

Overview of Solar Manufacturing in Europe

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An Overview of Europe's Current Domestic Manufacturing Landscape

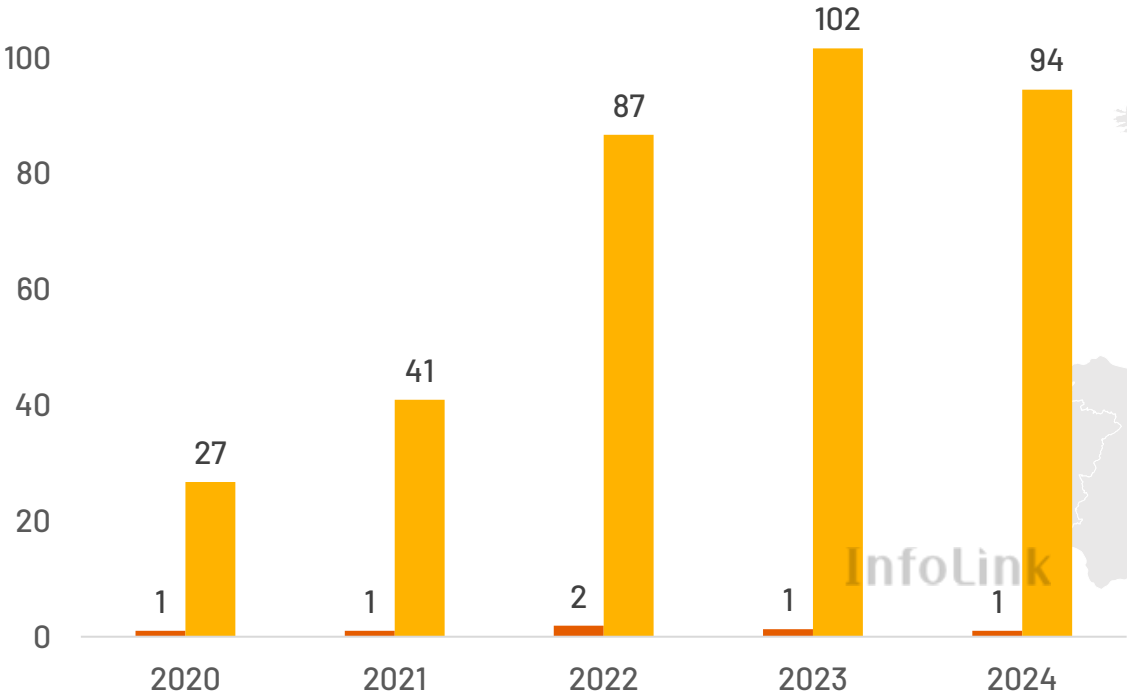
Mismatch: Surging Import Demand vs. Limited Local Output

