Historical Billing Reconciliation with Effective-Dated Pricing

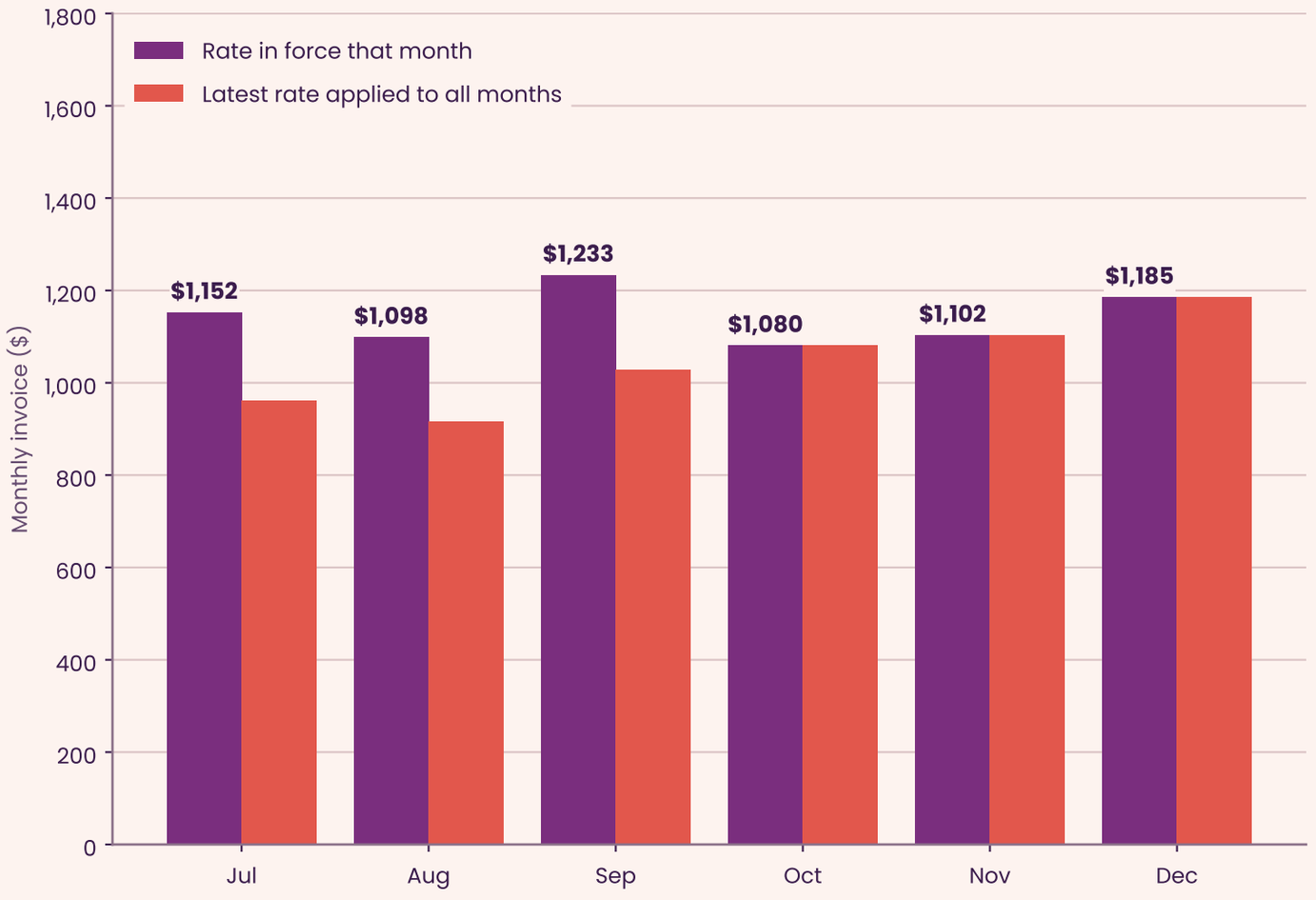
$580.50

six-month understatement when the newest unit price overwrites history. All of it sits in July to September, before the October rate change.

