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RESUMO

Este trabalho efetua uma análise abrangente da empresa SolarEdge com o objetivo de estimar o seu valor intrínseco ajustado a um conjunto de pressupostos sobre a dinâmica de negócio futuro da empresa. A SolarEdge desenvolve o seu negócio no setor das energias renováveis e é reconhecida globalmente como líder no setor. Dada a sua importância, é imperativo compreender o seu valor e potencial de investimento uma vez que a empresa é cotada no NASDAQ onde os investidores tomam decisões de investimento diárias. Este projeto utiliza o método dos Fluxos de Caixa Descontados como principal técnica de avaliação da empresa e estima o valor da empresa com base em 3 cenários alternativos, fornecendo insights essenciais para facilitar decisões de investimento bem informadas.

A trajetória do setor de energia renovável está alinhada com as necessidades globais de energia e os imperativos ambientais, posicionando a energia solar como pioneira até 2050. Novas abordagens, incluindo armazenamento de energia e melhorias na rede, atenuam os desafios de intermitência, aumentando o potencial das contribuições de energia renovável. Integral ao setor é a convergência de considerações ambientais, sociais e de governança (ESG), ressaltando seu alinhamento com os objetivos centrais e as implicações sociais das empresas de energia renovável. As conquistas da SolarEdge estão enraizadas na inovação, estabilidade financeira, alcance global e fortes relações com os clientes. Sua vantagem competitiva é fortalecida por sistemas inversores exclusivos e crescimento de receita consistente. No entanto, a empresa deve navegar pelas mudanças nas regulamentações, na dinâmica do mercado e na concorrência de forma criteriosa. Embora os pontos fortes estejam na inovação e na presença internacional, as vulnerabilidades surgem da dependência do produto e da rivalidade do setor. Para capitalizar os pontos fortes e mitigar os pontos fracos, a SolarEdge deve buscar estrategicamente oportunidades como eficiência de custos, iniciativas ecologicamente corretas e alinhamento tecnológico. Apesar desses esforços, a vigilância contra riscos, incluindo produtos falsificados, custos crescentes e volatilidade do mercado, é fundamental para o crescimento duradouro.

Dada a crescente importância da energia renovável no paradigma global, tomar decisões de investimento sólidas depende da compreensão dos pontos fortes, vulnerabilidades e dinâmica do setor de uma empresa. Este projeto utiliza uma abordagem qualitativa e quantitativa integrada, aprimorando as opções de investimento com perspetivas informadas. A análise qualitativa consiste numa revisão abrangente dos relatórios financeiros da empresa e outras

fontes de informação publicados pela empresa e por entidades externas. A análise quantitativa envolve o uso de técnicas de avaliação, como análise dos fluxos de caixa descontados e análise de múltiplos, para estimar o valor atual da SolarEdge. Os dados analisados revelam que a SolarEdge tem beneficiado de um forte crescimento das suas receitas ao longo dos últimos anos e que existem perspetivas favoráveis ao desenvolvimento sustentado do negócio nos próximos anos. No entanto, o negócio exige cautela devido ao aumento das responsabilidades e despesas operacionais. O forte crescimento das receitas deverá abrandar nos próximos anos e a empresa deve tornar-se mais eficiente no que respeita à obtenção de margens mais robustas e que permitam gerar maiores níveis de cash-flow. O cenário base desenvolvido assume que a empresa apresentará em 2023 um volume de negócios de 4,1 biliões de dólares e que este valor crescerá ao ritmo de 18% anual durante os próximos 5 anos. Estes valores de crescimento são prudentes uma vez que são mais baixos que as expectativas da empresa e estão em linha com a expectativa média dos analistas financeiros que seguem a empresa. Considerando uma solidificação das margens da empresa e a estimativa de novos investimentos, estima-se que a empresa será capaz de gerar anualmente valores de free-cash flow entre os 372 milhões de dólares e 863 milhões de dólares entre os anos de 2023 e 2027.

As estimativas efetuadas neste trabalho permitem concluir que, no cenário base, o valor atual da empresa ronda os 11,26 biliões de dólares ($199,81 por ação). Este valor compara com o valor de mercado à data de 31 de Julho de 2023 no montante de 13,3 biliões de dólares ($236,79 por ação), o que significa que a empresa está um pouco sobrevalorizada. O cenário mais pessimista aponta para um valor atual de 7,0 biliões de dólares ($124,33 por ação) e o cenário mais otimista aponta para um valor atual de 19,1 biliões de dólares ($338,75 por ação). Os resultados deste trabalho contribuem para que os investidores possam tomar decisões de investimento na SolarEdge de forma mais informada através da discussão de toda a infamação analisada neste projeto.

Palavras-chave: SolarEdge; Equity research; Fluxo de caixa descontado (DCF); Análise comparativa; Sector das energias renováveis.

ABSTRACT

This work performs a comprehensive analysis and valuation of SolarEdge, a notable participant in the renewable energy sector, with the objective of providing essential insights to facilitate well-informed investment decisions. Employing an integrated qualitative and quantitative approach, this study enhances investment choices with informed perspectives. The qualitative analysis consists of a comprehensive review internal and external sources of information and the quantitative analysis involves the use of the discounted cash flow to estimate the fair value of SolarEdge's.

The trajectory of the renewable energy sector aligns with global energy needs and environmental imperatives, positioning solar energy as a frontrunner by 2050. Novel approaches, including energy storage and grid enhancements, mitigate intermittency challenges, augmenting the potential of renewable energy contributions. Integral to the sector is the convergence of Environmental, Social, and Governance (ESG) considerations, underscoring their alignment with the core objectives and societal implications of renewable energy enterprises. SolarEdge's achievements are rooted in innovation, financial stability, global reach, strong customer relations. Its competitive edge is fortified by unique inverter systems and consistent revenue growth. However, the company must navigate shifting regulations, market dynamics, and competition judiciously. While strengths lie in innovation and international presence, vulnerabilities arise from product dependency and industry rivalry. To capitalize on strengths and mitigate weaknesses, SolarEdge should strategically pursue opportunities such as cost efficiency, eco-friendly initiatives, and technological alignment. Despite these endeavors, vigilance against risks including counterfeit products, rising costs, and market volatility is pivotal for enduring growth.

The valuation of SolarEdge reveals that, in the middle scenario, the fair value of the company is $11.23 billion dollars or $199.81 per share, which is slightly higher than the current market value of the company ($13.3 billion dollars on 31st of July 2023). The discussion of the assumptions and the alternative valuations using worst and best scenarios contribute to investors take more informed decisions related with SolarEdge.

Keywords: SolarEdge; Equity research; Discounted-cash-flow (DCF); Comparative Analysis; Renewable energy sector.

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ABBREVIATIONS LIST

APV	Adjusted Present Value
BVPS	Book Value per Share
CAPEX	Capital Expenditures
CAPM	Capital Asset Pricing Model
CAGR	Compounded Annual Growth Rate
D&A	Depreciation and Amortization
DCF	Discounted Cash Flow
DC	Direct Current
D/E	Debt to Equity
DDM	Dividend Discount Model
EBIT	Earnings Before Interests and Taxes
EBITDA	Earnings Before Interest Taxes Depreciation and Amortization
EPS	Earnings per Shares
EV	Enterprise Value
FCFF	Free Cash Flow to Firm
FCFE	Free Cash Flow to Equity
FV	Firm Value
GBP	Green Bond Principles
IoT	Internet of Things
IRENA	International Renewable Energy Agency
NWC	Net Working Capital
OCF	Operating Cash Flow
P/B	Price to Book Value
P/E	Price/Earnings Ratio
PP&E	Property, Plants and Equipment
PV	Photovoltaik
P/S	Price/Sales Ratio
RENIXX	Renewable Energy Industrial Index
SWOT	Strengths Weaknesses Opportunities and Threats
TV	Terminal Value
UPS	Uninterruptible Power Supplies
WACC	Weighted Average Cost of Capital
WC	Working Capital

1 INTRODUCTION

"Valuation is at the heart of any investment decision, whether that decision is to buy, sell or hold." – Aswath Damodaran (Damodaran, 2011)

Appropriate investment decisions can only be made following a company's valuation (Damodaran, 2011). Analyzing data and making informed decisions are critical for managers and investors that must deal with a challenging business environment. Valuation skills are particularly important to managers and investors who must process accounting and financial information to make sound investment decisions. This thesis uses valuation skills to analyze the dynamics of SolarEdge Technologies, Inc. (will hereinafter be referred to simply as SolarEdge) as a publicly traded company on the NASDAQ. The analysis developed in this thesis can be applied to the valuation of comparable companies. In essence, it is grounded on subjective rationale based on publicly available information to make independent investment decisions. Company valuation is not about finding the absolutely right value. Company valuation does not represent purely objective values but is based on many subjective assumptions and views. Instead, it is a matter of determining a plausible range of values on which an investment decision can be based. Accordingly, the conclusions of this thesis need to be analyzed cautiously as no universally correct enterprise value can be calculated.

It is about more than just understanding the connections between figures and valuation approaches to form one's opinion. First and foremost, it is about developing and applying valuation skills. This thesis aims to understand what influences the share price of a company and which key figures and alarm signals need to be analyzed before a decision can be made. By analyzing SolarEdge and taking a deeper look into the market and financial statements, this project aims to provide the reader with relevant information to facilitate an informed decision about a potential investment in SolarEdge. Due to the topicality and importance of the energy transition, a company from the renewable energy sector was selected. This topic is of great importance for our present and future given the current backdrop of climate change and the shortage of supply and increased energy prices due to the Russian war against Ukraine. The renewable energy industry is experiencing rapid growth, driven by increasing energy demand and the need to reduce carbon emissions. Renewable energy is the most crucial energy source of the future

(United Nations, 2014). By 2050, global energy consumption will increase by nearly 50% (Energy Information Administration, 2021). Renewable energy will play an increasingly important role in power generation due to the need to reduce CO^2 emissions, low production costs, and rising global energy demand (United Nations, 2014). According to current forecasts, solar energy will become the most crucial energy source by 2050, accounting for one-fifth of energy supplies (International Energy Agency, 2021). Between 2011 and 2021, cumulative photovoltaics (PV) installations' compound annual growth rate (CAGR) was 30% (Fraunhofer Institute, 2023). Due to the great potential in this market area, the selected company is specialized in the renewable energy sector, with a particular focus on the PV sector. The PV inverter market is particularly interesting within the photovoltaic systems. Inverters are referred to as the "brain of a solar system" as they enable the connection of electronic devices via Internet of Things (IoT) platforms. Market leaders in the PV inverter industry are SMA Solar Technology AG, Huawei, Power Electronics, ABB, Sungrow Power Supply, and SolarEdge (Bellini, 2022).

SolarEdge is an innovative renewable energy company and one of the world's leading providers of smart energy technologies such as inverters, energy storage, and charging solutions (International Economic Forum Renewable Energies, 2023a). The company has been listed on the US stock exchange since March 2015 (Renaissance Capital, 2015). The market for SolarEdge's products has grown steadily in recent years (Ameri Research, 2019). Since its founding in 2006, the company has grown steadily and reported revenues of $3.1B in 2022 (Fischer, 2023), which represents a 58% growth compared to the previous year (2021: $1.96B) (International Economic Forum Renewable Energies, 2023a). GAAP net income in 2022 was $93.8M, down 45% from the same period last year (2021: $169.M) (International Economic Forum Renewable Energies, 2023a). The company generated revenues of $890.7M (USD million) in the fourth quarter of 2022, representing a 61% increase compared to the last comparable quarter (Q4 2021: approximately $552M). The solar energy segment alone accounted for $837M (Fischer, 2023). The RENIXX (Renewable Energy Industrial Index) Group reported a net income of $20.8M for the fourth quarter, representing a 49 % decrease compared to the same quarter last year (Q4 2021: approximately $41M) (International Economic Forum Renewable Energies, 2023b). To value the company, it is crucial to understand the opportunities and risks of the industry where the company operates to have robust projections about the prospects of the company and assess its fair value.

The research will consist of a mixed strategy of different valuation approaches (intrinsic and relative). Damodaran states that using both approaches simultaneously can significantly improve a stock's intrinsic and relative valuation (Damodaran, 2011). A fundamental question in valuation is how detailed the process should be. According to Damodaran, while a higher level of detail provides the opportunity to produce better forecasts, it also requires more input (Damodaran, 2011). The potential for error in each input increases as more complex models are created (Damodaran, 2011). Therefore, it is essential to balance detail and complexity, as too much detail can increase the potential for error and uncertainty (Damodaran, 2011). It is essential to realize that less is more. The future will always be uncertain. Excessive complexity does nothing to reduce uncertainty (Damodaran, 2011). To implement these recommendations, care is taken in selecting data for this project to use a meaningful, limited data set to ensure that the analysis is focused and relevant. In summary, this project provides a better understanding of stock analysis and valuation methods through the analysis of SolarEdge. By developing and applying these skills, managers and investors can make informed investment decisions and contribute to the growth and success of their companies.

In line with this approach, the project is structured as follows. After the Introduction, the valuation overview section outlines the definitions and theoretical foundations. This is followed by data collection and methodology chapter. The company is introduced, followed by an overview of competitors, to learn and understand the market in which SolarEdge operates. In addition, publicly available company data, such as the balance sheet and income statements since 2016, are collected and used to perform ratio analysis in the data analysis chapter. The financial ratios are calculated and analyzed to gain a deeper insight into SolarEdge's financial situation and performance since 2016. The market analysis tools and valuation techniques are applied to provide the valuation of the company in the fourth chapter of this work. The discussion and conclusions of this thesis are presented in chapter five.

2 VALUATION OVERVIEW

2.1 Importance and Approaches of Valuation

Business valuation is the process of determining the present economic value of an asset, investment, or company through a set of procedures, analyses, and assessments, leading to the estimation of the company's value in monetary units for the specific moment (Miles, 1984). The need for a business valuation arises for various reasons, including mergers and acquisitions, strategic planning, raising capital, and investing in securities (Tomasito, 2018). These reasons also show that the interests behind a valuation differ. Buyers and sellers usually have different ideas about the value of a business. Both parties would benefit from a valuation when deciding whether to buy or sell and at what price. Business valuation is a critical aspect of the modern economy, as it helps determine a company's monetary value at a specific moment. But business valuation has difficulties in determining the final value of an entity due to the subjectivity of the concept of "value" and the combination of theory and practice in business valuation (Miciuła, Kadłubek, Stępień, 2020).

The actual market value of an enterprise is rarely determined exclusively by assets on the balance sheet but by various factors such as the economic situation, market attractiveness, and company strategy (Van de Schootbrugge, Wong, 2013). Business valuation estimates the price for assets and benefits a company achieves due to its management. It is carried out at the moment as market conditions are constantly changing (Schumpeter, 2017).

The goal of business valuation is to facilitate strategic decision-making in terms of organization, shares, or investments. However, despite its importance, the business valuation process has challenges. The growing importance of intellectual capital, such as legal assets, technology, and customer relationships, has made it increasingly difficult to accurately value a company's worth (Organisation for Economic Co-Operation and Development, 2006). Additionally, the existence of many subjective factors can lead to the distortion of fair value. According to Damodaran (2011), “all valuations are wrong.” He states if you don´t want to be wrong, you should not evaluate a company or a stock. But without valuation, no investment decision can be made. However, to make your own decisions, you must learn to accept that you will be wrong. But according to Damodaran (2011), the key is: “You don’t have to be right to make money. You just have to be less

wrong than everybody else." In summary, valuation is a quantitative process for determining the market value of an asset, investment, or business (Lessambo, 2021). Generally, a business can be valued in absolute or relative terms compared to similar businesses or assets. There are various methods and techniques to arrive at a valuation. Each of them can lead to a different value. According to Damodaran (2011), "Valuation involves evaluating various approaches to compare opportunities and potential profits or losses."

Therefore, this project combines different valuation models to produce a realistic valuation range of SolarEdge at this point. Valuations can be quickly affected by corporate earnings or economic events that force analysts to revise their valuation models (Damodaran, 2011). Therefore, future market events may cause this work to become outdated and require a revaluation. Another critical aspect is that while valuation is quantitative, it always involves subjective assumptions. Therefore, it is essential to take these subjective assumptions into account as well. These are considered in more detail in section 4.3.

2.1.1 Valuation Methods

Valuation methods have evolved, with a shift towards more formal, explicit, and institutionalized approaches (Luehrman, 1997). Damodaran (2006) categorizes valuation methods into four main groups, including balance sheet-based, relative valuation, option pricing, and DCF. Each method provides different insights and results, contributing to a comprehensive understanding of the valuation process (Freixo, 2022).

The balance sheet-based method considers values such as book value, focusing on static measures without considering time-varying effects (Fernandez, 2013). In contrast, relative valuation utilizes income statements and compares key indicators to the price of similar assets, providing a benchmark for valuation (Damodaran, 2006). The option pricing model measures the value of an asset by incorporating characteristics of share options (Fernandez, 2013). Lastly, the DCF approach derives values from expected future cash flows discounted to present value, incorporating the riskiness of these cash flows (Luehrman, 1997; Damodaran, 2006; Fernandez, 2013; Freixo, 2022).

Differentiating between value and price is crucial in the valuation process. Fernandez (2013) emphasizes that value can vary from buyer to buyer, whereas price represents the agreed-upon quantity between the buyer and seller. In this work, valuation compares the obtained value with the market price of SolarEdge's stock, guiding investment decisions regarding whether to buy, hold, or sell (Fernandez, 2013). The focus of this work lies on the DCF valuation method, which relies on meticulous forecasts and prudent assumptions for the model's variables (Fernandez, 2013; Freixo, 2022). Additionally, relative valuation will be used as a complementary tool to test the consistency and viability of the DCF valuation.

Valuation's significance extends beyond financial analysts, as managers also employ it to determine future strategies and resource allocation decisions (Luehrman, 1997). It aids in estimating a firm's value and stock price, thereby providing recommendations to investors regarding their stock holdings (Fernandez, 2007). Valuation encompasses objective factors such as market opportunities and industry assessment, as well as subjective and contingent factors (Neves, 2002). Hence, managers and analysts must consider quantitative and qualitative elements when performing a valuation.

Valuation is an essential process in finance, serving as a key driver for investment decisions and overall company performance. By employing intrinsic and extrinsic valuation approaches, this work aims to conduct an equity analysis of SolarEdge, a growth company that does not pay dividends. The chosen valuation methods, namely relative valuation with peers and DCF calculations, provide insights into SolarEdge's value from different perspectives. The subsequent section 2.3 will delve into a detailed description of the selected valuation methods and other commonly used approaches in equity analysis.

2.1.2 Company and Stock Valuation

Business valuation and stock valuation are methods used to determine the monetary worth of a company or a stock at a specific time. However, there are some key differences between the two. In business valuation, the value of a company is determined by considering all of its assets and liabilities. This is typically used by investors, lenders, and other stakeholders to make investment or financing decisions. Stock valuation is used to determine a specific stock's value and is typically used by investors to make investment decisions (Doran, 2021). In terms of value, both business and stock valuation can be classified into intrinsic value and market value. Intrinsic value is the inherent worth of a company or stock based on its underlying assets and future earnings potential (CFI Team, 2022b). On the other hand, market value or fair value is the price at which a company's shares or a stock is currently trading in the market, which is influenced by various factors such as economic conditions, market sentiment, and company performance (WealthDesk, 2022). The main difference between intrinsic value and market value is that intrinsic value is based on the underlying fundamentals of a company or stock. In contrast, market value is based on the current market conditions. The intrinsic value is what the company or the stock is worth fundamentally, while the market value is what it currently trades for. The difference between both values is known as the "valuation gap" (CFI Team, 2023).

2.1.3 Delimitations and Definitions of Value

In this section, the terms used in this thesis are defined and distinguished. Stock refers to a unit of ownership in a company that represents a claim on the part of the company's assets and earnings. The value of a stock is determined by the market and is based on the company's current and future performance. Market capitalization is calculated by multiplying the number of shares in the circulation of a company by the current share price (U.S. Securities and Exchange Commission, 2022). The market capitalization thus corresponds to the current market value of the equity and is thus to be distinguished from the market value as a whole (Van Horne, Wachowicz 2005). This thesis uses the term market capitalization synonymously with the term market value of equity. This value is used in practice as a benchmark for the value of a company compared to its competitors in the same industry. Enterprise value (EV) or firm value (FV) measures a company's total value, including debt and equity. It is calculated by adding a company's market

capitalization plus its debt minus cash and cash equivalents. EV is used to compare companies of different sizes or industries because it includes debt and cash, giving a complete picture of a company's overall value (Ang, Chng, 2013). Importantly, EV reflects the opportunistic nature of business and may change substantially over time because of external and internal conditions. Therefore, financial analysts often use a comfortable range of EVs in their calculations (Academia, 2018). Value investors commonly use enterprise value to spot companies undervalued in the markets (Ang, Chng, 2013). Market value, unlike market capitalization, can depend on many other factors, such as the company's industry, its profitability, debt load, and the general market environment. It reflects the opinion of investors or analysts. Market value is thus determined using numerous ratios and multiples, including price-to-earnings ratio, price-to-sales ratio, and return on equity (Van Horne, Wachowicz 2005). These different metrics consider several factors besides stockholder equity, such as outstanding bonds, long-term growth potential, corporate debt, taxes, and interest payments.

The higher the valuations, the greater the market value. Incorrectly, the market capitalization of a company is often used synonymously with the term market value. However, it refers to the market value of the equity and not the market value as a whole. The two terms must be distinguished and not used synonymously in this work. The terms company value, firm value, and enterprise value are used synonymously in this work and thus refer to the underlying calculation methods. These values are stated as absolute figures within the scope of the company analysis to reflect the company's market value. Therefore, the terms are not used synonymously with the term market value. Neither of these metrics should be confused with a company's book value, which is its net worth or net asset value (NAV) (James, 2023). The book value is calculated by subtracting non-monetary assets, liabilities, or debts from a company’s total assets (Hack, 2022). A company’s book value may be lower or higher than its market value or market capitalization. Book value per share (BVPS) and price-to-book (P/B) ratio are utilized in fundamental analysis (Allitt, 2016). The accounting book value is mainly used in these two cases. First, it serves as the total value of the company's assets that shareholders would theoretically receive if the company were liquidated. Secondly, unlike the market value of the company, the book value can indicate whether a share is undervalued or overvalued (Allitt, 2016).

2.2 Definitions concerning Sector and Industry

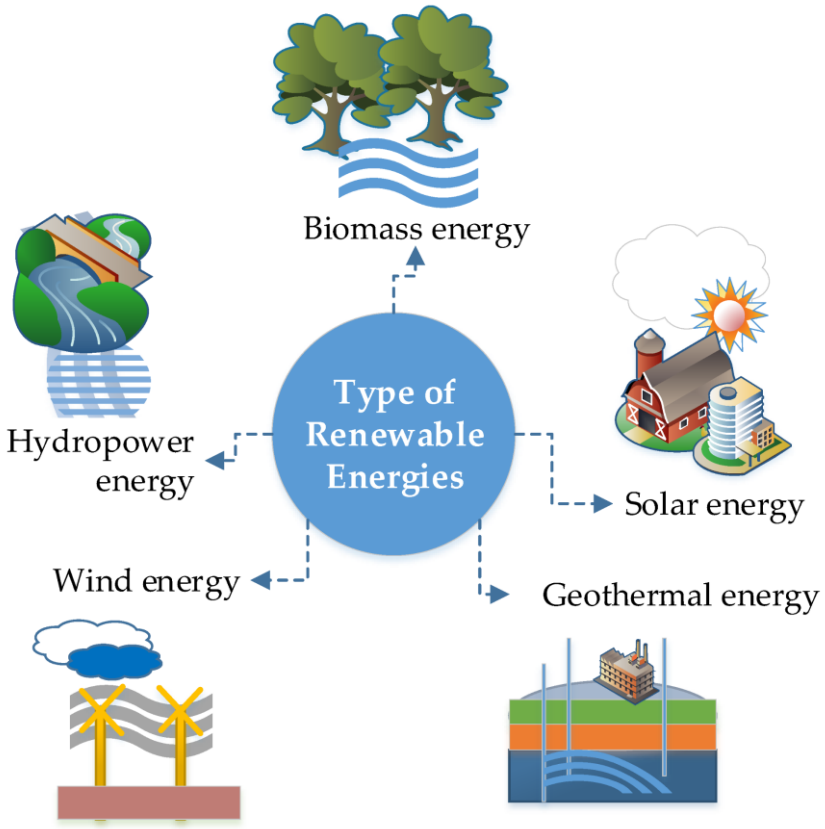
The distinction between sectors and industries is relevant for this project to classify the SolarEdge company according to its business segments and to consider the opportunities and risks of the respective sectors in the evaluation. The terms sector and industry mean a group of companies operating in the same economic segment or having a similar business type. The difference in the terms relates to their scope. The term sector refers to a large segment of the economy. An economy can be divided into about a dozen sectors, which can describe almost all of the business activity in that economy. Further subdivision of sectors leads to industries. Accordingly, the term industry of the economy describes a more specific group of companies or businesses with similar business activities. Industries can be further subdivided into different, more specific groupings called segments (Blythe, 2013). For example, the energy sector can be divided into conventional energy sources and renewable energy. The former can be further subdivided into industries based on the origin of the different energy sources, for example, coal, gas, or nuclear energy. The renewable energy industry can also be subdivided according to this classification. This then forms the industries of bioenergy, geothermal, hydropower, ocean, solar, and wind energy. All renewable energies have in common that energy is generated from inexhaustible natural sources. Using these inexhaustible resources, electricity can be generated. In contrast to conventional power generation, renewable energy use is sustainable and climate-friendly (Environment Federal Department, 2023).

These industries can be further subdivided depending on the business activity. In the photovoltaics sector, for example, a further subdivision can be made between companies that specialize in manufacturing solar modules or inverters. Depending on its business activities and the industry definition, a company can be assigned to different industries. When analyzing a company, it is essential to distinguish between the various business areas, as the respective market environment differs. Concerning SolarEdge, this means for this project that the business segments influence the company's valuation. Depending on the delineation of the industry and its subgroups, other comparison groups emerge from comparing SolarEdge with its competitors. Therefore, the delineation and subdivision of the energy sector classifications in section 2.2.1 are essential for evaluating the company.

