

Understanding the French Carbon Footprint Requirement for Solar Modules

CFE Certification Strategy for CRE Tender Success

Content Partner: J. v. G. technology GmbH

Turnkey solar module production lines — since 1997

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Technical Overview: French Carbon Footprint Requirements for Solar Modules



Created as part of the PVKnowHow Knowledge Network



Prepared by J.v.G. Technology GmbH



European specialists in turnkey solar module production lines

What Is CFE — Carbon Footprint Evaluation?

Definition

- CFE is a standardised carbon scoring methodology for PV modules used in French public tenders
- Measures lifecycle CO₂-equivalent emissions per kilowatt-peak (kg CO₂-eq/kWp)
- Mandated by the French Ministry of Energy within CRE tender frameworks
- Based on ISO 14040/14044 Life Cycle Assessment (LCA) principles

What It Measures

- Upstream raw material extraction and processing
- Module manufacturing energy consumption
- Transport and logistics emissions
- End-of-life treatment and recycling credit

Why CFE Is Critical for CRE Tenders

1

Scoring Weight

CFE score contributes directly to the tender evaluation grid – low-carbon modules improve bid ranking

2


Threshold Risk

Modules above a defined CO₂ threshold may be disqualified regardless of price competitiveness

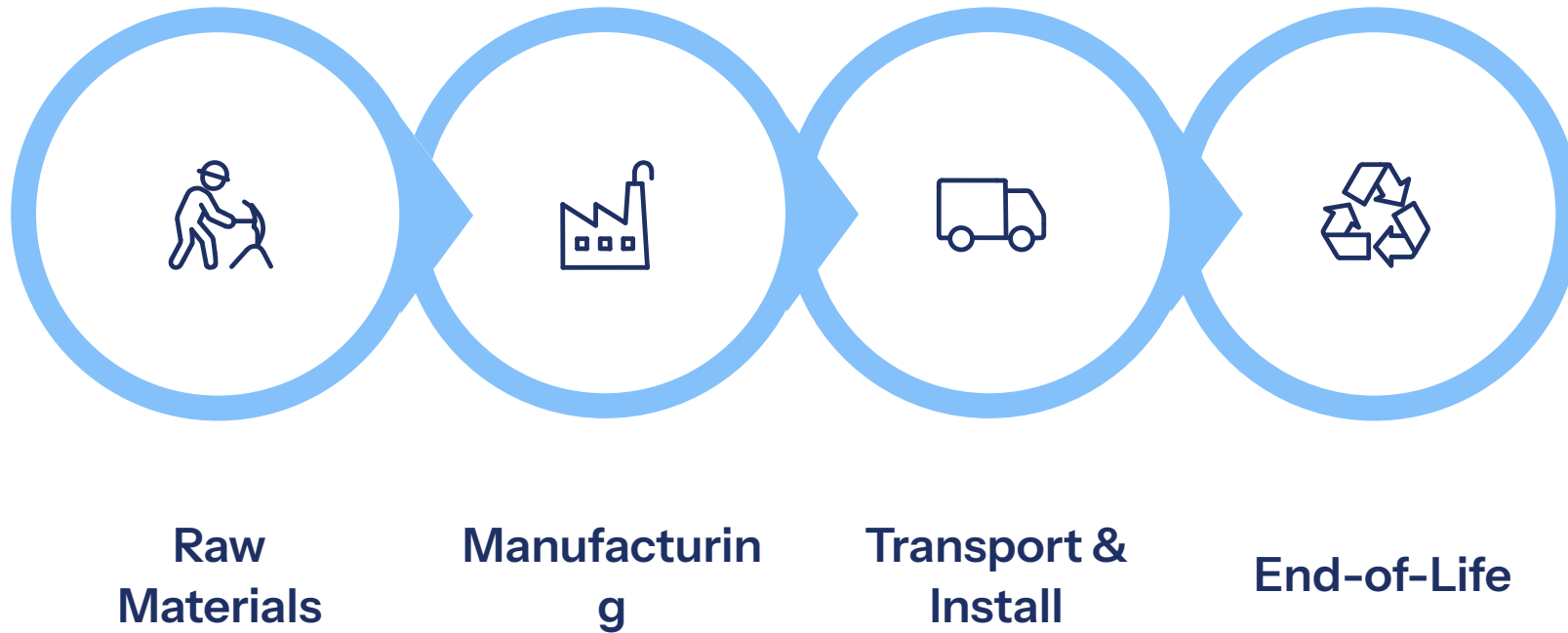
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Market Access Gate

CFE certification is becoming a de facto prerequisite for accessing the French utility-scale PV market

 Manufacturers without a valid CFE certificate face effective exclusion from French CRE tenders – regardless of module performance or pricing.

Lifecycle Approach: LCA Overview



The CFE methodology requires a full cradle-to-grave LCA covering all material inputs, energy consumption, transport modes, and end-of-life scenarios. Each phase contributes a quantified CO₂-eq value to the total module footprint score.