8.5%	16.7%	19,350	$0.00
of correct six-month billing lost	understatement in each pre-change month	units billed at the wrong rate	difference from October onward

EXHIBIT 1

Two ways to invoice the same usage



The bars diverge only in the three months before the rate change.

What the analysis shows

- Correct billing for the six months is $6,850.50. Repricing every month at the latest 15¢ rate gives $6,270.00, an understatement of $580.50 or 8.5%.
- The whole difference sits in July ($192.00), August ($183.00) and September ($205.50). From October the two methods agree to the cent.
- In each affected month the error is exactly 16.7% of the invoice: 3¢ on an 18¢ rate. It scales with usage, which is why September, the busiest pre-change month, is the largest.
- The error is 19,350 units × 3¢. Every extra cent of rate change would add $193.50 to it.
- The fix is a join on the rate effective in each service month, not a correction after the fact.

EXHIBIT 2

Understatement by month

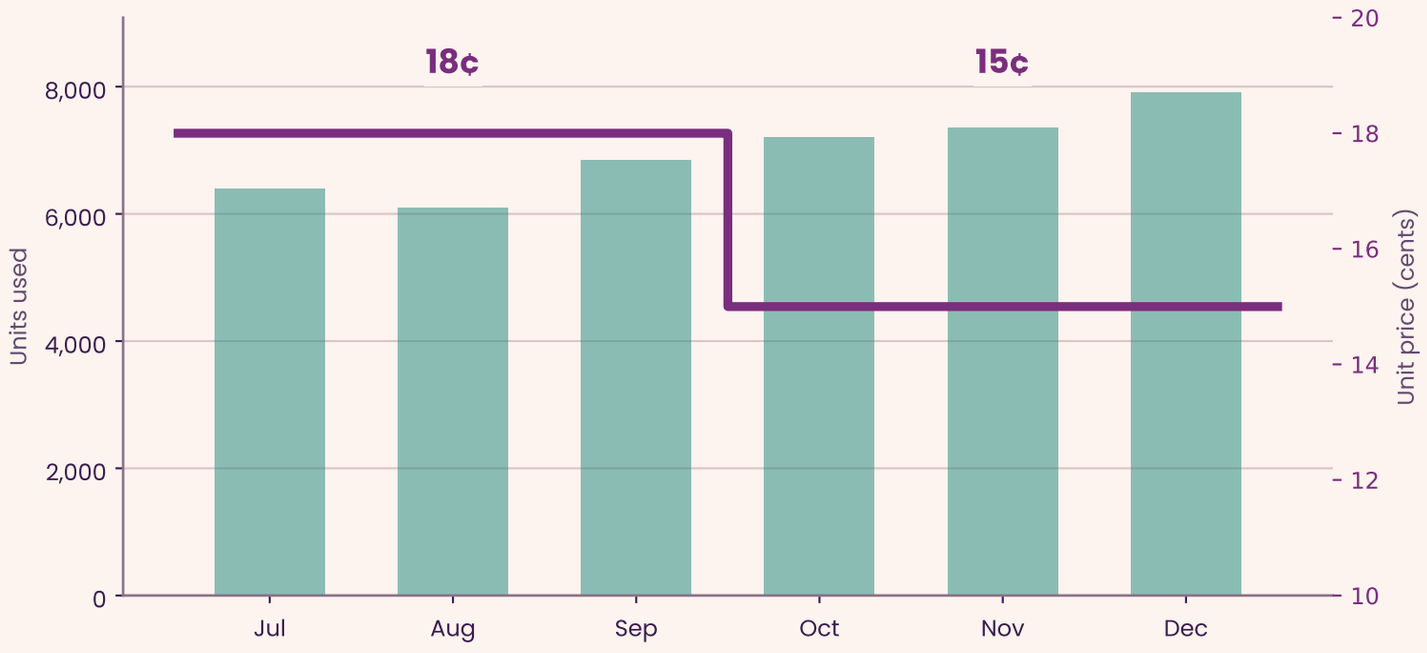


Three months carry the whole $580.50.

