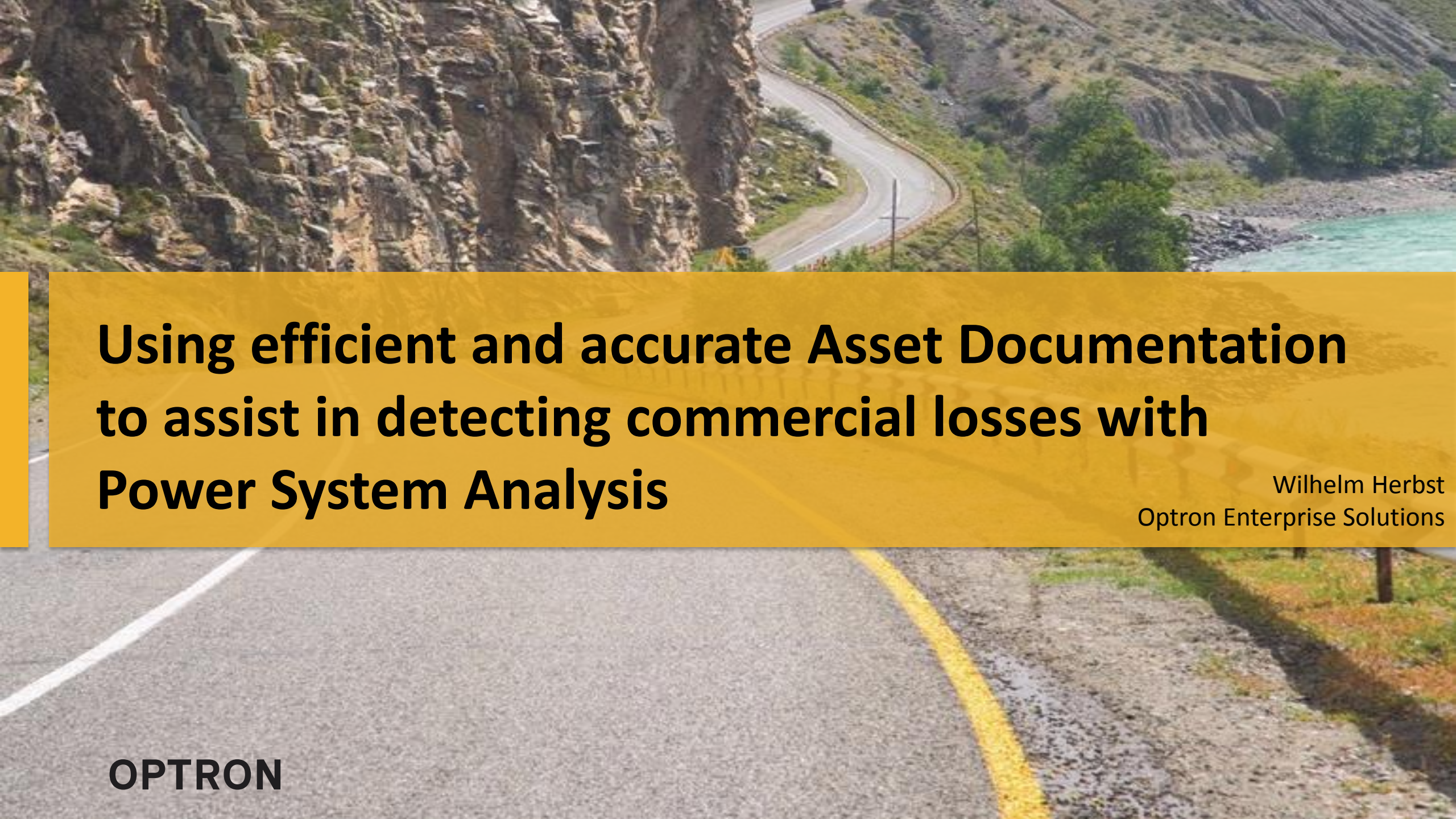

Using efficient and accurate Asset Documentation to assist in detecting commercial losses with Power System Analysis

Wilhelm Herbst
Optron Enterprise Solutions

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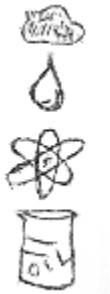
Introduction

- *Technical losses occurs in the electric distribution network naturally and non-technical due to various reasons.*
- *It is important to determine technical losses accurately to enable the calculation of non-technical losses.*
- *This can only be achieved with a well-documented electrical network.*
- *This presentation will focus on effective and efficient ways to properly document an electrical network in the South African context.*

