From Energy Audits to Action: Advancing Energy Efficiency in Buildings in Mauritius

Day 1

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Session 1: Strengthening Energy Auditing Practices and Opportunities for Improvement

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Background & Context

Critical energy drivers in Mauritius:

IMPORT DEPENDENCY

Mauritius remains heavily exposed to volatile international markets due to a deep reliance on imported coal and petroleum for electrical generation.

COOLING DEMANDS

Importation of air-conditioning units is rising sharply, driven by climate trends and urbanization, placing immediate pressure on the national load curve.

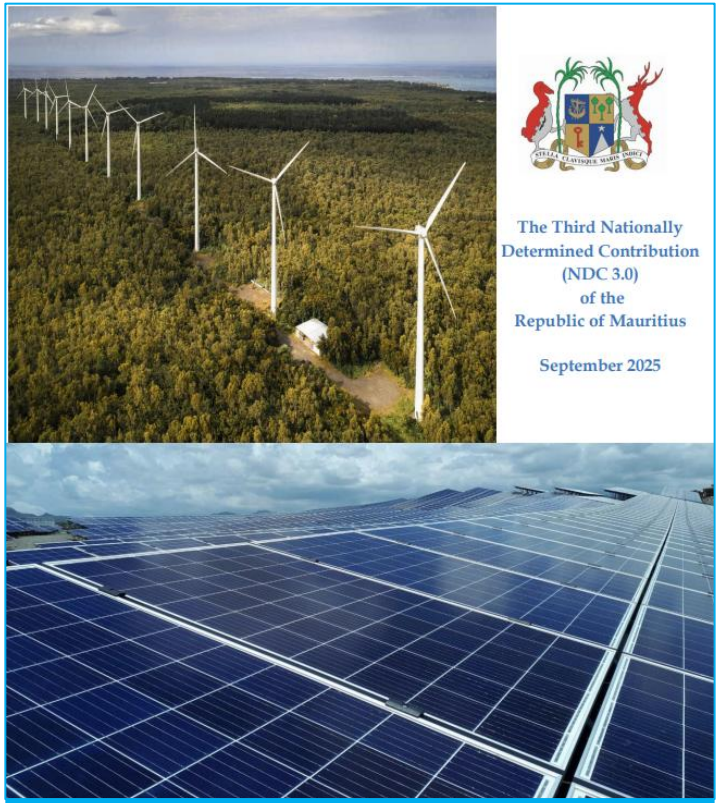
TARIFF SURGE

Global conflicts continue to stress fuel pricing, forcing a scheduled 15% Central Electricity Board tariff increase to pressure both household and business budgets (May 2026).

Background & Context

Regulatory mandates:

- **Energy Efficiency (Energy Consumer and Energy Audit) Regulations** 2017, under which EEMO oversees and enforces energy management practice among large consumers.
- **Public Sector Threshold**: Mandatory audit initiation for public-sector and government agencies exceeding 15 Toe / year.
- **Private Sector Threshold**: Mandatory compliance triggered for commercial and industrial entities exceeding 100 Toe / year.
- **ISO 50002 Standard**: All assessments must follow the ISO standard, ensuring a systematic, internationally recognized methodology.



10% energy efficiency improvement target
National economy-wide energy efficiency target by 2035 with 2019 as baseline under NDC 2025.

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Key Energy Conservation Measures Recommended in Energy Audits

Lighting

Upgrade current lighting stock with LEDs

HVAC

Upgrade split ACs with inverter AC units

Refrigeration

Upgrade current stock with higher efficiency units

Building envelope

Passive measures such as reflective paints for roof & window film

Controls

Installation of sensors and energy management systems

Other

Power factor monitoring and installation of solar heaters

Lighting: Shifting from Rules-of-Thumb to Rigorous Calculations

Common Auditing Practice

- **Assumed Baselines:** Auditors tend to introduce analytical bias by assuming identical operating profiles across similar facilities without verification.
- **Simplified Upgrades:** Retrofit planning commonly defaults to standard 1:1 capacity replacement without calculating actual luminaire output requirements.
- **Generalized Savings:** Energy savings projections can potentially rely on rules-of-thumb rather than calculations.

Good Practice

- **Verified Baselines:** Conduct structured building user interviews to construct precise, location-specific operating patterns and schedules.
- **Lumen-Equivalent Design:** Formulate efficiency designs based on exact lighting service needs rather than legacy energy footprint.
- **Validated Tool Calculations:** Deploy trusted analysis tools, such as the UNEP CCC Lighting Tool, to model and verify energy savings.

