Towards a Sustainability Framework for the Desertec Concept

Master thesis

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presented by

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Abstract

The Desertec concept offers an opportunity to contribute to sustainable development (SD) in Middle East and North Africa (MENA), which will face environmental, economic and social challenges driven by population growth and an enhanced demand for energy. However, as proposed by PricewaterhouseCoopers (PWC, 2010) it is still unclear as to whether the concept can actually delivere SD and especially whether the local population of the MENA region will see its benefits. One way to ensure that those benefits resulting from the implementation of the Desertec concept are delivered is to develop sustainability criteria.

Therefore, this study investigates what sustainability criteria, which have to be embedded in an overarching sustainability framework, would look like and how one could approach the development of these criteria. In the context of this study, a preliminary stakeholder analysis was conducted, because important stakeholders should be included in the development of sustainability criteria. Literature research was undertaken to examine the theoretical structure of sustainability frameworks and certification systems. Sustainability frameworks are a hierarchical list consisting of Principles, Criteria and Indicators (PC&I), which are based on a sustainability vision. The study further explores the issue of participation, because research suggests that stakeholder participation must play a decisive role in the development of sustainability criteria. To gain knowledge about sustainability criteria specifically for the Desertec concept, nine interviews were conducted with experts from NGOs, experts in the field of science, industry experts and a policy expert. The conclusion from the analysis of the interviews found that, even among the experts, only little knowledge is available as to what sustainability criteria for the Desertec concept should look like. Overall, experts mentioned that it might be too early to propose a fully scaled criteria catalogue or specific criteria with certain exceptions, such as the water usage of Concentrating Solar Power (CSP) plants. Experts also mentioned that criteria should be developed in a living, iterative, fault-tolerant process where the focus is on gaining knowledge. summary, one possible way to approach the development of sustainability criteria for the Desertec concept is through a multi-stakeholder dialogue which takes into account the Integrative Theory of Reflexive Dialogues developed by Welp and Stoll-Kleemann (2006).

Zusammenfassung

Das Desertec Konzept bietet eine Möglichkeit zur nachhaltigen Entwicklung des Mittleren Osten und Nordafrikas, der sogenannten MENA-Region, beizutragen. Zukünftig werden auf die MENA-Region, angetrieben von Bevölkerungswachstum und einer steigenden Nachfrage nach Energie, große ökologische, ökonomische und soziale Herausforderungen zukommen. Allerdings wurde auch in Frage gestellt, z.B. von PricewaterhouseCoopers (PWC, 2010), inwieweit und ob das Konzept überhaupt zur nachhaltigen Entwicklung, besonders der lokalen Bevölkerung der MENA-Region, beiträgt. Ein möglicher Weg die Vorteile, welche sich aus der Umsetzung des Desertec Konzepts ergeben könnten, sicherzustellen sind Nachhaltigkeitskriterien.
Folglich behandelt diese Arbeit wie Nachhaltigkeitskriterien aussehen könnten, welche in einen übergeordneten Nachhaltigkeitsrahmen eingebettet werden müssen, und wie man bei der Entwicklung solcher Kriterien vorgehen könnte. Außerdem wurde eine vorbereitende Stakeholder Analyse durchgeführt, da angenommen wurde, dass wichtige Stakeholder bei der Entwicklung solcher Kriterien einbezogen werden sollten. Basierend auf einer Literaturrecherche wurde der theoretische Aufbau verschiedener Nachhaltigkeitsrahmen und Zertifikationssysteme untersucht. Nachhaltigkeitsrahmen, welche auf einer Nachhaltigkeitsvision beruhen, sind hierarchisch geordnete Register bestehend aus Prinzipien, Kriterien und Indikatoren. Weiterhin wurde das Thema Partizipation behandelt, da sich während der Literaturrecherche herausstellte, dass die Partizipation von Stakeholdern ein wichtiges Element für die Erstellung von Nachhaltigkeitskriterien ist. Wissen über Nachhaltigkeitskriterien, welche spezifisch für das Desertec Konzept sind, wurde durch neun Experteninterviews ermittelt. Die Experten für diese Interviews kamen aus verschiedenen Bereich wie z.B. von Nichtregierungsorganisationen, aus der Wissenschaft und Forschung oder der Industrie. Durch die Analyse der Interviews stellte sich heraus, dass wenig Wissen unter den Experten darüber vorhanden ist wie spezifische Nachhaltigkeitskriterien für das Desertec Konzept aussehen sollten. Insgesamt gaben die Experten an, dass es zum jetzigen Zeitpunkt zu früh sei um einen vollständigen Kriterienkatalog oder spezifische Kriterien, mit einigen Ausnahmen wie z.B. des Wasserverbrauchs von CSP Kraftwerken, festzulegen. Weiterhin wurde von den Experten erwähnt, dass Nachhaltigkeitskriterien in einen lebendigen, iterativen, fehlertoleranten Prozess entwickelt werden sollten in welchem der Erkenntnisgewinn im Vordergrund stehen sollte. Daraus wurde gefolgert, dass ein Multi-Stakeholder-Dialog, unter Einbeziehung der „Integrative Theory of Reflexive Dialogues“ entwickelt von Welp und Stoll-Kleemann (2006), ein möglicher Ansatz zur Entwicklung von Nachhaltigkeitskriterien ist.

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AHP - Analytic Hierarchy Process
CDM - Clean Development Mechanism
CIFOR - Centre for International Forestry Research
CSP - Concentrating Solar Power
CSR - Corporate Social Responsibility
DII - Desertec Industrial Initiative
DLR - German Aerospace Center (*German*: Deutsches Zentrum für Luft- und Raumfahrt)
DNA - Designated National Authority
DNI - Direct Normal Irradiation
EIA - Environmental Impact Assessment
EPFL - École Polytechnique Fédérale in Lausanne
FFCS - Finnish Forest Certification System
FM - Forest Management
FSC - Forest Stewardship Council
GDP - Gross Domestic Product
GHG - Greenhouse Gas
GRI - Global Reporting Initiative
GS - Gold Standard
HVDC - High Voltage Direct Current
ICMM - International Council on Mining and Metals
MENA - Middle East and North Africa
MPWG - Montreal Process Working Group
MSP - Mediterranean Solar Plan
NA - North Africa
NGO - Non-Governmental Organization
NRM - Natural Resource Management
NTFPs - Non-Timber Forest Products
PEFC - Programme for the Endorsement of Forest Certification schemes
PV - Photovoltaic
PWC - PricewaterhouseCoopers
RSB - Roundtable on Sustainable Biofuels
SA - Stakeholder Analysis
SD - Sustainable Development
SFM - Sustainable Forest Management
SIA - Social Impact Assessment
SRI - Stanford Research Institute
SSN - SouthSouthNorth
TREC - Trans-Mediterranean Renewable Energy Cooperation
UfM - Union for the Mediterranean
WWF - World Wide Fund for Nature

1. Introduction

1.1 MENA Region: Future Challenges

The Middle East and North Africa (MENA) will face tremendous economic, environmental and social challenges in the future. The key drivers for these challenges are population growth, which increases the pressure on freshwater resources and enhances the demand for energy, as well as economic growth, which has two opposite effects: it also leads to more water and energy demand, because of new services, but also enhances gains in energy efficiency (Trieb and Mueller-Steinhagen, 2007; Trieb et al., 2009a). The population of North Africa[1] is expected to grow from 213 million in 2010 to 321 million in 2050 (UN, 2010), while the urban population in the MENA region is predicted to double by 2030 (Varis and Abu-Zeid, 2009). Today the MENA region already experiences water stress. For example: Of the 20 nations worldwide with internal renewable freshwater availability below 1000 m^3 per capita, 15 are located in MENA (Brooks, 2007). The whole water deficit in MENA is expected to grow from 60 billion m^3 per year to 150 billion m^3 in the year 2050. At the same time, electricity consumption in MENA will rise from 1000 TWh/y to around 3000 TWh/year (Desertec Foundation, 2009). Furthermore, the main energy sources in MENA are fossil fuels: Particularly oil and natural gas (Al-Widyan and Al-Muhtaseb, 2009). However, those fossil resources are unequally distributed among MENA countries. One has to distinguish between resource-rich countries (as in Algeria or Libya) and resource-scarce countries (like Tunisia and Morocco), which are highly dependent on energy imports (Steinberg, 2009).

The combustion of fossil fuels leads to anthropogenic caused climatic change due to increasing greenhouse gas (GHG)-emissions in the atmosphere. If no measures are taken, the MENA region will increasingly cause GHG-

[1] According to the region definition by the UN, figures for North Africa include the countries Algeria, Egypt, Libya, Morocco, Sudan, Tunisia and Western Sahara. Sudan is not included in the studies by the DLR.

emissions, and, at the same time, suffer from changes in precipitation patterns and desertification due to climatic change (Brauch, 2006; Varis and Abu-Zeid, 2009).

Based on these facts and scenarios, it is questionable how the MENA region, which not only belongs to the economically least integrated regions of the world (Steinberg, 2009) and lacks sufficient foreign direct investments (Hesse, 2009), will sustainably handle the future challenges mentioned above.

1.2 Renewable Energy Prospects in the MENA Region

Because of the favourable physical conditions (e.g. abundant sunshine and low humidity), the MENA region has huge potential for the generation of energy from solar power. The Direct Normal Irradiation (DNI), a measure for the solar irradiance received, is between 2200-2800 kWh/m²/year (DLR, 2005; Richter et al., 2008; Desertec Foundation, 2009; CTF, 2009). In comparison: The annual solar potential of Cyprus is 2000 kWh/m²/year (Poullikkas, 2009). There are of course other renewable energy potentials in the MENA region, such as wind power along the western coast of Morocco and geothermal energy in Turkey, but solar energy is the most abundant.

Different technologies to produce electricity from solar energy have been developed. The first one is Photovoltaic (PV), which uses semi-conducting materials to convert sunlight into energy. This technology is mostly used for small-scale, decentralized applications. The second technology is called Concentrating Solar Power (CSP). CSP concentrates the radiation of the sun with the help of reflectors and, in a second step, uses the heat to produce electrical energy. Three different CSP technologies can be distinguished by the way they concentrate solar radiation: parabolic trough systems, solar tower systems and solar dish systems[2] (Poullikkas, 2009). Parabolic trough

[2] The classification in these three technology families is not consistent in literature. For example Richter et al. (2008) classified CSP technology in four different groups: Linear Fresnel Reflector (LFR), Central Receiver, Parabolic Dish

power plants represent the most advanced and mature CSP technology (Schnatbaum, 2009). It is not in the focus of this paper to discuss the advantages and disadvantages of each technology (this was done elsewhere, e.g. in Richter et al., 2008), but it is important to mention that CSP can be combined with thermal storage technologies (e.g. molten salt). This combination allows for fluctuations to be compensated and thus CSP can supply base-load and balancing power. Furthermore, it is possible to combine CSP with different desalination technologies and the option of backup firing those power plants with fossil fuels or biomass (Desertec Foundation, 2009; DLR, 2007).

Many countries in the MENA region have recognized the potential of renewable energy sources and developed ambitious goals and programs[3].

1.3 Initiatives and Concepts

The most well known concept for large-scale deployment of CSP in the MENA region is the Desertec concept. The Desertec concept, promoted by the Desertec Foundation, describes a pathway for the future electricity supply supported by different renewable energy sources, with a focus on CSP, for the EU-MENA region. The electricity generated in this scenario is anticipated to fully satisfy the energy needs of the MENA region itself due to the implementation of renewable energy sources in the MENA region. Additionally, the concept envisioned solar imports from the MENA region to Europe via High Voltage Direct Current (HVDC) lines. By 2050, 15% of the European electricity demand could be provided by electricity generated from renewable energy sources in the MENA region. The overall costs are estimated to be in the range of 400 billion € (Trieb and Mueller-Steinhagen, 2007; Vallentin and Viebahn, 2009; Werenfels and Westphal, 2009). The idea goes back to the Trans-Mediterranean Renewable Energy Cooperation

and Parabolic Trough. The DLR (2005) grouped the existing CSP technologies in a way similar to that of Richter et al. (2008).

[3] E.g.: Algeria: 5% renewable power generation by 2017 (20% by 2030); Egypt: 20% share of renewable energy by 2020; Morocco: 20% renewable energy target by 2020 (CTF, 2009)

(TREC). TREC was founded in 2003 as a partnership of the Club of Rome, the Hamburg Climate Protection Foundation and the National Energy Research Centre of Jordan. The concept has been further detailed investigated and developed in three detailed studies[4] by the German Aerospace Center (DLR). Just recently, in October 2009, the Desertec Foundation and twelve large companies among them Munich Re, Deutsche Bank, Siemens and Schott Solar officially founded the Desertec Industrial Initiative (DII). In March 2010 four more companies joined the DII and in April 2010 further 15 companies joined the DII as associated partners (DII, 2010a; DII 2010b). The intention of DII is to undertake further steps towards the implementation of the Desertec concept, such as the establishment of suitable framework conditions, the conduction of feasibility studies and the development of project plans (DII, 2009; van Son, 2010).

Another concept comes from the Union for the Mediterranean (UfM). The UfM was formed in July 2008. The UfM builds on the Barcelona Process and has currently 43 member states. Within in the UfM different regional initiatives are proposed to enhance regional cooperation. Such initiatives include the pollution cleanup of the Mediterranean, maritime and land highways, civil protection, Mediterranean Solar Plan (MSP), higher education and research and the Mediterranean business development initiative (Hesse, 2009). The MSP, which is assumed to be one of the most advanced initiatives within the UfM, aims at installing 20 GW power plant capacity from renewable energy sources[5] in the MENA region by 2020. However, since then the whole process - influenced by political framework conditions - has stalled and has shown little advancement. This is primarily a result of the newly emerged conflict in the Gaza Strip (Richter et al., 2009; Werenfels and Westphal, 2009).

