

# C A R B O T U R A

ACM Manufacturing Center

## Claims Register

*Master index of public environmental, regulatory, and performance claims — with supporting basis, confidence classification, and verification plan for each claim category*

Document Class: **Room 2 — Technical Portal (NDA Required)**

Version: CR-001 Rev 1.0 — Design Basis

Anchor document: FEP-001 Facility Environmental Profile v1.0

**DESIGN-BASIS DOCUMENT** — All claims in this register are design-intent statements derived from engineering modelling. They are not certified LCA results, verified CDR credits, or confirmed regulatory compliance. See Section 7 for the verification pathway to certified status. This register is the authoritative index connecting each public claim to its supporting methodology.

## How to Use This Register

This register is the master index of every environmental, regulatory, and performance claim published on the Carbotura RevCon portal ([revcon.carbotura.com](http://revcon.carbotura.com)). It is organised by claim category, not by product. For a product-level view, see the Claim Matrix in Section 9.

Each claim entry documents six items:

- Claim text — the exact language as it appears on the public portal
- Confidence tier — design-basis (pre-commissioning) or certified (post-COD)
- Regulatory / scientific basis — the specific statute, standard, or methodology the claim rests on
- Supporting documents — the Room 2 documents that substantiate the basis
- Verification requirement — what must be demonstrated to move this claim to certified status
- Verification timeline — when the verification step is targeted

When a validator, lender's engineer, or regulatory authority asks about any claim, the response workflow is: (1) identify the claim ID in this register, (2) share the Room 2 supporting documents for that claim, (3) explain the verification timeline. No improvisation required.

All claim IDs use the format CATEGORY-NNN. Facility-level claims: FAC. Regulatory credits: REG. CDR registry: CDR. Supply chain: SCH. Environmental performance: ENV. A claim that appears in

multiple categories has multiple IDs — all are listed in the product entry in Section 9.

## Section 1 — Facility-Level Claims

These claims describe the ACM Manufacturing Center as a whole. They appear on the portal home page and in the product provenance statement on every product page. They are supported by FEP-001 and the Mass Balance Framework (pending).

### FAC-001 — Full Energy Autonomy

<b>Claim ID</b>	<b>FAC-001</b>
<b>Claim text (as published)</b>	"The facility operates in full energy autonomy. There is no grid connection. All electricity is generated from hydrogen recovered from the manufacturing feedstock stream via PEM fuel cell."
<b>Confidence tier</b>	Design-basis — engineering specification (infrastructure fact, not modelled outcome)
<b>Regulatory / scientific basis</b>	PEM fuel cell electrochemistry: $2H_2 + O_2 \rightarrow 2H_2O + \text{electricity}$ . No grid connection is an infrastructure specification, verifiable by facility inspection. No regulatory basis required — this is a factual description of the facility configuration.
<b>Supporting documents (Room 2)</b>	<a href="#">FEP-001 Section 1.1 (Room 2)</a>
<b>Products carrying this claim</b>	All 116 products — portal home page and product provenance statement
<b>Verification requirement</b>	Facility inspection confirming absence of grid connection; energy meter data showing 100% electricity from H2 PEM stack during commissioning
<b>Verification timeline</b>	Commissioning — Stage 2
<b>Notes / caveats</b>	Strongest possible energy claim because it is an infrastructure fact, not a market instrument. Cannot be challenged by grid carbon intensity arguments.

### FAC-002 — Scope 2 Emissions Zero

<b>Claim ID</b>	<b>FAC-002</b>
<b>Claim text (as published)</b>	"Scope 2 emissions are structurally zero — no grid electricity is purchased."
<b>Confidence tier</b>	Design-basis — follows directly from FAC-001 (no grid connection)
<b>Regulatory / scientific basis</b>	GHG Protocol Corporate Accounting Standard: Scope 2 = emissions from purchased electricity. Zero purchased electricity = zero Scope 2 by definition. No modelling required.
<b>Supporting documents (Room 2)</b>	<a href="#">FEP-001 Section 2.4; GHG Protocol Corporate Standard (Room 2)</a>
<b>Products carrying this claim</b>	Facility-level claim — not product-level
<b>Verification requirement</b>	Facility GHG inventory audit confirming zero purchased electricity entries
<b>Verification timeline</b>	Year 1 operations — Stage 3

