

Caffevolve™
TECHNOLOGIES

CAFFEINE MANAGEMENT & DELIVERY PLATFORM

How Caffevolve Personalizes Every Cup

The thinking behind a blend recommendation

COMFORT ZONE | DECAY RATE | WORKING TOGETHER | A DAY WITH ALEX | THE CALCULATION

Confidential

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Overview

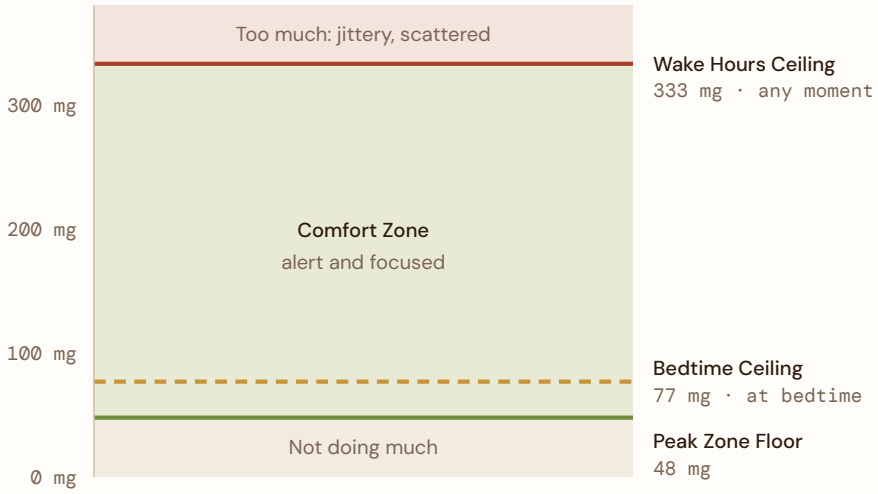
A coffee maker brews the same cup for everyone, at any hour. Caffevolve brews the strongest cup that still suits the person drinking it, at the moment they drink it.

It does this by blending caffeinated and decaffeinated beans in an exact ratio, worked out fresh at every brew. The ratio comes from three things the platform knows about each user. This brief explains each one in plain terms, then shows how they combine into a recommendation.

PART 1	PART 2	PART 3 · 4
How much caffeine suits them Their personal Caffeine Comfort Zone.	**How fast their body clears it** Their caffeine half-life, or decay rate.	**What they've had today** A running record of every drink, at home or away.

The Caffeine Comfort Zone

Think of the caffeine in a person's body as a level. It rises with each drink and falls as the body clears it. The Comfort Zone is the range of that level where caffeine is helping: alert and focused, but not wired. Caffevolve describes it with three numbers, each in milligrams of caffeine still active in the body.



An example profile from the app's setup screens: floor 48 mg, Bedtime Ceiling 77 mg, Wake Hours Ceiling 333 mg. The scale is the caffeine active in the body at any moment.

Peak Zone Floor

WHAT IT IS

The level where caffeine starts doing something noticeable. Below it, the user feels flat.

HOW IT'S SET

From one setup question: how many of your usual drinks before you feel alert?

Wake Hours Ceiling

WHAT IT IS

The most caffeine the user can carry at one moment before it works against them: jittery, scattered, less productive.

HOW IT'S SET

From one setup question: how many drinks before you feel wired or jittery?

WHEN IT'S CHECKED

Right now: what's in the body plus this cup.

Bedtime Ceiling

WHAT IT IS

The most caffeine the user can still have active when they go to bed and sleep well.

HOW IT'S SET

Caffevolve replays the user's usual day at their own decay rate (Part 2), from first drink to their latest comfortable one, and works out what is still active at their usual bedtime. They already sleep well with that amount, so it becomes the ceiling. It is a set figure that changes only gradually, through the user's feedback.

WHEN IT'S CHECKED

In the future: at tonight's bedtime.

What a ceiling actually tells us

A ceiling measures **sensitivity**: how much caffeine a person can hold before it causes a problem. It says nothing about how quickly they clear it. Two people with identical ceilings can need very different cups at noon, because one of them clears caffeine twice as fast. That is the job of Part 2.

