TRUST.SUPPLY · VALIDATOR ECONOMICS · MODEL RECALIBRATION

Validator efficiency: old model vs. live data

by trippledutch

Why the dashboard's EVLS / per-node projections diverged from reality, and what the on-chain data now says.

Prepared 23 Jun 2026 · sources: 15 validator monthly summaries (3-132 nodes), network node/validator counts, Daily Validations Cap-vs-Fulfilled chart

01 Executive summary

The dashboard's validator model assumed two size effects: a baseline of ~**4.9 validations / node / day** and an **EVLS penalty** that grew with validator size (-10% at 100 nodes, -44% at 221). Live data from 15 validators shows neither holds today. Post-fix, every validator from **3 to 132 nodes earns the same ~7.64 val/node/day**, governed by one relationship: **per-node = network demand cap / total nodes**.

Metric	Value
Val/node/day now (all sizes)	7.64
vs old 100-node model	+71%
Actual EVLS penalty	0%
MNW / validation (unchanged)	0.10

The one-line takeaway

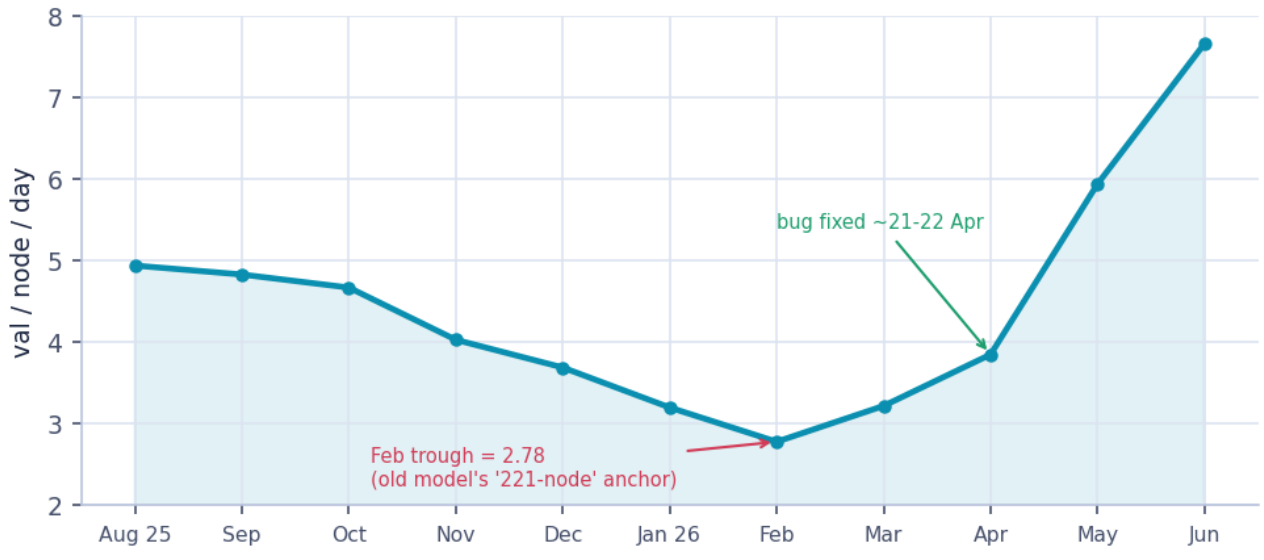
The "efficiency increase" was not a new feature and not a size effect. A bug had been suppressing how many of the available validations the network could fulfil since ~Aug 2025; it was fixed around **21-22 Apr 2026**, snapping fulfilment back to the demand cap. Combined with the validator count falling to an all-time low (76), each remaining node now captures a much larger slice of a **fixed cake**.

What it costs and what it means

Over the nine-month bug window the network missed roughly **1.25 million validations (~125,000 MNW)** in unpaid rewards, about **316 per node** (~20-25% of potential). Today's high per-node rate is partly a **scarcity premium** from the shrunken network: it compresses if nodes return, and rises as demand grows - June demand has already lifted the daily cake to ~22,497/day, past the old ~20,000 ceiling. Efficiency is confirmed flat only to 132 nodes; 200-500 node behaviour is not yet measured.

