

Arbitrage Window and Thresholds (decision record)

This page records how the nightly TOU arbitrage window and battery thresholds at Sezibwa (gw-pi2) were chosen and changed. For the running night-by-night results see the [Arbitrage Tracker](#). The engineering record is ADR-016 in the microgrid-gateway repository.

Current settings (from 30 Sep 2026)

Setting	Value
Discharge window	21:00 to 23:00 (config v17, microgrid-gateway PR #77)
Start threshold	75% battery at window start, otherwise skip the night
Floor	45% , stop discharging when reached
Recharge	from the grid at the off-peak rate from 00:00 (unchanged)

How the thresholds are enforced. Until now, the 75% start rule and the 45% floor were enforced by hand, by deploying a "disarm" config and later a "re-arm" config. That meant a change and a deploy after every outage day. It stops now:

- The edge software will enforce both rules itself: skip the night if the battery is low at 21:00, stop at 45%, and resume the next night automatically. The work is tracked in microgrid-gateway issue #78.
- Until that is live, the window stays armed every night and nobody switches it off by hand. The inverter's own protections still apply (it switches the load to the grid at 10% when the grid is present, and cuts the load at 48.8 V).

Why 21:00 to 23:00

Site load inside each candidate window, over 75 to 77 nights (1 Jul to 28 Sep 2026). Battery use is corrected for the two real nights, which used about 20% less charge than the load alone predicts.

Window	Average load	Heavy night (1 in 10)	Ends at, from a typical 86% start	Heavy nights ending below 45%	Ends at, from a 75% start
21:30 to 23:30 (previous)	3.5 kWh	4.5 kWh	59%	0%	48%

Window	Average load	Heavy night (1 in 10)	Ends at, from a typical 86% start	Heavy nights ending below 45%	Ends at, from a 75% start
21:00 to 23:00 (chosen)	3.8 kWh	4.8 kWh	57%	4%	46%
21:00 to 23:30	4.4 kWh	5.3 kWh	53%	9%	42%
22:00 to 23:59	2.9 kWh	4.0 kWh	about 64%	0%	about 53%

21:00 to 23:00 shifts slightly more energy than the previous window and stays clear of the floor on normal nights. 21:00 to 23:30 adds little energy, and from a 75% start it would end below the floor on most nights.

Typical start level. On normal evenings the battery is at about 86% at 21:00. It is lower only after a daytime outage (27 and 29 Sep started at 65% and 61%).

Outage timing. Of 14 outages seen from 25 Aug to 30 Sep (grid absent at least 30 minutes), 2 started between 21:00 and 06:00. The battery is refilled by about 01:30 after each night's discharge.

Value

Each kWh shifted from the peak rate (666.5 UGX) to the off-peak rate (429.7 UGX, at 90% round trip) saves about 189 UGX. Across the options above, arbitrage is worth roughly 15,000 to 20,000 UGX a month. The larger saving is solar (see "Solar Sizing Re-run, Sept 2026").

History

Date	Config	Change
26 Sep	v12	First armed night, 22:00 to 23:59
27 Sep	v13	Off after the overload outage (battery 65%)
28 Sep	v14	Window 21:30 to 23:30
29 Sep	v15	Off after the morning outage (battery 61%)
30 Sep	v16	Re-armed 21:30 to 23:30
30 Sep	v17	Window 21:00 to 23:00, start 75%, no more manual switch-offs