INNOVO Net Zero, Nil Capex for the Steel Industry

Commercial, Financial, and Strategic Impact Analysis
on the Industry, the First Mover and Followers

An Open Strategic Briefing for PR Agencies

Executive Summary

Webpages and short videos:

Smoke2Value technology profitably digests CO_2 in industrial smoke emissions: Smoke2Value
The technology's high profitability enables Net Zero, Nil Capex for emitters: Net Zero Nil Capex
INNOVO's PR Briefing for Strategic Advisors: PR Briefing for Strategic Advisors

PR advisors and their teams have access to INNOVO's full Data Room

Steel is one of the most strategically important and carbon-intensive industries on the planet. It accounts for approximately 8% of all global CO_2 emissions,[1] producing 2.6 billion tons of CO_2 annually. Decarbonizing global steel production will cost an estimated $4.4 trillion over the next 30 years under conventional approaches.[2] Yet INNOVO's Smoke2Value bio-farm technology achieves net zero emissions for any steel producer, at nil capital expenditure, while generating $200 net profit per ton of CO_2 digested.

INNOVO and its Technology Partner have developed and commercially validated a Smoke2Value bio-farm technology that enables oil and gas companies to achieve net zero emissions at nil capital expenditure. This is not a theoretical solution. Five of the world's top 10 oil and gas majors, including Shell, Chevron, and BP, completed two years of independent due diligence on an industrial-scale bio-farm and placed $16 billion in three multi-year offtake contracts as a result.

The mechanism is straightforward. An INNOVO Smoke2Value bio-farm is co-located adjacent to a steel plant. The CO_2 in the plant's industrial smoke is piped into the bio-farm's algae tanks, where it is digested by algae in seawater through photosynthesis. The bio-farm also draws CO_2 directly from the surrounding air. The resulting algal biomass is refined into crude algal oil (the feedstock for sustainable aviation fuel), animal feed, fish feed, omega-3 oils, and cosmetics – high-value commercial products whose revenues make the technology so profitable that INNOVO finances the entire bio-farm at no cost to the steel producer.

The high profitability of Smoke2Value bio-farms enables INNOVO to co-locate it operations adjacent to heavy-emitters on a Net Zero, Nil Capex basis. This accelerates technology deployment.

[1] World Steel Association: Steel industry global CO_2 emissions 2.6 Gt/year; steel accounts for 8% of global CO_2
[2] McKinsey & Company: Spotting opportunities in a surging net zero world – steel industry decarbonization cost $4.4 trillion

The commercial and strategic impact on the steel industry is transformative and urgent. The EU's Carbon Border Adjustment Mechanism (CBAM) began its definitive phase in January 2026, imposing carbon tariffs on all steel exports to the EU based on embedded CO_2 content.[3] EU Emissions Trading System (ETS) carbon prices currently run at €80–100 per ton and are projected to reach €150–200 per ton by 2030.[4] For a major steel producer emitting 1 million tons of CO_2 per year, this represents €80–200 million in annual carbon costs – costs that INNOVO's solution eliminates entirely, at nil capital expenditure to the producer.

The green steel premium is already a commercial reality. Corporate buyers in the automotive and construction sectors, including Volkswagen, BMW, Mercedes-Benz, and major construction groups, are paying a premium of $150–500 per ton for zero-emission steel to meet their own Scope 3 net zero commitments.[5][6] The first steel producer to achieve verifiable, physically genuine net zero status commands this premium across its entire output. A major producing 5 million tons per year gains $750 million to $2.5 billion annually in incremental revenue from green steel pricing alone.

The reference case is a major US direct reduction steelmaking plant in Texas: an $800 million INNOVO Smoke2Value bio-farm, entirely financed by INNOVO, digesting 1 million tons of CO_2 per year, generating $85 million per year in US Section 45Q Production Tax Credits for 12 years, saving the steel producer €80–100 million per year in EU ETS costs, and qualifying the plant's output as zero-emission steel for global premium markets.[7][8]

Commercial and Strategic Impact on the Steel Industry

The steel sector—responsible for 2.6 billion tons of CO_2 emissions annually and 8% of global emissions—faces the most expensive and operationally challenging decarbonization roadmap of any major industry. Conventional pathways such as green hydrogen, CCS, and electrification require multi-billion-dollar capital expenditure and years of technological maturation, with McKinsey estimating $4.4 trillion in required global investment over the next 30 years. [Steel - Th...026-1-3 MK | Word]

INNOVO's Smoke2Value bio-farm technology bypasses this cost curve entirely. By co-locating a bio-farm adjacent to a steel plant and digesting 100% of plant CO_2 emissions through algae photosynthesis, the steel producer achieves physically verified net zero at nil capital expenditure. The commercial products generated—SAF-grade algal oil, protein-rich feed, omega-3 oils—create sufficient margin that INNOVO finances the entire system.

Two rapidly strengthening commercial forces reshape the sector:

1. Rising carbon-cost exposure:

- EU ETS prices of €80–100/ton, rising to €150–200/ton by 2030, create escalating liabilities of €80–200 million annually per 1M tons CO_2.
- The EU Carbon Border Adjustment Mechanism (CBAM), in force from January 2026, applies tariffs of €144 per ton of steel (at 1.8 tons CO_2 per ton of steel at €80 carbon price), turning carbon intensity into a direct market access barrier.