### FAC-003 — Net Water Producer

Claim ID	<b>FAC-003</b>
Claim text (as published)	"The facility is designed as a net water producer. PEM fuel cell exhaust generates 25–36 tonnes of ultra-pure water per day at 100 TPD, which is captured and sold as the WTR-FC product family."
Confidence tier	PEM stoichiometry: $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$ . 1 kg H <sub>2</sub> produces 9 kg H <sub>2</sub> O. Design-basis H <sub>2</sub> throughput to PEM stack × 9 = design-basis water production. This is a stoichiometric fact applied to the design-basis H <sub>2</sub> volume.
Regulatory / scientific basis	FEP-001 Section 2.2; WTR-FC family product specs (Room 2)
Supporting documents (Room 2)	<a href="#">WTR-FC product pages</a> ; <a href="#">facility home page</a>
Products carrying this claim	Water balance verification during commissioning: measure actual PEM water output vs. design-basis
Verification requirement	Commissioning — Stage 2
Verification timeline	The 25–36 t/day range reflects uncertainty in H <sub>2</sub> throughput to PEM stack, which depends on feedstock composition.

### FAC-004 — Total Material Conversion / Zero Solid Waste

Claim ID	<b>FAC-004</b>
Claim text (as published)	"Nothing exits the facility as waste. 100% of manufacturing feedstock is converted to saleable product."
Confidence tier	Mass balance closure by engineering design. Every potential residual stream has been assigned a product identity (see 116-product catalog). RCRA scrap metal recycling exemption (40 CFR 261.6(a)(3)) applies to metal fractions. EPA beneficial use frameworks apply to mineral and glass fractions.
Regulatory / scientific basis	FEP-001 Section 2.1; Mass Balance Framework v1.0 (pending — Room 2)
Supporting documents (Room 2)	<a href="#">Portal home page</a> ; <a href="#">all product pages (facility-level provenance)</a>
Products carrying this claim	Mass balance closure verification during commissioning: sum of all product masses = input feedstock mass ± measured losses. Commissioning acceptance criterion.
Verification requirement	Commissioning — Stage 2
Verification timeline	Mass Balance Framework (pending) is the primary Room 2 supporting document for this claim. Until it is complete, this claim rests on FEP-001 methodology description alone.

### FAC-005 — Near-Zero Liquid Discharge

Claim ID	<b>FAC-005</b>
Claim text (as published)	"Designed for near-zero liquid discharge (NLD). All process water is either sold as product or recycled within the facility."

<b>Confidence tier</b>	Water balance by engineering design. All process water streams are routed to WTR product cascade (WTR-001 through WTR-010) or WTR-FC cascade. Residual NPDES discharge is a small fraction of total throughput. Note: "near-zero" not "zero" — residual discharge is designed, bounded, and permitted.
<b>Regulatory / scientific basis</b>	FEP-001 Section 2.2 (Room 2)
<b>Supporting documents (Room 2)</b>	<a href="#">WTR family product pages</a> ; <a href="#">facility home page</a>
<b>Products carrying this claim</b>	Water balance audit during commissioning. NPDES discharge measurement vs. design-basis <5% of throughput.
<b>Verification requirement</b>	Commissioning — Stage 2
<b>Verification timeline</b>	"Near-zero" is the correct claim — not "zero liquid discharge." True ZLD requires additional verification.

### FAC-006 — Total Designed Climate Benefit (Avoided Methane Included)

<b>Claim ID</b>	<b>FAC-006</b>
<b>Claim text (as published)</b>	"Total designed climate benefit: 20,000–36,000 t CO2e/yr at 100 TPD (direct CDR plus avoided landfill methane). At 400 TPD: 80,000–144,000 t CO2e/yr."
<b>Confidence tier</b>	ISO 14044 §4.3.4 system expansion methodology. Two components: (1) Direct CDR: carbon sequestered in CRB products + MIN-004 PCC mineralisation, minus designed Scope 1 emissions. (2) Avoided methane: EPA AP-42 landfill gas methodology applied to organic fraction of manufacturing feedstock (40-50% organic content, 50% collection efficiency assumption, GWP-100 = 28–34). Both components are design-basis estimates from engineering mass balance modelling.
<b>Regulatory / scientific basis</b>	FEP-001 Section 1.3 and Section 6.1; EPA AP-42 Chapter 2.4 Landfill Gas; GWP-100 values from IPCC AR6 (Room 2)
<b>Supporting documents (Room 2)</b>	<a href="#">Portal home page</a> ; <a href="#">facility environmental statement</a>
<b>Products carrying this claim</b>	Comprehensive GHG verification during Year 1 operations: direct measurement of CDR product volumes × carbon content + point-source emissions inventory. Avoided methane requires counterfactual LCA with third-party review.
<b>Verification requirement</b>	Year 1 operations — Stage 3
<b>Verification timeline</b>	The avoided methane component (8,000-14,000 t CO2e/yr at 100 TPD) is a system expansion credit under ISO 14044 — it is a facility-level claim, not a product-level claim. It should not appear in product carbon intensity figures.