Current European solar manufacturers

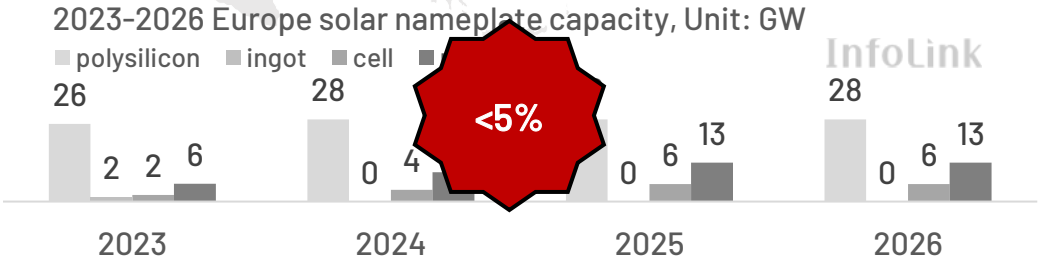
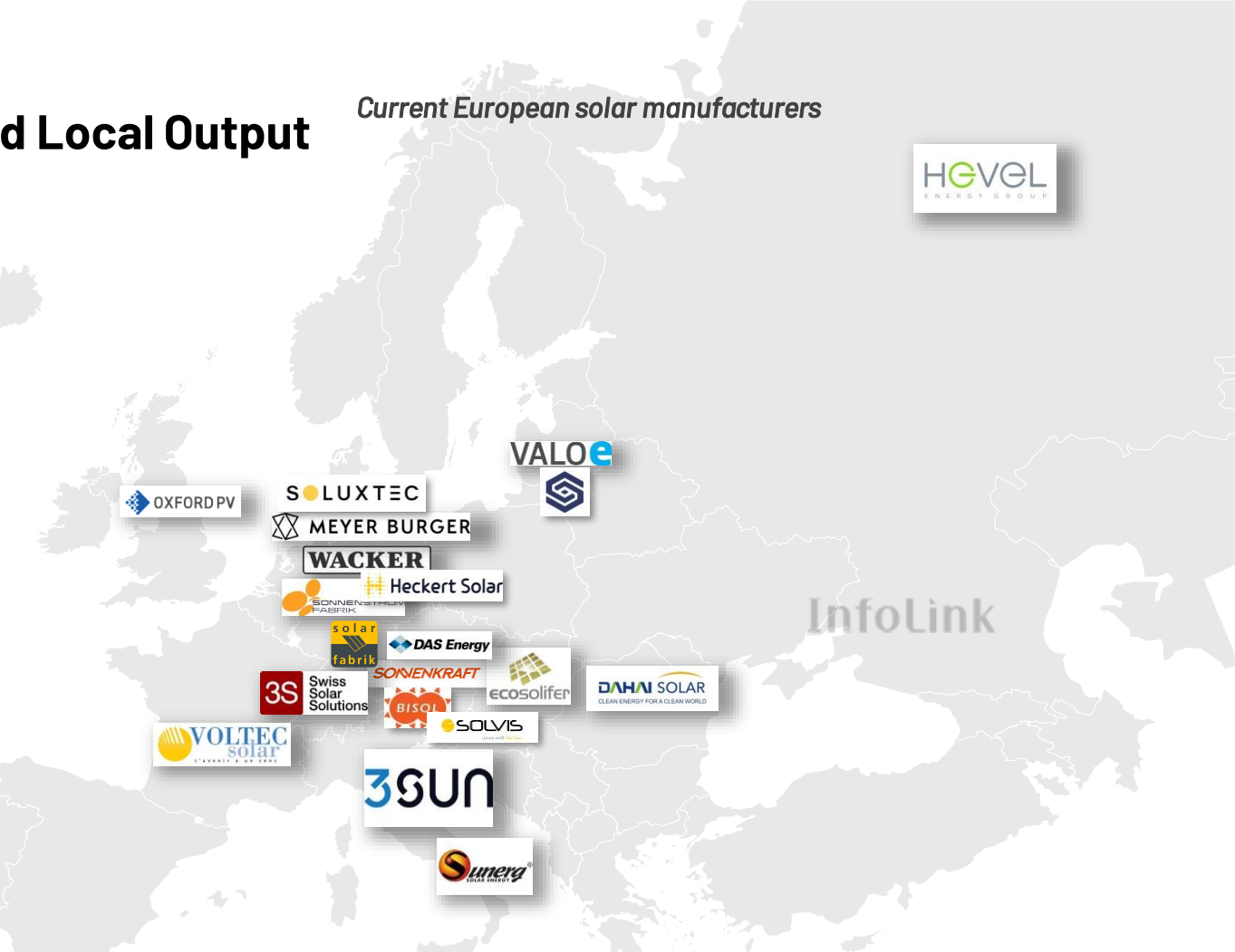


Five-year data on Chinese solar cell & module export to Europe, Unit: GW

cell module



Note: the data does not include Turkey.



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Challenges for Europe's Local Manufacturing

Challenge 1: Europe Can't Match China's Cost Structure

		
	<10 GW	>1000 GW
Production Scale and Supply Chain Coordination		
		
Manufacturing Cost	≈19 cents USD/W (total module cost)	≈9 cents USD/W (total module cost)
		
Conservative Investment and Long Payback Period	5-10+ years (depreciation period)	3-5 years (depreciation period)
		
Funding	Corporate financing	Mostly government-support or financed
		

China's integrated PV supply chain creates major cost advantages over Europe through economies of scale. Supply chain coordination – including **BOM materials** and **equipment** – is also significantly more advanced.