[4] The Desertec concept is described in detail in these three studies: Med-CSP (DLR, 2005), TRANS-CSP (DLR, 2006) and the AQUA-CSP (DLR, 2007)
[5] 10-12 GW from CSP, 5-6 GW from wind power and 3-4 GW from PV; costs: circa 80 billion € (Richter et al., 2008; Werenfels and Westphal, 2009)

1.4 The Need for a Sustainability Framework and Purpose of this Study

While the Desertec concept, as described in the studies by the DLR, claims to deliver sustainable development (SD) for the target region[6], the question was raised as to how far sustainable development will actually be delivered for countries in the target regions. For example, in a recent study by the PricewaterhouseCoopers (PWC, 2010) it was stated that "[...] it is by no means clear-cut whether European efforts to obtain renewable power from North Africa would bring sustainable development". Aside from environmental concerns, such as the usage of the scarce water resources in the MENA region to cool the CSP power plants, there are also concerns about the question of whether long-term economic development is delivered, which comes together with a generation of skills to design, operate and maintain modern industrial facilities, or whether benefits are primary a result of a revenue stream that would not benefit the local population to a large extent. Furthermore, the question is asked as to what extent local stakeholders play a role in determining project's design, placement and operation (PWC, 2010).

One way to ensure the deliverance of sustainable development for the target region is to develop sustainability criteria that are embedded in a sustainability framework for the Desertec concept. Therefore, the purpose of this study is to examine what sustainability criteria for the Desertec concept should look like and how one has to approach the development of sustainability criteria and a sustainability framework for the Desertec concept. For this purpose, expert interviews were conducted, because, as far as the author is aware, no study has investigated this issue so far and, hence, expert knowledge and perspectives seem to be a reliable source as a starting point for the development of sustainability criteria. Furthermore, it was anticipated, also as a result of the process of investigating sustainability frameworks from other sectors, such as the bioenergy sector, that the various stakeholders of the Desertec concept and participation of these stakeholders

[6] The terms target region and target countries are used in this study synonymously for the MENA region.

have to play a crucial role when developing a sustainability framework. For this reason, this study also includes a preliminary stakeholder analysis and investigates the issue of participation. The structure of this study is as follows: After the methodology on conducting the expert interviews and a stakeholder analysis are described in chapter 2, this study goes on in chapter 3 to examine the theoretical background of Principles, Criteria and Indicators (PCI) in other sectors and sustainability frameworks as well as the theoretical background of certification systems. The issue of participation is investigated in chapter 4, where emphasis was placed on the Integrative Theory of Reflexive Dialogues. Results obtained in the expert interviews are presented in chapter 5 and discussed in chapter 6, while the results for the stakeholder analysis were presented separately in chapter 5.5 and discussed in chapter 6.1. Finally, chapter 7 draws conclusions on the development of sustainability criteria that are embedded in a sustainability framework.

2. Methodology

Two different methods have been used in this study: expert interviews and stakeholder analysis. Expert interviews were conducted to gain knowledge answering the research question. The method of expert interviews was chosen because this method is especially useful when the field of research has not been intensively studied and when it is very likely that new, undiscovered information will be gained (Hohl, 2000). Against this background, it seems appropriate to apply the expert interview method because so far no research has been undertaken in developing a sustainability framework for the Desertec concept that focuses on ensuring benefits for local communities. The stakeholder analysis has been conducted because, in an early stage of research, the importance of including stakeholders in the process of developing a sustainability framework was recognized. This study, therefore, provides a preliminary stakeholder analysis on which further studies can be built. In addition, literature research was used mostly to obtain theoretical background information on the Desertec concept itself and also on the two methods applied. To a great extent, peer reviewed literature found via the ISI Web of Knowledge[7] was used for the literature research.

This chapter is structured as follows. After providing a short theoretical background about each research method, the chapter explains how the methods were applied in this study.

2.1 Expert Interviews – Theoretical Background

The method of expert interviews was chosen to gather information about the topic concerning this study.

Literature on expert interviews recognizes that the term “expert interview” is remarkably vague and imprecise (Liebold and Trinczek, 2009; Meuser and

[7] ISI Web of Knowledge is a search environment that provides access to over 23,000 scientific journals.

Nagel, 2009; Mey and Mruck, 2007). Hence, there is no single definition of expert interviews, what they are for or how to conduct them. Therefore, it seems appropriate to clarify how the method was understood in this study and how the expert interviews were conducted.

Interviews can be classified in many different ways with the help of different so-called dimensions that describe characteristics of an interview (Aghamanoukjan et al., 2007). The two most important dimensions are the degree of structuring and the degree of standardization. If interviews are highly structured, it means that the interviewer intervenes to a high degree in the interviews. The degree of standardization, on the other hand, describes how far questions and answers are pre-formulated (Mey and Mruck, 2007). While it is also mentioned that there is no clear line between qualitative and quantitative interviews (Gläser and Laudel, 2009), Mey and Mruck (2007) pointed out that highly structured and standardized interviews can be classified as quantitative interviews. These two dimensions, structuring and standardization, are sometimes used as synonymous in literature (Aghamanoukjan et al., 2007). Gläser and Laudel (2009) see the expert interview as a non-standardized method, which means that both questions and answers are not purported, and Meuser and Nagel (2009) see it as a semi-structured survey method. Hence, the expert interview can be classified as a qualitative interview method. Liebold and Trinczek (2009) noticed that there is common ground about the fact that expert interviews normally follow an outline. This outline, which contains previously developed questions or even only a range of topics based on preliminary considerations and/or literature research, should not be seen as a fixed schedule model. The use of an outline in an expert interview has to be balanced with the requirement for openness. The required high degree of openness goes hand in hand with the low degree of standardization and structuring and could be understood as the antipole for those two dimensions. The outline is also responsible for the idiosyncratic in-between position of the expert interviews as a survey method because, on the one hand, the degree of openness should be as high as

possible and, on the other hand, the outline regulates or prescribes to a certain extent the course of the interview (Liebold and Trinczek, 2009). Both extremes, the so-called “outline bureaucracy”, which means that the interviewer, like in a highly structured and standardized interview, orients himself too strictly to the outline and simply processes it; neglecting the outline, which could lead to huge deviations in the interview, (also) has to be avoided (Gläser and Laudel, 2009). Furthermore, the development of an outline delivers several advantages: The researcher has to deal intensely with the topic of interest, which makes him a competent dialog partner (e.g., the researcher develops an understanding of the topic and is able to understand and use special terms), which in turn leads to acceptance of the expert (Loheide, 2008). Hence, in this process the interviewer eventually becomes a so-called quasi-expert, which makes sure that the conversation between the researcher, as the interviewer, and the expert comes closest to the natural conservation between two experts (Pfadenhauer, 2007). However, the expert interviews based on an outline have the advantage of being comparable, to a certain extent, because the same topics are being addressed, but is also flexible enough to guarantee a natural conservational flow.

The purpose of an expert interview, as another dimension for the classification of interviews, is to gain or obtain expert knowledge about a specific field of research (Loheide, 2008), while the expert as a person and their biographic motivation, in contrast to narrative interviews, is of minor interest (Meuser and Nagel, 2009).

Other dimensions for classification are, for example, the way of communication (e.g., neutral, soft or hard), the distinction between group or single interviews or the communication medium. Gläser and Laudel (2009) highlight the advantages of a face-to-face interview compared to a telephone interview, because a trustful atmosphere could easier be established and non-verbal communication, like facial expressions and gestures, yield also important information. These and other dimensions of classification for the

expert interviews conducted in this study are summarized in the following table.

Table 1: Classification of expert interviews in this study

Dimension of differentiation	Expert interviews in this study
Intention of interview	Gain expert knowledge about the topics of interest
Structuring	Semi-structured
Degree of openness	High
Number of participants in one interview	One; single-interview
Way of communication	Oral
Style of communication	Neutral
Kind of questions	Open
Communication medium	Face-to-face; Video telephone (Skype)

The term 'expert interview', as an example of a so-called actor-specific interview, results not from the method that was used to collect data, but from the specific investigational group, i.e. the experts. Thus, the questions arise as to what is an expert and how is an expert selected? Again, there is no common ground about who can be described as an expert. The spectrum of definitions ranges from broad, such as the definition from Gläser and Laudel (2009), who mention that an expert could be everybody who has specific knowledge that could be relevant for the research that has to be conducted, to more specific definitions, such as the definition from Meuser and Nagel (2009), who suggested criteria that have to be fulfilled to give someone the status of an expert. According to Meuser and Nagel (2009) experts are:

- People in positions of responsibility for the design, the implementation or the control of problem solving, or
- People who have privileged access to information about relevant groups of persons, social issues or decision-making processes.

Broad definitions (e.g. from Gläser and Laudel, 2009) are sometimes criticized, because with these definitions anybody could be an expert – at least on their own lives (Liebold and Trinczek, 2009).

The status of an expert is not implicitly connected to a specific profession. Experts often gain their special knowledge from their occupation - not from their education - because they have privileged access to information (Meuser and Nagel, 2009). Another criteria to distinguish so-called informants from experts is the active participation, which describes the distinction between people who gained special knowledge purely from their own observations or experience (e.g., a barkeeper has knowledge of certain groups of people in a bar) and people who gained their knowledge about a problem actively in the framework of their occupation that tends to the problem and is somehow goal orientated (Meuser and Nagel, 2009).

For the selection of experts Gläser and Laudel (2009) propose specific questions that the researcher should ask:

- Who has available relevant information?
- Who has most likely the ability to give precise information?
- Who is most willing to give information?
- Who is available?

Also, as a basis, the topic of research should be described and important influencing factors and variables should be mentioned (see chapter 1). Experts from various groups with their different expert perspectives should be included in the selection (Loheide, 2008). The number of experts during this kind of survey depends on the research topic and is also strongly influenced by practical considerations like time and staff that are available. Also, it is not necessary to make a final selection of the experts at the beginning of the survey, because in the actual interview phase new experts, suggested by the experts interviewed, might be come up/be mentioned and could be included in the interview phase (Gläser and Laudel, 2009). Furthermore, experts can explicitly ask to recommend other experts. This selection method is called snowballing and was, for example, successfully used by Loheide (2008) for identifying experts for interviews.

There are different approaches for analyzing qualitative data or respectively expert interviews based on an outline. Broom (2005) notes that "[…] the process of qualitative data analysis is a difficult skill to develop" and that qualitative analysis is "[…] ultimately the 'black box'" (Broom, 2005). Various attempts have been undertaken to structure qualitative data analysis, e.g., from Mayring (2000), who developed the approach of qualitative content analysis, where the advantages of quantitative content analysis are retained and attempted to be transferred to qualitative methods with the help of clearly formulated steps that have to be carried out. Schmidt (2005) developed a method especially for the analysis of outline based interviews, which pays special attention to the postulated open character of these kinds of interviews. The guiding principle in this method is the exchange between the data that are gained due to the interviews and the previous gained theoretical background knowledge, which means that presumptions can be differentiated further, questioned, changed or even refused. This method, therefore, presents itself as highly favorable with respect to the research question and procedure. The method consists out of five steps. These five steps, according to Schmidt (2005), are described briefly in the following: The first step - in examining the data - is to develop categories for the analysis. Therefore, the interviews have to be fully transcribed and the transcription read repeatedly. In this step, the choice of categories is guided by the researcher's background knowledge and important themes that occur and that help to answer the research questions. In order to meet the claim of openness, it is also important to pay attention to new, previously not identified themes. The goal of this first step is not yet a comparative analysis of all interviews. Categories are formulated based on the indentified themes and topics. The process of developing categories is a "living process", meaning that the researcher can start to develop categories after a couple of interviews have been conducted and revise them while the process of conducting interviews advances. Furthermore, how the categories are formulated depends highly on the specific research questions. The second step is to assemble these

categories as an analysis outline and to test and adapt them. Moreover, the categories are more precisely described and, whenever possible, special characteristics are determined for each category. With the help of this analysis outline, all interviews are coded in the third step. Coding in this particular manner means that relevant information is assigned to a category. Therefore, the main message of a particular statement should be summarized. On the basis of this coding, it is possible to move onto case overviews (the fourth step), for example with the help of tables that contain the categories, the characteristics of the categories and the summarized statement and the deepened single case (the fifth step). Having said this, the analysis of a qualitative interview based on coding and the development of categories as suggest by Schmidt (2005) reduces the danger of a subjective arbitrary interpretation of data (Hohl, 2000).

2.1.1 Specific Procedure of Expert Interviews in this Study

As a first step, brainstorming was conducted to identify possible experts. The status of an expert was bestowed whenever at least one of the criteria suggested by Meuser and Nagel (2009) could be validated. Participation in, e.g., workshops, symposia or round table talks was used as an indicator for the criteria of active participation. Care was taken to include a variety of experts from different fields of occupation. As a result, a list of 25 experts was developed, but, due to practical reasons such as time constraints, the group of experts was narrowed down to 10 for the final interviews. With regards to the method of snowballing, firstly only five out of the 25 experts were asked via a formal email (see appendix II for cover letter) if they are willing to take part in an expert interview. The specific five experts were chosen, because it was relatively sure that they would take part in an expert interview, due to the fact that personal, previsions contact was already established during workshops etc., that the author attended himself. During the first five interviews the experts were asked who else they would recommend for an expert interview in this study or at least from which fields of occupation they

should come. The experts mentioned overlapped to a great extent with experts already identified in the preliminary list of 25 experts. However, all without one scheduled interview could be established. Therefore, the total number of conducted interviews is nine. Hence, experts interviewed in this study reflect a variety of different fields such as Non-Governmental Organizations (NGOs), policy, science and the economic sector. On the downside, all except one expert are working in Germany[8]. Due to the fact that almost all experts came from Germany, the analysis claims not to represent the full spectrum of possible opinions regarding the issues addressed in the interviews.

An outline was developed prior to the interviews (see appendix III). This outline was, according to a requirement from Gläser and Laudel (2009), changed and was slightly revised to fit better to specific experts.

Not all interviews could be arranged in a face-to-face manner, mostly because of the expenses involved with traveling to each expert. The interviews (4) that could not be established face-to-face were conducted via the video telephone software Skype[9]. While non-verbal communication cannot be perceived in classic telephone interviews without video, such is possible with video telephone technology. Another advantage is that not only audio, but also a video of the interview could easily be recorded. Video telephone, as a communication medium for interviews, is not yet described in the literature. In this study, it was successfully applied and yielded advantages, especially for the analysis of the interviews (audio and video record). However, the video function of Skype could not be used for all interviews. Nevertheless, the optimal conditions for an interview can be achieved only in a face-to-face manner, because this still is the most natural way of communication between human beings.

[8] One expert for this study was from the Middle-East.
[9] Skype is a communication software that employs video chat.

Interviews took between 30 min and 1 hr 45 min. The average interview lasted 45 min, whereas face-to-face interviews were, on average, longer than interviews conducted via Skype.