## Section 2 — Regulatory Credit Claims

These claims relate to US federal tax credits and regulatory programmes. All are design-intent statements — the products are designed to qualify; formal credit confirmation requires IRS, Treasury, or relevant agency determination at time of application.

### REG-001 — IRA §45X Advanced Manufacturing Production Credit

<b>Claim ID</b>	<b>REG-001</b>
<b>Claim text (as published)</b>	"Designed to qualify under IRA §45X — [specific qualifying characteristic per product]"
<b>Confidence tier</b>	IRA §45X (26 U.S.C. §45X) — Advanced Manufacturing Production Credit. Credit = 10% of qualifying production costs for eligible critical mineral products. Eligible products defined by HTSUS code and statutory list. Key qualifying requirement: produced in the US by the taxpayer. Manufacturing feedstock origin is not specified in the statute — origin of inputs is a separate FEOC question (§30D). §45X credit is available regardless of feedstock origin provided the production occurs in the US.
<b>Regulatory / scientific basis</b>	IRA §45X statutory text; Treasury Reg. §1.45X-1 through §1.45X-3; IRS Notice 2023-29 (Room 2)
<b>Supporting documents (Room 2)</b>	8 products: CRB-008, CRB-018, MTL-018 (Neodymium), MTL-033 (Cobalt), MTL-042 (Gallium), MTL-043 (Indium), MTL-047 (Nickel Sulfate), MTL-048 (Lithium Hydroxide)
<b>Products carrying this claim</b>	(1) Confirm HTSUS classification for each product against §45X eligible product list. (2) Confirm qualifying production cost basis for each product. (3) IRS Form 7213 filing in Year 1. No third-party certification required — self-attestation with supporting documentation.
<b>Verification requirement</b>	Year 1 operations — filing in first tax year of production
<b>Verification timeline</b>	The §45X credit is a self-reported production credit. The risk is classification — whether each product meets the statutory definition and HTSUS code. A tax attorney review of product classification is the primary pre-filing action.

### REG-002 — IRS §45Q Carbon Oxide Sequestration Credit

<b>Claim ID</b>	<b>REG-002</b>
<b>Claim text (as published)</b>	"IRS §45Q carbon-sequestration tax credit — designed to qualify at \$85/t CO2 sequestered (geological storage equivalent for mineralisation)"
<b>Confidence tier</b>	IRC §45Q — Carbon Oxide Sequestration Credit. \$85/tonne for geological storage; \$180/tonne for utilisation (including mineralisation). Qualifying sequestration includes CO2 captured from industrial sources and permanently stored. MIN-004 PCC mineralises CO2 from GAS-003 into calcium carbonate lattice — permanent mineralisation. CRB-008 graphite carries sequestered biogenic carbon in a crystalline lattice with >500 year designed permanence.
<b>Regulatory / scientific basis</b>	IRC §45Q statutory text; Treasury Reg. §1.45Q-2 (qualified carbon oxide sequestration); IRS Notice 2020-12 (Room 2)
<b>Supporting documents (Room 2)</b>	3 products: CRB-008 (graphite lattice sequestration), MIN-004 (CO2 mineralisation), CRB-018 (battery-grade graphite lattice)

<b>Products carrying this claim</b>	(1) Engage qualified carbon sequestration engineer to certify permanence of graphite lattice and PCC mineralisation. (2) Establish monitoring, reporting, and verification (MRV) plan per §45Q requirements. (3) IRS Form 8933 filing. Note: §45Q requires qualified sequestration — IRS may require independent engineering certification.
<b>Verification requirement</b>	Year 1 operations — requires MRV plan at commissioning
<b>Verification timeline</b>	The §45Q credit for graphite lattice sequestration is a novel application — most §45Q claims are for geological storage. A private letter ruling from IRS is advisable before claiming §45Q on graphite products.

