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Energy efficiency in action: GIZ tackles the water-energy nexus in Tanzania

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Presentation overview

1. ***Introduction and context***
2. ***Paper presentation; Main points***
3. ***Cases***
4. ***Next steps***
5. ***Discussion***

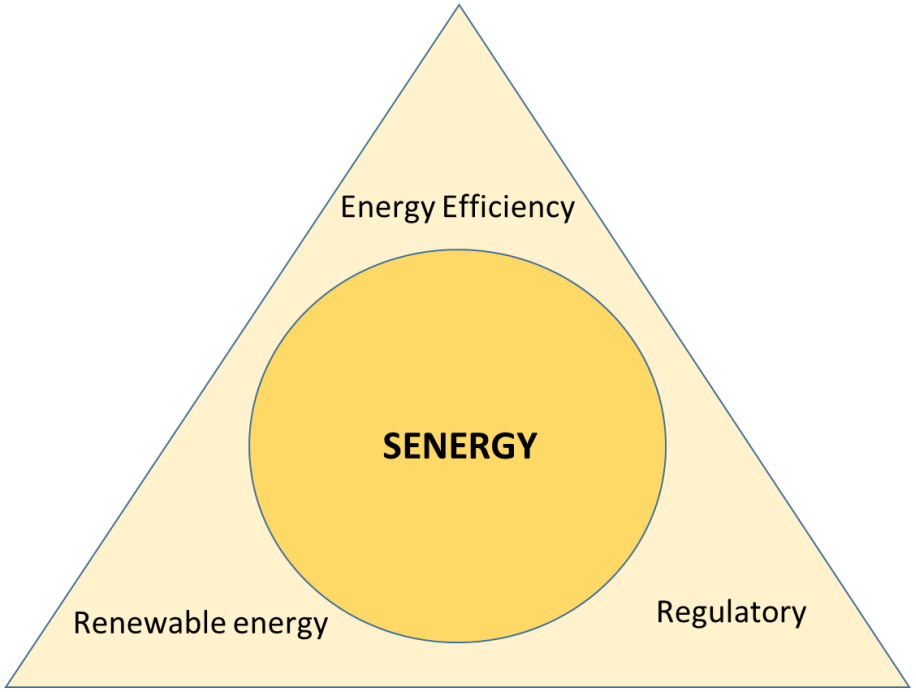
I. Introduction and context

Three main components:

- ***Energy Efficiency***
- ***Regulatory support***
- ***Renewable Energy***

Three main program partners:

- ***Ministry of Energy and Minerals (MEM)***
- ***Energy and Water Utilities Regulatory Authority (EWURA)***
- ***Rural Energy Agency***



II. Main points

- ***Totally 114 Water and Sanitation Authorities countrywide ~ 24 regional, ~ 8 national projects, 82 district and small township authorities***
- ***Analysis in the paper is based mainly on information reported to the regulator (EWURA) by regional utilities as part of annual performance assessments. Around 25 datasets were used from this. Also some information from other sources, such as ministry of water, have been employed although these are generally much less comprehensive / detailed***
- ***Furthermore a questionnaire has distributed to the utilities to collect supplementary data which will be used to further qualify the analysis presented in the paper***

