

INTEGRATING VARIABLE RENEWABLE ENERGY ONTO THE GRID

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GHANA**

**THE GREENER
ENERGY IS THE
ONE YOU DO NOT
USE.**

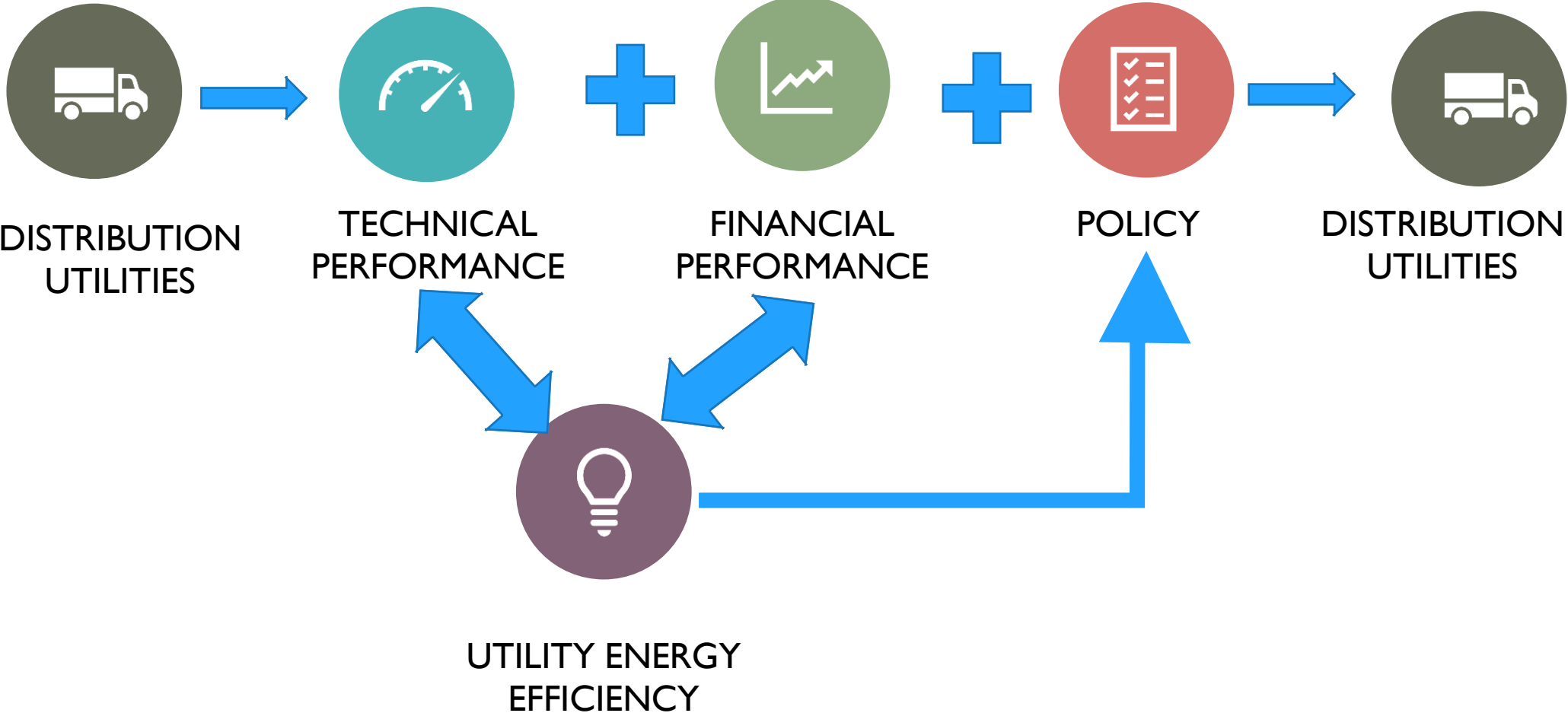
ONE OF WEDNESDAY'S ESEF PRESENTER

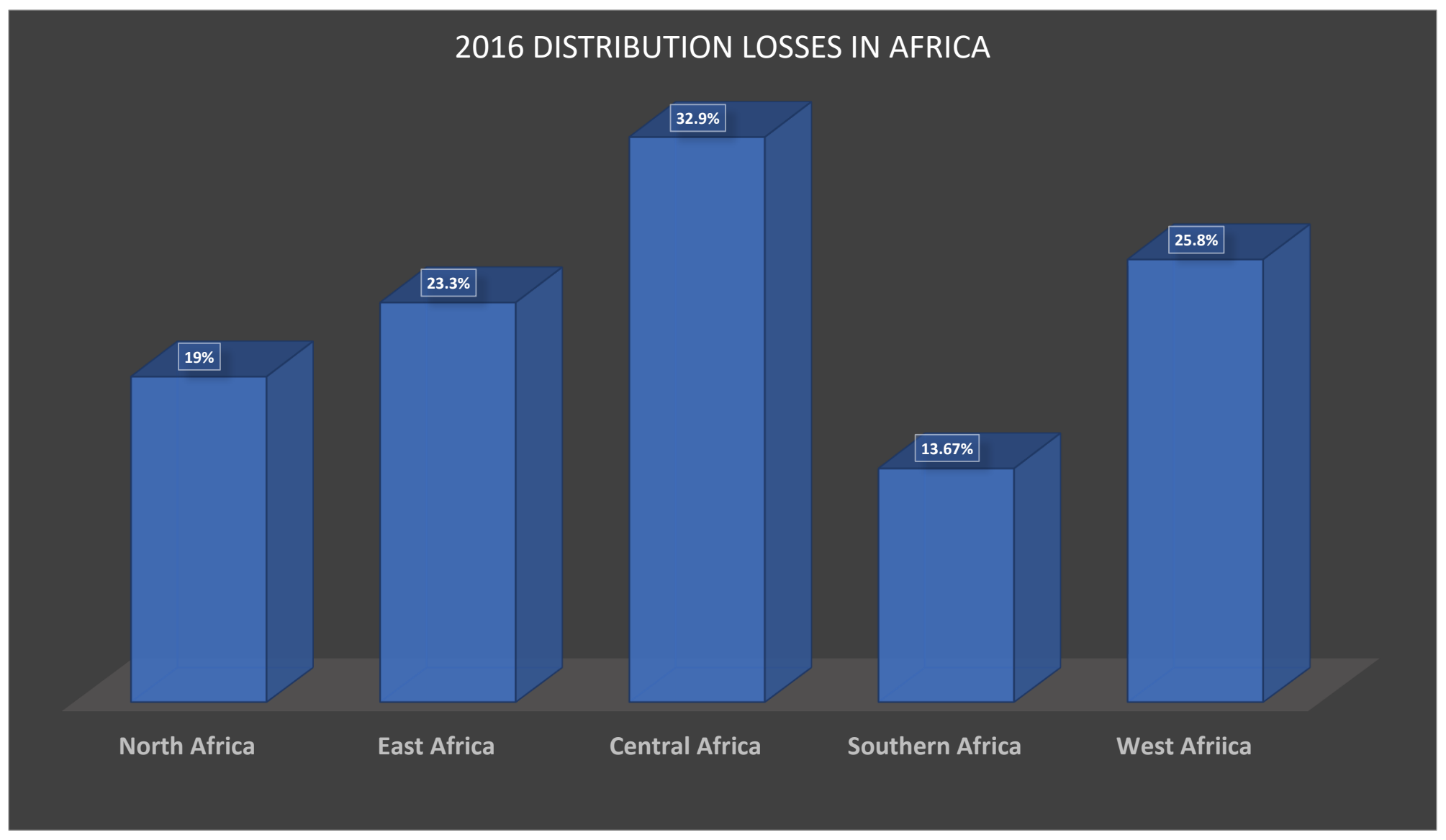


**ENERGY
EFFICIENCY IS
ESSENTIAL FOR
