to an isolated mini-grid and/or
  – Selling directly to retail customers (main grid-connected & isolated SPPs)

• Guidelines: roadmap to rules. There will be a separate ‘rules’ document.
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Definitions

- **DNO**: the licensee responsible for the operation of a distribution network in Tanzania. (Currently Tanesco)
- **SPP**: a power plant using a renewable energy source or waste heat, or cogeneration of heat and electricity, with an export capacity of up to ten (10) MW
- **Embedded Generator**: a single generator or a group of generating plant of total export capacity between 100 kW and 10 MW, connected to a Distribution Network in Tanzania, at 33 kV or below.
Proposed rules regarding LOI process: response times, cost estimates

• **Acknowledgement of receipt**: The rules require that within **seven days** of receiving the LOI request, the DNO will acknowledge receipt of the request.

• **Notice of decision**: Within **30 days** of receiving the complete LOI request, the DNO will send the project developer notice of its decision.

• **Reasons for disapproval by DNO stated**: If DNO disapproves of the project, the reasons for disapproval must be clearly stated in writing.

• **Reservation of Network Capacity**: The LOI in the case of sites operating on hydroelectric or wind power, or any other primary source of energy which is site-specific by way of its availability, will also imply the **exclusivity** of the interconnection to the Developer, within the period of validity of the LOI.

• **Estimate of interconnection costs**: Within **30 days** of sending the LOI, the DNO shall send the Seller a rough initial estimate of the **interconnection costs**.
VSPP project sequence

• Document check
• Identify circuit connection
• System study

• Line connecting construction
• Meter installation

• PPA Check

• All license check

• PPA signed

• All license check
• All test

• Meter reading

• First synch.

• Meter reading
• Billing

• COD

• Every 1st

VSPP will get first settlement within 3 month after COD.
Coordination among PEA divisions

DG office
- Technical & System Analysis
  - Document
  - Coordinator

System Operation Div.
- First synch. test

Relay Div.
- Switchgear & Relay test

Research Div.
- PQ test

Meter Div.
- Meter installation

Legal Div.
- PPA check

Finance Dep.
- Settlement

System Operation Area Office 1-12
- Identify circuit connection
  - Control & Operation
  - Communication

Area Office 1-12 & Local Office
- Line connecting construction
  - Meter reading

Tariff Div.
- Billing

Coordination among PEA divisions

Research Div. • PQ test
Relay Div. • Switchgear & Relay test
Meter Div. • Meter installation
Legal Div. • PPA check
Finance Dep. • Settlement

DG office
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  - Document
  - Coordinator

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- Meter installation

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System Operation Area Office 1-12
- Identify circuit connection
  - Control & Operation
  - Communication

Area Office 1-12 & Local Office
- Line connecting construction
  - Meter reading

Tariff Div.
- Billing
LOI request to TANESCO

1. Name and Address
2. Locations
3. Fuel type (hydro, biomass, wind, gas, etc.)
4. Power capacity (MW), planned power export (MW), annual energy generation (GWh).
5. Copy of deed of title or lease agreement
6. Rights to resource
Standardized Power Purchase Agreement (PPA)

• To initiate the PPA agreement process, the Seller completes and submits to TANESCO an “Application for Interconnection and Sale of Electricity”
  – technical engineering information (one-line diagrams, specifications of key equipment) that DNO needs in order to determine if the proposed project is in compliance with the Interconnection Rules and Guidelines
Granting/rejecting a PPA based solely on technical considerations

- The rules specify that the DNO’s decision to sign or reject the standardized PPA is based solely on its evaluation of whether the design of the Seller’s facility is in compliance with the “Guide for Grid Interconnection of Embedded Generators to the Main Grid and Isolated Mini-Grids in Tanzania”.
EWURA license

- SPPs up to 1 MW are exempt from EWURA’s licensure requirements
  - Must submit completed registration form
    - Location, business registration, capacity of facility, GWh/yr, date of planned construction

- Non-exempt (>1 MW)
  - Submit license application
    - Same as registration, plus
      - Section on managerial competence
      - Feasibility study
      - Business plan
      - Permits and clearances (NEMC, water rights, etc.)
  - Where possible, EWURA draws on financial analysis submitted to REA for rural electrification subsidy