Background

What happens to the electricity you put into the system

1+1 ≠ 2



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It end up in one of 4 areas


Metered Consumers

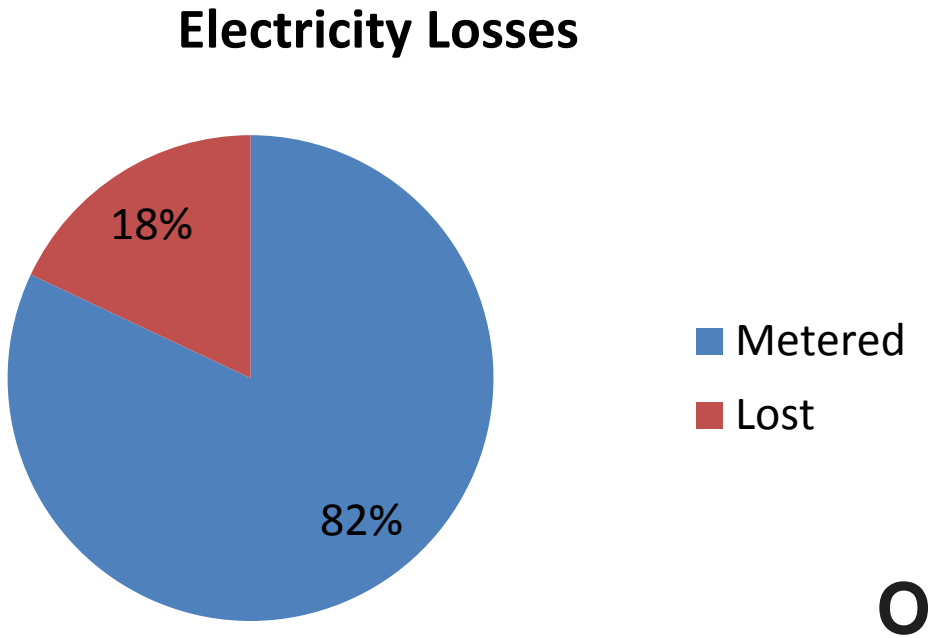

Administrative Losses


Technical Losses


Non-Technical Losses

Metered Consumers

The first category is the desired category where municipalities would like all their electricity input to end up. Unfortunately this is not the case and on average 18% of the electricity that South African municipalities bought from Eskom in FY2013 was lost and never reached paying customers. The situation is continuing.