INTEGRATING
VARIABLE RE
INTO
DISTRIBUTION
GRIDS!**

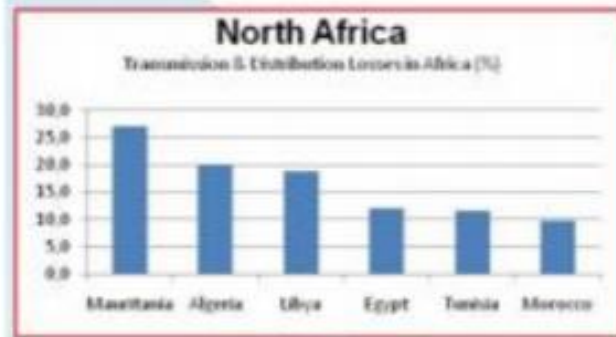


THE VIRTUOUS CYCLE

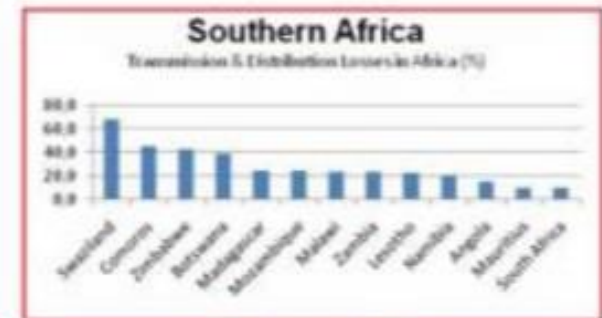




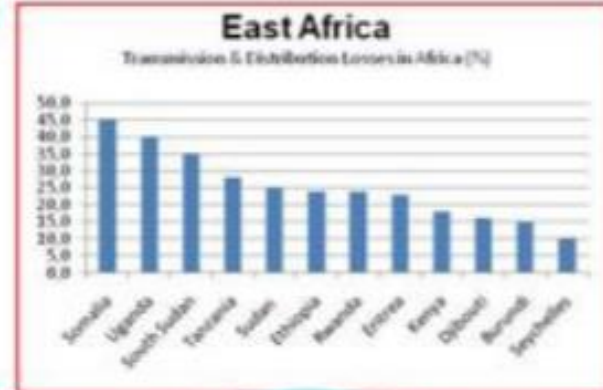
Conference Paper, Resolving West Africa's electricity dilemma through the pursuit of smart grid opportunities (Elhag, 2014)



