



MARKET INTELLIGENCE
HARDWARE & SOURCING

NORTH AMERICAN MARKET OUTLOOK · 2026 EDITION

2026

The Inhaled Extracts Market Report

North American Market Trends, Oil Economics,
and CCELL® Hardware

\$35B+

North American Legal Cannabis Spending ·
2025 Calculated Estimate

\$41B+

North American Legal Cannabis Spending ·
2030 Calculated Forecast

3.3%

Implied North American Annual Growth ·
2025–2030

MARKET MARKET OPPORTUNITY
PRODUCT OIL ECONOMICS & PRODUCT FIT
SUPPLY CCELL® & HAMILTON DEVICES®



PREPARED BY

Hamilton Devices® · Authorized CCELL® Distributor
October 2026 · hamiltondevices.com

Source: Tom Adams Research / BDSA, April 2026. North America means U.S. + Canada. Approximate calculations from rounded forecast inputs; estimates and forecasts, not reported retail totals. USD. Method: appendix source notes.



PART I

The Macroeconomic Foundation

Market demand, finished-product value and CCELL® hardware selection form the foundation of a sound production plan.

Start with the market and your customer. Compare all-in-ones, cartridges, batteries and pod systems, then bring formulation, hardware and production costs into the same decision. Hamilton Devices® helps you move from product selection and samples to standard orders or eligible custom branding.

MARKET OUTLOOK · USD BILLIONS

The Global Market. The North American Opportunity.

Legal cannabis spending establishes the scale of the market. The regional outlook puts North American demand in a global context.

MARKET · LEGAL CANNABIS	2025 ESTIMATE	2030 FORECAST	ANNUAL BASIS GROWTH	
Worldwide	\$38.5B	\$47.5B	4.3%	Published BDSA forecast summary
North America · U.S. + Canada	≈\$35.1B	≈\$41.3B	≈3.3%	Calculated regional remainder
Outside North America	≈\$3.39B	\$6.25B	13%	2025 calculated from forecast CAGR

WORLDWIDE · 2030 \$47.5B Forecast spending, all legal formats	NORTH AMERICA · 2030 ≈\$41.3B Derived forecast, U.S. + Canada	FORECAST PERIOD 2025–30 One framework; USD throughout
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TURN MARKET CONTEXT INTO PRODUCT DECISIONS

For a buyer, the next step is to identify the category, customer and formulation the business can serve. Those decisions guide hardware selection and the production plan.

Tom Adams Research: BDSA forecast, April 2026. USD; estimates and forecasts. North America is derived from rounded global and international inputs, not a separately published BDSA series. Calculations in market source notes. These totals include all legal cannabis formats, not hemp-derived products or empty-hardware procurement.

NATIONAL BENCHMARKS · USD BILLIONS

Two National Markets. Distinct Opportunities.

The United States and Canada provide distinct retail benchmarks for planning an extract product and its route to market.

NATIONAL BENCHMARK	ANNUAL SALES	PERIOD	SALES CHANGE	SCOPE
United States	\$29.1B	Calendar 2025	Down from \$30.1B in 2024	Regulated cannabis retail
Canada	≈\$4.03B	FY 2024/25	+6.1%	Legal recreational retail

UNITED STATES

\$29.1B

2025 regulated retail spending

CANADA

≈\$4.03B

FY 2024/25; USD equivalent

U.S. · A SUBSTANTIAL, COMPETITIVE MARKET

Price compression and uneven growth put more weight on product positioning. Define the customer and oil offering, then select hardware that supports a consistent finished product.

CANADA · A CHANGING CATEGORY MIX

Inhaled extracts grew 12.8% in FY 2024/25, faster than total cannabis sales. The next pages follow that change from the national market into the extract category.

Whitney Economics, p.14 · Vangst/Whitney 2026 report · Statistics Canada, 5 March 2026. Different periods and definitions: these benchmarks are not summed or used as components of the BDSA forecast. Canada excludes sales taxes; USD conversion at 1 USD = 1.3698 CAD, 2024 annual average (representative presentation rate).

FROM CATEGORY DEMAND TO FINISHED PRODUCT

Where the Extract Market Creates Business Opportunity

Extract producers, brands, filling operations and distributors each control a different part of bringing this retail category to market.

\$4.9B

Vapor-Pen Category Sales

Headset U.S. markets · Oct 2025–Sep 2026

The second-largest category in Headset's covered U.S. markets. This is retail spending on cannabis vapor products, not sales of empty hardware or standalone batteries. It connects extract demand to formulation, device and production decisions.



01 · EXTRACT PRODUCERS

Turn Formulation Expertise into a Product

Define the extract and finished blend. Match the oil to hardware and a filling process that support the intended experience.



02 · BRANDS & MSOS

Build a Recognizable Product

Define the customer, format, formulation and price position, with a clear standard for the finished experience.



03 · FILLERS & CONTRACT MANUFACTURERS

Make the Product Repeatable

Carry the approved sample through filling, capping and inspection. Measure throughput against units accepted for sale.



04 · DISTRIBUTORS & PURCHASING TEAMS

Connect Demand to a Supply Plan

Align the configuration, quantities, pricing, branding and order route with the customer's production requirements.

Align the Product and Production Plan

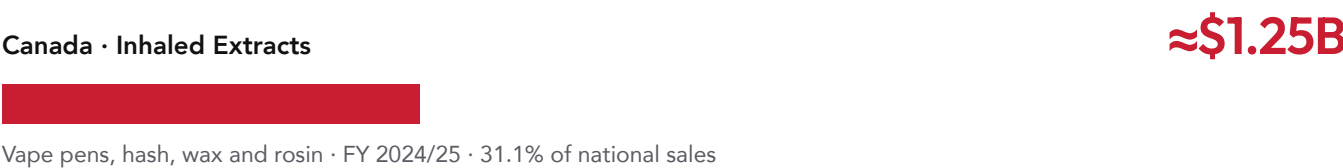
The customer receives the oil and the device as one product. Agree on the formulation, hardware and production requirements before increasing volume.

Headset Vapor Pens · Methodology. U.S. covered-market estimate: Oct 2025–Sep 2026; accessed 6 Oct 2026. USD retail sales, not hardware purchasing. The value-chain discussion is Hamilton Devices®'s commercial interpretation.

THE MACRO SCALE

From the National Market to the Extract Category

Canada provides a complete national example: inhaled extracts account for almost one-third of legal recreational cannabis sales.



SHARE OF SALES 31.1% Canada · inhaled extracts	ANNUAL GROWTH +12.8% FY 2024/25 vs prior fiscal year	CATEGORY SCOPE Vapes + Includes non-vape concentrates
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FROM EXTRACT DEMAND TO DEVICE SELECTION

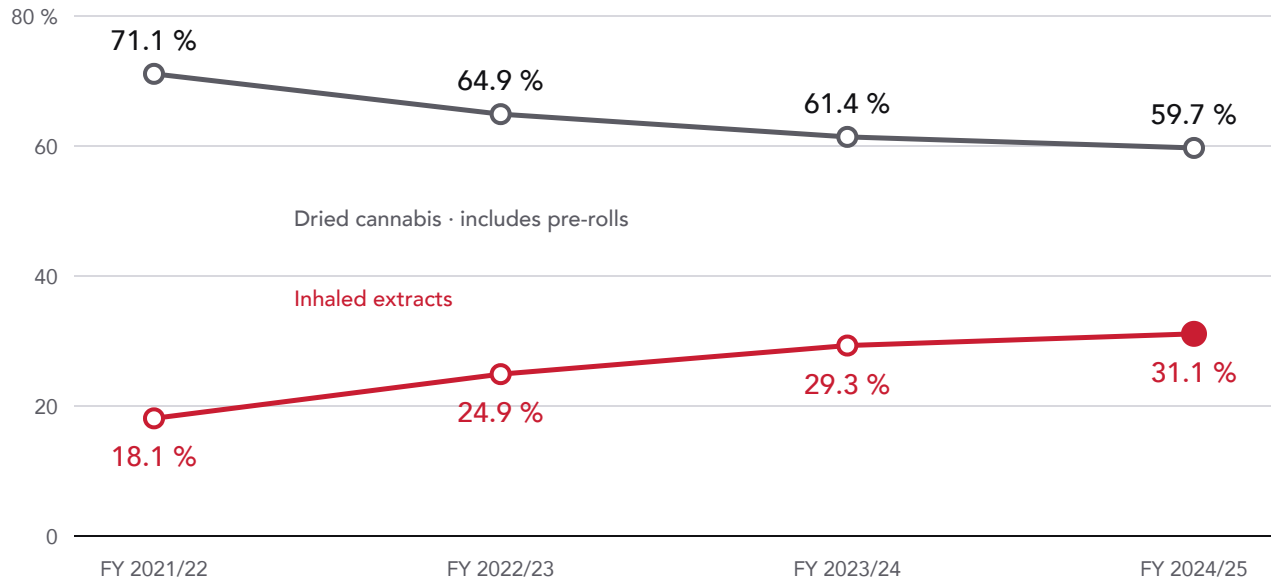
Extract retail sales establish category demand. For an oil-filled device, specify the format, formulation, customer and production volume. These requirements make the hardware decision more precise.

Statistics Canada, Table 10-10-0164-01 · The Daily, 5 March 2026. Same-period Canadian recreational sales; bars share a linear scale. Inhaled extracts include non-vape concentrates. Approximate USD equivalents use 1 USD = 1.3698 CAD, 2024 annual average; category share and growth use original local-currency data. Retail value is not hardware procurement.

MACRO MARKET CONTEXT

Inhaled Extracts Take Share from Flower

Share of legal retail cannabis sales in Canada by format, FY 2021/22 to FY 2024/25.



FY 2024/25 · GROWTH ENGINE

+12.8%

Inhaled-extract sales grew faster than the total market's 6.1% increase.

FOUR YEARS · A LARGER CATEGORY

+13.0 pts

Inhaled extracts rose from 18.1% to 31.1% of national recreational sales.

A SUSTAINED SHIFT IN THE CATEGORY MIX

Over these four fiscal years, extracts took a larger share of Canadian spending. For an oil-filled product, connect that demand to a specific formulation, format and customer experience.

Statistics Canada, Chart 4, 5 March 2026 · The Daily. Canada; legal recreational retail sales; fiscal years. Dried includes pre-rolls. Inhaled extracts include vape pens, hash, wax and rosin. The 13.0-percentage-point change is calculated. Growth refers to sales value, not share growth.

CATEGORY MIX · SHARE OF RETAIL SALES

The Full Category Mix Behind the Migration

Four fiscal years show how Canadian recreational spending moved across formats. Inhaled extracts gained share while remaining one part of a diverse product market.

SHARE OF RETAIL SALES	2021/22	2022/23	2023/24	2024/25
Dried · including pre-rolls	71.1%	64.9%	61.4%	59.7%
Inhaled extracts	18.1%	24.9%	29.3%	31.1%
Solid edibles	4.1%	4.5%	4.3%	4.0%
Ingested extracts	3.9%	3.6%	3.1%	3.1%
Beverages	1.5%	1.6%	1.6%	1.6%
Other	1.3%	0.5%	0.3%	0.5%

EXTRACT SALES GROWTH

12.8%

FY 2024/25 year on year

TOTAL MARKET GROWTH

6.1%

Same market and fiscal year

RELATIVE GROWTH

2.1×

12.8 ÷ 6.1; calculated

BUILD AROUND A DEFINED USE CASE

Extract products serve different preferences and use occasions. Use the category data to inform the oil profile, device format and price position, then establish a production plan the business can deliver consistently.

Statistics Canada, Chart 4, 5 March 2026 · The Daily. Canada; legal recreational retail sales. All table entries are percentage shares; fiscal years. Inhaled extracts include vape pens and non-vape concentrates; ingested extracts include tinctures, capsules, softgels and sprays. Other includes topicals, seeds and uncategorized products. Growth ratio calculated from rounded rates.

CONSUMER AND FORMAT SIGNALS

Consumer Mix and Hardware Formats

Headset's category profile shows substantial Gen Z participation. Pair that audience context with format and formulation choices when planning a product.

HEADSET CATEGORY PROFILE

32%

Gen Z's Share

Headset's category profile assigns 32% of vapor-pen spending to Gen Z; Baby Boomers account for under 7%.

Reading the Category Profile

The denominator is vapor-pen sales. It describes who is buying within this category, rather than the percentage of a generation's cannabis budget spent on vapes.

Headset obtains demographic information from loyalty programs at participating retailers.

Two Formats Share the Shelf

Cartridges · 50%

Replaceable Cartridge

The oil-filled cartridge works with a separate reusable battery. Hardware selection must account for that pairing.

All-in-ones · 50%

Integrated Device

The oil reservoir and battery travel together. The product experience includes both the formulation and the device.

Define the Finished Product Before Selecting the Device

Set the customer, formulation, format and price position. Evaluate the hardware against the experience and production requirements those choices create.

Headset category profile · Methodology. Accessed 6 Oct 2026. 32% is Gen Z's share of vapor-category dollars; demographic geography/period are not separately specified in the public overview. It is not Gen Z's vape wallet share. U.S. cartridge/AIO 50:50 dollar split is separate category context, Oct 2025–Sep 2026. Demographics derive from participating-retailer loyalty programs.

PRODUCT OPPORTUNITY

Compare Cartridge and All-in-One Formats

Both formats have substantial demand. The B2B choice rests on formulation fit, customer experience and production requirements.



Replaceable Cartridge

50% of covered vapor-pen sales dollars

A replaceable format for customers using a compatible battery. The cartridge and battery can also be specified together as a starter offering.

Formulation & Performance

Match the oil, heating core and intended battery settings.

Customer Experience

Confirm battery compatibility, connection and draw behavior.

Production & Cost Components

Compare the cartridge, filling, closure and packaging requirements. Define any separate battery offering.



All-in-One Device

50% of covered vapor-pen sales dollars

An integrated format that combines the reservoir and battery in one product, with a defined activation and charging experience.

Formulation & Performance

Evaluate the oil with the device's heating and power system.

Customer Experience

Review convenience, activation, draw and any charging steps.

Production & Cost Components

Include the integrated battery, filling, closure and packaging, along with storage and inspection requirements.

Compare the Complete Product

Compare the complete hardware, filling, packaging and support requirements for each format. Use the same formulation, output target and customer requirements as the basis.

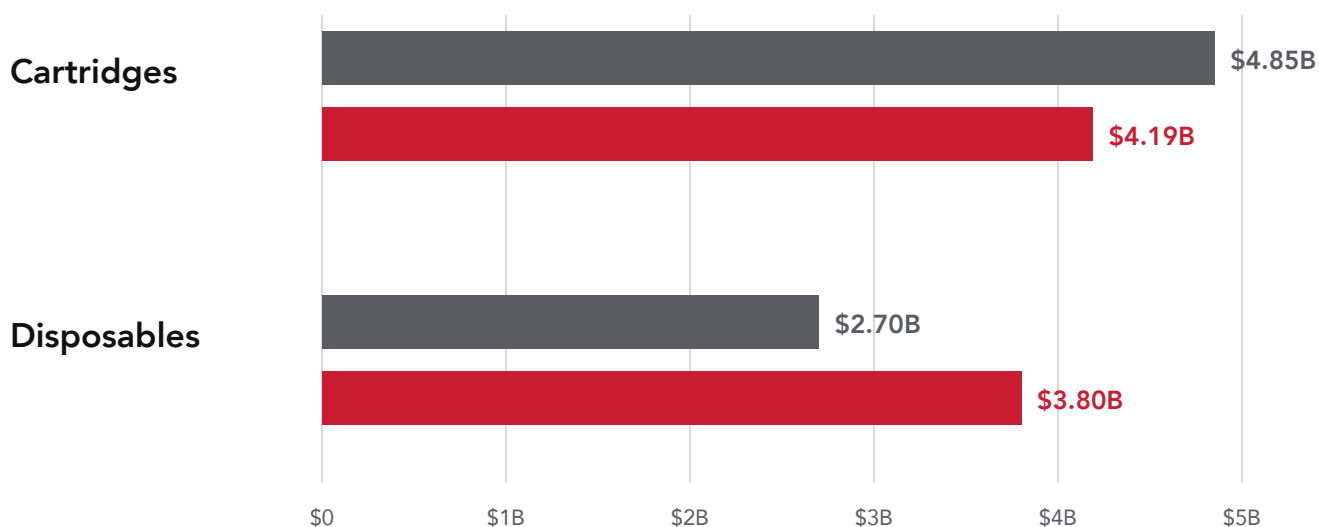
Headset Vapor Pens · Coverage and methodology. U.S. cartridge/all-in-one split by sales dollars; Oct 2025–Sep 2026; accessed 6 Oct 2026. Representative empty Hamilton Devices® product images; the comparison is a product-planning framework, not measured performance superiority. Standalone batteries and empty hardware are outside this retail-sales split.

FORMAT TRANSITION · BDSA U.S. RETAIL TRACKING

The Shift Toward All-in-One Formats

Disposable sales rose while cartridge sales declined. The shift matters when selecting a format and planning the battery experience, filling process and packaging.

■ June 2024–May 2025 ■ June 2025–May 2026



Annual Retail Revenue · USD Billions

MONTHLY CROSSOVER

April 2026

BDSA reports that monthly disposable revenue first exceeded cartridge revenue in April. The bars above compare full-year totals.

Select the Format for the Finished Product

Select a format with the required fill volume, battery experience and operating controls. Evaluate the available configuration with the finished oil before committing to volume.

BDSA retail tracking. United States; retail revenue, USD billions. Twelve months ended May 2025 and May 2026; prior dates inferred from the stated year-over-year comparison. Rounded published figures. The monthly crossover is a separate observation, not an annual-share claim. BDSA and Headset use different coverage and methods. Accessed 7 Oct 2026.

