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Your 45Z Program Has an Upstream Problem

Why Carbon Intensity Outcomes Are Determined in the Field — and What C-Level Leaders Must Do About It. A paper on CI data integrity, audit risk, execution accountability, and the competitive window that is closing now.

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Audience
C-Level · Biofuel · Agriculture · Energy Finance

About This Paper

Written for C-level executives, operational leaders, and policy influencers across the biofuel, agriculture, and energy finance sectors. It addresses the most consequential — and least discussed — execution challenge in 45Z compliance: the upstream agricultural data layer that determines whether carbon intensity scores are defensible, and whether tax credits are realizable.

Executive Summary

The Opportunity Is Real. The Execution Gap Is Larger Than You Think.

The 45Z Clean Fuel Production Credit is not a future policy debate. It is active. Credits are being claimed. Audits will follow. And the organizations that assumed their carbon intensity data was good enough are beginning to discover it is not.

Under 45Z, tax credit value is not fixed. It scales directly with carbon intensity performance. Lower CI produces higher credit value — up to **\$1.00 per gallon** for non-aviation fuel and **\$1.75 per gallon** for sustainable aviation fuel produced at qualifying facilities.

\$1.75 per gallon max credit for sustainable aviation fuel	\$1.00 per gallon max credit for non-aviation qualifying fuel	\$22.5M annual value at risk for a 50M gallon producer with a \$0.45/gal CI gap
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What most C-level leaders have not yet internalized is that CI scores are not produced in a finance department or a modeling platform. They originate in agricultural fields, across thousands of growers, through practice data that must be captured, verified, standardized, and governed before a single number enters a GREET model.

"45Z does not fail because of regulatory complexity. It fails because no one owns the upstream data layer — and by the time that becomes apparent, the exposure is already on the balance sheet."

Section 01

Why 45Z Is Structurally Different From Every Prior Biofuel Incentive

Every prior biofuel incentive in U.S. tax policy rewarded volume. Produce qualifying fuel, claim the credit. The economics were predictable, compliance was primarily administrative, and the value of the incentive was fixed per gallon regardless of how the feedstock was grown.

45Z is built on a fundamentally different logic. The credit is awarded for *carbon performance*, not crop production. Credit value scales inversely with lifecycle greenhouse gas emissions, measured in grams of CO₂ equivalent per megajoule (gCO₂e/MJ). A producer generating fuel at CI 20 earns materially more per gallon than the same producer generating the same fuel at CI 40.

Carbon Intensity Is Now a Revenue Variable

This structural shift has one profound implication for senior leaders: carbon intensity is no longer an ESG reporting metric. It is a direct input into revenue. Every agronomic decision that influences CI — fertilizer type and rate, tillage practice, cover crop adoption, field-level yield efficiency — now has a quantifiable financial consequence.

Agronomic variables that directly drive CI score and credit value

- Nitrogen fertilizer rate, source type, and timing (synthetic vs. enhanced efficiency formulations)
- Tillage intensity: conventional, reduced-till, or no-till practice by field
- Cover crop adoption, species selection, and termination method
- Field-level yield data (inputs per bushel of feedstock produced)
- On-farm energy and fuel use across planting, in-season, and harvest operations
- Irrigation source and intensity where applicable

None of these variables are self-reporting. None are automatically captured by existing farm management systems at the precision required for 45Z compliance. Each requires a data collection infrastructure, a verification process, a standardization protocol, and a governance framework capable of producing outputs that are both accurate and defensible under third-party audit.

Key Takeaway Carbon intensity is a revenue variable, not a reporting obligation. The organizations that treat it accordingly — and build execution infrastructure to match — will have a durable competitive advantage.

Section 02

The Market Is Already Pricing Execution Capacity

The competitive dynamics of the 45Z market are forming faster than most organizations anticipated. Across earnings calls and investor communications in ethanol, sustainable aviation fuel, and renewable diesel, the signals are consistent and reinforcing.