[3] EU Regulation 2023/956 – Carbon Border Adjustment Mechanism (CBAM): steel is a primary covered sector; carbon tariffs on embedded emissions from 2026

[4] EUROFER: EU Emissions Trading System (ETS) impact on steel – carbon costs €80–100/ton, rising to €150–200/ton by 2030

[5] S&P Global Commodity Insights: Green steel commands $150–500/ton premium in European markets

[6] Boston Consulting Group: The Green Premium for Steel – auto and construction buyers paying $150–500/ton premium for zero-emission steel

[7] IRS / US Treasury: Section 45Q Final Regulations – $85/ton CO_2 captured; algae photosynthesis explicitly authorised as qualifying fixation method

[8] INNOVO Net Zero: PR Briefing for Strategic Advisors – Profitable Net Zero, Nil Capex for the Steel Industry

INNOVO eliminates these costs entirely from the commissioning date onward, giving steel producers immediate cost leadership. [Steel - Th...026-1-3 MK | Word]

2. Emergence of a global green-steel premium:
Automotive and construction buyers—under severe Scope 3 pressure—are already paying $150–500/ton for zero-emission steel. Volkswagen, BMW, Mercedes-Benz and large contractors have publicly committed to zero-emission steel procurement. For a 5-million-ton producer, this premium yields $750 million to $2.5 billion annually in additional revenue. [Steel - Th...026-1-3 MK | Word]

The combined value of avoided carbon costs, premium revenue, and zero capex creates the first commercially viable pathway to net zero steel at scale—years ahead of hydrogen or CCS options.

First Mover vs. Follower: The Strategic Gap

The first steel producer to adopt INNOVO's technology secures permanent structural advantage across cost, regulation, market access, and customer relationships.

First mover advantages include:

- Immediate access to the $150–500/ton green-steel premium, unavailable to followers until they achieve verified zero emissions.
- Zero CBAM and EU ETS liabilities from day one. Followers continue absorbing escalating carbon costs of €80–200/ton CO_2.
- Preferred-supplier status for automotive and construction OEMs with binding Scope 3 commitments.
- Financial outperformance, including $160M in 45Q tax-credit value per bio-farm under preferred early-partner terms for U.S. deployments.
- Category-defining narrative leadership, positioning the first mover as *the company that solved net-zero steel at industrial scale*.

Followers face a compounding disadvantage: locked-out premium contracts, accelerating carbon costs, and narrowing credibility with investors, regulators, and talent markets. Premium steel supply contracts signed by the first mover can persist for years, materially limiting competitors' strategic options. [Steel - Th...026-1-3 MK | Word]

The Regulatory Landscape Driving Urgency

The steel sector confronts the tightest regulatory environment in its history. Every major framework increases the cost of inaction:

1. European CBAM (2026 definitive phase)

CBAM now imposes carbon tariffs on all non-EU steel imports, based on embedded CO_2 at the EU ETS price. Steel with ~1.8 tons CO_2 per ton incurs ~€144/ton in tariffs at current carbon prices, rising sharply as ETS prices climb. INNOVO-enabled zero-emission steel is fully exempt. [Steel - Th...026-1-3 MK | Word]

2. EU ETS price escalation

With free allowances being phased out and demand rising, ETS carbon prices are projected to reach €150–200/ton by 2030, creating existential cost pressure for high-emission producers. Eliminating Scope 1 emissions via INNOVO immediately removes exposure to the ETS price curve. [Steel - Th...026-1-3 MK | Word]

3. SBTi and IFRS S2

Global climate-disclosure frameworks now require physical, not paper-based, emissions reductions. Offsets and RECs do not qualify for Scope 1 decarbonization under SBTi rules. Smoke2Value's physical CO_2 digestion is fully aligned with both SBTi requirements and IFRS S2 disclosure standards.

4. ResponsibleSteel Certification

Corporate buyers increasingly require ResponsibleSteel-certified suppliers. INNOVO enables steel plants to meet the highest-certification thresholds by delivering verified Scope 1 elimination. [Steel - Th...026-1-3 MK | Word]

These regulatory forces make timing strategically decisive: delaying deployment locks steel producers into escalating multi-hundred-million-euro annual liabilities.

Enterprise Value Enhancement and ESG Leadership

Research from Carbon Tracker and the IEA shows that sustainability leaders in carbon-intensive sectors trade at 10–20% higher EV/EBITDA multiples than laggards. For a $20B steel company, that represents $2–4B in enterprise-value uplift. [Steel - Th...026-1-3 MK | Word]

The first producer to achieve verified net zero gains:

- Valuation multiple expansion from elimination of carbon liabilities.
- Preferential access to sustainability-linked debt, reducing weighted average cost of capital.
- Re-entry into ESG-mandated portfolios that currently exclude high-emission steel.
- Superior talent positioning, as engineering and sustainability professionals increasingly avoid high-emission industries.
- Reputational leadership, particularly in communities where steel plants face environmental and political pressure.

This valuation uplift compounds when combined with:
(1) avoided ETS/CBAM costs,
(2) green-steel pricing premiums, and
(3) INNOVO's nil-capex model.

Strategic Communications Opportunity for PR Agencies

The first steel producer to partner with INNOVO will command a **tier-one global media narrative**: the breakthrough that makes zero-emission steel commercially viable today, not in 2035–2040.

For PR agencies, this creates:

Enterprise-Wide, Multi-Year Mandates

The first mover will require support across:

- Investor relations (valuation re-rating narrative)
- C-suite thought leadership
- Regulatory engagement (CBAM, ETS, SBTi, IFRS S2)
- ESG reporting and verification
- Customer communications to automotive and construction majors

Such mandates are defensible, high-value, and extremely difficult for competitor agencies to displace once established.

Expansion Into Adjacent Sectors

Expertise built around net-zero steel communications unlocks mandates in:

- Automotive (Scope 3 steel decarbonization)
- Construction (low-carbon materials)
- Infrastructure (public procurement)
- Financial services (green finance, sustainability-linked debt)

A Category-Defining Narrative

The PR agency advising the first mover owns the central sustainability breakthrough story of the decade for heavy industry. Every follower becomes reactive.

