



universität
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MASTERARBEIT / MASTER'S THESIS

Titel der Masterarbeit / Title of the Master's Thesis

“Market Entry of International Project Companies into the Mexican Photovoltaic Sector: a Case Study of Two German Companies”

verfasst von / submitted by
Maximilian Hildebrandt, B.Sc.

angestrebter akademischer Grad / in partial fulfilment of the requirements for the degree
of
Master of Science (MSc)

Wien, 2022 / Vienna, 2022

Studienkennzahl lt. Studienblatt /
degree programme code as it appears on
the student record sheet:

UA 066 914

Studienrichtung lt. Studienblatt /
degree programme as it appears on
the student record sheet:

Masterstudium Internationale Betriebswirtschaft

Betreut von / Supervisor:
Mitbetreut von / Co-Supervisor:

**Univ.-Prof. i.R. Mag. Dr. Josef Windsperger
Mag. Haris Seferagic, PhD**

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List of Abbreviations

AMLO	Andrés Manuel López Obrador
CAMEXA	Cámara Mexicano-Alemana de Comercio e Industria
CFE	Comisión Federal de Electricidad
CO ₂	Carbon Dioxide
DG	Distributed Generation
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GW	Gigawatt
KPI	Key Performance Indicator
MW	Megawatt
NAFTA	North American Free Trade Agreement
OECD	Organization for Economic Co-operation and Development
PEMEX	Petróleos Mexicanos
PPA	Power Purchase Agreement
PV	Photovoltaics
RBV	Resource-Based View
RE	Renewable Energy
USMCA	United States-Mexico-Canada Agreement

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1 Introduction

The fight against climate change poses a serious challenge to our society: increasing natural disasters, loss of habitat for flora and fauna, extreme temperature increases and health risks for humanity (Zafar et al., 2020). Increased industrialization and the use of fossil fuels such as coal, oil, and natural gas, which emit billions of tons of CO₂ every year, have played a significant role in this crisis (Romero-Hernández et al., 2013). For this reason, more action must be taken to counteract climate change. One possibility is to enormously reduce the use of fossil fuels and replace them with renewable energies such as solar energy. This could be realized both by industrial nations and by developing or emerging countries because renewable energy not only offers ecological, but also economic advantages (Pao et al., 2014). Due to the increase in population worldwide, the demand for energy is naturally also increasing and some countries are already reaching their limits with conventional forms of energy (Pfeiffer & Mulder, 2013). This is related to the fact that resources are becoming scarcer and at the same time the extraction and trading of coal, oil or gas is becoming more and more expensive (Mercado & Rajagopal, 2013).

The thesis intends to investigate how Mexico can transition to renewable energies and can become less independent on fossil fuels. In particular it will examine the potential of the emerging country Mexico, for which renewable energies not only reduce risks for the environment and health but can also influence economic growth and ensure energy security (IRENA, 2016; Pfeiffer & Mulder, 2013). Mexico was chosen because of its geographical location, which provides excellent conditions for solar energy: Mexico is located in a favorable sun belt with more than 90% direct sunlight, limited cloud cover, and low rainfall. The whole country has immense potential to support solar energy and offers excellent conditions to expand solar energy production and use (Yaneva et al., 2018). Currently, solar energy accounts for about 6 percent (installed capacity) in Mexico. Conventional forms of energy such as coal or oil, on the other hand, still contribute more than 60 percent of Mexico's total energy (SENER, 2020; US Energy Information Administration (eia), 2020). The reasons for this may be due to Mexican politics, which does not yet sufficiently promote solar energy (Zafar et al., 2020). In addition, the lack of research-based innovations and initiatives, as well as a lack of capital and expertise

in this technology makes it more difficult for solar energy to take on a larger role (Zafar et al., 2020). One possibility for increasing solar energy in Mexico could be the market entry of foreign companies with technological know-how in this sector—in doing so, they could transfer capital, technology, and expertise to boost the development in the country (Keeley & Matsumoto, 2018). This master thesis focuses on German project planning companies in the photovoltaic sector, considering that Germany was a pioneer in solar energy and one of the first countries to invest intensively in this sector (Blechner, 2020). As a result, German companies developed new technologies and assumed levels of expertise relatively early in the history of solar energy use. However, German companies' domination of the market has declined and been replaced by a number of companies from other countries such as China or the USA, as they can offer more favorable prices (Blechner, 2020). Yet German companies want to revive this initiative and invest more in solar energy (Blechner, 2020). Based on the current situation, the Mexican market presents an opportunity for German companies to get back into a promising position, as the potential for this market is enormous. Therefore, this master thesis investigates the Mexican photovoltaic market as a potential market entry destination for German companies and will shed light on the following research questions:

- 1. What opportunities and risks do German project planning companies face in entering the Mexican photovoltaic market?*
- 2. What internal company resources are helpful in realizing these opportunities or minimize risks?*

The decision to focus on project companies was made because these companies are considered to be at the end of the photovoltaic value chain and provide a comprehensive picture of the entire industry. This is due to project companies' direct contact with customers, component manufacturers and their involvement in the entire process from planning to commissioning of the PV system.

The aim of this paper is to find out what potential Mexico offers as an entry country for German project companies in the photovoltaic sector. To do this, the external environment and the industry are first presented with the help of a literature review. These findings will later be embedded in a case study in order to link them to a real-world situation. Two German companies that have already established themselves

in Mexico will be interviewed and questioned about the macroeconomy and energy industry in Mexico. Furthermore, internal questions will be raised to see which resources are necessary and have helped the companies to establish themselves in the Mexican market. The second and third chapters present the theoretical foundations that are required to deal with this topic. This includes renewable energies, especially solar energy, internationalization of companies and strategic analysis frameworks (macroeconomic analysis, industry structure analysis, internal company resource analysis). In the following two chapters (4 and 5), the PESTEL framework for macroeconomics and Porter's Five Forces framework for industry structure analysis are applied for Mexico and its photovoltaic industry with the help of a literature review. Chapter 6 deals with the methodological approach, whereby the qualitative approach of case-study-based research is discussed. In addition, this chapter takes a closer look at measures that ensure the quality of research. The following chapter presents the results of the interviews with the two German companies. These results are going to be discussed in Chapter 8 and compared with the findings from the literature research in order to evaluate the extent to which theory and practice correspond. At the same time, the discussion highlights the opportunities and risks for German companies in Mexico as well as their internal resources. The last chapter summarizes the relevant findings of the research as a conclusion. In addition, the research conducted is critically appraised and the limitations identified are elaborated, which is followed by an outlook for possible future research and recommendations for the companies.

2 Renewable Energies

This chapter offers a broad overview of renewable energies, with a special focus on photovoltaics. It examines technical basics, advantages, and disadvantages, as well as forms and special applications. For the further course of the Master's thesis, this provides a basic prerequisite for understanding the relevance and functioning of renewable energies and photovoltaics in particular.

2.1 Definition and Overview

Renewable energies are natural energy sources that are infinitely available or renewable. Especially due to the issue of climate change and environmental problems caused by fossil fuels, renewable energies have moved more in the spotlight due to their low consumption of raw materials and low emissions of harmful greenhouse gasses. The sun is the largest renewable energy source, participating both directly as a form of energy and indirectly in other renewable forms of energy. Direct participation takes the form of solar thermal or photovoltaic energy and indirectly the sun is also used in forms of energy such as wind energy, hydropower, biomass, and geothermal energy (Hook, 2019; Johst, 2009).

Energy can be generated in the form of heat, electricity, and mobility; however, this thesis only focuses on the generation of electricity, as this is the energy sector with the highest greenhouse gas emissions and a large proportion of renewable energy is needed for climate change (Hook, 2019).

2.2 Fundamentals of Photovoltaics

As already mentioned, solar energy is a form of renewable energy. A distinction can be made between solar thermal and photovoltaic (Johst, 2009; Quaschning, 2019). Solar thermal energy involves collectors to generate heat with the help of the sun. This thesis focuses only on photovoltaics, since it can be used to generate electricity (Johst, 2009; Quaschning, 2019). Consequently, solar thermal systems are not discussed further in this thesis.

2.2.1 Definition and Technical Basics

Photovoltaic technology is a form of energy generation using direct sunlight. It involves the direct conversion of sunlight into energy (electricity) through solar cells,

without emissions or noise (photovoltaic effect) (Johst, 2009; Mundo-Hernández et al., 2014; Quaschning, 2019). The term "photovoltaic" is derived from the 2 components "photo" and "volt". "Photo" stands for light and "volt" for the unit used to measure electricity (Mundo-Hernández et al., 2014).

A photovoltaic system consists of the core grouping of solar cells, which are connected in a series or in a row. These groups of solar cells are also called solar modules. Other components are inverters, feed-in and/or consumption meters, charge regulators and various components such as batteries and cables (Hook, 2019; Mundo-Hernández et al., 2014).

Important key figures are the solar irradiation (kWh/m²) and the efficiency, which measures the proportion of solar irradiation that is converted into electrical power by the cell. The higher the efficiency, the more electricity can be generated by the solar cell (Johst, 2009; Quaschning, 2019).

2.2.2 Advantages and Disadvantages of Photovoltaic Systems

The advantages and disadvantages of photovoltaic systems are summarized in the following table:

Table 1

Advantages and Disadvantages of Photovoltaic Systems

Advantages	Disadvantages
• Clean and ecological energy generation without CO-emissions and noise	• Reliance on technology development
• Independence of customers on power grid/utilities	• Technical factors such as conversion efficiency, land access limits and the diffuses and intermittent nature of this natural resource
• Long life span of photovoltaic systems	• Necessity of a big amount of land to build and operate a big scale photovoltaic solar plant
• Wide range of applications (from small systems for homes to utility scale for businesses and regions)	• Energy limits since large amounts of energy are needed to produce photovoltaic technology
• Recyclability of photovoltaic modules	• High initial costs
• Low maintenance of photovoltaic modules required	• Necessity of large amounts of rare materials
• Dropping costs for years	• Necessity of highly skilled and expensive construction personnel
• Photovoltaic as future investment (possibility of reimbursement of unused electricity through feeding into power grid)	

Note. Own representation based on Hook, 2019; Mundo-Hernández et al., 2014

2.2.3 Forms of Photovoltaic Systems

Photovoltaic solar technology can be used as a standalone system or as a grid-connected system (Romero-Hernández et al., 2013). Both forms are explained in more detail in this subsection.

2.2.3.1 Off-Grid Systems

Systems of this type are usually small and are not connected to the electrical grid in order to function autonomously and be prepared for periods of bad weather, for example (Johst, 2009; Romero-Hernández et al., 2013). They are often found in remote areas without direct access to the grid and electricity. With such systems, small household appliances up to an entire household or building can be supplied with electricity.

These so-called off-grid systems have a battery to store energy and make it available throughout the day. Such systems are mostly found in rural areas and are financed with the help of government grants, as was the case in Mexico in 2007 (Romero-Hernández et al., 2013).

In off-grid systems, especially the small installations are reliable and efficient and can be used for more than 30 years. For larger systems with higher energy consumption, such as in large industrial operations, the batteries are not sufficient due to their limited capacity (Romero-Hernández et al., 2013).

2.2.3.2 On-Grid Systems

On-grid systems represent a second option. With on-grid systems electricity is generated directly into the public grid and thus the energy does not have to be stored. The user has several possibilities to use this energy. Either it is consumed directly, deducted from the electricity bill, or sold to the national grid. On-grid systems can therefore be more profitable than off-grid systems and are seen as a great opportunity for investors (Romero-Hernández et al., 2013).

These grid-connected systems can be divided into two different types: centralized and distributed systems. Central systems are usually built on expansive land and are regulated by long-term contracts, so-called Power Purchase Agreements. Such projects can have up to several MWs of capacity (Utility-Scale) and can be found worldwide. The larger systems are located mainly in countries such as the USA,

Germany, Japan, or Spain, but the capacity for them is also steadily increasing in emerging and developing countries (Romero-Hernández et al., 2013).

Distributed systems, on the other hand, are small and medium-sized power sources, widely dispersed and installed on buildings and houses (Romero-Hernández et al., 2013). These systems can be connected to low and medium voltage grids and are installed at the end-user location or behind the meter at the consumer's premises. The aim of these systems is self-consumption of clean electricity at relatively low prices (IRENA, 2019; Pereira da Silva et al., 2019).

These systems were initially installed less frequently than centralized systems, but their popularity has been increasing enormously in recent years due to falling costs and supporting policies such as net metering and fiscal incentives. The so-called model of net metering means that consumers can store the electricity generated and consume it later or sell it to the grid (IRENA, 2019; Pereira da Silva et al., 2019).

2.2.4 Special Applications

In order to promote the potential and market growth of solar energy, research is also being conducted on other special applications in addition to roofs and fields. One challenge for photovoltaics is finding sufficient space to operate. One solution is to integrate PV into different areas of the human environment—whether in the shell of buildings, on lakes or traffic routes (Trommsdorf et al., 2020). Therefore, special applications are, for example, photovoltaic integration at buildings (BIPV), solar trees, solar carports, Floating PV, and Agro-photovoltaics (IRENA, 2019). This master thesis only goes into more detail with the latter two applications, as they play an increasingly important role in offering more alternatives to use solar and photovoltaic technology.

2.2.4.1 Floating Photovoltaics

As the name suggests, floating photovoltaics are photovoltaic systems that are mounted on floating bodies of standing water. These systems were developed to counteract the lack of land space available for photovoltaics. Cost of land is much more expensive than the cost of the water surface and there are more regulations to follow. This makes floating PV more advantageous compared to land-based PV systems. In addition, these systems are less visible to the population and the efficiency is very high because water cools solar panels. In addition to producing

energy, floating photovoltaics also have environmental benefits: the water is shaded which protects the ecosystem from strong solar radiation, which reduces algae formation and also improves the water quality (IRENA, 2019; Patil Desai et al., 2017).

However, it is still a young technology that has to overcome challenges. These include, for example, withstanding the dynamic forces of waves and strong winds. In addition, the mooring systems have to be specially designed, which requires experience from specialists (IRENA, 2019).

2.2.4.2 Agro Photovoltaics

As photovoltaics require large open spaces, it can lead to land-use competition within the agricultural sphere. Agri-photovoltaics was developed to circumvent this scenario. This is a technology to use land for agriculture and electricity generation with photovoltaics at the same time. The principle is based on growing crops under solar panels mounted on the ground. Cultivation under these conditions is advantageous because the shade created by the PV systems promises higher electricity production, higher crop yields and lower water consumption. This creates a win-win situation for both the plants and the solar panels. For example, some plants grow better under the shade of the PV systems because they are spared direct sunlight and lose less water through transpiration, which reduces water consumption while food production remains the same. In addition, the efficiency of the panels is increased because the plants can lower the temperature through transpiration (IRENA, 2019; Trommsdorf et al., 2020).

Involving and convincing the associated stakeholders and the subsequent identification of suitable locations has proven to be a major challenge in the past (Trommsdorf et al., 2020).

3 Internationalization of Companies

This chapter will give a general overview about the internationalization of companies. The first section defines “internationalization” and an “international company.” The second section explains the reasons for entering the international market. The following subsections will give a theoretical overview for how a new market environment can be analyzed. Three frameworks will be used which are organized as three layers starting from the outside and moving inside: the macro environment using PESTEL analysis, the industry structure using Porter's Five Forces and finally the internal perspective from the company itself with the Resource-Based-View.

These theoretical foundations create a basic understanding for the further course of the Master's thesis in order to comprehend the relevance of internationalization and to apply these theoretical frameworks to German project companies in Mexico.

3.1 Internationalization

According to Welch & Luostarinen, the term “internationalization” does not have a concrete definition (1988). It could stand for different market entry forms, leading a foreign subsidy or cross-border foreign operations (Perlitz & Schrank, 2013). However, a possible definition could be that internationalization is “the process of increasing involvement in international operations” (Welch & Luostarinen, 1988, p.36). In this case, the term “process” is used on purpose in order to illustrate that internationalization is an ongoing and continuous activity (Knight, 2015).

An internationalization can represent an important strategic decision for a company in order to integrate horizontally on a global level (Adel et al., 2018). There are several theoretical approaches that attempt to explain the process of internationalization (López Morales, 2020). One approach is the Uppsala model by Johanson and Vahlne (Johanson & Vahlne, 1977). It shows how firms gradually internationalize by acquiring, integrating, and using knowledge about foreign markets and by becoming more involved in these new markets (Johanson & Vahlne, 1977). Foreign markets are explored over time through experiential learning. In addition, the internationalization process should first begin in countries that are physically close. There are four levels of engagement determined by the company's commitment and market knowledge (Johanson & Vahlne, 1977):

- No regular export
- Export through independent agents
- Foreign sales subsidiary
- Foreign production unit.

Another approach is Dunning's Eclectic Paradigm (Dunning, 1980). This model explains internationalization in terms of foreign direct investment (FDI). An important framework of this approach is the OLI paradigm, which emphasizes the need to focus on three advantages when entering a foreign market: Ownership (Why), Location (Where), and Internationalization (How). Ownership of brands, technology, or know-how, for example, can offer the company market power and competitive advantage. An advantageous location can have a positive impact on factors such as land, capital, and quality of labor. The internationalization advantage is assessed if it makes sense to carry out the value creation activity locally or abroad. The decisive factor is the transaction costs of the business relationship, which should be higher than for other management activities of international companies (Dunning, 1980; López Morales, 2020).

Two other approaches are depth and breadth of internationalization (López Morales, 2020). The depth of internationalization is the extent to which internationalization takes place outside of the country. This can be measured by financial indicators such as the ratio of foreign sales to total sales, the ratio of foreign sales to total assets, and the number of employees in foreign locations. These indicators can give an indication of the success of a company's overseas involvement and internationalization (Kaczmarek & Ruigrok, 2013; López Morales, 2020).

Breadth refers to the geographic scope of a company, i.e., the number and distribution of its overseas branches (Hsu et al., 2013; Velez-Calle et al., 2018). The breadth of internationalization can be divided into four scales (Aggarwal et al., 2010; López Morales, 2020):

- Domestic
- Regional
- Transregional
- Global

3.2 International Company

Firstly, it is important to mention that the word “multinational” represents a subset of “international”, but this thesis will refer exclusively to the umbrella term “international”. A company counts as multinational when it operates and lives under laws and customs of other countries but maintains its base in one country (Lilienthal, 1960). Furthermore, some authors have the opinion that a foreign subsidiary is essential—although they disagree about what constitutes an “international company”. There is no unanimity if a distribution subsidiary or a production subsidiary is necessary in order to be an international company (Kutschker & Schmid, 2011). Thus, a clear definition does not exist.

However, the classification of an international enterprise depends on the nature of its foreign operations. The level of foreign involvement of the enterprise plays an important role in determining its classification since, for example, just taking out a loan abroad does not designate the company as “international” (Perlitz & Schrank, 2013).

The degree of internationalization can be measured by quantitative factors such as: the share of foreign sales in total sales, the number of employees abroad, the level of direct investment, or the number of subsidiaries abroad. However, based on the heterogeneity of different companies and sectors, a quantitative approach would not be a suitable solution. Therefore, a qualitative orientation with respect to the company’s goals represents a better approach. Thus, a company can be seen as international “if the foreign activities are essential for achieving and securing the company's objectives” (Perlitz & Schrank, 2013, p.12).

3.3 Reasons for Internationalization

Particular reasons for an internationalization always differ from company to company. It depends on factors such as the size of the company or the industry in which it's operating. In addition, individual management motives, motives to leverage existing competitive advantages or to create new competitive advantages lead companies to internationalize (Wiesner, 2005).

Albaum et al. (Albaum et al., 2016) systemized the reasons and motives of companies to internationalize into basic and specific reasons. They differentiate

potential motives with two categories: *pull* and *push* factors, which are then divided into subcategories *internal* and *external* factors.

3.3.1 Basic Motivations

Every business has a primary objective, which may be profit or non-profit oriented. Profit oriented goals may be return on investment, growth, or stability, while non-profit goals include, for example, market share, financial liquidity, or humanitarian objectives. Ultimately, however, there is only one primary motivation: to make a profit. Without making a profit, a company cannot continue to operate and cannot achieve non-profit objectives. Nonprofit goals, so to speak, depend on the primary goal of making a profit (Albaum et al., 2016).

3.3.2 Pull Factors (Proactive) as Motivation

Pull factors may be seen as motivations which bring the firms to internationalize proactively. These factors can be internal or external (Wiesner, 2005).

Internal Factors

Internal factors derive from influences inside the company. For example, management may spur a move into foreign markets based on their own in-house analysis. Therefore, the characteristics, background, and experience of the manager play an important role for the decision of internationalization (Albaum et al., 2016).

A competitive marketing advantage with a unique product, service, or technology, in addition to an efficient marketing infrastructure and a good technical service, may catalyze a company's entry into a foreign market. The competitive advantage of offering customers something unique can make it more difficult for competitors to enter the market (Albaum et al., 2016).

The already mentioned unique competence of a product, service or technology obtained in the domestic market shows another internal motivation. This is justified by the fact that opportunity costs of exploiting these assets in another market will be very low and therefore sunk costs incurred in developing the competences. In this case, foreign operations can create location, cost, and competitive advantages (Albaum et al., 2016).

External Factors

External factors are caused by outside environmental impacts which cause proactively motivated actions.

It is clear that when foreign market opportunities are strong, the motivation to operate there is high. In this case, the target market seems also interesting as a start in order to tap into nearby locations at a later stage. However, to seize and respond to these opportunities, a company is supposed to have sufficient competencies or resources (Albaum et al., 2016).

Change agents such as governments, trade associations, banks or chambers of commerce can motivate an internationalization. They can be helpful through activities such as offering loans, providing credit facilities and insurance, providing information on foreign markets, or participating in trade agreements. Thus, beneficial economic effects and access to information can be guaranteed if a company has a relationship to the country's bureaucratic infrastructure (Albaum et al., 2016).

3.3.3 Push Factors (Reactive) as Motivation

On the other side, push-factors can be motives or even constraints that force the company to internationalize. In other words, the company reacts to particular internal or external circumstances (Wiesner, 2005).

Internal Factors

Internal forces to internationalize can pose market risks such as declining sales whereby profits can be reduced by diversified geographical markets. Therefore, the market spreading allows flexibility and an independence from the domestic market and its changing business conditions (Albaum et al., 2016).

Inventory levels may exceed desirable levels due to declining sales in the domestic market. In such a case, excess capacity can be a reactive internal incentive for internationalization since it can be widely distributed and cover fixed costs. Another possibility is to change the pricing in international markets to focus on variable costs (Albaum et al., 2016).

External Factors

A pushing factor to internationalize from the outside can be a small, stagnant, or declining domestic market with low sales opportunities and possibly a high competition pressure pushing firms into a foreign market. This can preserve or even increase the market share. However, not only the market size has to be taken into consideration but also its attractiveness. Depending on the product or the service, particular foreign markets may seem to be more attractive than the domestic market concerning demand, productivity, or resources (Albaum et al., 2016).

If a company already possesses a foreign client base, they could move a portion of their operations from their domestic market to the foreign market. In this case, an internationalization can be helpful in creating a proximity to international customers, both psychologically and physiologically. Possibly resulting in more sales (Albaum et al., 2016).

Table 2

Classification of Pull- and Push Factors as Motivation to Internationalize

	Internal	External
Pull Factors (Proactive)	• Managerial urge • Unique product/technology competence	• Foreign market opportunities • Change agents
Push Factors (Reactive)	• Risk diversification • Excess capacity of resources	• Small domestic market and stagnant or declining home market • Unsolicited foreign orders

Note. Own representation based on Albaum et al., 2016

3.4 Macroenvironmental Analysis (PESTEL Framework)

In order to design an effective internationalization strategic plan, categorizing and analyzing external macro-environmental factors plays an important role, as they

influence the future success of the company. By categorizing and analyzing external macro-environmental factors companies can better identify opportunities and threats within a current organizational environment and evaluate potential beneficial changes (G. Johnson et al., 2014).

The PESTEL framework is a useful classification and analysis tool for this purpose. PESTEL is an acronym made up of the first letters of each major environmental component: **P**olitical, **E**conomic, **S**ocial, **T**echnical, **E**cological, **L**egal (W. H. A. Johnson, 2021).

3.4.1 Political

Political factors represent aspects of the government or politics of the respective country that have an influence on the business activities of a company (W. H. A. Johnson, 2021).

The state in particular plays an important role here, acting as a potential customer, supplier, or owner (G. Johnson et al., 2014). This is crucial because government institutions can influence the establishment of companies and their business activities. Consequently, the PESTEL analysis can locate trends, provide important impressions about the political situation in the respective country and help decide whether a foreign operation in this country can be advantageous (W. H. A. Johnson, 2021).

Factors to consider can be:

- Government system and stability
- Industry regulations
- Deregulation/Liberalization
- Tariff Controls
- Taxation Policy
- Transparency and Corruption
- Trade Regulation (Bondra, n.d; Sammut-Bonnici & Galea, 2015).

3.4.2 Economical

For a company it is important to consider economic factors in order to understand how its markets are affected by macroeconomic dynamics (G. Johnson et al., 2014).

An interesting measure to evaluate a locality is gross domestic product, which reflects the purchasing power of the market and allows comparison with other countries. Other useful indicators, such as inflation or exchange rate, influence prices. The unemployment rate can give businesses an idea of disposable income and the labor market. For both consumers and investors, interest rates, which can incentivize or discourage new investments, need to be taken into account (Sammut-Bonnici & Galea, 2015). Thus, it is necessary to track economic factors in order to have an overall view of the interest in doing business in a particular market.

Significant factors are (Bondra, n.d; Sammut-Bonnici & Galea, 2015):

- Gross domestic product
- Economic trends (e.g inflation)
- Interest and Exchange rates
- Unemployment rate
- Corporate and product taxation
- Local and international economy (like Business cycles & economic growth)
- Trade alliances

3.4.3 Social

Social factors include culture, demographics and society and their impact on businesses (G. Johnson et al., 2014).

These include certain consumer attitudes or preferences that a company can capitalize on to strategically position its products or services in society. In addition, it may be useful to identify trends in the population, such as increased awareness of sustainability and the environment. The average level of education within a nation or region can provide some information on the capability of potential skilled workers, as well as the level of how demanding customers may be (Sammut-Bonnici & Galea, 2015).

Another influence on the company and the economy can be the demographic situation of a country or region. For example, an aging population creates different opportunities and threats than a younger population (G. Johnson et al., 2014).

By assessing social factors, companies are able to anticipate the pressures that different interest groups may exert on government policy decisions, which in turn may influence companies explicitly or implicitly (Sammut-Bonnici & Galea, 2015).

Important social factors include (Bondra, n.d; Sammut-Bonnici & Galea, 2015):

- Population demographics, growth/shift
- Income distribution
- Work/Leisure/Quality of life
- Health/Education/Welfare
- Lifestyle changes
- Consumer perception
- Public opinion, expectations, values
- Effect of advertising and public relations
- Racial, ethnic, religious influences

3.4.4 Technological

Technological factors play a very significant role in the analysis of the macro environment. These can be tools and techniques used to perform tasks by individuals and organizations (W. H. A. Johnson, 2021).

In this case, the level of innovation, diffusion, infrastructure, and technical standards will be considered (Cordell & Thompson, 2018). Technological development can help in making decisions about entering the market and in what form. These decisions are based on whether the market can provide support for a technology or if this technology is already being supported (W. H. A. Johnson, 2021).

Technological capabilities, if used wisely and with the help of a variety of factors, can help companies achieve a competitive advantage. Advantages include lower-cost production, improved access to customers, enhanced branding, higher product quality, and higher levels of business intelligence. However, technological systems change very quickly. For this reason, a company must stay abreast of all technological developments in the industry to be able to influence future attractiveness and profitability (Sammut-Bonnici & Galea, 2015).

Specific technological factors include:

- Innovations (e.g., processes, platforms)
- Technological substitution
- Obsolescence
- Emerging technologies
- Digital Economy (Information/communication technologies)

- Technology transfer and Know-How (Research & Development)
(Bondra, n.d; W. H. A. Johnson, 2021; Sammut-Bonnici & Galea, 2015).

3.4.5 Ecological

Considering environmental factors means assessing the impact of nature, energy consumption and regulations on the company (Cordell & Thompson, 2018). Therefore, the ecosystem of which the company is a part of is analyzed by taking into account climate conditions, resources and environmental regulations (W. H. A. Johnson, 2021).

As climate change becomes a growing concern, governments have introduced environmental regulations such as requirements and standards for companies. Our world is trending towards more sustainable business practices with better energy efficiency and greater awareness of natural resources and the environment (Janet, 2013; W. H. A. Johnson, 2021).

Important ecological factors include (Bondra, n.d; Janet, 2013; W. H. A. Johnson, 2021; WSEAS, 2009):

- Geographical location
- Weather and climate
- Laws on pollution and recycling
- Waste management
- Green or eco-friendly products and practices
- Energy Sources and consumption

3.4.6 Legal

Legal factors correspond to national laws and rules. They are related to all the other components of PESTEL, especially the political factors, but for clarity they form a separate part of the framework (W. H. A. Johnson, 2021).

These legal aspects are essential for the company to comply with the rules of the country's institutional framework. As some business sectors are subject to specific laws and regulations, it is even more vital to know them in order to be able to operate properly abroad (W. H. A. Johnson, 2021).

Important factors can be (Bondra, n.d; Janet, 2013; G. Johnson et al., 2014; WSEAS, 2009):

- Antitrust laws
- Health and safety laws
- Consumer protection laws
- Copyright and patent laws
- Employment laws
- Environmental protection laws
- Taxation laws
- Data protection laws

3.4.7 Criticism of the PESTEL Framework

The PESTEL framework is a useful strategic tool for assessing the impact of entering new markets at both the national and global levels. It enables an organization to identify and exploit opportunities and mitigate risks (Shatskaya et al., 2016). This framework classifies important factors into different key elements which are crucial to consider for creating and updating an effective strategy. It also shows an interconnection between the different factors, which can be helpful for the analysis of a macro environment. In addition, this framework focuses not only on market but also on non-market aspects, which are helpful in formulating effective market entry strategies (G. Johnson et al., 2014; W. H. A. Johnson, 2021). The framework is particularly useful when applied to a specific region or country and when deriving trends. This can provide a good overview of potential opportunities and risks in the macro environment (W. H. A. Johnson, 2021).

However, this framework also has limitations and shortcomings. One drawback may be the oversimplification of the information needed to make decisions. Moreover, the business world is not static but dynamic. Therefore, PESTEL should be regularly reviewed to ensure that it is effective and reflects the current situation and its changes. Another problem may be "paralysis by analysis": the user collects too much information and does not focus on the main purpose of the tool—to identify issues. Information gathering also presents a problem, as access to and quality of external information is often limited. This aspect is also related to the fact that the data used is based on assumptions and is therefore leads to subjective decision making (Shatskaya et al., 2016).

The PESTEL framework can be an effective tool for analyzing and understanding market and business positions. The best results are achieved in combination with other strategic tools such as Porter's Five Forces (Shatskaya et al., 2016).

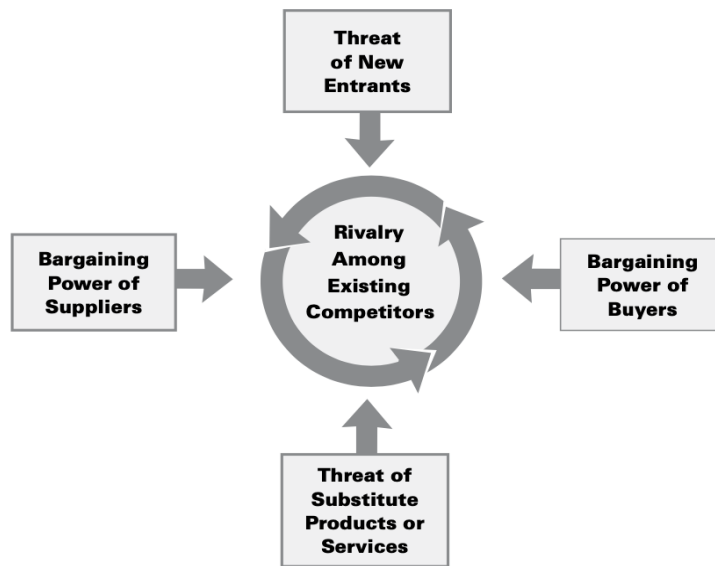
3.5 Industry Structure Analysis (Porter's Five Forces)

When analyzing new markets, it is important to look not simply at the macro environment, but also at the industry in which the company operates. The industry represents the aggregation of all organizations that provide similar products or services. Looking at the industry is crucial because the boundaries and limitations can be defined by the performance of each business. This leads to the concept of competitiveness. Competition is important for profitability because strong competition reduces the profitability of those operating in the industry and low competition can lead to the opposite situation (W. H. A. Johnson, 2021; Porter, 2008). Thus, the Five Forces Model by Michael Porter helps analyze the competitiveness and attractiveness of an industry in terms of profitability.

The framework explains five competitive forces to identify market attractiveness (G. Johnson et al., 2014; Porter, 2008):

1. Industry Rivalry
2. Power of Suppliers
3. Power of Buyers
4. Threat of New Entrants
5. Threat of Substitutes

Thus, not just the direct competition but also the suppliers, customers, potential entrants and substitute products or services shape the rivalry, structure, and nature of the industry. If forces are high, the return of investment is low and the attractiveness suffers. However, if the competitive forces are low, the return of investment is high, which increases the industry attractiveness. To determine the overall structure of the industry, one can use the 5 Forces Model, which emphasizes structural conditions rather than individual factors. By understanding this framework, companies can predict and influence competition and profitability in the long term. Thus, effective strategic positioning is possible by understanding the structure of the industry (Porter, 2008).

Figure 1*Five Forces of Porter Model*

Note. Representation adapted from Porter, 2008, p.4

3.5.1 Industry Rivalry

At the heart of the Five Forces analysis is rivalry between existing firms and its interdependence. This can be characterized through price competition, advertising campaigns, product launches or service improvements (Porter, 2008). For example, price competition is volatile and can worsen the overall profitability of an industry. On the other hand, promotional campaigns have the potential to increase product differentiation and thus lead to higher profits in the industry. These tactics are based on patterns of action and reaction that show dependence on different competitors (Porter, 1998). Also, the more competitors there are in the market, the smaller the market share, which leads to a less attractive and less profitable industry. The extent to which competition reduces the profit potential of an industry depends on the intensity and basis of the competition (Porter, 2008).

The industry rivalry can be evaluated by the following aspects (W. H. A. Johnson, 2021; Porter, 2008):

- Concentration (of market share)
- Exit barriers
- Industry growth
- Importance of the business unit to the larger corporation that owns it

- Rival diversity
- Product differentiation
- Fixed costs or Storage costs
- Industry capacity (overcapacity)
- Switching costs between competitors
- Brand identity

However, if all competitors have the same characteristics, zero-sum competition occurs, which reduces profitability. It is therefore important that companies segment their markets to focus on different customers. This will not only lead to higher average profitability, but also to industry expansion as the needs of a larger number of customer groups are better met (Porter, 2008).

3.5.2 Power of Suppliers

The suppliers are outside of the focal industry giving input to the industry since they sell their offerings to the focal industry participants. The power to bargain is important to evaluate attractiveness. The more powerful a supplier is the more, the more they can influence the price and quality of the product or service. As a result, they are more likely to exploit a higher value, resulting in lower profits for the industry (W. H. A. Johnson, 2021; Porter, 2008).

The concentration of suppliers in an industry is an indication of power. The bargaining power is high when the industry is more concentrated with less suppliers. However, as the number of suppliers increases, supplier power decreases. This is because the more choices there are, the easier it is to change suppliers and negotiate prices. Linked to that are also the switching costs going from one supplier to another (W. H. A. Johnson, 2021; Porter, 2008).

The supplier power can be assessed by (W. H. A. Johnson, 2021; Porter, 2008):

- Concentration (of suppliers)
- Economies of scale for suppliers (volume)
- Value/impact of inputs towards costs and differentiation
- Switching costs (of changing suppliers)
- Existence of input substitutes
- Threat of forward integration
- Costs relative to total purchases for industry

3.5.3 Power of Buyers

At the other end of the supply chain are the customers. Their bargaining power is also important in assessing the attractiveness of the industry. This is similar to the case of suppliers, as the greater power of the buyer leads to domination over price and quality. Buyers can capture more value and influence from the industry participants by playing them off against each other, resulting in higher costs and lower profit for companies in the industry (Porter, 2008).

Once again, industry concentration plays a key role. One buyer has greater bargaining power than many buyers. Equally important is the volume of purchases, as large-volume purchases increase bargaining power (Porter, 2008).

The buyer power can be assessed by (W. H. A. Johnson, 2021; Porter, 2008):

- Concentration (of buyers versus industry)
- Volume (of purchases)
- Information asymmetry (of buyers to sellers)
- Brand identity (of industry products/services)
- Price sensitivity (of buyers)
- Differentiation (of industry products/services)
- Buyer incentives offered
- Threat of backwards integration
- Availability of substitutes

3.5.4 Threat of New Entrants

New entrants are new competitors in the industry. This can be threatening, as new entrants increase competition, but also make the market less attractive, as profits may decrease. The threat depends on the barriers to entry and the reaction of industry players. If barriers to entry are low and the threat is high, the existing players will have to reduce prices or increase investment to deter new entrants. Both situations lead to lower profit margins (W. H. A. Johnson, 2021; Porter, 2008).

One example can be explained by economies of scale. A certain level of production capacity is most efficient for a single player, but a new entrant would create overcapacity, which would reduce the benefits for the whole sector, including the entrant. The sector is attractive when barriers to enter it are high. Existing players enjoy the benefit of commanding the market, while new entrants in the market want

to enter this space as they know that it won't be oversaturated. Potential entrants need to have specific characteristics, such as superior internal resources, to withstand entry cost pressures (W. H. A. Johnson, 2021; Porter, 2008).

Threats of new entrants can be evaluated by (W. H. A. Johnson, 2021; Porter, 2008):

- Cost advantages (of incumbents)
- Capital requirements for initial entry
- Proprietary learning curves
- Access to inputs
- Government policies (on firm size, input access, etc.)
- Economies of scale
- Brand identity
- Switching costs
- Access to complementary assets (such as distribution, labor markets, etc.)
- Intellectual and other legal protections of proprietary products
- Expectations of retaliation

3.5.5 Threat of Substitutes

“Substitutes are products or services that offer a similar benefit to an industry's products or services but have a different nature” (G. Johnson et al., 2014, p.45). For example, plastic can be a substitute for aluminum from a producer's point of view (Porter, 2008) or an electric car for a car with combustion engine (Kihm & Trommer, 2014). However, the substitutes may not be evident, and the threat may be indirect or subconscious. Because of this, there is concern that they may be overlooked and neglected because they may appear different from the industry's offerings (G. Johnson et al., 2014; Porter, 2008).

Substitute products can reduce demand by allowing customers to switch to alternative products. A simple risk could be that substitutes impose a price ceiling. The attractiveness and profitability of the sector may thus suffer if the threat of substitutes is high. To maintain profitability and growth potential, it is necessary to differentiate between industry supply and substitutes (G. Johnson et al., 2014; Porter, 2008).

Substitutes can affect (W. H. A. Johnson, 2021; Porter, 2008):

- Switching costs (towards substitutes)
- Price–performance tradeoffs (of substitutes)
- Variety and number (of substitutes)
- Necessity of industry products/services
- Brand identity
- Buyer inclination towards substitutes

3.5.6 Criticism of Porter's Five Forces

The Five Powers of Porter are a useful framework for understanding the attractiveness and structure of an industry within any particular country and for deciding whether to enter this industry (W. H. A. Johnson, 2021). Once a company locates the characteristics of an industry and its various stakeholders, it can evaluate the opportunities and risks and find the right strategy for a successful entry into the industry (G. Johnson et al., 2014).

However, Porter's Five Forces has some shortcomings as well which need to be addressed. First, Porter did not consider the effects of complements (products or services used together with an industry's product) although he made substitutes as one of the five forces (Porter, 2008, p.10). More specifically, the value created by two combined products as opposed to when one is used in isolation. An example of this is the use of hardware and software, because used separately, both products are not as valuable as combined (Porter, 2008).

In the revised version, Porter mentioned these complements, claiming that "they can be understood through the lense of the five forces," (Porter, 2008, p. 11) which many management theorists consider to be the sixth force (Goyal, 2020). Porter states that the industry structure drives competition and profitability (Porter, 2008). However, there are other factors that affect the profitability of companies. Governments can play an important role through regulation or deregulation, but technology can also drive and influence profitability (Goyal, 2020). Moreover, in the case of industry, value chains are oversimplified. Consumers need to be segmented and differentiated by channels, intermediary buyers, and end customers (Goyal, 2020).

Another disadvantage is that the five forces are static and only represent a snapshot of a certain time in the past. Today's world is dynamic and ever-changing, which sometimes makes the framework inappropriate (Goyal, 2020).

Moreover, the concept was originally developed in the 1980s and the 2008 revision also ignores the importance of business agility and digital technology. In today's business world, companies need to be fast, agile, and flexible, adept at using social media and digital tools, and able to move towards a strategy where customers present a desire before the company delivers it (Goyal, 2020).

Another disadvantage of Porter's Five Forces is that the model is very theoretical and does not provide a model to follow, as Porter does not mention how to use the forces. The emphasis on microeconomic theory rather than practice shows how highly prescriptive and rigid the model is (Goyal, 2020).

Finally, this concept is not consistent with the principle of sustainable competitive advantage. It is based on a theoretical and classic industrial approach that only allows a company to gain a competitive advantage, but not to maintain it (Goyal, 2020).

3.6 Internal Analysis (Resource-Based View)

To enter a new market and operate successfully, it is not only sufficient to look at the external factors but also at the internal factors - such as the organization's own strategic capabilities and how they encourage or restrict a strategy. That is reasonable since 20 percent of the profit derives from external factors through the industry or macroenvironment while 80 percent result from internal strengths (W. H. A. Johnson, 2021). These argumentations derive from the Resource-Based-View of strategy by Jay Barney in his article "Firm Resources and Sustained Competitive Advantage" from 1991 (J. Barney, 1991) and Birger Wernerfelt's work "The Resource-Based View of the Firm" from 1984 (Wernerfelt, 1984). However, other authors who contributed to this topic as well are Gary Hamel, C.K Prahalad, and Shelby Hunt.

This concept states that every company is different from each other in its strategic capabilities in terms of resources and competences even though they operate in the same external environment and sector. Therefore, a view inside its own organization

is necessary to highlight strengths and differentiate themselves from competitors (J. Barney, 1991; W. H. A. Johnson, 2021).

There are two assumptions within the RBV. The first is that a firm's resources must be heterogeneous, or in other words unique and not identical to other firms in terms of its capabilities. The second explains the immobility of resources that makes it difficult to transfer or replicate another firm's capabilities. If both concepts are valid, it goes without saying that a firm's capabilities are distinctive and can provide a competitive advantage and superior performance (J. Barney, 1991).

3.6.1 Resources

Resources can be categorized into tangible and intangible assets and capabilities which own and control a company (J. Barney, 1991; W. H. A. Johnson, 2021). These may allow companies to implement strategies that enhance both efficiency and effectiveness (J. Barney, 1991). Hunt defines resources as the units that are at the disposal of a company to produce valuable offerings for a particular market segment. He categorizes resources into seven distinct categories which includes tangible, intangible assets as well as capabilities (Hunt, 2000; Hunt & Morgan, 1995):

Table 3

Seven Categories of Resources

Resource	Description/Example
Financial	• Cash reserves and access to financial markets
Physical	• Plant, raw material, and equipment
Legal	• Trademarks and licensees
Human	• Skills and knowledge of individual employees, including, • importantly, their entrepreneurial skills

Relational	Relationships between competitors, suppliers, and customers
Organizational	Controls, routines, cultures, competences including, importantly, a competence for entrepreneurship
Informational	Knowledge about market segments, competitors, and technology

Note. Own representation based on: Hunt, 2000; Hunt & Morgan, 1995

Tangible assets are something that can be touched and seen such as capital, buildings, land, or equipment. On the other side, intangible assets are invisible and cannot be touched. Examples for that are intellectual property, knowledge, reputation or culture and organizational abilities. In other words, assets are something that the company owns (W. H. A. Johnson, 2021; Lev, 2001).

Capabilities are specific resources that refer to the relevant skills possessed by an organization in order to achieve strategic goals. They are usually intangible in that they represent what an organization can do in terms of the competencies embedded in its routines and processes (W. H. A. Johnson, 2021).

The proper combination of an organization's assets and capabilities creates its core competences. Core competencies strengthen the activities an organization undertakes, giving it a competitive advantage and enabling it to successfully achieve its strategic objectives (W. H. A. Johnson, 2021).

3.6.2 VRIO-Concept

However, to create sustainable competitive advantage and superior performance, the potential of resources needs to be assessed and analyzed. That is why Barney created the VRIO framework in 1991. This framework consists of four criteria. These

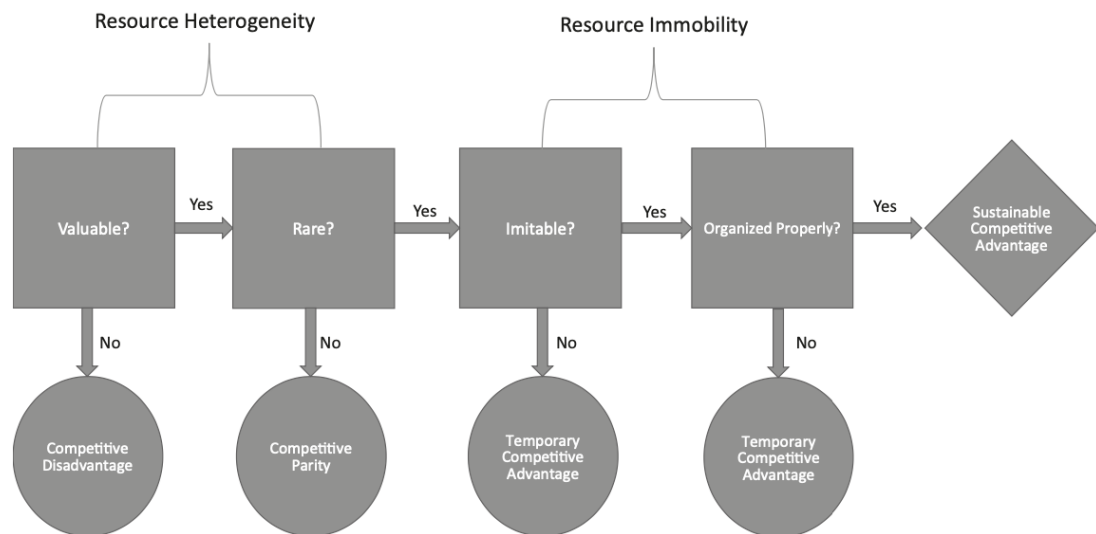
criteria are value, rarity, inimitability, and organizational support and are referred to as “VRIO” (J. Barney, 1991).

A resource is valuable if it can help an organization exploit an opportunity or counter a risk. Such resources can help produce valuable products or services for customers, generate more revenue or reduce costs. If a resource does not meet these requirements, it should be discarded because it is without value and represents a competitive disadvantage and unnecessary costs (J. Barney, 1991; W. H. A. Johnson, 2021).

The next step is to assess whether the resource is rare and whether it is owned only by the company or by a small number of competitors. If not, the resource is common and becomes a competitive parity. However, if the resource is valuable and rare, it meets one of the RBV assumptions: heterogeneity (J. Barney, 1991; W. H. A. Johnson, 2021).

In addition, resources must be inimitable. This means that it is difficult and costly for competitors to copy or replace these resources. Otherwise, resources may represent a disadvantage or merely a temporary competitive advantage. Resources can be difficult to imitate due to their complexity, causal ambiguity or culture and history (J. Barney, 1991; G. Johnson et al., 2014)

The final condition for achieving sustainable competitive advantage is organizational support. If the other three elements of the VRIO framework fit, it is necessary to organize resources in such a way that they are properly used. For example, by supporting appropriate organizational processes and systems. In this way, a successful interconnection of resources can be realized (G. Johnson et al., 2014; W. H. A. Johnson, 2021).

Figure 2*VRIO-Model for Sustainable Competitive Advantage*

Note. Representation from W. H. A. Johnson, 2021 but adapted from J. Barney, 1991

3.6.3 Criticism of the Resource-Based-View

The Resource-Based-View presents a productive strategic framework to analyze the internal environment of a company since it's particularly suitable for assessing an existing portfolio of resources or the use of resources to develop new markets. This can help determine the direction of a company's strategy (J. Barney, 1991; Sheehan & Foss, 2007).

However, this concept also has some limitations. For example, there are no managerial implications given (Priem & Butler, 2001). It is theoretical but the explanation on how to analyze and assess the resources is lacking (Connor, 2002; Miller, 2003).

Besides, there is an applicational limit of the RBV-framework since it is only valid when the rules of the industry remain constant and predictive. If an environment seems unpredictable with new and changing technologies and markets, the RBV has limitations (J. B. Barney, 2002; Kraaijenbrink et al., 2010).

Another criticism is the assumption that it is impossible to achieve sustainable competitive advantage and that the VRIO-components are not sufficient. (Kraaijenbrink et al., 2010). Fiol, for example, argued that resources and the way

firms use them must constantly change, resulting in a change in temporary advantage (Fiol, 2001). Since inimitability cannot be permanent because of the impact of knowledge embedded in production processes, the firm must continually innovate to meet new competitors and substitutes (Porter, 2008). Therefore, the concept of RBV seems too static and dynamic capabilities and organizational learning must be taken into account to allow the firm to adapt faster than its competitors and build a sustainable competitive advantage. Dynamic thinking allows the firm to improve the performance of acquired resources and protect them from imitation (Kraaijenbrink et al., 2010; Teece, 2018). Moreover, the RBV is based on analytical claims that are tautological. In other words, valid but not verifiable. In particular, the concept of value of a resource is indeterminate and makes the RBV an incomplete theory (Kraaijenbrink et al., 2010).

Another point of criticism relates to the broad definition of resources. This is a problem because the RBV does not recognise the differentiation between resources as inputs and those resources that can be organized. It does not take into account that different types of resources can contribute to the sustainable competitive advantage in different ways (Kraaijenbrink et al., 2010).

4 PESTEL Analysis of Mexico

This chapter highlights the applied macro-environmental analysis of the country of Mexico. It examines political, economic, social, technological, environmental, and legal aspects that are important for foreign companies to enter the Mexican market. In particular, the focus is on the energy and photovoltaic field.

4.1 Political

The previous government under Enrique Peña Nieto, who was Mexico's president from 2012 to 2018, recognised Mexico's dependence on fossil fuels and the need for energy transition as well as diversification. Emphasis was placed on renewable energy sources to reduce gas imports from the US on the one hand and to meet growing energy demand on the other (Dorfinger et al., 2014). At the same time, his administration also aimed at increasing productivity and competition in the energy markets in order to achieve competitive prices. For these purposes, a new energy reform was launched in 2014 to promote private electricity generation. This energy reform has changed the conditions for private actors in a positive way. In particular, it broke the 75-year monopolies of PEMEX, the state oil company, and CFE, the state electricity provider. Normally, both PEMEX and CFE were responsible for the entire energy supply chain in Mexico, but with the reform, generation and distribution are no longer only funneled through CFE—a market for the sale of electricity, clean energy certifications and a system of clean energy quotas have been introduced. As it is now possible to sell energy bilaterally, users can contract directly with electricity producers and trade across the wholesale market (Dorfinger et al., 2014; EY Mexico, 2018; Vietor & Haviland, 2017). The opening of the energy sector has allowed for private and foreign investment to develop and especially in the renewable energy sector. For example, one rule applied that the cheapest and cleanest energy had priority in the auctioned grid (Dorfinger et al., 2014; The Economist, 2021). In 2018, the leftist President Andrés Manuel López Obrador (AMLO) came to power, wanting to repeal and weaken part of the energy reform and introduce counter-reforms. He intends to give the CFE even more powers and to abolish the auction system. As a result, electricity is dirtier, more expensive, and less reliable due to outdated technology and the use of fossil fuels. The company intends to increase transmission fees and cut capacity in the renewable energy sector. This could undermine the entire solar industry and reduce its international

attractiveness, including for private and foreign investment. Furthermore, CFE does not have the capacity to meet peak energy demand (Starr, 2021; The Economist, 2021). In addition to CFE, the current Mexican president Andrés Manuel López Obrador (AMLO) also wants to return power to the indebted PEMEX, because he is keen to make Mexico self-sufficient in energy from hydrocarbons, since PEMEX, with its oil, was previously a factor in economic growth. The government is reducing private investment in the private sector but increasing public investment in a rescue plan for the indebted state company and in the Dos Bocas oil refinery (Dresser, 2019; Hernández Ibarzábal & Bonilla, 2020; Starr, 2021; The Economist, 2021).

