

M C P S E R V E R

N O C O D E

C L O U D H O S T E D

Carbon Capture Sizing Engine for engineers.

Get precise technical dimensions and economic data for CO₂ removal systems.

Carbon Capture Sizing Engine provides the technical math needed to design CO₂ removal systems. Your AI client uses this MCP to calculate vessel dimensions, solvent volumes, energy demands, and total capture economics for amine-based or other carbon capture technologies.

A+ Quality Score 100/100

carbon-capture

co2-removal

engineering

climate-tech

industrial-design



The connectivity layer between AI and the world's software.

Vinkius sits between AI and every application. All communication passes through Vinkius Cloud via the Model Context Protocol (MCP) — with governance, observability, and security at every layer.

Your AI Connections Run Through Vinkius Cloud

The world's largest
managed MCP catalog

Vinkius is the connectivity layer where AI connects to the software your business already runs. We handle the hosting, the security, the credentials, the uptime — you get agents that actually do things.

We operate the world's largest managed MCP catalog. Major SaaS platforms, CRMs, databases, and cloud providers — running, monitored, production-ready. This MCP server is hosted and maintained by the Vinkius Cloud for AI Agents.

The agent doesn't manage credentials, doesn't manage uptime, doesn't manage security. Vinkius does.

— Architecture principle

Four Pillars of the Vinkius Runtime

01 — Security by design

Credentials stay encrypted at rest via AES-256. The AI agent never touches raw keys — they're injected into a sandboxed V8 isolate at runtime. Actions are logged, and connections have an emergency kill switch.

03 — Deterministic observability

Eight immutable metrics per endpoint: request volume, p95 latency, error rate, active connections, cost attribution. A live payload feed logs every tool call with mutation detection.

02 — Built on MCP Fusion

This MCP server was built with **MCP Fusion**, the open-source framework (Apache 2.0) that powers the entire Vinkius catalog. Schema-as-firewall strips undeclared fields, compiled PII redaction runs at zero overhead, and cryptographic lockfiles produce git-diffable audit trails.

04 — Autonomous operations

Servers are deployed, monitored, and patched autonomously. New capabilities and security patches ship weekly. Zero-downtime deployments ensure continuous availability across all managed MCP servers.

AES-256

Encryption at rest

Ed25519

PKI vault signatures

24h TTL

Ephemeral session keys

V8 Isolate

Sandboxed execution

One Token. Instant Access.

Every MCP server on Vinkius is accessed through a **Connection Token**. Tokens are generated in the cloud dashboard and produce a unique MCP endpoint URL. Paste this URL into any MCP-compatible client — no SDK required.

A single token can serve **multiple AI clients simultaneously**, or you can issue separate tokens per client for granular access control. Each token tracks its own request count, last activity timestamp, and can be individually enabled or revoked.

MCP ENDPOINT`https://edge.vinkius.com/{token}/mcp`

Claude



Cursor



VS Code



Windsurf



Grok



Gemini

Security Is the Architecture

Security in Vinkius is not a feature — it's the foundation of the runtime. The gateway enforces multiple independent protection layers between AI agents and third-party APIs.

01 — Ed25519 PKI Vault

Every workspace has an Ed25519 Master Key. Session keys are generated ephemerally (24h TTL) and signed by the Master Key. Credentials never leave the vault boundary.

02 — V8 Isolate Sandboxing

Tool code runs inside isolated-vm V8 isolates with 64 MB memory caps and per-request timeouts. No filesystem access, no network access except through the SSRF-guarded fetch bridge.

03 — SSRF Guard

All outbound HTTP requests are DNS-resolved and validated before execution. Private IP ranges (10.x, 172.16-31.x, 192.168.x, AWS metadata 169.254.x) are blocked at the network layer.

05 — Cryptographic Audit Trail

Every request is signed into a SHA-256 hash chain with Ed25519 signatures. Events form a tamper-proof, SIEM-exportable forensic record.

04 — DLP & PII Redaction

A ResponseGuard pipeline intercepts every tool response. Configurable redaction patterns strip sensitive fields (emails, SSNs, card numbers) before data reaches the AI agent.

06 — Honeypot Trap System

Phantom credentials are injected into isolated environments. If a honeypot is used outside Vinkius infrastructure, the server is quarantined instantly.

Emergency Kill Switch

EU AI Act Art. 14(1)
Compliant

The kill switch is an **emergency halt** mechanism — not a simple toggle. When triggered, it executes three actions atomically:

01 — Server deactivated

The MCP server is immediately taken offline across the entire cluster.

02 — All tokens revoked

Every connection token is invalidated. Total lockout — reconnection blocked until new tokens are issued.