All interviews, aside from one, where the expert refused to be recorded, were recorded and fully transcribed and analyzed with the method proposed by Schmidt (2005) (for results see chapter 5; for quotes see appendix I; full transcriptions of the interviews can be obtained from the author). In the case where no record could be made, notes were taken during the interview. For this reason, no quotes could be used from that interview.

Expert interviews were numbered from E1 to E8. Tables were developed for the analysis, where the theme and the related sub theme are shown. The field "Expert interview" contains the number of the corresponding expert interview (e.g., "E1"). The quotes, on which the statement is based, were also numbered (e.g., "Q1"). Quotes used from an expert interview can be seen in appendix I[10]. Quotes are cited as following: "E1Q1" for expert interview 1 and quote 1. In addition, the table includes paraphrasing and a generalization of the quote. Table 2 provides an example of how the tables are structured.

Table 2: Example of table structure

Theme: Criteria			
Expert interview	Quote	Paraphrase	Generalization
Subtheme: Reasons for criteria			
E1	Q1	It is necessary to develop sustainability criteria, because otherwise acceptance of the local population cannot be established	Acceptance of local population

Subthemes, however, could not be distinguished clearly in many cases because issues branch out to several subthemes.

[10] Most quotes are available only in German as most of the interviews were conducted in German.

2.2 Stakeholder Analysis – Theoretical Background

Stakeholder Analysis (SA) has been developed in parallel during a relatively long period of time in many different fields, such as the business sector, policy development and political science as well as development and natural resource management. This development leads eventually to a "[…] widespread confusion over what is really meant by stakeholder analysis" (Reed et al., 2009). Therefore, SA is perceived differently in those fields. For example, in policy research SA has been used to gather knowledge and information "[…] about the relevant actors so as to understand their behavior, intentions, interrelations, agendas, interests, and the influence and resources they can bring to bear on the decision-making processes" (Brugha and Varvasovszky, 2000) and to provide a "[…] conceptualization which assists in the analysis of interests and influence with a specific focus on policy actors" (Brugha and Varvasovszky, 2000). Other authors see SA as a tool used especially by policymakers in analyzing qualitative data and in determining whose interests should be taken into account when developing or implementing a policy (Schmeer, 1999). In the business sector, SA goes back to the early 1930s: The General Electric Company identified four major groups of stakeholders that have to be considered (customers, employees, the general public and shareholders). The company assumed, that the shareholders would benefit, if the needs of the other three groups are met (Brugha and Varvasovszky, 2000). De Lopez (2001) located the roots of the modern stakeholder concept also in the field of business management. It could traced back to an internal memorandum at the Stanford Research Institute (SRI) written in 1963. The memorandum defines stakeholders as different groups, like shareowners, customers, suppliers, lenders and society, without whose support the organization would cease to exist. In business management, SA emerged in response to deal with complex social systems that modern corporations are facing (Grimble and Wellard, 1997). According to Reed et al. (2009) business management provides a relatively static approach to SA, because it fails to address that groups of stakeholders can

interact and change over time. In contrast, the participatory approach of SA is especially highlighted in the context of Natural Resource Management (NRM), development projects and project management, where SA goes hand in hand with the application of participatory methods for project design, management and evaluation and advocates an on-going and evolving involvement of stakeholders (Brown et al., 2004). In NRM, “SA can be defined as a holistic approach or procedure for gaining an understanding of a system, and assessing the impact of changes to that system, by means of identifying the key actors or stakeholders and assessing their respective interests in the system” (Grimble and Wellard, 1997). Furthermore, stakeholders are defined as “[…] any group of people, organized or unorganized, who share a common interest or stake in a particular issue or system; they can be at any level of position in society, from global national to regional concerns down to the level of household or intra-household, and be groups of any size or aggregation” (Grimble and Wellard, 1997). The term stakeholder may also include vaguer categories like “future generations,” “national interest” or “wider society.” The exact definition of what a stakeholder is and how it is broken down into categories cannot be pre-determined and depends on each individual case. In this way, SA can help to indentify trade-offs and conflicts between stakeholders and empower often marginalized, neglected or underrepresented groups of people or highlight their needs (Grimble and Wellard, 1997). According to Grimble and Wellard (1997), a SA is especially useful to conduct when the issue at stake is complex and compatibility problems between objectives and stakeholders can occur. This could, for example, be the case if there are cross-cutting systems (such as the ecological, the social and the economic system) and stakeholder interests, multiple uses and users of a resource or crucial differences in perspective regarding the use of a resource. However, it is also stated that in NRM and development projects various actors with different, sometimes conflicting, interests are involved and that it is important to understand the different perspectives of the actors involved. Therefore, a platform that facilitates a

learning and an understanding process among stakeholders is needed. While SA itself is not such a tool, it could used as a base to contribute to the development of such a platform (Reed et al., 2009).

In this study, the SA approach is most related to the NRM project management, because the Desertec concept can be perceived as a huge development project, which includes characteristics of a NRM project. Furthermore, it is likely that conflicts will occur due to the large number of different stakeholders.

2.2.1 Steps and Tools for Conducting a Stakeholder Analysis

Reed et al. (2009) distinguish between three different, consecutive key methodological steps, which can be further subdivided, and describe a broad range of tools that can be used to conduct the different steps. Grimble and Wellard (1997) mention that the degree of detail for conducting a SA depends on the individual issue, staff and time that is available, and, therefore, a SA has to be adopted to the needs of those initiating the SA. The different steps and tools that one could apply according to Reed et al. (2009) are described briefly in the following.

The first step is to set up a context for the SA, which includes identifying the focus of the SA, and if necessary (mostly for NRM) the identification of system boundaries. The second step starts with the sub-step of recognizing the different stakeholders. This is usually an iterative process, which means that additional stakeholders are added during the process as the analysis progresses. Stakeholders can be identified, for example, with the help of expert knowledge gained in semi-structured interviews, snow-ball sampling and focus groups or a combination of these. Jepsen and Eskerod (2009) added brainstorming as a tool for the identification of stakeholders. Chevalier and Buckles (2008) mention that it is possible to identify stakeholders with the help of written records, checklists or to let stakeholders be identified by other stakeholders. In the last case, interviews would also be appropriate. One

approach suggests creating a rainbow diagram that classifies stakeholders by the degree to which they are affected by or affecting a problem or an issue (see figure 1) (Chevalier and Buckles, 2008).

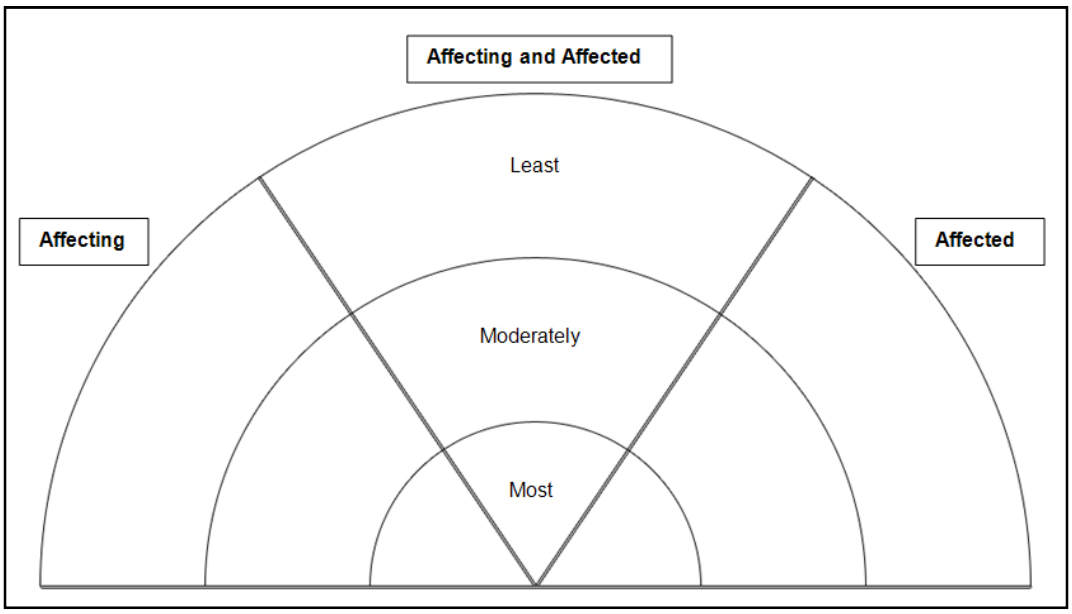

Figure 1: Example for a rainbow diagram to classify stakeholders

This classification could be regarded as the beginning of the second sub-step, which is to differentiate between and categories stakeholders. Grimble and Wellard (1997) see the distinction between stakeholders who affect (determine) a decision or action, and those who are affected by this decision or action as fundamental. Furthermore, they suggest that these groups could be labeled “active” or “passive” stakeholders. Another popular way to categories stakeholders is the use of an interest and influence matrix, where stakeholders are classified as “key players,” which have high influence and high interest over a particular phenomenon; “context setters”, which are highly influential, but have little interest; “subjects”, which have, in contrast, high interest, but little influence, and the “crowd”, which has little interest and influence. Stakeholders in an interest and influence matrix could additionally be grouped in other categories, such as supportive or unsupportive (Reed et al., 2009). Interest influence matrices have been criticized for being subjective, but could gain more objectivity if more information (e.g., Why have

a stakeholder a particular interest?) is added (Reed et al., 2009). The third and final sub-step is to investigate the relationship between different stakeholders. The most common way to describe the interrelationships between stakeholders is the use of an actor-linkage matrix, where stakeholders are listed in rows and columns and the relationship of the stakeholders is described in the resulting grid by key words, like conflict, complementary or cooperation. The advantage of this approach is its easy usage. It could also be used to simply identify key linkages between stakeholders or even key areas for interventions, or to pinpoint or develop indicators of change (Biggs and Matsaert, 1999).

After these steps have been completed, recommendations for future activities can be formulated, as necessary.

2.2.2 Specific Procedure of Stakeholder Analysis in this Study

The SA conducted in this study is geared to the steps suggested by Reed et al. (2009). Therefore, the first step is to set up the context of the SA. The context of the SA in this study is the implementation of the Desertec concept. Thus, question could be asked as to who would have a stake in the Desertec concept if it is implemented? This context was selected because it could be anticipated that at least a choice of stakeholder has to be included in a participatory manner for the development of a sustainability framework. The boundaries of the SA are not inherently geographical, but can be found on the level of examination. Grimble and Wellard (1997) mentioned that stakeholders can be found on all levels from the global and international, to the national, regional and local level depending on the issue at stake. This is especially true for the Desertec concept, where (trans-) national organizations, governments from different countries, companies, investors and a wide range of representatives from the civil society as well as local communities, to name only a few, are affected or affecting the outcome of the concept. However, the size of the concept and the number of stakeholders included influenced the decision to conduct this SA on a broader level. To

give an example: Local communities can, in the framework of this study, only be described and grouped as local communities as a whole because it is impossible to get all viewpoints from all local communities that are affected by the Desertec concept.

Preliminary brainstorming and literature research was carried out to identify stakeholders. This was done before the expert interviews were conducted so as to get an idea about the stakeholders involved. The experts that were interviewed often could also be regarded as stakeholders in the Desertec concept. For this reason, they have a double position, which is being an expert and being a stakeholder at the same time. This was very convenient for the SA, because the conversation could be geared towards a point where they explained their interest in the Desertec concept. During the process of conducting the interviews, a list with all identified stakeholders was developed and, whenever possible, stakeholders were grouped into categories, such as key player, context setter or subject, based on information given by the experts. As mentioned before (see chapter 2.2.1), SA is an iterative process so that the list and categories were often revised and adopted. Finally, as a first result, a rainbow diagram (see chapter 5.5) and an interest influence matrix were created.

3. Sustainability Frameworks

3.1 Principles, Criteria and Indicators for Sustainability Standards

One possible way to successfully implement the concept is to develop and establish Sustainability Standards with Principles, Criteria and Indicators (PC&I) frameworks for the Desertec concept which then could be certified by an independent institution or authority.

PC&I frameworks are defined as a thematical and hierarchical list of principles and criteria with corresponding, measurable indicators. They are a universal and versatile tool and are used in many different applications (such as eco-certification and policy-evaluation) and at different scales (such as the regional or national level) (Van Cauwenbergh et al., 2007). Frameworks in that context are viewed as structures to enclose or support a specific matter (Worrall et al., 2009). Frameworks can help to structure knowledge by transforming data into information. Furthermore, it is unlikely to find one common framework for different sectors and issues. It is, therefore, necessary to develop specific frameworks for certain purposes (Lyytimäki and Rosenström, 2008). A hierarchical framework is also useful to breakdown the goal that can be regarded as a sustainability vision, step by step into parameters that can be managed or assed (Lammerts van Bueren and Blom, 1996). Likewise, in a hierarchical framework related sets of information can be grouped in a logical way and, hence, frameworks are regarded as essential elements e.g., for the evaluation of SD (Kondyli, in press). Van Cauwenbergh et al. (2007) define principles as the first hierarchical level and as general conditions for achieving the ultimate goal, which is regarded to be sustainability. Sustainability itself is conceived as the classical three-pillar model, which represents an environmental, economic and social dimension. Furthermore, they pointed out that principles should be formulated as general concepts to be achieved. The second hierarchical level consists of criteria, which are more specific and concrete than principles. Criteria "[…] essentially indicate how the sustainability principles can be achieved" (Haywood and de

Wet, 2009). As they are related to a state of the system, one can link them easier to the third hierarchical level, which is formed by indicators. Indicators "[…] function by simplifying complex phenomena and information into quantifiable measures that can be readily communicated" (Khalifa and Connelly, 2009). Also, they are used to determine compliance with a certain criterion and should show a representative picture of all sustainability aspects of a system (Van Cauwenbergh et al., 2007). As descriptive tools, indicators can also provide measures of change in criteria over a certain time period (Worral et al., 2009) and, therefore, as units of measurements, criteria can make a development towards or away from sustainability more visible (Huge et al., 2009). Furthermore, indicators have been used in many different fields and became central to the sustainable development debate (Gasparatos et al., 2008). However, it is also mentioned, that it is difficult to find a balance between complexity and simplicity when developing indicators. Few, aggregate indicators may be easy to use (e.g., for decision makers), but may not be sufficient and accurate enough for the evaluation of complex issues (Worral et al., 2009). The fourth and lowest hierarchical level, as defined by Van Cauwenbergh et al. (2007), consists of reference values. They describe a desired level of sustainability for each indicator. Reference values can be subdivided into absolute reference values or relative reference values. Absolute reference values are fixed values that can be threshold values (expressing maximum or minimum levels of acceptable values) or target values (indentifying desirable states). Relative reference values can be used to compare values between different sectors, regional averages or different points in time. The potential advantages of a hierarchical framework are summarized in the table below.