China currently offers the most cost-efficient manufacturing conditions worldwide, driven by clear advantages in electricity, labour, land costs, and other key inputs.

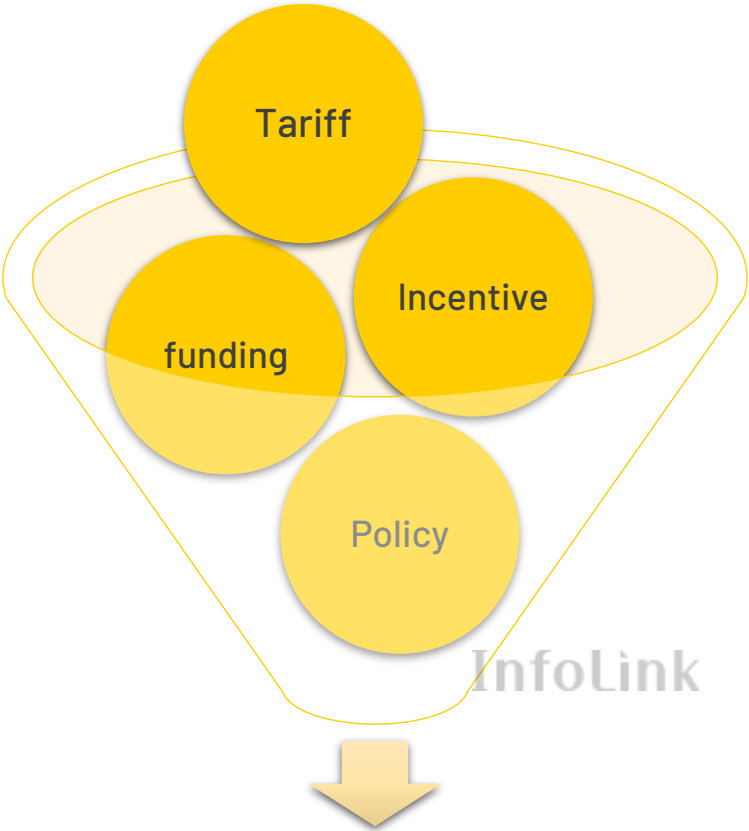
In capacity expansion, European companies tend to maximize the use of existing facilities and equipment, following more conservative accounting structures that result in longer payback periods.

In China, most manufacturing projects are government-funded and built, and with strong coordination between local governments and enterprises, **production facilities can typically go from announcement to operation within 3-6 months.**

Challenge 2: Europe – No Carrot, No Stick

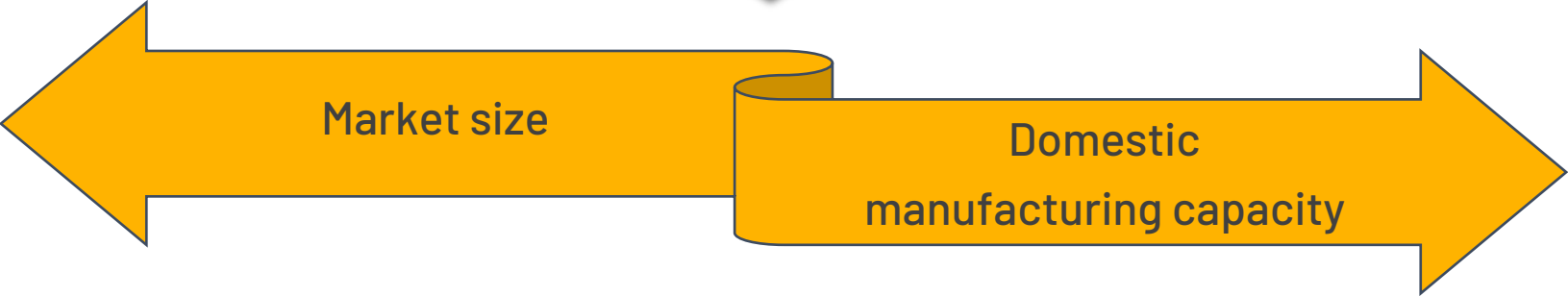
Overly restrictive trade barriers may limit market size growth.