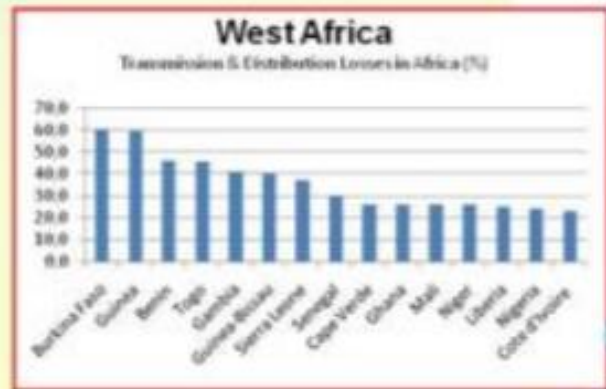
16.5%



28.5%

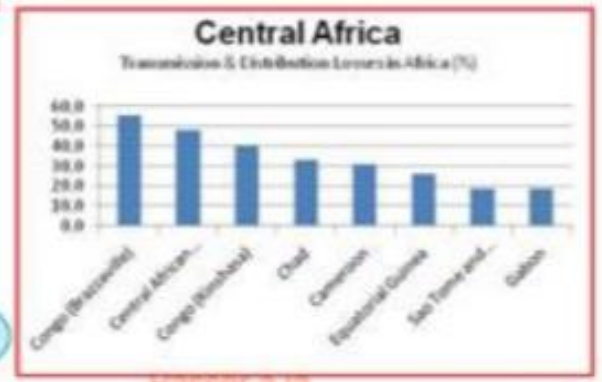


25.3%




35.7%

33.9%



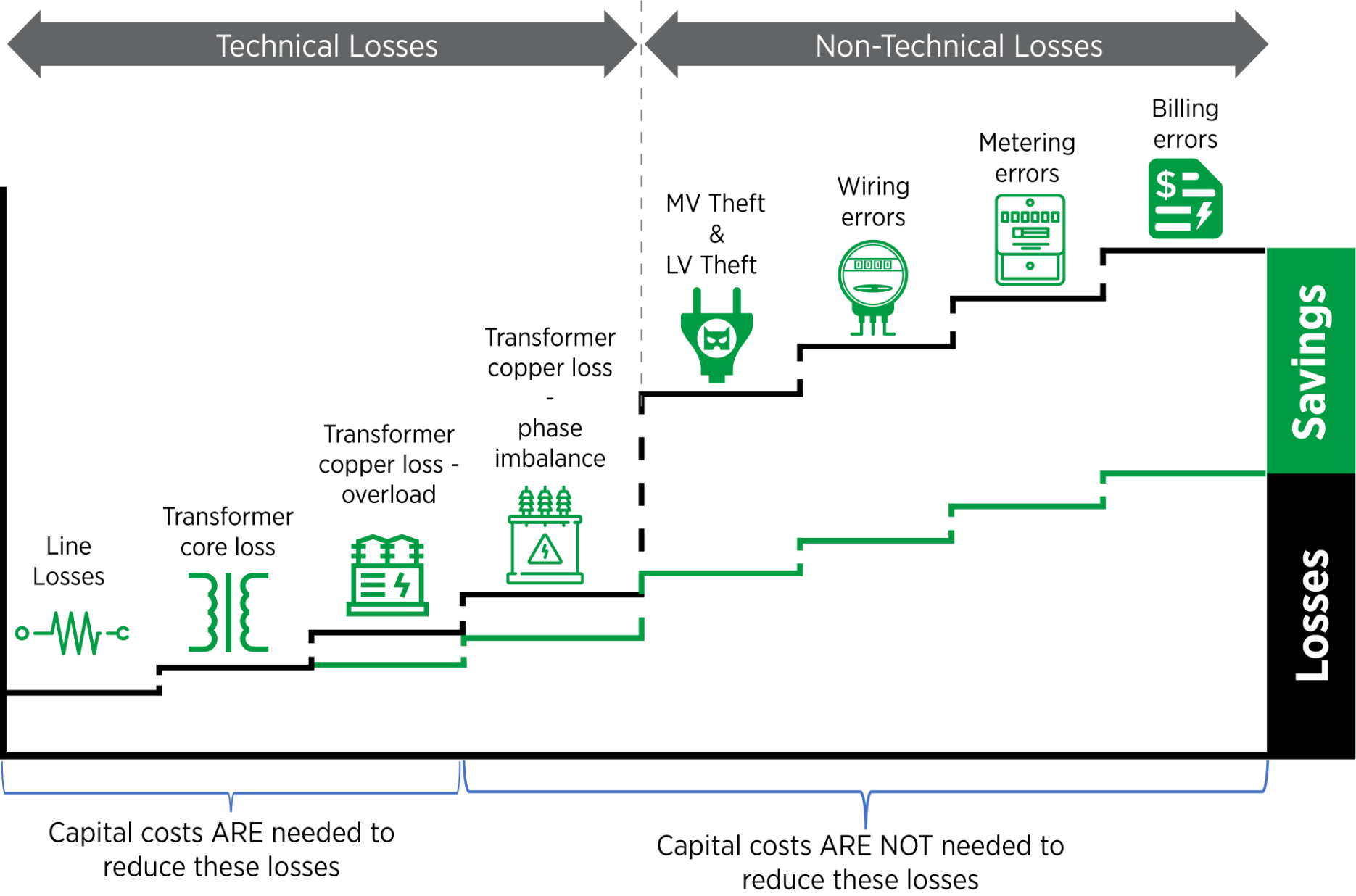
Source: Econstors (Resolving West Africa's electricity dilemma through the pursuit of smart grid opportunities) – Elhag, 2014

| Region | T&D Loss (%) | |
|----------------|-------------------------------|---------------------|
| Central Africa | 33.9 | 27.6 |
| East Africa | 25.3 | 15.9 |
| North Africa | 16.5 | 22.7 |
| South Africa | 28.5 | 15.5 |
| West Africa | 35.7 | 27.4 |
| Source | Elhag, 2014, Conference Paper | World Bank Database |