Corruption and bribery within the public sector are also a big issue in Mexico. The corruption perception index ranks countries from 0 (very corrupt) to 100 (not corrupt) and Mexico received 31 points and is ranked 124th out of 180 countries (Transparency International, 2020). AMLO proclaimed to tackle corruption and carried out some measures such as the imprisonment of a former minister and the indictment of a former PEMEX boss who stole money from the Mexican state in an illegal tapping of oil (Dresser, 2019). However, another action could cause additional corruption. For instance, the government cut expenses in the form of salaries, travel expenses and privileges of the public administration. Therefore, a huge number of civil servants resigned which leads to longer processes for authority requests and permits (Ehringfeld, 2019). Environmental, construction and connection permits are required for the installation of photovoltaic systems. These bureaucratic formalities are the responsibility of the CFE, but they remain lengthy and non-transparent, hindering and delaying the efficient and cost-effective planning of viable projects (Mundo-Hernández et al., 2014).

The proclaimed fight against corruption and change in energy policy are part of the so-called fourth transformation, in which PEMEX is at the forefront of a strong oil sector. The current administration has criticized solar and wind systems for their unreliability in case of crisis or weather events. As a result, the connection of new and existing solar and wind systems to the electricity grid has been suspended (Walsh et al., 2020).

On the positive side, the administration has offered tax incentives such as accelerated depreciation for investments in renewable energy equipment. This

applies to all renewable energy sources and allows companies investing in them to deduct up to 100% expenditures (Viscidi, 2018).

The net metering system under the Electricity Industry Act is also of interest. Consumers who generate their own electricity can use this system to pay back their energy or sell the energy they generate to the grid (Viscidi, 2018). Overall, the 2014 energy reform has laid a good foundation, yet it is still heavily dependent on the current government, which is moving in the opposite direction of the previous administration in regard to renewables. More details on the energy reform and its legal aspects are discussed in section 4.6.

The Mexican political system is more or less stable according to the Worldwide Governance Indicators with a value of -0,7 out of a range between -2,5 and 2,5 in Political Stability (World Bank, 2021c). However, uncertainty, changing directions and unpredictable actions of different governments discourage private investors and undermine Mexico's attractiveness as a location for solar energy. This is reflected in the declining attractiveness index of renewable energy in the country (EY, 2020).

4.2 Economical

Mexico is an emerging country, yet it is the second largest economy in Latin America after Brazil and the twelfth largest in the world (Department for International Trade, Foreign & Commonwealth Office, and Foreign, Commonwealth & Development Office, 2021).

It is a member of the OECD and has signed 14 free trade agreements—for example, with the European Union, but also and especially the USMCA, the agreement between Mexico, the United States and Canada. This is the follow-up treaty to NAFTA. It indicates that Mexico has a foreign policy of multilateral and bilateral openness and integration in relation to the world market, but that the United States is its closest and most important partner, with a strong dependence that is also reflected in 80% of its exports to this country (Department for International Trade, Foreign & Commonwealth Office, and Foreign, Commonwealth & Development Office, 2021; Potowski & Groß, 2018).

Mexico has a stable macroeconomic framework with moderate debt ratios and a strong external position, such as a manageable current account deficit and large foreign exchange reserves (Euler Hermes, 2021). The annual economic growth

normally averages 2-3%, but this is currently lower due to the COVID crisis (Instituto Nacional de Estadística y Geografía (INEGI), 2021a). Economic growth is also dependent on the USA, but it correlates with the global oil price development (Banco Santander, 2021a).

Mexico has grown primarily as an export nation. The country exports goods such as electrical equipment, automobiles, mechanical inputs, minerals, but also oil and gas, which represent a large part of the gross domestic product. In the past, Mexico was particularly attractive as a location with rich oil reserves. Today, however, crude oil is refined outside the country, and it is dependent on gasoline and gas imports, especially from the USA, which has transformed Mexico into an importing rather than an exporting country. This is due to the fact that oil production is decreasing annually. The reasons for this are shrinking oil fields and declining productivity due to outdated technologies, because too little has been invested in this sector (Alemán-Nava et al., 2014; Department for International Trade, Foreign & Commonwealth Office, and Foreign, Commonwealth & Development Office, 2021; Hernández Ibarzábal & Bonilla, 2020).

Electricity prices vary within Mexico, depending on regions and timezones. However, they are quite high in comparison to other countries; yet the real price is veiled due to subsidies. There are high subsidies on the electricity prices of the CFE, for residents about 80 % and for the industry 50 %. This could hinder an implementation of viable PV-projects since the cheaper prices of the CFE electricity makes PV less attractive. In addition, cheap natural gas imports from the USA depress electricity prices and would compete with renewable energy production (Potowski & Groß, 2018; Viscidi, 2018).

Mexico is also an attractive production location with low labor costs. Much of the production capacity in Mexico can be attributed to the Maquila programme in the north of the country. The free trade agreement with the USA and Europe also comes into effect, whereby international companies can produce cheaply in Mexico and then sell abroad. This circumvents US anti-dumping measures (Dorfinger et al., 2014).

As a result of the COVID crisis, inflation has been quite high in recent years ranging between 5-6% (Instituto Nacional de Estadística y Geografía (INEGI), 2021b), but the central bank follows an active inflation-targeting strategy with 3 % (Euler

Hermes, 2021). In addition, the exchange rate is volatile, which, due to its fluctuations, can affect the cost of financing photovoltaic projects. Volatility may be caused by the situation in the US, the recent negotiations on the new USMCA trade agreement, fluctuations in oil and gas prices, or the Central Bank's decision to raise interest rates, which led to the devaluation of the Mexican peso (EY Mexico, 2018). Mexico has had a permanent corporate tax rate of 30% for years, higher than the world average (KPMG, 2021). In addition, the Mexican government offers tax incentives for investment, import and export of renewable energy technologies (Potowski & Groß, 2018). Although the number of informal employment is quite high, statistics indicate that Mexico has a low unemployment rate of 4% (Instituto Nacional de Estadística y Geografía (INEGI), 2021c). Together with low productivity and inefficient public administration, this has an impact on the economy (Ehringfeld, 2019; Potowski & Groß, 2018).

A good general overview of how well Mexico serves as a business location is provided by the World Bank's Doing Business Index. It evaluates categories such as starting a business, building permits, registering property, obtaining credit etc. In this ranking, Mexico places in the upper midfield at 60th place out of a total of 190. Overall, Mexico has received a score of 72/100 in 2020 (World Bank, 2021a). The uncomplicated access to the capital market should be emphasized (Euler Hermes, 2021), which is why the score for obtaining a loan is 90 out of 100. Starting a business is also easy in Mexico, which is why it received a score of 86 points in this category (World Bank, 2021a). This can be done in a time-efficient manner through an electronic company registration platform and less bureaucracy (Potowski & Groß, 2018). As mentioned earlier, Mexico has many trade agreements, which facilitates cross-border trade. Therefore, in this category they score high at 82.

In categories such as dealing with construction permits, registering property, enforcing contracts, protecting minority investors, or paying taxes Mexico scores between 60 and 68 points, which is below their overall score. These numbers indicate that these tasks are more time-consuming, complex, and complicated in Mexico (World Bank, 2021a).

This index indicates that Mexico provides a mostly solid and structured business environment that exceeds the Latin American average (Euler Hermes, 2021).

The World Investment Report ranks Mexico 15th in the world as an FDI recipient with investments mostly from the United States, Spain, Canada, and Germany (Banco Santander, 2021b; UNCTAD, 2020). However, current policies with changing rules and uncertainty have had a negative impact on the economy and the country's reputation as a reliable investment destination, which has led to a recent decline in foreign investment. This shows the interdependence between politics and the economy (Ehringfeld, 2021). Despite Mexico's slightly unpredictable political situation, its economic stability makes it an attractive investment location for future photovoltaic projects.

4.3 Social

The Spanish-speaking country of Mexico is one of the most densely populated countries in the world, with almost 130 million people (United Nations, Department of Economic and Social Affairs, Population Division, 2019). The majority of the population, 80%, is located in urban areas, while the remaining 20% live in the countryside. Steady population growth is guaranteed for years to come, thanks to a fertility rate that is more than 2 (United Nations, Department of Economic and Social Affairs, Population Division, 2018). This will also lead to increasing energy consumption and demand, which cannot be met by fossil fuels alone (Mundo-Hernández et al., 2014). A high degree of urbanization plays an important role in this, as urban consumers use twice as much electricity as rural consumers. In addition, some rural areas do not have enough electricity (Viscidi, 2018).

Mexico is a country of contrasts, and not only because of the distribution of the population. As the Gini index shows, there are structural problems such as a huge gap between rich and poor. This coefficient shows the degree of inequality in the distribution of income, and at 45% it is quite high and above average in Mexico (World Bank, 2021b). This is particularly evident between the highly industrialized north and the less developed south (World Bank, 2020). As a result of this poverty, ordinary citizens will not be able to operate PV systems, which hinders the development of PV in this market segment (Mundo-Hernández et al., 2014). Related to poverty is the issue of security, organised crime, and terrorism due to the influence of drug cartels. They dominate certain areas and collect their profit margins which cause social and economic problems. There are regional differences in terms of public security, but particularly in warmer climates (for example in the

north, near the US border) are the most dangerous (Department for International Trade, Foreign & Commonwealth Office, and Foreign, Commonwealth & Development Office, 2021; Dorfinger et al., 2014).

Another aspect worth mentioning in relation to photovoltaic and other renewable energy projects is the situation of indigenous people in Mexico. Local communities are closely linked to the environment and culture. For this reason, many local communities are opposed to renewable energy projects for environmental, social, and cultural reasons. In addition, the indigenous communities are strongly connected to its land and environment. This makes it difficult to acquire territory in order to build PV-plants (Robles, 2016; Viscidi, 2018). The Electricity Law states that project developers must carry out a consultation process with indigenous peoples and agree on the project together. Otherwise, it is prohibited to start a project. However, it is quite difficult to obtain land in these areas, as ownership is quite contentious. Land can be privately owned or under a Mexican social ownership model, such as *ejidos*. *Ejidos* are mutually owned and used areas by communities. It is therefore not sufficient to negotiate only with one landowner, but also with multiple owners who possess different parts of the land (Potowski & Groß, 2018; Robles, 2016; Viscidi, 2018).

In addition, there is a lack of awareness of PV projects in the country in terms of social, environmental, and economic benefits (Mundo-Hernández et al., 2014). Mexico is an attractive location for manufacturing for many industries. As a result, universities offer many specialized courses and engineering degrees, and more than 130,000 students graduate with engineering degrees every year. This is more than is the case in countries such as Germany, Canada, or Brazil (Dorfinger et al., 2014).

Hofstede's cultural dimension is an interesting theory that can be neatly applied here. It describes the influence of culture on the values of its members and the behavioral patterns derived from them. The five dimensions consist of Power Distance, Individualism vs Collectivism, Masculinity vs Femininity, Uncertainty and Avoidance and Long-Term vs short term orientation (Adeoye & Tomei, 2014; G. H. Hofstede et al., 2010). Of these five dimensions, three can be highlighted on the basis of the literature review and applied to Mexico in this context. For example, the dimension individualism vs. collectivism describes the extent to which people in a

society are integrated into groups (G. Hofstede, 2011). It is important in Mexico to have a long-term commitment and to build harmonic trusting relationships (Demmler et al., 2018; Potowski & Groß, 2018). Therefore, in terms of business activity in Mexico, it is clear that this country has a collectivist society.

The two dimensions of uncertainty avoidance and short-term versus long-term orientation can also be applied to Mexico in this context. Uncertainty avoidance describes the degree to which members of a given society feel comfortable or uncomfortable in unstructured situations. The term orientation describes how much a society values traditions and the fulfillment of social obligations (G. Hofstede, 2011).

According to Hofstede's cultural measurements, Mexico is considered to be a country with a short-term mentality with a preference for quick returns on investment. This also indicates that Mexico is a country where uncertainty is likely to be avoided. However, the payback period for PV projects lasts several years (Demmler et al., 2018; Potowski & Groß, 2018).

4.4 Technical/Technological

As already mentioned under social aspects, Mexico is a technically savvy country, especially in the automotive and electronic sector. Therefore, universities boast high numbers of engineers and university programs and specializations (Dorfinger et al., 2014; Romero-Hernandez, et al., 2012). Thus, Mexico has a strong reputation in manufacturing due to low production costs, specialized infrastructure, and a highly qualified workforce (Rodríguez-Carvajal, et al., 2018; Romero-Hernandez, et al., 2012).

However, due to low investment into the renewable energy and photovoltaic sector, there is a lack of know-how or technology in order to manufacture the required solar panels with its specific characteristics (Mundo-Hernández et al., 2014; Romero-Hernandez, et al., 2012). In consequence, renewable energy equipment such as photovoltaic components have high costs and a lack of availability in Mexico since the market is small. For this reason, most of the PV-components are being imported from abroad, especially from China. China's industry is responsible for the constant drop of solar energy equipment costs and this equipment can be acquired for a competitive price. These costs dropped from 106.09 \$/Watt in 1976 to 0.38\$/Watt

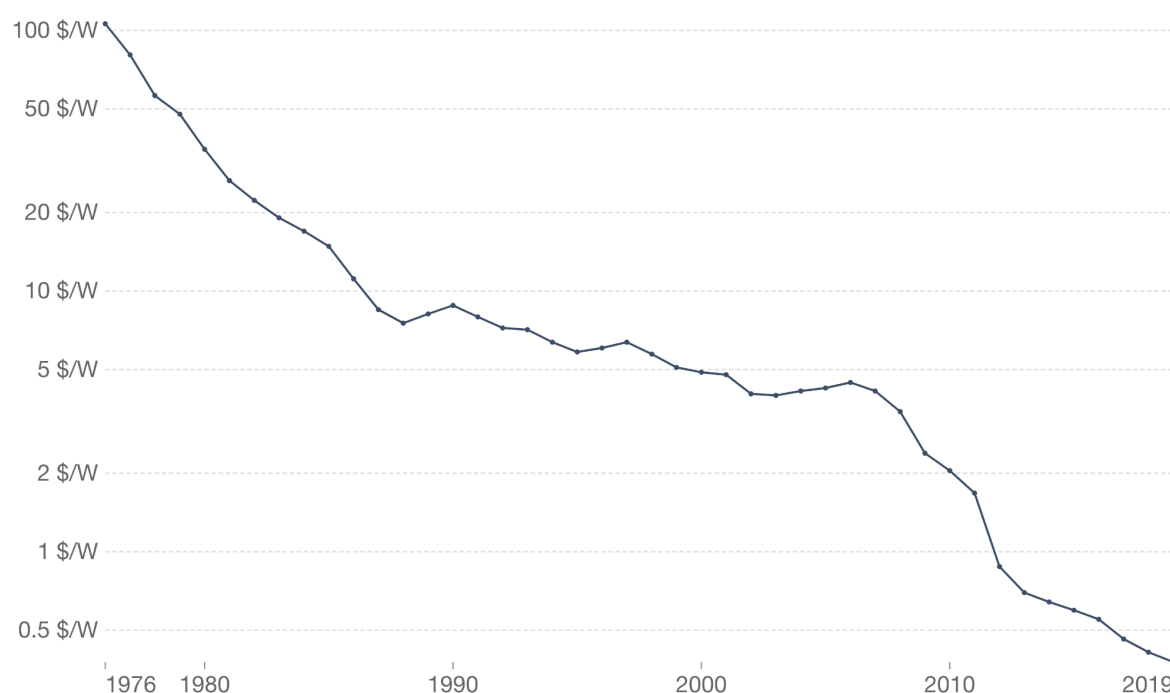
in 2019, which helped the expansion of PV in Mexico, and will eventually allow the country to compete with hydropower and fossil fuels at some point (KPMG, 2016; Romero-Hernandez, et al., 2012; Viscidi, 2018).

Figure 3

Solar PV Module Prices

Solar PV module prices

Global average price of solar photovoltaic (PV) modules, measured in 2019 US\$ per Watt.



Source: LaFond et al. (2017) & IRENA Database

OurWorldInData.org/energy • CC BY

Note. Data from Lafond et al., 2018 & IRENA Database. Published online at OurWorldInData.org by Ritchie et al., 2020.

Network coverage within the country varies greatly. There is a high population density and high network coverage in the center of the country. Although the solar radiation in the north is one of the highest in the country, the network density in the north is low and also has low transmission capacities (Dorfinger et al., 2014; Viscidi, 2018). The Baja California peninsula is a special case because it has an isolated supply network and is partially dependent on electricity imports from the United States (Dorfinger et al., 2014).

CFE is responsible for the electricity grid (KPMG, 2016). Due to a lack of investment in recent years, the entire national electricity grid is aging, in poor condition and in

need of renewal. As a result, Mexico's power supply is unreliable with power failures and spikes can damage complex electronic equipment. In addition, there is a lack of interconnection between capacity and lines, which needs to be expanded to effectively cover the whole country, especially the northern areas (Romero-Hernandez, et al., 2012; Viscidi, 2018).

Poor conditions in the electricity grid cause technical losses, but there can also be non-technical losses such as illegal access, improper metering, or incorrect billing (Viscidi, 2018).

PEMEX, the state-owned petroleum company, is responsible for the oil production which was for many years the growth factor for Mexico due to export possibilities. However, nowadays the crude oil has to be refined abroad due to lack of capacity and outdated technology. For this reason, Mexico exports crude oil but imports natural gas and petrol, for example (Walsh et al., 2020).

4.5 Ecological

Mexico's area belongs to one of the biggest countries worldwide and its landscape consists of variety with lowlands and highlands. Thus, it represents a complex geography with an impact on the climate, but the complexity also causes technical risks (Alemán-Nava et al., 2014; EY Mexico, 2018).

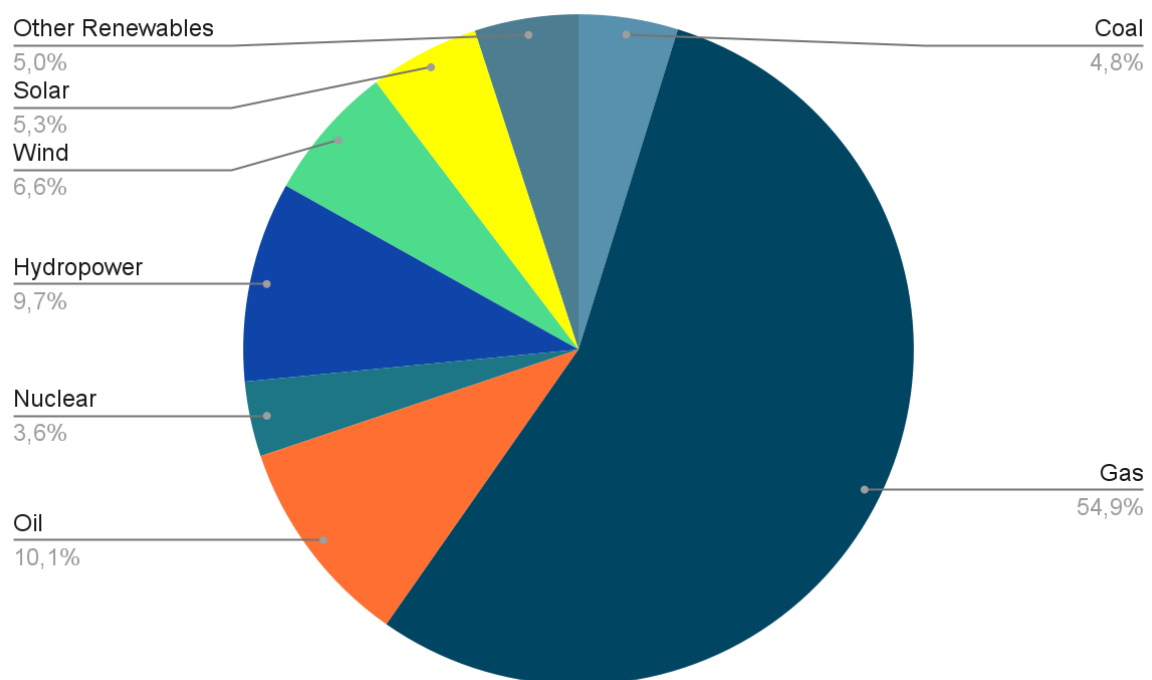
Mexico is located between the latitudes 14° and 33°N and the longitudes 86° and 119°W. This geographical location makes Mexico one of the most attractive countries for investing in Photovoltaic because this territory lies between the favorable "sun-belt" with an annual global solar radiation between 5,6 and 6.1 KWh/m²-day. These semi-arid regions have the best conditions for solar power and are characterized by high solar radiation which is 90 % of direct radiation considering that cloud coverage and rainfall is limited (Alemán-Nava et al., 2014; Romero-Hernandez, et al., 2012). The potential for photovoltaic energy is high in all of Mexico but especially in the northwestern part of the country which is mostly desert (Alemán-Nava et al., 2014).

In comparison to other regions like Germany or Canada with a higher solar energy production, it is obvious that the solar potential in Mexico is much higher since the same technology would require half the area to produce the same amount of energy (Romero-Hernandez, et al., 2012).

Besides, Mexico is a strategic manufacturing location with the largest PV module production base in Latin America. Moreover, the geographical proximity to the United States, Canada and the growing Latin American market is advantageous for trading purposes, for example (Potowski & Groß, 2018).

Mexico's growth factor in the past was largely due to significantly rich oil reserves. The oil reserves are still present but the oil production decreases since the production quotas are falling, and the development of new deposits is becoming increasingly capital intensive due to more difficult accessibility. In addition, oil production creates high technological, environmental, and social risks—one such example of this is the oil spill in the Gulf of Mexico in 2010 (Alemán-Nava et al., 2014; Dorfinger et al., 2014; Walsh et al., 2020).

Even though there are some issues with the oil production, Mexico wants to expand its production which shows the investment into the construction of new refineries, e.g. Dos Bocas refinery in Tabasco. Furthermore, Mexico relies on petrol and natural gas imports to secure the national energy supply, especially from the United States (Dresser, 2019; Hernández Ibarzábal & Bonilla, 2020). This is necessary since in 2021 Mexico's electricity generation consists of about 70 % of fossil fuels like oil, gas, and coal. The remaining power production comes from clean energy where solar power amounts only 5,3 % (BP, 2022; Ember, 2022).

Figure 4*Electricity Production by Energy Resource in Mexico in 2021*

Note. Own representation with data from BP, 2022; Ember, 2022. *Published online at OurWorldInData.org* by Ritchie et al., 2020.

The use of fossil fuels also affects the environment. For example, Mexico City, the capital of Mexico, has low air quality. The air pollution comes from exhaust fumes, agriculture, industry, but also energy production. For this reason, Mexico has been trying to counteract this problem for years but have not yet sufficiently accomplished this with alternative energy generation sources (*Mexiko-Stadt Verordnet Sich Bessere Luft*, 2019).

4.6 Legal

The success and spread of photovoltaics also depend on legal foundations. Specifically, it is worth mentioning laws and agreements that accelerate measures for the use of technologies to combat climate change. These include the promotion of renewable energies such as photovoltaics.

A major global milestone influencing the legal situation regarding renewable energy for many countries was the Paris Climate Agreement in 2015. This is an international legally binding agreement in the fight against climate change. The goal is to keep

global warming below 2 degrees Celsius by reducing greenhouse gas emissions and creating a climate-neutral world (Briggs, 2021; United Nations, 2015). Mexico was the first emerging country to submit a plan to reduce 22 % of carbon emissions by 2030. According to the agreement, the targets must be revised every 5 years. However, Mexico did not submit a revised update, but maintained the targets, indicating that they are moving backwards and will not hit the target in the fight against climate change (Government of Mexico. Ministry of Environment and Natural Resources, 2020; Stillman & de Haldevang, 2021).

As early as 2008, a law (known as LAEFERTE) was passed on the benefits of renewable energies and the financing of an energy transition, whose. National targets were set that address the expansion of renewable energies. The energy generation should consist of 35 percent clean energy by 2024, 40 percent by 2030 and 50 percent by 2050 (Postigo-Urbe et al., 2021; Vidal-Amaro et al., 2015).

One of the most important reforms was the Energy reform in 2013. The purpose was to accelerate the RE-development in Mexico as well as clean-energy obligations, polluting emissions reductions and to reduce Mexico's fossil fuels dependence. Mexican laws include certain tax benefits for RE-investments if a corporation is engaged in renewable energy production (Postigo-Urbe et al., 2021; Vietor & Haviland, 2017).

The energy reform ushered out two key laws: the Electricity Industry Law and the Energy Transition Law. The Electricity Industry Law allows the liberalization of the energy sector, giving private parties the opportunity to invest and participate—and especially with regard to the generation and commercialisation of energy, but also for the exploration and extraction of oil and other hydrocarbons (Viscidi, 2018). In the same breath, the monopolies of CFE and Pemex were broken up, transforming them into productive state enterprises with the aim of increasing economic value and national income (KPMG, 2016; Vietor & Haviland, 2017). The electricity industry law also allows distributed electricity generation. This makes it possible to feed electricity into the national grid. Due to this a private person or a company can generate decentralized electricity up to 0,5 MW for their own consumption and have the possibility to sell it to the grid or directly to end customers or with the help of a supplier (EY Mexico, 2018; Potowski & Groß, 2018).

The Energy Transition Act regulates the use of clean energy and the reduction of emissions by creating mechanisms, setting targets, and promoting RE resources. This is to be achieved through more installed clean energy capacity and generation, upgrading, and expanding transmission infrastructure as well as distributed generation, promoting clean energy technology development and talent, and democratizing access to clean energy. Important methods and instruments include long-term auctions and clean energy certificates. Long-term contracts such as power purchase agreements guarantee long-term revenues for years and reduce the risk of investing in renewable energy. Clean energy certificates certify that a certain amount of electricity is produced by clean energy. They can be sold to meet energy consumption requirements and generate additional revenue (Postigo-Urbe et al., 2021).

However, recent intended counter regulations in 2020 by the current president AMLO could hinder the expansion of renewable energy production. The focus of his reforms lies on prioritizing CFE and PEMEX again over private companies, reviving fossil fuels and neglecting renewable energy. Non-governmental groups and private generators have taken action against these policies. Some protests were successful, others were rejected or suspended by the courts. Although authorities such as the current government intend to implement or change regulations regarding the energy sector, the judicial branch is a strong counterbalance in Mexico. Therefore, the future situation is uncertain if the regulations will come into effect (Postigo-Urbe et al., 2021; Starr, 2021).

5 Porter's Five Forces of Mexico's Photovoltaic-Industry

The following chapter examines the second layer needed to analyze a market: industry structure analysis. The well-known framework of Porter's Five Forces is applied to the Mexican energy and photovoltaic sector to show how attractive this sector is for market entry and what barriers may exist for project companies. Industry rivalry, the power of suppliers and buyers, and the threat of substitute products and new entrants are examined in detail.

5.1 Industry Rivalry

In this paper, the industry structure analysis is examined from the perspective of project companies. To do this, it is important to differentiate the photovoltaic market into segments in which these companies can operate. On the one hand, there is the distributed power generation segment, which includes small and medium-sized projects such as residential, commercial, and industrial customers. On the other hand, there are the centralized large utility-scale projects (Rodríguez Suárez et al., 2017).

Distributed generation (DG) targets medium and small-scale projects are deployed in end-use sectors such as households, commercial enterprises, and industrial customers. In addition, economic development of the region in combination with environmental protection plays a role (Rodríguez Suárez et al., 2017).

The large utility-scale projects are mostly applicable in combination with the wholesale electricity market, which is mainly represented by large international players. These projects are developed to meet the energy needs of generation companies such as CFE and large energy consumers (Rodríguez Suárez et al., 2017).

The Mexican solar market is highly competitive with currently more than 1000 companies and at the end of the value chain in the photovoltaic industry are the project developers (Dutch ministry of Economic Affairs and Climate Policy, 2020; Potowski & Groß, 2018). These can be pure project developers which are only involved in the first stages of the project development until they sell them at some point to investors, developers who also offer maintenance and operation after the

project development, or energy companies. However, due to ease of installation, low solar module costs and the high return on investment in this sector, it seems attractive to enter and there are signs of oversupply. Hence, one can assume that the number of companies involved in this sector will decrease and that leading companies with a high focus on quality and service will gain a high market share (Dutch ministry of Economic Affairs and Climate Policy, 2020).

After the structure in the Mexican energy sector was changed, allowing privatization and a wholesale electricity market, a dynamic emerged in the sector. For this reason, a growth of photovoltaic applications can also be perceived in the last years, both in the distributed generation and utility-scale segment. This has resulted in exponential growth, which has also led to a drastic reduction in the cost of solar modules and the emergence of a strong, competitive market in Mexico (Dutch ministry of Economic Affairs and Climate Policy, 2020; Rodríguez Suárez et al., 2017).

Installed solar capacity in Mexico is increasing year by year. In 2020, for example, Mexico had 10x more installed capacity than in 2017, at 6.5 GW, with 79% utility-scale and 21% distributed generation (SolarPower Europe, 2021). To put this in perspective, 1 GW could power 750,000 average sized homes (Dellinger, 2021). The Mexican photovoltaic market is on the rise despite new government paradigms (Steinmeyer, 2020). The construction of new large-scale solar parks is uncertain and has slowed down since the government prioritizes CFE and PEMEX again. They also exclude new renewable energy sources, terminate the electricity auction system, and maintain the priority of dispatch to CFE plants (Dutch ministry of Economic Affairs and Climate Policy, 2020; SolarPower Europe, 2021; Steinmeyer, 2020). However, for this reason and since the governmental changes did not affect the legal framework of DG, market players are increasingly pushing into the area of distributed power generation for industrial customers using PPAs, for example. This includes major European energy companies such as Acciona, Engie and Iberdrola. Therefore, the DG sector is expected to grow even more (SolarPower Europe, 2021; Steinmeyer, 2020).

5.2 Power of Suppliers

Project developers within the supply chain are responsible for planning entire PV-projects such as development, procurement, construction and sometimes even operating and maintaining the PV-systems. Therefore, it is necessary to obtain the PV-components such as solar panels, inverters, trackers, or materials like cables by various suppliers.

There are few local producers of these components in Mexico, although Mexico is a strategic production location due to its low production costs and good reputation in engineering and manufacturing. However, it is difficult to find suppliers in Mexico for PV components due to factors such as cost, quality, and technical specifications. The direct value added in the PV supply chain in Mexico is low (Dorfinger et al., 2014; Romero-Hernandez, et al., 2012). For inverters, batteries and cables, there is value creation in Mexico, but they are not specialized in PV (Dorfinger et al., 2014; Rodríguez Suárez et al., 2017). For this reason and for economic reasons, it is better to import these components from China or the USA (Dorfinger et al., 2014; Hopkins & Li, 2016). The global PV module market is dominated by Chinese companies, which is why they are also imported from China (Gil Perez & Hansen, 2020; Rapoza, 2021). The Chinese companies have a large market share with a few high-volume firms and low production costs. These companies can produce at low costs due to the large production volume and therefore offer them at lower costs (A Dlouhy, 2021; Hopkins & Li, 2016). It is therefore a highly concentrated market (The Economic Times, 2021). Initially, there were complications due to the low quality of products from China. However, this has changed within the last few years, which is why the components are not only cheaper than local ones, but also maintain a high quality and are therefore almost unrivaled (Hopkins & Li, 2016). Some US companies are also in the market; however, their market share is smaller (A Dlouhy, 2021; Rapoza, 2021).

5.3 Power of Buyers

Firstly, there is a need to differentiate between customer segments from photovoltaic project companies. The buyers can be private households (residential), public customers, commercial, industrial or utility-companies. The photovoltaic company must be aware beforehand which customer groups are to be served, as

the demands and complexities differ between customer groups (Dorfinger et al., 2014; Potowski & Groß, 2018; SolarPower Europe, 2021).

Small photovoltaic systems are sold on the roofs of private households. Self-sufficiency is the primary goal in installing PV systems in private domains. A high initial investment would be necessary, but over time the investment is amortized, and the electricity becomes cheaper for private households. In Mexico, there are different electricity tariffs, depending on consumption. The higher the consumption, the higher the rating. However, these electricity prices are disguised due to high subsidies from the government (50-80%), which depresses the final electricity price. Tarifa Doméstica de Alto Consumo (DAC), which is the highest tariff, is no longer subsidized and must be paid by the customer if 2500 kwh per month is exceeded. For this tariff, a PV system would undoubtedly present a better alternative (Dorfinger et al., 2014; Potowski & Groß, 2018; Rodríguez Suárez et al., 2017).

For commercial and industrial customers, the focus is also on self-sufficiency and cost savings by placing medium-scale PV systems on the roof or factory floor of an economically used building. These can be factories, warehouses, or supermarkets. Due to increasing electricity consumption and rising energy and raw material prices, such PV self-supply systems present a solid alternative for this customer segment. Through net metering there is even the chance to create a new sales opportunity (Dorfinger et al., 2014; Potowski & Groß, 2018).

In addition, there is the possibility of concluding contracts with private electricity producers who sell electricity to commercial and industrial customers via PPAs (Dorfinger et al., 2014; Potowski & Groß, 2018). Photovoltaic companies such as project developers can also act as independent power producers and offer power generation and sales in the form of PPAs as a service as well (Steinmeyer, 2020). However, private energy producers such as independent power producers can also include customers or investors who buy or invest into photovoltaic systems. These also include energy supply companies. Consequently, these are mostly large-scale projects in the form of utility scales. This customer segment pursues the goal of generating returns through the sale of electricity, either to CFE, private or public customers. Commercialization takes place either through PPAs or through the wholesale electricity market. Additional revenue opportunities could arise from the sale of clean energy certificates (Dorfinger et al., 2014; KPMG, 2016).

The advantage is that potential customers can come from many different sectors with the aim of saving costs and switching to clean energy. Some examples could include retail, automotive, mining, chemical industry, or construction (Steinmeyer, 2020). Increased energy consumption due to economic growth and population growth leads to a steadily increasing demand for energy. Today, the demand is mainly met by fossil fuels. However, as CFE capacity is reaching its limits and fossil fuels are finite, new opportunities arise from renewable energies such as photovoltaic systems (Potowski & Groß, 2018; Rodríguez Suárez et al., 2017).

The number of electricity customers in Mexico is roughly visible on the basis of CFE customers. 90 percent of the customers are private households, but they only buy about 27% of the electricity sold. However, this sector is growing steadily. On the other hand, less than 1 percent are customers from large-scale industries, but they buy 57 % of the electricity. This indicates that the industrial sector is characterized by high energy consumption. This reveals that both residential and commercial customers will demand more for energy. In particular, the industrial sector has enormous potential for photovoltaic installations (Potowski & Groß, 2018; SolarPower Europe, 2021).

Utility-scale plays more of a role for large industry or large utilities that buy PV systems from PV project developers. These utilities have also recognized the trend towards the energy transition and want to move more in the direction of renewable energies (SolarPower Europe, 2021; Steinmeyer, 2020).

While there is a high number of potential customers and a high demand for energy, which could be accompanied by increased photovoltaic demand, the availability and government preference of fossil fuels such as natural gas and oil could present a barrier.

In particular, electricity subsidies, which are regulated by the current government, could make the use of photovoltaic systems seem more expensive (Dorfinger et al., 2014; Potowski & Groß, 2018). This could be a problem for customers, as there is a lack of awareness of renewable energy in Mexico on the one hand (Mundo-Hernández et al., 2014), and a demand-driven price sensitivity on the other. Mexico is an emerging country and has to deal with poverty, which is why a cheaper price remains in the foreground and helps with the purchase decision (Mundo-Hernández et al., 2014).

5.4 Threat of New Entrants

While entering the photovoltaic industry can be profitable, factors such as government administration changes and financing could hinder a smooth transition into the market. Normally, it is more convenient for private, international companies to enter the Mexican Photovoltaic market due to the energy reform in 2014 (Vieter & Haviland, 2017). In addition, the former government has created clear rules and thus ensured security among investors, which has led to increased participation of private companies in the sector (EY Mexico, 2018). However, the current government, with its new energy policies and its preference for fossil fuels, makes it more difficult and less attractive to enter the market.

The Mexican photovoltaic market is growing, both in the utility-scale and distributed generation sectors, but the current government is creating uncertainty in the investment climate and the approval processes are long—and especially for large photovoltaic plants, which creates risks for investors and project developers with regard to signing PPAs, for example (Dutch ministry of Economic Affairs and Climate Policy, 2020; Walsh et al., 2020). The auctions in the power generation sector were suspended and existing contracts with the private sector were subsequently amended which also led to discouragement for future private participants or investors (Walsh et al., 2020). On the other hand, this opens up more opportunities for medium-sized and smaller projects that focus on distributed generation of energy (Dutch ministry of Economic Affairs and Climate Policy, 2020; Steinmeyer, 2020).

One market barrier for new entrants could be the subsidized, low electricity prices in Mexico which could make the electricity production costs for PV electricity higher (Potowski & Groß, 2018). This could lead to solar projects suffering from cash flow problems, making successful project implementation more difficult and uncertain (EY Mexico, 2018). Linked to this is the challenge of finding attractive financing models. Consequently, financially strong, and independent market participants have an advantage (EY Mexico, 2018; KPMG, 2016). Despite decreasing production costs for PV, the initial investment for PV projects is above average, but the ongoing operating and maintenance costs are all lower. The payback period must therefore be taken into account in order to plan economically for the long term (Dutch ministry

of Economic Affairs and Climate Policy, 2020; Romero-Hernández et al., 2013). In Mexico, people tend to think in short terms with a timely profit distribution. Thus, a long period until the “break-even” point and long-term contracts are unusual for investors and customers, and for this reason difficult to explain to customers (Potowski & Groß, 2018; Romero-Hernández et al., 2013). Therefore, high investments for market entry are assumed and outstanding market knowledge as well as business relations (KPMG, 2016; Potowski & Groß, 2018). Whereby these investment risks could be relatively low due to the prospect of high long-term returns. This is related to the high profitability of the emerging sector, which can account for more than half of the investment (KPMG, 2016; Vargas-hernández & Espinosa, 2016).

When new entrants rely on debt financing, it can be a challenge as project financing is difficult. This is because the photovoltaic industry is relatively new and complex. Banks associate this with uncertainty and especially with the new energy reforms, the development of the market is unstable (KPMG, 2016). This is also accompanied by the fluctuating exchange rate and the associated fluctuation in project financing (Potowski & Groß, 2018).

5.5 Threat of Substitutes

The purpose of photovoltaic systems is to produce energy, such as electricity. Therefore, it is theoretically possible to substitute all different sources of energy production. Solar energy can be substituted, for example, by wind power, hydroelectric power, as well as by coal, gas, or oil. However, in order to achieve climate change objectives and meet growing energy demand, renewable energy sources should complement each other, not replace them (Jurasz et al., 2020). Renewables are aimed at replacing conventional energy sources such as gas, coal, and oil, yet because of these conventional sources' cheap prices and environmental danger, they pose the biggest threat to Mexico.

The government intends to introduce new policies and laws to support CFE and PEMEX, which automatically means focusing on fossil fuels (The Economist, 2021). The state-owned energy company CFE plans to exclude new renewable energy generation capacity, end the electricity auction system, and maintain the priority of dispatch. As a result, consumers will not have access to cheap renewable energy,

but to CFE's electricity generation, which is more expensive and whose plants are predominantly fossil fuel fired. They will use either crude oil from the state oil company PEMEX or imported natural gas from the United States (Dutch ministry of Economic Affairs and Climate Policy, 2020; Starr, 2021). This policy is linked to the 'oil obsession' of the current Mexican president, AMLO. He wants to once again support the oil industry, which in the past has been the main factor in Mexico's economic growth. This explains the investment in the state oil company PEMEX and the construction of a new refinery (Dresser, 2019). The current government seeks oil's energy dominance and therefore criticizes the 2013 energy reform because the privatization hit PEMEX and CFE, which led to a decline in oil production (Hernández Ibarzábal & Bonilla, 2020).

In addition, as noted above, Mexico imports cheap natural gas from the United States (The Economist, 2021). In short, natural gas is used extensively in Mexico for electricity generation because it is cheap, but this means dependence on the United States. Renewable energy sources, including photovoltaic systems, do not play an important role in the current Mexican government. They do not fit in with its protectionist policy with strong state-owned enterprises, its focus on fossil fuels and, according to the government, renewable energy sources, especially solar and wind energy, do not have credibility (Dresser, 2019; Hernández Ibarzábal & Bonilla, 2020; Walsh et al., 2020). This policy view makes it difficult for private companies to start a PV business in Mexico because fossil fuels pose a major threat as a substitute.

6 Methodology

The methodology of this master thesis is based on qualitative methods. German project companies, operating in the Mexican photovoltaic market, were analyzed, in order to answer the following research questions:

- 1. What opportunities and risks do German project planning companies face in entering the Mexican photovoltaic market?*
- 2. What internal company resources are helpful in realizing these opportunities or minimize risks?*

These questions are examined through two case studies. These case studies analyze two German project companies that have already established themselves in the Mexican PV market. The project companies were chosen because they are at the last position in the PV value chain but can still provide a comprehensive picture of the whole sector. This is due to their direct contact with customers, component manufacturers and their involvement in the entire process from planning to commissioning of the PV system.

From a methodological point of view, the aim is to build on the theory set out in the previous chapters, but at the same time to substantiate or extend it with practical and critical insights to ultimately answer the research questions.

This chapter can be divided into two parts: the first part describes the methodological approach of the case study of German companies in the Mexican PV market. The second part presents the quality assurance measures of the study.

6.1 Case Study-Based Research

This master thesis follows Sharan Merriam's case study method (Merriam, 1998). It is based on a qualitative approach and Merriam describes a qualitative case study as “an intensive, holistic description and analysis of a bounded phenomenon such as a program, an institution, a person, a process, or a social unit” (Merriam, 1988, p. 21). In this case, the phenomenon is German companies promoting a new market in a foreign geographic region, which is the Mexican market. Merriam's case study method is characterized by focusing on a specific phenomenon (particularistic), allowing a comprehensive and in-depth description of the phenomenon (descriptive) as well as promoting a detailed knowledge of the subject (heuristic) (Merriam, 1998;

Yazan, 2015). The qualitative case study approach is appropriate for the research questions, as only a small number of German project companies are represented in the Mexican PV market and the whole industry is relatively new and complex, but also of increasing importance due to climate change.

A multiple case study is applied to the integrated design (Yin, 2014), as two different companies are studied to get a more complete picture from multiple perspectives yet operating in the same environment. The target group of the study consists of two German companies that are already active in the Mexican PV market and can therefore benefit from the experience and expertise. There are differences between these companies in terms of the active market segment, but also in terms of the services offered. This provides a more complete picture of the market in question. The individual case studies are based on qualitative interviews with experts. For this purpose, professionals within the companies who are suitable for the investigated subject are identified on the basis of their activities. In this case, a business development manager and an international project manager working for German companies but based in Mexico.

This is an integrated project as data from qualitative interviews with experts are integrated into the case study. Data is accumulated for this thesis after Kaiser's method (2014), and then the expert interviews are analyzed using qualitative content analysis, according to Kuckartz's method (2016). In the final stage, the results of the analysis are evaluated and discussed to highlight similarities and differences between cases and to establish a link with theoretical frameworks.

6.1.1 Creation of a Database

Merriam's case study design attributes an important role to the literature review as it makes an important contribution to theory development (Merriam, 1998). Data has already been presented in the previous chapters through literature research on photovoltaic, entry motives and theoretical frameworks for market analysis such as PESTEL analysis for macro environment, Porter's Five Forces for industry structure analysis and the Resource-Based-View for internal firm analysis.

An empirical database has been developed through guided interviews with experts. Through this type of interview, the expert's specific knowledge is interrogated to generate new ideas for answering the research questions that are available in

documentary sources to a limited extent. It does not have to generate only new data but can also deepen and complement the theory.

Kaiser lists three important quality criteria in expert interviewing: the intersubjective intelligibility of the data collection and evaluation procedures, the theory-based working method, and the neutrality of the researcher with respect to new findings. To ensure these criteria, Kaiser outlined a ten-step research plan. These include developing an interview guide, pre-testing the guide, selecting and contacting interview partners, conducting the interview, and recording it. The remaining steps are outlined in the following subsections (Kaiser, 2014; Wustmans, 2019).

The interview guidelines are based on the literature and should provide a clear foundation. First general questions are posed about the person and the company as an introduction, followed by questions about the motivation to enter the market, later about the market analysis from the outside in, i.e., macro environment, through the industry to internal questions about internal resources. The questions are asked in general terms but should allow for a more specific dialogue on the issues. Finally, a summary answer is expected on opportunities and risks as well as possible future market developments. The guideline was based on literature that allowed the interviewer to already have a basic understanding to be able to face an expert with advanced knowledge.

As a pre-test, the finished interview guide was forwarded to the co-supervisor of the master thesis to discuss and adapt it. Experts were chosen from respective companies whose day-to-day work involves topics from the Mexican photovoltaic market and who can provide the most expertise on the topic. In this case, a business development manager and an international project manager have been chosen. This also results in responses from two different company divisions. It will also be interesting for the evaluation that one interview participant has German-Mexican nationality and another has Mexican nationality. Both interview participants were contacted via LinkedIn.

The companies are from Germany but have a subsidiary in Mexico. Both companies are active in Mexico as project developers and can therefore provide an all-encompassing view of the photovoltaic sector in Mexico. The selection criteria are therefore: German project developer in the photovoltaic sector with a subsidiary in Mexico.

The expert interviews were conducted as individual interviews via Skype and recorded after consultation with the interviewees. The interview duration was between 1-2 hours.

As a protocol of the interview situation, it can be said that the individual interviews took place online via Skype call with a time difference of 6 hours due to the geographical location. Both interviews started with a short, small talk to get to know each other, which created a relaxed atmosphere right from the start. The interview guide was meant to serve as an orientation but could be carried out and answered flexibly by both the interviewer and the interviewee. This allowed for open dialogues in order to ask further spontaneous questions, to address unclear statements or to go into more detail on certain topics. It should also be mentioned that one interview was conducted in German and one in English.

6.1.2 Analysis of the Database

Further steps are recommended for the evaluation of the data. These are securing the results in the form of a transcript, coding the text material, and identifying the essential statements (Kaiser, 2014). The qualitative content analysis according to Kuckartz was used for this (Kuckartz, 2016).

The transcription was done on the basis of the recorded audio file, whereby the text was written down verbatim and smoothed. The coding of the text material was done by means of content-based, structuring qualitative content analysis. According to Kuckartz, the approach is applied through a systematic evaluation procedure, whereby the analysis of the data material is carried out with the help of categories or codes (Kuckartz, 2016). The software MAXQDA 2020 was used as support for the coding.

In the first step, introductory text work or familiarization with the transcript texts took place in order to highlight important text passages. In the second step, the main categories were developed. This was done deductively, i.e., the categories were derived from the theory. After the main categories were devised, the transcripts were read again, and the text passages were systematically assigned to the categories. This constitutes the coding of the interviews. In the following steps, the coded material was analyzed, and main and sub-categories were inductively formed. This means that new categories were formed on the basis of the material in the process.

Based on the newly added inductive categories, the transcripts were coded again and then the results of all categories were analyzed. In the process, statements have been summarized and analyzed on the basis of the codes (Kuckartz, 2016; Wustmans, 2019). The two transcripts were considered independently in the results in order to be able to assign them to the individual companies. However, the data was then merged in the discussion step.

6.1.3 Evaluation of the Case Studies

The evaluation of the case studies was carried out using a theory-based generalization (Kaiser, 2014). The results of the category-based content analysis helped in this (Kuckartz, 2016). In this step, the results of the case studies or the expert interviews were discussed with the findings from the theory. This means that the research questions were answered by the combined findings of the theory and the empirical section. In doing so, specific aspects of the theory were used and deepened, evaluated, and supplemented with the help of the expert interviews. At the same time, the similarities, and differences in the results of the two interviewed companies were addressed for a comprehensive understanding from two perspectives.

All in all, the case studies aim to investigate the opportunities and risks of entering the Mexican photovoltaic market. This is based on the experience and expertise of two German project companies that are already present in the market. In this way, it can provide a theory-based but also complemented by a practice-relevant insight into this topic.

6.2 Measures to Ensure the Quality of Research

Qualitative research involves a subjective view of the researcher (Khan, 2014; Saunders et al., 2015). For this reason, it is necessary to ensure certain quality criteria in order to guarantee the quality of the research (Wustmans, 2019). For the implementation and evaluation of the empirical part of this Master's thesis, the quality criteria construct validity, reliability and internal and external validity have been emphasized (Baxter & Jack, 2015; Khan, 2014).

6.2.1 Construct Validity

Construct validity refers to the necessity for the result to be both confirmable and understandable (Wustmans, 2019).

The interviewees for the interviews are experts in the research area. They bring experience and knowledge from practice and explain causal relationships. The surveyed companies precisely met the desired selection criteria, so that the best and most up-to-date knowledge from practice can be drawn from them. With this company-specific knowledge, the subjectivity of the researcher can be limited.

Furthermore, both known and established theories have been applied in the Master's thesis and the methodology has been described in detail so that an understandable approach can be presented.

6.2.2 Reliability

Qualitative research is reliable as soon as the results are trustworthy, and the methodological procedure is understandable. Other researchers using the same method should achieve the same or similar results (Wustmans, 2019).

The research questions present the aim of the study in an understandable way. Furthermore, the detailed description of the methodological procedure helps to follow the interview guide and the formation of deductive categories in an understandable way. Verbal transcription, analysis of the interviews with the help of MAXQDA and triangulation through secondary sources make it possible to record the generated empirical results (Wustmans, 2019).

6.2.3 Internal and External Validity

A high credibility of the results stands for a high quality of the research and thus indicates internal validity. This is again ensured in this work through triangulation—on the one hand through secondary sources and on the other hand through the insight of several companies on this topic. This allows comparisons to be made regarding similarities and differences (Wustmans, 2019).

Qualitative research is externally valid as soon as it is transferable to other cases. This, in turn, can be realized through the detailed documentation of the methodological procedure. Furthermore, a transfer to other cases can be ensured through the category building for the case study analysis. The main categories were

already formed deductively in advance of the empirical study with the help of the literature research. They can therefore be applied to any other cases. This can already be seen in this Master's thesis, as the developed categories have been applied to two different companies (Wustmans, 2019).

7 Results

This chapter will initially focus on the first company, Goldbeck Solar. Starting with a short description of the company and then the results from the expert interview will be presented. Subsequently, the same process is repeated with a focus on the second company, SOWITEC.

As already described under the point "Methodology", the contents of the interviews were divided into categories. The main categories arose deductively from the theory and also correspond to the following subdivisions: motivation to enter the Mexican market, macro-environment, industry, internal view and a future outlook for photovoltaics in Mexico. This is worthwhile in order to get a realistic assessment from those involved in the industry. These categories were subdivided according to the content of the theoretical frameworks. In this case, macro-environment was subdivided according to the six components of the PESTEL analysis and industry according to Porter's Five Forces. The internal view remains deductively a single main-category, with focus on the resources, but in the following chapter "Discussion", the framework of the Resource-Based View is dealt with in more detail. Further sub-categories have emerged inductively and are recognisable in the text.

7.1 Company 1: Goldbeck Solar

Goldbeck Solar is an international family-owned company headquartered in Hirschberg, Germany. The company specializes in photovoltaic projects with a range of services covering everything from design, consulting, financing, installation, operation, and maintenance of solar systems. The company is present in 17 countries around the world and has 120 employees. The 2020/21 financial year ended with a turnover of €180 million (Goldbeck Solar GmbH, n.d.).

Since December 2017, Goldbeck Solar has been operating in the private solar sector in Mexico and is currently still in the start-up phase with only three employees. The company normally focuses on large solar parks, but in Mexico they focus on smaller behind-the-meter solutions. Goldbeck Solar Mexico, for example, has built a 0.5 MW solar park to sell electricity on the spot market (electricity wholesale market). This is another business segment that also aims to create a power circuit. The interview partner is Alexander Foeth. He is a German-Mexican business development manager with many years of experience in Mexico and is currently

involved in setting up the subsidiary of Goldbeck Solar in Mexico (Goldbeck Solar GmbH, n.d., Interview 1).

