Modeling different pathways for the introduction of sustainability and resilience criteria (SRC) in the PV auctioning regime

Assessing cost and RES roll-out implications from alternative approaches de-risking and PV industrial support through the NZIA

January 2024

Background information

Political framework

Net-Zero Industry Act (NZIA) Articles 19 und 20:

Objectives

- **Creation of a Level-Playing-Field:** Closing the price gap between Chinese PV modules and modules from Europe due to a lack of compliance with environmental and social standards as well as substantial government subsidies.
- **Promoting resilience in the European solar industry:** Reducing dependencies on third countries for a secure and affordable energy transition.

Implementation

- **Prequalification:** Introduction of a ban on modules produced under forced labor on the EU market as a prerequisite for participation in any tender (already contributes to closing the price gap, as fairly produced modules are associated with higher costs).
- **Sustainability and resilience criteria (SRC):** Fulfillment of the criteria is rewarded with a bonus, which aims at closing the remaining price gap and thus creates fair market conditions.

Model assumptions: Phase-in pathways

Unclear design of the SRC threatens to diminish the leverage of NZIA Art. 19 and 20:

Latest discussions to finalize the text of the NZIA have raised questions about whether a phase-in of SRC by segmenting the market would reduce costs to the public and pace of RES roll-out in the EU. To assess this, and how they related to the achievement of NZIA's strategic goals of increasing economic resilience and supporting net zero industrial production in the EU, a modelling of different phase-in scenarios has been undertaken.

- **Pathway A:** Market segmentation of 20% subject to SRC on an ongoing basis
- **Pathway B:** Slow phase-in of 20% subject to SRC in 2025 to 100% in 2029
- **Pathway C:** Quick phase-in of 50% subject to SRC in 2025, 75% in 2026, and 100% in 2027
- **Pathway D:** Immediate phase-in of 100% with SRC in 2025

Model assumptions: Build-out scenarios

The costs of the phase-in pathways are calculated depending on various possible build-out scenarios:

- The modelling of the four pathways assesses the different public cost implications and impact on achieving RES targets for each and considers the extent to which each addresses the objective of de-risking EU dependence on a single non-EU supplier, currently China, with the objective of supporting the continuation and development of domestic EU industrial SV manufacturing capacity.
- **To illustrate the main strategic variations of relevance in establishing the most appropriate phase-in approach, there are four scenarios established as follows with different combinations of de-risking dependence and support for domestic manufacturing through application of SRC:**

Reference or "Dependence and de-industrialization" Scenario	"High de-risking and ambitious industrialization" Scenario	"Moderate de-risking through friendshoring" Scenario	"Smart Industrialization through risk diversification" Scenario
Assumes the lowest use of SRC for PV tendering, closest to a continuation of the status quo. Because the impact of SRC is so small, the cost cap between Chinese and non-Chinese modules is maintained, EU module production therefore has insufficient scale to compete and declines without being replaced by non-Chinese suppliers.	Ambitiously estimated capacities for EU production (= all announced production capacities are realized. Remaining required capacities are provided from "friendshored" overcapacities.	Demand for modules can primarily be covered by EU modules (conservative estimate of production capacities) and "friendshored" overcapacities (= sustainable modules, primarily from the USA & India). This scenario will be sufficient to satisfy EU module demand but comes with a cost premium.	Combination of conservative EU production capacities, "friendshored" overcapacities and "clean" (i.e., forced labor-free) Chinese modules. Describes the most realistic and feasible scenario.

- The four phase-in pathways using different approaches to market segmentation (or none) have been assessed and four main scenarios identified. The minimal additional cost implications from the scenario described as 'industrial development through risk diversification' scenario delivers no negative impact on RES roll-out whilst achieving the primary of goals of the NZIA. All other scenarios entail failure of NZIA to achieve its primary goals, resulting in de-industrialization and high dependence on a single non-EU PV producer, or additional unnecessary costs.