Key Metrics at a Glance

Metric	Value / Impact
Global steel CO_2 emissions	2.6 billion tons per year; 8% of all global CO_2 emissions
Steel industry decarbonization cost	$4.4 trillion over 30 years under conventional approaches (McKinsey)
INNOVO profit per ton CO_2	$200 net profit; nil capex to steel producer
Bio-farm IRR	58.9% project IRR; 42.3% equity IRR (2.6-year payback)
Technology validation	$16 billion in offtake contracts from 5 of the world's top 10 oil & gas majors
Reference case	Major US direct reduction steelmaking plant, Texas: $800M bio-farm, 1M tons CO_2/year, nil capex to the steel producer
EU ETS saving per plant (1M T/yr)	€80M–100M/year at current carbon prices (€80–100/ton)
45Q credits per plant (1M T/yr)	$85M/year for 12 years = $1.02 billion total per US-based plant
Green steel premium	$150–500/ton in European markets for verified zero-emission steel
Revenue uplift (5M T/yr producer)	$750M–$2.5 billion per year from green steel premium alone
CBAM impact	Definitive phase from January 2026: carbon tariffs on all EU steel imports
EU ETS trajectory	€80–100/ton today; projected €150–200/ton by 2030

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1. Strategic Communications Opportunity for PR Agencies

INNOVO's Smoke2Value technology for the steel industry is one of the most important industrial decarbonization stories of this decade. It resolves the most intractable challenge in one of the world's most politically and economically significant industries – at nil capital expenditure, with a financial model that benefits both the technology provider and the steel producer. As a strategic advisor to the C-suites of major steel companies,[9] you can bring this intelligence to your clients before it becomes public and before competitors act.

This briefing is being provided simultaneously and in advance of INNOVO's public launch to a select group of global PR agencies. The first steel producer to announce its partnership with INNOVO defines the narrative for the entire industry. Every other major becomes a follower. The communications mandate available to the agency that enables that announcement is the most significant heavy industry communications mandate of this decade.

1.1 Why the Steel Story Is Uniquely Compelling

Steel is central to the political economy of every major industrialised nation. It is the material from which bridges, cars, buildings, ships, and infrastructure are built. Its decarbonization is not a niche ESG story: it is a mainstream political, economic, and industrial story with tier-one global media coverage across financial, industrial, political, and environmental outlets simultaneously.

The communications story for the first net zero steel producer is genuinely groundbreaking: the world's most carbon-intensive material industry has found a solution that eliminates its emissions at no cost to the producer, generates profit from the captured carbon, and makes zero-emission steel affordable to buyers who cannot wait for the multi-decade, multi-trillion dollar conventional decarbonization pathway. This is not a press release: it is a category-defining announcement.

1.2 Enterprise-Wide Communications Mandates

The steel producer that deploys INNOVO's technology first will require comprehensive, multi-year communications support across every function simultaneously. Investor relations must reframe the investment case to capture the valuation premium and eliminate the discount applied for carbon cost risk. C-suite thought leadership must establish the company as the architect of the steel industry's net zero breakthrough. Regulatory engagement must leverage the deployment to shape CBAM implementation, EU ETS treatment of bio-farm-enabled reductions, and national climate policy frameworks. Customer communications must market the green steel premium to automotive and construction buyers. ESG reporting must document and verify the genuine CO_2 reduction for IFRS S2 and SBTi purposes.

This is a multi-function, multi-year, enterprise-wide mandate that, once won by an agency, is virtually impossible to displace. The institutional knowledge, relationship depth, and technical fluency required to serve it accumulate over years.

1.3 New Business Across Adjacent Sectors

Expertise in INNOVO's steel industry decarbonization story creates immediate adjacencies to communications opportunities in automotive (Scope 3 steel procurement stories for car makers),

construction (green building materials), infrastructure (zero-emission steel for public contracts), and financial services (sustainability-linked debt and green bonds for steel producers).[10]

The technical depth required to advise credibly on steel industry decarbonization – blast furnace process emissions, CBAM tariff structures,[11][12] EU ETS free allowance phase-out, SBTi sector guidance,[13] ResponsibleSteel certification,[14] and the 45Q tax credit monetization structure[15] – creates a competitive moat that competitors cannot acquire without years of investment. Early engagement is the only path to building this expertise.

1.4 No Conflict of Interest

INNOVO is appointing its own PR firm to manage the INNOVO brand and global launch.[16] There is no conflict of interest between INNOVO and any steel industry client relationship. All strategic information in this briefing is in the public domain. You are free to share it with any existing or potential clients without restriction or notification.

2. Commercial and Strategic Impact on the Steel Industry

2.1 The Scale of the Decarbonization Challenge

Global steel production generates approximately 2.6 billion tons of CO_2 per year, making it one of the two or three highest-emitting sectors globally, accounting for around 8% of all anthropogenic CO_2 emissions.[17] The steel industry is classified as a 'hard-to-abate' sector because the primary steelmaking route – the blast furnace – uses carbon (coke) not only as a fuel but as a chemical reductant in the iron-making process, making electrification fundamentally incompatible with the conventional process.

McKinsey estimates that decarbonizing the global steel industry will cost $4.4 trillion over 30 years under conventional approaches, including green hydrogen-based direct reduced iron and CCS.[18][19] This cost is borne by steel producers through massive capital expenditure on new plant and equipment, before any return is generated. The equivalent INNOVO investment – co-located bio-farms digesting all of a plant's CO_2 – is borne entirely by INNOVO, not the steel producer.