Key Components of the Carbon Footprint

Upstream Production

- Polysilicon, wafer, and cell manufacturing energy intensity
- Dominated by electricity consumption in production regions
- Grid carbon intensity of production country is the primary variable

Transport

- Sea freight vs. rail vs. road — emissions vary significantly by mode
- Distance from manufacturing site to France directly impacts score
- European manufacturing locations carry a structural transport advantage

Module Manufacturing

- Energy used in cell processing, lamination, framing, and testing
- Manufacturing grid carbon intensity applies at this stage
- Process efficiency and renewable energy use affect this component

End-of-Life & Recycling Credit

- Disposal, collection, and recycling pathways are modelled
- Recycling of aluminium, glass, and silicon generates a carbon credit
- PV CYCLE-aligned end-of-life scenarios are typically referenced

The Role of Electricity Grid Carbon Intensity

Why Grid Mix Dominates the Score

- PV manufacturing is highly electricity-intensive — grid carbon intensity is the single largest driver of CFE score
- A coal-heavy grid multiplies manufacturing emissions by a factor of 10–20× vs. a low-carbon grid
- Grid mix data must be documented and verifiable for the LCA submission

Implications for Sourcing Strategy

- Manufacturers in high-renewables regions hold a structural CFE advantage
- Renewable energy certificates (PPAs, GOs) may be credited if verifiable
- Grid mix improvements over time must be tracked and updated in LCA datasets
- ADEME (French agency) grid emission factors are the accepted reference

Strategic Advantage of Low-Carbon Manufacturing Locations

France & Western Europe

- Low-carbon electricity grid (nuclear + renewables base)
- Minimal transport distance to French project sites
- Favourable CFE scoring — structural competitive advantage in CRE tenders

Southeast Asia (Standard Manufacturing)

- Historically coal-intensive electricity grid — high upstream carbon burden
- Long-distance sea freight adds transport emissions component
- CFE scores typically higher (worse) — competitive disadvantage in scored tenders

Southeast Asia (Green Manufacturing)

- Manufacturers transitioning to renewable PPAs can reduce manufacturing emissions
- Transport component remains structurally elevated vs. European production
- Score improvement possible but requires verifiable documentation

Supply Chain Implications

Supplier Selection

- Wafer and cell suppliers must provide verified LCA data
- Tier-1 data availability is a supply chain qualification criterion
- Opaque supply chains create LCA data gaps — increasing default emission factors

Data Traceability

- Bill of materials with origin and weight data required per module type
- Energy consumption records at each manufacturing stage must be auditable
- Transport mode, distance, and weight documentation essential

Strategic Sourcing

- European cell and wafer sourcing reduces upstream carbon significantly
- A proven turnkey manufacturing concept in a low-carbon region delivers compounding advantages
- Supply chain decisions made today determine CFE competitiveness for years

CFE Certification Process

- 1 — Data Collection**

Bill of materials, energy consumption records, transport data, and supplier documentation compiled per module type

LCA system boundary and functional unit defined per CFE methodology
- 2 — LCA Modelling & Submission**

Life cycle inventory modelled using approved datasets (ecoinvent, ADEME)

CFE score (kg CO₂-eq/kWp) calculated and submitted to certifying body
- 3 — Third-Party Audit**

Independent auditor reviews data quality, calculation methodology, and documentation completeness

On-site or document-based audit depending on certification body requirements
- 4 — Certification & Registration**

Certificate issued with valid CFE score — recognised for CRE tender submissions

Certificate valid for a defined period; must be renewed with updated data periodically

Key Project Data

kg CO₂...

Key Metric

Unit used to express module carbon footprint in CFE certification

CFE

Certification Standard

Carbon Footprint Evaluation — mandatory for French CRE tenders

FR / EU


Target Market

France (CRE tenders) and broader EU procurement frameworks

LCA


Methodology Basis

ISO 14040/14044 Life Cycle Assessment — cradle-to-grave scope

 Topic: Solar module carbon footprint compliance · Certification: CFE (France) · Strategic lever: low-carbon manufacturing · Source: PVKnowHow / J.v.G. Technology GmbH

Timeline Expectations for CFE Certification

Phase	Estimated Duration	Key Dependency
Data collection & supplier engagement	4–8 weeks	Supplier LCA data availability
LCA modelling & calculation	3–6 weeks	LCA specialist engagement
Third-party audit	2–4 weeks	Auditor scheduling and document completeness
Certificate issuance	1–2 weeks	Audit outcome and corrections
Total lead time (estimate)	3–5 months	First-time certification; renewal is faster

 CFE certification must be initiated well in advance of target CRE tender submission dates — lead times are frequently underestimated.

Low Carbon as a Competitive Strategy

1

Tender Score Advantage

A lower CFE score directly improves weighted tender scoring — measurable differentiation vs. high-carbon competitors

2


Price Premium Justification

Carbon compliance enables a sustainable price premium — projects where modules are disqualified on CFE are won on quality, not lowest cost

3

Regulatory Future-Proofing

EU CBAM and evolving procurement rules will intensify carbon requirements — early compliance builds structural advantage

 An experienced European turnkey provider integrating low-carbon manufacturing design from the outset significantly reduces the time and cost of achieving compliant CFE certification.

Strategic Positioning in the EU Market

Key Strategic Imperatives

- Treat CFE certification as a market access prerequisite — not an optional credential
- Prioritise supply chain transparency and LCA data availability in supplier qualification
- Locate or source manufacturing in low-carbon electricity grid regions where possible
- Initiate certification process a minimum of 6 months before target tender deadlines
- Monitor EU regulatory evolution — CFE methodology and thresholds will tighten

Market Entry Implications

- French CRE market rewards structured, documented carbon performance
- Manufacturers without CFE face growing market exclusion risk
- European manufacturing — or sourcing from proven low-carbon turnkey concepts — provides compounding advantages
- Carbon compliance is becoming a baseline requirement across EU procurement

✓ Early movers on CFE compliance gain durable competitive positioning as thresholds tighten across the EU solar market.

About the Content Partner

J. v. G. technology GmbH – The DESERT Company

Founded in 1997 in Bavaria, Germany. Family-owned engineering company specializing in turnkey solar module production lines.

More than 90 factory projects delivered worldwide.

On-site team training included – no prior manufacturing experience required.

Key areas:

Turnkey PV manufacturing lines | DESERT Technology® |
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