



BLACK PELLETS & NEXT-GEN FUELS PANEL

European Market Lessons for Canada's Biocarbon Opportunity

Demand, carbon-credit economics, production quality, and the logistics rules reshaping export markets

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OUR VANTAGE POINT

A European producer's view, in five minutes

FLOYD BioEnergy operates a fleet of decentralized, modular gasification-CHP units in Austria — each converting wood chips into power, heat, and EBC-certified biochar on-site. That's given us a direct, operator-level view of what European biochar and biocarbon buyers actually demand.

5

modular CHP-biochar
units live at our Griffen site

EBC

certified biochar, aligned to ÖNORM S 2211
quality standards

Europe Already Runs on Biomass

Austria is 47.9% forest — 4.02 million hectares, an all-time high...

Bioenergy supplies **55%** of all renewable energy in the country — the largest single renewable source.

2,474 biomass heating plants and 183 biomass CHP plants are already in operation...

Bioenergy now heats more homes than heating oil and natural gas combined (2023/24).

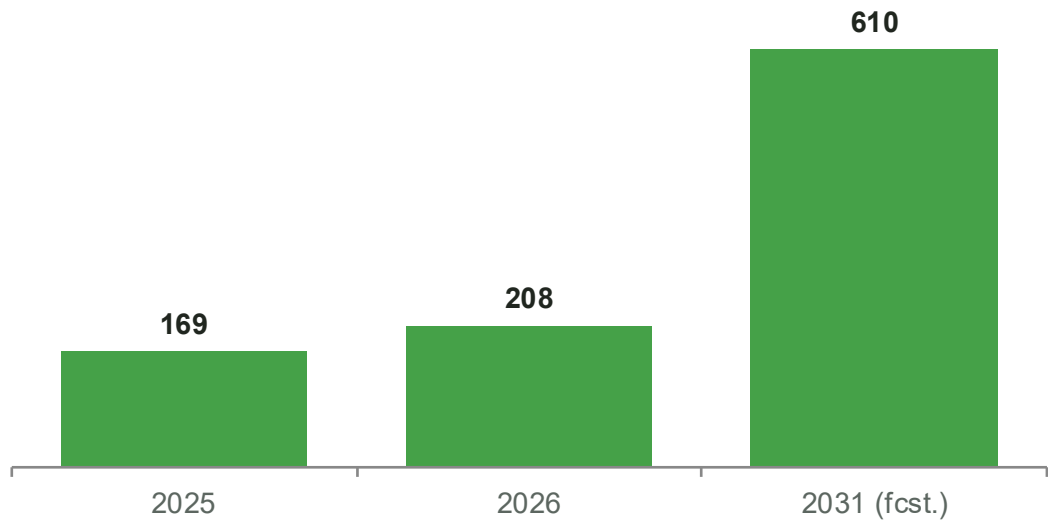
Harvesting has reached 97% of annual increment, and increment itself is falling...

The remaining headroom is in **damaged, dead and residual wood**.

EUROPEAN DEMAND

Who's buying — and where demand is strongest

Europe biochar market volume (kt)



24% CAGR 2026–2031 — Germany leads with ~29% share

DEMAND IS BROADENING BEYOND SOIL

76%

Animal feed additives — today's largest single use (methane reduction)

+26%

Industrial uses (cement, steel, concrete) — the fastest-growing segment, CAGR

+161%

Corporate carbon-credit procurement, year-over-year growth (2024)

Global black pellets: USD 299M (2025) → USD 3.2B (2040), 14.8% CAGR — Europe holds ~55% of demand, driven by coal-to-biomass conversion.

Sources: Mordor Intelligence, Europe Biochar Market (2025); Grand View Research, Black Pellets Market Report (2025).

CARBON REMOVAL CREDITS

Credits don't just add revenue — they set the rules

\$125–\$145

per tonne CO₂e — current biochar carbon-removal credit price range, consistent across projects and feedstocks

~6 months

from production to issued removal credit — fast relative to most CDR pathways

A NUMBER FROM OUR OWN PROJECTS

Our biochar runs ~92% carbon content — but after the required life-cycle-assessment correction, only about 2.4–2.5 tonnes of CO₂ per tonne of biochar is what can actually be claimed as a credit (versus ~3.4 t at pure stoichiometric maximum). Carbon content and creditable CO₂ are two different numbers — **know your LCA-corrected ratio before you price a project, not after.**

EU CRCF: THE CERTIFICATION FRAMEWORK TO WATCH

- Feb 2026 — biochar approved as one of the EU's first certified permanent-removal methodologies
- 2028 — EU-wide certified-removals registry goes live
- Certified units currently count only toward EU climate targets — a factor in who can buy from a non-EU project

Sources: Puro.earth / Nasdaq CO2X reference index (2026); EU CRCF regulation, adopted methodologies (Feb 2026); FLOYD BioEnergy project data.