[19] McKinsey & Company: The Net Zero Transition – $9.2 trillion annual average spending on physical assets to achieve net zero by 2050

2.2 The EU CBAM: An Immediate Existential Competitive Threat

The EU's Carbon Border Adjustment Mechanism entered its definitive phase in January 2026.[20] Steel is one of the primary sectors covered. All steel exported to the EU now attracts a carbon tariff based on the embedded CO_2 content of the product, calculated at the EU ETS carbon price. At current EU ETS prices of €80–100 per ton of CO_2,[21] a major steel producer exporting 2 million tons of steel to the EU – with approximately 1.8 tons of CO_2 embedded per ton of blast furnace steel – faces a CBAM liability of approximately €288–360 million per year.

For producers who have not eliminated their emissions, the CBAM is a direct competitive threat from low-emission competitors – including those using INNOVO's technology. A steel producer with a co-located Smoke2Value bio-farm that has eliminated its Scope 1 emissions has zero CBAM liability on those emissions, while its competitors pay hundreds of millions of euros annually in tariffs. The CBAM is not merely a compliance cost: it is a market access barrier that reshapes global steel trade flows.[22]

The EU ETS carbon price trajectory compounds this pressure. Prices are currently €80–100 per ton and are projected to reach €150–200 per ton by 2030.[23] Every year of delay in eliminating emissions locks a steel producer into an escalating liability. The first movers who eliminate their emissions now protect themselves from this entire escalating cost curve.

2.3 The Green Steel Premium: A New Revenue Opportunity

The steel industry is experiencing the emergence of a new market dynamic: green steel commands a significant price premium over commodity steel. Corporate buyers in the automotive and construction sectors – which together consume the majority of globally traded flat steel products – are under intense Scope 3 emissions reduction pressure from their own investors, customers, and regulators.[24]

Analysis by S&P Global Commodity Insights, McKinsey, and the Boston Consulting Group shows that zero-emission steel commands a premium of $150–500 per ton in European markets, with some transactions at the upper end of this range from automotive OEMs with binding net zero commitments.[25][26] Volkswagen, BMW, Mercedes-Benz, SSAB, and major construction groups have all publicly committed to procuring zero-emission or low-emission steel by specific dates, creating contracted, premium-priced demand for verified zero-emission steel output.

For a steel producer achieving verifiable net zero status through INNOVO's technology, this premium is immediately accessible across all qualifying output. A producer making 5 million tons of steel per year, achieving a $150–500 per ton green premium, generates $750 million to $2.5 billion

[22] EUROFER: EU CBAM impact on the steel industry – competitive analysis and tariff implications

[24] World Steel Association: Green steel market development – corporate procurement commitments and Scope 3 buyer pressure

per year in incremental revenue from green pricing alone – before accounting for avoided carbon costs under the EU ETS and CBAM.

2.4 Scope 3 Client Retention and Supply Chain Leadership

The pressure for green steel is not just regulatory: it flows through corporate supply chains. The Science Based Targets initiative (SBTi) has approved over 7,000 corporate net zero targets globally,[27] and Scope 3 emissions – those generated in a company's supply chain – typically represent 70–90% of a manufacturer's total carbon footprint. When a car manufacturer's steel supplier achieves net zero through INNOVO's technology, the car manufacturer's Scope 3 steel emissions fall to zero. This makes INNOVO's steel partner the preferred supplier for every buyer with a binding Scope 3 commitment.

Under the GHG Protocol Corporate Accounting and Reporting Standard,[28] the zero-emission steel designation produced by INNOVO's bio-farm deployment meets the requirements for Scope 3 Category 1 (purchased goods and services) emissions elimination. This is a physically verified designation – not a credit or offset – which is increasingly the standard required by the Science Based Targets initiative and major corporate buyers.

2.5 Enterprise Value Enhancement and ESG Leadership

Valuation Impact of Net Zero Leadership

Research by Carbon Tracker and the IEA demonstrates that sustainability leaders in carbon-intensive sectors trade at 10–20% higher EV/EBITDA multiples than laggards.[29][30] For a major steel company with an enterprise value of $20 billion, a 10–20% sustainability premium represents $2–4 billion in incremental enterprise value. This premium operates through multiple simultaneous mechanisms: ESG re-rating by institutional investors who previously excluded the stock due to carbon intensity, re-initiation of coverage by sustainability-focused funds, analyst upgrades driven by resolution of the regulatory cost threat, and lower weighted average cost of capital from sustainability-linked debt and equity markets.

Sustainability-Linked Finance

Sustainability-linked bonds, loans, and revolving credit facilities now carry pricing mechanisms that reward genuine, verified emissions reductions. A steel company that has deployed INNOVO's technology and achieved verified net zero status at a major plant is eligible for reduced interest margins on sustainability-linked debt, access to green bond markets, and preferential terms from ESG-mandated lenders. At the scale of steel company balance sheets, the interest cost reduction on multi-billion dollar facilities is itself a significant financial benefit.

Talent, Brand, and Community Positioning

The steel industry, particularly in traditional steel-producing regions, faces a talent crisis as younger engineers and executives prefer employers with credible sustainability credentials. The first steel company to achieve genuine, verified net zero through INNOVO's technology gains a material talent

[27] Science Based Targets initiative (SBTi): Steel sector decarbonization guidance and net zero pathway requirements
[28] GHG Protocol: Corporate Accounting and Reporting Standard ISO 14064-1:2018 – Scope 1, 2, and 3 emissions accounting
[29] Carbon Tracker: Paris-Proof Steel – stranded asset risk and sustainability leadership valuation premiums
[30] Carbon Tracker: Stranded asset risk across heavy industry – valuation multiple premiums for sustainability leaders

advantage in attracting engineering graduates, sustainability professionals, and the next generation of industry leadership. This advantage compounds over years.