2.2.1 Renewable Energy Sector Characteristics

This section delineates the sector and industries to which SolarEdge can be assigned. Subsequently, the unique features of the industries and their market environment are explained. Figure 2.1 shows that the renewable energy sector includes a variety of sources and technologies, such as bioenergy, geothermal, hydropower, ocean energy, solar energy, and wind energy.

Figure 2.1: Types of Renewable Energies



Source: Avtar, Sahu, Aggarwal, et al. (2019)

The characteristics of the different renewable energy sources are as follows (Avtar, Sahu, Aggarwal, et al., 2019). Hydropower is a renewable energy source that generates electricity from the energy of falling or flowing water. This form of energy is harnessed by using turbines to convert the kinetic energy of moving water into mechanical energy, which is then converted into electrical energy. Biomass is a renewable energy source that derives energy from organic matter, such as wood, agricultural waste, or municipal solid waste. This energy source is generated through various processes such as combustion, gasification, or anaerobic digestion and can be used to produce heat or electricity. Solar energy is a renewable energy source that is derived from the sun. Solar technologies are

used to capture the energy from the sun and convert it into electricity or heat. This can be achieved through various methods, such as photovoltaic panels or solar thermal collectors. Geothermal energy is a renewable energy source that is derived from the heat of the Earth's core. This form of energy is accessed through deep wells and used to generate electricity or heat buildings. The process involves pumping water or other fluids into hot rock formations and returning the heated fluid to the surface to generate electricity. Wind energy is a renewable energy source derived from the movement of air. This form of energy is harnessed by using wind turbines to convert the kinetic energy of the wind into electrical energy. Wind energy is a rapidly growing form of renewable energy and has the potential to play a significant role in reducing carbon emissions and mitigating climate change (Avtar, Sahu, Aggarwal, et al., 2019).

Renewable energy sources have gained significant attention in recent years due to their various advantages, such as sustainability, environmental benefits, and decentralization. However, they also face significant challenges, such as the intermittent nature of some sources, which can create difficulties in storing energy for later use. Despite these challenges, renewable energy sources have become increasingly competitive in the energy market, with declining costs and improved technologies making them more viable options. Furthermore, the potential for further technological advancements and innovation presents an opportunity for renewable energy to become even more competitive in the future. Overall, while challenges remain, the advantages of renewable energy, coupled with the potential for further innovation, suggest that it will likely continue to gain ground in the energy market and increase its competitiveness over time (Organisation for Economic Co-Operation and Development, 2021).

Market Environment, Historical Trends, and Future Projections

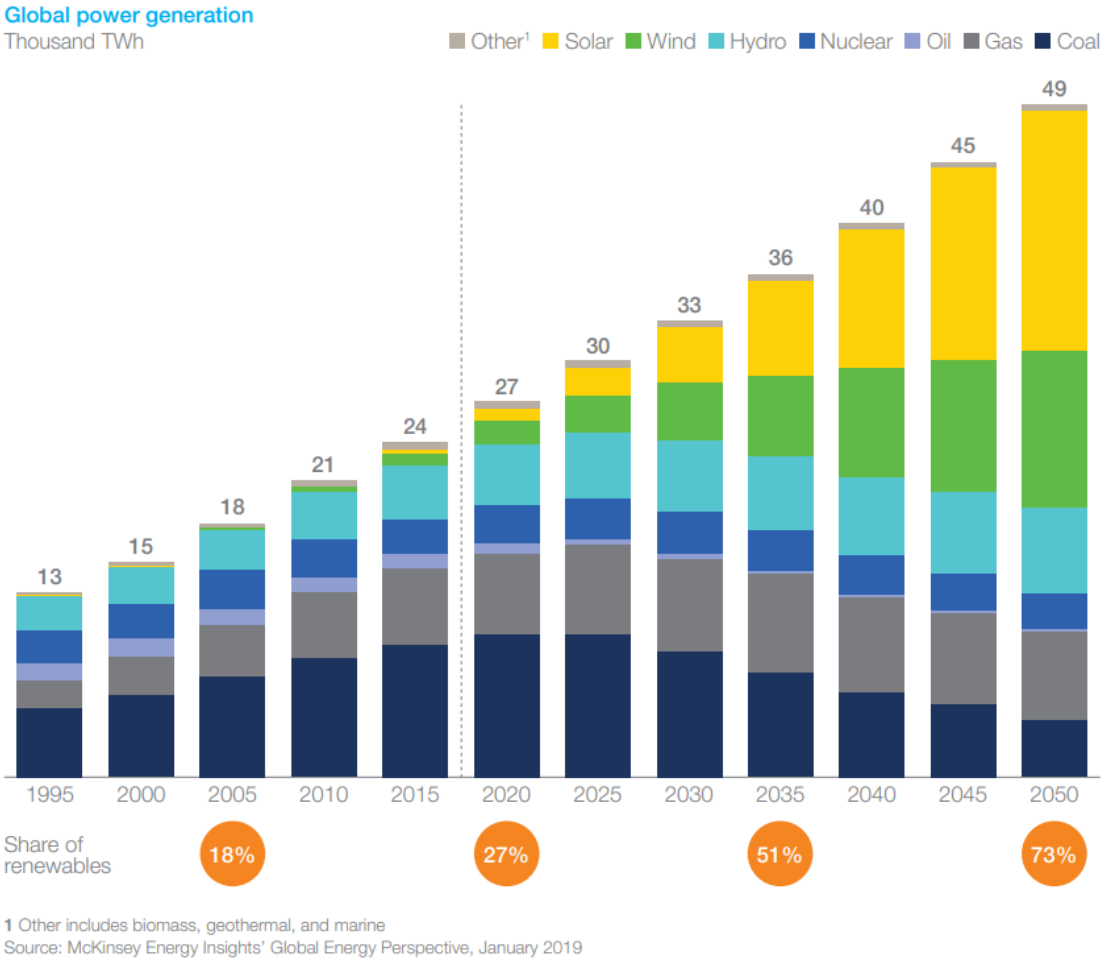
According to the International Renewable Energy Agency (IRENA), the transition to renewable energy will create more jobs in the energy sector than will be lost in the fossil fuel industry (Sustainability for all, 2019). It is estimated that 19 million new jobs will be created in this sector by 2050 (Sustainability for all, 2019). The market development of renewable energies varies by technology, with some sources like solar energy seeing particularly strong growth in recent years. According to a report by the International Energy Agency (IEA), solar photovoltaic (PV) installations grew by an impressive 43% in 2020, with China and the United States leading the way in new installations. In the past

decade, the renewable energy sector has grown. The share of renewable energy in global electricity generation increased from 22.3% in 2011 to 29.3% in 2020, according to the same IEA report. This growth is expected to continue, with the IEA projecting that renewable energy sources will account for 95% of the net increase in global power capacity over the next decade (International Energy Agency, 2020).

In addition to the growth of renewable energy sources, global energy demand has steadily risen over a decade. According to the BP Statistical Review of World Energy 2021, global energy consumption increased by 2.9% in 2019, before the COVID-19 pandemic (BP, 2021). This increase was driven by strong economic growth in emerging markets, particularly in Asia. Looking to the future, the IEA projects that global energy demand will increase by 4.6% in 2021 and continue to grow in the coming years. By 2050, global energy consumption will increase by nearly 50% (Energy Information Administration, 2021). Renewable energy will play an increasingly important role in energy production. The reason is the necessary reduction of CO^2 emissions and low production costs. According to current forecasts, solar energy will be the most crucial energy source by 2050 (International Energy Agency, 2014). As renewable energy sources continue to grow in popularity and market share, they have the potential to play an increasingly important role in meeting the world's growing energy demands (The Hermit Trader, 2019). However, challenges remain, such as the need for improved energy storage technologies to address the intermittent nature of some renewable sources. Nonetheless, the outlook for renewable energy sources remains positive, with continued growth expected in the coming years (U.S. Department of Energy, 2019).

As can be seen in Figure 2.2., McKinsey & Co.'s "Global Energy Perspective 2019" predicts that renewable energy will make up over 50% of power generation by 2035. However, this transition will not happen immediately and primary energy sources like coal and oil are expected to plateau by 2030 due to increased renewable penetration. Cost reductions of renewable technologies are expected to make them more competitive with fossil fuels. The report also anticipates a doubling of overall power generation from 2020 to 2050, driven by the electrification of buildings and transportation, particularly the adoption of electric vehicles. EVs can reduce global reliance on fossil fuels, as passenger vehicles are responsible for a quarter of global oil demand according to the International Energy Agency (McKinsey, 2019b).

Figure 2.2: Sources of Renewable Energy



Source: McKinsey (2019b)

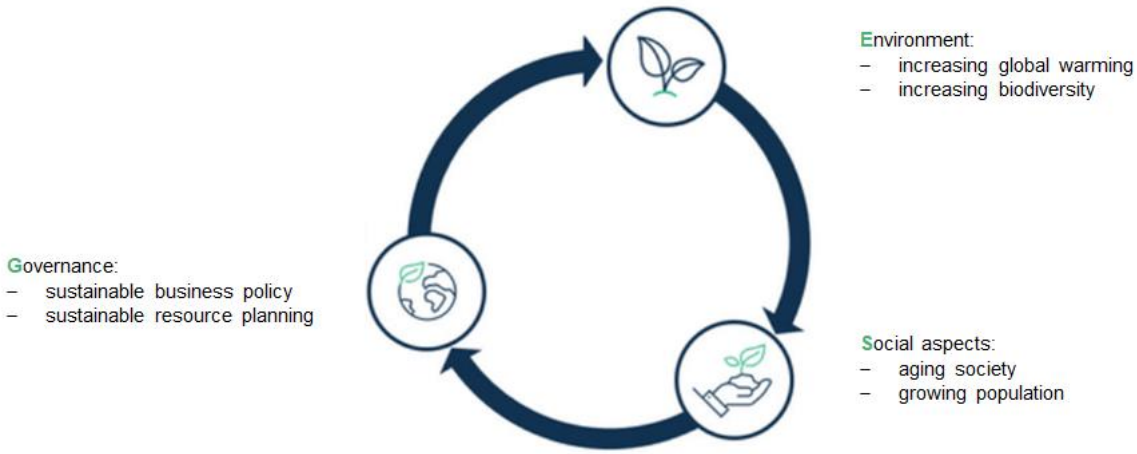
However, the transition to renewable energy sources also presents challenges. One of the primary challenges is the intermittency of specific renewable sources, which can lead to an unstable and unreliable energy supply. Nevertheless, advancements in energy storage technologies and grid infrastructure are expected to address these challenges, paving the way for a future powered by clean and renewable energy sources (International Renewable Energy Agency, 2022a). To conclude, the "Global Energy Perspective 2019" report highlights the potential for significant growth in renewable energy sources and the shift towards electrification across various sectors. While the transition will take time, significant opportunities exist for reducing carbon emissions and addressing climate change by adopting renewable energy sources.

2.2.2 ESG and Corporate Governance

Christian Vögtlin, Head of the Center for Corporate Responsibility at the Zurich University of Applied Sciences ZHAW (Niklowitz, 2022) explains that "the term CSR is more closely linked to corporate action and had a moral connotation in its origins. Sustainability comes from natural science and realizing that our natural planetary resources are limited. Finally, ESG serves the financial industry as a governance tool for sustainable investment". ESG stands for environment, social aspects, and responsible corporate management (governance). The different criteria from these three areas can be used to assess a company's sustainability, for example (LBBW Asset Management, 2023).

ESG considerations are particularly important for companies working in the renewable energy sector because they are often closely linked to the company's core business operations and mission. Renewable energy companies are often heavily regulated and have an impact on the environment, and as such, they must be able to demonstrate that they are operating responsibly and sustainably. Therefore ESG and corporate governance are critical considerations for companies in the renewable energy sector. In addition, there are other reasons, which are illustrated in Figure 2.3 (McKinsey, 2019a).

Figure 2.3: ESG-Factors



Source: own illustration, LBBW Asset Management (2023)

First, environmental considerations are particularly important for companies in the renewable energy sector, as they are directly responsible for the production of clean energy, which is a crucial component in mitigating the effects of climate change. As such, companies in this sector must demonstrate a commitment to reducing their carbon footprint and promoting sustainable practices (Peterdy, 2023). Second, social considerations are also important for companies in the renewable energy sector, as they have the potential to positively impact communities through the creation of jobs and the provision of clean energy. However, it is also important for these companies to consider the potential negative impacts of their operations on local communities and take steps to mitigate them (Emerick, 2023).

Finally, strong corporate governance is essential for ensuring the long-term sustainability and success of companies in the renewable energy sector. This includes transparent and effective management, as well as a commitment to ethical and responsible decision-making (Emerick, 2023). In the words of the International Finance Corporation, "Effective corporate governance is crucial to the long-term success of renewable energy companies and the sector as a whole" (Grabinska, Kedzior, Grabinski, 2021). Furthermore, according to the Carbon Trust, "ESG factors can have a material impact on the financial performance of companies in the renewable energy sector" (Organisation for Economic Co-Operation and Development, 2021). Therefore, investors need to consider these factors when making investment decisions.

Additionally, ESG (Environmental, Social, and Governance) and corporate governance are important because they provide a framework for companies to manage and measure their impact on various stakeholders, including shareholders, employees, customers, suppliers, and the environment (Peterdy, 2023). ESG considerations can help companies identify and manage risks and opportunities related to environmental and social issues, as well as governance practices. This can ultimately enhance a company's reputation, reduce regulatory and legal risks, improve employee engagement and retention, and increase the company's access to funding and investment opportunities.

Green bonds are a type of bond used to label the commitment to finance environmentally friendly projects such as renewable energy, energy efficiency, and sustainable transportation (International Capital Market Association, 2015). Green bonds are related

to ESG and corporate governance because they allow companies to raise capital for green projects and demonstrate their commitment to sustainability to investors and other stakeholders (Organisation for Economic Co-Operation and Development, 2015). The Green Bond Principles (GBP) are voluntary process guidelines recommending transparency and disclosure (International Capital Market Association, 2015).

However, it's worth noting that there are some pitfalls and downsides of ESG, such as a lack of standardization of ESG metrics and reporting, which can make it difficult for investors and managers to compare the performance of different companies. There is also the risk of "greenwashing," where companies make exaggerated or misleading claims about their environmental performance (Peterdy, 2023). Overall, ESG and corporate governance are becoming increasingly important for companies and investors, and companies need to understand and integrate these considerations into their business operations and strategies. This can help companies to manage risks, create value, and build long-term relationships with stakeholders. Additionally, it's also important for investors to have a clear understanding of the company's ESG performance and governance practices when making investment decisions.

In conclusion, strong adherence to ESG and corporate governance principles is essential for companies in the renewable energy sector to ensure their long-term success, mitigate negative impacts, and positively contribute to society and the environment.

2.3 Discounted Cash-Flows (DCF)

The discounted cash flow (DCF) approach is widely acknowledged and widely used in academic research for company valuation. By considering a company as a cash flow generator, this approach calculates the present value of those cash flows using an appropriate discount rate (Mathews, 2019; Freixo, 2022). The standard DCF model can be summarized by equation 2.1 and 2.2 (Mathews, 2019; Becker 2021):

$$V = \frac{CF_1}{1+k} + \frac{CF_2}{(1+k)^2} + \frac{CF_3}{(1+k)^3} + \ldots + \frac{CF_n + VR_n}{(1+k)^n}$$

(equation 2.1)

$$V = \frac{CF_n(1+g)}{(k-g)}$$

(equation 2.2)

where:

- Vn: Residual worth of the enterprise during year n
- k: Suitable rate of discount that mirrors the cash flow's risk
- CFi: Cash flow produced by the enterprise
- g: Steady growth rate subsequent year n
- VR^n: Residual value of the enterprise within year n

These equations encompass two distinct time periods. The initial period represents the growth period, during which cash flows are projected for a specific number of years. The subsequent period, starting from year n, represents an indefinite period with a constant growth rate (Mathews, 2019; Freixo, 2022; Becker, 2021). The terminal value, VR^n, denotes the company's value during this perpetual growth phase.

In the realm of business valuation, specifically in the context of employing the Free Cash Flow to Firm (FCFF) approach, the concept of an undetermined timeframe assumes the nomenclature of the terminal value (Becker 2021). This terminal value encapsulates a period characterized by unwavering growth dynamics (Mathews, 2019). As previously noted, the Discounted Cash Flow (DCF) methodology holds a prominent position in valuation due to its ability to incorporate detailed projections and astute assumptions

regarding diverse variables. This is the primary model used in this work. However, it is essential to acknowledge that the DCF method has certain limitations in its application, leading to the development of various DCF model variations. Nevertheless, these valuation methodologies share a fundamental principle centered around the relationship between present and future value (Luehrmann, 1997).

2.3.1 Free Cash Flow to the Firm (FCFF)

The money a company can generate after deducting capital expenditures is valued in the free cash flow model, indicating its ability to distribute cash to investors and cover operating costs. This knowledge aids in evaluating financial health and guiding strategic decision-making for long-term growth and profitability. The valuation process can be approached in two ways (Damodaran, 2006), with a key distinction lying in the choice of the discount rate. The first method employs the weighted average cost of capital (WACC), incorporating debt and equity components to evaluate enterprise value. This approach is known as the free cash flow to the firm (FCFF) method, which measures the financial performance of a company (Becker, 2021). On the other hand, the second method focuses solely on equity and utilizes the cost of equity, resulting in the free cash flow to equity (FCFE) approach. FCFF signifies the cash flow accessible to all investors prior to settling debts and addressing reinvestment requirements, whereas FCFE denotes the remaining cash flow post-debt payments and reinvestment considerations (Becker, 2021). A favorable free cash flow value indicates a company's capacity to meet its operational expenditures (Freixo, 2022).

The WACC, known for its accessibility and ease of use, is widely employed and recognized among financial analysts (Luehrmann, 1997). It enables estimating enterprise value by considering the effects of debt, such as tax shields and bankruptcy costs (Damodaran, 2006). Free cash flows to the firm (FCFF) encompass the cash generated by all assets of the company, irrespective of their financing structure (Freixo, 2022), and can be calculated as in equation 2.3. FCFF represents the cash flows available to both creditors and shareholders, considering working capital requirements and capital expenditures (Freixo, 2022). Importantly, these cash flows remain unleveraged, providing a comprehensive measure of the company's financial performance.

$$FCFF = EBIT * (1 - tax\ rate) + D\&A - CAPEX - \Delta NetWC$$

(equation 2.3)

where:

- $EBIT$ represents earnings before interest and taxes
- $D\&A$ depricitaion and amortization costs
- $CAPEX$ denotes capital expenditure
- $\Delta NetWC$ represents the change in working capital

The FCFF approach commonly employs the WACC as the preferred discount rate (Becker, 2021). WACC provides an inclusive assessment of the company's overall risk by considering equity and debt components and can be computed as in equation 2.4 (Becker, 2021).

$$WACC = k_e * \left(\frac{E}{(D\ +\ E)}\right) + k_d * \left(\frac{D}{(D\ +\ E)}\right) * (1 - T_C)$$

(equation 2.4)

where:

- k_e stands for the equity cost
- k_d refers to the debt cost
- D represents the debt's market value for the company
- E signifies the equity's market value for the company
- T_C represents the marginal corporate tax rate.

To calculate the value of the company, one needs to adjust the general equations 2.1 and 2.2 to this specific approach such as in equation 2.5:

$$Firm\ Value\ = \frac{FCFF_1}{1\ +\ WACC} + \frac{FCFF_1}{(1\ +\ WACC)^2} + \ldots + \frac{FCFF_n}{(1\ +\ WACC)^n} + \frac{TV_n}{(1\ +\ WACC)^n}$$

(equation 2.5)

where:

- n represents the life of the company
- $FCFF_n$ designates the Free Cash Flow to the Firm during period n

- $WACC$ represents the Weighted Average Cost of Capital
- TV_n signifies the Terminal Value of the company in period *n*.

These variables aid in determining the intrinsic value of a company over its lifespan. Terminal value pertains to the appraisal of anticipated cash flows extending beyond the explicitly projected timeline of a project (Freixo, 2022). The precise determination of this value holds pivotal importance in project assessment, given its usual substantial contribution within the DCF approach (Janiszewski, 2011; Freixo, 2022). The terminal value, also known as the residual value of the company, is computed as in equation 2.6.

$$TV = \frac{FCFF_{n+1}}{(WACC - g)}$$

(equation 2.6)

where:

- g represents the period growth rate
- $WACC$ stands for the Weighted Average Cost of Capital
- $FCFF_{n+1}$ refers to the Free Cash Flow to the Firm in period n+1.

FCFF components

In the FCFF model, it is essential to make prudent assumptions and conduct a detailed forecast based on various variables. Careful consideration of each assumption is crucial as it significantly impacts the company's performance and overall valuation. Attaining a thorough comprehension of these factors is essential for enhancing the precision of projections (Becker, 2022). These elements need to be forecasted for every interval within the selected timeframe, usually on an annual or semi-annual cadence (Becker, 2022).

Predictions for **earnings before interest and taxes** hinge on expansion rates for operational revenues and expenditures, encompassing macroeconomic elements like financial crises or industry and company-specific information (Janiszewski, 2011). In the current context, notable macroeconomic factors are the COVID-19 pandemic and the Russian war against Ukraine. These events have substantial implications for the economic environment, shaping the operating conditions and financial performance of companies.

In the process of determining the suitable **tax rate** for FCFF calculations, one has the option of selecting either the effective tax rate or the marginal tax rate (Damodaran, 2012). The commonly employed method in financial statement and FCFF valuation relies on the effective tax rate, derived by dividing taxes owed by taxable income (Becker, 2021). Distinct companies possess different marginal tax rates contingent on factors like regional, state, and local taxes (Becker, 2021).

Forecasting **depreciation** can be undertaken through three distinct approaches (Koller, Goedhart, & Wessels, 2005). If insights into the company's depreciation policy are accessible, internal methodology can be employed for forecasting (Becker, 2021). Alternatively, depreciation can be linked proportionally to revenue or to property, plants, and equipment (PP&E) (Becker, 2021). However, the latter method may increase depreciation without capital expenditure (Becker, 2021). As highlighted by Koller et al. (2005), when capital expenditure (Capex) remains stable, the choice is insignificant. Yet for entities characterized by irregular or sporadic Capex patterns, Koller et al. (2005) propose aligning depreciation PP&E.

Predicting **capital expenditure** proves intricate due to several factors (Damodaran, 2012). Primarily, corporate outlays can experience substantial fluctuations on an annual basis (Becker, 2021). Additionally, the accounting interpretation might diverge for certain transactions, as acquisitions are not categorized under capital expenditure (Becker, 2021). Consequently, businesses that expand via acquisitions could potentially downplay their net capital. An approach to potentially mitigate these complexities involves standardizing Capex by deriving an average from historical periods (Becker, 2021).

Working capital, the contrast between current assets and current liabilities, demonstrates "the company's ability to meet its short-term obligations" (Freixo, 2022). While forecasting it is relatively straightforward, caution is required due to potential base year anomalies. Hence, changes in working capital should relate to projected revenue shifts proportionally (Damodaran, 2012). Negative working capital can offer short-term cash release advantages but may impact long-term revenue negatively (Damodaran, 2012).

Weighted Average Cost of Capital – WACC

The extensively employed discount rate in modern equity analysis is known as the weighted average cost of capital (WACC), as it incorporates both the company's debt (D) and equity (E) (Becker, 2021). This facilitates the inclusion of anticipated bankruptcy expenses and the tax advantages linked with debts (Luehrmann, 1997; Damodaran, 2006). Consequently, the calculation of the WACC (as in equation 2.4) necessitates determining the cost of debt (k_d), adjusted for taxes using the marginal tax rate of the company (T_C) to account for the impact of debt, and the cost of equity (k_e). Moreover, the expenses tied to debt and equity must be evaluated within the framework of the company's capital composition (Fernandez, 2013; Becker, 2021). The WACC is unsuitable for the adjusted present value (APV) approach in cases where the company experiences frequent changes in its capital structure, as the WACC assesses debt effects separately (Damodaran, 2006).

Cost of Equity

In equity analysis, the cost of equity refers to the return expected by an investor in exchange for assuming investment risk. The **capital asset pricing model** (CAPM) is a commonly used framework for calculating the cost of equity. It seeks to quantify the anticipated return relative to a specified level of risk, offering a useful proxy (Fama and French, 2004). Nevertheless, it is important to note that the CAPM encounters empirical challenges when validating the model and relies on several simplifying assumptions (Fama and French, 2004). The CAPM formula is expressed as in equation 2.7:

$$R_S = R_f + \beta * (R_M - R_f)$$

(equation 2.7)

where:

- R_S represents the expected return on the stock
- R_f denotes the risk-free interest rate
- β corresponds to the stock's sensitivity to the market return
- $(R_M - R_f)$ signifies the market risk premium

To determine the risk-free rate, Koller et al. (2005) suggest utilizing the yield of a government bond that carries no default risk. Damodaran (2012) defines risk as the

variance between actual and expected returns. Within the framework of the CAPM, the risk-free rate denotes the yield on an asset devoid of risk (Becker, 2021). When selecting long-term and short-term bonds, a longer maturity aligns better with a company's cash flows (Becker, 2021). Nonetheless, this principle might not remain valid for unpredictable premiums, wherein a briefer timeframe could be more appropriate (Koller et al., 2005). Additionally, the currency of the government bond should correspond with the selected currency used in the company's financial statements (Becker, 2021).

The CAPM estimates a stock's expected return relative to a specific risk level. As Damodaran (2012) describes, the market risk premium represents the extra return above a risk-free investment. In CAPM, this factors into the risk-free rate, adjusted by the stock's beta (β). Damodaran (2012) notes that historical or implied premium methods calculate the risk premium. However, no consensus exists on the preferred approach due to limitations. Historical estimation varies based on time frames or averaging techniques, while implied premium relies on accurate stock market valuation (Damodaran, 2012). Incorporating a country risk premium might be necessary, considering political, economic, customer, and currency influences. One approach involves using the country's credit rating differential from a reputable agency (Damodaran, 2012; Becker, 2021).

The investment's beta (β) in the CAPM represents the risk added to a market portfolio by investing in that specific asset (Damodaran, 2012). Damodaran (2012) presents three techniques for beta estimation: regression analysis using historical data grounded in market prices of the investment, estimation relying on fundamental characteristics, and incorporation of the company's accounting data. It is crucial to differentiate between levered and unlevered companies, as beta necessitates adjustments in accordance with the capital structure (Becker, 2021).