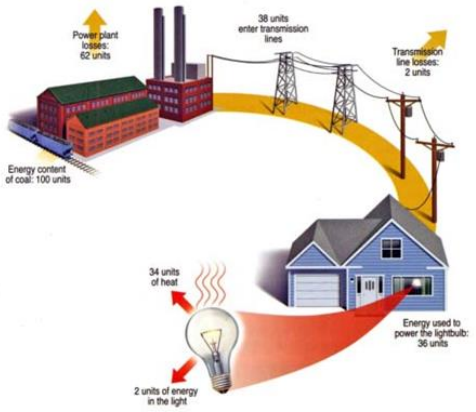


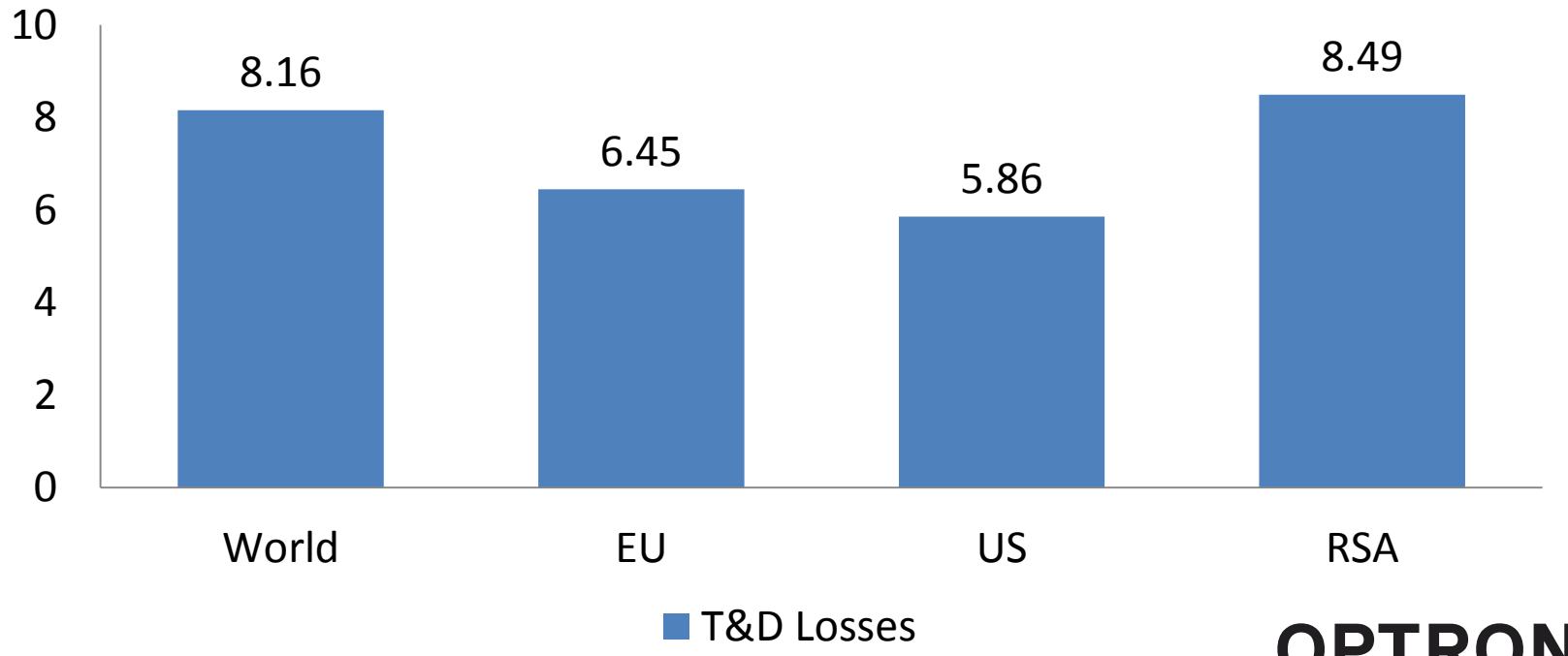
Administrative Losses

Thus is the part of the distribution networks losses that get used by the utility for the proper running of its operation. This includes substation, stores, warehouses, depots and offices. Again this cannot be prevented but are usually a small portion of the losses.

Technical Losses

Thus is the part of the losses in the distribution network that is inherent in the physical delivery of energy. This is primarily due to heat dissipation resulting from current passing through conductors and from magnetic losses in transformers.





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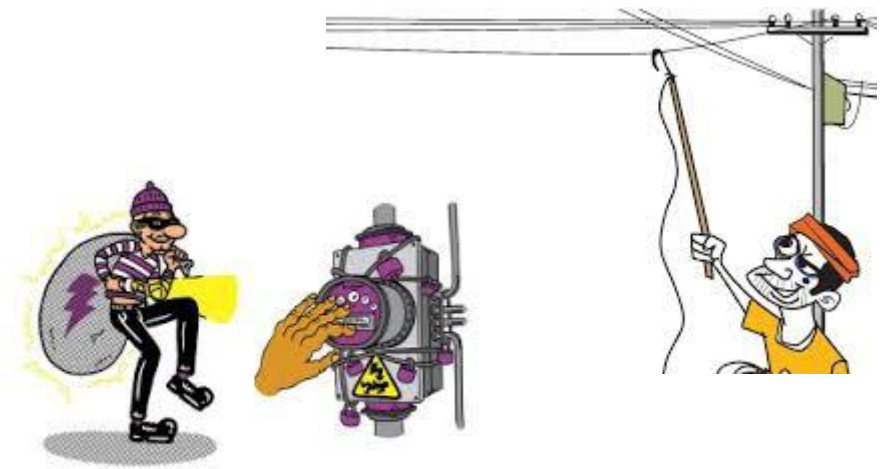
Non Technical Losses

- This is the portion of the distribution network losses that is primarily due to human whether it is intentional or not.



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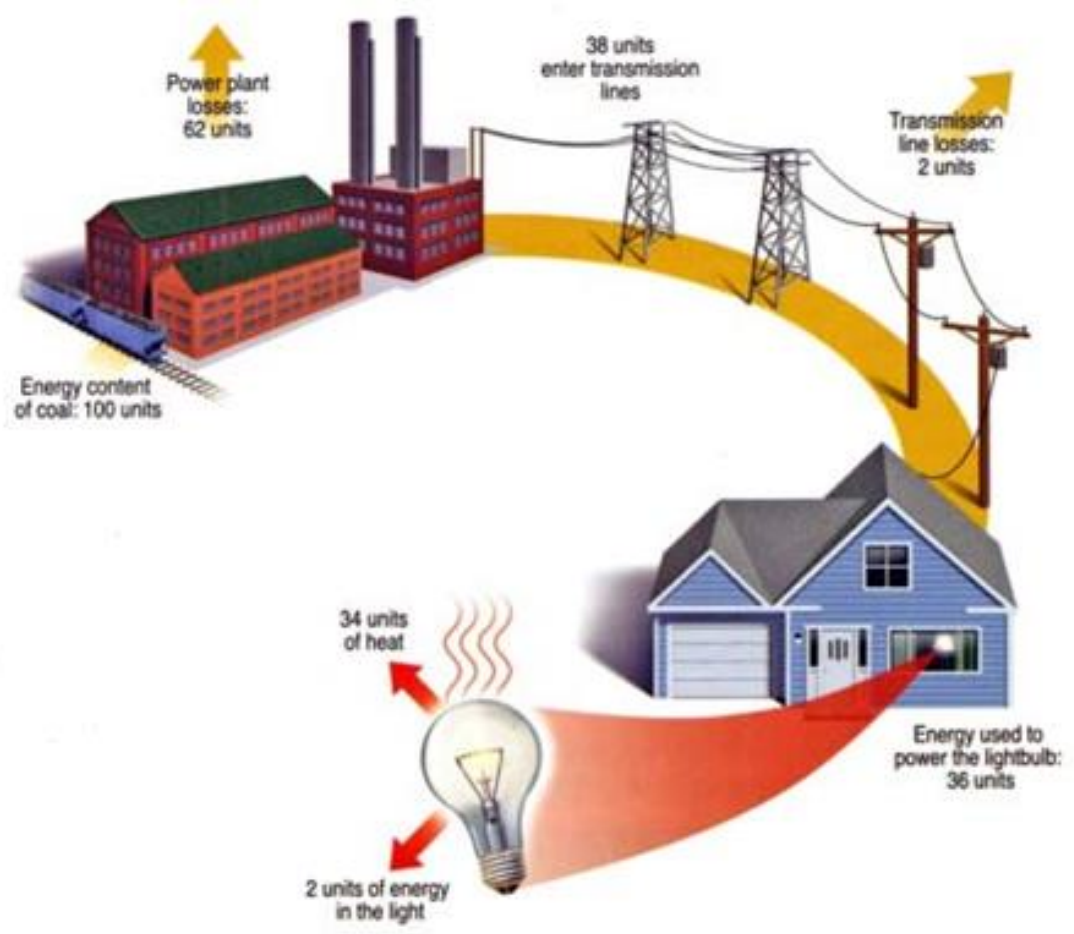
Step 1 in Loss Calculations

