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Powering Tomorrow? – A Comprehensive Equity
Analysis of SMA Solar Technology AG – Part 1

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Abstract

Part 1 of the Equity Research report on SMA Solar Technology AG presents a comprehensive analysis, focused on the company's strategic positioning in the global solar inverter market with a total size of €29bn in 2022. It offers detailed insights into SMA's competitive landscape, and future growth potential. The report emphasizes SMA's market share which amounts to ca.4% in 2022, product offerings, and its response to industry-specific challenges, including the impact of macroeconomic factors. The analysis includes a thorough examination of SMA's competitive advantages and risks, providing a nuanced understanding of its market dynamics. This robust evaluation culminates in a strategic investment recommendation, making it a valuable resource for potential investors and stakeholders in the renewable energy sector. Based on the derived target share price of EUR 67.45, the report closes with a BUY recommendation.

Equity Research, SMA Solar Technology AG, Energy, Power Inverter

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This report is part of the SMA Solar Technology AG Equity Research report (annexed), developed by Jakob Storm and Cornelius Krips and should be read as an integral part of it.

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Introduction

This analysis is one of two parts of a complete equity research report on SMA Solar Technology AG, a well-known player in the solar inverter industry. In a detailed analysis of the company, an investment recommendation is made. This is based on a holistic view consisting of an in-depth analysis of the industry and the company.

The consolidated report begins with an overview of SMA Solar Technology AG and key information on the company. This is followed by an in-depth look at the solar inverter industry, covering both macroeconomic and industry-specific trends. This is followed by a competitive analysis focussing on SMA's main competitors and key characteristics of the competitive landscape. The resulting categorisation of the most relevant risks is followed by a detailed forecast of SMA's sales based on a number of key drivers. The expected sales development is analysed at segment and regional level. An analysis of key operating drivers is followed by a detailed derivation of the valuation using an APV and a relative valuation. Finally, the resulting recommendation is substantiated. A **BUY** recommendation is issued for the SMA share.

This section makes a significant contribution to the results of the analysis by analysing the industry and the competition. In particular, it covers the analysis of the industry and the competition and uses this to gain key insights into SMA's future development opportunities and valuation. In addition, this section also contains the relative valuation and thus supplements a valuation based on comparable, listed companies.

The complementary part deals in particular with the analysis of SMA's financial performance and the forecast of the financials. In addition, an APV is used as a further valuation method.

For a complete understanding of the report, please refer to both the Consolidated Report and Part 2.

Company Overview

Company description



Figure 1: Location of SMA's headquarter production facilities in Niestetal, Germany

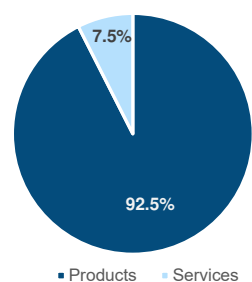


Figure 2: Revenue split products vs. services (2022)

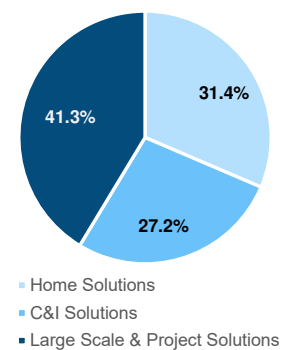


Figure 3: Revenue split by segment (2022)

SMA Solar Technology AG, a distinguished German manufacturer of solar inverters, has its headquarters and production facilities in Niestetal, Germany. As of September 2023, the company operates globally in ca.20 countries with a workforce exceeding 4,000 employees. In 2022, SMA reported total sales revenue of EUR 1,066m (YTD Sep-2023: EUR 1,337m) and an EBITDA of EUR 70m, translating to a margin of 6.6% (YTD Sep-2023: EUR 214m; 16.0%).

SMA's offerings include the development, production, assembly, and maintenance of solar inverters. Predominantly, manufacturing constitutes SMA's core business, accounting for 92.5% of its 2022 revenue, compared to 7.5% from the service segment. The company, known for launching the world's first solar inverter in 1987, has since concentrated on R&D and manufacturing over service offerings. Its products are categorized into three segments: "Home Solutions," "Commercial & Industrial Solutions" (C&I Solutions), and "Large Scale & Project Solutions." These segments cater to different applications, with Home Solutions focusing on integrated system solutions for small PV systems used in residential settings, C&I Solutions targeting business and industrial customers, and Large Scale & Project Solutions offering solutions, including central inverters and system controllers for grid services, for large-scale PV system operators.

In 2022, all three segments contributed relatively equally to SMA's total revenue, with the Large Scale Segment leading at 41.3%, followed by Home Solutions at 31.4%, and C&I Solutions at 27.2%. The majority of SMA's revenue is generated in the EMEA region, accounting for 62.6% in 2022, with Germany contributing ca.49% of that, equating to 32.2% of global revenues. The Americas and APAC follow with 24.5% and 12.9% revenue shares, respectively. This revenue distribution reflects SMA's strategy to differentiate through quality and to leverage its European base to compete with Asian manufacturers in the domestic market.

As a key player in the solar inverter industry based in Europe, SMA emphasizes high-quality products, distinguishing itself from lower-priced Asian competitors through advanced R&D. This focus on R&D activities led to a portfolio of about 1,700 patents. With that number, SMA is clearly one of the frontrunners in the industry. In addition, SMA won numerous product awards for its products in the last years, underlining their perception as being of high quality.

With commissioning planned for 2024, SMA is currently building an additional plant at its main site. With an investment of EUR 80m, the current production capacity will be expanded by ca.20 GW and thus almost doubled.

SMA holds the 6th largest market share in the solar inverter market globally, with ca.4% in 2022, making it the European company with the largest market share behind five Chinese manufacturers.

SMA shares

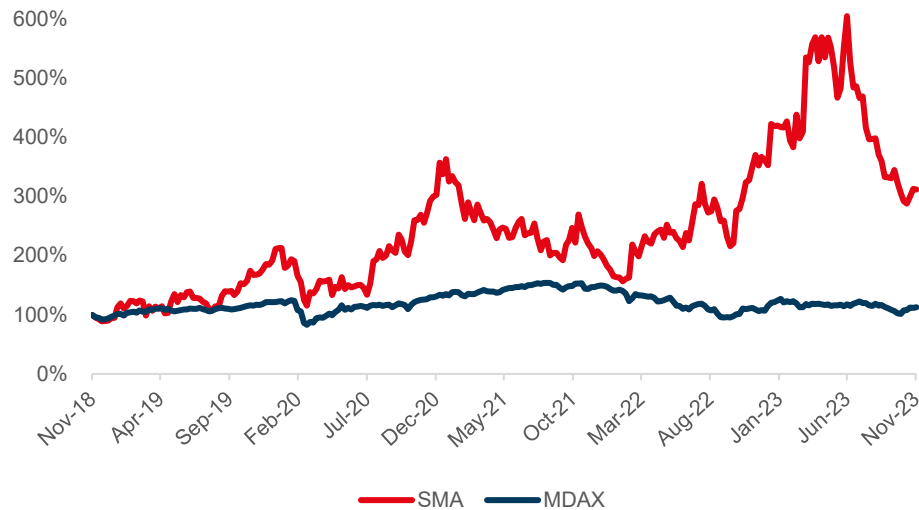


Figure 4: Performance of SMA stock vs. MDAX (Nov-2018 to Nov-2023)

SMA has been a constituent of the Frankfurt Stock Exchange since its initial public offering (IPO) in June 2008. It is currently a part of the MDAX index, which includes companies ranked 41st to 90th in terms of market capitalization in Germany, and the TecDAX, showcasing the top 30 German technology stocks.

As of December 2023, SMA's market capitalization stands at EUR 1.9bn, a decrease from EUR 2.6bn in December 2022. This decline primarily comes from a downward trend in its stock value, following a peak of EUR 111.9 on 30 June 2023, which marked an all-time high. In a broader context, over the past five years, the MDAX has witnessed a growth of 13.0%. In contrast, SMA's shares have experienced a substantial appreciation, recording a 211.6% increase in value over the same period.

Ownership and management structure

SMA's shareholder structure is topped by Danfoss A/S, holding ca.20% of the shares. The Danish company, known for its expertise in climate technology solutions, became a significant shareholder in SMA following a strategic plan in 2014. This move involved SMA acquiring Danfoss' solar inverter business, while Danfoss purchased a 20% stake in SMA.

This exchange marked the beginning of a strategic alliance aimed at reinforcing both companies' foothold in the solar inverter market. In 2018, the two companies furthered their collaboration by announcing a joint venture focused on energy management in supermarkets.

The strong ties between SMA and Danfoss have been maintained post-acquisition, exemplified by SMA's CEO serving on Danfoss' supervisory board. Other notable shareholders include Lars Cramer with ca.10%, cdw Stiftungsverbund gGmbH holding 8.7%, Uwe Kleinkauf at 6.3%, and Verena Salzmann with ca.5%. The free float of SMA shares constitutes about 40.5%.

SMA's management board is led by Dr. Jürgen Reinert as CEO. He has been with SMA since 2011, joining the managing board in 2014, and was appointed CEO in October 2018. His tenure at SMA, coupled with his industry expertise and role on Danfoss' supervisory board, places him in a unique position to support the relationship with SMA's largest shareholder while steering the company through various market conditions.

Industry overview

Macro analysis

The COVID-19 pandemic initially brought significant challenges to the solar inverter industry, disrupting production and supply chains. Despite these initial setbacks, Germany's renewable energy sector, particularly in solar inverters, showed resilience with a strong recovery, evidenced by a 19% increase in power generated by photovoltaic (PV) systems from 2021 to 2022 (ISE, 2023). This recovery was supported by a global shift towards renewable energy, further accelerated by the war in Ukraine. The conflict highlighted the need for energy independence in European countries, which had relied heavily on Russian energy, thus speed up diversification efforts and benefiting the solar PV industry (Heinhaus, 2022).

Trade restrictions arising from the war in Ukraine and COVID-19-related disruptions significantly impacted global supply chains, notably causing semiconductor chip shortages.

While post-COVID efforts have somewhat alleviated these issues, they have not been completely resolved, as reflected in fluctuating EU energy prices. In August 2022, the price per Megawatt hour (MWh) in the EU was ca.EUR 465, compared to ca.EUR 35 in August 2020. By November 2023, the price had decreased from its August 2022 peak to about EUR 91 (Kleiner et al., 2023).

Inflation rates in Europe (8.4%) and the US (8.1%) peaked in 2022, driven primarily by rising energy prices due to the Ukraine conflict and decreased demand in the manufacturing sector. The IMF forecasts a convergence of inflation rates to ca.2% by 2027. China's inflation rate, starting at 2.2% in 2022, is also expected to reach 2.0% in 2027.

GDP growth in the Euro area is projected to decline from 3.3% in 2022 to 1.5% in 2027, with a low of 0.7% in 2023. In contrast, the US is expected to maintain a stable growth rate of 2.1% from 2022 to 2027, although a temporary dip to 1.5% is anticipated in 2024. China, with a 3.0% growth rate in 2022, is expected to experience higher growth rates in the following years, peaking at 5.0% in 2023 and stabilizing at 3.7% in 2027.

Market analysis

The global solar inverter market generated sales of EUR 29bn in 2022, with ca.50% of these sales originating in the APAC region, making it the largest global market. EMEA contributed ca.28% to the sales, while the Americas accounted for ca.12%. This market encompasses solar inverters for various use cases, ranging from residential to large-scale on-grid applications. Analyst forecasts predict the global market to grow at a Compound annual growth rate (CAGR) of 8.2% until 2032.

■ EMEA

The EMEA solar inverter market, a key market for SMA, accounted for ca.28% of global inverter sales in 2022, translating to a total volume of EUR 8bn. This market is projected to grow at 8.2% p.a. from 2023 to 2032, reaching EUR 17.6bn in 2032. Historically, the market experienced high double-digit growth rates, with increases of 44% from 2020 to 2021 and 82% from 2021 to 2022. In 2022, the Large Scale segment contributed 165 GW, accounting for 58.1% of the total installed solar capacity, while the C&I segment added 27.1% (77 GW), and the Home Solutions segment made up 14.8% with 42 GW.

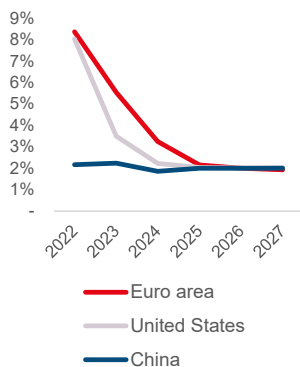


Figure 5: Inflation rate (expectations) 2022-2027

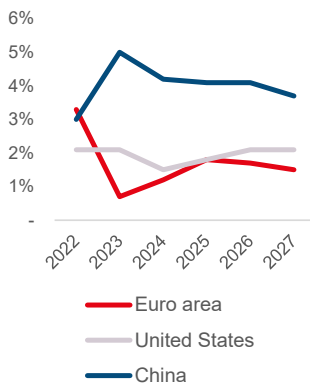
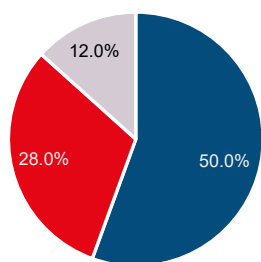


Figure 6: GDP growth rate (expectations) 2022-2027



■ APAC ■ EMEA ■ Americas

Figure 7: Global split of solar inverter market in 2022

The European Green Deal, launched in 2019, significantly drives Europe's renewable energy strategy. It aims to position the EU as a net-zero greenhouse gas emitter by 2050, targeting a reduction in emissions by at least 55% by 2030 compared to 1990 levels and ensuring above 32% of the EU's energy comes from renewables by 2030. The REPowerEU plan, established in 2022, further accelerates this shift, aiming to build solar capacities of 400 GW by 2025 and 750 GW by 2030 in Europe (Ivanova, 2022).

The war in Ukraine has intensified the need for energy diversification in Europe, highlighting vulnerabilities in energy security, particularly dependence on Russian gas. This has led to a policy shift towards renewable energy sources, including solar, wind, and hydrogen. As a result, daily imports of crude oil from Russia dropped from 2.4m barrels per day in early 2022 to 0.6m barrels per day in January 2023 (IEA, 2023). The EU is also promoting domestic production of renewable energy components to reduce dependence on Asian manufacturers (Mendonça, 2023).

National regulations in EU member states, like Germany, the Netherlands, and Belgium, as well as Switzerland, significantly impact solar energy expansion. Regulations mandate solar installations on new commercial buildings, and some extend to existing buildings. The EU plans to enforce a solar installation obligation by 2027 for commercial and 2029 for residential buildings (Tisheva, 2023). With current adoption rates of ca.11% in residential buildings in Germany and 16% in the Netherlands, these regulations indicate significant potential for solar energy growth (Dilon, 2022).

In Europe, annual solar energy production increased from ca.46 Terawatt hours (TWh) in 2018 to ca.61 TWh in 2022. Despite an overall decrease in energy production, solar energy's share of the total grew from 7.5% in 2018 to 13.0% in 2022. Coal and natural gas, while still major energy contributors, have lost shares to renewable energies, particularly solar power.

■ Americas

America represents the smallest market for solar inverters, accounting for ca.12% of the global market, equivalent to EUR 3.4bn in 2022. With a projected market CAGR of 8.2% until 2032, the American solar inverter market is expected to expand to a total size of EUR 7.5bn. In 2022, the region had an installed capacity base of ca.200 GW, with the Large Scale segment being the largest, comprising 131 GW (65.7%). The Home Solutions segment accounted for ca.50 GW (25.0%), and the C&I Solutions segment contributed 19 GW (9.3%). By 2030, a total capacity of 621 GW is anticipated in America, split among 408 GW in Large Scale solar PV, 155 GW in Home Solutions, and 58 GW in C&I applications.

Over the past decade, the US has significantly advanced towards energy independence, marked by a substantial increase in domestic oil and natural gas production due to advancements in extraction technologies. US crude oil production increase from about 5m barrels per day in 2008 to nearly 13m by 2019, a rise of over 150% (EIA, 2019). This growth established the US as a global oil production leader. Natural gas production also witnessed considerable growth, positioning the US prominently in the global natural gas market. Concurrently, the US experienced a shift towards renewable energy, particularly in wind and solar. Renewable energy consumption surpassed coal in the US for the first time in over 130 years in 2019 (EIA, 2019). Solar power generation grew from 1.2bn Kilowatt hours (KWh) in 2008 to about 93bn KWh in 2020.

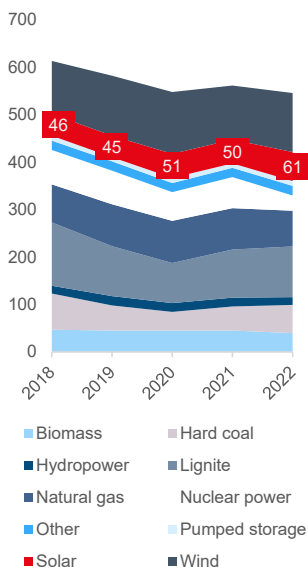


Figure 8: Annual energy production in Europe by source in TWh (Source: Agora Energiewende)

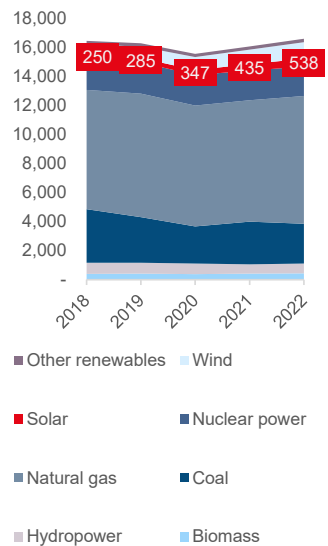


Figure 9: Energy consumption in the US by source in TWh (Source: Our World in Data)

Political initiatives, especially the 2022 Inflation Reduction Act (IRA), have been pivotal in promoting renewable energies in the US. The IRA allocates USD369bn to decarbonize the economy and address climate change. It offers a 30% tax credit to enable an additional 7.5m families to install rooftop solar panels, leading to significant savings (Weaver, 2022). The IRA also includes incentives for manufacturers, with tax credits for solar system installation and specific credits for inverter manufacturers (Kennedy & Fischer, 2022). A critical aspect of the IRA is the requirement for production to be US-based to qualify for government subsidies, aiming to create long-term jobs and enhance domestic energy security (Mehta & O'Rourke, 2022). The SEIA estimates that the solar deployment by 2033 will increase by 48% due to the IRA, with an additional investment volume of USD 144bn anticipated by 2032 (SEIA, 2022).

While total energy consumption in the US rose marginally by 0.8% between 2018 and 2022, the share of renewable energies in the energy mix increased significantly. The share of renewables grew from 7.5% in 2018 to 11.5% in 2022, with solar energy's share rising from 1.5% (250 TWh) in 2018 to 3.3% (538 TWh) in 2022 (Ritchie & Roser, 2023).

■ APAC

In 2022, the APAC region represented the largest market for solar inverters, holding ca.50% of the global market share, equivalent to EUR 14.3bn. The market is forecasted to reach a valuation of EUR 31.3bn by 2032, growing at a rate of 8.2% p.a. Within APAC, China dominates, accounting for 78% of the region's market.

The total installed solar PV capacity in APAC in 2022 was 144 GW, with the Large Scale segment being the predominant contributor at 93 GW (64.7%). The C&I Solutions segment followed with 34 GW (23.5%), and the Home Solutions segment constituted the smallest portion with 17 GW (11.8%).

China's transition towards renewable energy production, particularly solar power, is driven by the government's goals to reduce CO2 emissions. The target is to peak CO2 emissions before 2030 and achieve CO2 neutrality by 2060 (IEA, 2021). Despite the ambitious nature of these goals, recent studies suggest their feasibility (WWF, 2014).