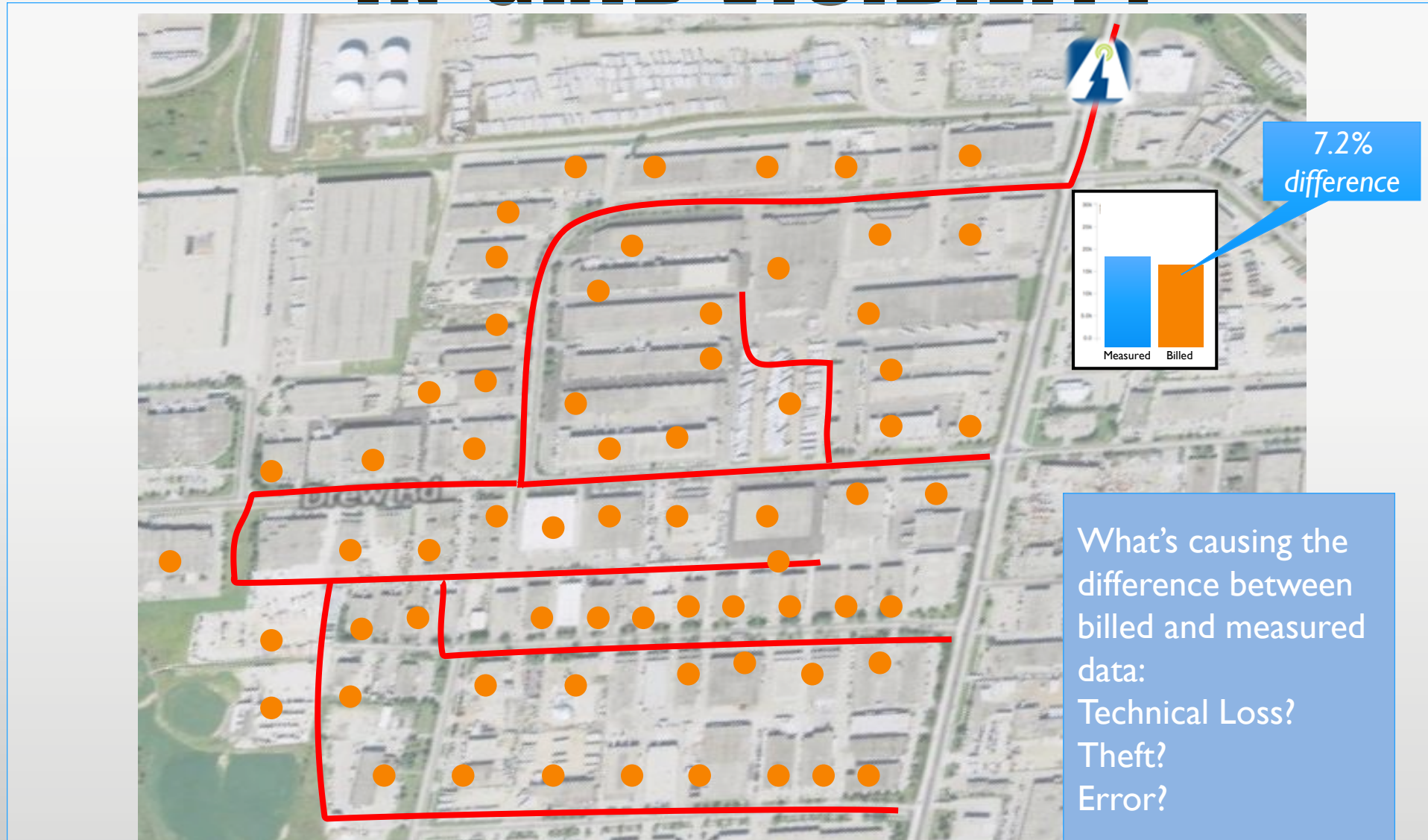


**UTILITY ENERGY
EFFICIENCY AT
WORK –
THE ECG CASE**

**THE TRUE GRID INTELLIGENCE (TGI)
PILOT PROJECT**



IN-GRID VISIBILITY

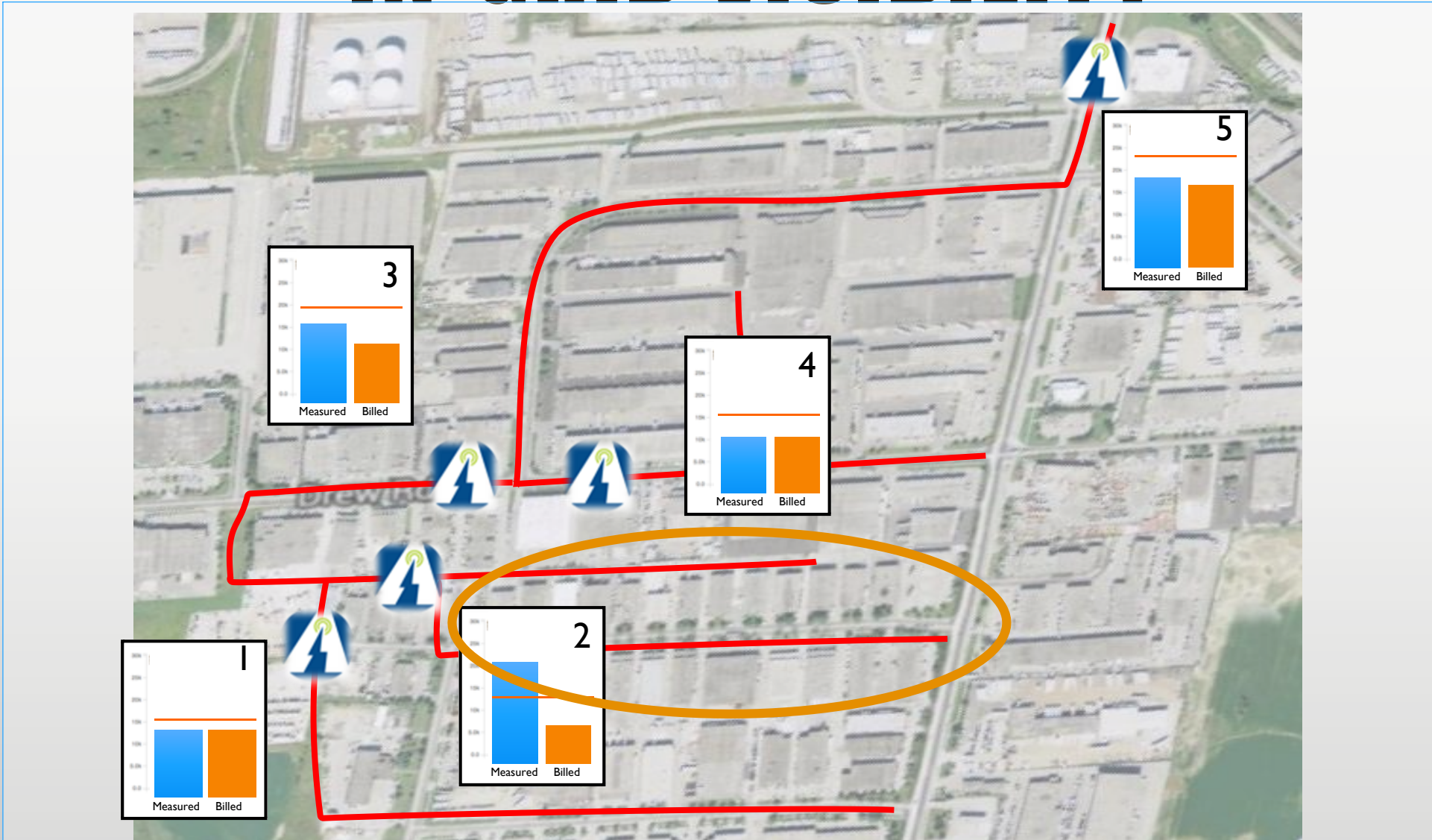


