RBC – Demand Daily Safety Net v1.1

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Design Framework: DAI + RBC Framework v5.85 (October 2025)
Change Reference: Documentation – Detailed Design Creation (No behavioural change).

1. Functional Overview

Late-night guard at 23:55 for the **Demand Daily** bias. If the primary Bias Producer has not processed today (period key mismatch), this automation performs a one-shot EWMA bias update using the same maths and clipping as the Producer, stamps the period key, writes the bias helper, logs the outcome, and notifies the Pixel 9 Pro device. If the estimate is not ready (≤ 0), it skips and notifies. No events are fired.

2. Entity Map

Entity ID / Var	Purpose	Direction
input_text.rbc_last_period_demand_daily	Last processed period key (YYYY-MM-DD)	Read/Write
input_number.rbc_bias_demand_daily	Stored Demand Daily bias (kWh)	Read/Write
sensor.brenchley_load_today	Actual daily demand (kWh) for today	Read
input_number.dai_expected_usage_daily_kwh	Daily demand estimate (kWh)	Read
notify.mobile_app_pixel9pro	Notification target for safety messages	Send
alpha = 1 − 0.5^(1/4)	EWMA weight (half-life 4 days)	Compute
clipped_residual ∈ [−30, +30]	Residual clamp (kWh)	Compute
period_key = now().date()	Today's date (YYYY-MM-DD)	Compute

3. Trigger Matrix

Trigger ID	Condition	Purpose
t_2355	Time = "23:55:00"	Run safety check shortly before midnight

4. Logic Flow

1. Compute period_key = today's date and fetch last_period from input_text.rbc_last_period_demand_daily.

2. Read actual (kWh) from sensor.brenchley_load_today and estimate (kWh) from input_number.dai_expected_usage_daily_kwh.

3. If last_period != period_key AND estimate > 0:

4. a) residual = actual − estimate.

5. b) clipped_residual = clip(residual, −30, +30).

6. c) alpha = 1 − 0.5^(1/4) (i.e., half-life ≈ 4 days).

7. d) new_bias = alpha*clipped_residual + (1 − alpha)*prior_bias.

8. e) Write new_bias (rounded 2 dp) to input_number.rbc_bias_demand_daily.

9. f) Stamp input_text.rbc_last_period_demand_daily = period_key.

10. g) Logbook entry with full calculation summary.

11. h) Notify Pixel 9 Pro that the Safety Net applied the update.

12. Else if last_period != period_key AND estimate <= 0:

13. • Log skip and notify Pixel 9 Pro to investigate Producer/Estimator.

14. Else:

15. • Log no action (already processed for today).

5. Guards and Safety

• Runs once per day at 23:55; uses `mode: single` to avoid overlap.

• No inverter writes; helper updates and text stamping only.

• Residual is clipped to ±30 kWh to prevent extreme bias jumps.

• Estimate must be > 0 to perform an update, preventing invalid maths.

• Produces clear logbook records and a mobile notification for auditability.

6. Scheduling

Single time trigger at 23:55. Positioned to run after the Producer's typical window but before midnight rollover.

7. Acceptance Tests

Test ID	Scenario	Expected Result
T1	Producer missed today; estimate valid (>0)	Bias updated; period stamped; logbook + notification sent.
T2	Producer missed today; estimate invalid (≤0)	Skip with logbook + notification advising investigation.
T3	Producer already ran	No action; logbook states already processed for today.
T4	Large residual magnitude	Residual clipped to ±30; update uses clipped value.

8. Version Lineage & Governance

v1.1 – Safety Net aligns with Demand Daily Producer maths: EWMA with half-life ≈ 4 days and residual clipping ±30 kWh; includes notification.

Governance: Protected Architecture Mode v5.9; Two-Phase Code-Change Gate v2.2. This document captures the live YAML behaviour; no changes introduced.

9. YAML Reference (Read-Only Excerpt)

trigger: "23:55:00"
vars: period_key, last_period, actual, estimate, prior_bias, alpha = 1 − 0.5^(1/4)
if (last_period != period_key) and (estimate > 0): new_bias =
alpha*clip(actual−estimate,±30) + (1−alpha)*prior_bias; write bias; stamp period; log; notify.
elif estimate <= 0: log skip; notify.
else: log already processed.

10. Compliance Checklist

✅ Entity ↔ ID alignment confirmed: rbc_last_period_demand_daily, rbc_bias_demand_daily, brenchley_load_today, dai_expected_usage_daily_kwh.

✅ Trigger has ID; Visual-Editor-safe structure; default logging path present.

- ✅ No inverter writes; Master-only rule unaffected.
- ✅ Notification target present: notify.mobile_app_pixel9pro.
- ✅ Bias maths and clipping documented; half-life rationale included.