To support these objectives, the Chinese government has implemented various policy initiatives. Since 2021, an emissions trading system (ETS) has been operational in China's energy sector (Guel, 2021). The ETS aims to fairly price CO2 emissions, thereby favouring low-carbon products. Although currently limited to the energy sector, there are plans to expand the ETS to other emission-intensive industries. Regional pilot projects showed that even the implementation of low prices of ca.EUR 13 per ton of CO2 (compared to ca.EUR 80 per ton in Europe as of October 2023 (Tiseo, 2023)) can lead to a significant decrease. In the Guangdong region, this led to a CO2 emission decrease of over 12% from 2013 to 2019. This shows the influence, a proper ETS can have.

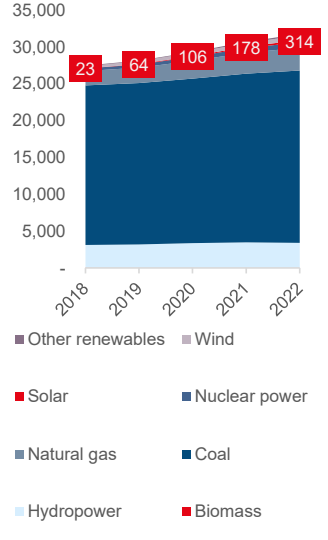


Figure 10: Annual energy consumption in China by source in TWh (Source: Our world in Data)

In addition to the ETS, China has introduced subsidies for renewable energy. For instance, in 2022, the government announced a package worth ca.EUR 380m to boost wind and solar energy deployment in various regions (Wang, 2022). Significant investments are also being made in necessary infrastructure, including storage solutions and electricity grid adaptations for renewable energy integration. The "Outline of the National Comprehensive ThreeDimensional Transportation Network Planning" published in 2021 sets benchmarks and leads planning for these measures (Guel, 2021).

In 2018, China's energy mix was heavily reliant on coal, contributing ca.78% to total energy consumption. Renewables only accounted for 1.4%, with solar energy representing a minor fraction. By 2022, the renewable share more than doubled to 3.6%, with solar power constituting 32.1% of this share (1.1% of total consumption). The rapid growth rates of 25.6% p.a. for renewables (92.5% for solar) indicate a clear shift towards greener energy, as evidenced by coal's reduced contribution to 73.6% of China's total energy consumption in 2022 (Ritchie & Roser, 2023).

Competitive landscape

The competitive landscape in the solar inverter industry is diverse and varies regionally, with a small number of large international players dominating the overall competition. This group includes global technology companies like Huawei and specialized solar inverter manufacturers such as SMA and SolarEdge. The market is primarily controlled by these top players. In 2022, Huawei held a market share of 28.0%, while Sungrow contributed 22.5% to the total market in terms of shipments. Thus, these two companies combined hold over 50% of the solar inverter market. The next seven largest companies collectively accounted for ca.31%, meaning the top nine players in the market held a share of over 82%. This represents a consolidation of the market compared to previous years. In 2021, the top nine companies had a market share of ca.78%, and in 2020, it was about 74%.

A Herfindahl-Hirschman-Index (HHI) of 1.8k in 2022 indicates that the market is moderately concentrated. The increase of the HHI from 1.6k in 2021 also indicates the market to become more consolidated. A higher HHI represents a higher level of concentration within a market.

Huawei, in particular, has seen significant gains in market share, increasing by ca.6ppt from 2020 to 2022. In contrast, SMA experienced a decline in market share during this period. SMA's share decreased from 7.8% in 2020 to 3.7% in 2022, yet it remains the 6th largest player in the market. It's important to note that these market shares are based on inverter shipments. Given that SMA's products are priced higher than those of its Asian competitors, SMA's share in terms of sales revenue would be significantly larger. This pricing strategy contrasts with that of Asian competitors, who focus on gaining market shares through competitive pricing.

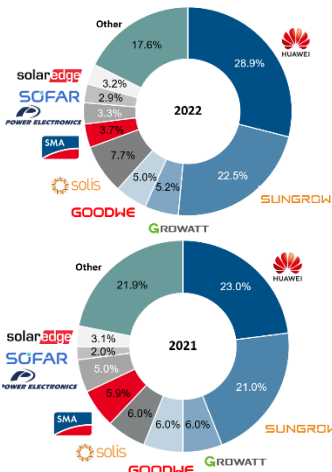


Figure 11: Market shares of top-9 players in global solar inverter market 2022 vs. 2021 (Source: Wood MacKenzie, Analyst analysis)

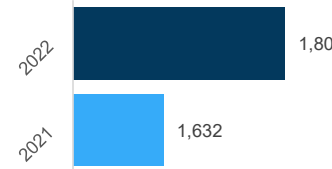


Figure 12: HHI for solar inverter industry 2022 vs. 2021 (Source: Wood MacKenzie, Analyst analysis)

European key players like SMA, Kostal, and Fronius, both of which are privately held companies, demand higher prices for their products. An analysis of inverter prices reveals that SMA is at the top among European suppliers, with prices of European manufacturers being 40.1% higher on average than their Chinese counterparts.

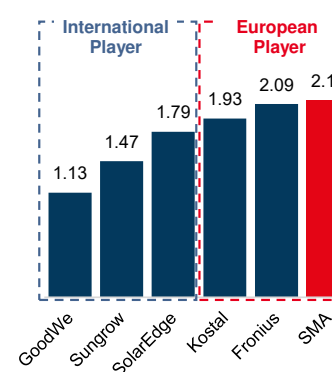


Figure 13: Price comparison of European & International Players of 10kW inverters in EUR k (Source: Company information, Analyst analysis)

Competitor overview



Huawei's foray into the solar sector primarily centers on smart photovoltaic solutions, leveraging its ICT competencies. The product portfolio includes efficient inverters, smart energy storage, and cloud-based management systems, showcasing a technology-driven approach. This positions Huawei as a direct competitor to SMA's core business, but with a stronger emphasis on integrated smart solutions. Performance-wise, Huawei has shown resilience and the ability to grow in the market even during complicated time periods, but geopolitical factors impact its market access, particularly in the US and parts of Europe.



Sungrow's product range, from string inverters to large-scale central inverters, covers a lot of SMA's portfolio but with a more aggressive pricing strategy. This positions Sungrow as a cost-effective alternative to SMA, especially in price-sensitive markets. Sungrow's performance indicators, such as market share and global reach, are robust, especially in the APAC region.



Growatt's portfolio, mainly targeting residential and commercial sectors, competes with SMA in these segments. Their products, however, are positioned as more economical options, appealing to a different customer segment compared to SMA's premium offerings. Growatt's performance in emerging markets is noteworthy, but it lacks SMA's brand recognition and technological depth.



GoodWe competes with SMA in the residential and commercial inverter market. Their products, known for reliability and user-friendliness, are positioned as mid-range options, contrasting with SMA's high-end market position. GoodWe's performance indicators show strong growth in Europe and China.



Ginlong Solis' inverters cover a similar range to SMA, but with a specific focus on string inverter technology. This specialization differentiates them from SMA's more diverse offerings. Ginlong's performance in terms of revenue growth and market penetration is ascending, especially in European and North American markets.



Specializing in utility-scale solutions, **Power Electronics** offers products that cater to a different segment than SMA's more diversified portfolio. Their focus on large-scale projects positions them somewhat apart from SMA in the industry. Power Electronics has shown steady growth, especially in large solar installations.



SofarSolar competes with SMA in the residential and commercial segments with more cost-effective solutions. Their product portfolio, while similar in scope to SMA's, is positioned at a lower price point. Performance-wise, SofarSolar is expanding in Asian and European markets but lacks the global brand presence of SMA.



SolarEdge's product portfolio, featuring power optimizers and integrated inverter solutions, competes directly with SMA's offerings but with a unique value proposition centred on maximizing power efficiency. This positions them as a technology leader, akin to SMA, but with a distinct technological edge. SolarEdge's performance indicators, including market share and revenue growth, are strong, especially in North America and Europe. The company has been active in M&A, acquiring companies to enhance its technological capabilities and market reach.

SMA in Fiscal year 2022 & YTD Sep-2023

In a successful fiscal year 2022, SMA broke the EUR 1bn sales barrier once again after 2020, with total sales of EUR 1.066m and an EBITDA of EUR 70m (6.6% margin). The positive result was achieved due to a significantly better operating performance than in the previous year. SMA was also able to carry this positive trend into 2023. By the reporting date of the third quarter on 30 September 2023, sales of EUR 1.337m and EBITDA of EUR 214m (16.0% margin) had already been generated. YTD Sep-2023 thus already exceeds full year 2022 revenues by 25.5% and EBITDA is even 205.9% higher. Compared to Q1-Q3 2022, YTD Sep-2023 revenues are 84.7% higher, showing the continuation of the growth trend from 2022.

ESG performance

In the solar inverter industry, ESG (Environmental, Social, and Governance) performance is increasingly recognized as a crucial factor by investors. At first glance, a positive ESG image is typically associated with companies in this sector, attributed to the eco-friendly nature of the industry. However, upon closer examination, notable variances in ESG performance are revealed among SMA's competitors.

In Figure the Sustainalytics ESG Risk Ratings for key industry players are illustrated, indicating different levels of exposure to industry-specific risks. These ratings encompass the range of internal ESG initiatives and the material risks inherent in the industry. A significantly lower risk profile is exhibited by SMA compared to most of its peers, with SolarEdge being the only competitor with a marginally better rating.

As the industry evolves, an increased emphasis on internal ESG efforts is anticipated, with the comparative analysis with other energy forms becoming less relevant. Being a European entity, SMA is well-positioned to navigate these challenges. However, it is observed that the complexity of managing internal and external ESG factors tends to increase with the company's size. Therefore, it remains to be seen whether SMA can maintain its competitive edge in ESG performance amidst its anticipated growth.

Key risks

In the solar inverter market, which is intrinsically linked to the broader solar energy sector, seasonal and political factors play a significant role. As discussed in the market section above, initiatives by the European Union, with countries like Germany at the forefront, and the US, aim to promote solar energy expansion. These initiatives are designed to enhance the purchasing power of both end-users and manufacturers in the industry. However, these initiatives are heavily reliant on political position of the of the ruling parties and their willingness to drive deployment of renewables. At the same time, political support makes SMA very dependent on the associated framework conditions. In some regions, funding is linked to the fulfilment of certain conditions. These can also be politically influenced. For example, support under the Inflation Reduction Act (more on this in later chapters) is also a protectionist measure to strengthen the domestic economy. As a foreign producer, SMA is therefore only partially eligible for solar PV subsidies in the US. However, as such measures usually apply for longer periods of time (often until at least 2030), it is possible to plan until then, at least to a limited extent. The associated risk is therefore considered to be medium to low.

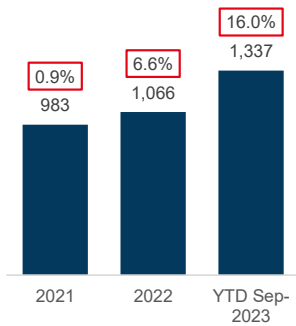


Figure 14: Total sales (EUR m) and EBITDA-margins 2021- YTD Sep-2023 (Source: Annual reports, Analyst analysis)

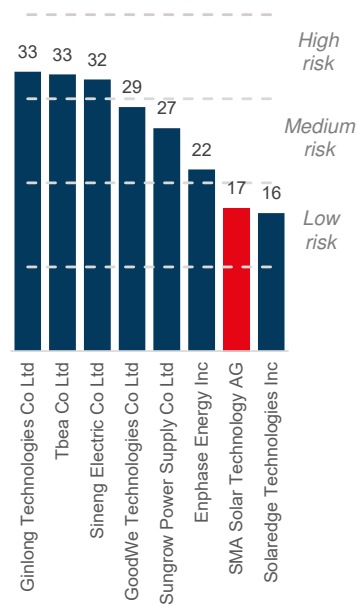


Figure 15: Comparison of Sustainalytics' ESG Risk Rating of SMA's key competitors (Source: Sustainalytics)

Concerning SMA's financial performance, challenges in generating positive cash flow have been observed, particularly in recent years. From 2020 to 2022, revenues have remained relatively steady at ca.EUR 1bn, while EBITDA margins have shown variability, ranging from 0.9% to 7.0%. The sustainability of SMA's current performance, especially regarding its EBITDA margin, is a critical question for investors and analysts alike.

SMA has overcome difficult market conditions and has been operating in a much more sustainable manner for several years now and is showing a positive trend. The risk is therefore also considered to be medium to low.

SMA occupies a unique position in the inverter market, attributed to its comparatively high pricing policy. Historically, there have already been problems with this strategy in competition. SMA could not keep up with the prices of its Asian competitors and therefore had major problems maintaining its strategy at the time. Over time, SMA was able to identify a niche in which it could keep up with its prices. However, this strategy relies heavily on its activities in Europe, where SMA's brand and high quality make it competitive despite its high prices. However, this strategy is not without risk and could become a problem as soon as other suppliers manage to offer the same quality at lower prices and SMA is forced to lower its prices. In the subsequent section, titled 'solar inverter price development,' various potential price scenarios are compared, also considering the implications for SMA's future share price. In recent years, SMA has already been able to prove that its own competitive position definitely has a right to exist. The assessment of this risk is thus medium to low.

Key Risk	Assessment
Political Stability of political decisions	Medium to Low
Financial Performance	Medium to Low
Competitive Positioning	Medium to Low

Figure 16: Assessment of SMA's key risks (Source: Analyst analysis)

Relative Valuation – Trading Comparables

In the relative valuation analysis of SMA, three distinct groups of comparable companies were consulted to mitigate the limitations of each individual group. These groups include:

Key Competitors: This group comprises direct competitors involved in solar inverter manufacturing.

Extended Key Competitors: Includes manufacturers of solar modules and technical accessories for such modules.

Non-Core Competitors: Characterized by companies operating in related industries like semiconductor manufacturing.

For the final valuation, the results from these analyses were weighted with 50% for key competitors, 30% for extended key competitors, and 20% for non-core competitors. This weighting adjusts for the bias of the key competitor group being primarily large Asian companies and incorporates other significant factors such as regional influences.

The key competitors, although sharing industry-specific risks with SMA, have limited direct comparability due to differences in size, maturity, and product portfolios. For instance, Sungrow, a significant player in this group, diversifies into floating PV systems and wind inverters, with ca.68% of its 2022 sales in the PV segment (Sungrow, 2022).

Similarly, the solar module industry, dominated by a few global companies like LONGi, shares main market drivers with SMA. LONGi, a Chinese solar manufacturer, recorded a substantial revenue growth and represents a market segment parallel to SMA in terms of supply chain dependencies and technological components (Bütow, 2023).

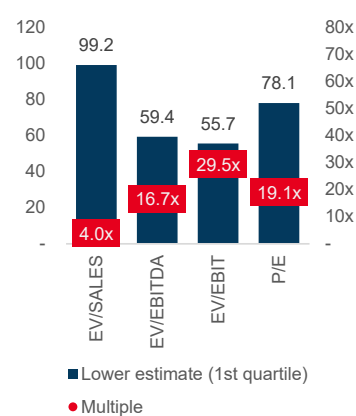


Figure 17: Relative valuation at 1st quartile of trading multiples in EUR (Source: Analyst analysis)

Additionally, the semiconductor market was included as a complementary benchmark due to its growth trajectory (CAGR 2022-2027: 7.8%) and similar challenges faced during COVID-19, which align with SMA's experiences. German companies Elmos and X Fab were selected as the most relevant non-core peers, despite Elmos having a significantly higher EBITDA margin (Fernández, 2023).

Utilizing the weighted peer group in EV/EBITDA and EV/EBIT calculations resulted in a share price estimation ranging from EUR 59.4 to EUR 176.6 and EUR 55.7 to EUR 169.0, respectively. This extensive analysis of comparable companies is somewhat constrained due to the differences in competitors' structures and the scarcity of highly similar trading comparables to SMA. Nonetheless, the analysis corroborates the cash-flow-based valuation by indicating upside potential. Even at the lower end of the relative valuation, no downside potential is evident.

In addition, the relative valuation is limited in its relevance, as the multiples of the comparable companies all relate to the most recent date of data availability. However, SMA is valued as per 31 December 2024, which means that the valuation using the available multiples always requires the assumption that the multiples of the comparable companies will not change significantly by the valuation date.

Company	Category	Share price	Market cap (EUR m)	EV (EUR m)	EV/Sales	EV/EBITDA	EV/EBIT	P/E
SUNGROW	Key Competitors	10.7	22,495	23,890	2.9x	21.7x	23.4x	33.6x
GOODWE	Key Competitors	13.5	5,393	5,391	5.6x	28.3x	30.8x	26.5x
CanadianSolar	Extended Key Competitors	18.5	1,856	5,023	0.7x	6.3x	9.1x	5.8x
LONGI	Extended Key Competitors	2.8	43,406	40,999	2.3x	18.3x	25.7x	10.7x
elmos	Non-Core Competitors	76.0	949	987	1.8x	5.5x	7.0x	18.2x
xfab	Non-Core Competitors	10.0	862	794	1.0x	3.8x	6.1x	26.7x

Figure 18: Overview of Trading multiples of SMA's key competitors (Source: Annual reports, Refinitiv, Analyst analysis)

Recommendation

The target price for SMA as of December 31, 2024, has been established at **EUR 67.45**. This indicates a substantial upside potential of 21.2%, or EUR 11.80, compared to the current share price of EUR 55.65.

The recommendation for the SMA stock after detailed analysis is **BUY**.

SMA is foreseen to benefit from the robust growth of the overall market, especially due to the positive and stable trajectory in Europe, its most crucial market. The growth in Europe is propelled by the societal and political commitment to transitioning energy production towards more sustainable sources. Despite facing challenges in its competitive positioning, characterized by significantly higher prices, SMA is expected to carve out a niche in Europe. Following a period of variable results, the company is projected to achieve growth and stabilize its margins, underpinned by enhanced operational performance.

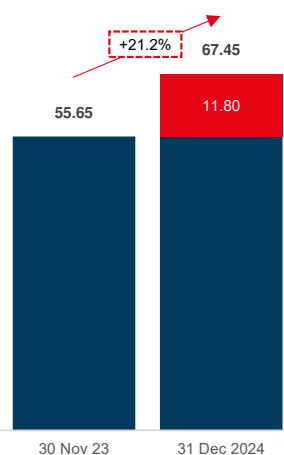


Figure 19: Upside potential of target price (31 Dec 2024) vs current share price in EUR (Source: Analyst analysis)

The market currently appears to underestimate the potential of SMA's shares. However, detailed analyses suggest that SMA is well-positioned to capitalize on the favourable market trends, leading to a considerable appreciation in its share value. It is noteworthy that a dividend payment for the year 2024 is not anticipated.

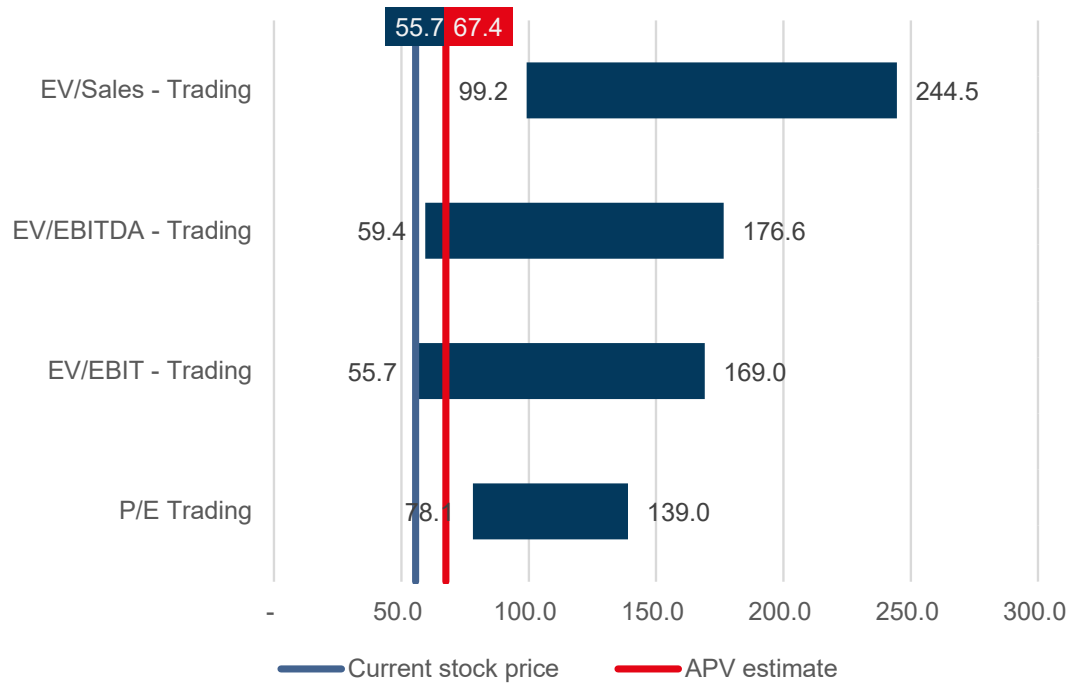


Figure 20: Overview of valuation results of different multiples and APV in EUR (Source: Analyst analysis)

For valuation purposes, an APV as well as a relative valuation model has been applied. However, the recommendation is mainly based on the APV due to accuracy and superiority over the valuation based on trading multiples. The limitations of the relative valuation are explained in detail in the respective chapter. However, the relative valuation clearly emphasizes the BUY recommendation derived from the APV valuation.