IN-GRID VISIBILITY

Step 2: Exploratory Investigation to find area of loss

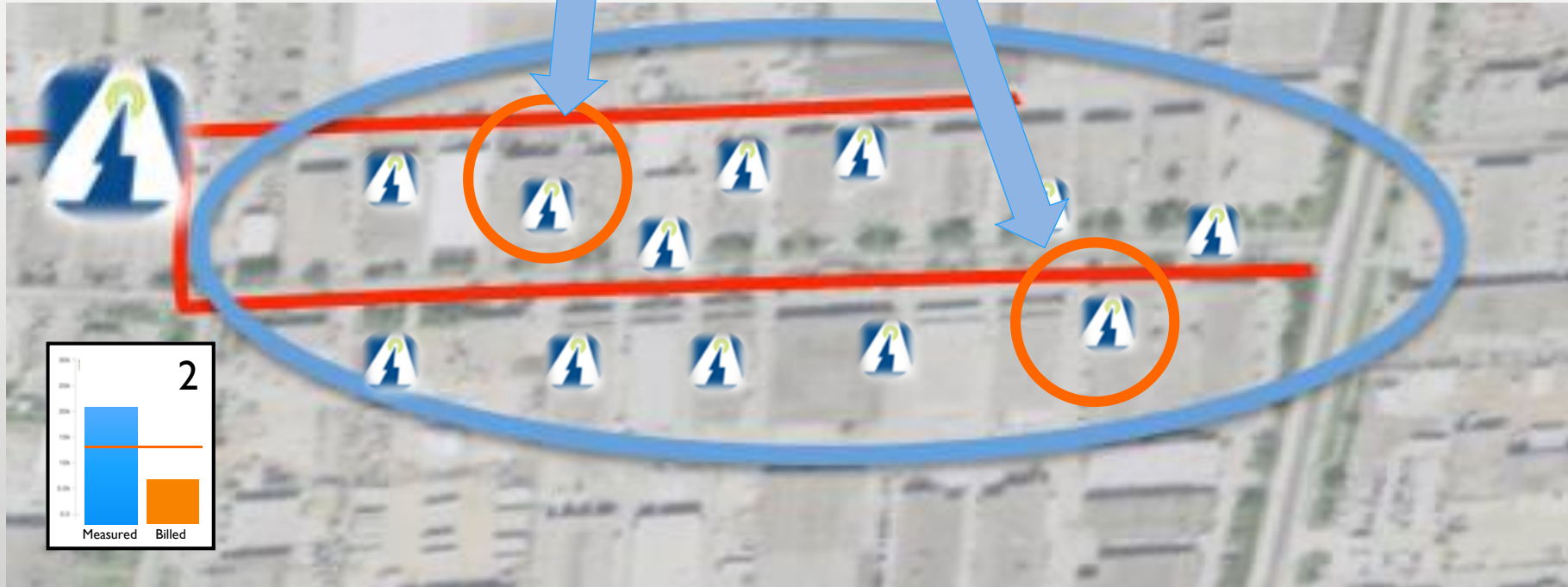


IN-GRID VISIBILITY



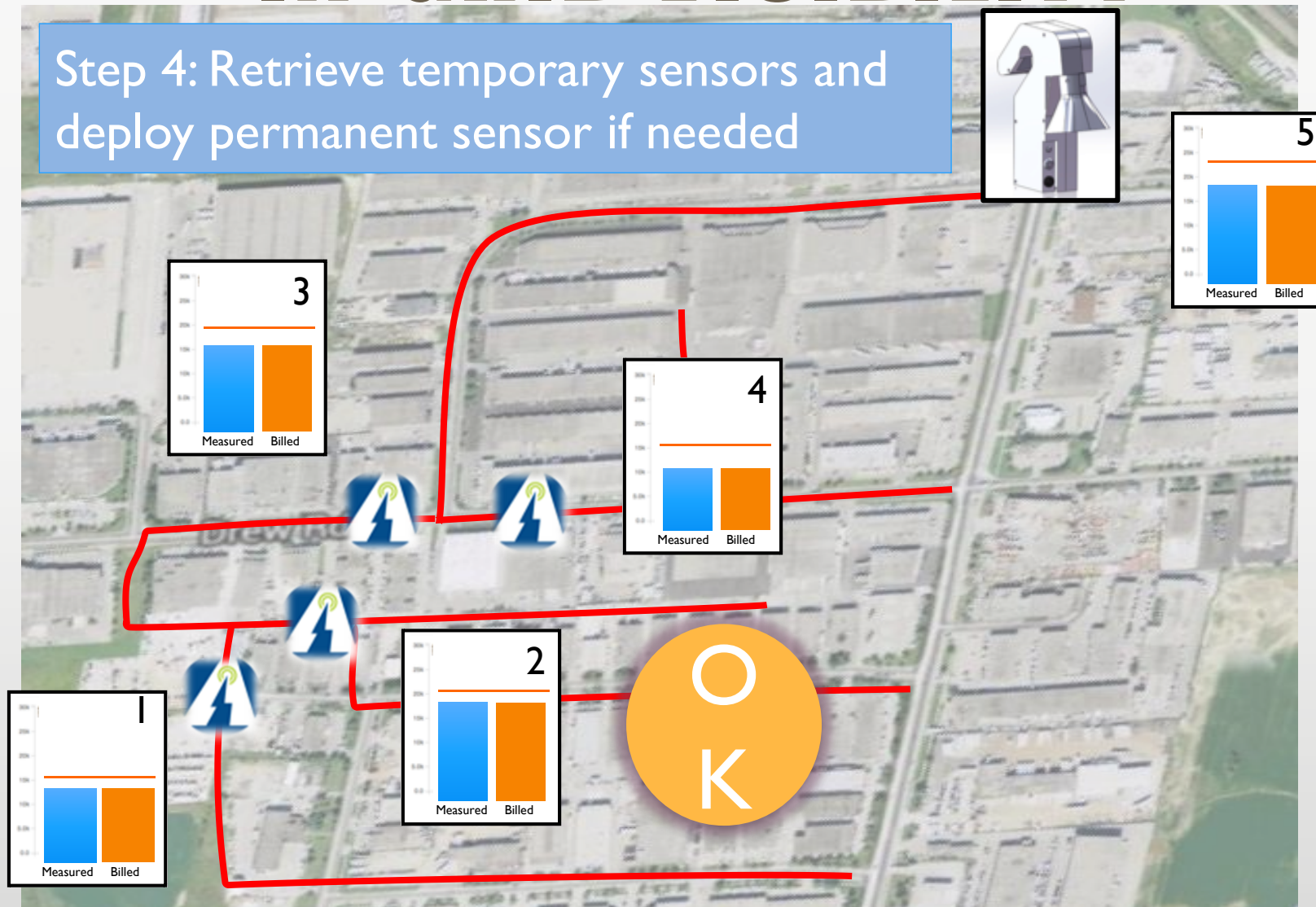
IN-GRID VISIBILITY