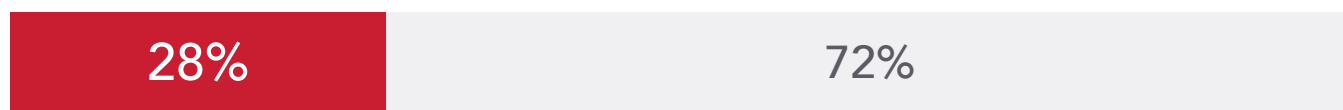
OIL MIX · BDSA U.S. RETAIL TRACKING

Premium Extracts Are Gaining Share

Live resin and rosin gained four percentage points of vape revenue share. That change makes formulation-specific hardware selection an important part of product planning.

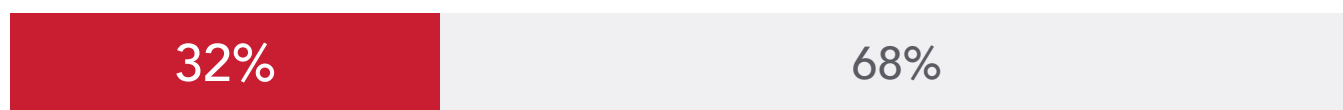
June 2024–May 2025

Vape Revenue Share



June 2025–May 2026

Vape Revenue Share



■ Live Resin + Rosin

■ All Other Vape Oils

+4 pp

Change in Revenue Share

32% is the combined share of live resin and rosin. The remaining 68% includes all other vape oil types.

Define the Extract Offering

Be specific about the extract, flavor profile and experience the finished product is intended to deliver. Make the packaging and product claims consistent with that brief.

Evaluate the Finished Formulation

Use the actual blend, fill volume and production conditions in the hardware trial. The finished blend provides the basis for evaluating oil flow, heating and the intended experience.

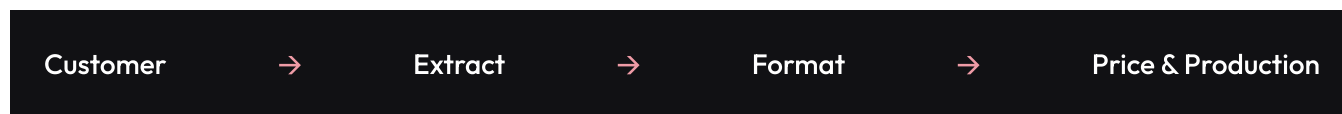
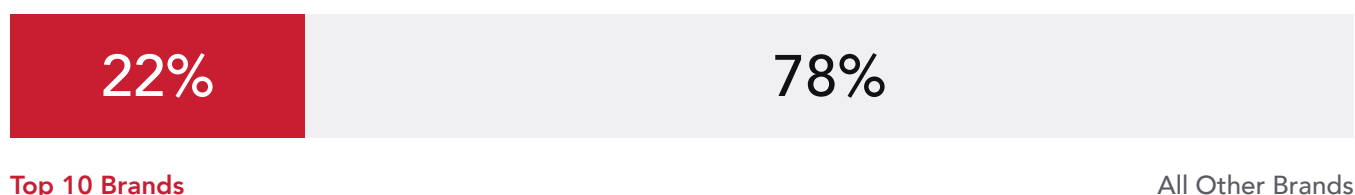
BDSA retail tracking. United States; share of vape retail revenue. June 2025–May 2026 versus the preceding twelve months. Live resin and rosin are combined; other oils are the calculated complement. Four percentage points = 32% – 28%. No price premium or hardware-performance result is inferred. Accessed 7 Oct 2026.

COMPETITIVE STRUCTURE · BDSA U.S. RETAIL TRACKING

Define Your Position in a Fragmented Vape Market

Brands outside the top ten account for 78% of vape retail revenue. A clear customer, extract offering and production plan help define where a brand intends to compete.

Share of Vape Retail Revenue · June 2025–May 2026



Customer & Market	Define the geography, retail channels, assortment and use occasion. Set the experience and convenience your customer should recognize.
Extract & Flavor	Specify the finished formulation and flavor profile. Make the product claims and presentation consistent with the oil you intend to fill.
Format & Device	Choose a hardware model with the format, fill volume, battery experience and operating controls that fit the product requirements.
Price & Production	Set the selling-price position, expected volume and cost assumptions. Connect them to the filling process, approved sample and supply plan.

A Product Brief That Can Become a Production Order

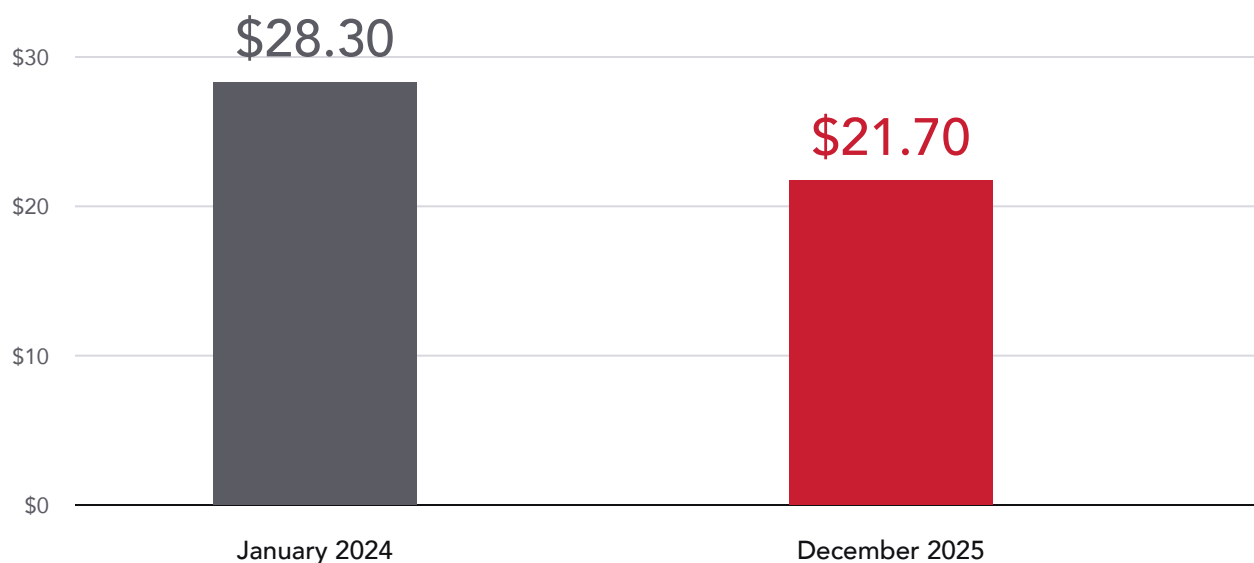
Bring the oil specification, hardware configuration and commercial requirements together. Carry the approved specifications through purchasing, production and repeat orders.

BDSA retail tracking. United States; share of national vape retail revenue, June 2025–May 2026. Top ten brands: 22%; other-brand share = 100% – 22%. BDSA retail estimates. The product-position framework supports planning; the other-brand share represents existing competitive sales, not unclaimed demand. Accessed 7 Oct 2026.

HISTORICAL PRICING · HEADSET COVERED U.S. MARKETS

Vapor-Pen Retail Pricing, 2024–2025

These historical price endpoints show the pressure on finished-product economics during this period. Assess current selling prices alongside production cost and usable output.



Published Endpoints · USD per Gram Equivalent

PRICE CHANGE

-\$6.60

Per Gram Equivalent

RELATIVE DECLINE

-23.3%

Calculated from the Published Endpoints

Connect Selling Price to Production Cost

Model oil, hardware, packaging and handling together. The next section shows how usable output changes the comparison between hardware prices.

Headset vapor-pen report. Published 25 Feb 2026; participating U.S. markets. Monthly vapor-pen retail equivalized price, USD per gram, January 2024 and December 2025. Endpoints only; not item price, oil procurement cost or a full monthly series. Change: $\$21.70 - \28.30 ; percentage change: $(\$21.70 \div \$28.30 - 1) \times 100$. Accessed 7 Oct 2026.



PART II

The Economics of Every Unit

Every filled device carries an investment in oil, hardware and production. Product losses affect the cost of a run—and the value of repeat orders.

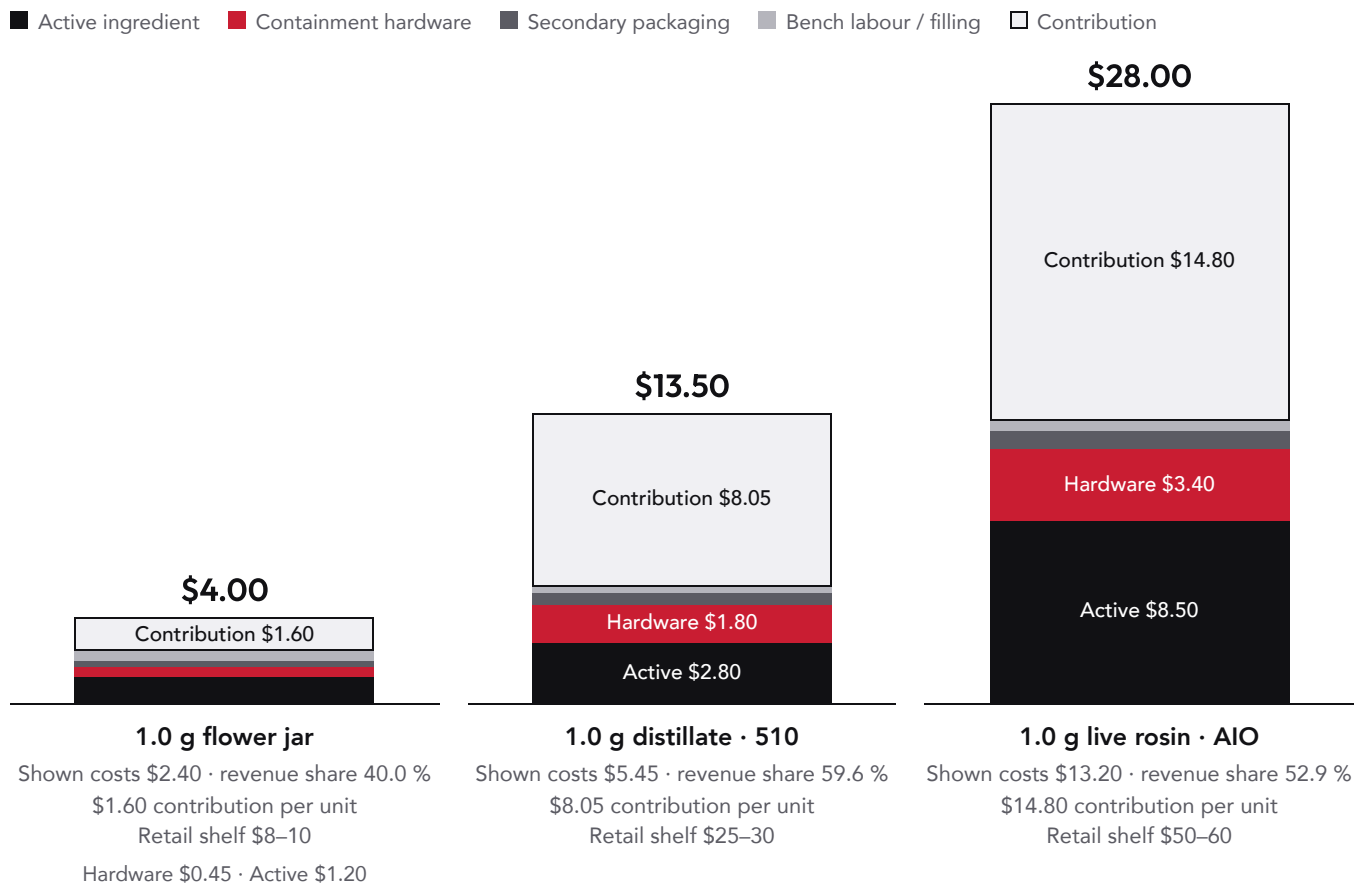
Follow the oil and packaging costs, account for breakage and leakage, and compare a Higher-Loss Scenario with a Lower-Loss Target at the same usable output. The illustrative model connects one run to monthly and annual savings; the appendix provides the calculations.

CONTRIBUTION AFTER SHOWN COSTS · ILLUSTRATIVE MODEL

The Economics of the Finished Product

Each finished format combines ingredients, hardware, packaging and production work. These cost stacks show the investment committed before the product reaches a customer.

ILLUSTRATIVE UNIT ECONOMICS · ONE FINISHED GRAM · WHOLESALE TO DISPENSARY



Each stack uses the same dollar scale. Filled segments show four assumed costs; the outlined segment shows the revenue remaining after those costs.

Model basis: contribution is assumed revenue less the four shown costs. Other production costs, overhead and selling costs are excluded. The comparison uses finished grams; starting biomass and extraction yields differ.

Illustrative finished-product model, Table 3.1. Prices and costs are illustrative assumptions. USD per finished 1.0 g unit; different starting biomass and extraction yields are not compared.

THE VALUE INSIDE THE DEVICE

Protect the Oil Inside Every Filled Unit

A filled device combines the hardware with oil, packaging and production work. Evaluate the investment in the finished product alongside the component price.

ASSUMED UNIT VALUES · USD

HIGHER-LOSS SCENARIO

\$2.00

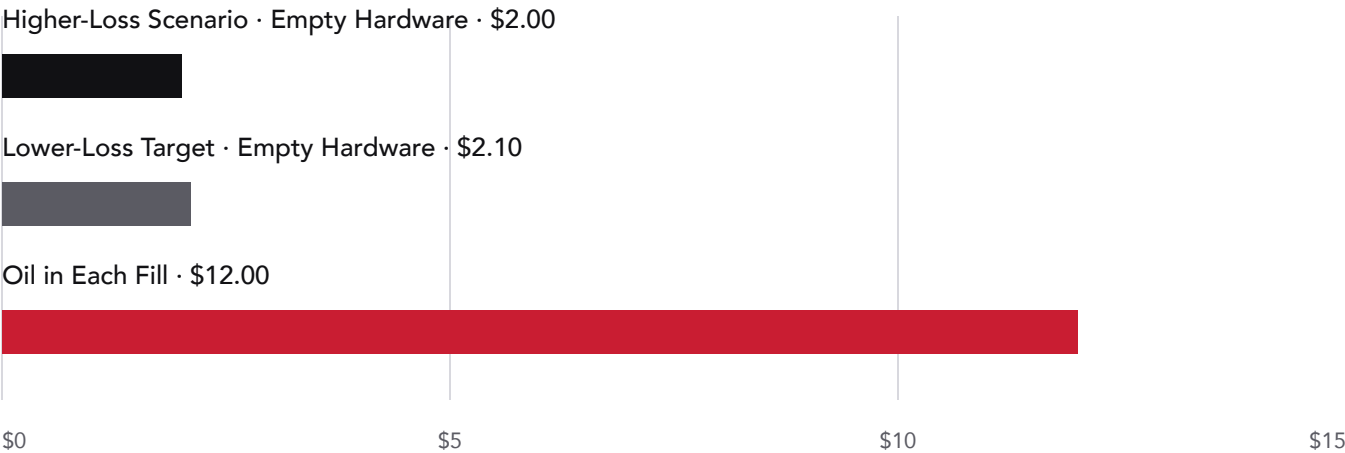
OIL IN EACH FILL

\$12.00

OIL / HARDWARE VALUE

6x

ILLUSTRATIVE VALUES PER UNIT · COMMON DOLLAR SCALE



In this example, the oil is worth **6 times the Higher-Loss Scenario hardware price**. A broken or leaking filled unit can also consume oil, packaging and handling costs.

The next comparison holds usable output received equal at 250,000 finished units. It tests a \$0.10 hardware premium against assumed filled-unit loss rates of 3.5% and 0.5%. These assumed inputs illustrate the trade-off; they are not measured supplier results or current product quotations.

Model scope: completed-product losses through delivery and receiving, with the same loss rate for replacements. No recovery or credit. Excludes before-fill rejects, post-acceptance consumer returns, normal labor and freight. USD; unrounded calculations. Calculation method.

FOUR LOSS PATHWAYS · ONE COST BASIS

Where Product Value Can Be Lost

The counts below use assumed loss rates, not measured supplier results. The pathways show what to evaluate from production through receiving.

ILLUSTRATIVE SCENARIO · USD

35

Higher-Loss Scenario

5

Lower-Loss Target

30 Fewer

per 1,000 attempts · modeled

Where Loss Can Occur	Value at Risk	Capability to Evaluate
Filling + Capping	Filling misalignment, damaged seals or cracked components can lose oil and hardware.	Model-matched filling guidance, snap-fit fixtures and batch-capping options.
Formulation + Storage	An oil–hardware mismatch can cause leakage or unacceptable finished-product performance.	Heating-platform selection and trials with the actual finished formulation.
Handling + Packing	Impact or compression can break units and waste the hardware and unrecovered contents.	Protective packing and eligible preloaded-cap options; confirm the selected configuration.
Transport + Receipt	Pressure-related leakage or broken units at receipt can require replacement and handling.	Confirm packing and receiving checks with Hamilton Devices®; inspect the delivered lot.

One Lost Unit. One Loss Record.

A broken cartridge that leaks is one loss. Recording its cause and stage once keeps the count accurate. Replacement hardware and material are already included in the model.

The quantified case counts irrecoverable losses of completed products through delivery and receiving inspection. Each such loss consumes \$12.00 oil and \$1.50 packaging, plus \$3.00 extra handling. Before-fill rejects and consumer returns after receiving acceptance are excluded. Actual loss rates depend on the selected product and process.

Production and receiving evaluation. Irrecoverable filled-and-packaged product losses through delivery and receiving inspection. Target: usable units received; replacement attempts face the same assumed loss rate. Consumer returns after receiving acceptance are excluded. Capability sources: CCELL® filling and capping · platform design. Rates are planning assumptions.

PRODUCTION COSTS · EQUAL USABLE OUTPUT

How Lower Product Losses Change Production Cost

For the same usable output, fewer losses can offset a higher hardware price. This comparison uses assumed prices and loss rates, not measured supplier results.