Appendix

SMA SOLAR TECHNOLOGY AG

COMPANY REPORT

ENERGY

20.12.2023

CORNELIUS KRIPS, JAKOB STORM

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Powering Tomorrow?

A Comprehensive Equity Analysis of SMA Solar Technology AG

- Following the comprehensive analysis of SMA Solar Technology AG, a **BUY** recommendation is issued. The price target of EUR 67.45 as of 31 December 2024, indicates an upside potential of 21.2% compared to the current share price of EUR 55.65. This recommendation is grounded in the detailed assessment of SMA's market position, financial performance, and the growth prospects in the solar inverter industry.
- SMA is foreseen to benefit from **overall positive growth expectation for the solar inverter market**. Especially in SMA's core market Europe this development is driven by governmental expansion targets for solar PV energy.
- With a focus on Europe as core market as well as on its **positioning as high-quality manufacturer**, SMA can find its niche within the market and can be able to justify higher prices.
- A **doubling of SMA's production capacity by 2024** and more focus on operational performance improvement are expected to lead to higher and stable margins. The **EBITDA margin is expected to increase to 12.2% in 2028** from 6.6% in 2020.

Company description

SMA Solar Technology AG (referred to as "SMA"), is a German company, specialized in development and manufacturing of solar inverters for a broad range of customers. In 2022, SMA generated EUR 1,066m in revenues and an EBITDA of EUR 70m while employing over 3,600 people.

Recommendation: BUY

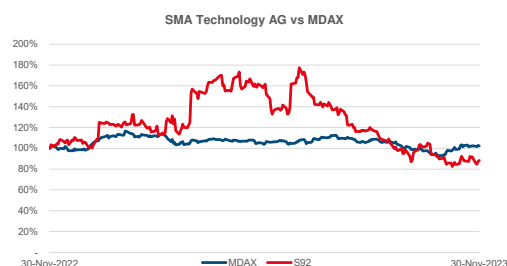
Price Target 31.12.2024: EUR 67.45

Price (as of 30.11.2023) EUR 55.65

Bloomberg: S92 GR; Refinitiv: S92G.DE

52-week range (EUR)	52.05 – 111.90
Market Cap (EUR m)	1,931
Outstanding Shares (m)	34.7

Source: Refinitiv



Source: Refinitiv

(Values in EUR m)	2022A	2023E	2024FC
Revenues	1,066	1,858	2,097
YoY growth	8.4%	74.3%	12.9%
EBITDA	70	274	228
YoY growth	728.1%	291.0%	(16.7%)
Net Profit	56	157	126
YoY growth	n/a	182.1%	(20.2%)
EPS	1.6	4.5	3.6
YoY growth	n/a	182.1%	(20.2%)

Source: Refinitiv, S&P Capital IQ, SMA Annual Reports

THIS REPORT WAS PREPARED EXCLUSIVELY FOR ACADEMIC PURPOSES BY [INSERT STUDENT'S NAME], A MASTER IN FINANCE STUDENT OF THE NOVA SCHOOL OF BUSINESS AND ECONOMICS. THE REPORT WAS SUPERVISED BY A NOVA SBE FACULTY MEMBER, ACTING IN A MERE ACADEMIC CAPACITY, WHO REVIEWED THE VALUATION METHODOLOGY AND THE FINANCIAL MODEL. (PLEASE REFER TO THE DISCLOSURES AND DISCLAIMERS AT END OF THE DOCUMENT)

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Company Overview



Company description



Figure 1: Location of SMA's headquarter production facilities in Niestetal, Germany (Source: Analyst analysis)

SMA Solar Technology AG, a distinguished German manufacturer of solar inverters, has its headquarters and production facilities in Niestetal, Germany. As of September 2023, the company operates globally in ca.20 countries with a workforce exceeding 4,000 employees. In 2022, SMA reported total sales revenue of EUR 1,066m (YTD Sep-2023: EUR 1,337m) and an EBITDA of EUR 70m, translating to a margin of 6.6% (YTD Sep-2023: EUR 214m; 16.0%).

SMA's offerings include the development, production, assembly, and maintenance of solar inverters. Predominantly, manufacturing constitutes SMA's core business, accounting for 92.5% of its 2022 revenue, compared to 7.5% from the service segment. The company, known for launching the world's first solar inverter in 1987, has since concentrated on R&D and manufacturing over service offerings. Its products are categorized into three segments: "Home Solutions," "Commercial & Industrial Solutions" (C&I Solutions), and "Large Scale & Project Solutions." These segments cater to different applications, with Home Solutions focusing on integrated system solutions for small PV systems used in residential settings, C&I Solutions targeting business and industrial customers, and Large Scale & Project Solutions offering solutions, including central inverters and system controllers for grid services, for large-scale PV system operators.

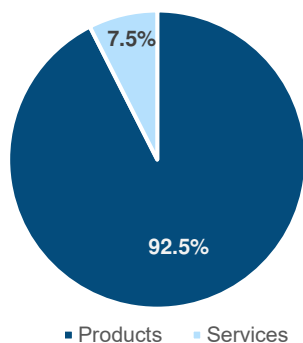


Figure 2: Revenue split Products vs. Services in 2022 (Source: Analyst analysis)

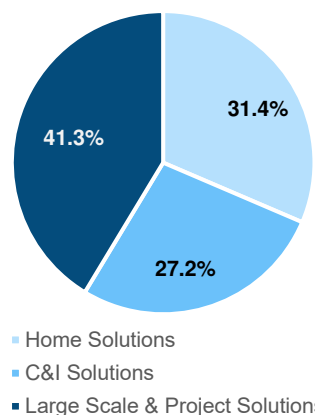


Figure 3: Revenue split by segment in 2022 (Source: Analyst analysis)

In 2022, all three segments contributed relatively equally to SMA's total revenue, with the Large Scale Segment leading at 41.3%, followed by Home Solutions at 31.4%, and C&I Solutions at 27.2%. The majority of SMA's revenue is generated in the EMEA region, accounting for 62.6% in 2022, with Germany contributing ca.49% of that, equating to 32.2% of global revenues. The Americas and APAC follow with 24.5% and 12.9% revenue shares, respectively. This revenue distribution reflects SMA's strategy to differentiate through quality and to leverage its European base to compete with Asian manufacturers in the domestic market.

As a key player in the solar inverter industry based in Europe, SMA emphasizes high-quality products, distinguishing itself from lower-priced Asian competitors through advanced R&D. This focus on R&D activities led to a portfolio of about 1,700 patents. With that number, SMA is clearly one of the frontrunners in the industry. In addition, SMA won numerous product awards for its products in the last years, underlining their perception as being of high quality.

With commissioning planned for 2024, SMA is currently building an additional plant at its main site. With an investment of EUR 80m, the current production capacity will be expanded by ca.20 GW and thus almost doubled.

SMA holds the 6th largest market share in the solar inverter market globally, with ca.4% in 2022, making it the European company with the largest market share behind five Chinese manufacturers.

SMA shares

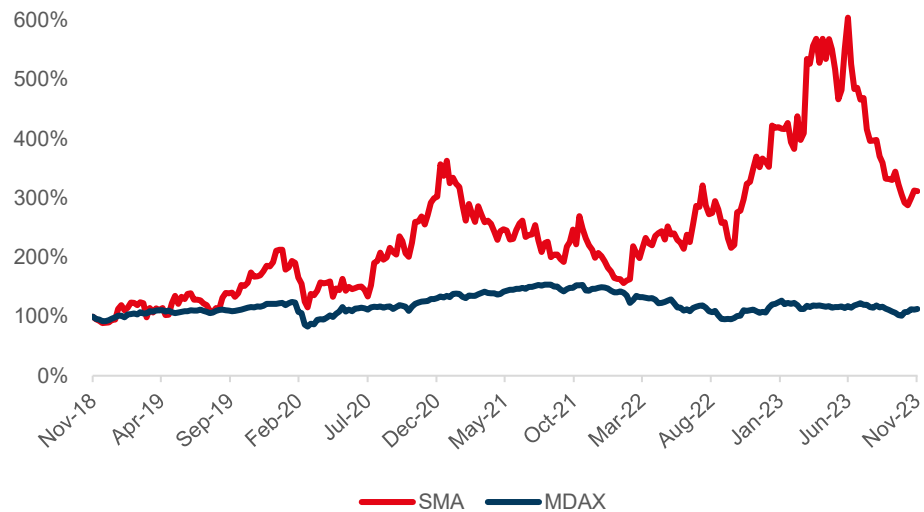


Figure 4: Performance of SMA stock vs. MDAX (Nov-2018 to Nov-2023)

SMA has been a constituent of the Frankfurt Stock Exchange since its initial public offering (IPO) in June 2008. It is currently a part of the MDAX index, which includes companies ranked 41st to 90th in terms of market capitalization in Germany, and the TecDAX, showcasing the top 30 German technology stocks.

As of December 2023, SMA's market capitalization stands at EUR 1.9bn, a decrease from EUR 2.6bn in December 2022. This decline primarily comes from a downward trend in its stock value, following a peak of EUR 111.9 on 30 June 2023, which marked an all-time high. In a broader context, over the past five years, the MDAX has witnessed a growth of 13.0%. In contrast, SMA's shares have experienced a substantial appreciation, recording a 211.6% increase in value over the same period.

Ownership and management structure

SMA's shareholder structure is topped by Danfoss A/S, holding ca.20% of the shares. The Danish company, known for its expertise in climate technology solutions, became a significant shareholder in SMA following a strategic plan in 2014. This move involved SMA acquiring Danfoss' solar inverter business, while Danfoss purchased a 20% stake in SMA.

This exchange marked the beginning of a strategic alliance aimed at reinforcing both companies' foothold in the solar inverter market. In 2018, the two companies furthered their collaboration by announcing a joint venture focused on energy management in supermarkets.

The strong ties between SMA and Danfoss have been maintained post-acquisition, exemplified by SMA's CEO serving on Danfoss' supervisory board. Other notable shareholders include Lars Cramer with ca.10%, cdw Stiftungsverbund gGmbH holding 8.7%, Uwe Kleinkauf at 6.3%, and Verena Salzmann with ca.5%. The free float of SMA shares constitutes about 40.5%.

SMA's management board is led by Dr. Jürgen Reinert as CEO. He has been with SMA since 2011, joining the managing board in 2014, and was appointed CEO in October 2018. His tenure at SMA, coupled with his industry expertise and role on Danfoss' supervisory board, places him in a unique position to support the relationship with SMA's largest shareholder while steering the company through various market conditions.

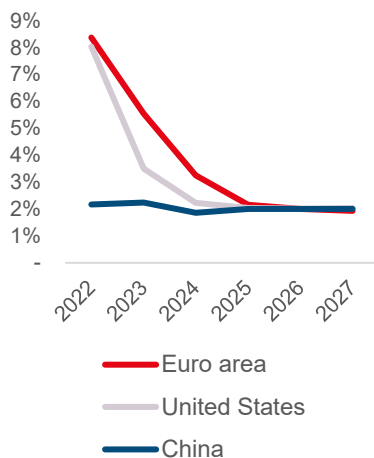


Figure 5: Inflation rate (expectations) 2022-2027

Industry overview

Macro analysis

The COVID-19 pandemic initially brought significant challenges to the solar inverter industry, disrupting production and supply chains. Despite these initial setbacks, Germany's renewable energy sector, particularly in solar inverters, showed resilience with a strong recovery, evidenced by a 19% increase in power generated by photovoltaic (PV) systems from 2021 to 2022 (ISE, 2023). This recovery was supported by a global shift towards renewable energy, further accelerated by the war in Ukraine. The conflict highlighted the need for energy independence in European countries, which had relied heavily on Russian energy, thus speed up diversification efforts and benefiting the solar PV industry (Heinhaus, 2022).

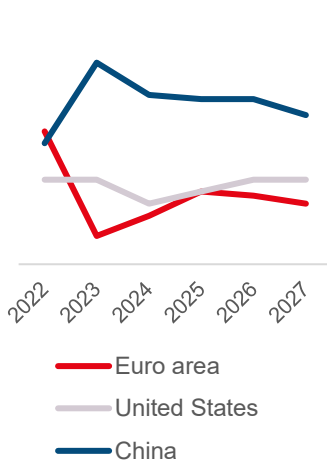


Figure 6: GDP growth rate (expectations) 2022-2027

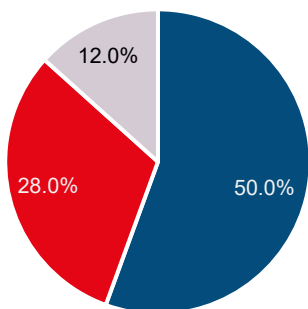
Trade restrictions arising from the war in Ukraine and COVID-19-related disruptions significantly impacted global supply chains, notably causing semiconductor chip shortages.

While post-COVID efforts have somewhat alleviated these issues, they have not been completely resolved, as reflected in fluctuating EU energy prices. In August 2022, the price per Megawatt hour (MWh) in the EU was ca. EUR 465, compared to ca. EUR 35 in August 2020. By November 2023, the price had decreased from its August 2022 peak to about EUR 91 (Kleiner et al., 2023).

Inflation rates in Europe (8.4%) and the US (8.1%) peaked in 2022, driven primarily by rising energy prices due to the Ukraine conflict and decreased demand in the manufacturing sector. The IMF forecasts a convergence of inflation rates to ca. 2% by 2027. China's inflation rate, starting at 2.2% in 2022, is also expected to reach 2.0% in 2027.

GDP growth in the Euro area is projected to decline from 3.3% in 2022 to 1.5% in 2027, with a low of 0.7% in 2023. In contrast, the US is expected to maintain a stable growth rate of 2.1% from 2022 to 2027, although a temporary dip to 1.5% is anticipated in 2024. China, with a 3.0% growth rate in 2022, is expected to experience higher growth rates in the following years, peaking at 5.0% in 2023 and stabilizing at 3.7% in 2027.

Market analysis



■ APAC ■ EMEA ■ Americas

The global solar inverter market generated sales of EUR 29bn in 2022, with ca. 50% of these sales originating in the APAC region, making it the largest global market. EMEA contributed ca. 28% to the sales, while the Americas accounted for ca. 12%. This market encompasses solar inverters for various use cases, ranging from residential to large-scale on-grid applications. Analyst forecasts predict the global market to grow at a Compound annual growth rate (CAGR) of 8.2% until 2032.

■ EMEA

The EMEA solar inverter market, a key market for SMA, accounted for ca. 28% of global inverter sales in 2022, translating to a total volume of EUR 8bn. This market is projected to grow at 8.2% p.a. from 2023 to 2032, reaching EUR 17.6bn in 2032. Historically, the market experienced high double-digit growth rates, with increases of 44% from 2020 to 2021 and 82% from 2021 to 2022. In 2022, the Large Scale segment contributed 165 GW, accounting for 58.1% of the total installed solar capacity, while the C&I segment added 27.1% (77 GW), and the Home Solutions segment made up 14.8% with 42 GW.

Figure 7: Global split of solar inverter market in 2022

The European Green Deal, launched in 2019, significantly drives Europe’s renewable energy strategy. It aims to position the EU as a net-zero greenhouse gas emitter by 2050, targeting a reduction in emissions by at least 55% by 2030 compared to 1990 levels and ensuring above 32% of the EU’s energy comes from renewables by 2030. The REPowerEU plan, established in 2022, further accelerates this shift, aiming to build solar capacities of 400 GW by 2025 and 750 GW by 2030 in Europe (Ivanova, 2022).

The war in Ukraine has intensified the need for energy diversification in Europe, highlighting vulnerabilities in energy security, particularly dependence on Russian gas. This has led to a policy shift towards renewable energy sources, including solar, wind, and hydrogen. As a result, daily imports of crude oil from Russia dropped from 2.4m barrels per day in early 2022 to 0.6m barrels per day in January 2023 (IEA, 2023). The EU is also promoting domestic production of renewable energy components to reduce dependence on Asian manufacturers (Mendonça, 2023).

National regulations in EU member states, like Germany, the Netherlands, and Belgium, as well as Switzerland, significantly impact solar energy expansion. Regulations mandate solar installations on new commercial buildings, and some extend to existing buildings. The EU plans to enforce a solar installation obligation by 2027 for commercial and 2029 for residential buildings (Tisheva, 2023). With current adoption rates of ca.11% in residential buildings in Germany and 16% in the Netherlands, these regulations indicate significant potential for solar energy growth (Dilon, 2022).

In Europe, annual solar energy production increased from ca.46 Terawatt hours (TWh) in 2018 to ca.61 TWh in 2022. Despite an overall decrease in energy production, solar energy’s share of the total grew from 7.5% in 2018 to 13.0% in 2022. Coal and natural gas, while still major energy contributors, have lost shares to renewable energies, particularly solar power.

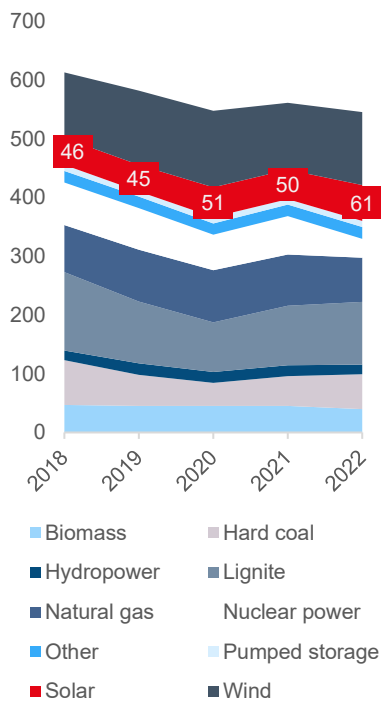


Figure 8: Annual energy production in Europe by source in TWh (Source: Agora Energiewende)

▪ Americas

America represents the smallest market for solar inverters, accounting for ca.12% of the global market, equivalent to EUR 3.4bn in 2022. With a projected market CAGR of 8.2% until 2032, the American solar inverter market is expected to expand to a total size of EUR 7.5bn. In 2022, the region had an installed capacity base of ca.200 GW, with the Large Scale segment being the largest, comprising 131 GW (65.7%). The Home Solutions segment accounted for ca.50 GW (25.0%), and the C&I Solutions segment contributed 19 GW (9.3%). By 2030, a total capacity of 621 GW is anticipated in America, split among 408 GW in Large Scale solar PV, 155 GW in Home Solutions, and 58 GW in C&I applications.

Over the past decade, the US has significantly advanced towards energy independence, marked by a substantial increase in domestic oil and natural gas production due to advancements in extraction technologies. US crude oil production increase from about 5m barrels per day in 2008 to nearly 13m by 2019, a rise of over 150% (EIA, 2019). This growth established the US as a global oil production leader. Natural gas production also witnessed considerable growth, positioning the US prominently in the global natural gas market. Concurrently, the US experienced a shift towards renewable energy, particularly in wind and solar. Renewable energy consumption surpassed coal in the US for the first time in over 130 years in 2019 (EIA, 2019). Solar power generation grew from 1.2bn Kilowatt hours (KWh) in 2008 to about 93bn KWh in 2020.

