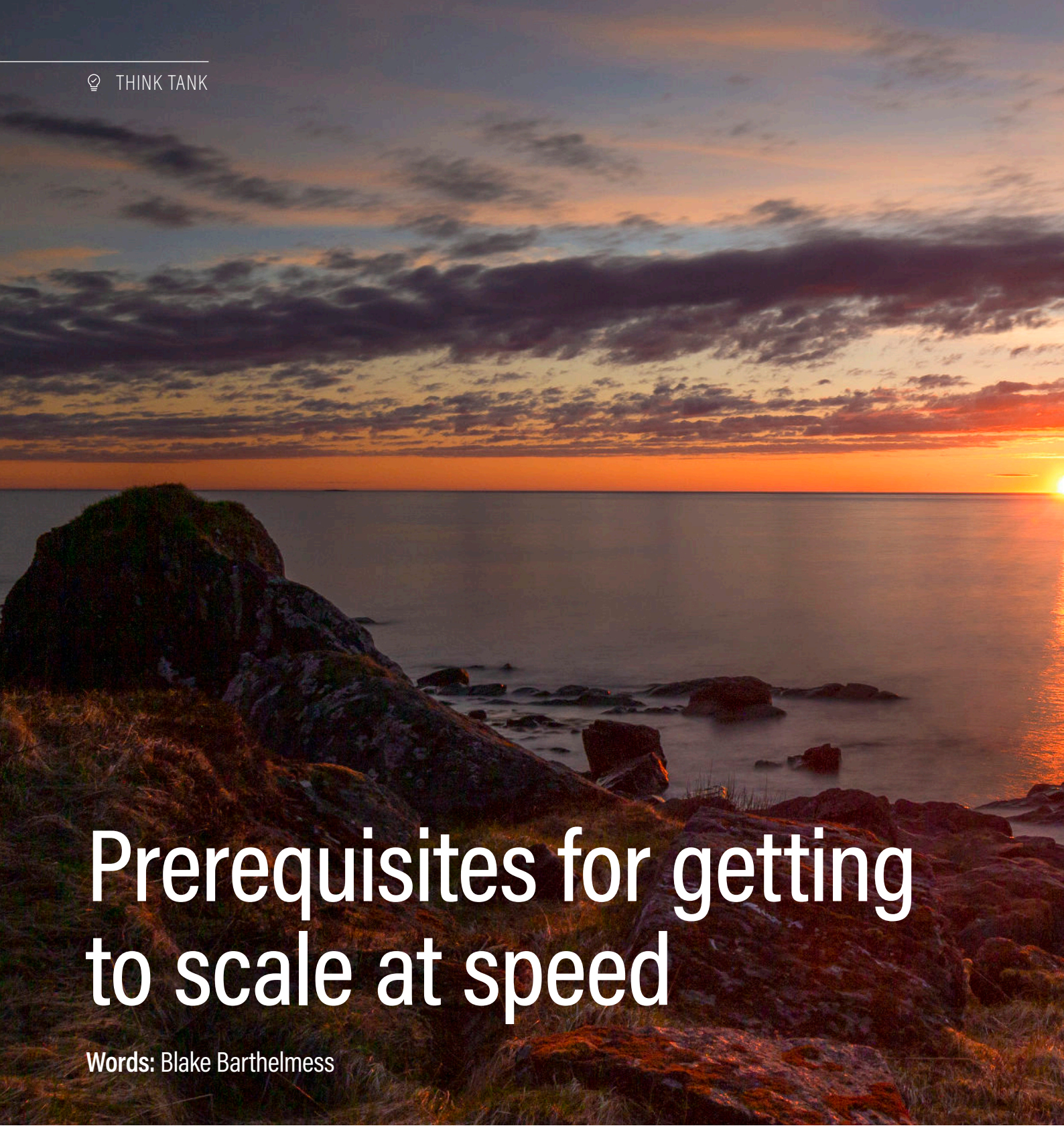

Prerequisites for getting to scale at speed

Words: Blake Barthelmess

Positive intentions to rebuild the European solar PV value chain are continuing to accelerate, notably in the past year, as energy dependencies and vulnerabilities have become a reality. If we could transform intentions into realities, solar PV supply chain vulnerabilities, logistical concerns, energy costs and manufacturing emissions could be dramatically reduced.