Variables for resilience criteria

The model examines the pathways and scenarios with regard to two variables that are decisive for the leverage effect of the criteria:

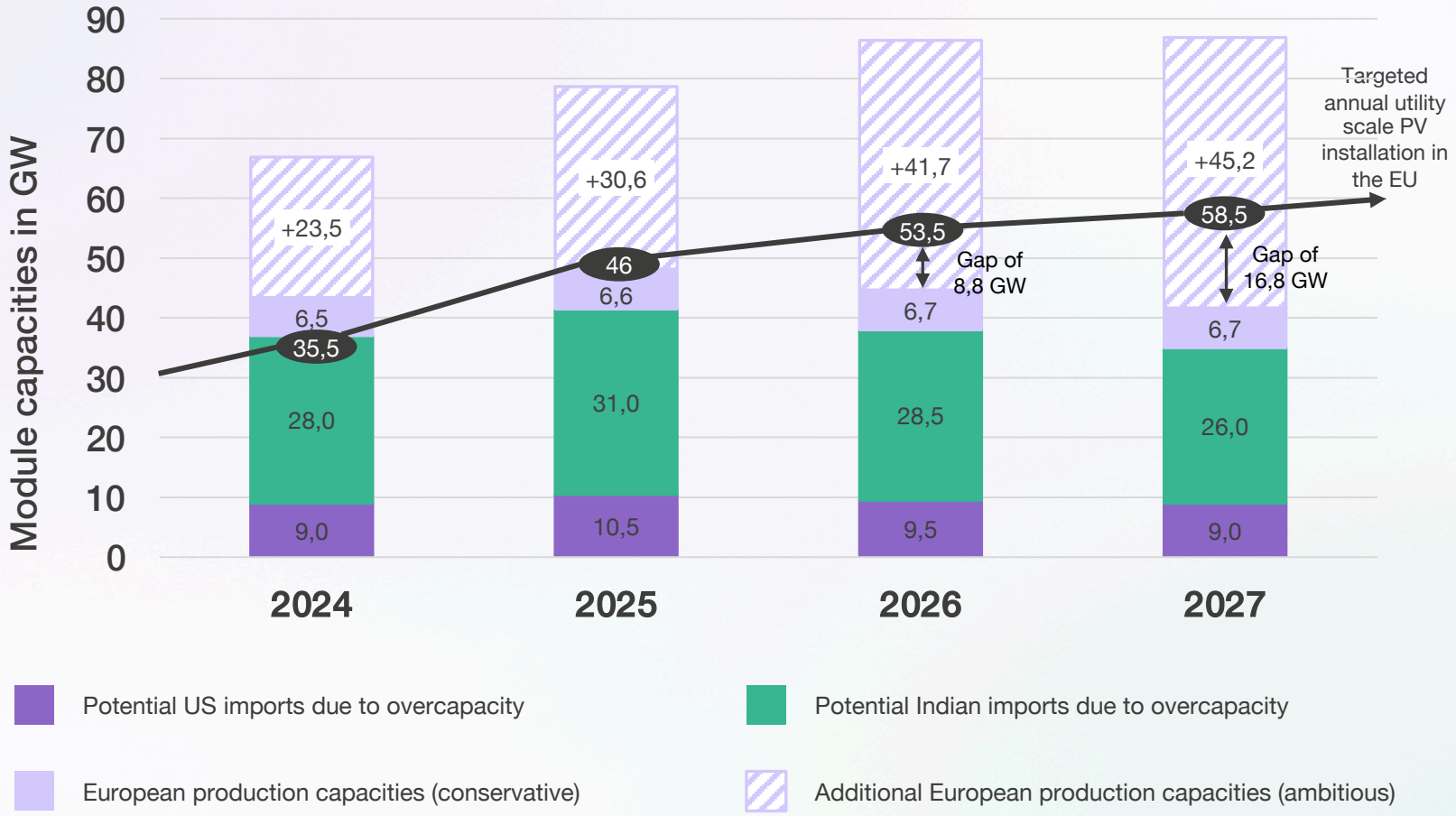
1. **Effects on the LCOE and associated subsidy needs**