ILLUSTRATIVE SCENARIO · USD

Planning Inputs	Higher-Loss Scenario	Lower-Loss Target	Modeled Difference
Usable Units Received	250,000	250,000	Same output
Assumed Hardware Price	\$2.00	\$2.10	\$0.10 more
Assumed Product-Loss Rate	3.5%	0.5%	3.0 pp lower
Oil / Packaging per Attempt	\$12.00 / \$1.50	\$12.00 / \$1.50	Same inputs
Extra Handling per Loss	\$3.00	\$3.00	Same input
Equal Received Output	Higher-Loss Scenario	Lower-Loss Target	Modeled Difference
Modeled Production Cost	\$4,042,746.11	\$3,923,366.83	\$119,379.28 less
Cost per Usable Unit	\$16.1710	\$15.6935	\$0.4775 less

MODELED PRODUCTION-COST REDUCTION

\$119,379.28

47.75¢ less per usable unit received, with 7,811.08 fewer production attempts.

The assumed \$0.10 premium tests how much improvement would cover a higher quote. Use an actual quote and matched trial results to replace both scenarios' assumed prices and loss rates.

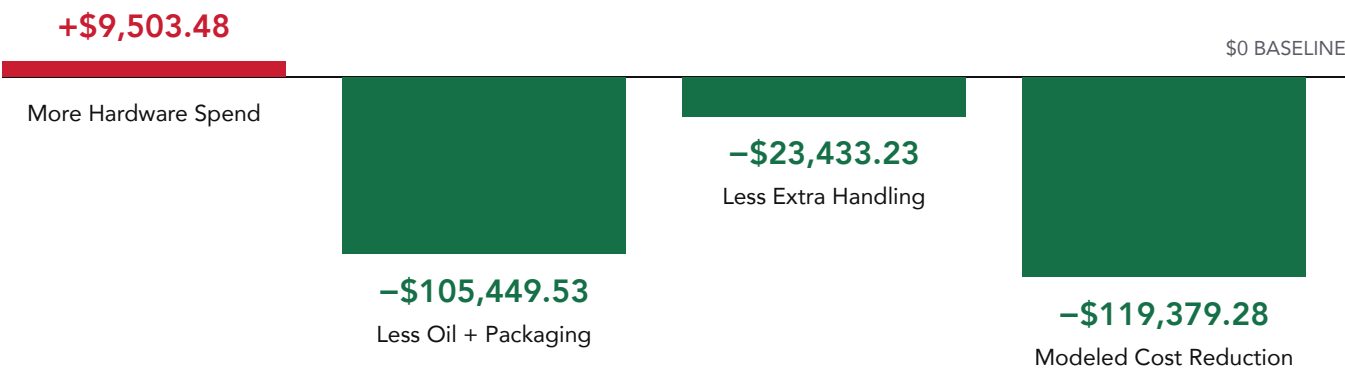
Model scope: completed-product losses through delivery and receiving, with the same loss rate for replacements. No recovery or credit. Excludes before-fill rejects, post-acceptance consumer returns, normal labor and freight. USD; unrounded calculations. Calculation method.

THE COST BRIDGE · SAME USABLE OUTPUT RECEIVED

Where the \$119,379 Modeled Saving Comes From

At 250,000 usable units received, the assumed loss-rate improvement reduces material and handling costs. The bars show the Lower-Loss Target minus the Higher-Loss Scenario.

ILLUSTRATIVE SCENARIO · USD



\$128,882.76 less oil, packaging and additional handling, offset by \$9,503.48 more hardware spend, leaves \$119,379.28 in modeled cost reduction.

Equal Received Output	Higher-Loss Scenario	Lower-Loss Target	Modeled Difference
Hardware	\$518,134.72	\$527,638.19	\$9,503.48 more
Oil + Packaging	\$3,497,409.33	\$3,391,959.80	\$105,449.53 less
Additional Handling	\$27,202.07	\$3,768.84	\$23,433.23 less
Total	\$4,042,746.11	\$3,923,366.83	\$119,379.28 less

Fewer replacements mean fewer units purchased. The net reduction deducts the additional hardware spend from avoided material and handling costs. Revenue and normal production labor are excluded.

Model scope: completed-product losses through delivery and receiving, with the same loss rate for replacements. No recovery or credit. Excludes before-fill rejects, post-acceptance consumer returns, normal labor and freight. USD; unrounded calculations. Calculation method.

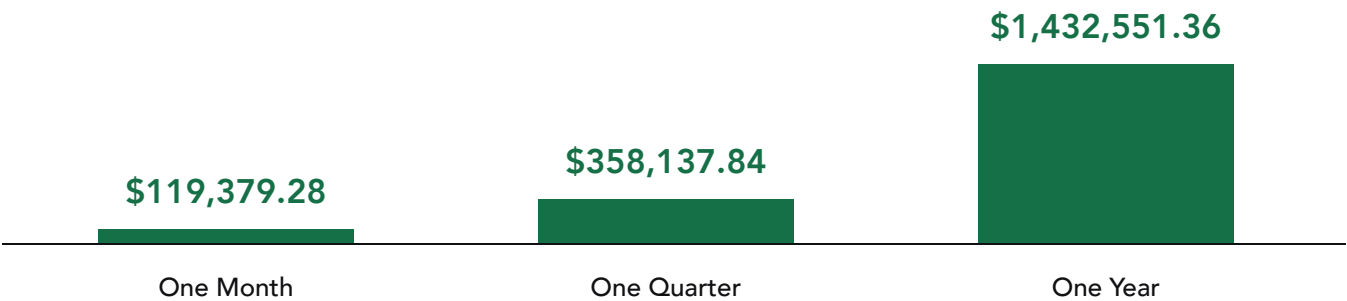
FROM ONE RUN TO THE ANNUAL BUSINESS CASE

Modeled Monthly, Quarterly and Annual Savings

These projections extend the Lower-Loss Target’s modeled advantage over the Higher-Loss Scenario, with assumed prices, loss rates and monthly output held constant.

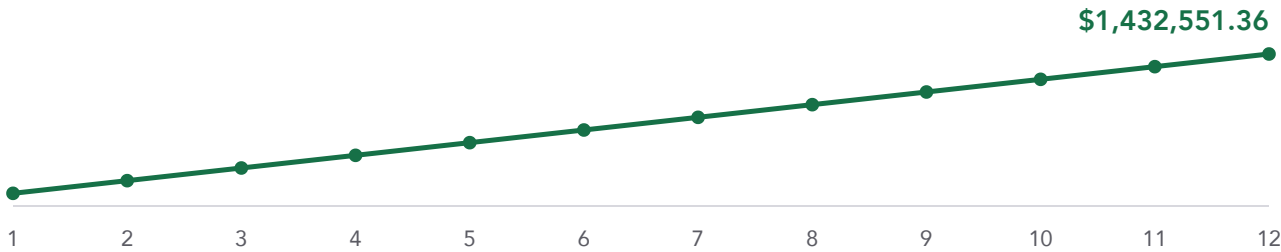
ILLUSTRATIVE SCENARIO · USD

250,000 USABLE UNITS RECEIVED PER MONTH · CONSTANT INPUTS



Usable Units Received / Month	Modeled Monthly Saving	Modeled Quarterly Saving	Modeled Annual Saving
10,000	\$4,775.17	\$14,325.51	\$57,302.05
50,000	\$23,875.86	\$71,627.57	\$286,510.27
250,000	\$119,379.28	\$358,137.84	\$1,432,551.36

CUMULATIVE SAVINGS BY MONTH · 250,000 USABLE UNITS RECEIVED / MONTH



The projection repeats the same monthly saving without compounding. Cash timing depends on purchasing and inventory; profit also depends on sales, prices and other costs. Capacity released by fewer replacements is a separate operating benefit. Trial, tooling and implementation costs reduce the first-year benefit.

Model scope: completed-product losses through delivery and receiving, with the same loss rate for replacements. No recovery or credit. Excludes before-fill rejects, post-acceptance consumer returns, normal labor and freight. USD; unrounded calculations. Calculation method. Monthly totals scale by three and twelve using unrounded values.

TEST THE QUOTE AGAINST THE RESULT

The Improvement Needed to Recover a \$0.10 Hardware Premium

Compare the hardware premium with the improvement in usable output. These three outcomes use assumed prices and loss rates to identify the break-even point.

ILLUSTRATIVE SCENARIO · USD

1.034946%

Higher-Loss Scenario rate
at equal modeled cost

The Lower-Loss Target assumes a loss rate of 0.5% and its hardware price at \$2.10. The required improvement is 0.534946 percentage points.

Modeled Outcome	Higher-Loss Scenario Rate	Lower-Loss Target Difference / Run
Below Break-Even	1.00%	\$1,649.66 more
At Break-Even	1.034946%	Same modeled cost
Above Break-Even	3.50%	\$119,379.28 less

What Hardware Price Can the Case Support?

\$2.5751

Break-even Lower-Loss Target hardware price: 3.5% losses in the Higher-Loss Scenario versus a 0.5% target. Above this price, the target costs more.

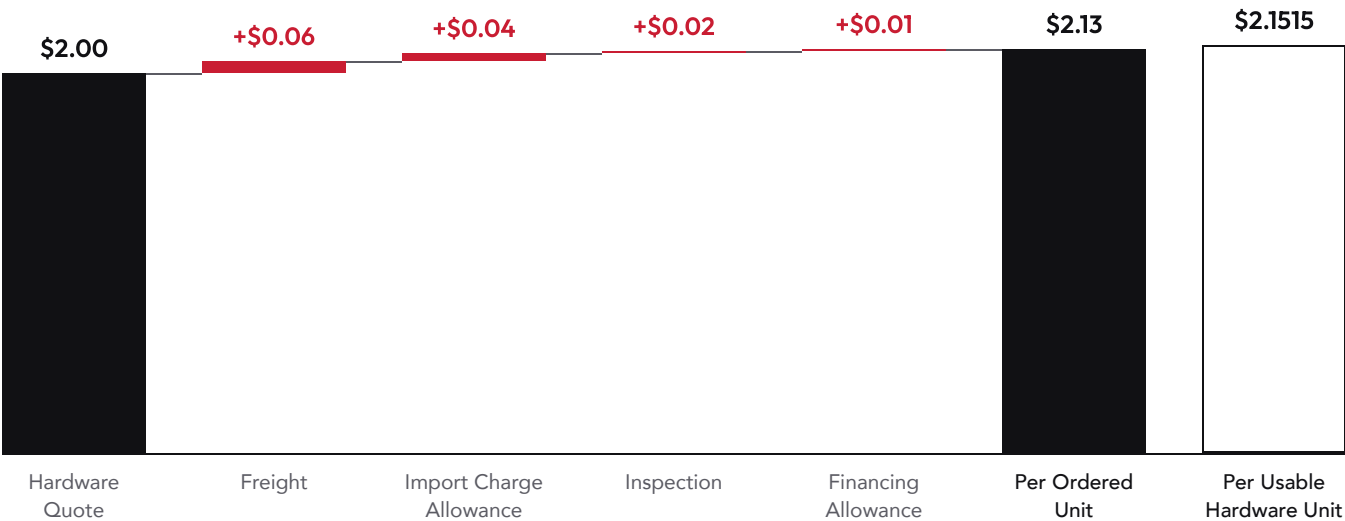
The \$2.5751 threshold applies to these assumed inputs; it is not a product quotation. Your quote and matched trial results determine the threshold for your production line.

Model scope: completed-product losses through delivery and receiving, with the same loss rate for replacements. No recovery or credit. Excludes before-fill rejects, post-acceptance consumer returns, normal labor and freight. USD; unrounded calculations. Calculation method. Thresholds hold the other shared inputs fixed; they apply to equal usable output received.

A SEPARATE COST SCOPE · EMPTY HARDWARE ONLY

From Quoted Price to Usable Landed Cost

A hardware quote is the starting point. Add the costs to receive and inspect the order, then divide by the empty hardware units that can be used.

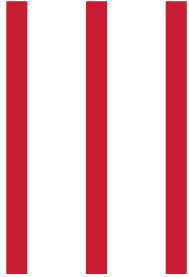


COST COMPONENT	STATED ASSUMPTION	ORDER TOTAL	PER ORDERED UNIT
Hardware	10,000 ordered × \$2.00	\$20,000	\$2.00
Freight	Flat order allowance	\$600	\$0.06
Import Charges	Illustrative order allowance	\$400	\$0.04
Inspection	Flat order allowance	\$200	\$0.02
Financing	Illustrative financing allowance	\$100	\$0.01
Total to Receive the Order	10,000 units before usability check	\$21,300	\$2.13

Usable hardware: assume 100 of 10,000 units cannot be used and have no recovery value. That leaves **9,900 usable empty hardware units**. $\$21,300 \div 9,900 = \2.151515 **per usable empty hardware unit** (about \$2.15). The final two bars divide the same order cost by different quantities.

This is the landed cost of **empty hardware**. It excludes oil, filling, packaging and subsequent production issues. Those belong in the separate finished-output model. Actual freight, import, inspection and financing costs complete the supplier comparison.

Illustrative order-cost model: amounts and the 100 unusable units are assumed. Import charges and financing are flat order allowances. USD; oil and finished-product costs are excluded. Actual import and financing costs depend on the order.



PART III

Formulation and Hardware

Usable output depends on the finished formulation and the device working together. Oil delivery, heating and filling conditions all influence that fit.

Evaluate the selected configuration with your formulation and filling process. Compare observed results with your current hardware to replace the illustrative loss assumptions and guide the purchasing decision.

FORMULATION BASICS

Four Extract Families, Different Formulation Requirements

Each extract family starts with a different production process. Its finished composition guides hardware selection and sample evaluation.



Distillate

Refined cannabinoid fraction

A refined oil produced through distillation. Terpenes may be added to create the finished formulation.

BUYER FOCUS

Confirm the final blend, including terpene content where known.



Live Resin

Fresh-frozen · solvent-extracted

An extract from fresh-frozen cannabis, commonly made using hydrocarbon solvents to preserve its aromatic profile.

BUYER FOCUS

Clarify whether the finished oil is live resin or a blend containing it.



Live Rosin

Fresh-frozen · solventless

A solventless rosin from fresh-frozen starting material. Rosin production uses heat and pressure instead of extraction solvents.

BUYER FOCUS

Evaluate the prepared formulation with hardware suited to its composition and flow.



Liquid Diamonds

Crystalline-derived formulation

A formulation based on highly refined crystalline cannabinoid material, often combined with terpenes.

BUYER FOCUS

Share the finished composition and preparation when selecting hardware.

Specify the Finished Formulation

Share the oil family, composition and viscosity if known, including the measurement temperature. Evaluate the actual blend using the selected device's current filling and capping instructions.

Category background: CCELL® on distillate (2022); resin and rosin (2024); live resin and liquid diamonds (2024). Selection considerations depend on the finished formulation and the exact hardware model.

FORM FACTOR VS. ENGINEERING INTERFACE

Match the Extract to the Hardware Interface

The format shapes the customer experience. Formulation, oil delivery and heating work together to deliver it. Evaluate those elements as one finished product.



510-THREAD CARTRIDGE

A replaceable reservoir and heating system used with a compatible battery. Confirm construction, closure and battery pairing.



ALL-IN-ONE DISPOSABLE

The reservoir, heating system and battery form one device. Confirm activation, charging and storage guidance for the selected model.



CLOSED POD SYSTEM

A replaceable pod works with its matching battery. Confirm the pod, electrical interface and operating settings together.

THE INTERFACE THAT MATTERS

EXTRACT

- Dynamic viscosity μ at the measured temperature
- Composition and terpene content of the finished blend
- Flow and stability under intended conditions



DARCY'S LAW

CERAMIC CORE

- Effective porous flow area A
- Intrinsic permeability κ of the sintered matrix
- Wall thickness L and the pressure difference ΔP

The next step is to balance oil delivery with heating demand, then confirm performance with the actual formulation and device.

CCELL® platform design · Darcy flow model. Product images illustrate the three formats. Dimensions, compatibility and intake specifications are model-specific.

CAPILLARY FLOW

Balance Oil Delivery with Heating Demand

Darcy's law connects oil flow to permeability, area, pressure and viscosity. In the working device, oil delivery must keep pace with vaporization.

$$Q = \frac{-\kappa A}{\mu} \cdot \frac{\Delta P}{L}$$

Qvolumetric porous flow,
m³/s**κ**intrinsic permeability of
the ceramic core, m²**A**effective porous flow
area, m²**μ**dynamic viscosity of the
extract, Pa·s**ΔP / L**pressure gradient
across the ceramic wall,
Pa/m

CERAMIC FLOODING · OVER-SUPPLY

Lower Resistance to Flow

at the relevant composition and temperature

**Supply Exceeds Operating Demand**

flow pathways deliver more oil than needed

**Excess Oil Accumulates**

retention and consumption are insufficient

**Liquid Can Reach the Airway****Possible Spit-Back or Weeping**

CORE STARVATION · UNDER-SUPPLY

Higher Resistance to Flow

at the relevant composition and temperature

**Supply Falls Below Operating Demand**

replenishment is too slow for the draw

**Oil Supply Below Consumption**

compare liquid-equivalent volume per second

**Heating Becomes Uneven****Performance Can Deteriorate** — dry areas and inconsistent delivery

USGS: Darcy's law · CCELL® EVOMAX core design. Simplified laminar porous-flow model with constant fluid properties; negative sign indicates flow down the pressure gradient. Actual saturation, capillarity, temperature and evaporation also matter. The pathways illustrate possible outcomes; device thresholds require testing.

THERMODYNAMICS OF CAPPING

How Headspace Cooling Changes Pressure

A fixed-volume ideal-gas example shows how cooling changes headspace pressure. The calculation illustrates pressure magnitudes; filling settings and seal performance require model-specific guidance.