PRODUCTION QUALITY

Scaling consistent, high-purity biocarbon is the hard part

1

Feedstock sets the ceiling

Biochar is not a uniform material — carbon structure, ash content, and contamination risk all trace back to feedstock. Processing can refine output, but it cannot fix a poor input.

2

Know your contaminant panel, not just the headline number

In our own EBC testing, light volatile compounds (e.g. naphthalene) dominated total-PAH figures, while the heavier, more regulated compounds — benzo[a]pyrene included — sat an order of magnitude inside limits. Which total your buyer's standard uses changes the answer.

3

Permanence is earned at the process level

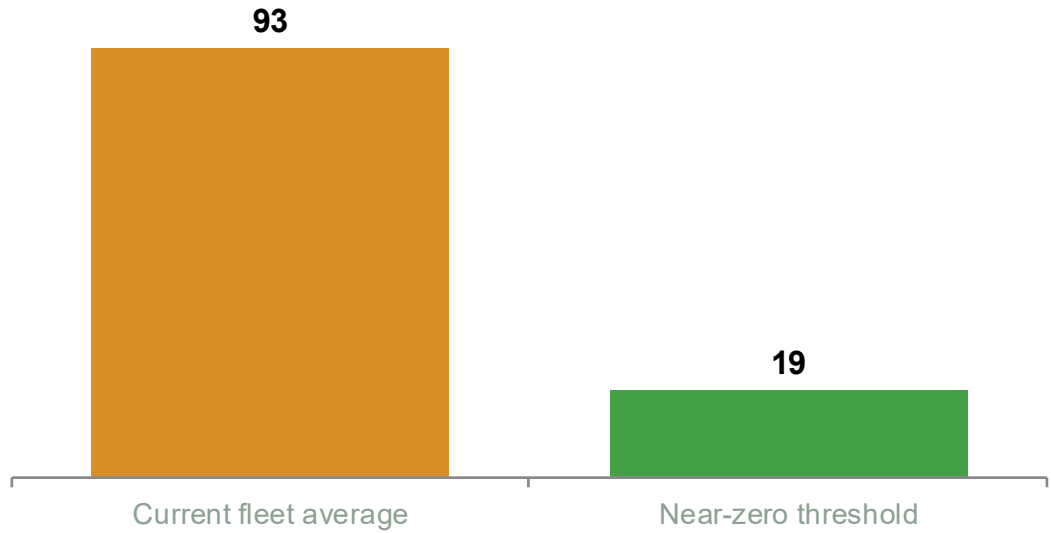
Carbon stability scales with pyrolysis temperature and residence time. Above ~600°C, biochar approaches the recalcitrant, graphene-like structure of geological inertinite — the property a CDR credit is actually paying for.

Lesson for Canada: build your quality documentation — elemental analysis, full PAH panel, stability data — before a buyer asks for it. It decides which certifications and markets are open to you.

Sources: FLOYD BioEnergy EBC/DIN EN 17503 testing data; Carbon Gold, "Feedstock Matters" (2025).

New IMO rules are about to touch your supply chain

GHG Fuel Intensity (gCO₂e / MJ, well-to-wake)



Approved, April 2025 (MEPC 83)

First global, legally binding GHG-intensity standard for shipping — enters into force ~16 months after formal adoption.

Covers 85%+ of shipping emissions

Applies to oceangoing ships over 5,000 gross tonnage; a pricing mechanism rewards low-GFI fuels and charges high-GFI ones.

EU FuelEU Maritime runs in parallel

A second, EU-specific well-to-wake fuel-intensity regime already applies to voyages touching EU ports.

For exporters: well-to-wake carbon documentation is becoming currency in shipping compliance, too — not just at the point of end use.

Wildfire fuel treatment as a feedstock strategy

ILLUSTRATIVE MODEL — SINGLE COMMUNITY

1

Local energy security, fixed

A 2–3 unit FLOYD F60/F60 TC cluster (120–240 kWe) — the same modular approach as our Austrian fleet — takes over baseload power and heat for the community on a steady ~1,200 BDT/yr, permanently displacing remote diesel.