The community and reputational benefits are also significant. Steel plants in communities where air quality and environmental performance are local political issues gain a powerful local narrative: not only has the plant eliminated its CO_2 emissions, but the co-located bio-farm produces high-value food and fuel products, is a net positive for local air quality, and demonstrates that industrial production and environmental leadership are compatible.

3. Reference Case: Major US Direct Reduction Steelmaking Plant, Texas

The reference case for INNOVO's steel industry deployment is a major US direct reduction (DRI/HBI) steelmaking plant in Texas, chosen because its process emissions profile, scale, and geographic location make it ideally suited to the Smoke2Value bio-farm model. The company name is withheld at INNOVO's discretion pending formal engagement. The case demonstrates the full financial benefit to the steel producer, the INNOVO financial model, and the US tax credit structure in a single, fully quantified example.[31]

Parameter	Reference Case: Major US Direct Reduction Steelmaking Plant, Texas (anonymized)
Host facility	Major US direct reduction (DRI/HBI) steelmaking plant, Texas (company name withheld pending engagement)
CO_2 source	Direct reduction process emissions from natural gas-based steelmaking
Annual CO_2 captured	1 million metric tons
Bio-farm capex	$800 million (INNOVO finances 100%; nil capex to the steel producer)
Project IRR (10-year)	58.9%
Equity IRR (10-year)	42.3%
Bio-farm payback	2.6 years
EU ETS savings	€80M–100M per year at current carbon prices (€80–100/ton)
45Q tax credits	$85/ton × 1M tons = $85M/year for 12 years = $1.02 billion total
Steel producer capex	Nil – INNOVO finances, builds, and operates the bio-farm
Steel producer benefit	Zero-emission status, avoided carbon costs, CBAM compliance, ESG credentials

3.1 Financial Benefits to the Steel Producer

INNOVO finances 100% of the $800 million bio-farm construction and operating costs. The steel producer provides the CO_2 emission source and site access. In return, the steel producer receives zero-emission status for the plant, eliminating its EU ETS liability on those emissions and its CBAM exposure on steel exported to the EU. At current EU ETS prices of €80–100 per ton,[32] this represents €80–100 million per year in avoided carbon costs for 1 million tons of CO_2 eliminated.

The zero-emission designation also enables the steel producer to market the plant's output as verified zero-emission green steel, accessing the $150–500 per ton green steel premium in European and North American markets.[33][34] For a plant producing 2 million tons of steel per year, a conservative $150/ton premium generates $300 million per year in incremental green steel revenue.

3.2 The US 45Q Tax Credit Structure

The Texas bio-farm qualifies for US Section 45Q Production Tax Credits at $85 per ton of CO_2 captured and utilised, following the One Big Beautiful Bill Act signed in July 2025.[35] At 1 million tons of CO_2 captured annually, this generates $85 million per year in 45Q credits for 12 years, totalling $1.02 billion per bio-farm. Section 45Q(f)(5)(A)(i) explicitly authorises credits for fixation of qualified carbon oxide through photosynthesis, such as through the growing of algae.[36]

INNOVO's financing structure for the first steel partner offers $160 million in 45Q credits for a $80 million sustainability-linked loan, providing the lender with a verified 2:1 return. This structure allows the steel producer to participate directly in the tax credit economics while INNOVO finances the entire bio-farm construction.

[35] US Congress: One Big Beautiful Bill Act (OBBBA), July 2025 – Section 45Q increased to $85/ton and Section 45Z clean fuel provisions

4. First Mover vs. Follower: The Strategic Gap

The steel industry operates on thin margins, long investment cycles, and intense price competition from global producers. The competitive consequences of being a first mover in genuine net zero steel are therefore particularly profound: the first mover gains access to premium-priced markets, preferred regulatory treatment, and preferred customer relationships that are structurally unavailable to followers – at least until followers have deployed the same technology.

First Mover	Follower
Immediate access to $150–500/ton green steel premium across all qualifying output	Continues selling at commodity prices; cannot access premium markets requiring verified zero emissions
Zero CBAM liability from date of bio-farm commissioning	Continues paying €80–200/ton CBAM tariff on all EU exports; cost escalates as ETS price rises
Zero EU ETS carbon cost from date of commissioning	Continues bearing €80–200/ton EU ETS cost on all covered emissions; cost trajectory accelerates
$160M profit from 45Q tax credit structure per bio-farm (first mover preferred terms)	Accesses tax credit profits only after first mover preferred capacity is allocated
Preferred supplier status for automotive and construction buyers with Scope 3 commitments	Loses supply contracts to net zero steel competitors; buyers switch to verified zero-emission suppliers
Valuation multiple expansion: 10–20% EV/EBITDA premium for sustainability leadership	Valuation multiple discount maintained; higher cost of capital; sustainability-linked debt premiums
Category-defining narrative: first producer to achieve verified net zero steel at nil capex	Reactive positioning; cannot claim leadership regardless of subsequent deployment
Preferred deployment terms and timeline from INNOVO	Waits for bio-farm deployment capacity following first mover's full deployment
Science-based target alignment achieved immediately; no multi-billion capex programme required	Must commit to expensive hydrogen or CCS programmes to achieve SBTi alignment
Talent leadership: engineering and sustainability professionals prefer genuine net zero employers	Talent pipeline weakens as credibility gap with first mover widens

4.1 The First Mover's Financial Advantage in Detail

The financial advantage for the first steel producer to deploy INNOVO's Smoke2Value technology is multi-dimensional and cumulative. On avoided carbon costs alone, eliminating 1 million tons of CO_2 per year saves €80–100 million per year at current EU ETS prices, rising to €150–200 million per

year as ETS prices reach their projected 2030 level.[37] A major producer with 5 million tons of annual CO_2 avoids €400 million to €1 billion per year in escalating carbon costs.