- 01 **Define the Initial Gas State** · $50\text{ }^{\circ}\text{C} = 323.15\text{ K}$; fixed volume and fixed amount of gas
- 02 **Set Initial Pressure** · $P_1 = 101.325\text{ kPa}$; assume ideal-gas behavior and no leakage
- 03 **Calculate the Final State** · $20\text{ }^{\circ}\text{C} = 293.15\text{ K}$; use $P_2/P_1 = T_2/T_1$
- 04 **Pressure Decreases** · $P_2 = 101.325 \times 293.15 / 323.15 = 91.92\text{ kPa} \rightarrow \Delta P = -9.41\text{ kPa} (-94.1\text{ mbar})$
- 05 **Compare the Oil-Column Pressure** · $pgh = 1,050 \times 9.81 \times 0.025\text{ m} = +0.258\text{ kPa} (+2.58\text{ mbar})$

MODELLED COOLING: $50\text{ }^{\circ}\text{C}$ TO $20\text{ }^{\circ}\text{C}$

$\Delta P = -94.1\text{ mbar}$

Calculated from the stated ideal-gas assumptions. Seal performance requires a separate hardware evaluation.

PRESSURE-MAGNITUDE RATIO

36.5x

Cooling Pressure Drop $|\Delta P| \cdot 94.1\text{ mbar}$

Hydrostatic Head $pgh \cdot 2.58\text{ mbar}$

Assumed column height: 25 mm. Assumed oil density: $1,050\text{ kg/m}^3$. A 94.1 mbar pressure change is about 36.5 times the 2.58 mbar hydrostatic head.

NO TEMPERATURE CHANGE IN THE MODEL

$\Delta P = 0$

With temperature, gas amount and volume unchanged, this model predicts no pressure change. Other forces still matter.

NASA: ideal gas equation. Author calculation: $P_2 = 101.325 \times 293.15 / 323.15 \approx 91.92\text{ kPa}$; $\Delta P \approx -94.1\text{ mbar}$. Hydrostatic head $= 1,050 \times 9.81 \times 0.025 \approx 258\text{ Pa}$. Real hardware can exchange gas, deform or change volume. Filling settings follow the selected model's approved procedure.

SAMPLING AND VALIDATION

Review the Exact Hardware Configuration



- 1 Mouthpiece and closure**

Integrated mouthpiece; snap-fit closure. Obtain the current filling and capping procedure before selecting equipment.
- 2 Reservoir capacity**

1.0 mL configuration shown. Confirm the tank material, capacity and body revision on the current specification.
- 3 Product dimensions**

Obtain the current dimensional drawing for the 1.0 mL configuration before specifying tooling or packaging.
- 4 Heating platform**

CCELL® 3.0 Bio-Heating: porous ceramic structure with a heating film. Evaluate the platform with the intended finished formulation.
- 5 Branding and finish**

Body and mouthpiece offer distinct decoration surfaces. Confirm the current drawing and print areas before finalizing artwork.

Numbered callouts identify visible regions on the Blade 1.0 mL image. Use the current specification for the exact model and revision on the order.

Hamilton Devices® Blade 1.0 mL · CCELL® 3.0. Hardware supplied empty.

IV

PART IV

CCELL® Engineering and Manufacturing

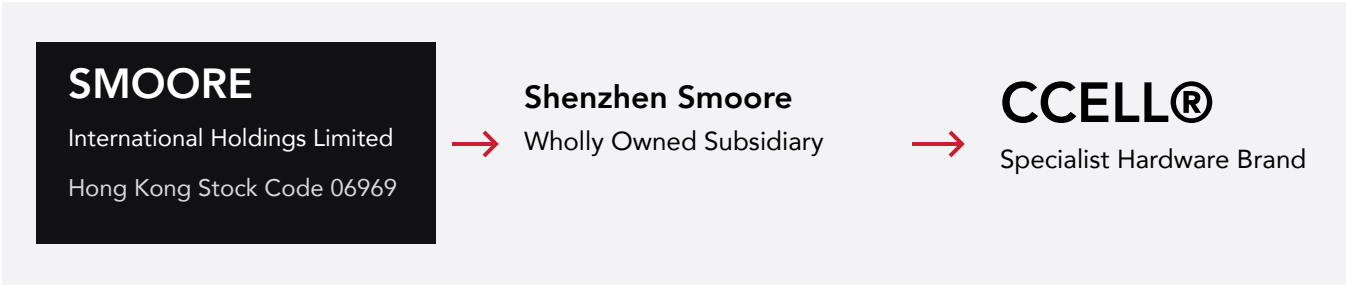
Explore the ceramic heating platforms, manufacturing capabilities and product specifications behind the CCELL® range.

The following pages connect those capabilities to formulation fit, production consistency and handling efficiency—the factors to assess when selecting samples for your application.

CORPORATE RESOURCES BEHIND THE BRAND

The Public Company Behind CCELL®

SMOORE’s public reports show the research investment behind its atomization businesses. That financial history adds context to the engineering platform buyers evaluate through CCELL®.



SMOORE listed on the Hong Kong Stock Exchange Main Board on 10 July 2020. CCELL® identifies itself as a flagship brand of Shenzhen Smoore Technology Ltd.

ANNUAL GROUP R&D EXPENSE · CALCULATED USD



More Than \$200 Million a Year in 2023–2025

Sustained research investment supports the group’s engineering and product-development work. In 2025, R&D expense represented **10.7% of SMOORE group revenue**.

Established Resources

Start with an existing platform, then focus your team on the formulation, customer experience and approved configuration.

A Supplier You Can Evaluate

Review the group’s investment and financial history alongside model specifications, samples and order terms.

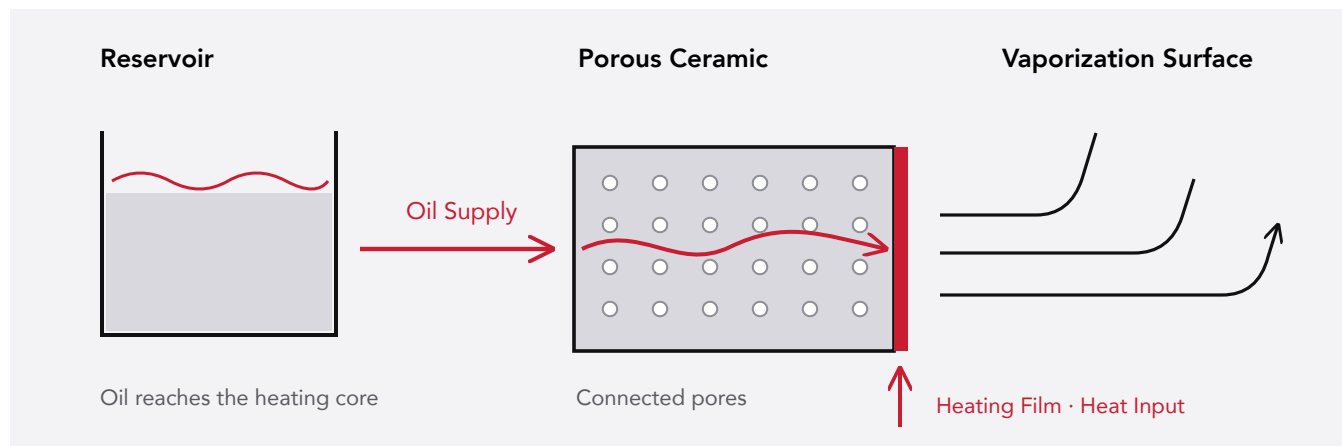
Group-wide R&D expense provides corporate context. Model specifications and sample results support the product evaluation.

Sources: SMOORE 2025 annual report, pp. 3, 18, 27, 76 and 164 · 2024 annual report, pp. 20 and 30 · CCELL® release, 10 June 2025 · Federal Reserve G.5A, 5 January 2026. USD equivalents use each year’s average exchange rate. Expenses exclude separately capitalized development costs. Product certifications and test reports apply to their named models and scope.

MATERIALS, CERAMIC AND RESEARCH

How CCELL® 3.0 Ceramic Design Supplies Oil and Heat

CCELL® 3.0 ceramic architecture connects oil delivery and heat distribution. Evaluate its oil delivery, heat distribution and model-specific materials with your formulation.



Illustrative CCELL® 3.0 oil-supply and heating relationship; not a cutaway of a specific SKU.

3D Stomata Ceramic

Structured oil pathways are designed to balance oil supply with consumption at the heating surface.

Nexus Film

Nexus Film distributes heat across the ceramic surface.



Research Behind the Design

CCELL® has researched atomization since 2016. In June 2025, it described a global network of **1,400+ engineers and scientists, including 120+ PhDs**.

That engineering base supports platform development. The next step is the exact device, material specification and production setup you approve.

Materials Chosen by Model

Ceramic-EVOMAX pairs a ceramic center post with borosilicate glass. TH2-SE pairs a low-lead brass post with a borosilicate glass body.

Know What Touches Your Oil

Oil flow and heat delivery work together. Match the construction, product specification and test documentation to the exact hardware you approve.

Sources: CCELL® 3.0 · R&D · CCELL® release, 10 June 2025 · Ceramic-EVOMAX · TH2-SE. Architecture and design descriptions are manufacturer-reported; performance depends on the selected model and formulation. Photo © CCELL®. Reviewed 7 October 2026.

FROM EXTRACT TO EXPERIENCE

Choose the CCELL® Platform for Your Formulation

Oil, the heating platform and the finished device form one product. Match the exact configuration to the experience you intend to sell.



BLADE · 1.0 mL
CCELL® 3.0 Bio-Heating

Bring the Platform into Your Product.

The selected model brings the heating platform into a specific tank, airflow path and closure. Those details connect the extract to the finished customer experience.

Oil Delivery

Reservoir, intake design and airflow shape how oil reaches the heating zone.

Heating Platform

CCELL® 3.0 combines a structured ceramic core with a heating film.

Production Fit

Confirm the mouthpiece, closure, filling procedure and branding surfaces.

Feel the Weight. Inspect the Finish. Test the Draw.

Then evaluate the selected hardware with your own formulation before committing to the production run.

Sources: CCELL® 3.0. Hardware supplied empty.

PLATFORM SELECTION

Compare CCELL® Ceramic Heating Technologies

Four CCELL® design families, with different starting points for matching the hardware to your extract.

PLATFORM	DESIGN DIRECTION	WHERE TO BEGIN EVALUATION
SE Classic ceramic	Established ceramic heating architecture.	CCELL® positions its classic SE AIO range especially for distillates.
EVOMAX Optimized ceramic	Core structure and heat distribution developed for a broader range of oils.	Evaluate distillate, live resin, live rosin and liquid-diamond formulations against the exact model.
CCELL® 3.0 Bio-Heating	3D Stomata Ceramic and Nexus Film. Product architecture varies by model.	Investigate oil supply, heating response and flavor performance in your selected device.
HeRo Rosin-focused	Partitioned atomization, two oil pathways and an isolated airway in Rosin Bar.	A dedicated starting point for live rosin evaluation.

Match Your Extract First.

Platform names describe a design family. Tank size, airflow, power settings and construction still differ between devices.

Test the Exact Configuration.

Use the model and revision you plan to order. Review its filling guidance, materials and trial results together.

EVO also remains in the range and is distinct from EVOMAX. This overview highlights four platform families; compatibility is evaluated with the selected model and formulation.

Sources: CCELL® AIO range · EVOMAX · CCELL® 3.0 · HeRo introduction. Reviewed 6 October 2026.

PRODUCT FIT

CCELL® Cartridge Specifications by Model

Three published configurations show how capacity, materials and closure differ within the CCELL® range. Use these specifications to select the starting point for samples.

Specification	Ceramic-EVOMAX	TH2-EVOMAX	TH2-SE
Capacity	0.5 / 1.0 mL	0.5 / 1.0 mL	0.5 / 1.0 / 1.2 mL
Resistance	1.7 Ω	1.7 Ω	1.4 Ω
Published Intakes	4 × Ø2 mm	4 × Ø2 mm	4 × Ø2 mm
Center Post	Ceramic	Stainless steel	Low-lead brass
Reservoir Body	Borosilicate glass	Borosilicate glass	Borosilicate glass
Mouthpiece Closure	Snap-fit	Snap-fit	Snap-fit; screw-on for 0.5 / 1.0 mL
Batch Capping	50 at a time	50 at a time	50 at a time; snap-fit only

FROM SPECIFICATION TO SAMPLE

Match the exact capacity, closure and construction to your formulation and filling equipment. Hamilton Devices® can help narrow the selection and coordinate samples of the configuration you intend to order.

Manufacturer specifications: Ceramic-EVOMAX · TH2-EVOMAX · TH2-SE. Reviewed 6 October 2026. Intake diameter and ceramic permeability describe different properties. Capacity, closure and batch-capping capability apply to the listed configurations; samples confirm fit with the intended formulation.



MANUFACTURING CAPABILITY AND ADOPTION

CCELL® Manufacturing at Scale

Published production capacity, cumulative shipments and patent activity show the scale of CCELL®'s hardware business.



Automated equipment and trained operators at a CCELL® manufacturing facility.

PUBLISHED MANUFACTURING CAPABILITY

20 Million

Atomizers per month

Published production capability

5 Million

Batteries per month

Published production capability

64,500 m²

Factory area

China and Indonesia combined

Class 10,000

Cleanliness grade

Published by CCELL®

CUMULATIVE REACH AND INTELLECTUAL PROPERTY

530M+

Cartridges shipped

Cumulative manufacturer claim

2,000+

Brand partners worldwide

Manufacturer-reported reach

499 / 247

Applied for / issued patents

CCELL® global patent counts

Capacity describes potential output. Shipments, partners and patents describe reach and development; their reporting periods are unspecified.

Hamilton Devices® connects this manufacturing capability to the hardware, branding, quantity and pricing requirements of your program.

Sources: CCELL® manufacturing · cartridge shipments · brand partners · patents. Manufacturer-reported figures with unspecified reporting periods. Available inventory and delivery quantities are confirmed for the order. Photo © CCELL®. Reviewed 7 October 2026.

FROM COMPONENTS TO PACKAGED PRODUCT

Quality Controls from Components to Packaged Product

CCELL® describes six quality-control stages, from incoming components to packaged product. The commercial purpose is consistent production and fewer avoidable corrections along the line.

SIX STAGES PUBLISHED BY CCELL® · DECEMBER 2019

01 IQC

Incoming Quality Control

Check essential components for function, appearance and dimensions.

02 LQC

Line Quality Control

Monitor assembly and packaging on the production line.

03 IPQC

Input Process Quality Control

Evaluate the process and keep inspectors' training current.

04 FQC

Final Quality Control

Review finished-product design, function and quality.

05 OQC

Outgoing Quality Control

Check packaging, labels and possible defects before shipment.

06 OBA

Out-of-Box Audit

Review how the packaged product is presented and placed.



CCELL® manufacturing floor.

Quality Built into the Run

Automation and material checks connect the approved specification to repeatable production.

Testing Beyond Appearance

CCELL® describes battery tests for capacity, short circuit, impact, extrusion and heating.

6

Quality-control stages

A Published Quality Framework

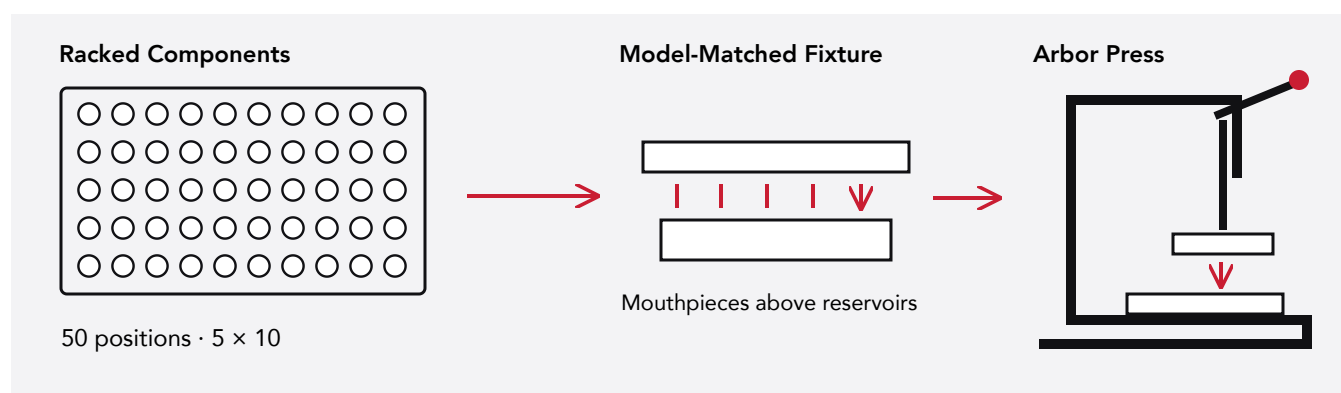
CCELL® describes incoming, line, process, final and outgoing checks, followed by an out-of-box audit. Model-specific documentation connects these controls to the hardware being ordered.

Sources: six QC stages, 11 December 2019 · CCELL® manufacturing discussion, 12 June 2023 · manufacturing · battery testing. Historical manufacturer process descriptions. The tests and inspection scope for a given model are defined in its supporting documentation. Photo © CCELL®. Reviewed 7 October 2026.

PRODUCTION FIT · TH2-EVOMAX SNAP-FIT

Match the Device to the Filling and Capping Line

Organized trays, aligned components and the right fixture let the filling batch move directly to controlled batch capping.



TH2-EVOMAX snap-fit example. Diagram shows the component relationship with a model-matched fixture.

- | | | |
|-----------|--------------------|---|
| 01 | Load | Confirm the 0.5 or 1.0 mL model, snap-fit mouthpieces, tray layout and matching fixture. |
| 02 | Fill | Follow the current device guide for fill amount, temperature, headspace and the fill-to-cap window. |
| 03 | Align + Cap | Position the matching mouthpiece tray and fixture. The TH2-EVOMAX snap-fit configuration caps 50 at a time. |
| 04 | Verify | Inspect mouthpiece seating, set aside rejects and release the accepted batch to packaging. |

Confirm the Whole Setup

CCELL® names ATG Pharma, Thompson Duke, DDS, Xylem and Vape-Jet as compatible equipment manufacturers. Compatibility depends on the machine model, tooling and device revision. Batch size and capping timing are device-specific.