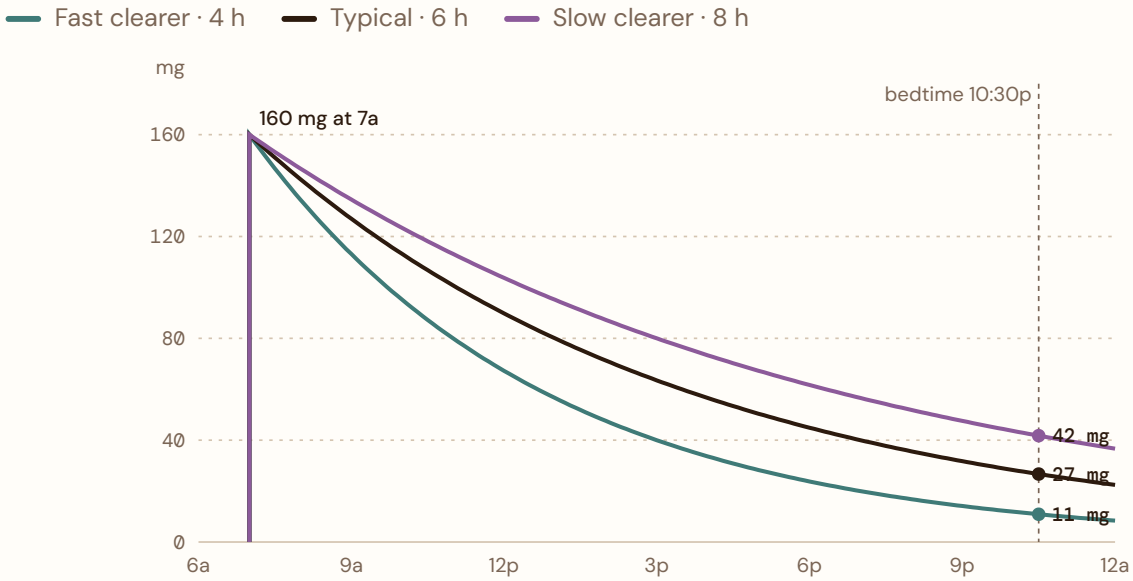
A ceiling is also a **budget**, not a warning light. Caffevolve recommends the cup that uses the room left under the tighter ceiling, so the user gets as much caffeine as they can have without paying for it later.

Every number is the user's own. Residents are never sorted into "low, medium or high" tiers, and setup asks about everyday coffee habits plus one health question, whether they smoke. Questions about things like pregnancy or medications are deliberately left out to protect privacy. A user with their own reason to cap caffeine can set an optional daily limit instead. After setup, short one-tap check-ins such as "How did you sleep?" fine-tune all three numbers in small steps the user can see and undo. Learning is fastest over the first 30 brews and never stops, so the zone follows the user as their habits change. The user can also set either ceiling by hand at any time.

Caffeine metabolism: the decay rate

Caffeine doesn't switch off when the mug is empty. The body clears it at a steady proportion: every so many hours, half of what is there is gone. That stretch of time is the **caffeine half-life**, which Caffevolve calls the Caffeine Decay Rate. In healthy adults it averages about 5 hours, and it ranges from roughly 1.5 to 9.5 hours from person to person. A bigger number means slower clearance.

Caffevolve starts every user at 6 hours, slightly above average so that early estimates lean toward protecting sleep. It then adjusts that from three everyday questions: whether they smoke (smoking speeds clearance), how often they feel jittery in the afternoon, and whether a lunchtime coffee is still noticeable by dinner. A new user's starting value lands between 2.75 and 7.5 hours.



One full-strength 12 oz cup (160 mg) at 7:00 AM and nothing else. Only the half-life differs between the three lines. By a 10:30 PM bedtime the slow clearer still carries nearly four times as much caffeine as the fast one.

Why it matters

The half-life turns caffeine drunk now into caffeine taken to bed. It works like an exchange rate. With a 6-hour half-life, each milligram drunk at 7 AM is worth about 0.17 mg at 10:30 PM. The same milligram at 4 PM is worth about 0.47 mg. The later the cup, or the slower the clearance, the more of it is still there at bedtime.