Political initiatives, especially the 2022 Inflation Reduction Act (IRA), have been pivotal in promoting renewable energies in the US. The IRA allocates USD369bn to decarbonize the economy and address climate change. It offers a 30% tax credit to enable an additional 7.5m families to install rooftop solar panels, leading to significant savings (Weaver, 2022). The IRA also includes incentives for manufacturers, with tax credits for solar system installation and specific credits for inverter manufacturers (Kennedy & Fischer, 2022). A critical aspect of the IRA is the requirement for production to be US-based to qualify for government subsidies, aiming to create long-term jobs and enhance domestic energy security (Mehta & O'Rourke, 2022). The SEIA estimates that the solar deployment by 2033 will increase by 48% due to the IRA, with an additional investment volume of USD 144bn anticipated by 2032 (SEIA, 2022).

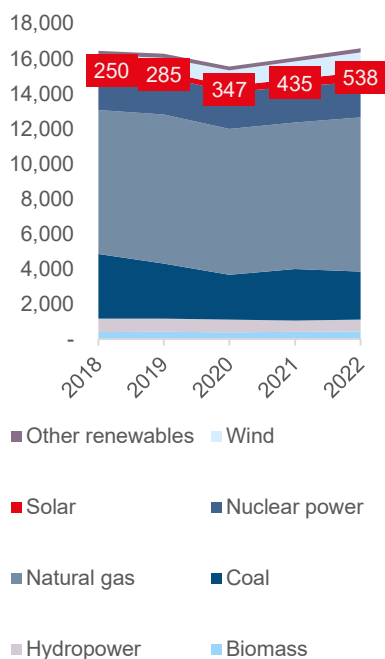


Figure 9: Energy consumption in the US by source in TWh (Source: Our World in Data)

While total energy consumption in the US rose marginally by 0.8% between 2018 and 2022, the share of renewable energies in the energy mix increased significantly. The share of renewables grew from 7.5% in 2018 to 11.5% in 2022, with solar energy's share rising from 1.5% (250 TWh) in 2018 to 3.3% (538 TWh) in 2022 (Ritchie & Roser, 2023).

▪ APAC

In 2022, the APAC region represented the largest market for solar inverters, holding ca.50% of the global market share, equivalent to EUR 14.3bn. The market is forecasted to reach a valuation of EUR 31.3bn by 2032, growing at a rate of 8.2% p.a. Within APAC, China dominates, accounting for 78% of the region's market.

The total installed solar PV capacity in APAC in 2022 was 144 GW, with the Large Scale segment being the predominant contributor at 93 GW (64.7%). The C&I Solutions segment followed with 34 GW (23.5%), and the Home Solutions segment constituted the smallest portion with 17 GW (11.8%).

China's transition towards renewable energy production, particularly solar power, is driven by the government's goals to reduce CO₂ emissions. The target is to peak CO₂ emissions before 2030 and achieve CO₂ neutrality by 2060 (IEA, 2021). Despite the ambitious nature of these goals, recent studies suggest their feasibility (WWF, 2014).

To support these objectives, the Chinese government has implemented various policy initiatives. Since 2021, an emissions trading system (ETS) has been operational in China's energy sector (Guel, 2021). The ETS aims to fairly price CO₂ emissions, thereby favouring low-carbon products. Although currently limited to the energy sector, there are plans to expand the ETS to other emission-intensive industries. Regional pilot projects showed that even the implementation of low prices of ca.EUR 13 per ton of CO₂ (compared to ca.EUR 80 per ton in Europe as of October 2023 (Tiseo, 2023)) can lead to a significant decrease. In the Guangdong region, this led to a CO₂ emission decrease of over 12% from 2013 to 2019. This shows the influence, a proper ETS can have.

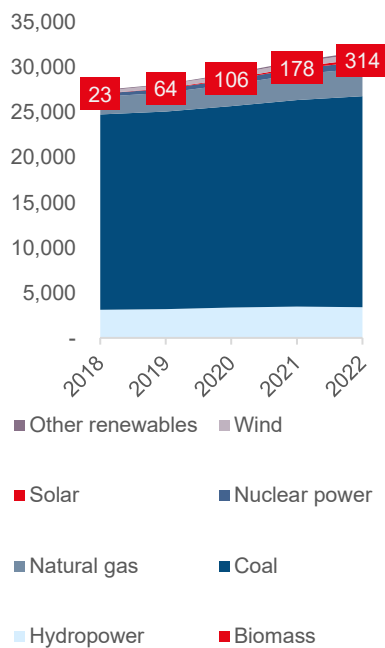


Figure 10: Annual energy consumption in China by source in TWh (Source: Our world in Data)

In addition to the ETS, China has introduced subsidies for renewable energy. For instance, in 2022, the government announced a package worth ca.EUR 380m to boost wind and solar energy deployment in various regions (Wang, 2022). Significant investments are also being made in necessary infrastructure, including storage solutions and electricity grid adaptations for renewable energy integration. The "Outline of the National Comprehensive ThreeDimensional Transportation Network Planning" published in 2021 sets benchmarks and leads planning for these measures (Guel, 2021).

In 2018, China's energy mix was heavily reliant on coal, contributing ca.78% to total energy consumption. Renewables only accounted for 1.4%, with solar energy representing a minor fraction. By 2022, the renewable share more than doubled to 3.6%, with solar power constituting 32.1% of this share (1.1% of total consumption). The rapid growth rates of 25.6% p.a. for renewables (92.5% for solar) indicate a clear shift towards greener energy, as evidenced by coal's reduced contribution to 73.6% of China's total energy consumption in 2022 (Ritchie & Roser, 2023).

Competitive landscape

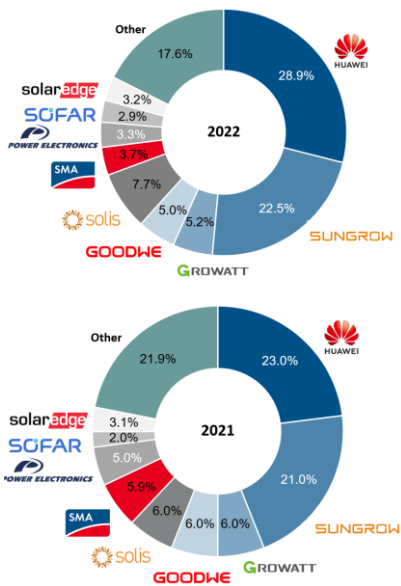


Figure 11: Market shares of top-9 players in global solar inverter market 2022 vs. 2021 (Source: Wood MacKenzie, Analyst analysis)

The competitive landscape in the solar inverter industry is diverse and varies regionally, with a small number of large international players dominating the overall competition. This group includes global technology companies like Huawei and specialized solar inverter manufacturers such as SMA and SolarEdge. The market is primarily controlled by these top players. In 2022, Huawei held a market share of 28.0%, while Sungrow contributed 22.5% to the total market in terms of shipments. Thus, these two companies combined hold over 50% of the solar inverter market. The next seven largest companies collectively accounted for ca.31%, meaning the top nine players in the market held a share of over 82%. This represents a consolidation of the market compared to previous years. In 2021, the top nine companies had a market share of ca.78%, and in 2020, it was about 74%.

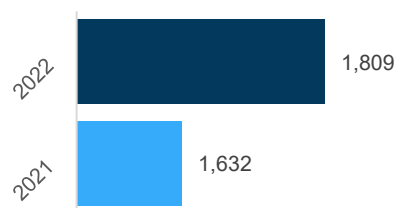


Figure 12: HHI for solar inverter industry 2022 vs. 2021 (Source: Wood MacKenzie, Analyst analysis)

A Herfindahl-Hirschman-Index (HHI) of 1.8k in 2022 indicates that the market is moderately concentrated. The increase of the HHI from 1.6k in 2021 also indicates the market to become more consolidated. A higher HHI represents a higher level of concentration within a market.

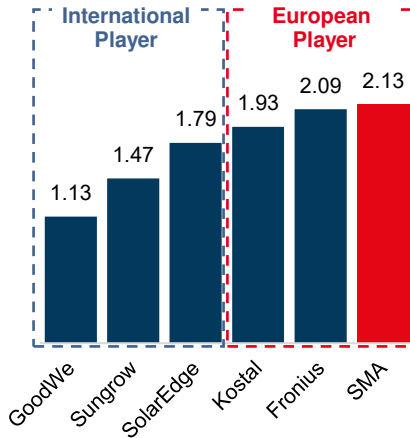


Figure 13: Price comparison of European & International Players of 10kW inverters in EUR/k (Source: Company information, Analyst analysis)

Huawei, in particular, has seen significant gains in market share, increasing by ca.6ppt from 2020 to 2022. In contrast, SMA experienced a decline in market share during this period. SMA's share decreased from 7.8% in 2020 to 3.7% in 2022, yet it remains the 6th largest player in the market. It's important to note that these market shares are based on inverter shipments. Given that SMA's products are priced higher than those of its Asian competitors, SMA's share in terms of sales revenue would be significantly larger. This pricing strategy contrasts with that of Asian competitors, who focus on gaining market shares through competitive pricing.

European key players like SMA, Kostal, and Fronius, both of which are privately held companies, demand higher prices for their products. An analysis of inverter prices reveals that SMA is at the top among European suppliers, with prices of European manufacturers being 40.1% higher on average than their Chinese counterparts.

Competitor overview

Huawei's foray into the solar sector primarily centers on smart photovoltaic solutions, leveraging its ICT competencies. The product portfolio includes efficient inverters, smart energy storage, and cloud-based management systems, showcasing a technology-driven approach. This positions Huawei as a direct competitor to SMA's core business, but with a stronger emphasis on integrated smart solutions. Performance-wise, Huawei has shown resilience and the ability to grow in the market even during complicated time periods, but geopolitical factors impact its market access, particularly in the US and parts of Europe.

Sungrow's product range, from string inverters to large-scale central inverters, covers a lot of SMA's portfolio but with a more aggressive pricing strategy. This positions Sungrow as a cost-effective alternative to SMA, especially in price-sensitive markets. Sungrow's performance indicators, such as market share and global reach, are robust, especially in the APAC region.

Growatt's portfolio, mainly targeting residential and commercial sectors, competes with SMA in these segments. Their products, however, are positioned as more economical options, appealing to a different customer segment compared to SMA's premium offerings. Growatt's performance in emerging markets is noteworthy, but it lacks SMA's brand recognition and technological depth.



GOODWE

GoodWe competes with SMA in the residential and commercial inverter market. Their products, known for reliability and user-friendliness, are positioned as mid-range options, contrasting with SMA's high-end market position. GoodWe's performance indicators show strong growth in Europe and China.



Ginlong Solis' inverters cover a similar range to SMA, but with a specific focus on string inverter technology. This specialization differentiates them from SMA's more diverse offerings. Ginlong's performance in terms of revenue growth and market penetration is ascending, especially in European and North American markets.



Specializing in utility-scale solutions, **Power Electronics** offers products that cater to a different segment than SMA's more diversified portfolio. Their focus on large-scale projects positions them somewhat apart from SMA in the industry. Power Electronics has shown steady growth, especially in large solar installations.



SofarSolar competes with SMA in the residential and commercial segments with more cost-effective solutions. Their product portfolio, while similar in scope to SMA's, is positioned at a lower price point. Performance-wise, SofarSolar is expanding in Asian and European markets but lacks the global brand presence of SMA.



SolarEdge's product portfolio, featuring power optimizers and integrated inverter solutions, competes directly with SMA's offerings but with a unique value proposition centred on maximizing power efficiency. This positions them as a technology leader, akin to SMA, but with a distinct technological edge. SolarEdge's performance indicators, including market share and revenue growth, are strong, especially in North America and Europe. The company has been active in M&A, acquiring companies to enhance its technological capabilities and market reach.

SMA in Fiscal year 2022 & YTD Sep-2023

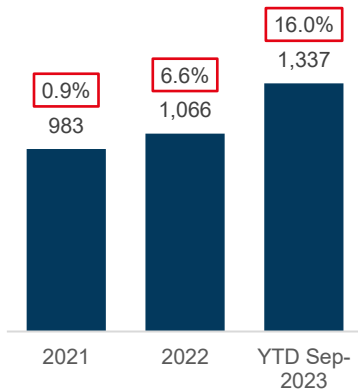


Figure 14: Total sales (EUR m) and EBITDA-margins 2021- YTD Sep-2023 (Source: Annual reports, Analyst analysis)

In a successful fiscal year 2022, SMA broke the EUR 1bn sales barrier once again after 2020, with total sales of EUR 1.066m and an EBITDA of EUR 70m (6.6% margin). The positive result was achieved due to a significantly better operating performance than in the previous year. SMA was also able to carry this positive trend into 2023. By the reporting date of the third quarter on 30 September 2023, sales of EUR 1.337m and EBITDA of EUR 214m (16.0% margin) had already been generated. YTD Sep-2023 thus already exceeds full year 2022 revenues by 25.5% and EBITDA is even 205.9% higher. Compared to Q1-Q3 2022, YTD Sep-2023 revenues are 84.7% higher, showing the continuation of the growth trend from 2022.

ESG performance

In the solar inverter industry, ESG (Environmental, Social, and Governance) performance is increasingly recognized as a crucial factor by investors. At first glance, a positive ESG image is typically associated with companies in this sector, attributed to the eco-friendly nature of the industry. However, upon closer examination, notable variances in ESG performance are revealed among SMA's competitors.

In Figure 15 the Sustainalytics ESG Risk Ratings for key industry players are illustrated, indicating different levels of exposure to industry-specific risks. These ratings encompass the range of internal ESG initiatives and the material risks inherent in the industry. A significantly lower risk profile is exhibited by SMA compared to most of its peers, with SolarEdge being the only competitor with a marginally better rating.

As the industry evolves, an increased emphasis on internal ESG efforts is anticipated, with the comparative analysis with other energy forms becoming less relevant. Being a European entity, SMA is well-positioned to navigate these challenges. However, it is observed that the complexity of managing internal and external ESG factors tends to increase with the company's size. Therefore, it remains to be seen whether SMA can maintain its competitive edge in ESG performance amidst its anticipated growth.

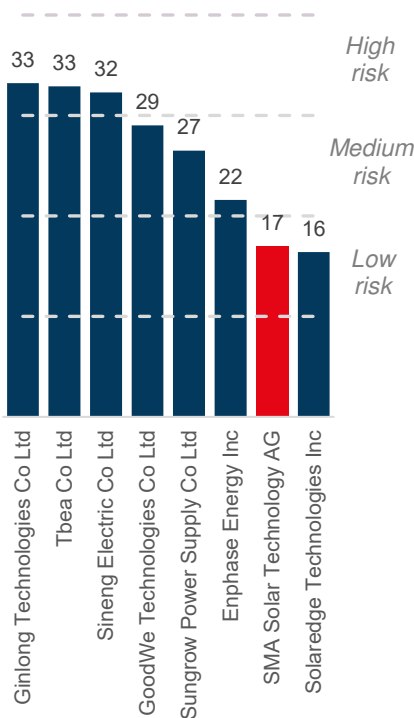


Figure 15: Comparison of Sustainalytics' ESG Risk Rating of SMA's key competitors (Source: Sustainalytics)

Key risks

In the solar inverter market, which is intrinsically linked to the broader solar energy sector, seasonal and political factors play a significant role. As discussed in the market section above, initiatives by the European Union, with countries like Germany at the forefront, and the US, aim to promote solar energy expansion. These initiatives are designed to enhance the purchasing power of both end-users and manufacturers in the industry. However, these initiatives are heavily reliant on political position of the of the ruling parties and their willingness to drive deployment of renewables. At the same time, political support makes SMA very dependent on the associated framework conditions. In some regions, funding is linked to the fulfilment of certain conditions. These can also be politically influenced. For example, support under the Inflation Reduction Act (more on this in later chapters) is also a protectionist measure to strengthen the domestic economy. As a foreign producer, SMA is therefore only partially eligible for solar PV subsidies in the US. However, as such measures usually apply for longer periods of time (often until at least 2030), it is possible to plan until then, at least to a limited extent. The associated risk is therefore considered to be medium to low.

Concerning SMA's financial performance, challenges in generating positive cash flow have been observed, particularly in recent years. From 2020 to 2022, revenues have remained relatively steady at ca.EUR 1bn, while EBITDA margins have shown variability, ranging from 0.9% to 7.0%. The sustainability of SMA's current performance, especially regarding its EBITDA margin, is a critical question for investors and analysts alike.

SMA has overcome difficult market conditions and has been operating in a much more sustainable manner for several years now and is showing a positive trend. The risk is therefore also considered to be medium to low.

SMA occupies a unique position in the inverter market, attributed to its comparatively high pricing policy. Historically, there have already been problems with this strategy in competition. SMA could not keep up with the prices of its Asian competitors and therefore had major problems maintaining its strategy at the time. Over time, SMA was able to identify a niche in which it could keep up with its prices. However, this strategy relies heavily on its activities in Europe, where SMA's brand and high quality make it competitive despite its high prices. However, this strategy is not without risk and could become a problem as soon as other suppliers manage to offer the same quality at lower prices and SMA is forced to lower its prices. In the subsequent section, titled 'solar inverter price development,' various potential price scenarios are compared, also considering the implications for SMA's future share price. In recent years, SMA has already been able to prove that its own competitive position definitely has a right to exist. The assessment of this risk is thus medium to low.

Key Risk	Assessment
Political Stability of political decisions	Medium to Low
Financial Performance	Medium to Low
Competitive Positioning	Medium to Low

Figure 16: Assessment of SMA's key risks (Source: Analyst analysis)

Value drivers and forecasts

Revenue forecast

SMA's revenue forecast employs a bottom-up approach, ensuring robust and segment-specific projections across different regions. The fundamental concept for forecasting revenues involves multiplying the sold quantity by the price per GW.

For the quantity, its direct impact on SMA's revenues is acknowledged. The quantity sold in each of the three segments is forecasted independently for every region to ensure precision in projections.

Regarding prices, they are evaluated as the price per sold GW. Given the market's sensitivity to solar inverter prices across different segments and geographies, a detailed approach is adopted for price projections. The significance of pricing as a key differentiator among market players underscores the need for accurate price forecasting.

Each segment and region's primary value drivers for both quantity and price are then identified individually. SMA's historical performance is regressed against the historical trends of each driver. This analysis yields coefficients that act as weights for each value driver, uniquely applied to each segment in each region.

For detailed regression results and the coefficients per segment and region, see the detailed overview table in the Appendix.

A source-based forecast for each value driver is employed, and the calculated weights are applied to achieve reliable sales projections for the detailed planning period up to 2027. The historical regional and segment splits are then applied to determine the total sales expectations. Beyond this, a convergence period from 2028 to 2034 is incorporated, where the planning gradually aligns with the long-term growth expectation.

- Quantity

The quantity sold by SMA is influenced by four key drivers, with the degree of dependency varying across different segments.

One of the primary drivers is the annual installed capacity, pivotal to the success of a country's solar PV expansion strategy. This capacity, generally dictated by national renewable energy plans, outlines the targeted GW installations for each year within the detailed planning period (2023-2027), and varies by country. Political commitment to reducing CO2 emissions and promoting renewable energies, along with the practicality of different energy forms, are influential. The choice of energy expansion is often dictated by geographical features, with countries rich in coastlines favouring hydropower and wind energy, while sunnier nations prioritize solar PV. Each country and industry, therefore, crafts its strategy and expansion targets based on these factors.

The real estate market's trajectory also delicately impacts solar PV installations. New constructions frequently include solar PV panels, driven either by regulatory requirements or the owner's preference. This trend affects both the Home Solutions and C&I Solutions segments, making them dependent on the construction industry's health. Furthermore, the region's GDP plays a critical role in SMA's revenue development. Investments in renewable energy are typically priorities for wealthier economies, with the level of investment correlating with a country's GDP and its future projections.

In the realm of energy competition, both qualitative and quantitative factors are considered. The Levelized Cost of Energy (LCOE) is a critical metric for quantitative evaluation, accounting for total investment, production costs, and total energy production over a plant's technical lifespan. The LCOE varies significantly among different segments, influencing the choice of energy generation methods.