Sources: CCELL® Filling & Capping Solution · TH2-EVOMAX specifications · equipment compatibility. Fifty-unit batch applies to the named snap-fit cartridge configuration and matching tooling. Schematic is explanatory, not an equipment instruction. Reviewed 7 October 2026.

CCELL® PRODUCTION AND LOGISTICS

Packaging and Handling That Support Production Efficiency

Organized components and a clear carton specification connect shipment to production. Plan protection, handling and delivery with the hardware order.

01

Racked Units
50 TH2-EVOMAX snap-fit units per matched capping batch.

02

Cap Options
Preloaded protective caps can remove preparation steps.

03

Matched Fixture
Match the device, closure and fixture to the line.

04

Ready to Ship
Plan protection, handling and carton quantities together.

L × W × H
Measure the Carton

Confirm carton dimensions, gross weight and unit count for the selected configuration. Use the actual freight quote to calculate logistics cost.

PACKING AND DELIVERY · QUOTE DETAILS

FIELD	CONFIRM FOR THE SELECTED CONFIGURATION
Units and Components	Units per tray/carton; protective-cap options; components supplied together.
Carton Specification	External length × width × height; gross weight; carton count; protection.
Handling and Protection	Receiving, unpacking and line-loading steps; protection during transit.
Delivered Cost	Freight quote; chargeable weight/volume; shipping terms; accepted quantity.

Freight per usable hardware unit = quoted freight ÷ accepted hardware units. Compare equal delivery and handling scopes.

Calculate freight value from the actual carton specification, quoted charges and accepted quantity.

Sources: CCELL® Filling & Capping Solution · TH2-EVOMAX specifications. Fifty-unit capping applies to the named snap-fit configuration with matching tooling. Freight and storage costs are calculated from actual packing details and quotations. The fields shown are a planning checklist. Reviewed 7 October 2026.

PRODUCTION ECONOMICS

Turn Production Efficiency into a Unit-Cost Advantage

Batch capping can reduce repeated handling. Measure labor against usable output to see what a change on the line is worth each month and year.

CCELL® BATCH-CAPPING CAPABILITY

50

Units per Capping Batch

TH2-EVOMAX snap-fit

Matched

Trays and Fixtures

Confirm the model and tooling

The named snap-fit cartridge caps 50 at a time with matching tooling. Measure paid labor for the same accepted output to establish the value on your line.

$$\text{Labor Cost per Usable Unit Received} = \frac{\text{Total Paid Production Labor Cost}}{\text{Usable Units Received}}$$

Include setup, changeover, filling, capping, inspection and rework. Sum all operators' paid hours. Compare the same device, formulation and acceptance standard; count usable units received.

Illustrative cost: 10 paid hours × \$25/hour = \$250; \$250 ÷ 1,000 usable units received = **\$0.25 per unit.**

WHAT A ONE-CENT IMPROVEMENT CAN MEAN · ILLUSTRATIVE

\$0.01

Less Labor Cost per Unit

Assumed improvement

\$2,500

Per Month

250,000 units received

\$30,000

Per Year

12 identical months

\$0.01 × 250,000 = \$2,500 per month. Measure the change on the line; use the usable volume you plan to receive.

This separate labor illustration uses assumed inputs. When combining measured labor improvements with the main case, count handling covered by the \$3 loss allowance only once.

Sources: CCELL® Filling & Capping Solution · TH2-EVOMAX. Fifty-unit capping is model- and closure-specific. Both worked examples use assumed USD costs and output; actual productivity is established on the buyer's line. Labor scope excludes hardware, oil, freight, depreciation and other nonlabor costs. Shared calculation inputs: report appendix. Reviewed 7 October 2026.

THE BUSINESS BEHIND THE HARDWARE

How Manufacturing Scale Supports Hardware Value

Manufacturing scale, repeatable processes and a defined order can support quality and value together. Evaluate those capabilities alongside the Hamilton Devices® quote.

THE MANUFACTURING EQUATION

Quality at Scale. Strong Commercial Value.

Efficient production, purchasing power and coordinated orders can lower the cost of supplying consistent hardware.

Purchasing Power

Large, recurring component demand supports supplier economics. The advantage can begin before a device reaches the assembly line.

Manufacturing Efficiency

Automation spreads production effort across volume. Process control helps reduce variation, avoidable rework and wasted materials.

Demand-Led Production

An approved specification and committed order give production a destination, reducing exposure to unsold custom configurations.

Established Platforms

Build around an established hardware architecture. Retain the approved design to simplify repeat orders.

Toyota's Lesson: Quality and Flow Work Together

Jidoka · Build in Quality

Detect an abnormality and stop to address it, before defects move onward.

Just-in-Time · Coordinate Flow

Replenish what the next process needs, with minimum stocks to keep work moving.

Toyota provides a reference for quality and flow. CCELL®'s own published process controls are described separately.

Hamilton Devices® connects the pieces: the hardware, finish, production plan and delivery coordination.

Sources: Hamilton Devices® September 6 custom-production brief and operating explanations; CCELL® manufacturing; Toyota Production System. Toyota is an explanatory reference, separate from CCELL®. Component inventory and production arrangements vary; the quote and operating results establish the buyer's commercial outcome.



ENGINEERING CAPABILITY AND COMMERCIAL VALUE

Where CCELL® Can Improve Your Production Economics

Hardware price is one line in the purchasing decision. Formulation fit, production consistency, labor and delivery determine the value of the complete order.

CAPABILITY → PRODUCTION EFFECT → COST LINE

CCELL® CAPABILITY	WHAT IT CAN CHANGE IN THE OPERATION	WHAT TO COMPARE
Formulation Fit	Match oil supply, heating and materials to the formulation. Validate the configuration before the order.	Usable units received; discarded oil and packaging
Controlled Production	Component, process and finished-product checks support a repeatable approved specification.	Rejects, rework and extra handling
Batch Handling	Matched trays and fixtures can reduce repeated actions. Preloaded caps may remove preparation steps.	Paid labor cost per usable unit received
Scale and Packing	An established platform, defined order and actual carton specification support production and delivery planning.	Hardware quote; transport losses; freight quote
Repeat-Order Specifications	Carry an approved configuration into repeat orders; manage changes against the same record.	Repeated development and qualification work

Connect Capability to Cost per Usable Unit

The [illustrative equal-output case](#) compares a 3.5% Higher-Loss Scenario with a 0.5% Lower-Loss Target through transport and receiving. The [monthly and annual comparison](#) shows the modeled saving over repeated orders.

Price Still Matters

Compare Hamilton Devices® pricing for the exact device, quantity and finish.

Make the Benefit Measurable

Compare CCELL® trials with your current hardware using matched conditions, actual costs and usable output.

The loss assumptions describe scenarios, not CCELL® or another supplier's performance. Normal labor and freight charges remain outside the model.

Sources: CCELL® 3.0 · manufacturing · quality stages, 11 December 2019 · filling and capping. The cost connections identify outcomes to measure. Hamilton Devices® pricing and production requirements follow the approved configuration and current quote.



PART V

From Hardware to Your Brand

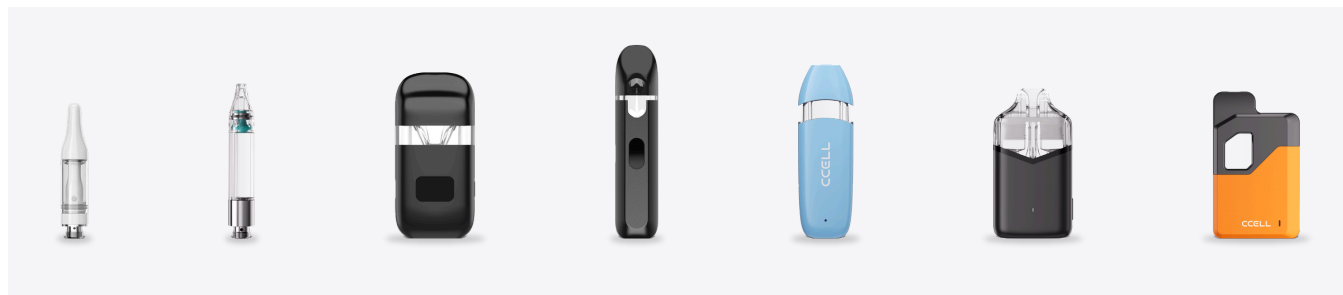
Bring the hardware, purchasing plan and brand together with Hamilton Devices®—from the first sample to repeat orders.

Compare CCELL® formats, published volume tiers and available branding options. Hamilton Devices® can help you select a starting model and organize the next step: evaluating samples with your formulation.

SELECTION · SAMPLES · ORDER COORDINATION

Explore the CCELL® Range with Hamilton Devices®

Choose all-in-ones, cartridges, batteries or pod systems, then connect your selection to samples, pricing and eligible custom production.



A Direct Path to Authentic Hardware.

Hamilton Devices® is a privately owned, authorized CCELL® distributor. Hamilton Devices® pursues a low-margin pricing strategy aimed at making authentic hardware commercially accessible.

Support for Your Production Program.

Buy standard hardware online. For a branded product or a larger production requirement, connect your project to hardware selection, samples and coordinated ordering.

Select

Choose the format and experience. Match oil-bearing hardware to your formulation, and batteries to the intended cartridge or pod.

Evaluate

Test the intended combination. Record filled-product output and losses; check battery fit, activation and charging.

Coordinate

Develop artwork, review samples and work through production and delivery planning with a dedicated representative.

Tell Us What You Want to Build.

Share your configuration, quantity and timing. Confirm the quote and delivery terms, then use trial results to compare cost per accepted unit.

Sources: Hamilton Devices® wholesale · Custom branding. Ownership and pricing strategy: Hamilton Devices® company information. Product imagery: CCELL® catalog. Order terms apply to the selected configuration.

CHOOSE YOUR FORMAT

Four Hardware Formats, One CCELL® Portfolio

Start with the format your customer needs. These four product examples show the choices within the range; current options and availability vary by model.



ALL-IN-ONES

Blade

An integrated reservoir, heating system and battery. Evaluate formulation fit, fill volume and the intended charging and activation experience.

[Explore Blade →](#)



510 CARTRIDGES

Ceramic-EVOMAX

A replaceable cartridge for a compatible battery. Choose tank size and available mouthpiece; confirm the model's closure requirements.

[Explore Ceramic-EVOMAX →](#)



510 BATTERIES

Fino

Power for a compatible 510 cartridge. Review physical fit, output settings, activation and charging as part of the complete product experience.

[Explore Fino →](#)



POD SYSTEMS

Luster Pro

A reusable battery body paired with its matching pod. Confirm the exact pod fitment and specify the body and pods as separate order items.

[Explore Luster Pro →](#)

Choose Your Starting Point.

Review the exact listing, available pack size and quotation. If the fit is still open, start with samples or complete your product selection.

Product examples and imagery: Hamilton Devices® CCELL® range and catalog. Hardware is supplied empty. Compatibility depends on the selected cartridge, battery or pod combination.

PUBLISHED VOLUME TIERS

CCELL® Pricing by Model and Order Quantity

Published tiers make it easy to compare the exact hardware, pack size and order quantity.

\$1.54

Ceramic EVOMAX · 1.0 mL
Per unit at a 2,000-unit case quantity

\$2.32

Blade · 1.0 mL AIO
Per unit at 4+ cases of 576 units each

EXACT CONFIGURATION	QUANTITY	USD / UNIT
CCELL® Ceramic EVOMAX 1.0 mL cartridge ↗ CC-EVOMAX-10-MP	1–49 pieces	\$2.50
	100-unit box	\$1.77
	2,000-unit case	\$1.54
CCELL® M6T10-EVO Clear round mouthpiece ↗ M6T10-EVO-CRM	100–1,999 pieces	\$2.26
	2,000+ pieces	\$1.85
CCELL® Blade 1.0 mL AIO · Black ↗ D9210-BF-BK	48-unit box	\$3.07
	1–3 cases · 576 / case	\$2.67
	4+ cases · 2,304+ units	\$2.32

Selected public tiers, checked October 6, 2026. USD per empty unit, before tax and shipping. Prices, availability and applicable quantities may change; review the selected configuration and pack total online.

Current public listings: Ceramic EVOMAX · M6T10-EVO · Blade 1.0 mL.

MAKE THE SELECTED HARDWARE YOUR OWN

Branding Options for Your CCELL® Hardware

Build a coordinated product line around your selected hardware. Confirm the available color, finish, mouthpiece, artwork and packaging options for each model.



All-in-One · Blade



Cartridges · EVOMAX



Battery · Palm Pro

Color & Finish

Choose stock or eligible custom colors and surface finishes. Review the color reference on the actual housing material.

Mouthpiece & Configuration

Select supported mouthpiece shapes or materials. Keep capacity, closure and the approved hardware specification aligned.

Artwork & Decoration

Confirm the print area, method, placement and orientation. Approve color and artwork on the agreed reference.

Packaging & Reorders

Coordinate packaging with device dimensions and order quantities. Retain the approved artwork, hardware record and revision for reorders.

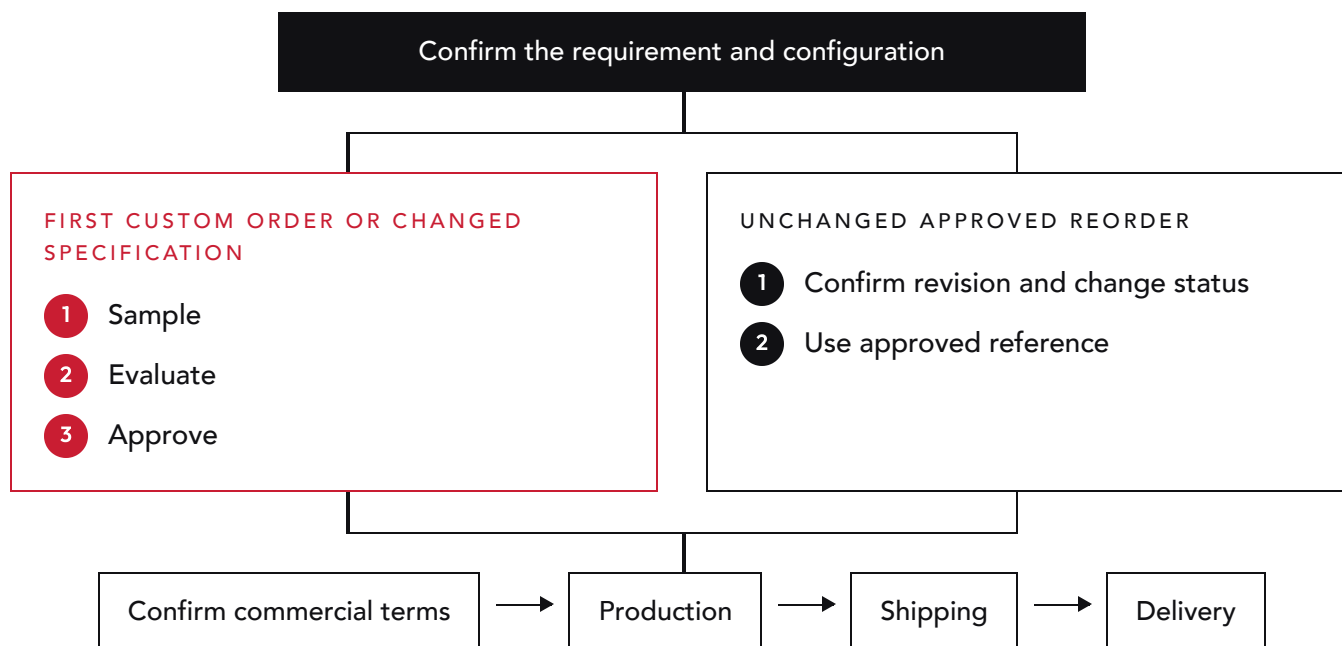
Hamilton Devices® connects the visual brief to model-specific options, sample review and production coordination. Review the sample and approval process for your custom order.

Hamilton Devices® custom branding · Catalog concepts show fictional brand marks. Options, minimums, sample requirements and timing are confirmed per project.

EXECUTION PROCESS

Approve Your Custom Order and Keep Reorders Consistent

Start a new or changed configuration with sample review. Repeat an unchanged order from the approved specification, artwork and reference.



Sample review establishes the reference for a first custom order or a changed specification. Unchanged reorders follow that approved reference. Confirm the configuration and commercial terms, then coordinate production and delivery.

Discuss your custom order  →

SAMPLING AND VALIDATION

Evaluate Samples on Your Production Line

Evaluate the selected CCELL® model with your intended formulation and equipment. For a battery or pod system, evaluate the matching cartridge or pod as part of the same customer experience.

01 Define the checks for your format.

For oil-bearing hardware, agree on fill weight, closure integrity, draw, appearance and storage checks. For batteries, include cartridge or pod fit, output settings, activation and charging.

02 Record the selected model and reference.

Keep the model, revision and lot with the quotation. Note the paired cartridge or pod so the production order matches the combination evaluated.

03 Follow the current model instructions.

Use the filling and capping guidance that applies to the selected hardware. For batteries, follow the charging and operating guidance for the intended combination.

04 Record the outcome and production inputs.

For filled products, record accepted units, rejects, filling and capping labor, and extra handling. Record fit and operating results for a battery or pod-system trial.

05 Keep the approved sample and trial record.

Retain the reference for reorders. Review product, artwork or process changes before relying on the earlier result. Compare actual outcomes with your current hardware under matched conditions.

Hamilton Devices® sample-evaluation framework. Current model instructions govern filling, capping and operation. Complete your CCELL® product selection and trial and savings summary.