Table 3: Potential values of a hierarchical framework (according to Lammerts van Bueren and Blom, 1996)

increases the chance of complete coverage of all the important aspects to be monitored or assessed
avoids redundancy; it limits the set of P, C & I to a minimum without superfluous parameters
results in a transparent relation between the parameter that is measured and the compliance with the principle it refers to

In addition to PC&I, guidelines could be formulated, and more appropriately, done outside of the hierarchical framework while maintaining a strong link to criteria and indicators. Guidelines are used "[…] to translate criteria and indicators into practical guidance for actions to meet the requirements of criteria and indicators" (Lammerts van Bueren and Blom, 1996).

3.2 Composite Indices

A composite index (sometimes also called composite indicators) "[…] is formed when individual indicators are compiled into a single index on the basis of an underlying model" (Nardo et al., 2005). Composite indices can be especially helpful for planners and decision makers if all methodological choices that can be make during the process of developing a composite index are transparent (Gasparatos et al., 2009), as composite indicators summarize information provided by base indicators in an overall judgment and make ranking possible (Gómez-Limóm and Sanchez-Fernandez, 2010). Steps for constructing a composite index have been developed by Nardo et al. (2005). These steps include the development of a theoretical framework, the selection of indicators and gathering of data, a multivariate analysis, the imputation of missing data, the normalization of data, weighting and aggregation and finally a robustness and sensitivity analysis. However, the multi-step procedure leaves much room for intransparency, which could make it difficult for decision makers to comprehend how a composite index was developed. According to Sharpe (2004) there are two different fundamental views in the indicator literature: The aggregators "[…] believe that such a summary statistic can indeed capture reality and is meaningful, and that stressing the bottom line is extremely useful in garnering media interest and hence the attention of policy makers. The second school, the non-aggregators, believes one should stop once an appropriate set of indicators has been created and not go the further step of producing a composite index. Their key objection to aggregation is what they see as the arbitrary nature of the weighting process by which the variables are combined". Hence, the

problem centered around the debate is the step of weighting and aggregation (Gómez-Limóm and Sanchez-Fernandez, 2010). There are, in principle, two different ways for the extraction of weights: A participatory process, where selected participants state their opinion for a specific sustainability issue, and a non-participatory way, which relies on statistics (Gasparatos et al., 2009). Sutter (2003) for example combined two different methods of weighting that were conducted by experts. The first method is direct weighting, where experts assign points to criteria; the more points assigned, the more important the specific criterion. The second method as used by Sutter (2003) is the Analytic Hierarchy Process (AHP), which is an indirect weighting method based on pair-wise comparison of criteria. AHP, according to Sutter (2003), reveals advantages compared to direct weighting: Due to the indirect weighting process it is more difficult to actively influence the results and, hence, this approach is less biased. Whether weighting methods are combined or not, weighting is always somehow biased because "[…] the relative distribution of importance weights depends on the decision maker's individual preferences" (Sutter, 2003). In addition, even if experts or representatives of the public are asked to weight, the questions occur as to how are those experts chosen and on which criteria are they based. Furthermore, during the aggregation procedure it is possible that a certain indicator with high performance (e.g., economic activity) compensates for an indicator with lower performance (e.g., greenhouse gas reduction), and even due to different aggregation techniques (such as linear or geometric aggregation) it is not possible to fully prevent compensability (Gasparatos et al., 2009). Another way to aggregate indicators is the use of multi-criteria analysis that, according to Kondyli (in press), "[…] assures non-compensability by finding compromises between two or more legitimate goals." Avoiding compensability is also possible if minimum thresholds are defined for each criterion, while the threshold level, in return, involves normative judgment, because a decision has to be made as to what is actually an appropriate threshold for a specific criterion (Sutter 2003).

Pros and Cons of composite indices have been examined by Saisana and Tarantola (2002) and are summarized in the following table.

Table 4: Pros and Cons of composite indices (according to Saisana and Tarantola, 2002)

Pros	Cons
- Can be used to summarize complex or multi-dimensional issues, in view of supporting decision makers	- May send misleading, non-robust policy messages if poorly constructed or misinterpreted
- Provide the big picture; can be easier to in interpret than trying to find a trend in many separate indicators	- Can result/Result in the simple "big picture," which may invite politicians to draw simplistic policy conclusions
- Can help attract public interest by providing a summary figure	- Can comprise steps involving judgments that are not always transparent or based on sound statistical principles
- Could help to reduce the size of a list of indicators or to include more information within the existing size limit	- May be misused, e.g., to support a desired policy
	- May lead to inappropriate policies if dimensions of performance that are difficult to measure are ignored

3.3 Principles, Criteria & Indicator in different Sustainability Frameworks

Sustainability standards and frameworks have been used in different sectors and for different issues, such as, in the forestry sector, the biofuel sector, the mining sector and in the context of the Clean Development Mechanism (CDM).

In forestry, various processes are in place for the development and implementation of PC&I on the international, national and local level for different forest types (Mrosek et al., 2006). While C&I frameworks for the international and national level[11] are in a more advanced stadium, conceptual and methodological challenges arise on the local level because operational guidelines, data collection standards and a theoretical basis for the linkage between criteria and indicators are lacking (Mrosek et al., 2006). One of the first internationally accepted C&I for sustainable forest management for

[11] For an overview of Criteria and Indicators for Sustainable Forest Management (SFM) by various organizations, see: Castanada et al. (2001)

boreal and temperate forests was developed by the Montreal Process Working Group (MPWG, 2009). General principles and criteria were developed by the Forest Stewardship Council (FSC, 1996). The Centre for International Forestry Research (CIFOR, 1999) developed a process for the identification and evaluation of C&I for natural, tropical forests. The generic set of C&I was tested in Germany, Indonesia, Cote d'Ivoire, Brazil, Austria, Cameroon and the United States and can be used by various user groups, such as certification bodies, government officials, donors, forest managers, project managers and scientists. The C&I are based on five international C&I sets, which were evaluated in five field locations. The CIFOR framework presents a top-down approach which includes external experts rather than local knowledge and experience (Sherry et al., 2005).

Sustainability PC&I were also developed for the bioenergy sector. Principles and criteria were, for example, developed by the Roundtable on Sustainable Biofuels (RSB). The RSB is a key-multi-stakeholder initiative which was initiated in 2007 by the Energy Center at the École Polytechnique Fédérale in Lausanne (EPFL). It builds on an existing national and commodity-based initiative and seeks to achieve global consensus about principles and criteria of sustainable biofuel production (van Dam et al., 2008). Members of the RSB include farmers, companies, non-governmental organizations, experts, governments and inter-governmental agencies (RSB, 2010). The principles and criteria, developed by the RSB, "[…] provide guidelines on best practices in the production and processing of biofuel feedstock and raw material, and for the production, use and transport of liquid biofuel for transport" (RSB, 2009). Buchholz et al. (2009) analyzed sustainability criteria for bioenergy systems. The authors pointed out, that, so far, no clear census has emerged about which criteria and indicators are relevant, practical, reliable and important. Some criteria can be measured relatively easily using tools like life cycle assessment, while others (such as local participation) are more difficult to measure. The measurement and significance of some criteria are often hotly debated.

Worral et al. (2009) give a comprehensive overview about PC&I frameworks for legacy mine land. According to them, PC&I have been developed by different organizations like the International Council on Mining and Metals (ICMM) and the Global Reporting Initiative (GRI). Azapagic (2004) developed indicators for the mining sector with integrated indicators based on the classical three-pillar model of sustainability. Furthermore, PC&I frameworks for legacy mining often target larger players, which leads to large and complex frameworks and also leaves gaps for smaller miners (Worral et al., 2009).

Besides those resource sector sustainability frameworks, criteria for sustainable development (SD) have also been developed for the CDM. The CDM has the double aim, which is to achieve SD in developing countries and to find the most cost-effective way of reducing GHG emissions in developed countries (Olsen and Fenhann, 2008). To fulfill its twofold goal, a wide range of options is conceivable, which also includes renewable energy projects. In that sense, the CDM can be compared to the Desertec concept, and problems that occurred during the implementation of the CDM could help identify possible challenges for the Desertec concept. So far, the CDM barely contributed to local SD in developing countries because it almost accomplished no technology transfer, induced only low capital investment and promoted almost no additional employment (Nussbaumer, 2009; Sutter and Parreno, 2007; Olsen, 2007). Reasons for this failure are, among others, the difficulty of defining SD (Boyd et al., 2009), finding respectively meaningful criteria for SD and translating them into measurable indicators, especially at the local level (Huge et al., 2009). Also, the assessment of the contribution made to SD is left to the Designated National Authority (DNA) of the host country (Nussbaumer, 2009). This could lead to a “race to the bottom” (Sutter, 2003), which means, that a host country may ease minimum requirements for SD because it prefers to attract foreign investments instead. These and other shortcomings of the CDM were acknowledged by different

organizations, which eventually resulted[12] in the Gold Standard (GS). The GS was developed under the direction of the World Wide Fund for Nature (WWF), SouthSouthNorth (SSN) and HELIO International (Gonzales and Schomerus, 2010). The goal of the GS is to support "[…] sustainable development through carbon offset markets that are characterized by transparency and equality of access for all market participants" (GS, 2010). The GS is an add-on, voluntary tool for the CDM. The assessment framework includes three elements: A sustainability matrix, which allows a simple assessment of the project's contribution to SD, an Environmental Impact Assessment (EIA) and a stakeholder consultation. The stakeholder involvement is crucial in this approach: It should ensure that local sustainability benefits are real and should also reduce the risk of oppositions to and delays during project implementation (Nussbaumer, 2009).

Lessons that can be learned from the CDM to develop a PC&I framework for the Desertec concept are as follows: a) there are difficulties in translating the broad concept of sustainability into useful and specific criteria and indicators, especially at the local level; b) stakeholder involvement is important during the process of developing PC&I and their implementation and c) there are obvious problems with leaving the full evaluation of the SD goals obtained to the obligation of a host country.

Labuschagne et al. (2005) reviewed a number of sustainability frameworks that are used to asses sustainability on the national, international or local level with the aim to develop a comprehensive framework of sustainability criteria to asses sustainability of projects, technologies and overall company sustainability. Frameworks the authors reviewed include the Global Reporting Initiative (GRI), the United Nations Commission on Sustainable Development Framework, the Sustainability Metrics of the Institution of Chemical Engineers and the Wuppertal Sustainability Indicators. Furthermore, because the authors conclude that the social dimension of sustainability was not regarded

[12] There are other initiatives that try to overcome the shortcomings of the CDM, such as the Community Development Carbon Fund.

as efficient, they also reviewed additionally Social Impact Assessment (SIA) guidelines and frameworks as well as literature on Corporate Social Responsibility (CSR). The resulting set of criteria and sub-criteria, therefore, is especially elaborated for the social dimension of sustainability. An overview of the criteria suggested by Labuschagne et al. (2005) is presented in figure 2; the sub-criteria of the social dimension are shown in figure 3 (next page).

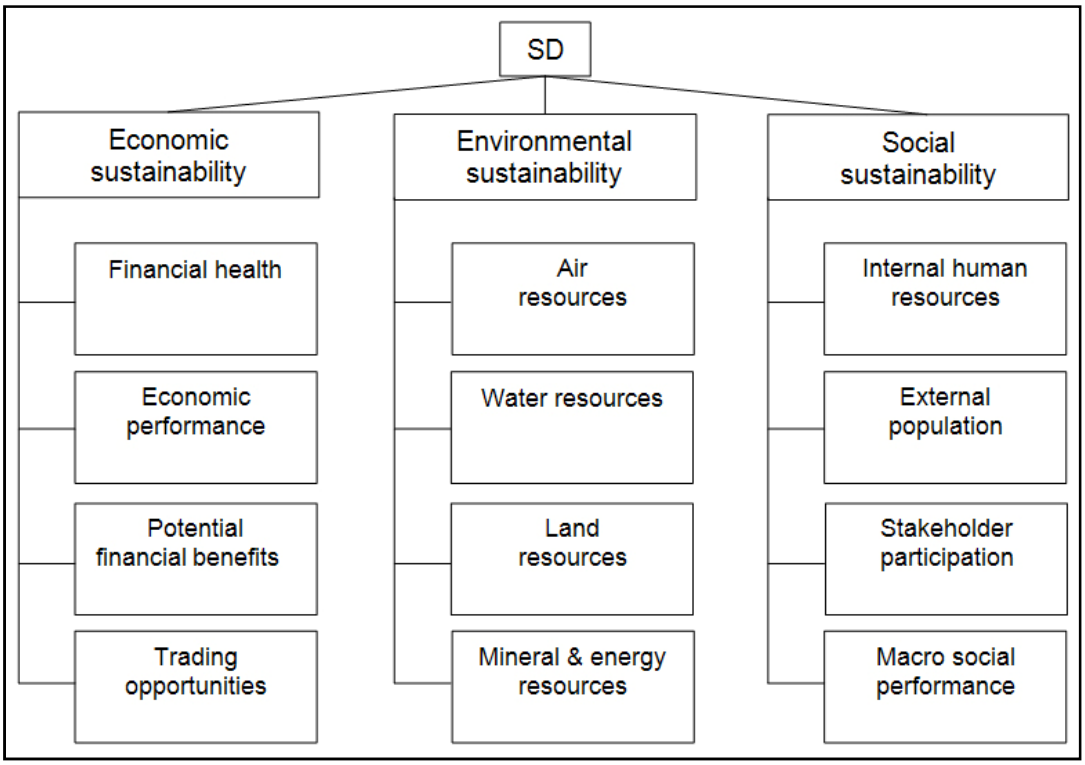

Figure 2: Overview of suggested criteria by Labuschagne et al. (2005)