Cost of Debt

The cost of debt represents the expenses incurred by the firm to finance a project through borrowed funds (Damodaran, 2012). The firm's default risk influences these costs, the tax advantages associated with debt, and the risk-free rate (Damodaran, 2006). In the process of ascertaining the cost of debt, Damodaran delineates two methods. The initial approach presupposes the issuance of a long-term bond that is actively traded in the market. In this

case, the cost of debt (k_d) can be estimated based on the prevailing market price of the bond. To calculate the cost of debt after taxes, the tax benefits resulting from interest payments are factored in using equation 2.8 (Damodaran, 2002; Becker, 2021).

$$After - tax\ cost\ of\ a\ debt\ =\ Pre - tax\ cost\ of\ debt\ *\ (1\ -\ tax\ rate)$$

(equation 2.8)

where:

- $After - tax\ cost\ of\ a\ debt$ is the actual expense a company faces for its debt financing after accounting for tax benefits gained by deducting interest expenses.
- $Pre - tax\ cost\ of\ debt$ represents the company's cost before taking taxes into account. It is the interest rate a company would pay without considering tax advantages.
- $tax\ rate$ is the corporate tax rate applicable to the company's taxable income.

Alternatively, if the bond is not frequently traded, the cost of debt can be approximated using the company's credit rating and the corresponding default spread (Damodaran, 2012). In equation 2.9, the cost of debt is calculated as the ratio of interest expenses to the sum of short-term debt and long-term debt. This equation provides a straightforward approach to determining the average cost of the company's debt financing. By dividing the interest expense by the total debt (sum of short-term and long-term debt), the equation provides an average cost of the company's entire debt portfolio. This is a simplified approach to understanding the cost of debt.

$$Cost\ of\ debt\ =\ \frac{Interest\ expense}{(short\ term\ debt\ +\ long\ term\ debt)}$$

(equation 2.9)

where:

- $Cost\ of\ debt$ represents the effective interest rate a company pays on its total debt.
- $Interest\ expense$ is the total amount of interest payments a company makes on its outstanding debt over a specific period.
- $short\ term\ debt$ refers to the company's debts that are due within the next year, such as loans with maturities of less than 12 months.
- $long\ term\ debt$ includes the company's debts with maturities exceeding one year, such as bonds or loans with longer repayment periods.

2.3.2 Free Cash Flow to Equity (FCFE)

Free cash flow to equity (FCFE) (equation 2.10) represents the cash flow available to equity shareholders after fulfilling all financial obligations, including debt payments, capital expenditures, and working capital needs (Janiszewski, 2011; Becker, 2021).

$$FCFE = Net\ income + D\&A - CAPEX - \Delta NetWC + New\ Debt - Debt\ Repayment \quad \text{(equation 2.10)}$$

where:

- $Net\ income$: Company's revenue minus expenses and taxes
- $D\&A$: Non-cash expenses for asset value decline
- $CAPEX$: Investments in assets like equipment
- $\Delta NetWC$: Cash change from current assets and liabilities.
- $New\ Debt$: Additional debt taken on during the period.
- $Debt\ Repayment$: Amount of debt paid off during the period.

The equity value is then determined by discounting the FCFE of each period and the terminal value (TV_n) using the required return on equity (R_e), as in equation 2.11:

$$Equity\ Value = \frac{FCFE_1}{1 + R_e} + \frac{FCFE_2}{(1 + R_e)^2} + \ldots + \frac{FCFE_n}{(1 + R_e)^n} + \frac{TV_n}{(1 + R_e)^n} \quad \text{(equation 2.11)}$$

where:

- $FCFE_1$, $FCFE_2$, ..., $FCFE_n$ represents Free Cash Flows to Equity in different periods
- TV_n (Terminal Value) represents the value of the company at the end of the projection period, often determined using methods like the perpetuity growth model
- R_e(Required Return on Equity) represents the rate of return that investors require for holding equity in the company.
- $(1 + Re)^1$, $(1 + Re)^2$, ..., $(1 + Re)^n$: The discounting factor for each period, accounting for the time value of money.

The FCFE formula helps assess the cash flow available to shareholders, aiding in investment decision-making and valuation of the company's equity (Becker, 2021).

2.3.3 Relative Valuation

The discounted cash flow (DCF) method evaluates the value of an asset based on its cash flow, growth prospects, and risk characteristics. In contrast, relative valuation determines the asset's value by comparing it to similar assets in the market (Damodaran, 2012). Relative valuation is a valuable complement to DCF valuation, enabling a thorough examination of forecasted cash flows, industry drivers, and competitive differentiators (Koller et al., 2005; Nobre, 2017). However, the reliance on market-based multiples in relative valuation can also be a drawback. Damodaran (2012) highlights the possibility of overvaluation or undervaluation of multiple companies due to market dynamics. Furthermore, selecting appropriate comparable companies poses a significant challenge, considering factors such as growth, risk, and return on invested capital (Koller et al., 2005; Nobre, 2017).

Multiples, as classified by Fernandez (2001), can be categorized into three groups: enterprise value multiples, equity multiples, and growth-referenced multiples. These ratios provide insights into the amount paid for the asset (numerator) and the corresponding return received (denominator). Among the commonly used multiples, the Price to Earnings Ratio (PER) (equation 2.12) and the enterprise value to EBITDA (EV/EBITDA) are widely employed (Fernandez, 2001).

$$Price\ to\ Earnings\ = \frac{Price}{EPS}$$

(equation 2.12)

where:

- $Price$: Current market price of one share.
- $Earnings\ per\ Share\ (EPS)$: Company's profit divided by outstanding shares.

The P/E Ratio contrasts a company's stock price with its earnings per share, offering insight into the price investors are willing to pay for each unit of earnings. Additional price ratios, like price to book (P/BV) or price to cash earnings (P/CE), are also present, although their suitability differs based on industries.

It is important to note that these ratios have limitations, particularly regarding earnings per share (EPS), which can be affected by accounting practices and one-time effects (Fernandez, 2001).

Regarding the evaluation of the cost of equity, the Capital Asset Pricing Model (CAPM) can be employed to approximate it. CAPM seeks to quantify the anticipated return in relation to the corresponding risk level. However, the CAPM has limitations and relies on certain assumptions (Fama and French, 2004). The determination of the cost of equity is shaped by elements like the risk-free rate, the market risk premium, and the asset's beta (Fernandez, 2013).

Overall, the DCF method provides a comprehensive approach to valuing assets, while relative valuation offers insights by comparing them to similar assets. The choice between these approaches depends on the availability of reliable data and the appropriateness for the specific analysis of SolarEdge.

2.3.4 Adjusted Present Value

In equity analysis, two standard methods for estimating the value of assets are the adjusted present value (APV) and the weighted average cost of capital (WACC). While both approaches share similarities, they differ in treating debt financing effects (Luehrmann, 1997; Damodaran, 2006; Becker, 2021). The APV approach separates the effects of debt from the asset's value, while the WACC incorporates these effects within the discount rate. Precisely, the Adjusted Present Value (APV) technique gauges the worth of an asset by considering a scenario with no debt and subsequently incorporating tax benefits and bankruptcy expenses as distinct components (Miller and Modigliani, 1963; Damodaran, 2006). As per Damodaran (2006), the valuation of a company can be represented by equation 2.13:

$$Value\ of\ Firm = Value\ of\ Business\ with\ 100\%\ Equity + Present\ Value\ of\ Tax\ Shield - Expected\ Bankrupty\ Costs$$

(equation 2.13)

where:

- $Value\ of\ Business\ with$ 100% $Equity$ (VBE) represents the hypothetical value of the firm if it were financed entirely with equity (no debt).
- $Present\ Value\ of\ Tax\ Shield$ reflects the tax advantages gained from having debt in the capital structure. Debt interest payments are tax-deductible, resulting in tax savings, which are considered in the valuation.
- $Present\ Value\ of\ Expected\ Bankrupty\ Costs$ considers the potential costs associated with bankruptcy or financial distress due to the presence of debt. It reflects the negative impact of debt on the firm's value.

The equation provides a way to estimate the value of a firm's equity by considering various factors related to its financing structure, taxation, and potential distress costs.

To calculate the APV, Damodaran (2006) suggests starting with the unlevered firm value and then incorporating the expected tax shield and bankruptcy cost. The tax shield's present value depends on the firm's tax rate and is discounted by the riskiness of the debt cash flow. Estimating the tax benefit involves determining the appropriate tax rate, currency value, and discount rate (Damodaran, 2006).

Different approaches exist, including Fernandez's (2004) method that calculates the value of debt by comparing the unlevered and leveraged firm, incorporating interest tax benefits. Cooper and Nyborg (2006), on the other hand, suggest discounting the present value of interest tax savings at the cost of debt. It's worth noting that increasing debt levels can magnify debt-related advantages while simultaneously elevating the projected cost of bankruptcy. Estimating the present value of expected bankruptcy costs can be intricate, involving the consideration of both direct and indirect impacts stemming from financial distress, such as potential loss of customers or suppliers (Opler and Titman, 1994). An approach proposed by Damodaran (2006) to assess the probability of bankruptcy entails using bond ratings, mirroring the methodology applied in WACC calculations.

3 DATA COLLECTION AND METHODOLOGY

This chapter prepares the available information about SolarEdge and some competitors and classifies the company in the market. In addition, the financial statements from 2016 until 2022 and other financial data of SolarEdge are used to perform the company analysis and DCF in the following chapter.

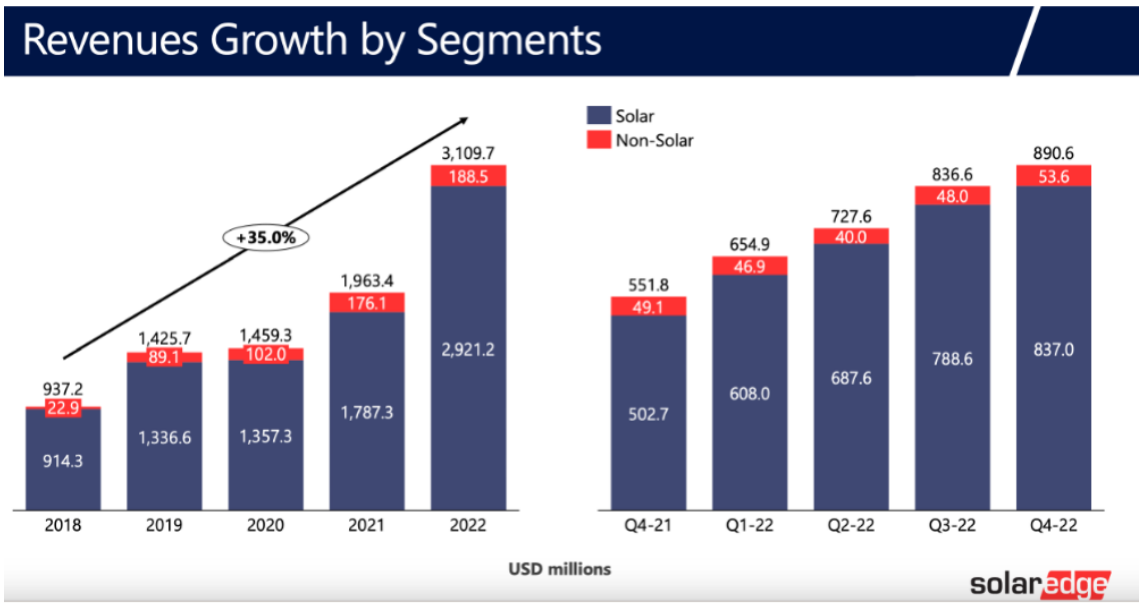
3.1 Company Overview

This section deals with the company SolarEdge to provide a deeper insight into the company and its business areas. SolarEdge is one of the world's leading providers of smart energy technologies. Founded as a startup in 2006, the company's innovations have fundamentally changed how a Photovoltaic system generates and manages energy. SolarEdge's smart DC-optimized inverter solution maximizes energy harvesting while reducing the cost of electricity generated by the Photovoltaic system for greater profitability (Habib-Valdhorn, 2021). SolarEdge continues to drive the development of smart energy, serving a wide range of market segments (SolarEdge, 2022c).

In addition to the DC-optimized inverter solution, the company has developed the world's first charger for electric vehicles with an integrated PV inverter. Thus, it is possible to combine solar and grid power to charge an electric car up to 2.5 times faster than conventional mode 2-chargers for electric vehicles. In addition, the systems can be controlled and monitored via apps, allowing tracking of solar power consumption, electricity used for the electric car, and electricity purchased from the grid for transparency and control of household energy use (SolarEdge, 2022a). The company is headquartered in Israel with development sites in Germany and Italy, as well as offices in other countries (Solaredge, 2022e).

SolarEdge has been at the forefront of solar innovation since its inception, with a focus on developing new technologies to improve the performance and reliability of solar PV systems. The company has a strong patent portfolio, with over 1,500 patents and patent applications filed worldwide. These patents cover a wide range of technologies, including power optimizers, inverters, monitoring systems, and energy storage solutions (SolarEdge, 2022d).

Figure 3.1: SolarEdge: Revenues Growth by Segments



Source: Bhambhani (2023)

As shown in Figure 3.1, SolarEdge's growth has been impressive, with the company expanding its product line and global presence over the past decade. The company has offices and operations in over 25 countries and has shipped over 20 million power optimizers and inverters worldwide. SolarEdge's revenue has also grown rapidly, from $325M in 2015 to over $1.6B in 2021 (Rozen, 2013).

SolarEdge's commitment to innovation has been a key driver of its revenue growth. The company has invested heavily in research and development, with over 15% of its revenue dedicated to R&D. This investment has paid off, with SolarEdge introducing new products and technologies that have helped to increase its market share and revenue. SolarEdge's revenue growth has been particularly strong in recent years, with the company reporting revenue of $1.6B in 2021, up from $1.B in 2020. This growth can be attributed to several factors, including the increased demand for solar PV systems, the expansion of SolarEdge's product line, and its strong global presence (SolarEdge, 2021).

3.1.1 History

SolarEdge was founded by Guy Sella and four partners in 2006 as a startup in Israel. The aim was to develop and produce inverters for photovoltaic systems. It took three years to develop the product. In 2015, SolarEdge went public, but not in the domestic market in Israel but in the USA on the NASDAQ, as a higher valuation was expected here (SolarEdge, 2023e).

Strategic Acquisitions: SolarEdge is expanding and broadening its offering. For this purpose, SolarEdge acquired Kokam, a South Korean company that manufactures lithium-ion batteries for energy storage and electric vehicles, in 2018. In addition, in 2019, SolarEdge acquired SMRE, an Italian company that develops powertrains for electric vehicles (Salkin, 2022).

The company has also partnered with major corporations such as Tesla and Schneider Electric. Tesla produces electric cars and also battery storage and photovoltaic systems (Tesla, 2023). Schneider Electric is a French-listed electrical engineering group active in the fields of electrical power distribution and industrial automation (Schneider Electric, 2023). Today, SolarEdge offers a broad product portfolio within the scope of Smart Energy technology and is one of the top ten leading companies in the inverter market (Markets and Markets, 2022). SolarEdge has more than 4.100 employees and monitors over 2.600.000 systems around the world (SolarEdge, 2023e).

3.1.2 Business Segments

SolarEdge focuses on advanced smart energy technologies, offering a diversified product range that caters to various energy market segments. Its product portfolio includes solutions for residential PV, commercial and large-scale PV, energy storage, electric vehicle charging, home energy management, grid services, virtual production units, batteries, and uninterruptible power supplies (UPS).

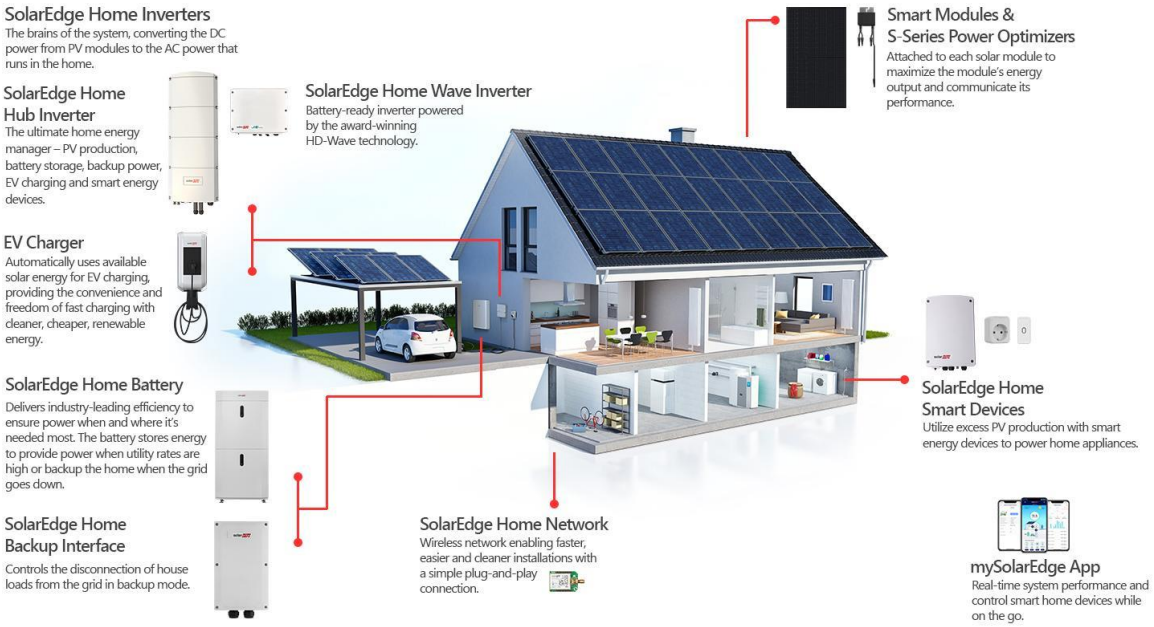
SolarEdge sells its products worldwide and has a total of 16 locations on all continents. They also work with a large distribution network with various wholesalers and distributors. Currently, the United States and Europe are the strongest sales markets

(Osborne, 2021). In the future, emerging markets will become more and more important as the demand for energy will increase the most there (International Energy Agency, 2022b). Therefore, SolarEdge already covers China and India in Asia with its own subsidiaries.

The company's core business focuses on smart energy technology and covers a wide range of energy market segments. Within this framework, the product offering consists of the following product offerings: residential, commercial, and large-scale PV installations, energy storage systems and backup power solutions, electric vehicle charging, home energy management, grid services and virtual power plants, batteries, and uninterrupted power supply (UPS) solutions (SolarEdge, 2023e). Accordingly, the portfolio of products can be divided into commercial solutions and residential solutions. Consequently, residential and commercial customers are the two main target groups.

Figure 3.2 shows SolarEdge's **range of residential energy solutions**, including photovoltaic systems for power generation, hub inverters for energy system control, batteries for energy storage, electric vehicle chargers, and smart home devices, including an app.

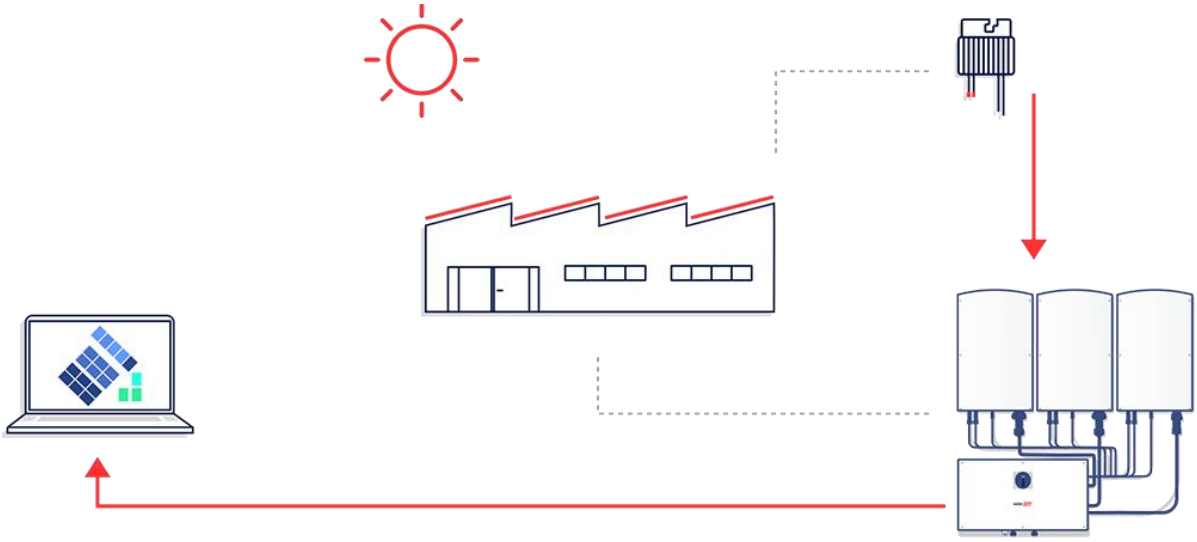
Figure 3.2: Residential Products



Source: SolarEdge (2023c)

For **commercial customers**, SolarEdge offers specialized analysis and tools to maximize energy harvesting, in addition to photovoltaic system design and installation. SolarEdge inverters support longer and uneven strings, requiring less supporting hardware to be installed. A single string can also have modules positioned at different orientations and tilts to make installation even easier. This is not possible with traditional photovoltaic systems. SolarEdge's proprietary Maximum Power Point Tracking (MPPT) further enhances performance, allowing each module to operate individually at maximum capacity (SolarEdge, 2023a).

Figure 3.3: How does the system work?



Source: SolarEdge (2023a)

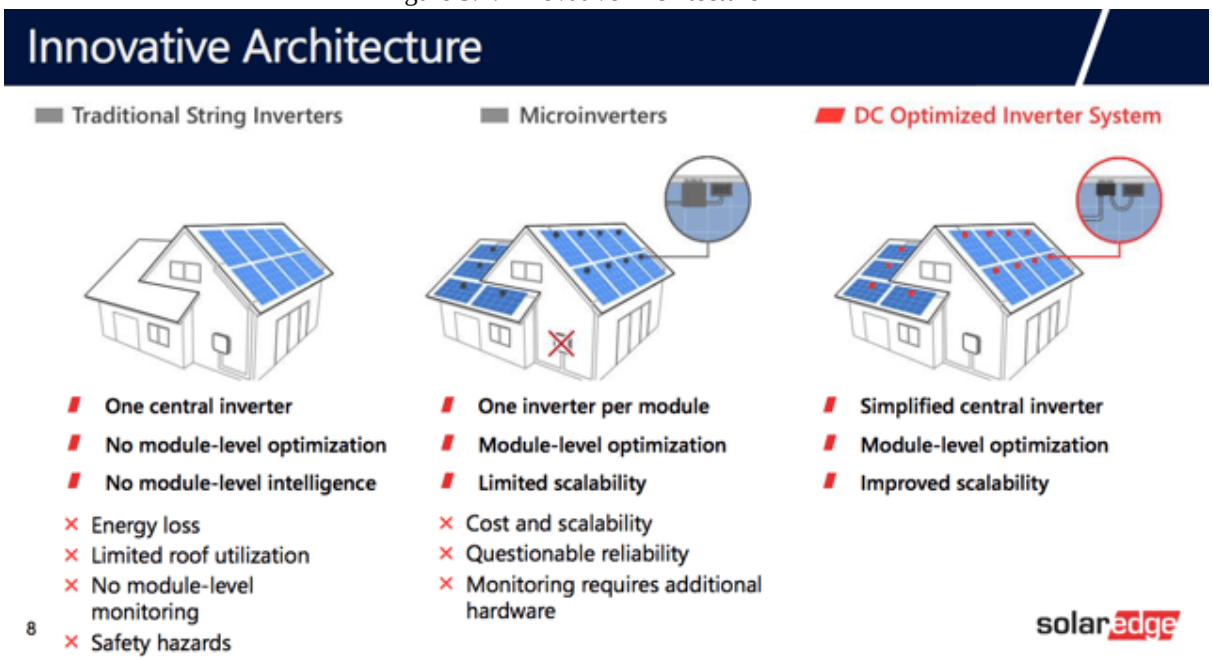
As Figure 3.3 shows, SolarEdge installations feature module-level monitoring that sends automatic alerts of system problems, preventing potential safety risks, while monitoring the platform enables remote troubleshooting. SolarEdge monitors the entire lifecycle of its installations, performs maintenance, and ensures support. In addition to selling the products, the company is also involved in maintenance and offers complete energy management systems.

3.1.3 Company Mission

“SolarEdge’s mission is to become the leading provider of inverter solutions across all PV market segments and broaden the availability of clean, renewable solar energy” (SolarEdge, 2023b). SolarEdge wants to use its innovative technology to become the market leader across all PV market segments. Additionally, CEO Zvi Lando states in 2021: “Our desire, intent, and activity is focused on expanding the company into even more avenues in the field of green and renewable energy” (Bahur Nir, 2021). This means the company's mission is also to expand its activities to other business areas in the field of renewable energies.

Zvi Lando summarizes this as follows: "Our mission is to shape the future of sustainable energy - with a focus on clean energy generation, management, storage, and e-mobility. This reflects our commitment to protecting the environment for generations to come. SolarEdge aims to "shape the future of sustainable energy" with its innovative technologies and has the **vision** to lead the energy transition (SolarEdge, 2023d).

Figure 3.4: Innovative Architecture



Source: Cardenal (2019)

As Figure 3.4 shows, SolarEdge has implemented a unique architectural design that utilizes optimizers on each panel, thereby enabling independent panel operation while relying on a central inverter. This approach not only leads to superior performance but

also reduces costs by eliminating the need for duplicate inverters. As a result of this innovative approach, SolarEdge has successfully consolidated its leadership position in the market and has achieved a substantial global reach. Furthermore, the company has achieved a remarkable compounded annual growth rate in revenue of 38 % since 2014 (SolarEdge, 2023d).

SolarEdges' **success** can be attributed to several **key drivers**, including innovative technology, strong financial performance, geographic diversification, strong customer relationships, government policies and regulations, brand reputation, strategic partnerships, and cost-efficient production. The company's DC-optimized inverter systems have been well-received in the market, and SolarEdge has a patent portfolio to safeguard its intellectual property, providing a differentiated product that can confer a competitive edge in the solar inverter market. Furthermore, SolarEdge has reported consistent revenue growth and profitability in recent years, enabling the company to invest in research and development, expand into new markets, and attract investors.