[START HERE](#)

Request Samples of Your Selected CCELL® Hardware

Explore a cartridge, all-in-one, battery or pod system with Hamilton Devices®. Share what you know about the product you want to build; the team can help narrow the selection.

Share What You Already Know. Start with the details you have. Hamilton Devices® can help with the remaining product choices.

Formulation, If Applicable

Oil family and final blend; viscosity if known.

Preferred Format

Cartridge, all-in-one, battery or pod system.

Tank Size, If Applicable

Target fill volume, or the cartridge/pod to pair.

Color & Mouthpiece

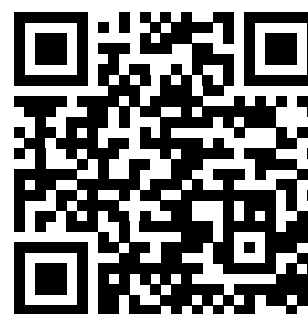
Stock or custom color; mouthpiece preference if offered.

Production / Operating Setup

Filling and capping method, or battery pairing.

Quantity & Branding

Expected volume, model if selected, and artwork needs.



Scan to start your sample request. Use your product selection to organize the brief. Then evaluate the samples using the format-specific checks.

Request Samples  →

hamiltondevices.com/request-samples/

Ready to Order?

Explore available CCELL® hardware and published volume tiers. **Shop the range** ↗

Building Your Own Brand?

Explore eligible colors, finishes and artwork. **Discuss custom branding** ↗

Hamilton Devices® · Authorized CCELL® Distributor
Brands · Processors · Distributors · Manufacturers · MSO buyers



Hamilton Devices® · Hardware supplied empty. Requests are reviewed by the wholesale team. The six details above help the team recommend a starting point.

MARKET EVIDENCE

Sources and Appendix Index

Sources, calculation methods and practical evaluation records for the figures in this report.

Sources	51–53	Market, engineering and commercial evidence
Unit Economics	54–59	Finished-product examples and same-order comparisons
Full Cost Models	60–62	Cash reconciliation, replacements and break-even
Technical Evaluation	63–65	Battery storage, evidence and laboratory scope
Buyer Records	66–69	Procurement, acceptance, product selection and trial savings
Planning Examples	70–72	Assumed market sizing and audience mixes, separate from sourced findings

1. Tom Adams Research, BDSA Forecast Update — April 2026
- Published forecast inputs from a collaborating analyst’s April 2026 summary. The North American outlook is calculated by Hamilton Devices® from those inputs; it is an estimate rather than a directly reported regional total.
2. Vangst × Whitney Economics, 2026 U.S. Cannabis Jobs Report landing page
- 2025 U.S. regulated retail revenue: \$29.1B. National estimate; price compression differs across markets.
3. Boston Cannabis Retail License Saturation Analysis, revised February 20 2026
- Printed page 14: national 2024/2025 revenue comparison; revised February 20, 2026.
4. Statistics Canada Table 10-10-0164-01 · The Daily, March 5, 2026 · Chart 4
- FY 2024/25 sales, category growth and recreational market shares.
5. Headset Vapor Pens
- U.S. category sales \$4.9B, Oct 2025–Sep 2026; cartridge/AIO dollar split 50:50. Public demographic profile: Gen Z 32% of category dollars; demographic period/geography not separately stated.
6. Headset FAQ methodology
- POS receipt data + government reported data, anonymous sample used for statewide sales estimates, loyalty-program demographics, pre-tax prices.
7. Bank of Canada annual average exchange rates
- Calendar 2024 annual average: one US dollar = 1.3698 Canadian dollars. Used as one representative presentation rate for Canadian FY 2024/25 annual totals, not a fiscal-year-specific average.

Derived North American Forecast Calculations

USD billions. Outside North America in 2025: $6.25 \div 1.13^5 \approx 3.39$.
North America: $2025 \approx 38.5 - 3.39 = 35.1$; $2030 \approx 47.5 - 6.25 = 41.3$.
Implied annual growth: $(41.25 \div 35.108)^{1/5} - 1 \approx 3.3\%$. Rounded inputs limit precision; these figures are estimates and forecasts.

Sources checked October 8, 2026. All monetary figures are shown in U.S. dollars. Canadian sales are converted at the Bank of Canada 2024 annual average of 1 USD = 1.3698 CAD; a historical comparison rate. Canadian inhaled extracts include vape pens, hash, wax and rosin; dried cannabis includes pre-rolls. Changes in share are reported in percentage points.

Source review: 8 October 2026. All report monetary figures are USD. Labels identify published data, forecasts, derived calculations and illustrative models; each uses the period and scope stated beside the figure.

ENGINEERING EVIDENCE

Engineering Sources and Definitions

Research supporting the report's discussion of formulation, flow, materials, pressure and storage.

1. Formulation rheology

Idárraga-Vélez et al., Journal of Chemical & Engineering Data (2023). Experimental viscosity and terpene-content evidence.

2. Porous flow and Darcy's Law

USGS Professional Paper 1331. Basis for the simplified flow relationship and its assumptions.

3. Metals in unused cannabis vape liquids

Gajdosechova et al., ACS Omega (2022). A 41-device study; reported counts apply to that sample.

4. Hardware and metal exposure

McDaniel et al., Chemical Research in Toxicology (2021). Evidence relevant to product-contact evaluation.

5. Ideal-gas pressure calculation

NASA Glenn Research Center. The headspace-cooling example uses fixed gas quantity and volume with absolute temperature.

6. Battery calendar aging

Journal of Power Sources (2025). A three-year study of 28 cells with temperature and charge-state variables.

Technical Units and Terms

Pa·s: pascal-second, a unit of dynamic viscosity; 1 Pa·s = 1,000 centipoise.

K: kelvin, absolute temperature; kelvin = degrees Celsius + 273.15.

mbar: millibar, a pressure unit; 1 mbar = 100 pascals.

CoA: certificate of analysis for the identified sample and test scope.

Engineering examples explain the underlying mechanisms. Production settings depend on current model-specific procedures and validation of the chosen formulation. Financial examples use the separate assumptions stated with each calculation.

Sources support the formulation, materials, capping and storage discussions. Study findings apply to the samples and conditions described in each publication.

PRODUCT & COMMERCIAL EVIDENCE

Commercial Sources and R&D Calculations

Product documentation and public financial reporting support different parts of the CCELL® business case.

1. CCELL® manufacturing capability

Factory metrics and photographs; manufacturer-reported capability.
2. CCELL® R&D capability

Materials, technology and test capability; manufacturer disclosure.
Battery testing: CCELL® safety.
3. EVOMAX technology

Oil-delivery and ceramic-core design.
4. CCELL® 3.0 Bio-Heating

Platform construction and manufacturer terminology.
5. HeRo / Rosin Bar

Rosin-focused model positioning.
6. TH2-SE

Model-specific construction.
7. TH2-EVOMAX

Materials and specification behind the illustrated cartridge.
8. Ceramic EVOMAX

Model-specific material and capacity description.
9. Live resin and distillate

Category definitions; preparation and operating conditions depend on the finished formulation.
10. Hamilton Devices® product and price sources

Exact Ceramic EVOMAX, M6T10-EVO and Blade links accompany the pricing page.
11. Hamilton Devices® custom branding

OEM/ODM distinctions, eligible customization and project process.
12. Hamilton Devices® samples and wholesale contact

Request route, intake details and follow-up process.

SMOORE Group R&D Expense · Conversion Record

YEAR	REPORTED RMB MILLIONS	RMB PER USD	USD MILLIONS
2023	1,482.846	7.0809	209.4
2024	1,572.313	7.1957	218.5
2025	1,523.340	7.1875	211.9

USD = reported RMB expense ÷ matching calendar-year average RMB per USD. Figures use unrounded inputs and are displayed to one decimal million. Reported expense covers the SMOORE group. Capitalized development is a separate measure.

SMOORE 2024 Annual Report, pp. 20 and 30 · 2025 Annual Report, pp. 18 and 27 · Federal Reserve G.5A, January 5, 2026. Listing and subsidiary context: 2025 report, pp. 3, 76 and 164; CCELL® brand relationship.

CCELL® Filling & Capping Solution: configuration-specific filling/capping features and protective-cap options. The report’s buyer calculations use separately stated cost and output assumptions.

Product descriptions are attributed to manufacturer documentation; platform illustrations explain the design. Confirm the current specification for the selected model before production. Hamilton Devices®’s company positioning reflects management-supplied information.

Product sources checked 6–7 October 2026. R&D source amounts and annual exchange rates checked 7 October 2026. Source records retain original reporting currency; the main report presents USD.

ILLUSTRATIVE FINISHED-PRODUCT ECONOMICS

\$1.60 to \$14.80 After Shown Costs per Finished Gram

Compare the assumed revenue and four shown costs for each finished format. The remaining contribution helps put the hardware purchase in context.

ILLUSTRATIVE COST OR REVENUE	1.0 G FLOWER JAR	1.0 G DISTILLATE (510)	1.0 G LIVE ROSIN (AIO)	ROSIN VS. FLOWER
Wholesale active-ingredient cost	\$1.20	\$2.80	\$8.50	Higher ingredient cost
Primary containment / hardware	\$0.45 glass jar + lid	\$1.80 510 cartridge	\$3.40 AIO device	Different hardware format
Secondary packaging & child-resistant seal	\$0.35	\$0.55	\$0.85	Packaging assumption
Direct bench labour & automated filling	\$0.40	\$0.30	\$0.45	Filling labor assumption
Total shown costs	\$2.40	\$5.45	\$13.20	+450 %
Wholesale invoice to dispensary	\$4.00	\$13.50	\$28.00	+600 %
Contribution after shown costs	\$1.60	\$8.05	\$14.80	+\$13.20 contribution / unit (+825 %)
Contribution / revenue (%)	40.0 %	59.6 %	52.9 %	+12.9 percentage points
Dispensary retail shelf price	\$8.00–10.00	\$25.00–30.00	\$50.00–60.00	Illustrative shelf price

RAW FLOWER JAR

\$1.60

40.0 % of revenue

+403 %



1.0 G DISTILLATE VAPE

\$8.05

CONTRIBUTION 59.6 % of revenue

+84 %



1.0 G LIVE ROSIN AIO

\$14.80

CONTRIBUTION 52.9 % of revenue · +825 % vs. flower

Contribution = assumed invoice – shown costs. Rosin: $\$28.00 - \$13.20 = \$14.80$. Revenue share: $\$14.80 \div \$28.00 = 52.9\%$. Finished grams are not equal starting biomass. Other production costs, overhead and selling costs are excluded.

Illustrative model, Table 3.1. All prices and costs are assumed. USD per finished 1.0 g unit. Contribution is revenue less the four shown costs, before other production costs, overhead and selling expenses. Starting biomass and extraction yields differ.

SAME PURCHASED QUANTITY · ILLUSTRATIVE SCENARIO

How Unit Price and Yield Shape the Order

For a fixed order, compare the higher hardware invoice with less lost material and handling. Prices and loss rates are assumed, rather than measured supplier results.

ILLUSTRATIVE SCENARIO · USD

HARDWARE PREMIUM	ASSUMED LOSS GAP	FEWER LOST UNITS	AVOIDED LOSS VALUE	LOWER COMPARISON
\$25,000.00 250,000 × \$0.10	3.0 pp 3.5% – 0.5%	7,500 250,000 × 3.0%	\$123,750.00 7,500 × \$16.50	\$98,750.00 Same purchased order

Oil Discarded \$12.00 per lost completed unit	Packaging Discarded \$1.50 per lost completed unit	Extra Handling \$3.00 per lost completed unit
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\$16.50 per additional lost unit. Hardware purchases are already counted in hardware spend. The comparison adds discarded material value and handling once.

\$98,750.00 lower hardware + loss-value + handling measure

The same 250,000 purchased units produce different received outputs: 241,250 in the Higher-Loss Scenario versus 248,750 at the Lower-Loss Target. This measure combines hardware, discarded material value and handling; cash expenditure is reconciled separately. Cash reconciliation · Equal received output.

Model scope: assumed completed-product losses through delivery and receiving. No salvage or credit. Excludes post-acceptance consumer returns, normal labor, freight, duties, financing and overhead. Unrounded calculations. Formula and scope.

SAME PURCHASED QUANTITY · DIFFERENT RECEIVED OUTPUT

Compare Hardware Spend and Material Loss

This illustration compares a fixed hardware order, the assumed value lost and the usable units received. Prices and loss rates are planning inputs.

ILLUSTRATIVE SCENARIO · USD

Item	Higher-Loss Scenario	Lower-Loss Target	Modeled Difference
Purchased Units	250,000	250,000	Same
Hardware Price / Unit	\$2.00	\$2.10	\$0.10 more
Hardware Spend	\$500,000.00	\$525,000.00	\$25,000.00 more
Assumed Product-Loss Rate	3.50%	0.50%	3.0 pp lower
Lost Units Through Receipt	8,750	1,250	7,500 fewer
Oil + Packaging Discarded	\$118,125.00	\$16,875.00	\$101,250.00 less
Extra Handling	\$26,250.00	\$3,750.00	\$22,500.00 less
Hardware + Loss Value + Handling	\$644,375.00	\$545,625.00	\$98,750.00 less
Usable Units Received	241,250	248,750	7,500 more

The \$16.50 loss allowance is \$12.00 oil + \$1.50 packaging + \$3.00 handling. Hardware is counted once. The green total combines hardware spend, discarded material value and handling. Reconcile cash expenditure before comparing equal received output.

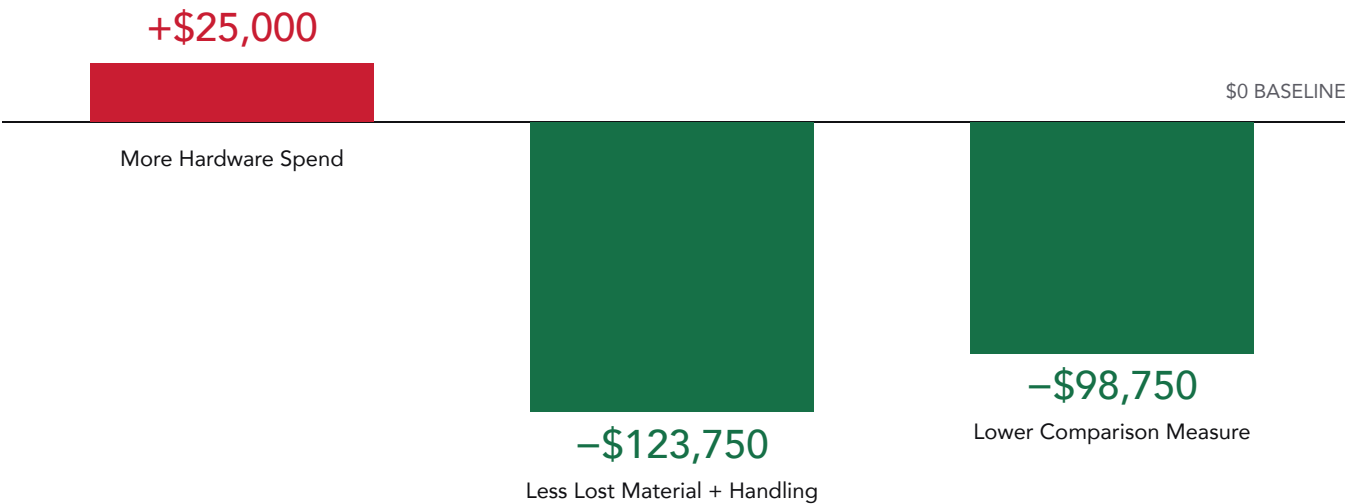
Model scope: assumed completed-product losses through delivery and receiving. No salvage or credit. Excludes post-acceptance consumer returns, normal labor, freight, duties, financing and overhead. Unrounded calculations. Formula and scope.

SAME-ORDER BRIDGE · MODELED COST CHANGE

Lower-Loss Target Difference on the Same Order

With the same purchased quantity and assumed loss rates, less discarded material and handling offset the higher hardware invoice. Green marks the lower comparison measure.

ILLUSTRATIVE SCENARIO · USD



\$98,750.00 lower same-order comparison measure

The Lower-Loss Target uses **\$25,000.00 more hardware spend** and has **\$123,750.00 less discarded material value and handling**. It also delivers **7,500 more usable units** from the same purchased quantity.

The Lower-Loss Target spends \$2,500.00 more initial cash while reducing the combined hardware, lost-value and handling measure by \$98,750.00. [Cash reconciliation](#) · [Equal-output savings](#).

Model scope: assumed completed-product losses through delivery and receiving. No salvage or credit. Excludes post-acceptance consumer returns, normal labor, freight, duties, financing and overhead. Unrounded calculations. Formula and scope.

AN ILLUSTRATIVE BREAK-EVEN EXAMPLE

How Many Extra Losses Erase a Unit-Price Saving?

Break-even is the point where the lower invoice is exactly offset by the extra discarded material and handling. The steps below convert the assumed price difference into an extra-loss count.

Break-Even Extra Loss-Rate Gap =

Higher Quote – Lower Quote

Value and Handling per Extra Loss

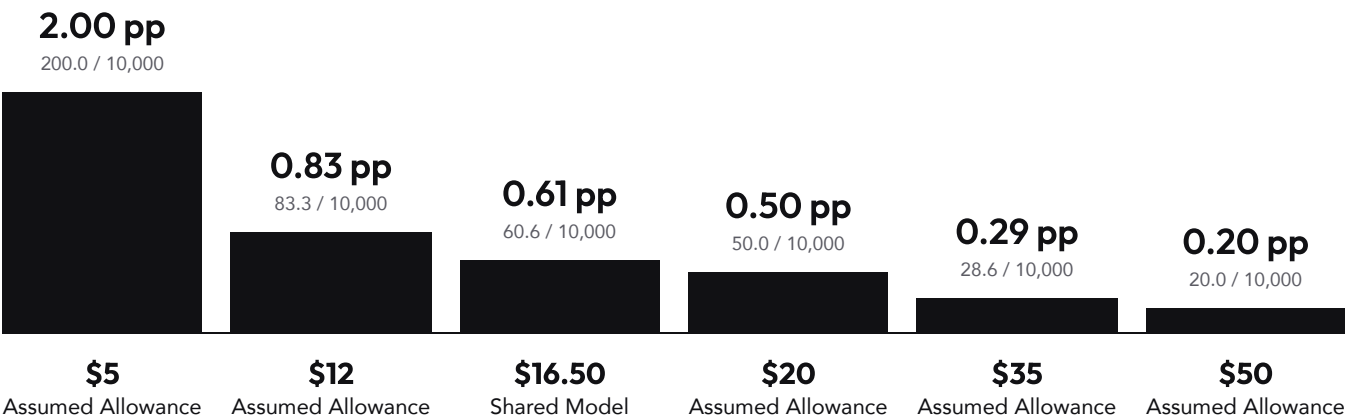
ORDER SIZE CANCELS

Larger orders multiply both the saving and the consequences.