On top of the avoided cost, the first mover accesses the green steel premium. At $150–500 per ton for a 5 million ton per year producer, the premium revenue is $750 million to $2.5 billion per year.[38][39] This is not a theoretical future benefit: automotive and construction procurement contracts for green steel at premium prices are already being signed. The first producer with a verified net zero supply wins these contracts; followers must wait until they achieve equivalent status, by which time the first mover has locked in long-term supply agreements.

On the US tax credit structure, the first steel producer to partner with INNOVO on a US-based plant acquires Section 45Q credits at a 50% discount, generating a verified 2:1 return. On CBAM, zero-emission production eliminates CBAM liability entirely from the date of bio-farm commissioning – the competitive benefit relative to a follower that continues to pay €288–360 million per year in CBAM tariffs on 2 million tons of EU-bound exports compounds annually.[40][41]

4.2 The Follower's Compounding Disadvantage

Followers in the steel industry face a particularly severe version of the first mover / follower gap because the premium market for green steel is not unlimited: automotive and construction buyers sign long-term supply agreements with net zero steel suppliers. Once the first mover has signed those agreements, followers cannot access the same buyers on the same terms until existing agreements expire. The first mover's green steel supply contracts are not just current revenue: they are barriers to entry for followers.

Simultaneously, followers continue to pay escalating CBAM tariffs and EU ETS costs that the first mover has eliminated entirely. The competitive margin advantage for the first mover – the combination of avoided costs and premium revenues – widens every year that followers delay. And followers face growing regulatory pressure to adopt binding net zero pathways under IFRS S2, SBTi requirements, and national climate laws,[42] all of which require credible, verified, physical emission reductions – not offsets or certificates.

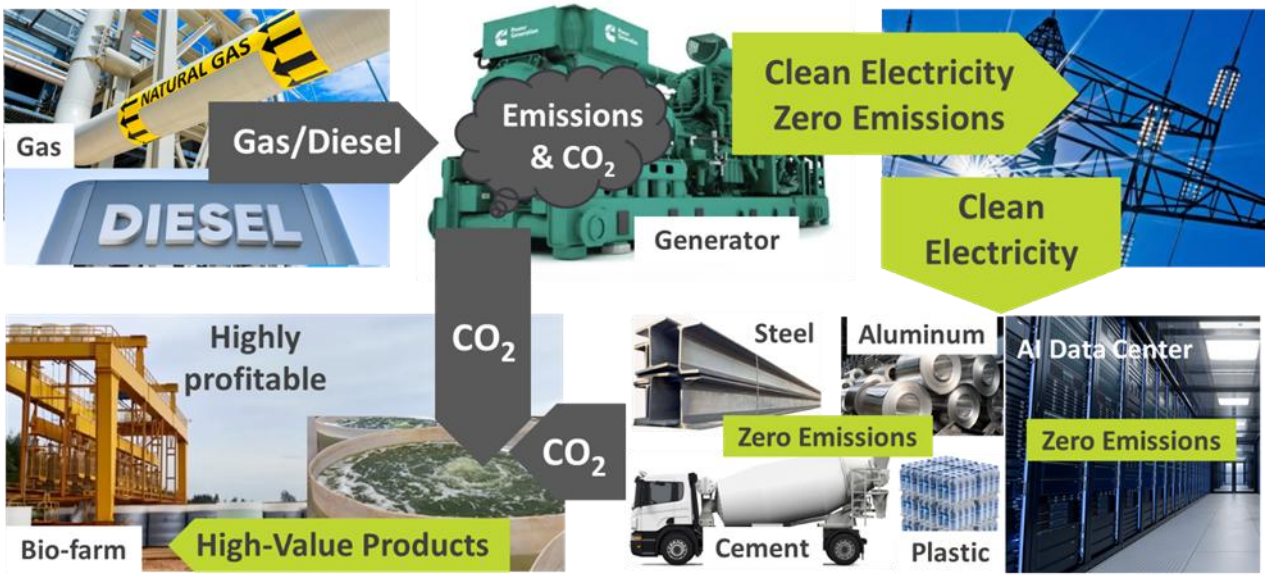
5. The Smoke2Value Bio-farm Technology

1.1 How It Works for Steel Producers

INNOVO's Smoke2Value bio-farm is co-located adjacent to a steel plant or integrated steelmaking facility. The CO_2 in the plant's industrial exhaust – from blast furnaces, direct reduction plants, electric arc furnaces, and ancillary processes – is piped directly into the bio-farm's deep 2.4m × 2.4m tanks of algae in seawater, where it is bubbled through the algae-rich water. The bio-farm simultaneously draws additional CO_2 from the surrounding air through direct air capture. The algae digest both streams through photosynthesis in sunlight, growing rapidly and continuously.

The algal biomass is continuously harvested and refined into four streams of high-value commercial products: crude algal oil at $1,100 per ton (the premium feedstock for sustainable aviation fuel), crude algal cake at $250 per ton (for animal and fish feed), omega-3 oils at $80,000 per ton (for food supplements and pharmaceuticals), and fish supplement at $1,250 per ton. These revenues make the bio-farm so profitable – 58.9% project IRR and a 2.6-year payback – that INNOVO finances the entire capital expenditure, typically $400–800 million per bio-farm, at nil cost to the steel producer.

Smoke2Value Algae Bio-farms Profitably Digest CO_2 in Smoke



The steel plant continues to operate exactly as before. Its blast furnace, its natural gas supply, its electricity infrastructure, and its workforce are all unchanged. The difference is that the CO_2 that would otherwise have entered the atmosphere is now being captured, digested, and converted into commercial products. The plant's Scope 1 emissions fall to zero.