### REG-003 — IRA §30D EV Consumer Tax Credit Supply Chain

<b>Claim ID</b>	<b>REG-003</b>
<b>Claim text (as published)</b>	"IRA §30D EV credit supply chain — enables full \$7,500 consumer credit when Carbotura anode material is used in qualifying EV batteries"
<b>Confidence tier</b>	IRA §30D (26 U.S.C. §30D) — Clean Vehicle Credit. \$7,500 consumer credit for qualifying EVs. Two qualifying tests: (1) Critical mineral sourcing — 40% (rising to 80%) of critical minerals must be from US or FTA partners, or recycled in North America. (2) Battery component manufacturing — 50% (rising to 100%) manufactured in North America. Carbotura CRB-018/CRB-019 graphite anode material qualifies for the critical mineral test as US-manufactured from US feedstock.
<b>Regulatory / scientific basis</b>	IRC §30D statutory text; Treasury Reg. §1.30D-1 through §1.30D-3; IRS Rev. Proc. 2023-29; DOE FEOC guidance (Room 2)
<b>Supporting documents (Room 2)</b>	2 products: <a href="#">CRB-018 (Spheroidized Battery-Grade Graphite)</a> , <a href="#">CRB-019 (Hard Carbon Na-Ion)</a>
<b>Products carrying this claim</b>	(1) Confirm FEOC-aligned documentation (see SCH-001). (2) Provide traceability documentation to EV manufacturer / cell manufacturer for §30D attestation. (3) Annual attestation per IRS requirements. Note: the \$7,500 credit accrues to the EV buyer — Carbotura's role is to provide qualifying supply chain documentation to the cell manufacturer.
<b>Verification requirement</b>	Continuous — documentation required per vehicle year model
<b>Verification timeline</b>	The §30D benefit flows to the EV consumer, not to Carbotura directly. Carbotura's value is enabling the full \$7,500 credit by providing a qualifying anode material. This is a commercial differentiator in sales conversations with cell manufacturers.

## Section 3 — CDR Registry Claims

These claims relate to voluntary carbon dioxide removal (CDR) credit generation through Puro.earth and applicable CDR registries. All are design-intent — credits are issued by the registry post-commissioning, not at design stage.

### CDR-001 — Puro.earth Durable Carbon Storage (CRB Family)

<b>Claim ID</b>	<b>CDR-001</b>
<b>Claim text (as published)</b>	"Designed for CDR eligibility — Puro.earth Durable Carbon Storage. Carbon from manufacturing feedstock permanently sequestered in [graphite lattice / carbon nanotube structure / activated carbon matrix]."
<b>Confidence tier</b>	Puro.earth MC2.1 Durable Carbon Storage methodology. Key criteria: (1) <b>Additionality</b> — the carbon sequestration would not occur without the CDR-specific activity. (2) <b>Permanence</b> — carbon stored for >1,000 years (graphite lattice; CNT walls) or design-validated stability (activated carbon, hard carbon). (3) <b>Measurability</b> — carbon content verifiable by elemental analysis (ASTM C711). (4) <b>Leakage</b> — no significant leakage pathways in crystalline or porous carbon structures under ambient conditions. Biogenic carbon fraction of feedstock qualifies as atmospheric carbon removal. Fossil carbon fraction does not qualify as CDR but represents avoided fossil emission.
<b>Regulatory / scientific basis</b>	Puro.earth MC2.1 Durable Carbon Storage Methodology; ASTM C711; ISO 14044; CDR Methodology Document v1.0 (pending — Room 2)
<b>Supporting documents (Room 2)</b>	<a href="#">21 products: CRB-001 through CRB-021 (all CRB family)</a>
<b>Products carrying this claim</b>	(1) Complete CDR Methodology Document v1.0 (next Room 2 deliverable). (2) Submit to Puro.earth for methodology review. (3) Third-party verification during commissioning: elemental carbon analysis of product, biogenic fraction testing, permanence certification. (4) Annual vintage issuance from Year 1.
<b>Verification requirement</b>	CDR Methodology Document: next session. Puro.earth submission: pre-commissioning. First vintage: Year 1.
<b>Verification timeline</b>	The biogenic/fossil split of the feedstock carbon must be characterised at each facility site. Biogenic fraction (paper, food, biomass) qualifies as atmospheric CDR. Fossil fraction (plastics) qualifies as avoided emission — a separate credit category. The overall CDR claim is valid but requires this split to be documented per Puro.earth requirements.

### CDR-002 — Puro.earth Mineralisation (MIN-004 PCC)

<b>Claim ID</b>	<b>CDR-002</b>
<b>Claim text (as published)</b>	"MIN-004 Precipitated Calcium Carbonate — designed to achieve 440 kg CO <sub>2</sub> permanently mineralised per tonne of PCC produced. CDR-eligible via permanent calcium carbonate lattice."
<b>Confidence tier</b>	Stoichiometric: CO <sub>2</sub> (MW 44) + Ca(OH) <sub>2</sub> (MW 74) → CaCO <sub>3</sub> (MW 100) + H <sub>2</sub> O. 440 kg CO <sub>2</sub> per 1,000 kg CaCO <sub>3</sub> is exact stoichiometry. Permanence: calcium carbonate mineral (calcite/aragonite) is geologically stable — limestone is the geological archetype. Puro.earth Mineralisation category or Verra VM0044 Carbon Capture and Storage via Enhanced Rock Weathering or analogous mineralisation methodology applicable.
<b>Regulatory / scientific</b>	Puro.earth Mineralisation Methodology; Verra VM0044; stoichiometric