e.g., US

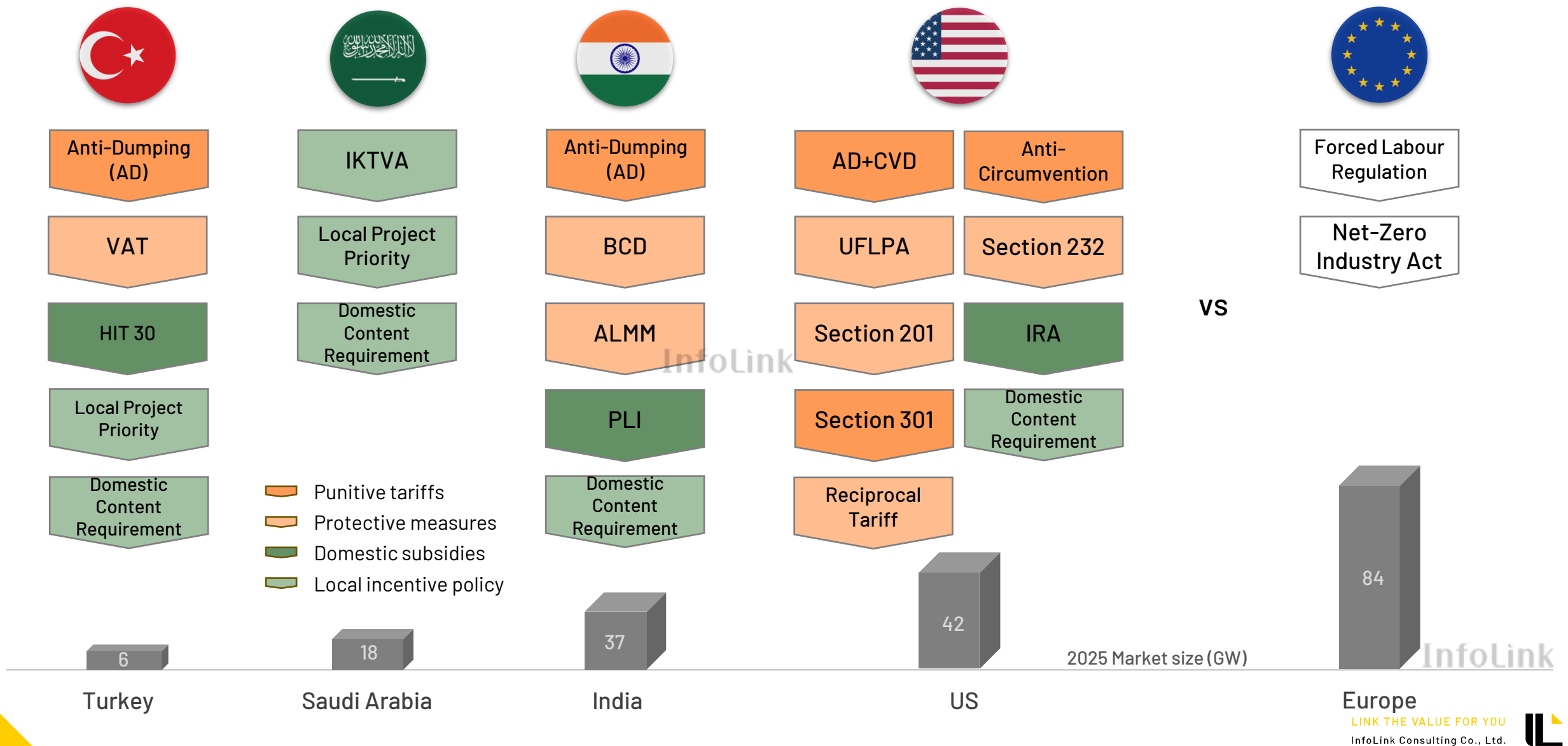


Without protective policies and incentives, local manufacturing cannot achieve significant growth.