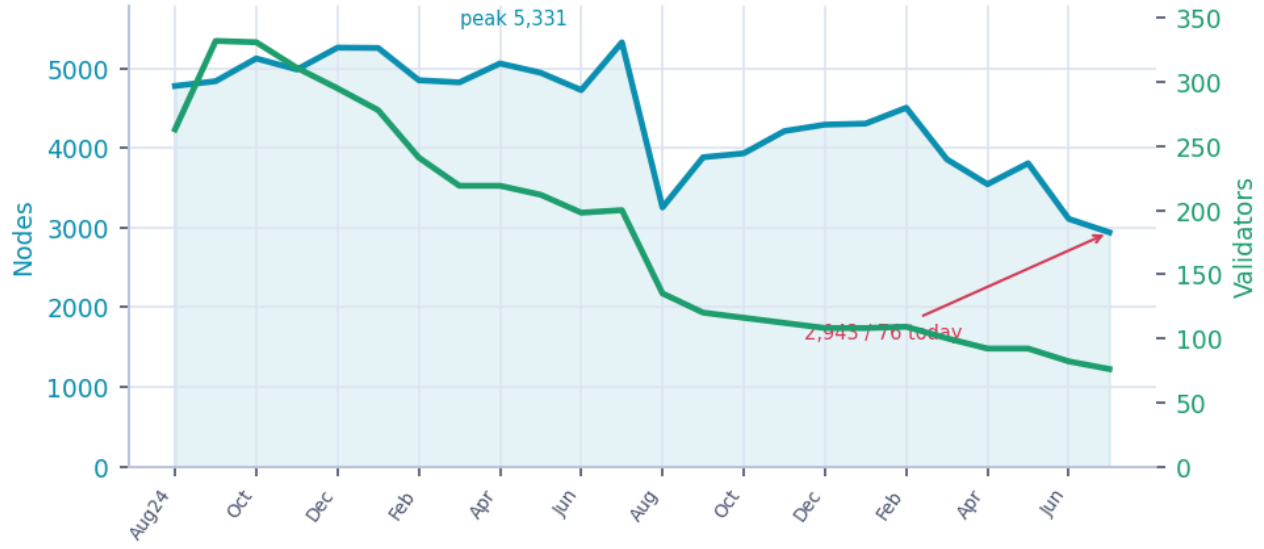
02 What actually happened

Demand (the cap) stayed flat at ~20,000/day. Fulfilled validations tracked it until ~Aug 2025, then decayed to ~10,000 by Apr 2026 as a bug throttled throughput, then snapped back to the cap on ~21-22 Apr 2026 when fixed. The same shape shows in val/node/day: a long decline to a **Feb 2026 trough of 2.78**, then a sharp **May-Jun jump to ~7.64**.



Per-node throughput over time - representative 132-node validator

How to read: the slide from ~4.9 to the 2.78 trough is the bug worsening; the May-Jun rise is the fix, amplified by fewer nodes sharing the work.