7.1.1 Motives to Enter Mexico

At the beginning of the interview, the motivation for entering the Mexican market was questioned. Mr. Foeth made it clear that he had not been with Goldbeck from the beginning, but had joined in 2018, one year after entering the market. Nevertheless, he emphasized that the Managing Director is personally connected to Mexico. In addition, the 2014 energy reform played a major role, which liberalized the energy market and thus enabled huge business potentials for private companies, also from abroad. As a result, there was significant excitement in the industry, which led to a significant amount of solar and wind energy being built in Mexico (Interview 1, para.9). For Mr. Foeth personally, his motivation is that he is moving Mexico forward with these projects (Interview 1, para.114).

7.1.2 Macroenvironment

This subchapter presents the results of the interview with Goldbeck Solar on macroeconomics. The chapter is divided according to the six categories of the PESTEL framework: political, economic, social, technological, ecological, and legal.

7.1.2.1 Political

Politics definitely plays a big role for photovoltaics. Mr. Foeth particularly emphasizes the energy reform from 2014 with the liberalization of the energy market. This energy reform enabled Goldbeck Solar to be on the move in various business opportunities. These include large solar parks, solar installations for customers, electricity sales to the wholesale electricity market and PPAs (Interview 1, para.33). Goldbeck Solar has a 0.5 MW solar park that sells electricity to the spot market, which is another source of income and also with the aim of creating a corresponding electricity circuit (I1, para.25). Certificates can also be traded on the wholesale electricity market. Goldbeck Solar is also involved in this business opportunity as a source of income. The procedure, the "beneficiation" unit, to obtain such certificates has been terminated by the company. As a result, Goldbeck Solar will soon be able to trade with them, although the price for these certificates is still

relatively low due to the small size of the 0.5 MW solar park. With a larger solar park revenues are expected to increase significantly. The current solar park's main purpose is to familiarize the business with the mechanism of trading certificates (I1, paras.28-32).

Of course, it was also asked to what extent the new legislative initiative will have an impact on Goldbeck Solar's business. According to Mr. Foeth, however, the company is not affected because the legislative initiative is very specific and relates exclusively to utility-scale systems, a market segment where Goldbeck Solar Mexico is not yet represented (I1, paras.34-35). Since 2018, it has been impossible or more difficult to obtain permits for large solar parks (I1, para.9). Nevertheless, the company would like to get involved there in the future. The legislative initiative puts private companies at a disadvantage, especially in the dispatch order. However, Mr. Foeth is of the opinion that Mexico needs more electricity per year anyway and thus the company would supply electricity even with a utility-scale, only at a slightly later point in time (I1, paras.34-35).

Regarding political aspects, the uncertainty that is felt every 6 years during presidential elections was also emphasized. There is often radical change with no consistency (I1, para.102).

Dealing with authorities is also a challenge in Mexico (I1, para.160). However, this depends on the authority in question. One doesn't know whether they will deal with a streamlined system or one that is heavily delayed. The CFE was mentioned as a bureaucratic necessity to deal with. Due to the energy reform, it was divided into regional CFEs, and the CFE in Queretaro, for example, can be completely different from the CFE in Monterrey. However, it is important to have a good relationship with the CFE, as they are responsible for the grid connection. So, there is a dependency and if CFE does not grant a grid connection, the whole project can fail. Especially with the authorities, corruption can be a problem. This is because the authorities do not always respect rules and laws. For this reason, working with a local partner can be advantageous, as you might have to pay even more as a foreigner. A local Mexican partner can take care of authority procedures and is familiar with the conditions and the people in the country (I1, paras.158-164).

Mr. Foeth had not personally experienced corruption, but Goldbeck Solar avoided it from the beginning by not doing business with the government—they did not work

with any municipalities, federal states, or public companies. The risk of getting involved in corruption is higher with government agencies (I1, paras.52-55).

Another issue is subsidies. Mr Foeth said that solar no longer needs subsidies because it is already so advanced (I1, para.15). In Mexico there were only a few subsidies from the beginning anyway. There were indirect subsidies, what you could think of as PPAs, in that CFE had to supply private solar power and there were no transmission costs. These contracts were called "Contratos Legados" and were energy contracts even before the 2014 reform which provided the possibility to sell private energy (I1, paras.17-19).

7.1.2.2 Economical

Economic growth ensures that the demand for electricity will increase steadily (I1, para.37). Mr. Foeth mentioned that it is difficult to receive financing from a bank in Mexico; moreover, the conditions are very expensive (I1, para.61).

The location of the photovoltaic plants depends heavily on the electricity prices, and these vary. In the north of Mexico, electricity prices are cheap due to electricity imports from Texas, and in Baja California they are very expensive due to the isolation of the peninsula (I1, para.43 & 71).

Prices for PV components and materials are also expensive in Mexico. Mr. Foeth also emphasizes the high cost of living in Mexico City (headquarters of Goldbeck Solar Mexico) and the associated high wage costs for qualified employees. (I1, para.128 & 166).

An economic risk also arises from the exchange rate. To minimize this problem, Goldbeck Solar works with euros, dollars, and Mexican pesos. Quotations are submitted in dollars and regularly adjusted to the new exchange rate. Furthermore, for this reason offers are limited in time in order to be able to react according to current exchange rates (I1, para.188/189).

7.1.2.3 Social

Mr. Foeth refers to the high population growth in Mexico and the resulting steady increase in electricity consumption. For this reason, Mexico also offers the potential to be successful in this area in the future (I1, para.37).

Mr. Foeth frequently mentions the importance of good employees and manpower. It is difficult to find qualified employees in the Mexican energy sector, as most of them are already working in other companies and are well paid. The supply on the labor market is low, as the energy and photovoltaic market has only existed in this form for a few years. For this reason, there are few people working in this field with expertise (I1, paras.47-51). This is also noticeable, for example, among employees of the network operators. They are sometimes unaware of the new legislation and photovoltaic issues, such as how to connect a solar park. But customers are also lacking in knowledge about this topic because society is not yet aware of the subject of solar energy (I1, para.55). The problem for Goldbeck Solar starts with finding a contact person because, for example, there are no energy managers in the companies (I1, paras.60-61). For this reason, Goldbeck Solar also has to go through lengthy contract processes in order to explain aspects such as the technology or the costs to the customers in a comprehensible way (I1, para.98).

Another aspect is the mistrust in Mexico. This is again linked to unawareness, but also to the habit of being supplied with electricity by CFE. It is a new experience for customers to be supplied with electricity by a private company. Some customers are not yet aware that this is possible and are afraid of being without electricity or having problems with CFE (I1, para.51).

On the other hand, Mexico, as an emerging country, has other problems to deal with. For example, poverty and the large gap between rich and poor (I1, para.145-146).

7.1.2.4 Technological

A frequent topic regarding technological or technical conditions in Mexico was the grid. Mr. Foeth mentioned that the infrastructure, and this includes the grid in Mexico, is very backward and outdated (I1, para.11). The problem is that Mexico, for example the region around Queretaro, has grown, but the grid has not. No investments have been made but these are urgently needed. This can be seen in the fact that a lot of solar and wind energy has been pushed into the market, but the grid has reached its limits and is overloaded (I1, paras.37 & 39). A bottleneck has thus formed and there are problems getting the generated solar energy to the consumers (I11, para.11). In particular, feeding and transporting it through the grid is proving quite difficult (I1, para.15).

Mr. Foeth said that Goldbeck Solar helps relieve CFE's grids because the electricity can be generated on site and the customer does not necessarily need the grid electricity, thus creating more capacity.

Another issue concerns constructing in Mexico (I1, para.39). The structure and organization for construction has low circumstances. This starts with the lack of construction plans of the buildings or factories (I1, paras. 94 & 114). In order to get an overview of the structure of the buildings, Goldbeck Solar has carried out scanning or sound measurements. However, this is complicated and still associated with risk, which is why Goldbeck Solar has abandoned rooftop installations and concentrates on open spaces. This is advantageous in Mexico because many industrial parks have unused open spaces that are ideal for solar installations (I1, para.115 & 116).

In addition, the lack of building permits has often been a challenge for project implementation. A building permit is required for the construction of solar plants, but it has happened that the client did not have one or had not yet applied for one. This delays the whole project process. You could theoretically start without a building permit, which is often the case in Mexico, but this comes with a risk (I1, para.114).

7.1.2.5 Ecological

Mr Foeth emphasizes the optimal environmental conditions for solar in Mexico. He particularly highlights the Bajio region, where Goldbeck Solar operates. The conditions there are optimal, with plenty of sun and a light breeze to ensure cooling. Mr. Foeth feels that these are almost laboratory conditions. Compared to Germany, the same solar plant in Mexico can produce twice as much electricity. The efficiency of the solar plants is over 90 percent, showing that solar energy can be a long-term success in Mexico (I1, paras.76-79).

The size of Mexico must also be emphasized. Geographically, it is a huge country and for this reason Goldbeck Solar has drawn a circle and focused on Mainland Mexico, i.e., Mexico City, Metropolitan Area and Bajio (I1, paras, 43 & 71).

Each region in Mexico has its own characteristics, which is why a company needs to be aware of where to operate in Mexico. For example, Goldbeck Solar is not in Tijuana because of security. Nor is it in Baja California. There are good conditions there due to high electricity prices and the electricity emergency, but it is relatively

closed there and difficult to get a foothold as an extern. In Yucatan it is also risky to build solar plants due to the hurricane risk, the Mayan ruins, and the buildings there are mostly made of porous limestone, which makes construction difficult. The border to the USA is also avoided by Goldbeck Solar because of the security situation but also because of the cheap electricity transports from Texas (I1, para.71).

Mexico is a huge country where it is difficult to cover the whole republic. On the one hand long distances pose an issue, but also because of typical risks of particular regions. For this reason, concentration is necessary (I1, para.71).

In the north of the country there is also the desert. Conditions there are also excellent because it is not too hot. This is important because solar plants must not get too hot. However, the problem is to get the electricity from the desert because no companies are located there and no lines to the grid are laid. To use the desert, long lines would have to be laid, but no one does this because of the cost (I1, paras.75-77).

To the question of whether Mexico can be seen as an entry market for other countries in Latin America or the USA, Mr. Foeth gave a clear answer: Goldbeck Solar is already active in Chile and would like to concentrate on Mexico and Chile for the time being. Both are very large markets, and the company would like to establish itself there first (I1, paras.149 & 150).

Europe and Germany are already densely built-up with solar plants, which is why there is less open space. For this reason, agro-photovoltaics was introduced to combine agriculture and photovoltaics there and not to create a competitive situation. In Mexico, the situation is different. There is enough open space to build and for farmers, which is why agro-PV does not yet play a role in Mexico (I1, paras.151-154).

7.1.2.6 Legal

Under legal aspects, Mr. Foeth mentioned the energy reform, which promises great business opportunities (I1, para.9). However, he believes that the reform still has space for improvement. In Germany, for example, the energy reform has been adjusted umptein times and the levies changed, which also needs to happen in Mexico. Therefore, Foeth thinks that the first change after 6 years in the form of the amendment is a normal process (I1, para.15). As already mentioned under

"Politics", the new legislative initiative does not affect Goldbeck Solar. It is mainly meant for utility-scale plants and is intended to clean up and correct some of the "contratos legados" - the old energy contracts that existed before 2014 (I1, paras.34 & 35).

Goldbeck Solar Mexico is an independent company and 100% subsidiary of Goldbeck Solar Germany. This has legal reasons and is required by law, because for projects you need a company to handle all imports, for example. In this case, an independent Mexican company is the best solution. In addition, locals are employed by the company instead of foreign German expats. (I1, paras.167-170).

7.1.3 Industry

This subchapter presents the results of the interview with Goldbeck Solar on the industry structure. The chapter is divided according to the Five Forces of Porter: Industry Rivalry, Buyers, Suppliers, New Entrants and Substitutes.

7.1.3.1 Industry Rivalry

Mr. Foeth stresses that it is important to focus when coming to Mexico. It is not possible to be involved everywhere, especially due to enormous competition. The Mexican solar market is mainly in the hands of Spanish companies, but also of Italian, French or US companies. These companies have a large workforce, years of experience, financial power, relations, and infrastructure (I1, paras.44-47).

Regarding industry rivalry, Mr. Foeth distinguishes between three markets. On the one hand, the classic house and roof market for private customers and small businesses. These represent small solar installations and there is fierce competition because there are so many vendors. This is because there is no regulation in Mexico as to who can operate in this sector. Any private person could theoretically sell and install small solar systems (I1, paras.83-85).

Then there is the utility-scale sector with the large solar parks. In this sector we see an oligopoly with about 10 companies, especially the big international players like Iberdrola, Enel, Amper, Acciona or Engie (I1, paras.85-87).

The third market segment, where Goldbeck Solar has been represented in Mexico so far, is industry PV. This last market provides good balance because these projects are too big for the small providers and too small for the big providers.

However, with the standstill of the large solar parks due to politics, it is noticeable that the large companies are now also entering this segment. However, this market segment is expansive and in demand (I1, para.92).

7.1.3.2 Buyers

As already mentioned, there are three market segments where customers are represented. The market for private customers and small businesses with a high level of competition. The utility-scale sector with few but powerful players and the ever-growing industrial sector, where Goldbeck Solar is currently active in Mexico (I1, paras. 82-89).

As Mexico needs more and more electricity every year due to population growth, the demand is naturally increasing (I1, paras.36 & 37). However, customers are used to receiving electricity from CFE—although this is becoming more difficult as CFE's grids are overloaded. Customers can become more independent by generating their own electricity with PV to satisfy their demand (I1, paras 39-41). However, there is a certain lack of knowledge on the part of customers about the benefits of PV and that electricity can also be purchased from private suppliers (I1, paras.51-55; 98). This requires raising awareness in society about the benefits of PV (I1, paras.60 & 61).

The bond with the customer can be realized through PPAs. The duration and annual payment of these contracts depend on the customer's commitment and according to Mr. Foeth, they range mostly between 5-10 years. However, the shorter the term, the higher the price for the customer. In this case, the customer could theoretically also buy the electricity from CFE, if the aspect of cost is concerned. Goldbeck Solar's goal is therefore to offer the electricity price below that of CFE in order to create added value for the customer. Mr Foeth emphasizes that customers are chosen very carefully and that there must be mutual trust (I1, paras.64-65).

7.1.3.3 Suppliers

Goldbeck Solar imports the main components for PV systems such as panels or inverters from abroad. They have no preference in this, but he mentioned China and the USA. However, the quality of the components plays a major role. Materials, such as cables, are procured locally in Mexico (I1, para.118). However, purchasing in Mexico is difficult due to high costs considering most components are imported (I1,

para.128). In Germany the cables would be cheaper, but due to the high transport costs and the flexibility on site, Goldbeck Solar decided to purchase the cables in Mexico (I1, paras.132-134). Mr. Foeth justifies the high material costs not only by the import, but also because of a low supply and fluctuating availability (I1, paras. 128 & 142). Moreover, the costs are even more expensive when quality is required (I1, para.140).

Goldbeck Solar has also hired a Mexican company to build the solar plants. This company had no experience with such solar parks, but Goldbeck Solar trained them (I1, para.118). Finding a suitable construction company with know-how was one of the first activities in Mexico and turned out to be a long, difficult process. Goldbeck Solar decided to hire a subcontractor instead of hiring its own staff in order to be flexible when there is no project. However, it can be problematic that the respective company is not available at the moment when it is needed (I1, para.124).

7.1.3.4 New Entrants

Mexico is an interesting country for solar, which is why many companies are active in this sector. There are no regulations for the market segment with small solar installations, which is why anyone can enter the market without any problems (I1, para.85). For the PV industry there is enough demand, but more and more big companies are entering this sector (I1, para.92). However, Mr. Foeth stresses that the utility-scale market is already divided among the large companies (I1, paras.79-81). He mentions RWE, for example—a very big company from Germany that only entered the Mexican energy market in 2020. In his opinion, this is quite late because of the market distribution, but because of RWE's size and budget, they will eventually be able to establish themselves (I1, paras.79-81; 100).

For market entry in Mexico, Mr. Foeth points out to stay lean and flexible due to the fluctuations and frequent changes in Mexico. A favorable cost structure helps to react quickly to changes and to be resistant (I1, para.100).

Small companies or start-ups may have difficulties without a large parent company or financing behind them (I1, paras.101 & 102). A financial backup is extremely important to survive difficult times without orders in Mexico (I1, para.100). However, not only finances play a role in establishing oneself in Mexico, but also experience, good workforce and connections (I1, paras.175 & 176).

Marketing or advertising, for example, is also difficult in Mexico in the solar market. The technology needs to be explained and especially when a new, unknown company enters the market, it is difficult to convince customers because no projects have been released yet. It is important to already have something to show (I1, paras.56-59). Word of mouth plays a role (I1, paras.111 & 112). Mr. Foeth mentioned, for example, that during the construction of a plant, new interested parties from the neighborhood had already shown interest (I1, para.108).

CAMEXA, the German-Mexican Chamber of Commerce, offers great help for German companies entering the market. They have the know-how of the market and provide advice and start-up assistance for German companies. There is also, for example, the German Center, a concept for start-ups to provide them with infrastructure such as offices etc. (I1, para.170). In general, local partners are helpful to become established in Mexico, e.g., for dealing with authorities (I1, para.162).

7.1.3.5 Substitutes

Mr Foeth does not see fossil fuels such as gas, coal, and oil as competition for Goldbeck Solar's business model, but it will definitely play an important role for many years to come. He justifies this with the fact that Mexico is an oil rich country and 80% of electricity generation is still realized via petcoke and coal. It will not change anytime soon, as Mexico does not have the money to build new gas plants (I1, paras.143-144). For this reason, fossil fuels are definitely still used as substitutes or substitute products to solar energy for cost reasons (I1, paras.147 & 148).

7.1.4 Internal View

Goldbeck Solar is a start-up in Mexico and still relatively unknown. Nevertheless, they have already completed two projects and are planning a third solar park. Mr. Foeth says that the awareness of Goldbeck Solar has increased with each project and attracts interest (I1, paras.47; 56-59; 92-94).

Goldbeck Solar does everything from design to installation to operation of solar plants (I1, para.23). The company also offers in-house financing in the form of PPAs. This is an important issue because there is a lack of money in Mexico. Goldbeck Solar uses its own capital for this and finances and builds the plant. The electricity produced is then sold to the customer in the form of a monthly electricity bill, which is used to pay off the plant piece by piece. This offer sets Goldbeck Solar apart from

tough competition (I1, paras.61-63). In addition, the company's construction method sets it apart. It does not build on roofs, but rather on open spaces in industrial parks, of which there are many in Mexico. In this space, Goldbeck Solar builds with tracker plants that move according to the sun. This system is combined with bifacials justified with the huge amount of sunshine hours. These panels generate electricity from both sides with reflection, which is extremely advantageous due to the bright sand. This means that Goldbeck Solar can produce significant amounts of electricity from a small area and thus the efficiency of the solar plants is very high. This type of installation does not yet exist in Mexico. It is actually intended for large solar parks due to the high costs. However, Goldbeck Solar can build this cost-efficiently on small areas due to a good purchasing policy and its reputation in Germany and Europe (I1, paras.94; 106; 108). To build these plants in this way requires good engineering, which Goldbeck Solar can draw on in Germany. The design and engineering are handled entirely through Germany. This helps Goldbeck Solar in Mexico because it means that the subsidiary does not have to build up large cost structures and can act flexibly. For this reason, the team in Mexico consists of only 3 people and external companies are hired if a project is pending. For this reason, there are no exorbitant costs in times of no projects, as only project-related calculations are made (I1, paras.98 & 100). One problem, however, is that Goldbeck Solar has only worked with one company so far. For more flexibility they are looking for another external company (I1, para.126).

The financial, logistical, and technological backup of an established parent company in Germany is also a great help for Goldbeck Solar in Mexico (I1, paras.100-102). The reputation of a German company with the quality seal "Made in Germany" also plays a role. Mr. Foeth emphasized that Goldbeck Solar is more expensive than other competitors, but customers can enjoy a high-quality installation according to standards (I1, paras.69-71).

Mr. Foeth also mentioned some points where the competition is ahead of them. For example, the financial strength of the big companies, more connections to customer bases, authorities or governments and years of experience in this market (I1, paras.175 & 176).

7.1.5 Future

The interview concluded by asking for a personal opinion regarding the future of photovoltaics in Mexico and how the market might develop. Regarding the future of solar in Mexico, Mr. Foeth believes that there will be a rising curve with hills and dips and valleys. In the long term, however, it is definitely rising (I1, paras.177-182).

The behind-the-meter solution was highlighted in particular. This is generally what Mr. Foeth sees as the future for solar, taking advantage of the fact that solar energy is generated where it is consumed without having to run the power through the grid. Of course, the hype of this solution is related to the fact that the large solar farms are currently blocked by the government (I1, para.21).

7.2 Company 2: SOWITEC Mexico

SOWITEC is an international family-owned company headquartered in Sonnenbühl, Germany. SOWITEC is one of the world's leading developers of renewable energy projects, particularly in wind and solar energy. It specializes in photovoltaic and wind energy projects with a range of services covering everything from planning, design, yield and profitability calculations, construction support, sales, financing as well as technical and commercial management of wind and solar parks. Ecological & sociological studies and stakeholder relations are also an important scope of SOWITEC. The company is present in 15 countries worldwide with a focus on fast-growing emerging and developing economies and employs more than 200 people. The 2020 financial year ended with a turnover of €15,54 million which is lower than expected due to COVID19 (SOWITEC group GmbH, n.d.; Interview 2).

Since 2013, SOWITEC has also been operating in the solar sector in Mexico as a pure developer of projects. That means SOWITEC just stays in the first stages of the project development until the credit stage is reached. Thus, the company is focused on large solar parks with the aim to sell to big private investors.

The interview partner is José Daniel Orbezo Parrao. He is a Mexican civil engineer with many years of experience in Mexico and the renewable energy sector. He is currently the head of project management at SOWITEC with responsibilities of defining the feasibility of renewable energy projects within Mexico (SOWITEC group GmbH, n.d.; Interview 2).

7.2.1 Motives to Enter Mexico

Mr. Orbezo could not give a detailed answer because he was not yet working in the company at the time. However, he pointed out that SOWITEC entered the market in 2008 and this was a good time to do so because some movements were happening in the legislation. This meant that SOWITEC was ready for the energy reform in 2013 and had already secured the best locations. In addition, SOWITEC already had agreements with, for example, large Italian companies. This pushed SOWITEC into the market to deliver promising projects to these investors (I2, paras.11-13).

7.2.2 Macro Environment

This subchapter presents the results of the interview with SOWITEC on macroeconomics. The chapter is divided according to the six categories of the PESTEL framework: political, economic, social, technological, ecological, and legal.

7.2.2.1 Political

Politics has a major influence on SOWITEC in Mexico. When SOWITEC came to Mexico, the energy reform and the framework for project development was beneficial, but this has changed with the current leftist government. The government acts protectionist and wants to promote fossil fuels (I2, paras.22 & 23) and indirectly blocks private companies to strengthen CFE in energy generation and eliminate competitors (I2, paras.16 & 17). Mr. Orbezo emphasized, among other things, that under the current government it is difficult to get an interconnection agreement, which is essential to start projects (I2, paras 18 & 19).

On the other hand, Mr. Orbezo believes that corruption was more of a problem under the previous administration to get permits and exploit government relations. Currently, however, the problem is not corruption but the government's ignorance of private companies in the energy sector (I2, paras.20 & 21).

Regarding subsidies for solar projects, Mr. Orbezo mentioned that new companies in the renewable energy sector do not have to pay taxes for the first 3 years after the company is established. This is good for project development, but Mr Orbezo would have hoped for more (I2, paras.24 & 25).

Mr Orbezo divided the efficiency of the bureaucracy into two parts. One is the private sector, such as with investors or suppliers. There are no problems with this. On the other hand, it becomes difficult with the public sector, because there can be delays and lengthy negotiations to obtain licenses or permits (I2, paras.34 & 35).

7.2.2.2 Economical

SOWITEC always looks for the best moments to make investments. Of course, key performance indicators (KPIs) such as GDP play an important role. At the moment, however, such variables are difficult to assess due to the pandemic (I2, para.27). Mr Orbezo agreed that Mexico, as an emerging market with steady economic growth, has a high market potential (I2, para.28 & 29). In economic terms, trade relations also play a major role according to Mr Orbezo. He mentions the new trade agreement with the USA and Canada. Mr. Orbezo assumes that this agreement will change the government's attitude towards renewable energies, as President Biden from the USA has a positive view of these technologies. This could push Mexico more in this direction to meet the purposes of the US, such as the sale of renewable energy merchandise from Mexico to the US (I2, paras.36 &37). Mexico also has a good relationship with China. This gives Mexico access to advanced components for photovoltaic systems (I2, para.57).

7.2.2.3 Social

An important point in project development is the social aspect assessment. This includes aspects that influence project development within communities. This includes consultations with indigenous groups and receiving feedback on how these groups feel about the planned projects. Without confirmation from the indigenous groups, the project cannot begin. This is particularly problematic in central Mexico, where there are more indigenous groups than, for example, in the north, where there are also several utility scales at present (I2, para.39). The indigenous groups also need to be compensated financially in most cases (I2, paras.44 &45).

Mr. Orbezo also sees the cartels, which are present throughout Mexico, as a problem. Cartels control various communities and in order to realize a project in such an area, for example, contact must be established with the population, which indirectly establishes contact with the cartels, because they have to be informed or asked for permission. The cartels know that such communities will benefit financially

from solar projects and want a part of it. In the worst case, threats or violence can occur if the cartels are not involved (I2, paras.49-55).

Mr. Orbezo also agrees with the fact that the Mexican population has a high number of engineers. He justifies this with the trade agreement with the USA, for example, to produce certain car parts in Mexico. For this reason, there are many engineers in Mexican universities to solve problems in this industry. The opportunities in this industry are great, but this is also true for the solar power industry, which is why there is proper manpower for this sector in Mexico (I2, para.47).

7.2.2.4 Technological

As mentioned earlier, Mexico has access to advanced components for solar systems through trade relations with China and also has the appropriate manpower to deal with them due to the high number of engineers (I2, paras.47 & 57).

Mr Orbezo also discusses the old transmission network in Mexico. High investments would have to be made to make renewable energies more widespread (I2, paras.60 & 61). The grid is not only old, but also overloaded. Mr. Orbezo points out that in the north of the country there is a lot of space for energy production, but not as much demand as in the rest of the country. For this reason, the electricity generated in the north would have to travel through the country to the grid, but the grid is full and in addition one would have to pay a transmission fee (I2, para.65).

When asked if agro-PV plays a role in Mexico, Mr. Orbezo said that it is not yet present. Floating PV, on the other hand, does, but in a special way. It is not possible to develop floating PV on lakes or gulfs due to environmental restrictions. However, an interesting possibility for floating PV would be in water bodies, of which there are plenty in central Mexico. These water bodies are mostly contaminated, and this technology would offer the opportunity to improve the water quality in these water bodies and produce electricity at the same time (I2, paras.70 & 71).

7.2.2.5 Ecological

One of the most important aspects in the course of a project development, which is necessary, is the assessment of environmental issues. This includes, for example, the assessment of flora and fauna in the respective project location (I2, para.39).

Of course, indigenous peoples also play a role in this regard. Many indigenous peoples are located in central Mexico and an agreement must be reached with them as to whether a project can be realized in this region. But the south and east of the country, such as Oaxaca and Yucatan, are also part of this. There, archaeological issues come to the fore, as it is problematic to realize projects in regions where ecological heritage is present. This is often the case in Oaxaca and Yucatan (I2, paras.42 & 43).

Mr. Orbezo agreed that Mexico is a country with high potential for solar energy, as the whole country is exposed to high solar radiation and also has enough free space to build projects. Free large areas with very good solar conditions are especially available in the north of the country. There, however, the demand is not so high because there are not many populated cities, and the desert takes up a large part. Solar energy can be generated cheaply there, but the transfer to the rest of the country is complex and expensive due to the overloaded grid and the expensive transmission fees (I2, paras.64-67).

Mr. Orbezo also stressed that it is not possible to realize floating PV in lakes or gulfs due to environmental restrictions. He had an alternative due to the huge availability of contaminated water bodies, which has already been discussed under the sub-heading Technology (I2, paras.70 & 71).

7.2.2.6 Legal

Under legal aspects, Mr. Orbezo mentioned that the energy reform was beneficial for SOWITEC, but the new changes created problems for the company. This is because fossil fuels and CFE are strengthened by these amendments and the private sector is weakened at the same time (I2, paras.16-19). However, companies that have a social objective, such as the generation of electricity from renewable energy, are supported by getting tax rebates for the first 3 years (I2, 24 & 25).

7.2.3 Industry

This subchapter presents the results of the interview with SOWITEC on the industry structure. The chapter is divided according to the Five Forces of Porter: Industry Rivalry, Buyers, Suppliers, New Entrants and Substitutes.

7.2.3.1 Industry Rivalry

Mr. Orbezo describes the current situation in the photovoltaic sector in Mexico from two perspectives: utility scale and distributed generation. Utility-scale is currently problematic and not progressing strongly. On the other hand, distributed energy, i.e., small and medium-sized projects, is booming because they do not rely on private investors and are even pushed by the government (I2, paras.76-81).

Regarding competition, Mr Orbezo said that the number of companies with the same business field as SOWITEC has decreased. This number has been decreasing for 2 years, which is related to the utility-scale sector block. Nowadays there are only a bunch of companies active, so to speak, and not as many as 2 years ago (I2, paras.82 & 83).

When asked who the competitors are, it became clear that it is not the energy companies as it is for Goldbeck Solar. These are seen as investors and consequently as buyers of the projects (I2, paras.92-95). The competitors for SOWITEC are companies that have only focused on pure project development. As an example, Mr. Orbezo mentioned Alijaval, a Spanish company.

According to the framework and the new laws, PEMEX should be active in the renewable energy sector, but they have not yet realized a participation. For this reason, they have not yet come into contact with SOWITEC. Neither as a competitor nor as a customer (I2, paras.96-99).

7.2.3.2 Buyers

The actual competitors in the form of energy companies are potential investors for SOWITEC. SOWITEC's business model is pure project development with the aim of selling completed projects to investors, for example in the form of PPAs (I2, paras.92-95; 118 & 119).

Mr. Orbezo could not give more specific information about the clients, except that they can be in almost any sector and are mainly private companies because it is easier to do business with them. However, SOWITEC also expresses interest in doing business with public clients if it should arise (I2, paras.112-119).

7.2.3.3 Suppliers

According to Mr Orbezo, Mexico has very good access to advanced technologies for solar energy. This is especially due to the good trade opportunities with China (I2, para.57), which can be seen in the fact that SOWITEC imports most of its photovoltaic components from China. Partly also from the USA, but mostly from China (I2, paras.58 & 59). Apart from American and Chinese, SOWITEC also sources some products from Spanish or French companies. For example, for floating systems. SOWITEC is always looking for the best suppliers, but it is also important that they are allowed to work in Mexico (I2, para.107).

Mr. Orbezo agreed that the demand for suppliers is high and therefore they can easily increase prices. Combined with the fact that SOWITEC works especially with experienced companies, they naturally expect a reasonable payment. Suppliers are therefore in a powerful and unique position and can renegotiate prices (I2, paras.108-111).

7.2.3.4 New Entrants

As a new market player, it is difficult to gain a foothold in the Mexican photovoltaic market. Especially if there are no relationships and capital available (I2, paras. 100 & 101). However, new companies in the renewable energy sector in Mexico are supported by ensuring tax rebates (I2, para.25).

7.2.3.5 Substitutes

Mr. Orbezo agreed with the statement that the Mexican government acts in a protectionist way and that coal, oil and gas are promoted (I2, paras.22 & 23).

This is therefore a threat to SOWITEC, as fossil energies are being pushed instead of renewable energies. As a result, investors are hesitant to invest in this sector (I2, paras. 102-105).

7.2.4 Internal View

Mr Orbezo emphasizes the advantage over other companies that SOWITEC is a global company and has years of experience in different countries and is also not in a bad financial position. The fact that Vestas has taken a stake in SOWITEC and supports the company also plays a role (I2, paras.83-87).

Another strength of SOWITEC is its comprehensive specialization in wind and solar projects, but also its ability to carry out environmental, social, and technical feasibility studies itself. Due to this know-how and manforce, SOWITEC does not need to contract other companies, but carries this out in-house. The experience, knowledge and skills make a difference between SOWITEC and other developers in Mexico (I2, para.121).

According to Mr. Orbezo, SOWITEC does not have an engineering masterpiece or a supertool, but they stand out as a center of excellence in Germany. The experience and knowledge, as already mentioned, plays a special role here, as analysis for hybrid plants, for solar plants, for floating PV plants and other technologies on renewable energy are carried out here, for example. This knowledge for project development can then be applied from Germany to the various locations where SOWITEC is active. Not only Latin America like Mexico, but also Russia, Kazakhstan, or Asia (I2, paras.122 & 123).

Of course, the "Made in Germany" also helps for a high reputation in Mexico (I2, paras.126 & 127).

7.2.5 Future

The interview concluded by asking for a personal opinion regarding the future of photovoltaics in Mexico and how the market might develop.

Mr. Orbezo sees the future for photovoltaics in Mexico encouraging. In particular, he hopes that the midterm in Mexico will improve the situation with regard to photovoltaics. When asked about hydrogen, Mr Orbezo says that it is an opportunity, but the technology is not ready yet. Nevertheless, it may be possible to produce hydrogen in the future and export it to the USA, for example (I2, paras.130-134).

He also mentioned an interesting possibility for floating photovoltaics. This type of technology can be used for water bodies, which are common in central Mexico. These water bodies are mostly contaminated and floating PV can help to improve the water quality in them and generate electricity at the same time (I2, paras.70 & 71).

8 Discussion

The results from the interviews will be discussed in this chapter and compared with the findings from the literature research in order to evaluate the extent to which theory and practice correspond. At the same time, the discussion highlights the opportunities and risks for German companies in Mexico as well as their internal resources.

8.1 Opportunities

This sub-chapter examines the opportunities for German companies in the Mexican photovoltaic market: Energy Reform and Distributed Generation, Energy Demand, Business Relations, Engineering, Mexico's Location and Environmental Conditions as well as High Profitability of the Photovoltaics Sector.

8.1.1 Energy Reform and Distributed Generation

The energy reform of 2013 pursued the goal of reducing the use of fossil fuels in Mexico and increasing the use of clean energy. To achieve this, the monopolies of CFE and PEMEX were loosened in the course of this reform. This opened the Mexican energy market to private and international companies (Dorfinger et al., 2014; EY Mexico, 2018; Vietor & Haviland, 2017). This was, for example, one of the reasons why Goldbeck Solar entered the Mexican market. SOWITEC was already in Mexico, but the conditions for renewable energies, including solar energy, have improved considerably as a result—for example, tax incentives for companies related to renewable energy have been installed (Viscidi, 2018).

In addition, the introduction of wholesale electricity markets, long-term auctions, and clean energy certificates have made the Mexican energy market more attractive and provided several opportunities to sell produced solar power, decrease investment risk, and generate additional revenue (Dorfinger et al., 2014; EY Mexico, 2018).

The Electricity Industry Law, as part of the energy reform, allows the distributed generation of electricity (EY Mexico, 2018; Potowski & Groß, 2018). This form of energy generation is taking on an increasingly important role in Mexico and this importance will steadily increase and represent the future for solar energy in Mexico, because it is not dependent on private investors and is even being pushed by the government (SolarPower Europe, 2021; Steinmeyer, 2020). The blockade of utility-

scale by the government and the associated uncertainty opens opportunities for distributed generation of energy. Thus, the focus of companies in the photovoltaic sector is shifting more and more to distributed generation using PPAs (Dutch ministry of Economic Affairs and Climate Policy, 2020; Steinmeyer, 2020).

8.1.2 Energy Demand

The steadily increasing demand for energy represents another opportunity that makes Mexico a country attractive for solar energy (Potowski & Groß, 2018; Rodríguez Suárez et al., 2017). Mexico is an emerging country with almost 130 million inhabitants, which is growing not only in terms of population but also economically (United Nations, Department of Economic and Social Affairs, Population Division, 2019). As a consequence, consumption is increasing, and more and more energy is needed. This demand cannot be satisfied with limited fossil fuels alone, but also requires renewable energies. The fact that CFE does not have enough capacity to meet the increasing energy demand shows that there is a state of emergency here and that the market is far from being overcrowded (Starr, 2021; The Economist, 2021).

This is therefore an opportunity for German photovoltaic companies to enter the Mexican market, as there are a large number of potential customers. Demand will increase in the residential, commercial, and industrial sectors (Potowski & Groß, 2018; SolarPower Europe, 2021). Due to rising energy and raw material prices, the switch to PV self-supply systems will also become more attractive for the general population. Mexico definitely has a high market potential in this respect (Dorfinger et al., 2014; Potowski & Groß, 2018).

8.1.3 Business Relations

Another opportunity for foreign companies represents Mexico's multi- and bilateral openness in the world market (Department for International Trade, Foreign & Commonwealth Office, and Foreign, Commonwealth & Development Office, 2021; Potowski & Groß, 2018). In the World Bank Doing Business Index, Mexico scores particularly well in terms of its numerous trade agreements and facilitated cross-border trade (World Bank, 2021a). They maintain a solid relationship with the European Union, but in particular the relationship with the US and China needs to be highlighted (Department for International Trade, Foreign & Commonwealth

Office, and Foreign, Commonwealth & Development Office, 2021; Potowski & Groß, 2018). The new USMCA trade agreement between the USA, Mexico and Canada is seen as positive with regard to the development of renewable energies, as the current American President Biden places a high value on this. As the US is the most important trading partner for Mexico, this could spill over to Mexico and give a boost to the development of renewable energies, especially solar energy. This potential push could lead to a huge opportunity for companies in the photovoltaic sector and give German companies an incentive to establish themselves in the Mexican market.

Mexico's good relationship with China is also a benefit. This enables the provision of advanced technologies and photovoltaic components. This is important because the majority of today's components for a photovoltaic system come from China, making trade inevitable (Gil Perez & Hansen, 2020; Rapoza, 2021). The products are of high quality and are also offered at a more favorable price (A Dlouhy, 2021; Hopkins & Li, 2016). Considering that German companies operate in Mexico in the form of Mexican subsidiaries, the positive trade relationship between Mexico and China represents an advantage for them.

8.1.4 Engineering

Mexico is a country with plenty of engineers and specialized courses of study (Dorfinger et al., 2014). This was once again set in motion by the trade agreement with the USA. This could drive production in Mexico for the American market, especially in the automotive sector. This shows that a large number of qualified workers with engineering skills are available in Mexico (Rodríguez-Carvajal, et al., 2018; Romero-Hernandez, et al., 2012). Training in the renewable energy sector, such as the photovoltaic sector in Mexico, still has some catching up to do, but the basic conditions for further positive training of the qualified workforce are in place. Once there is more focus on training in photovoltaic technology in Mexico, this will also be an opportunity for German companies looking to establish themselves in Mexico, as the labor market can offer a large pool of manpower who are also familiar with the Mexican market.

8.1.5 Mexico's Location and Environmental Conditions

Mexico is one of the countries par excellences to install photovoltaics. This is due to its excellent geographical location with high and direct solar radiation, as well as limited cloud cover and rainfall (Alemán-Nava et al., 2014; Romero-Hernandez, et al., 2012). This applies to the whole country, but especially the northwest of the country with a huge desert is worth mentioning, although the demand there is low due to the small population. Goldbeck Solar operates in the center of the country and even spoke of laboratory-like conditions there with plenty of sunshine and a light breeze to achieve high efficiency and long-term success.

In contrast to Germany, for example, where a large part of the country's land is already built up, there is still enough free land in Mexico. This is also due to the fact that the country has an enormous surface area, as there is still enough land and no investment—at least in the foreseeable future—would compete with agricultural production.

Floating photovoltaics, on the other hand, could play a more important role in the near future, for example in Mexico City. It is difficult to install this on lakes or gulfs due to environmental restrictions, but in central Mexico there are a lot of water bodies. These are often polluted, but floating PV could change this by improving water quality and producing electricity at the same time.

The geographical proximity to the USA, Canada or other Latin American countries is also an advantage, and especially for trade such as components or material for photovoltaics (Potowski & Groß, 2018). Due to beneficial climatic conditions, solar energy can be produced efficiently in Mexico, which can be advantageous in the future, in connection with the global focus on the energy transition, by exporting this energy to surrounding countries.

In the past, this geographical proximity of Mexico was used for the export of oil, as Mexico was an attractive location with its oil reserves. Today, however, Mexico is more of an importing country than an exporting one due to shrinking oil fields and the outdated technology to process the oil. This has created a dependency on the US to import gasoline and natural gas (Alemán-Nava et al., 2014; Department for International Trade, Foreign & Commonwealth Office, and Foreign, Commonwealth & Development Office, 2021; Hernández Ibarzábal & Bonilla, 2020).

Photovoltaics can represent an opportunity for Mexico to break away from this dependency and produce energy in quantities due to its advantageous location. German companies should consider this high potential in Mexico. The fact alone that the same solar plant in Mexico can produce twice as much electricity as in Germany and that the efficiency is over 90 percent shows that photovoltaics can be planned and profitable in the long term in Mexico.

8.1.6 High Profitability of the Photovoltaics Sector

The steadily falling cost of photovoltaic modules has enabled the worldwide expansion of photovoltaic systems, including in Mexico (Dutch ministry of Economic Affairs and Climate Policy, 2020; Mundo-Hernández et al., 2014). Growth of these technologies has been recorded in the last years in both utility-scale and distributed generation in Mexico (Dutch ministry of Economic Affairs and Climate Policy, 2020; Rodríguez Suárez et al., 2017). The relatively low cost of PV makes it possible to compete with both hydropower and fossil fuels in the future (KPMG, 2016; Romero-Hernandez, et al., 2012; Viscidi, 2018). This is also due to the fact that Mexico's oil sector, for example, has not been competitive for a long time due to outdated technologies and relies on expensive investments (Department for International Trade, Foreign & Commonwealth Office, and Foreign, Commonwealth & Development Office, 2021; Hernández Ibarzábal & Bonilla, 2020).

In contrast, photovoltaics offers easy installation, decreasing costs and a high return of investment over a period of 5-15 years (Dutch ministry of Economic Affairs and Climate Policy, 2020). It is still a very young and new market in Mexico, but this emerging sector promises high profitability (KPMG, 2016).

8.2 Threats

This sub-chapter examines the threats for German companies in the Mexican photovoltaic market: Current Government and US Dependency, Public Administration, Financing Aspects, Structural, Environmental and Cultural Challenges, Infrastructure as well as Strong Competition.

8.2.1 Current Government and US Dependency

The most obvious problem is caused by politics because the current government under AMLO wants to weaken the energy reform and give more power to CFE and PEMEX (Starr, 2021; The Economist, 2021). The goal of this is to put more focus on fossil fuels and minimize private investment (Dresser, 2019; Hernández Ibarzábal & Bonilla, 2020; Starr, 2021; The Economist, 2021). The background behind this is AMLO's protectionist oil obsession with making Mexico self-sufficient in hydrocarbons (Dresser, 2019). Investments have already been made in new oil refineries (Dresser, 2019). Since fossil fuels are being pushed by this government, market entry for companies in the renewable energy sector seems to be difficult and unattractive. As a result, investors are also staying away from solar projects, as this is associated with too much risk (Dutch ministry of Economic Affairs and Climate Policy, 2020; EY Mexico, 2018; Walsh et al., 2020).

An initiative by the government is particularly tailored to utility-scale. It is almost impossible or very difficult to obtain permits for large solar parks. For this reason, utility-scale is currently extremely problematic in Mexico and is not making any progress. This is particularly critical for companies in the photovoltaic sector due to the uncertainty and block of large-scale solar parks. There is insufficient capacity for such large parks, as no capacity is provided by CFE (Starr, 2021; The Economist, 2021). Furthermore, the connection of new and existing solar systems to the electricity grid has been suspended (Walsh et al., 2020). In addition, the auction system is to be terminated and the dispatch order changed. CFE will be given more freedom again and private companies will be disadvantaged by coming last in the order (Dutch ministry of Economic Affairs and Climate Policy, 2020; SolarPower Europe, 2021; Steinmeyer, 2020).

The fact that the previous government pushed for a change to renewable energies and the current one is doing exactly the opposite shows another problem in Mexico: planning security due to changes in government. These radical changes of political positions in the government make long-term planning impossible because it is unpredictable. As a result, Mexico suffers as a location for solar energy, as private companies and investors are discouraged (EY Mexico, 2018; Walsh et al., 2020). Obviously, the fact that Mexico has been an oil-rich country for years also plays a role. This is shown by the fact that almost 70 % of electricity is still powered by petroleum and coal (BP, 2022; US Energy Information Administration (eia), 2020).

A radical change to renewable energies is difficult to realize. Especially with a lack of support from the government.

8.2.2 Public Administration

Dealing with authorities and the bureaucracy is another major challenge. These include construction permits, registering property, enforcing contracts, protecting minority investors, or paying taxes (World Bank, 2021a). In the public sector in Mexico, it can frequently occur that there are delays and lengthy negotiations in order to obtain a permit, for example (Mundo-Hernández et al., 2014). In the public sector, it is also common that corruption and bribery play a role in speeding up the process (Transparency International, 2020). The public sector also includes the CFE. To enter the photovoltaic sector in Mexico, there is a dependency on CFE, because this entity is responsible for granting a grid connection (KPMG, 2016). If CFE does not approve this, the whole project can fail.

However, there is a problem with the network operators. Some of their employees have no knowledge of the subject matter like photovoltaic, for example how a solar park is connected. On the one hand, there is a lack of training, and on the other hand, there is a lack of up-to-date knowledge about the legislation. This in turn can lead to lengthy discussions and long waiting times.

8.2.3 Financing Aspects (High Subsidies, Exchange Rate, Banking Financing)

Financial aspects of gaining a foothold in the photovoltaic sector in Mexico can also pose problems.

One of these is the financing of projects (KPMG, 2016; Potowski & Groß, 2018). High initial costs are necessary for a photovoltaic system, which is why financing is needed. The entire solar energy sector is still relatively new, and complex compared to other forms of energy and therefore associated with uncertainties for banks, which is also linked to politics, for example (KPMG, 2016). In some cases, banks do offer financing for such projects, but only under unfavorable, expensive conditions in order to minimize risk.

Furthermore, the fluctuating exchange rate is problematic for the financing of photovoltaic projects, which makes cost planning difficult (EY Mexico, 2018).

Mexico's dependence on the USA is also noticeable here because the volatility of the Mexican peso is strongly linked to the US situation. For example, the new USMCA trade agreement, fluctuations in oil and gas prices or rising interest rates led to a devaluation of the Mexican peso (EY Mexico, 2018).

The permanent corporate tax rate has been at 30% for years, which is above average compared to other countries, making the decision to enter the Mexican market no easier (KPMG, 2021).

Another challenge worth mentioning is the high subsidies on electricity prices from CFE. Residents receive up to 80% and industrial customers 50% subsidies (Potowski & Groß, 2018; Viscidi, 2018). Due to these low prices, it is difficult for photovoltaic companies to offer this technology attractively and to achieve market penetration, as the Mexican population is cost sensitive.

In addition to the high subsidies on CFE electricity, cheap natural gas imports from the USA also compete with renewable energies such as photovoltaics (Dresser, 2019; Hernández Ibarzábal & Bonilla, 2020; Walsh et al., 2020).

8.2.4 Structural, Environmental and Cultural Challenges (Security, Indigenous, Lack of Awareness and Mentality, Poverty)

In Mexico, German companies must expect structural, environmental, and cultural challenges.

Mexico is still an emerging country with a high poverty rate (Mundo-Hernández et al., 2014). The country lacks the money to invest intensively in infrastructure or renewable energies such as photovoltaic systems (Mundo-Hernández et al., 2014). Unfortunately, corruption is also often a problem here, which makes the needed money disappear.

Poverty also makes itself felt among the population through criminal organizations such as the drug cartels, which are spread throughout the country but threaten security especially in the north and west of Mexico (Department for International Trade, Foreign & Commonwealth Office, and Foreign, Commonwealth & Development Office, 2021; Dorfinger et al., 2014).

Due to poverty and corruption, there is a great mistrust of unknown and new technologies in Mexico. As a result of this and the government's negative attitude

towards renewable energies, hardly any information is distributed regarding the functioning and benefits of photovoltaics (Mundo-Hernández et al., 2014). This lack of awareness and lack of knowhow in this area could cause great problems for German companies to establish themselves in the market, as a lot of persuasion and education is required. In addition, mistrust of foreign companies could come to the fore here.

Another example of what can emerge as a problem is the short-term mentality of Mexicans and the preference for a quick return on investment (Potowski & Groß, 2018). This is not the case with photovoltaics, because patience over several years is necessary for investment amortization. This can be a decisive factor in the decision for or against photovoltaics among Mexicans, as the payback can take years.

Among other things, the indigenous population and tradition in Mexico could pose a challenge. The indigenous population is very traditional and feels drawn to nature. For this reason, these peoples tend to be against renewable energy projects for environmental, social, and cultural reasons (Potowski & Groß, 2018; Robles, 2016; Viscidi, 2018). These indigenous peoples must also be included and rewarded in the process of project developers according to the Electricity Law. There is a consultation between both parties and if the indigenous peoples do not agree, the project cannot be started, which makes this population group very important in this context (Potowski & Groß, 2018; Robles, 2016; Viscidi, 2018).

In general, the situation of implementing photovoltaic projects is more difficult due to ecological heritage. This is often the case in Oaxaca or Yucatan, for example. In addition, there are also risks of severe weather disasters, such as hurricanes in Yucatan. This would be disadvantageous for solar plants.

Furthermore, building in Mexico is more difficult. The Yucatan region can be cited as an example, where many buildings are mostly made of porous limestone, which makes construction difficult. In addition, in Mexico there are hardly any construction plans of the buildings available, which is why the project developers are uncertain about what they might encounter during the construction phase and how the buildings are cut. This complicates the entire planning phase and is again associated with risks.

8.2.5 Infrastructure

The infrastructure in Mexico poses problems for photovoltaic expansion. The country is growing, but the transmission network is not because the government has failed to invest in it. The grid is outdated and overloaded, so that the capacities are not sufficient (Romero-Hernandez, et al., 2012; Viscidi, 2018). This means that while solar energy can be produced cheaply in Mexico, transferring it within the country proves difficult because of the overloaded grid. A good example is the northwest of the country with good conditions for solar energy, but the transfer to other parts of the country with higher demand is complicated because the capacities are not sufficient or new transmission networks would have to be laid first. This means that even though the demand and potential are there, it cannot be effectively exploited because of an old transmission network.

The procurement of photovoltaic components also turned out to be problematic. The market in Mexico is still relatively small with few suppliers and therefore availability is very fluctuating and low (KPMG, 2016; Romero-Hernandez, et al., 2012; Viscidi, 2018). At the same time, this causes purchase prices to rise, especially if high quality is required. For this reason, importing components from China or the USA is considered in most cases (KPMG, 2016; Romero-Hernandez, et al., 2012; Viscidi, 2018).

However, it is not only difficult to obtain material and components at an affordable price, but also qualified personnel. The photovoltaic market in Mexico is still relatively young, which is why the supply on the labor market is still low. There are plenty of university graduates and engineers, but few of these students specialize in renewable energies and especially photovoltaics. The highly qualified personnel with experience in the energy sector and legislation are usually already employed by a company and receive an above-average salary.

8.2.6 Strong Competition

The photovoltaic sector already has an excellent reputation due to its ease of installation, falling costs for solar modules and high investment return (Dutch ministry of Economic Affairs and Climate Policy, 2020). The same applies to Mexico. The downside is that there are already plenty of players in the market, so oversupply is a problem. In the end, the number of competitors will decrease over time and only

companies with a focus on quality and service will prevail, which could make it difficult for new companies to successfully enter the market (Dutch ministry of Economic Affairs and Climate Policy, 2020).

The degree and intensity of competition depends on the market segment. German companies must be aware of this and know from the outset exactly which market segment they want to enter and which strengths they can demonstrate in order to stand up to the strong competition.

Spanish companies in particular, but also Italian, French and US companies, have the upper hand in the Mexican photovoltaic sector. Primarily in the utility-scale segment, the market shares are largely distributed, but due to the government blockade in this segment, the larger companies are also spreading out in the distributed generation segment. This makes a successful market entry even more difficult, as these companies can rely on years of experience, relationships, financial power, and a large number of employees.