To develop a viable, rational and sustainable European industry and market, several interdependent elements must be coordinated for Europe's PV Renaissance to become a reality. These elements include an appropriate level of transparency throughout the value chain; synchronicity in market; value chain development to scale; the development of a reference price for European production; at each step in that value chain, aligned public policy, private initiative execution, together with engaged, active investors willing to deploy the necessary capital.

Value chain synchronicity: production and manufacturing

The value chain is much more than the production and manufacturing of solar cells, modules, and systems. In recent years, Europe has seen a surge of investment in modules, with several large-scale manufacturing plants opening across the continent. However, the same cannot be said for other parts of the value chain. Figure 1 highlights the critical production and manufacturing steps before modules are manufactured. It also highlights the mutual interdependencies involved and the need to develop relevant scale throughout the PV value chain in a balanced and synchronised process over time. Failure to do so will only exacerbate rather than resolve the underlying challenge.

At the same time, each of the elements has its own technology, competences, processes, capital profile and critical scale, which in large part preclude developing a fully integrated value chain from polysilicon to modules. History has also proven some of the other weaknesses in this approach to the industry, creating false security and unhealthy cross subsidisation.

Value chain synchronicity refers to the degree to which the activities and processes within a company or industry's value chain are balanced over time. This includes everything necessary to design, manufacture, market, deliver, and support solar PV. Synchronicity means that each activity is designed and dimensioned to support the other, creating a seamless and efficient flow of value from business to business.

The ability of an industry to optimize its operations across the entire value chain requires coordination and integration among different functions with European network partners, including suppliers and distributors. The goal of synchronicity is to improve the overall efficiency and effectiveness of the European value chain, resulting in better outcomes, reduced costs, and increased profitability.

This is challenging in a steady state industrial value chain, but significantly more so as the European solar value chain must be largely built to scale from scratch and continue to support growth in a coordinated fashion for the long term.

As Europe's solar PV industry grows and economies of scale start to take effect, value chain synchronicity will become a more natural evolution. However, given the infancy of the industry, this process needs some external catalyst and support. For example, the cell manufacturing step relies on ingot or wafering manufacturing, which remains weak within the European value chain due to under investment.

Government incentives and initiatives to support the growth of manufacturing capacity could aim to promote the development of domestic solar PV supply chains and reduce Europe's reliance on imported solar cells and panels. All while meeting the intention of a low emission renewable energy source, both in production and operation.

As we discussed previously in PES, 'Significant risk and uncertainty in offtake along the value chain leads to inefficiencies, as manufacturers seek large advance payments to secure customers' offtake obligations and, to bolster their CAPEX.' Therefore, synchronicity is necessary to avoid price flexibility or risk.

Need for a representative reference price throughout the PV value chain

The reference price for a solar photovoltaic (PV) wafer and cell can vary depending on a number of factors, including the region, market demand, size and quality of the product. In general, a reference price is a benchmark or baseline price that is used to compare prices in the market. It is important to note that the actual price of a solar PV wafer and cell may differ from the reference price based on the specific product specifications and market conditions.

Solar PV wafer reference prices, by default, are currently defined by Chinese manufacturers, given the dominance of China's industry and influenced by several factors. These include wafer thickness, in particular how many microns, efficiency, form factor and dopant. Thus, the industry must agree on which parameters are relevant in defining a 'wafer' and a 'cell price.'

Given current industry development, it is likely that eventually each regional market will develop a reference price. However that development will take time. At the moment, when the fledgling industry is at its most vulnerable, we must draw guidance from the Chinese reference price, rationalized based on the factors influencing European production, most notably capital costs and labour, but also considering other factors like carbon footprint and traceability.