03 — WebSocket connections killed

Active connections terminated via Redis pubsub broadcast. Propagates to every runtime node in the cluster.

Full Visibility. Zero Guesswork.

The Vinkius cloud dashboard includes a full MCP Governance suite — real-time analytics and security controls for production AI operations.

Control Plane

KPI dashboard with request volume, latency, success rate, token consumption, and AI-generated operational briefings.

FinOps

Cost tracking per tool, payload compression savings, budget optimization signals, and consumption trends.

Firewall & DLP

PII redaction activity, sensitive data protection counters, and security event timeline.

Agent Activity

Which AI clients are connecting, how often, and what they're doing — real-time session tracking.

Tool Health

Slowest and most error-prone tools, with actionable root-cause insights and performance baselines.

Incident Log

Error trends, failure rates, status-code breakdowns, and forensic audit trail access.

Get started at cloud.vinkius.com — connect your AI agent in under 60 seconds.

Carbon Capture Sizing Engine MCP

4 tools available

Cloud-hosted on Vinkius

You can use this MCP to handle the heavy lifting of sizing carbon capture equipment. Instead of manually running calculations for every design iteration, you tell your AI client what your gas stream looks like, and it returns the physical and chemical requirements for the system. It works by processing flow rates, concentrations, and circulation rates to output specific engineering data. You'll get the diameter and height of absorbers and strippers, the exact amount of solvent needed for your gas stream, and the thermal and electrical power required to keep the process running. It also handles the financial side by estimating the cost per tonne of CO2 captured based on your capital expenditure. This is a specialized tool for designing industrial-scale carbon removal hardware.

Core Capabilities

01 — Equipment Sizing

Your agent uses this to find the physical height and diameter of capture vessels.

02 — Chemical Inventory Planning

The AI calculates the solvent amounts needed for a specific gas stream.

03 — Energy Load Estimation

Your client determines the thermal and electrical power required for the process.

04 — Economic Modeling

The AI calculates the cost per tonne of CO2 based on capital spending.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/carbon-capture-sizing-engine — connect your AI agent in three steps.

- 01 Connect your AI client to the Vinkius-hosted MCP.
- 02 Provide gas stream data like flow rate and CO2 concentration to your agent.
- 03 The agent calls the specific sizing or economic tools.
- 04 The MCP returns the calculated dimensions, energy, or cost data.
- 05 You use the results to refine your engineering design.

You connect the MCP to your AI client and provide your technical parameters.

Built For

This MCP is built for engineers working in climate tech and industrial carbon removal. You can hand off raw gas stream data to your agent to get immediate sizing results.

Process Engineer

Uses the tool to define equipment specs and energy requirements.

Chemical Engineer

Uses the tool to calculate solvent needs and system dimensions.

Project Economist

Uses the tool to estimate the cost per tonne of captured CO2.

What Changes When You Connect

- 01 Reduces manual calculation time for vessel sizing.

-
- | | |
|----|---|
| 02 | Provides consistent energy demand estimates for thermal and electrical loads. |
| 03 | Links physical equipment dimensions to economic cost outputs. |
| 04 | Supports amine-based and other CO2 removal technology designs. |
-

Real-World Applications

Initial System Design

You provide gas flow rates to get the first set of absorber and stripper dimensions.

Energy Budgeting

You use the energy demand tool to see if a facility can support the required thermal load.

Solvent Procurement Planning

You calculate the necessary chemical volume for a specific gas stream concentration.

Project Feasibility Studies

You run economic models to find the cost per tonne of CO2 for a proposed plant.

Patterns to Avoid

Guessing vessel dimensions

❌ AVOID

You tell your agent to just give you a rough idea of how big an absorber should be for a new project.

✓ INSTEAD

Use ``get_system_dimensions`` to get specific height and diameter requirements based on your actual gas stream data.

Ignoring energy costs

❌ AVOID

You focus only on the capital cost of the hardware and forget to account for the power needed to run it.

✓ INSTEAD

Run ``estimate_energy_demand`` to get the thermal and electrical loads required for the process.

Underestimating solvent needs

❌ AVOID

You assume a standard amount of solvent will work for every gas concentration you encounter.

✓ INSTEAD

Use ``calculate_solvent_requirements`` to find the exact volume needed for your specific gas stream.

The Right Fit

Process and chemical engineers working on industrial carbon removal should connect this MCP. Project economists looking for rapid feasibility data will also find it useful. If you are just looking for general climate trends or high-level policy data, this tool isn't for you.

4 Engineering Tools for Carbon Capture Design

These tools handle the math for equipment sizing, chemical inventory, energy loads, and project economics.