2. **Determination of exceptions to the criteria: Benchmark for disproportionate price differences (NZIA Art. 20 Paragraph 3)**

EU PV build-out trajectories 2024-2027

With an ambitious industrial policy regime, EU and friendshore capacities can potentially satisfy future module demand

Production capacities vs. EU utility scale build-out trajectories:



"Moderate de-risking through friendshoring" Scenario:

Theoretically, the EU's PV expansion targets for 2024 and 2025 can be achieved with the conservatively estimated available module capacities from EU and friendshore production.

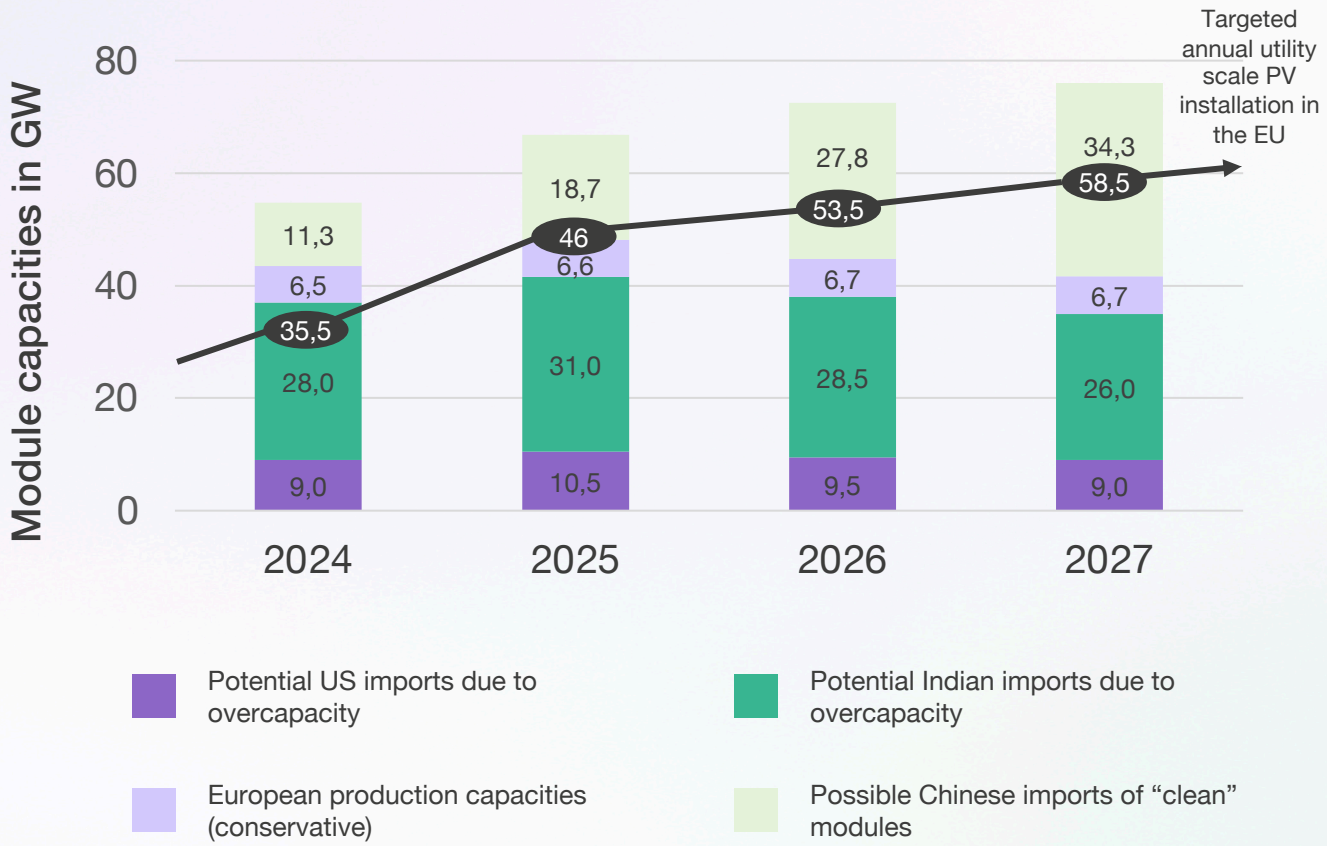
- For 2026 and 2027, a gap of 8,8 GW and 16,8 GW respectively arises with conservative EU production capacities.