Additionally, SolarEdge has a global customer base and a presence in diverse geographic markets, which helps mitigate the impact of market fluctuations and provides a more stable revenue stream. The company's reputation for high-quality products and excellent customer service strengthens customer relationships and fosters new business opportunities. Understanding the rapidly evolving government policies and regulations related to renewable energy is also critical, and having a strong reputation for quality and reliability can help attract new customers and increase sales. Developing strategic partnerships with other companies and organizations can further expand SolarEdge's reach, facilitate access to new markets, and share the risks and costs of new ventures. Finally, cost-efficient production is essential for SolarEdge to increase profit margins and remain competitive in the market. It is the combination of these factors that can drive success for SolarEdge and similar companies (SolarEdge, 2022b).

3.2 Classification of SolarEdge in the Renewable Energy Sector

In the previous section, SolarEdge was introduced as a company that designs, develops, and sells direct current (DC) optimized inverter systems for solar photovoltaic (PV) installations (SolarEdge, 2022e). The purpose of this section is to classify and evaluate SolarEdge in terms of the sectors and industries it operates, particularly within the renewable energy sector. Being focused on manufacturing power optimizers for solar panels, SolarEdge occupies a unique niche that complicates direct industry comparisons. Nevertheless, it generally operates in the energy sector, and more specifically, it can be assigned to the solar energy industry. Within the solar energy industry, SolarEdge's primary category is the production of inverters. The inverter market, although related to solar energy, falls under the technology sector and encompasses specific applications like inverters for electric vehicles and solar systems (Lowden, 2023).

Furthermore, while the solar industry isn't directly classified under the semiconductor industry, it heavily relies on semiconductor technologies and materials like silicon (Varas, Varadarajan, Goodrich, et al., 2021). These diverse classifications significantly impact the company's comparison with its competitors. ReadyRatios places SolarEdge in the "Electronic And Other Electrical Equipment And Components, Except Computer Equipment" sector, which doesn't perfectly align with its product portfolio (Ready Ratios, 2021). On the NASDAQ, SolarEdge's stock is listed in the Semiconductors industry (NASDAQ, 2023). Hence, to assess SolarEdge's financial position, key figures for the "Semiconductors and Related Devices" industry are used. The PV inverter market, a crucial segment within the photovoltaic systems market, features competitors like SMA Solar Technology AG, Huawei, Power Electronics, ABB, Sungrow Power Supply, and SolarEdge. Additionally, in the energy storage systems market, SolarEdge competes with Tesla. Energy storage technologies fall into five broad categories: mechanical, electrochemical (batteries), thermal, electrical, and hydrogen storage (Allied Market Research, 2022). Due to varying industry classifications, obtaining accurate industry ratio data for benchmarking SolarEdge proves challenging. Nevertheless, major competitors' key figures will be used to evaluate the company's financial performance and growth potential in the renewable energy sector.

3.3 Competitors and Competitive Position

SolarEdge operates in a growing market. The growth opportunities in the renewable energy sector mean the market is highly competitive as companies vie for market share. Analysts say, “SolarEdge's growth potential is already priced in at its current market capitalization” (Simple Investment Ideas, 2021). As stated, market capitalization is calculated by multiplying the company’s share price by its total number of shares outstanding (Ragas, Culp, 2021). As of 1st of August, 2023, SolarEdge traded at 239.47 USD. With a total number of shares outstanding of 56.215.490, the company has a market capitalization of 13,31 B USD. Significant players in the industry are First Solar, SMA Solar, Enphase, SunGrow, and Huawei, while Tesla is also starting to produce solar products (Simple Investment Ideas, 2021). SolarEdge is one of the market leaders in inverters. Its biggest competitor is Enphase Energy Inc. The competitor is gaining market share, especially in the US market. Enphase's revenue growth and operating profit margin are significantly better. While Enphase has a slightly more robust presence in the U.S., SolarEdge leads the market in Europe and the rest of the world by revenue. This section gives an overview of the main competitors of SolarEdge.

Enphase Energy delivers reliable and innovative energy management solutions to advance the global potential of renewable energy. The company's microinverter system, which is based on semiconductor technology, converts direct current (DC) electricity to alternating current (AC) at the individual solar module level. Enphase Energy leverages its design expertise in power electronics, semiconductors, networking, and cloud-based software technologies to offer a high-technology approach to solar energy generation. The technology was designed to increase energy production, simplify design and installation, improve system uptime and reliability, reduce fire risk, and provide a platform for intelligent energy management. With over 16 million microinverters shipped, representing over 3 gigawatts of solar photovoltaic (PV) generating capacity, Enphase Energy's technology has been deployed in more than 739,000 residential and commercial systems across 110 countries (CSI Market, 2021).

Schneider Electric SE is an energy management and automation company focused on developing technologies for electricity distribution. Its key products range from automation/control and low voltage systems to solar/energy storage and medium voltage

distribution. The company offers energy services, field automation, cloud solutions, and consulting across various industries. Schneider Electric serves various industries, including banking and finance, food and beverage, healthcare, life sciences, marine, metals, minerals and cement, mining, oil and gas, retail, and automotive and mobility, among others. With a global presence across regions including Africa, Europe, and North America, Schneider Electric is headquartered in Rueil-Malmaison, France (Schneider Electric, 2023).

ABB Ltd stands for Asea Brown Boveri, a Swiss company based in Zurich. ABB manufactures transformers, cables, and switchgear in the electrical engineering sector and is also active in power engineering. The group also makes motors, wind generators, and solar products, as well as low-voltage products (ABB, 2023).

First Solar, Inc. produces solar modules using thin film semiconductor tech, offering economical and eco-friendly photovoltaic power solutions. It operates waterless, emission-free PV power plants, advocating clean, competitive renewable electricity. First Solar leads in green product lifecycle management and has a thorough module recycling initiative. Its dedication to sustainable energy ensures positive impacts from material sourcing to end-of-life recycling (CSI Market, 2021).. Table 3.1 presents some key figures of the main competitors of SolarEdge.

Table 3.1: Competitors

Competitor	Industry	Founding Date	Employees	Revenue 2022 ($)	Market Capitalization ($)
Schneider Electric SE	Power	1836	166.025	40.4 B	93 B
Enphase Energy, Inc.	Solar	2006	2.820	2.3 B	31 B
ABB Ltd	Manufacturing & Industrial	1988	105.100	29.4 B	64 B
First Solar	Energy & Utilities	1999	4.800	2.6 B	22 B
SMA Solar	Solar	1981	3.510	0.98 B	4 B
Huawei	Mobile & Telecommunications Technology	1987	195.000	637 B	71 B

Source: own illustration based on Craft (2023)

Table 3.2 summarizes some key figures of SolarEdge, the semiconductors & related devices industry, the energy sector, and the NASDAQ exchange.

Table 3.2: SolarEdge vs. The Competition

Metric	SolarEdge Technologies	Semiconductors & Related Devices Industry	Energy Sector	NASDAQ Exchange
Market Cap	$15.74B	$23.13B	$6.51B	$6.03B
Dividend Yield	N/A	26.47%	10.90%	5.86%
P/E Ratio	169.84	24.51	66.84	15.86
Price/ Sales	5.06	15.68	9.113.20	62.73
Price/ Cash	39.87	34.18	37.45	88.51
Price/ Book	7.20	7.05	8.22	5.09
Net Income	$93.78M	$1.02B	$1.14B	$189.40M

Source: own illustration based on MarketBeat (2023)

Positioning and Classification of SolarEdge in the Renewable Energy Sector

SolarEdge's core product, the SolarEdge inverter, optimizes power generation by countering shading and temperature variances for enhanced system efficiency. Diversifying its offerings to encompass battery storage systems, electric vehicle (EV) charging solutions, and grid services, SolarEdge sustains competitiveness and seizes more of the growing renewable energy market (SolarEgde, 2018). SolarEdge is a leading provider of power optimization and monitoring solutions within the PV solar energy sector. Its technology is mainly utilized in residential and commercial solar energy systems to maximize energy production and reduce system costs.

It has extended its reach into utility-scale solar projects, with global adoption in large-scale solar farms. Additionally, SolarEdge has made significant progress in energy storage and EV charging solutions, which provides opportunities for future growth. SolarEdge's battery storage systems gain importance as more entities aim to self-generate and store renewable energy. Likewise, its EV charging solutions align with rising EV market demand. SolarEdge's competitiveness and larger market share are anchored in innovation and diversification. Its accomplishments in residential, and commercial solar sectors, coupled with expanding utility-scale and energy storage ventures, establish it as a vital player in the renewable energy sector.

3.4 Methodology

The company analysis involves different methods, which are presented in this section. While the past can be analyzed for insights, predicting the future remains elusive. Instead, probable scenarios are developed based on current data, recognizing that more extensive data enhance forecast accuracy, yet numerous variables can still introduce errors. Hence, the challenge in business analysis lies in prioritizing essential factors to minimize error sources (Damodaran, 2011).

No single valuation model fits every situation; instead, selecting a model aligned with the company's characteristics is crucial. Utilizing different models allows leveraging each model's advantages and mitigating their disadvantages, leading to a range of possible values. Applying various methods facilitates gaining diverse insights from the figures (Koller et. al, 2020).

In terms of methods, the discounted cash flow (DCF) method is commonly used in both business and stock valuation to estimate the intrinsic value of an asset or business by forecasting its future cash flows and discounting them to present value. Additionally, in business valuation, the asset-based method and the market approach are commonly used. The asset-based method values a company based on the value of its assets, such as inventory, property, and equipment. The market approach, on the other hand, values a company by comparing it to similar companies that have recently been sold or are currently for sale.

Company and stock valuation is essential for managers and investors because it allows them to determine the fair value of a company or stock, make informed investment decisions, and identify undervalued or overvalued companies. Valuations are uncertain and can be biased. Due to the complexity and subjectivity of the valuation process, it is essential to consult various sources, use different approaches, and properly utilize the collected information about the company and its environment of operations to provide a comprehensive analysis and reach a range of values and make a more informed decision. As Damodaran (2011) states, "Valuation is not an exact science, and there is no one 'correct' value for a stock or a company. Rather, it is an iterative process, with inputs that are both quantitative and subjective, that leads to a range of values."

3.4.1 Discounted Cash Flow Model (DCF)

Absolute valuation models strive to ascertain the intrinsic or authentic value of an investment solely by considering fundamental factors. This entails analysing dividends, cash flow, and growth rate specific to an individual company, without drawing comparisons to other enterprises. Such valuation models encompass the dividend discount model, discounted cash flow model, residual income model, and asset-based model (Henschke, 2010).

SolarEdge does not distribute dividends, rendering the dividend discount model inapplicable. In lieu of dividends, the discounted cash flow (DCF) model evaluates a company's worth through the discounted value of its anticipated future cash flows. Numerous iterations of the DCF model exist, with the Two-Stage DCF model being the most prevalent. In this iteration, free cash flows are usually predicted over a span of five to ten years, followed by the computation of a terminal value that encapsulates all subsequent cash flows beyond the forecasted timeframe.

The first requirement for using this model is for the company to have positive and predictable free cash flows. Due to this requirement, the application of this method, especially for companies that are still in the growth phase, has its risks. Small, high-growth companies and immature companies have high capital expenditures and difficult-to-predict free cash flows (Baker et. al., 2020). Since SolarEdge is still in the growth phase, different assumptions are made, and the DCF method is calculated under different assumptions. Thus, a range of values can be calculated depending on which future scenario is assumed to be probable (Larrabee, 2012).

By valuating a company in the renewable energy sector, a combination of different valuation models is used to arrive at a comprehensive and accurate assessment of the company's value. One beneficial model for valuing a company in this sector is the discounted cash flow (DCF) model. This model involves projecting the company's future cash flows and then discounting them back to their present value using a discount rate that reflects the risk involved. This model is beneficial for valuing companies in the renewable energy sector because it allows for the incorporation of future growth prospects

and the effects of government regulations and policies, which are important factors in the renewable energy industry.

Professor Andrew Metrick, from the Yale School of Management, introduced a model for forecasting a young company's growth in his book Venture Capital and the Finance of Innovation and found that start-ups usually revert to an industry average growth rate within five years (Metrick, 2011).

Despite its many possibilities, there are some criticisms of discounted cash flow. At the core of the criticism is the data basis of the model. The valuer has to make various assumptions and must predict the development of the company as accurately as possible. Deviations in the assumptions made can mean a significant deviation in value. In addition, the assumption of an unlimited lifespan for companies is unrealistic. Various companies disappear from the market or are bought up and merged. This reality contradicts the approach of perpetuity, which has a significant share in the company value in the discounted cash flow (Wilkens, 2023b).

Inaccuracies in discounted cash flow can be avoided using the so-called scenario technique. The enterprise value is calculated based on various assumptions. One optimistic, one realistic, and one pessimistic. This method produces a range of plausible enterprise values and will be applied in this work. Afterward, further valuation methods can be applied to increase the accuracy of the valuation further (Wilkens, 2023b).

3.4.2 Relative Valuation

Another useful model for valuating a company in the renewable energy sector is the comparables analysis model. This model involves comparing the financial metrics of a company to those of similar companies in the industry. This model is helpful for valuating a company in the renewable energy sector because it allows for comparing companies operating in the same industry and under the same macroeconomic conditions. This model will be applied to the competitor Enphase Energy.

Moreover, relative valuation models operate by contrasting the target company with similar counterparts. These approaches involve the calculation of diverse multiples and ratios, such as the price-to-earnings (P/E) ratio, which are subsequently compared to the corresponding figures of analogous firms (Meitner, 2006). These models don't attempt to find an intrinsic value for the stock. The comparison of the stock's price multiples to a benchmark helps to determine if the stock is relatively undervalued or overvalued (Meitner, 2006). This concept is rooted in the Law of One Price, which asserts that comparable assets ought to be priced similarly (Borch, Wosnitzer, 2020).

Numerous multiples can be employed within the comparables model, encompassing metrics like price-to-earnings (P/E), price-to-book (P/B), price-to-sales (P/S), price-to-cash flow (P/CF), and several others. Out of these, the P/E ratio is the most commonly used because it focuses on a company's earnings, which are a crucial factor in determining its investment value (Pinto, 2020). Utilizing the P/E multiple for comparison necessitates the company's status as a publicly traded entity, thus having accessible stock prices and earnings data. Moreover, positive earnings are imperative for meaningful comparison, as a negative P/E multiple would lack significance.

Another condition is that earnings quality must be robust. This means that earnings should exhibit minimal volatility, and managerial accounting practices should not excessively distort reported earnings (Wagener, 2023). Accordingly, the ratios will be used to analyze the company and to compare its ratios with its competitors and the industry.

3.4.3 Industry Analysis Methods

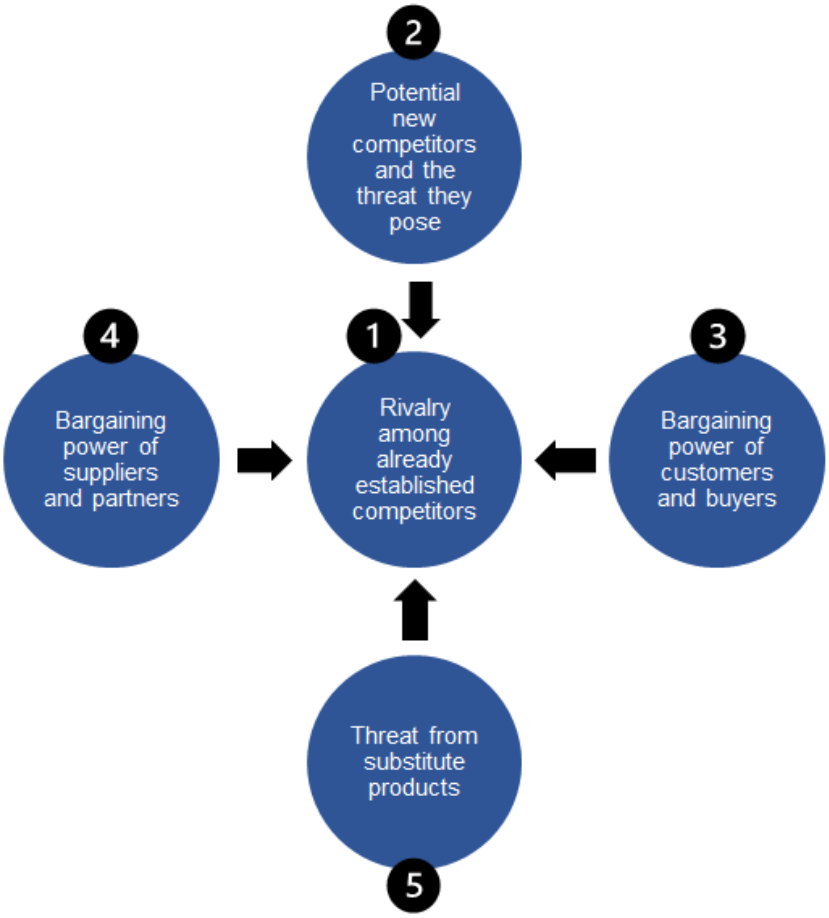
The methods used for industry and competition analysis are presented in this section and applied in the following sections.

The **SWOT analysis** is a strategic planning method and is the basis for strategy and corporate planning. It shows the strengths and weaknesses of the company as well as opportunities and risks in the environment (Fleig, 2022). The characteristics and their evaluation are presented in a table or matrix. The results of the SWOT analysis help to identify fields of action for strategy development, to use the potentials, and to recognize and limit dangers (Fleig, 2022). It is used to analyze the present strengths and weaknesses of the company and the opportunities and threats SolarEdge is facing in its current business environment (Fern Fort University, 2023). Thus, the method of SWOT analysis combines the perspective of business analysis with the analysis of the environment (Fleig, 2022).

Industry structure analysis based on the **five forces model** is a strategy development tool developed by Michael E. Porter in 1979 and one of the most important strategic tools for competitive analysis (Müller-Pellet, Domeier, 2021). This market-oriented approach focuses on the company's own positioning and the precise analysis of the industry. The goals are to find the optimal position, the attractive industries and to develop clear competitive advantages (Gottschalk, 2022). By identifying the key factors influencing the profitability of an industry, strategic decisions can then be made. The analysis takes a closer look at the following five influencing forces and identifies their drivers:

The goal is to operate in an industry with an attractive industry structure and to build up a defensible position. In the optimum case, the five competitive forces, shown in Figure 3.5, would have the least threatening manifestation possible. The decisive factor here is that all competitive forces are viewed holistically. The greater the threat posed by these five competitive forces, the less attractive the industry under consideration and the more difficult it is to achieve sustainable competitive advantage. Thus, this analysis method can reveal the attractive potential within a market.

Figure 3.5: Five Forces Model



Source: own illustration based on Müller-Pellet, Domeier (2021)

The advantage of this method is that it has a clearly defined structure, and thus, results can be achieved quickly. A disadvantage is that this analysis is only a snapshot, and the competitive forces change quickly and dynamically; therefore, the analysis can quickly lose its relevance and must be applied regularly (Gottschalk, 2022).

The **PESTEL analysis** is an essential strategic analysis tool in which the effects of external influencing factors on one's own company are evaluated. This involves describing specific market conditions, probable developments, and their effects, and thus developing a sound basis for management decisions. The macro-environment has a considerable influence on strategic decisions and must, therefore, also be taken into account. Figure 3.6 illustrates the criteria that comprise a classic PESTEL analysis.

Figure 3.6: PESTEL Analysis

Source: Müller-Pellet, Domeier (2021)

Political factors affect the economic order, stability in countries, as well as export and import regulations. Therefore, it is important to consider the political framework, such as tariffs or government subsidies. Economic factors affect the supply/demand balance and the goods and capital markets. Macroeconomic indicators such as the inflation rate, exchange rate fluctuations, or unemployment figures must be considered. Socio-cultural factors that lead to changes in values and norms or social structures are, for example, the level of education, religious affiliation, or the understanding of roles. Technological factors include the use and application of new technologies, affecting manufacturing processes, production goods, and value chains. The stage of digitalization of a country and the equipment of the IT infrastructure are to be considered. Ecological-geographical factors affect the nature of the infrastructure and the availability of natural resources. The environmental regulations in place and the ease with which raw materials are available must be considered. The influence on consumer behavior concerning sustainability must also be considered. Legal factors determine the legal framework and have an impact on the legal system and the legal awareness of the market. Here, tax, competition, or antitrust law must be considered, and it must be determined which requirements must be met with regard to product liability or occupational health and safety (Müller-Pellet, Domeier, 2021). The results of this environment analysis are then compared with the internal strengths and weaknesses of the company under consideration as part of a SWOT analysis and used as a central component of this company analysis (Gottschalk, 2022).

4 DATA ANALYSIS

4.1 Business Risks and Opportunities

This section uses the information previously developed about SolarEdge and its competitors and puts it into a macroeconomic context of the main regions where SolarEdge operates: America and Europe.

4.1.1 Macroeconomic Framework

The worldwide COVID-19 pandemic has brought about substantial changes in the daily routines of individuals across over 188 nations, consequently exerting various influences on this valuation. Global indices witnessed a noteworthy decline beginning in late February, with both the DOW and the FTSE experiencing their most substantial quarterly Equity Valuation drop since 1987 (BBC, 2021). The pandemic has caused disruptions in economies worldwide, leading to a decline in GDP, increased unemployment rates, and changes in consumer spending patterns. When examining the total GDP of Q2 in 2020 in contrast to the preceding year, there was a substantial decrease observed, as reported by both Eurostat and OECD, along with various distinct national statistical sources (Our World in Data, 2020). Moreover, there was a notable decline in real GDP growth during the first quarter of 2020, pushing many nations to the verge of an economic downturn. As a result, in June 2020, the International Monetary Fund (IMF) projected a global economic contraction of -4.9% for the year 2020 (International Monetary Fund, 2020). Responding to this economic turmoil, unemployment rates surged. In the United States, the unemployment rate escalated from 3.7% in 2019 to 10.4% in 2020, while in Germany, it rose from 3.2% in 2019 to 3.9% in 2020.

However, the industry also witnessed increased demand in certain regions, driven by government incentives, rising environmental concerns, and energy security considerations. Despite the pandemic's challenges, the renewable energy sector has experienced substantial growth in recent years. This growth can be attributed to multiple factors, including declining costs of renewable technologies, increasing environmental awareness, and supportive government policies. ESG factors have also played a significant role in shaping the industry's growth trajectory, as investors and consumers increasingly prioritize sustainable and socially responsible practices.

Various legal implications have influenced the renewable energy sector, creating challenges and opportunities for SolarEdge and other industry players. Government regulations and policies, such as feed-in tariffs, renewable portfolio standards, and emission reduction targets, have incentivized the adoption of renewable energy solutions. Market opportunities have emerged in regions with favorable regulatory frameworks and high demand for renewable energy, such as Europe, Australia, and certain countries in Asia and Africa.

SolarEdge operates within a macroeconomic framework shaped by the COVID-19 pandemic and the growth of the renewable energy sector. Despite the challenges posed by the pandemic, SolarEdge and the broader industry have experienced significant growth, driven by factors such as government support, increasing ESG considerations, and market opportunities.

The United States, as one of SolarEdge's key markets, has maintained a strong economic position with a consistently high gross domestic product (GDP) in recent years. As of 2021, the US economy is the largest in the world with a GDP of 22.996 trillion US dollars. This indicates a robust economic output and highlights the country's significant contribution to the global economy.

Regarding economic development, the United States has implemented various policies to foster growth and competitiveness. For instance, initiatives such as the Inflation Reduction Act 2022 aim to stimulate innovation, attract investments, and enhance the business environment. These policies are crucial in shaping the market conditions within which SolarEdge operates. The bill is considered a milestone for climate protection and provides, among other things, for investments of 369 B US dollars in renewable energy projects.

The measures are intended to drive the expansion of solar energy in the USA and create jobs. The government's focus on clean energy initiatives has created opportunities for companies like SolarEdge. With an increasing emphasis on sustainability and environmental consciousness, the demand for solar energy solutions has grown.

4.1.2 Sector Framework

The **European residential markets** remained strong for SolarEdge in the first quarter. The company increased deliveries of three-phase inverters for residential buildings, particularly the new backup inverter and three-phase residential battery. SolarEdge expects this momentum to continue in the coming quarters as it expands its backup inverter capacity to meet the significant order backlog and strong demand for this product (SolarEdge 2023f).

Revenue in the **U.S. market** declined compared to the previous quarter, primarily due to weakness in the residential housing segment, influenced by interest rate effects and lower battery sales. However, the overall residential real estate market improved in the first quarter, reaching the level of the previous year or even slightly surpassing it. Despite short-term uncertainties in the U.S. housing market, SolarEdge believes in the long-term dynamics of NEM 3.0 (Net Energy Metering 3.0) and the growth expectations for third-party ownership (TPO), which align well with the company's product offerings and market position (SolarEdge, 2023f).

The solar energy sector in the United States has experienced significant growth and transformation in recent years. With increasing awareness of climate change and the need for clean energy alternatives, the demand for solar energy solutions has risen. This has created a favorable market environment for SolarEdge to expand its market presence and capitalize on the growing opportunities. In terms of the company's performance, SolarEdge has showcased strong growth and market penetration in the United States. The company has successfully leveraged its expertise in providing advanced solutions for solar energy systems, such as inverters, power optimizers, and monitoring platforms. The United States has supported renewable energy initiatives, including solar power. Government policies and incentives, such as investment tax credits, and net metering, have played a crucial role in fostering the growth of the solar energy sector. These policies have incentivized consumers and businesses to adopt solar energy systems, driving the demand for SolarEdge's products. Furthermore, technological advancements and cost reductions have made solar energy more accessible and cost-effective. SolarEdge's focus on innovation and optimization has allowed the company to offer efficient and high-performance solutions to its customers. As the solar energy sector continues to evolve,

SolarEdge's market position remains promising. The company's strong brand reputation, extensive product portfolio, and commitment to quality and reliability contribute to its competitive advantage.