X-Y = Loss



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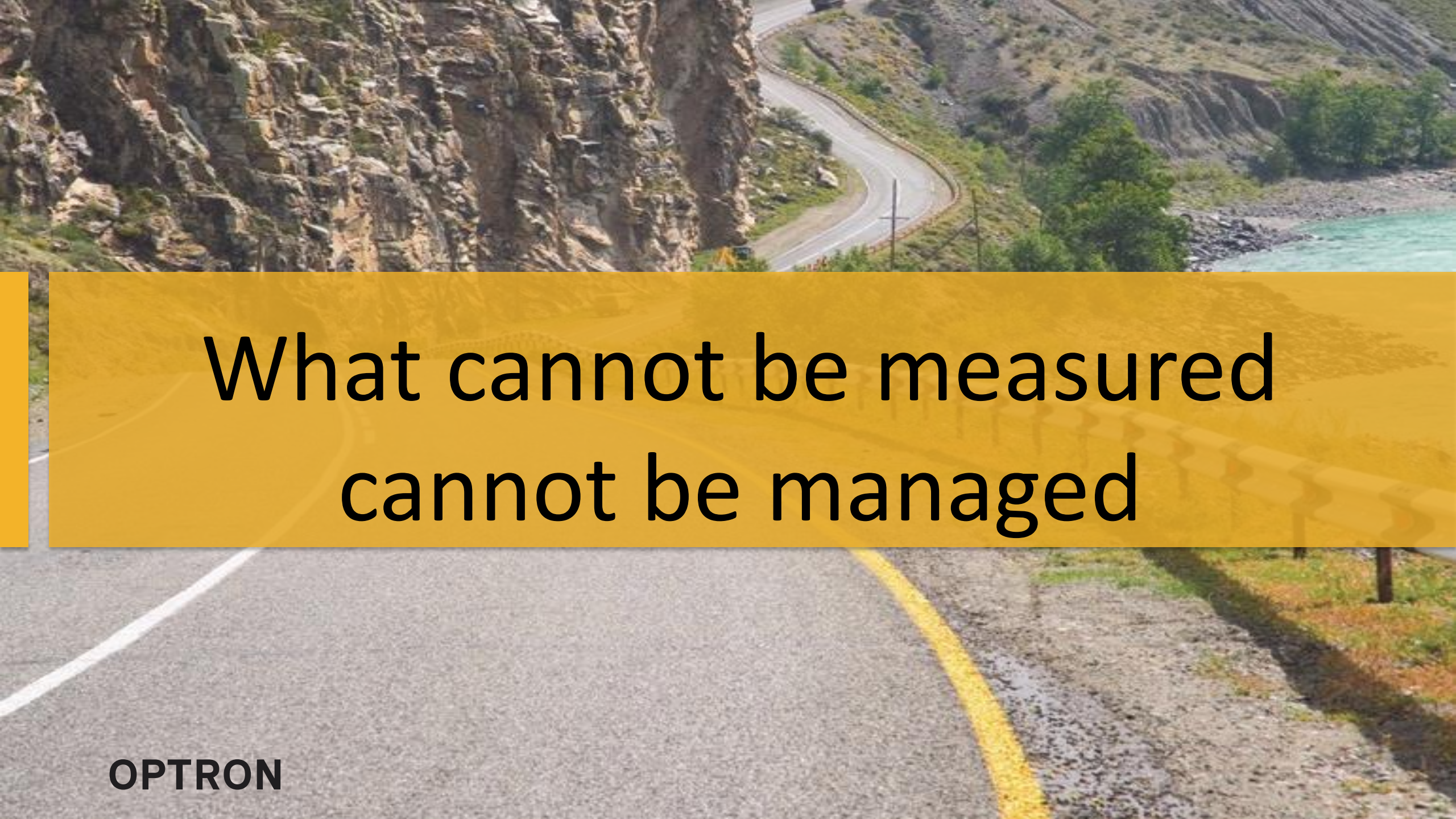