"High de-risking and ambitious industrialization" Scenario:

In the case of ambitious EU production capacities (i.e., all announced capacities from the Member States can actually be realized), the available modules would even far exceed the demand for the expansion targets.

Hitting build-out targets is most probable under a diversified module supply

Chinese modules that meet the prequalification requirements can continue to participate in tenders



"Smart Industrialization through risk diversification" Scenario:

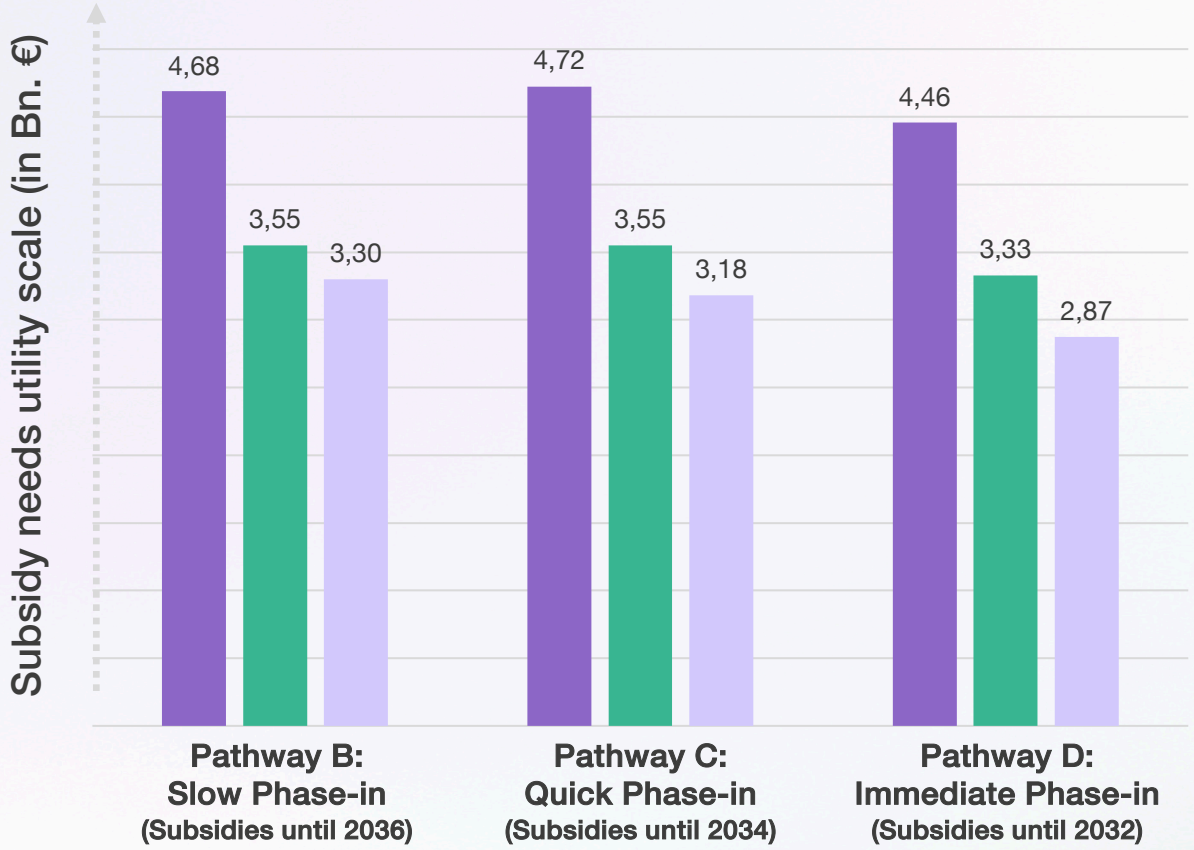
- **Achieving the expansion paths with European and friendshore capacities alone is possible but unlikely due to uncertain domestic production and an import surplus from the USA and India that cannot be planned with certainty.**
- **Potential existing supply gaps therefore continue to require Chinese modules. The strictest ecological and social standards are essential in order to minimize negative environmental impacts and legal violations.**
  - Not all Chinese modules are affected by exclusions: Around 40% of Chinese polysilicon already comes from Xinjiang-free production, and this proportion is set to rise to over 70% by 2026.
  - These modules meet the prequalification standards and would continue to have access to the EU market. The cost gap compared to EU modules would also be smaller due to compliance with social standards for these modules, which would also reduce the need for subsidies.