An intensive forecast of each influencing factor was conducted for the detailed planning period. SMA's historical revenue development was analysed in relation to the progression of these factors. Statistical regression was used to derive a coefficient, indicating the impact of each factor's future development on SMA's revenues. The quantity sold is thus calculated from the growth rates of these factors and their historically weighted influence, acknowledging the significant impact of market conditions on SMA's trajectory. Additionally, SMA's historical market performance, particularly in relation to identified revenue drivers, is factored into future performance projections. Therefore, the forecasted future sales for various segments and regions are grounded in both internal and external growth drivers, offering a multi-faceted and reliable forecast.

- **Price**

In the coming years, intense price competition is expected across all three regions where SMA operates, driven by the competitively low prices of Asian competitors. These rivals can offer more attractive prices due to their significantly lower production costs. Although SMA's strategy focuses on high-priced products, a reduction in prices may become necessary for maintaining competitiveness in the global market.

Historically, SMA's prices have shown a trend similar to the LCOE, stemming from the inclusion of initial investment costs in the LCOE calculation. Therefore, a similar trend in solar inverter prices, following the LCOE, is projected for the future. It is expected that the price for a GW sold by SMA will decline from ca. EUR 93m in 2023 at a rate of 2.9% p.a. to ca. EUR 63m by 2032. In addition to the volume sold, pricing will have a substantial impact on SMA's revenues. Adapting to market dynamics and competitive pressures from lower-cost producers is thus a key consideration for SMA's financial strategy moving forward.

- **Scenario Analysis**

In previous discussions, it was highlighted that SMA's inverters are positioned at a higher price point compared to competitors in both European and global markets. Market research indicates a downward trend in the LCOE for SMA's primary regions in the foreseeable future. Authoritative sources, such as the European Technology Platform for Photovoltaics, predict a decrease in solar system installation costs, particularly affecting inverter prices. The analysis includes a projected price reduction aligned with the expected LCOE decline through to 2028.

However, a comprehensive assessment of the pricing impact is necessary, especially on EBITDA margins and cash conversion rates, with the aim of maintaining stable margins. This approach presupposes SMA's ability to effectively pass on price fluctuations to suppliers and third parties, while implementing cost-efficiency strategies under consistent conditions.

The scenario analysis projects annual price reductions ranging from 5.5% to 9.4% until 2030. The scenario of a 9.4% annual decrease corresponds to a situation where SMA's inverter prices fall by 50% from 2023 to 2030. This aligns with the report from the European Technology Platform for Photovoltaics, which forecasts a similar 50% reduction in global PV system prices by 2030. Nevertheless, such a significant price decline could be transformative for the industry. The analysis indicates that even under this extreme scenario, SMA's share price is expected to remain within the current range, thereby reducing the risk of losses. It is important to recognize that this analysis focuses primarily on assessing the maximum risk, without exploring potential upsides. Lower inverter prices might boost the competitiveness of solar PV energy against other energy forms, offering additional opportunities for market growth and investment.

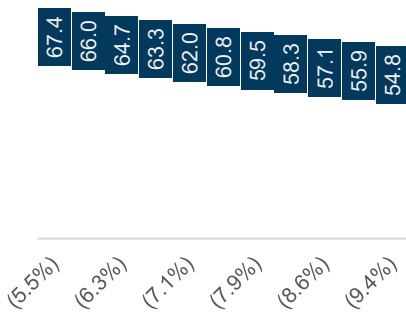


Figure 17: Scenario analysis for different levels of annual inverter price decreases in EUR (Source: Analyst analysis)

EMEA

The prominence of EMEA as key market for SMA is projected to grow substantially. It is anticipated that EMEA's contribution to SMA's total sales will rise by 11ppt, from 71.1% in 2023 to 82.1% by 2032. This equates to an absolute growth from EUR 1,321m in 2023 to EUR 3,392m in 2032, representing a CAGR of 10.7%.

In Europe, SMA's primary market, the expansion of solar energy is predominantly driven by political objectives established by the EU Commission. While implementation rests with national governments, the overarching goals are set at the European level. The REPowerEU plan, introduced in 2022, is particularly pivotal for the solar industry, establishing two critical targets: achieving an EU-wide solar PV capacity of 400 GW by 2025 and a goal of 750 GW by 2030. Experts believe these targets are not only attainable but may also be surpassed. The forecast assumes the successful achievement of these targets. However, the deployment hinges on the availability of a skilled workforce and necessary materials, which are currently limited and require development within Europe. Therefore, it is considered realistic that Europe will initially aim to meet its 2025 goal with an annual capacity installation of 55.7 GW from 2023 to 2025. Following this, an acceleration in expansion is expected, with an annual capacity increase of 76.2 GW leading up to 2030.

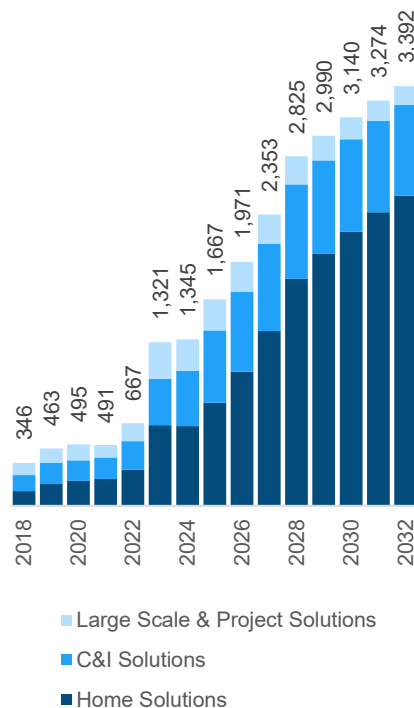


Figure 18: Revenue development in EMEA per segment in EUR m (Source: Annual reports)

- Home Solutions

In EMEA, the Home Solutions segment, with revenue of EUR 651m, constitutes 49.3% of SMA's sales in 2023, and is forecasted to be a key driver of sales in the future, with a CAGR of 16.1% from 2023 to 2032. By 2027, this segment's revenue share in EMEA is anticipated to reach 60.0% (EUR 1,411m), and further increase to 73.8% (EUR 2,505m) in 2032.

The robust growth of this segment is primarily driven by the anticipated decrease in LCOEs, projected to fall by just under 4% p.a. until 2030. LCOEs encompass both installation and operating costs. Homeowners, a significant customer base for SMA, often prefer domestic products with reliable service. As LCOEs continue to decrease, sales to private customers are expected to become increasingly accessible. Another influential factor is the growth of the European GDP. The IMF's projection of steady one-digit GDP growth rates until 2028, following a slight decline in 2022, suggests a correlation with the growth of Home Solutions. In a more prosperous economic environment, homeowner investments in green energies are likely to rise.

However, the annual capacity increase in the EU is forecasted to have minimal impact on revenues, emphasizing that homeowner spending is more influenced by factors directly affecting their lives, such as LCOE and the overall economic situation. The residential housing market is also not expected to significantly impact sales, given the relatively low adoption rate of solar PV in most European countries and the lack of imminent EU-wide regulations for new residential buildings.

- C&I Solutions

C&I Solutions, with sales of EUR 375m and a 28.4% share in 2023, is EMEA's second-largest segment. It is expected to grow at 7.7% p.a., reaching sales of EUR 734m by 2032 (EUR 704m in 2027). As this growth rate is lower than that of the Home Solutions segment, C&I Solutions is expected to lose relative sales shares.

The significant number of regulations already in place for the C&I segment in Europe is a key driver for revenue growth in SMA's C&I segment. C.27% of the total solar PV capacity built in Europe, contributing 133.5 GW, is expected from this segment. Apart from that, decreasing LCOEs over the forecast period and the commercial real estate market also influence the sales of C&I Solutions in EMEA. However, given the low adoption rate, new buildings play only a minor role in SMA's sales.

▪ Large Scale & Projects Solutions

In contrast, the Large Scale segment in EMEA is the only one projected to show decreasing sales in the forecast period. With an annual decline rate of 7.0% from 2023 to 2032, sales are expected to decrease from EUR 295m to EUR 153m (EUR 237m in 2027), resulting in a reduced share of total sales in EMEA from 22.3% to 4.5%.

In the Large Scale segment, two opposing effects are observed. On one hand, capacity increase in this segment is a key driver, with ca.58% of the total capacity increase coming from an additional 276.3 GW in large-scale solar PV. On the other hand, the expected price decrease particularly affects this segment. Large-scale projects are predominantly investment-driven with a focus on returns, where LCOE plays a decisive role. SMA's higher prices contribute to higher project-specific LCOEs, making it challenging for SMA to compete in price wars against significantly cheaper suppliers from Asia, despite its quality leadership and service.

Americas

In 2023, SMA's total sales in the Americas are expected to reach EUR 418m, accounting for 22.5% of the company's revenue. With a modest CAGR of 2.3% from 2023 to 2032, revenues are projected to increase to EUR 511m in 2032, reducing their share to 12.4% of SMA's total sales.

The American market presents unique complexities in SMA's forecast. Despite evident growth potential indicated by IRENA's capacity expansion projections of an additional 296.2 GW of solar PV from 2023-2032, the Inflation Reduction Act (IRA) also plays a critical role.

▪ Home Solutions

In the Home Solutions segment in the Americas, a strong growth period of 31.9% p.a. is forecasted from 2023 to 2027, followed by a decline of 11.0% annually from 2028 to 2032. This results in a slight long-term increase, from EUR 16m in 2023 to EUR 28m in 2032. The deployment of 105.2 GW of solar PV in the Home Solutions segment by 2030 and decreasing LCOE are significant factors. The IRA's subsidies in the US, up to 6.5 cents per Watt, are expected to reduce prices by over 10% each year from 2024 to 2032. SMA's competitive advantage of high quality is less pronounced outside of Europe, where factors like domestic brand recognition are less influential.

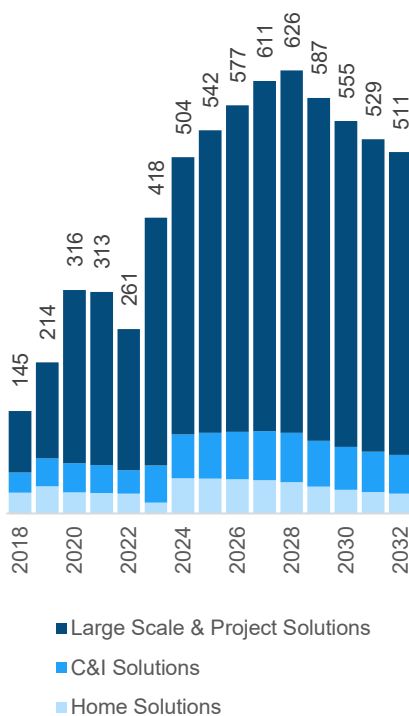


Figure 19: Revenue development in Americas per segment in EUR m (Source: Annual reports)

▪ C&I Solutions

In 2023, the C&I Solutions segment in the Americas is expected to contribute 12.5% (EUR 37m) to the region's sales, with figures nearly stagnant until 2032, reaching EUR 34m. It is projected to decline at a CAGR of -0.7% from 2023 to 2032. Similar to Home Solutions, decreasing LCOE and a solar PV capacity increase of 39.2 GW until 2030 are primary drivers, although the IRA provides smaller subsidies of 2 cents per Watt for commercial inverters. The commercial real estate market, expected to grow at stable rates of ca.3% p.a. until 2028, also contributes to the segment's development.

▪ Large Scale & Project Solutions

The Large Scale segment, with revenues of EUR 350m in 2023 and EUR 428m in 2032, contributes the largest share to SMA's revenue in America (83.8% in 2032). This is largely due to geographical conditions that favour large unutilized spaces with strong solar radiation. The segment is expected to grow at 2.3% p.a. from 2023 to 2032. Key growth drivers include decreasing LCOE, at 1.5 cents per Watt for utility-scale inverters, and a capacity growth of 276.3 GW in the Large Scale sector, accounting for 65.7% of the total solar PV deployment in America. Additionally, GDP growth, projected at an average of 4.1% p.a. from 2023 to 2028 in the USA, is an important factor in the sales forecast, as investment and government spending are more feasible with a growing GDP.

APAC

Overall sales in the APAC region for SMA are projected to experience a moderate increase at a rate of 6.1% p.a. from 2023 to 2032, resulting in EUR 203m and a sales share of 4.9% in 2032. This marks a decline from a 6.4% share (EUR 119m) in 2023, indicating a reduced relative importance in SMA's overall sales distribution.

The sales forecast for China, a dominant player in the APAC region, is heavily influenced by political regulations and targets. The effectiveness of China's political system in achieving set goals places it at the forefront of Asia's targets. A total installation of 287.3 GW of solar PV is planned by 2030, as China aims to peak its CO2 emissions before 2030 and achieve climate neutrality by 2060. Consequently, SMA's sales in the region are forecasted conservatively. Moreover, Asia's competitive landscape, populated with numerous solar inverter manufacturers, poses a significant challenge for SMA, a European supplier with relatively high prices.

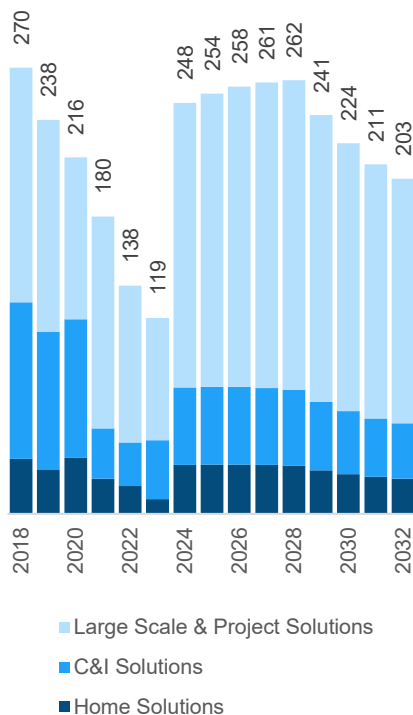


Figure 20: Revenue development in APAC per segment in EUR m (Source: Annual reports)

- Home Solutions

In APAC, SMA's Home Solutions segment is relatively small both in absolute terms and compared to the other segments. With sales projected at EUR 9m in 2023 and increasing to EUR 21m in 2032, it represents 7.4% and 10.5% of regional sales, respectively. The segment is forecasted to grow at a CAGR of 10.3% from 2023 to 2032. Out of the total 287.3 GW of installed solar PV capacity in APAC by 2030, 33.8 GW (11.8%) is attributed to Home Solutions. The decreasing LCOE in APAC, expected to fall annually by 3.3% and 3.5% in 2023 and 2024, respectively, with further declines reaching double digits by 2027, is a significant growth driver.

- C&I Solutions

Sales in the C&I Solutions segment in APAC are expected to decrease annually by 0.7% from 2023 to 2032, dropping from EUR 36m to EUR 34m. Consequently, the segment's share of regional revenue is projected to almost halve from 30.1% to 16.6% over this period. The decrease in LCOE in APAC heavily influences this trend, alongside the segment's expansion by 67.6 GW, accounting for 23.5% of total capacity growth. Despite these positive drivers, the anticipated reduction in SMA's prices per GW predominates, leading to falling sales and a diminishing influence in the region.

- Large Scale & Project Solutions

In APAC, the Large Scale segment is the main contributor to absolute sales growth, nearly doubling from EUR 74m in 2023 to EUR 148m in 2032. This equates to a CAGR of 8.0% and an increase in regional sales share from 62.5% to 72.9%. The segment is influenced by the substantial decrease in LCOE, like the other segments. Large Scale Solutions are expected to contribute the majority to APAC's capacity expansion, with 185.9 GW representing 64.7%. After a 1.0% GDP decrease in 2023, China's GDP growth is forecasted to stabilize above 5% annually from 2024 to 2028, boosting SMA's sales in the Large Scale segment in APAC. This growth is seen as a driver for government spending on necessary infrastructure.

Operating performance & margin development

SMA has transitioned from a period of fluctuating results, historically characterized by instability. In 2018, the company was loss-making, with both EBIT and EBITDA margins in negative territory. Despite slightly increasing sales, earnings only showed marginal improvement before facing another setback in 2021 due to COVID-19 and severe supply constraints from Asia, resulting in a barely positive EBITDA margin of 0.9% (EBIT margin: -3.4%). Nonetheless, the gross margin displayed an overall positive trend throughout this period.

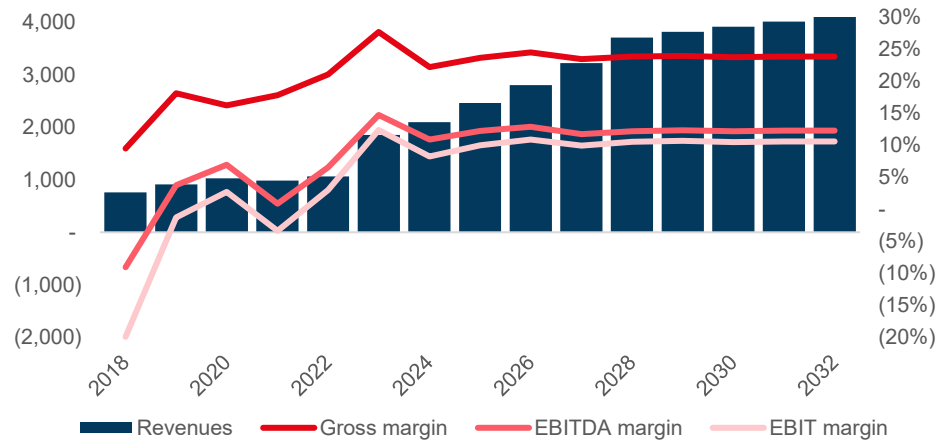


Figure 21: Revenue (in EUR m) & margin development (Source: Annual report, Analyst analysis)

A significant recovery was observed in 2022, with sales and margins returning to a stable range. The year 2023 marks a notable upturn for SMA. Firstly, sales are estimated at a considerable increase. Secondly, margins are about to reach exceptionally high levels. The gross margin at 27.7% was 6.7ppt above the previous year. Similarly, the EBITDA margin (14.7%) and EBIT margin (12.4%) also saw significant year-over-year improvements. Relative savings in almost all operating cost items were achieved in 2023 compared to 2022, primarily attributed to a substantial order backlog. The order book in 2022 was filled with a volume of EUR 2.077m, facilitating more reliable planning after unstable years and allowing internal capacity to be focused on improving operational performance.

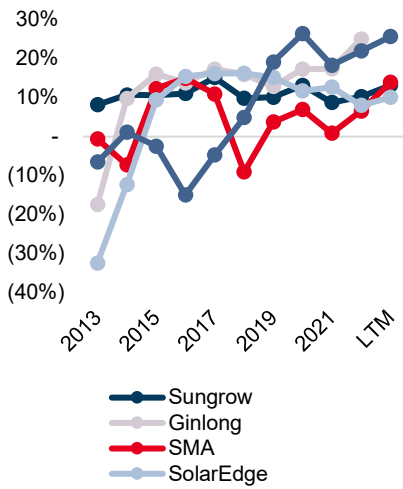


Figure 22: : EBITDA-margin compariosn with key competitors (Source: Annual reports, Analyst analysis)

Looking ahead, margins are not anticipated to sustain the 2023 levels despite an expected increase in sales. The inauguration of an additional production facility and subsequent capacity expansion will likely introduce new cost elements for SMA. However, margins are projected to remain higher than in the years preceding 2023. While the production expansion will incur new costs compared to 2023, operating costs relative to sales are expected to decrease significantly. Production costs per GW sold will reduce substantially as production capacity expands. For instance, SMA plans to engage 200 full-time equivalents (FTEs) for an additional 20 GW of production capacity, in contrast to over 3,000 employees currently required for the existing 21 GW (Henkel, 2022).

When compared with competitors with substantially higher production capacities, it is observed that they achieve significantly higher operating margins than SMA, even with lower prices in some instances. From 2024 to 2032, SMA's margins are forecasted to stabilize at a relatively constant level. The gross margin is anticipated to be ca.24% over the forecasting period. EBITDA and EBIT margins are also expected to remain stable, at ca.12% and 10-11%, respectively, during the same period.