SolarEdge achieved a record of 2.1 gigawatts of inverters delivered in the **commercial sector**, representing a 36% increase compared to the previous quarter and a 108% increase compared to the previous year. The strong demand in this sector is driven by ESG (Environmental, Social, and Governance) initiatives of companies and numerous applications for commercial and industrial customers. SolarEdge's solution's inherent advantages, such as safety and balanced cost-efficiency, position the company well as the demand for its product continues to exceed capacity. The acquisition of Hark Systems further strengthens SolarEdge's growth strategy by offering energy management applications and services to customers (SolarEdge, 2023f).

SolarEdge operates in a dynamic and growing sector within the United States. The increasing demand for solar energy solutions, supportive government policies, and SolarEdge's strong market position indicate favorable prospects for the company's future growth and success in the United States.

4.1.3 Strategic Analysis

The SWOT analysis of SolarEdge is resumed in Table 4.1. SolarEdge's **strengths** stem from its innovative technology and robust patent portfolio, safeguarding its intellectual property. The well-received DC-optimized inverter systems have fortified the company's market position. Geographic diversification presents another advantage, with a global customer base and a presence in diverse markets, fostering new revenue streams and mitigating economic cycle risk (Fern Fort University, 2023).

The main **weaknesses** are over-reliance on its DC-optimized inverter systems, making it vulnerable to demand fluctuations. Also, within the solar energy industry, SolarEdge operates in a highly competitive market. Therefore, SolarEdge must continue to innovate and differentiate itself to maintain its market position.

Amidst this landscape, several **opportunities** emerge. Decreasing transportation costs offer the potential for enhanced profitability or market share gain. The government's green drive provides opportunities for SolarEdge to procure products for state and federal contracts. Embracing new technology and consumer trends can unlock new markets and revenue streams.

However, **threats** must be acknowledged. Counterfeit products in emerging markets risk SolarEdge's reputation and market position. Rising raw material costs and wages challenge profitability, while market volatility demands continued innovation to remain competitive.

To ensure sustained growth and success, SolarEdge must leverage its strengths, address weaknesses, seize opportunities, and navigate threats astutely. Diligence in these aspects will be pivotal for maintaining market prominence and capitalizing on the company's potential in the dynamic solar energy industry.

Table 4.1: SWOT Analysis SolarEdge

Strengths	Weaknesses
• Innovative technology • Patent portfolio • Geographic diversification • Expertise at entering new markets and making them successful • Strong financial performance • Strong Brand Portfolio • Strong distribution network • High level of customer satisfaction • Skilled workforce	• Dependent on a single product segment (DC-optimized inverter systems) • Highly competitive market • Marketing: positioning and unique selling proposition not clearly defined • Defense against new entrants in niche categories insufficient so far • Gaps in the product range, lack of choice
Opportunities	**Threats**
• Decreasing transportation costs: Opportunity to boost profitability or gain market share • Government green drive: Opportunity for procurement by state and federal government contractors • Leveraging core competencies: Potential success in similar product fields • Stable free cash flow: Opportunity to invest in adjacent product segments and new technologies • New consumer behavior trends: Opening up new markets and revenue streams • New technology: Enabling a differentiated pricing strategy and attracting loyal and new customer	• Currency fluctuations in multiple countries, especially in politically volatile markets • Threat of imitation and low-quality products • Rising raw material costs • Increasing wages in China • Impact of new environmental regulations • Growing competition from local distributors • Seasonal nature of highly profitable products • Isolationist trends affecting international sales

Source: own illustration based on Fern Fort University (2023)

4.1.4 Industry Analysis

This section performs the **five forces analysis and the PESTEL analysis** for SolarEdge and the renewable energy industry. Porter's Five Forces analysis is a framework used to assess the competitive intensity and attractiveness of an industry.

The threat of new entrants: The renewable energy sector is relatively capital-intensive and requires significant expertise and experience to enter. However, the increasing popularity of renewable energy and the falling costs of solar and wind power technologies have made it easier for new companies to enter the market.

The threat of substitute products or services: Electric utilities and fossil fuel-based power generation are the main substitutes for renewable energy. These substitutes are less expensive and more widely available, but renewable energy is becoming more cost-competitive and has the added benefit of being more sustainable.

Bargaining power of suppliers: SolarEdge depends on suppliers for components like panels and inverters. While suppliers hold bargaining power, SolarEdge's inverter leadership provides negotiation leverage.

Bargaining power of buyers: The renewable energy sector is characterized by large and powerful buyers such as utilities and large corporations. These buyers have significant bargaining power, which can impact the prices and terms of contracts for renewable energy companies.

Competitive rivalry: The renewable energy sector is highly competitive, with many companies vying for market share. SolarEdge competes primarily with other inverter manufacturers, such as Enphase Energy, SMA Solar Technology, ABB, Fronius International, and Huawei Technologies.

Overall, the renewable energy sector is a rapidly growing and dynamic industry, with a high level of competition and new companies and technologies entering the market regularly. SolarEdge, as a leading player in the inverter market, has some competitive

advantages, but it also faces significant challenges and competition from other market players.

The **PESTEL analysis** helps organizations understand the external macro-environmental factors that can influence their business environment, allowing them to identify risks, opportunities, and strategic considerations.

SolarEdge's operations are subject to various **political factors** that can influence demand for its products and services. Government policies and regulations on renewable energy, including subsidies, tax credits, and renewable energy targets, play a significant role in shaping the demand landscape. Additionally, trade tariffs and regulations affect the import and export of components and finished goods, impacting SolarEdge's global operations. Political instability in certain countries also risks the company's operations and market access.

Economic conditions can directly impact SolarEdge's financial performance. Economic downturns can reduce demand for new solar installations, adversely affecting the company's revenue. Conversely, increases in fossil fuel prices can boost the cost competitiveness of renewable energy, potentially driving demand for SolarEdge's products. Macroeconomic factors such as interest rates and inflation also play a role in shaping the company's financial prospects.

Sociocultural factors influence the demand for renewable energy and SolarEdge's products. Public opinion and awareness of environmental issues play a pivotal role in shaping the adoption of renewable energy solutions. Cultural and social factors also influence attitudes toward renewable energy and investment in solar installations.

The company operates in a dynamic **technological** landscape where advancements in the solar industry can impact the cost and efficiency of solar power systems, directly influencing demand for SolarEdge's products. The company's ability to innovate and develop new technologies is crucial for maintaining its competitiveness in the market.

Legal considerations encompass a range of regulations that can affect SolarEdge's operations. Laws related to renewable energy, energy efficiency, and environmental

protection influence the company's market access and operations. Compliance with safety, health, and environmental regulations, as well as labor laws, is essential. Legal disputes, such as patent infringement lawsuits, can significantly affect the company's operations and financial performance.

Environmental factors pose both challenges and responsibilities for SolarEdge. Weather conditions and natural disasters can impact the company's operations and product performance. Complying with environmental regulations and considering the environmental impact of its operations and products are crucial aspects of SolarEdge's sustainability efforts.

Navigating the complex interplay of these political, economic, sociocultural, technological, legal, and environmental factors is vital for SolarEdge's success and resilience in the renewable energy market.

4.2 Financial Statement Analysis

This section analyzes the financial statements and the capital structure of SolarEdge.

4.2.1 Income Statement Analysis

To analyze the annual Income Statement from 2016 until 2022 (Table 4.2), a horizontal and vertical analysis is performed (Table 4.3 and 4.4). Looking at the **revenue,** it is evident the company's sales have grown every year. Revenues increased steadily from 480 Million USD in 2016 to 1.426 Million USD in 2019. With 1.459 Million USD of revenue in 2020, they were slightly higher than in 2019. The most significant increase in revenue was from 1.964 Million USD in 2021 to 3.110 Million USD in 2022. In this period, revenues increased by 58%.

Table 4.2: Income Statement SolarEdge (2016-2022)

Annual Income Statement (All Values USD Millions)							
	2022	**2021**	**2020**	**2019**	**2018**	**2017**	**2016**
Sales/Revenue	3110	1964	1459	1426	937	607	480
Cost of Goods Sold	2266	1335	998	946	618	392	318
Gross Income	845	629	461	479	319	215	162
SG&A Expense	272	201	159	137	98	69	95
Interest Expense	7	6	5	5	3	0	1
Income Tax	83	18	23	34	9	16	10
Net Income	**94**	**169**	**140**	**147**	**129**	**84**	**51**
EBITDA	332	248	171	247	152	98	73

Source: own illustration, SolarEdge

The company's **net income** was positive yearly since 2016. Therefore the company was profitable. From 2016 to 2020, net income increased from 51 Million USD to 147 Million USD. In 2021 net income dropped by 7 Million USD to 140 Million USD. This means the company was less profitable in 2020 than in 2019. As a reason for this decrease, the global supply chain disruption caused by the coronavirus pandemic has affected short-term industry expansion (Ibis World, 2023). From 2020 to 2021, net income increased to 169 Million USD. Therefore, the impact of the pandemic seems to be lower than in 2020.

From 2021 to 2022, net income dropped by 45% to 94 Million USD, despite the total revenue increase of 58% year-on-year.

Table 4.3: Vertical Analysis of the Income Statement (2016-2022)

	Vertical Analysis							Average 2022-2016
	2022	**2021**	**2020**	**2019**	**2018**	**2017**	**2016**	
Sales/Revenue	100%	100%	100%	100%	100%	100%	100%	
Cost of Goods Sold	73%	68%	68%	66%	66%	65%	66%	67%
Gross Income	27%	32%	32%	34%	34%	35%	34%	33%
SG&A Expense	9%	10%	11%	10%	10%	11%	20%	12%
Interest	0%	0%	0%	0%	0%	0%	0%	0%
Income Tax	3%	1%	2%	2%	1%	3%	2%	2%
Net Income	**3%**	**9%**	**10%**	**10%**	**14%**	**14%**	**11%**	**10%**
EBITDA	11%	13%	12%	17%	16%	16%	15%	14%

Source: own illustration

The **vertical analysis** of the Income Statement helps to see the proportion of each line item as a proportion of revenue (Table 4.3). Analyzing the years 2016 to 2022, it is noticeable that the ratios are relatively stable every year. The costs of goods sold increased by five percent comparing 2022 to the previous year. The proportion of expenses is also relatively stable. Having a closer look at the development of the net income, it is evident that its proportion decreased by comparing 2022 to the previous years. In 2018 and 2017, the proportion of net income was 14%, while it was only three percent in 2022.

Table 4.4 supplements this view by providing a **horizontal analysis** with the year-by-year development. Since 2016 the company has thrived and has grown steadily. On average, the net income increased by 38% every year. This high amount mainly depends on the significant increases in 2018 (54 %), 2019 (53%), and especially 2022 (58 %). Unfortunately, in 2020 the Revenues only increased by 2% compared to 2019. The company stated the impact of the pandemic made it impossible for the company to grow at the same rate as the previous years. The supply-chain issues due to the pandemic seem to be solved, since in 2021 and 2022, the company continued its growth. Another number

is now in the spotlight. From 2021 to 2022, the COGS have increased by 70%. The increased sales is one reason because the more a company sells, the more it has to produce. Therefore, the costs of goods sold are higher. Also, the increased prices and high inflation rates due to the Russian war against Ukraine drive the COGS.

Table 4.4: Horizontal Analysis of the Income Statement (2016-2022)

	Horizontal Analysis						Average 2022-2017
	2022	2021	2020	2019	2018	2017	
Sales/Revenue	0,58	0,35	0,02	0,52	0,54	0,26	0,38
Cost of Goods Sold	0,7	0,34	0,05	0,53	0,58	0,23	0,41
Gross Income	0,34	0,36	-0,04	0,5	0,48	0,33	0,33
SG&A Expense	0,35	0,26	0,16	0,4	0,42	-0,27	0,22
Interest	0,17	0,2	0	0,67		-1	
Income Tax	3,61	-0,22	-0,32	2,78	-0,44	0,6	1
Net Income	-0,44	0,21	-0,05	0,14	0,54	0,65	0,17
EBITDA	0,34	0,45	-0,31	0,63	0,55	0,34	0,33

Source: own illustration

4.2.2 Balance Sheet

Analyzing the **Balance Sheet of SolarEdge from 2016 until 2022** shows the company's development. Total Assets increased from 2016 to 2022 from 425 Million USD to 4.266 Million USD. The company increased its Equity mainly by issuing stocks. As a result, shareholders' Equity increased from 289 Million USD in 2016 to 2.176 Million USD in 2022. Total liabilities increased from 136 Million USD in 2016 to 2.090 Million USD in 2022.

The horizontal analysis from 2016 until 2020 (Table 4.4) shows an increase in total assets, total liabilities, and shareholder's equity of more than 50% annually. From 2020 to 2021, the increase was only 19%, and from 2021 to 2022, it was 47%. The highest yearly increase was from 2019 to 2020 in total liabilities. In this time frame, the total liabilities nearly doubled. In the years before, they increased, on average, by 70% per year.

Analyzing the Balance sheet, the company has multiplied several items, which is positive but also brings its risks. The increase in total liabilities was higher than the increase in total equity. **Debt to Equity Ratio** increased from 0,47 in 2016 to its peak of 1,24 in 2020 and dropped to 0,96 in 2022. A greater debt-to-equity ratio implies elevated risk, whereas a low ratio might suggest that a company isn't utilizing debt financing effectively to foster its growth (QFinance, 2009). A value between 0,5 and 1,5 is considered reasonable in the solar industry. Therefore, this Debt to Equity Ratio is reasonable.

SolarEdge has increased its equity since 2016, mainly by issuing additional shares. On the one hand, this leads to the dilution of the existing shares. On the other hand, this means that the company is less dependent on debt to finance its assets. This is a standard business practice to obtain funding for further investments without raising further debt. It is equity capital, and the financial resources are available to the company long-term. In return, the equity investor, or shareholder, has co-determination rights (Wilkens, 2023a).

4.2.3 Cash Flow Statement

The Cash Flow Statement focuses on liquidity. It can be differentiated into three sections of cash flows (Cash from operations; Cash used in investing; Cash from financing). Each section gives essential information on how the company uses cash during the evaluation period. The cash flow statement can be used to see if the company is making money or not and what its funding requirements are (CFI Team, 2022a).

Table 4.5: Cash Flow Statement SolarEdge (2017-2022)

Year	2017	2018	2019	2020	2021	2022
Net Income	**84**	**129**	**147**	**140**	**169**	**94**
Depreciation & Amortization	7	13	27	32	40	50
Share-Based Compensation	18	31	60	67	103	146
Other Operating Activities	28	17	25	-17	-97	-258
Operating Cash Flow	**137**	**189**	**259**	**223**	**214**	**31**
Operating Cash Flow Growth	160,17%	38,35%	36,98%	-14,03%	-3,83%	-85,39%
Capital Expenditures	-21	-39	-73	-127	-149	-169
Acquisitions	0	-95	-38	0	0	0
Change in Investments	-64	-23	-39	-111	-333	-252
Other Investing Activities			-3	2	-2	4
Investing Cash Flow	**-85**	**-157**	**-153**	**-237**	**-484**	**-417**
Share Issuance / Repurchase	7	10	9	17	6	655
Debt Issued / Paid	0	-4	-9	619	-16	0
Other Financing Activities		-14	-73	5	-6	0
Exchange Rate Effect	0	0	3	-23	-12	-16
Financing Cash Flow	**7**	**-8**	**-73**	**640**	**-15**	**655**
Net Cash Flow	**58**	**25**	**33**	**627**	**-285**	**269**
Free Cash Flow	115	150	186	96	65	-138
Free Cash Flow Growth	212,93%	30,52%	23,90%	-48,58%	-32,32%	
Free Cash Flow Margin	18,99%	16,05%	13,08%	6,57%	3,30%	-4,44%
Free Cash Flow Per Share	2,73	3,33	3,89	1,91	1,24	-2,51

Source: own illustration based on Stock Analysis (2023)

Table 4.5 shows the Cash Flow Statements of SolarEdge from 2017 to 2022. Operating Cash Flow (OCF) is a metric that subtracts a firm's income tax expenses from its EBITDA, providing insight into its financial health and the reliability of its reported earnings. OCF represents the cash generated from operational activities, excluding costs associated with long-term investments or marketable securities. OCF is widely used by investors and analysts to evaluate a company's financial performance and ability to generate cash from core business activities (Macroaxis, 2023). In particular, operating cash flow showed remarkable growth from 2017 to 2019, underlining the company's dexterity in transforming its operating activities into cash inflows. However, this upward

momentum was dampened by a downturn in subsequent years, with a significant decline of -14.03% in 2020 and an even more significant decline of -3.83% in 2021 and -85.39% in 2022. This contrasting trend indicates a possible shift in the company's operating momentum or external market influences affecting its ability to generate operating cash flows. Capital expenditure (CapEx), which represents investment in the company's infrastructure and assets, is trending upwards. This indicates that the strategic focus is on improving the company's operational capabilities and capacity expansion.

Financing activities manifested pronounced fluctuations, characterized by a substantial increase in 2020, propelled by share issuances, which pointed to the company's capital-raising endeavors through equity markets. Of significance was the company's engagement in debt-related activities in 2020, with an issuance of debt of $619 million, underlining the strategic utilization of debt as part of its financing mix. However, the year 2021 witnessed a negative net cash flow, attributed to the interplay of various factors, including operational dynamics and the influence of financing activities.

Analyzing the development of operating cash flow, investing cash flow, and financing cash flow from 2017 to 2022 provides deeper insights. The operating cash flow showcased robust growth in the initial years but encountered challenges in subsequent years. The investing cash flow trends reflect shifts in capital allocation priorities, with a cautious approach to investments in recent years. The financing cash flow fluctuations highlight the company's utilization of equity and debt markets to support growth, with notable variations in funding activities.

The cash flow statement analysis from 2017 to 2022 reveals a multifaceted trajectory marked by operational growth, fluctuations in investment patterns, and varying strategies in financing activities. The company's ability to generate operational cash flow showcased robust growth in the initial years but encountered challenges in subsequent years. Furthermore, shifts in capital expenditures and investment activities indicate evolving strategic priorities. This dynamic cash flow landscape underscores the need for a comprehensive evaluation of both internal and external factors when assessing SolarEdges’ financial performance and prospects.

4.2.4 Capital Structure and Dividend Policy

Capital structure is the specific mix of debt and equity a company uses to finance its operations and growth. The company's proportion of short-term versus long-term debt is considered when analyzing its capital structure (Robinson et al., 2015). By analyzing the capital structure, an investor can assess a company's ability to manage its debt obligations, determine the level of risk associated with the company's capital structure, and make informed investment decisions. SolarEdge currently does not have a dividend policy and is considered a growth company, which typically reinvests its earnings into expanding its business operations and generating higher returns for its shareholders in the future.

SolarEdge operates in the Semiconductors & Semiconductor Equipment industry and, on the 31st of July, 2023, had a market capitalization of $13.34B. Companies that use more debt than equity to finance their assets and fund operating activities have a high leverage ratio and an aggressive capital structure. A company that pays for assets with more equity than debt has a low leverage ratio and a conservative capital structure. That said, a high leverage ratio and an aggressive capital structure can also lead to higher growth rates, whereas a conservative capital structure can lead to lower growth rates. It is the goal of company management to find the ideal mix of debt and equity, also referred to as the optimal capital structure, to finance operations. The debt-to-equity (D/E) ratio is a commonly used measure of a company's capital structure and can provide insight into its level of risk. A company with a high proportion of debt in its capital structure may be considered riskier for investors but may also have greater potential for growth. SolarEdge´s current debt-to-equity ratio of 0.96 suggests that the company relies more on debt financing than equity, which could increase financial risk in the long term. However, SolarEdge Technologies shows a healthy financial performance regarding profitability and liquidity (Macroaxis, 2023).

The company's invested capital, which is calculated by subtracting current liabilities from total assets, is $3.52B, with an average invested capital of $3.23B. SolarEdge's working capital is $2.17B, indicating a solid ability to meet its short-term obligations. Moreover, the company's return on equity and assets are 0.05% and 0.0493%, respectively, indicating that it is generating a decent return on its shareholders' investments as the company is facing strong growth. Its current ratio of 3.73x shows that the company has a

sufficient amount of current assets to meet its current liabilities. SolarEdge's market capitalization is $13.31B, with a 52-week range of $190.15 to $374.48 (1st of August 2023) (Seeking Alpha, 2023a). The company's beta is 2.39, indicating higher volatility than the market (Value Investing, 2023). The company's price-to-earnings ratio is 187.07, which is relatively high for conventional standards. The company's earnings per share is $1.54, with a projected net income per employee of $19.54k and revenue per employee of $673.29k.

The company's profit margin is 0.0302%, and its operating margin is 0.09%. SolarEdge has a tangible asset value of $4.55B and generated $31.28M in cash flow from operations in 2023. The company's earnings before interest, taxes, depreciation, and amortization (EBITDA) is $230.15M, with an enterprise value of $17.12B. While SolarEdge has a relatively high debt-to-equity ratio, its healthy profitability and liquidity ratios suggest that the company is managing its debt effectively. Nonetheless, the company needs to be cautious and keep its debt levels in check to mitigate financial risk in the long run (Yahoo Finance, 2023b).

Overall, SolarEdge's capital structure is characterized by reasonable leverage and substantial working capital, but further analysis of the company's operations and market conditions is necessary to understand its current and potential future performance fully.

4.3 DCF Valuation

4.3.1 Revenues and Revenues Growth

To estimate the company's value, future projections and several assumptions are necessary. SolarEdge´s financial reports between 2018 and 2022 are used, together with publicly available information published by the company, to make forecasts for the years 2023 to 2027. These assumptions and forecasts are crucial for estimating the company's intrinsic value.

In the following sections, the critical value drivers and assumptions will be made to run the DCF model in three scenarios. By analyzing different scenarios, such as worst case, middle case, and best case, investors can gain a better understanding of the range of possible outcomes and make more informed investment decisions. The scenario method can help to manage risk by identifying potential downside risks and considering how to mitigate them. Furthermore, it can enhance decision-making by assessing the trade-offs between risk and return. Overall, the scenario method is a valuable approach to conducting a DCF analysis, as it provides a range of potential outcomes, assesses sensitivity, manages risk, and enhances decision-making (Murnikov, 2021). In the following pages, the key value drivers used in this valuation are defined, the assumptions are explained together with some necessary adjustments.

Typically, the projected timeframe for the Discounted Cash Flow (DCF) analysis spans from five to ten years. In this instance, the selected projection period encompasses the years 2023 to 2027. In the context of equity analysis for SolarEdge, a five-year time period is deemed reasonable. SolarEdge has been an active participant in the rapidly growing renewable energy industry and has emerged as a leading international market player. However, due to its size, SolarEdge is not expected to sustain the same level of growth as smaller and younger companies. The valuation of SolarEdge was conducted in US dollars, the currency in which the company reports its financial statements and operates. This approach ensures consistency and alignment with SolarEdge's financial reporting practices. In this DCF valuation for SolarEdge, various key variables and assumptions are employed to determine the intrinsic value of the company's shares across different scenarios.

Operating Revenue

This section analyzes the operating revenue of SolarEdge to recognize existing and additional future growth drivers. The analysis focuses on key factors that contribute to the company's revenue growth, including geographical expansion, product demand, and market trends, to simplify forecasting. Analyzing historical development is necessary to understand and forecast where it will likely come from in the future. Therefore, this section will integrate insights from the most recent **earnings call from 31st of March, 2023** (SolarEdge, 2023f).

Historical Revenue Growth

SolarEdge achieved record-breaking operating revenue in the first quarter of the current fiscal year 2023. The company reported total revenue of approximately $944M, with solar business revenue reaching a record $909M and non-solar business revenue at $35M. This represents a 9% increase compared to the previous quarter and a significant 49% increase compared to last year. The revenue growth can be attributed to strong sales in Europe and other regions, including Germany, Austria, Switzerland, France, South Africa, and Australia. This valuation is based on the assumption that SolarEdge will continue to grow (SolarEdge, 2023f).

Geographical Expansion

SolarEdge experienced remarkable sales performance in various countries, particularly in Europe. The company achieved record revenues in Germany, Austria, Switzerland, France, South Africa, and Australia. It is worth noting that the company's presence and growth opportunities extend beyond the US and Europe, with significant sales in the Rest of the World region. This region witnessed a 30% increase in revenue compared to the previous quarter, with sales generated from 24 countries across the Asia-Pacific, Africa, and South America regions. Noteworthy markets with substantial market size and revenue include Australia, Israel, Taiwan, Thailand, Korea, Brazil, and South Africa (SolarEdge, 2023f).

Market Segments

SolarEdge's revenue growth is driven by residential and commercial segments. In the residential sector, the European market has shown strong performance, with deliveries of three-phase inverters and batteries for residential buildings. The company anticipates this

positive momentum to continue in the coming quarters, as they expand their backup inverter capacity to meet the significant demand for this product. In the United States, revenue declined compared to the previous quarter due to weakness in the housing sector, influenced by interest rates and lower battery sales. However, the company expects the long-term dynamics of NEM 3.0 (Net Energy Metering) and the growth expectations of third-party ownership to align well with their product offerings and market position (SolarEdge, 2023f).

Commercial Sector

SolarEdge's commercial sector achieved record results, with 2.1 gigawatts of inverters delivered in the first quarter. This represents a 36% increase compared to the previous quarter and a remarkable 108% increase compared to last year. The strong demand in the commercial and industrial (C&I) market is driven by ESG (Environmental, Social, and Governance) initiatives and the increasing applications for commercial and industrial customers. SolarEdge's solutions, known for their safety and balanced cost-efficiency, position the company well to meet the demand exceeding its capacity. Additionally, the company's growth strategy includes offering energy management applications and services to customers, as demonstrated by its recent acquisition of Hark Systems (SolarEdge, 2023f).

Forecast and Financial Performance

SolarEdge's financial performance has been robust, with a record total revenue of $943.9M in the first quarter, a 6% increase from the previous quarter and a significant 44% increase from last year. The solar segment revenue reached a record $908.5M, representing a 9% increase compared to the previous quarter and a substantial 49% increase compared to the previous year. The company's strong financial position is further highlighted by its gross margin, which improved to 31.8% on a GAAP basis and 32.6% on a non-GAAP basis (SolarEdge, 2023f).