II. Main points

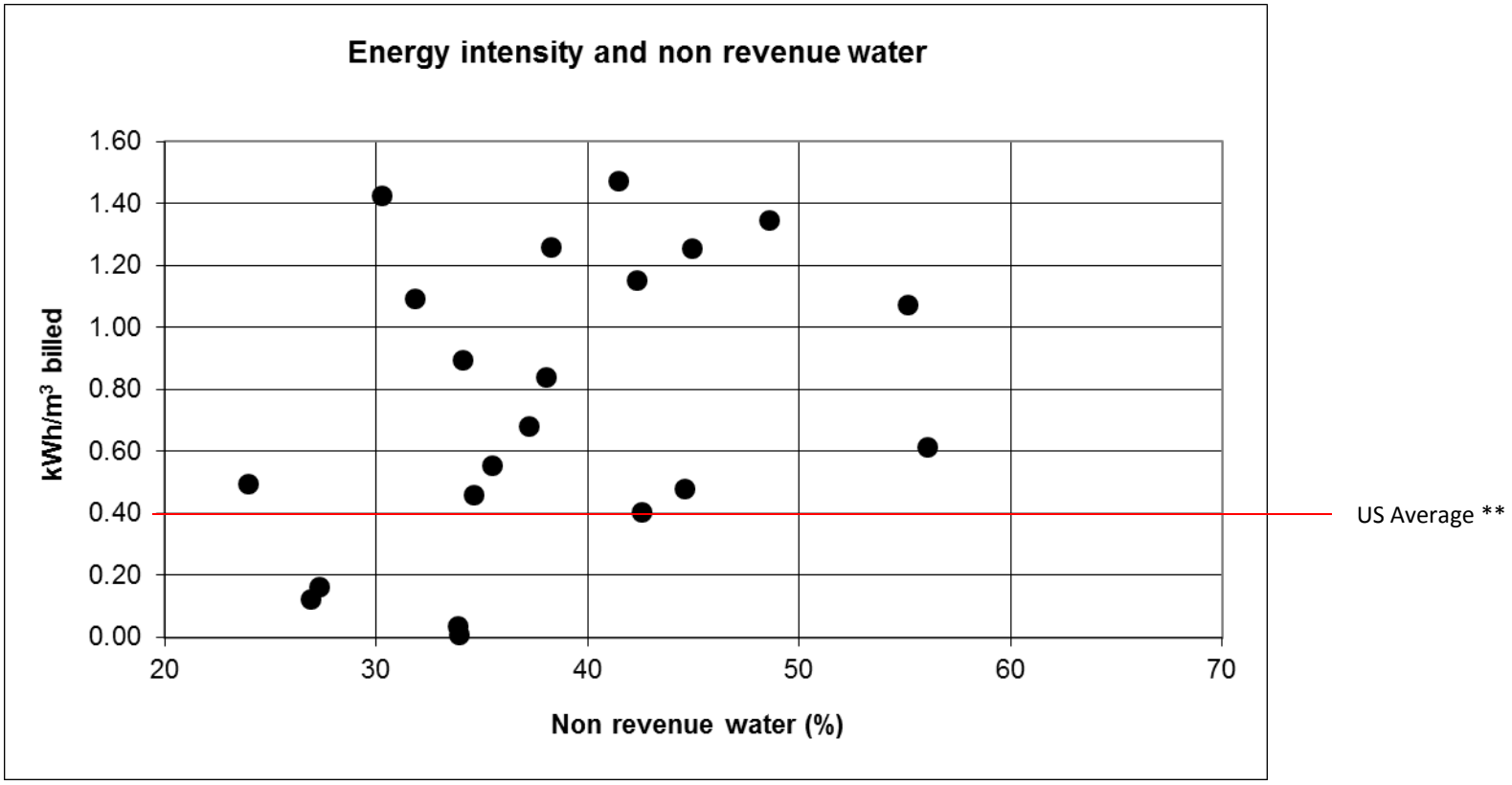
- ***Based on available information, the total annual water production in Tanzania in 2014 was estimated to be ~ 220 million m^3, for which it can be estimated that around 100 million kWh was used, i.e. around 1.5 – 2 % of all electricity in Tanzania***

- ***Grid electricity is generally expensive (~ 0.13 Eur/kWh), unreliable, and of poor quality leading to frequent supply interruptions, damaged pump motors etc***

- ***Energy intensity and energy costs in water utilities are high***

- ***Water losses (NRW) are high, which contributes significantly to the high energy costs***