e.g., Europe



Challenge 2: Europe – No Carrot, No Stick

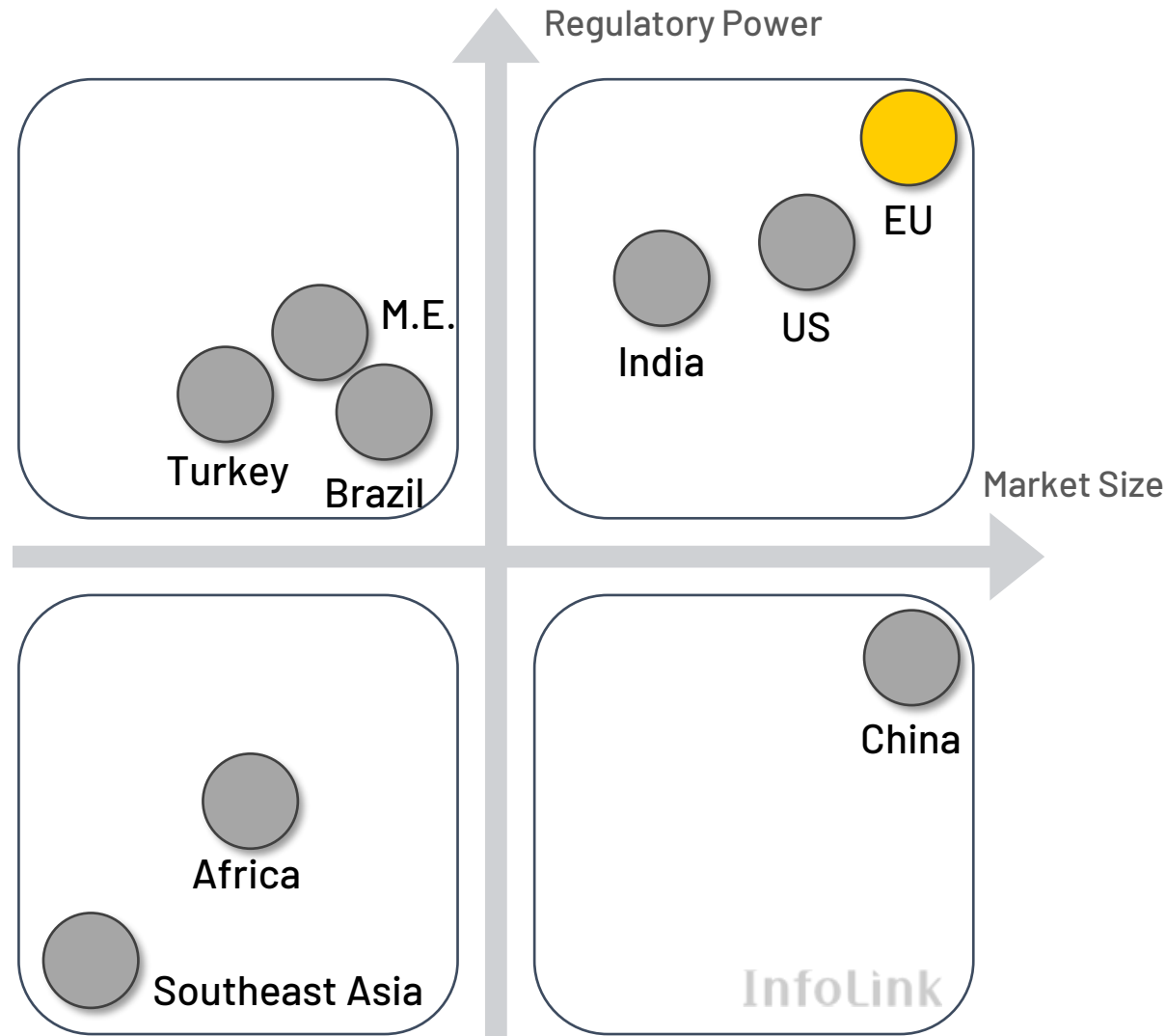


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The Competitive Advantages of European Manufacturing