SolarEdge's operating revenue analysis showcases its impressive growth in the solar energy industry. The company's expansion into global markets, particularly in Europe and the Rest of the World region, has contributed significantly to its record-breaking revenue. The residential and commercial sectors have been key revenue drivers, with strong demand for solar products and solutions. Given the anticipated success and

SolarEdge's focus on innovation, product quality, and market diversification this thesis is confident in the company's ability to grow (SolarEdge, 2023f).

Based on information from the last earnings call on May 03, 2023, and forecasts of 30 analysts of seekingalpha.com (Table 4.6), the 2023 revenue forecasts were made (Seeking Alpha 2023a).

Table 4.6: Earnings estimates by Analysts

Fiscal Period Ending	Revenue Estimate	YOY Growth	FWD Price/Sales	Low	High	# of Analysts
Dec 2023	4,10	31,84%	3,57	3,80	4,35	29
Dec 2024	5,01	22,17%	2,93	4,42	5,86	30
Dec 2025	5,84	16,50%	2,51	5,19	7,16	23
Dec 2026	6,42	9,96%	2,28	5,95	6,73	5
Dec 2027	7,03	9,50%	2,09	6,49	7,53	4
Dec 2028	7,53	7,15%	1,95	7,17	7,99	3
Dec 2029	8,25	9,51%	1,78	7,99	8,58	3
Dec 2030	8,98	8,95%	1,63	8,87	9,09	3
Dec 2031	9,78	8,82%	1,50	9,53	9,91	3
Dec 2032	10,78	10,23%	1,36	10,68	10,88	2
						in Billion USD

Source: own illustration based on Seeking Alpha (2023b)

As a continuous growth rate, SolarEdge assumes a 20% to 30% growth rate for the next years. A growth rate of 30% may be very optimistic, even for a five-year period. For the next three years, analysts expect annual growth averaging 23.5% (Seeking Alpha 2023b). For the next five years, analysts expect an average growth rate of 18% (Seeking Alpha 2023b). As Table 4.6 shows, analysts forecast an average of $4,10B in revenue for 2023. This is used as a reference for the initial 2023 revenues projection in the middle case scenario. For the worst-case scenario $3,8B revenue, and for the best-case scenario, $4,40B is estimated. For long-term growth, revenue growth rates of 14%, 18%, and 22% are applied to each respective scenario, as the middle point is the analyst expectation for the next 5 years.

Operating Expenses

Operating expenses play a crucial role in determining the financial performance and profitability of a company. This section analyzes SolarEdge's operating expenses based on the data from the company's recent earnings call on March 31, 2023 (SolarEdge, 2023f). In forecasting operating expenses for the period indicated, a similar approach was taken for operating income. Firstly, to understand the expenses and their development, the historical values of the individual items were set in relation to the revenues. Table 4.7 shows the cost ratios from 2018 to 2022.

Table 4.7: Cost Ratios

Cost Ratios	2018	2019	2020	2021	2022	ø
COGS/Revenue	0,659	0,664	0,684	0,677	0,727	68%
OFC/Revenue	0,178	0,163	0,199	0,194	0,165	18%
D&A/Revenue	0,013	0,019	0,022	0,020	0,016	1,8%
IE/Revenue	0,003	0,003	0,003	0,003	0,002	0,3%

Source: own illustration

Historical average total costs are 86% of revenue. As the company is still in its growth phase, in this work it is assumed that the company will become more efficient, which is in line with the company's expectations, which are outlined in the following. Therefore it is assumed that total costs will be a fraction of 75% of the revenue for the middle case scenario, 77% in the worst case, and 73% in the best case scenario.Table 4.8 shows the COGS and OFC as a fraction of total costs. Therefore, they are estimated accordingly.

Table 4.8: Total Cost Assumptions

	WC	MC	BC
COGS/TC	0,60	0,59	0,57
OOE/TC	0,17	0,16	0,16
TC/Revenue	**77%**	**75%**	**73%**

Source: own illustration

SolarEdges reports and its future strategic decisions on expenditure need to be considered when making a reasonable forecast for the explicit period. SolarEdge's operating expenses amounted to $123.6M or 13.1% of revenue on a non-GAAP basis in the first quarter of 2023. This represents an increase compared to $119M or 13.4% of revenue in the previous quarter and $98.9M or 15.1% of revenue in the same quarter of the previous

year (SolarEdge, 2023f). The company expects its **operating leverage** to increase throughout 2023 as **revenues continue to grow faster than operating costs**.

SolarEdge's consolidated GAAP **gross margin** for the first quarter of 2023 was 31.8%, an improvement from 29.3% in the previous quarter and 27.3% in the same quarter of the previous year. The non-GAAP gross margin reached 32.6% in the first quarter, compared to 30.2% in the previous quarter and 28.4% in the previous year. Within the solar segment, the gross margin was 35%, indicating an increase from 32.4% in the previous quarter and 30.2% in the previous year (SolarEdge, 2023f). SolarEdge aims to further improve its gross margin through cost reduction measures, enhanced supply chain efficiency, and maintaining product quality.

The non-GAAP **operating income** for the quarter reached a record of $183.8M, compared to $149.6M in the previous quarter and $87.2M in the same period of the previous year (SolarEdge, 2023f). SolarEdge's solar segment achieved a record operating income of $206.7M, while the non-solar segment incurred an operating loss of $22.9M. The company's GAAP **net profit** for the first quarter was $138.4M, an increase from $20.8M in the previous quarter and $33.1M in the previous year. The non-GAAP net profit reached a record of $174.5M, compared to $171.5M in the previous quarter and $68.8M in the previous year (Seeking Alpha 2023c, SolarEdge, 2023f).

For the second quarter of 2023, SolarEdge expects revenue in the range of $970M to $1.01B (SolarEdge, 2023f). The non-GAAP gross margins are projected to be between 32% and 35%, with non-GAAP operating income expected to range from $195M to $215M. The revenue in the solar segment is forecasted to be between $930M and $980M, with **gross margins expected to range from 34% to 37%**. SolarEdge anticipates a high order backlog for the commercial and industrial sectors, indicating strong growth potential for this market segment (SolarEdge, 2023f).

SolarEdge's operating expenses analysis reveals the company's strategic focus on expanding its global presence, capturing growth opportunities in different regions, and optimizing its product offerings. Despite short-term challenges in specific markets, SolarEdge demonstrates resilience and stability in its business operations. The company's

continuous efforts to improve gross margins and control operating expenses will contribute to its long-term profitability and financial success.

Based on the earnings call, the expectations for future operating expenses are influenced by the following factors (SolarEdge, 2023f). SolarEdge's growth prospects are evident through its record sales in diverse regions, signaling expansion opportunities. To meet the growing demand, the company plans to establish new production facilities, which may increase operating expenses. The commercial and industrial (C&I) market is expected to grow, driven by rising electricity prices and environmental, social, and governance (ESG) motivations. The company's substantial order backlog reflects the need for additional operating expenses to support market expansion. Acknowledging the significance of research and development (R&D) personnel, SolarEdge aims to augment its workforce. However, rapid hiring may pose challenges, potentially limiting the growth rate and influencing operating expenses.

As future growth hinges on product, customer, and geographical mix, the company underscores the importance of sales and marketing efforts. With a focus on the C&I market, marketing initiatives may contribute to heightened demand, increasing operating expenses. Careful consideration and strategic allocation of resources are imperative for SolarEdge to capitalize on growth opportunities while managing operating expenses effectively (SolarEdge, 2023f).

Based on these factors, it is expected that future operating expenses will increase as the company focuses on expanding production capacity, entering new markets, investing in R&D, and promoting sales and marketing activities to drive growth. At the same time, the company expects its operating leverage to increase as revenues continue to grow faster than operating costs, which justifies the previous assumptions regarding costs.

4.3.2 Income Statement Projections

To estimate revenues and operating costs between 2023 and 2028, the values developed in the previous section are used. Using the historical data from 2018 to 2022, as shown in Table 4.9, the average effective **tax rate** is 19%. This rate is used for the income statement projections.

Table 4.9: Corporate Tax Rate Forecast

	2018	2019	2020	2021	2022	ø
tax rate	0,066	0,188	0,143	0,096	0,471	19%

Source: own illustration, SolarEdge

Table 4.10; 4.11 and 4.12 present the Income Statement Projections for all three scenarios.

Table 4.10: Income Statement Projections and DCF Valuation, Worst Case Scenario

Worst Case Scenario												
Millions of US $	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Revenue	490	607	937	1426	1459	1964	3110	3800	4332	4938	5630	6418
Cost of Goods Sold	318	392	618	946	998	1330	2260	2298	2620	2986	3404	3881
Gross Profit	161	215	319	479	461	629	845	1502	1712	1952	2225	2537
Other operating expenses	90	124	167	232	290	381	512	628	716	816	931	1061
EBITDA	76	98	152	248	171	248	332	874	996	1136	1295	1476
Dep & Amort			13	27	32	40	50	71	80	92	105	119
EBIT	71	91	139	221	139	209	283	803	916	1044	1190	1357
Interest expenses	0	0	-2,5	-4,8	-4,9	-5,8	-7	-11	-13	-14	-16	-19
EBT	70	100	137	216	134	203	276	792	903	1030	1174	1338
Income Taxes	6	16	9	34	23	18	83	151	172	196	223	254
tax rate	9%	16%	7%	19%	14%	10%	47%	19%	19%	19%	19%	19%
Net Income	64	84	129	147	140	169	94	642	732	834	951	1084

Source: Author, SolarEdge Annual Reports

The worst case scenario starts with the estimated revenue of $3.8B, projected with a revenue growth rate of 14%. COGS and other operating expenses are computed as previously explained. Total costs are assumed to be a fraction of 77% of the revenues. EBITDA is calculated as the difference between gross profit and other operating expenses. Depreciation and Amortization costs are computed for all three scenarios with the average of the last five years (1.8%).

Table 4.11: Income Statement Projections and DCF Valuation, Middle Case Scenario

Middle Case Scenario												
Millions of US $	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Revenue	490	607	937	1426	1459	1964	3110	4100	4838	5709	6736	7949
Cost of Goods Sold	318	392	618	946	998	1330	2260	2415	2850	3363	3968	4682
Gross Profit	161	215	319	479	461	629	845	1685	1988	2346	2769	3267
Other operating expenses	90	124	167	232	290	381	512	660	779	919	1085	1280
EBITDA	76	98	152	248	171	248	332	1025	1210	1427	1684	1987
Dep & Amort			13	27	32	40	50	76	90	106	125	148
EBIT	71	91	139	221	139	209	283	949	1120	1321	1559	1840
Interest expenses	0	0	-2,5	-4,8	-4,9	-5,8	-7	-12	-14	-17	-20	-23
EBT	70	100	137	216	134	203	276	937	1106	1305	1539	1816
Income Taxes	6	16	9	34	23	18	83	178	210	248	292	345
tax rate	9%	16%	7%	19%	14%	10%	47%	19%	19%	19%	19%	19%
Net Income	64	84	129	147	140	169	94	759	895	1057	1247	1471

Source: Author, SolarEdge Annual Reports

The middle case scenario starts with the estimated revenue of $4.1B, projected with a revenue growth rate of 18%. Total costs are assumed to be a fraction of 75% of the revenues. EBITDA is calculated as the difference between gross profit and other operating expenses.

Table 4.12: Income Statement Projections and DCF Valuation, Best Case Scenario

Best Case Scenario												
Millions of US $	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Revenue	490	607	937	1426	1459	1964	3110	4400	5368	6549	7990	9747
Cost of Goods Sold	318	392	618	946	998	1330	2260	2523	3077	3755	4581	5588
Gross Profit	161	215	319	479	461	629	845	1877	2291	2794	3409	4159
Other operating expenses	90	124	167	232	290	381	512	689	841	1026	1252	1527
EBITDA	76	98	152	248	171	248	332	1188	1449	1768	2157	2632
Dep & Amort			13	27	32	40	50	82	100	122	148	181
EBIT	71	91	139	221	139	209	283	1106	1350	1647	2009	2451
Interest expenses	0	0	-2,5	-4,8	-4,9	-5,8	-7	-13	-16	-19	-23	-28
EBT	70	100	137	216	134	203	276	1093	1334	1627	1986	2422
Income Taxes	6	16	9	34	23	18	83	208	253	309	377	460
tax rate	9%	16%	7%	19%	14%	10%	47%	19%	19%	19%	19%	19%
Net Income	64	84	129	147	140	169	94	886	1081	1318	1608	1962

Source: Author, SolarEdge Annual Reports

The best case scenario starts with the estimated revenue of $4.4B, projected with a revenue growth rate of 22%. Total costs are assumed to be a fraction of 73% of the revenues. EBITDA is calculated as the difference between gross profit and other operating expenses.

4.3.3 CAPEX Investment and WC Investment

Capital Expenditure (CapEx) is set at 6.7% of revenues for all cases, aligning with the historical data average of the last five years. Fixed assets include tangible and intangible assets. CapEx represents investments in assets for growth and maintenance and is computed using equation 4.1:

$$CapEx = Gross\ Fixed\ Assets_{n-1} - Gross\ Fixed\ Assets_{n}$$

(equation 4.1)

where:

- $Gross\ Fixed\ Assets_{n-1}$: Value of fixed assets at the previous period's end.
- $Gross\ Fixed\ Assets_{n}$: Value of fixed assets at the current period's end.

The equation calculates the change in fixed asset value over time, indicating investment or disposal impact on the company's operations and growth potential. Table 4.13 shows SolarEdges' CapEx calculation and CapEx/Sales Ratio from 2018 to 2022.

Table 4.13: CapEx Assumption

	2018	2019	2020	2021	2022	ø
Gross fixed assets	287	562	718	1190	1366	
CapEx		73	127	149	169	
CapEx/Sales		0,051	0,087	0,076	0,054	6,7%

Source: SEDG, Author

The Capex investment calculation involved a series of steps. First, Gross fixed assets are computed by adding the beginning fixed assets to the ending fixed assets and dividing the result by two. Next, the CapEx was calculated by subtracting the current year's gross fixed assets value from the previous year's value. Finally, the Capex investment was determined by dividing CapEx by Sales and computing the historical average. These steps allowed for a comprehensive evaluation of the company's capital expenditure and investment plans for the forecasted period. This assumption also aligns with the following factors. Firstly, the renewable energy sector, including solar power, requires substantial investments in capital assets. Allocating a significant portion of revenue towards capital expenditures is in line with industry standards and reflects the capital-intensive nature of the business. This is particularly important considering SolarEdge's growth and expansion

plans, as investments in research and development, production capacity, and market expansion are crucial.

Moreover, the renewable energy industry is characterized by rapid technological advancements. By dedicating resources to upgrading technology and developing new solutions, SolarEdge can remain competitive and meet evolving market demands. A 6.7% capital expenditure estimation demonstrates the company's commitment to staying at the forefront of technological innovation. Efficient asset management is another key consideration. Investing in the maintenance and optimization of existing infrastructure and equipment allows SolarEdge to enhance operational efficiency and overall performance. This supports the company's goal of ensuring the longevity and reliability of its assets. Therefore Capital Expenditure (CapEx) is set at 6.7% of revenues for all cases, which also aligns with the previously computed historical data of the last five years (Finbox, 2023).

"In general, **working capital** is the difference between current assets and current liabilities required for operations" (Corporate Finance, 2023). To estimate SolarEdge's net working capital, several factors should be considered. As a global company operating in multiple regions, SolarEdge requires working capital to support its operations across different markets, including inventory management and cash flow cycles. The renewable energy sector involves substantial upfront investments in equipment and components. This can lead to higher levels of accounts receivable and inventory compared to other industries. Additionally, SolarEdge's growth plans and expansion efforts may increase working capital requirements to accommodate rising sales volumes and market penetration. Table 4.14 shows the NWC calculation.

Table 4.14: Net Working Capital

Net Working Capital	2018	2019	2020	2021	2022	ø
(1) Current Assets	677	933	1719	1711	2900	1588
(2) Current Liabilities	226	437	436	525	890	503
(3) Net Working Capital	452	496	1283	1186	2010	1085
Formula: (3) = (1) - (2)						
In Millions of United States Dollar (USD)						

Source: Author

Calculating net working capital as "current assets less cash" minus "current liabilities" offers a more precise assessment of a company's short-term liquidity and operational status. By excluding cash from current assets, the approach emphasizes non-cash assets crucial for generating revenue. This adjustment aligns with the operational cycle, provides a clearer picture of operational liquidity, and highlights assets directly tied to day-to-day activities. The resulting measure gives a focused view of a company's ability to cover short-term obligations using operational assets. This is shown in Table 4.15.

Table 4.15: Net Working Capital, Current Assets less Cash

Net Working Capital	2018	2019	2020	2021	2022	ø
(1) Current Assets less Cash	361	613	688	1013	1876	910
(2) Current Liabilities	226	437	436	525	890	503
(3) Net Working Capital	135	176	252	488	986	408
Formula: (3) = (1) - (2)						
In Millions of United States Dollar (USD)						

Source: Author

The average Net Working Capital (NWC) of $0.41B does not fit well for the first estimation of 2023, as it is lower than in 2022 and there is a clear growth pattern. Therefore, the assumption for the first NWC is that it is a fraction of revenue. The NWC values computed in Table 4.15 are used to compute NWC as a fraction of revenue in Table 4.16.

Table 4.16: NWC (%) of Revenue

NWC (%) of Revenue	2018	2019	2020	2021	2022	ø
(1) Revenues	937	1426	1459	1964	3110	1779
(2) NWC	135	176	252	488	986	408
(3) NWC (% of Revenue)	14%	12%	17%	25%	32%	20%
Formula: (3) = (2) / (1)						

Source: Author, SEDG

Therefore, the first NWC is assumed to be $0,82B, which is computed by using the average NWC of 20% and multiplying by the middle case revenue projection for 2023 ($4.10B). This value is consistent with SolarEdge's historical financial performance, industry benchmarks, and management guidance.

For the following years, the assumption is that Net Working Capital (NWC) is a fraction of revenues. This assumption is based on the typical relationship between a company's working capital needs and its revenue generation. As revenues increase, so do the

requirements for working capital to support operations, manage inventory, and meet short-term obligations. This historical pattern justifies assuming that future NWC will continue to be influenced by revenue growth. This simplifies estimating the company's working capital needs in the DCF valuation for SolarEdge, allowing for a practical approach to account for its impact on cash flows and overall valuation. The average value based on historical data sets the networking capital as a fraction of 20% of the revenues. This value is used for all scenarios in the following FCFF calculations.

4.3.4 WACC

In order to advance with the Discounted Cash Flow Valuation model, it is imperative to compute the weighted average cost of capital. This calculation is essential for establishing the continuity value, subsequent equity value, and the implied share price. The formula for calculating the WACC is outlined in equation 2.4. This section centers on the necessary variables for estimating the WACC and elaborates on each one, commencing with the evaluation of the cost of equity, followed by the cost of debt and its constituent elements.

4.3.4.1 Cost of Equity

This section uses the Capital Asset Pricing Model (CAPM) to determine the cost of equity. Determining the cost of equity involves three essential components: the risk-free rate, beta, and market risk premium. Although there is no universally accepted approach for determining these inputs, this section will outline the methods employed to obtain the values used in the analysis. The equation of the CAPM to determine the cost of equity R_e is represented as in equation 2.7.

Long-Term Interest Rate

According to Damodaran (2012), it is advisable to choose a longer term for the risk-free interest rate if the premium remains stable. In addition, the chosen maturity should be consistent with the duration of the forecast period and should match the currency used in the company's financial statements. In this analysis, the explicit period spans 5 years,

followed by an infinite growth period. The official OECD value of the 10-year U.S. long-term interest rate (as of May 2023) with a value of **3.57%** was chosen for the risk-free interest rate (Organisation for Economic Co-Operation and Development, 2023).

Market Risk Premium

In this work, a market risk premium of **5%** is utilized. The choice is based on an extensive historical analysis spanning 1973 to 2022 by prof Damodaran, ensuring a comprehensive understanding of market behavior over economic cycles. Reputable academic calculations further support this selection. The stability of the market risk premium within the 5.3% to 5.7% range since 2011 reinforces the reliability of the chosen value (Statista, 2023).

Adjusted Beta

In this work, an adjusted beta of **1.4** is employed for the valuation of SolarEdge. The adjusted beta is derived from the historical "Raw Beta," which was initially calculated by regressing the daily returns of SolarEdge (SEDG) on the returns of the S&P 500 over the last two years, resulting in a raw beta of 1.6 (Wollnywp, 2023). However, to enhance the accuracy of the beta estimate, an adjustment is made based on the belief that a “true” future beta of security tends to converge toward the market average (1.0) in the long term (Damodaran, 2012). The calculation involves multiplying the raw beta by 2/3 and adding 1 times 1/3.

Consequently, the adjusted beta is estimated to be 1.4, indicating a tendency for SolarEdge's systematic risk to align more closely with the market average in the long run. The choice of the adjusted beta is based on the understanding that the cost of equity is a critical input in the DCF valuation. Considering company-specific risks, industry factors, and the systematic risk component, the adjusted beta provides a more refined measure of SolarEdge's risk exposure to overall market fluctuations. This procedure is considered best practice and is the de facto standard by several data provider. (DePamphilis, 2019).

CAPM Calculation

Table 4.17 presents the calculation of the Cost of Equity using the Capital Asset Pricing Model (CAPM) for SolarEdge by using equation 2.7.

Table 4.17: Cost of Equity Calculation

Cost of Equity Calculation		
(1)	Risk free rate	3,57%
(2)	Adjusted beta	1,4
(3)	US market risk premium	5%
(4)	Cost of Equity	10,57%
CAPM (cost of equity) = (1) + (2) * (3)		

Source: Author, Damodaran (2023)

The risk-free rate of return, represented by the long-term interest rate for the US at **3.57%**, is added to the product of the adjusted beta (**1.4**) and the market risk premium (**5%**). This results in a **Cost of Equity of 10.57%** for all scenarios. The CAPM formula, which combines the risk-free rate with the risk estimate (beta) and the market risk premium, allows for a systematic and objective determination of the required return on equity for SolarEdge, considering both the inherent risk of the stock and the prevailing market conditions.

4.3.4.2 Cost of Debt

The cost of debt is calculated as in equation 2.9 and the inputs are resumed in Table 4.18.

Table 4.18: Cost of Debt Calculation

Cost of Debt Calculation (Averages 2018-2022)		
(1)	Interest Expense	5
(2)	Short term debt	503
(3)	Long term debt	719
(4)	Cost of Debt	0,41%
Cost of debt = (1) / ((2) + (3))		

Source: Author, SEDG Annual Reports

The data for interest expense, along with short-term and long-term debt, were collected from SolarEdge's financial statements covering the years 2018 to 2022. The average of each value is used to calculate the cost of debt. The historical cost of debt for SolarEdge

has been relatively low, measuring less than 1%, primarily attributed to the prevailing historically low interest rates in recent years.

The cost of debt represents the interest rate on the company's debt financing. To take into account the tax advantages of debt, the adjusted cost of debt is calculated as in equation 4.2.

$$Adjusted\ Cost\ of\ Debt\ = \frac{interest\ expense}{total\ debt} x\ (1 - marginal\ tax\ rate)$$

(equation 4.2)

where:

- $Adjusted\ Cost\ of\ Debt$ accounts for the tax benefits of debt by calculating interest expense divided by total debt, adjusted by the marginal tax rate.
- $interest\ expense$ represents the interest paid on the company's debt.
- $total\ debt$ refers to the company's overall debt obligations.
- $marginal\ tax\ rate$ denotes the tax rate applicable to the company's earnings.

This calculation considers how the tax shield from interest payments affects the actual cost of debt. By multiplying the interest expense by (1 - marginal tax rate), the adjusted cost of debt acknowledges the tax benefits associated with deducting interest payments. This approach provides a more accurate estimation of the effective cost of debt, considering the tax advantages it offers. The inputs are resumed in Table 4.19.

Table 4.19: Adjusted Cost of Debt

Adjusted Cost of Debt		
(1)	Interest Expense	5
(2)	Total debt	1222
(3)	Marginal tax rate	19%
(4)	Adjusted Cost of Debt	0,33%
Adjusted cost of debt = (1) / (2) * (1 - (3))		

Source: Author, SEDG Annual Reports

However, the interest rate landscape has experienced substantial changes in recent months, with the current 5-year interest rate in the U.S. standing at 4.155% (YCharts 2023a). Consequently, considering this significant shift, the 4.155% interest rate is now utilized as the more realistic cost of debt for SolarEdge. This approach acknowledges the

likelihood of obtaining financing at rates below 1% over the next 5 years as less plausible in the current economic environment.

The total debt value is established by adding together both short-term and long-term debt. Market capitalization of $13.3 billion is derived by multiplying the count of outstanding shares in July 2023 (56.34 million shares) by the share price on the identical date ($236.79). The figures presented in Table 4.20 indicate the relative distribution of equity and debt utilized in the calculation of WACC.

Table 4.20: Weights

Weights		
Total debt	2090	13,6%
Market Capitalization	13311	86,4%
Total	15401	100%
in Million $		

Source: Author, SEDG Annual Reports

4.3.4.3 Final Calculation WACC

Once all the relevant components have been computed, the Weighted Average Cost of Capital (WACC) is determined (Table 4.21) and ready to be utilized in the valuation model.

Table 4.21: WACC Calculation

WACC Calculation	
Cost of equity	10,57%
Cost of debt	4,16%
Tax rate	19%
Weight of equity	86,43%
Weight of debt	13,57%
WACC	**9,59%**

Source: Author

The WACC is calculated at 9.59% for all cases. To shock the assumptions the discount rate for the worst case is 10.59% by adding one percent, 9.59% in the middle case, and 8.59% in the best case by subtracting one percent.

4.3.5 Other Issues

4.3.5.1 Terminal Growth Rate

Determining the terminal growth rate is a critical step in the DCF valuation process as it represents the infinite growth rate for the company beyond the explicit forecast period. To estimate the terminal growth rate for SolarEdge, consideration is given to various factors, including the real GDP growth rate and inflation rate in the United States, as well as industry growth trends.

Based on the current data, the real US GDP growth rate stands at 5.9% (Data Commons, 2023), while the inflation rate is 4.05%, higher than the long-term average (YCharts 2023b). Taking these factors into account, a conservative and reasonable terminal growth rate of 3.5% is assumed for SolarEdge. This rate aligns with the real GDP growth rate and considers the company's market size and industry dynamics. It is essential to observe that the terminal growth rate must remain below the actual GDP growth rate and inflation rate. This precaution is vital for achieving a practical and enduring projection of the company's forthcoming performance.