- A structural shortage of verified, CI-qualified acres relative to fuel production demand
- Active competition among fuel producers for CI-ready feedstock, with premiums being quoted in procurement conversations
- Significant difficulty scaling CI-ready supply chains beyond pilot programs
- Growing recognition that the constraint is not capital or demand — it is execution capacity

The Constraint Is Execution, Not Understanding

Most sophisticated players in biofuels and agricultural supply chains understand 45Z conceptually. The regulatory structure, the CI scoring mechanics, the GREET model requirements — these are broadly understood. What is not broadly understood is what operationalizing them actually requires at scale.

Scale Context

What "At Scale" Actually Means

A mid-scale ethanol producer drawing from a regional supply shed may source feedstock from **8,000 to 15,000 individual fields** across hundreds of growers. Each field requires practice data. Each grower requires formal enrollment and documented attestation.

That data must be standardized across different agronomic regions, verified against available records, and maintained in a form that can withstand IRS audit review. This is not a software integration project. It is a field-level execution challenge that requires agronomic expertise, program management discipline, and governance infrastructure built specifically for regulatory defensibility.

Key Takeaway The 45Z market is not waiting. Verified acres are becoming scarce. The competitive premium for execution-ready supply chains is real and growing. The organizations that build the upstream data layer now will move faster, carry less risk, and monetize credits with confidence.

Section 03

Where 45Z Programs Break Down — and Why It Shows Up on Your Balance Sheet

The failure pattern in 45Z programs is recognizable to anyone who has worked across the full chain. Organizations assemble what looks like a comprehensive execution stack: regulatory counsel, a CI modeling platform, agronomic field staff, a data ingestion tool. Each component performs its function. Together, they consistently fail to produce defensible outcomes. The reason is structural, not technical.

Common Failure Modes

- **Inconsistent field data:** practices recorded in different formats, units, and levels of precision across geographies
- **Low grower participation:** without structured enrollment, data coverage is incomplete and unrepresentative of the actual supply shed
- **Missing attestation:** growers' practice claims are not documented in a way that supports third-party verification
- **No audit owner:** when a regulator or verifier examines CI claims, no single party is positioned to own the defense

Illustrative Scenario · The \$22.5M Gap

What the Execution Gap Costs in Practice

Consider a mid-scale ethanol producer: 8,000 fields, 600 growers, 50 million gallons annually. A producer with defensible, optimized CI data may achieve a blended credit rate of **\$0.85/gallon**. A producer with inconsistent, unverified data may realize only **\$0.40/gallon** — or less if documentation gaps force credit recapture. On 50 million gallons, that \$0.45/gallon gap equals **\$22.5 million in annual credit value at risk**.

Program Comparison

Risk Area	Fragmented Model	Corvian Execution
CI Score Integrity	Inconsistent inputs; GREET scores undefendable at audit	Verified, standardized practice data from field to model
Grower Participation	Informal engagement; low adoption; documentation gaps	Structured enrollment with standardized attestation protocols
Audit Accountability	No single owner; accountability diffused across vendors	Single execution owner; clear chain of custody
Credit Monetization	Delayed or reduced realization; balance-sheet exposure	Defensible outcomes enabling confident credit realization

Key Takeaway 45Z does not fail because of regulation. It fails because execution is fragmented and no single party owns the output. That failure shows up on the balance sheet — but it originates in the field.

Section 04 —

What 45Z-Ready Actually Means for C-Level Leaders

"Genuine 45Z readiness is binary: either your CI scores can withstand audit scrutiny or they cannot. The test is whether, if the IRS requested documentation for every CI claim in your last submission, you could produce a defensible record for every field in your supply shed."

The Four Non-Negotiable Requirements

1

Scaled field-level data capture

The program must reach individual fields, not just growers or geographies. Practice data — fertilizer, tillage, cover crops, yield, energy use — must be collected systematically at the scale that represents the actual supply shed. Sampling approaches and agronomic proxies are insufficient for audit defense at the field level.

