ALCAP GROUP

ALCAP EDUCATIONAL DOCUMENT | ENERGY MANAGEMENT

Metering, Submetering, and Energy Data

How to design trustworthy measurement that reveals where, when, and why energy is used

Meters create visibility, but value comes from a measurement plan: clear questions, correct locations, suitable instruments, verified installation, reliable communications, governed data, and a process that turns exceptions into action.

WHAT YOU WILL LEARN

- How utility, check, and submetering roles differ
- What to define before selecting a meter
- Why CT ratios, polarity, timestamps, and data quality matter
- How dashboards and alarms support ongoing energy management

PRACTICAL. INDEPENDENT. DECISION-FOCUSED.

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01 | THE ESSENTIALS

Build the right mental model

Do not meter everything because it is technically possible. Meter the points that support decisions, allocate material use, verify projects, manage peaks, detect faults, or reconcile the site's energy balance.

Measurement hierarchy

Start at the utility incomer, then major distribution boards, processes, buildings, and critical equipment. Each layer should reconcile reasonably with the layer above after accounting for unmetered loads and losses.

Installation integrity

Meter accuracy depends on correct voltage references, current transformer ratio and class, polarity, phase association, wiring, scaling, time synchronisation, and commissioning against a reference.

Data system

Define sample and logging intervals, storage, naming, units, timestamps, missing-data rules, cybersecurity, access, ownership, backups, and change control. A dashboard cannot repair bad source data.

BEGIN WITH THE DECISION

Question -> measurement point -> quantity -> interval -> accuracy -> communications -> analysis -> action.

If the intended action is unclear, the meter risks becoming an expensive display rather than a management tool.

A QUICK REFERENCE

Question	Useful data	Typical action
What creates the peak?	15/30 min kW/kVA by feeder	Sequence or control
Where is base load?	Overnight end-use profiles	Shutdown and repair
Did a project save?	Baseline/reporting boundary	Verify and correct
Is power quality poor?	PQ logger/waveforms/events	Engineering study

02 | PUT IT TO WORK

Turn understanding into action

Create a metering plan and point schedule before procurement. Include purpose, electrical location, quantities, range, accuracy, interval, CT details, communications, naming, and responsible owner.

1. **Define use cases**
   List decisions, reports, alarms, allocations, verification, and compliance needs.
2. **Map the electrical hierarchy**
   Use a current single-line and identify material unmetered branches and reconciliation points.
3. **Specify and install**
   Match voltage, current, fault environment, accuracy, communications, enclosure, and safe isolation requirements.
4. **Commission the chain**
   Prove phase mapping, polarity, ratios, scaling, timestamps, data transfer, units, and dashboard calculations.
5. **Operate data quality**
   Assign owners for gaps, flat-lines, drift, clock errors, configuration changes, and periodic reconciliation.

ILLUSTRATIVE EXAMPLE: NEGATIVE POWER

A new submeter reports negative kW during normal import. The dashboard appears to show generation, but a CT polarity or phase-association error is likely. The point must be electrically commissioned before its data is used for cost allocation or savings.

A GOOD DECISION LOOKS LIKE

- Each meter has a named purpose and owner.
- The hierarchy reconciles within a defined tolerance and period.
- Alarms lead to a person, response time, investigation, and recorded closure.

03 | CHECKLIST AND NEXT STEPS

Use this before you proceed

[ ]	Define the question and intended action for each point.
[ ]	Use an up-to-date single-line and metering hierarchy.
[ ]	Specify quantities, range, accuracy, interval, CTs, and communications.
[ ]	Commission phase, polarity, ratios, units, clock, and data path.
[ ]	Document naming, ownership, access, retention, and change control.
[ ]	Reconcile submeters with upstream totals and investigate exceptions.

RED FLAGS

- A dashboard with no commissioning record
- Unknown CT ratio, polarity, or meter multiplier
- Unlabelled points or duplicated names
- Missing data silently treated as zero

PLAIN-LANGUAGE GLOSSARY

CT	Current transformer used to scale current for measurement.
Submeter	Meter below the main utility meter for an area or end use.
Interval data	Measurements stored at repeated time intervals.
Reconciliation	Comparison of lower-level totals with an upstream measurement.
Data gap	Expected time period with missing or invalid measurements.

SOURCES AND FURTHER READING

- U.S. DOE - Metering in federal buildings
- Better Buildings - Submetering resources
- U.S. DOE - Performance metrics tiers

IMPORTANT NOTE

This document is for general education only. It is not a substitute for a site assessment, electrical design, tariff review, safety study, or professional advice. Use the latest applicable standards, utility rules, municipal requirements, and manufacturer instructions. Work on electrical systems must be performed by suitably qualified and authorised persons.

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