Inside the numbers

EXHIBIT 3

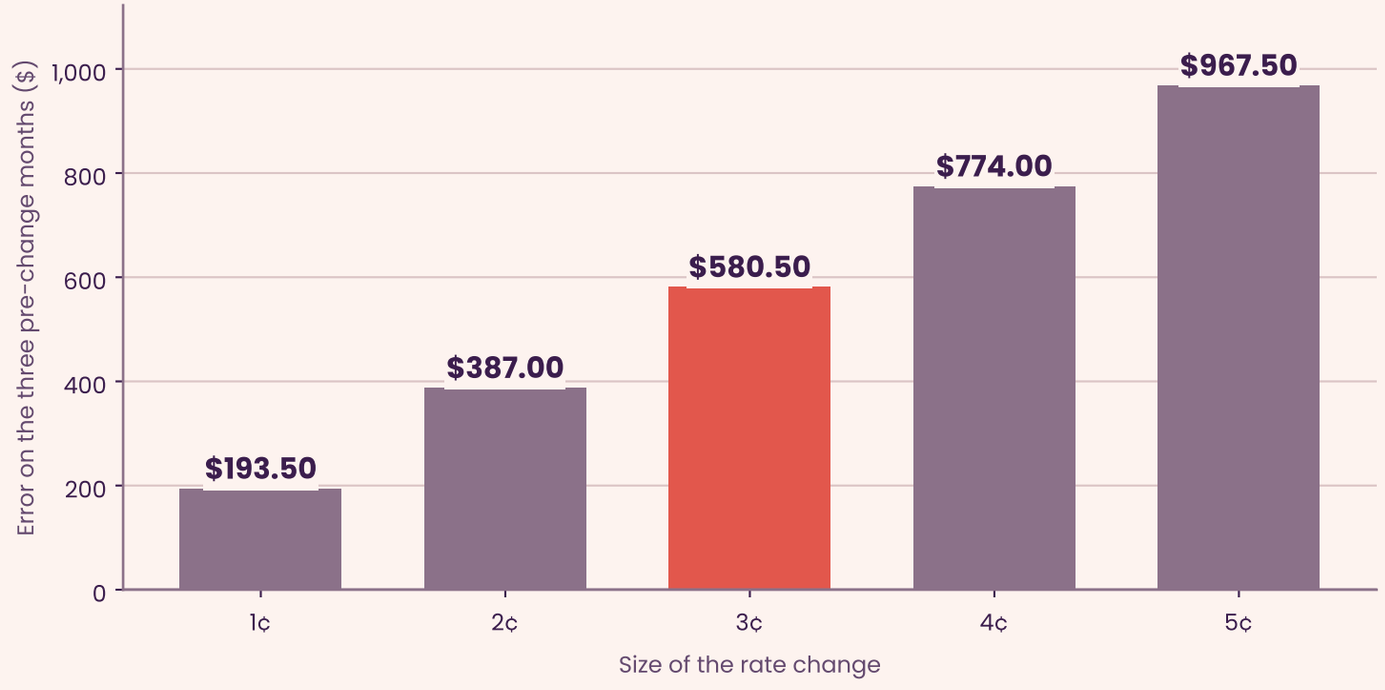
Usage and the price in force



Bars are units; the line is the unit price, stepping from 18¢ to 15¢ in October.