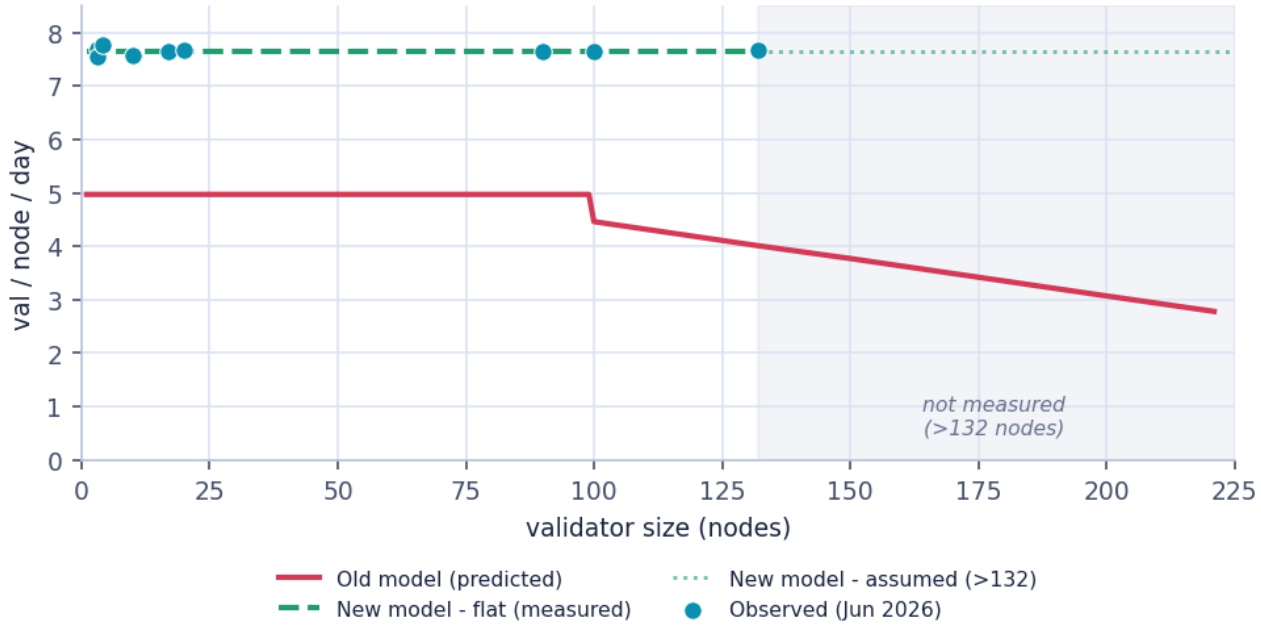


Network shrinkage - total nodes and validators

How to read: nodes (left axis) and validators (right axis) both fell to all-time lows (2,943 / 76), which is why each surviving node now earns more of the same fixed cake.

03 The key finding: efficiency is flat across all sizes

Fifteen validators across a 44x size range (3 to 132 nodes) all land at the same per-node rate. The old model predicted a steep decline with size; the data is a flat line.



Val/node/day vs validator size - old model vs observed

How to read: red is the old prediction; cyan dots are real validators on a flat line, so the size penalty does not exist. The shaded zone above 132 nodes is not yet measured.

Validator	Nodes	May 2026	Jun 2026	Reward/val
A	3	5.97	7.70	0.10
B	3	5.93	7.55	0.10
C	4	6.03	7.76	0.10
D	10	5.91	7.57	0.10
E	17	5.98	7.65	0.10
F	20	5.99	7.66	0.10
G	90	5.95	7.64	0.10
H	100	5.99	7.65	0.10
I	132	5.94	7.66	0.10
Mean	-	~5.97	~7.64	0.10

Disclaimer: validators above 132 nodes

Measurements span **3 to 132 nodes**. We have not sampled **200-500 node** validators, so we cannot guarantee they get the same ~7.64 val/node/day. The flat rate is confirmed only up to ~132 nodes; beyond that it is an extrapolation (dotted line / hatched bar in the charts).

04 Old model vs. new model

Parameter	Old model	New (data-driven)
Baseline val/node/day (<=100)	4.90 - 4.97	7.64 (= cake / nodes)
EVLS penalty	-10.26% @100, -0.279%/node	0% - flat to >=132 nodes

Parameter	Old model	New (data-driven)
Val/node/day @132 nodes	4.01	7.66
Network-size scaling	sqrt(4,338 / nodes)	linear: cake / nodes
Total network validations	scale up with network	limited by demand (~22.5k/day)
Active nodes baseline	4,338	2,943
Active validators baseline	108	76
Reward / validation (12-mo)	0.10	0.10 (unchanged)
Stake / node	1,800 MNW	1,800 (unchanged)

Val/node/day - old model vs observed, by size

How to read: the gap widens with size, so the old model most badly understated large validators. The hatched 200-node bar is assumed, not measured.