Table 4

Opportunities and Threats for German Project Companies to Enter the Mexican Photovoltaic Market

Opportunities	Threats
Energy reform and distributed generation	Current government and US dependency
Energy demand	Public administration
Business relations	Financing aspects (high subsidies, exchange rate, banking financing)
Engineering	Structural, environmental, and cultural challenges (security, indigenous, lack of awareness and mentality, poverty)
Mexico's location and environmental conditions	Infrastructure
High profitability of the photovoltaics sector	Strong competition

Note. Own Representation

8.3 Internal Resources

Both Goldbeck Solar and SOWITEC have successfully entered the Mexican photovoltaic market. Both companies have approached the market with different views and have different strategic capabilities despite operating in the same external sector.

Both companies are globally active in several countries and can rely on the experience (intangible asset) to establish themselves in new countries. With regard to Mexico, SOWITEC has been in the photovoltaic market in Mexico a little longer, as they have been operating there since 2013. Exactly at the time when the energy reform was realized and due to the demand and agreements with large international investors, which pushed SOWITEC into the market as a result. Through these years of experience and connections in Mexico, SOWITEC has already built a good reputation (intangible asset).

On the other hand, Goldbeck Solar is still a relatively unknown start-up in Mexico, which is still in the process of creating structures. It is problematic, for example, to find customers without connections, as much in this market runs through experience and contacts that the company does not yet have. Goldbeck Solar, however, has already completed several projects and thus created awareness and growing interest.

For both companies, having a large parent company based in Germany behind them is an advantage. The financial, logistical, and technological power of the parent companies helps. SOWITEC, for example, is not in a bad position financially, also because a large company like Vestas owns shares in SOWITEC and thus also receives support. Furthermore, SOWITEC in Mexico can rely on experience, knowledge, and skills from the Center of Excellence in Germany (intangible assets). This means that the engineering is implemented in Germany and can then be applied in various locations, such as Mexico.

The same is true for Goldbeck Solar Mexico. They can rely on financial support from the German parent company, whereas larger groups like those from Spain or Italy, for example, can rely on even more financial strength. In addition, the design and engineering are also done in Germany. Therefore, no large cost structures are built up in order to stay flexible and lean, which is advantageous in an emerging country like Mexico with unexpected changes within a short period of time.

Because Goldbeck Solar has already built up a good reputation in Germany and Europe, it possesses a good purchasing policy, which is also an advantage in Mexico.

In order to keep project costs low and to be able to react flexibly, such as in phases where no projects are pending, Goldbeck Solar hires an external company. This company came from a different industry but was trained by Goldbeck Solar to meet their requirements. Goldbeck Solar is also very happy with this, but it is a risk that they only have one external company and that the contract is not exclusive. It may happen that the external company is not available at a certain time, so Goldbeck Solar wants to look for an alternative for flexibility and risk hedging. SOWITEC, on the other hand, has a large workforce and does all the work in-house in order to act independently of external companies. Both companies head in different directions, so to speak.

What is true for both companies are the label "Made in Germany", which stands for quality and automatically increases their reputation in other countries such as Mexico. Goldbeck Solar, for example, points out that their projects are more expensive than those of other competitors, but they guarantee high standards and top quality.

As already mentioned, Goldbeck Solar takes care of everything from design to installation to operation of solar plants. One specific service that sets them apart from other competitors is offering in-house financing in the form of PPAs. This attracts customers and at the same time helps them with a problem, the financing of solar projects, which is initially associated with high costs. Especially in emerging markets like Mexico, such a concession with financial support is a big plus.

Another point with which Goldbeck Solar differentiates itself is a special construction method, because due to various problems with construction, the solar plants of Goldbeck Solar are not installed on roofs, but in open areas in the industrial park of the companies. This is done with trackers that tilt towards the sun and bifacials, whereby electricity can be generated from both sides by reflection. This way, electricity can be generated much more efficiently. This method of construction is new in Mexico and normally it is intended for larger areas due to cost and is theoretically not viable for smaller areas. However, due to its purchasing policy, Goldbeck Solar can afford to build this construction method on small areas in industrial zones and thus differentiate itself from competitors.

In addition to the center of excellence in Germany, experience, know-how and manforce, specialization in wind and solar projects also plays a major role at SOWITEC. In particular, SOWITEC sets itself apart from competitors through its ability to carry out environmental, social, and technical feasibility studies. As mentioned in the previous chapter, Mexico is a complex country where a lot of attention has to be paid to environmental, social and technical influences. Acting independently in this area and conducting these studies on its own is also a unique selling point for SOWITEC to be successful in the photovoltaic sector in Mexico and to adapt to different stakeholders and natural conditions.

All in all, both companies shine through tangible assets such as capital (financial resources), but intangible assets play a greater role. These include technical and entrepreneurial skills, experience and knowledge of the employees and

management (human resources), good relationships with investors and suppliers (relational resources), but also an established corporate culture with reputation, routines, and entrepreneurship competences (organizational resources). The engineering and design are carried out in Germany and the subsidiaries in the other countries, such as Mexico, can access this. The internationality again generates knowledge about different market segments, but also about how the company itself and the competitors operate in different environments (informational resources).

Both Goldbeck Solar and SOWITEC have the valuable resources of a large and successful parent company in Germany in Mexico. This gives both companies financial, logistical, and technological support, which is essential. Since the engineering and general technological research is done in Germany, the costs in Mexico can be kept low. This allows the companies to operate lean and react quickly to market changes. In addition, the brand "Made in Germany" still has a very high value and stands for quality.

Valuable for Goldbeck Solar, for example, is also the good purchasing policy they have been able to build up worldwide over the years. This also allows them to reduce costs enormously and, for example, to apply special construction methods to smaller areas, which would otherwise only be profitable on a large scale. A valuable offer for the customer from Goldbeck Solar is also the possibility of in-house financing. Among other things, SOWITEC can rely on long-term partnerships with investors and the fact that a large company like Vestas is involved in SOWITEC and thus also supports it. Furthermore, SOWITEC is an expert with the ability to carry out environmental, social, and technical feasibility studies.

Not many companies can rely on the help of a parent company with capital, experience, and reputation. This resource, as well as Goldbeck's in-house financing and special construction method and SOWITEC's independent studies, can therefore also be described as rare. This means that the first assumption of the RBV is given for both companies, namely heterogeneity.

All the previously mentioned resources are equally difficult to imitate. This may be due to complexity (special construction method, feasibility studies), culture ("Made in Germany") or history (experiences, relationships).

The organizational support is also given for both companies. Once again, the support of the parent company comes into play. This means that both companies

can fall back on resources, routines and processes that have helped the company in the past. Goldbeck Solar and SOWITEC can concentrate on the essentials in Mexico, as the planning, engineering and design of photovoltaic systems is carried out in Germany. SOWITEC has been established in Mexico for several years and Goldbeck Solar is still a start-up in Mexico, which is just establishing corporate structures in the country. Nevertheless, it can be said of both companies that all 4 characteristics of resources are fulfilled: Valuable, Rare, Inimitability and Organizational Support. Goldbeck Solar and SOWITEC can therefore demonstrate a sustainable competitive advantage in Mexico, which is also proven by their successful market entry.

9 Conclusion

This chapter summarizes the relevant findings of the research as a conclusion. In addition, the research conducted is critically appraised and the limitations identified are elaborated, which is followed by an outlook for possible future research and recommendations for action for the companies.

9.1 Summary

This master's thesis sought to answer two crucial questions regarding the renewable solar energy sector in Mexico:

- 1. What opportunities and risks do German project planning companies face in entering the Mexican photovoltaic market?*
- 2. What internal company resources are helpful in realizing these opportunities or minimize risks?*

For investors in solar energy Mexico presents an attractive location because of its geographic diversity and profitable market; however due to cultural, technological, and political reasons, the country remains a complicated case study in bringing solar energy to emerging countries. Therefore, this Master's thesis presented a detailed overview of the political, economic, social, technological, ecological, and legal framework of Mexico. After this framework was established, the thesis investigated the current state of the renewable energy industry using Porter's "Five Forces." The intent of this was to provide insight into the current state of the solar energy industry in Mexico in order to preface the main data collected for the study: interviews with two German project companies already established in Mexico. Methodologically, the thesis follows a qualitative analysis based on Sharan Merriam's method. Two companies of different sizes were chosen in order to vary the results and provide a more comprehensive perspective into the state of the industry potential in Mexico. The first company, Goldbeck Solar, has only three employees and is new in the Mexican market. The second company, SOWITEC, is already established in the region, with more connections, employees, and experience. Interviews were recorded and then compared with the political, economic, social, technological, ecological, and legal framework of Mexico, as well as with the current state of solar energy in the country.

Regarding the first research question, it became clear that there are ample opportunities for German companies to enter the solar energy market in Mexico—yet not without some difficulties. The literature exemplifies that investors have faced issues with changing Mexican administrations who give preference to conventional sources of energy, such as fossil fuels; and that the general population may be hesitant to accept changes in traditional energy accelerated by foreigners. Furthermore, technical problems—such as outdated electricity grid infrastructure—can also pose problems. Goldbeck Solar and SOWITEC both reiterated that politics and general distrust pose problems, however the larger company, SOWITEC, experienced more bureaucratic push back because they are more focused on utility scale projects which are currently blocked by the current government. Goldbeck Solar can act more freely as they are present into the distributed generation sector which is not affected as much by the legal framework of the current administration. Nevertheless, both companies have experienced success in Mexico. The competition in the solar energy industry in Mexico is fierce and the market shares largely distributed. However, both SOWITEC and Goldbeck Solar chose a favorable time to enter the market when market shares were still up for grabs. As a result, they were able to carve out their places in the market. Both companies can also distinguish themselves from the competition through certain unique selling points. Goldbeck Solar, for example, has a special construction method and its own financing to accommodate its customers. The company also relies on a subcontractor for their projects which allows them to survive moments of stagnation. SOWITEC is able to independently carry out environmental, social, and technical feasibility studies. This turns out to be helpful as discussions with indigenous peoples are often necessary and Mexico in general has complex environmental and social structures. The company also enjoys the privilege of having more experience in this industry in Mexico and all of the advantages—employees, connections, reputation—that comes with longevity.

The second research question builds on the first: the internal resources of each company dictate their strategy in the region. As mentioned, Goldbeck remains a new player in the market and thus maneuvers flexibly, being able to invest capital when the opportunity arises. SOWITEC relies on an extensive in-house framework which allows them a steady presence in the market but also comes with its risks as they brush up against the new government which seeks to promote fossil fuels instead

of renewable energy. In addition, both can rely on the financial and logistical backup of the parent company. For this reason, they are not exclusively dependent on loans from banks and do not build up large cost structures in Mexico, which allows them to remain agile and resilient.

Furthermore, the "Made in Germany" brand also plays an important role and strengthens their reputation abroad. Besides, years of experience in research, technology and international markets help to adapt to the new market. In addition, both brands have developed connections to suppliers, investors, and customers. As mistrust is common in Mexico, these connections and experiences can help to mitigate this and at the same time strengthen the lack of awareness of photovoltaics in the Mexican population. Through these internal resources, companies can take advantage of the excellent opportunities to promote photovoltaic in Mexico, but also minimize certain risks.

9.2 Limitations

There are also limitations to be mentioned in this Master's thesis. In terms of literature review, it was difficult to access current topics and gauge the status quo, as macroeconomics and industry are changing rapidly due to global events. As an example, the COVID19 crisis turned the world upside down, not only crushing global economies but also stalling the production of many components used in the solar energy supply chain. Individual customers also possessed less capital and were less likely to invest heavily into new forms of energy. For this reason, the analysis frameworks used can also be seen as limited, as they analyze a certain point in time but are less able to deal with changes, which is critical due to the dynamics and fast-moving nature of the economy.

The case studies with the two companies were very helpful to get an insight into individual companies and practice. However, they cannot be considered representative and generalized. The companies were not permitted to release specific financial data and did not want to expand on key business strategies considering that the market is competitive. Political relationships, both positive and negative, could also not be expanded on, considering the important role that they play in Mexico.

In addition, emphasis was only placed on project companies, as these can best represent the entire value chain. This was chosen to simplify the industry analysis, because the industry is complex, and it is not possible to deal explicitly with every stage of the value chain in this Master's thesis. The interview with Goldbeck Solar was conducted with a Business Development Manager and the interview with SOWITEC was with a project manager with a focus on engineering. Although each interviewee was extremely knowledgeable about the functions of their own departments, not every department was represented in detail for the study.

9.3 Implications for Research and Practice

Photovoltaic energy in Mexico can present researchers with many opportunities to better understand not only the technology and its environmental benefits, but also this economic market. Based on the limitations listed above, it would be worthwhile to expand the research and survey a large number of international companies in Mexico. Companies from different countries could be included to evaluate cultural and country-specific differences and similarities. Also, studying different value chain stages and subdivided by company size would help offer broader insight into the whole industry. A literature review with macroeconomic and industry analysis should be repeated at regular intervals to also represent a development in the country and not only the current moment. With regard to Mexico, the change under different governments would be particularly interesting.

In practice, it can be concluded that the photovoltaic market in Mexico is almost oversaturated and difficult to establish as a new company. Especially for small companies it is impossible to get a market share. For large corporations, which have a lot of experience, connections, manpower and financial power, a successful market entry is not easy, but it is realistic. It quickly becomes clear in this work that the political situation is trend-setting for the solar industry and Mexico is not exempt from this. In any case, companies should consider the current political situation with regard to renewable energies as a deterrent to entering the Mexican market. However, this can change very quickly as new presidential elections can completely turn the perspective in Mexico. This does not mean there is no hope for change. In 2024, a new president will be elected in Mexico with the hope that renewable energies will once again become the focus of attention. Because it is undisputed that Mexico's geographical location is excellent for solar energy. Moreover, the PV

sector is becoming more and more profitable, which is also an opportunity. The profitability is partly due to Mexico's business relations with many advantageous trade agreements to promote renewable energies and to get components into the country at a lower price. Furthermore, Mexico can be considered an engineering country, which makes the labour market attractive for international companies. For this reason, and especially because of the enormous opportunities the country offers for solar energy, companies should not write off the potential market of Mexico and constantly monitor developments.

These positive aspects about Mexico have of course not gone unnoticed and many international companies are already established in Mexico with large market shares. This strong competition makes it difficult for newcomers to enter the Mexican market.

Other challenges include political risks, low productivity and corruption in the public administration, financial aspects such as high subsidies on electricity prices, the volatile Mexican peso and the difficulty of obtaining cheap financing.

Structural, environmental and cultural challenges also have an enormous impact. These include old, expandable infrastructure, public security, the influence of indigenous peoples, but also poverty, lack of awareness and mentality issues.

Nevertheless, despite the challenges that the Mexican market may pose for investors and corporations, this research has shown that the geographic location and market in general show tremendous potential for a fruitful future in photovoltaic energy. A new government change, more awareness from locals, and less of an emphasis on fossil fuels could push Mexico into being a heavily competitive market for renewable solar energy in the future.

Bibliography

- A Dlouhy, J. (2021). *How China Beat the U.S. to Become World's Undisputed Solar Champion*. Bloomberg.
<https://www.bloomberg.com/news/articles/2021-06-04/solar-jobs-2021-how-china-beat-u-s-to-become-world-s-solar-championr>
- Adel, H. M., Zeinhom, G. A., & Mahrous, A. A. (2018). Effective management of an internationalization strategy: A case study on Egyptian–British universities' partnerships. *International Journal of Technology Management & Sustainable Development*, 17(2), 183–202.
https://doi.org/10.1386/tmsd.17.2.183_1
- Adeoye, B. F., & Tomei, L. A. (Eds.). (2014). *Effects of information capitalism and globalization on teaching and learning*. Information Science Reference.
- Aggarwal, R., Berrill, J., Hutson, E., & Kearney, C. (2010). What is a Multinational Company? Classifying the Degree of Firm-Level Multinationality. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.900522>
- Albaum, G. S., Duerr, E., & Josiassen, A. (2016). *International marketing and export management* (Eighth edition). Pearson.
- Alemán-Nava, G. S., Casiano-Flores, V. H., Cárdenas-Chávez, D. L., Díaz-Chavez, R., Scarlat, N., Mahlknecht, J., Dallemand, J.-F., & Parra, R. (2014). Renewable energy research progress in Mexico: A review. *Renewable and Sustainable Energy Reviews*, 32, 140–153.
<https://doi.org/10.1016/j.rser.2014.01.004>
- Banco Santander. (2021a). *MEXICO: Economic and Political Outline*. Santander Trade. https://santandertrade.com/en/portal/analyse-markets/mexico/economic-political-outline?url_de_la_page=%2Fen%2Fportal%2Fanalyse-

markets%2Fmexico%2Feconomic-political-

outline&&actualiser_id_banque=oui&id_banque=0&memoriser_choix=memoriser

Banco Santander. (2021b). *Mexico: Foreign Investment*. Santander Trade.

<https://santandertrade.com/en/portal/establish-overseas/mexico/foreign-investment>

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, 17(1), 99–120.

<https://doi.org/10.1177/014920639101700108>

Barney, J. B. (2002). *Gaining and sustaining competitive advantage* (2nd ed). Prentice Hall.

Baxter, P., & Jack, S. (2015). Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. *The Qualitative Report*.

<https://doi.org/10.46743/2160-3715/2008.1573>

Blechner, N. (2020). *Hoffnung auf einen Solarboom 2.0*. Tagesschau.De.

<https://www.tagesschau.de/wirtschaft/boerse/solarindustrie-in-deutschland-101.html>

Bondra, J. (n.d). *P.E.S.T.E.L/P.E.S.T.L.E. Analysis of a Company, Industry or Product*. Itahaca College Library.

<https://libguides.ithaca.edu/c.php?g=847270&p=6063743>

BP. (2022). *BP Statistical Review of World Energy 2021*.

Briggs, H. (2021). *What is the Paris climate agreement and why did the US rejoin?*

BBC. <https://www.bbc.com/news/science-environment-35073297>

Connor, T. (2002). The resource-based view of strategy and its value to practising managers. *Strategic Change*, 11(6), 307–316.

<https://doi.org/10.1002/jsc.593>

- Cordell, A., & Thompson, I. (2018). *The category management handbook* (1 Edition). Routledge.
- Dellinger, A. (2021). *Gigawatt: The solar energy term you should know about*. CNET. <https://www.cnet.com/home/energy-and-utilities/gigawatt-the-solar-energy-term-you-should-know-about/>
- Demmler, M., Ortiz Ayala, R., & Urbiola Solís, A. (2018). Comparing Corporate Cultural Profiles Using the Cultural Dimensions of Hofstede. *Journal of Business and Management Sciences*, 6(2), 28–35.
<https://doi.org/10.12691/jbms-6-2-1>
- Department for International Trade, Foreign & Commonwealth Office, and Foreign, Commonwealth & Development Office. (2021). *Overseas Business Risk—Mexico*. <https://www.gov.uk/government/publications/overseas-business-risk-mexico/overseas-business-risk-mexico>
- Dorfinger, P., Maaß, K., Kober, M., & Hanewinkel, N. (2014). *Marktreport Mexiko—Photovoltaik*. Deutsche Energie-Agentur GmbH (dena).
- Dresser, D. (2019). *MEXICO: López Obrador's "Fourth Transformation."* Berkeley Review of Latin American Studies.
<https://clas.berkeley.edu/research/mexico-lópez-obrador's-fourth-transformation>
- Dunning, J. H. (1980). Toward an Eclectic Theory of International Production: Some Empirical Tests. *Journal of International Business Studies*, 11(1), 9–31. <https://doi.org/10.1057/palgrave.jibs.8490593>
- Dutch ministry of Economic Affairs and Climate Policy. (2020). *Business opportunities for Dutch companies in the Mexican renewable energy sector*. Dutch ministry of Economic Affairs and Climate Policy.
- Ehringfeld, K. (2019). *Mexikos Präsident López Obrador bekommt den*

- Drogenkrieg nicht unter Kontrolle*. Handelsblatt.
<https://www.handelsblatt.com/politik/international/ein-jahr-im-amt-mexikos-praesident-lpez-obrador-bekommt-den-drogenkrieg-nicht-unter-kontrolle/25282480.html?ticket=ST-94617-iHwQScPL2U1XKSX1EqY-ap3>
- Ehringfeld, K. (2021). *Mexiko wird als Wirtschaftsstandort immer heikler*. Handelsblatt.
<https://www.handelsblatt.com/meinung/kommentare/kommentar-mexiko-wird-als-wirtschaftsstandort-immer-heikler/27079098.html>
- Ember. (2022). *Global Electricity Review 2022*.
- Euler Hermes. (2021). *Country Risk—Mexico*. Euler Hermes.
https://www.eulerhermes.com/en_global/economic-research/country-reports/Mexico.html#link_internal_3
- EY. (2020). *Renewable Energy Country Attractiveness Index. 56th Edition*.
https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/power-and-utilities/ey-renewable-energy-country-attractiveness-index-56.pdf
- EY Mexico. (2018). *Mexico's New Energy Era*. German-Mexican Energy Partnership.
- Fiol, C. M. (2001). Revisiting an identity-based view of sustainable competitive advantage. *Journal of Management*, 27(6), 691–699.
<https://doi.org/10.1177/014920630102700606>
- Gil Perez, A. J., & Hansen, T. (2020). Technology characteristics and catching-up policies: Solar energy technologies in Mexico. *Energy for Sustainable Development*, 56, 51–66. <https://doi.org/10.1016/j.esd.2020.03.003>
- Goldbeck Solar GmbH. (n.d.). *Goldbeck Solar*. Goldbeck Solar.
<https://goldbecksolar.com/de/unternehmen/>
- Government of Mexico. Ministry of Environment and Natural Resources. (2020).

Nationally Determined Contributions. 2020 Update.

- Goyal, A. (2020). A Critical Analysis of Porter's 5 Forces Model of Competitive Advantage. *Journal of Emerging Technologies and Innovative Research (JETIR)*, Volume 7(7), 149–152.
- Hernández Ibarzábal, J. A., & Bonilla, D. (2020). Examining Mexico's energy policy under the 4T. *The Extractive Industries and Society*, 7(2), 669–675.
<https://doi.org/10.1016/j.exis.2020.03.002>
- Hofstede, G. (2011). Dimensionalizing Cultures: The Hofstede Model in Context. *Online Readings in Psychology and Culture*, 2(1).
<https://doi.org/10.9707/2307-0919.1014>
- Hofstede, G. H., Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations: Software of the mind: intercultural cooperation and its importance for survival* (3rd ed). McGraw-Hill.
- Hook, S. (2019). *Einführung in die Regenerative Energiewirtschaft*. Springer Fachmedien Wiesbaden. <https://doi.org/10.1007/978-3-658-22416-5>
- Hopkins, M., & Li, Y. (2016). The Rise of the Chinese Solar Photovoltaic Industry. In Y. Zhou, W. Lazonick, & Y. Sun (Eds.), *China as an Innovation Nation* (pp. 306–332). Oxford University Press.
<https://doi.org/10.1093/acprof:oso/9780198753568.003.0012>
- Hsu, C.-W., Lien, Y.-C., & Chen, H. (2013). International ambidexterity and firm performance in small emerging economies. *Journal of World Business*, 48(1), 58–67. <https://doi.org/10.1016/j.jwb.2012.06.007>
- Hunt, S. D. (2000). *A General Theory of Competition: Resources, Competences, Productivity, Economic Growth*. SAGE Publications, Inc.
<https://doi.org/10.4135/9781452220321>
- Hunt, S. D., & Morgan, R. M. (1995). The Comparative Advantage Theory of

- Competition. *Journal of Marketing*, 59(2), 1–15.
<https://doi.org/10.1177/002224299505900201>
- Instituto Nacional de Estadística y Geografía (INEGI). (2021a). *GDP and National Accounts*. Inegi.
- Instituto Nacional de Estadística y Geografía (INEGI). (2021b). *National Consumer Price Index (CPI)*. Inegi.
- Instituto Nacional de Estadística y Geografía (INEGI). (2021c). *Unemployment Rate*. Inegi.
- IRENA. (2016). *Renewable Energy Market Analysis: Latin America*. IRENA.
- IRENA. (2019). *Future of Solar Photovoltaic: Deployment, investment, technology, grid integration and socio-economic aspects (A Global Energy Transformation: Paper)*.
- Janet, T. (2013). The PESTEL Environment and Its Impact on the Value Created. *INTERNATIONAL JOURNAL OF MANAGEMENT & INFORMATION TECHNOLOGY*, 6(2), 805–816.
- Johanson, J., & Vahlne, J.-E. (1977). The Internationalization Process of the Firm—A Model of Knowledge Development and Increasing Foreign Market Commitments. *Journal of International Business Studies*, 8(1), 23–32.
<https://doi.org/10.1057/palgrave.jibs.8490676>
- Johnson, G., Whittington, R., Scholes, K., Angwin, D., Regnér, P., & Pyle, S. (2014). *Exploring strategy* (Tenth edition). Pearson.
- Johnson, W. H. A. (2021). *Managing global strategy: Developing an effective strategy in international business*. Routledge/Taylor & Francis Group.
- Johst, C.-B. (2009). *Erneuerbare Energien in Lateinamerika die nachhaltige Internationalisierung von Unternehmen: Das Beispiel Costa Rica*.
<http://www.diplomica.de>

- Jurasz, J., Canales, F. A., Kies, A., Guezgouz, M., & Beluco, A. (2020). A review on the complementarity of renewable energy sources: Concept, metrics, application and future research directions. *Solar Energy*, 195, 703–724. <https://doi.org/10.1016/j.solener.2019.11.087>
- Kaczmarek, S., & Ruigrok, W. (2013). In at the Deep End of Firm Internationalization: Nationality Diversity on Top Management Teams Matters. *Management International Review*, 53(4), 513–534. <https://doi.org/10.1007/s11575-012-0159-7>
- Kaiser, R. (2014). *Qualitative Experteninterviews*. Springer Fachmedien Wiesbaden. <https://doi.org/10.1007/978-3-658-02479-6>
- Keeley, A. R., & Matsumoto, K. (2018). Relative significance of determinants of foreign direct investment in wind and solar energy in developing countries – AHP analysis. *Energy Policy*, 123, 337–348. <https://doi.org/10.1016/j.enpol.2018.08.055>
- Khan, S. N. (2014). Qualitative Research Method—Phenomenology. *Asian Social Science*, 10(21), p298. <https://doi.org/10.5539/ass.v10n21p298>
- Kihm, A., & Trommer, S. (2014). The new car market for electric vehicles and the potential for fuel substitution. *Energy Policy*, 73, 147–157. <https://doi.org/10.1016/j.enpol.2014.05.021>
- Knight, J. (2015). Updated Definition of Internationalization. *International Higher Education*, 33. <https://doi.org/10.6017/ihe.2003.33.7391>
- KPMG. (2016). *Opportunities in the Mexican Electricity Sector*. KPMG.
- KPMG. (2021). *Corporate Tax Rates Table*. KPMG. <https://home.kpmg/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html>
- Kraaijenbrink, J., Spender, J., & Groen, A. (2010). The resource-based view: A

- review and assessment of its critiques. *Journal of Management*, Vol.36(1), 349–372.
- Kuckartz, U. (2016). *Qualitative Inhaltsanalyse: Methoden, Praxis, Computerunterstützung* (3., überarbeitete Auflage). Beltz Juventa.
- Kutschker, M., & Schmid, S. (2011). *Internationales Management: Mit 100 Textboxen* (7., überarb. und aktualisierte Aufl). Oldenbourg.
- Lafond, F., Bailey, A. G., Bakker, J. D., Rebois, D., Zadourian, R., McSharry, P., & Farmer, J. D. (2018). How well do experience curves predict technological progress? A method for making distributional forecasts. *Technological Forecasting and Social Change*, 128, 104–117.
<https://doi.org/10.1016/j.techfore.2017.11.001>
- Lev, B. (2001). *Intangibles: Management, measurement, and reporting*. Brookings Institution Press.
- Lilienthal, D. E. (1960). *The multinational corporation: A review of some problems and opportunities for business management in a period of world-wide economic change*. Development and Resources Corporation.
- López Morales, J. S. (2020). Internationalization: An Analysis of 26 Definitions. *Intersticios Sociales*, 19, 87–99. <https://doi.org/10.55555/IS.19.290>
- Mercado, P. R., & Rajagopal, N. A. (2013). Renewable energy market in Mexico: A research framework. *International Journal of Business Competition and Growth*, 3(1), 23. <https://doi.org/10.1504/IJBCG.2013.051642>
- Merriam, S. B. (1988). *Case study research in education: A qualitative approach* (1st ed). Jossey-Bass.
- Merriam, S. B. (1998). *Qualitative research and case study applications in education* (2nd ed). Jossey-Bass Publishers.
- Mexiko-Stadt verordnet sich bessere Luft. (2019). Zeit Online.

- https://www.zeit.de/politik/ausland/2019-12/klimaschutz-mexiko-stadt-luftqualitaet-massnahmen-treibhausgase?utm_referrer=https%3A%2F%2Fwww.google.com%2F
- Miller, D. (2003). An asymmetry-based view of advantage: Towards an attainable sustainability. *Strategic Management Journal*, 24(10), 961–976.
<https://doi.org/10.1002/smj.316>
- Mundo-Hernández, J., de Celis Alonso, B., Hernández-Álvarez, J., & de Celis-Carrillo, B. (2014). An overview of solar photovoltaic energy in Mexico and Germany. *Renewable and Sustainable Energy Reviews*, 31, 639–649.
<https://doi.org/10.1016/j.rser.2013.12.029>
- Pao, H.-T., Li, Y.-Y., & Hsin-Chia Fu. (2014). Clean energy, non-clean energy, and economic growth in the MIST countries. *Energy Policy*, 67, 932–942.
<https://doi.org/10.1016/j.enpol.2013.12.039>
- Patil Desai, S., Wagh, M., & Shinde, N. N. (2017). A Review on Floating Solar Photovoltaic Power Plants. *International Journal of Scientific & Engineering Research*, 8(6), 789–794.
- Pereira da Silva, P., Dantas, G., Pereira, G. I., Câmara, L., & De Castro, N. J. (2019). Photovoltaic distributed generation – An international review on diffusion, support policies, and electricity sector regulatory adaptation. *Renewable and Sustainable Energy Reviews*, 103, 30–39.
<https://doi.org/10.1016/j.rser.2018.12.028>
- Perlitz, M., & Schrank, R. (2013). *Internationales Management* (6., vollst. neu bearb. Aufl). UVK Verl.-Ges. [u.a.].
- Pfeiffer, B., & Mulder, P. (2013). Explaining the diffusion of renewable energy technology in developing countries. *Energy Economics*, 40, 285–296.
<https://doi.org/10.1016/j.eneco.2013.07.005>

- Porter, M. E. (1998). *Competitive strategy: Techniques for analyzing industries and competitors: with a new introduction* (1st Free Press ed). Free Press.
- Porter, M. E. (2008). The five competitive forces that shape strategy. *Harvard Business Review*, 86(1), 78–93, 137.
- Postigo-Urbe, J. A., Palma-Cruz, P., Hernandez-Ernult, M. E., & Trejo-Galvez, T. E. (2021). *The Renewable Energy Law Review: Mexico*. The Law Reviews. <https://thelawreviews.co.uk/title/the-renewable-energy-law-review/mexico>
- Potowski, K., & Groß, J. (2018). *MEXIKO Solarthermie und Photovoltaik Zielmarktanalyse 2018 mit Profilen der Marktakteure*. Deutsch-Mexikanische Industrie- und Handelskammer (AHK Mexiko).
- Priem, R. L., & Butler, J. E. (2001). Is the Resource-Based “View” a Useful Perspective for Strategic Management Research? *The Academy of Management Review*, 26(1), 22. <https://doi.org/10.2307/259392>
- Quaschnig, V. (2019). *Regenerative Energiesysteme: Technologie - Berechnung - Klimaschutz* (10., aktualisierte und erweiterte Auflage). Hanser.
- Rapoza, K. (2021). *How China’s Solar Industry Is Set Up To Be The New Green OPEC*. Forbes. <https://www.forbes.com/sites/kenrapoza/2021/03/14/how-chinas-solar-industry-is-set-up-to-be-the-new-green-opec/?sh=5516ce91446d>
- Ritchie, H., Roser, M., & Rosado, P. (2020). *Energy*. OurWorldInData.Org. <https://ourworldindata.org/energy>
- Robles, A. (2016). *Tracking the Progress of Mexico’s Power Sector Reform*. Wilson Center Mexico Institute.
- Rodríguez Suárez, J. S., Navarrete Espinoza, E., Rosenbusch, J., Ortega Navarro, H. O., Martinez Fernandez, Dr. M., Cedano Villavicencio, K. G., & Armenta, M. (2017). *La Industria Solar Fotovoltaica y Fototérmica en*

México. 1st Edition.

- Rodríguez-Carvajal, R., Isiordia Lachica, P., Taddei, J., Picón-Núñez, & Romero Hidalgo, J. A. (2018). The Market Prospect of Solar Technology in Mexico. In *Solar Collectors* (pp. 223–247). Nova Science Publishers.
- Romero-Hernandez, S., Rodríguez-granada, B. D., Romero-Hernández, O., & Wood, D. (2012). *Solar Energy Potential in Mexico's Northern Border States*. Woodrow Wilson International Center for Scholars - Mexico Institute.
- Romero-Hernández, S., Romero-Hernández, O., & Wood, D. (2013). *Renewable Energy in Mexico: Policy and Technologies for a Sustainable Future*. Woodrow Wilson International Center for Scholars Mexico Institute.
- Sammut-Bonnici, T., & Galea, D. (2015). PEST analysis. In C. L. Cooper (Ed.), *Wiley Encyclopedia of Management* (pp. 1–1). John Wiley & Sons, Ltd.
<https://doi.org/10.1002/9781118785317.weom120113>
- Saunders, M. N. K., Lewis, P., & Thornhill, A. (2015). *Research methods for business students* (Seventh edition). Pearson Education.
- SENER. (2020). *Sistema de Información Energética Secretaría de Energía Dirección General de Planeación e Información Energéticas Evolución de la capacidad instalada por tipo de tecnología 2018-2032*. SENER.
http://sie.energia.gob.mx/bdiController.do?action=cuadro&cvecua=DIPS_SE_C33_ESP
- Shatskaya, E., Samarina, M., & Nekhorosheva, K. (2016). *Pestel Analysis as a Tool of Strategic Analysis in International Markets*. 2nd International Conference: Science and practice: a new level of integration in the modern world, Sheffield.
- Sheehan, N. T., & Foss, N. J. (2007). Enhancing the prescriptiveness of the

- resource-based view through Porterian activity analysis. *Management Decision*, 45(3), 450–461. <https://doi.org/10.1108/00251740710745070>
- SolarPower Europe. (2021). *Global Market Outlook For Solar Power 2021—2025*.
- SOWITEC group GmbH. (n.d.). SOWITEC. SOWITEC.
<https://www.sowitec.com/de/>
- Starr, P. (2021). *Energy is the spark that blows up López Obrador's Mexico plans*. Financial Times. <https://www.ft.com/content/985bcc4f-c20b-496c-bb1f-0d0c91f57d0d>
- Steinmeyer, F. (2020). *La industria fotovoltaica mexicana está en constante evolución*. El Economista. <https://www.eleconomista.com.mx/opinion/La-industria-fotovoltaica-mexicana-esta-en-constante-evolucion-20200213-0021.html>
- Stillman, A., & de Haldevang, M. (2021). *Energy Protectionism in Mexico Has Made Climate the Victim*. Bloomberg.
<https://www.bloomberg.com/news/articles/2021-01-09/energy-protectionism-in-mexico-has-made-climate-the-victim>
- Teece, D. J. (2018). Business models and dynamic capabilities. *Long Range Planning*, 51(1), 40–49. <https://doi.org/10.1016/j.lrp.2017.06.007>
- The Economic Times. (2021). *Definition of “Market Concentration.”* The Economic Times. <https://economictimes.indiatimes.com/definition/market-concentration>
- The Economist. (2021). *A bad energy law says much about Mexico's president*. The Economist. <https://www.economist.com/the-americas/2021/03/11/a-bad-energy-law-says-much-about-mexicos-president>
- Transparency International. (2020). *Corruption Perceptions Index*. Transparency International. <https://www.transparency.org/en/countries/mexico>

- Trommsdorf, M., Gruber, S., & Keinath, T. (2020). *Agro-Photovoltaik: Chance für Landwirtschaft und Energiewende*. Fraunhofer-Institut für Solare Energiesysteme.
- UNCTAD (Ed.). (2020). *International production beyond the pandemic* (30th anniversary edition). United Nations.
- United Nations. (2015). *Paris Agreement*.
- United Nations, Department of Economic and Social Affairs, Population Division. (2018). *World Urbanization Prospects: The 2018 Revision*. Online Edition. <https://population.un.org/wup/Download/>
- United Nations, Department of Economic and Social Affairs, Population Division. (2019). *World Population Prospects 2019*. Online Edition. Rev. 1. <https://population.un.org/wpp/Download/Standard/Population/>
- US Energy Information Administration (eia). (2020). *Country Analysis Executive Summary: Mexico*.
- Vargas-hernández, J. G., & Espinosa, E. R. A. (2016). Solar Panel and Renewable Energy in Mexico Development and Outlook for Photovoltaic. *International Journal of Environment and Sustainability*, 5(2). <https://doi.org/10.24102/ijes.v5i2.677>
- Velez-Calle, A., Sanchez-Henriquez, F., & Contractor, F. (2018). Internationalization and performance: The role of depth and breadth. *Academia Revista Latinoamericana de Administración*, 31(1), 91–104. <https://doi.org/10.1108/ARLA-04-2017-0125>
- Vidal-Amaro, J. J., Østergaard, P. A., & Sheinbaum-Pardo, C. (2015). Optimal energy mix for transitioning from fossil fuels to renewable energy sources – The case of the Mexican electricity system. *Applied Energy*, 150, 80–96. <https://doi.org/10.1016/j.apenergy.2015.03.133>

- Vietor, R. H. K., & Haviland, S.-T. (2017). *Mexico's Energy Reform*. Harvard Business School Case 717-027.
- Viscidi, L. (2018). *Mexico's Renewable Energy Future*. Wilson Center Mexico Institute.
- Walsh, E., Blomeier, H.-H., & Beck, A.-K. (2020). *Nostalgie statt Zukunft*. Konrad-Adenauer-Stiftung.
- Welch, L. S., & Luostarinen, R. (1988). Internationalization: Evolution of a Concept. *Journal of General Management*, 14(2), 34–55.
<https://doi.org/10.1177/030630708801400203>
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, 5(2), 171–180. <https://doi.org/10.1002/smj.4250050207>
- Wiesner, K. A. (2005). *Internationales Management* (1. Aufl.). Oldenbourg.
- World Bank. (2020). *Poverty & Equity Brief, Latin America & The Caribbean—Mexico*. https://databank.worldbank.org/data/download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D68AFE/Global_POVEQ_MEX.pdf
- World Bank. (2021a). *Doing Business 2020*. The World Bank.
<https://www.doingbusiness.org/en/doingbusiness>
- World Bank. (2021b). *Gini-Index Mexico*.
<https://data.worldbank.org/indicator/SI.POV.GINI?locations=MX>
- World Bank. (2021c). *Worldwide Governance Indicators*. World Bank.
<https://databank.worldbank.org/source/worldwide-governance-indicators#>
- WSEAS (Ed.). (2009). *Advances in marketing, management and finances: Proceedings of the 3rd International Conference on Management, Marketing and Finances (MMF'09), Houston, USA, April 30-May 2, 2009*. WSEAS.
- Wustmans, M. (2019). Methodisches Vorgehen. In M. Wustmans, *Patent*

- Intelligence zur unternehmensrelevanten Wissenserschließung* (pp. 69–85). Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-24066-0_4
- Yaneva, M., Tisheva, P., & Tsanova, T. (2018). *The Big Mexico Renewable Energy Report*. Renewables Now.
- Yazan, B. (2015). Three Approaches to Case Study Methods in Education: Yin, Merriam, and Stake. *The Qualitative Report*. <https://doi.org/10.46743/2160-3715/2015.2102>
- Yin, R. K. (2014). *Case study research: Design and methods* (Fifth edition). SAGE.
- Zafar, M. W., Shahbaz, M., Sinha, A., Sengupta, T., & Qin, Q. (2020). How renewable energy consumption contribute to environmental quality? The role of education in OECD countries. *Journal of Cleaner Production*, 268, 122149. <https://doi.org/10.1016/j.jclepro.2020.122149>

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A 1: Abstract

A 1.1: Abstract (English)

Climate change is a serious problem that must be actively addressed. One option is to promote renewable energy worldwide, such as solar power, to reduce harmful CO₂ emissions.

This Master's thesis examines the potential of Mexico and its solar industry as an entry point for German project companies to promote photovoltaics energy in this emerging country. In particular, two research questions are explored: the opportunities and risks that German project companies face in the Mexican solar PV market, and what internal resources are useful to exploit these opportunities or minimize the risks. To this end, the macro-environment and the solar PV industry were analyzed using the PESTEL framework and Porter's five forces. Finally, two expert interviews with German companies established in Mexico were integrated into the case study to gain empirical insights into the macro-environment, the industry, but also the resources needed for successful market entry.

This qualitative case study approach concludes that Mexico is an attractive market due to its geographical diversity and offers many opportunities for solar energy deployment. However, due to cultural, technological, and political reasons, the country remains a complicated case study for solar energy deployment in emerging markets.

A 1.2: Abstract (German)

Der Klimawandel ist ein ernstes Problem, dem aktiv entgegengewirkt werden muss. Eine Möglichkeit ist eine weltweite Förderung von erneuerbaren Energien, wie z.B Solarenergie, um die schädlichen CO₂-Emissionen zu reduzieren.

Die vorliegende Masterarbeit untersucht das Potenzial Mexikos und seiner Photovoltaik-Industrie als Markteintrittsmarkt für deutsche Projektunternehmen, um Photovoltaik in diesem Schwellenland zu fördern. Hierbei werden insbesondere zwei Forschungsfragen genauer beleuchtet: Die Chancen und Risiken von deutschen Projektunternehmen im mexikanischen Photovoltaik-Markt sowie welche internen Ressourcen hilfreich sind, um diese Chancen zu realisieren bzw. Risiken zu minimieren. Hierfür wurden mithilfe des PESTEL Frameworks und Porters Five Forces das Makroumfeld und die Photovoltaik-Industrie analysiert. Abschließend wurden zwei Experteninterviews mit etablierten deutschen Unternehmen in Mexiko geführt und in die Fallstudie integriert, um einen empirischen Einblick zu dem Makroumfeld, der Industrie, aber auch notwendiger Ressourcen für einen erfolgreichen Markteinstieg, zu bekommen.

Dieser qualitative Fallstudienansatz kommt zu dem Ergebnis, dass Mexiko aufgrund seiner geografischen Vielfalt ein attraktiver Markt ist und viele Möglichkeiten bietet, um Solarenergie zu verbreiten. Aufgrund kultureller, technologischer und politischer Gründe bleibt das Land jedoch ein kompliziertes Fallbeispiel für die Einführung der Solarenergie in Schwellenländern.

A2: Interview Guideline

1. General:

- Questions about company (business model) and person
- How long has your company been active in Mexico?

2. Motives for Market Entry?

- Why did you decide to enter the Mexican market (motives)?

3. Macro Environment (PESTEL)

- Which aspects are important to you when you analyze a market from the beginning?
What do you look at in particular?
- Go into detail (related to Mexico): Political, Economic, Social, Technological, Environmental, Legal

4. Industry (5 Forces)

- How would you describe the current situation in the PV sector in Mexico? (Strategic Groups, Network Effects, Market Segmentation, Strategic Customer).
- What are the barriers to market entry? Competition? Substitution? Suppliers?
New competitors? Buyers? Overcoming them?
- Who do you see as competitors? Is the market already crowded?
Competitors rather Mexican or foreign companies? New market entrants?
- Substitution services/products as a barrier? E.g., gas/oil?
- What is the power of suppliers? Who are the suppliers?
- Power of customers? Who are customers? Private households? Industrial customers? Public customers? Private electricity producers (IPP, small producers)?

5. Resources and Capabilities:

- What can you offer to the PV sector (strengths)? How are you different from other companies? Competitive Advantage?
- Where are other competitors ahead of you?

6. Summary:

- What opportunities does the Mexican PV sector offer your company?
- What challenges do you face? Which were obvious before entering the market and which ones were surprising?
- How do you see the future in the PV market in Mexico?

A3: Interview Transcripts

A3.1: Interview Transcript with Mr.Foeth from Goldbeck Solar (Interview 1)

(2) I= Interviewer

(3) AF= Alexander Foeth

(4) I: Ich schreibe derzeit meine Masterarbeit über Markteintritt bzw.

Internationalisierung von deutschen Unternehmen in den mexikanischen Photovoltaik-Markt. Und möchte sozusagen die Chancen und Risiken evaluieren, die die Unternehmen dort erwarten. Ich mache das anhand von Experteninterviews, um daraus Case-Studies zu bilden, um dann die Theorie mit der Praxis zu verbinden und einen Überblick zu verschaffen.

[0:00 – 0:31]

(5) AF: Super. Ja, dann kann ich Ihnen gerne etwas aus der Praxis erzählen.