Step 3: Detailed Investigation
to pinpoint cause of loss

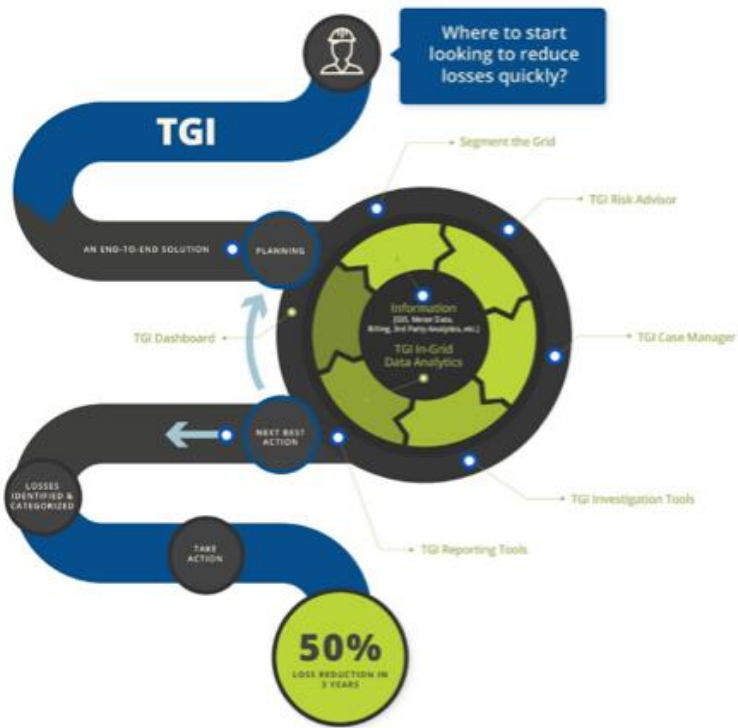


IN-GRID VISIBILITY

Step 4: Retrieve temporary sensors and deploy permanent sensor if needed



True Grid Intelligence (TGI)