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No direct representative index currently exists

There is no representative price index or price list for European made Ultra-Low-Carbon-Footprint N-Type wafers, with documented traceability, and adherence to ILO-work standards. In general, European produced ingots and wafers must be able to compete on an even playing field, without special incentives. However, it is important to note that we must, as a regional value chain, be consistent when we define market prices. If Ultra Low-Carbon Footprint and regional production are requirements, the products are different from the ones reported in Chinese price indices

All available price quotes are based on wafer production within a Chinese value chain, and largely all are quoting P-Type.

As demand for and market share of N-Type increases and wafer production outside

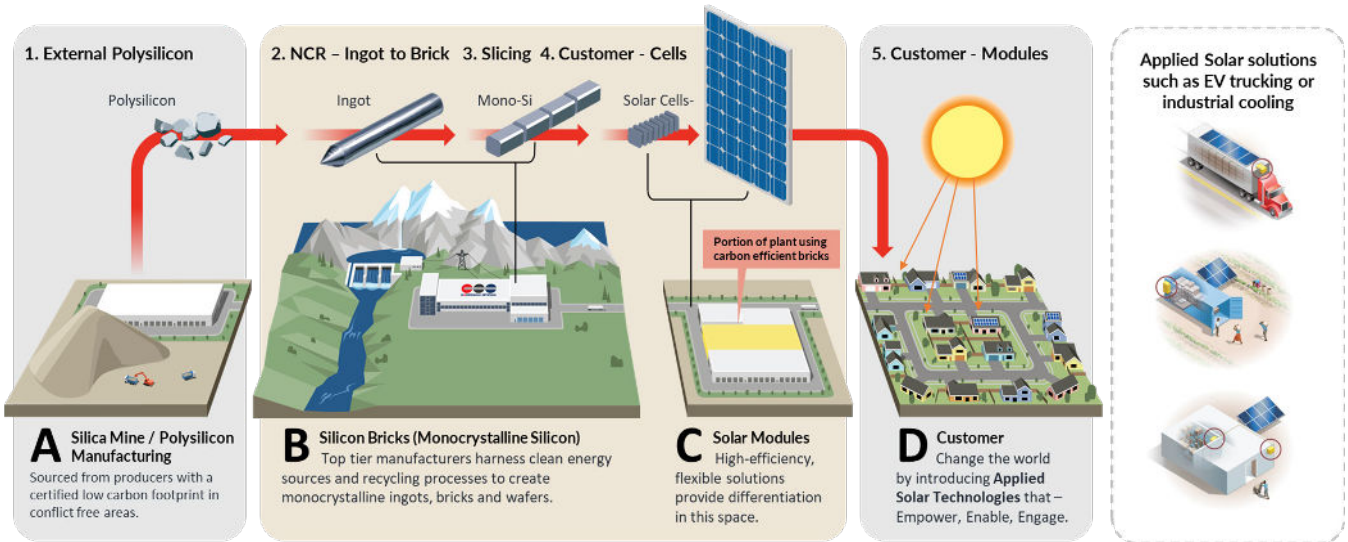

Figure 1 The solar PV value chain

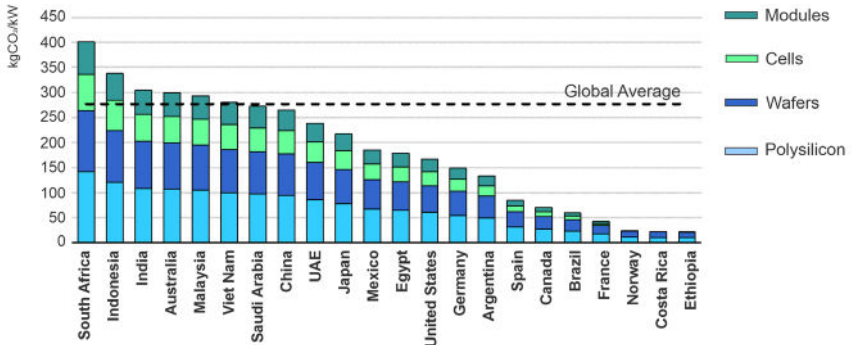

Figure 2: Hypothetical solar PV manufacturing emissions intensity for selected countries

China grows in volume; a more directly representative index is likely to emerge. Until then, suboptimal insights using the existing methodology will provide some guidance but need to be used with caution.