5.2 Proven at Industrial Scale

The technology has been proven at industrial scale through two years of independent due diligence by five of the world's top 10 oil and gas majors, including Shell, Chevron, and BP, who competed in a commercial tender and together placed $16 billion in multi-year offtake contracts for crude algal

oil.[43] The bio-farm holds full US EPA approval and EU International Sustainability and Carbon Certification (ISCC).[44]

5.3 Comparison with Alternative Decarbonization Technologies

Criterion	INNOVO Smoke2Value	Green Hydrogen	CCS (Storage)	Electrification
Capex to steel producer	**Nil**	Very High	Very High	Very High
Proven at scale	**Yes**	Limited	Partial	Limited
Revenue generated	**Yes – SAF, feed, omega-3**	None	None	None
CO_2 digested	**1M T/yr/farm**	Indirect	Sequestered	Indirect
IRR for provider	**58%**	Negative	Negative	Low
Deployment time	**24–30 mths**	5–10 yrs	5–10 yrs	5–10 yrs
Process heat compatible	**Yes**	Partial	No	Limited
Supply chain risk	**Low**	Very High	High	High

Green hydrogen, carbon capture and storage (CCS), and electrification are the three most commonly cited decarbonization pathways for steel. All three require enormous capital expenditure by the steel producer, none generates any commercial revenue for the producer, and none has been demonstrated at full industrial scale for the blast furnace or direct reduction processes that account for the majority of the industry's CO_2 emissions.[45] INNOVO's Smoke2Value bio-farm requires zero capital expenditure, generates no risk for the producer, has been validated at industrial scale, and is deployable in 24–30 months.

[43] Hortidaily: $16 billion cross-industry net zero programme – INNOVO technology partner offtake contracts from 5 top-10 oil & gas majors
[44] ISCC: International Sustainability and Carbon Certification – lifecycle verification for algae-based products and bio-farm outputs
[45] IEA: Iron and Steel Technology Roadmap – decarbonization pathways, cost analysis, and green steel premium pricing

6. EPC Consortium: KEPCO, Samsung & ARCO Build Program

INNOVO has assembled a **world-class EPC consortium** to deliver the turnkey construction and full commissioning of twenty-four Smoke2Value bio-farms: 14 at shovel-ready sites in Corpus Christi, Texas, and 10 in Gladstone, Queensland, Australia. The total project value is $9.41 billion ($392M per bio-farm), of which the KEPCO/Samsung/ARCO construction scope totals $3.0 billion ($125M per bio-farm).

6.1 Consortium at a Glance

Entity	Role	Revenue	Employees	Credit
KEPCO	Primary turnkey EPC; harvester design; tanks; refinery	~$70B	~49,000	AA / Aa2
Samsung C&T + E&A	Civil engineering; bio-refinery EPC; SAF facility	$27B+	~5,500+	KOSPI 200
ARCO Group	US subcontractor; site prep; MEP; commissioning	$6.8B	1,200+	ENR #4 DB

Combined annual revenues: ~$83 billion. The $3.0B construction scope represents approximately 3.6% of the consortium's combined annual revenue.

6.2 KEPCO: Sovereign-Grade EPC Contractor

Korea Electric Power Corporation (KEPCO) is 51% South Korean government-owned, with credit ratings of AA (S&P, stable) and Aa2 (Moody's, stable). KEPCO's consolidated revenue for FY2025 was ~$70 billion, with operating income of ~$9.7 billion. KEPCO is ranked 258th on the Fortune Global 500.

KEPCO's most significant international project is the **$20.4 billion Barakah Nuclear Power Plant** in Abu Dhabi — the first nuclear power plant in the Arabian Peninsula. All four units are fully operational (2021–2024). KEPCO has also signed the $18.6 billion Dukovany Nuclear Program in the Czech Republic. KEPCO has structured 23 overseas project finance arrangements without parent-company guarantees.

6.3 Samsung: Proven KEPCO Partner with Bio-Refinery Expertise

Samsung E&A secured a **$955 million EPCC contract** for the Phoenix Biorefinery in Malaysia — producing 650,000 tons/year of SAF, biodiesel, and bio-naphtha. Samsung C&T operates 3 GW of solar in Texas and 1.3 GW in Australia — the exact INNOVO deployment geographies.

6.4 ARCO Group: US Construction & Commissioning Partner

ARCO Group generated $6.8 billion in revenue, ranked ENR #4 Top Design-Build Firm, with 6,000+ completed projects across 48+ US offices. ARCO co-founded the Net Zero Data Center Alliance alongside INNOVO on April 23, 2025.

6.5 Deployment Plan

Location	Bio-Farms	EPC Scope	Total Cost
Corpus Christi, Texas	14	$1,750M	$5,488M
Gladstone, Queensland	10	$1,250M	$3,920M
TOTAL	**24**	**$3,000M**	**$9,408M**

Bio-farm technology holds both **US EPA certification** and **EU ISCC certification**, enabling immediate production start.

7. US Federal Tax Credits: Section 45Q

7.1 Section 45Q Production Tax Credits

Each INNOVO Smoke2Value bio-farm co-located with a US-based steel plant qualifies for Section 45Q Production Tax Credits at $85 per ton of CO_2 captured and utilised under the One Big Beautiful Bill Act (July 2025).[4647] At 1 million tons of CO_2 captured annually, a single large-scale US bio-farm generates $85 million per year in 45Q credits for 12 years, totalling $1.02 billion per bio-farm. These credits are fully transferable to third parties at prevailing market rates of 85–95% of face value.