The Methodology



The Hardware



The Software

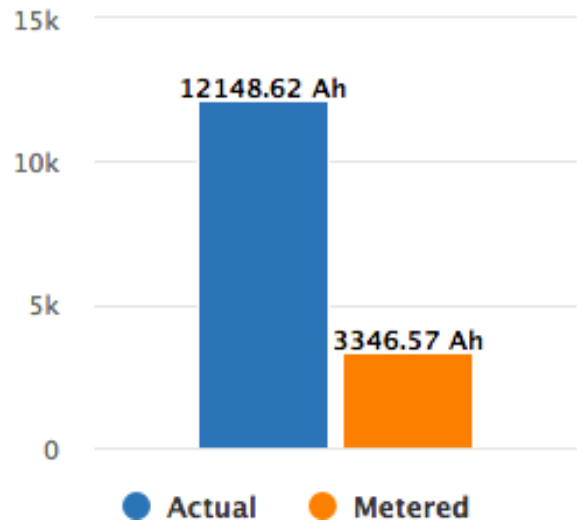


ANALYSIS – CURRENT BALANCES

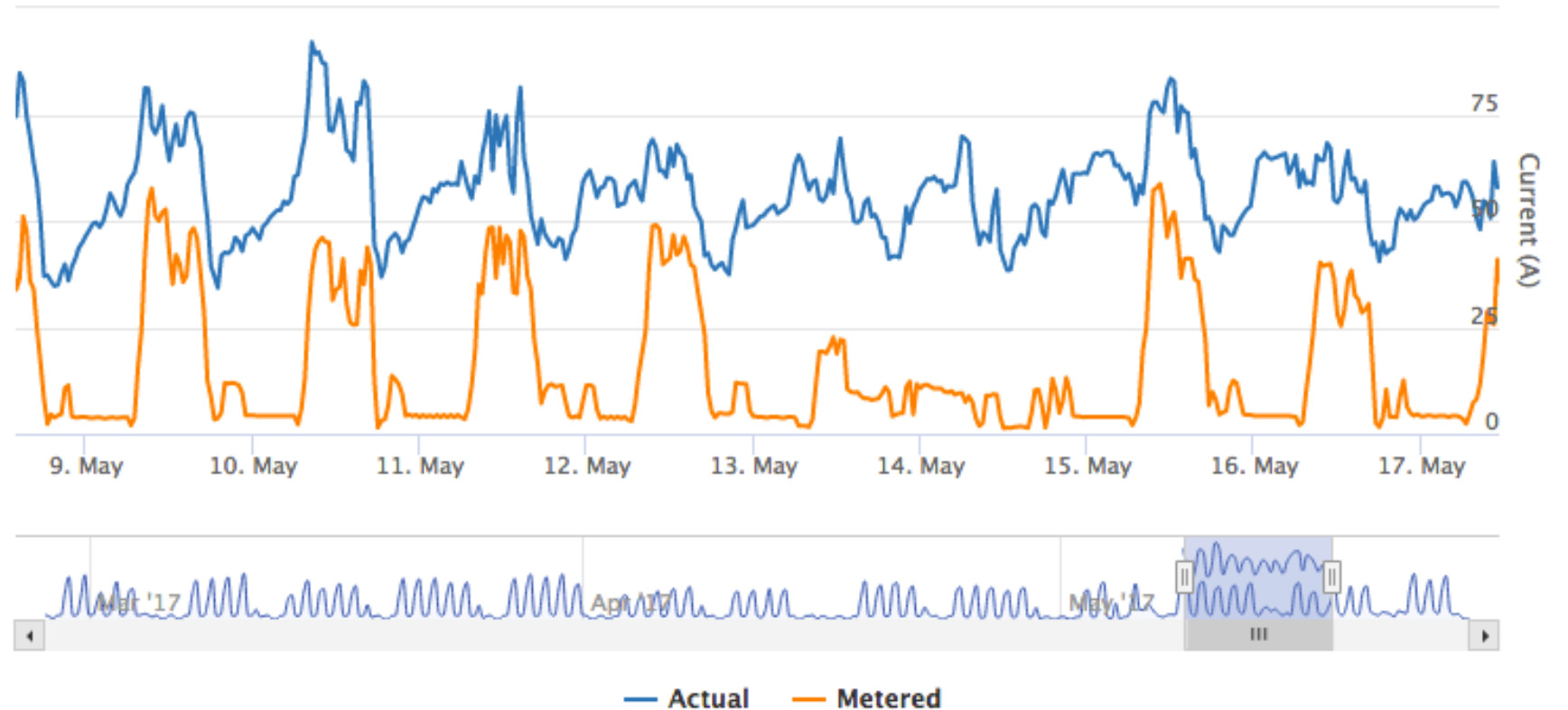
Selected duration: 8.89 days

Discrepancy:

- 8802.06 Ah
- 72.45 %
- 990.11 Ah/day



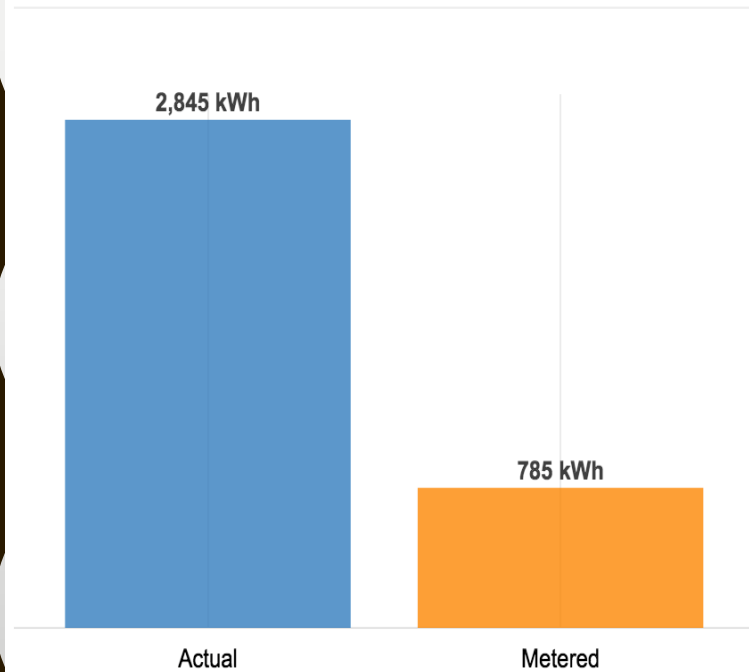
Zoom 1m 3m 6m YTD 1y All From May 8, 2017 To May 17, 2017