Capital Expenditures

For SMA, Property, Plant, and Equipment (PP&E) primarily comprise assets related to production, such as machinery and plants. In 2022, land and buildings constituted the largest portion of PP&E, accounting for 57.4%. Other assets not directly linked to production, like the vehicle fleet and office equipment, contributed minimally to total PP&E. It is inferred that growth Capital Expenditure (CAPEX) is exclusively dedicated to expanding production capacity.

SMA's CAPEX is closely associated with its production capacity, measured in GW. After a period of not investing in a capacity expansion, because operational performance improvement was of the highest interest of SMA, an additional production capacity expansion of 20 GW is already ongoing. This almost doubles the production capacity in Niestetal, with a planned CAPEX of EUR 80m for 2023 and 2024, aiming for operational readiness by 2024. In 2021 and 2022, a net reduction in PP&E was observed due to the absence of growth CAPEX and maintenance CAPEX being lower than depreciations.

Post-2024, to align with market demand, SMA is projected to increase its capacity by an average of about 3 GW per year, amounting to a total capacity of 68.4 GW by 2034. The expansion cost per additional GW, based on the 2024 investment for the new factory, is estimated at EUR 4m per GW.

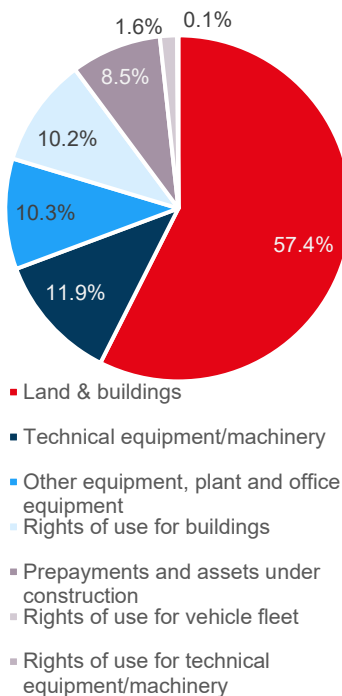


Figure 23: Coposition of SMA's PP&E in 2022 (Source: Annual report, Analyst analysis)

This capacity increase could be achieved through the expansion of production facilities or investments in efficiency enhancements. Over the long term, CAPEX is expected to gradually normalize at a sustainable and prudent level.

Intangible assets at SMA mainly consist of development projects and intangibles in progress, such as the development of energy storage solutions. Intangibles are crucial for SMA to maintain its competitive edge of high quality, justifying a higher price level. In the forecast period, intangibles are anticipated to grow due to increased R&D expenses. However, with SMA’s market position and production capacity predicted to stabilize, the intangible assets are only expected to grow from EUR 88m in 2022 to EUR 97m by 2034.

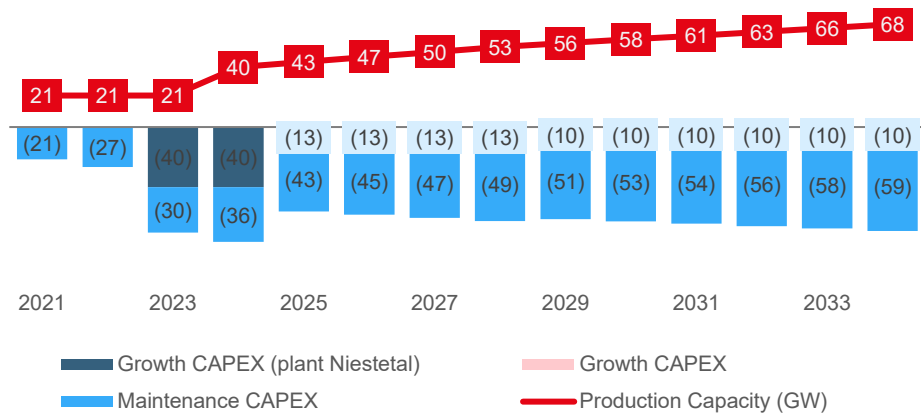


Figure 24: Development of Production Capacity in comparison with Growth & Maintenance CAPEX in EUR m (Source: Annual report, Analyst analysis)

Working Capital Management

SMA’s Net Working Capital (NWC) is a crucial indicator of its liquidity and operational efficiency, aligning with common patterns in the inverter manufacturing industry. In 2022, SMA’s Cash Conversion Cycle (CCC) was 128.6 days, indicative of the duration required to convert investments in inventory and other short-term assets into cash flows. This cycle is marked by high Days of Inventory Outstanding (DIO) and prolonged Days of Sales Outstanding (DSO).

To improve operations, SMA has implemented several initiatives, including rationalizing product platforms, standardizing components, and diversifying its supplier base. These efforts are aimed at increasing operational flexibility. As a result, SMA’s CCC is expected to decrease to 116 days in 2023 and ca.118 days in 2024, propelled by strong order demand and increased GW output.

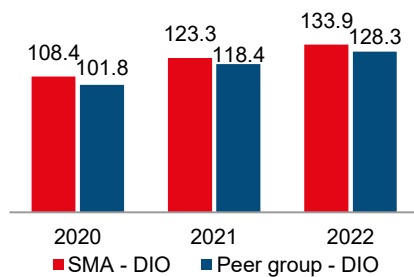


Figure 25: Comparison of DIOs in days SMA vs Peer group (Source: Analyst analysis)

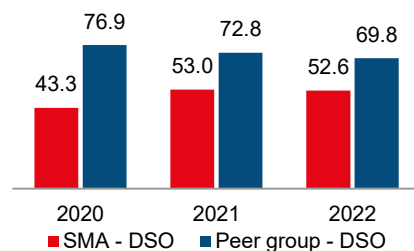


Figure 26: Comparison of DSOs in days SMA vs Peer group (Source: Analyst analysis)

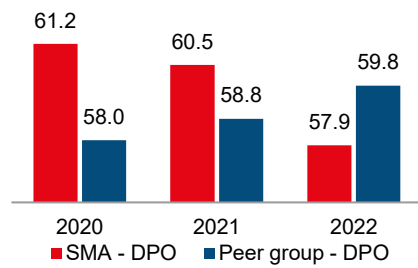


Figure 27: Comparison of DPOs in days SMA vs Peer group (Source: Analyst analysis)

By contrast, Enphase Energy reported a significantly lower CCC of ca.61 days in 2022. This is primarily due to its emphasis on large-scale customers and more powerful inverters, leading to fewer shipments per GW output.

Sungrow, experiencing a 50% increase in sales from 2020 to 2022, observed a notable rise in its DIOs (from 88.0 to 177.6 days). In a similar vein, SolarEdge doubled its sales from EUR 1,280m in 2020 to EUR 2,959m in 2022, experiencing an increase in CCC from 82.8 to 113.7 days.

Given SMA's position within its competitive landscape, anticipated sales growth, and continuous efforts to minimize NWC, SMA's CCC is projected to reach a competitive level of 138.3 days in the long term.

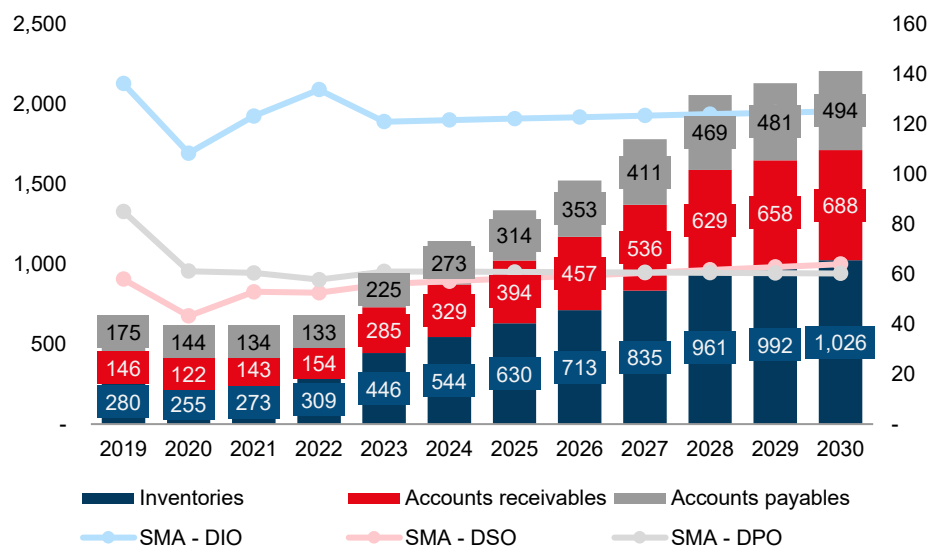


Figure 28: Detailed overview of SMA's working capital components (in EUR m) and KPIs (in days) (Source: Analyst analysis)

Capital Structure

Historically, SMA showed rather low Debt-to-Equity-ratios (D/E-ratio) compared to its peer group. The peer group used for the capital structure analysis includes SMA's solar inverter competitors from Europe as well as other manufacturers of technological components such as semiconductors. Unfortunately, a comparison with Asian competitors is not practicable in this case, as their capital structure is not comparable due to the fundamentally different political situation and monetary policy. A peer group with comparable market and political risks was therefore selected. With a D/E ratio of 5.1% in 2022, SMA is just in the 1st quartile of the peer group. In the past years, SMA has chosen a conservative capital structure as the overall development was very unstable and because of the negative results in some of the recent years, the value of the tax shield was neglectable.

With earnings being expected to be more stable going forward, SMA is foreseen to gradually take on a higher leverage. By 2028, SMA will reach its target capital structure, resulting in a D/E-ratio of 18.1% in 2028. After that, the capital structure is expected to remain at a stable level. Compared to the peer group this still can be seen as a rather conservative capital structure, as SMA has shown to follow a more cautious approach.

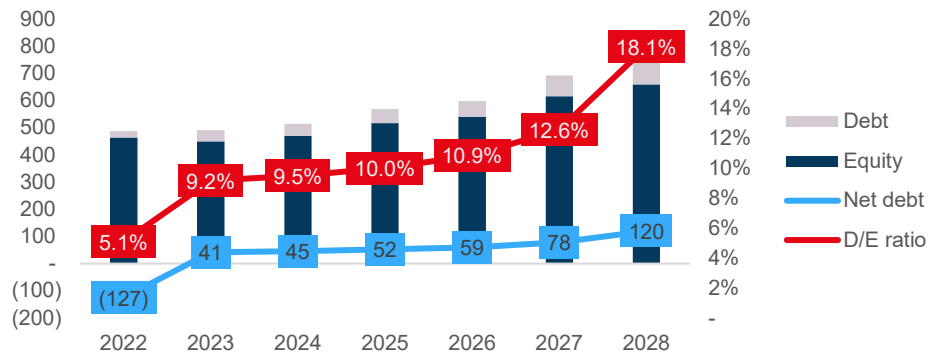


Figure 29: Debt, Net debt & Equity development in EUR m (Source: Analyst analysis)

In comparison to its peer group, SMA's current liquidity ratios align closely with the median of the group. Specifically, SMA's current ratio in 2022, standing at 2.2, is slightly higher than the peer group median of 1.9. Upon extending the analysis to encompass the comprehensive planning and convergence periods, a gradual increase in liquidity ratios is observed. This trend highlights SMA's status as a well-capitalized and solidly positioned entity in its market.

The progressive improvement in liquidity ratios reflects SMA's financial health and its effective management of current assets relative to current liabilities. This positioning enables SMA to meet its short-term obligations comfortably, indicating a robust financial foundation. As such, SMA's liquidity measures, being in line or above the median of its peers, underscore the company's financial stability and its capacity to sustain operations efficiently in the evolving market landscape.

Valuation

Weighted average cost of capital – WACC

In order to accurately determine the value of SMA, an Adjusted Present Value (APV) has been calculated, where the discount rate is primarily derived from the company's unlevered cost of equity and cost of debt. Given the delicate influence, the cost of capital can have on the valuation, its calculation was processed very carefully.

Cost of equity

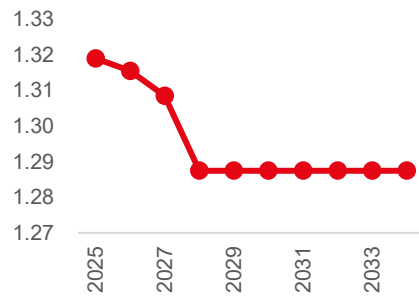


Figure 30: Development of Ru over time (Source: Analyst analysis)

SMA's unlevered cost of capital (Ru) has been calculated using the Capital Asset Pricing Model (CAPM), employing a dual approach that combines a competitor beta analysis and regression of SMA's historical returns against the MDAX returns from November 2018 to November 2023. This combination was chosen to overcome the limitations of each method individually, thereby enhancing the reliability of the derived beta. The competitor beta analysis utilized 5-year monthly and 3-year weekly unlevered betas. The regression of SMA's returns, however, indicated low statistical significance with an R² of 18.0% and a 95% confidence interval between 0.61 and 2.2. The delevering of SMA's equity beta reflects the changing capital structure, with the D/E-ratio increasing from 10.0% in 2023 to 18.1% in 2028. Consequently, the derived Ru decreases from 1.29 to 1.23, while the overall unlevered beta (including both peer analysis and regression) decreases from 1.31 to 1.28 over this period.

The risk-free rate used is 2.0%, based on the yield of German 10-year government bonds. The market risk premium (MRP) is observed at 8.2%, representing the median of historical annual excess returns of the MSCI world over German 10-year government bonds. Thus, Ru ranges from 12.8% in 2023 to 12.6% in 2034.

A sensitivity analysis of the MRP and the levered beta obtained from SMA's performance regression with the MDAX suggests that variations in these factors do not significantly alter the valuation results. However, these factors must be calculated carefully, as they can affect the obtained share price by several Euros (see Appendix for detailed results).

Cost of debt

Cost of debt	
Targeted credit rating	BBB
Implied yield approximation	4.6%
Probability of default (10y)	0.4%
Annual defaulted corporate bond & loan recoveries (1st lien)	61.0%
Loss given default	39.0%
Cost of debt	4.5%

Given SMA's historical lack of significant debt and absence of outstanding bonds, estimating the cost of debt involves a certain level of complexity. Historically, SMA's loss-making status negated the benefits of a tax shield, and the uncertain market environment and SMA's performance would have made debt expensive.

Moving forward, SMA is anticipated to take on debt, aiming for a credit rating at the lower end of investment grade (BBB). This strategy balances moderate debt levels with reasonable interest costs, offering an optimal mix of risk and opportunity. This rating is expected to provide SMA with the necessary operational agility for investments in new projects and market strategies. Long-term yield approximations by Bloomberg for similarly rated companies in the Energy sector amount to 4.6%.

Figure 31: Overview of cost of debt components (Source: Analyst analysis)

The cost of debt estimation uses historical probability of default and loss given default for correspondingly rated companies. The long-term default probability for similarly rated companies is 0.4%, with a 10-year historic average loss given default of 39% for senior unsecured debt, resulting in a forecasted cost of debt of 4.5%.

Sensitivity analysis of the D/EV-ratio and cost of debt indicates that modifications in these parameters do not significantly impact the overall implications. Whether maintaining SMA's current debt level or adjusting it to the peer average, the influence on the share price is minimal. This also applies to variations in the cost of debt, as detailed in Appendix.

Cash Flow based Valuation - APV

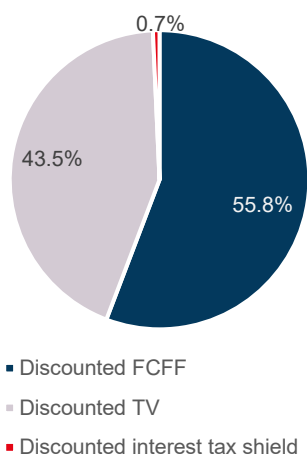


Figure 32: Composition of EV as of 31.12.2024
(Source: Analyst analysis)

For valuing SMA's forecasted cash flows, the APV method was selected, offering several advantages particularly relevant to SMA's situation. APV's primary benefit lies in its capacity to independently assess the impacts of operating performance and financing decisions. This is particularly advantageous for companies like SMA, experiencing significant financial changes where traditional DCF assumptions of a stable capital structure are not applicable. APV enables adjustments for changes in leverage over time, providing a more precise and flexible framework for evaluating a firm's value.

Initially, APV estimates the firm's value as if it were solely equity-financed, concentrating on operating cash flows and discounting them at R_u . This process yields the value of the firm's operations exclusive of debt influence. Following this, APV incorporates the present value of the tax shield from debt, leveraging the benefit of tax-deductible interest payments. This method distinctly separates the contributions to value from the firm's operations and its financing choices, enhancing clarity in understanding each aspect. Adjustments were also made in the cash flows for an appropriate default risk for SMA and the corresponding loss given default.

SMA's cash flows are projected to grow at double-digit rates from 2022 to 2029, stabilizing at ca.3% from 2030 onwards. The cash flow for 2023 is notably lower due to investments in new production capacities. The terminal Return on New Invested Capital (RONIC) is set at 16.4%, with a reinvestment rate of 15.0%, implying a terminal growth rate of 2.5%.

The discounted terminal value accounts for 43.5% of the EV on the valuation date. With the valuation date established as 31 December 2024, the latest cash flow considered is that of 2025.

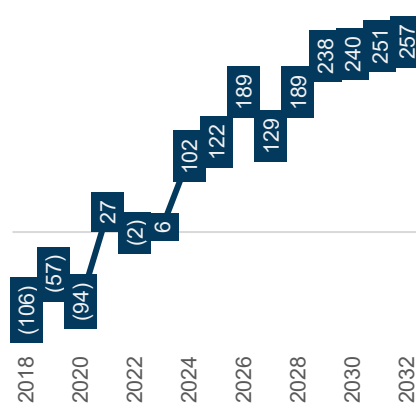


Figure 33: Free cash flows to firm in EUR m
(Source: Analyst estimation)

This results in an EV of EUR 1,953m on the valuation date. After accounting for the present value of net debt, the equity value is determined to be EUR 2,340m, equating to EUR 67.45 per share for 34.7m outstanding shares.

Relative Valuation – Trading Comparables

In the relative valuation analysis of SMA, three distinct groups of comparable companies were consulted to mitigate the limitations of each individual group. These groups include:

Key Competitors: This group comprises direct competitors involved in solar inverter manufacturing.

Extended Key Competitors: Includes manufacturers of solar modules and technical accessories for such modules.

Non-Core Competitors: Characterized by companies operating in related industries like semiconductor manufacturing.

For the final valuation, the results from these analyses were weighted with 50% for key competitors, 30% for extended key competitors, and 20% for non-core competitors. This weighting adjusts for the bias of the key competitor group being primarily large Asian companies and incorporates other significant factors such as regional influences.

The key competitors, although sharing industry-specific risks with SMA, have limited direct comparability due to differences in size, maturity, and product portfolios. For instance, Sungrow, a significant player in this group, diversifies into floating PV systems and wind inverters, with ca.68% of its 2022 sales in the PV segment (Sungrow, 2022).

Similarly, the solar module industry, dominated by a few global companies like LONGi, shares main market drivers with SMA. LONGi, a Chinese solar manufacturer, recorded a substantial revenue growth and represents a market segment parallel to SMA in terms of supply chain dependencies and technological components (Bütow, 2023).

Additionally, the semiconductor market was included as a complementary benchmark due to its growth trajectory (CAGR 2022-2027: 7.8%) and similar challenges faced during COVID-19, which align with SMA's experiences. German companies Elmos and X Fab were selected as the most relevant non-core peers, despite Elmos having a significantly higher EBITDA margin (Fernández, 2023).