Higher-Loss Scenario quote: \$2.00. Lower-Loss Target quote: \$2.10. The saving is \$0.10 per purchased unit. One extra lost completed unit represents \$12 discarded oil + \$1.50 packaging + \$3 extra handling = \$16.50.

1 · INVOICE SAVING	2 · PER EXTRA LOSS	3 · BREAK-EVEN COUNT	4 · WHOLE-UNIT CHECK
\$1,000 10,000 units × \$0.10	→ \$16.50 oil + packaging + handling	→ 60.606 1,000 ÷ 16.50 extra losses	→ 61 first count above break-even

EXTRA LOSS-RATE GAP THAT ERASES \$0.10 · PERCENTAGE POINTS



Convert the count to a rate: $60.606 \div 10,000 \times 100 \approx 0.60606$ percentage points. At 60 extra losses, the modeled consequence is \$990; at 61 it is \$1,006.50, just above the \$1,000 saving. This is the *difference* between the two loss rates, not either scenario's total rate.

Lower-Loss Target's assumed difference: 3.0 pp fewer losses, above this 0.606061 pp same-order break-even gap.

Illustrative same-purchased-order formula, distinct from the equal-received-output formula. Assumed product-loss rates are 3.5% and 0.5% through receipt. Bars use assumed loss allowances and theoretical counts per 10,000; pp means percentage points. Rates are planning inputs, not observed supplier results.

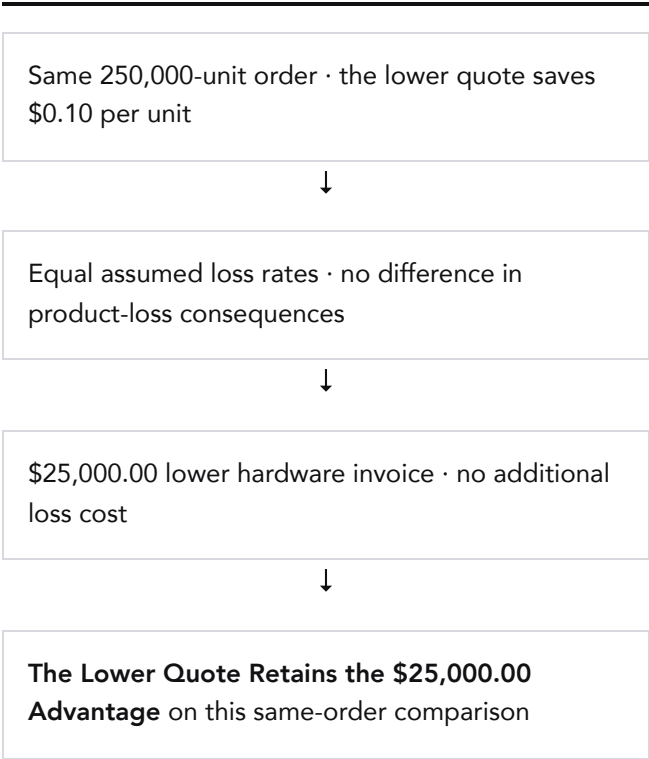
BALANCED STRATEGY · SAME PURCHASED QUANTITY

A Practical Framework for Hardware Selection

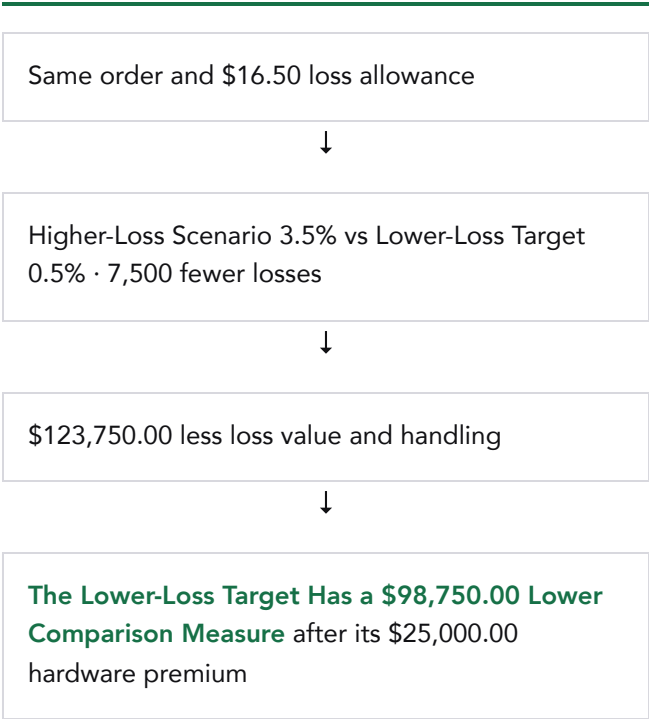
The same hardware quote can lead to a different decision when usable output changes. Both paths below use assumed prices and loss rates.

ILLUSTRATIVE SCENARIO · USD

EQUAL PERFORMANCE



THE ASSUMED LOSS RATES



When observed performance, product fit and supply terms are equal, the lower quote retains its advantage. When fewer completed products are lost, the calculation can change. Matched trials provide the loss rates for your own comparison.

Both paths hold purchased quantity equal. The equal-received-output model separately counts replacement attempts and total modeled production cost.

Model scope: assumed completed-product losses through delivery and receiving. No salvage or credit. Excludes post-acceptance consumer returns, normal labor, freight, duties, financing and overhead. Unrounded calculations. Formula and scope.

RECONCILIATION · SAME PURCHASED QUANTITY

Reconcile the Same-Order Comparison

Using the same assumed inputs, this table separates initial purchases from the value of material discarded. Both outcomes matter to the order economics.

ILLUSTRATIVE SCENARIO · USD

Item	Higher-Loss Scenario	Lower-Loss Target	Modeled Difference
Purchased Units	250,000	250,000	Same
Hardware Spend	\$500,000.00	\$525,000.00	\$25,000.00 more
All Oil + Packaging Purchased	\$3,375,000.00	\$3,375,000.00	Same
Extra Handling	\$26,250.00	\$3,750.00	\$22,500.00 less
Modeled Initial Cash Spend	\$3,901,250.00	\$3,903,750.00	\$2,500.00 more
Discarded Material Value	\$118,125.00	\$16,875.00	\$101,250.00 less
Same-Order Measure	\$644,375.00	\$545,625.00	\$98,750.00 less
Usable Units Received	241,250	248,750	7,500 more

The Lower-Loss Target spends \$2,500.00 more modeled initial cash and delivers 7,500 more usable units. Discarded material is already part of the \$3,375,000.00 material purchase. It is included once in initial cash spend.

The \$98,750.00 favorable difference is the same-order comparison measure: hardware + discarded material value + handling. It measures the change in those selected cost lines, rather than cash expenditure. The next table holds usable units received equal and includes replacement purchases.

Model scope: assumed completed-product losses through delivery and receiving. No salvage or credit. Excludes post-acceptance consumer returns, normal labor, freight, duties, financing and overhead. Unrounded calculations. Formula and scope.

EQUAL RECEIVED OUTPUT · EXPECTED VALUES

Compare the Cost of 250,000 Usable Units Received

At equal usable output, the assumed loss-rate improvement reduces replacement purchases. The difference column shows each cost change in the Lower-Loss Target.

ILLUSTRATIVE SCENARIO · USD

Item	Higher-Loss Scenario	Lower-Loss Target	Modeled Difference
Usable-Received Target	250,000	250,000	Same
Expected Attempts	259,067.3575	251,256.2814	7,811.0761 fewer
Expected Lost Units	9,067.3575	1,256.2814	7,811.0761 fewer
Hardware Spend	\$518,134.72	\$527,638.19	\$9,503.48 more
Oil + Packaging	\$3,497,409.33	\$3,391,959.80	\$105,449.53 less
Additional Handling	\$27,202.07	\$3,768.84	\$23,433.23 less
Modeled Production Cost	\$4,042,746.11	\$3,923,366.83	\$119,379.28 less
Cost / Usable Unit Received	\$16.170984	\$15.693467	\$0.477517 less

\$119,379.28 less modeled cost for the same received output

Every lost completed-product attempt consumes hardware and material. Its replacement faces the same assumed loss rate. Fractional counts represent expected production volumes. No salvage, reusable failed hardware or supplier credit is assumed.

Any added per-attempt processing cost also applies to replacements. [Main scenario comparison](#) · [Monthly and annual savings](#).

Model scope: assumed completed-product losses through delivery and receiving. No salvage or credit. Excludes post-acceptance consumer returns, normal labor, freight, duties, financing and overhead. Unrounded calculations. Formula and scope.

CALCULATION METHOD · EXPECTED VALUES

The Equal-Output Formula

The formula holds usable output constant and includes replacement attempts. Each attempt consumes hardware and material and faces the same assumed loss rate.

$$\text{Attempts} = Q \div (1 - r)$$

$$\text{Losses} = \text{Attempts} \times r$$

$$\text{Cost} = Q \times (P + V + rH) \div (1 - r)$$

Q = 250,000 usable units received; P = hardware price (\$2.00 Higher-Loss Scenario / \$2.10 Lower-Loss Target); V = \$13.50 oil and packaging per attempt; H = \$3.00 additional handling per loss; r = 0.035 Higher-Loss Scenario / 0.005 Lower-Loss Target.

Break-Even Loss-Rate Improvement

$$(P_C - P_R) \times (1 - r_C) \div (P_C + V + H)$$

$$\$0.10 \times 0.995 \div (\$2.10 + \$13.50 + \$3.00)$$

$$= 0.0053494624 \text{ as a fraction}$$

$$= \mathbf{0.534946 \text{ percentage points}}$$
 above the Lower-Loss Target's 0.5% loss rate.

The Higher-Loss Scenario break-even rate is **1.034946%**.

Break-Even Lower-Loss Target Hardware Price

$$P_{C,\max} = c_R(1 - r_C) - V - r_C H$$

With Higher-Loss Scenario cost per usable unit received $c_R = \$16.170984$, the Lower-Loss Target hardware threshold is **\$2.5751**.

Two Different Purchasing Questions: the same-purchased-order comparison attributes discarded value and gives a 0.606061-point threshold. The main commercial case holds usable output received equal and purchases replacement hardware and material; it uses 0.534946 points. These thresholds answer different questions.

Adding Production Costs: the Higher-Loss Scenario needs 7,811.0761 more attempts. Every additional dollar of normal processing cost per attempt adds \$7,811.08 to its modeled disadvantage. Add fixed fees, volume pricing, measured recovery, correlated losses and return outcomes using their own recorded inputs.

Illustrative cost model using assumed prices and loss rates. R = Higher-Loss Scenario (reference); C = Lower-Loss Target (comparison); c = cost per usable unit received. Expected counts may be fractional. No oil recovery or supplier credits. Detailed cost bridge.

ELECTROCHEMICAL AGING

Battery Storage and Inventory Planning

Manufacturing date, storage temperature and state of charge help inform inventory planning and sample evaluation.

Battery age includes manufacturing, transit and storage. Cell chemistry, temperature history, state of charge and time can affect capacity at dispatch.

CELL MANUFACTURE → DEVICE ASSEMBLY → TRANSIT → WAREHOUSE → USE

AGE AT DISPATCH

Time before receipt + time in your warehouse

Manufacturing or lot dates help distinguish battery age from time in your warehouse.

Time

Calendar aging happens while a cell is stored, even without ordinary charge/discharge cycling.

Temperature

Research consistently treats temperature history as an important aging variable.

Charge State

Storage state of charge can change the rate and mechanisms of degradation.

RESEARCH CONTEXT · 21700 CELLS

28

21700 lithium-ion cells
NMC811 / graphite

3 Years

calendar-aging observation

25 / 50°C

two storage temperatures

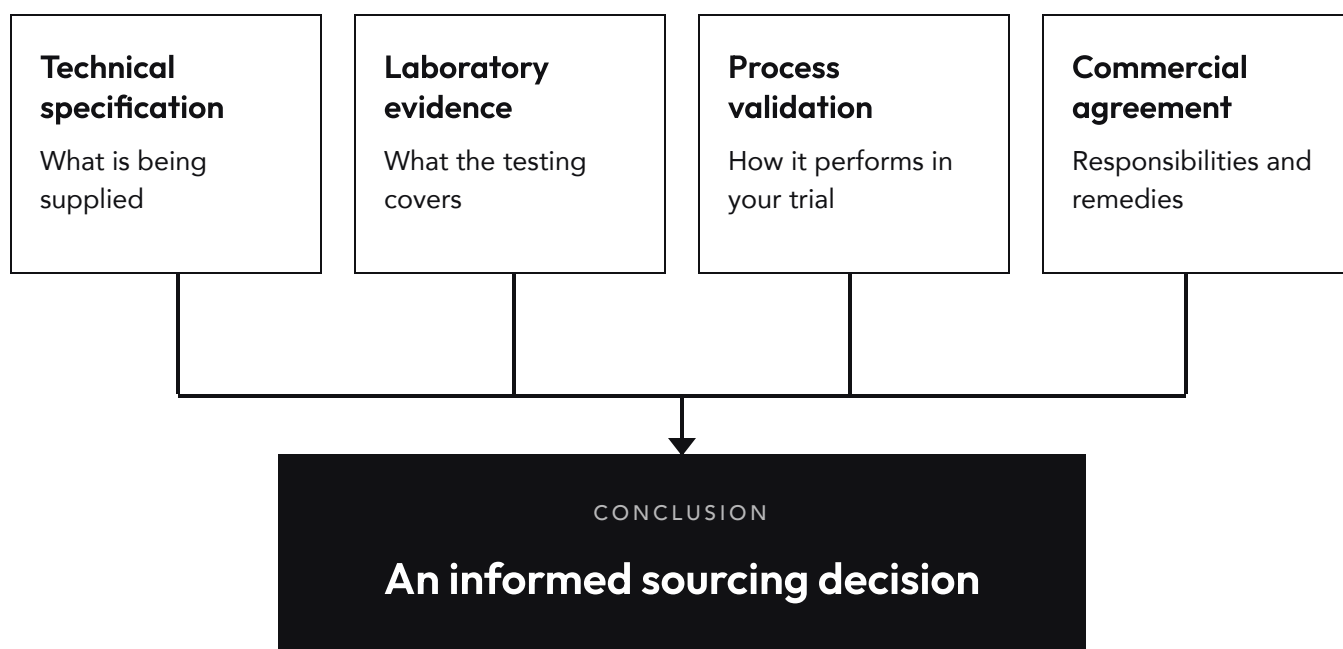
The study used 21700 cells, separate from CCELL® AIO batteries. Higher-temperature exposure increased degradation; charge state also mattered. Storage guidance and service life remain model-specific.

Influence of periodic temperature variations on calendar ageing of lithium-ion batteries, Journal of Power Sources (2025), DOI 10.1016/j.jpowsour.2025.238147; NLR, Multi-Scale Modeling of Battery Physics. The study provides aging context; it does not establish a CCELL® battery expiry or voltage threshold.

QUALITY DOCUMENTATION

Review the Evidence Behind the Configuration

Specifications, laboratory reports, production trials and order terms each answer a practical sourcing question. Together, they connect the chosen product to the way it will be supplied and used.



The specification describes the product. Laboratory reports identify the sample, test method and evaluation limits. Your production trial shows how the selected combination performs on your line. Agreed order terms set responsibilities, support and remedies. Keep these records together as the reference for purchasing and reorders.

VERIFICATION PROTOCOL

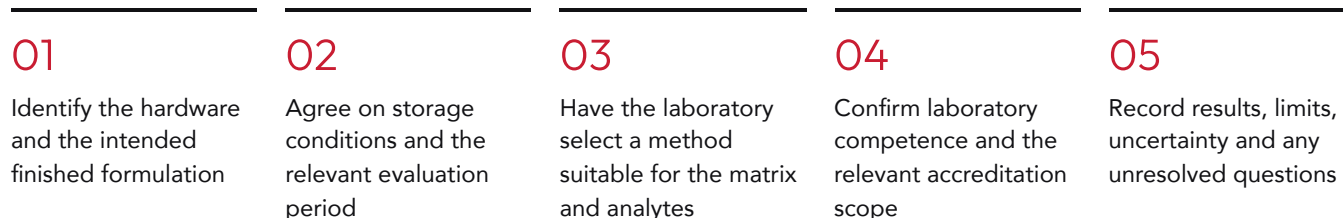
Specify a Test Plan That Matches the Product

A useful report answers a defined question about a traceable sample. Agree on the formulation, conditioning, method and acceptance criteria with the laboratory before testing.

DEFINE THE EVALUATION BEFORE INTERPRETING THE RESULT



FIVE STEPS FOR LABORATORY COORDINATION



DETAILS THAT MAKE RESULTS USEFUL

- Storage period covered by the evaluation
- Test approach matched to the exposure question
- Documented method, preparation and conditions
- Report matched to the model and revision
- Sample identity and report date recorded

WHAT THE RECORD SHOULD ESTABLISH

- Dated report with laboratory and relevant scope identified
- Traceable model, revision, lot and sample identity
- Formulation and conditioning matched to the question
- Method and preparation suitable for the test matrix
- Results evaluated against the applicable stated criteria

ISO/IEC 17025 laboratory competence · Gajdosechova et al., 2022. Laboratory coordination framework. The laboratory defines suitable preparation, analytes and conditions for the product and intended market.