Strategic Lever 1: Market Power and Regulatory Influence

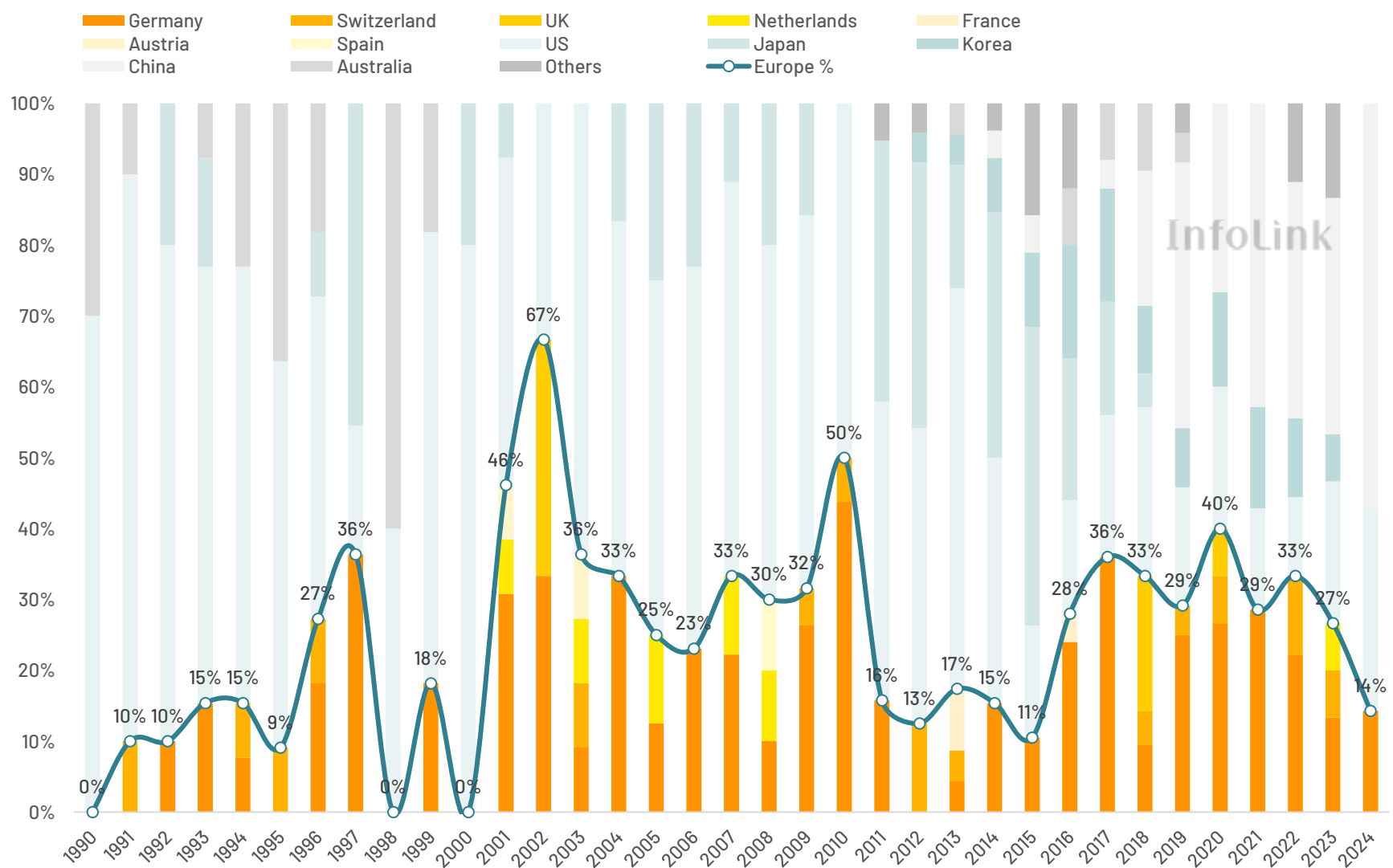
Strategic positioning (conceptual diagram)