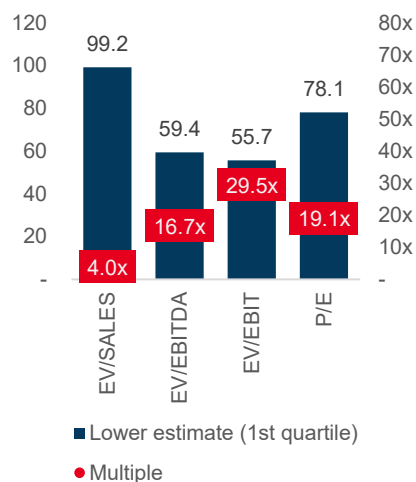


Figure 34: Relative valuation at 1st quartile of trading multiples in EUR (Source: Analyst analysis)

Utilizing the weighted peer group in EV/EBITDA and EV/EBIT calculations resulted in a share price estimation ranging from EUR 59.4 to EUR 176.6 and EUR 55.7 to EUR 169.0, respectively. This extensive analysis of comparable companies is somewhat constrained due to the differences in competitors' structures and the scarcity of highly similar trading comparables to SMA. Nonetheless, the analysis corroborates the cash-flow-based valuation by indicating upside potential. Even at the lower end of the relative valuation, no downside potential is evident.

In addition, the relative valuation is limited in its relevance, as the multiples of the comparable companies all relate to the most recent date of data availability. However, SMA is valued as per 31 December 2024, which means that the valuation using the available multiples always requires the assumption that the multiples of the comparable companies will not change significantly by the valuation date.

Company	Category	Share price	Market cap (EUR m)	EV (EUR m)	EV/Sales	EV/EBITDA	EV/EBIT	P/E
SUNGROW	Key Competitors	10.7	22,495	23,890	2.9x	21.7x	23.4x	33.6x
GOODWE	Key Competitors	13.5	5,393	5,391	5.6x	28.3x	30.8x	26.5x
CanadianSolar	Extended Key Competitors	18.5	1,856	5,023	0.7x	6.3x	9.1x	5.8x
LONGi	Extended Key Competitors	2.8	43,406	40,999	2.3x	18.3x	25.7x	10.7x
elmos	Non-Core Competitors	76.0	949	987	1.8x	5.5x	7.0x	18.2x
xfab	Non-Core Competitors	10.0	862	794	1.0x	3.8x	6.1x	26.7x

Figure 35: Overview of Trading multiples of SMA's key competitors (Source: Annual reports, Refinitiv, Analyst analysis)

Recommendation

The target price for SMA as of December 31, 2024, has been established at **EUR 67.45**. This indicates a substantial upside potential of 21.2%, or EUR 11.80, compared to the current share price of EUR 55.65.

The recommendation for the SMA stock after detailed analysis is **BUY**.

SMA is foreseen to benefit from the robust growth of the overall market, especially due to the positive and stable trajectory in Europe, its most crucial market. The growth in Europe is propelled by the societal and political commitment to transitioning energy production towards more sustainable sources. Despite facing challenges in its competitive positioning, characterized by significantly higher prices, SMA is expected to carve out a niche in Europe. Following a period of variable results, the company is projected to achieve growth and stabilize its margins, underpinned by enhanced operational performance.

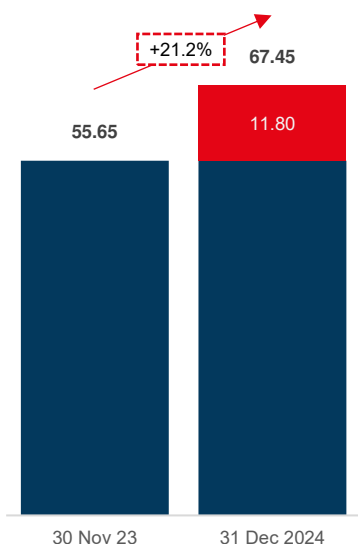


Figure 36: Upside potential of target price (31 Dec 2024) vs current share price in EUR (Source: Analyst analysis)

The market currently appears to underestimate the potential of SMA's shares. However, detailed analyses suggest that SMA is well-positioned to capitalize on the favourable market trends, leading to a considerable appreciation in its share value. It is noteworthy that a dividend payment for the year 2024 is not anticipated.

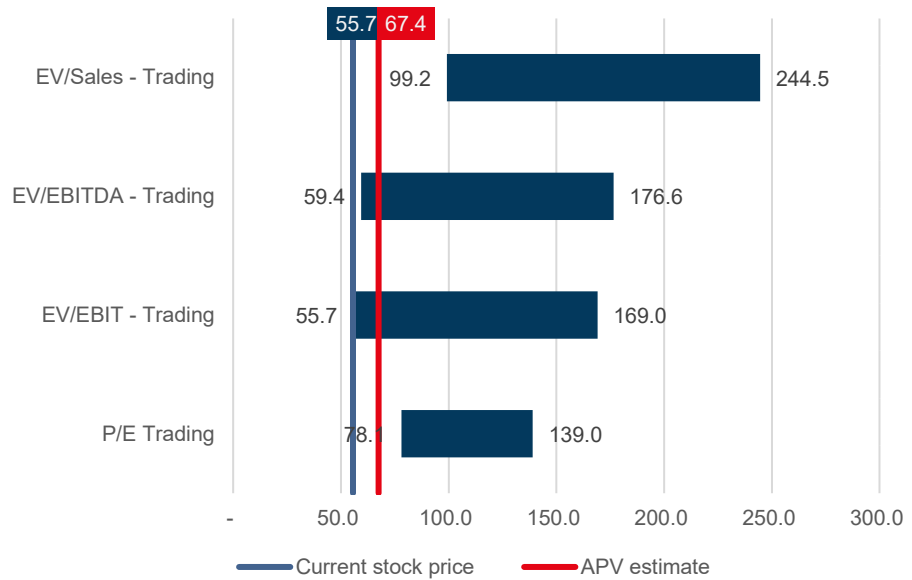


Figure 37: Overview of valuation results of different multiples and APV in EUR (Source: Analyst analysis)

For valuation purposes, an APV as well as a relative valuation model has been applied. However, the recommendation is mainly based on the APV due to accuracy and superiority over the valuation based on trading multiples. The limitations of the relative valuation are explained in detail in the respective chapter. However, the relative valuation clearly emphasizes the BUY recommendation derived from the APV valuation.

Bibliography

- Bhuiyan, M. A. (April de 2022). *Frontiers*. Obtained from Frontiers: <https://www.frontiersin.org/articles/10.3389/fenvs.2022.878394/full>
- Bilicic, G. (2023). *2023 Levelized Cost Of Energy+*. Lazard.
- BMWK. (February de 2023). *Time series on the development of renewable energies in Germany 2022*. BMWK. Obtained from BMWK.
- Bütow, N. (May de 2023). *LONGi*. Obtained from LONGi: <https://www.longi.com/de/news/jahresbericht-2022-q1-2023/>
- Database, R. (September - December de 2023). *Refinitiv*. Obtained from Refinitiv.
- Dilon, J. (July de 2022). *Power Mag*. Obtained from Power Mag: <https://www.powermag.com/a-global-look-at-residential-solar-adoption-rates/>
- Electronics, P. (December de 2023). *Power Electronics - Corporate Website*. Obtained from Power Electronics: <https://power-electronics.com/en>
- Energiewende, A. (2015). *Insights from Germany's Energiewende*. Agora Energiewende.
- EurObserv'ER. (2023). *Photovoltaic Barometer 2023*. EurObserv'ER.
- Europe, S. (December de 2023). *Sofar Europe - Corporate Website*. Obtained from Sofar Europe: <https://sofarsolar.eu/>
- Fernández, L. (2023). *Power Technology*. Obtained from Power Technology: <https://www.power-technology.com/buyers-guide/leading-solar-pv-module-manufacturers/>
- GoodWe. (December de 2023). *GoodWe - Corporate Website*. Obtained from GoodWe: <https://en.goodwe.com/>
- Growatt. (December de 2023). *Growatt - Corporate Website*. Obtained from Growatt: https://www.ginverter.com/?gad_source=1&gclid=CjwKCAiA1fqrBhA1EiwAMU5m_zxM0avWOhYfRMVdeRwkTTvPonsentnocmU7DhDQV4CxLNW1o-NhoC2joQAvD_BwE
- Guel, T. (2021). *An Energy Sector Roadmap to Carbon Neutrality in China*. IEA, International Energy Agency. Obtained from <https://iea.blob.core.windows.net/assets/9448bd6e-670e-4cfd-953c-32e822a80f77/AnenergysectorroadmaptocarbonneutralityinChina.pdf>
- Heinhaus, A. (April de 2022). *ARD*. Obtained from Tagesschau: <https://www.tagesschau.de/wirtschaft/verbraucher/solarenergie-boom-ukraine-krieg-101.html>
- Henkel, S. (February de 2022). *SMA Solar Technology AG*. Obtained from SMA Solar Technology AG: [https://www.sma.de/en/newsroom/news-details/sma-announces-doubling-of-production-capacity-by-2024#:~:text=SMA%20Solar%20Technology%20AG%20\(SMA,almost%2040%20GW%20by%202024.](https://www.sma.de/en/newsroom/news-details/sma-announces-doubling-of-production-capacity-by-2024#:~:text=SMA%20Solar%20Technology%20AG%20(SMA,almost%2040%20GW%20by%202024.)
- Huawei. (December de 2023). *Huawei - Solar*. Obtained from Huawei: <https://solar.huawei.com/de>
- IEA. (September de 2021). *IEA, International Energy Agency*. Obtained from IEA, International Energy Agency: <https://www.iea.org/news/china-has-a-clear-pathway-to-build-a-more-sustainable-secure-and-inclusive-energy-future>
- IEA, I. E. (2023). *International Energy Agency*. Obtained from International Energy Agency: <https://www.iea.org/topics/russias-war-on-ukraine>
- Insights, S. M. (2023). *Statista - Commercial Real Estate*. Obtained from Statista : <https://www-statista-com.eu1.proxy.openathens.net/outlook/fmo/real-estate/commercial-real-estate/custom?currency=EUR&locale=en&token=XJeZ8BGYtbZhvlSf6nz1wstV1Y9vrBe8o6V9xK2fjaTfmjRpf9ZOzNCVrkStVyDDF6UTLKCZIV1akqFJzN0XXBRJ9kxjnCnHxuf5Dx5RzEP7srufL3bljw%3D%3D>
- IRENA. (2023). *Renewable Energy Capacity Statistics 2023, page 25*. IRENA.
- ISE, F. I. (January de 2023). *Fraunhofer*. Obtained from Fraunhofer: <https://www.ise.fraunhofer.de/en/press-media/press-releases/2023/net-electricity-generation-in-germany-in-2022-significant-increase-in-generation-from-wind-and-pv.html>
- Ivanova, A. (December de 2022). *Renewables Now*. Obtained from Renewables Now: <https://renewablesnow.com/news/eu-set-to-surpass-2030-target-for-750-gw-of-solar-808831/>
- Ivanova, A. (December de 2022). *Renewables Now - EU set to surpass 2030 target for 750 GW of solar*. Obtained from Renewables Now: <https://renewablesnow.com/news/eu-set-to-surpass-2030-target-for-750-gw-of-solar-808831/>
- Jacobo, J. T. (June de 2022). *PV Tech - MENA to add 50GW of utility-scale solar by 2030, report says*. Obtained from PV Tech: <https://www.pv-tech.org/mena-to-add-50gw-of-utility-scale-solar-by-2030-report-says/>

- Kennedy, & Fischer. (November de 2022). *PV Magazine*. Obtained from PV Magazine: <https://pv-magazine-usa.com/2022/11/14/the-role-of-solar-in-the-inflation-reduction-act/>)
- Kleiner et al. (September de 2023). *Agora-Energiewende*. Obtained from https://www.agora-energiewende.de/daten-tools/agorameter/chart/today/power_import_export/01.06.2013/30.11.2023/monthly
- Kost, D. C. (2021). *Levelized Cost of Electricity- Renewable Energy Technologies*. Fraunhofer ISE.
- KPMG. (January de 2021). *NYU Stern*. Obtained from https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/countrytaxrate.html
- Mckenzie, W. (July de 2021). *Wood Mckenzie - Asia Pacific solar PV capacity to triple to 1,500 GW by 2030*. Obtained from Wood Mckenzie: <https://www.woodmaca.com/press-releases/asia-pacific-solar-pv-capacity-to-triple-to-1500-gw-by-2030/>
- Mehta, N., & O'Rourke, S. (October de 2022). *McKinsey*. Obtained from McKinsey: <https://www.mckinsey.com/industries/public-sector/our-insights/the-inflation-reduction-act-heres-whats-in-it>
- Mendonça, S. H. (September de 2023). *Intersolar*. Obtained from Intersolar: <https://www.intersolar.de/market-trends/pv-production-in-europe>
- Reuters. (September de 2023). *Reuters - China's solar capacity expected to hit 1,000 GW by 2026, Rystad Energy says*. Obtained from Reuters: <https://www.reuters.com/world/china/chinas-solar-capacity-expected-hit-1000-gw-by-2026-rystad-energy-2023-09-12/>
- Ritchie, H., & Roser, M. (2023). *Our World in Data*. Obtained from Our World in Data: <https://ourworldindata.org/energy/country/united-states>
- Santos, B. (April de 2023). *PV Magazine - Average solar LCOE increases for first time this year*. Obtained from PV Magazine: <https://www.pv-magazine.com/2023/04/14/average-solar-lcoe-increases-for-first-time-this-year/#:~:text=In%202023%2C%20it%20ranged%20from,end%20of%20the%20LCOE%20range.>
- SEIA, S. E. (August de 2022). *Solar Energy Industries Association*. Obtained from Solar Energy Industries Association: <https://www.seia.org/research-resources/impact-inflation-reduction-act#:~:text=The%20IRA%20will%20drive%20an,under%20a%20no%20DIRA%20scenario.>
- Siddiqi, S. (June de 2023). *IDTechEx*. Obtained from IDTechEx: <https://www.idtechex.com/de/research-report/charging-infrastructure-for-electric-vehicles-and-fleets-2024-2034/945>
- SMA Solar Technology AG. (2013 - 2022). *SMA Solar Technology AG - Annual Reports from 2013 - 2022*. Obtained from SMA Solar Technology AG.
- SMA Solar Technology AG. (2019 - 2023). *SMA Solar Technology AG - Quarterly Reports from 2019 - 2023*. Obtained from SMA Solar Technology AG.
- SolarEdge. (December de 2023). *SolarEdge - Corporate Website*. Obtained from SolarEdge: <https://www.solaredge.com/de/>
- Solis. (December de 2023). *Solis - Corporate Website*. Obtained from Solis: <https://www.solisinverters.com/us>
- Sungrow. (2022). *2022 Annual Report*. Sungrow Power Supply Co., Ltd.
- Tiseo, I. (November de 2023). *Ember*. Obtained from Ember: ember-climate.org
- Tisheva, P. (December de 2023). *Renewables Now*. Obtained from Renewables Now: <https://renewablesnow.com/news/eu-agrees-rules-on-solar-deployment-on-buildings-842643/>
- Tu, Q. (2020). *Energy Policy - Achieving grid parity of solar PV power in China- The role of Tradable Green Certificate*.
- Vöpel, A. (October de 2023). *gruenes haus*. Obtained from gruenes haus: <https://gruenes.haus/photovoltaik-preisentwicklung/#:~:text=Preisentwicklung%3A%20Wechselrichter,-Die%20Preisentwicklung%20f%C3%BCr&text=In%202015%20kostete%20ein%20Wechselrichter,Preisentwicklung%20von%20fast%20%2D50%20%25.>
- Wang, V. (June de 2022). *Solarbe Global*. Obtained from Solarbe Global: <https://www.solarbeglobal.com/china-to-offer-over-2-7-billion-subsidies-for-wind-solar-power/>
- Weaver, J. F. (August de 2022). *PV Magazine*. Obtained from PV Magazine: <https://www.pv-magazine.com/2022/08/15/whats-in-the-inflation-reduction-act-for-the-solar-industry/>
- WWF. (2014). *WWF*. Obtained from WWF: <https://www.wwf.org/?216412/China-renewables-report>
- Zhu, Y. (September de 2023). *RystadEnergy - China's solar capacity surges; expected to top 1 TW by 2026*. Obtained from RystadEnergy: <https://www.rystadenergy.com/news/china-s-solar-capacity-surges-expected-to-top-1-tw-by-2026>