What cannot be measured cannot be managed

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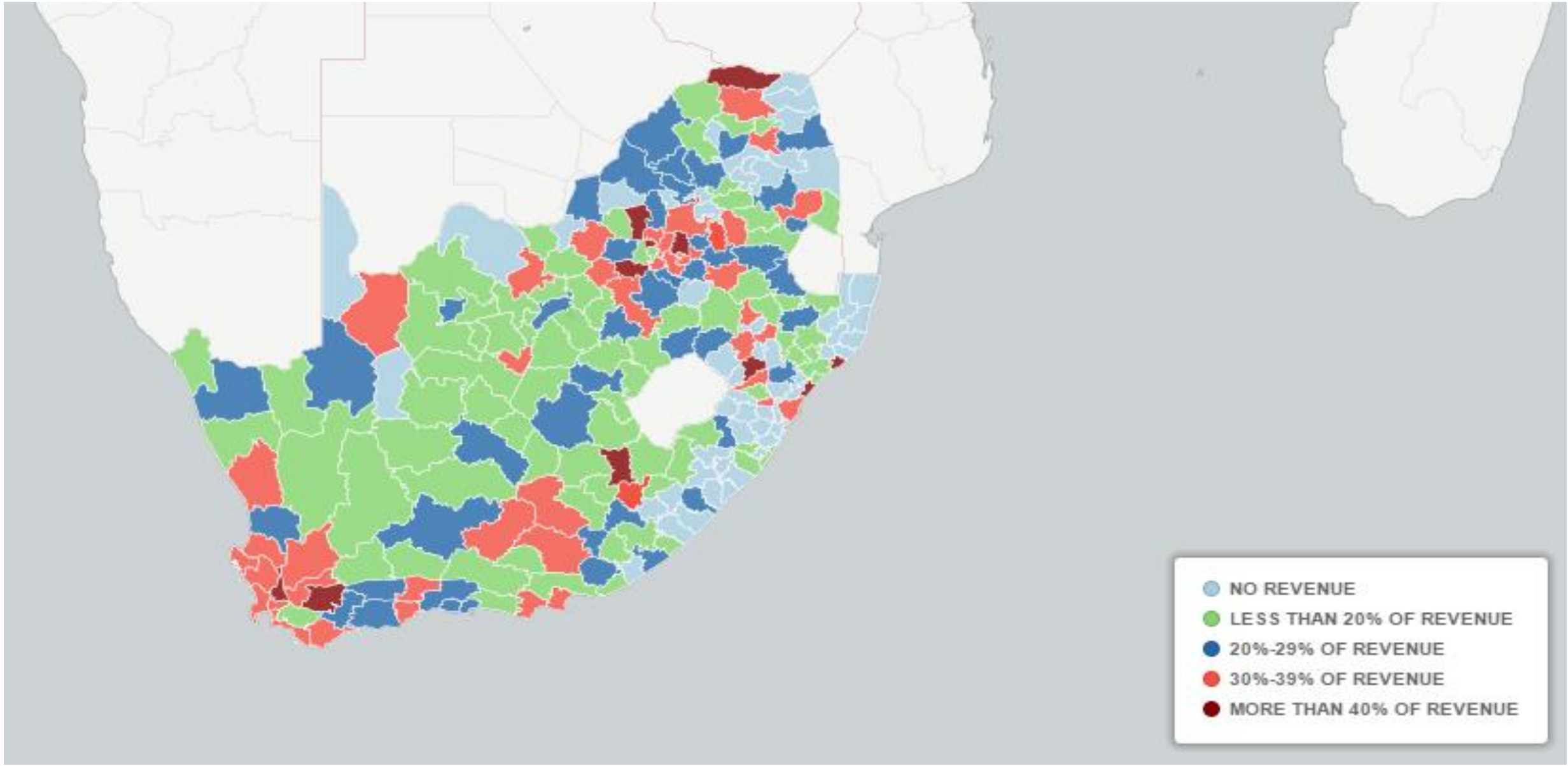
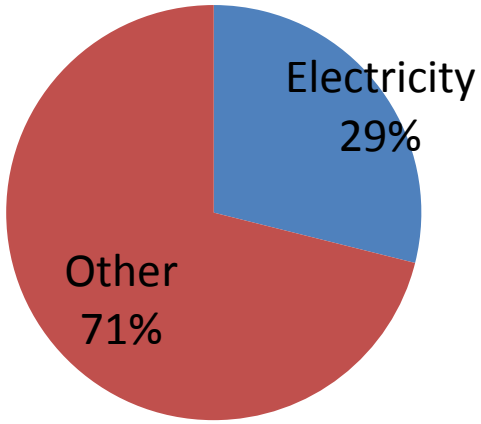
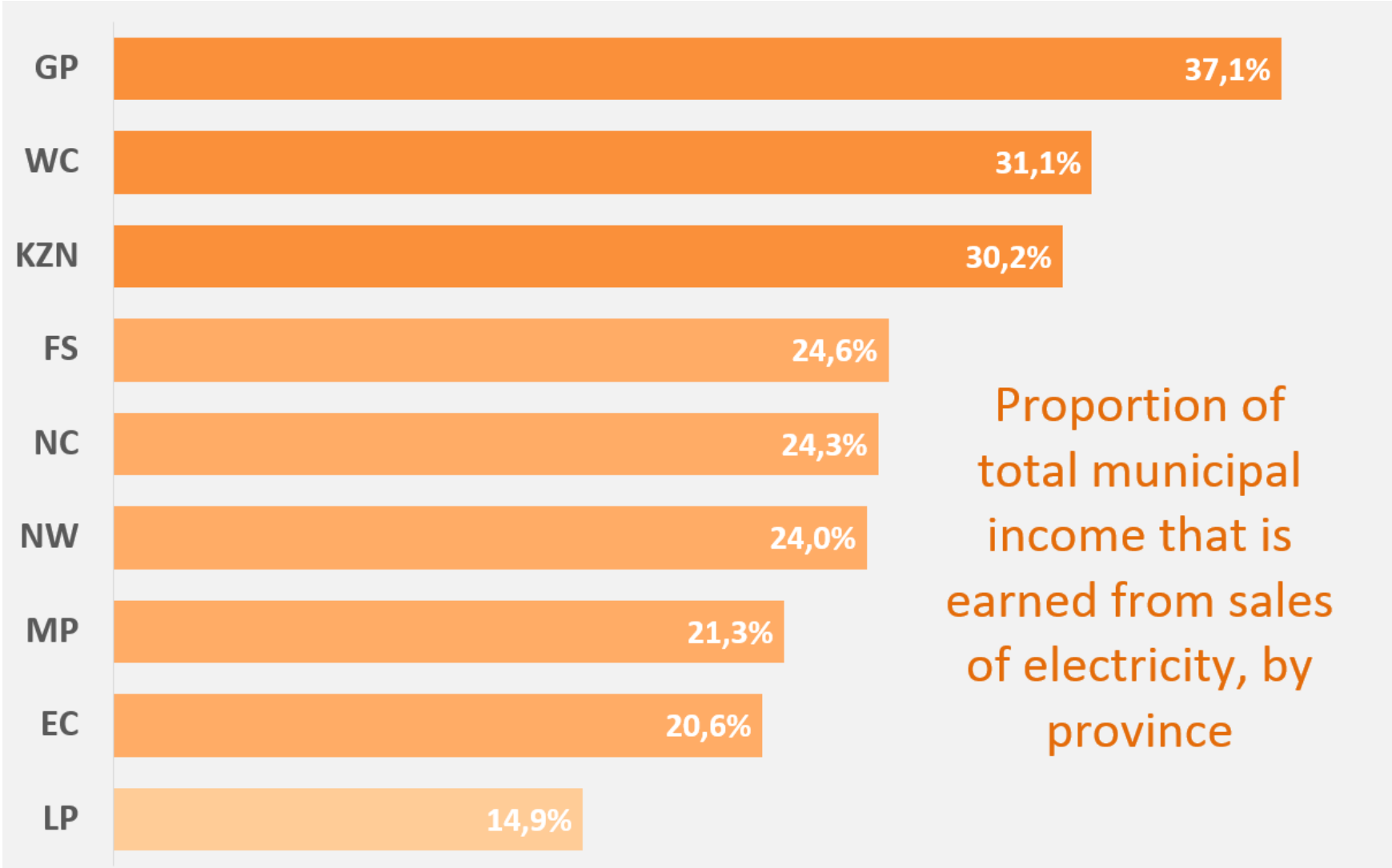
Electricity Revenue as a % of Total Revenue



