

DAI – RBC Evening Bias Producer v1.0

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Design Framework: DAI + RBC Framework v5.85 (October 2025)

Change Reference: CR013 – Evening Buffer RBC Learner (Pre-1 PM Execution)

1. Functional Overview

This automation executes nightly after the 16:00–22:00 Active Period to run the RBC Update Bias blueprint script instance for the Evening domain. The script computes the smoothed bias ($\Delta = \text{Actual} - \text{Forecast}$) using EWMA logic and stores the result in `input_number.rbc_evening_bias_kwh`. This producer ensures the blueprint runs exactly once per day at 23:40 and again on HA restart if the system reboots after 22:10.

2. Entity Map

Entity ID	Purpose	Direction
<code>script.rbc_update_bias_evening_16_22</code>	Blueprint script that performs EWMA bias calculation	Execute
<code>input_text.rbc_last_period_evening_demand</code>	Last processed period record (blueprint idempotence)	Read/Write
<code>input_number.rbc_evening_bias_kwh</code>	Helper where bias value (kWh) is written	Write

3. Trigger Matrix

Trigger ID	Condition	Purpose
<code>t_2340</code>	Time = 23:40	Primary daily run after Active Period closure
<code>t_ha_start</code>	Home Assistant Start (after 22:10)	Re-run blueprint if HA restarted overnight

4. Logic Flow

1. At 23:40, invoke the RBC – Update Bias (Evening 16–22) blueprint script via service call.
2. The blueprint reads Actual and Forecast 16–22 helpers, computes $\Delta = \text{Actual} - \text{Forecast}$.

3. Applies EWMA smoothing (half-life = 4 days, clip = $0.5 \times$ Estimate, limit ± 25 kWh).
4. Updates input_number.rbc_evening_bias_kwh and logs via its internal mechanism.
5. HA-start guard checks system time > 22:10 before executing to prevent premature runs.

5. Guards and Safety

- No inverter writes – limited to blueprint and helper updates.
- HA-start guard ensures runs only after Active Period ends.
- Single-mode execution to avoid duplicate calls.
- EWMA smoothing and outlier clipping handled by blueprint (safety bound ± 25 kWh).
- Logbook entries generated at each successful execution.

6. Scheduling

The automation runs at 23:40 daily and on HA-start (if current time \geq 22:10). This ensures bias is always updated once per day and recovered after reboot.

7. Acceptance Tests

Test ID	Scenario	Expected Result
T1	Normal nightly run at 23:40	Bias helper updates with new value; log entry recorded
T2	HA-start after 22:10	Blueprint executed automatically; no duplicate runs
T3	HA-start before 22:00	No execution; guard prevents early bias update
T4	Blueprint unavailable	Automation logs error message; no crash
T5	Bias unchanged (stable)	Helper retains last value; no unexpected reset

8. Version Lineage & Governance

v1.0 – Initial release under CR013 – Evening Buffer RBC Learner (Pre-1 PM Execution).
 Implements nightly call to the RBC blueprint script with HA-start guard. Governed under DAI Project Instructions §21 and §24 (Protected Architecture Mode).