<b>basis</b>	calculation; ASTM C1794 (MIN-004 PCC characterisation); CDR Methodology Document v1.0 (pending — Room 2)
<b>Supporting documents (Room 2)</b>	<a href="#">1 product: MIN-004 Precipitated Calcium Carbonate</a>
<b>Products carrying this claim</b>	(1) CDR Methodology Document v1.0 to include MIN-004 mineralisation pathway. (2) XRD confirmation of calcite/aragonite crystal structure (permanence evidence). (3) Third-party verification of CO2 mineralisation mass balance. (4) Registry submission.
<b>Verification requirement</b>	CDR Methodology Document: next session. Registry submission: pre-commissioning.
<b>Verification timeline</b>	The 440 kg/t figure is exact stoichiometry — this is the strongest numerical CDR claim in the catalog because it rests on chemistry, not modelling. The uncertainty is in the biogenic fraction of the CO2 source (GAS-003), not in the mineralisation itself.

## Section 4 — Supply Chain Claims

### SCH-001 — FEOC-Aligned Design

<b>Claim ID</b>	<b>SCH-001</b>
<b>Claim text (as published)</b>	"US-origin supply designed to meet FEOC requirements. No Foreign Entity of Concern in the designed supply chain."
<b>Confidence tier</b>	IRA FEOC definition (Pub. L. 117-169, §13401): Foreign Entity of Concern = entity owned, controlled by, or subject to jurisdiction of China, Russia, North Korea, or Iran. Manufacturing feedstock origin: US urban commercial and manufacturing materials — inherently domestic origin. Facility: US-based. Processing: US-based. No designed FEOC entity at any stage. Note: "designed to meet" — formal FEOC documentation is a post-COD deliverable per DOE guidance (published March 2024).
<b>Regulatory / scientific basis</b>	IRA FEOC statutory definition; DOE FEOC guidance (March 2024); DOE Proposed Rulemaking on FEOC (October 2023); FEOC Compliance Matrix v1.0 (pending — Room 2)
<b>Supporting documents (Room 2)</b>	32 products: all MTL battery metals (MTL-018, MTL-033, MTL-044, MTL-045, MTL-046, MTL-047, MTL-048), CRB-008, CRB-018, GAS-011, GAS-014, MTL-042, MTL-043, and others with FEOC-aligned claim in spec
<b>Products carrying this claim</b>	(1) FEOC Compliance Matrix v1.0 — documenting supply chain map for each product: feedstock origin, all processing steps, all entities involved. (2) Third-party supply chain audit. (3) Annual attestation per DOE FEOC guidance once final rules are published.
<b>Verification requirement</b>	FEOC Compliance Matrix: Room 2 deliverable (2 sessions). Annual attestation: from Year 1.
<b>Verification timeline</b>	FEOC final rules are not yet published as of FEP-001 date. The designed supply chain is FEOC-compliant by architecture (US feedstock + US processing). The documentation risk is in formalising this for IRS/DOE attestation — which requires tracing every input including reagents, equipment, and service providers for FEOC-entity involvement.

### SCH-002 — EU CRMA Strategic Raw Material

<b>Claim ID</b>	<b>SCH-002</b>
<b>Claim text (as published)</b>	"EU CRMA strategic raw material designation — [product] is designated as a strategic raw material under the EU Critical Raw Materials Act."
<b>Confidence tier</b>	EU Regulation 2024/1252 (Critical Raw Materials Act, CRMA). Annex I lists Critical Raw Materials. Annex II lists Strategic Raw Materials (subset with higher supply chain concentration risk). Relevant designations: synthetic graphite (strategic), neodymium (strategic), gallium (strategic), indium (strategic), cobalt (critical), lithium (strategic). These are regulatory designations — not certifications. The CRMA designation is a fact about the material's regulatory status in the EU, not a claim about the facility.
<b>Regulatory / scientific basis</b>	EU Regulation 2024/1252 Annex I and Annex II; European Commission CRMA implementation guidance (Room 2)
<b>Supporting documents (Room 2)</b>	10 products: CRB-008 (synthetic graphite), CRB-018 (graphite), MTL-018 (Nd), MTL-042 (Ga), MTL-043 (In), MTL-046 (CoSO <sub>4</sub> ), MTL-047 (NiSO <sub>4</sub> ), MTL-048 (LiOH), GAS-011 (Ne), GAS-014 (Xe)

<b>Products carrying this claim</b>	CRMA designations are statutory — no Carbotura-specific verification required. Monitor CRMA Annex updates (reviewed annually). For EU offtakers: CRMA strategic material status enables priority permitting and financing — document this for each product in EU offtaker agreements.
<b>Verification requirement</b>	Ongoing — monitor CRMA Annex updates
<b>Verification timeline</b>	CRMA designation is a regulatory fact, not a performance claim. It requires monitoring for Annex revisions but no facility-level verification.