Wie wollen wir vorgehen? Wollen wir durch die Fragen gehen? [0:32 – 0:43]

(6) I: Ja, ich würde einfach sagen, wir machen das so nach dem Rahmen, dass wir einfach nichts vergessen. [0:44 – 0:47]

(7) AF: Ja, das ist eigentlich ganz gut. Da können wir uns ein bisschen ranhangeln. Soll ich dann mal anfangen? [0:48 – 0:56]

(8) I: Genau, Stellen Sie sich erstmal selber vor, was Ihr Unternehmen macht, was Ihre Position ist, wie das Geschäftsmodell aussieht. [0:57 – 1:03]

(9) AF: Gerne. Naja, also mein Name ist Alexander Foeth. Ich bin Deutsch-Mexikaner. Also ich habe beide Staatsangehörigkeiten. Und ich arbeite hier für Goldbeck Solar-Mexico. Goldbeck Solar ist eine in Deutschland recht bekannte Firma, die schon seit 20 Jahren, also quasi seit der Energiewende-Reform in Deutschland existiert. 2001. In Mexiko ist die Firma seit Dezember 2017 mit einem Büro hier im German Center in Santafe. Ich selbst bin erst Oktober 2018 dazu gestoßen. Ich kam von CEMEX Energia. Das ist ein Baustoffkonzern, ein mexikanischer Baustoffkonzern, global tätig, die jetzt eine eigene Branche haben, die nennt sich CEMEX Energia. Dann bin ich zu Goldbeck Solar gestoßen und wir befinden uns quasi in der Aufbauphase. Die Entscheidung nach Mexiko zu kommen, da muss ich jetzt ein bisschen, ich war ja nicht dabei, aber so wie ich das verstehe. Es ist halt so, dass der Herr Goldbeck erstmal persönlich mit Mexiko verbunden ist. Seine Frau ist Mexikanerin. Da gab es

wohl immer diesen Blick auf Mexiko. Und speziell jetzt natürlich nach der Energiereform von 2014, die da jetzt in Mexiko nach vielen vielen Jahren Monopol, den Energiemarkt liberalisiert hat, haben sich da natürlich unheimlich große Business Potentiale ergeben. Und warum das jetzt von 2014 bis 2017 gedauert hat bis das Office eröffnet wurde kann ich nicht sagen, aber ich denke mal das hat einfach seine Zeit genommen. In Mexiko ging ja seit 2014 ein richtiger Boom los, auch mit Solar und Wind. Also da sind über 8 GW installiert wurden innerhalb 4 Jahren oder so. Es ist jetzt zu einem Stillstand gekommen aufgrund der neuen Regierung. Jetzt seit 2018 merken wir ganz klar, dass da neue Genehmigungen für große Solarparks sind, momentan gar nicht, schwierig oder fast gar nicht zu bekommen. [1:04 – 3:57]

(10) I: Also, Sie arbeiten derzeit nur noch mit den schon vorhandenen Projekten und keine Neuen, die installiert werden können in naher Zukunft? [3:58 – 4:07]

(11) AF: Ja, das muss man differenzieren. Ich gehe jetzt mal auf das Makroumfeld ein. Mexiko, wie Sie ja wissen, ist in vielem, was Infrastruktur angeht, relativ rückständig bzw. veraltet. Da sind jetzt in kurzer Zeit sehr viel Solar -und Windenergie gebaut worden. Und es ist wohl schon so, dass es ein Problem gibt, diese Energie auch an die Verbraucher zu bringen. Das heißt, es sind relativ viele und sehr große Solarparks in einer relativ beengten Region gebaut worden. Die Gegebenheiten dort waren einfach ideal für Solar, aber es hat sich das Bottleneck, mit dem, und zwar das Netzwerk, die Grid. [4:08 – 5:10]

(12) I: On-Grid? [5:11]

(13) AF: Ja, das Verteilernetzwerk. [5:12 – 5:13]

(14) I: Mit der Netzeinspeisung sozusagen gab es Probleme? [5:14 – 5:16]

(15) AF: Die Einspeisung und der Transport über das Netz ist schwierig und ist an Grenzen gestoßen. Und daher kommt ein bisschen der Hype. Und der ein und das andere Thema ist auch, dass CFE, der ursprüngliche Monopolist, von heute auf morgen in eine ziemlich prekäre Situation gedrängt wurde. Von heute auf morgen wurde der Markt liberalisiert und CFE wurde auch zerstückelt sozusagen. Je nachdem, welchen Hut man

sich aufzieht und man sich den CFE-Hut aufzieht, dann muss man schon sagen, dass das ein Todesstoß für das Unternehmen war. Auf jeden Fall hat die Reform auch Verbesserungsbedarf. Ich meine, das ist in Deutschland auch nichts Neues und die Energiereform ist zimal angepasst und geändert worden. Die Umlage hoch, runter, rauf. Das muss auch in Mexiko passieren. Wir hatten seit 2014 bis jetzt, zum ersten Mal 2021, die erste Änderung, also Änderung der Reform. Oder Anpassung. Also nach 6 Jahren und ich denke, das ist ein normaler Prozess. Solar brauch auch nicht mehr Subventionen oder so. Solar ist inzwischen so weit, dass es von allein sehr gut mit anderen Energieressourcen mithalten kann. [5:17 – 6:51]

(16) I: Das heißt Sie sind nicht mehr von den Subventionen der mexikanischen Regierung abhängig? [6:52 – 6:56]

(17) AF: Ja, es gab schon von Anfang an relativ wenig Subventionen. Es gibt ja so indirekte Subventionen. Da muss man jetzt einsteigen ins Detail. Ich weiß nicht, ob Ihnen das Thema „Contratos Legados“ was sagt. Das sind Energieverträge, die vor der Reform von 2014 schon standen. Es war auch davor schon möglich Energie zu verkaufen, also private. Das kann mit dem Nachbarvertrag von 1994. Großen Unternehmen sollte die Möglichkeit erlaubt werden, für sich selber Strom zu erzeugen. Das war der ursprüngliche Gedanke. Wie zum Beispiel Bimbo, das ist ein riesen Unternehmen hier, aus der Lebensmittelindustrie. Die haben natürlich riesige Energieverbräuche und die sollten dann die Möglichkeit kriegen, selber ihren eigenen Strom zu erzeugen für sich selber. Dieses Modell ist ziemlich ausgedehnt worden und zu einem Geschäftsmodell gemacht worden. Zum Beispiel CEMEX hat eigene Windparks. CEMEX ist ein Baustoffkonzern. Die haben hier in Mexiko zwei große Windparks a 500 MW. Schon seit 2001. Der Strom ist ja eigentlich für sie selber, aber durch eine Möglichkeit, da die Gesetzgebung nicht klar genug war, haben sie eine Gesellschaft gegründet. Du kannst dort Aktien kaufen, ganz billig, und wirst dann Miteigentümer dieser Gesellschaft und kannst dann Strom bekommen. Ganz grob, das war dieses Geschäftsmodell. Sagen wir mal der Windpark ist in Tamaulipas, oben an der Grenze zur USA, und ich bin jetzt irgendwo in Mexiko City und habe mir da symbolisch eine Aktie

gekauft von dieser Gesellschaft und kriege billigen Strom geliefert. [6:57 – 9:04]

(18) I: Heißt das, das waren schon PPAs? [9:05 – 9:08]

(19) AF: Ja, das waren PPAs. Das Thema war eben, dass CFE den Strom liefern musste und es gab keine Durchleitungskosten, ganz wenige nur. Das war natürlich eine Subvention. Also da gibt's jede Menge Themen, die bearbeitet werden müssen in Mexiko. Ja, mal gucken, ob die jetzt gelöst werden. Wir hoffen, dass das irgendwann wieder anzieht mit den großen Solarparks. Wir sind natürlich auch an solchen Parks interessiert als Goldbeck Solar. Also wir bauen große Parks. Das ist unsere Spezialität, aber wir haben uns da jetzt fokussiert auf „behind-the-meter“-Lösungen. [9:09 – 10:04]

(20) I: Was ist das? [10:05 – 10:07]

(21) AF: „Abasto aislado“ und „generacion local“. Das sind „behind-the-meter“-Lösungen. Also, ich erzeuge meinen Solarstrom auf meinem Gelände. Hinter meinem Zähler. Da kann ich machen, was ich will ungefähr. Und da gibt's inzwischen auch gute 8,9,10 MW-Anlagen, die gebaut werden, neben einer Firma, neben einer Produktionsstätte, und sich dann direkt einspeisen. Das hat jetzt angezogen in Mexiko, diese Lösungen. Ich denke das ist auch die Zukunft für Solar in generell. Also der Vorteil von Solar ist dort Strom zu erzeugen, wo er verbraucht wird. Nicht, dass du den noch kilometerweit durch das Netz leiten musst. Das ist ja das geniale an der Sonne, die ist überall. Und dadurch, dass die großen Parks gebremst wurden, hat dieses Marktfeld angezogen. Wir werden jetzt wohl bald anfangen zu bauen, ein 7,5 MW Solarpark für ein Automobil-Konzern. Also direkt neben dem Werk. Wir haben schon kleinere Parks, so 0,5 MW bauen wir auch schon. Und zwar im Industriepark, neben dem Werk vom Kunden. Die haben oft genug Platz, das ist gut in Mexiko. Und da hauen wir dann eine Solaranlage hin. [10:08 - 11:40]

(22) I: Geht es Ihnen hauptsächlich darum die Projekte zu verkaufen, also zu bauen und zu entwickeln oder ist es Ihnen auch wichtig die Anlage in Betrieb zu nehmen und durch den Stromverkauf zusätzlich Umsatz zu generieren? [11:41 – 11:57]

- (23) AF: Ja, wir machen alles von A-Z. Wir machen Design, wir bauen und wir betreiben die auch. Wir bieten auch Finanzierungen an. Das sind also quasi PPAs. Das heißt wir bauen die Anlage, verkaufen dann den Strom an den Kunden mit einem Strompreis. Das machen wir auch. Wir machen auch O&M, also Operation and Maintenance. Das ist auch einer unserer großen Geschäftsfelder. [11:58 – 12:37]
- (24) I: Ist der Betrieb der Anlage immer mit dabei oder kann es auch sein, dass sie nur das Projekt verkaufen? Der Investor ist dann sozusagen ein IPP, der dann selber den Strom verkauft und Ihnen das Projekt abkauft? [12:38 – 12:55]
- (25) AF: Ja richtig. Wir haben jetzt einen 0,5 MW Solarpark gebaut und der Strom wird an den Spotmarkt verkauft, stündlich. Das ist jetzt auch möglich in Mexiko, seit 2015. Das ist dieser MEM – Mercado Electrico Mayorista. Der ist jetzt angezogen. Und das ist eine eigene Investition, also das machen wir selber. Da wollen wir Geld verdienen, in dem wir den Strom an den Spotmarkt verkaufen. Und dann eben einen entsprechenden Stromkreis kreieren in dieser Region. [12:56 – 13:36]
- (26) I: Und Sie sind dann der Generator oder der Trader? [13:37 – 13:41]
- (27) AF: Nein, du brauchst einen Trader - Suministradores cualificados. Du brauchst jemanden, der auf diesem MEM repräsentiert ist. Eben wie an der Börse, so ein Trader, so ein Broker. Den müssen wir anheuern. Der repräsentiert uns auch als Generator auf diesem MEM und der macht für uns den Verkauf der Energie. Er wickelt das für uns ab, kriegt die Gebühr für und wir kriegen dann das Geld, was er von der CENACE bekommt. Das ist was relativ Neues in Mexiko. Das haben wir auch gewusst gemacht, weil wir da auch einsteigen und das kennenlernen wollen. Dann sind wir mit einer 0,5 MW-Anlage in dieses Geschäft eingestiegen. Das ist auch ein Geschäftsfeld, wo wir unterwegs sind. [13:42 – 14:42]
- (28) I: Handeln Sie auf dem MEM auch mit Zertifikaten oder ist das noch nicht so präsent? [14:43 – 14:52]
- (29) AF: CELs, genau. Da sind wir gerade dabei. In diesem Park. Diese Woche hatten wir die „beneficiation“ unit gehabt. Das Prozedere, was du machen musst, um die CELs zu bekommen. Da sind wir gerade dabei, das haben wir abgeschlossen. Das heißt wir werden wohl ab nächsten Monat

- bzw. bald die CELs anerkannt bekommen. Dann werden wir damit Handel treiben. Wobei der Preis für diese CELs relativ low ist. [14:53 – 15:25]
- (30) I: Das wären dann sozusagen noch zusätzliche Einnahmen. [15:26 – 15:30]
- (31) AF: Das sind zusätzliche Einnahmen, genau. Uns geht's hauptsächlich darum zu verstehen, wie das funktioniert. Für so eine kleine Anlage kriegen wir ca. 1300 CELs oder so im Jahr. Da kriegen wir vielleicht 10 Dollar für, wenn wir Glück haben. Aber wir wollen wissen, wie es funktioniert. Deshalb machen wir es. Weil wenn wir das erst einmal mit einer größeren Anlage machen, dann ... [15:31 – 15:55]
- (32) I: ..dann können sich auf jeden Fall noch weitere Möglichkeiten entwickeln. [15:56 – 15:58]
- (33) AF: Genau, genau. Also wir sind in allen möglichen Geschäftsmöglichkeiten unterwegs, die die Energiereform bietet: Große Solarparks, Kundenanlagen, Stromverkauf in den Spotmarkt, PPAs. Wir haben die ganze Bandbreite dabei und es zieht an. Man merkt 2019 war ein gutes Jahr, 2020 war Stillstand. Total. Und jetzt ab März, April haben wir gemerkt, dass das wieder anzieht und die Leute wieder unterwegs sind. Hoffen wir mal, dass das weiterhin so bleibt. [15:59 – 16:45]
- (34) I: Hat die neue Gesetzesinitiative einen Einfluss auf ihr Geschäft? Könnte das Probleme geben? [16:46 – 16:54]
- (35) AF: Nein, wir haben uns das mal angeguckt und alles das, was jetzt gemacht wurde, diese Novelle, die jetzt durchgeboxt wurde, betrifft uns eigentlich in keinem Punkt, indem wo wir unterwegs sind. Das ist sehr spezifisch. Das waren sehr spezifische Themen. Hauptsächlich auch das, was ich vorhin erzählt habe mit diesen „contratos legados“. Darauf zielt diese Novelle. Die wollten da jetzt endlich mal aufräumen. Uns hat es nicht betroffen, aber auch weil wir momentan keine utility-scale- Solaranlage betreiben. Also diese ganzen großen 100 MW-Parks oder so. Da sind wir noch nicht dabei. Insofern betrifft es uns momentan nicht. Aber hätten wir so einen großen Solarpark in Betrieb, dann hätte uns das auch betroffen in dem „dispatch“. Die haben das ja geändert vom „economic dispatch“. Also die haben die Reihenfolge geändert. Also es wird nicht immer der billigste Strom zuerst genommen, sondern es werden erst die CFE-eigenen

Anlagen dispatched und dann kommen die Privaten hinterher. Wir haben uns das persönlich angeguckt und wir glauben, dass uns das so oder so egal ist, weil Mexiko braucht den Strom. Insofern sind wir halt etwas später dran, aber wir werden immer drankommen. Mexiko braucht jedes Jahr glaub ich 3 % mehr Strom in den nächsten 10 Jahren. [16:55 – 18:46]

(36) I: Liegt das einfach am Bevölkerungs – und Wirtschaftswachstum?
[18:47- 18:50]

(37) AF: Ja, genau. Also hauptsächlich Bevölkerungswachstum. Wirtschaftswachstum auch. Und jetzt hat die Pandemie – mal schauen, ob die Zahlen auch stimmen – aber sagen wir mal bis vor der Pandemie waren die Vorausberechnungen, dass Mexiko in den nächsten 10 Jahren jedes Jahr 3 % mehr Stromerzeugung braucht. Und das ist auch ein Grund für uns in Mexiko zu bleiben, weil wir wissen so oder so, das Land brauch irre Mengen an neuer Stromerzeugung. Aber es bedarf auch jede Menge Investitionen in Netzausbau, ganz dringend. Da muss man halt schauen, die Balance zu halten. Das ist so ein bisschen der Hintergrund zu dem, was jetzt so passiert. Es ist sehr viel Solar und Windenergie in den Markt gepusht worden, aber der Netzausbau ist überhaupt nicht parallel mit einhergegangen. Also wir haben große Probleme. In Queretaro haben wir eine Anlage gebaut. Das Netz in Queretaro ist Katastrophe. [18:51 – 19:55]

(38) I: Weil das zu veraltet ist, oder warum ist es eine Katastrophe?
[19:56 – 20:00]

(39) AF: Ja, das Netz ist total veraltet. Queretaro ist irre gewachsen in den letzten 10 Jahren, aber das Netz ist überhaupt nicht mitgewachsen. Die sind an ihre Grenzen gekommen. Und wenn du jetzt ein Unternehmen hast. Wir hatten jetzt den Fall, ein deutscher Unternehmer, völlig verzweifelt, weil er sich neue Maschinen bestellt hat, die er installieren will, weil er eben wächst. Er brauch aber mehr Kapazitäten. Die hat er dann beantragt bei CFE und die sagen: „Nein, du kriegst nichts, wir haben nichts“. Das heißt er muss alte Maschinen abschalten, um neue zu betreiben oder er kann die neuen nicht betreiben. Das hat er sich nicht vorher angeguckt und die Dinger schon bestellt. Jetzt ist er am Verzweifeln. Das ist die Situation von vielen Unternehmen hier. Wir helfen quasi CFE, indem wir jetzt vor Ort den Strom selber erzeugen. Das heißt der Kunde brauch dann weniger Strom

- aus dem Netz und den Strom kannst du jemand anderen geben. [20:01 – 21:04]
- (40) I: Sie sind sozusagen eine Substitution von dem Netz, dass Sie den Kunden die Möglichkeit geben den Strom selber zu nutzen? [21:05 – 21:15]
- (41) AF: Genau. Damit dass der Kunde jetzt selber Strom erzeugt bei sich, einspeist in seinen Trafo, brauch er das nicht mehr aus dem Netz ziehen. Er wird weniger vom Netz ziehen, zumindest tagsüber, und den Strom kann dann jemand anderes verwenden. [21:16 – 21:39]
- (42) I: Beispielsweise, mir fällt jetzt Baja California ein, die relativ isoliert sind. Gibt's da auch Chancen? Ich hätte da jetzt Floating-PV im Sinn gehabt? [21:40 – 21:51]
- (43) AF: Wir sind nicht in Baja California unterwegs. Es ist interessant dort zu arbeiten, weil es sehr hohe Preise gibt für Strom. Also, die haben einen absoluten Stromnotstand dort. Aus Baja California halten wir uns aber raus, es ist schwierig dort. Es ist relativ geschlossen und als Externer dort Fuß zu fassen ist schwierig. Wir konzentrieren uns auf Mainland Mexiko und da vor allem in Mexiko City, Metropolitan Area und Bajío. Diese ganze Gegend. Da haben wir uns konzentriert. Das Land ist einfach so groß. [21:52 – 22:49]
- (44) I: Man kann sich wahrscheinlich nicht aufteilen und überall mal ein bisschen mitmachen bzw. mitmischen, oder? [22:50 – 22:54]
- (45) AF: Ja, genau. Man muss sich schon konzentrieren, wenn man nach Mexiko kommt. Mexiko wartet nicht auf dich. Es ist nicht so, dass sie dich mit offenen Armen empfangen. Es gibt harte Konkurrenz. Mexiko ist in der Hand von spanischen Konzernen: Iberdrola, Acciona, Amper. Darüber hinaus haben wir auch Italiener, Franzosen. [22:55 – 23:43]
- (46) I: US-Amerikaner vermutlich auch? [23:44 – 23:49]
- (47) AF: Ja, Amerikaner sind auch dabei. Das ist ein hart umkämpfter Markt hier. Wobei ganz klar die Spanier hier die Überhand haben. Wir als kleine Goldbeck, wir sind ja quasi noch ein Start-Up, haben zwar ordentlich finanzielle Power hinter uns, aber wir konkurrieren ja mit den Großen. 1000 Leute angestellt, Infrastruktur, schon seit 20 Jahren hier. Das ist ein hart umkämpfter Markt. Das war auch bisschen die Erfahrung, die der Herr Goldbeck machen musste. Er dachte, die Margen sind ja spektakulär, aber

jetzt musste er leider verstehen, dass die nicht so spektakulär sind. Es gibt einen harten Preiskampf hier. Das muss man im Klaren haben. Mexiko ist kein El Dorado an sich. Projekte bauen hier in Mexiko ist auch schwierig. Projekte bauen ist sowieso immer schwierig, aber Mexiko ist nochmal extrem herausfordernd. Das andere Thema ist Personal finden. Das ist auch nicht einfach. Den Energiemarkt gibt's ja erst seit 5-6 Jahren in Mexiko. Das heißt es gibt noch nicht so viele Leute, die sich in diesem Markt bewegen oder wirklich Ahnung haben. Leute finden ist schwierig. [23:50 – 25:24]

(48) I: Was suchen Sie da genau? Was ist Ihnen wichtig? [25:25 – 25:31]

(49) AF: Am besten, ideal, wäre es ein Ingenieur, der technische Erfahrung mitbringt und aber sich auch exzellent in den ganzen Gesetzgebungen auskennt. Dann noch ein Verkaufstalent. Das wäre mein Idealkandidat, aber das ist schwierig. Vor allem was jetzt Know-How im Energiemarkt angeht. Das ist so das Hauptproblem. Da gibt's wenig Leute und die Leute, die es gibt, sind schwer zu kriegen, weil die haben schon einen Job. Also wenn du in Mexiko im Energiesektor unterwegs bist, hast du eigentlich immer einen Job. Das muss man schon so sagen. [25:32 – 26:20]

(50) I: Auch mit Zukunftspotenzial auf jeden Fall. Ich hatte auch gelesen, dass in Mexiko viele Ingenieure von den Unis abgehen. Mehr als in Deutschland, Frankreich oder Kanada beispielsweise. Aber da fehlt dann das Know-How im Energiebereich? [26:21 – 26:44]

(51) AF: Ja, es fehlen halt Leute, die sich einfach auskennen in dieser relativ neuen Gesetzgebung und die wirklich trittfest sind. Denn wenn du zu einem Kunden gehst, der Kunde hat noch keinerlei Kontakt gehabt mit Energie. Das war nie ein Thema bei denen. Das war immer nur CFE, da musst du die Rechnung bezahlen und fertig. Du möchtest denen eine relativ komplexe Sache verkaufen. Wir fangen bei -2 an. Teilweise glauben die gar nicht, dass du von CFE – das ist der ehemalige Monopolist – weg kannst. Und zu einem Privaten gehen kannst. Das können die gar nicht glauben. Das ist wie im Delirium. Man fängt bei null an und muss dem Kunden alles ganz genau erklären und die sind auch alle sehr misstrauisch. Haben natürlich auch Angst, wenn du dann sagst, dass wir den Zähler

- wechseln und kriegst dann Strom von uns. Aber wenn der Strom ausfällt, lässt mich CFE dann wieder links liegen, weil ich nicht sein Kunde bin? Nein nein, das ist das Netz. Das hat nichts mit dem Vertrag zu tun. Das ist rein virtuell. Das ist wirklich ganz schwierige Arbeit und du musst wirklich sattelfest sein, weil wenn du beim Kunden einmal zögerst, dann wird er sofort misstrauisch. Misstrauen ist in Mexiko ganz groß. [26:45 – 28:27]
- (52) I: Das wäre auch meine nächste Frage. Ob Korruption ein riesen Problem ist, was Ihnen auffällt. [28:28 – 28:34]
- (53) AF: Ich persönlich bin damit noch nicht konfrontiert worden bis jetzt. Aber wir haben zum Beispiel ganz klar eine Policy: wir machen keine Verträge mit „Gobierno“. Mit Gemeinden oder Bundesländern oder öffentlichen Unternehmen machen wir kein Geschäft. Wir lassen das einfach. [28:35 – 29:01]
- (54) I: Einfach eine gewisse Vorsicht an den Tag legen. [29:02 – 29:04]
- (55) AF: Ja, wir wollen da gar nicht erst reinkommen. Da ist es hauptsächlich, wo solche Sachen verlangt werden. „Ok kriegst du, aber zahlen“. Das ist hauptsächlich bei „Gobierno“. Deswegen haben wir entschieden, dass wir da gar nicht erst mitmachen. Wir konzentrieren uns auf Privatunternehmen und auch bei der Umsetzung der Projekte gab es zwar auch Schwierigkeiten von seitens des Netzbetreibers, der sich schwierig anstellt, aber das konnten wir bisher immer lösen mit langen Telefonaten und Gesprächen und Unterlagen. Wir sind bisher noch nie in die Situation gekommen, dass etwas verlangt, wurde von uns. Aber wir versuchen das auch von Anfang an zu umgehen. Das Problem ist eher, worauf wir beim Netzbetreiber treffen, dass wir auf Mitarbeiter treffen, die gar keine Ahnung haben. Zum Beispiel wie jetzt ein Solarpark angeschlossen wird. Das ist eher das Problem, was wir sehen. Die Ausbildung der Mitarbeiter beim Netzbetreiber, dass die wissen, was jetzt Sache ist. Auch wieder die neue Gesetzgebung. Das haben die alle teilweise gar nicht drauf. Das sind eher so Schwierigkeiten, auf die wir treffen. Große Unwissenheit beim Kunden und Unwissenheit beim Netzbetreiber, mit dem du dich ja auseinandersetzen musst, um deinen Netzanschluss zu bekommen. Das sind so die zwei großen Probleme, auf

- die wir treffen, wo wir auch immer viel Zeit und Energie reinstecken müssen. [29:05 – 30:56]
- (56) I: Und arbeiten Sie mit Marketing bzw. Advertising? Können Sie da den Kunden etwas zu sich bringen, ein bisschen mehr Vertrauen gewinnen? [30:57 – 31:07]
- (57) AF: Nein, wir haben relativ wenig Marketing gemacht hier in Mexiko. Es ist eher klassisch Kundenbesuche und Präsentationen halten, erklären, zeigen. Vor Ort. Wir überlegen jetzt zum ersten Mal, jetzt wo wir zwei Parks gebaut haben, und in Planung von einem dritten sind. Jetzt macht es vielleicht Sinn, dass wir bisschen Marketing machen, weil wir auch was zum Zeigen haben. Davor haben wir eigentlich gar kein Marketing gemacht bzw. sehr wenig. Hier und da mal was gesponsert. Aber nein, das Produkt ist auch zu komplex, um Marketing zu machen. [31:07 – 31:57]
- (58) I: Ja, mit der Technik und Technologie ist das auch schwer rüberzubringen. [31:58 – 32:02]
- (59) AF: Ja, genau. Sehr erklärungsbedürftig. Hier in Mexiko kennt uns keiner. Das heißt, wenn wir hier irgendwo Goldbeck Solar hinschreiben. Es ist schwierig für unser Produkt Marketing zu machen, was catchy ist und schnell erklärbar. [32:03 – 32:24]
- (60) I: Das heißt, das Thema müsste, sozusagen, erstmal sensibilisiert werden in der Gesellschaft. [32:25 – 32:29]
- (61) AF: Ja, genau. Das fehlt wirklich an allen Ecken und Enden. Die Reform ist schon 6 Jahre her, aber es ist wirklich erstaunlich wenig angekommen bei den Industrieunternehmen. Es geht ja auch damit los, wenn du zu einem Unternehmen gehst, und um ein Gespräch bittest, dass die gar nicht wissen, wer dafür zuständig ist. Es gibt keinen. Es gibt keinen Energiemanager oder so. Das haben die hier noch nicht. Das kommt erst langsam. Also jetzt werden die ersten Generationen von Energiemanagern... die CAMEXA, weiß nicht, ob das Ihnen ein Begriff ist, die Deutsch-Mexikanische Industrie- und Handelskammer, die bilden ja Energiemanager aus. Das sind so ein Jahres-Kurse, die zertifizieren die. Die tun was, aber es sind immer noch viel zu wenige, um den Bedarf in Mexiko zu decken. Grundsätzlich, wenn das jetzt keine großen Konzerne sind, die sowieso ihr eigenes Ding machen, sondern mittelständige

Unternehmen und Industriebetriebe, die wissen gar nicht wer dafür zuständig ist. Wenn ich da hin gehe und sage „Ich möchte mit euch über Solar reden“. Da kriegst du den Maintenance-Manager oder den Einkaufsmanager oder vielleicht mal den Direktor, aber richtig Ahnung gibt es nicht. Das ist ein Problem. Der Kunde muss sich auch emanzipieren und sich da auch schlau machen, um dann auch zu wissen, was er will. Dass er auch mal auf die Suche geht und sagt „Ich glaube ich brauche jetzt Solar. Ich mach das mal“. So wie in Deutschland das der Fall ist. Aber in Deutschland muss man niemand mehr erklären, warum man Solar für die Industrie braucht, sondern im Gegenteil – die kommen zu dir und sagen ganz genau, was sie wollen. „Ich will 780 KW, ich habe schon eine Finanzierung von der Sparkasse.“ Die Bank, Sparkasse versteht das. Aber gehen Sie mal hier in Mexiko zu einer Bank und versuchen eine Finanzierung für Solar zu bekommen. Ganz schwierig. Kriegen Sie vielleicht, aber superteuer, also wirklich superteuer und macht keinen Sinn dann. Deshalb haben wir jetzt 2019 eigene Finanzierungen, also In-House zur Verfügung. Für gewisse Kunden, die den Kriterien entsprechen, haben wir auch Finanzierungen. Das war ein großes Thema. Weil in Mexiko fehlt das Geld. [32:30 – 34:58]

- (62) I: Wie läuft das ab? Wie funktioniert das? [34:59 – 35:04]
- (63) AF: Das ist unser Eigenkapital. Wir finanzieren die Anlage, wir bauen die und dann sagen wir: „jetzt speist du dir den Strom ein und für jedes KWH haben wir den Preis festgemacht“. Dann schreiben wir denen jeden Monat eine Rechnung. Eine Stromrechnung. Dann zahlen die uns das peu a peu ab bis die Anlage dann ihnen gehört. [35:05 – 35:25]
- (64) I: Wie viele Jahre dauert das dann? Ich habe gelesen 20-30 Jahre sind die normalen Verträge meistens. Wann wäre das abbezahlt? [35:26 – 35:35]
- (65) AF: 20-30 Jahre habe ich noch nicht gehört. Die Anlage läuft locker 30 Jahre, die Lebensdauer einer Solaranlage sind locker 30 Jahre. Was wir hier so sehen sind zwischen 5 und 15 Jahre kriegt man einen PPA- ein Power-Purchase-Agreement. Je nachdem was der Kunde bereit ist sich festzuschreiben. Nicht viele, jetzt mit der Pandemie noch weniger, würde einen 15 Jahres-Vertrag unterschreiben. Das macht ja keiner mehr. Wir

sehen jetzt so 5 Jahre oder 10. Zwischen 5 und 10 Jahre, vielleicht sogar 12,13. Das geht noch. Wir können das auch in 5 Jahren machen, aber entsprechend steigt der Preis. Da zahlt er ja fast schon mehr, als wenn er bei CFE geblieben wäre. Das macht schon Sinn so 10 – 12 Jahre zu unterschreiben. Dann haben wir auch einen vernünftigen Strompreis, der unter dem Strompreis von CFE ist. Es ist schwierig. Mexiko. Ich meine, jetzt haben die sich auf 10 Jahre mit einem Kunden finanziert und Tagesmoral ist schwierig. Man muss sehr gut aussuchen mit wem man das macht und mit wem nicht. [35:36 – 37:03]

(66) I: Es beruht auf persönlichen Kontakten und Beziehungen? Kennen die euch, passt das so? [37:04 – 37:16]

(67) AF: Genau. Also, was ist das für ein Unternehmen? Wenn das Kühne & Nagel ist oder so – das kennen wir auch aus Deutschland. Wir wissen, die sind solide. Bei denen kann man das machen oder Kellogs. Das sind Unternehmen, da gibt's gar kein Problem. Aber beispielsweise Hermanos ... GmbH & Co KG, irgendwo in Tehuantepec (fiktiv). [37:17 – 37:42]

(68) I: Da ist das Misstrauen dann schon von Anfang an gegeben. [37:43 – 37:47]

(69) AF: Ja, genau. Wir haben unsere Auswahlkriterien. Wir haben Finanzierungen, aber können die nicht jedem anbieten. Aber ja, das muss man auch haben, wenn man nach Mexiko kommt. Du brauchst Finanzierungen für den Kunden, du brauchst ein gutes Produkt. Du musst dich hier irgendwie abheben und die Konkurrenz, die es hier gibt, die ist sehr hart. Warum sollen die jetzt ausgerechnet zu dir kommen? Unsere Linie ist, wir sind ein deutsches Unternehmen, wir liefern Qualität. Absolute Qualität. Wir sind zwar ein bisschen teurer, aber bei uns hast du absolute Sicherheit, dass wir da eine Topanlage hin bauen nach Standards. [37:48 – 38:38]

(70) I: „Made in Germany“ ist schon nachhaltig im Gedächtnis geblieben? [38:39 – 38:43]

(71) AF: Ja, genau. Das ist unser Ziel. So wie wir das auch bauen, heben wir uns von den anderen ab, auch technisch. Das brauchst du. Du musst wissen, was dein Produkt ist. Du musst Finanzierungen mitbringen. Du

brauchst gute Leute hier, ganz schwieriges Thema – Mitarbeiter. Du brauchst gute Mitarbeiter. Das steht und fällt hier mit guten Mitarbeitern. Wenn du ein super Team hast, dann kannst du hier Berge versetzen. Wenn du aber Pech hast, dann schlägst du dich nur mit solchen Sachen herum. Im Endeffekt musst du dann alles selbst machen. Das ist ein großes Thema. Was haben wir noch an Problemen hier? Ja, Mexiko ist riesig. Dir muss klar sein: Kannst du in Cancun was anbieten oder lässt du das lieber gleich bleiben? Willst du nach Tijuana gehen, wo du dann vielleicht ausgeraubt wirst, bevor du eine Anlage auf dem Dach hast? Sicherheit ist auch ein Thema. Wo wollen wir agieren. Wir sind in Baja California raus, Yucatan sind wir raus wegen der Hurricans. Das Risiko wollen wir nicht eingehen, dass eine Anlage durch einen Hurrikan wegfliegt. Ist auch schwierig dort zu bauen. Das ist alles so Kalkstein, so ein poröser Kalkstein. Und alles voller Maya-Ruinen. Das machen wir auch nicht. Auch Grenze USA wollen wir nicht hin wegen der Sicherheitslage einerseits und die andere Sache ist: die Strompreise sind dort relativ billig, weil die aus den USA viel importieren. Billigen Strom aus Texas. Insofern sind die Preise dort relativ mau. Das sind so Themen, deshalb muss man sich überlegen, wo man geographisch in Mexiko unterwegs sein will. Das ist ein riesen Land. Als kleines Unternehmen, wenn du hier einsteigst, hast du auch nicht die Man-Power, um die ganze Republik abzudecken. Von hier nach Monterrey sind ja 1000 Kilometer. Da muss man nicht mal überlegen. Das heißt du würdest jetzt quasi auch in der Türkei anbieten, wenn man sich das so geographisch überlegt. Das muss einem klar sein. Ich gehe nach Mexiko, aber wohin genau? Das Land ist riesig. Da haben wir jetzt auch unseren Zirkel gezogen und wissen, wenn es außerhalb dieses Zirkels ist, brauchen wir keine Zeit investieren. [38:44 – 41:42]

(72) I: Wollen Sie jetzt auch in dem Bereich bleiben oder mittelfristig, langfristig sich schon in Mexiko ausweiten? [41:43 – 41:51]

(73) AF: Kann gut sein. Momentan ist erstmal diese Gegend Zona Metropolitana und Bajío. Die ist es jetzt. Ich glaube da gibt es genug zu tun. Das ist auch ein riesen Gebiet. Das ist, glaube ich, allein schon so groß wie Deutschland. Das reicht uns erstmal. In der Zukunft natürlich, wir sind

in Mexiko, wir nennen uns Goldbeck Solar Mexiko. Also theoretisch ja, in der Praxis noch nicht. Das ist auch gut. [41:51 – 42:23]

- (74) I: Ich habe noch zwei Fragen wegen der geographischen Lage. Spielt die Wüste eine Rolle oder wäre der Wirkungsgrad zu hoch, weil es zu heiß ist? [42:24 – 42:39]
- (75) AF: Ja das ist ein Thema. Witzigerweise darf es nicht zu heiß werden auf den Solaranlagen. Nein, wir haben nirgendwo Restriktionen vom Klima her. Eigentlich ist Mexiko fast ideal, klimatisch. Es ist nicht zu heiß. Das Problem ist eher: Wie kriegen sie den Strom aus der Wüste raus? Da müssen sie erstmal eine Leitung legen. [42:40 – 43:14]
- (76) I: Da sind dann wahrscheinlich auch keine Unternehmen angesiedelt. [43:15 – 43:19]
- (77) AF: Ja. Du kannst halt da bauen, aber dann musst du dir ne 80 Kilometer-Leitung legen und das kostet irre Geld. Das macht keiner. Wir haben sogar so optimale Bedingungen in Bajio. Das sind optimale Bedingungen für Solar. Es ist heiß mit viel Sonne mit einer leichten Brise. Einer leichten, konstanten Brise, so dass immer ein bisschen Abkühlung da ist. Nachts kühlt es ab durch die Kombination von Sonne und Wind, so einer Böe. Das sind ideale, fast Laborbedingungen, die wir dort haben für Solar. Wir können dort, beispielsweise in Deutschland, es gibt es so eine Messeinheit. Das sind kWh per Kilowatt peak (kWp) per year. Also was produziert ein Kilowatt. Wieviel kWh produziert ein Kilowatt peak installiert in einem Jahr. Das ist so eine Einheit, in Deutschland sind wir ungefähr so bei 900 kWh pro Kilowatt pro Jahr. Hier sind wir bei über 2000. Also wir holen doppelt so viel raus aus der gleichen Anlage. Das ist natürlich genial. Das macht richtig Sinn hier. Du kannst hier richtig viel Strom produzieren. [43:20 – 44:43]
- (78) I: Auf jeden Fall effektiv, effizient. [44:44 – 44:46]
- (79) AF: Ja natürlich. Da ist natürlich die Effizienz der Anlage eine komplett andere. Wir bewegen uns bei über 90 Prozent. Im Vergleich zu Deutschland sind das Traumwerte. Deshalb macht das auch Sinn in Mexiko Solar zu machen. Deshalb wissen wir, dass wir langfristig hier ein Geschäft haben. Optimale Gegebenheiten kombiniert mit einem ständig wachsenden Strombedarf, Energiebedarf und die Energiereform, die diesen Markt

überhaupt jetzt geöffnet hat. Diese drei Sachen machen Mexiko zu einem sehr interessanten Land für Solar. Deshalb sind auch viele hier unterwegs. Die Deutschen sind mal wieder langsam. Letztes Jahr kam RWE nach Mexiko. [44:47 – 45:42]

(80) I: Letztes Jahr ist schon spät. [45:43 – 45:45]

(81) AF: Ja völlig. Der Kuchen ist schon verteilt. Aber die sind halt groß die Jungs. Die haben Power. Bei denen wird schon was gehen. Aber das haben die Spanier und Amerikaner schon unter sich aufgeteilt. [45:46 – 45:58]

(82) I: Wenn ich jetzt nochmal auf die Industrie genau eingehe, auf die Situation: Würden Sie sagen es ist ein Oligopol mit wenigen aber sehr starken Konkurrenten oder ist es relativ ausgeglichen mit einer perfekten „Competition“, wo niedrige Eintrittsbarrieren sind, aber niedrigere Profite. [45:59 – 46:19]

(83) AF: Da muss man unterscheiden, in welchem Solarmarkt wir uns bewegen. Es gibt meines Erachtens drei Solarmärkte. Den klassischen Häuser – und Dach-Markt und kleine Unternehmen. Also kleine Shops. Die kleinen Solaranlagen für Häuser. Da herrscht absolute, brutale Konkurrenz. Da gibt's so viele Anbieter. Das ist ein hart umkämpfter Markt. Der Häusermarkt. Solar für Häuser. [46:20 – 46:55]

(84) I: Aber trotzdem in der Industrie? Also die Businesskunden? Das ist jetzt nicht auf private Kunden bezogen? [46:56 – 47:03]

(85) AF: Doch doch. Privat und „Comercio“, so wie Oxxo. Das ist aber ein nicht zu unterschätzender Markt. Das ist Kleinvieh, aber macht auch ganz schön Mist. Da herrscht brutaler Wettbewerb. Es gibt in Mexiko in diesem Markt keinerlei Regelung, wer da agieren darf. Du kannst dir morgen ein paar Solarpanels auf die Schultern, auf deinen Pick-up schmeißen und dann Solar installieren. Das ist schon ein bisschen scary. Aber es gibt auch sehr gute Unternehmen da. Da gibt's alles, aber es ist ein hart umkämpfter Markt. Das andere Extrem sind dann diese großen Solarparks. Utility-Scale nennt man das. Also so wirklich 100 MW, 150 MW, 200 MW. Da tummeln sich, sagen wir mal Oligopol von vielleicht 10 Unternehmen, die hier den Markt beherrschen. [47:04 – 48:13]

(86) I: Das sind dann wahrscheinlich die ganz Großen? [48:14 – 48:15]

- (87) AF: Das sind die ganz großen Player. Auch die internationalen Player hab ich schon genannt: Iberdrola, Enel, Amper, Acciona, Engie, das sind Franzosen. Wen gibt's noch? [48:16 – 48:31]
- (88) I: Und RWE ist dann zu spät wahrscheinlich, um da mit einzusteigen? [48:32 – 48:47]
- (89) AF: Ja, wobei man da gucken muss, was RWE genau hier macht. Ich weiß nicht genau, ob die im Solar unterwegs sind, aber die wollen auf jeden Fall in den Energiemarkt. Ich weiß nicht, ob die was mit Solar machen. Aber ja, RWE 2020 herkommen. Mal gucken. Hier wird mit harten Bandagen gekämpft. Das ist rough. Da wollen wir aber auch rein als Goldbeck Solar. Wir wollen auch solche großen Parks bauen. Wir haben einen 150 MW Park, den wir schon seit längerem im Auge haben und den wir bauen wollen. Mal gucken. Aber das ist schwierig. Da sind wir hier einer der ganz Kleinen und spielen gegen die ganz Großen. [48:48 – 49:25]
- (90) I: Wie würden Sie versuchen die Barrieren zu überwinden, um da mit reinzukommen? [49:26-49:31]
- (91) AF: Die Barrieren liegen... Naja, es wird halt schon so viel gebaut. Da muss man gucken, wo du noch bauen kannst. Das ist die eine Sache. Die andere ist, was machst du mit dem Strom von 180 MW? An wen verkaufst du das? Da tun wir uns schwer. Weil Iberdrola hat z.B. 1000 Mitarbeiter. Die schwirren alle aus und klopfen an allen Türen und nach 3 Monaten haben, die den Strom unter Dach und Fach gebracht. Wir sind hier zu dritt und bis wir so viel Strom an den Mann bringen, da müssen wir richtig ackern. Da ist das Problem. Was machen wir mit dem Strom? An wen verkaufen wir das? Die haben viel mehr Kontakte. Bis wir an diese Unternehmen rankommen. Iberdrola und Acciona waren schon dreimal vorher da. Da wo ich hingekommen bin, war Iberdrola schon da. Die haben riesen Man-Power.
- (92) Als letzteres gibt's noch das Industry-PV. So nennen wir das. Also Photovoltaik für die Industrie. Da bewegen wir uns ganz gut. Da haben wir uns gut positioniert. Da haben wir auch schon drei Projekte gebaut. Die kommen gut an und da heben wir uns auch ab von der Konkurrenz, was wir da machen können. Da kommen beispielsweise die Kleinen nicht hin, weil das für die zu groß ist. Die Industrie. Und für diese großen Unternehmen

war das bis jetzt nicht interessant, weil das zu klein ist. Die brauchen große Projekte, sonst rentiert sich das nicht. Wir haben uns von Anfang an auf diesen Industrie-PV-Sektor konzentriert, aber da gibt es noch genug für alle. Wir sehen inzwischen, dass die großen Konzerne, dadurch da die Entwicklung von großen Solarparks derzeit stillsteht, merken wir wie die auch in den Industrie-Sektor kommen. Das haben wir jetzt gesehen, dass die sich da auch bemühen, was denen vorher zu popelig war für die Großen. Wir sehen, dass die Großen sich jetzt auch in diesen Industrie-Sektor reinbewegen. Da werden wir jetzt auch mehr Konkurrenz haben. Aber ich glaube da sind wir schon gut aufgestellt. Da sind wir Kosten-Struktur-mäßig einfach besser [49:32 - 52:22]

(93) I: Da haben Sie sich schon die Reputation aufgebaut über die letzten Jahre. Das spielt wahrscheinlich auch nochmal eine große Rolle. [52:23 – 52:28]

(94) AF: Ja genau. Also wenn du erstmal einen Park gebaut hast, dann kommen die Unternehmen drumherum auch schon von allein. Das sehen wir auch immer. Das schwierigste ist immer das erste Werk, die erste Anlage. Wenn die sehen, dass das funktioniert und wie cool das aussieht. Ich kann Ihnen das mal zeigen. Da bin ich stolz drauf. Das ist hier eine Kundenanlage in einem Industriepark drin. Das geniale ist, womit heben wir uns ab? Normalerweise, die meisten bauen auf dem Dach. Wir haben uns von Dächern verabschiedet, weil wir gemerkt haben in Mexiko ist das zu schwierig. Die Infrastruktur ist schlecht, es gibt keine Pläne, da sind meistens nur die Blechlatten darauf. Wir haben dann gesehen, dass überall in diesen Industrieparks, das sehen Sie auch hier, überall noch Freiflächen sind. Da haben wir gefragt, was die mit diesen Freiflächen machen. „Ja, wir haben einfach das ganze Ding gekauft, als wir dahin sind. Den ganzen Slot gekauft, weil es so billig war.“ Wir dachten uns: „Macht doch was damit“ und wir bauen jetzt Solar mit Tracker. Das sind Tracker-Anlagen, die sich nach der Sonne bewegen. Und weil da so viel Sonne draufscheint, machen wir „Bifacials“ drauf. Das ist auch ziemlich neu. Diese Panels erzeugen von beiden Seiten Strom. Also auch mit der Reflexion. Hier ist ja relativ heller Sand. Das heißt es reflektiert unheimlich gut und diese Reflexion nehmen die Panels auch noch auf und produzieren auch nochmal Strom damit. Das

heißt wir produzieren mehr Strom durch die Art der Panels, die wir hier verbauen, und wir produzieren mehr Strom weil wir hier Tracker verbauen. Also die Panels werden immer im optimalen Winkel zur Sonne stehen. Damit holen wir richtig viel Strom raus auf so einer kleinen Fläche. Die Solaranlage ist jetzt fertig und wird nächste Woche angeschlossen. In 4,5 Jahren ist die Anlage vom Kunden abbezahlt und er spart sich eine monatliche Stromrechnung im Jahr. Das sieht auch genial aus und wir merken schon das Interesse von den Nachbarn. Die gucken alle. [52:29 – 55:30]

(95) I: Sonst würde dort ja garnichts stehen, oder? Sonst wäre es nur ein Freiraum? [55:31 – 55:34]

(96) AF: „Terreno baldio“ nennen die das hier. Ein ungenutztes Grundstück. Und jetzt werden die damit Geld verdienen. [55:35 - 55:46]

(97) I: Das ist echt produktiv, effizient und innovativ. [55:47 – 55:50]

(98) AF: Genau. Da wären die gar nicht alleine darauf gekommen. Das haben die nur bezahlt mit teuer Kapital und liegt brach. Das Grundstück konnten die auch für nichts anderes nutzen. Und jetzt werden die damit richtig richtig Geld sparen. Also das ist schon genial. Wenn man die Kunden erstmal so weit hat und das ist ein langer Prozess, den die da verstehen müssen. Die müssen die Zahlen verstehen. Die müssen das technisch verstehen. Die müssen verstehen, wie das mit CFE kombiniert funktioniert. Das ist wirklich ein langer Prozess. Das hat 1 Jahr gedauert mit dem Kunden. Vom ersten Kontakt bis zum Vertragsabschluss. 1 Jahr. Das dauert einfach in Mexiko. Dann haben wir noch eine andere identische gebaut. Die Anlage zeige ich Ihnen auch. Das kann auch nicht jeder. Auf so einem krummen Gebiet so eine Anlage hin bauen. Wir haben jeden letzten Meter optimal genutzt. Da braucht man gute Ingenieure und die haben wir in Deutschland. Wir sind hier nur zu dritt und die ganze Ingenieursleistung wird in Deutschland gemacht. [55:51 – 57:10]

(99) I: Sie sind nur zu dritt? Echt ein kleines Team. Hätte ich nicht erwartet. [57:11 – 57:14]

(100) AF: Wir sind ein kleines Team. Das Engineering und Design wird komplett in Deutschland gemacht. Für den Bau haben wir zwei Ingenieure bekommen. Die sind hierhergekommen und haben hier die Baustelle

geleitet. Das macht natürlich auch einen guten Eindruck beim Kunden. Ist nicht ganz einfach für die deutschen Ingenieure, die sich dann hier in Mexiko rumschlagen. Und dadurch bauen wir hier in Mexiko nicht so große Kostenstrukturen auf. Wir haben in Deutschland Leute sitzen, die sprechen alle Spanisch und sind dann auch bei Kundengesprächen mit zugeschaltet. Das ist natürlich zeitlich ein Problem. Aber das klappt auch ganz gut. Also das läuft. Ich muss sagen, wir haben das glaube ich gut angestellt. Wir hätten hier auch 10 Leute anstellen können und machen alles hier vor Ort, aber dadurch da das projektbetrieben ist, kann es gut mal sein, dass wir mal 4-5 Monate keine Projekte haben mit Leerlauf. Da haben wir hier dann keine Kosten, die hochlaufen. Als Markteintritt in Mexiko: versuche so lean und flexibel zu bleiben, wie es geht. Weil Mexiko ist ein Up und Down. Auch mit der Pandemie. Da waren wir einfach gut aufgestellt. Wir sind nur 3 Leute hier. Wir konnten die Pandemie gut durchstehen, weil wir keine hohe Kostenstruktur hier haben. Wenn wir Aufträge kriegen, dann wickeln wir die über Deutschland ab. Mit dem Backup von Deutschland. Man muss sagen, das hat uns geholfen hier in Mexiko resistent zu sein. Das würde ich auch immer raten. Es sei denn du bist RWE mit unermesslichem Budget. Aber als Start-Up hier in Mexiko: Bleib so leicht und flexibel, wie es geht. Damit kannst du in Mexiko sehr schnell reagieren auf Gegebenheiten, die in Mexiko halt da sind. Mexiko ist nicht Deutschland. Du weißt nicht, was nächstes Jahr kommt. Da musst du flexibel sein. Das ist das A und O. Und du brauchst finanziellen Backup. Du musst auch mal ne Trockenzeit überstehen können. [57:15 – 1:00:04]

(101) I: Also ein Start-Up ohne Mutterkonzern im Rücken wird schwierig?
[1:00:05 – 1:00:08]

(102) AF: Ja, oder Finanzierungen. Das kann man ja auch machen. Deine Kriegskasse muss hier schon mal 2 Jahre reichen. Alle 6 Jahre wird hier ein Präsident gewählt und dann ist hier alles neu. Dann wird alles auf null resettet und geht wieder von neu los, und zwar in die Richtung. Und 6 Jahre später wieder. Das ist ja Mexiko. Alle 6 Jahre findet man alles neu hier. Da wird das Rad neu erfunden. Ich glaube das ist auch ein Problem von Mexiko, weil es hier keine Konstanz gibt. Aber gut. Das ist jetzt nicht für

- uns zu entscheiden. Wenn wir hier Geld machen wollen, müssen wir uns dem anpassen. [1:00:09 – 1:00:54]
- (103) I: Das stimmt. Das ist mir sowieso allgemein in Lateinamerika aufgefallen. Die Extreme von den Regierungen von rechts zu links, dann wieder rechts oder links. Da ist nie wirklich eine Konstante drin, wo sich so viel in wenigen Jahren ändert. [1:00:55 – 1:01:09]
- (104) AF: Ja, das ist unglaublich. Hier in Mexico City, jedes Mal, wenn eine neue Regierung kommt, dann wird erstmal alles überstrichen. Also ihre Farben. Jetzt sind wir Magenta, Rosa. Davor war alles grün. Jetzt im Juni sind wieder Wahlen, da kommt eine neue Regierung. Also wird das wieder neu gestrichen. Dafür ist Geld da. Das zeigt aber auch, wie das Land hier tickt. Du musst flexibel sein. Das ist eine andere Anlage, die ich Ihnen zeigen wollte. Wie Sie sehen – mitten im Nichts. Den Strom von der Anlage verkaufen wir an den Spotmarkt. [1:01:10 – 1:02:02]
- (105) I: Ist das Agriculture-PV? [1:02:03 – 1:02:08]
- (106) AF: Nein, noch nicht. Das ist auch im Kommen. Das ist ein Produkt, dass wir in Mexiko noch nicht vertreiben, aber in Deutschland schon. Das ist auch bifacial mit Trackern und das werden Sie in Mexiko in der Art und Weise nicht finden. Also in so kleinen Projekten. Diese Technologie ist natürlich teurer als einfach nur auf einem Gestell drauf. Bis jetzt war die nur umsetzbar in Großprojekten. Da wir eine ganz gute Einkaufspolitik haben in Deutschland, dadurch können wir solche 0,5 MW Anlagen mit dieser Technologie bauen. Das heißt damit heben wir uns ab von allen anderen. Kaum jemand schafft es diese Anlage kosteneffizient auf so eine kleine Fläche zu bauen. Sehen Sie das Video? Da können Sie sehen, wie es sich bewegt und flexibel ist. Da wird es gerade manuell gemacht. [1:02:09 - 1:03:14]
- (107) I: Sieht voll modern und gut aus. Das macht auch was her. [1:03:15 – 1:03:18]
- (108) AF: Das ist absolut High-Tech, was wir hier bauen. Wie gesagt, das haben wir nicht erfunden, aber diese Technologie, die Großprojekten vorbehalten ist, auf solche kleine 500 KW-Anlagen zu bringen. Für Industriekunden können wir diese Technologie zur Verfügung stellen. Das ist eine Einkaufs- und Kostensache. Das schafft nicht jeder. Das schaffen

wir, weil wir so groß in Europa sind und schon über ein 1 Gigawatt an Solar gebaut. Wir haben also so viel Einkaufsmacht, dass wir auch sowas machen können. Denn normalerweise, wenn der Hersteller von diesen Trackern – Schletter heißen die. Wenn Sie zu dem hingehen, in Deutschland in München, und sagen: „Schick mir mal einen halben Mega-Tracker nach Mexiko“. Dann sagt er, dass er nicht interessiert ist. Komm wieder ab 10 Mega. Wir schaffen das. Wir sagen: „Wir haben dir dieses Jahr schon 300 Mega gekauft. Schick mir mal einen halben Mega nach Mexiko.“ Das macht er. Das ist das, wo wir uns abheben. Mit unserem Produkt – wir bauen so. Und so eine Anlage sieht natürlich super aus und alle Nachbarn drumherum sind scharf auf diese Anlage. Die sind jetzt daran interessiert. Das ist dann auch so ein Premium. Das ist so als wenn du in einem Mercedes sitzt oder einem Tesla heute. Das ist eine Marktnische, die wir uns überlegt haben. Wir bauen Solar, aber wir bauen das komplett anders. [1:03:19 – 1:05:17]

(109) I: Wir bauen es effizient, innovativ und gutaussehend. So in dem Sinn, oder? [1:05:18 – 1:05:21]

(110) AF: High-Tech. Die Anlage wird von Deutschland aus monitoriert. 24 Stunden. Wir haben in Deutschland so ein 24h-Office, wo wir unsere Anlagen weltweit überwachen. Da wissen wir gleich, ob wir jemand hinschicken müssen. Der Kunde ist schon beeindruckt. Die kennen halt nur Solar – das Package auf dem Dach. [1:05:22 – 1:05:54]

(111) I: Das ist dann Word of Mouth. Das spricht sich dann herum. [1:05:55 – 1:05:59]

(112) AF: Absolut. Das merken wir jetzt schon. Sieht auch super aus. Da fährt zum Beispiel eine Autobahn vorbei und die gucken alle hier darauf. Das kann auch nicht jeder. Hier so krumm eine Anlage hinzubauen. Da sind wir auch richtig stolz drauf. Wir sehen das auch als Zukunft. Da ist ja überall noch Platz. Das Gute ist, in Deutschland kann man das nicht machen, weil man da keinen Platz mehr hat. Hier in Mexiko eben nicht. Die haben noch Flächen. Das kommt uns entgegen. Deshalb funktioniert die Strategie. Das sind so ein paar schöne Bilder. [1:06:00 – 1:06:55]

(113) I: Kann ich mir gut vorstellen, dass man stolz ist, wenn man das im Nachhinein sieht. [1:06:56 – 1:07:00]

(114) AF: Absolut. Ich bin stolz wie Oskar. Wir tun auch was Gutes. Wir bringen Mexiko voran. Das ist für mich persönlich auch wichtig. Ich muss dran glauben, weil sonst habe ich nicht die Energie da ein Jahr lang einen Kunden zu bequatschen. Man muss selber überzeugt sein und das merken die auch hier. Wenn du selber dahinterstehst, 100 %. Es ist aber auch eine Erfahrung so ein Projekt umzusetzen hier in Mexiko. Das ist tough. Ich habe schon viele Jahre gearbeitet, auch in der Industrie. Da kommt mir Deutschland vor wie ein Krippenspiel. Hier ging es heiß her. Es gibt nichts, was nicht passieren kann. Das ist unglaublich. Das ist eben auch ein Problem hier. Man muss sich darauf gefasst machen, dass man ganz niedrige Umstände findet für die Projekte. Also in dem Fall der Kunde hatte gar keine Genehmigung. Wir brauchen eine Baugenehmigung für dieses Werk, für diese Anlage. Aber als wir dann in die Unterlagen reingeguckt haben. Die Jungs hatten seit 2010 keine Genehmigung beantragt. Die waren komplett irregulär. Das war eine deutsche Firma. Das heißt die haben erstmal 5 Monate gebraucht, um das erstmal in Ordnung zu bringen. Wir hätten auch ohne Baugenehmigung bauen können. Aber das ist riskant und da haben wir gesagt „Machen wir nicht“. Wir brauchen eine Baugenehmigung und wir kriegen die nur, du kannst nur eine neue beantragen, wenn du die alten in Ordnung hast. Die haben die aber nie beantragt. Da wird hier was angebaut und da was angebaut, aber nie eine Genehmigung beantragt. Die haben ohne Genehmigung gebaut. Das ist so in Mexiko. Sie werden hier noch extremere Sachen vorfinden, wenn Sie hier Unternehmen besuchen. Das ist eine riesen Herausforderung. Die hatten gar keine Pläne. Wir wussten nicht was wir vorfinden. Keiner macht hier Pläne. Das ist extrem. [1:07:01 – 1:09:39]

(115) I: Das ist nicht so strukturiert und organisiert wie in Deutschland sozusagen? [1:09:40 – 1:09:43]

