MCP SERVER | NO CODE | CLOUD HOSTED

Solar Panel Calculator MCP for AI Agents

Calculating Solar System Capacity and ROI for Residential Homes

Solar Panel Calculator estimates your entire solar system setup. It helps you figure out how much energy you need, what size panel array you require, and if it's worth the investment. You get detailed financial breakdowns, like payback periods, plus a clear picture of your carbon footprint reduction potential.

A+ Quality Score 100/100

solar | renewable-energy | roi | sustainability | utility | savings

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vinkius.com/mcp/solar-panel-calculator

SCAN TO VIEW

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.

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.

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.

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	Ed25519	24h TTL	V8 Isolate
Encryption at rest	PKI vault signatures	Ephemeral session keys	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.

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.

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.

06 — Honeytoken Trap System

Phantom credentials are injected into isolated environments. If a honeytoken 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.

Agent Activity

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

FinOps

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

Tool Health

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

Firewall & DLP

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

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.

Solar Panel Calculator MCP

4 tools available
Cloud-hosted on Vinkius

This MCP gives you a full technical and financial assessment for residential solar power. It stops you from having to juggle complex spreadsheets just trying to figure out how much roof space you need or if the investment will actually pay off. You start by feeding in your annual energy usage and local sun hours, letting the system determine the necessary capacity. After that, you can run deep dives into economics—checking things like payback periods over 25 years and comparing financing models (Purchase vs. Lease). Furthermore, it quantifies your positive environmental impact so you know exactly what carbon offset potential you're getting. Because Vinkius hosts this MCP, you connect once to your preferred AI client and gain access to all these detailed energy calculations.

Core Capabilities

01 — Determine optimal system size

It calculates the precise kilowatt (kW) capacity needed for your home based on your annual energy consumption and local sun exposure.

02 — Analyze investment returns

The tool provides detailed financial projections, estimating savings, payback periods, and total long-term value over decades.

03 — Compare financing options

It evaluates the costs associated with different ownership structures, including purchasing, leasing, or using a Power Purchase Agreement (PPA).

04 — Measure environmental benefit

The system quantifies your personal carbon offset potential by tracking how much pollution you avoid annually.

One Click on Vinkius — From Prompt to Execution

Available at **vinkius.com/mcp/solar-panel-calculator** — connect your AI agent in three steps.

01 Input your home's total annual energy usage (kWh) and the average peak sun hours available at your location.

02 The MCP first uses this data to determine the minimum required solar system capacity, giving you a technical baseline.

03 Next, run financial models by providing costs and utility rates to calculate projected savings, payback periods, and environmental impact.

The bottom line is that it converts raw energy numbers into actionable financial and sustainability plans for your home.

Built For

This MCP is essential for homeowners researching solar power or for specialized electrical contractors needing quick, accurate feasibility reports. If you're tired of calling three different consultants just to get a basic ROI estimate, this tool streamlines the entire process.

Homeowner

Runs initial estimates on their own roof space and energy needs before talking to an installer. They want to know if solar makes financial sense.

Solar Installer/Contractor

Quickly verifies system sizing feasibility for a client's location and usage profile, speeding up the pre-sale assessment phase.

Financial Advisor

Models various financing outcomes—PPA vs. Purchase—to recommend the most economically sound solar path for their clients.

What Changes When You Connect

01 Determines the exact system size you need. The `estimate_system_capacity` tool takes your usage data to give you a precise kW requirement, so you don't overbuy or under-plan.

02 Provides clear financial planning. Use `calculate_financial_returns` to model total savings and know exactly when you hit break-even, eliminating guesswork.

03 Compares financing options side-by-side. The `compare_financing_models` tool lets you weigh the risks of purchasing versus the low upfront cost of a PPA in one view.

04 Measures your impact instantly. You can use `estimate_environmental_impact` to see your carbon offset potential, proving the project's value beyond just money.

05 Saves time on feasibility studies. Instead of calling an engineer for basic sizing data, you get immediate estimates using the MCP.

Real-World Applications

Figuring out if solar is even possible

A homeowner asks their agent: 'Based on my 12,000 kWh annual usage and 5 peak sun hours, what size system do I need?' The agent uses `estimate_system_capacity` to immediately give a required capacity of ~8.82 kW, providing the starting point for all other calculations.

Weighing between buying or renting

A client asks: 'Should I buy my solar system outright or should I use a PPA?' The agent uses `compare_financing_models` to show that while the PPA has zero upfront risk, purchasing offers the lowest net cost over 25 years.

Understanding long-term savings

The user asks: 'What are my total projected savings if I install a 10kW system costing $20,000?' The agent runs `calculate_financial_returns` and outputs an estimated payback period of 6.5 years with over $32k in total savings.

Showing the environmental benefit to my family

The user asks: 'How much pollution will this system prevent?' The agent runs `estimate_environmental_impact` and gives a concrete figure for avoided CO2 emissions, making the sustainability case tangible.

Patterns to Avoid

Using only general calculators

✗ AVOID

Relying on basic online forms that only calculate system size but ignore local utility rates or financing options.