II. Main points, continued



** ESMAP , 2012. A Primer on Energy Efficiency for Municipal Water and Waste Water Utilities,Technical Report

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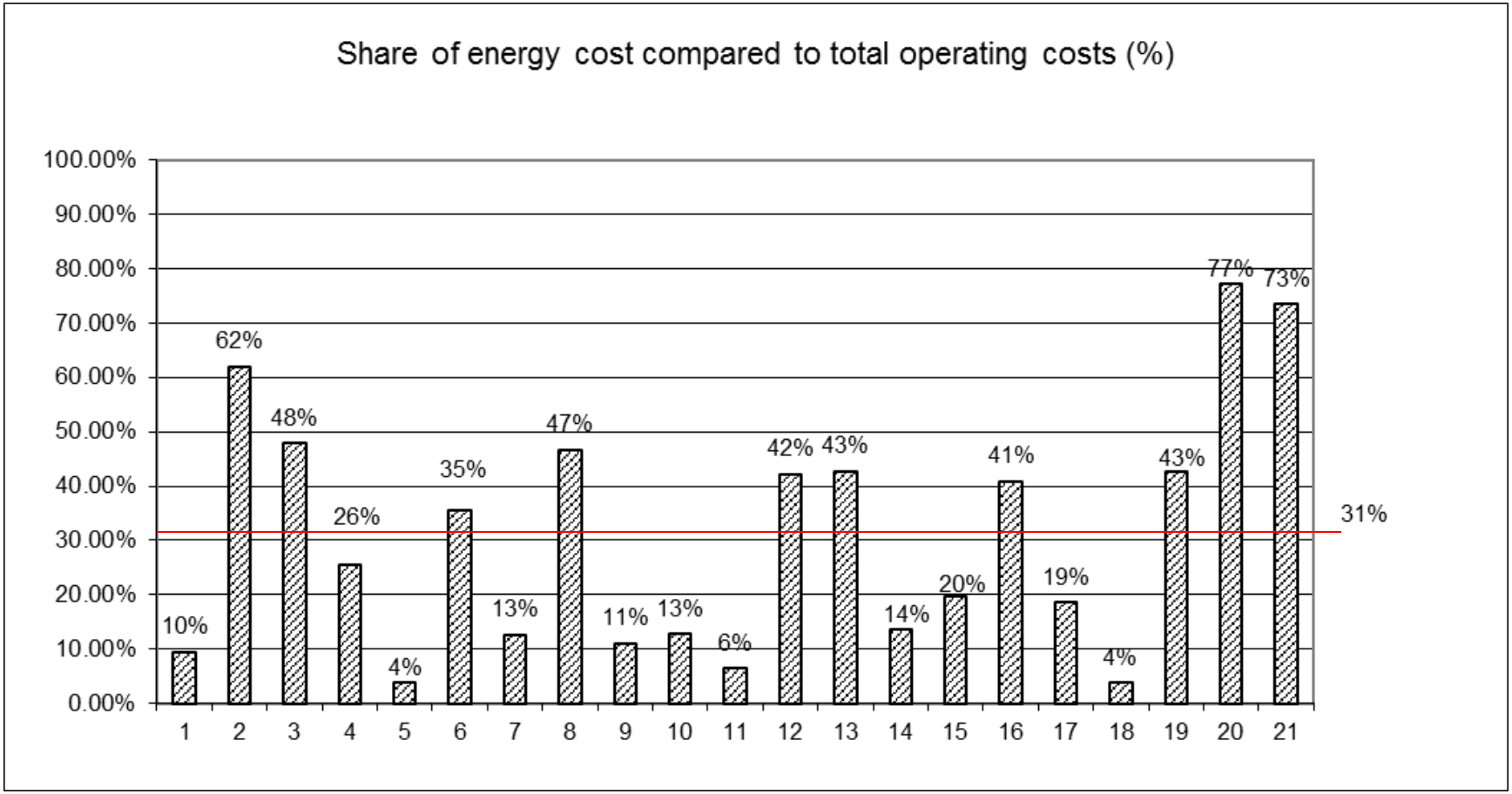