Cost implications

An immediate phase-in is rather unlikely in view of the required module capacities

	Share of the resilience segment									
	in %	in GW	in %	in GW	in %	in GW	in %	in GW	in %	in GW
	2025		2026		2027		2028		2029	
Phase-in Pathway B: Slow Phase-in	20%	9,2 GW	40%	21,4 GW	60%	35,1 GW	80%	54,0 GW	100%	73,8GW
Phase-in Pathway C: Quick Phase-in	50%	23,0 GW	75%	40,1 GW	100%	58,5 GW	100%	67,5 GW	100%	73,8 GW
Phase-in Pathway D: Immediate Phase-in	100%	46,0 GW	100%	53,5 GW	100%	58,5 GW	100%	67,5 GW	100%	73,8 GW

The total subsidy needs hardly differ in the phase-in pathways



Modeling assumptions:

- The model assumes that after reaching 100% market applicability of the resilience bonus, subsidies will still be needed for 7 years until the level playing field is reached.
- Exclusion of path A, as a level playing field cannot be achieved under the scenario of continued market segmentation, which distorts competition and creates artificial demand.

Conclusion:

- The immediate phase-in is ultimately the most cost-effective due to the shorter funding period, despite the higher average annual subsidy requirements compared to the other pathways.
- Nevertheless, the implementation of pathway D is unlikely in reality, as it will take at least two years to plan and implement investments for the construction of the European production facilities required for the market ramp-up.
- The gradual introduction of the resilience bonus is therefore recommended. Rapid introduction is both the cheaper and more immediate solution.