- Because of the % income, most municipalities will at least have a list of meters

Ave SA Municipal Income





Documenting your Electrical Assets

Above ground Assets - Meters

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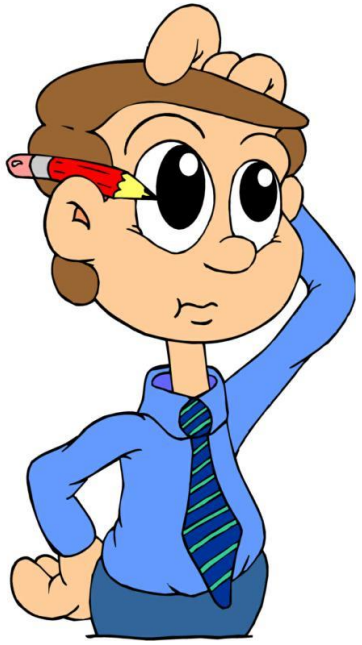
Meters

- Get a list of meter
  - Is it complete?
  - Do you know where they are?
- Most dwellings will have electricity
- Determine occupied dwellings as staring point



Formal Build Up Areas

- Get a cadastral plan and up to date aerial photography – If there is a building they use electricity!
- Overlay meter position(If available)
- Do normal meter reading but also check all occupied properties not read in past
- Update land and water meter