There needs to be a sensible and commensurate pricing model.

Public policy alignment

European governments and the public need European manufacturers to adhere to the highest standards of ESG across the whole PV value chain, including compliance to environmental standards. However, these requirements have a real cost compared to current alternatives. If these 'factors' and related costs are not valued by the consumer, this will be a competitive disadvantage for European players.

Bearing this in mind and the need for support in establishing a European value chain at scale, there are several ways that public policy can help accelerate the solar industry and private initiatives in Europe.

These include financial incentives. Governments can provide incentives such as tax credits, subsidies, or feed-in tariffs to encourage investment in solar projects. These incentives can make solar projects more financially viable and can help to spur growth in the industry. In PES previously, we spoke about the development of a European PV Market mechanism (EPvMM) for short term support as the industry ramps up for growth.

Governments can also implement policies and regulations that support the growth of the solar industry. For example, streamlining permitting and licensing processes, reducing bureaucratic barriers, and providing clear guidelines for interconnection can all help to accelerate the deployment of solar projects.

Governments and private companies can invest in research and development of new solar technologies to make them more efficient and cost-effective. This can help to reduce the overall cost of solar power and increase its competitiveness with other energy sources over time, as well as securing a platform for long term sustainability.

It is also important to raise public awareness about the benefits of creating a PV value chain and thus paying a small premium to do so.

The IEA in its Special Report on Solar PV Global Supply Chains states 'producing the entire PV value chain in Norway today, where the manufacturing emissions intensity would be around 25 kg CO_2/kW, could result in 90% lower manufacturing emissions than in China.' (Source: IAE pg 79).

Overall, a combination of support, research, incentives and awareness can all help to accelerate the growth of the solar industry in Europe.

Deploying capital, transparency, virtual integration and a win-win-win approach

Access to capital remains a challenge, but the issues are broader than just access. At each step in the PV value chain participants are seeking to build CAPEX intensive capacity and therefore demand significant prepayments to secure offtake. This shifts capital further down the chain from one player to another, unfortunately not creating the necessary platform for growth.

Perhaps further consideration needs to be given to a virtually integrated model. As an industry we talk about this, but do not seem willing to actually execute on it, as it requires a change in mindset. Such a model will have to be supported by transparency and open book relationships designed to create a win-win-win throughout the value chain. This approach is different from the industry's past positioning, which has largely been about win-lose type outcomes. To survive and thrive there needs to be a model based on shared risk and reward based on real risk exposure and not just the relative negotiating strength of the individual player in the value chain.

The Chinese model of virtual integration has proven to be very effective. Whilst this cannot be replicated in Europe there are some lessons to be learnt.

The question then becomes 'who is going to manage the capital exposure? At what point in the value chain does capital get deployed? Certainly, some form of support to mitigate expansion risks in the form of managing temporary imbalances, and lack of synchronicity, in the value chain should be considered.

Transparency as an alternative to a single control point

It can be argued that China has been successful partially because there is a single control point. In Europe, we can achieve similar results through transparency and collaboration, as noted above. This will take a level of maturity between companies and individuals, with effort and trust that has yet not been realized or activated within the industry. The normal reaction is 'how much win can I achieve and loss exposure can I avoid', rather than mutually aligning around the art of the possible. A stronger, collaborative, and profitable European PV Value Chain.

Challenges and opportunities

While the solar PV value chain in Europe is poised for continued growth and development in 2023, there are still significant challenges and opportunities that need to be addressed.

Will EU solar GW installations keep growing beyond targets? The challenge is to keep 'talking' and allow the EU solar trade deficit to continually increase. The opportunity is to 'act', with transparency and collaboration amongst each other and work towards a secure, low emission renewable energy source.

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