#	TOOL	DESCRIPTION
01	calculate_capture_economics	This tool performs cost analysis for your carbon capture operation. It calculates the financial impact of the capture process.
02	calculate_solvent_requirements	This tool determines the chemical solvent volume needed. It calculates how much solvent is required to process your specific gas stream.
03	estimate_energy_demand	This tool calculates the energy footprint of the system. It provides both thermal and electrical energy requirements for operation.
04	get_system_dimensions	This tool outputs the physical size of your capture equipment. It determines the specific dimensions for vessels like absorbers and strippers.

See It in Action

Real prompts you can use once this MCP is connected to your AI agent through Vinkius Cloud.

U What are the dimensions for a system capturing 90% of CO₂ from a gas stream with a flow rate of 50 m³/s and a 15% CO₂ concentration?



The absorber diameter is 3.5 meters with a height of 12.0 meters, and the stripper diameter is 2.8 meters with a height of 10.5 meters.

U How much energy will be required for a capture system with a circulation rate of 150 kg/s?



The system requires 450 MW of thermal energy and 25 MW of electrical energy for operation.

U What is the estimated cost per tonne of CO₂ if the capital expenditure is 500 million dollars?



The estimated cost is 65 dollars per tonne of CO₂ captured.

Frequently Asked Questions

01 What kind of carbon capture technologies does this MCP support?

It is designed for engineers working with amine-based and other CO₂ removal technologies.

02 Can I use this with Claude or Cursor?

Yes, you can connect this MCP to any compatible client like Claude, Cursor, or Windsurf.

03 Does this tool provide electrical and thermal energy estimates?

Yes, the `estimate_energy_demand` tool calculates both thermal and electrical energy needs.

04 How does the tool handle economic analysis?

The `calculate_capture_economics` tool provides cost analysis for the capture operation based on your inputs.

05 What physical data can I get from this MCP?

You can get specific dimensions for equipment, such as the diameter and height of absorbers and strippers.

06 What can I calculate with this server?

You can determine the physical size of absorbers and strippers, the required solvent circulation rate, the total energy demand, and the economic cost per tonne of CO2 captured.

07 How do I determine the equipment size?

Use the ``get_system_dimensions`` tool by providing the flue gas composition, the gas flow rate, and your target CO2 capture fraction.

08 Does this support different solvent types?

Yes, you can specify different solvents like MEA, DEA, or PZ when using ``calculate_solvent_requirements`` to get accurate circulation rates.

Go Live in 60 Seconds

Get your connection token from cloud.vinkius.com, then paste the endpoint URL into any MCP-compatible client.

YOUR MCP ENDPOINT

`https://edge.vinkius.com/[TOKEN]/mcp`

CLIENT	WHERE TO CONFIGURE
 Claude AI	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
 Cursor	Settings → Features → MCP Servers → "+ Add New MCP Server" → Type: SSE → Paste endpoint
 VS Code	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add <code>"carbon-capture-sizing-engine": { "url": "..." }</code>
 Windsurf	MCP Settings → <code>mcp_settings.json</code> → Add endpoint URL
 ChatGPT	Settings → Tools & plugins → Add MCP server → Paste endpoint
 Gemini	Extensions → Add MCP Server → Paste endpoint URL

ASK AN AI ABOUT THIS

Let your preferred AI explain this MCP server

-  Ask ChatGPT 
-  Ask Claude 
-  Ask Perplexity 
-  Ask Gemini 
-  Ask Grok 

READY TO CONNECT

Carbon Capture Sizing Engine is live on Vinkius Cloud.

Get your connection token, paste it into your AI agent, and
start building. No SDK. No deployment. Just results.

Start at cloud.vinkius.com →

vinkius.com · support@vinkius.com

INDEPENDENT PLATFORM DISCLAIMER

Vinkius is an independent platform and is not affiliated with, endorsed by, sponsored by, verified by, or otherwise authorized by Carbon Capture Sizing Engine. All third-party trademarks, logos, and brand names are the property of their respective owners. Their use in this document is strictly for informational purposes to identify service compatibility and interoperability.

DOCUMENT INFORMATION

Generated	September 2026
MCP Server	Carbon Capture Sizing Engine MCP
Server ID	01a09155-4dde-72a6-9d95-f45fb5dc0277
Platform	Vinkius Cloud for AI Agents
Endpoint	https://edge.vinkius.com/{token}/mcp

LICENSE & USAGE

This document is generated automatically by the Vinkius PDF Engine. Content reflects the MCP server configuration at the time of generation and may change as updates are deployed. For the most current information, visit vinkius.com/en/ai-agent-connect/carbon-capture-sizing-engine.