TECHNICAL SOURCING AUDIT

Procurement Review Before the Purchase Order

Use this checklist to align the approved product, supporting records and order terms before purchasing.

- | | |
|---|--|
| ☐ 01 Engineering drawing & revision control
Current drawing or specification: dimensions, materials and revision code. | ☐ 06 Supply path and shipping documents
Confirm stock, inbound or production route; request the exact battery model's UN 38.3 test summary. |
| ☐ 02 Formulation–hardware alignment
Selected hardware evaluated with the finished formulation and operating settings. | ☐ 07 Change-control protocol
Agree on change notice and review before a change to the approved specification. |
| ☐ 03 Capping-line compatibility
Approved filling and closure procedure, equipment settings and trial results. | ☐ 08 Issue Resolution and Corrective Action
Define responsibilities, investigation and replacement logistics for exceptions. |
| ☐ 04 Third-party laboratory CoAs
Dated reports with sample identity, method, conditions and laboratory scope. | ☐ 09 Working-capital alignment
Freight, duties and milestone payments planned apart from customer deposits. |
| ☐ 05 Total Cost of Sourcing model
Hardware, unrecovered materials and handling captured once in the cost model. | ☐ 10 Post-receipt performance tracking
Log yields, closure issues and agreed storage checks for the next order. |

Approve the Configuration and the Supply Plan Together

Keep the sample record, supporting evidence, cost model and agreed order requirements together so that the next production run starts from an approved reference.

PHMSA battery-transport resources · Laboratory competence. Shipping documentation and packing requirements depend on the battery configuration, transport mode and destination. Coordinate these details with the supplier and carrier.

SAMPLING AND VALIDATION

Set Acceptance Criteria Before the Trial

Agreed acceptance criteria make sample results useful for purchasing. Record the checks, measurement methods and acceptable ranges before the trial, then share them with the team evaluating the product.

Useful criteria are specific to the configuration: fill weight and its tolerance, closure integrity after conditioning, activation and draw on the intended battery or device, appearance after storage, and any check required by your market. Where a check needs specialist equipment, arrange the measurement with the supplier or laboratory.

Record results and operating conditions against each criterion. If a result falls outside the agreed range, review the formulation, process and hardware together before choosing the next step.

A Clear Trial Plan Supports a Confident Order.

RECORD WITH EACH TRIAL

- ☐ Model, revision and lot
- ☐ Formulation and fill weight
- ☐ Equipment and settings
- ☐ Storage conditions and duration
- ☐ Result against each criterion

Hamilton Devices® sample-evaluation framework. Procedures and acceptance criteria apply to the selected configuration.

YOUR PRODUCT BRIEF

Your CCELL® Product Selection

Four starting choices help narrow the hardware range. Complete what applies to your product; the selected model is the result of the conversation.

01 Formulation

For oil-bearing hardware: identify the finished oil or blend, plus viscosity and measurement temperature if known. For a battery-only order, note the intended cartridge or matching pod.

Oil / blend or intended cartridge / pod _____

02 Tank Size

Specify the target fill volume for a cartridge, all-in-one or pod. For a battery-only order, confirm the intended cartridge or pod and its physical fit.

Target fill volume / paired cartridge or pod _____

03 Color

Choose an available stock color or describe the custom color direction. Availability and decoration methods depend on the selected model.

Stock color / custom reference _____

04 Mouthpiece

Where options are offered, note the preferred material or shape. Integrated mouthpieces follow the selected model's design.

Preference / integrated model mouthpiece _____

Selected CCELL® Model

Use the four inputs to narrow the range with Hamilton Devices®. Confirm the exact model, revision, capacity and paired components on the quote.

Model / revision / paired cartridge or pod _____

For Batteries: confirm compatibility with the intended cartridge or matching pod, physical fit and supported operating settings before ordering. [Request samples](#) to evaluate the chosen combination.

Hamilton Devices® product-selection guide. Options vary by model. For standalone batteries, begin with the intended cartridge or pod; the quotation confirms the selected combination.

YOUR SELECTED HARDWARE · YOUR OBSERVED RESULTS

Your CCELL® Trial and Savings Summary

Compare your selected CCELL® hardware with your current hardware using recorded trial results and actual quotes. Use these observations in place of the illustrative loss assumptions.

Prepared by / date

Accepted units per run / per month

Product Fit & Usable Output

Record the CCELL® and current models, trial dates, formulation and fill. Use matched conditions and receiving criteria; count attempts and accepted units in both trials.

Losses & Material Value

Count each loss once at its stage. Record consumed oil and packaging, unrecovered value, recoveries and credits; distinguish empty rejects from filled-product losses.

Production Labor

Record normal production labor and additional failure handling separately for the same accepted output. Include paid rework time without counting it twice.

Quote & Delivery Cost

Record actual hardware quotes and included freight or delivery costs on the same basis. Confirm quantity, receiving requirements and order-specific delivery terms.

Repeat Order & Implementation

Retain the approved model, revision and sample for reorders. Record changes, recurring fees and one-time trial, tooling or implementation costs separately.

Modeled Saving / Run

Monthly Projection

Annual Projection

USD

USD

USD

Calculate from Your Trial.

At equal accepted output, subtract the cost based on your CCELL® trial from the cost based on your current hardware. Project the difference using planned volume. Enter a negative result if costs rise; deduct one-time implementation costs separately.

One-time cost / next action

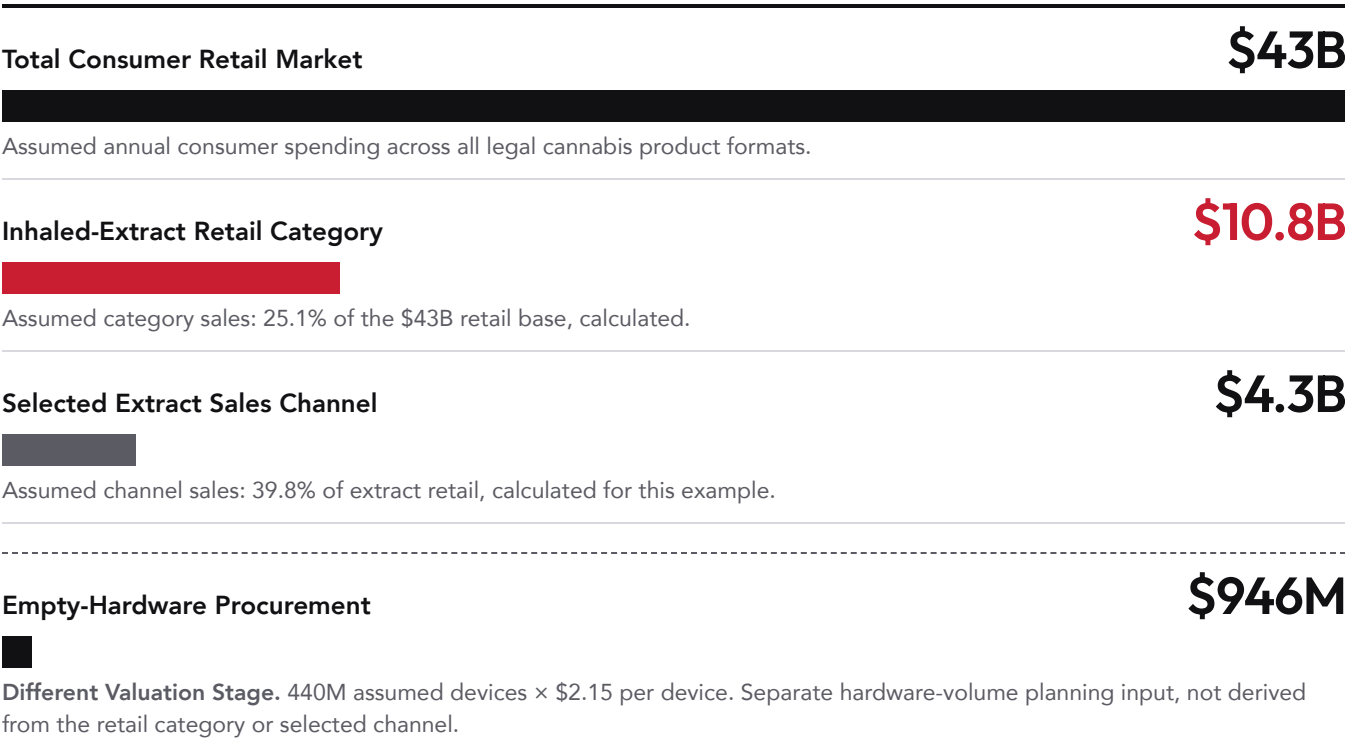
Trial owner / decision

Savings projections use your recorded costs and output. Monthly and annual results assume those unit economics continue at the stated volume. Calculation method · Loss-stage definitions.

PLANNING EXAMPLE · ASSUMED INPUTS

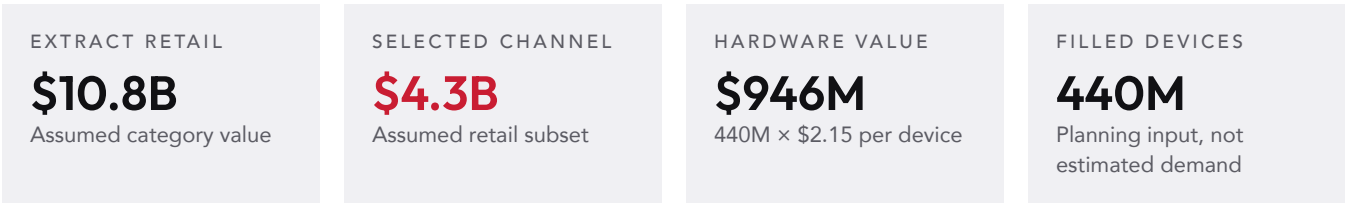
From Retail Demand to Hardware Procurement

This planning example uses assumed inputs: \$43B total retail, \$10.8B extract retail, \$4.3B selected-channel sales, 440M filled devices and \$2.15 per empty device. These are illustrative figures, not measured market data.



SEPARATE RETAIL VALUE FROM HARDWARE PURCHASING

Retail sales measure consumer spending; procurement measures spending on empty devices. The first three bars represent assumed retail scopes. The separate hardware calculation uses **440M devices × \$2.15**. A hardware purchasing plan also needs device volume and unit price.

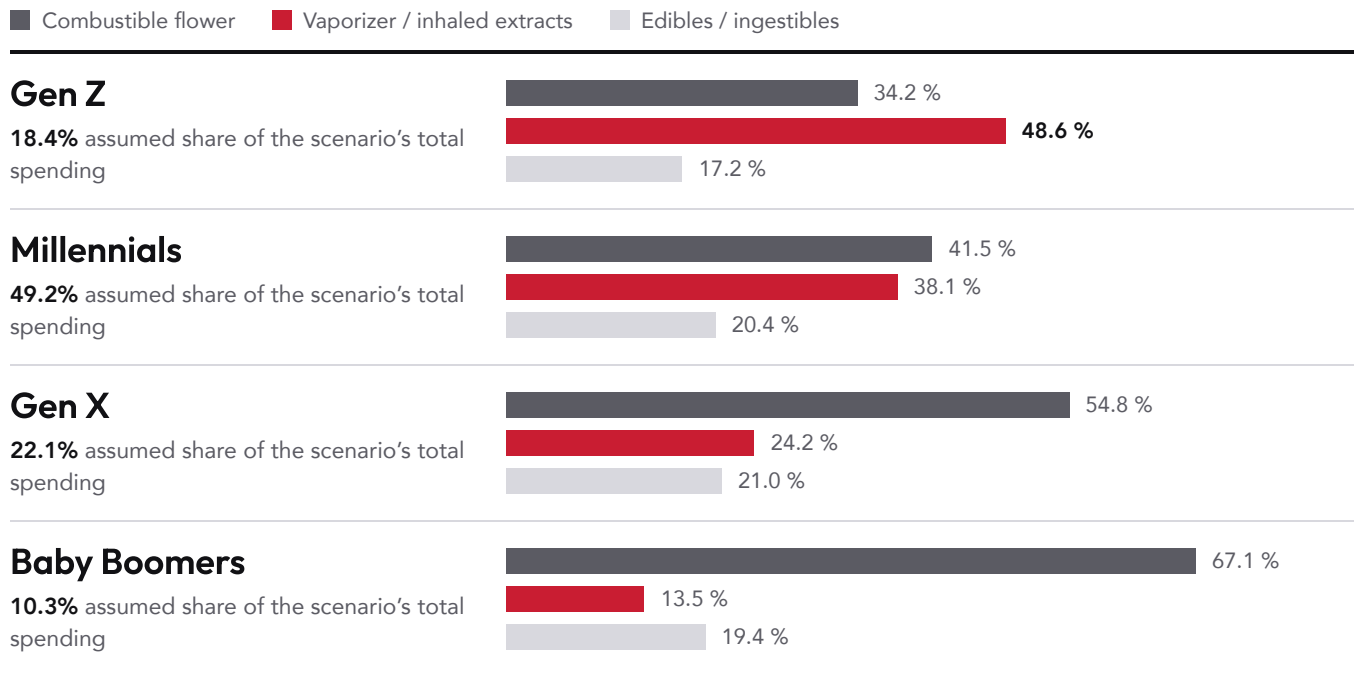


Assumed planning inputs, separate from the sourced findings in Part I: Market Opportunity. The first three bars show assumed retail scopes; the hardware bar uses an independent device-volume assumption to calculate procurement value. All bars use one linear dollar scale. Percentages are rounded calculations.

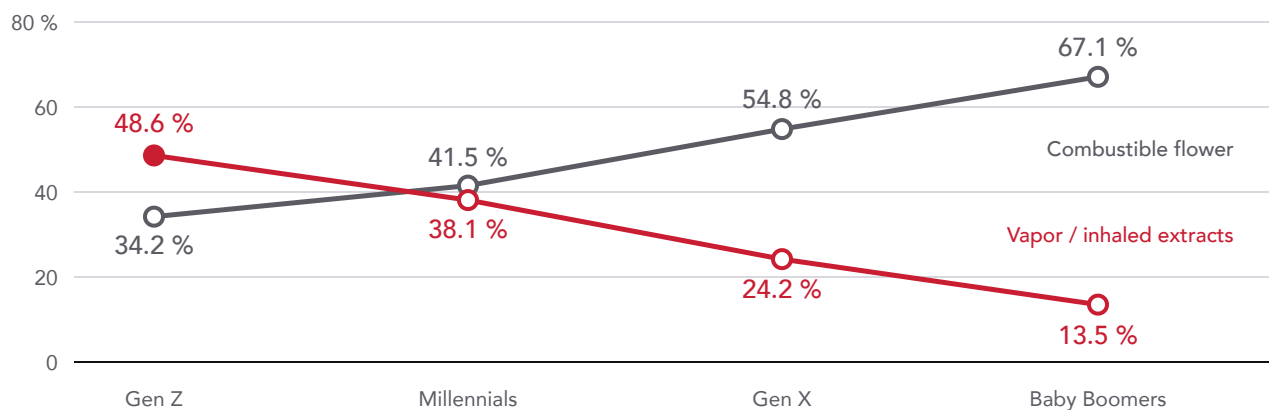
PLANNING EXAMPLE · ASSUMED INPUTS

Compare Audience and Format Priorities

This illustrative spending mix shows how audience and format choices can shape a product plan. All cohort shares are assumed inputs, not measured demographic data.



ILLUSTRATIVE WALLET SHARES · ASSUMED INPUTS



Illustrative assumptions, not Headset/BDSA observations. Each cohort's three format shares sum to 100%; the separate 18.4/49.2/22.1/10.3% weights sum to 100% of the scenario's spending. Bar scale: 0–70%. Line plot compares cohorts, not change over time; it shows flower and vapor only. The inputs have no survey date or geography; replace them with customer research for an actual market plan.

PLANNING EXAMPLE · ASSUMED INPUTS

Audience Priorities for Product Planning

Use this illustrative matrix to organize audience and product considerations. All spending figures are assumed; total scenario spending and within-cohort format shares measure different things.

COHORT	BASIS	TOTAL SCENARIO SPEND	FLOWER	VAPOR	EDIBLE	POSITIONING HYPOTHESES
Gen Z	Assumed	18.4 %	34.2 %	48.6 %	17.2 %	Discretion, perceived odor, portability
Millennials	Assumed	49.2 %	41.5 %	38.1 %	20.4 %	Consistent experience, flavor, convenience
Gen X	Assumed	22.1 %	54.8 %	24.2 %	21.0 %	Familiar format, straightforward controls
Baby Boomers	Assumed	10.3 %	67.1 %	13.5 %	19.4 %	Familiar format, clear instructions

GEN Z · PLANNING HYPOTHESES

Discretion	A discreet format suited to the use occasion.
Perceived Odor	The role of perceived odor in product choice.
Portability	How the product will be carried and stored.

MILLENNIALS · PLANNING HYPOTHESES

Consistency	A consistent experience across purchases.
Flavor	An oil and flavor profile suited to the customer.
Convenience	Straightforward preparation and operation.

MILLENNIAL WEIGHT

49.2%

Assumed share of total scenario spending

GEN Z VAPOR WALLET

48.6%

Assumed within-cohort format share

EACH FORMAT ROW

100%

Flower + vapor + edibles/ingestibles

Use the customer’s occasion, formulation, format and desired experience to build the product brief. Test these planning hypotheses through customer research before treating them as audience preferences.

Illustrative planning matrix, not measured demographic spending. The four total-spending weights sum to 100%; each three-format wallet row also sums to 100%. Positioning considerations are qualitative hypotheses; they are not survey findings.