



ALCAP EDUCATIONAL DOCUMENT | ENERGY COST

Time-of-Use Tariffs and Load Shifting

How to move flexible electricity use to lower-cost periods without losing control of demand or operations

Time-of-use tariffs assign different energy rates to defined periods and seasons. Load shifting can reduce cost by changing when electricity is used, but the full tariff and resulting demand profile must be modelled.

WHAT YOU WILL LEARN

- How peak, standard, and off-peak energy periods work
- The difference between load shifting and energy efficiency
- Which loads are usually flexible
- How to test cost, demand, production, and rebound effects

PRACTICAL. INDEPENDENT. DECISION-FOCUSED.

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01 | THE ESSENTIALS

Build the right mental model

A time-of-use schedule is a price map. It does not change the physical kWh required by a process; it changes the price applied according to time. Period definitions can vary by tariff, season, day type, and supplier.

Shift, shed, or save

Shifting moves energy to another time. Shedding temporarily reduces load. Efficiency reduces energy needed for the same service. A project may combine all three, but the benefits must not be double counted.

Flexible loads

Thermal storage, water heating, pumping, charging, refrigeration, compressed air, batch processes, and non-critical support systems may offer flexibility when storage or process margins exist.

Constraints

Quality, safety, staffing, noise, product temperature, storage capacity, start-up demand, maintenance, and upstream/downstream dependencies set the real operating window.

COST MODEL

Shift value = energy moved x (original rate - new rate), adjusted for losses, demand effects, operating cost, and any rebound. Use the actual tariff calendar and current approved rates.

A QUICK REFERENCE

Opportunity	Enabler	Watch for
Water pumping	Reservoir/storage	Level, hygiene, demand
Cooling	Thermal mass/storage	Temperature and rebound
Battery charging	Controls and capacity	Losses and cycle cost
Batch production	Schedule flexibility	Labour and bottlenecks

02 | PUT IT TO WORK

Turn understanding into action

Start with interval data overlaid on the correct time-of-use calendar. Then screen loads for controllability and operational storage before changing schedules.

1**Map the tariff**

Create a calendar of seasons, day types, and peak, standard, and off-peak windows.

2**Overlay interval data**

Allocate every kWh and demand interval to the correct tariff bucket.

3**Screen flexible loads**

Estimate power, duration, controllability, storage, and operational constraints.

4**Simulate the new profile**

Include start-up, rebound, efficiency losses, demand charges, and production impacts.

5**Pilot and automate**

Test on selected days, add safeguards, document overrides, and verify bills.

ILLUSTRATIVE EXAMPLE: THERMAL PRE-COOLING

A facility pre-cools a controlled space before a high-price window, then reduces compressor load during the peak period. Success depends on thermal storage, product limits, weather, controls, and whether the rebound creates a new demand peak.

A GOOD DECISION LOOKS LIKE

- The analysis uses the current tariff calendar and interval data.
- Production, safety, and quality constraints are expressed as control limits.
- Savings include losses, labour, maintenance, and demand interactions.

03 | CHECKLIST AND NEXT STEPS

Use this before you proceed

- [] Obtain the complete current tariff schedule and definitions.
- [] Validate season, day-type, holiday, and clock settings.
- [] Identify flexible loads and the service they provide.
- [] Quantify storage capacity and acceptable operating limits.
- [] Simulate energy, demand, and rebound before implementation.
- [] Install monitoring, alarms, and a documented manual override.

RED FLAGS

- Assuming every nighttime kWh is cheaper
- Shifting energy but creating a higher billed demand
- Ignoring efficiency losses or battery degradation
- Automating a schedule without process safeguards

PLAIN-LANGUAGE GLOSSARY

TOU	Time-of-use tariff with defined price periods.
Peak	A tariff period assigned a relatively high rate.
Load shifting	Moving electricity use from one time to another.
Rebound	Increased load after a curtailment or pre-conditioning event.
Thermal storage	Using heat or cooling capacity to move electrical demand in time.

SOURCES AND FURTHER READING

- Eskom - Tariff and TOU reference information
- Eskom - Use electricity smartly
- U.S. DOE - Evaluating utility rate options

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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