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HVAC: Where Estimates Need More Rigor

Common Auditing Practice
• **Uniform HVAC Assumptions:** Usage assumptions are applied uniformly across different building spaces (e.g., labs and standard offices) for inverter and non-inverter type units. • **Limited Assessment of Benefits**: Inverter AC replacements are commonly recommended, but potential energy savings are not always quantified or rely on rules-of-thumb to estimate savings. • **Inverter AC Recommendations Need Better Evidence:** In many cases, limited assessment is undertaken to evaluate whether a shift from non-inverter to inverter technology is technically and economically warranted.

HVAC: Where Estimates Need More Rigor

Good Practice

- **Record SEER or COP from nameplate:** To estimate the energy consumption of new AC units, identify comparable models with high energy-efficiency ratings (typically A or A+ labels) and use their SEER (Seasonal Energy Efficiency Ratio) and COP (Coefficient of Performance) values to calculate expected performance under similar operating conditions

$$Energy\ consumption\ of\ the\ new\ AC\ units\ (kWh) = AC\ stock * Operation\ hours\ (h) * cooling\ capacity\ required\ (kW)/\ (SEER\ *0.5)$$

- **It is also advised to conduct a case-specific techno-economic sense-check of whether switching to inverter AC systems is actually necessary.**

Refrigeration: Enhancing Transparency in Analysis

Common Auditing Practice
Lack of transparency: Auditors can sometimes do not clearly specify the assumptions used to estimate energy consumption of refrigerators • This can lead to discrepancies in whether the refrigerator is assumed to operate continuously throughout the year or under variable duty cycles • Differences may arise depending on application type (commercial, residential, or medical storage), due to varying usage patterns and temperature requirements • Energy savings estimates in ECMs can be unclear when replacing end-of-life units with higher-efficiency models

Refrigeration: Enhancing Transparency in Analysis

Good Practice

- To calculate annual energy consumption of refrigerators, operating hours can be determined based on established best practices. Table below provides an example of the Equivalent Full Load Hours (EFLH) for general purpose and medical storage refrigerators:

Usage type	EFLH (hours)
Residential Family (middle usage)	2700-3400
Residential family (high usage)	3500-3750
Medical storage (steady temperature, middle usage)	4500-5000
Medical storage (steady temperature, high usage)	5000-5200

- To estimate the energy savings potential from replacing existing stock with energy-efficient units, an A+ labelled refrigerator with equivalent storage volume is identified. Annual energy consumption is derived using the corresponding labelled performance data of the comparable unit. The latest EEMO refrigeration energy efficiency labelling database can be used as a reference for this analysis for Mauritius.

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Common Challenges in Energy Audit Practices

Missing or incomplete payback analysis

Payback periods vary widely. Often unclear whether implementation costs include labour, installation, and dismantling. Some ECMs presented without any payback information.

Lack of calculation transparency

Methodology for savings estimates not documented. Results cannot be reproduced or independently verified by the client or a financier.

Baseline not calibrated to metered data

Models built on interview-based assumptions without formal calibration to CEB billing data. Identical assumptions sometimes applied across different buildings.

Equipment data gaps

SEER/COP of AC units not recorded. Equipment age and installation date absent. Refrigerator type (medical vs. general) not specified.

Key Takeaways and Recommendations

1 Verify AC replacement capacity against actual load

Replacement capacity should be checked against actual operational needs, including occupancy, equipment loads, infiltration, and solar heat gains.

2 Switch to lumen-based LED replacement

Select LED fixtures to match luminous flux of existing fitting, not wattage. Can consider using established tools such as the UNEP CCC lighting tool as a basis.

3 Record SEER/COP during site walkthrough

Capture from nameplate or technical spec for every AC unit. Flag unreadable nameplates in the report.

4 Calibrate baseline to ≤5% of CEB monthly billing

Use 24 months of CEB data including the year the audit is being conducted. Document anomalies (holidays, atypical operations).

5 Rank ECMs for decision making

To facilitate informed decision-making, ECMs could potentially be prioritized through a ranking system

6 Submit supporting calculation files

Detailed Excel workbooks documenting methodology, assumptions and data sources must accompany every audit submission.

Better audits → stronger business cases → bankable energy efficiency projects for Mauritius

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