(116) AF: Absolut. Und Sie müssen sich alles selber erarbeiten. Wir haben Scanning durchgeführt. So Schallmessungen durchgeführt zu gucken, ob da irgendwelche Rohre sind. Wir mussten alles selber machen. Wir hatten nichts gehabt. Nichts. Deshalb sind wir auch vom Dach weg. Als wir gemerkt haben – das ist ein russisches Roulette hier. Haben wir gesagt: „Okay wir gehen auf die Freiflächen“. Da können wir garantieren, dass das

so steht. Sie finden hier in Mexiko keinerlei Pläne. Das gibt's nicht. Selbst bei deutschen Unternehmen. Das ist erschreckend. Da müssen Sie auch mit umgehen. Wenn man aus Deutschland kommt, kann man sich das gar nicht vorstellen. Das überlegt man sich gar nicht. Aber ist so. Das sind so die Hürden hier. [1:09:44 – 1:10:50]

(117) I: Die Zulieferer sind dann größtenteils aus Deutschland, die das dann zusammenbauen? [1:10:51 – 1:11:00]

(118) AF: Die Komponenten, die Hauptkomponenten. Das sind also Panels, Struktur und Wechselrichter. Die werden importiert. Das kann aus China kommen, das kann aus den USA kommen. Je nachdem, wo wir gerade einkaufen. Wir sind nicht fixiert auf irgendwelche Marken. Wir suchen uns das Beste aus. Alle Materialien, sogenannte Materials, besorgen wir alles in Mexiko. Kabel vor allem und für die Zementierung zum Beispiel die Pfosten und so. Materials besorgen wir alle hier. Wir haben auch keine eigenen Leute hier. Das heißt wir haben erstmal 2 Leute aus Deutschland hierher geschickt, also einen Projektmanager und einen Poulier. Der Rest der Mannschaft, da haben wir eine mexikanische Firma hier angeheuert und haben die quasi ausgebildet. Die kommen aus Häuser- und Dachbau. Das ist eine sehr ambitionierte Firma aus Puebla. Die haben sich alles selber beigebracht, aber haben schon 10 Jahre hinter sich und waren schon ganz gut aufgestellt. Natürlich hatten die keine Erfahrung mit solchen Parks. Das heißt wir haben die vorher geschult, zusammen mit den Herstellern haben wir die Unterlagen durchgeschaut, Online-Schulungen gemacht. Es war schon spannend. Die haben sich da ganz gut geschlagen. Da muss man in Mexiko sagen: die haben zwar keine Vorkenntnisse, aber die lernen schnell. Wir haben eine steile Kurve, eine steile Lernkurve festgestellt von Projekt zu Projekt. Aber Qualitätssicherstellung ist auch ein riesen Thema hier. Wie garantierst du, dass hier in Mexiko so gebaut wird, wie es in Deutschland gewünscht ist? [1:11:01 – 1:13:05]

(119) I: Also Regelungen und Vorschriften? [1:13:06 – 1:13:08]

(120) AF: Erstmal das. Aber auch zum Beispiel beim Bau selber. Beispiel: Der Mexikaner musste Kabel kaufen und wir haben ganz klar gesagt 6 mm Durchmesser. Er hat die nicht gefunden und hat dann halt 8 mm gekauft, ohne uns zu fragen, weil er dachte das passt. Als wir das festgestellt

hatten: „Nein, tut mir leid, aber 8 mm nehmen wir nicht. Wir wollen 6 mm“. Also da muss man eben aufpassen, dass bei der Umsetzung der Projekte du die Qualität wirklich sicherstellst. [1:13:09 – 1:13:49]

(121) I: Also wirklich nochmal alles überprüfen, was gekauft wurde, was gemacht wurde? [1:13:50 – 1:13:54]

(122) AF: Du musst. Wir hatten jemand aus Deutschland da, der hat auf der Baustelle gewohnt. Der war jeden Tag da. Er konnte zwar kein Spanisch, aber der hat sich mit denen schon verständigt. Wirklich alles überprüfen. „Die Gräben waren nicht tief genug. Du musst einen Meter ausheben“. Du sagst denen was, die machen sollen und die machen es anders. Das ist halt die Konversation in Mexiko. Das war auch interessant, aber es funktioniert. Man darf da nicht 3 Sekunden die Augen zu machen. Du musst danebenstehen und wirklich alles überprüfen. Das ist auch für so deutsche Ingenieure neu. Die sind es gewöhnt, dass es morgens eine Versammlung gibt, da gibt's eine Ansage und dann wird das gemacht. Abends kann man dann vielleicht kontrollieren und einen Rundgang machen und dann ist es okay. Das sind auch so kulturelle Probleme, die man auch verstehen muss. Das ist einfach so hier. Das muss man klar haben. Ich glaube da hilft einfach nur Erfahrung. Da kann man sich vielleicht vorher bisschen schlau machen und so, aber im Endeffekt brauchst du die Erfahrung auf der Baustelle. [1:13:55 - 1:15:50]

(123) I: Und die Sprache auf jeden Fall, wie Sie gesagt hatten. Also mit Englisch kommt man da glaube ich nicht so weit. [1:15:51 – 1:15:56]

(124) AF: Schwierig. Die arbeiten ja alle in dem angeheuerten Unternehmen. Die sprechen da kein Englisch. Wir hatten Glück, weil der Vorarbeiter von denen sprach ganz gut Englisch. Da konnten die sich ganz gut verstehen. Der hatte das weitergegeben. Aber das ist auch ein Problem. Die Natur von unserem Geschäft ist so, du brauchst Leute, und zwar immer nur projektweise. Wir sind 3, aber für den Bau brauchten wir auf einmal 15 Leute. Wir werden nicht einstellen, sondern ziehen die an uns ran. Und da musst du halt sicherstellen, dass die auch das Know-How haben, was nötig ist. Dass die das auch umsetzen, wie du baust. Eine schwierige Entscheidung, auch für jemand der hierherkommt und, sagen wir mal, Projekte macht. Stellst du die Leute selber ein, bildest die selber

aus, also in-house? Aber dann hast du die an der Kette. Wenn du mal kein Projekt hast, hast du da 15 Leute rumsitzen. Oder du heuerst die wegen den Projekten an, aber dann kann es sein, dass dieses Team bzw. diese Firma nicht zur Verfügung steht für ein Projekt, weil die schon woanders unterwegs sind. Da musst du gucken, wo du die herkriegst und wen. Das war schwierig, da jetzt eine Firma ausfindig zu machen, mit der du das machen kannst. Das war ein langer Prozess. Das war eine der ersten Sachen, die wir hier gemacht haben in Mexiko, als wir gesagt haben wir stellen nicht selber Leute ein, sondern wir brauchen eine Firma, die das für uns baut. Mit wem machen wir das? Da haben wir wirklich über ein Jahr Gespräche geführt, Leute interviewt. Das war ein langer Prozess, der sich aber gelohnt hat. [1:15:17:56 – 1:17:52]

(125) I: Auf jeden Fall. Das ist jetzt sozusagen Ihr fixes Unternehmen, was sich darum kümmert? [1:17:53 – 1:17:57]

(126) AF: Ja, das ist nicht exklusiv. Wir sind auch offen für andere, aber erstmal machen wir es mit denen. Zum Beispiel die machen das nicht überall. Die sind geographisch ein bisschen beschränkt. Das heißt sollten sich Projekte ein bisschen weiter woanders ergeben, dann werden wir die anfragen, aber die sagen „Nein“, dann müssen wir uns eine zweite Firma suchen. Unsere Schwäche ist, dass wir noch keine zweite Firma haben. Ich bin gerade dabei. Durch die Pandemie hat es geholfen, dass jetzt mehr Unternehmen bereit wären. Wir bräuchten noch ein zweites Unternehmen, um flexibel zu sein. Flexibel sein in Mexiko ist das A und O. Das heißt wir sind jetzt gerade dabei, Gespräche zu führen mit anderen Unternehmen, um zu schauen, ob es passt und ob die uns auch bieten können, was wir suchen. Da müssen wir noch gucken. Aber mit der sind wir ganz zufrieden. Ich hoffe auch, dass die uns treu bleiben. [1:17:58 – 1:19:02]

(127) I: Wie sieht es mit der Macht von den Zulieferern aus? Also Preisverhandlungen sozusagen? [1:19:03 – 1:19:10]

(128) AF: Einkauf in Mexiko ist ein schwieriges Thema. Die Sachen sind hier sehr teuer, weil hier alles importiert wird. Also Kabel sind in Mexiko teurer als in Deutschland. Wir haben überlegt, ob wir das importieren oder hier kaufen. Haben uns dann aber entschieden das hier zu machen. Die Transportkosten sind da ein Thema. Es ist sehr teuer hier. Warum? Es gibt

nicht so viel Auswahl hier, die meisten Produkte werden importiert und sind dann halt teuer. Und wenn du Qualität haben willst, dann ist es nochmal teurer. Das ist ein Problem hier. Wir brauchen einen mit Einkaufserfahrung hier in Mexiko. Ich weiß nicht, ob es Macht ist, aber es ist einfach sehr teuer aufgrund des geringen Angebots. Schwierig genau das zu bekommen, was man haben will. [1:19:11 – 1:20:15]

(129) I: Und auch kein großes Angebot? Also es ist begrenzt auf einige wenige, wo dann auch die Qualität dem entspricht, was Sie suchen?
[1:20:16 – 1:20:25]

(130) AF: Genau, das gibt es eben nur zwei Anbieter, die genau diese Kabel verkaufen, die du brauchst. Aber die sind beide superteuer. Was machst du jetzt? Musst du dann kaufen. Diesen Posten mussten wir erhöhen. Es ist sehr teuer hier in Mexiko. [1:20:26 – 1:20:50]

(131) I: Das denkt man auch von Anfang an gar nicht, oder? Man denkt als Schwellenland wird es günstig sein und dann wird man überrascht. Oder waren Sie sich dessen schon bewusst? [1:20:51 – 1:21:00]

(132) AF: Nicht so richtig. Nein. Da muss man zugeben, dass das uns überrascht hat, wie teuer das dann tatsächlich ist. Da hat jetzt nicht so reingehauen, aber das war schon ein Punkt. Es gibt auch keine richtige Lösung. Was soll man da machen? Das Einzige, wir könnten das in Deutschland billiger einkaufen, aber dann müssen wir es immer noch hierher kriegen. Transportkosten sind in diesen Jahren auch durch die Decke gegangen. Insofern stehen wir jetzt da. [1:21:01 – 1:21:38]

(133) I: Ist dann auch wieder so ein Risiko, ob es möglich ist in der Zeit dies geliefert zu bekommen. Da will man doch lieber die Flexibilität vor Ort, dass es möglich ist von heute auf Morgen die Kabel zu bekommen.
[1:21:39 – 1:21:54]

(134) AF: Genau. Da muss man Abwägen zwischen Flexibilität und Preis. Das, was wichtiger ist. In Mexiko kaufen wir die Kabel heute und haben sie am gleichen Tag da. Wenn wir das aus Deutschland importieren, brauchen wir eine viel längere Vorlaufzeit. Das sind so Sachen, die man dann abwägen muss und irgendwann einfach entscheiden muss. Also ja, Materialien in Mexiko sind teuer. Die, die wir brauchen. Absolut. Und nicht immer vorhanden. [1:21:55 – 1:22:39]

- (135) I: Sie haben auch gesagt, dass alles importiert wird? [1:22:40 – 1:22:43]
- (136) AF: In Mexiko wird quasi alles importiert. Das ist erstaunlich wie selbst einfachste Teile, wie so Plastikteile. Das kann doch nicht sein, dass alles aus den USA importiert wird. [1:22:44 – 1:23:00]
- (137) I: Ja. Ich dachte beispielsweise durch die Maquiladoras im Norden, dass das von dort bezogen werden kann? [1:23:01 – 1:23:08]
- (138) AF: Ja. Da könnte man vielleicht billiger rankommen. Aber da sind wir nicht vertreten. Wir haben uns von Projekten in Tijuana verabschiedet. Das ist uns zu heikel. Zu weit weg, zu heikel. Da sind wir einfach nicht da. Aber es kann sein, dass wir die Sachen da billiger kriegen, weil es eben schnell aus den USA rüberkommt. [1:23:09 – 1:23:37]
- (139) I: Und wenn Sie da bestellen, also schon auf demselben Kontinent. Wäre das da trotzdem für die Transportkosten zu hoch? [1:23:38 – 1:23:47]
- (140) AF: Naja nein. Es ist eher der Einkaufspreis ohne Transport, der teuer ist. Qualität in Mexiko zu bekommen ist teuer. Und sie haben es nicht immer zur Verfügung. [1:23:48 – 1:24:08]
- (141) I: Da haben Sie bestimmt auch lange gesucht, bis Sie einen passenden Zulieferer gefunden hatten. [1:24:09 – 1:24:13]
- (142) AF: Ja, das hatte ich ja erzählt mit dem Kabel. Wir wollten 6 mm, dann ist der losgegangen. Das war sozusagen das Scope of Work von dem Subkontraktor und das war bisschen unfair, weil die hatten das auf den abgedrückt. „Okay, mach uns einen Preis und du kaufst die Materialien ein.“ Wir sagen die genau welche und du musst die dann besorgen. Er hat die 6 mm dann nicht gefunden. War nicht da. Hat er eben 8 mm gekauft. Weil sie eben nicht vorhanden waren. Das ist auch eine Schwierigkeit. Die Verfügbarkeit von Materialien ist in Mexiko schwankend und teuer. [1:24:14 - 1:25:16]
- (143) I: Ein Punkt sind noch Substitutionsprodukte. Beispielsweise Gas, Öl, Kohle ist schon noch sehr groß vorhanden. Sehen Sie das trotzdem als Konkurrenz, als Substitution? Weil das über Jahre hinweg der Rohstoff in Mexiko war. [1:25:17 – 1:25:43]
- (144) AF: Als Konkurrenz sehe ich das nicht. Aber das wird in Mexiko über viele viele Jahre noch eine wichtige Rolle spielen. Absolut. Mexiko ist ein

Höhenland. Es macht dann auch Sinn als Land mit Ölvorkommen auf Öl zu setzen. 80 % der Stromgenerierung in Mexiko von den großen Anlagen geschieht über Pet-Coak und Kohle. Das wird weiterhin auch so bleiben. Mexiko hat nicht das Geld, um aus dem Nichts 10 neue Gaswerke zu schaffen. [1:25:44 – 1:26:35]

- (145) I: Mexiko hat auch derzeit andere Probleme als sich darum zu kümmern, um das abzuschaffen. [1:26:36 – 1:26:38]
- (146) AF: Exakt. Hier bricht die U-Bahn-Station ein, falls Sie das gelesen haben. Mexiko ist arm. Also Mexiko ist ein reiches Land, nur das Geld haben andere. Das ist das Problem, was ich hier in Mexiko sehe. Mexiko an sich ist ein super reiches Land. Ich sehe es nicht als Konkurrenz an. [1:26:39 – 1:27:18]
- (147) I: Schon ein Substitutions- bzw. Ersatzprodukt, wenn es zu teuer wäre. Dass was man aus den letzten Jahren kennt und darauf zurückgreifen kann. [1:27:19 – 1:27:30]
- (148) AF: Genau [1:27:31]
- (149) I: Noch etwas anderes. Als Sie jetzt in den mexikanischen Markt eingetreten sind, kann damit auch verbunden werden, dass Sie das als Eintrittsmarkt für Nachbarstaaten nehmen, um danach den nächsten Schritt zu machen? Angenommen der Markt Lateinamerika wird durch Mexiko erschlossen, um andere Länder in Lateinamerika kennenzulernen. [1:27:32 – 1:28:02]
- (150) AF: Also wir sind bereits in Chile vertreten. Mit einem Mann. Also nur mit einer Person, die wir da haben. Da geht es konkret um Großprojekte. Also wir sind schon in Chile. USA ist außen vor. Da sind wir nicht interessiert. Das ist nicht in unserem Scope drin. Erstmal bleiben wir in Mexiko und in Chile. Momentan haben wir keinerlei Intentionen kurz- bis mittelfristig irgendwo anders etwas aufzubauen. Wir müssen uns erstmal hier etablieren bevor wir auf anderen Spielplätzen mitspielen. Nein, es ist nichts geplant außerhalb von Mexiko und Chile. [1:28:03 - 1:29:07]
- (151) I: Um nochmal auf das Thema Agro-Photovoltaik zurückzukommen. Sie haben gemeint, dass es in Mexiko noch nicht so möglich ist bzw. noch nicht so häufig genutzt wird. [1:29:08 – 1:29:18]

- (152) AF: Nein. Es wird hier noch nicht gepusht dieses Produkt. Aber wir als Unternehmen haben schon das Produkt und versuchen das in Europa an den Mann zu bringen, aber in Mexiko noch nicht. [1:29:19 – 1:29:38]
- (153) I: Weil es weniger Freiflächen in Europa gibt, aber dadurch kann man es kombinieren? [1:29:39 – 1:29:43]
- (154) AF: Genau. Dieses Produkt wird ja geboren aus dem Problem, dass Europa und Deutschland schon eng bebaut ist. Das Land ist knapp, das was Mexiko nicht hat. Die meisten Landwirte hier haben so viel Fläche, dass da immer irgendwo Platz ist für Solar. Also dieses Agro-PV ist ein Produkt, was schon spezifisch für Europa gebaut ist, weil die Flächen dort konkurrieren. Benutze ich die jetzt für Solar oder baue ich da jetzt Getreide an? Diese Konkurrenz-Situation, die wir jetzt immer mehr haben. Die Lösung ist jetzt eben: macht doch beides! Die Lösung für ein Problem in Europa, aber nicht hier in Mexiko. Hier haben wir ja Platz. [1:29:44 – 1:30:44]
- (155) I: Würden Sie CFE als Konkurrenten sehen? [1:30:45 – 1:30:52]
- (156) AF: Ich glaube die sehen uns als Konkurrenten. Wir die aber nicht. Das ist so die Situation. [1:30:53 – 1:30:59]
- (157) I: Also nur wegen dem Stromverkauf sozusagen sie die Sie als Konkurrenten? [1:31:00 – 1:31:05]
- (158) AF: Ja klar. Wir nehmen denen ja Strom weg. Den Strom, den der Kunde aus seiner Solaranlage zieht, zieht er nicht mehr aus dem Netz der CFE. Andererseits für uns ist immer der Preis, den CFE anbietet, der Kampf. Also der Preis gegen den wir ankämpfen. Wenn wir jetzt zum Kunden gehen, der 100 % bei CFE ist. 100 % von seinem Strom bezieht er von CFE und die zahlen den CFE-Preis. Und wenn wir jetzt kommen und denen ein Angebot machen, dann geht es immer darum den Preis von CFE zu unterbieten – billiger zu sein als CFE. Das heißt je teurer CFE ist, desto besser für uns. Je billiger CFE wird, desto schwieriger für uns. Es ist schon Konkurrenz. Nicht direkt an sich, aber es ist schon unser Gegenpart, gegen den wir immer spielen. Und, ich glaube, die sehen uns schon als Konkurrenz. Weil den Strom, den wir anbieten, werden die nicht mehr bei CFE einkaufen. Andererseits haben die das Problem, dass die Netze überlastet sind. Da tun wir denen ja einen Gefallen. Es ist so ein

ambivalentes Verhältnis. Manchmal treffen wir auch auf Widerstände dort und manchmal geht das Hand in Hand ohne Probleme. CFE sind überall lokale Fürstentümer. CFE Queretaro hat nichts zu tun mit CFE Monterey. Das eine kann super sein und die sind total fit und cool und wissen, was sie tun und bei den anderen stößt du auf absolute Unwissenheit. Wirklich schlimm. Man weiß halt nicht, was dich erwartet bei CFE. Aber wir müssen mit CFE klarkommen, weil die müssen uns den Netzanschluss gewähren.
[1:31:06 – 1:33:11]

- (159) I: Es ist also eine Abhängigkeit gegeben. [1:33:12 – 1:33:15]
- (160) AF: Absolut. Eine starke Abhängigkeit und wenn die uns dann Steine in den Weg legen wollen, dann können die das machen. Dann müssen wir richtig strampeln. Wir müssen mit denen klarkommen. Es bleibt uns nichts anderes übrig. Wir kommen nicht um die herum und das ist immer eine schwierige Hürde hier im Projekt: der Netzanschluss mit der lokalen CFE. Da haben wir von der Skala schon alles durch. Von superschnell und effizient bis zu 3 Monate mit denen rumgeschlagen. Also das ist auch eine Herausforderung für jedes Start-Up in Mexiko: Umgang mit Behörden. Da brauchst du auch, meiner Meinung nach, lokale Leute, die sich hier auskennen. Das bringt nichts, wenn sich da jemand aus Deutschland drum kümmert. Das muss einer hier machen. [1:33:16 – 1:34:11]
- (161) I: Also die Bürokratie allgemein ist eine Katastrophe. [1:34:12 – 1:34:15]
- (162) AF: Das ist eine Katastrophe. Das ist total irre und nicht wirklich logisch. Das läuft nach allen möglichen Gesetzen und die musst du kennen. Du musst dich da bewegen können. Du musst auch wissen, wie du mit den Leuten redest. Da haben wir auch gesagt, bevor da jetzt ein tollpatschiger Deutscher dahin kommt, haben wir zum Glück jemand gefunden. Einen Partner, einen Mexikaner, wer sich sehr gut damit auskennt und viele Projekte bereits gemacht hat. Hauptsächlich Wind. Die sind super, wir verstehen uns gut. Wir haben eine Partnerschaft mit denen und die machen uns überall diese „Tramites“. Ich glaube das war eine gute Lösung zu sagen: Lass das den Mexikaner machen. Du brauchst jemanden von hier. Ich glaube das brauchst du in jedem Land. Was Behörden angeht, brauchst

- du ein lokales Feeling. Das war eine wichtige Entscheidung. Da sind wir auch zufrieden mit. [1:34:16 – 1:35:19]
- (163) I: Was ich als Tourist mitbekomme habe ist, dass sobald dort gemerkt wird, dass man Ausländer ist, dann wird das ausgenutzt, um das Beste für sich herauszuholen. [1:35:20 – 1:35:30]
- (164) AF: Ja genau. Wir haben auch ganz klar die Ansage: „Keine humanidad“. Die Ansage muss man machen, wenn man Behördengänge macht bzw. wenn der lokale Partner für dich die Behördengänge macht. Da muss man die Ansage machen, dass wir nichts mehr zahlen. Gerade da ist die Korruption. Natürlich kommt man da in Versuchung, wenn der jetzt 3 Monate das Projekt stoppt, weil du ein Papier nicht kriegst. Da liegst du schon abends mal wach und denkst: „Wenn ich jetzt was zahlen würde...“. Aber das ist für uns ganz klar keine Diskussion. Machen wir nicht. Das muss alles irgendwo anders geregelt werden können. Wenn die Ausländer sehen, denken manche „Oh, der hat ja Geld. Da ist richtig Kohle. Dem könnte ich ja etwas abknöpfen“. Aber wenn ein Lokaler hingeht, dann ist es nicht so offensichtlich. Das muss man sich auch gut überlegen. Auf dem Radar haben, dass behördliche Sachen in Mexiko ein Alptraum sind. Da kann es auch mal egal sein, was das Gesetz sagt. Das interessiert die da nicht. So weit geht das. Und du brauchst gute Leute auch wieder. Gute Leute in Mexiko. Wenn du gute Leute in Mexiko hast, dann läuft hier auch. Die gibt es, aber schwer zu kriegen. Das macht viel viel aus. Die guten Leute wollen natürlich gut bezahlt werden. Auch in Mexiko. Ist nicht so, dass du hierherkommst und für einen Apfel und ein Ei alles nachgeworfen bekommst. Die verdienen hier auch gutes Geld. [1:35:31 – 1:37:22]
- (165) I: Ist das dann schon mit deutschen Löhnen zu vergleichen? [1:37:23 – 1:37:29]
- (166) AF: Ja. Natürlich gibt es das Gehalt an sich, aber in Mexiko läuft auch viel über die Benefits, die es in Deutschland nicht so viel gibt. Weil auch der Staat schon Sozialversicherung, Krankenversicherung und so was per Gesetz anbietet. Hier nicht. Hier kann man viel machen über diese Benefits. Aber ja, wenn du gute Leute haben willst, die auch etwas auf dem Kasten haben und das auch wissen und beispielsweise in Harvard studiert haben, denen musst du echt gutes Geld anbieten. Da darf man nicht

vergessen, das Leben in Mexiko City ist teuer. Das ist teurer als Berlin. Die wollen dann hier auch gut leben und gutes Geld verdienen. Du kannst billig Leute kriegen, aber dann kriegst du halt billige Leute. Das ist so ein Trade-Off. Das ist schwierig und muss man auch auf dem Radar haben. [1:37:30 – 1:38:51]

(167) I: Goldbeck Solar Mexiko ist eine Tochtergesellschaft oder eine Niederlassung? [1:38:52 – 1:38:58]

(168) AF: Ja. Das ist eine eigenständige Firma, die aber zu 100 % der Goldbeck Solar Deutschland gehört. Eine Tochter. [1:38:59 – 1:39:10]

(169) I: Okay. Gab es Gründe, wieso Sie sich dafür entschieden hatten? [1:39:11 – 1:39:15]

(170) AF: Ja, es verlangt auch der Gesetzgeber. Wenn du hier Projekte machen willst, brauchst du eine Gesellschaft für den Import zum Beispiel. Es ist besser, wenn du hier eine eigenständige mexikanische Firma hast, wenn du Sachen importierst. Und das machen wir ja. Insofern macht das Sinn. Das hilft uns und wir sind alle als „Local“ angestellt und keine Expats. Wir sind lokal angestellt bei Goldbeck Solar Mexico. Das ist natürlich auch nochmal ein Unterschied. Es gab gute Gründe dafür. Da kann man sich auch beraten lassen. Das sollte man auch machen. Also ich würde jedem CAMEXA empfehlen, also die deutsch-mexikanische Handelskammer anzuquatschen. Die kennen sich unheimlich gut aus und können auch sehr gut Starthilfen geben. Wir mieten ja auch Büros im German-Center. Das ist ein Konzept für Start-Ups. Das ist ein Bürogebäude. Die geben dir die ganze Infrastruktur. Büros komplett eingerichtet, Strom, Licht alles dabei. Telefon. [1:39:16 – 1:40:28]

(171) I: Für 3 Leute reicht das dann auch. [1:40:29 – 1:40:30]

(172) AF: Ja genau. Man muss jetzt nicht selber alles kaufen, sondern das ist schon da. Ich finde das da ganz angenehm. Das ist auch gut gemacht. Man merkt, dass das in deutscher Hand ist sozusagen. Das sollte man auch in Anspruch nehmen, wenn man Infos braucht. Für deine Arbeit kann ich dir auch die CAMEXA ans Herz legen, dass du mit denen mal sprichst. Die haben auch sehr viele Infos und kennen sich super gut aus. Das ist ja genau ihr Ding. Die wollen deutsche Unternehmen nach Mexiko bringen. [1:40:31 – 1:41:12]

- (173) I: Ja. Werde ich. Hab ich auch auf meiner Liste mit gehabt. [1:41:13 – 1:41:17]
- (174) AF: Super. Ich finde die alle nett da. Wir sind natürlich auch Mitglied.
- (175) I: Ich glaube wir haben jetzt auch alles abgearbeitet. Mit den Kompetenzen, um es noch einmal zusammenzufassen, wo Ihnen andere Konkurrenten voraus sind. Da hatten Sie gesagt, dass manche von der Struktur größer sind, länger im Markt mit mehr Erfahrung und einfach die finanziellen Mittel? [1:42:11 – 1:42:33]
- (176) AF: Finanziell deutlich stärker aufgestellt und natürlich viel mehr Connections haben. Die haben jede Menge Verbindungen zu den Regierungen, Kundenkontakte. Die haben einfach schon einen riesen Kundenstamm mit denen die arbeiten können. Die Erfahrung ist immer, wenn ich irgendwo hingeh, da war Iberdrola schon da. Das ist schon harte Konkurrenz. Die Spanier sind teilweise schon seit 10-20 Jahren hier. Die kennen sich auch ganz gut aus. Das merkt man. Die haben auch Verbindungen zu ganz oben oder nach ganz rechts oder ganz links oder zu CFE zum Beispiel. Da gehen die ganz anders mit um als wir Kleinen. Das ist schon ein Unterschied. [1:42:34 - 1:43:22]
- (177) I: Gut. Wie würden Sie die Zukunft in den nächsten Jahren auf dem Markt sehen? Es geht immer steigend nach oben, oder? [1:43:23 – 1:43:37]
- (178) AF: Ja, ich sehe da schon eine steigende Kurve mit Hügeln und Dellen und Tälern. Aber langfristige Tendenz ist steigend. So würde ich das beschreiben. [1:43:38 – 1:43:55]
- (179) I: Ich habe jetzt noch das Stichwort Wasserstoff, aber da sind sie glaube noch weit von entfernt. Das ist glaube ich noch ganz ganz langfristig. [1:43:56 – 1:44:06]
- (180) AF: Ja. Noch kein Thema. Könnte ich auch nicht viel zu sagen. [1:44:07 – 1:44:11]
- (181) I: Ja. Das war jetzt nur, weil es derzeit so einen Hype über Wasserstoff gibt, da wird es aber in Mexiko noch dauern, wenn Deutschland schon Probleme damit hat. [1:44:12 – 1:44:21]
- (182) AF: Ja. Das ist noch Zukunftsmusik. Es kommt, aber bis das nach Mexiko kommt... [1:44:22 – 1:44:28]

- (183) I: Gut. Hätten Sie noch Ergänzungen von Ihrer Seite? [1:44:29 – 1:44:32]
- (184) AF: Nein. Ich glaube es ist alles gesagt. [1:44:33 – 1:44:35]
- (185) I: Wir haben es auf jeden Fall sehr detailliert durchgesprochen, wofür ich mich herzlich dafür bedanke. [1:44:36 – 1:44:41]
- (186) AF: Gerne. Ich war ja auch mal Student. [1:44:42 – 1:44:45]
- (187) Additional information via LinkedIn:
- (188) I: Inwiefern stellt der Wechselkurs ein Risiko für Ihr Unternehmen dar? Wie wirken Sie dem entgegen?
- (189) AF: Zum Thema Wechselkurs: Dies stellt tatsächlich ein Problem dar. Wir arbeiten mit Euro, Dollar und mexikanischen Pesos. Unsere Angebote sind alle in US-Dollar und wir legen alle paar Tage den neuen Wechselkurs für die Umrechnungen fest. Außerdem sind alle unserer Angebote befristet, um gegebenenfalls den Wechselkurs anpassen zu können.

A3.2: Interview Transcript with Mr.Orbeza from SOWITEC Mexico (Interview 2)

(2) I = Interviewer

(3) DO = Daniel Orbezo

(4) I: Alright. Thank you again for participating in the interview. I would like to ask you to introduce yourself, like your position and what your company is doing. [0:00 – 0:15]

(5) DO: Yes. Yeah absolutely. My name is José Daniel Orbezo Parrao. Better called as Daniel Orbezo. I am a civil engineer and currently I am working as Head of Project department at Sowitec Mexico for almost 7 years now. To my background, as I said I am a civil engineer, but I have a master degree in renewable energies and other technical studies which help me in order to define in a better way the feasibility of renewable projects. That is what I am doing here at Sowitec. I started as a civil engineer but then became head of engineer department as I said currently, I am working as Head of Project management for 2 years ago more or less. [0:16 – 1:31]

(6) I: Okay. And your company, like the business model, is it about selling projects or the operation and maintenance of the solar systems? [1:32 – 1:47]

(7) DO: Well, that depends on the market we are talking about. Here in Mexico, we are a pure developer. We just keep in the first stages of the project development until we reach the credit stage. In other countries for example we are participating in some other markets as independent producers. For example in Uruguay. As is said it depends, for example in Germany the company's scope includes for example the maintenance and so on. In Mexico we are just developers. [1:48 - 2:34]

(8) I: That means that also the clean energy certificates do not play a big role in Mexico right now? [2:35 – 2:41]

- (9) DO: Right now, for us no. But you should know in our law, we have already an energy transition law which includes the emission of clean energy certificates as a help for the renewable project development. [2:42 – 3:13]
- (10) I: Okay. The next point, I am not quite sure if you are familiar with that but do you know why Sowitec entered the Mexican market? Like motives. Maybe the manager had some contacts over there and decided to move the company. Do you have any ideas about that? [3:14 – 3:32]
- (11) DO: Well, I think the question is a little bit out of my scope. But I would say Sowitec entered to the Mexican market in 2008. That was a good moment for Mexico because in that moment was a lot of movements in the law. If you remember, we had a change in Energy law in 2013. So when Sowitec came to Mexico was the best time to find the best spots in Mexico in order to be prepared for the new market that were appearing. And of course, in that moment Sowitec had big agreements with big companies. Lets say Italian companies. That pushed Sowitec to find projects to deliver to that Italian investor. [3:33 – 5:06]
- (12) I: So it was mostly because of the big market opportunities that you pushed yourself into it? [5:07 – 5:11]
- (13) DO: Exactly. Exactly that is the point. [5:12 – 5:16]
- (14) I: So as you know I am analyzing the whole market. Like the macroenvironment, the industry and the internal environment. I would start with the macroenvironment. I do it in form of a PESTEL. I go after different aspects. P for political, E for economical and so on. That we can go step by step after some details that could be important points to analyze the market. IF you think about political aspects, you mentioned already the energy reform. What would you think is for your industry for Sowitec important to analyze to be successful in the market? [5:17 – 6:17]
- (15) DO: You mean in a political context? [6:18 – 6:23]
- (16) I: Yes. For example, the energy reform. How does it influence your business model? How does it help? Also with the new, how is it called –

Novela? The president actually wants to strengthen CFE and how does it affect you for example? [6:24 – 6:48]

(17) DO: Well that affects us in a very important way. Lets say Sowitec is always looking for smooth project developments in interesting markets. When Sowitec came to Mexico the political framework was another. The administration in that moment was a little bit in a center or right position. And now we have a left-winged administration. Once Sowitec came here to Mexico, they found a good framework for project development that helped us in order to find the best business models for us. Being able to sell our projects to investors that were interested in our projects. Right now with the current administration, they have another completely different vision on what we need for a contract. This position has strengthened CFE, a state company in charge of almost the whole energy chain. They are big players in generation, they are a monopoly in transmission. On supply, for example, they do not have competitors right now. The law permits to have other competitors for domestic supply but there is no other up to date. And specifically related to what we do here at Sowitec, we had experiences with some troubles because the position of the state is to keep CFE as the most important player in energy production. That means, the state is going to indirectly block us because they don't want to fight with the private sector. They know that they are not efficient enough and they are not interested in having competitors which are looking for the best technologies. More or less this is what happening with that. [6:49 – 9:59]

(18) I: So actually, the energy reform was beneficial for you at the beginning but since the "Novela" it gets trickier and more difficult for you? [10:00 – 10:10]

(19) DO: Exactly. That's it what it is. What is happening. From 2 years ago we have been experienced a lot of indirect blocks. For example, there is not a possibility to obtain an investigative study which is the first step in the interconnection process. If you don't have an interconnection agreement, you do not have any projects. [10:11 – 10:44]

- (20) I: Another point what is always been mentioning in the news, is about the corruption. Do you feel that, or did you experience something? Would you say it is a problem? [10:45 – 11:03]
- (21) DO: Well, I think corruption was a problem at the very beginning. It is not a problem with this administration but in the last administration when everything related to the private sector was okay. The corruption was related to the possibility to obtain some permits, taking advantage on the relationship they have with the administration. With the public administration. The trouble is that when you don't have those connections with the government, it is more difficult for the company to develop their projects. Now, I think that the problem is not corruption. It is not corruption; it is just ignorance from the current administration. In my opinion, they are not seeing the consequences of not open the market to the private sector [11:04 – 12:20]
- (22) I: So you would say, because of the protectionism they want to promote again the coal and oil and gas [12:21 – 12:30]
- (23) DO: Yes [12:31]
- (24) I: OK. Another point is about taxes. Like subsidies. Do you still live with that? Or you can survive on your own and don't really need that anymore? [12:32 - 12:57]
- (25) DO: Related to that, I think there are not really movements. I mean, we are still having subsidies from the government for renewable projects. I mean, for example, if you create a new company related with the social object of generate electricity, you don't need to pay taxes or related with incomes. The next, I think, 3 years from the creation of the subsidiary, for example. That kind of subsidies are still on-going. That is good for project development but not as good as we expect. [12:58 – 14:00]

- (26) I: Alright. Then let's go to the next step. The economical points. Let's say in general, the GDP in Mexico has an influence? It is probably about the sectors. If you have the solar systems for the population, you are probably dependent on it. But if you go more into the industry sector or the utility scale, then probably not or what would you say? [14:01 – 14:40]
- (27) DO: Well, to be sincere, I don't have an answer for that. But let's say, we are always trying to define the best moment to make investments, looking for multiple variables. So, one of that is the GDP, for example. Maybe is not the best time to look at those KPIs right now because of the pandemic situation. That phenomenon is happening here in Mexico, too. Let's say, I am pretty sure it is related with the success of project development. [14:41 – 15:45]
- (28) I: And since Mexico is an emerging country, there is still like a steady growth, like an economic growth. That's why it is also a high potential market, I guess? [15:46 – 16:00]
- (29) DO: Yes [16:01]
- (30) I: I am not sure how familiar you are with the interest and exchange rates. Do they influence the business? [16:02 – 16:14]
- (31) DO: Yeah, but to be sincere that is not part of my scope. I don't have an answer for that. [16:15 – 16:27]
- (32) I: No problem at all. How would you describe the bureaucracy in Mexico? Like in order to deal with the administration, sign contracts. Is it a long and hard process? [16:28 – 16:50]
- (33) DO: Can you repeat the first part of the question please? [16:51 – 16:55]
- (34) I: How would you describe the bureaucracy, like the ease of doing business in Mexico. Is it a long process to sign contracts or to come in touch with partners, administrations? [16:56 – 17:11]

(35) DO: Well, let's say, I think we can divide that into two parts. The first are the things that you must align with the private sector related with the project development for example. Looking for investors, looking for suppliers and so on, there is not any trouble to find them or to sign a specific contract. There is not any problem with that. But if you look for the public sector. Licenses, permits, and contracts that we need to perform in order to develop a project for example. There is where we can expect some delays and negotiations with the bosses in that administration. I would say, it depends on who you are looking for making business with. If you want to make agreements with the private sector is not any trouble but if you want to make the same with the public administration, there is where you will find some issues [17:12 – 18:40]

(36) I: Another question regarding the economic aspects. Do trade agreements play a role? Like with the United States? [18:41 – 18:52]

(37) DO: Yes absolutely. You should know that Mexico is currently signing a new agreement, a new commercial agreement with the United States and Canada. We think that is going to affect the way on how this administration face the renewable energy projects. As you know, President Biden has another completely different way of seeing that technologies. I would say, the current administration in the United States love that kind of technologies. That situation is going to push Mexico to align with purposes on the United States. And of course it is related with the recent agreement sign. The possibility to sell, let's say merchandise to the United States. [18:53 – 20:16]

(38) I: Okay. The next part will be about the social aspects. Like if you look for projects for the solar systems, there could be problems. For example, does it affect you with indigenous groups? That you cannot build something in special regions? [20:17 – 20:42]

(39) DO: Yes. That Is the part of our most important issues that we see before a project development. Actually, here in Sowitec Mexico we are an

expert in that. I would say, yes of course, there is a lot of characteristics we need to face during the straining phase. Our environmental issues for environmental issues, you'll find, for example, some environmental conditions that you need to fulfil. They are mostly related to project design but there is other kind of works that should be done before starting the construction. You should perform a flora and fauna rescue. And other detailed environmental studies with bears, with bats and other fauna monitoring. That is the environmental site. In the social site, we should start any development with a social aspect assessment which is basically the definition on the impacts related with the installation of projects inside a community. That includes, for example, in an indigenous group, a consulting, an investigation on how the indigenous population looks at our projects and if they agree with our installations. You should obtain an approval from that communities. This is one of the most important issues, we need to face at the very beginning. That becomes harder once you get closer from central Mexico because central Mexico is where you can find a lot of indigenous communities. That is why you are going to notice that in Central Mexico there are just a few utility scales. That's why more utility scales are in the North of Mexico, for example. In the northern part of Mexico, where you will find a lot of land but just few people. [20:43 – 24:08]

(40) I: Because there is the dessert? [24:09 – 24:11]

(41) DO: Exactly, exactly. But if you come near to Mexico City for example, there is not any land to develop utility scale. [24:12 – 24:22]

(42) I: And I think it would be also the same with Oaxaca and Yucatan, for example? [24:23 – 24:28]

(43) DO: Yeah absolutely. And it is not just related with social issues but with archeological issues. This is another perspective on social characteristics. If you want to develop a project in Yucatan or in Oaxaca you will find indigenous communities. This is a fact. But actually, you should study if in the location where you want to build your PV-plant, if there is not

other ecological heritage you need to rescue. It is very probable that you will find it because it is Oaxaca and Yucatan. [24:29 – 25:25]

(44) I: Okay. And will those indigenous groups benefit monetary from that like you have to give them money in order to compensate it or just an agreement that it is okay for them? [25:26 – 25:39]

(45) DO: Well, I think to give them money is part of the agreement that you should organize with them. It is not a rule but it is a situation that you are going to face very very probably. Actually you can obtain an approval without giving any money but it is not probable that this happens. [25:40 – 26:17]

(46) I: I also read that Mexico is a technical country. Like the automobile industry and that there are many engineers. For example, more than in the US and in Canada that leave the University as an engineer. Would you say that this helps you for the market to hire new people that you have a good offer in order to get good manpower? [26:18 – 26:47]

(47) DO: Yes I agree with that. I think from 2000 to now, there are increasing the number of engineers that are able to work in the industry. That is because of the trade agreement with the United States. As you know, I commented that previously, that we recently signed an agreement with them and that enables us to work on automotive parts in Mexico. In Mexico we do not construct cars from the scratch but we have a lot of companies that construct some automotive parts like wheels. Because of that we have a lot of universities working on problems for engineers and they have the opportunity to work in this industry. That is why we have proper manpower for the development of the solar power industry. [26:48 – 28:42]

(48) I: Okay, sounds good. Another point and I know the Mexicans do not like to talk about it but it is about the safety and security issues regarding the cartels. How would you describe it as a problem for your company? [28:43 – 29:00]

- (49) DO: Definitely, it is a trouble or a problem because, you should know, the cartels are located in the whole country. It's not a problem for a specific zone. So for example, if you are looking for a development in the central of Mexico, you will find the first social situations as I described previously. The indigenous population with ecological heritage and also security troubles with cartels and so on. For example, if you find that in the location where you want to develop a project, that means that very probable you need to make contact with them. Maybe indirectly but that is going to happen because the people who live in that community will be involved with the cartels at the level where they need to answer them everything. You know what I mean? [29:01 – 30:19]
- (50) I: Yes, I know. So that means you have to communicate with the population there or with the cartels? [30:20 – 30:25]
- (51) DO: No, I think that is directly with the population but in many cases you will need to talk with the cartel, too. Maybe not with the bosses but with people which are in charge of the location or the community. [30:26 – 30:46]
- (52) I: Sometimes they also threaten you and you have to pay them? [30:47 – 30:52]
- (53) DO: Probably. That depends on the situation. I would like to mention one history that recently happened to us. We have been looking for a project in Guanajuato and right now in Guanajuato, you should know, there is a cartel Santa Rosa de Lima, which are one of the worst, in terms of violence. Of course, the people were interested in the development of that project but very honestly they told us that they should request permission to the cartel. That is what is happening.[30:53 – 31:50]
- (54) I: Oh okay. A really tricky situation [31:51 – 31:52]

- (55) DO: A tricky situation, yes. The cartel knows that the people is going to earn money from the project, and they want to have a part of that. [31:53 – 32:08]
- (56) I: Oh okay. Let's go to the next part, how would you describe the technological situation concerning solar systems and photovoltaic in Mexico? [32:09 – 32:24]
- (57) DO: Well, let's say we have a very good trade opportunity with China and in the solar sector it is very well known that China plays a big role. I think that we have access to the most advanced moduls, converters and trackers and so on. I think there is not a trouble for Mexico. [32:25 – 33:03]
- (58) I: You import all the components from China mostly? [33:04 – 33:08]
- (59) DO: Mostly from China and of course from the United States but mostly from China, yeah. [33:09 – 33:25]
- (60) I: Okay. How would you describe in general the transmission network, the cables in Mexico and the infrastructure? Is it mostly older and you need to renew them? [33:26 – 33:40]
- (61) DO: Yes, this is very old. Actually, in the planning document what provides SENER which is the security of Energy here in Mexico, it is like a joke because they expect to construct just 17 kilometers of high voltage transmission line in Mexico in 2021. 17. There is not an investment in the transmission. We need to have it in order to accept more renewable energies. But, I think, that the government knows that that they want to push the private sector in order to beat them. That affects directly the project because we could not reach a levelized energy accordingly what the investors are looking for. [33:41 – 35:05]
- (62) I: Would you also say that one the one side the government wants to block the private parties in order to strengthen CFE but on the other side they

need the private companies like Sowitec to have more space in the network, right? Because I read that the network is completely full, so there has to be decentralized energy generations. Actually, you have to work with them somehow. [35:06- 35:53]

(63) DO: Yes, basically. [35:54]

(64) I: Another point, you already mentioned ecological parts. It is obvious that Mexico has a lot of sun in the whole country. That makes it high-potential, too. Also that it is a big country with lots of free space for building projects. You would agree with that? [35:55 – 36:29]

(65) DO: Yes, absolutely. Accordingly, the solar global atlas, we have the global irradiation average around 2150 kwh/m² per year. This is a very high irradiation. This is perfect for PV-plants project development. Yes, we have a lot of space, mainly up the north of Mexico. But the situation is that the north of Mexico doesn't have big, populated cities. The demand is not there. So, there is a lot of space in the North, but that electricity needs to travel to the better load zones and that means that this electricity needs to use the grid and the grid, as you know, is full. You could find perfect locations in North Mexico to develop projects but if you want to establish a PPA, that is where you will face trouble. You will find a PPA but the loads will be located in other zones of Mexico and not only in the North. What is going to happen is, that you are going to produce cheap electricity, but this electricity is going to travel and you should pay transmission fee. The cost is going to increase and maybe won't be the best conditions for a PPA. [36:30 – 38:29]

(66) I: That means that you don't use the dessert for projects mostly? Its good conditions but because of the transmission its difficult. [38:30 – 38:38]

(67) DO: Exactly. [38:40]

(68) I: Alright. Then let's go to special applications. For example, do you use in Mexico Agro-Photovoltaic or not yet? [38:41 – 38:59]

- (69) DO: Not yet. I have heard about some projects that are trying to include that technology but there is not any project installed with that technology. [39:00 – 39:20]
- (70) I: And what about floating-PV? For example, I just had in mind the golf of Mexico or Baja California? [39:21 – 39:30]
- (71) DO: Well, for Floating-PV, I think that we are not going to be able to develop on our seas or oceans or gulfs. Because there are a lot of environmental restrictions on that. But let's say, and this is one is going to be interesting for you. We commented previously that one of the most important troubles to develop PV-projects in central Mexico was the land because there is a lot of population and difficult to find hectares and flat land to develop the projects. But in Central Mexico, the other option would be to develop that kind of technology but in water bodies. A special characteristic of central Mexico is that we have a lot of water bodies. Artificial or natural. Other characteristic is that water what is in the water bodies are mostly contaminated. You should know 25 million people in Mexico City pollute a lot. We have a lot of contaminated water bodies. One of the expectations in the sector is that in the next years we will be able to develop Floating-PV on that contaminated water bodies in order to help the water bodies to improve the water quality and also to produce electricity. That is like a chance to get to objectives. [39:31 – 41:36]
- (72) I: That's a really good idea. Efficient. [41:37 – 41:40]
- (73) DO: Exactly. It is, of course, an idea and we need to develop. Let's say it is a possibility for the future. [41:41 – 41:51]
- (74) I: So you would say, currently not but in the future? [41:52 – 41:58]
- (75) DO: Yes [41:59]

- (76) I: Good, perfect. Let's talk a little bit about the industry. How would you in general describe the actual situation in the photovoltaic sector in Mexico? Is it booming? [42:00 – 42:19]
- (77) DO: Well, I think that the utilities are not moving too much. But distributed energy, let's say, they are on the boom because they do not depend on private investors. The capacity of the distributed electricity is not more than 1 MW. It is good seen by the current government. They push the people to get those systems. So let's say, distributed energy have a boom here in Mexico but utility scale is a little bit of a stop. [42:20 – 43:18]
- (78) I: Is it also because of the "Novela"? [43:19 – 43:20]
- (79) DO: Exactly. It is definitely related with that. [43:21 – 43:25]
- (80) I: So little and medium projects are still possible but utility scales difficult. [43:26 – 43:33]
- (81) DO: Difficult, exactly. [43:34 – 43:36]
- (82) I: How would you describe the competition? Is it more or less an oligopoly with a few competitors or is it a hypercompetition with lots of companies you have to compete with? [43:37 – 43:51]
- (83) DO: Well, maybe two years ago, it was lot of competitors for Sowitec Mexico. I mean, competitors lets say the companies doing the same as Sowitec. Pure project development. Two years ago there were several companies in that but now, in my perspective, just a bunch of companies are still working on project development because they couldn't face the 2 years block that we already have in the sector. You know what I mean? Just a company as Sowitec with a strong support would be able to restrain. [43:52 – 44:52]
- (84) I: What support do you mean? [44:53 – 44:55]

- (85) DO: Yes. Support, for example, you should know that currently Sowitec has participation of Vestas. That is the situation. Economically speaking, we are okay and that is not the same story for all the tiny developers in Mexico. I know that they are trying to sell their projects at the very early stage because they have not expectation to be able to sell later. [44:56 - 45:37]
- (86) I: Ah okay. Because you have the experience, you have the capital and its easier for you to establish. [45:38 – 45:43]
- (87) DO: Exactly. [45:44]
- (88) I: In which market segments are you active? Every segment? Even the little for the building or you focus more on utility scale or medium projects? [45:45 – 46:00]
- (89) DO: Yeah absolutely. We are just focused on utility scale. We do not develop tiny projects. [46:01 – 46:09]
- (90) I: You have a special region or is it all around Mexico? [46:10 – 46:16]
- (91) DO: Yes. All around and we are always looking for the best spots to develop projects. [46:17 – 46:36]
- (92) I: Who would you say are your competitors? Is it more the big companies, lets say the Spanish and Italian ones? [46:37 – 46:48]
- (93) DO: Yes, but let's say we do not take these companies as our competitor but as our potential investors. I mean, we are always looking for business models like pure development for these companies. Looking for selling our project at ready to be at stage for them. [46:49 – 47:21]

- (94) I: I mean, for example, the Spanish company Iberdrola. The big Spanish and Italian companies in the energy sector are no competitors for you? [47:22 – 47:43]
- (95) DO: Exactly. They are not competitors for us. As I understand, the business model in Sowitec Mexico, they are not our competitors but our possible investors. Selling our projects once they are ready to be at stage. [47:44 – 48:12]
- (96) I: Who would you see as competitors then? [48:13 – 48:18]
- (97) DO: For example, Aljaval. It's a pure developer in Mexico. It is a Spanish company and others like them. [48:19 – 48:49]
- (98) I: You wouldn't also see PEMEX as a competitor? It is not really in your field right? [48:50 – 49:06]
- (99) DO: PEMEX is more related with hydrocarbons. This is not a company really related with us. I mean, it would be because now the framework, the law, the rules enable them to work in renewable energies but up today, they haven't any renewable projects. [49:07 – 49:42]
- (100) I: You already said it is difficult to get as a new company into the market, right? If you don't have connections or capital. [49:43 – 49:53]
- (101) DO: Exactly. [49:54]
- (102) I: What would you say are substitute products? It's still like because the government promotes the gas and the oil. Would you say it is still a kind of a threat? [49:55 – 50:13]
- (103) DO: Yes. Definitely it is. Maybe not a trouble but a situation for us because the government are pushing other sectors not related to renewable energies and the consequences on that is that investors really don't want to invest the proper amounts of money because of that. [50:14 – 50:49]