For the economic dimension of SD Labuschagne et al. (2005) also pointed out that one has to distinguish between an internal and an external focus. The internal focus, thereby, can be described as the direct economic sustainability of, e.g., a company, to maintain its own economic health and viability, while the external focus also includes external economic contributions, e.g., the impacts on stakeholders and on economic systems on the local, national and global level. While the environmental dimension of the suggested sustainability criteria by Labuschagne et al. (2005) is self-

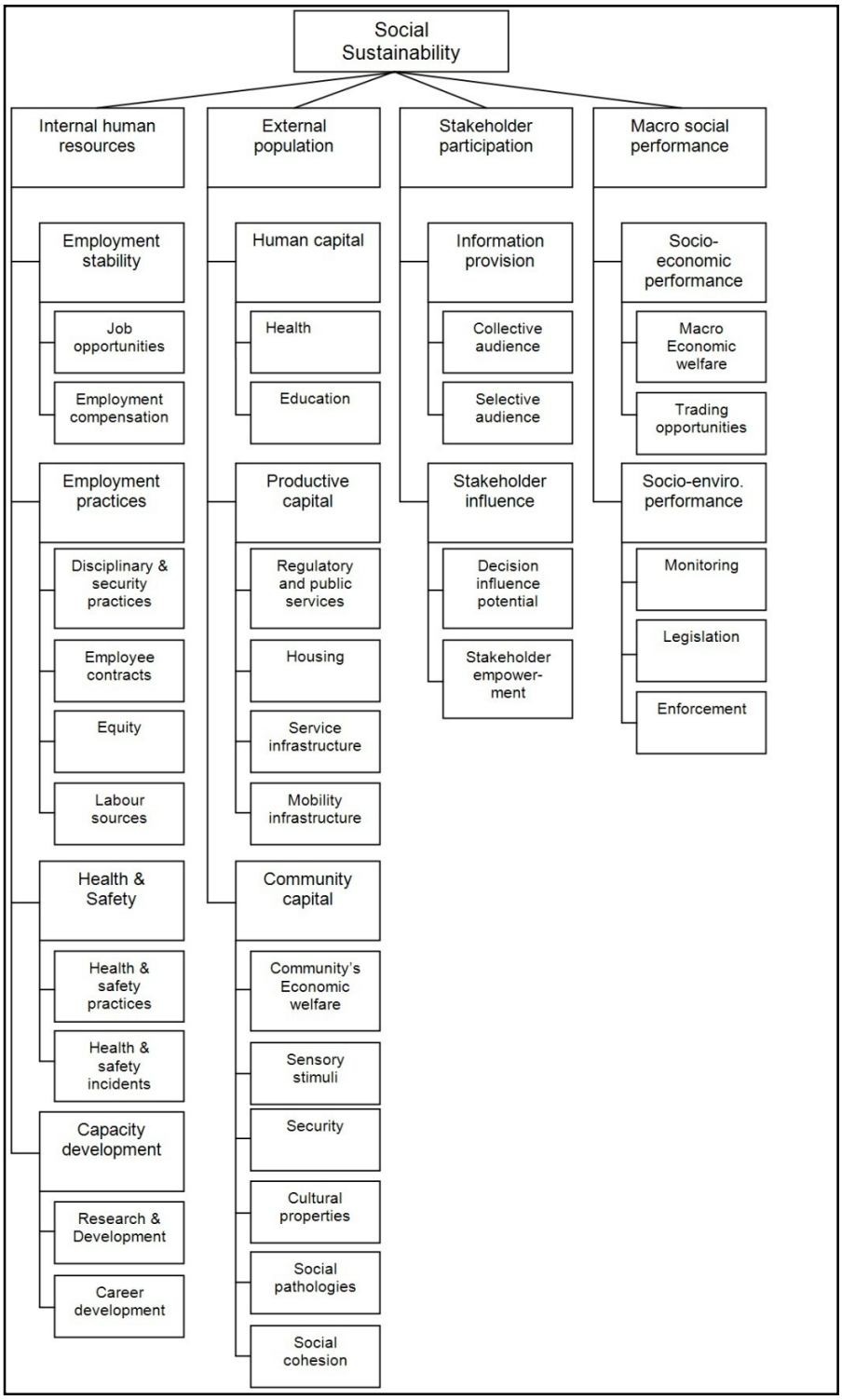

Figure 3: Sub-criteria of social dimension according to Labuschagne et al. (2005)

explanatory, it is appropriate to outline the social dimension because of its complexity and degree of detail. Like in the economic dimension one can

distinguish between an internal focus, which addresses, e.g., the health and wellbeing of employees, equity, training and development opportunities and human rights aspects, and the external focus, which pays attention to the impacts of an initiative on local communities, the regional and international level and highlights the importance of communication and stakeholder participation. However, depending on the classification, external impacts of an initiative, especially economic contributions, can either labeled as external economic benefits or external social benefits and, therefore, grouped under the economic or social dimension of SD. The criteria and sub-criteria formulated by Labuschagne et al. (2005) are shortly summarized and described in tables 5 to 8.

Table 5: Criteria for economic dimension of sustainability according to Labuschagne et al. (2005)

Economic dimension (focus: internal)		
Criteria		Description
Financial health		Assesses the internal stability, e.g., of a company
Sub-criteria	Profitability	
	Liquidity	
	Solvency	
Economic performance		Assesses the value of a company as perceived by shareholders, top-management and government
Sub-criteria	Share profitability	
	Contribution to gross domestic product (GDP)	
	Market share performance	
Potential financial benefits		Assesses financial benefits other than profits
Trading opportunities		Assesses the vulnerability of the trade network as well as the risks exposed by the network

Table 6: Criteria for environmental dimension of sustainability according to Labuschagne et al. (2005)

Environmental dimension (focus: external)		
Criteria		Description
Air resources		Assesses contribution of the regional air quality effects
Water resources		Focuses on impacts on the quantity and quality of water
Land resources		Assesses impacts on the quantity and quality of land resources
Sub-criteria	Land-usage and transformation (including impacts on biodiversity)	
	Direct and indirect releases of soil pollutants	
Mineral & energy resources		Assesses contribution to the depletion of non-renewable mineral and energy resources

Table 7: Criteria for social dimension I of sustainability according to Labuschagne et al. (2005)

Social dimension I (focus: internal and external)		
Criteria		Description
Stakeholder participation		Assesses the relationship with internal and external stakeholders
Sub-criteria	Information provision	Assesses quality and quantity of information shared with stakeholders
	Stakeholder influence	Assesses and evaluates the degree to which stakeholders opinions are incorporated into operation decision-making
Macro-social performance		Focuses on impacts on the external population on a regional and/or national level
Sub-criteria	Socio-economic performance	Addresses external economic impacts (e.g., contribution to GDP and foreign currency savings)
	Socio-environmental performance	Considers the contributions to the improvement of the environment on a community, regional and national level

Table 8: Criteria for social dimension II of sustainability according to Labuschagne et al. (2005)

Social dimension II (focus: internal and external)		
Criteria		Description
Internal human resources		Focus on social responsibility towards workforce
Sub-criteria	Employment stability	Addresses impacts on work opportunities (stability and evaluation of the fairness of compensation)
	Employment practices	Addresses disciplinary, secrecy and employee contracts to ensure compliance with laws of a country, international human rights and fair employment practice standards as well as gender and racial equity
	Health & Safety	Evaluates preventive measures and the occurrence and handling of health and/or safety incidents
	Capacity development	Addresses research & development and career development aspects
External population		Focuses on the impacts on the community
Sub-criteria	Human capital	Focuses on contributions on local medical facilities and education facilities (e.g., possible training opportunities and sharing of information)
	Productive capital	Includes the assets and infrastructure an individual needs to maintain a productive life
	Community capital	Takes into account the impacts on the social and institutional relationships and networks of trust, reciprocity, support and typical characteristics of the community

A set of criteria for SD in the context of the CDM has been developed together by Sutter (2003) and Heuberger (2003) (see figure 4, page 35). While the overarching themes are nearly the same in this set, it is not as detailed as the set described by Labuschagne et al. (2005). This accounts especially for the social dimension. On the other hand, this set mentioned explicitly the criterion of technology transfer. The criterion of technology transfer is not included in the set proposed by Labuschagne et al. (2005), maybe, because it does not play such an important role in the context Labuschagne et al. (2005) developed in their set compared to the context of the CDM. The set developed by Sutter (2003) and Heuberger (2003) was taken as a base and slightly changed by Brent et al. (2005): The criterion

equal distribution was replaced by social equity and poverty alleviation; the criteria regional economy and employment generation are replaced with the criterion macroeconomic benefits, and a government investment criterion was added.

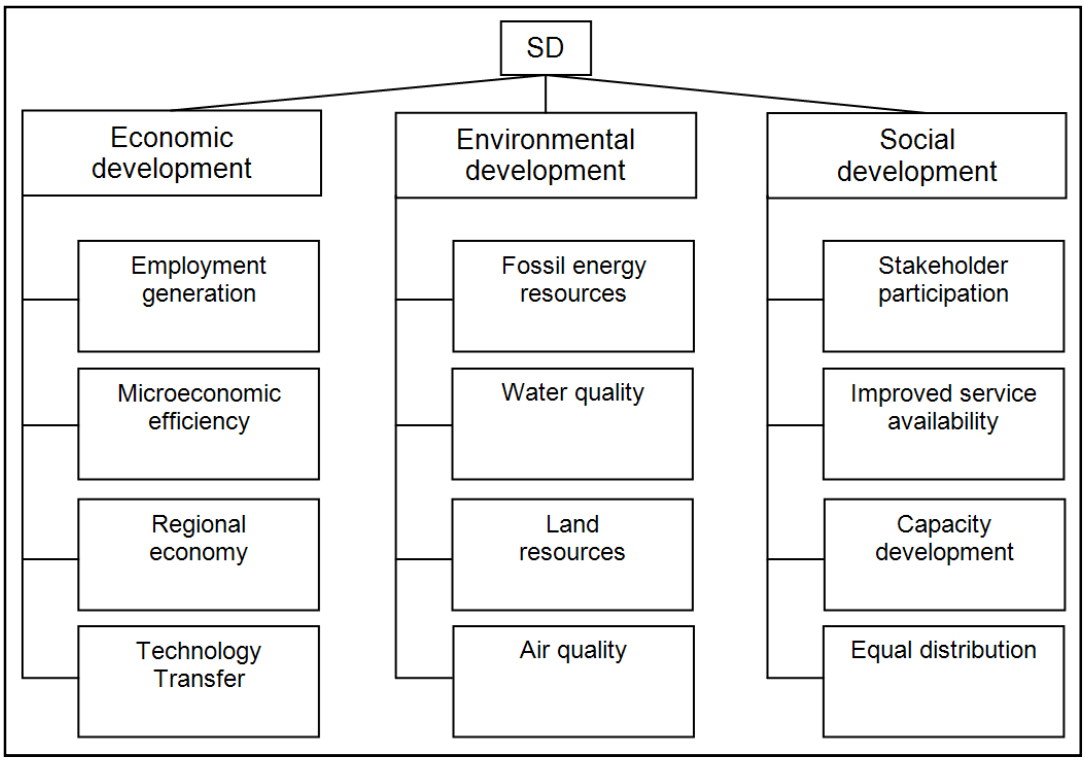

Figure 4: Sustainability criteria as suggested by Sutter (2003)

However, as mentioned before, sets of criteria have to be developed for specific purposes and issues with the help of stakeholder participation. The presented sets of criteria do, of course, fail to meet the specific requirements of the Desertec concept, because they were designed for different purposes. On the other hand, they give an idea what sets of criteria could look like and, therefore, provide a good base for a set of criteria adapted to the needs of the Desertec concept.

3.4 Normative, Systemic and Procedural Dimension of Sustainability Frameworks and Vertical Integration

While characterizing indicator-based sustainability assessment methods in agriculture systems, Binder et al. (2010) distinguish between three dimensions in a sustainability assessment: a normative, a systemic and a procedural dimension.

The main task in the normative dimension is to develop specific targets and goals derived from the underlying concept of sustainability (Binder et al., 2010). The concept of sustainability was first described by the Brundtland Commission as follows: ‘‘Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). At a minimum, SD is described by the classical three-pillar model[13], which contains an environmental, economic and social dimension (Sutter, 2003). This is probably the most common attempt to conceptualize SD. There are also discussions about whether to include or exclude additional dimensions of SD, such as a political (Heuberger et al., 2007), a governance dimension (Hacking and Guthrie, 2008) or an institutional dimension (Labuschagne et al., 2005).

The systemic dimension should, according to Binder et al. (2010), describe all important aspects of the system with the help of indicators. As previously discussed, the indicators should represent the system as simple as possible, while also sufficiently describing the complexity of the system. It is also relevant to show relationships between the indicators[14].

While describing concrete steps for the sustainability assessment, which is of minor importance in the context of this paper, Binder et al. (2010) highlighted under the procedural dimension the importance of stakeholder involvement in the process to yield good results. However, the underlying concept of

[13] The three-pillar model is also referred to as the triple bottom-line or the magic triangle of SD.
[14] Binder et al. (2010) call the criteria, which an indicator has to fulfill, parsimony, sufficiency and indicator interaction.

sustainability can be theory-based or developed in a transdisciplinary process where stakeholders can be involved (Binder et al., 2010). It is also argued, that a top-down approach, where general sustainability goals are formulated, has to be merged with a bottom-up approach, where local problem areas are taken into account (Hartmuth et al., 2008). Top-down, expert-led approaches often fail to engage local communities. Bottom-up, community-based approaches could, in contrast, enhance community capacity for learning and understanding SD objectives, but there is a certain danger: The participatory techniques alone may not accurately or reliably monitor all aspects of SD because some aspects may be out of the scope of the affected community or are not regarded as relevant for them (Reed et al., 2009). Integrated approaches also can take into account local knowledge, and the definitions of sustainability differ dramatically at different scales (Sherry et al., 2005).