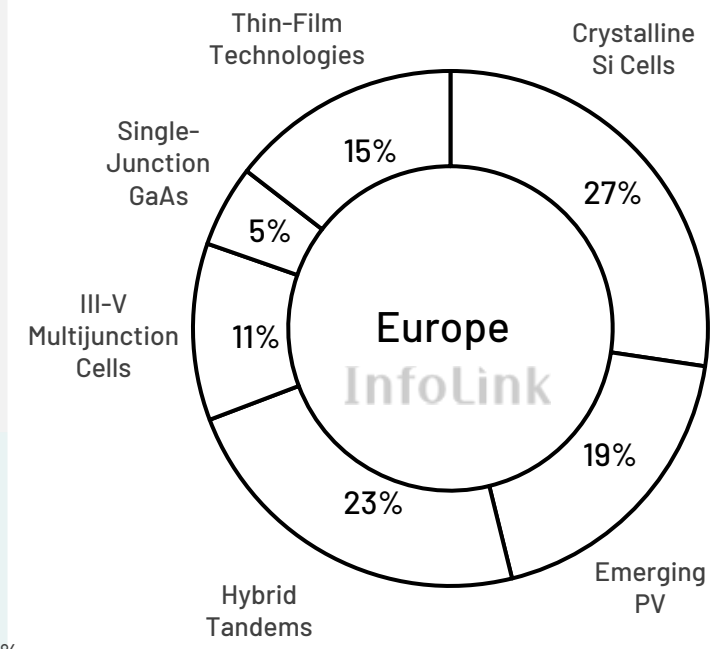
- **Strong bargaining power:**
Importing 80–90 GW of PV modules annually equals to €6–7 billion. In recent years, Chinese tier-1 module manufacturers have accounted for over 40% of global exports, and Europe is the most hotly contested market of all time.
- **Attracts innovation and new technology:**
Europe has long served as a proving ground for global PV technologies—from earlier PERC modules to more recent advancements like TOPCon, HJT, back-contact, and even the latest rectangular formats.
- **A key market for investment and strategic expansion:**
Despite current gaps in manufacturing, the European market has consistently attracted industry players because of its position over the years.
- **Standard-setting dominance:**
Given Europe's market weight, module suppliers have continued to adjust and import size-compliant products—such as adapting to Germany's shift from a 2-square-meter to a 3-square-meter rule.

Strategic Lever 2: Europe Leads in Photovoltaic Research Excellence

Global share of NREL record research-cell efficiency entries by country (1990-2024)