2

Verified and standardized practice data

Data collected from growers must be independently verified — cross-referenced against agronomic records, satellite-derived land use data, or certified agronomist confirmation — and standardized into formats that CI models can ingest without manual adjustment.

3

Clear attestation and documented governance

Every grower's practice data must be formally attested, with documented consent and clear records of what was captured, when, by whom, and under what verification protocol. This attestation chain is the foundation of audit defense.

4

A single accountable execution owner

The most consistently missing element in fragmented 45Z programs. Someone must own the full chain from field data capture to CI model input to audit-ready documentation. This is not a technology function — it requires program management discipline, agronomic expertise, and direct accountability for audit outcomes.

Key Takeaway Readiness is operational, not aspirational. It is built from the field up, not from the model down. The organizations that move now will have an infrastructure advantage that latecomers cannot close quickly.

Section 05

The Corvian Execution Model: What "Field-First, Audit-Ready" Looks Like in Practice

Corvian exists to solve the execution problem that no one else has owned. Our core thesis is simple: CI outcomes are determined by what happens in agricultural fields, not in modeling platforms. The data layer that exists between the field and the GREET model is where most 45Z programs are fragile. Corvian builds that layer — and owns accountability for its defensibility.

We do not compete with CI modelers, regulatory advisors, or data platforms. We are the execution infrastructure that makes all of them work.

Our Execution Architecture

01 Grower Enrollment Structured onboarding with standardized attestation protocols at scale	02 Field Data Capture All CI-relevant variables collected at the field level — not sampled or proxied
03 Verification & Standardization Cross-referenced, normalized, and formatted for defensible GREET model inputs	04 Governance & Audit Readiness Chain of custody documented; single owner accountable from field to credit claim

Who the Corvian Execution Model Is Built For

- **CEOs and CFOs** who need CI scores that are defensible at claim time — not modeled assumptions
- **Chief Sustainability Officers** who own carbon intensity commitments and need verified data to back them
- **Ethanol, SAF, and renewable diesel producers** competing for CI-qualified feedstock at scale
- **Grain handlers, co-ops, and aggregators** building CI-premium supply chain programs
- **Investors and lenders** underwriting 45Z credit streams who need to understand execution risk

The Right Frame

Organizations frequently ask whether Corvian competes with their existing CI modeling vendor or agronomy provider. The honest answer is that those relationships are not the constraint. **The constraint is the data going into them.** Corvian owns what others leave ungoverned: the upstream data layer between the field and everything downstream.

Key Takeaway Corvian owns the execution layer that determines whether every other element of your 45Z program produces defensible outcomes. Field-first is not a methodology preference. It is the only architecture that produces audit-ready CI data at scale.

Closing Perspective —

The Organizations That Move Now Will Carry Less Risk and Capture More Value

45Z is a genuine, durable economic opportunity. The credit structure is real, the demand for CI-qualified feedstock is real, and the premiums available to verified low-CI supply chains are real and growing.

None of this changes the fundamental challenge: the opportunity is only realized through execution discipline at the field level. The organizations that will capture disproportionate value from 45Z are not necessarily the largest, the most technologically sophisticated, or the earliest to engage with the regulation. They are the ones that recognize — early enough to act — that the upstream data layer is the determinant of downstream outcomes, and that build execution infrastructure accordingly.

The competitive window is not permanently open. Verified acres are becoming scarce. Grower relationships take seasons to build. Attestation protocols require iteration. The infrastructure cannot be replicated overnight. Conversely, organizations that continue investing in models and platforms without addressing the upstream data layer will face an accelerating reckoning as audit pressure increases and verification requirements tighten.

"The question every C-level leader in biofuels and agriculture needs to answer now: when the auditor asks for the data behind your CI scores, what will you hand them?"

See How the Corvian Model Applies to Your Program

Book a 30-minute executive briefing. We'll walk through your current execution architecture, identify where your program carries audit risk, and outline a field-first path to defensible CI outcomes at scale.

[Request Briefing](#)corvian.com/45Z-Assessment

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