By applying a terminal growth rate of 2.5% in the worst case, 3% in the middle case and 3.5% in the best case, the DCF valuation incorporates the assumption of a stable growth rate beyond the explicit forecast period, reflecting the company's long-term prospects.

4.3.5.2 Terminal Value

The terminal value of SolarEdge is calculated as in equation 2.6. The inputs for this equation are the following:

- g represents the terminal growth rate. For the worst case 2.5; middle case 3; and for the best case scenario 3.5 are applied.
- $WACC$ stands for the Weighted Average Cost of Capital. In the worst case 10.59; in the middle case 9.59; and in the best case scenario 8.59 are applied.
- $FCFF_{n+1}$ refers to the Free Cash Flow to the Firm in period n+1.

The forecasted cashflow for 2027 is used to calculate the terminal value.

$$TV(2027) = FCFF_{n+1} * \frac{(1+g)}{(WACC - g)}$$

Therefore, the terminal value assumes three different figures depending on the scenario that is considered. More specifically, the discounted terminal value is $4830M for the worst-case scenario, $8529M for the middle-case scenario, and $15642M for the best case scenario.

4.3.6 Firm Valuation (FCFF)

Table 4.22 summarizes the main assumptions discussed in the previous sections for each scenario.

Table 4.22: Assumptions

Variable	Worst case	Middle case	Best case
First revenue	3,80	4,10	4,40
Revenues (% growth)	14%	18%	22%
First NWC change	0,82	0,82	0,82
Net Working Capital (% of revenue)	20%	20%	20%
Costs (% of revenues)	77%	75%	73%
Depreciation and amortization	1,86%	1,86%	1,86%
Taxes (% rate)	19%	19%	19%
CapEx (% rate)	6,7%	6,7%	6,7%
% growth TV	2,5%	3,0%	3,5%
Discount rate	10,59%	9,59%	8,59%

Source: Author

The estimations of the free cash flows for the company are calculated by using equation 4.3:

$$FCFF = EBIT(1-t) + D\&A - CAPEX\ Investment\ - WC\ Investment$$

(equation 4.3)

where:

- $EBIT$ Earnings before interest and taxes, representing operating profits before deducting interest and taxes
- t stands for the applicable tax rate
- $D\&A$ depreciation and amortization expenses
- $CAPEX\ Investment$ capital expenditures, representing investments in fixed assets
- $WC\ Investment$ changes in working capital investment, accounting for short-term operational needs

This equation reflects the cash flows generated by the company's operations after accounting for taxes, depreciation, investments in assets, and working capital changes. It

offers insights into the company's ability to generate cash that can be reinvested or distributed to stakeholders.

Table 4.23 resumes the FCFF estimation process for the 5-year period for the worst, middle, and best case scenarios respectively.

Table 4.23: FCFF Calculation, Worst, Middle, and Best Case Scenario

FCFF Calculation						in Million USD
WORST CASE						
Discounted Cash Flow Firm	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
EBIT (1-t)	150	651	742	846	964	1099
Dep & Amort	50	71	80	92	105	119
CAPEX Investment	-208	-255	-290	-331	-377	-430
Working Capital Investment	-229	-138	-106	-121	-138	-158
FCFF	-238	329	426	485	553	631
MIDDLE CASE						
Discounted Cash Flow Firm	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
EBIT (1-t)	150	769	907	1070	1263	1490
Dep & Amort	50	76	90	106	125	148
CAPEX Investment	-208	-275	-324	-382	-451	-533
Working Capital Investment	-229	-198	-148	-174	-206	-243
FCFF	-238	372	525	620	731	863
BEST CASE						
Discounted Cash Flow Firm	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
EBIT (1-t)	150	896	1093	1334	1627	1985
Dep & Amort	50	82	100	122	148	181
CAPEX Investment	-208	-295	-360	-439	-535	-653
Working Capital Investment	-229	-258	-194	-236	-288	-352
FCFF	-238	425	640	780	952	1162

Source: Author, SEDG Annual Reports, Seeking Alpha

The calculation of the FCFF with the historical data for the year 2022 shows a negative cash flow in all three scenarios. In the worst-case scenario, the FCFF projections for the years 2023 to 2027 show an annual increase in cash flow. This projection implies a moderate improvement in the cash flow position of the company, as the increasing capital expenditures, as well as the increasing working capital is covered by the increase in earnings before interest and taxes (EBIT).

The medium scenario forecasts a similar pattern of growing cash flows over the projection period. Earnings before interest and taxes (EBIT) show stronger growth in this scenario. Capital expenditures and capital investments also increase at a constant rate, but under the assumption of operational efficiency improvements, which is reflected in the positive values of the FCFFs.

This trend is also evident in the best-case scenario. Here, the FCFF calculations project the strongest cash flows, justified by strong growth in EBIT, alongside increasing capital expenditures and capital investments, assuming operational efficiency improvements. This scenario envisages substantial capital expenditures and working capital investments, reflecting the company's ambitious expansion and investment strategies.

Calculations for the enterprise value, equity value, and implied share price involve deriving the terminal value. This is achieved through the application of varying terminal growth rates (2.5% for the worst case, 3% for the middle case, and 3.5% for the best case) in conjunction with WACC values of 10.59%, 9.59%, and 8.59% for the corresponding scenarios. Upon applying a discount to the free cash flows and terminal value until the year 2023, the summation of these discounted figures establishes the enterprise value.

The enterprise value of SolarEdge is estimated in Table 4.24 using the discounted 5-year projections of the FCFF and the discounted terminal value for each of the three scenarios. The equity value is obtained by subtracting the market value of debt. There is little difference between the enterprise value and the equity value as debt is not a major issue for SolarEdge.

Table 4.24: Share Price Calculation (FCFF)

Share Price Calculation (FCFF)						in Million USD
WORST CASE		1	2	3	4	5
Discounted Cash Flow Firm		**2023**	**2024**	**2025**	**2026**	**2027**
FCFF discounted		297,32	348,07	358,80	369,86	381,27
Terminal Value discounted						4830,66
Enterprise Value	6585,98					
Market value of debt	-403,04					
Equity Value	6989,02					
Outstanding shares	56,22					
Implied Share Price	**124,33**					
MIDDLE CASE		1	2	3	4	5
Discounted Cash Flow Firm		**2023**	**2024**	**2025**	**2026**	**2027**
FCFF discounted		339,52	437,15	470,70	506,82	545,72
Terminal Value discounted						8529,39
Enterprise Value	10829,29					
Market value of debt	-403,04					
Equity Value	11232,33					
Outstanding shares	56,22					
Implied Share Price	**199,81**					
BEST CASE		1	2	3	4	5
Discounted Cash Flow Firm		**2023**	**2024**	**2025**	**2026**	**2027**
FCFF discounted		391,44	542,47	609,46	684,72	769,28
Terminal Value discounted						15642,48
Enterprise Value	18639,84					
Market value of debt	-403,04					
Equity Value	19042,88					
Outstanding shares	56,22					
Implied Share Price	**338,75**					

Source: Author, SEDG Annual Reports, Seeking Alpha

Using all the assumptions described previously, the estimated equity value of SolarEdge for the middle case is $11.23B or $199.81 per share. These numbers are not much different from today's market value of SolarEdge ($236.79, accessed on 31st of July 2023), although suggesting that the company is slightly overvalued when one considers the base case assumptions. The more pessimistic scenario reduces the estimated equity value of SolarEdge to $124.33 per share while the more optimistic scenario increases such value to $338.75 per share.

4.3.7 Risk Factors

In the valuation of SolarEdge, various risks must be considered to provide a comprehensive assessment of the company's investment potential. **Regulatory and legal risk** is a significant threat to SolarEdge's operations due to its global presence, exposing the company to diverse regulations and laws in different countries. Changes in regulatory environments can impact the company's profitability and operations, necessitating continuous monitoring and adaptation.

Competitive risk is another significant factor, as the solar power industry is highly competitive, with numerous players vying for market share. Success in the market relies on the quality and pricing of SolarEdge's products, as well as its ability to differentiate itself from competitors.

Technological risk is ever-present in the rapidly evolving solar industry, urging SolarEdge to maintain its edge through innovation and continuous product development.

Economic risk poses a substantial threat to SolarEdge's profitability, as the company's revenue is tied to the broader economic environment. Economic downturns can significantly impact the demand for solar products and services, adversely affecting SolarEdge's operations and profitability.

Financial risk, encompassing factors like interest rates, currency fluctuations, and access to capital, further challenges SolarEdge's financial performance.

In addition to these risks, analysts' opinions highlight SolarEdge's valuation relative to ENPH and the growth projections. Despite being an attractive play on the European solar market and exhibiting solid European growth, the company faces competition and uncertainties surrounding policies and regulations (Sansyzbayev, 2023). While the company boasts a slight advantage over its peer Enphase in terms of efficiency, concerns arise from the current high valuation of the stock, prompting some analysts to recommend a Hold rating (Stewart, 2022). SolarEdge's stock is known for its high volatility, which could present both opportunities and risks for investors (Seeking Alpha, 2023d). Furthermore, the rapid growth in the solar industry has intensified competition, with

Tesla's aggressive moves posing a significant threat to SolarEdge's market position (Seeking Alpha, 2021). As one of the largest companies in the sector, SolarEdge faces the challenge of sustaining growth while fending off fierce competition and ensuring that its growth potential still needs to be fully reflected in its current market capitalization (Stewart, 2022).

SolarEdge's valuation must be analyzed thoroughly considering the many risks in the solar power industry. There are concerns about the current valuation and potential challenges ahead for the company. While the solar industry offers strong growth prospects, carefully considering risks and future cash flows is crucial in determining an appropriate investment strategy (Seiler, 2023). An in-depth assessment of the competitive landscape and the company's ability to innovate and adapt to regulatory changes is essential. Investors should weigh these risks against the company's growth potential and the evolving solar market to make informed investment decisions.

4.3.8 Relative Valuation

This section includes a comparative analysis of some of SolarEdge's key performance indicators with selected competitors, as well as with related industries. Table 4.25 presents the Price to Earnings, Price to Sales, and Price to Book Value Ratios for SolarEdge and the related Industries of Electronic Parts & Equipment Industry, Semiconductors, and the Energy Sector.

Table 4.25: Comparables Analysis: SolarEdge vs. Industry Ratios

SolarEdge vs. Industry	P/E	P/S	P/B
SolarEdge	177,1	5,27	7,53
Electronic Parts & Equipment Industry	8,41	0,68	1,68
Semiconductors	12,3	0,33	4,23
Energy Sector	9,87	1,23	2,67

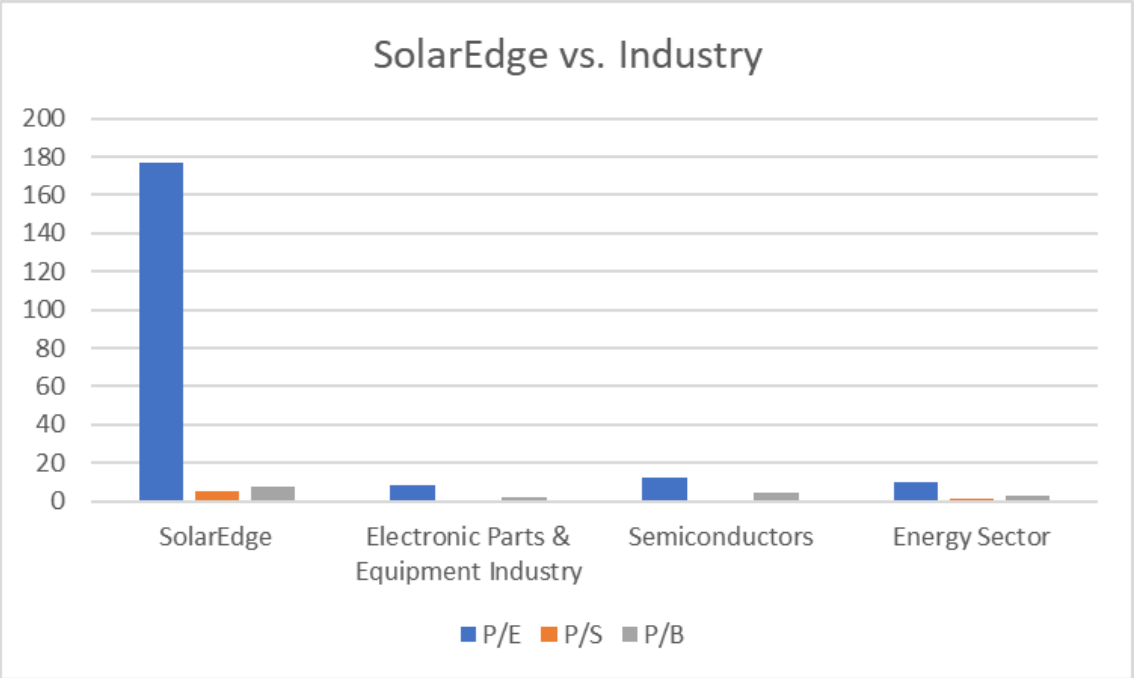
Source: own illustration based on CSI Market (2021)

Based on the given ratios, SolarEdge appears to be trading at a significant premium compared to its industry peers. Its P/E ratio of 177.1 is much higher than the Electronic Parts & Equipment Industry (8.41), Semiconductors (12.3), and Energy Sector (9.87). This suggests that investors are willing to pay a much higher price for each dollar of earnings from SolarEdge, indicating high growth expectations.

The P/S ratio of SolarEdge is also considerably higher than its industry peers, indicating that investors are willing to pay more for each dollar of revenue generated by the company. SolarEdge's P/S ratio of 5.27 is much higher than the Electronic Parts & Equipment Industry (0.68), Semiconductors (0.33), and Energy Sector (1.23).

Finally, SolarEdge's P/B ratio of 7.53 is higher than the Electronic Parts & Equipment Industry (1.68) and Energy Sector (2.67), but lower than the Semiconductors (4.23) industry. Figure 4.1 presents the values visually to improve comparability.

Figure 4.1: Comparables Analysis: SolarEdge vs. Industry Ratios



Source: own illustration based on CSI Market (2021)

Overall, these ratios suggest that SolarEdge is considered a high-growth company by investors, as evidenced by its high P/E and P/S ratios. However, its P/B ratio is not as high as the Semiconductors industry, which may indicate that investors view SolarEdge as less valuable from a book value perspective. Table 4.26 presents the Price to Earnings, Price to Sales, and Price to Book Value Ratios for SolarEdge and the competitors Enphase Energy, ABB Ltd., and First Solar.

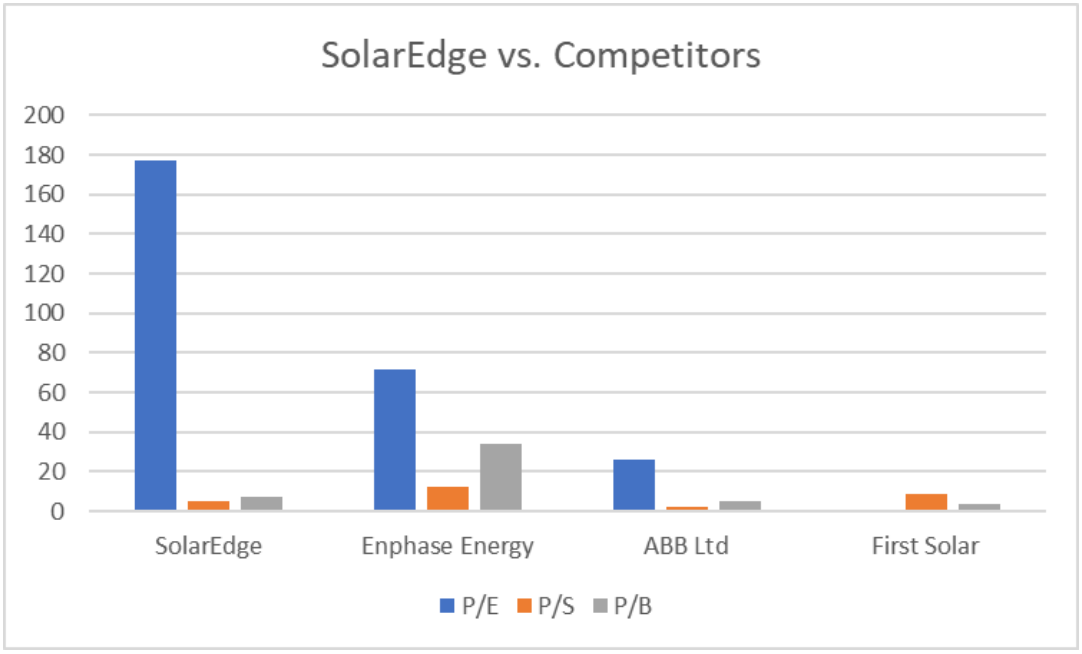
Table 4.26: Comparables Analysis: SolarEdge vs. Competitors

SolarEdge vs. Competitors	P/E	P/S	P/B
SolarEdge	177,1	5,27	7,53
Enphase Energy	71,62	12,12	34,21
ABB Ltd	26,05	2,2	4,91
First Solar	at loss	8,64	3,88

Source: own illustration based on CSI Market (2021)

Compared to its competitors, SolarEdge appears to be trading at a much higher P/E ratio, indicating that investors are willing to pay a much higher price for each dollar of earnings from SolarEdge. Enphase Energy has a P/E ratio of 71.62, which is still high but lower than SolarEdge's ratio. ABB Ltd and First Solar have much lower P/E ratios, with ABB Ltd at 26.05 and First Solar at a loss. In terms of P/S ratio, Enphase Energy has the highest ratio of 12.12, indicating that investors are willing to pay the highest premium for each dollar of revenue generated by Enphase Energy. SolarEdge's P/S ratio of 5.27 is lower than Enphase Energy's but still higher than ABB Ltd (2.2) and First Solar (8.64). Regarding the P/B ratio, Enphase Energy has the highest ratio of 34.21, indicating that investors are willing to pay a very high premium for each dollar of book value generated by Enphase Energy. SolarEdge has a P/B ratio of 7.53, much lower than Enphase Energy but higher than ABB Ltd (4.91) and First Solar (3.88). Figure 4.2 presents the values visually to improve comparability.

Figure 4.2: Comparables Analysis: SolarEdge vs. Competitors



Source: own illustration based on CSI Market (2021)

Overall, ratios show SolarEdge at a premium compared to rivals. Enphase Energy has even higher ratios, suggesting it's pricier. ABB Ltd and First Solar show lower ratios, possibly seen as less valuable. However, in-depth analysis of financials, competition, and growth is crucial for sound investment decisions.

5 DISCUSSION AND CONCLUSION

This work undertakes a comprehensive analysis of SolarEdge, a notable player in the renewable energy sector, aiming to provide valuable insights for investment decisions. The analysis integrates qualitative and quantitative approaches to derive a holistic understanding of the company's financial performance and valuation.

The renewable energy industry's growth trajectory aligns with global energy demands and environmental imperatives, where solar energy is anticipated to lead by 2050. The challenges arising from the intermittency will be addressed through innovations in energy storage and grid improvements, offering promising prospects for the contribution of renewable energy to the energy landscape. Furthermore, the importance of Environmental, Social, and Governance (ESG) considerations in this sector was emphasized, as they align with the core objectives and societal impact of renewable energy companies.

SolarEdge's success can be attributed to a constellation of factors, including innovation, financial stability, global reach, strong customer relations, regulatory compliance, brand reputation, strategic partnerships, and cost efficiency. Its patented inverter systems and consistent revenue growth have fortified its competitive edge. However, inherent risks such as evolving regulations, market volatility, and competition warrant careful attention. While the company boasts strengths related to innovation, patent protection, and global presence, it also faces weaknesses and threats tied to over-dependence on specific product lines and intense industry rivalry.

To harness its strengths and address vulnerabilities, SolarEdge should capitalize on emerging opportunities, such as reducing transportation costs, leveraging government green initiatives, and aligning with evolving technological trends. Nevertheless, threats from counterfeit products, escalating costs, and market volatility necessitate vigilant management strategies. Effectively navigating these complexities will be pivotal for SolarEdge's sustained growth and prominence within the renewable energy market.

The competition analysis has shown that the field of renewable energies is very competitive. Despite high entry barriers in the market, the growth potential attracts further competitors. Innovation and technological progress are important success factors. As the role of renewable energy in global energy supply becomes more important, informed investment decisions are based on a thorough understanding of a company's strengths, weaknesses and broader sector dynamics.

The empirical analysis reveals that SolarEdge has presented strong growth over the last years and there are favourable prospects for the business in the medium term. The strong growth of revenues is expected to slow during the next years together with an increase in margins that contribute to generate higher cash flows. The middle case scenario in this thesis assumes a $4,1 billion revenues in 2023 and a 18% growth in revenues over the next 5 years. These growth numbers are cautious as they are bellow company’s expectations and in line with financial analysts' expectations. Considering that SolarEdge is expected to increase margins and continue to invest in the business, it is expected that the company generates a free-cash flow between $372 million and $863 million between 2023 and 2027.

The valuation analysis places SolarEdge's equity value for the mid-case at $11.23B or $199.81 per share. This valuation is higher than today's market value of SolarEdge ($236.79, as of July 31, 2023), reflecting a slightly higher valuation under the base case assumptions. The pessimistic scenario yields an equity value of $124.33 per share, while the optimistic outlook elevates it to $338.75 per share.

It is essential to acknowledge the limitations associated with this work, primarily rooted in the assumptions and methodologies employed. It is important to emphasise that the future is unknown, and the assumption are always arguable. Recommendations for future research encompass exploring the impacts of evolving regulatory environments on SolarEdge's operations and examining competitive dynamics within the evolving solar industry.

Bibliography

ABB (2023) ABB, *ABB.* Available at: https://new.abb.com/ch (accessed 29 March 2023)

Academia Ed. D (2018). *Appraisal Feasibility Study Ethics Business Valuation Consultancy*, USA, Partridge Publishing Singapore

Allied Market Research (2022) Power Inverter Market Is Expected to Reach $112.7 Billion by 2031, *Allied Market Research.* Available at: www.globenewswire.com/en/news-release/2022/11/28/2563245/0/en/Power-Inverter-Market-Is-Expected-to-Reach-112-7-Billion-by-2031-Allied-Market-Research.html (accessed 22 December 2022)

Allitt, Malcolm (2016) *Creating Financial Value: A Guide for Senior Executives with No Finance Background*, India, Bloomsbury Publishing, p.10

Ameri Research (2019) Global PV Inverters Market Outlook to 2026, *Ameri Research.* Available at: www.ameriresearch.com/pv-inverters-market/ (accessed 9 October 2022)

Ang, R., Chng, V. (2013*) Value Investing in Growth Companies*, Singapur, Wiley, 1, 15

Avtar, R., Sahu, N. Aggarwal, A. K., et al. (2019) Exploring Renewable Energy Resources Using Remote Sensing and GIS- A Review, *Resources*, 8, 149. Available at: https://doi.org/10.3390/resources8030149 (accessed 3 December 2022)

Bahur Nir, D. (2021) The man charged with keeping SolarEdge's current flowing, *CTech.* Available at: www.calcalistech.com/ctech/articles/0,7340,L-3894732,00.html (accessed 25 March 2023)

Baker, H. K., Filbeck, G., Kiymaz, H. (2020). *Equity Markets, Valuation, and Analysis*, USA, Wiley, p. 165

BBC (2021), Coronavirus: How the pandemic has changed the world economy, *BBC*, Available at: https://www.bbc.com/news/business-51706225 (accessed 4 August 2023)

Becker, P. (2021) *Equity Valuation Activision Blizzard*, Universidade Católica Portuguesa, Lisbon, Available at: https://repositorio.ucp.pt/bitstream/10400.14/35261/1/202657221.pdf (accessed 4 August 2023)

Bellini, E. (2022) Wood Mackenzie: Huawei continues to lead the inverter supplier in 2021, *PV Magazine*. Available at: www.pv-magazine.de/2022/07/08/wood-mackenzie-huawei-2021-weiter-an-der-spitze-der-wechselrichter-lieferanten/ (accessed 9 October 2022)

Bhambhani, A. (2023) SolarEdge Reports 'Record' 2022 Revenues, Up 58% Annually, *Taiyang News*. Available at: https://taiyangnews.info/business/solaredge-reports-record-2022-revenues-up-58-annually/ (accessed 22 March 2023)

Blythe, J. (2013). *Principles and Practice of Marketing*. United Kingdom, SAGE Publications. p.217

BP (2021) Statistical Review of World Energy, *BP*. Available at: www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2021-full-report.pdf (accessed 10 December 2022)

Cardenal, A. (2019) SolarEdge: Growth, Momentum, And Valuation, *Seeking Alpha.* Available at; https://seekingalpha.com/article/4298717-solaredge-growth-momentum-and-valuation (accessed 25 March 2023)

CFI Team (2022a) Analysis of Financial Statements, *CFI.* Available at: https://corporatefinanceinstitute.com/resources/knowledge/finance/analysis-of-financial-statements/ (accessed 11 April 2023)

CFI Team (2022b) Intrinsic Value, *CFI*. Available at: https://corporatefinanceinstitute.com/resources/valuation/intrinsic-value-guide/ (accessed 10 November 2022)

CFI Team (2023) Valuation Gap, *CFI*. Available at: https://corporatefinanceinstitute.com/resources/valuation/valuation-gap/ (accessed 12 February 2023)

Christian Borch, Robert Wosnitzer (2020) *The Routledge Handbook of Critical Finance Studies*, United Kingdom: Taylor & Francis.

Cooper, I., and Nyborg, K. (2006), The value of tax shields IS equal to the present value of tax shields, *Journal of Finance and Economics*, Vol. 40, No.2.

Corporate Finance (2023) Net Working Capital – Das (Netto-) Umlaufvermögen, *Corporate Finance.* Available at: https://corporate-finance.org/net-working-capital-nettoumlaufvermoegen/ (accessed 4 November 2022)

Craft (2023) SolarEdge competitors and similar companies, *Craft.* Available at: https://craft.co/solaredge/competitors (accessed 30 March 2023)

CSI Market (2021) SolarEdge Technologies Inc's Competitiveness, *CSI Market.* Available at: https://csimarket.com/stocks/compet_glance.php?code=SEDG (accessed 29 March 2023)

Damodaran, A. (2012) *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset* (3rd ed., Vol. 666). John Wiley & Sons.