Having said this, it seems also to be important to take into account the different levels or scales that are actually affected by the Desertec concept and, therefore, have to play a role when developing a sustainability framework. Levels that are affected by the Desertec concept are the supranational level (the MENA and the EU region), the national level (one could, for example, make a further distinction in this level between countries in the south and countries in the north), the regional level and the local level. However, the vertical integration of a sustainability framework from the higher to the lower level of hierarchy is, according to Mascarenhas et al. (2010), a difficult task. There are different approaches to the vertical integration, e.g., from a regional to a local level. Valentin and Spangenberg (2000) argue that it is necessary to develop an individual set of indicators for each community within a common structure because due to that comparison between different communities such is possible without ignoring individual needs and situations. In contrast, Mascarenhas et al. (2010) suggest developing common local sustainability indicators within a regional context because common indicators make a comparison between different communities more useful, prevent local sustainability monitoring losing a regional context, and local communities may

feel that they can greater effect change (e.g., on a higher hierarchical level). Regardless of whether common or different local indicators are developed, both approaches highlight the need for participatory methods and stakeholder involvement as crucial.

Nevertheless, the most important challenge seems to define a common, overall sustainability vision (Haywood and de Wet, 2009), to which the following PC&I are geared. Lewandowski and Faaij (2006) explain that the set up of sustainability standards is a procedure that involves multiple steps: The first step is the formulation of a mission, including the already addressed definition of sustainability, which has to be context specific. Secondly, sustainability C&I have to be formulated together with stakeholders. For this step there are various tools, including interviews with the previously identified stakeholders or workshops. The C&I have to be locally adapted with the help of transdisciplinary teams, consultants and local representatives. The last two steps in the process are testing the C&I sets in the field to make sure that the user understands the C&I sets and guidelines and evaluating the field testing results using the feedback from field testing.

3.5 Certification Systems

According to van Dam et al. (2008), “Certification is the process whereby an independent third party assesses the quality of management in relation to a set of predetermined requirements (standards)”. It could also be “[…] understood as formal procedure by which a third-party guarantees that the system, process, product or service complies with the requirements of specified standards or technical regulations” (Ticona and Frota, 2008). Certification systems include a published norm or standard, an inspection process (normally carried out by third-party inspectors), a quality label or seal and a network of institutions from the governmental and non-governmental side operating at all scales (locally up to transnationally) that govern labels and set standards for certification practices (Mutersbaugh et al., 2005). Depending on the complexity of the issue that has to be certified and its

geographical scale (e.g., only one issue in one region or one issue in a widespread geographical area), one or multiple organizations are necessary to fulfill the certification. It is also important to verify that a certain body or organization is competent to carry out a specific task. This procedure is called accreditation (Font, 2002). Certification standards are most often formulated as PC&I (van Dam et al., 2008). Delzeit and Holm-Müller (2009) added that criteria for a certification scheme must be backed up by theory, important to relevant stakeholders and verifiable at reasonable costs.

Certification systems exist for many different sectors[15]. For the forestry sector certification systems were introduced in the early 1990's to popularize the concept of Sustainable Forest Management (SFM) for conserving biodiversity as well as SD. While certification systems at the beginning were concentrated only on timber-based practices, nowadays also Non-Timber Forest Products (NTFPs) are included (Bhattacharyya et al., 2009). Arguably most prominent is the certification led by the FSC. FSC accredited certification bodies carry out the FSC certification for two different types: the Forest Management (FM) Certificate and the Chain of Custody Certificate, which includes all stages of processing, transformation, manufacturing and distribution of the raw material to the consumer. Other certification systems for forestry are the Programme for the Endorsement of Forest Certification schemes (PEFC), which is a global umbrella organization for national forestry certification systems, such as the Finnish Forest Certification System (FFCS) (van Dam et al., 2008).

For the agricultural sector, certification systems were mostly implemented to ensure environmental benign or sustainable production methods which result in healthier and safer products for the consumer (Lewandowski and Faaij, 2006). Examples are EUREGAP (established in 2001), which is a private sector body that sets voluntary standards for the certification of agricultural products (such as fruits and vegetables) and covers the process of the certified product from before the seed is planted until it leaves the farm.

[15] For a comprehensive list of certification systems, see: Lewandowski and Faaij (2006).

Other certification systems are, for example, the previously mentioned GS for CDM projects, the certification by the RSB for the biofuel sector and various green electricity labels for the energy sector (e.g., EUGENE, Milieukeur, ok-power, Green Power and Austrian Ecolabel). Among these are also green-electricity labels for biomass where the definition of allowed feeding material and additional criteria for the ecological quality of the biomass and the specification of technology for different plant types are most important (van Dam et al., 2008).

Aside from this sectoral distinction of certification systems, there are also different approaches to implementing certification systems. The implementation ranges from voluntary to mandatory approaches on different scales, from the small scale, regional level or the national level to the international level. Van Dam et al. (2008) distinguish between five approaches for biomass certification systems. In the first approach, a government sets minimum, mandatory standards via government regulation. Those minimum standards can be combined with incentives. The second approach, where a group of governments, companies and other interested parties voluntarily adopts standards and certification systems, is also called a bottom-up approach. The whole process, which is regarded to improve over time, can be pushed forward by relevant national or international players. The third approach, while being a voluntary approach, sets standards on top of standards regulated by law in the form of a private label. The GS is an example of this kind of certification system. The fourth approach is a combination of a voluntary certification system that is combined with an international agreement. This international agreement could consist of written general guidelines or a ‘codex of behaviour’. Finally, the fifth approach is a mandatory, legally binding standard on the international level. However, this list of possible approaches also shows the breadth and flexibility of certification systems.

3.6 Hurdles for Small Stakeholders and Strictness of Sustainability Standards

It is mentioned in the literature (Proforest, 2005) that small stakeholders could become isolated by certification systems because small stakeholders may have difficulties and often need support and advice to implement the requested criteria and because the verification process is disproportionately expensive for small stakeholders. If small stakeholders could not participate in the Desertec concept because they are not able to fulfill the requested criteria this inability could on the other hand hinder the whole concept to contribute to SD especially on the local scale as those small stakeholders become excluded from the project. Therefore, the issue of small stakeholder involvement needs special attention. Two suggestion Cramer et al. (2007) propose are to simplifying the sustainability requirements for small stakeholders or enabling group certification, which means that only a sample of a certain group of small stakeholders has to be verified. Furthermore, certification systems could be accompanied by capacity building for small stakeholders (van Dam et al., 2008). However, it is also argued that the implementation of a certification system should not create a significant hurdle for nascent industry and that C&I, while being adaptable to the requirements of different regions, are mindful of the implementation costs (WWI, 2006).

From this aspect another question arises: How strict should the definition of PC&I and/or sustainability standards for the Desertec be? A range of options are thinkable, producing two extremes, from which the resulting PC&I for the Desertec concept, when established, will be somewhere in between. One extreme is that PC&I for the Desertec concept are set very low or defined very broadly, where potentially all involved stakeholders would be able to fulfill these standards. Very low standards, on the other hand, may not be able to provide sufficient goals and PC&I for ensuring the implemented concept contributes to SD. One result could be that there is no local acceptance for the Desertec concept from local communities. Local

acceptance for the project is needed to ensure the success of the concept. Also, the Desertec concept could be seen as a “greenwashed” concept, e.g., by NGOs. The other extreme is that the hurdles and barriers to implementation generated by the PC&I are so high and demanding that primarily small local stakeholders cannot fulfill them and are, hence, excluded. Depending on whether certification is voluntary or mandatory, it is thinkable that stakeholders would also just ignore the sustainability standards because they assume that they cannot fulfill them. Thus, sustainability standards, if neglected by involved stakeholders, would not contribute to the ultimate goal of SD. Here the difficulty is to ensure that the implemented concept contributes to SD, especially for local communities, without creating a significant hindrance to the implementation of the concept. This seems to be important also because projects established as a result of the Desertec concept will have to compete against, besides others, highly subsidized, non-renewable energy projects, which do not have to fulfill sustainability standards at all. Against this background, it seems reasonable to establish also (monetary) incentives for the stakeholders, encouraging them to apply the sustainability standards.

4. Participation and Stakeholder Dialogues

As mentioned several times before in this study, participation can be regarded as one corner stone when developing a sustainability framework. Therefore, an appropriate approach would be to discuss the issue of participation and stakeholder dialogues further. The goal of this chapter is, therefore, to give an overview of the issue of participation and stakeholder dialogues. Furthermore, the end of the chapter briefly introduces the Integrative Theory of Reflexive Dialogues developed by Welp and Stoll-Kleemann (2006), which integrated several scientific approaches with the goal to provide a conceptual framework for stakeholder dialogues.

4.1 Participation and Stakeholder Participation

The term participation can be interpreted in different ways. Berghöfer and Berghöfer (2006) mentioned that participation and sustainability are umbrella concepts which can be easily used in many contexts. Due to their flexibility, these terms also come with a certain danger, because they mean different things to different people and, therefore, have to be specified. Both terms, participation and sustainability, are described as buzzwords by Læssøe (2008), which have to be reinterpreted and adapted to specific contexts to be meaningful. In literature, participation is often distinguished into public or citizen participation and stakeholder participation. Citizen or public participation can be defined as "[…] a process that provides individuals with an opportunity to influence public decisions" (Stoll-Kleemann and Welp, 2006). Reed (2008) focuses more on stakeholder participation, which is defined as "[…] a process where individuals, groups and organizations choose to take an active role on making decisions that affect them". However, while the definitions have similarities, like the definition of participation as a process, the distinction is made between the groups who are actually the participants in the process (the wider public or stakeholders[16]). According to

[16] The different definitions of the term stakeholder were already discussed in chapter 2.2.

Reed (2008) "[…] for purposes of efficiency, most conservationist focus on engaging those who hold a stake […] in the scope of their initiative, rather than attempting to meaningfully engage with the wider public". Based on a literature review, Reed (2008), furthermore, points out that there are different typologies for stakeholder participations.

The first typology is based on different degrees of participation on a continuum. In this context Pretty (1995) distinguishes between seven types of participation. Pretty's stages of participation range from manipulative and passive participation, where people are told what has or will happen, to self-mobilization, where people actually take initiative independent from external agencies. Pretty's seven types, or stages, of participation are shortly summarized in the following:

1.) Manipulative participation, where representatives, who are not elected and have no power, are on official boards.

2.) Passive participation, where people participate, but are just informed of what has happened or already has been decided.

3.) Participation by consultation, where people participate by being consulted by an external agent, who has no obligation to take into account people's views.

4.) Participation for material incentives, where people participate by contributing resources (e.g., labor in return for food), but are not involved in, e.g., the process of learning.

5.) Functional participation, where participation is seen as a means to achieve project goals (e.g., by external agencies). The involvement may be interactive and includes shared decision making, but often arises only after major decisions have been made by external agents.

6.) Interactive participation, where people participate in joint analysis, development of action plans and formation of local institutions. In

contrast to functional participation, participation is seen as a right, not just as a mean to achieve project goals.

7.) Self-mobilization, where people participate by taking initiatives independently of external institutions to change systems. While people develop contacts with external institutions for advice, they retain control over how resources are used.

The second typology of stakeholder participation as suggested by Reed (2008) is based on the nature of participation according to the direction of communication flows. Here, participation is understood as a two-way communication between participants and exercise organizers. In contrast to participation, the gathering of information from participants is defined as consultation. In a participation process based on this typology, information is exchanged in a dialogue or in negotiations.

Reed's (2008) third typology is based on a theoretical base that distinguishes between a normative and/or a pragmatic participation. Normative participation means that people have a democratic right to participate in decision-making, while pragmatic participation is more seen as a means to an end, where the process can deliver higher quality decisions.

The last typology mentioned by Reed (2008) is based on the objectives for which participation is used. His examples of objectives for participation that can be found in literature include research-driven versus development-driven objectives, building consensus, diagnostic and informing, co-learning and co-management.

Reed (2008) further pointed out that, on the one hand, claimed benefits of stakeholder participation have driven the incorporation of the concept in policies, while, on the other hand, those claims may not have been realized.

Claimed benefits, which can be broadly categorized under normative and pragmatic arguments, and critique of stakeholder participation are summarized in table 9 (next page).

Table 9: Claimed benefits of and critique on stakeholder participation based on a literature research that was conducted by Reed (2008)

Claimed benefits of stakeholder participation	Critique on stakeholder participation
Normative claim	
- Reduces the likelihood that people on the periphery of the decision making process are marginalized	- Empowerment of marginalized groups may have unexpected (negative) interactions with existing power structures.
- Increases public trust in decisions and civil society	- Group dynamics may discourage minority perspectives from being expressed, which may lead to "dysfunctional consensus."
- Empowers stakeholders through the co-generation of knowledge with researchers	- Consultation fatigue may develop; stakeholder may perceive that their involvement gains them little reward.
- Increases participants' capacity to use knowledge gained	- Participatory processes can become "talking shops" that delay decisive actions.
- Increases likelihood that decisions are perceived to be holistic and fair	- Limitation of empowerment of stakeholders due to non-negotiable positions and veto powers
- Promotes social learning	- Stakeholders may have insufficient knowledge to engage in technical debates.
Pragmatic claims	
- Enables interventions and technologies to be better adapted to local socio-cultural and environmental conditions	
- Makes research more robust by providing higher quality information inputs	
- Increases the likelihood that local needs and priorities are successfully met	
- Anticipating and ameliorating unexpected outcomes before they occur	
- Has the capacity to transform adversarial relationships	
- Long-term support and active implementations of decisions may be enhanced.	
- May reduce implementation costs	

Instead of giving one approach for one definition of the term participation, Berghöfer and Berghöfer (2006) seek clarity by breaking down the term

participation along four axes of differentiation. Those axes are formulated as four basic questions. While providing basic answers to those questions, the authors also ascertained that further questions and issues have to be dealt with to answer those questions in a meaningful way. The first question the authors raise is “Who participates?” This question, among other things, pays attention to the selection of participants, which is a problematic issue. Several issues come up in conjunction with that question. For example, according to Berghöfer and Berghöfer (2006), there is a certain danger of localism, because places may seen as a locality which stands alone from the complex system it is embedded. Hence, places may seen as isolated from the wider multidimensional context. Therefore, participatory processes should be supplemented by paying attention to the larger structural context. Moreover, Berghöfer and Berghöfer (2006) argue that it is important for a participatory process, such as a dialogue between stakeholders, to recognize differences and inequalities between members of a community. Even members of one community that are exposed to similar circumstances have inequalities concerning status, means, independence and influence, which leads to heterogeneous perspectives. The second question Berghöfer and Berghöfer (2006) asked is “Participation: in what dimension?” As examples for dimensions of participation the authors mention economic, political, social and project participation, whereas the space for participation is determined by the interpretations of these dimensions. The third question that Berghöfer and Berghöfer (2006) think is worth investigating is process-related. (“How does the process of participation take place?”) The authors argue that the existing set of rules within a community and local customs have to be understood and accepted. This is especially important when local customs conflict with participatory methods and tools. Hence, the propriety of imported rules and institutions has to be reviewed critically. Another procedural issue deals with the costs and the benefits of participating: It is important to consider and balance the costs and benefits of those participating in the process. Another procedural challenge is the role of the facilitator. While facilitators are often

external experts who "[…] provide the master plan of participation" (Berghöfer and Berghöfer, 2006), the authors asked the question as to whether the facilitators are actually capable of fulfilling the various, extremely demanding tasks and requirements, such as humility, curiosity, empathy, experience and patience. Also, with regard to procedural justice and conflicts, one can ask whether the responsibility of reaching consensus and achieving justice should be left to the facilitator. However, while it could also be questioned as to whether there is a situation in the real world with no dominance between equal participants, rules and mechanisms are necessary to reduce inequalities during the process. Finally, the last questioned raised by Berghöfer and Berghöfer (2006) deals with the purpose of participation. ("What is the purpose of participation?") Here, the authors distinguish between two principle purposes or interpretations of so-called "meaningful participation", while they also advocate that those who are engaged in the process lay open their intentions (e.g.: What are the intentions of external experts that facilitate the process?). One purpose of participation aims towards aid efficiency and another one aims towards empowerment of people. The enhancement of a project's efficiency as one purpose of participation seems feasible, according to Berghöfer and Berghöfer (2006). The empowerment of people due to participation is, in contrast, far more complicated and complex because it also includes a political dimension. Berghöfer and Berghöfer (2006) recommend in conclusion of their discussion about the term participation that the presented questions should be answered and that limitations in the specification of answers as well as the ambiguity of the term participation should be acknowledged by everyone who approaches what they call "practicing participation". Furthermore, the local situation in terms of interactions, power relationships, within the community, but also between the community and its wider structural setting, should be analyzed. Additionally, the facilitating party should consider its own limits (e.g., beliefs, judgments and norms), and the actual space for participation (e.g., allocation of funds and timing) should be clarified.