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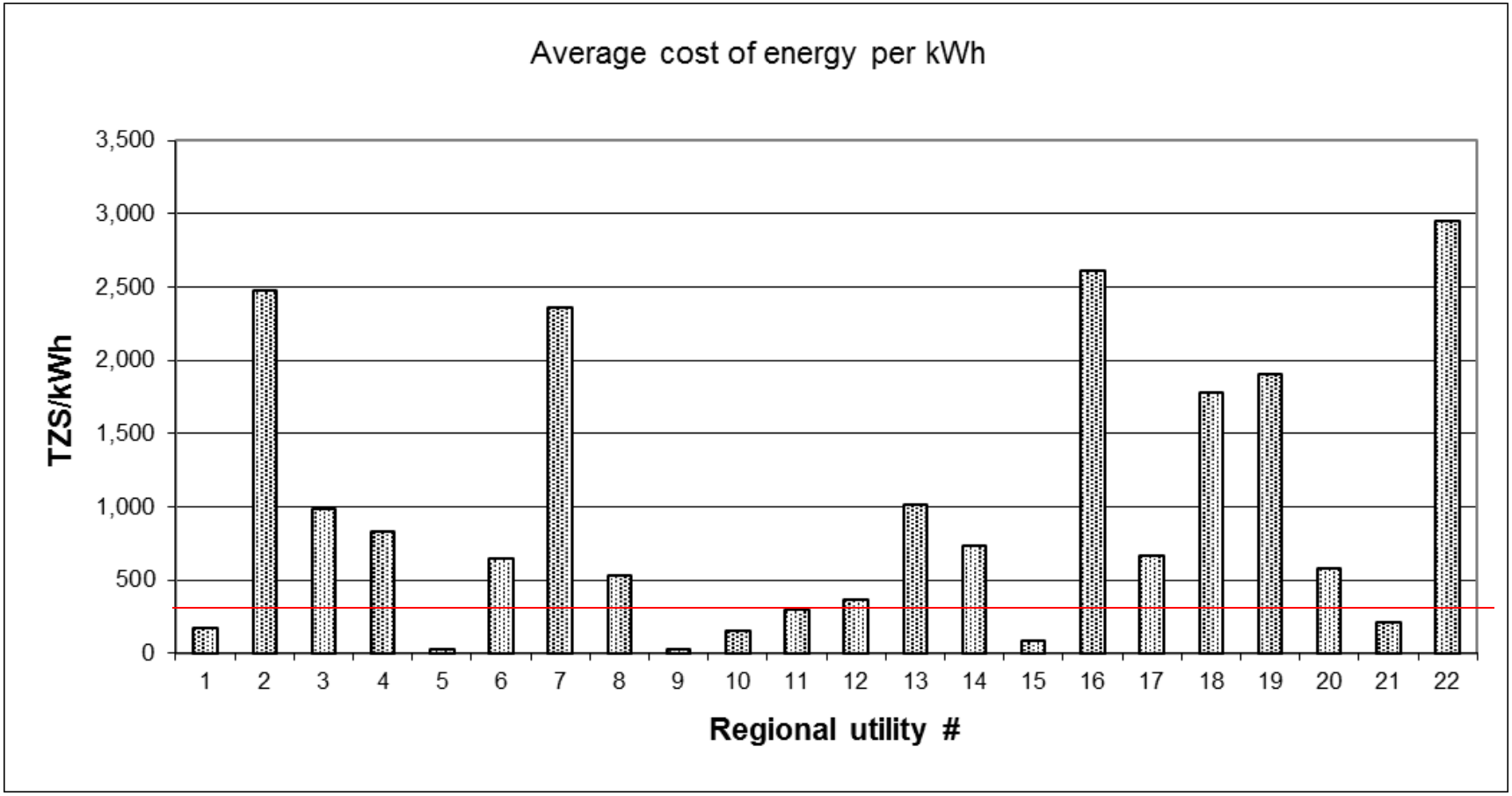
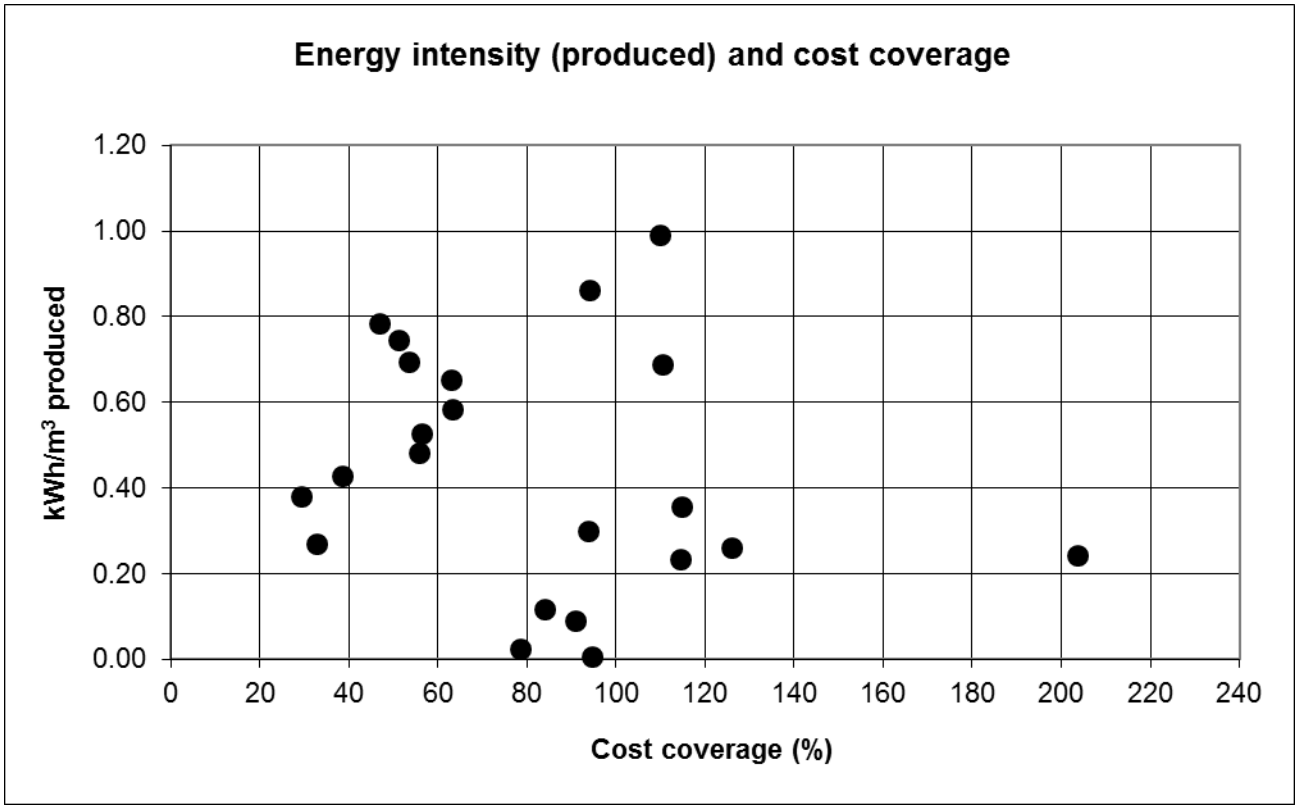