✓ INSTEAD

Use the Solar Panel Calculator MCP. It handles sizing (`estimate_system_capacity`) and immediately feeds those numbers into financial analysis using `calculate_financial_returns` for a complete picture.

Mixing up cost structures

✗ AVOID

Getting quotes that only compare the upfront purchase price without factoring in long-term lease payments or maintenance costs.

✓ INSTEAD

The MCP's `compare_financing_models` tool solves this by modeling Purchase, Lease, and PPA options against each other based on actual cost structures.

Ignoring environmental impact

✗ AVOID

Focusing only on the dollar savings while ignoring the carbon reduction goal of the project.

✓ INSTEAD

Always run `estimate_environmental_impact` alongside your financial models. It grounds the decision in real sustainability metrics.

The Right Fit

Use this MCP if you need a complete, quantitative feasibility report covering size, money, and environment for residential solar. You must know your annual energy usage (kWh) and local sun hours to start. Don't use it if you just want general advice; it needs data inputs to calculate anything. If all you need is a rough idea of how much electricity you consume, check your utility bill first. However, never settle for just one number—make sure you run

`estimate_system_capacity` *and* follow up with `compare_financing_models`. That combination tells the whole story.

Solar Panel Calculator MCP: Calculating Residential Solar System Capacity and ROI

Figuring out solar capacity is usually a headache. You start by checking your utility bill, then you have to cross-reference that with local sun data and the physical space on your roof. It involves multiple spreadsheets, making sure you account for efficiency loss versus required kW. One misstep in any of those calculations can throw off the entire financial projection.

With this MCP, the process is instant. You feed in your usage numbers, and it determines the ideal system size using `estimate_system_capacity`. The agent gives you a single, precise number for the required kW capacity—the one figure you actually need to move forward with.

Solar Panel Calculator MCP: Modeling Financial Returns and Financing Options

The hardest part is choosing the right money structure. Do you buy it outright, or do you prefer a low-upfront PPA? Each choice changes the payback period and your long-term net cost dramatically. Manually comparing these models takes hours of spreadsheet work.

Now, all that complexity is handled by the MCP. By running `compare_financing_models` and then feeding those results into `calculate_financial_returns`, you get a clear recommendation on which structure gives you the best ROI without having to build complex amortization schedules yourself.

4 Solar Panel Calculator Tools for Energy & Financial Modeling

Use these tools to calculate required system capacity, project financial returns, compare financing methods, and measure environmental impact for any solar installation.

#	TOOL	DESCRIPTION
01	`calculate_financial_returns`	Calculates the detailed financial payback period and total savings projections from a solar investment.
02	`compare_financing_models`	Evaluates the net cost difference between purchasing, leasing, or using a PPA for a solar setup.
03	`estimate_environmental_impact`	Quantifies your annual carbon offset potential by calculating avoided emissions.
04	`estimate_system_capacity`	Determines the precise required kilowatt (kW) capacity for a solar system based on usage and sun hours.

See It in Action

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

U I'm looking at 10kW systems. How does buying it versus using a PPA affect my total cost over 25 years?

Solar Financing Comparison

MODEL	UPFRONT COST (APPROX)	MONTHLY PAYMENT	TOTAL NET COST (25 YRS)
Purchase	$20,000	N/A	**$18,500**
PPA	$0	$150	**$36,000**

The purchase model is cheaper long-term. Note that the PPA gives you zero upfront risk.

U My energy usage increased last year to 14,500 kWh annually. What system size do I need now?

System Capacity Estimate

Based on your updated annual usage of 14,500 kWh and assuming a local peak sun hour average of 5 hours:

The required solar capacity is approximately **10.2 kW**. This size accounts for standard efficiency losses and maximizes energy generation based on your consumption profile.

U What does the environmental impact look like if I go with this system?

Carbon Offset Projection

Installing a 10.2 kW system will generate significant clean power, resulting in these estimated annual offsets:

- **Annual CO_2 Avoided:** 7.8 metric tons
- **Equivalent to:** Removing an average car from the road for approximately 6 months.

This provides a clear sustainability benefit alongside your financial savings.

Frequently Asked Questions

01 **How do I know if solar power is financially worth it for my home?**

The Solar Panel Calculator MCP calculates the full Return on Investment (ROI). By using the `calculate_financial_returns` tool, you get a precise payback period and total projected savings over 25 years so you know exactly when to break even.

02 **Can I compare buying solar panels vs. financing through a PPA?**

Yes, the MCP handles this comparison perfectly. The `compare_financing_models` tool lets you run Purchase, Lease, and PPA options simultaneously, showing which structure has the lowest net cost for your specific property.

03 **What do I need to input first to calculate system size?**

You must provide your home's total annual energy usage in kilowatt-hours (kWh) and the average number of peak sun hours at your address. The MCP uses these figures with `estimate_system_capacity` to give you a precise kW requirement.

04 **Does Solar Panel Calculator help me track my environmental impact?**

Absolutely. The `estimate_environmental_impact` tool quantifies your carbon offset potential, allowing you to measure the full sustainability value of going solar beyond just dollar savings.

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 `"solar-panel-calculator": { "url": "…" }`
Windsurf	MCP Settings → `mcp_settings.json` → 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

Solar Panel Calculator 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

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