- (104) I: Because they are still scared that it could get problems with the government? [50:50 – 50:55]
- (105) DO: Exactly. [50:56]
- (106) I: And since you are responsible for the development of the projects, you also need to be in touch with all the suppliers. Who are the suppliers mostly? You said already from China a lot. [50:57 – 51:14]
- (107) DO: Exactly. But even from the United States for example. Nextracker or GE, for example, for inverters. And for floating, for example, we are looking for floating systems in Spanish companies like EasyFloating. That's the name of the Spanish company but others like French companies like Ciel et Terre. Basically, we are looking for the best suppliers. We just need to certify that they are able to work in Mexico but basically it is only that. [51:15 – 52:13]
- (108) I: How would you describe the power from those suppliers concerning the price negotiations? Because the demand is big, so they can increase the prices easily? [52:14 – 52:30]
- (109) DO: Yes absolutely. If we agree that the company is already in Mexico, they should have experience in the development in that kind of projects. So yes, we start with companies that have the experience. Of course, considering that they are going to negotiate in the proper stage to negotiate the cost on the supply. [52:31 – 53:09]
- (110) I: So they have a powerful position in order to renegotiate because of their unique position? [53:10 – 53:22]
- (111) DO: Yes, exactly. [53:23]
- (112) I: Last point about the industry. You said you are in the Utility-scale-segment. So, your clients are big companies mostly, I guess? Would you say like the real big companies or how big is the scale from that? Or you

also do it for little companies for their own power generation? [53:24 – 53:57]

(113) DO: That goes out of my scope. Basically, we are always trying to make business with the most important companies. That means, the Italian, the Spanish and so on. But as I said, it is not my scope. [53:58 – 54:24]

(114) I: They are probably also in every sector? Can be retail, can be automotive, can be everything? [54:25 – 54:33]

(115) DO: Yes [54:34]

(116) I: Do you also have public clients? Or mostly just private? [54:35 – 54:41]

(117) DO: Well, mainly private. Because they are easiest in Mexico to make business with them. But if there is an opportunity to make business with public companies, we are interested in that. [54:42 – 55:03]

(118) I: Ok. So you mostly do it with the PPAs then? To finance it at the same time. [55:04 – 55:09]

(119) DO: Yes. [55:10]

(120) I: Good. Thank you for that. Last point is about the own resources and capabilities. What would you say are the strengths of Sowitec? What is your competitive advantage and what makes you strong in the sector? [55:11 – 55:37]

(121) DO: Basically, because we are able to face almost all the specialties that you need to develop a renewable project in Mexico. Sowitec aren't just specialized in wind but also in solar and environmental, social, and technical feasibility studies. We do not contract other companies to do our technical studies, for example, because our manpower is able to do that. This is what I think is our advantage over other developers in Mexico. We

are a global company; we do have a lot of experience and knowledge and of course the know-how. This is what I think makes the difference between us and other developers in Mexico. [55:38 – 56:51]

(122) I: So, on the on side it's the experience, the manpower, the skills, the knowledge and also as you said before, the capital. The monetary point. Because it is a big company with locations everywhere. Do you also have a special product like an engineering masterpiece what can be seen as competitive advantage, or you build something differently? [56:52 – 57:27]

(123) DO: You should know, not specifically a super-tool or something like that. I don't think so. But the knowledge that has our specialized company which is Sowitec development in Germany. Of course, they represent a center of excellence and has the experience and knowledge, as I said, not related with wind, but the possibility to perform analysis for hybrid plants, for solar plants, for floating PV plants and other technologies on renewable energies. Actually, as I said, the experience on the development not just in Latin America but in other countries like Russia, Kazakhstan and also Asia, South America and so on. I think, this is our most important advantage over other competitors. [57:28 – 58:34]

(124) I: Okay. How would you describe that you are working in a German company? You really notice that? [58:35 – 58:51]

(125) DO: Yeah, absolutely. I am very happy to work in a German company. I think that German people respect a lot the rights on the workers. We have very good working conditions. Let's say, to be working in Mexico we have German conditions in our contracts. I think, we are experiencing the way of the German people work directly in Germany but in Mexico. But yes, I notice that we are working in a German company because of the quality, a lot of characteristics. [58:52 – 59:46]

(126) I: So, it helps also that products "Made in Germany" stand for the reputation in Mexico? [59:47 – 59:45]

- (127) DO: Exactly. Yes. [59:46]
- (128) I: You don't have to answer that, but would you say that some other companies have something what you want to gain? Something you need to acquire to be more successful what another company in the industry has. [59:47 – 1:00:20]
- (129) DO: I am not sure. I prefer not to answer that. [1:00:21 – 1:00:27]
- (130) I: That's fine. Last question then. How would you see the future of the photovoltaic market in Mexico? [1:00:28 – 1:00:44]
- (131) DO: Well, that's encouraging. We already have midterm elections in Mexico and the balance and the power seem to be better for us. I would say encouraging, mostly. [1:00:45 – 1:01:08]
- (132) I: Also, in terms of hydrogen, for example? Or is it really a future topic what is not present in Mexico right now. [1:01:09 – 1:01:15]
- (133) DO: Well, the hydrogen is present in Mexico but this kind of technology right now is not changeable. [1:01:16 – 1:01:33]
- (134) I: But, lets say, in the longer future it could be a possibility to produce hydrogen over there and maybe export to the United States or somewhere else. [1:01:34 – 1:01:44]
- (135) I: Alright. Then, thank you a lot. That's all from my side. You want to add something maybe? Something we did not point out. [1:01:45 – 1:01:56]
- (136) DO: No. Just thank you because the interest of having this interview, I am glad too. [1:01:57 – 1:02:03]

A4: Table with Coding of Statements from Transcripts

A4.1: Table with Coding of Statements from Transcripts of Interview 1 (Goldbeck Solar)

Statement	Paragraph	Code
Goldbeck Solar ist eine in Deutschland recht bekannte Firma, die schon seit 20 Jahren, also quasi seit der Energiewende-Reform in Deutschland existiert. 2001. In Mexiko ist die Firma seit Dezember 2017 mit einem Büro hier im German Center in Santa Fe.	9	Company Information (Goldbeck Solar)
Dann bin ich zu Goldbeck Solar gestoßen und wir befinden uns quasi in der Aufbauphase.	9	Company Information (Goldbeck Solar)
Die Entscheidung nach Mexiko zu kommen, da muss ich jetzt ein bisschen, ich war ja nicht dabei, aber so wie ich das verstehe. Es ist halt so, dass der Herr Goldbeck erstmal persönlich mit Mexiko verbunden ist. Seine Frau ist Mexikanerin. Da gab es wohl immer diesen Blick auf Mexiko. Und speziell jetzt natürlich nach der Energiereform von 2014, die da jetzt in Mexiko nach vielen vielen Jahren Monopol, den Energiemarkt liberalisiert hat, haben sich da natürlich unheimlich große Business Potentiale ergeben. Und warum das	9	Motives to enter Mexico

jetzt von 2014 bis 2017 gedauert hat bis das Office eröffnet wurde kann ich nicht sagen, aber ich denke mal das hat einfach seine Zeit genommen. In Mexiko ging ja seit 2014 ein richtiger Boom los, auch mit Solar und Wind. Also da sind über 8 GW installiert wurden innerhalb 4 Jahren oder so.		
Und speziell jetzt natürlich nach der Energiereform von 2014, die da jetzt in Mexiko nach vielen Jahren Monopol, den Energiemarkt liberalisiert hat, haben sich da natürlich unheimlich große Business Potentiale ergeben.	9	Macro Environment/Legal (Subcode: Energy reform)
Es ist jetzt zu einem Stillstand gekommen aufgrund der neuen Regierung. Jetzt seit 2018 merken wir ganz klar, dass da neue Genehmigungen für große Solarparks sind, momentan gar nicht, schwierig oder fast gar nicht zu bekommen.	9	Macro Environment/Political (Subcode: Government)
Ich gehe jetzt mal auf das Makroumfeld ein. Mexiko, wie Sie ja wissen, ist in vielem, was Infrastruktur angeht, relativ rückständig bzw. veraltet. Da sind jetzt in kurzer Zeit sehr viel Solar -und Windenergie gebaut worden. Und es ist wohl schon so, dass es ein Problem gibt, diese Energie auch an die Verbraucher zu bringen.	11	Macro Environment/Technology (Subcode: Infrastructure)

Das heißt, es sind relativ viele und sehr große Solarparks in einer relativ beengten Region gebaut worden. Die Gegebenheiten dort waren einfach ideal für Solar, aber es hat sich das Bottleneck, mit dem, und zwar das Netzwerk, die Grid		
Die Einspeisung und der Transport über das Netz ist schwierig und ist an Grenzen gestoßen	15	Macro Environment/Technology (Subcode: Infrastructure)
CFE, der ursprüngliche Monopolist, von heute auf morgen in eine ziemlich prekäre Situation gedrängt wurde. Von heute auf morgen wurde der Markt liberalisiert und CFE wurde auch zerstückelt sozusagen. Je nachdem, welchen Hut man sich aufzieht und man sich den CFE-Hut aufzieht, dann muss man schon sagen, dass das ein Todesstoß für das Unternehmen war	15	Macro Environment\Political (Subcode: Public Administration)
Auf jeden Fall hat die Reform auch Verbesserungsbedarf. Ich meine, das ist in Deutschland auch nichts Neues und die Energiereform ist zig mal angepasst und geändert worden. Die Umlage hoch, runter, rauf. Das muss auch in Mexiko passieren. Wir hatten seit 2014 bis jetzt, zum ersten Mal 2021, die erste Änderung, also Änderung der Reform. Oder Anpassung. Also nach 6	15	Macro Environment\Legal (Subcode: Energy reform)

Jahren und ich denke, das ist ein normaler Prozess		
Solar braucht auch nicht mehr Subventionen oder so. Solar ist inzwischen so weit, dass es von allein sehr gut mit anderen Energieressourcen mithalten kann	15	Macro Environment\Political (Subcode: Subsidies)
Ja, es gab schon von Anfang an relativ wenig Subventionen. Es gibt ja so indirekte Subventionen. Da muss man jetzt einsteigen ins Detail. Ich weiß nicht, ob Ihnen das Thema „Contratos Legados“ was sagt. Das sind Energieverträge, die vor der Reform von 2014 schon standen. Es war auch davor schon möglich Energie zu verkaufen, also private. Das kann mit dem Nachbarvertrag von 1994. Großen Unternehmen sollte die Möglichkeit erlaubt werden, für sich selber Strom zu erzeugen. Das war der ursprüngliche Gedanke. Wie zum Beispiel Bimbo, das ist ein riesen Unternehmen hier, aus der Lebensmittelindustrie. Die haben natürlich riesige Energieverbräuche und die sollten dann die Möglichkeit kriegen, selber ihren eigenen Strom zu erzeugen für sich selber. Dieses Modell ist ziemlich ausgedehnt worden und zu einem Geschäftsmodell gemacht worden. Zum Beispiel	17	Macro Environment\Political (Subcode: Subsidies)

CEMEX hat eigene Windparks. CEMEX ist ein Baustoffkonzern. Die haben hier in Mexiko zwei große Windparks a 500 MW. Schon seit 2001. Der Strom ist ja eigentlich für sie selber, aber durch eine Möglichkeit, da die Gesetzgebung nicht klar genug war, haben sie eine Gesellschaft gegründet. Du kannst dort Aktien kaufen, ganz billig, und wirst dann Miteigentümer dieser Gesellschaft und kannst dann Strom bekommen. Ganz grob, das war dieses Geschäftsmodell. Sagen wir mal der Windpark ist in Tamaulipas, oben an der Grenze zur USA, und ich bin jetzt irgendwo in Mexiko City und habe mir da symbolisch eine Aktie gekauft von dieser Gesellschaft und kriege billigen Strom geliefert.		
Ja, das waren PPAs. Das Thema war eben, dass CFE den Strom liefern musste und es gab keine Durchleitungskosten, ganz wenige nur. Das war natürlich eine Subvention	19	Macro Environment\Political (Subcode: Subsidies)
Wir hoffen, dass das irgendwann wieder anzieht mit den großen Solarparks. Wir sind natürlich auch an solchen Parks interessiert als Goldbeck Solar. Also wir bauen große Parks. Das ist unsere Spezialität, aber wir haben uns da jetzt fokussiert auf „behind-the-meter“-	19	Company Information (Goldbeck Solar) Company Internal (Subcode: Portfolio)

Lösungen.		
„Abasto aislado“ und „generacion local“. Das sind „behind-the-meter“-Lösungen. Also, ich erzeuge meinen Solarstrom auf meinem Gelände. Hinter meinem Zähler. Da kann ich machen, was ich will ungefähr. Und da gibt's inzwischen auch gute 8,9,10 MW-Anlagen, die gebaut werden, neben einer Firma, neben einer Produktionsstätte, und sich dann direkt einspeisen. Das hat jetzt angezogen in Mexiko, diese Lösungen. Ich denke das ist auch die Zukunft für Solar in generell. Also der Vorteil von Solar ist dort Strom zu erzeugen, wo er verbraucht wird. Nicht, dass du den noch kilometerweit durch das Netz leiten musst. Das ist ja das geniale an der Sonne, die ist überall. Und dadurch, dass die großen Parks gebremst wurden, hat dieses Marktfeld angezogen.	21	Future (Subcode: Distributed Generation) Industry/ Industry Rivalry (Subcode: Distributed Generation)
Wir werden jetzt wohl bald anfangen zu bauen, ein 7,5 MW Solarpark für ein Automobil-Konzern. Also direkt neben dem Werk. Wir haben schon kleinere Parks, so 0,5 MW bauen wir auch schon. Und zwar im Industriepark, neben dem Werk vom Kunden. Die haben oft genug Platz, das ist gut in Mexiko. Und da hauen wir dann eine Solaranlage hin	21	Company Information (Goldbeck Solar) Industry/ Buyers (Subcode: Distributed Generation)

Ja, wir machen alles von A-Z. Wir machen Design, wir bauen und wir betreiben die auch. Wir bieten auch Finanzierungen an. Das sind also quasi PPAs. Das heißt wir bauen die Anlage, verkaufen dann den Strom an den Kunden mit einem Strompreis. Das machen wir auch. Wir machen auch O&M, also Operation and Maintenance. Das ist auch einer unserer großen Geschäftsfelder.	23	Company Information (Goldbeck Solar) Company Internal (Subcode: Portfolio)
Ja richtig. Wir haben jetzt einen 0,5 MW Solarpark gebaut und der Strom wird an den Spotmarkt verkauft, stündlich. Das ist jetzt auch möglich in Mexiko, seit 2015. Das ist dieser MEM – Mercado Electrico Mayorista. Der ist jetzt angezogen. Und das ist eine eigene Investition, also das machen wir selber. Da wollen wir Geld verdienen, in dem wir den Strom an den Spotmarkt verkaufen. Und dann eben einen entsprechenden Stromkreis kreieren in dieser Region.	25	Company Information (Goldbeck Solar) Company Internal (Subcode: Portfolio) Macro Environment\Political (Subcode: Energy reform)
Das ist was relativ Neues in Mexiko. Das haben wir auch gewusst gemacht, weil wir da auch einsteigen und das kennenlernen wollen. Dann sind wir mit einer 0,5 MW-Anlage in dieses Geschäft eingestiegen. Das ist auch ein Geschäftsfeld, wo wir	27	Company Information (Goldbeck Solar) Company Internal (Subcode: Portfolio)

unterwegs sind		
Handeln Sie auf dem MEM auch mit Zertifikaten oder ist das noch nicht so präsent? [14:43 – 14:52] AF: CELs, genau. Da sind wir gerade dabei. In diesem Park. Diese Woche hatten wir die „beneficiation“ unit gehabt. Das Prozedere, was du machen musst, um die CELs zu bekommen. Da sind wir gerade dabei, das haben wir abgeschlossen. Das heißt wir werden wohl ab nächsten Monat bzw. bald die CELs anerkannt bekommen. Dann werden wir damit Handel treiben. Wobei der Preis für diese CELs relativ low ist. [14:53 – 15:25] I: Das wären dann sozusagen noch zusätzliche Einnahmen. [15:26 – 15:30] AF: Das sind zusätzliche Einnahmen, genau. Uns geht's hauptsächlich darum zu verstehen, wie das funktioniert. Für so eine kleine Anlage kriegen wir ca. 1300 CELs oder so im Jahr. Da kriegen wir vielleicht 10 Dollar für, wenn wir Glück haben. Aber wir wollen wissen, wie es funktioniert. Deshalb machen wir es. Weil wenn wir das erst einmal mit einer größeren Anlage machen, dann ... [15:31 – 15:55] I: ..dann können sich auf jeden Fall noch weitere Möglichkeiten entwickeln.	28-32	27 Company Information (Goldbeck Solar) Company Internal (Subcode: Portfolio) Macro Environment\Political (Subcode: Energy reform)

Also wir sind in allen möglichen Geschäftsmöglichkeiten unterwegs, die die Energiereform bietet: Große Solarparks, Kundenanlagen, Stromverkauf in den Spotmarkt, PPAs. Wir haben die ganze Bandbreite dabei und es zieht an. Man merkt 2019 war ein gutes Jahr, 2020 war Stillstand. Total. Und jetzt ab März, April haben wir gemerkt, dass das wieder anzieht und die Leute wieder unterwegs sind. Hoffen wir mal, dass das weiterhin so bleibt	33	Macro Environment\Political (Subcode: Energy reform)
Hat die neue Gesetzesinitiative einen Einfluss auf ihr Geschäft? Könnte das Probleme geben? [16:46 – 16:54] AF: Nein, wir haben uns das mal angeguckt und alles das, was jetzt gemacht wurde, diese Novelle, die jetzt durchgeboxt wurde, betrifft uns eigentlich in keinem Punkt, indem wo wir unterwegs sind. Das ist sehr spezifisch. Das waren sehr spezifische Themen. Hauptsächlich auch das, was ich vorhin erzählt habe mit diesen „contratos legados“. Darauf zielt diese Novelle. Die wollten da jetzt endlich mal aufräumen. Uns hat es nicht betroffen, aber auch weil wir momentan keine utility-scale- Solaranlage betreiben. Also diese ganzen großen 100 MW-Parks oder so. Da sind wir	34-35	Macro Environment\Legal (Subcode: New energy initiative) Macro Environment\Political (Subcode: New energy initiative)

noch nicht dabei. Insofern betrifft es uns momentan nicht. Aber hätten wir so einen großen Solarpark in Betrieb, dann hätte uns das auch betroffen in dem „dispatch“. Die haben das ja geändert vom „economic dispatch“. Also die haben die Reihenfolge geändert. Also es wird nicht immer der billigste Strom zuerst genommen, sondern es werden erst die CFE-eigenen Anlagen dispatched und dann kommen die Privaten hinterher. Wir haben uns das persönlich angeguckt und wir glauben, dass uns das so oder so egal ist, weil Mexiko braucht den Strom. Insofern sind wir halt etwas später dran, aber wir werden immer drankommen. Mexiko braucht jedes Jahr glaub ich 3 % mehr Strom in den nächsten 10 Jahren. [16:55 – 18:46]		
Liegt das einfach am Bevölkerungs – und Wirtschaftswachstum? [18:47- 18:50] AF: Ja, genau. Also hauptsächlich Bevölkerungswachstum. Wirtschaftswachstum auch. Und jetzt hat die Pandemie – mal schauen, ob die Zahlen auch stimmen – aber sagen wir mal bis vor der Pandemie waren die Vorausberechnungen, dass Mexiko in den nächsten 10 Jahren jedes Jahr 3 % mehr Stromerzeugung braucht.	36-37	Macro Environment\Social (Subcode: Energy demand) Macro Environment\Economic (Subcode: Economic growth) Macro Environment\Technological (Subcode: Infrastructure)

Und das ist auch ein Grund für uns in Mexiko zu bleiben, weil wir wissen so oder so, das Land braucht irre Mengen an neuer Stromerzeugung		
Ja, das Netz ist total veraltet. Queretaro ist irre gewachsen in den letzten 10 Jahren, aber das Netz ist überhaupt nicht mitgewachsen. Die sind an ihre Grenzen gekommen. Wir helfen quasi CFE, indem wir jetzt vor Ort den Strom selber erzeugen. Das heißt der Kunde braucht dann weniger Strom aus dem Netz und den Strom kannst du jemand anderen geben.	39	Macro Environment\Technological (Subcode: Infrastructure) Industry\Buyers (Subcode: Distributed Generation)
Sie sind sozusagen eine Substitution von dem Netz, dass Sie den Kunden die Möglichkeit geben den Strom selber zu nutzen? [21:05 – 21:15] AF: Genau. Damit dass der Kunde jetzt selber Strom erzeugt bei sich, einspeist in seinen Trafo, braucht er das nicht mehr aus dem Netz ziehen. Er wird weniger vom Netz ziehen, zumindest tagsüber, und den Strom kann dann jemand anderes verwenden.	40-41	Industry\Buyers (Subcode: Distributed Generation)
Wir sind nicht in Baja California unterwegs. Es ist interessant dort zu arbeiten, weil es sehr hohe Preise gibt für Strom. Also, die haben	43	Macro Environment\Ecological (Subcode: Locations in Mexico) Company Internal

einen absoluten Stromnotstand dort. Aus Baja California halten wir uns aber raus, es ist schwierig dort. Es ist relativ geschlossen und als Externer dort Fuß zu fassen ist schwierig. Wir konzentrieren uns auf Mainland Mexiko und da vor allem in Mexiko City, Metropolitan Area und Bajio. Diese ganze Gegend. Da haben wir uns konzentriert. Das Land ist einfach so groß.		(Subcode: Target regions)
Man kann sich wahrscheinlich nicht aufteilen und überall mal ein bisschen mitmachen bzw. mitmischen, oder? [22:50 – 22:54] AF: Ja, genau. Man muss sich schon konzentrieren, wenn man nach Mexiko kommt. Mexiko wartet nicht auf dich. Es ist nicht so, dass sie dich mit offenen Armen empfangen. Es gibt harte Konkurrenz. Mexiko ist in der Hand von spanischen Konzernen: Iberdrola, Acciona, Amper. Darüber hinaus haben wir auch Italiener, Franzosen. [22:55 – 23:43] I: US-Amerikaner vermutlich auch? [23:44 – 23:49] AF: Ja, Amerikaner sind auch dabei. Das ist ein hart umkämpfter Markt hier. Wobei ganz klar die Spanier hier die Überhand haben. Wir als kleine Goldbeck, wir sind ja quasi noch ein Start-Up, haben zwar ordentlich finanzielle Power hinter	44-47	Industry\Industry Rivalry (Subcode: Competition) Macro Environment\Social (Subcode: Labor market)

uns, aber wir konkurrieren ja mit den Großen. 1000 Leute angestellt, Infrastruktur, schon seit 20 Jahren hier. Das ist ein hart umkämpfter Markt. Das war auch bisschen die Erfahrung, die der Herr Goldbeck machen musste. Er dachte, die Margen sind ja spektakulär, aber jetzt musste er leider verstehen, dass die nicht so spektakulär sind. Es gibt einen harten Preiskampf hier. Das muss man im Klaren haben. Mexiko ist kein El Dorado an sich. Projekte bauen hier in Mexiko ist auch schwierig. Projekte bauen ist sowieso immer schwierig, aber Mexiko ist nochmal extrem herausfordernd		
Am besten, ideal, wäre es ein Ingenieur, der technische Erfahrung mitbringt und aber sich auch exzellent in den ganzen Gesetzgebungen auskennt. Dann noch ein Verkaufstalent. Das wäre mein Idealkandidat, aber das ist schwierig. Vor allem was jetzt Know-How im Energiemarkt angeht. Das ist so das Hauptproblem. Da gibt's wenig Leute und die Leute, die es gibt, sind schwer zu kriegen, weil die haben schon einen Job. Also wenn du in Mexiko im Energiesektor unterwegs bist, hast du eigentlich immer einen	49	Macro Environment\Social (Subcode: Labor market)

Job. Das muss man schon so sagen		
Ja, es fehlen halt Leute, die sich einfach auskennen in dieser relativ neuen Gesetzgebung und die wirklich trittfest sind Denn wenn du zu einem Kunden gehst, der Kunde hat noch keinerlei Kontakt gehabt mit Energie. Das war nie ein Thema bei denen. Das war immer nur CFE, da musst du die Rechnung bezahlen und fertig. Du möchtest denen eine relativ komplexe Sache verkaufen. Wir fangen bei -2 an. Teilweise glauben die gar nicht, dass du von CFE – das ist der ehemalige Monopolist – weg kannst. Und zu einem Privaten gehen kannst. Das können die gar nicht glauben. Das ist wie im Delirium. Man fängt bei null an und muss dem Kunden alles ganz genau erklären und die sind auch alle sehr misstrauisch. Haben natürlich auch Angst, wenn du dann sagst, dass wir den Zähler wechseln und kriegst dann Strom von uns. Aber wenn der Strom ausfällt, lässt mich CFE dann wieder links liegen, weil ich nicht sein Kunde bin? Nein nein, das ist das Netz. Das hat nichts mit dem Vertrag zu tun. Das ist rein virtuell. Das ist wirklich ganz schwierige Arbeit und du musst wirklich sattelfest	51	Macro Environment\Social (Subcode: Labor market) Industry\Buyers (Subcode: Mistrust and lack of knowledge) Macro Environment\Social (Subcode: Mistrust and lack of knowledge)

sein, weil wenn du beim Kunden einmal zögerst, dann wird er sofort misstrauisch. Misstrauen ist in Mexiko ganz groß.		
Das wäre auch meine nächste Frage. Ob Korruption ein riesen Problem ist, was Ihnen auffällt. [28:28 – 28:34] AF: Ich persönlich bin damit noch nicht konfrontiert worden bis jetzt. Aber wir haben zum Beispiel ganz klar eine Policy: wir machen keine Verträge mit „Gobierno“. Mit Gemeinden oder Bundesländern oder öffentlichen Unternehmen machen wir kein Geschäft. Wir lassen das einfach. [28:35 – 29:01] I: Einfach eine gewisse Vorsicht an den Tag legen. [29:02 – 29:04] AF: Ja, wir wollen da gar nicht erst reinkommen. Da ist es hauptsächlich, wo solche Sachen verlangt werden. „Ok kriegst du, aber zahlen“. Das ist hauptsächlich bei „Gobierno“. Deswegen haben wir entschieden, dass wir da gar nicht erst mitmachen.	52-55	Macro Environment/Political (Subcode: Corruption)
Wir konzentrieren uns auf Privatunternehmen und auch bei der Umsetzung der Projekte gab es zwar auch Schwierigkeiten von seitens des Netzbetreibers, der sich schwierig anstellt, aber das konnten wir bisher immer lösen mit langen Telefonaten und Gesprächen und	55	Macro Environment/Social (Subcode: Lack of knowledge) Industry\Buyers (Subcode: Lack of knowledge)

Unterlagen. Wir sind bisher noch nie in die Situation gekommen, dass etwas verlangt, wurde von uns. Aber wir versuchen das auch von Anfang an zu umgehen. Das Problem ist eher, worauf wir beim Netzbetreiber treffen, dass wir auf Mitarbeiter treffen, die gar keine Ahnung haben. Zum Beispiel wie jetzt ein Solarpark angeschlossen wird. Das ist eher das Problem, was wir sehen. Die Ausbildung der Mitarbeiter beim Netzbetreiber, dass die wissen, was jetzt Sache ist. Auch wieder die neue Gesetzgebung. Das haben die alle teilweise gar nicht drauf. Das sind eher so Schwierigkeiten, auf die wir treffen. Große Unwissenheit beim Kunden und Unwissenheit beim Netzbetreiber, mit dem du dich ja auseinandersetzen musst, um deinen Netzanschluss zu bekommen. Das sind so die zwei großen Probleme, auf die wir treffen, wo wir auch immer viel Zeit und Energie reinstecken müssen		
Und arbeiten Sie mit Marketing bzw. Advertising? Können Sie da den Kunden etwas zu sich bringen, ein bisschen mehr Vertrauen gewinnen? [30:57 – 31:07] AF: Nein, wir haben relativ wenig Marketing	56-59	Company Internal (Subcode: Marketing) Industry\New Entrants (Subcode: Marketing)

gemacht hier in Mexiko. Es ist eher klassisch Kundenbesuche und Präsentationen halten, erklären, zeigen. Vor Ort. Wir überlegen jetzt zum ersten Mal, jetzt wo wir zwei Parks gebaut haben, und in Planung von einem dritten sind. Jetzt macht es vielleicht Sinn, dass wir bisschen Marketing machen, weil wir auch was zum Zeigen haben. Davor haben wir eigentlich gar kein Marketing gemacht bzw. sehr wenig. Hier und da mal was gesponsert. Aber nein, das Produkt ist auch zu komplex, um Marketing zu machen. [31:07 – 31:57] I: Ja, mit der Technik und Technologie ist das auch schwer rüberzubringen. [31:58 – 32:02] AF: Ja, genau. Sehr erklärungsbedürftig. Hier in Mexiko kennt uns keiner. Das heißt, wenn wir hier irgendwo Goldbeck Solar hinschreiben. Es ist schwierig für unser Produkt Marketing zu machen, was catchy ist und schnell erklärbar. [32:03 – 32:24]		
Das heißt, das Thema müsste, sozusagen, erstmal sensibilisiert werden in der Gesellschaft. [32:25 – 32:29] AF: Ja, genau. Das fehlt wirklich an allen Ecken und Enden. Die Reform ist schon 6 Jahre her,	60-61	Macro Environment\Social (Subcode: Lack of knowledge) Industry\Buyers (Subcode: Lack of knowledge)

aber es ist wirklich erstaunlich wenig angekommen bei den Industrieunternehmen. Es geht ja auch damit los, wenn du zu einem Unternehmen gehst, und um ein Gespräch bittest, dass die gar nicht wissen, wer dafür zuständig ist. Es gibt keinen. Es gibt keinen Energiemanager oder so. Das haben die hier noch nicht		
Aber gehen Sie mal hier in Mexiko zu einer Bank und versuchen eine Finanzierung für Solar zu bekommen. Ganz schwierig. Kriegen Sie vielleicht, aber superteuer, also wirklich superteuer und macht keinen Sinn dann.	61	Macro Environment\Economic (Subcode: Financing and Banking)
Deshalb haben wir jetzt 2019 eigene Finanzierungen, also In-House zur Verfügung. Für gewisse Kunden, die den Kriterien entsprechen, haben wir auch Finanzierungen. Das war ein großes Thema. Weil in Mexiko fehlt das Geld. [32:30 – 34:58] I: Wie läuft das ab? Wie funktioniert das? [34:59 – 35:04] AF: Das ist unser Eigenkapital. Wir finanzieren die Anlage, wir bauen die und dann sagen wir: „jetzt speist du dir den Strom ein und für jedes KWH haben wir den Preis festgemacht“. Dann schreiben wir denen jeden Monat eine Rechnung.	61-63	Company Internal (Subcode: own financing)

Eine Stromrechnung. Dann zahlen die uns das peu a peu ab bis die Anlage dann ihnen gehört.		
Wie viele Jahre dauert das dann? Ich habe gelesen 20-30 Jahre sind die normalen Verträge meistens. Wann wäre das abbezahlt? [35:26 – 35:35] AF: 20-30 Jahre habe ich noch nicht gehört. Die Anlage läuft locker 30 Jahre, die Lebensdauer einer Solaranlage sind locker 30 Jahre. Was wir hier so sehen sind zwischen 5 und 15 Jahre kriegt man einen PPA- ein Power-Purchase-Agreement. Je nachdem was der Kunde bereit ist sich festzuschreiben. Nicht viele, jetzt mit der Pandemie noch weniger, würde einen 15 Jahres-Vertrag unterschreiben. Das macht ja keiner mehr. Wir sehen jetzt so 5 Jahre oder 10. Zwischen 5 und 10 Jahre, vielleicht sogar 12,13. Das geht noch. Wir können das auch in 5 Jahren machen, aber entsprechend steigt der Preis. Da zahlt er ja fast schon mehr, als wenn er bei CFE geblieben wäre. Das macht schon Sinn so 10 – 12 Jahre zu unterschreiben. Dann haben wir auch einen vernünftigen Strompreis, der unter dem Strompreis von CFE ist. Es ist schwierig. Mexiko. Ich meine, jetzt haben die	64-65	Industry\Buyers (Subcode: Long-term contracts/PPA)

sich auf 10 Jahre mit einem Kunden finanziert und Tagesmoral ist schwierig. Man muss sehr gut aussuchen mit wem man das macht und mit wem nicht		
Du brauchst Finanzierungen für den Kunden, du brauchst ein gutes Produkt. Du musst dich hier irgendwie abheben und die Konkurrenz, die es hier gibt, die ist sehr hart. Warum sollen die jetzt ausgerechnet zu dir kommen? Unsere Linie ist, wir sind ein deutsches Unternehmen, wir liefern Qualität. Absolute Qualität. Wir sind zwar ein bisschen teurer, aber bei uns hast du absolute Sicherheit, dass wir da eine Topanlage hin bauen nach Standards. [37:48 – 38:38] I: „Made in Germany“ ist schon nachhaltig im Gedächtnis geblieben? [38:39 – 38:43] AF: Ja, genau. Das ist unser Ziel. So wie wir das auch bauen, heben wir uns von den anderen ab, auch technisch. Das brauchst du. Du musst wissen, was dein Produkt ist. Du musst Finanzierungen mitbringen. Du brauchst gute Leute hier, ganz schwieriges Thema – Mitarbeiter. Du brauchst gute Mitarbeiter. Das steht und fällt hier mit guten Mitarbeitern. Wenn du ein super Team hast,	69-71	Company Internal (Subcode: Unique selling points)

dann kannst du hier Berge versetzen. Wenn du aber Pech hast, dann schlägst du dich nur mit solchen Sachen herum		
Ja, Mexiko ist riesig. Dir muss klar sein: Kannst du in Cancun was anbieten oder lässt du das lieber gleich bleiben? Willst du nach Tijuana gehen, wo du dann vielleicht ausgeraubt wirst, bevor du eine Anlage auf dem Dach hast? Sicherheit ist auch ein Thema. Wo wollen wir agieren. Wir sind in Baja California raus, Yucatan sind wir raus wegen der Hurricans. Das Risiko wollen wir nicht eingehen, dass eine Anlage durch einen Hurrikan wegfliegt. Ist auch schwierig dort zu bauen. Das ist alles so Kalkstein, so ein poröser Kalkstein. Und alles voller Maya-Ruinen. Das machen wir auch nicht. Auch Grenze USA wollen wir nicht hin wegen der Sicherheitslage einerseits und die andere Sache ist: die Strompreise sind dort relativ billig, weil die aus den USA viel importieren. Billigen Strom aus Texas. Insofern sind die Preise dort relativ mau. Das sind so Themen, deshalb muss man sich überlegen, wo man geographisch in Mexiko unterwegs sein will. Das ist ein riesen Land. Als kleines Unternehmen, wenn du hier einsteigst, hast du auch nicht die Man-	71	Macro Environment\Technological (Subcode: Infrastructure, Country environmental characteristics) Macro Environment\Ecological (Subcode: Country environmental Characteristics) Macro Environment\Economic (Subcode: USA)

Power, um die ganze Republik abzudecken. Von hier nach Monterrey sind ja 1000 Kilometer. Da muss man nicht mal überlegen. Das heißt du würdest jetzt quasi auch in der Türkei anbieten, wenn man sich das so geographisch überlegt. Das muss einem klar sein. Ich gehe nach Mexiko, aber wohin genau? Das Land ist riesig. Da haben wir jetzt auch unseren Zirkel gezogen und wissen, wenn es außerhalb dieses Zirkels ist, brauchen wir keine Zeit investieren.		
Ich habe noch zwei Fragen wegen der geographischen Lage. Spielt die Wüste eine Rolle oder wäre der Wirkungsgrad zu hoch, weil es zu heiß ist? [42:24 – 42:39] AF: Ja das ist ein Thema. Witzigerweise darf es nicht zu heiß werden auf den Solaranlagen. Nein, wir haben nirgendwo Restriktionen vom Klima her. Eigentlich ist Mexiko fast ideal, klimatisch. Es ist nicht zu heiß. Das Problem ist eher: Wie kriegen sie den Strom aus der Wüste raus? Da müssen sie erstmal eine Leitung legen.	74-75	Macro Environment\Ecological (Subcode: Country environmental characteristics)
Da sind dann wahrscheinlich auch keine Unternehmen angesiedelt. [43:15 – 43:19] AF: Ja. Du kannst halt da	76-79	Macro Environment\Ecological (Subcode: Country environmental characteristics)

bauen, aber dann musst du dir ne 80 Kilometer-Leitung legen und das kostet irre Geld. Das macht keiner. Wir haben sogar so optimale Bedingungen in Bajio. Das sind optimale Bedingungen für Solar. Es ist heiß mit viel Sonne mit einer leichten Brise. Einer leichten, konstanten Brise, so dass immer ein bisschen Abkühlung da ist. Nachts kühlt es ab durch die Kombination von Sonne und Wind, so einer Böe. Das sind ideale, fast Laborbedingungen, die wir dort haben für Solar. Wir können dort, beispielsweise in Deutschland, es gibt es so eine Messeinheit. Das sind kWh per Kilowatt peak (kWp) per year. Also was produziert ein Kilowatt. Wieviel kWh produziert ein Kilowatt peak installiert in einem Jahr. Das ist so eine Einheit, in Deutschland sind wir ungefähr so bei 900 kWh pro Kilowatt pro Jahr. Hier sind wir bei über 2000. Also wir holen doppelt so viel raus aus der gleichen Anlage. Das ist natürlich genial. Das macht richtig Sinn hier. Du kannst hier richtig viel Strom produzieren. [43:20 – 44:43] I: Auf jeden Fall effektiv, effizient. [44:44 – 44:46] AF: Ja natürlich. Da ist natürlich die Effizienz der Anlage eine komplett andere. Wir bewegen uns		
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bei über 90 Prozent. Im Vergleich zu Deutschland sind das Traumwerte. Deshalb macht das auch Sinn in Mexiko Solar zu machen. Deshalb wissen wir, dass wir langfristig hier ein Geschäft haben		
Optimale Gegebenheiten kombiniert mit einem ständig wachsenden Strombedarf, Energiebedarf und die Energiereform, die diesen Markt überhaupt jetzt geöffnet hat. Diese drei Sachen machen Mexiko zu einem sehr interessanten Land für Solar. Deshalb sind auch viele hier unterwegs. Die Deutschen sind mal wieder langsam. Letztes Jahr kam RWE nach Mexiko. [44:47 – 45:42] I: Letztes Jahr ist schon spät. [45:43 – 45:45] AF: Ja völlig. Der Kuchen ist schon verteilt. Aber die sind halt groß die Jungs. Die haben Power. Bei denen wird schon was gehen. Aber das haben die Spanier und Amerikaner schon unter sich aufgeteilt.	79-81	Industry\Industry Rivalry (Subcode: competition)
Wenn ich jetzt nochmal auf die Industrie genau eingehe, auf die Situation: Würden Sie sagen es ist ein Oligopol mit wenigen aber sehr starken Konkurrenten oder ist es relativ ausgeglichen mit einer perfekten „Competition“, wo niedrige Eintrittsbarrieren sind,	82-89	Industry\Buyers (Subcode: Market segments) Industry\Industry Rivalry (Subcode: Competition)

aber niedrigere Profite. [45:59 – 46:19] AF: Da muss man unterscheiden, in welchem Solarmarkt wir uns bewegen. Es gibt meines Erachtens drei Solarmärkte. Den klassischen Häuser – und Dach-Markt und kleine Unternehmen. Also kleine Shops. Die kleinen Solaranlagen für Häuser. Da herrscht absolute, brutale Konkurrenz. Da gibt's so viele Anbieter. Das ist ein hart umkämpfter Markt. Der Häusermarkt. Solar für Häuser. [46:20 – 46:55] I: Aber trotzdem in der Industrie? Also die Businesskunden? Das ist jetzt nicht auf private Kunden bezogen? [46:56 – 47:03] AF: Doch doch. Privat und „Comercio“, so wie Oxxo. Das ist aber ein nicht zu unterschätzender Markt. Das ist Kleinvieh, aber macht auch ganz schön Mist. Da herrscht brutaler Wettbewerb. Es gibt in Mexiko in diesem Markt keinerlei Regelung, wer da agieren darf. Du kannst dir morgen ein paar Solarpanels auf die Schultern, auf deinen Pick-up schmeißen und dann Solar installieren. Das ist schon ein bisschen scary. Aber es gibt auch sehr gute Unternehmen da. Da gibt's alles, aber es ist ein hart umkämpfter Markt. Das andere Extrem sind dann diese großen		
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Solarparks. Utility-Scale nennt man das. Also so wirklich 100 MW, 150 MW, 200 MW. Da tummeln sich, sagen wir mal Oligopol von vielleicht 10 Unternehmen, die hier den Markt beherrschen. [47:04 – 48:13] I: Das sind dann wahrscheinlich die ganz Großen? [48:14 – 48:15] AF: Das sind die ganz großen Player. Auch die internationalen Player hab ich schon genannt: Iberdrola, Enel, Amper, Acciona, Engie, das sind Franzosen. Wen gibt's noch? [48:16 – 48:31] I: Und RWE ist dann zu spät wahrscheinlich, um da mit einzusteigen? [48:32 – 48:47] AF: Ja, wobei man da gucken muss, was RWE genau hier macht. Ich weiß nicht genau, ob die im Solar unterwegs sind, aber die wollen auf jeden Fall in den Energiemarkt. Ich weiß nicht, ob die was mit Solar machen. Aber ja, RWE 2020 herkommen. Mal gucken. Hier wird mit harten Bandagen gekämpft. Das ist rough. Da wollen wir aber auch rein als Goldbeck Solar. Wir wollen auch solche großen Parks bauen. Wir haben einen 150 MW Park, den wir schon seit längerem im Auge haben und den wir bauen wollen. Mal gucken. Aber das ist schwierig. Da sind wir hier einer der ganz Kleinen und spielen gegen die		
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ganz Großen. [48:48 – 49:25]		
Die Barrieren liegen... Naja, es wird halt schon so viel gebaut. Da muss man gucken, wo du noch bauen kannst. Das ist die eine Sache. Die andere ist, was machst du mit dem Strom von 180 MW? An wen verkaufst du das? Da tun wir uns schwer. Weil Iberdrola hat z.B. 1000 Mitarbeiter. Die schwirren alle aus und klopfen an allen Türen und nach 3 Monaten haben, die den Strom unter Dach und Fach gebracht. Wir sind hier zu dritt und bis wir so viel Strom an den Mann bringen, da müssen wir richtig ackern. Da ist das Problem. Was machen wir mit dem Strom? An wen verkaufen wir das? Die haben viel mehr Kontakte. Bis wir an diese Unternehmen rankommen. Iberdrola und Acciona waren schon dreimal vorher da. Da wo ich hingekommen bin, war Iberdrola schon da. Die haben riesen Man-Power. Als letzteres gibt's noch das Industry-PV. So nennen wir das. Also Photovoltaik für die Industrie. Da bewegen wir uns ganz gut. Da haben wir uns gut positioniert. Da haben wir auch schon drei Projekte gebaut. Die kommen gut an und da heben wir uns auch ab von der Konkurrenz, was wir da machen können.	91-92	Industry\Industry Rivalry (Subcode: Competition) Industry\Buyers (Subcode: Market segments) Company Internal (Subcode: Employees)

Da kommen beispielsweise die Kleinen nicht hin, weil das für die zu groß ist. Die Industrie. Und für diese großen Unternehmen war das bis jetzt nicht interessant, weil das zu klein ist. Die brauchen große Projekte, sonst rentiert sich das nicht. Wir haben uns von Anfang an auf diesen Industrie-PV-Sektor konzentriert, aber da gibt es noch genug für alle. Wir sehen inzwischen, dass die großen Konzerne, dadurch da die Entwicklung von großen Solarparks derzeit stillsteht, merken wir wie die auch in den Industrie-Sektor kommen. Das haben wir jetzt gesehen, dass die sich da auch bemühen, was denen vorher zu popelig war für die Großen. Wir sehen, dass die Großen sich jetzt auch in diesen Industrie-Sektor reinbewegen. Da werden wir jetzt auch mehr Konkurrenz haben. Aber ich glaube da sind wir schon gut aufgestellt. Da sind wir Kosten-Struktur-mäßig einfach besser		
Aber ich glaube da sind wir schon gut aufgestellt. Da sind wir Kosten-Struktur-mäßig einfach besser [49:32 - 52:22] I: Da haben Sie sich schon die Reputation aufgebaut über die letzten Jahre. Das spielt wahrscheinlich auch nochmal eine große Rolle.	92-94	Company Internal (Subcode: Reputation)

[52:23 – 52:28] AF: Ja genau. Also wenn du erstmal einen Park gebaut hast, dann kommen die Unternehmen drumherum auch schon von allein		
Das ist hier eine Kundenanlage in einem Industriepark drin. Das geniale ist, womit heben wir uns ab? Normalerweise, die meisten bauen auf dem Dach. Wir haben uns von Dächern verabschiedet, weil wir gemerkt haben in Mexiko ist das zu schwierig. Die Infrastruktur ist schlecht, es gibt keine Pläne, da sind meistens nur die Blechlatten darauf. Wir haben dann gesehen, dass überall in diesen Industrieparks, das sehen Sie auch hier, überall noch Freiflächen sind. Da haben wir gefragt, was die mit diesen Freiflächen machen. „Ja, wir haben einfach das ganze Ding gekauft, als wir dahin sind. Den ganzen Slot gekauft, weil es so billig war.“ Wir dachten uns: „Macht doch was damit“ und wir bauen jetzt Solar mit Tracker. Das sind Tracker-Anlagen, die sich nach der Sonne bewegen. Und weil da so viel Sonne draufscheint, machen wir „Bifacials“ drauf. Das ist auch ziemlich neu. Diese Panels erzeugen von beiden Seiten Strom. Also auch mit der Reflexion. Hier ist ja relativ heller	94	Company Internal (Subcode: Portfolio/Special construction) Macro Environment\Technological\ (Subcode:Infrastructure)

Sand. Das heißt es reflektiert unheimlich gut und diese Reflexion nehmen die Panels auch noch auf und produzieren auch nochmal Strom damit. Das heißt wir produzieren mehr Strom durch die Art der Panels, die wir hier verbauen, und wir produzieren mehr Strom weil wir hier Tracker verbauen. Also die Panels werden immer im optimalen Winkel zur Sonne stehen. Damit holen wir richtig viel Strom raus auf so einer kleinen Fläche. Die Solaranlage ist jetzt fertig und wird nächste Woche angeschlossen. In 4,5 Jahren ist die Anlage vom Kunden abbezahlt und er spart sich eine monatliche Stromrechnung im Jahr. Das sieht auch genial aus und wir merken schon das Interesse von den Nachbarn. Die gucken alle		
Wenn man die Kunden erstmal so weit hat und das ist ein langer Prozess, den die da verstehen müssen. Die müssen die Zahlen verstehen. Die müssen das technisch verstehen. Die müssen verstehen, wie das mit CFE kombiniert funktioniert. Das ist wirklich ein langer Prozess. Das hat 1 Jahr gedauert mit dem Kunden. Vom ersten Kontakt bis zum Vertragsabschluss. 1 Jahr. Das dauert einfach in Mexiko	98	Industry\Buyers (Subcode: Lengthy processes) Macro Environment\Social (Subcode: Lengthy processes)

Auf so einem krummen Gebiet so eine Anlage hin bauen. Wir haben jeden letzten Meter optimal genutzt. Da braucht man gute Ingenieure und die haben wir in Deutschland. Wir sind hier nur zu dritt und die ganze Ingenieursleistung wird in Deutschland gemacht.	98	Company Internal (Subcode: Strengths/Engineering)
Wir sind ein kleines Team. Das Engineering und Design wird komplett in Deutschland gemacht. Für den Bau haben wir zwei Ingenieure bekommen. Die sind hierhergekommen und haben hier die Baustelle geleitet. Das macht natürlich auch einen guten Eindruck beim Kunden. Ist nicht ganz einfach für die deutschen Ingenieure, die sich dann hier in Mexiko rumschlagen. Und dadurch bauen wir hier in Mexiko nicht so große Kostenstrukturen auf. Wir haben in Deutschland Leute sitzen, die sprechen alle Spanisch und sind dann auch bei Kundengesprächen mit zugeschaltet. Das ist natürlich zeitlich ein Problem. Aber das klappt auch ganz gut. Also das läuft. Ich muss sagen, wir haben das glaube ich gut angestellt. Wir hätten hier auch 10 Leute anstellen können und machen alles hier vor Ort, aber dadurch da das projektbetrieben ist, kann es gut mal sein, dass wir mal 4-5 Monate keine Projekte haben mit	100	Company Internal (Subcode: Strengths/Engineering) Industry\New Entrants (Subcode: Advice for new entrants)

Leerlauf. Da haben wir hier dann keine Kosten, die hochlaufen. Als Markteintritt in Mexiko: versuche so lean und flexibel zu bleiben, wie es geht. Weil Mexiko ist ein Up und Down. Auch mit der Pandemie. Da waren wir einfach gut aufgestellt. Wir sind nur 3 Leute hier. Wir konnten die Pandemie gut durchstehen, weil wir keine hohe Kostenstruktur hier haben. Wenn wir Aufträge kriegen, dann wickeln wir die über Deutschland ab. Mit dem Backup von Deutschland. Man muss sagen, das hat uns geholfen hier in Mexiko resistent zu sein. Das würde ich auch immer raten. Es sei denn du bist RWE mit unermesslichem Budget. Aber als Start-Up hier in Mexiko: Bleib so leicht und flexibel, wie es geht. Damit kannst du in Mexiko sehr schnell reagieren auf Gegebenheiten, die in Mexiko halt da sind. Mexiko ist nicht Deutschland. Du weißt nicht, was nächstes Jahr kommt. Da musst du flexibel sein. Das ist das A und O. Und du brauchst finanziellen Backup. Du musst auch mal ne Trockenzeit überstehen können.		
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: Also ein Start-Up ohne Mutterkonzern im Rücken wird schwierig? [1:00:05 – 1:00:08] AF: Ja, oder Finanzierungen. Das kann man ja auch machen. Deine Kriegskasse muss hier schon mal 2 Jahre reichen	101-102	Company Internals (Subcode: Strengths) Industry\New Entrants (Subcode: Advice for new entrants)
Alle 6 Jahre wird hier ein Präsident gewählt und dann ist hier alles neu. Dann wird alles auf null resettet und geht wieder von neu los, und zwar in die Richtung. Und 6 Jahre später wieder. Das ist ja Mexiko. Alle 6 Jahre findet man alles neu hier. Da wird das Rad neu erfunden. Ich glaube das ist auch ein Problem von Mexiko, weil es hier keine Konstanz gibt.	102	Macro Environment\Political (Subcode:Government)
Das ist ein Produkt, dass wir in Mexiko noch nicht vertreiben, aber in Deutschland schon. Das ist auch bifacial mit Trackern und das werden Sie in Mexiko in der Art und Weise nicht finden. Also in so kleinen Projekten. Diese Technologie ist natürlich teurer als einfach nur auf einem Gestell drauf. Bis jetzt war die nur umsetzbar in Großprojekten. Da wir eine ganz gute Einkaufspolitik haben in Deutschland, dadurch können wir solche 0,5 MW Anlagen mit dieser	106	Company Internal (Subcode: Strengths/ Special construction)

Technologie bauen. Das heißt damit heben wir uns ab von allen anderen. Kaum jemand schafft es diese Anlage kosteneffizient auf so eine kleine Fläche zu bauen.		
Das ist absolut High-Tech, was wir hier bauen. Wie gesagt, das haben wir nicht erfunden, aber diese Technologie, die Großprojekten vorbehalten ist, auf solche kleine 500 KW-Anlagen zu bringen. Für Industriekunden können wir diese Technologie zur Verfügung stellen. Das ist eine Einkaufs- und Kostensache. Das schafft nicht jeder. Das schaffen wir, weil wir so groß in Europa sind und schon über ein 1 Gigawatt an Solar gebaut. Wir haben also so viel Einkaufsmacht, dass wir auch sowas machen können. Denn normalerweise, wenn der Hersteller von diesen Trackern – Schletter heißen die. Wenn Sie zu dem hingehen, in Deutschland in München, und sagen: „Schick mir mal einen halben Mega-Tracker nach Mexiko“. Dann sagt er, dass er nicht interessiert ist. Komm wieder ab 10 Mega. Wir schaffen das. Wir sagen: „Wir haben dir	108	Company Internals (Subcode: Strenghts/Special construction and Procurement)

dieses Jahr schon 300 Mega gekauft. Schick mir mal einen halben Mega nach Mexiko.“ Das macht er. Das ist das, wo wir uns abheben. Mit unserem Produkt – wir bauen so. Und so eine Anlage sieht natürlich super aus und alle Nachbarn drumherum sind scharf auf diese Anlage. Die sind jetzt daran interessiert. Das ist dann auch so ein Premium. Das ist so als wenn du in einem Mercedes sitzt oder einem Tesla heute. Das ist eine Marktnische, die wir uns überlegt haben. Wir bauen Solar, aber wir bauen das komplett anders		
Hier so krumm eine Anlage hinzubauen. Da sind wir auch richtig stolz drauf. Wir sehen das auch als Zukunft. Da ist ja überall noch Platz. Das Gute ist, in Deutschland kann man das nicht machen, weil man da keinen Platz mehr hat. Hier in Mexiko eben nicht. Die haben noch Flächen. Das kommt uns entgegen. Deshalb funktioniert die Strategie	112	Company Internals (Subcode: Strenghts/Engineering)