* 1 Euro ~ 2200 TZS

II. Main points, continued

- ***Non-payment of water bills is a serious issue for many utilities***
- ***Water tariffs are frequently not able to cover electricity costs. Most utilities are therefore technically operating at a loss***
- ***…and in practice deferring other essential activities in order to cover electricity costs as well as reducing operating hours)***
- ***Apart from liquidity, many utilities lack sufficient project management and energy efficiency expertise***

II. Main points, continued



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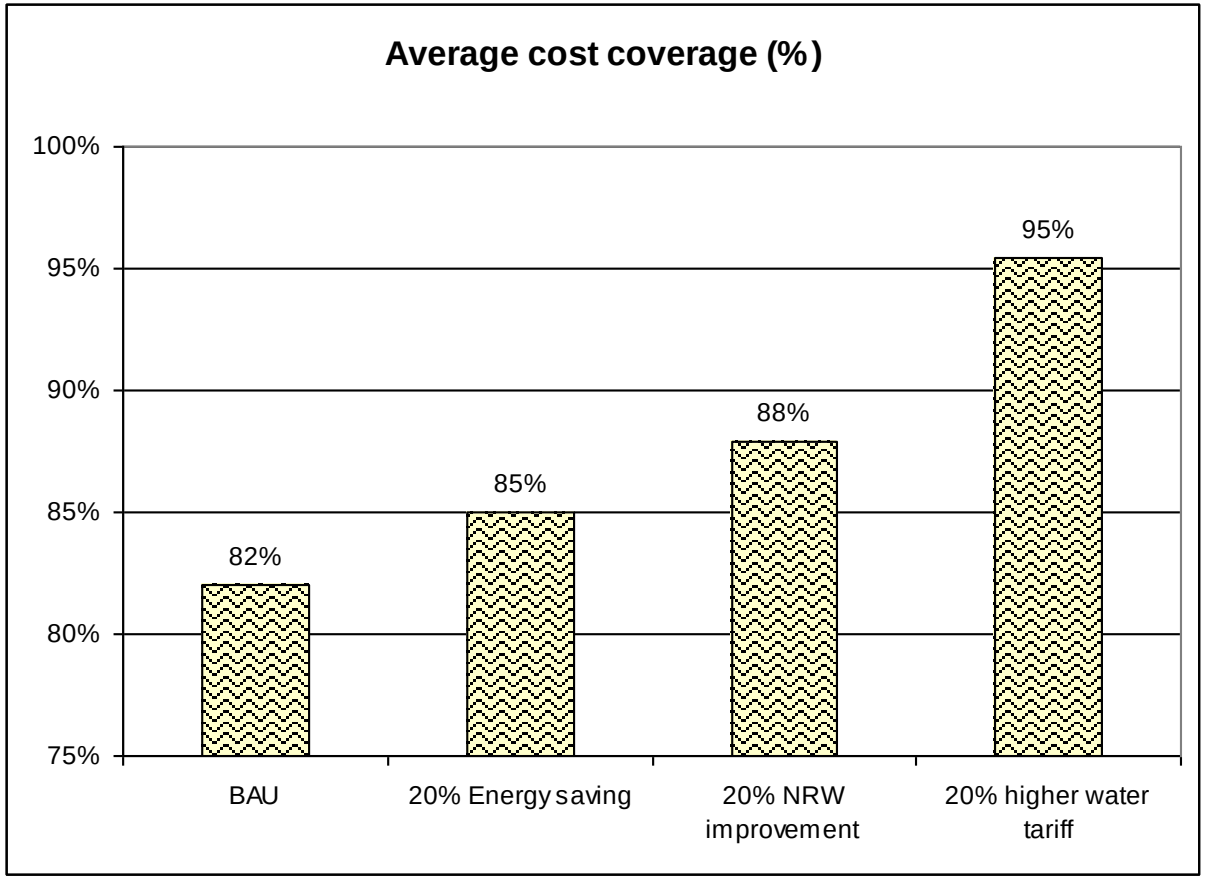
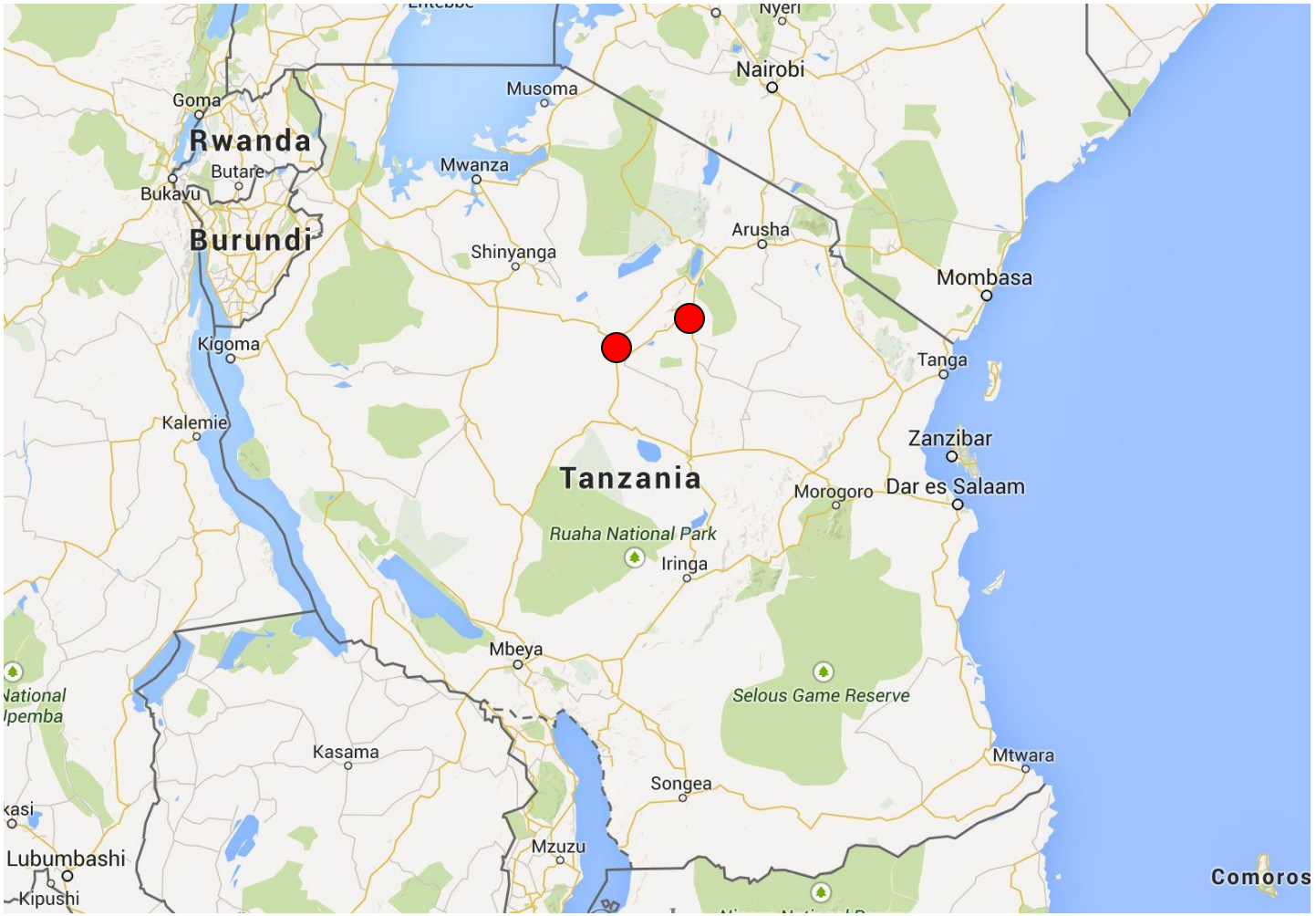