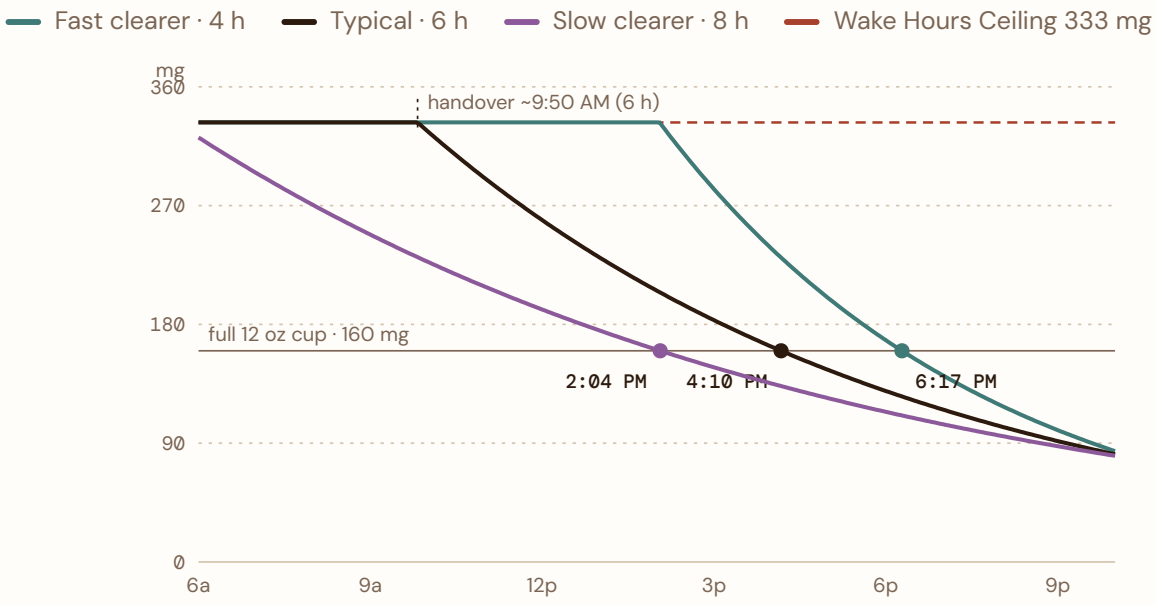
The decay rate is set once at setup. Refining it from each user's own logged drinks and sleep check-ins is a top priority for the next platform version and is in development. As it sharpens, every recommendation sharpens with it.

How the ceilings and the half-life work together

At every brew, Caffevolve runs two tests, three if the user has set a daily limit, and uses the smallest answer.

1. **Right now.** How much can this cup add before the user reaches their Wake Hours Ceiling? That is the ceiling minus what's already in the body.
2. **At bedtime.** How much can this cup add before tonight's bedtime level reaches the Bedtime Ceiling? Here the half-life does the work. If only a small share of the cup will still be active at bedtime, the cup can be large. If a large share will be, the cup must be small.
3. **Today's limit, if the user sets one.** How much of their chosen daily total is left? This is a plain running count of milligrams since last night's bedtime. It is the user's own choice about their day, so the platform honors it as set.

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room at bedtime  = (Bedtime Ceiling − tonight's projected level) ÷ share of this cup still active at bedtime
share at bedtime = ½ ^ (hours until bed ÷ half-life)
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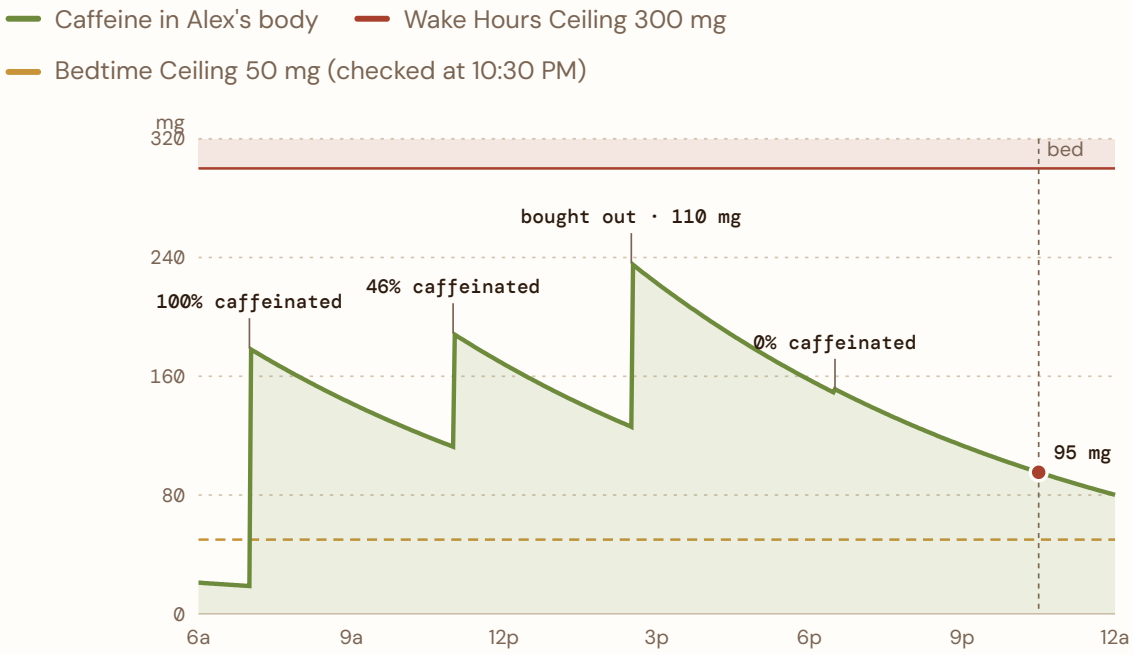
The largest single cup allowed at each hour for the example profile (Wake Hours Ceiling 333 mg, Bedtime Ceiling 77 mg, bed at 10:30 PM), starting from nothing in the body. The flat section is the Wake Hours Ceiling; the falling curve is the Bedtime Ceiling. Each dot is the last moment a full-strength cup still fits. Same ceilings, different metabolism: that moment moves by about four hours.