4.2 Stakeholder Dialogues

Stoll-Kleemann and Welp (2006) explicitly point out the difference between participation and stakeholder dialogues. In their view a stakeholder dialogue can be defined "[…] as a process in which a structured exchange of views and reflection on values of stakeholders can take place" (Stoll-Kleemann and Welp, 2006). Hence, in contrast to participation, where, in principle, everybody has the chance to get involved, in stakeholder dialogues stakeholders have to be selected depending on the issue at hand. Stakeholder dialogues gained popularity in fields like corporate management, policy-making, natural resource management and integrated assessment (Stoll-Kleemann and Welp, 2006). In that sense, a stakeholder dialogue can be understood as a type of stakeholder participation that uses a special kind of communication that is the dialogue. Hence, the word dialogue has to be defined. In that regard, Stoll-Kleemann and Welp (2006) follow the definition of the term dialogue that was proposed by Bohm (1996). Bohm distinguished between discussions and dialogues. A discussion in Bohm's view can be described "[…] almost like a Ping-Pong game, where people are batting the ideas back and forth and the object of the game is to win […]" (Bohm, 1996). In contrast, in a dialogue, the goal is not to make a particular view prevail, because the goal is to create win-win situations. Participants are not playing against each other, but with each other (Bohm, 1996). The base of a dialogue is mutual respect, the notion that another participant has a valid viewpoint and a free flow of meaning between the participants is possible. The outcome of a dialogue is, therefore, that participants gain insights, which they may not have reached alone (Stoll-Kleemann and Welp, 2006). Furthermore, knowledge creation is one goal of stakeholder dialogues because it is easier to create new knowledge in a group with different perspectives than by an individual who works in isolation (Welp and Stoll-Kleemann, 2006). Hence, learning plays an essential role in stakeholder dialogues and can be described as "[...] one of the key concepts for stakeholder dialogues and participation" (Welp and Stoll-Kleemann, 2006; see also chapter 4.3).

According to Welp et al. (2006a), one can distinguish four different types of a stakeholder dialogue. These are policy dialogues, multi-stakeholder dialogues for governance, corporate dialogues, and science-based dialogues. The four types of dialogue have in common the underlying concept of learning, exchange of knowledge and opinions as well as arguments, while mutual trust is a base for that process that seeks to create a safe space where participants can learn from each others.

Policy dialogues, which are applied in many different sectors (e.g., water and conservation policies), seek to support policies (Stoll-Kleemann and Welp, 2006). In a policy dialogue scientists can be involved to support the decision making process. An example of a practical application of a policy dialogue can be seen in the Forest Biodiversity Programme for Southern Finland: The whole process aimed, among other things, to seek consensus about goals and create a schedule of work to improve the protection status of forests in southern Finland. For this purpose a commission was formed where scientists were assigned several roles “inside” the process (Hellström, 2006). In the traditional view of science, scientists produce and transmit information for the decision making process and are not active members of the value-based decision-making. However, Hellström (2006) argues that there is a growing call for participation in our society and that scientists are no exception for that call. Furthermore, scientists involved from the “inside” of a decision-making process can act as bridges to the rest of the scientific community.

An example for a multi-stakeholder dialogue that seeks to create partnerships and voluntary commitments between a wide range of actors on the international scale is the already described FSC (see chapter 3.3 and 3.5). In a multi-stakeholder dialogue stakeholders from the industry as well as from NGOs can be included.

Corporate dialogues, which have the purpose of demonstrating openness, generating the will for a critical exchange of views and learning about different expectations of different stakeholders regarding a company’s business, are

nowadays an essential element in the field of Corporate Social Responsibility (CSR) (Stoll-Kleemann and Welp, 2006).

According to Stoll-Kleemann and Welp (2006), a science-based stakeholder dialogue is defined "[…] as a structured communicative process of linking scientists with selected actors who are relevant for the research problem at hand." This kind of dialogue highlights transdisciplinary research, because, with complex problems, such as biodiversity loss and climate change, disciplinary approaches are not enough (Welp et al., 2006b). Transdisciplinary research, which for example investigates the interdependency of social and natural systems in sustainability science, instead has a holistic approach and therefore advocates the partnership between different disciplines (Scheffran, 2007). Also, interdisciplinary approaches, meaning the collaboration of research institutes and the private sector, are relevant for science-based stakeholder dialogues because they make research socially relevant. Furthermore, science-based stakeholder dialogues foster mutual learning among all participants who take part in the process (Welp et al., 2006b).

Oels (2006) differentiates stakeholder dialogues by the purpose of the dialogue and therefore distinguishes dialogues in a slightly different way. According to her, three purposes of a dialogue can be distinguished: To clarify and improve knowledge (purpose of a stakeholder dialogue for science), to base decision-making upon the deliberation of a collective will (purpose of a stakeholder dialogue for policy making) and to support implementation (purpose of a stakeholder dialogue for management).

However, while the main goal of a dialogue may not necessarily be to reach a consensus (Scheffran, 2006; Welp and Stoll-Kleemann, 2006), one can distinguish between consensus-seeking dialogues, such as policy and corporate dialogues, and dialogues that accept radical different views as an outcome. An example of the second kind of dialogue is the science-based dialogue, where different views and dissent may be also relevant as a result

(Welp and Stoll-Kleemann, 2006). Van de Kerkhof (2006) criticizes the consensus-building approach that is often the main objective of stakeholder-participation, mainly, because the goal may shift away from finding a quality decision and move towards a decision that everyone can agree on in the consensus-building process. Another critique by Van de Kerkhof (2006) is that the consensus orientation may lead to a selection of participants that are less skeptical towards the issue at stake. Therefore, the author promotes an alternative approach, which conceived dialogues as a process of deliberation, where deliberation is understood as a process of open exchange of viewpoints and opinions. In that sense, the definition of a dialogue as a process of deliberation comes close to the definition of a dialogue suggested by Bohm (1996). In that context, Scheffran (2006) argues: “Even if no agreement can be achieved, stakeholder dialogues may produce net benefits, simply by the information shared”.

Oels (2006) recommends the evaluation of a stakeholder dialogue for several, very different, reasons driven by the purpose that one has in mind for the evaluation. For example, an evaluation can help to improve the practice and the process of a stakeholder dialogue. Furthermore, an evaluation can also measure the satisfaction of the participants with the process and help to understand the intended and unintended effects of the stakeholder dialogue. Depending on the time when an evaluation is carried out, it can also help to form course corrections (e.g., when the evaluation is carried out during the process of a stakeholder dialogue and not after the process is finished). Also, evaluation makes it possible to compare different stakeholder dialogues. For the evaluation process itself, Oels (2006) distinguished between theory-based evaluation, user-based or stakeholder based evaluation and goal-free evaluation. The goal of theory-based evaluation “[...] is to assess to what extent a stakeholder dialogue fulfils the criteria (and related indicators) as spelled out in the theoretical literature” (Oels, 2006). In theory-based evaluation, a universal set of normative criteria is applied to all stakeholder dialogues. As one of its strengths, theory-based evaluation makes it easy to

compare different stakeholder dialogues. On the down side and in contrast to user-based evaluation, where stakeholders actually specify the objectives of the evaluation process, theory-based evaluation does not involve stakeholders in the process of developing the criteria for evaluation. This could lead to a low acceptance of the practitioners for theory-based evaluation because they may find several criteria not useful. According to Oels (2006), the challenge of user-based evaluation is to find one set of criteria for evaluation that integrates the diverse objectives of the stakeholders. Goal-free evaluation, which is applied if the stakeholders have no clear objectives or when the objectives are conflicting, represents a general assessment of the dialogue by the stakeholders. However, Oels (2006) suggests that the best results may reached if approaches of theory-based and stakeholder-based evaluation are combined, while concluding that learning and networking are likely results of a stakeholder dialogue.

4.3 The Integrative Theory of Reflexive Dialogues

Stoll-Kleemann and Welp (2006) expressed the need for a conceptual framework that is practical in and applicable to stakeholder dialogues. The need for a good theoretical framework arose because stakeholder dialogues had not been well structured; objectives and success criteria remained fuzzy and such a framework "[…] can be valuable in guiding practice and in tool development" (Stoll-Kleemann and Welp, 2006). In their conceptual framework, which they call the Integrative Theory of Reflexive Dialogues, Welp and Stoll-Kleemann (2006) synthesized several scientific approaches, such as social psychological approaches, organizational learning and formal mathematical approaches for decision support. The selection process of the approaches included was influenced by practical experiences, intellectual and professional background in the field of sustainability science and the applicability for tool development. The framework focuses on actors, structures, processes, methods and outcomes.

Actors can be members of different groups, such as different social groups, different organizations, and part of the society, while each individual may play different roles. The Integrative Theory of Reflexive Dialogues acknowledges that actors are simultaneously members of these groups and that they also have different individual preferences, values and knowledge bases.

Structures are especially understood as power relations between the various actors, who exert a great influence on a stakeholder dialogue. While the ideal situation of a power-free discourse can never be met in reality, rules and principles can help to foster a fair dialogue. With regard to structures, the authors also mention the cognitive limitations of the human brain as a physical limit.

Two important processes that play a role in the theory are meta-communication and stereotyping. Meta-communication is reflection about the process of communication and is a key feature of reflexive dialogues (e.g., reflection about how the process should take place). Stereotyping can be a limiting factor for group learning as it can negatively affect communication, e.g., between business leaders and environmentalist. While it is difficult to overcome stereotypes, bringing people together and engaging them in common activities might be a first step.

With regard to methods, the authors distinguish between communication and analytical tools. Tools for communication "[…] are needed to inspire and structure interaction between individuals" (Welp and Stoll-Kleemann, 2006). As examples for communication tools focus groups, which combine interviews and group discussions, are mentioned. Bayesian networks, which are graphical tools that help to make a decision under uncertainty, multi-criteria decision analysis, which helps to weigh options against measurable criteria, and computer models are analytical tools that can be used to visualize issues and options or to test arguments. Scheffran (2006) describes different tools for stakeholder modeling and simulation. Among others, he mentioned agent-based modeling, which "[…] uses computer simulation to analyse complex

interaction between multiple agents who follow given action rules and stimulus response mechanisms to form complex social patterns" (Scheffran, 2006). While agent-based modeling takes into account the adaptive, disaggregated nature of human decision-making and collective responses to changing environments, a key challenge is to integrate them into real-world applications such as stakeholder dialogues (Scheffran, 2006).

Finally, networking, the ability to deal better with complex issues, behavior change as well as consensus or dissent, can be described as outcomes of a stakeholder dialogue.

However, learning on different levels (e.g., the individual level, the group level and the organizational level) is a key concept or cornerstone of the Integrative Theory of Reflexive Dialogues and can be regarded as an interface between the different theories that were integrated. Here, especially a learning exchange between organizations is problematic, as regular interactions are rarer and, therefore, trust building might take longer and, because different organizations might not share the same vision or interests.

The theory highlights the reflexibility of the process. What is meant by that is that rules of the dialogue are not fixed or imposed by the facilitator, rather the rules are negotiable and are developed and reviewed by all participants who take part in the process. For this reason, the theory is also in line with issues that were addressed by Berghöfer and Berghöfer (2006) who also advocate for a collaboration of the participants in creation of the process.

5. Results

In this chapter results are presented following the methodology explained in chapters 2.1.1 and 2.2.2. Results are presented in tables 10 to 14 and discussed in chapter 6. For each theme that occurred during the interviews one table was created and further subdivided into subthemes. The theme "stakeholder" is separately presented in chapter 5.5 and discussed in chapter 6.1. The following themes came up in the interviews:

- Benefits that could result from the implementation of the Desertec concept;
- Challenges that the Desertec concept is facing for its implementation;
- Criteria that could ensure the sustainability of the Desertec concept;
- Certification systems for the Desertec concept;
- Stakeholders for the Desertec concept.

5.1 Benefits

The theme "benefits" (see table 10, next page) was further subdivided into three subthemes: benefits for target countries, benefits for Europe and overall advantages of the Desertec concept. While the first two subthemes are self explanatory, the third subtheme includes advantages that are either based on the technology used, mostly with regards to the CSP technology, or advantages that are on a higher-ranking, hierarchical level like the promotion of renewable energy sources in general.