Appendix

Financial Statements

▪ **Income Statement**

	FY 2018A	FY 2019A	FY 2020A	FY 2021A	FY 2022A	FY 2023E	FY 2024FC	FY 2025FC	FY 2026FC	FY 2027FC	FY 2028FC	FY 2029FC	FY 2030FC	FY 2031FC	FY 2032FC	FY 2033FC	FY 2034FC	FY 2035FC
Home Solutions	118,888	174,367	200,145	215,422	290,458	651,045	642,915	832,715	1,082,521	1,411,170	1,834,331	2,033,631	2,213,558	2,371,245	2,504,557	2,611,637	2,690,482	2,738,565
C&I Solutions	128,727	174,078	167,364	175,411	230,508	375,457	447,423	584,995	643,967	704,144	762,400	755,464	746,822	739,005	734,111	733,864	739,717	752,937
Large Scale & Project Solutions	98,582	114,737	127,449	99,890	146,286	294,723	254,816	249,251	244,489	237,331	228,158	200,736	179,517	163,900	153,004	146,732	144,827	147,415
EMEA	346,196	463,181	494,959	490,524	667,251	1,321,225	1,345,153	1,666,960	1,970,977	2,352,646	2,824,889	2,989,632	3,139,897	3,274,051	3,391,672	3,492,234	3,575,026	3,638,918
Home Solutions	29,404	38,615	29,798	28,953	27,806	15,533	49,600	49,315	48,418	47,033	44,238	38,080	33,440	30,071	27,783	26,450	26,011	26,475
C&I Solutions	28,466	39,145	41,256	39,498	33,386	52,379	62,044	64,607	66,865	69,033	69,884	64,745	60,463	57,126	54,782	53,471	53,245	54,195
Large Scale & Project Solutions	87,119	135,943	245,022	244,738	199,600	350,073	391,862	427,759	461,835	495,317	512,158	484,656	460,766	441,678	428,231	421,087	420,889	428,394
Americas	144,989	213,703	316,076	313,189	260,793	417,985	503,506	541,680	577,118	611,383	626,279	587,481	554,669	528,875	510,797	501,008	500,145	509,063
Home Solutions	33,216	26,863	33,753	29,720	16,751	8,780	29,671	29,832	29,772	29,528	29,129	28,298	24,061	22,394	21,272	20,683	20,634	21,164
C&I Solutions	94,719	83,332	83,975	30,421	26,418	35,692	46,796	47,050	46,955	46,570	45,940	41,476	37,948	35,319	33,550	32,621	32,544	33,379
Large Scale & Project Solutions	141,814	127,990	97,821	128,038	94,733	74,040	171,963	177,269	181,591	184,810	187,109	173,369	162,117	153,558	147,814	145,005	145,313	149,042
APAC	269,748	238,185	215,549	179,709	137,902	118,511	248,429	254,151	258,318	260,908	262,178	241,142	224,126	211,271	202,637	198,309	198,491	203,584
Reconciliation / Not allocated sales	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sales Revenue	760,934	915,069	1,026,583	983,422	1,065,946	1,857,722	2,097,089	2,462,792	2,806,413	3,224,937	3,713,347	3,818,455	3,918,692	4,014,197	4,105,105	4,191,551	4,273,662	4,351,565
Production and Cost of Sales	NA	(749,303)	(859,815)	(808,217)	(841,677)	(1,343,505)	(1,631,988)	(1,880,770)	(2,118,926)	(2,469,141)	(2,827,520)	(2,904,722)	(2,988,387)	(3,057,148)	(3,126,569)	(3,193,698)	(3,255,321)	(3,314,661)
Manufacturing Costs of Sales	(688,856)	NA	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Cost of Sales	(688,856)	(749,303)	(859,815)	(808,217)	(841,677)	(1,343,505)	(1,631,988)	(1,880,770)	(2,118,926)	(2,469,141)	(2,827,520)	(2,904,722)	(2,988,387)	(3,057,148)	(3,126,569)	(3,193,698)	(3,255,321)	(3,314,661)
Gross Profit	72,078	165,766	166,768	175,205	224,269	514,216	465,101	582,022	687,487	755,796	885,826	913,733	930,305	957,048	978,537	997,853	1,018,342	1,036,905
Selling Expenses	NA	(79,844)	(86,256)	(85,420)	(102,155)	(135,962)	(178,869)	(210,062)	(239,371)	(275,068)	(316,727)	(325,692)	(334,241)	(342,387)	(350,141)	(357,515)	(364,518)	(371,163)
Distribution Cost	(72,067)	NA	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-
General and Administrative Expenses	(55,244)	(49,030)	(50,606)	(50,368)	(64,016)	(82,564)	(86,525)	(101,614)	(115,792)	(133,060)	(153,212)	(157,549)	(161,684)	(165,625)	(169,376)	(172,942)	(176,330)	(176,157)
Research and Development Expenses	(49,023)	(52,179)	(55,988)	(50,235)	(51,598)	(81,570)	(48,689)	(50,452)	(55,883)	(61,356)	(62,781)	(62,390)	(64,023)	(65,290)	(66,892)	(68,540)	(70,088)	(71,714)
Other Operating Expenses	(82,905)	(38,770)	(39,348)	(66,863)	(55,879)	(74,193)	(96,843)	(113,731)	(129,600)	(148,927)	(171,482)	(176,336)	(180,965)	(185,375)	(189,573)	(193,565)	(197,357)	(200,955)
Other Operating Income	35,451	42,286	93,336	44,462	81,266	89,742	118,666	139,359	158,803	182,486	210,123	216,070	221,742	232,291	237,182	241,829	246,237	250,955
Total Operating Expenses	(223,788)	(177,537)	(138,862)	(208,424)	(192,382)	(284,546)	(292,261)	(336,500)	(381,842)	(435,926)	(494,078)	(505,896)	(519,171)	(531,501)	(543,691)	(555,380)	(566,465)	(573,752)
thereof D&A	(82,610)	(45,963)	(43,578)	(41,674)	(38,126)	(44,066)	(55,179)	(55,300)	(56,463)	(58,627)	(61,124)	(63,731)	(65,835)	(67,857)	(69,852)	(71,839)	(73,822)	(75,805)
Operating Profit - before tax	(151,710)	(11,771)	27,906	(33,219)	31,887	229,670	172,840	245,522	305,645	319,870	391,748	407,638	411,134	425,547	434,845	442,472	451,877	463,153
Tax income (expense) on operating profit	(8,303)	2,349	892	10,501	19,173	(69,901)	(47,381)	(69,186)	(87,222)	(95,961)	(117,524)	(122,351)	(123,340)	(127,664)	(130,454)	(132,742)	(135,563)	(138,946)
Operating Profit - after tax	(160,013)	(9,422)	28,786	(22,718)	51,060	160,769	125,459	176,336	218,422	223,909	274,223	285,486	287,794	297,883	304,392	309,731	316,314	324,207
Financial Expenses	(3,662)	(1,199)	(1,660)	(2,464)	(6,169)	(6,401)	(1,877)	(2,033)	(2,356)	(2,667)	(3,525)	(5,435)	(5,768)	(6,099)	(6,427)	(6,757)	(7,095)	(7,431)
Financial Income	2,125	2,194	984	2,112	7,854	-	-	-	-	-	-	-	-	-	-	-	-	-
Result from Investments Accounted for Using the Equity Method	(13,134)	NA	NA	(304)	1,286	1,654	2,127	2,735	3,517	4,523	5,726	6,488	7,063	7,533	7,934	8,285	8,600	8,772
Financial Profit - before tax	(14,671)	995	(676)	(656)	2,971	(4,747)	250	702	1,162	1,856	2,201	1,053	1,295	1,434	1,507	1,528	1,505	1,342
Tax income (expense) on financial profit	(803)	(199)	(21)	207	1,786	(1,424)	(175)	(211)	(348)	(557)	(680)	(316)	(388)	(430)	(452)	(458)	(452)	(403)
Financial Profit - after tax	(15,474)	796	(697)	(449)	4,757	(3,323)	175	492	813	1,299	1,541	737	906	1,004	1,055	1,070	1,054	939
Other Income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Income (Loss)	(175,487)	(8,626)	28,091	(23,167)	55,817	157,446	125,633	176,828	219,235	225,208	275,764	286,223	288,700	298,887	305,446	310,800	317,367	325,146
EBITDA	(69,100)	34,192	71,484	8,455	70,013	273,736	228,019	300,822	362,107	378,497	452,872	471,568	476,969	493,404	504,697	514,311	525,699	538,957
in % of sales	(9.1%)	3.7%	7.0%	0.9%	6.6%	14.7%	10.9%	12.2%	12.9%	11.7%	12.2%	12.3%	12.2%	12.3%	12.3%	12.3%	12.3%	12.4%

■ Balance Sheet

in (€K)	FY 2018A	FY 2019A	FY 2020A	FY 2021A	FY 2022A	FY 2023E	FY 2024FC	FY 2025FC	FY 2026FC	FY 2027FC	FY 2028FC	FY 2029FC	FY 2030FC	FY 2031FC	FY 2032FC	FY 2033FC	FY 2034FC	FY 2035FC
Working Cash	38,047	45,753	51,329	49,171	53,297	92,886	104,854	123,140	140,321	161,247	185,667	190,923	195,935	200,710	205,255	209,578	213,683	217,578
Inventories	193,795	279,883	255,469	273,024	308,668	445,706	544,093	630,127	713,401	835,370	961,267	992,288	1,025,781	1,054,409	1,083,492	1,112,005	1,138,813	1,165,020
Accounts receivable	115,844	145,530	121,872	142,674	153,528	285,167	328,518	393,566	457,321	535,682	628,510	658,331	687,959	717,373	746,553	775,480	804,137	832,506
Deferred tax assets	31,928	39,091	40,756	60,277	85,427	118,912	92,040	77,136	62,233	62,233	62,233	62,233	62,233	62,233	62,233	62,233	62,233	62,233
Remaining operating current assets	36,285	55,544	65,469	43,264	38,137	51,503	83,643	93,171	103,289	120,348	139,528	142,987	146,489	150,188	153,656	156,858	159,913	162,837
Operating current assets	415,899	565,810	534,895	568,410	639,057	994,175	1,153,148	1,317,140	1,476,565	1,714,881	1,977,206	2,046,762	2,118,398	2,184,914	2,251,190	2,316,155	2,378,779	2,440,175
Accounts payable and accruals	110,851	174,742	144,210	134,026	133,449	225,010	272,877	313,908	353,019	410,622	469,369	481,309	494,271	504,723	515,242	525,342	534,497	543,241
Deferred tax liabilities	10	9	278	364	442	1,150	776	912	1,039	1,194	1,374	1,413	1,450	1,486	1,519	1,551	1,582	1,611
Prepayments	13,928	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Contractual obligations	161,769	157,468	155,553	158,647	152,926	149,519	147,874	146,247	144,638	143,047	141,473	139,916	138,377	136,855	135,349	133,860	132,387	130,931
Operating current liabilities	286,558	332,219	300,041	293,037	286,817	375,678	421,527	461,067	498,696	554,862	612,216	622,638	634,099	643,063	652,110	660,753	668,466	675,783
Net operating current assets	129,341	233,582	234,854	275,373	352,240	618,497	731,621	856,074	977,869	1,160,019	1,364,990	1,424,124	1,484,299	1,541,851	1,599,080	1,655,401	1,710,313	1,764,392
Property, plant and equipment	198,884	208,172	207,180	194,173	191,845	231,845	271,845	285,271	298,696	312,122	325,548	335,548	345,548	355,548	365,548	375,548	385,548	395,548
Intangible assets	35,869	36,745	43,781	62,218	88,450	118,889	79,660	73,622	73,956	76,400	79,542	82,916	85,771	88,455	91,081	93,689	96,290	98,889
Fixed assets	234,753	244,917	250,961	256,391	280,295	350,734	351,505	358,893	372,652	388,522	405,090	418,464	431,319	444,002	456,629	469,236	481,838	494,437
Provisions	157,025	153,233	167,577	208,898	159,146	205,451	272,510	296,200	351,105	395,664	460,079	470,792	484,336	495,533	507,065	517,585	527,805	537,385
Other current liabilities	62,551	162,995	95,647	88,333	170,300	297,902	335,040	393,466	448,364	515,229	593,260	610,052	626,067	641,325	655,849	669,660	682,778	695,224
Other operating liabilities	(219,576)	(316,228)	(263,224)	(297,231)	(329,446)	(503,353)	(607,549)	(689,666)	(799,470)	(910,894)	(1,053,338)	(1,080,844)	(1,110,402)	(1,136,858)	(1,162,914)	(1,187,244)	(1,210,583)	(1,232,609)
Operating invested capital	144,518	162,271	222,591	234,533	303,089	465,877	475,576	525,301	551,052	637,647	716,741	761,743	805,216	848,996	892,794	937,393	981,568	1,026,220
Investments	16,212	23,513	17,988	14,521	14,274	17,211	20,258	23,661	26,406	29,237	31,828	34,446	36,914	39,558	42,391	45,428	48,682	52,169
Goodwill	482	482	482	482	482	482	482	482	482	482	482	482	482	482	482	482	482	482
Other current assets	39,822	31,495	84,032	40,530	19,398	28,400	35,111	39,442	45,966	52,235	60,483	62,021	63,739	65,246	66,747	68,141	69,482	70,745
Other non-current assets	2	11	19,428	2,662	6,170	2,212	2,497	2,933	3,342	3,840	4,422	4,547	4,667	4,780	4,889	4,991	5,089	5,182
Non-operating assets	56,518	55,501	121,930	58,195	40,324	48,305	58,349	66,518	76,196	85,794	97,215	101,497	105,801	110,066	114,509	119,042	123,735	128,578
Financial liabilities	741	1,241	538	538	568	990	990	990	990	990	990	990	990	990	990	990	990	990
Liabilities Held-for-sale	31,325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other non-current liabilities	6,172	6,224	10,417	8,179	6,007	21,944	18,010	21,374	27,203	28,981	33,863	35,383	35,754	36,810	37,713	38,396	39,199	39,917
Non-operating liabilities	38,238	7,465	10,955	8,717	6,575	22,934	19,000	22,364	28,193	29,971	34,853	36,373	36,744	37,800	38,703	39,386	40,189	40,907
Net non-operating assets	18,280	48,036	110,975	49,478	33,749	25,371	39,349	44,155	48,004	55,823	62,362	65,124	69,056	72,267	75,806	79,657	83,546	87,671
Total funds invested	162,798	210,307	333,566	284,011	336,838	491,248	514,925	569,455	599,055	693,470	779,103	826,867	874,272	921,262	968,601	1,017,050	1,065,113	1,113,891
Short-term debt	5,402	11,051	11,475	18,170	7,307	16,026	17,353	20,111	22,769	30,093	46,399	49,244	52,067	54,866	57,685	60,570	63,433	66,338
Long-term debt	15,013	23,462	29,658	28,485	16,356	25,310	27,406	31,762	35,961	47,528	73,282	77,774	82,233	86,653	91,106	95,663	100,183	104,771
Financial debt	20,415	34,513	41,133	46,655	23,663	41,336	44,759	51,872	58,730	77,622	119,681	127,018	134,300	141,519	148,791	156,233	163,616	171,109
Excess cash	282,099	241,099	144,491	170,664	150,348	-	-	-	-	-	-	-	-	-	-	-	-	-
Net debt	(261,684)	(206,586)	(103,358)	(124,009)	(126,685)	41,336	44,759	51,872	58,730	77,622	119,681	127,018	134,300	141,519	148,791	156,233	163,616	171,109
Minority interest	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shareholder's equity	424,482	416,893	436,924	408,020	463,523	449,913	470,166	517,583	540,325	615,848	659,422	699,849	739,972	779,743	819,810	860,817	901,497	942,781
Total equity	424,482	416,893	436,924	408,020	463,523	449,913	470,166	517,583	540,325	615,848	659,422	699,849	739,972	779,743	819,810	860,817	901,497	942,781
Total funds reconciliation	162,798	210,307	333,566	284,011	336,838	491,248	514,925	569,455	599,055	693,470	779,103	826,867	874,272	921,262	968,601	1,017,050	1,065,113	1,113,891

- Cash Flow Statement

	FY 2018A	FY 2019A	FY 2020A	FY 2021A	FY 2022A	FY 2023E	FY 2024FC	FY 2025FC	FY 2026FC	FY 2027FC	FY 2028FC	FY 2029FC	FY 2030FC	FY 2031FC	FY 2032FC	FY 2033FC	FY 2034FC	FY 2035FC
Operating profit after tax	(160,013)	(9,422)	28,788	(22,718)	51,060	160,769	125,459	176,336	218,422	223,909	274,223	285,486	287,794	297,883	304,392	309,731	316,314	324,207
Plus depreciation and amortization	82,610	45,963	43,578	41,674	38,126	44,066	55,179	55,300	56,483	58,627	61,124	63,731	65,835	67,857	69,852	71,839	73,822	75,805
Operating gross cash flow	(77,403)	36,541	72,366	18,956	89,186	204,835	180,638	231,636	274,885	282,536	335,347	349,217	353,628	365,740	374,244	381,570	390,136	400,012
Less change in net operating current assets	4,410	(104,242)	(1,272)	(40,519)	(76,867)	(266,256)	(113,124)	(124,453)	(121,795)	(182,150)	(204,970)	(59,134)	(60,175)	(57,552)	(57,229)	(56,322)	(54,912)	(54,079)
Less change in other operating assets	(3,968)	96,652	(53,004)	34,007	32,215	173,907	104,197	82,116	109,804	111,424	142,445	27,506	29,558	26,455	26,057	24,330	23,339	22,026
Total investments	442	(7,590)	(54,276)	(6,512)	(44,652)	(92,349)	(8,928)	(42,337)	(11,991)	(70,726)	(62,526)	(31,628)	(30,617)	(31,097)	(31,172)	(31,991)	(31,573)	(32,053)
Operating free cash flow	(76,961)	28,951	18,091	12,444	44,533	112,486	171,710	189,300	262,893	211,810	272,821	317,589	323,011	334,644	343,072	349,578	358,563	367,959
Less investments in PP&E and intangibles	(34,678)	(56,127)	(49,622)	(47,104)	(62,030)	(114,505)	(55,950)	(62,688)	(70,222)	(74,497)	(77,692)	(77,104)	(78,690)	(80,540)	(82,479)	(84,447)	(86,424)	(88,404)
Investing free cash flow	(34,678)	(56,127)	(49,622)	(47,104)	(62,030)	(114,505)	(55,950)	(62,688)	(70,222)	(74,497)	(77,692)	(77,104)	(78,690)	(80,540)	(82,479)	(84,447)	(86,424)	(88,404)
Non-operating income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Less change in non-operating assets	5,974	(29,756)	(62,939)	61,497	15,729	8,378	(13,977)	(4,806)	(3,849)	(7,819)	(6,539)	(2,762)	(3,932)	(3,210)	(3,540)	(3,850)	(3,889)	(4,125)
Non-operating free cash flow	5,974	(29,756)	(62,939)	61,497	15,729	8,378	(13,977)	(4,806)	(3,849)	(7,819)	(6,539)	(2,762)	(3,932)	(3,210)	(3,540)	(3,850)	(3,889)	(4,125)
Free cash flow to firm	(105,665)	(56,932)	(94,470)	26,837	(1,768)	6,359	101,782	121,805	188,822	129,494	188,590	237,722	240,389	250,893	257,053	261,282	268,250	275,430
as % of EBITDA	152.9%	(166.5%)	(132.2%)	317.4%	(2.5%)	2.3%	44.6%	40.5%	52.1%	34.2%	41.6%	50.4%	50.4%	50.8%	50.9%	50.8%	51.0%	51.1%
YoY growth rate	(194.8%)	(46.1%)	65.9%	(128.4%)	(106.6%)	(459.8%)	1,500.6%	19.7%	55.0%	(31.4%)	45.6%	26.1%	1.1%	4.4%	2.5%	1.6%	2.7%	2.7%
Net financial profit after taxes	(15,474)	796	(697)	(449)	4,757	(3,323)	175	492	813	1,299	1,541	737	906	1,004	1,055	1,070	1,054	939
Change in net financial debt and other claims	132,686	55,099	103,228	(20,651)	(2,676)	168,020	3,423	7,114	6,858	18,891	42,060	7,337	7,282	7,218	7,272	7,442	7,383	7,493
Debt financing cash flow	117,212	55,895	102,530	(21,100)	2,082	164,698	3,598	7,605	7,671	20,190	43,600	8,074	8,188	8,222	8,327	8,512	8,437	8,432
Cash outflows from minority interest	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity financing cash flow	(11,547)	1,037	(8,060)	(5,737)	(314)	(171,057)	(105,380)	(129,411)	(196,493)	(149,685)	(232,191)	(245,796)	(248,578)	(259,115)	(265,380)	(269,794)	(276,687)	(283,862)
Financing cash flow	105,665	56,932	94,470	(26,837)	1,768	(6,359)	(101,782)	(121,805)	(188,822)	(129,494)	(188,590)	(237,722)	(240,389)	(250,893)	(257,053)	(261,282)	(268,250)	(275,430)

Sensitivity analysis

		Levered Equity beta (SMA)								
		1.19	1.24	1.29	1.34	1.39	1.44	1.49	1.54	1.59
MRP	7.8%	75.65	74.36	73.12	71.93	70.78	69.66	68.59	67.55	66.54
	7.9%	74.71	73.45	72.23	71.05	69.91	68.81	67.75	66.73	65.74
	8.0%	73.80	72.55	71.35	70.19	69.07	67.99	66.94	65.93	64.95
	8.1%	72.92	71.69	70.50	69.35	68.25	67.18	66.15	65.15	64.19
	8.2%	72.05	70.84	69.67	68.54	67.45	66.40	65.38	64.40	63.45
	8.3%	71.21	70.01	68.86	67.74	66.67	65.63	64.63	63.66	62.72
	8.4%	70.39	69.21	68.07	66.97	65.91	64.89	63.90	62.94	62.02
	8.5%	69.59	68.43	67.30	66.22	65.17	64.16	63.18	62.24	61.33
	8.6%	68.81	67.66	66.55	65.48	64.45	63.45	62.49	61.56	60.66

		Target D/EV-ratio								
		7.0%	9.1%	11.2%	13.3%	15.4%	15.8%	16.2%	16.6%	17.1%
Cost of Debt	4.1%	66.84	67.79	68.74	69.69	70.66	70.86	71.06	71.26	71.46
	4.2%	66.04	66.95	67.86	68.79	69.72	69.91	70.10	70.30	70.49
	4.3%	65.33	66.20	67.09	67.98	68.88	69.07	69.25	69.44	69.62
	4.4%	64.68	65.53	66.39	67.25	68.13	68.31	68.49	68.67	68.85
	4.5%	64.10	64.93	65.76	66.60	67.45	67.62	67.80	67.97	68.15
	4.6%	63.58	64.38	65.19	66.01	66.83	67.00	67.17	67.35	67.52
	4.7%	63.10	63.88	64.67	65.47	66.27	66.44	66.61	66.77	66.94
	4.8%	62.66	63.43	64.20	64.98	65.76	65.93	66.09	66.25	66.41
	4.9%	62.26	63.01	63.76	64.52	65.29	65.45	65.61	65.77	65.93

Regression analytics

	Annual installed capacity	GDP growth	Residential housing market	Commercial housing market	LCOE
EMEA					
Home Solutions	0.021	0.250	-	0	8.994
C&I Solutions	0.291	-	0	0.027	3.300
Large Scale	0.250	0	0	0	0
Americas					
Home Solutions	0.250	-	0	0	-
C&I Solutions	0.250	-	0	0.095	0.423
Large Scale	0.428	0.424	0	0	0.425
APAC					
Home Solutions	0.250	-	-	0	0.250
C&I Solutions	0.250	-	0	-	0.250
Large Scale	0.250	0.722	0	0	0.250

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Report Recommendations

Buy	Expected total return (including expected capital gains and expected dividend yield) of more than 10% over a 12-month period.
Hold	Expected total return (including expected capital gains and expected dividend yield) between 0% and 10% over a 12-month period.
Sell	Expected negative total return (including expected capital gains and expected dividend yield) over a 12-month period.

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