Wir tun auch was Gutes. Wir bringen Mexiko voran. Das ist für mich persönlich auch wichtig. Ich muss dran glauben, weil sonst habe ich nicht die Energie da ein Jahr lang einen Kunden zu bequatschen. Man muss selber überzeugt sein und das merken die auch hier	114	Motives to enter Mexico
Das ist eben auch ein Problem hier. Man muss sich darauf gefasst machen, dass man ganz niedrige Umstände findet für die Projekte. Also in dem Fall der Kunde hatte gar keine Genehmigung. Wir brauchen eine Baugenehmigung für dieses Werk, für diese Anlage. Aber als wir dann in die Unterlagen reingeguckt haben. Die Jungs hatten seit 2010 keine Genehmigung beantragt. Die waren komplett irregulär. Das war eine deutsche Firma. Das heißt die haben erstmal 5 Monate gebraucht, um das erstmal in Ordnung zu bringen. Wir hätten auch ohne Baugenehmigung bauen können. Aber das ist riskant und da haben wir gesagt „Machen wir nicht“. Wir brauchen eine Baugenehmigung und wir kriegen die nur, du kannst nur eine neue beantragen, wenn du die alten in Ordnung hast. Die haben die aber nie beantragt. Da wird hier was angebaut und da was	114	Industry\Buyers (Subcode: Problems/Permits) Macro Environment\Technologic al\ (Subcode: Infrastructure)

angebaut, aber nie eine Genehmigung beantragt. Die haben ohne Genehmigung gebaut. Das ist so in Mexiko. Sie werden hier noch extremere Sachen vorfinden, wenn Sie hier Unternehmen besuchen. Das ist eine riesen Herausforderung. Die hatten gar keine Pläne. Wir wussten nicht was wir vorfinden. Keiner macht hier Pläne. Das ist extrem.		
Die Zulieferer sind dann größtenteils aus Deutschland, die das dann zusammenbauen? [1:10:51 – 1:11:00] AF: Die Komponenten, die Hauptkomponenten. Das sind also Panels, Struktur und Wechselrichter. Die werden importiert. Das kann aus China kommen, das kann aus den USA kommen. Je nachdem, wo wir gerade einkaufen. Wir sind nicht fixiert auf irgendwelche Marken. Wir suchen uns das Beste aus. Alle Materialien, sogenannte Materials, besorgen wir alles in Mexiko. Kabel vor allem und für die Zementierung zum Beispiel die Pfosten und so. Materials besorgen wir alle hier. Wir haben auch keine eigenen Leute hier. Das heißt wir haben erstmal 2 Leute aus Deutschland hierher geschickt, also einen Projektmanager und einen Poulter. Der Rest der Mannschaft, da	117-118	Industry\Suppliers (Subcode: Procurement and Import)

haben wir eine mexikanische Firma hier angeheuert und haben die quasi ausgebildet. Die kommen aus Häuser- und Dachbau. Das ist eine sehr ambitionierte Firma aus Puebla. Die haben sich alles selber beigebracht, aber haben schon 10 Jahre hinter sich und waren schon ganz gut aufgestellt. Natürlich hatten die keine Erfahrung mit solchen Parks. Das heißt wir haben die vorher geschult, zusammen mit den Herstellern haben wir die Unterlagen durchgeschaut, Online-Schulungen gemacht. Es war schon spannend. Die haben sich da ganz gut geschlagen. Da muss man in Mexiko sagen: die haben zwar keine Vorkenntnisse, aber die lernen schnell. Wir haben eine steile Kurve, eine steile Lernkurve festgestellt von Projekt zu Projekt. Aber Qualitätssicherstellung ist auch ein riesen Thema hier. Wie garantierst du, dass hier in Mexiko so gebaut wird, wie es in Deutschland gewünscht ist?		
Also wirklich nochmal alles überprüfen, was gekauft wurde, was gemacht wurde? [1:13:50	121-124	Macro Environment\Social (Subcode: Cultural differences)

– 1:13:54] AF: Du musst. Wir hatten jemand aus Deutschland da, der hat auf der Baustelle gewohnt. Der war jeden Tag da. Er konnte zwar kein Spanisch, aber der hat sich mit denen schon verständigt. Wirklich alles überprüfen. „Die Gräben waren nicht tief genug. Du musst einen Meter ausheben“. Du sagst denen was, die machen sollen und die machen es anders. Das ist halt die Konversation in Mexiko. Das war auch interessant, aber es funktioniert. Man darf da nicht 3 Sekunden die Augen zu machen. Du musst danebenstehen und wirklich alles überprüfen. Das ist auch für so deutsche Ingenieure neu. Die sind es gewöhnt, dass es morgens eine Versammlung gibt, da gibt's eine Ansage und dann wird das gemacht. Abends kann man dann vielleicht kontrollieren und einen Rundgang machen und dann ist es okay. Das sind auch so kulturelle Probleme, die man auch verstehen muss. Das ist einfach so hier. Das muss man klar haben. Ich glaube da hilft einfach nur Erfahrung. Da kann man sich vielleicht vorher bisschen schlau machen und so, aber im Endeffekt brauchst du die Erfahrung auf der Baustelle. [1:13:55 - 1:15:50] I: Und die Sprache auf		
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jeden Fall, wie Sie gesagt hatten. Also mit Englisch kommt man da glaube ich nicht so weit. [1:15:51 – 1:15:56] AF: Schwierig. Die arbeiten ja alle in dem angeheuerten Unternehmen. Die sprechen da kein Englisch. Wir hatten Glück, weil der Vorarbeiter von denen sprach ganz gut Englisch.		
Und da musst du halt sicherstellen, dass die auch das Know-How haben, was nötig ist. Dass die das auch umsetzen, wie du baust. Eine schwierige Entscheidung, auch für jemand der hierherkommt und, sagen wir mal, Projekte macht. Stellst du die Leute selber ein, bildest die selber aus, also in-house? Aber dann hast du die an der Kette. Wenn du mal kein Projekt hast, hast du da 15 Leute rumsitzen. Oder du heuerst die wegen den Projekten an, aber dann kann es sein, dass dieses Team bzw. diese Firma nicht zur Verfügung steht für ein Projekt, weil die schon woanders	124	Industry\Suppliers (Subcode: Subcontractor)

unterwegs sind. Da musst du gucken, wo du die herkriegst und wen. Das war schwierig, da jetzt eine Firma ausfindig zu machen, mit der du das machen kannst. Das war ein langer Prozess. Das war eine der ersten Sachen, die wir hier gemacht haben in Mexiko, als wir gesagt haben wir stellen nicht selber Leute ein, sondern wir brauchen eine Firma, die das für uns baut. Mit wem machen wir das? Da haben wir wirklich über ein Jahr Gespräche geführt, Leute interviewt. Das war ein langer Prozess, der sich aber gelohnt hat.		
Unsere Schwäche ist, dass wir noch keine zweite Firma haben. Ich bin gerade dabei. Durch die Pandemie hat es geholfen, dass jetzt mehr Unternehmen bereit wären. Wir bräuchten noch ein zweites Unternehmen, um flexibel zu sein. Flexibel sein in Mexiko ist das A und O. Das heißt wir sind jetzt gerade dabei, Gespräche zu führen mit anderen Unternehmen, um zu schauen, ob es passt und ob die uns auch bieten können, was wir suchen. Da müssen wir noch gucken. Aber mit der sind wir ganz zufrieden. Ich hoffe auch, dass die uns treu bleiben	126	Company Internal (Subcode: Weakness)
Einkauf in Mexiko ist ein schwieriges Thema. Die	128-142	Industry\Suppliers (Subcode: Procurement)

Sachen sind hier sehr teuer, weil hier alles importiert wird. Also Kabel sind in Mexiko teurer als in Deutschland. Wir haben überlegt, ob wir das importieren oder hier kaufen. Haben uns dann aber entschieden das hier zu machen. Die Transportkosten sind da ein Thema. Es ist sehr teuer hier. Warum? Es gibt nicht so viel Auswahl hier, die meisten Produkte werden importiert und sind dann halt teuer. Und wenn du Qualität haben willst, dann ist es nochmal teurer. Das ist ein Problem hier. Wir brauchen einen mit Einkaufserfahrung hier in Mexiko. Ich weiß nicht, ob es Macht ist, aber es ist einfach sehr teuer aufgrund des geringen Angebots. Schwierig genau das zu bekommen, was man haben will. [1:19:11 – 1:20:15] I: Und auch kein großes Angebot? Also es ist begrenzt auf einige wenige, wo dann auch die Qualität dem entspricht, was Sie suchen? [1:20:16 – 1:20:25] AF: Genau, das gibt es eben nur zwei Anbieter, die genau diese Kabel verkaufen, die du brauchst. Aber die sind beide superteuer. Was machst du jetzt? Musst du dann kaufen. Diesen Posten mussten wir erhöhen. Es ist sehr teuer hier in Mexiko. [1:20:26 – 1:20:50]		Macro Environment\Economic (Subcode: Economical Situation/Prices)
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I: Das denkt man auch von Anfang an gar nicht, oder? Man denkt als Schwellenland wird es günstig sein und dann wird man überrascht. Oder waren Sie sich dessen schon bewusst? [1:20:51 – 1:21:00] AF: Nicht so richtig. Nein. Da muss man zugeben, dass das uns überrascht hat, wie teuer das dann tatsächlich ist. Da hat jetzt nicht so reingehauen, aber das war schon ein Punkt. Es gibt auch keine richtige Lösung. Was soll man da machen? Das Einzige, wir könnten das in Deutschland billiger einkaufen, aber dann müssen wir es immer noch hierher kriegen. Transportkosten sind in diesen Jahren auch durch die Decke gegangen. Insofern stehen wir jetzt da. [1:21:01 – 1:21:38] I: Ist dann auch wieder so ein Risiko, ob es möglich ist in der Zeit dies geliefert zu bekommen. Da will man doch lieber die Flexibilität vor Ort, dass es möglich ist von heute auf Morgen die Kabel zu bekommen. [1:21:39 – 1:21:54] AF: Genau. Da muss man Abwägen zwischen Flexibilität und Preis. Das, was wichtiger ist. In Mexiko kaufen wir die Kabel heute und haben sie am gleichen Tag da. Wenn wir das aus Deutschland importieren, brauchen wir eine viel längere Vorlaufzeit. Das		
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sind so Sachen, die man dann abwägen muss und irgendwann einfach entscheiden muss. Also ja, Materialien in Mexiko sind teuer. Die, die wir brauchen. Absolut. Und nicht immer vorhanden. [1:21:55 – 1:22:39] I: Sie haben auch gesagt, dass alles importiert wird? [1:22:40 – 1:22:43] AF: In Mexiko wird quasi alles importiert. Das ist erstaunlich wie selbst einfachste Teile, wie so Plastikteile. Das kann doch nicht sein, dass alles aus den USA importiert wird. [1:22:44 – 1:23:00] I: Ja. Ich dachte beispielsweise durch die Maquiladoras im Norden, dass das von dort bezogen werden kann? [1:23:01 – 1:23:08] AF: Ja. Da könnte man vielleicht billiger rankommen. Aber da sind wir nicht vertreten. Wir haben uns von Projekten in Tijuana verabschiedet. Das ist uns zu heikel. Zu weit weg, zu heikel. Da sind wir einfach nicht da. Aber es kann sein, dass wir die Sachen da billiger kriegen, weil es eben schnell aus den USA überkommt. [1:23:09 – 1:23:37] I: Und wenn Sie da bestellen, also schon auf demselben Kontinent. Wäre das da trotzdem für die Transportkosten zu hoch? [1:23:38 – 1:23:47] AF: Naja nein. Es ist eher der Einkaufspreis ohne Transport, der teuer ist.		
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Qualität in Mexiko zu bekommen ist teuer. Und sie haben es nicht immer zur Verfügung. [1:23:48 – 1:24:08] I: Da haben Sie bestimmt auch lange gesucht, bis Sie einen passenden Zulieferer gefunden hatten. [1:24:09 – 1:24:13] AF: Ja, das hatte ich ja erzählt mit dem Kabel. Wir wollten 6 mm, dann ist der losgegangen. Das war sozusagen das Scope of Work von dem Subkontraktor und das war bisschen unfair, weil die hatten das auf den abgedrückt. „Okay, mach uns einen Preis und du kaufst die Materialien ein.“ Wir sagen die genau welche und du musst die dann besorgen. Er hat die 6 mm dann nicht gefunden. War nicht da. Hat er eben 8 mm gekauft. Weil sie eben nicht vorhanden waren. Das ist auch eine Schwierigkeit. Die Verfügbarkeit von Materialien ist in Mexiko schwankend und teuer. [1:24:14 - 1:25:16]		
Ein Punkt sind noch Substitutionsprodukte. Beispielsweise Gas, Öl, Kohle ist schon noch sehr groß vorhanden. Sehen Sie das trotzdem als Konkurrenz, als Substitution? Weil das über Jahre hinweg der Rohstoff in Mexiko war. [1:25:17 – 1:25:43] AF: Als Konkurrenz sehe ich das nicht. Aber das	143-144	Industry/Substitutes (Subcode: Fossil Fuels)

wird in Mexiko über viele viele Jahre noch eine wichtige Rolle spielen. Absolut. Mexiko ist ein Höhenland. Es macht dann auch Sinn als Land mit Ölvorkommen auf Öl zu setzen. 80 % der Stromgenerierung in Mexiko von den großen Anlagen geschieht über Pet-Coak und Kohle. Das wird weiterhin auch so bleiben. Mexiko hat nicht das Geld, um aus dem Nichts 10 neue Gaswerke zu schaffen		
Mexiko hat auch derzeit andere Probleme als sich darum zu kümmern, um das abzuschaffen. [1:26:36 – 1:26:38] AF: Exakt. Hier bricht die U-Bahn-Station ein, falls Sie das gelesen haben. Mexiko ist arm. Also Mexiko ist ein reiches Land, nur das Geld haben andere. Das ist das Problem, was ich hier in Mexiko sehe. Mexiko an sich ist ein super reiches Land	145-146	Macro Environment\Social (Subcode: Poverty/Social Problems) Macro Environment\Economical (Subcode: Poverty) Macro Environment\Economical (Subcode: Corruption)
Schon ein Substitutions- bzw. Ersatzprodukt, wenn es zu teuer wäre. Dass was man aus den letzten Jahren kennt und darauf zurückgreifen kann. [1:27:19 – 1:27:30] AF: Genau	147-148	Industry/Substitute (Subcode: Fossil Fuels)

Noch etwas anderes. Als Sie jetzt in den mexikanischen Markt eingetreten sind, kann damit auch verbunden werden, dass Sie das als Eintrittsmarkt für Nachbarstaaten nehmen, um danach den nächsten Schritt zu machen? Angenommen der Markt Lateinamerika wird durch Mexiko erschlossen, um andere Länder in Lateinamerika kennenzulernen. [1:27:32 – 1:28:02] AF: Also wir sind bereits in Chile vertreten. Mit einem Mann. Also nur mit einer Person, die wir da haben. Da geht es konkret um Großprojekte. Also wir sind schon in Chile. USA ist außen vor. Da sind wir nicht interessiert. Das ist nicht in unserem Scope drin. Erstmal bleiben wir in Mexiko und in Chile. Momentan haben wir keinerlei Intentionen kurz- bis mittelfristig irgendwo anders etwas aufzubauen. Wir müssen uns erstmal hier etablieren bevor wir auf anderen Spielplätzen mitspielen. Nein, es ist nichts geplant außerhalb von Mexiko und Chile	149-150	Motives to enter Mexico Macro Environment\Ecological (Subcode: Geographical Location)
Um nochmal auf das Thema Agro-Photovoltaik zurückzukommen. Sie haben gemeint, dass es in Mexiko noch nicht so möglich ist bzw. noch nicht so häufig genutzt	151-154	Macro Environment\Technological\ (Subcode: Infrastructure\Agro-PV) Macro Environment\Ecological

wird. [1:29:08 – 1:29:18] AF: Nein. Es wird hier noch nicht gepusht dieses Produkt. Aber wir als Unternehmen haben schon das Produkt und versuchen das in Europa an den Mann zu bringen, aber in Mexiko noch nicht. [1:29:19 – 1:29:38] I: Weil es weniger Freiflächen in Europa gibt, aber dadurch kann man es kombinieren? [1:29:39 – 1:29:43] AF: Genau. Dieses Produkt wird ja geboren aus dem Problem, dass Europa und Deutschland schon eng bebaut ist. Das Land ist knapp, das was Mexiko nicht hat. Die meisten Landwirte hier haben so viel Fläche, dass da immer irgendwo Platz ist für Solar. Also dieses Agro-PV ist ein Produkt, was schon spezifisch für Europa gebaut ist, weil die Flächen dort konkurrieren. Benutze ich die jetzt für Solar oder baue ich da jetzt Getreide an? Diese Konkurrenz-Situation, die wir jetzt immer mehr haben. Die Lösung ist jetzt eben: macht doch beides! Die Lösung für ein Problem in Europa, aber nicht hier in Mexiko. Hier haben wir ja Platz.		(Subcode: Natural conditions/Agro-PV)
Andererseits haben die das Problem, dass die Netze überlastet sind. Da tun wir denen ja einen Gefallen. Es ist so ein ambivalentes Verhältnis. Manchmal treffen wir	158	Macro Environment\ Technological\ (Subcode: Infrastructure)

auch auf Widerstände dort und manchmal geht das Hand in Hand ohne Probleme		
Es ist so ein ambivalentes Verhältnis. Manchmal treffen wir auch auf Widerstände dort und manchmal geht das Hand in Hand ohne Probleme. CFE sind überall lokale Fürstentümer. CFE Queretaro hat nichts zu tun mit CFE Monterey. Das eine kann super sein und die sind total fit und cool und wissen, was sie tun und bei den anderen stößt du auf absolute Unwissenheit. Wirklich schlimm. Man weiß halt nicht, was dich erwartet bei CFE. Aber wir müssen mit CFE klarkommen, weil die müssen uns den Netzanschluss gewähren. [1:31:06 – 1:33:11] I: Es ist also eine Abhängigkeit gegeben. [1:33:12 – 1:33:15] AF: Absolut. Eine starke Abhängigkeit und wenn die uns dann Steine in den Weg legen wollen, dann können die das machen. Dann müssen wir richtig strampeln. Wir müssen mit denen klarkommen. Es bleibt uns nichts anderes übrig. Wir kommen nicht um die herum und das ist immer eine schwierige Hürde hier im Projekt: der Netzanschluss mit der lokalen CFE. Da haben wir von der Skala schon alles durch. Von superschnell und effizient bis zu 3 Monate mit	158-162	Macro Environment\Political\ (Subcode: Public Administration)

denen rumgeschlagen. Also das ist auch eine Herausforderung für jedes Start-Up in Mexiko: Umgang mit Behörden. Da brauchst du auch, meiner Meinung nach, lokale Leute, die sich hier auskennen. Das bringt nichts, wenn sich da jemand aus Deutschland drum kümmert. Das muss einer hier machen. [1:33:16 – 1:34:11] I: Also die Bürokratie allgemein ist eine Katastrophe. [1:34:12 – 1:34:15] AF: Das ist eine Katastrophe. Das ist total irre und nicht wirklich logisch. Das läuft nach allen möglichen Gesetzen und die musst du kennen. Du musst dich da bewegen können. Du musst auch wissen, wie du mit den Leuten redest. Da haben wir auch gesagt, bevor da jetzt ein tollpatschiger Deutscher dahin kommt, haben wir zum Glück jemand gefunden. Einen Partner, einen Mexikaner, wer sich sehr gut damit auskennt und viele Projekte bereits gemacht hat. Hauptsächlich Wind. Die sind super, wir verstehen uns gut. Wir haben eine Partnerschaft mit denen und die machen uns überall diese „Tramites“. Ich glaube das war eine gute Lösung zu sagen: Lass das den Mexikaner machen. Du brauchst jemanden von hier. Ich glaube das brauchst du in		
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jedem Land. Was Behörden angeht, brauchst du ein lokales Feeling. Das war eine wichtige Entscheidung. Da sind wir auch zufrieden mit		
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machen. Du brauchst jemanden von hier. Ich glaube das brauchst du in jedem Land. Was Behörden angeht, brauchst du ein lokales Feeling. Das war eine wichtige Entscheidung. Da sind wir auch zufrieden mit.		
Ja genau. Wir haben auch ganz klar die Ansage: „Keine humanidad“. Die Ansage muss man machen, wenn man Behördengänge macht bzw. wenn der lokale Partner für dich die Behördengänge macht. Da muss man die Ansage machen, dass wir nichts mehr zahlen. Gerade da ist die Korruption. Natürlich kommt man da in Versuchung, wenn der jetzt 3 Monate das Projekt stoppt, weil du ein Papier nicht kriegst. Da liegst du schon abends mal wach und denkst: „Wenn ich jetzt was zahlen würde...“. Aber das ist für uns ganz klar keine Diskussion. Machen wir nicht. Das muss alles irgendwo anders geregelt werden können. Wenn die Ausländer sehen, denken manche „Oh, der hat ja Geld. Da ist richtig Kohle. Dem könnte ich ja etwas abknöpfen“. Aber wenn ein Lokaler hingeht, dann ist es nicht so offensichtlich. Das muss man sich auch gut überlegen. Auf dem Radar haben, dass behördliche Sachen in	164	Macro Environment\Political (Subcode: Corruption)

Mexiko ein Alptraum sind. Da kann es auch mal egal sein, was das Gesetz sagt. Das interessiert die da nicht. So weit geht das		
Gute Leute in Mexiko. Wenn du gute Leute in Mexiko hast, dann läuft hier auch. Die gibt es, aber schwer zu kriegen. Das macht viel viel aus. Die guten Leute wollen natürlich gut bezahlt werden. Auch in Mexiko. Ist nicht so, dass du hierherkommst und für einen Apfel und ein Ei alles nachgeworfen bekommst. Die verdienen hier auch gutes Geld	164	Macro Environment\Social (Subcode: Labor market)
Ja. Natürlich gibt es das Gehalt an sich, aber in Mexiko läuft auch viel über die Benefits, die es in Deutschland nicht so viel gibt. Weil auch der Staat schon Sozialversicherung, Krankenversicherung und so was per Gesetz anbietet. Hier nicht. Hier kann man viel machen über diese Benefits. Aber ja, wenn du gute Leute haben willst, die auch etwas auf dem Kasten haben und das auch wissen und beispielsweise in Harvard studiert haben, denen musst du echt gutes Geld anbieten. Da darf man nicht vergessen, das Leben in Mexiko City ist teuer. Das ist teurer als Berlin. Die wollen dann hier auch gut leben und gutes Geld verdienen. Du kannst billig Leute	166	Macro Environment\Economical (Subcode: Costs/Labor market)

kriegen, aber dann kriegst du halt billige Leute. Das ist so ein Trade-Off. Das ist schwierig und muss man auch auf dem Radar haben.		
Goldbeck Solar Mexiko ist eine Tochtergesellschaft oder eine Niederlassung? [1:38:52 – 1:38:58] AF: Ja. Das ist eine eigenständige Firma, die aber zu 100 % der Goldbeck Solar Deutschland gehört. Eine Tochter. [1:38:59 – 1:39:10] I: Okay. Gab es Gründe, wieso Sie sich dafür entschieden hatten? [1:39:11 – 1:39:15] AF: Ja, es verlangt auch der Gesetzgeber. Wenn du hier Projekte machen willst, brauchst du eine Gesellschaft für den Import zum Beispiel. Es ist besser, wenn du hier eine eigenständige mexikanische Firma hast, wenn du Sachen importierst. Und das machen wir ja. Insofern macht das Sinn. Das hilft uns und wir sind alle als „Local“ angestellt und keine Expats. Wir sind lokal angestellt bei Goldbeck Solar Mexico. Das ist natürlich auch nochmal ein Unterschied. Es gab gute Gründe dafür. Da kann man sich auch beraten lassen. Das sollte man auch machen. Also ich würde jedem CAMEXA empfehlen, also die deutsch-mexikanische Handelskammer anzuquatschen. Die	167-170	Company Information (Goldbeck Solar) Industry\New Entrants (Subcode: Advice for new entrants) Macro Environment\Legal (Subcode: Legal aspects to start a company)

kennen sich unheimlich gut aus und können auch sehr gut Starthilfen geben. Wir mieten ja auch Büros im German-Center. Das ist ein Konzept für Start-Ups. Das ist ein Bürogebäude. Die geben dir die ganze Infrastruktur. Büros komplett eingerichtet, Strom, Licht alles dabei. Telefon		
Mit den Kompetenzen, um es noch einmal zusammenzufassen, wo Ihnen andere Konkurrenten voraus sind. Da hatten Sie gesagt, dass manche von der Struktur größer sind, länger im Markt mit mehr Erfahrung und einfach die finanziellen Mittel? [1:42:11 – 1:42:33] AF: Finanziell deutlich stärker aufgestellt und natürlich viel mehr Connections haben. Die haben jede Menge Verbindungen zu den Regierungen, Kundenkontakte. Die haben einfach schon einen riesen Kundenstamm mit denen die arbeiten können. Die Erfahrung ist immer, wenn ich irgendwo hingehe, da war Iberdrola schon da. Das ist schon harte Konkurrenz. Die Spanier sind teilweise schon seit 10-20 Jahren hier. Die kennen sich auch ganz gut aus. Das merkt man. Die haben auch Verbindungen zu ganz oben oder nach ganz rechts oder ganz links	175-176	Company Internal (Subcode: Weakness) Industry\New Entrants (Subcode: Advice for new entrants)

oder zu CFE zum Beispiel. Da gehen die ganz anders mit um als wir Kleinen. Das ist schon ein Unterschied.		
Gut. Wie würden Sie die Zukunft in den nächsten Jahren auf dem Markt sehen? Es geht immer steigend nach oben, oder? [1:43:23 – 1:43:37] AF: Ja, ich sehe da schon eine steigende Kurve mit Hügeln und Dellen und Tälern. Aber langfristige Tendenz ist steigend. So würde ich das beschreiben. [1:43:38 – 1:43:55] I: Ich habe jetzt noch das Stichwort Wasserstoff, aber da sind sie glaube noch weit von entfernt. Das ist glaube ich noch ganz ganz langfristig. [1:43:56 – 1:44:06] AF: Ja. Noch kein Thema. Könnte ich auch nicht viel zu sagen. [1:44:07 – 1:44:11] I: Ja. Das war jetzt nur, weil es derzeit so einen Hype über Wasserstoff gibt, da wird es aber in Mexiko noch dauern, wenn Deutschland schon Probleme damit hat. [1:44:12 – 1:44:21] AF: Ja. Das ist noch Zukunftsmusik. Es kommt, aber bis das nach Mexiko kommt... [1:44:22 – 1:44:28]	177-182	Future
Inwiefern stellt der Wechselkurs ein Risiko für Ihr Unternehmen dar?	188-189	Macro Environment\Economic (Subcode: Exchange rate)

Wie wirken Sie dem entgegen? AF: Zum Thema Wechselkurs: Dies stellt tatsächlich ein Problem dar. Wir arbeiten mit Euro, Dollar und mexikanischen Pesos. Unsere Angebote sind alle in US-Dollar und wir legen alle paar Tage den neuen Wechselkurs für die Umrechnungen fest. Außerdem sind alle unserer Angebote befristet, um gegebenenfalls den Wechselkurs anpassen zu können.		
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A4.2: Table with Coding of Statements from Transcripts of Interview 2 (SOWITEC Mexico)

Statement	Paragraph	Code
I: Okay. And your company, like the business model, is it about selling projects or the operation and maintenance of the solar systems? [1:32 – 1:47] DO: Well, that depends on the market we are talking about. Here in Mexico, we are a pure developer. We just keep in the first stages of the project development until we reach the credit stage. In other countries for example we are participating in some other markets as independent producers. For example in Uruguay. As is said it depends, for example in Germany the company's scope includes for example the maintenance and so on. In Mexico we are just developers.	6-7	Company Information (SOWITEC)
I: That means that also the clean energy certificates do not play a big role in Mexico right now? [2:35 – 2:41] DO: Right now, for us no. But you should know in our law, we have already an energy transition law which includes the emission of clean energy certificates as a help for the renewable project	8-9	Company Information (SOWITEC)

development.		
DO: Well, I think the question is a little bit out of my scope. But I would say Sowitec entered to the Mexican market in 2008. That was a good moment for Mexico because in that moment was a lot of movements in the law. If you remember, we had a change in Energy law in 2013. So when Sowitec came to Mexico was the best time to find the best spots in Mexico in order to be prepared for the new market that were appearing. And of course, in that moment Sowitec had big agreements with big companies. Lets say Italian companies. That pushed Sowitec to find projects to deliver to that Italian investor. [3:33 – 5:06] I: So it was mostly because of the big market opportunities that you pushed yourself into it? [5:07 – 5:11] DO: Exactly. Exactly that is the point.	11-13	Motives to enter Mexico
I: Yes. For example, the energy reform. How does it influence your business model? How does it help? Also with the new, how is it called – Novela? The president actually wants to strengthen CFE and how does it affect you for example? [6:24 – 6:48] DO: Well that affects us in	16-17	Macro Environment\Political (Subcode: Energy reform)

a very important way. Lets say Sowitec is always looking for smooth project developments in interesting markets. When Sowitec came to Mexico the political framework was another. The administration in that moment was a little bit in a center or right position. And now we have a left-winged administration. Once Sowitec came here to Mexico, they found a good framework for project development that helped us in order to find the best business models for us. Being able to sell our projects to investors that were interested in our projects. Right now with the current administration, they have another completely different vision on what we need for a contract. This position has strengthened CFE, a state company in charge of almost the whole energy chain. They are big players in generation, they are a monopoly in transmission. On supply, for example, they do not have competitors right now. The law permits to have other competitors for domestic supply but there is no other up to date. And specifically related to what we do here at Sowitec, we had experiences with some troubles because the position of the state is to keep CFE as the most important player in energy production. That means,		
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the state is going to indirectly block us because they don't want to fight with the private sector. They know that they are not efficient enough and they are not interested in having competitors which are looking for the best technologies. More or less this is what happening with that.		
I: So actually, the energy reform was beneficial for you at the beginning but since the "Novela" it gets trickier and more difficult for you? [10:00 – 10:10] DO: Exactly. That's it what it is. What is happening. From 2 years ago we have been experienced a lot of indirect blocks. For example, there is not a possibility to obtain an investigative study which is the first step in the interconnection process. If you don't have an interconnection agreement, you do not have any projects.	18-19	Macro Environment\Political (Subcode: Energy reform; new policy)
I: Another point what is always been mentioning in the news, is about the corruption. Do you feel that, or did you experience something? Would you say it is a problem? [10:45 – 11:03] DO: Well, I think corruption was a problem at the very beginning. It is not a problem with this administration but in the	20-21	Macro Environment\Political (Subcode: Corruption)

last administration when everything related to the private sector was okay. The corruption was related to the possibility to obtain some permits, taking advantage on the relationship they have with the administration. With the public administration. The trouble is that when you don't have those connections with the government, it is more difficult for the company to develop their projects. Now, I think that the problem is not corruption. It is not corruption; it is just ignorance from the current administration. In my opinion, they are not seeing the consequences of not open the market to the private sector [		
So you would say, because of the protectionism they want to promote again the coal and oil and gas [12:21 – 12:30] DO: Yes	22-23	Macro Environment\Political (Subcode: Government) Industry\Substitutes (Subcode: Fossil fuels)
OK. Another point is about taxes. Like subsidies. Do you still live with that? Or you can survive on your own and don't really need that anymore? [12:32 - 12:57] DO: Related to that, I think there are not really movements. I mean, we are still having subsidies from the government for renewable projects. I mean, for example, if you	24-25	Macro Environment\Political (Subcode: Subsidies) Industry\New Entrants (Subcode: Taxes)

create a new company related with the social object of generate electricity, you don't need to pay taxes or related with incomes. The next, I think, 3 years from the creation of the subsidiary, for example. That kind of subsidies are still on-going. That is good for project development but not as good as we expect. [12:58 – 14:00]		
Well, to be sincere, I don't have an answer for that. But let's say, we are always trying to define the best moment to make investments, looking for multiple variables. So, one of that is the GDP, for example. Maybe is not the best time to look at those KPIs right now because of the pandemic situation. That phenomenon is happening here in Mexico, too. Let's say, I am pretty sure it is related with the success of project development.	27	Macro Environment\Economic (Subcode: KPI)
And since Mexico is an emerging country, there is still like a steady growth, like an economic growth. That's why it is also a high potential market, I guess? [15:46 – 16:00] DO: Yes	28-29	Macro Environment\Economic (Subcode: Economic growth)
How would you describe the bureaucracy, like the ease of doing business in Mexico. Is it a long process to sign contracts	34-35	Macro Environment\Political (Subcode: Public administration and Bureaucracy)

or to come in touch with partners, administrations? [16:56 – 17:11] DO: Well, let's say, I think we can divide that into two parts. The first are the things that you must align with the private sector related with the project development for example. Looking for investors, looking for suppliers and so on, there is not any trouble to find them or to sign a specific contract. There is not any problem with that. But if you look for the public sector. Licenses, permits, and contracts that we need to perform in order to develop a project for example. There is where we can expect some delays and negotiations with the bosses in that administration. I would say, it depends on who you are looking for making business with. If you want to make agreements with the private sector is not any trouble but if you want to make the same with the public administration, there is where you will find some issues		
Do trade agreements play a role? Like with the United States? [18:41 – 18:52] DO: Yes absolutely. You should know that Mexico is currently signing a new agreement, a new commercial agreement with the United States and Canada. We think	36-37	Macro Environment\Economic (Subcode: Trade agreements) Macro Environment\Political (Subcode: Foreign policy)

that is going to affect the way on how this administration face the renewable energy projects. As you know, President Biden has another completely different way of seeing that technologies. I would say, the current administration in the United States love that kind of technologies. That situation is going to push Mexico to align with purposes on the United States. And of course it is related with the recent agreement sign. The possibility to sell, let's say merchandise to the United States.		
Yes. That is the part of our most important issues that we see before a project development. Actually, here in Sowitec Mexico we are an expert in that. I would say, yes of course, there is a lot of characteristics we need to face during the straining phase. Our environmental issues for environmental issues, you'll find, for example, some environmental conditions that you need to fulfil. They are mostly related to project design but there is other kind of works that should be done before starting the construction. You should perform a flora and fauna rescue. And other detailed environmental studies with bears, with bats and other fauna monitoring.	39	Macro Environment\Ecological (Subcode: Environmental scanning) Macro Environment\Social (Subcode: Social scanning) Company Internal (Subcode: Strengths)

That is the environmental site. In the social site, we should start any development with a social aspect assessment which is basically the definition on the impacts related with the installation of projects inside a community. That includes, for example, in an indigenous group, a consulting, an investigation on how the indigenous population looks at our projects and if they agree with our installations. You should obtain an approval from that communities. This is one of the most important issues, we need to face at the very beginning. That becomes harder once you get closer from central Mexico because central Mexico is where you can find a lot of indigenous communities. That is why you are going to notice that in Central Mexico there are just a few utility scales. That's why more utility scales are in the North of Mexico, for example. In the northern part of Mexico, where you will find a lot of land but just few people.		
Because there is the dessert? [24:09 – 24:11] DO: Exactly, exactly. But if you come near to Mexico City for example, there is not any land to develop utility scale.	40-41	Macro Environment\Ecological (Subcode: Desert)
And I think it would be also the same with	42-43	Macro Environment\Ecological

Oaxaca and Yucatan, for example? [24:23 – 24:28] DO: Yeah absolutely. And it is not just related with social issues but with archeological issues. This is another perspective on social characteristics. If you want to develop a project in Yucatan or in Oaxaca you will find indigenous communities. This is a fact. But actually, you should study if in the location where you want to build your PV-plant, if there is not other ecological heritage you need to rescue. It is very probable that you will find it because it is Oaxaca and Yucatan.		(Subcode: Indigenous and archaeology)
Okay. And will those indigenous groups benefit monetary from that like you have to give them money in order to compensate it or just an agreement that it is okay for them? [25:26 – 25:39] DO: Well, I think to give them money is part of the agreement that you should organize with them. It is not a rule but it is a situation that you are going to face very very probably. Actually you can obtain an approval without giving any money but it is not probable that this happens.	44-45	Macro Environment\Ecological (Subcode: Indigenous)
Yes I agree with that. I think from 2000 to now, there are increasing the number of engineers that are able to work in the	47	Macro Environment\Technological (Subcode: Engineering) Macro

industry. That is because of the trade agreement with the United States. As you know, I commented that previously, that we recently signed an agreement with them and that enables us to work on automotive parts in Mexico. In Mexico we do not construct cars from the scratch but we have a lot of companies that construct some automotive parts like wheels. Because of that we have a lot of universities working on problems for engineers and they have the opportunity to work in this industry. That is why we have proper manpower for the development of the solar power industry.		Environment\Social (Subcode: Engineering)
Definitely, it is a trouble or a problem because, you should know, the cartels are located in the whole country. It's not a problem for a specific zone. So for example, if you are looking for a development in the central of Mexico, you will find the first social situations as I described previously. The indigenous population with ecological heritage and also security troubles with cartels and so on. For example, if you find that in the location where you want to develop a project, that means that very probable you need to make contact with them. Maybe indirectly but that is going to happen because the people who	49-55	Macro Environment\Social (Subcode: Public security + cartels)

live in that community will be involved with the cartels at the level where they need to answer them everything. You know what I mean? [29:01 – 30:19] I: Yes, I know. So that means you have to communicate with the population there or with the cartels? [30:20 – 30:25] DO: No, I think that is directly with the population but in many cases you will need to talk with the cartel, too. Maybe not with the bosses but with people which are in charge of the location or the community. [30:26 – 30:46] I: Sometimes they also threaten you and you have to pay them? [30:47 – 30:52] DO: Probably. That depends on the situation. I would like to mention one history that recently happened to us. We have been looking for a project in Guanajuato and right now in Guanajuato, you should know, there is a cartel Santa Rosa de Lima, which are one of the worst, in terms of violence. Of course, the people were interested in the development of that project but very honestly they told us that they should request permission to the cartel. That is what is happening.[30:53 – 31:50]		
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I: Oh okay. A really tricky situation [31:51 – 31:52] DO: A tricky situation, yes. The cartel knows that the people is going to earn money from the project, and they want to have a part of that.		
DO: Well, let's say we have a very good trade opportunity with China and in the solar sector it is very well known that China plays a big role. I think that we have access to the most advanced moduls, converters and trackers and so on. I think there is not a trouble for Mexico.	57	Industry\Suppliers (Subcode: China) Macro Environment\Technological (Subcode: China) Macro Environment\Economic (Subcode: China)
I: You import all the components from China mostly? [33:04 – 33:08] DO: Mostly from China and of course from the United States but mostly from China, yeah. [33:09 – 33:25]	58-59	Industry\Suppliers (Subcode: Import, China)
Okay. How would you describe in general the transmission network, the cables in Mexico and the infrastructure? Is it mostly older and you need to renew them? [33:26 – 33:40] DO: Yes, this is very old. Actually, in the planning document what provides SENER which is the security of Energy here in Mexico, it is like a joke because they expect to construct just 17 kilometers of high voltage transmission line in	60-61	Macroenvironment\Technological (Subcode: Infrastructure)

Mexico in 2021. 17. There is not an investment in the transmission. We need to have it in order to accept more renewable energies. But, I think, that the government knows that that they want to push the private sector in order to beat them. That affects directly the project because we could not reach a levelized energy accordingly what the investors are looking for		
There is not an investment in the transmission. We need to have it in order to accept more renewable energies. But, I think, that the government knows that that they want to push the private sector in order to beat them. That affects directly the project because we could not reach a levelized energy accordingly what the investors are looking for. [33:41 – 35:05] I: Would you also say that one the one side the government wants to block the private parties in order to strengthen CFE but on the other side they need the private companies like Sowitec to have more space in the network, right? Because I read that the network is completely full, so there has to be decentralized energy generations. Actually, you have to work with them somehow. [35:06- 35:53] DO: Yes, basically	61-63	Macro Environment\Political (Subcode: Infrastructure + political investment)

Another point, you already mentioned ecological parts. It is obvious that Mexico has a lot of sun in the whole country. That makes it high-potential, too. Also that it is a big country with lots of free space for building projects. You would agree with that? [35:55 – 36:29] DO: Yes,absolutely. Accordingly, the solar global atlas, we have the global irradiation average around 2150 kwh/m2 per year. This is a very high irradiation. This is perfect for PV-plants project development. Yes, we have a lot of space, mainly up the north of Mexico. But the situation is that the north of Mexico doesn't have big, populated cities. The demand is not there. So, there is a lot of space in the North, but that electricity needs to travel to the better load zones and that means that this electricity needs to use the grid and the grid, as you know, is full. You could find perfect locations in North Mexico to develop projects but if you want to establish a PPA, that is where you will face trouble. You will find a PPA but the loads will be located in other zones of Mexico and not only in the North. What is going to happen is, that you are going to produce cheap electricity, but this	64-67	Macro Environment\Ecological (Subcode: Environmental conditions)

electricity is going to travel and you should pay transmission fee. The cost is going to increase and maybe won't be the best conditions for a PPA. [36:30 – 38:29] I: That means that you don't use the dessert for projects mostly? Its good conditions but because of the transmission its difficult. [38:30 – 38:38] DO: Exactly.		
But the situation is that the north of Mexico doesn't have big, populated cities. The demand is not there. So, there is a lot of space in the North, but that electricity needs to travel to the better load zones and that means that this electricity needs to use the grid and the grid, as you know, is full	65	Macro Environment\Technological (Subcode: Infrastructure)
You could find perfect locations in North Mexico to develop projects but if you want to establish a PPA, that is where you will face trouble. You will find a PPA but the loads will be located in other zones of Mexico and not only in the North. What is going to happen is, that you are going to produce cheap electricity, but this electricity is going to travel and you should pay transmission fee. The cost is going to increase and maybe won't be the best conditions for a PPA.	65	Macro Environment\Technological (Subcode: Infrastructure)
For example, do you use	68-69	Macro

in Mexico Agro-Photovoltaic or not yet? [38:41 – 38:59] DO: Not yet. I have heard about some projects that are trying to include that technology but there is not any project installed with that technology		Environment\Technological (Subcode: Agro-PV)
And what about floating-PV? For example, I just had in mind the golf of Mexico or Baja California? [39:21 – 39:30] DO: Well, for Floating-PV, I think that we are not going to be able to develop on our seas or oceans or gulfs. Because there are a lot of environmental restrictions on that. But let's say, and this is one is going to be interesting for you. We commented previously that one of the most important troubles to develop PV-projects in central Mexico was the land because there is a lot of population and difficult to find hectares and flat land to develop the projects. But in Central Mexico, the other option would be to develop that kind of technology but in water bodies. A special characteristic of central Mexico is that we have a lot of water bodies. Artificial or natural. Other characteristic is that water what is in the water bodies are mostly contaminated. You should know 25 million people in	70-73	Future (Subcode: Floating PV) Macro Environment\Technological (Subcode: Floating PV) Macro Environment\Ecological (Subcode: Floating PV)

Mexico City pollute a lot. We have a lot of contaminated water bodies. One of the expectations in the sector is that in the next years we will be able to develop Floating-PV on that contaminated water bodies in order to help the water bodies to improve the water quality and also to produce electricity. That is like a chance to get to objectives. [39:31 – 41:36] I: That's a really good idea. Efficient. [41:37 – 41:40] DO: Exactly. It is, of course, an idea and we need to develop. Let's say it is a possibility for the future		
Good, perfect. Let's talk a little bit about the industry. How would you in general describe the actual situation in the photovoltaic sector in Mexico? Is it booming? [42:00 – 42:19] DO: Well, I think that the utilities are not moving too much. But distributed energy, let's say, they are on the boom because they do not depend on private investors. The capacity of the distributed electricity is not more than 1 MW. It is good seen by the current government. They push the people to get those systems. So let's say, distributed energy have a boom here in Mexico but utility scale is a little bit of	76-81	Industry\Industry Rivalry (Subcode: Industry situation)

a stop. [42:20 – 43:18] I: Is it also because of the “Novela”? [43:19 – 43:20] DO: Exactly. It is definitely related with that. [43:21 – 43:25] I: So little and medium projects are still possible but utility scales difficult. [43:26 – 43:33] DO: Difficult, exactly		
I: How would you describe the competition? Is it more or less an oligopoly with a few competitors or is it a hypercompetition with lots of companies you have to compete with? [43:37 – 43:51] DO: Well, maybe two years ago, it was lot of competitors for Sowitec Mexico. I mean, competitors lets say the companies doing the same as Sowitec. Pure project development. Two years ago there were several companies in that but now, in my perspective, just a bunch of companies are still working on project development because they couldn’t face the 2 years block that we already have in the sector.	82-83	Industry\Industry Rivalry (Subcode: Competition)
Just a company as Sowitec with a strong support would be able to restrain. [43:52 – 44:52] I: What support do you mean?[44:53 – 44:55] DO: Yes. Support, for example, you should know that currently	83-87	Company Internal (Subcode: Strengths)

Sowitec has participation of Vestas. That is the situation. Economically speaking, we are okay and that is not the same story for all the tiny developers in Mexico. I know that they are trying to sell their projects at the very early stage because they have not expectation to be able to sell later. [44:56 - 45:37] I: Ah okay. Because you have the experience, you have the capital and its easier for you to establish. [45:38 – 45:43] DO: Exactly.		
In which market segments are you active? Every segment? Even the little for the building or you focus more on utility scale or medium projects? [45:45 – 46:00] DO: Yeah absolutely. We are just focused on utility scale. We do not develop tiny projects	88-89	Company information (SOWITEC)
You have a special region or is it all around Mexico? [46:10 – 46:16] DO: Yes. All around and we are always looking for the best spots to develop projects.	90-91	Company information (SOWITEC)
Who would you say are your competitors? Is it more the big companies, let's say the Spanish and Italian ones? [46:37 – 46:48] DO: Yes, but let's say we do not take these	92-95	Industry\Buyers (Subcode: Investors) Industry\Industry Rivalry (Subcode: Competitors)

companies as our competitor but as our potential investors. I mean, we are always looking for business models like pure development for these companies. Looking for selling our project at ready to be at stage for them. [46:49 – 47:21] I: I mean, for example, the Spanish company Iberdrola. The big Spanish and Italian companies in the energy sector are no competitors for you? [47:22 – 47:43] DO: Exactly. They are not competitors for us. As I understand, the business model in Sowitec Mexico, they are not our competitors but our possible investors. Selling our projects once they are ready to be at stage.		
Who would you see as competitors then? [48:13 – 48:18] DO: For example, Aljaval. It's a pure developer in Mexico. It is a Spanish company and others like them. [48:19 – 48:49] I: You wouldn't also see PEMEX as a competitor? It is not really in your field right? [48:50 – 49:06] DO: PEMEX is more related with hydrocarbons. This is not a company really related with us. I mean, it would be because now the framework, the law, the rules enable them to work in renewable energies but up today, they haven't	96-99	Industry\Industry Rivalry (Subcode: Competitors)

any renewable projects.		
You already said it is difficult to get as a new company into the market, right? If you don't have connections or capital. [49:43 – 49:53] DO: Exactly.	100-101	Industry\New Entrants (Subcode: Advice for new entrants)
What would you say are substitute products? It's still like because the government promotes the gas and the oil. Would you say it is still a kind of a threat? [49:55 – 50:13] DO: Yes. Definitely it is. Maybe not a trouble but a situation for us because the government are pushing other sectors not related to renewable energies and the consequences on that is that investors really don't want to invest the proper amounts of money because of that. [50:14 – 50:49] I: Because they are still scared that it could get problems with the government? [50:50 – 50:55] DO: Exactly	102-105	Industry\Substitutes (Subcode: Fossil fuels) Macro Environment\Political (Subcode: Fossil fuels)
Who are the suppliers mostly? You said already from China a lot. [50:57 – 51:14] DO: Exactly. But even from the United States for example. Nextracker or GE, for example, for inverters. And for floating, for example, we are looking for floating	106-111	Industry\Suppliers (Subcode: Suppliers)

systems in Spanish companies like EasyFloating. That's the name of the Spanish company but others like French companies like Ciel et Terre. Basically, we are looking for the best suppliers. We just need to certify that they are able to work in Mexico but basically it is only that. [51:15 – 52:13] I: How would you describe the power from those suppliers concerning the price negotiations? Because the demand is big, so they can increase the prices easily? [52:14 – 52:30] DO: Yes absolutely. If we agree that the company is already in Mexico, they should have experience in the development in that kind of projects. So yes, we start with companies that have the experience. Of course, considering that they are going to negotiate in the proper stage to negotiate the cost on the supply. [52:31 – 53:09] I: So they have a powerful position in order to renegotiate because of their unique position? [53:10 – 53:22] DO: Yes, exactly		
Last point about the industry. You said you are in the Utility-scale-segment. So, your clients are big companies mostly, I guess? Would you say like the real big companies or how big is	112-119	Industry\Buyers (Subcode: Clients)

the scale from that? Or you also do it for little companies for their own power generation? [53:24 – 53:57] DO: That goes out of my scope. Basically, we are always trying to make business with the most important companies. That means, the Italian, the Spanish and so on. But as I said, it is not my scope. [53:58 – 54:24] I: They are probably also in every sector? Can be retail, can be automotive, can be everything? [54:25 – 54:33] DO: Yes [54:34] I: Do you also have public clients? Or mostly just private? [54:35 – 54:41] DO: Well, mainly private. Because they are easiest in Mexico to make business with them. But if there is an opportunity to make business with public companies, we are interested in that. [54:42 – 55:03] I: Ok. So you mostly do it with the PPAs then? To finance it at the same time. [55:04 – 55:09] DO: Yes. [55:10]		
Basically, because we are able to face almost all the specialties that you need to develop a renewable project in Mexico. Sowitec aren't just specialized in wind but also in solar and environmental, social, and technical feasibility studies. We do not contract other companies to do our technical	121-123	Company internals (Subcode: Strengths)

studies, for example, because our manpower is able to do that. This is what I think is our advantage over other developers in Mexico. We are a global company; we do have a lot of experience and knowledge and of course the know-how. This is what I think makes the difference between us and other developers in Mexico. [55:38 – 56:51] I: So, on the on side it's the experience, the manpower, the skills, the knowledge and also as you said before, the capital. The monetary point. Because it is a big company with locations everywhere. Do you also have a special product like an engineering masterpiece what can be seen as competitive advantage, or you build something differently? [56:52 – 57:27] DO: You should know, not specifically a super-tool or something like that. I don't think so. But the knowledge that has our specialized company which is Sowitec development in Germany. Of course, they represent a center of excellence and has the experience and knowledge, as I said, not related with wind, but the possibility to perform analysis for hybrid plants, for solar plants, for floating PV plants and other technologies on renewable energies.		
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Actually, as I said, the experience on the development not just in Latin America but in other countries like Russia, Kazakhstan and also Asia, South America and so on. I think, this is our most important advantage over other competitors		
So, it helps also that products “Made in Germany” stand for the reputation in Mexico? [59:47 – 59:45] DO: Exactly. Yes.	126-127	Company internals (Subcode: Strengths)
How would you see the future of the photovoltaic market in Mexico? [1:00:28 – 1:00:44] DO: Well, that’s encouraging. We already have midterm elections in Mexico and the balance and the power seem to be better for us. I would say encouraging, mostly. [1:00:45 – 1:01:08] I: Also, in terms of hydrogen, for example? Or is it really a future topic what is not present in Mexico right now. [1:01:09 – 1:01:15] DO: Well, the hydrogen is present in Mexico but this kind of technology right now is not changeable. [1:01:16 – 1:01:33] I: But, lets say, in the longer future it could be a possibility to produce hydrogen over there and maybe export to the United States or somewhere else.	130-134	Future (Subcode: PV Future, Hydrogen)