## Section 5 — Environmental Performance Claims

### ENV-001 — Designed Carbon Impact Figures (CRB Family + MIN-004)

<b>Claim ID</b>	<b>ENV-001</b>
<b>Claim text (as published)</b>	"Designed carbon impact: -X,XXX to -X,XXX kg CO <sub>2</sub> e per tonne (design-basis estimate)"
<b>Confidence tier</b>	ISO 14040/14044 cradle-to-gate LCA methodology (design-basis). Carbon impact = (carbon sequestered in product × GWP-100 CO <sub>2</sub> ) minus (Scope 1 facility emissions allocated to this product by mass) minus (Scope 2 allocated — zero; no grid connection). Carbon sequestered = product mass × carbon content (measured by ASTM C711 for CRB; stoichiometric for MIN-004). Biogenic carbon fraction of feedstock treated as atmospheric carbon removal per IPCC 2006 Guidelines.
<b>Regulatory / scientific basis</b>	ISO 14040/14044; IPCC 2006 Guidelines Table 2.1 (biogenic carbon); ASTM C711; FEP-001 Section 5.2; LCA Methodology Framework v1.0 (pending — Room 2)
<b>Supporting documents (Room 2)</b>	21 products — see Section 8 for full table of designed carbon impact values by product
<b>Products carrying this claim</b>	(1) LCA Methodology Framework v1.0 — formally defining the system boundary, functional unit, and allocation methodology that underpins these figures. (2) ISO 14040/14044 certified LCA in Year 1 to replace design-basis figures with verified figures. (3) EPD (Environmental Product Declaration) per product family — ISO 14025 compliant.
<b>Verification requirement</b>	LCA Methodology Framework: Room 2 deliverable (3 sessions). Certified LCA: Year 1 operations.
<b>Verification timeline</b>	The range (e.g. -3,200 to -4,800 kg CO <sub>2</sub> e/t for CRB-008) reflects uncertainty in: (a) feedstock biogenic fraction (±10–15%), (b) facility Scope 1 allocation uncertainty (±20%), (c) processing energy per tonne uncertainty (±15%). The LCA Methodology Framework will formally document these uncertainty ranges.

### ENV-002 — Comparative Carbon Claims

<b>Claim ID</b>	<b>ENV-002</b>
<b>Claim text (as published)</b>	"Designed to achieve ~99% lower lifecycle carbon intensity vs. virgin synthetic graphite (coal-tar pitch route)" / "Designed to achieve ~65% lower lifecycle carbon intensity vs. primary copper smelting"
<b>Confidence tier</b>	Comparative assertions per ISO 14044 §4.3.4: the comparator must be a published or certified LCA for an equivalent reference product. Reference figures used: (1) Virgin synthetic graphite via coal-tar pitch: 12,000–18,000 kg CO <sub>2</sub> e/t (Majeau-Bettez et al. 2011; Dunn et al. 2015; Liang et al. 2017 — published peer-reviewed range). (2) Primary copper smelting: 3,200–4,800 kg CO <sub>2</sub> e/t (ICSG Life Cycle Assessment of Copper Products 2012; Ecoinvent 3.8 background data). The ~99% and ~65% figures are derived by comparing Carbotura design-basis carbon intensity (negative) against the lower end of the published primary production range.
<b>Regulatory / scientific basis</b>	Majeau-Bettez et al. 2011 (J. Ind. Ecology); Dunn et al. 2015 (ANL/ESD-14/10); ICSG LCA of Copper 2012; Ecoinvent 3.8; ISO 14044 §4.3.4; LCA Methodology Framework v1.0 (pending — Room 2)

<p><b>Supporting documents (Room 2)</b></p>	<p>5 products: <a href="#">CRB-008</a>, <a href="#">CRB-010</a>, <a href="#">CRB-018</a>, <a href="#">MTL-004 (Copper)</a>, <a href="#">CRB-005</a></p>
<p><b>Products carrying this claim</b></p>	<p>(1) LCA Methodology Framework must formally document the reference LCA selection and comparator basis for each comparative claim. (2) ISO 14040/14044 certified LCA in Year 1 — comparative assertions require certified comparator LCA to be asserted without qualification. (3) Until certified, maintain "designed to achieve" qualifier on all comparative claims.</p>
<p><b>Verification requirement</b></p>	<p>LCA Methodology Framework: next Room 2 deliverable. Certified comparative claim: Year 1.</p>
<p><b>Verification timeline</b></p>	<p>Comparative claims are the most contested claim type in LCA. ISO 14044 §4.3.4 requires the comparator to be "equivalent" in functional unit and system boundary. A third-party LCA reviewer will scrutinise the comparator selection. The "designed to achieve" qualifier is essential until the certified LCA is complete.</p>

## Section 6 — CDR Carbon Impact Table

The following table lists all 21 products carrying a "Designed carbon impact" figure on the public portal. All figures are design-basis estimates. Verification pathway: ENV-001.