Metric (per node, 12-mo)	Old	New	Change
Val/node/day (@100 nodes)	4.46	7.64	+71%
Annual validations / node	1,628	2,789	+71%
Annual MNW / node	162.8	278.9	+71%
MNW yield on 1,800 stake	9.0%	15.5%	+72%
Break-even nodes / VPS @ $0.062	~8	~4	easier
Val/node/day @132 nodes	4.01	7.66	+91%

05 Why the old and new results differ

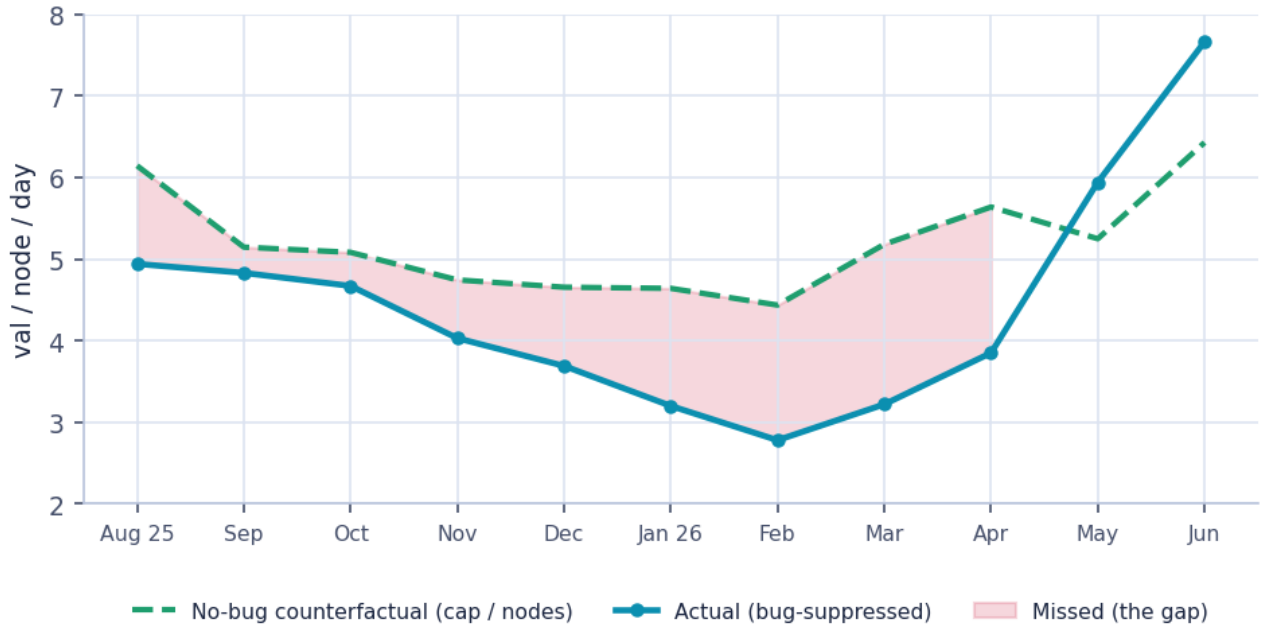
Root cause: a time-based bug was mis-modelled as a size-based penalty

The old EVLS curve was calibrated on two anchors: 4.9662 val/node/day and 2.78 ("221 nodes, -44%"). But a single 132-node validator sat at 4.94 in Aug 2025 and decayed to exactly 2.78 by Feb 2026. Those are the same validator at two points in time, during the bug's decline. The model mistook **throughput decay over time** for a **penalty that grows with size**.

- **The bug (and its fix).** Fulfilment fell from ~20k to ~10k/day, then was restored ~21-22 Apr 2026.
- **Network shrinkage.** Nodes halved (5,331 to 2,943), validators fell to 76. With a fixed cake, each remaining node's slice grew.
- **Demand is the ceiling, not supply.** Validations come from query demand (~22.5k/day), not node count. The ceiling is not a hard limit: June demand already grew past the old ~20k/day, and more queries grow the cake and lift per-node.

06 Validations missed to the bug

Without the bug, each node would have validated at **cap / nodes** per day. The shortfall vs that counterfactual, summed Aug 2025 to Apr 2026, is the missed total (estimate: cap ~20,000/day; month-start node snapshots; April blended).