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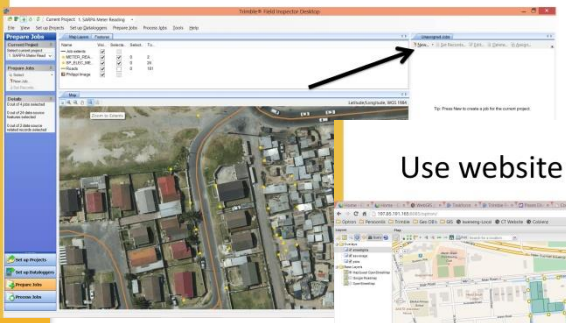
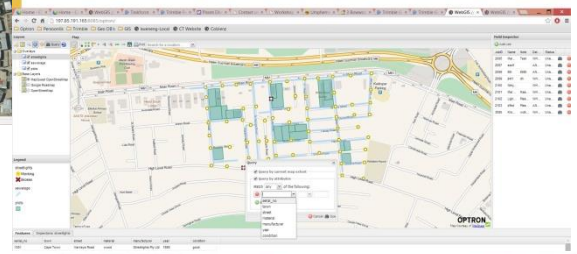
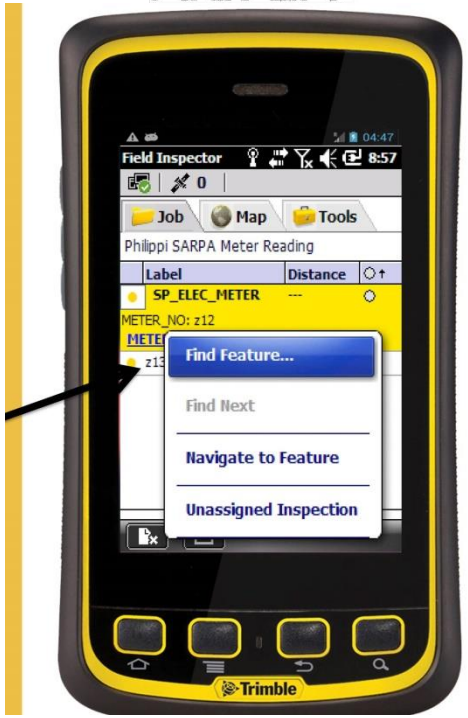
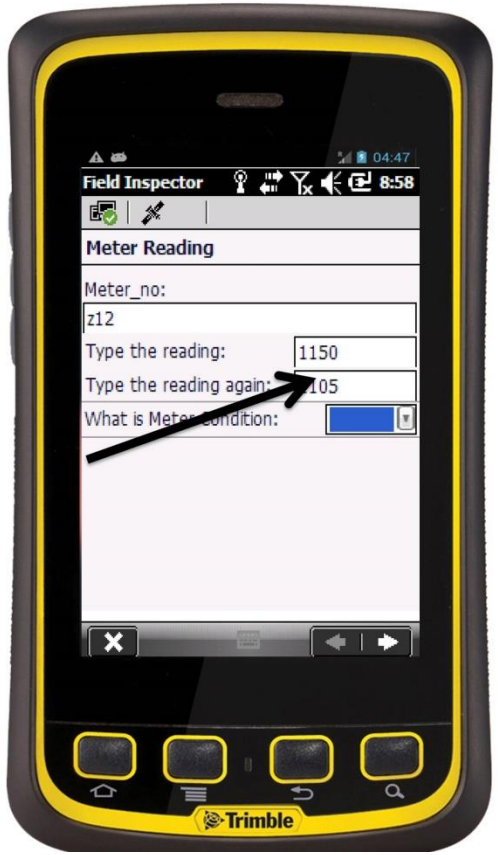
Create Jobs



Use website to create jobs







Informal Build Up Areas

- If not metered, this can help you plan for meters
- Recent aerial photograph (UAV)
- Use image analysis to identify structures
- In a metered area follow the same process as above
- In an unmetered area, use this as input for Power System Analysis (They are probably already using power)