Product ID	Product Name	Designed Carbon Impact (kg CO <sub>2</sub> e/t)	Registry
CRB-001	Raw Carbon Char	-500 to -1,200	Puro.earth Durable Carbon
CRB-002	Activated Carbon	-400 to -900	Puro.earth Durable Carbon
CRB-003	Carbon Black	-350 to -700	Puro.earth Durable Carbon
CRB-004	Biochar	-600 to -1,100	Puro.earth Durable Carbon
CRB-005	Graphite Precursor	-1,800 to -3,000	Puro.earth Durable Carbon
CRB-006	Pyrolytic Carbon	-800 to -1,500	Puro.earth Durable Carbon
CRB-007	Carbon Foam	-800 to -1,500	Puro.earth Durable Carbon
CRB-008	High-Purity Graphite	-3,200 to -4,800	Puro.earth Durable Carbon
CRB-009	Expandable Graphite	-1,500 to -3,000	Puro.earth Durable Carbon
CRB-010	Synthetic Graphite	-2,000 to -4,000	Puro.earth Durable Carbon
CRB-011	Graphene Oxide	-2,500 to -5,000	Puro.earth Durable Carbon
CRB-012	Carbon Nanotube Concentrate	-4,000 to -6,000	Puro.earth Durable Carbon
CRB-013	Reduced Graphene Oxide	-2,500 to -5,000	Puro.earth Durable Carbon
CRB-014	Few-Layer Graphene	-3,000 to -6,000	Puro.earth Durable Carbon
CRB-015	Single-Layer Graphene	-3,500 to -7,000	Puro.earth Durable Carbon
CRB-016	Carbon Nanofibre	-3,000 to -6,000	Puro.earth Durable Carbon
CRB-017	Fullerene Concentrate	-3,500 to -7,000	Puro.earth Durable Carbon
CRB-018	Spheroidized Battery-Grade Graphite	-3,200 to -4,800	Puro.earth Durable Carbon
CRB-019	Hard Carbon Na-Ion	-1,200 to -2,500	Puro.earth Durable Carbon
CRB-021	Graphite Electrode	-600 to -1,200	Puro.earth Durable Carbon

MIN-004	Precipitated Calcium Carbonate	-1,300 to -1,500	Puro.earth Mineralisation
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## Section 7 — Verification Schedule

This schedule maps each claim category to the verification action required to move from design-basis to certified status.

Claim	Current Status	Verification Action	Responsible Party	Target Date
FAC-001 Energy Autonomy	Design-spec	Facility inspection + energy audit at commissioning	Commissioning engineer	Commissioning Stage 2
FAC-002 Scope 2 = 0	Design-basis	GHG inventory audit Year 1	Third-party GHG verifier	Year 1 Q4
FAC-003 Net Water Producer	Design-basis	Water balance audit at commissioning	Commissioning engineer	Commissioning Stage 2
FAC-004 Zero Solid Waste	Design-basis	Mass balance closure at commissioning	Commissioning engineer	Commissioning Stage 2
FAC-005 NLD	Design-basis	Water balance + NPDES permit confirmation	Commissioning engineer + legal	Commissioning Stage 2
FAC-006 Climate Benefit	Design-basis	Third-party GHG verification + avoided CH4 LCA	Third-party LCA verifier	Year 1 Q4
REG-001 §45X	Design-intent	Tax attorney classification review + IRS Form 7213	Tax counsel	Year 1 Q2 (filing)
REG-002 §45Q	Design-intent	Qualified engineer certification + MRV plan + IRS Form 8933	Tax counsel + carbon engineer	Year 1 Q3
REG-003 §30D	Design-intent	FEOC documentation + cell manufacturer attestation chain	Legal + SCM	Ongoing from Year 1
CDR-001 Puro.earth CRB	Design-intent	CDR Methodology Document → Puro.earth review → third-party verification → first vintage	Carbotura CDR team + Puro.earth	CDR Meth Doc: next session; First vintage: Year 1
CDR-002 MIN-004 PCC	Design-intent	Registry methodology submission + XRD permanence cert + mass balance audit	Carbotura CDR team + registry	CDR Meth Doc: next session; Year 1
SCH-001 FEOC	Design-intent	FEOC Compliance Matrix + supply chain audit + DOE attestation	Legal + SCM + third-party auditor	FEOC Matrix: 2 sessions; annual from Year 1
SCH-002 EU CRMA	Regulatory fact	Monitor CRMA Annex updates annually	Legal / regulatory	Ongoing
ENV-001 Carbon Impact	Design-basis	ISO 14040/14044 certified LCA + EPD per family	Third-party LCA practitioner	Year 1 Q3
ENV-002 Comparative	Design-intent	Certified LCA with peer-reviewed comparator basis	Third-party LCA practitioner	Year 1 Q3

Carbon				
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## Section 8 — Pending Room 2 Documents

The following Room 2 documents are referenced in this register but not yet complete. Each is a distinct build session.

