



Non-technical loss mitigation lessons for Africa from global experiences

Andreas Beutel
Eskom Holdings SOC Ltd

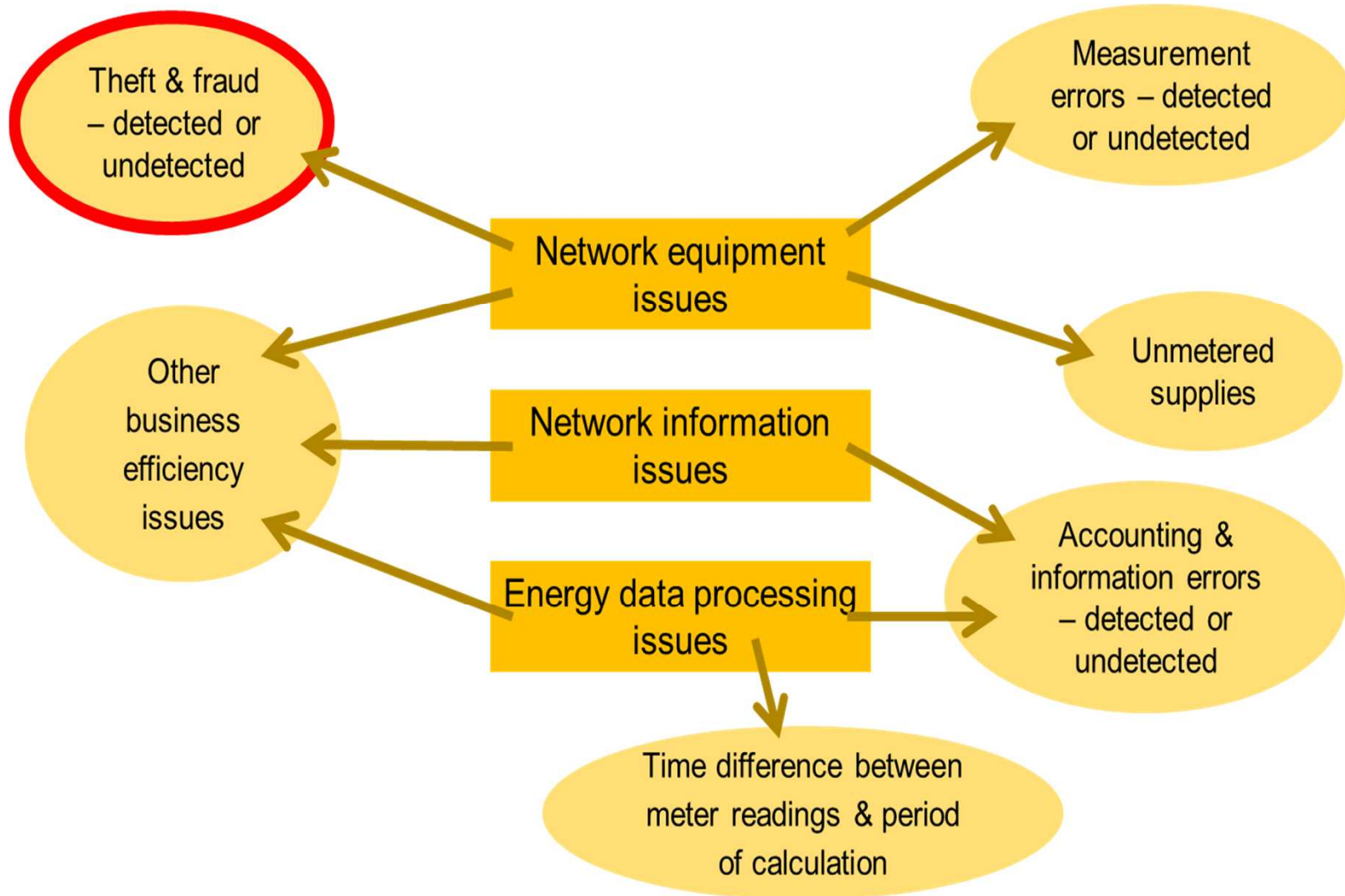
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Overview