The statutory basis for algae-based capture is explicit. Section 45Q(f)(5)(A)(i) authorises credits for fixation of qualified carbon oxide through photosynthesis or chemosynthesis, such as through the growing of algae.[48] Algae-based products achieve 60–80% lifecycle CO_2 emissions reductions compared to petroleum fuels. ISCC certification provides the required third-party lifecycle verification.[49]

7.2 The Financing Structure for the First Steel Partner

- INNOVO finances 100% of the $800 million bio-farm construction and operation.
- INNOVO offers the first steel partner $160 million in 45Q tax credits in exchange for a $80 million sustainability-linked loan.
- The steel producer receives a verified 2:1 return: $80 million invested generates $160 million in credits.
- Surplus credits from the remaining $862 million (over 12 years) are sold to third parties, funding INNOVO's global expansion.
- The steel producer simultaneously eliminates €80–100 million per year in EU ETS costs and its CBAM tariff liability on EU-bound exports.

8. The Regulatory Landscape Driving Urgency

The regulatory environment for the steel industry is the most demanding it has ever been, and the pace of change is accelerating. Every major regulatory development described below either increases the cost of inaction or increases the commercial reward for first movers who achieve genuine net zero status through INNOVO's technology.

8.1 EU Carbon Border Adjustment Mechanism (CBAM)

EU Regulation 2023/956, the Carbon Border Adjustment Mechanism, entered its definitive phase on 1 January 2026. Steel is one of the primary covered sectors.[50] All steel imported into the EU must now carry CBAM certificates corresponding to the EU ETS carbon price on the embedded CO_2 content. For blast furnace steel with approximately 1.8 tons of CO_2 per ton of output, the CBAM tariff at €80/ton CO_2 is €144 per ton of steel exported to the EU.

European steel producers (who pay ETS costs domestically) have been calling for CBAM to level the playing field with non-EU producers who had previously faced no carbon cost.[51] For non-EU producers, the CBAM creates an immediate, large, and annually escalating cost that is eliminated entirely by INNOVO's technology. For EU producers, elimination of their own ETS liability through INNOVO's technology directly improves their cost competitiveness relative to any remaining non-EU producers who have not yet deployed equivalent technology.

8.2 EU Emissions Trading System (ETS)

The EU ETS is the world's largest carbon pricing mechanism. Current carbon prices at €80–100 per ton create immediate, material financial pressure on every steel producer with EU-covered facilities.[52] The EU ETS is designed to tighten progressively: free allowances for the steel sector are being phased out as CBAM provides an alternative mechanism for managing carbon leakage. By 2030, EU ETS prices are projected to reach €150–200 per ton, representing a doubling to tripling of the current carbon cost burden.

A steel producer that has eliminated its CO_2 emissions through INNOVO's technology is exempt from EU ETS costs on those eliminated emissions from the date of bio-farm commissioning. The benefit is not merely avoided future cost: it is an immediate, current-year saving of €80–100 million per million tons of CO_2 eliminated.

8.3 Science Based Targets Initiative (SBTi) and IFRS S2

More than 7,000 companies globally have approved Science Based Targets, which require alignment with a 1.5°C pathway and prohibit the use of offsets for Scope 1 and Scope 2 emissions reductions.[53] For steel producers, this means that genuine physical CO_2 reduction – of the kind

achieved by INNOVO's bio-farm – is required, not carbon credits or renewable energy certificates. Companies without credible, funded, physical net zero pathways are increasingly excluded from SBTi approval, which in turn affects access to sustainability-linked finance and preferred supplier status with corporate buyers.

IFRS S2 Climate Disclosure Standards require companies to disclose the physical carbon impacts of their operations and the credibility of their net zero pathways. For steel producers, this means disclosing actual Scope 1 emissions and actual reduction strategies, not aspirational targets. A steel producer with INNOVO's technology deployed has a physically verified, independently certified zero-emission designation: the gold standard for IFRS S2 disclosure.

8.4 ResponsibleSteel International Standard

The ResponsibleSteel International Standard requires certified steel producers to demonstrate net zero commitments and supply chain transparency.[54] Major automotive, construction, and infrastructure buyers increasingly require ResponsibleSteel certification or equivalent as a condition of supply contracts. INNOVO's technology provides the physical CO_2 elimination that underpins ResponsibleSteel certification at the highest level, giving certified steel producers preferred supplier access to the entire premium corporate procurement market.

[54] ResponsibleSteel International Standard: Net zero certification requirements for steel producers in global supply chains

9. Next Steps

The CBAM definitive phase began in January 2026. Every month of delay by a steel producer locks in additional carbon cost liability and cedes further competitive ground to the first mover. The communications opportunity that defines a generation of agency relationships in the steel sector will be won or lost in the weeks ahead.

9.1 Recommended Immediate Actions

- Schedule your comprehensive webinar briefing with the INNOVO team to review the technology, the fully quantified US reference case, the CBAM analysis, and the specific opportunity for each of your major steel industry clients.
- Request data room access to conduct independent due diligence on the technology validation, Section 45Q tax credit structure, green steel premium market data, and CBAM and EU ETS analysis.
- Identify which of your existing clients in steel, automotive, construction, or industrial manufacturing are most immediately advantaged by first mover net zero steel status or by first access to verified zero-emission steel supply.
- Prepare the strategic intelligence package for your client's C-suite – Chief Executive, Chief Financial Officer, Chief Sustainability Officer, and Chief Commercial Officer – drawing on the data room materials.
- Engage your client before competitors do. The green steel premium market, the preferred CBAM exemption window, and the first mover communications narrative are all available exclusively to the steel producer that acts first.

9.2 Contact

PR Agency Enquiries: public.relations@innovo-network.com

innovo-net-zero.com/pr-briefing

All information in this briefing is in the public domain. There is no requirement to notify INNOVO before approaching any client or media contact.

Sources

The following external sources are referenced throughout this document via numbered footnotes. Where INNOVO documentation corroborates an external source, the INNOVO reference is noted in parentheses. All INNOVO supporting documentation is available in the INNOVO Data Room at innovo-net-zero.com/pr-briefing.

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