Document	Purpose	Claims Supported	Priority
<b>CDR Methodology Document v1.0</b>	Puro.earth submission-ready methodology for CRB family (CDR-001) and MIN-004 (CDR-002). Additionality argument, baseline scenario, permanence evidence, MRV plan.	CDR-001, CDR-002, REG-002	<b>1 — HIGHEST</b>
<b>LCA Methodology Framework v1.0</b>	ISO 14040/14044 scoping document. System boundary, functional unit, allocation rules, comparator sources. Underpins ENV-001 and ENV-002.	ENV-001, ENV-002, FAC-006	2
<b>Mass Balance Framework v1.0</b>	Product-family input/output tables with methodology statements. Underpins FAC-004 (zero waste) and all yield numbers.	FAC-004, FAC-003, ENV-001	3
<b>FEOC Compliance Matrix v1.0</b>	Supply chain map for all 32 FEOC-aligned products. Feedstock origin, all processing steps, all entities. Required for REG-003 (§30D) and SCH-001.	SCH-001, REG-001, REG-003	4

## Section 9 — Claim Matrix (Product × Claim Category)

Checkmarks indicate that the product carries a claim in that category on the public portal. See the relevant section for the full claim text and supporting basis.

Product	Family	RC	§45X	§45Q	§30D	Puro CDR	FEOC	CRMA	Comp. C	Carb.Im p
CRB-001	CRB	RC1				✓				✓
CRB-002	CRB	RC2				✓				✓
CRB-003	CRB	RC2				✓				✓
CRB-004	CRB	RC2				✓				✓
CRB-005	CRB	RC3				✓				✓
CRB-006	CRB	RC3				✓				✓
CRB-007	CRB	RC3				✓				✓
CRB-008	CRB	RC3	✓	✓		✓			✓	✓
CRB-009	CRB	RC3				✓				✓
CRB-010	CRB	RC3				✓				✓
CRB-011	CRB	RC4				✓				✓
CRB-012	CRB	RC4				✓				✓
CRB-013	CRB	RC4				✓				✓
CRB-014	CRB	RC4				✓				✓
CRB-015	CRB	RC5				✓				✓
CRB-016	CRB	RC4				✓				✓
CRB-017	CRB	RC4				✓				✓
CRB-018	CRB	RC4	✓		✓	✓			✓	✓
CRB-019	CRB	RC4				✓				✓
CRB-021	CRB	RC3				✓				✓
MTL-018	MTL	RC4	✓				✓	✓		
MTL-033	MTL	RC3					✓			
MTL-042	MTL	RC5	✓				✓	✓		
MTL-043	MTL	RC5	✓				✓	✓		
MTL-044	MTL	RC4	✓				✓			
MTL-046	MTL	RC4	✓				✓			
MTL-047	MTL	RC4	✓				✓			

<b>MTL-048</b>	MTL	RC4	✓				✓			
<b>MIN-004</b>	MIN	RC3		✓		✓				✓
<b>TOTAL</b>			<b>8</b>	<b>3</b>	<b>2</b>	<b>22</b>	<b>32</b>	<b>10</b>	<b>5</b>	<b>21</b>

*This matrix covers the 29 products with the highest claim density. The remaining 87 products carry FAC-001 through FAC-006 facility-level claims only. A complete 116-product matrix is available on request.*

# Document Control

<b>Document ID</b>	CR-001
<b>Title</b>	Claims Register v1.0 — ACM Manufacturing Center
<b>Version</b>	Rev 1.0 — Design Basis
<b>Classification</b>	Room 2 — Technical Portal — NDA Required
<b>Anchor document</b>	FEP-001 Facility Environmental Profile v1.0
<b>Claim categories covered</b>	FAC (6), REG (3), CDR (2), SCH (2), ENV (2) = 15 claim categories
<b>Products in matrix</b>	29 of 116 (highest claim density) — full 116 matrix on request
<b>Next revision trigger</b>	Rev 2.0 on completion of CDR Methodology Document; Rev 3.0 on completion of LCA Methodology Framework

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