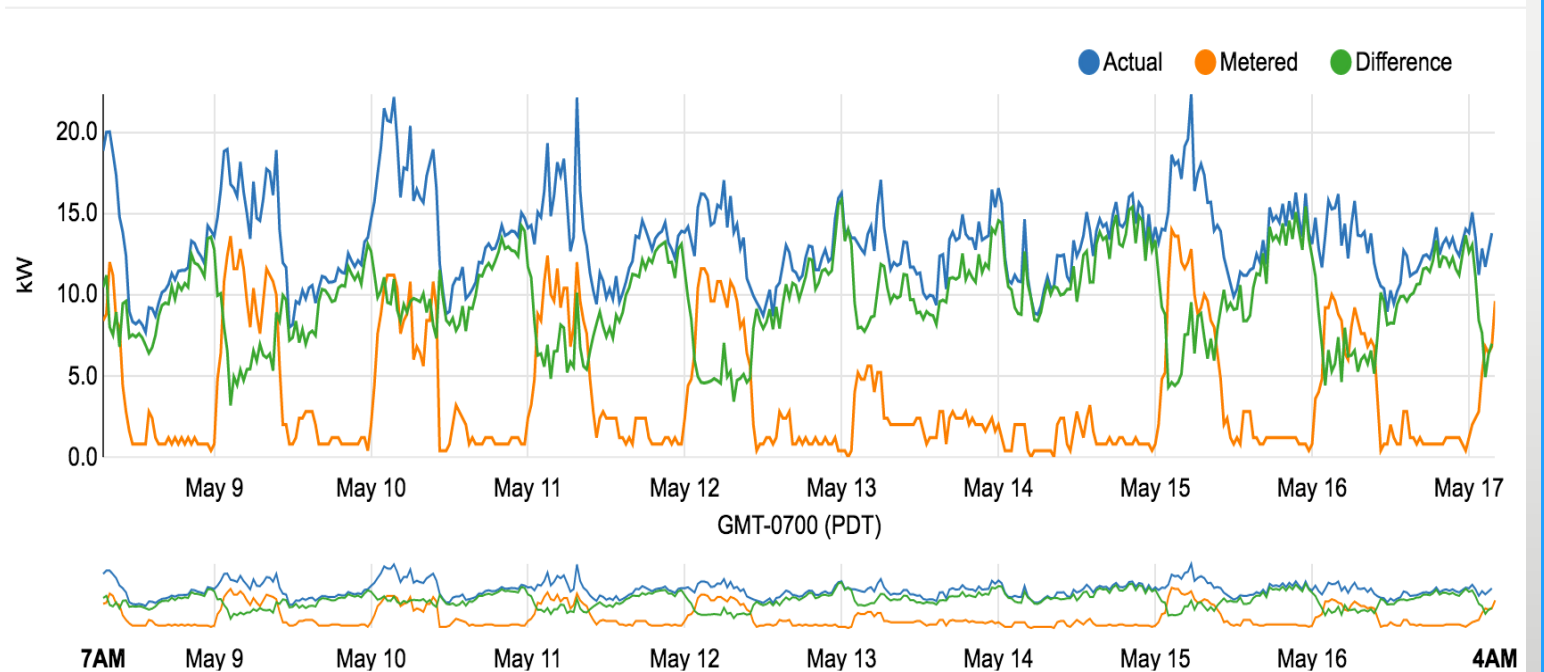
ANALYSIS – ENERGY BALANCES

2,060 kWh (72.4%) discrepancy : 231 kWh/Day (using 8.92 days of data out of 8.88 days)

Actual vs Metered



Profile



PROJECT RESULTS SUMMARY



6 Months

76 Detailed Customer Investigations

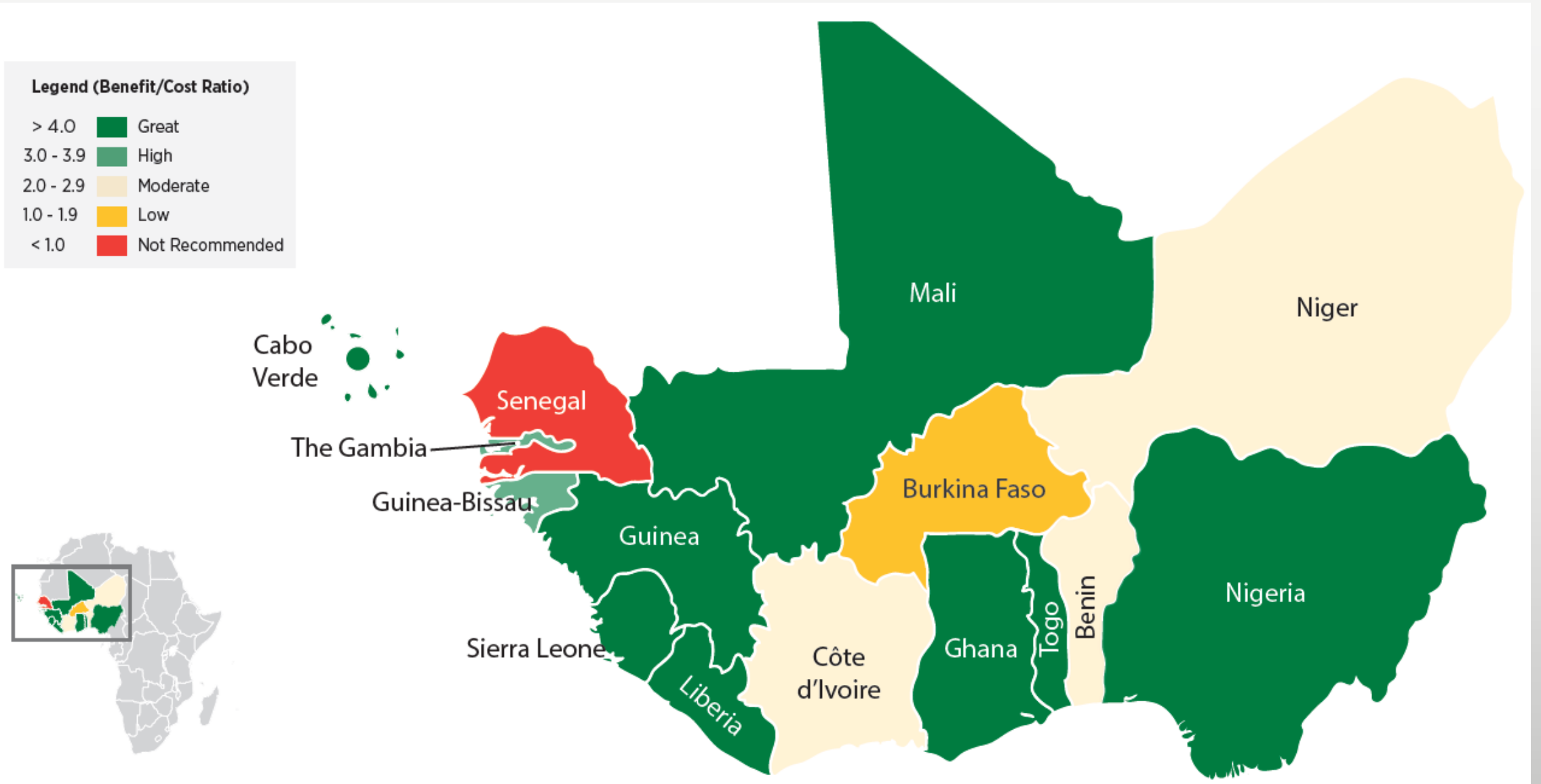
10 Investigations showed direct evidence of loss or suspicious consumption patterns

05 Investigations' Results were confirmed

> US\$1.5M Commercial Losses identified

351% Return on Investment

BENEFIT-COST ANALYSIS



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ONE OF WEDNESDAY'S ESEF PRESENTER



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THANK YOU.