- The contents are part of a report produced by CIRED WG CC-2015-2 on reduction of technical & non-technical losses
- Co-authors: Yann Toravel (convenor, Enedis) & Nerea Ruiz Onandi (Iberdrola)
- Contents:
 - Types of non-technical losses (NTL)
 - Mitigation measures used around the world
 - Proposed mitigation measures for Sub-Saharan Africa

Types of NTL



Types of theft & fraud

- Illegal connections to the network – not immediately known & hence not metered
- Illegal re-connections – customer reconnects supply after being disconnected, the utility may not be metering & charging
- Bypassing of or other tampering with the meter to avoid paying or to reduce the billed amount

serious safety risks



Mitigation measures – main principles

- Adequate regulatory framework
- Electrification
- Privatisation (not always)

- Good relationships with customers
- Large power users are especially important
- Customer education

Dimension	Global	Local
External to the DSO*	Regulation	Customer
Internal to the DSO*	Measurements & IT systems	Field force

- Accurate measurement
- Improving utility business efficiency, e.g. advanced IT systems
- Improving design, maintenance, inspection
- Data analysis
- Smart meters

- Dedicated NTL reduction teams
- The largest users of electricity should be tackled first

*DSO = distribution system operator

Mitigation: data mining & smart meters

- Data mining can optimize field inspections, steering them to specific areas or locations suspected of fraud, cf. blanket inspections
- Smart meters are not required for data mining, but can drastically improve the effectiveness of data mining
- Energy balancing can be performed by simple differences between energy inflows & outflows

Other measures

- Equipment-related measures: tamper-proof meter boxes, split meters, prepaid meters...
- Utility process-related measures: energy audits, check & replace defective meters, update records, internal training & awareness...
- Law enforcement-related measures: strict laws & enforcement, strictly apply all reasonable safety measures as soon as illegal connection is detected...
- As many measures as possible should be used simultaneously
- But...cost of mitigation should be < the cost of losses

Proposals for Sub-Saharan Africa

Dimension	With opportunity for smart meter deployment	Without opportunity for smart meter deployment
Developed countries	Scenario 1 (Sc 1)	Scenario 2 (Sc 2)
Developing countries	Scenario 3 (Sc 3)	Scenario 4 (Sc 4)

Actions: external to DSO	Sc 1	Sc 2	Sc 3	Sc 4
Electrification of un-electrified areas, where illegal connections are known to be rife	M	M	H	H
Good relationships with customers	H	H	H	H
Engage regulatory authorities to adequately incentivize loss reduction & put appropriate regulation & laws in place	H	H	H	M
Customer education & awareness	H	H	M	M



Proposals for Sub-Saharan Africa

Action – internal to DSO		Sc 1	Sc 2	Sc 3	Sc 4
Metering	Accurate measurement, detection & location of NTL	H	M	M	L
	Implementation of smart meters & corresponding support systems	H	M	M	L
	Implementation of prepaid meters	L	L	M	M
Operating efficiency	Improving utility business efficiency generally	H	H	H	H
	Improving technology & network design to make NTL less likely	H	H	M	M
	Dedicated NTL reduction teams, including adequate legal & logistical backup	H	M	M	L
Analytics	Tackle the largest users of electricity first, including prosecution, publicity & other related measures	H	H	H	H
	Data analysis to support all of the above, including data collection process & data quality validation	H	M	M	L



Recommendations for Sub-Saharan Africa

- Most countries are scenario 4
- “Social avenues” are therefore expected to be the most effective:
 - Actions that do not rely on complex technology
 - Actions that improve the efficiency of DSO operations (not necessarily technological)