Which test sets the cup?

Early in the day the Wake Hours Ceiling usually sets the limit. A morning cup has many hours to fade before bed, so the bedtime test allows plenty, and the real question is how much the user can carry right now. As bedtime approaches, more of each cup lasts into the night and the Bedtime Ceiling takes over. For the example profile with a 6-hour half-life, the handover comes at about 9:50 AM. A user with a very sleep-sensitive profile, like Alex below, hands over almost from the first cup.

A day with Alex

Alex is a sample user with a sleep-sensitive profile: Wake Hours Ceiling 300 mg, Bedtime Ceiling 50 mg, half-life 6 hours, bed at 10:30 PM. He went to bed last night at his Bedtime Ceiling, so about 19 mg is still active when he wakes. His day: Caffevolve cups at 7:00 AM and 11:00 AM, a coffee bought out at 2:30 PM, and a smaller 8 oz cup at 6:30 PM.



DRINK	IN BODY NOW	ROOM · NOW	ROOM · BEDTIME	SET BY	BLEND	CAFFEINE	AT BEDTIME
7:00 AM Cup 1	19	281	281	Full cup	100%	160	30
11:00 AM Cup 2	113	187	76	Bedtime	46%	76	50
2:30 PM Coffee out	126	—	—	bought out	—	110	94
6:30 PM Cup 3 (8 oz)	149	151	0	Bedtime	0%	3	95

All figures in milligrams. "Room" is the largest cup each test would allow. At a 6.0-hour half-life the 11:00 AM cup comes out 46% caffeinated. Bedtime lands at 95 mg, over the 50 mg ceiling, because a drink bought elsewhere can't be blended down.

What the day shows

The 7:00 AM cup brews at full strength. By 11:00 AM the platform blends down to about 46% caffeinated, which lands Alex exactly on his Bedtime Ceiling: the strongest cup that still protects the night. The coffee he buys out can't be blended, so it pushes his bedtime level over. Caffevolve can't undo that, but it can stop adding to it, so it recommends decaf for the evening cup. Away from home, the CaffevolveGo app logs that coffee and can advise on what still fits before he orders.

The whole calculation, in order

1. Add up the caffeine still active from everything the user has had, including last night's leftover, each drink faded by their half-life. That is where they stand now.
2. Carry that same total forward to tonight's bedtime. That is where they would stand at bedtime if they stopped now.
3. Room under the Wake Hours Ceiling is the ceiling minus where they stand now.
4. Room under the Bedtime Ceiling is the ceiling minus the bedtime projection, divided by the share of this cup that will still be active at bedtime.
5. If the user has set a daily limit, room under it is the limit minus everything they've had since last night's bedtime.
6. Take the smallest of these. That is the caffeine this cup may carry.
7. Work out the mix of caffeinated and decaf beans that delivers exactly that for the cup size and strength chosen. When there is no room left, the answer is 100% decaf, which still carries a trace of caffeine.
8. Show the recommendation. The user can accept it, adjust it or override it. The machine always brews when the user asks it to.

The user decides

Caffevolve recommends; it never refuses a brew. Every boundary change is shown to the user and can be undone.

Personal, not a category

Every value comes from the user's own answers to setup questions about everyday habits, and the Comfort Zone is then refined from their own outcomes.

The whole day counts

Cups brewed at home or the office (if Caffevolve equipped) are logged automatically, and CaffevolveGo adds drinks bought anywhere else.