EXHIBIT 4

Error for other rate-change sizes

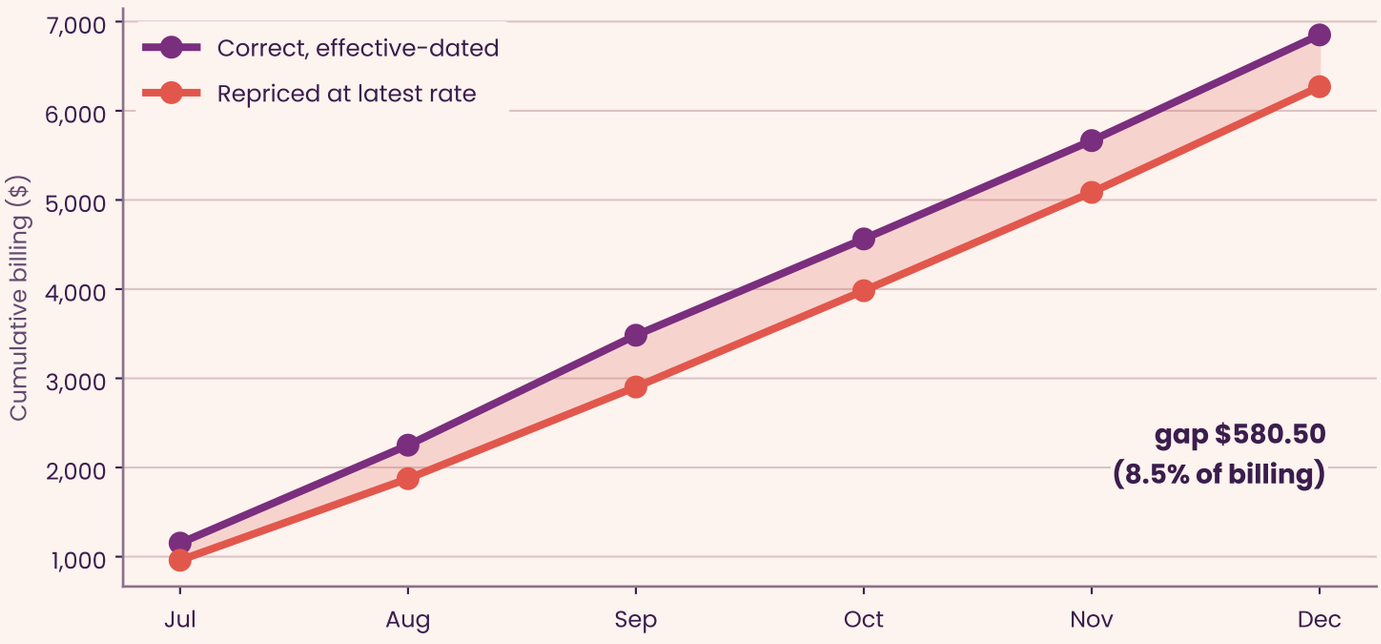


With the same usage, the error is linear in the size of the change. The actual 3¢ change is highlighted.

What changes the answer

EXHIBIT 5

Cumulative billing under each method



The gap opens through September and then stays constant.

EXHIBIT 6

Rate ledger

Month	Units	Rate	Historical	Latest-rate	Difference
Jul	6,400	18¢	$1,152.00	$960.00	$192.00
Aug	6,100	18¢	$1,098.00	$915.00	$183.00
Sep	6,850	18¢	$1,233.00	$1,027.50	$205.50
Oct	7,200	15¢	$1,080.00	$1,080.00	$0.00
Nov	7,350	15¢	$1,102.50	$1,102.50	$0.00
Dec	7,900	15¢	$1,185.00	$1,185.00	$0.00
Total	41,800		$6,850.50	$6,270.00	$580.50

Units, rate in force and both invoice amounts for each month.

How it was built and how far it goes

RECOMMENDED USE

- Store prices with effective dates and join usage to the rate in force for the service month.
- Re-run the reconciliation for any report that spans a rate change.
- Add a check that historical invoice totals do not move when a new price is loaded.

METHOD

- Usage is joined to the unit price effective in each service month (18¢ through September, 15¢ from October).
- The comparison invoice applies the latest price to every month.
- Difference is historical minus latest-rate invoice, by month and in total; both invoices were recomputed from units and rates.

LIMITS

- Worked ledger with one rate change and one product.
- Taxes, discounts, refunds and mid-month changes are excluded.
- Assumes usage is recorded against the correct service month.

NUMBERS RECONCILED

Quantity	Value	How it was checked
Historical total	$6,850.50	sum of units × rate in force
Latest-rate total	$6,270.00	sum of units × 15¢
Difference	$580.50	19,350 units × 3¢
July	$192.00	6,400 × 3¢
August	$183.00	6,100 × 3¢
September	$205.50	6,850 × 3¢