South Africa

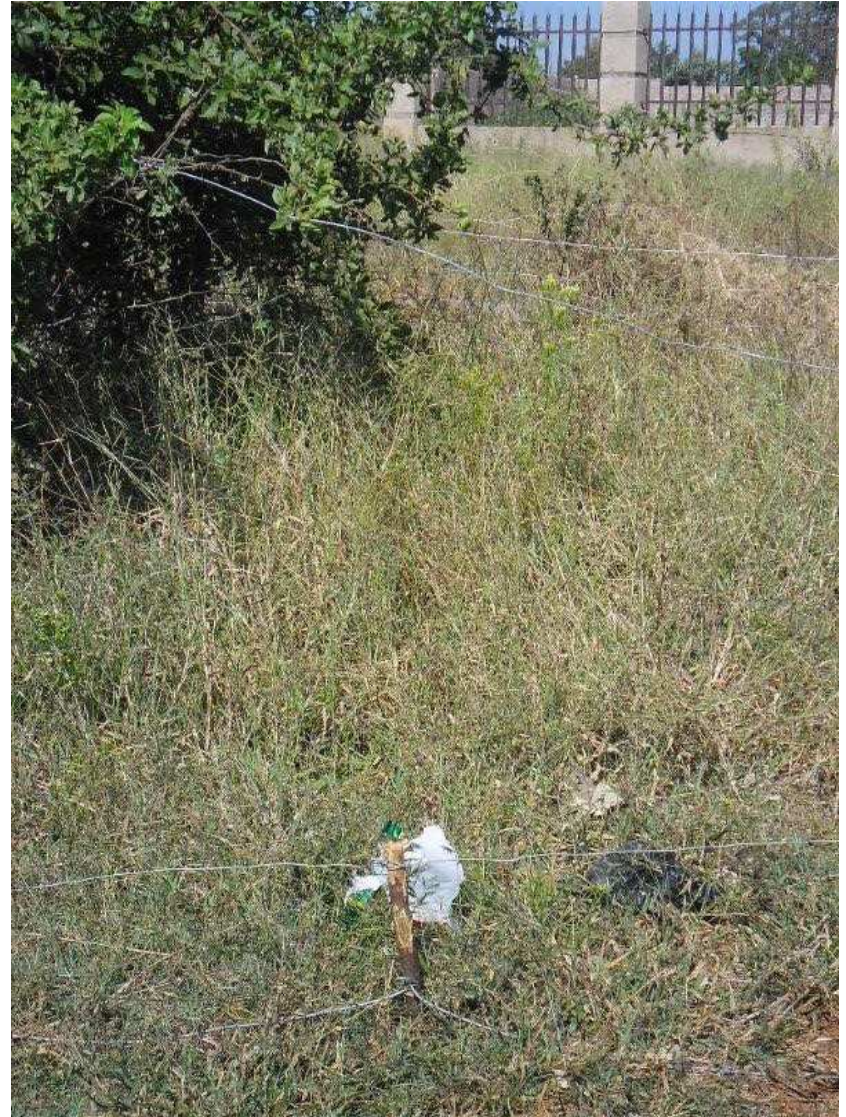
- Considering the social problems with electricity theft, scenario 3 is most likely
- The possibility of smart meters means that losses can be more accurately measured
- But social pressures such as community resistance to measures such as implementation of smart and/or split meters makes this difficult
- In essence, technology cannot be used to solve social problems, so electricity theft & fraud becomes a societal problem

Recommendations

- Engage with government to address societal issues
- Actively cooperate with law enforcement agencies
- Tackle the largest users of electricity first
- Foster good customer relationships & conduct regular community engagements

Further recommendations

- Smart technologies have a big role in reducing losses & improving efficiency, in principle, e.g. smart meters & energy balancing
- But must be supported by business processes and regulatory & general socio-economic conditions



Further recommendations

- Other applications can be supported by the same technology
- Examples are proactive detection & rectification of supply interruptions & safety hazards