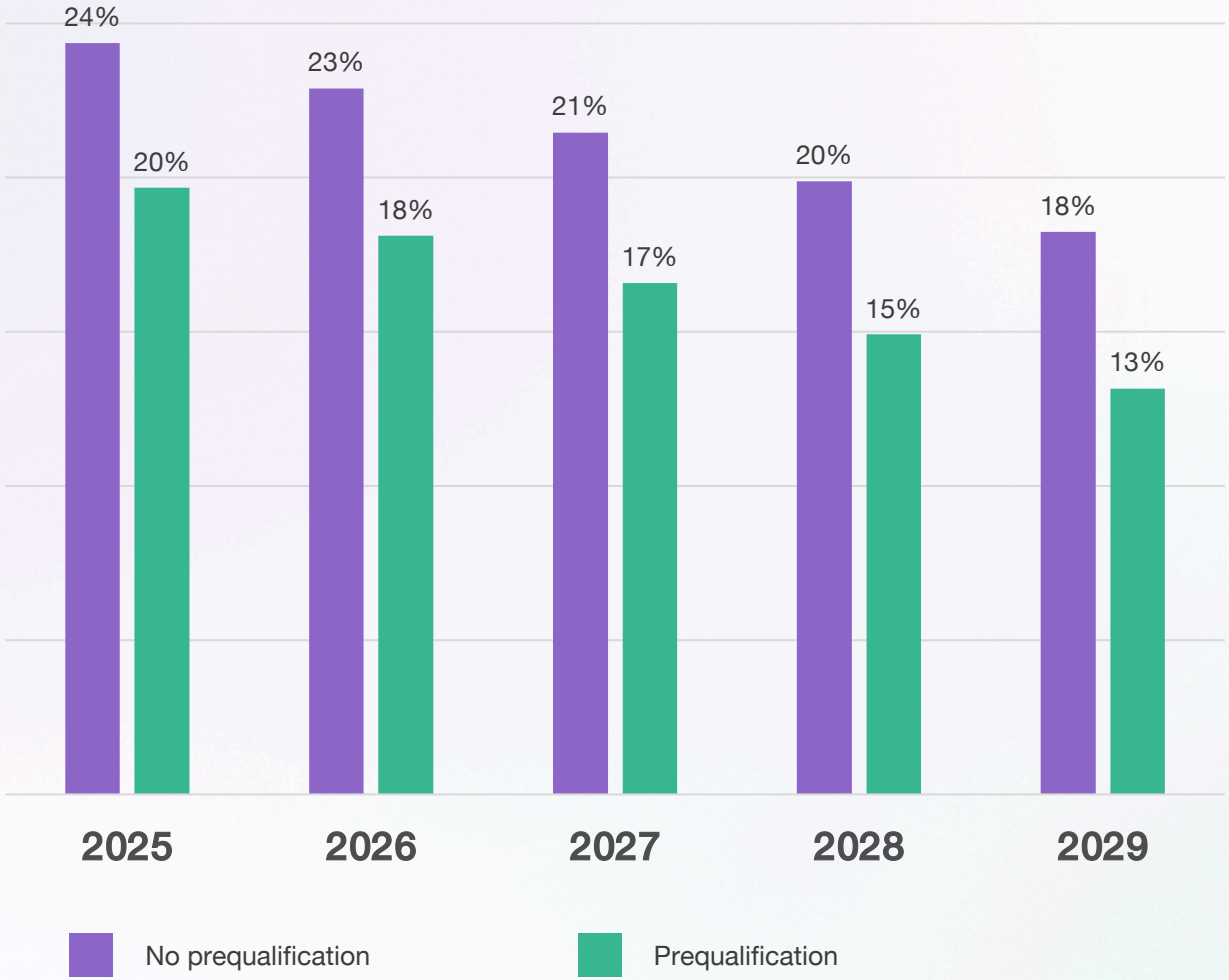
"High de-risking and ambitious industrialization" Scenario

"Moderate de-risking through friendshoring" Scenario

"Smart Industrialization through risk diversification" Scenario

Benchmark for disproportionate price differences

Investment proof benchmark for disproportionate price differences must be at least 30%



Explanation of the calculation:

- If we compare the LCOE for modules from conservative European production capacities (= highest price) with the LCOE for Chinese modules (= lowest price), taking into account the reference wholesale prices defined by each Member States (here the example of France), we obtain the percentage price gap that must be overcome by the resilience bonus in order to establish a level playing field.
- The actual price gap of the modules is significantly higher (up to 68%); however, as the share of modules in the total LCOE is only 29%, a significantly lower benchmark is sufficient.

The benchmark for disproportionate price differences in the case of prequalification must accordingly be at least 20%.

Taking into account error variance and the possibility that effects of scale are less pronounced than our model assumes, we recommend a price exemption rule of 30-40% to ensure the effectiveness of the SRC instrument.