Damodaran, A. (2011) *The Little Book of Valuation: How to Value a Company, Pick a Stock and Profit.* John Wiley & Sons

Damodaran, A. (2006). *Valuation Approaches and Metrics: A Survey of the Theory and Evidence*. Stern School of Business

Damodaran, A. (2002) *Investment Valuation: Tools and Techniques for determining the value of Any Asset*, 2nd Edition, Wiley (New York);

Damodaran, A. (2023) Damodaran Online. Available at: https://pages.stern.nyu.edu/~adamodar/ (accessed 10 August 2023)

Data Commons (2023) *United States.* Available at: https://datacommons.org/place/country/USA/?utm_medium=explore&mprop=amount&popt=EconomicActivity&cpv=activitySource,GrossDomesticProduction&hl=de. (accessed 15 July 2023)

DePamphilis, D. (2019). *Mergers, Acquisitions, and Other Restructuring Activities: An Integrated Approach to Process, Tools, Cases, and Solutions*. Netherlands: Elsevier Science. p. 274

Doran, D. (2021) Business Valuation vs. Stock Market Valuation, *Value Scout.* Available at: https://getvaluescout.com/blog/valuation/business-valuation-vs-stock-market-valuation/ (accessed 4 November 2022)

Emerick, D. (2023) What is ESG and Why is it important?, *ESG The Report.* Available at: www.esgthereport.com/what-is-esg-and-why-is-it-important/ (accessed 5 March 2023)

Energy Information Administration (2021) EIA. International Energy Outlook, *Energy Information Administration.* Available at: www.eia.gov/outlooks/ieo/consumption/sub-topic-03.php (accessed 6 October 2022)

Environment Federal Department (2023) Frequently asked questions about the energy transition, *Environment Federal Department.* Available at: www.umweltbundesamt.de/themen/klima-energie/klimaschutz-energiepolitik-in-deutschland/haeufige-fragen-zur-energiewende#ziele-wege-und-instrumente (accessed 26 February 2023)

Fama and French (2004) *The Capital Asset Pricing Model: Theory and Evidence*. Journal of Economic Perspectives, 18(3), 25-46.

Fern Fort University (2023) SolarEdge Technologies, Inc. SWOT Analysis/ Matrix, *Fern Fort University.* Available at: http://fernfortuniversity.com/term-papers/swot/nyse/3895-solaredge-technologies--inc-.php (accessed 17 March 2023)

Fernandez, P. (2013) *Valuing Companies by Cash Flow Discounting: Fundamental Relationships and Unnecessary Complications*. Madrid: IESE Business School.

Fernandez, P. (2007) *Company valuation methods. The most common errors in valuations*. IESE Business School, University of Navarra, working paper no.449

Fernandez, P. (2004) *80 common errors in company valuation*. Madrid: IESE Business School.

Fernandez, P. (2001). *Valuation using Multiples*. IESE Business School, 1, 1-13.

Finbox (2023) Capital Expenditures for SolarEdge Technologies, Inc., *FinBox.* Available at: https://finbox.com/NASDAQGS:SEDG/explorer/capex/. (accessed 15 July 2023)

Fischer, A. (2023) SolarEdge announces record revenues in 2022, *PV Magazine.* Available at: https://www.pv-magazine.com/2023/02/15/solaredge-announces-record-revenues-in-2022/ (accessed 12 October 2022)

Fleig, J. (2022) SWOT Analysis. This is how a SWOT analysis is created, *Business Wissen*. Available at: www.business-wissen.de/artikel/swot-analyse-so-wird-eine-swot-analyse-erstellt/ accessed 15 March 2023)

Fraunhofer Institute (2023) Photovoltaics Report, *Fraunhofer Institute for Solar Energy Systems.* Available at: www.ise.fraunhofer.de/content/dam/ise/de/documents/publications/studies/Photovoltaics-Report.pdf (accessed 8 October 2022)

Freixo, M (2022) *Valuation of Nike Inc.*, Instituto Universitário de Lisboa, Lisbon

Gottschalk, A. (2022) Industry and PESTEL analysis- Methods for strategy development, *Anna Gottschalk Coaching-Consulting.* Available at: https://annagottschalk.de/2021/09/28/strategieentwicklung-mit-five-forces-und-pestel-analyse/ (accessed 17 March 2023)

Grabinska, B. Kedzior, D., Grabinski, K. (2021) The Impact of Corporate Governance on the Capital Structure of Companies from the Energy Industry. The Case of Poland, Energies, 14(21), p. 7412. Available at: www.mdpi.com/1996-1073/14/21/7412 (accessed 7 March 2023)

Habib-Valdhorn, S. (2021) How SolarEdge won its place in the sun, *Global*, Available at: https://en.globes.co.il/en/article-how-solaredge-won-its-place-in-the-sun-1001357062 (accessed at 22 March 2023)

Hack, C. (2022) Market capitalization and market value- What does this mean? A definition, *Digital magazine.* Available at: https://digital-magazin.de/marktkapitalisierung-vs-marktwert-unterschied/ (accessed 22 November 2022)

Henschke, S. (2010). *Towards a more accurate equity valuation: An empirical analysis*, Germany, Gabler Verlag

Ibis World (2023) Solar Power Industry in the US- Market Research Report, *Ibis World*. Available at: www.ibisworld.com/united-states/market-research-reports/solar-power-industry/ (accessed 30 March 2023)

International Monetary Fund (2020) World Economic Outlook, April 2020: The Great Lockdown Available at: https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/weo-april-2020 (accessed 04 April 2023)

International Capital Market Association (2015) Green Bond Principles, 2015. Voluntary Process Guidelines for Issuing Green Bonds, *ICMA.* Available at: www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/GBP_2015_27-March.pdf (accessed 7 March 2023)

International Economic Forum Renewable Energies (2023a) SolarEdge achieves record sales in Q4 and in the full year 2022-profit declines, *IWR.* Available at: www.iwr.de/ticker/bilanz-solaredge-erzielt-in-q4-und-im-gesamtjahr-2022-rekordumsaetze-gewinn-geht-zurueck-artikel5184 (accessed 9 October 2022)

International Economic Forum Renewable Energies (2023b) RENIXX- Renewable Energy Industrial Index, *IWR.* Available at: www.iwr.de/renixx/renixx-firmen.php/ (accessed 14 October 2022)

International Energy Agency (2014) How solar energy could be the largest source of electricity by mid-century, *International Energy Agency,* Available at: www.iea.org/news/how-solar-energy-could-be-the-largest-source-of-electricity-by-mid-century (accessed 13 December 2022)

International Energy Agency (2021a) Net Zero by 2050. A roadmap for the Global Energy Sector, *International Energy Agency.* Available at: https://iea.blob.core.windows.net/assets/deebef5d-0c34-4539-9d0c-10b13d840027/NetZeroby2050-ARoadmapfortheGlobalEnergySector_CORR.pdf (accessed 8 October 2022)

International Energy Agency (2021b) Pathway to critical and formidable goal of net-zero emissions by 2050 is narrow but brings huge benefits, according to IEA special report, *International Energy Agency,* Available at: https://www.iea.org/news/pathway-to-critical-and-formidable-goal-of-net-zero-emissions-by-2050-is-narrow-but-brings-huge-benefits (accessed 8 October 2022)

International Energy Agency (2020) Renewables 2020 Solar PV, *International Energy Agency.* Available at: www.iea.org/reports/renewables-2020/solar-pv (accessed 10 December 2022)

International Renewable Energy Agency (2022a) World Energy Transitions, *IRENA.* Available at: https://www.irena.org/Digital-Report/World-Energy-Transitions-Outlook-2022 (accessed 17 December 2022)

International Energy Agency (2022b) World Energy Outlook 2022. Outlook for energy demand, *International Energy Agency.* Available at: www.iea.org/reports/world-energy-outlook-2022/outlook-for-energy-demand (accessed 23 March 2023)

Van Horne, J. C., Wachowicz, J. M. (2005) *Fundamentals of Financial Management*, United Kingdom, Financial Times Prentice Hall, p. 534

James, L. (2023) Stock Investments, *Office of the New York State Attorney General.* Available at: https://ag.ny.gov/investor-protection/understanding-common-investments-stock (accessed 17 February 2023)

Janiszewski, S. (2011) *How to perform discounted cash flow valuation?* (Vol. 3). Foundations of management.

Koller, T., Goedhart, M., and Wessels, D. (2005) *Valuation: Measuring and Managing the Value of Companies*, 4th Edition - University Edition, New Jersey: McKinsey and Company

Koller, T., Goedhart, M., Wessels, D. (2020). *Valuation: Measuring and Managing the Value of Companies*. USA: Wiley.

Larrabee, D. (2012) The DFC Model: Question your assumptions, *CFA Institute.* Available at: https://blogs.cfainstitute.org/investor/2012/01/04/the-dcf-model-question-your-assumptions/ (accessed 11 March 2023)

Lessambo, F. (2021). *U.S. Mergers and Acquisitions: Legal and Financial Aspects*. Switzerland. Springer International Publishing. p. 221

LBBW Asset Management (2023) Briefly explained- ESG, SDG, etc. , *LBBW Asset Management.* Available at: www.lbbw-am.de/unser-ansatz/kurz-erklaert-esg-sdg-etc (accessed 5 March 2023)

Lowden, O. (2023) The top 10 companies in the power optimizers industry, *BCC Research.* Available at: https://blog.bccresearch.com/10-companies-in-the-power-optimizers-industry (accessed 2 March 2023)

Luehrman, T.A. (1997) *What's it Worth? A General Manager's Guide to Valuation*, Harvard Business Review, pp. 132-141.

Macroaxis (2023) SolarEdge Cash Flow from Operations, *Macroaxis*. Available at: www.macroaxis.com/invest/ratio/SEDG/Cash-Flow-from-Operations (accessed 11 April 2023)

MarketBeat (2023) SolarEdge Technologies- SEDG Competitors, *MarketBeat.* Available at: /www.marketbeat.com/stocks/NASDAQ/SEDG/competitors-and-alternatives/ (accessed 30 March 2023)

Markets and Markets (2022) Inverter Market by Type (Solar Inverters, Vehicle Inverter, others), Output Power Rating (Upto 10kW, 10-50 kW, 51-100 kW, above 100 kW), End User (PV Plants, Residential, Automotive), Connection, Voltage, Sales Channel & Region- Global Forecast to 2027, *Markets and Markets.* Available at; www.marketsandmarkets.com/Market-Reports/inverter-market-263171818.html (accessed 22 March 2023)

Mathews, S. (2019) *The ABCs of DCF Valuation & Modeling,* Independently published

McKinsey (2019a) Five ways that ESG creates value, *McKinsey.* Available at: www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/five-ways-that-esg-creates-value (accessed 5 March 2023)

McKinsey (2019b) Global Energy Perspective 2019: Reference Case, *Energy Insights by McKinsey.* Available at: www.mckinsey.com/~/media/mckinsey/industries/oil%20and%20gas/our%20insights/global%20energy%20perspective%202019/mckinsey-energy-insights-global-energy-perspective-2019_reference-case-summary.ashx (accessed 17 December 2022)

Meitner, M. (2006). The Market Approach to Comparable Company Valuation. Deutschland: Physica-Verlag HD. p. 23

Metrick, A., Yasuda, A. (2011) *Venture Capital & the Finance of Innovation*, United States of America, John Wiley and Sons. p. 196. Available at: http://ict-industry-reports.com.au/wp-content/uploads/sites/4/2013/09/2011-Book-Venture-Capital-and-Finance-of-Innovation-Metrick-Yasuda-Dec-2011.pdf, (accessed 11 March 2023)

Miciuła, I., Kadłubek, M. and Stępień, P. (2020) Modern Methods of Business Valuation—Case Study and New Concepts, *Sustainability,* 12(7), 2699, p.2. Available at: https://doi.org/10.3390/su12072699 (accessed 20 October 2022)

Miles, R.C. (1984) *Basis Business Appraisal,* New York, John Wiley & Sons.

Modigliani, F.; Miller, M. (1963) *Corporate income taxes and the cost of capital: a correction.* American Economic Review. 53 (3): 433–443

Müller-Pellet, P., Domeier, M. (2021) Strategieentwicklung trotz Tagesgeschäft? Diese zwei Werkzeuge helfen, *Haufe.* Available at: www.haufe.de/controlling/controllerpraxis/strategieentwicklung-mit-five-forces-und-pestel-analyse_112_540940.html (accessed 17 March 2023)

Murnikov, M. (2021) What is the real use of discounted cash flow companies?, *AGICAP*. Available at: https://agicap.com/de/artikel/discounted-cash-flow/ (accessed 11 April 2023)

Nasdaq (2023) SolarEdge Technologies, Inc. Common Stock (SEDG), *Nasdaq*. Available at: www.nasdaq.com/de/market-activity/stocks/sedg (accessed 2 March 2023)

Neves, J. (2002) *Avaliação de empresas e negócios: Fundamentos, Técnicas e Aplicações*. Mcgraw-Hill.

Niklowitz, M. (2022) Sustainability Standards. The subtle differences, *Handelszeitung*. Available at: www.handelszeitung.ch/specials/corporate-social-responsibility-2022/csr-und-esg-die-unterschiede-553101 (accessed 2 March 2023)

Nobre, V. (2017) *Equity Research - Jerónimo Martins*, Lisbon School of Economics & Management, Lisbon

Opler, T; Titman, S. (1994) *Financial Distress and Corporate Performance*, Journal of Finance and Economics, Vol. 49, No. 3.

Organisation for Economic Co-Operation and Development (2021) ESG Investing and Climate Transition: Market Practices, Issues and Policy Considerations, *OECD Paris*. p. 17. Available at: www.oecd.org/finance/ESG-investing-and-climate- transition-Market-practices-issues-and-policy-considerations.pdf (accessed 10 December 2022)

Organisation for Economic Co-Operation and Development (2015), Green bonds. Mobilising the debt capital markets for a low-carbon transition, *OECD*. Available at: www.oecd.org/environment/cc/Green%20bonds%20PP%20%5Bf3%5D%20%5Blr%5D.pdf (accessed 7 March 2023)

Organisation for Economic Co-Operation and Development (2006) Intellectual Assets and Value Creation: Implications for Corporate Reporting, *OECD*, 43, p. 7. Available at: www.oecd.org/corporate/ca/corporategovernanceprinciples/37811196.pdf (accessed 20 October 2022)

Organisation for Economic Co-Operation and Development (2023) Long Term Interest Rates, *OECD*, Available at: https://data.oecd.org/interest/long-term-interest-rates.htm (accessed 15 July 2023)

Osborne, M. (2021) SolarEdge posts revenue record but rapid growth story draws to a close, *PV Tech.* Available at: www.pv-tech.org/solaredge-posts-revenue-record-but-rapid-growth-story-draws-to-a-close/ (accessed 23 March 2023)

Our World in Data (2020) Which countries have protected both health and the economy in the pandemic? *Our World at Data*. Available at: https://ourworldindata.org/covid-health-economy (accessed 4 April 2023)

Peterdy, K. (2023) ESG (Environmental, Social and Governance), *CFI.* Available at: https://corporatefinanceinstitute.com/resources/esg/esg-environmental-social-governance/ (accessed 5 March 2023)

Pinto, J. E. (2020) *Equity Asset Valuation*. United Kingdom, Wiley, p. 461

Ragas, M., Culp, R. (2021) *Business Acumen for Strategic Communicators: A Primer*. United Kingdom. Emerald Publishing Limited.

Ready Ratios (2021) Electronic And Other Electrical Equipment And Components, Except Computer Equipment: average industry financial ratios for U.S. listed companies, *Ready Ratios.* Available at: www.readyratios.com/sec/industry/36/ (accessed 20 December 2022)

Renaissance Capital (2015) SolarEdge Technologies prices IPO at $18, the high end of the range, *Nasdaq.* Available at: www.nasdaq.com/articles/solaredge-technologies-prices-ipo-18-high-end-range-2015-03-26 (accessed 9 October 2022)

Robinson, T. R., Henry, E., Pirie, L. W. Broihahn, M A. (2015) *International Financial Statement Analysis*. USA, Wiley.

Rozen, H. (2013) SolarEdge at Intersolar: Expanding Power Optimization Solutions to Further More Solar PV Segments, *SolarEdge.* Available at: www.solaredge.com/de/node/12091 (accessed 22 March 2023)

Salkin, L. (2022) SolarEdge Opens 2GWh New Battery Cell Facility in South Korea to Meet Growing Demand for Battery Storage, *SolarEdge.* Available at: www.solaredge.com/us/solaredge-opens-2gwh-new-battery-cell-facility (accessed 22 March 2023)

Sansyzbayev, D. (2023) Why I Prefer Not To Invest In SolarEdge Technologies Stock, Seeking Alpha, Available at: https://seekingalpha.com/article/4610144-solaredge-technologies-stock-why-i-prefer-not-to-invest (accessed 7 July 2023)

Schumpeter, J.A. (2017) *Essays: On Entrepreneurs, Innovations, Business Cycles and the Evolution of Capitalism*, Abingdon, Taylor & Francis Group.

Schneider Electric (2023) Innovation with Schneider Electric, *Schneider Electric.* Available at: www.se.com/ww/en/ (accessed 22 March 2023)

Seeking Alpha (2021) SolarEdge Is Facing More Competition Than Ever Before, *Seeking Alpha*, Available at: https://seekingalpha.com/article/4402379-solaredge-is-facing-competition-ever (accessed 1 February 2023)

Seeking Alpha (2023a) SolarEdge, *Seeking Alpha*, Available at: https://seekingalpha.com/symbol/SEDG/earnings/revisions (accessed 1 February 2023)

Seeking Alpha (2023b) SolarEdge, *Seeking Alpha*, Available at: https://seekingalpha.com/symbol/SEDG/earnings/estimates (accessed 1 February 2023)

Seeking Alpha (2023c) SolarEdge, *Seeking Alpha*, Available at: https://seekingalpha.com/article/4599560-solaredge-technologies-inc-2023-q1-results-earnings-call-presentation (accessed 1 April 2023)

Seeking Alpha (2023d) SolarEdge Technologies: Overvalued But Still Worth Watching, *Seeking Alpha*, Available at: https://seekingalpha.com/article/4568297-solaredge-technologies-overvalued-worth-watching (accessed 6 January 2023)

Seiler, G. (2023) SolarEdge Poised To Benefit From European Solar Push, *Seeking Alpha*, Available at: https://seekingalpha.com/article/4591047-solaredge-poised-to-benefit-from-european-solar-push (accessed 6 April 2023)

Simple Investment Ideas (2021) SolarEdge is facing more competition than ever before, *Seeking Alpha*. Available at: https://seekingalpha.com/article/4402379-solaredge-is-facing-competition-ever (accessed 26 March 2023)

SolarEdge (2023a) Commercial Solutions. Proven value to a broad range of commercial applications, *SolarEdge*. Available at: www.solaredge.com/commercial-solutions-pv-professionals (accessed 23 March 2023)

SolarEdge (2023b) Corporate Profile, *SolarEdge*. Available at: https://investors.solaredge.com/corporate-information/corporate-profile/ (accessed 25 March 2023)

SolarEdge (2023c) Grow your business with SolarEdge Home. Our Residential Products, *SolarEdge*. Available at: www.solaredge.com/installers/solaredge-home (accessed 23 March 2023)

SolarEdge (2023d) Powering the Future of Energy, *SolarEdge*. Available at: www.solaredge.com/de/sustainability (accessed 25 March 2023)

SolarEdge (2023e) This is SolarEdge, *SolarEdge*. Available at: www.solaredge.com/corporate/about-us (accessed 2 March 2023)

SolarEdge (2023f) Q1 2023 Earnings call transcript, *SolarEdge*. Available at: https://edge.media-server.com/mmc/p/a36no7e2 (accessed 23 July 2023)

SolarEdge (2022a) EV Charging Single Phase Inverter, *SolarEdge.* Available at: www.solaredge.com/es/products/ev-charger/ (accessed 17 March 2023)

SolarEdge (2022b) Powering the Global Energy Transformation, *SolarEdge*. Available at: https://investors.solaredge.com/static-files/280f957a-34c6-4096-ab6e-f51e41e36af0 (accessed 26 March 2023)

SolarEdge (2022c) SolarEdge Announces Fourth Quarter and Full Year 2021 Financial Results, *SolarEdge.* Available at: https://investors.solaredge.com/news-releases/news-release-details/solaredge-announces-fourth-quarter-and-full-year-2021-financial (accessed 17 March 2023)

SolarEdge (2022d) SolarEdge Fact Sheet, *SolarEdge.* Available at: https://knowledge-center.solaredge.com/sites/kc/files/se-fact-sheet-na.pdf (accessed 17 March 2023)

SolarEdge (2022e) Welcome to the SolarEdge Home, *SolarEdge.* Available at: www.solaredge.com (accessed 20 December 2022)

SolarEdge (2021) Powering the future of energy. Sustainability Report 2021, *SolarEdge.* Available at: https://knowledge-center.solaredge.com/sites/kc/files/annual_sustainability_report_2021.pdf (accessed 22 March 2023)

SolarEdge (2018) Sustainability and Social Responsibility Report 2018, *SolarEdge.* Available at: https://knowledge-

center.solaredge.com/sites/kc/files/se_sustainability_report_2018_eng.pdf (accessed 30 March 2023)

Statista (2023) Average market risk premium in the United States from 2011 to 2023, *Statista*, Available at: https://www.statista.com/statistics/664840/average-market-risk-premium-usa (accessed 4 June 2023)

Stewart, H. (2022) SolarEdge Technologies: Solid Growth Story But With A Lot Of Volatility, *Seeking Alpha*, Available at: https://seekingalpha.com/article/4493559-solaredge-technologies-stock-solid-growth-story-lot-of-volatility (accessed 7 June 2023)

Stock Analysis (2023) SolarEdge Technologies, Inc. (SEDG): Cash Flow Statement (Annual), *Stock Analysis*, Available at: https://stockanalysis.com/stocks/sedg/financials/cash-flow-statement/ (accessed 10 August 2023)

Sustainability for all (2019), The most used renewable energies, *Sustainability for all.* Available at: www.activesustainability.com/renewable-energy/the-most-used-renewable-energies/?_adin=02021864894 (accessed 10 December 2022)

Tesla (2023) Tesla, *Tesla.* Available at: www.tesla.com/ (accessed 22 March 2023)

The Hermit Trader (2019) Charts Showing Explosive Momentum in Clean Energy Sector, *Seeking Alpha.* Available at: https://seekingalpha.com/article/4292218-charts-showing-explosive-momentum-in-clean-energy-sector (accessed 15 December 2022)

Tomasito, Z (2018) *Appraisal Feasibility Study Ethics Business Valuation Consultancy*, Partridge Publishing Singapore.

United Nations (2014) UN Climate Action. Renewable energy- powering a safer future, *United Nations*. Available at: www.un.org/en/climatechange/raising-ambition/renewable-energy (accessed 6 October 2022)

U.S. Department of Energy (2019) Spotlight. Solving Challenges in Energy Storage, *Office of technology transitions.* Available at: www.energy.gov/sites/default/files/2019/07/f64/2018-OTT-Energy-Storage-Spotlight.pdf (accessed 15 December 2022)

U.S. Securities and Exchange Commission (2022) Market Capitalization, *Investor*. Available at: www.investor.gov/introduction-investing/investing-basics/glossary/market-capitalization (accessed 15 November 2022)

Van de Schootbrugge, E., Wong, M.K. (2013) Multi-Stage valuation for start-up high tech projects and companies. *Journal of Accounting and Finance* 13 (2), 45–50. Available at http://digitalcommons.www.na-businesspress.com/JAF/WongKM_Web13_2_.pdf (accessed 20 October 2022)

Varas, A., Varadarajan, R. Goodrich, J., et al. (2021) Strengthening the global semiconductor supply chain in an uncertain era, *BCG, SIA.* Available at:

www.semiconductors.org/wp-content/uploads/2021/05/BCG-x-SIA-Strengthening-the-Global-Semiconductor-Value-Chain-April-2021_1.pdf (accessed 20 December 2022)

Wagener, S (2023) Accounting for the middle: motivations, extent, and limitations of middle managers' earnings management. J Bus Econ. Available at: https://doi.org/10.1007/s11573-023-01162-8 (accessed 15 August 2023)

WealthDesk (2022) What is the Fair Value of a Stock, and how to calculate it, *WealthDesk.* Available at https://wealthdesk.in/blog/fair-value-of-a-stock/ (accessed 11 November 2022)

Wilkens, P. (2023a) Capital Increase- Definition & Example, *DeltaValue.* Available at: www.deltavalue.de/kapitalerhoehung-capital-increase/ (accessed 11 April 2023)

Wilkens, P. (2023b) Discounted Cash Flow (DCF) - Formula & Calculation, *DeltaValue*, Available at: www.deltavalue.de/discounted-cash-flow-dcf/ (accessed 15 March 2023)

Wollnywp C. (2023) Adjusted Beta, *Wollnywp.* Available at: https://www.wollnywp-unternehmensbewertung.de/adjusted-beta/ (accessed 15 July 2023)

QFinance (2009) The Ultimate Resource, Qatar Financial Centre, United Kingdom, Bloomsbury USA, p. 529.

Yahoo Finance (2023a) SolarEdge Technologies, Inc (SEDG) - Cash Flow, *Yahoo Finance.* Available at: https://finance.yahoo.com/quote/SEDG/cash-flow/ (accessed 11 April 2023)

Yahoo Finance (2023b) SolarEdge Technologies, Inc (SEDG), *Yahoo Finance*. Available at: https://finance.yahoo.com/quote/SEDG?p=SEDG (accessed 11 April 2023)

YCharts (2023a) *5 Year Treasury Rate (I:5YTCMR)*. Available at: https://ycharts.com/indicators/5_year_treasury_rate (accessed 01 August 2023)

YCharts (2023b) *US Inflation Rate (I:USIR).* Available at: https://ycharts.com/indicators/us_inflation_rate (accessed 01 August 2023)

Value Investing (2023) *SEDG Solaredge Technologies Inc.* Available at: https://valueinvesting.io/SEDG/valuation/intrinsic-value. (accessed 01 August 2023)