III. Three illustrative cases



III. Two illustrative cases

- ***Between 30 and 40 % of operating costs are electricity***
- ***Water tariffs cannot cover electricity cost at the moment***
- ***The reason being that the costs for electricity have until now been covered by Ministry of Water, and electricity cost was therefore not included in the costs to be covered by the tariff***

- ***Were offered VSD drives for their main boreholes by a supplier, who estimated a 20% energy savings through this measure***
- ***The VSDs were installed in February 2015***
- ***First month of real operational data showed that compared to before the savings were***

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- ***First month of real operational data showed that compared to baseline consumption the savings were effectively ZERO***

III. Two illustrative cases

- ***It shows that the suppliers are not always providing accurate advice on the best savings opportunities or solutions***

- ***It implies that Energy management and more in-house knowledge on energy efficiency and possible solutions, would have enabled the utility to have a more qualified discussion with the supplier before going ahead with installation of expensive equipment***

III. Two illustrative cases

- ***Water production was increased by ~ 50%***

- ***Electricity costs increased by ~***

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- ***Water production was increased by ~ 50%***

- ***Electricity costs increased by ~ 400% !***

- ***The main – but not only – reason is seen in the picture:***
- ***The Pumps have been vastly oversized in order to be able to accommodate projected water demand 10-15 years from now***

- ***This, and other design flaws in the water supply and distribution system, is most likely due to a problem with procurement procedures where LCC is not taken into account when selecting the winning proposal***

III. Some EE opportunities

- ***Old and poorly maintained equipment***
- ***Electrical and mechanical losses, e.g.:***
  - ***Low power factor***
  - ***Incorrect sizing of pumps and pump motors,***
  - ***Various mechanical losses (poorly aligned shafts, worn belt drives, poor foundations etc leading to mechanical vibrations, friction, deformation etc)***
  - ***Poor and inadequate wiring***
- ***Hydraulic losses in distribution networks and end user installations, e.g.:***
  - ***Network leakages, and clogging (incl. clogged filters, cracked and burst pipes, root infiltration etc.)***
  - ***End user installation leakages***
  - ***Pressure losses (valves, throttling, incorrect pipe sizing, bends & branching points, junctions etc.)***
- ***Operational issues, e.g.:***
  - ***Frequent start/stops of pump motors,***
  - ***Mismatch between demand and supply (variable demand but constant supply)***
  - ***Insufficient water storage capacity***
  - ***End user behavior/awareness***
- ***System design and procurement issues, e.g.:***
  - ***Energy use not considered as a design parameter,***
  - ***Design for long life/uncertainty in demand projections,***
  - ***Lack of dynamic/variable flow considerations, etc.***
  - ***Procurement not done according to least lifecycle cost***

IV. Next steps

- ***Follow up and improvements to the mapping of energy use in water utilities***

- ***Selection of pilot projects to demonstrate EE process (EM and procurement) and technical opportunities***

- ***Discussions on possible regulatory intervention / incentive mechanism to encourage investments for EE in WSSAs***

V. Discussion

It will be interesting to get feedback on our situational analysis and on ways to address the situation in Tanzania based on experiences in other countries and contexts

- ***Energy/data Management***

- ***Procurement procedures***

- ***Incentive mechanism / revolving fund sustained through e.g. a levy on top of water tariffs***

- ***Fiscal measures (taxation of produced water)***

-***Other***

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Thank you for your attention !

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