Source: NREL Best Research-Cell Efficiency Chart

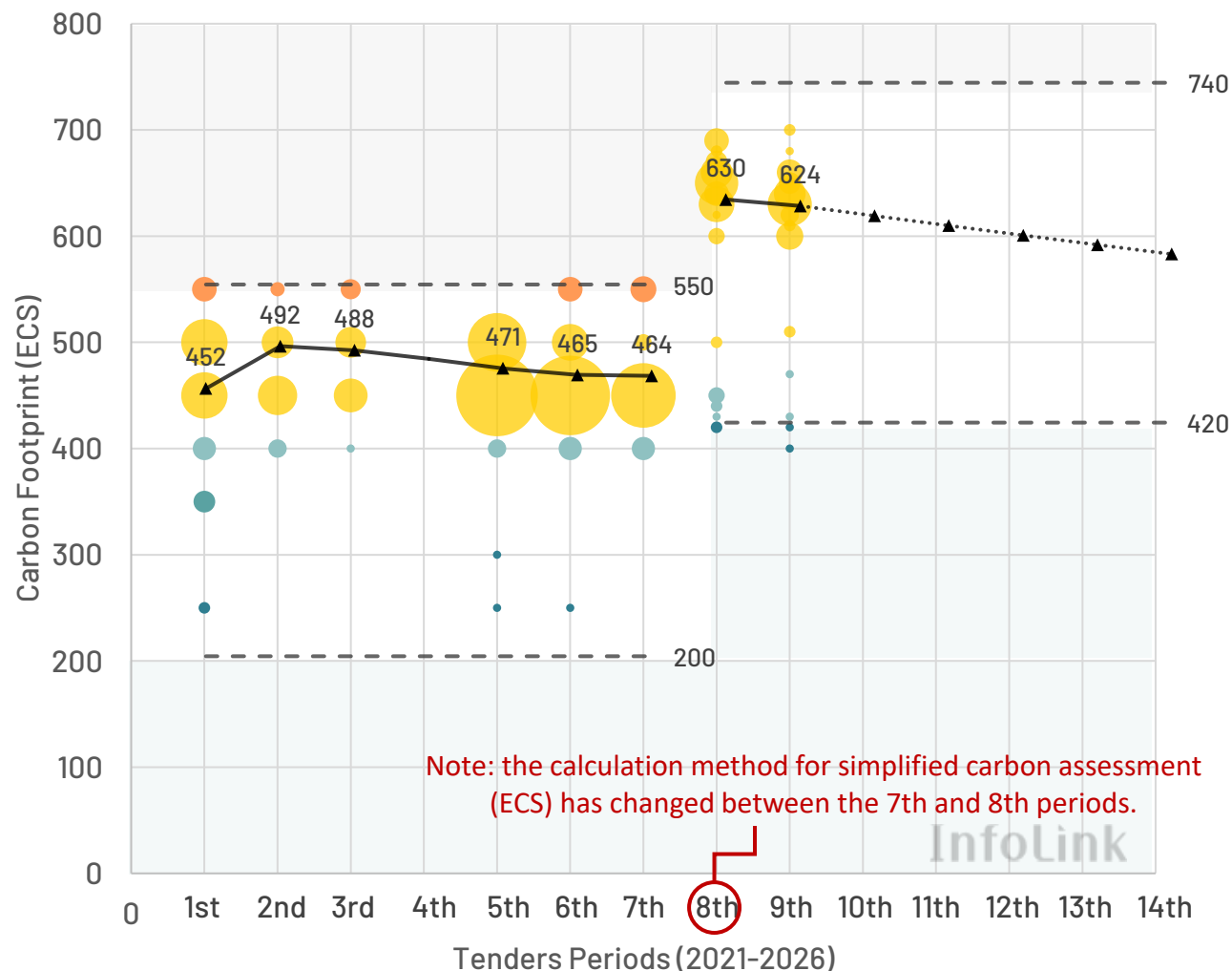


Source: NREL Best Research-Cell Efficiency Chart



Strategic Lever 3: CBAM – A Potential Trade Barrier in the Making

Distribution of solar modules by carbon footprint in France's PPE2 Tenders, Unit: kg eq.CO₂/kWc



- China – Jan 6, 2025**

MOFCOM issued a draft guideline proposing a carbon footprint limit of **415 kg CO₂/kWp** for exported PV modules. (industry values reportedly range from 330–815 kg CO₂/kWp).

- France – Ongoing PPE2 Tenders**

CRE requires certified PV modules to have a carbon footprint **below 740 kg eq.CO₂/kWp** to qualify. *Maximum scoring is awarded for values ≤ 420 kg eq.CO₂/kWp.*

- EU – CBAM (Potential)**

The current scope of the CBAM does not include PV modules. However, materials such as steel and aluminium used in PV manufacturing are already subject to CBAM, and will indirectly affect the industry.

Nevertheless, future extensions may include finished products such as solar cells, solar modules, and batteries, based on ongoing policy discussions.

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Conclusion



Options for Action: How Europe Can Rebuild Its Solar Industry

Strategic Positioning- OEM & Rebranding



Long-term marginalisation risk



- Cost efficiency
- Policy flexibility

Remain Unchanged- Full Dependence on China



Risk of energy dependency



- Best LCOE and IRR
- Avoid investment and operational risks

Policy Push- Build an EU-Based Supply Chain



Requires substantial funding



- Energy independence
- Create jobs

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