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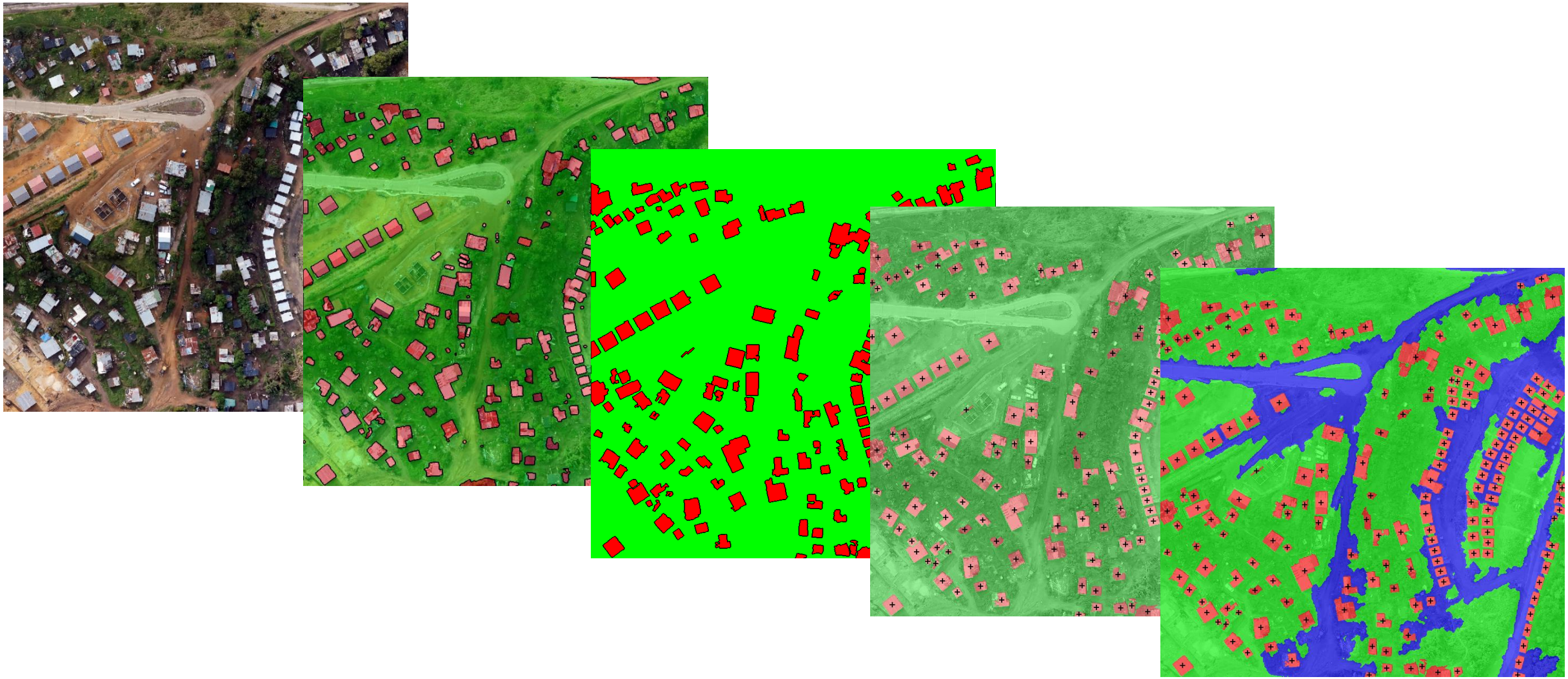
Using Image Analysis Software to calculate structures



Documenting your Electrical Assets

Above ground Assets - Other

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- Use meter readers to capture other assets – do this one asset at a time
- Use a mobile scanner solution
  - Also useful for other departments


Trimble

Documenting your Electrical Assets

Under ground Assets

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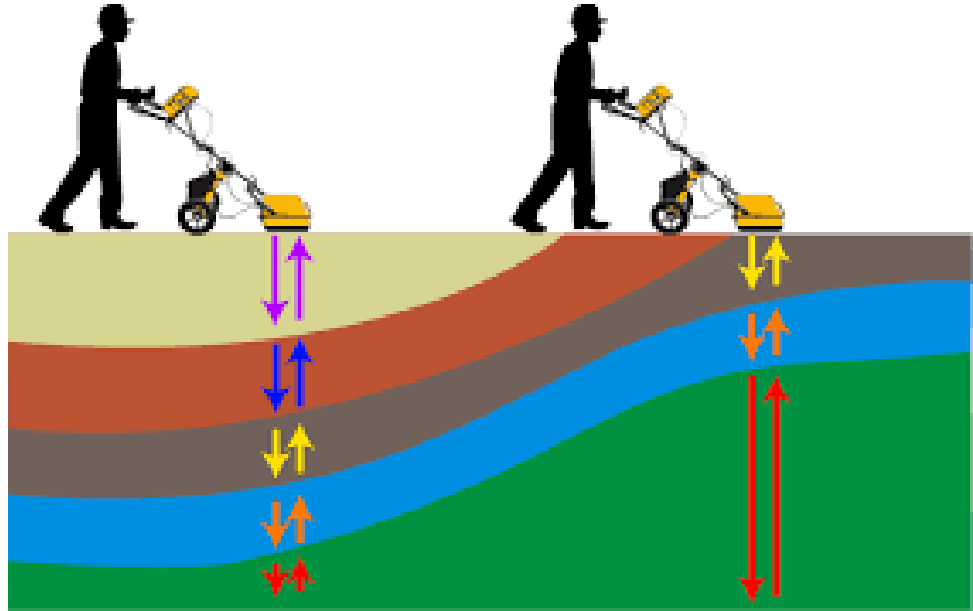
- Use above ground assets as input and design principles to guess under ground network
- Manually check manholes for number and direction
- Use Ground penetrating Radar to confirm location of assets



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Conclusion

Accurately documenting your electrical assets is crucial to the analysis and management of your Power System. Fortunately with the technologies available today this need not to be an unachievable task and can be done quite fast.

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Thank You

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