2

Mobile torrefaction captures the surplus

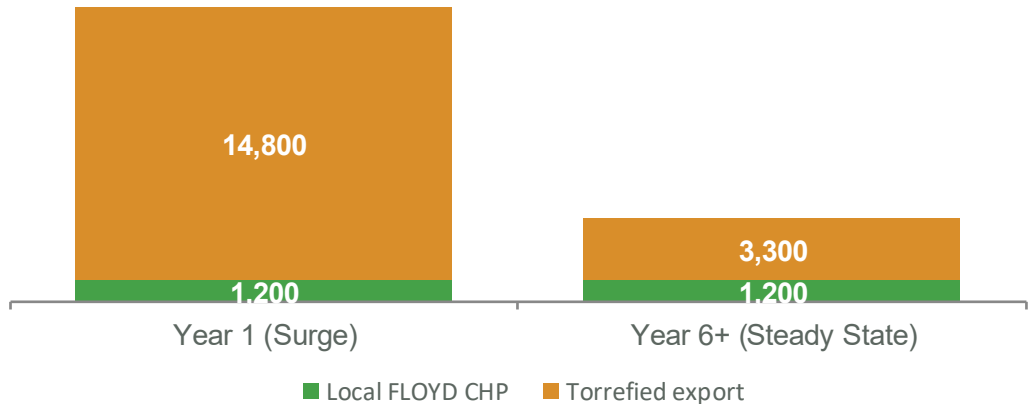
Wildfire fuel-treatment clearing routinely yields far more fiber than any local plant can use. Moveable torrefaction units process the surplus into high-energy, hydrophobic black pellets on-site — avoiding the cost of hauling wet slash out of remote terrain.

3

Asian offtake anchors the economics

Long-term Asian industrial buyers (Japan, Korea) provide the volume commitment that justifies mobilizing harvesting and torrefaction equipment into a remote WUI in the first place.

ANNUAL HARVEST ALLOCATION (BDT/YR)



Total harvest tapers 16,000 → 4,500 BDT/yr as emergency clearing gives way to routine maintenance — but the local FLOYD allocation never changes. Diesel displacement is locked in at every phase; only the export volume available for torrefaction shifts.

Source: hypothetical baseline-village model, single remote off-grid community (FLOYD BioEnergy / FireIntegra, 2026).

TAKEAWAYS

What this means for Canadian producers

1

Demand is real — and diversifying

Soil use still leads, but industrial decarbonization is the fastest-growing buyer segment. Design for more than one market.

3

Quality documentation is a commercial asset

Full elemental, contaminant, and stability data open certification and export doors — build the file before a buyer asks.

5

Logistics carbon counts now, too

New IMO and EU shipping rules mean the carbon story doesn't end at the plant gate — it follows the cargo.

2

Price your carbon, not your carbon content

LCA-corrected credit ratios — not lab carbon percentages — determine what you can actually sell. Get this right before you quote a project.

4

Modular, decentralized production manages feedstock risk

Smaller, distributed units keep quality controllable per site — our own approach in Austria — even as total volume scales.

6

Wildfire fuel treatment is a Western Canada-specific opening

Pairing local CHP energy security with mobile torrefaction turns an emergency mitigation cost into an ongoing export revenue stream.

Which Additive, and Why

The ash decides which mineral works. Match it and the bed stays clean — mismatch it and you make things worse.

SILICA-RICH ASH → LIMESTONE



FUEL & ASH

Rice husk, bamboo, straw. Ash is mostly silica (SiO_2).



THE RISK

Potassium + silica melt low — they glue the bed.



THE FIX

+ Limestone (CaCO_3): calcium grabs the silica first.
Result — solid far hotter.

POTASSIUM-CARBONATE ASH → TALC



FUEL & ASH

Coffee grounds, mushroom substrate, buckwheat husk.
Little silica — potassium sits as carbonate.



THE RISK

Adding lime here makes it worse.



THE FIX

+ Talc (Mg-silicate) locks potassium into high-melting phases. Dose: 0.4–0.6 wt%.



Right mineral for the right ash · 0.4–5 wt% of the fuel

Two Ways to Deliver It. One Reason to Bother.

The mineral is a commodity. What matters is picking the right one for the ash and getting the dose right — too little can be worse than none at all.



Route A — Inside the Pellet

CO-PELLETISED AT PRODUCTION

The mineral is pressed into every pellet — the dose travels with the fuel and spreads evenly through the bed. No dosing equipment needed at the plant.

Best for bought-in fuel on a fixed specification



Route B — Blended at the Plant

DOSED INTO THE FUEL STREAM

The mineral is added on site, mixed directly into the fuel stream — and the dose can be retuned with every delivery.

Flexible — dose retuned with every delivery



Same chemistry either way — only the point of addition changes.



No Clinker

No shutdown to break out slag



Steady Output

Stable gas and power



Residues → Revenue

Cheap local residues become usable fuel



Chlorine Exception

No mineral binds it — dry sorbent stage in development

One mineral system, two entry points — zero clinker either way.



Thank you

Looking forward to the discussion

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