Per-node: actual vs no-bug counterfactual (shaded gap = missed)

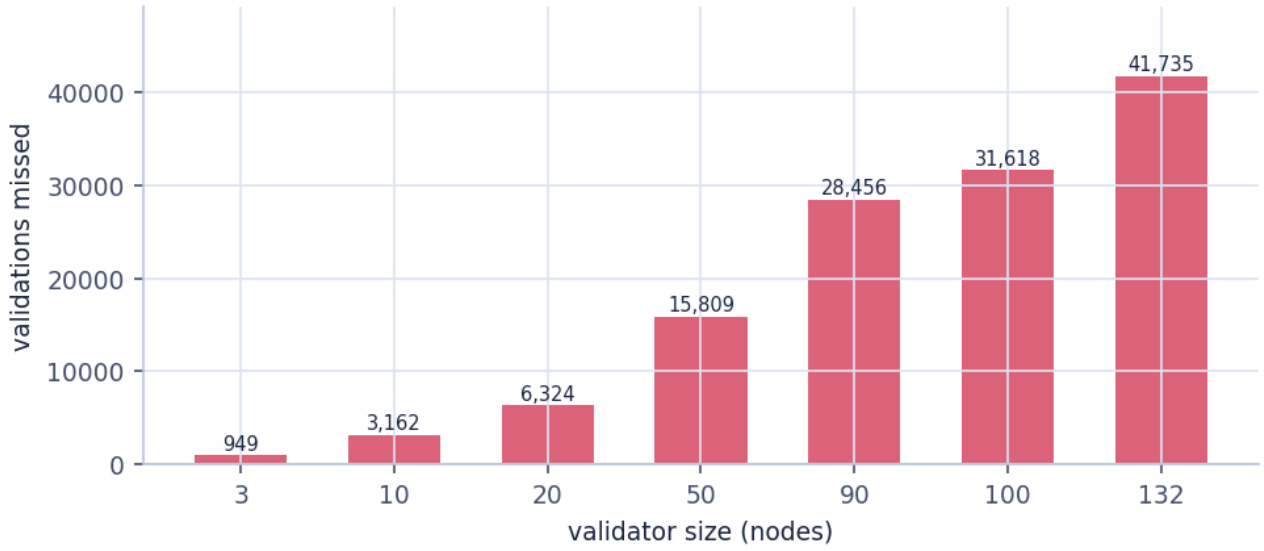
How to read: green dashed is cap/nodes (no bug); cyan is actual. The shaded area is missed throughput, closing once the bug is fixed.

Headline

About **~316 validations missed per node** (~32 MNW), roughly **20-25% of rewards** an operator would otherwise have earned. Network-wide ~**1.25 million validations (~125k MNW)** unpaid.

Validator size	Validations missed	MNW missed
3 nodes	~950	~95
10 nodes	~3,160	~316

Validator size	Validations missed	MNW missed
20 nodes	~6,320	~632
50 nodes	~15,800	~1,580
90 nodes	~28,460	~2,846
100 nodes	~31,620	~3,162
132 nodes	~41,740	~4,174



Total validations missed to the bug, by validator size

How to read: missed validations scale linearly with size; a 100-node validator lost ~31,600 validations (~3,160 MNW).

07 Conclusions

- **No EVLS penalty exists in current data.** Per-node is flat from 3 to 132 nodes; remove the size-penalty curve (factor = 1.0).
- **APY is size-independent.** A 3-node and a 132-node operator earn the same per node. The only remaining size effect is VPS cost amortisation.
- **The network is demand-constrained.** Total validations are demand-limited (~22.5k/day in June); adding nodes dilutes everyone's share rather than creating more.
- **Today's ~7.64 is a scarcity premium.** It compresses if nodes return; it rises as demand grows past the old ~20k/day.
- **The dashboard understated earnings by ~1.7x and over-penalised large validators.** Recalibrate to cake / nodes x 0.10 with flat EVLS.

Recommended model: val/node/day = demand_cap / total_nodes · reward 0.10 · EVLS = 1.0 · baselines 2,943 nodes / 76 validators · demand cap as an adjustable lever.