Benefits for the target countries, according to the experts, can be summarized as the creation of jobs that are necessary to build components for power plants and to operate power plants, know-how and technology that is transferred (from Europe) or acquired to build and operate power plants, the build-up of production capacities and infrastructure that are needed, the supply of renewable electricity to the population (urban and rural) of the target countries, the enhancement of the electricity grid in the MENA region, the desalination of water based on renewable energy sources, overall economic

growth in the target countries and the democratization of the target countries. Benefits for the EU are the supply of renewable electricity and, therefore, the reduction of CO_2 emissions; the diversification of the energy mix; fewer migrants from North Africa (NA) to the EU and the maintenance of jobs in the renewable energy sector. Overall advantages of the Desertec concept are realized in the extensive promotion of renewable energy sources; the ability of the CSP technology to provide base-load; an economic growth for the target countries; the enhancement of the cooperation between countries; the creation of win-win situations and the provision of a "role model" that could inspire on other regions of the world.

Table 10: Summary of the theme "benefits", based on expert statements

Theme: Benefits			
Expert interview	**Quote**	**Paraphrase**	**Generalization**
Subtheme: Overall advantages of the Desertec concept			
E1	Q4	An advantage of CSP technology is that electricity can be produced round-the-clock.	Provision of base-load through CSP
E2	Q1	Renewable electricity can be produced in an electricity-intensive country, and there is a possibility of exporting the electricity and gaining economic benefits.	Renewable energy production and economic benefits
E2	Q6	If well implemented, the concept would provide a chance to solve different challenges and problems for Europe and the MENA region, which could have positive effects on other regions of the world.	Creation of win-win situations and positive effects on other regions
E3	Q1	The main advantage of CSP is that it can provide a base-load.	Provision of base-load through CSP
E8	Q1	This concept promotes renewable energy instead of fossil fuels.	Promoting of renewable energy
E8	Q3	Desertec can get countries to work together.	Cooperation of countries

Table 11: Summary of the theme "benefits", based on expert statements (continuation of table 10)

Theme: Benefits			
Expert interview	**Quote**	**Paraphrase**	**Generalization**
Subtheme: Benefits for target countries			
E1	Q1	For target countries benefits are an economic boost, technology gain and acquired know-how.	Economic growth, technology gain and acquired know-how
E1	Q2	A main benefit for the region is especially seen in job creation.	Job creation
E1	Q3	Roads, rails, supply roads and settlements are needed.	Build-up of infrastructure
E2	Q2	Electricity supply can be provided to rural regions and also cities, which spurs the development of dynamic economic growth.	Electricity supply and economic growth
E2	Q3	Desertec is a chance for the democratic and participatory development in the target countries.	Democratization
E2	Q5	It is not possible to build all components that are needed for an energy plant or the grid in Europe or Germany; some elements should be build in the region.	Development of production capacities and job creation
E3	Q2	Production capacities are developed on-site/on-location, which creates jobs and generates know-how, and, with it, promotes education.	Development of production capacities, job creation and education
E3	Q3	Renewable energy can be used instead of fossil fuels to desalinate water.	Desalination
E4	Q1	Benefits include the technology transfer from North to South, job creation, and democratization.	Technology transfer, job creation, democratization
E4	Q2	An advantage is the development of the region, which means the enhancement of the electricity grid and the electricity supply for rural regions and cities.	Enhancement of electricity grid and electricity supply
E4	Q3	Waste heat can be used for desalination.	Desalination
E5	Q1	Countries could ensure electricity supply with their own means, regional income, job creation and the development of production capacities.	Renewable electricity supply, job creation and development of production capacities
E6	Q1	Electricity is supplied for local demand at predictable prices; production of components from the local supply chain, job creation and overall economic growth	Renewable electricity supply, job creation, development of production capacities
E7	Q1	It is possible to reduce the water shortage in the region with the use of renewable energy for desalination.	Desalination
E8	Q2	Countries benefit from technical experience, technology transfer, job creation and a renewable energy supply.	Renewable electricity supply, job creation and development of production capacities
Subtheme: Benefits for the EU			
E1	Q11	The EU benefits through the diversification of the energy mix and lowering of dependency on single countries.	Diversification of the energy mix
E2	Q4	Reaching the goal of 100% renewable electricity supply without large-scale projects is difficult to achieve.	Renewable electricity supply
E4	Q1	Advantages are the maintenance and creation of jobs and a renewable electricity supply.	Job maintenance and creation, renewable electricity supply
E5	Q2	The Desertec concept is necessary for there to be a quick change in the renewable electricity supply.	Renewable electricity supply
E6	Q9	Cooperation of Europe and Northern Africa could reduce migration	Reduction of migration
E8	Q2	Renewable energy sources reduce CO_2 emissions.	Reduction of CO_2 emission

5.2 Challenges

The theme “challenges” (see table 12, next page) could be distinguished into the subthemes challenges for the implementation of the Desertec concept, thinkable risks that could occur due to the implementation of the Desertec and disadvantages of the Desertec concept compared to more decentralized electricity supply concepts.

Challenges for the implementation of the Desertec concept are seen in the lack of a sound business model and a policy framework; existing technological hurdles; the lack of a political will to expand renewable energy sources; the expansion of the electricity grid; the market competiveness of renewable energy resources (especially CSP); the dependency of the EU on resources outside from its borders and the nescience about acceptance of the concept in the target region. Risks could occur if the Desertec concept is implemented without paying attention to the water usage of CSP plants; if electricity is not firstly allocated to the population of the target countries and if participation or access rights are neglected. Disadvantages of the Desertec concept are rooted in the ownership situation of centralized energy structures and reinforcement of existing energy oligopolies.

Table 12: Summary of the theme "challenges", based on expert statements

Theme: Challenges			
Expert interview	**Quote**	**Paraphrase**	**Generalization**
Subtheme: Challenges for implementation			
E1	Q5	Policy framework is necessary: a business model has to be developed.	Lack of policy framework and business model
E1	Q6	Desertec could fail if market competitiveness, in the end, is not met.	Market competitiveness
E3	Q18	A huge challenge is the funding.	Funding
E3	Q19	Water balance of CSP plants is a challenge.	Water usage
E3	Q20	There is no sound business model.	Lack of business model
E5	Q3	There is no knowledge about how these kinds of power plants (CSP) will be accepted in the MENA region.	Acceptance
E6	Q2	Countries (of the north) want to avoid dependency and want, first of all, to exploit their own renewable energy resources.	Dependency
E6	Q3	A new business model has to be developed.	Lack of Business model
E6	Q4	Until now, the electricity grid in the MENA region has not been capable of dealing with a high proportion of fluctuating renewable energy.	Grid expansion
E6	Q5	The right policy framework is missing; there is a lack of understanding and knowledge about one another (between the EU and MENA region).	Lack of policy frame work and cooperation
E8	Q4	The biggest challenges are based in the technology and the political will, because the political will is highly influenced by fossil fuel industry.	Technological hurdles and political will
Subtheme: Risks			
E1	Q7	Not enough attention is paid to the water issue.	Water usage
E2	Q7	There is a certain risk that energy will not be allocated for the local population in the first place. The local population does not participate in the process of implementation. The rights of participation and access are neglected.	Allocation of electricity, participation and access rights
E4	Q7	There is the risk that the Desertec concept would be received negatively because it cannot deliver all promised benefits.	High expectations
E4	Q11	No benefit sharing occurs. Energy production oligopolies are potentially reinforced.	No benefit sharing and strengthen of energy oligopolies
Subtheme: Disadvantages of the Desertec concept			
E3	Q4	Compared to decentralized approaches, the power relationship and ownership situation are disadvantageous.	Ownership
E5	Q3	Energy production oligopolies would potentially be reinforced.	Energy oligopoly

5.3 Criteria

The theme “criteria” (see table 13, next page) could be further distinguished into ideas for sustainability criteria, approaches of how to develop sustainability criteria and reasons for the need of sustainability criteria.

Ideas for sustainability criteria are attention to the water usage of a CSP plant; attention to the material flow needed to build a power plant; a limit of electricity that is transferred to Europe; social, ecologic and economic criteria; participation, educational, ownership and security aspects; technology transfer and employment aspects; local suitable criteria and steplike criteria in the beginning. Approaches for developing sustainability criteria include the orientation to human, process and participation rights; the development of criteria modules; the development of process or procedural criteria and the creation of a process/space for communication. The need for sustainability criteria is seen in that social acceptance of the concept has to be ensured, that due to sustainability criteria the delivering of benefits could be ensured and that ecologic issues, like the water usage of the CSP plants, are addressed because of sustainability criteria.

Table 13: Summary of the theme "criteria", based on expert statements

Theme: Criteria			
Expert interview	**Quote**	**Paraphrase**	**Generalization**
Subtheme: Ideas for sustainability criteria			
E1	Q8	The water usage of CSP plants has to be considered.	Water usage
E3	Q5	"Hard" criteria are possible, for example, for the water balance of a CSP plant.	Water usage
E3	Q6	Considerations include the participation of people, educational aspects, ownership aspects, security aspects.	Participation of people, educational aspects, ownership aspects, security aspects
E3	Q9	The process of developing criteria should be fault-tolerant and should take into account the different situations of the countries; gaining of knowledge is important and a key focus.	Local suitable criteria
E3	Q10	Sustainability criteria are defined in three dimensions: social, ecological and economic.	Social, ecological and economic criteria
E4	Q4	No more than 15% of electricity should be imported from the MENA region to Europe.	Maximum amount of electricity that should be imported
E4	Q5	Material flow has to be kept low.	Material flow
E5	Q4	A distinction has to be made between social and ecological sustainable criteria.	Social and ecological criteria
E5	Q5	Social criteria includes, e.g., sustainability of employment; ecological criteria incorporates, e.g., water usage.	Employment and water usage
E7	Q2	Water usage has to be considered and the local industry has to be strengthened.	Water usage and local industry
E7	Q3	Education has to be strengthened because it is needed for well trained employees.	Education
E7	Q4	Criteria should be steplike, because in the beginning too high criteria could exclude parts of the industry.	Steplike criteria
E8	Q6	Criteria could be, e.g., to ensure maximum employment from the local labor force, to equip the government with technology needs, and to provide part of the technology transfer package.	Employment for local labor force and technology transfer
Subtheme: Approaches to develop sustainability criteria			
E2	Q8	Development of criteria has to be orientated toward human rights, such as the right to food, water, land use; also participation and process rights have to be considered.	Orientation toward human rights, process rights and participation rights
E2	Q10	Criteria modules should be developed that are applicable for different situation; criteria should be process criteria.	Development of criteria modules; process criteria
E3	Q8	Criteria cannot be developed in an abstract manner and have to be developed in an iterative process: criteria should be very procedural-orientated.	Procedural criteria are needed, developed in an iterative process
E3	Q9	The process of developing criteria should be fault-tolerant and should take into account the different situations of the countries; gaining of knowledge is important and in the focus.	Fault-tolerant process; Local suitable criteria; gaining knowledge
E5	Q6	Criteria should be developed based on reference projects.	Criteria based on reference projects
E8	Q5	Sustainability criteria are necessary, but a space for communicating ideas is needed, e.g., the MENAREC conferences.	Dialogue / space for communication is needed
Subtheme: Reasons for the need of sustainability criteria			
E2	Q9	Social acceptance for the Desertec concept is needed in the north and in the south.	Social acceptance
E2	Q12	The water problem must be handled.	Water usage
E3	Q7	For security reasons and, hence, economic reasons, the local population should benefit.	Security, social acceptance and ownership
E8	Q5	Sustainability criteria are necessary to ensure benefits.	Ensure benefits

5.4 Certification

The theme “certification” (see table 14, next page) includes the subthemes critiques on a certification system, arguments for a certification system, suggestions for alternative approaches as well as suggestions for structures that could ensure compliance with sustainability criteria. Critiques that were mentioned on a certification system include financial gains for outsiders; the complexity of a certification system and, hence, difficulties for its implementation; lack of benefits for plant operators due to certification; the incompatibility of a certification system with the energy sector and the observation that acceptance of sustainability criteria is not reached through a certification system, but it has to come from the target countries. The assurance of delivering benefits was mentioned as a reason for a certification system. The Monitoring, Reporting and Verification system from the climate policy sector was suggested as an alternative approach to a certification system. Structures to monitor compliance with sustainability criteria include the Desertec foundation, an independent verification system organized by project developers and the governments of the target countries.

Table 14: Summary of the theme "certification", based on expert statements

Theme: Certification			
Expert interview	**Quote**	**Paraphrase**	**Generalization**
Subtheme: Critiques on a certification system for the Desertec concept			
E1	Q9	Other parties will participate financially if a certification system is established.	Financial gains for outsiders
E1	Q10	What are the benefits for a plant operator participating in a certification system?	Benefits for plant operator not clarified
E2	Q11	Fundamental doubts arise if a certification system is capable of fulfilling the requirements that result from the complexity of the Desertec concept.	Certification system cannot fulfill requirements
E2	Q12	A certification system is too expensive and complex, and it may hinders the Desertec concept in delivering benefits with regard to the urgency of climate policy and macroeconomic benefits.	Certification system would be too complex and hindrance of delivering overall benefits
E5	Q7	It is difficult/challenging to develop a certification system along the whole value chain as seen, e.g., with certification systems for food.	Certification system is too difficult to develop
E6	Q8	The energy sector does not work through a certification system.	Energy sector is not compatible with a certification system
E8	Q7	A certification system is not necessary, because each individual country has to determine which criteria they accept.	Acceptance of criteria due to countries and not due to a certification system
Subthemes: Arguments for a certification system			
E4	Q6	Certification is important to ensure not only an economic benefit from the projects for project developers, but also benefits for population in target countries.	Deliver benefits for population in target countries
Subtheme: Suggestions for alternative approaches to a certification system			
E3	Q11	Approaches from the climate policy sector like Monitoring, Reporting and Verification could be adapted.	Monitoring, reporting and verification
Subtheme: Suggestions for structures (organizations, institutions etc.) that could control the compliance with sustainability criteria			
E2	Q13	Monitoring could not be carried out by Desertec foundation.	Not Desertec Foundation
E3	Q12	Project operators are pledged to organize independent verification; an organization manages the verified projects.	Independent verification organized by project operators
E3	Q13	Control of compliance with sustainability criteria is not possible due to one single organization.	Decentralization
E5	Q8	Monitoring could be carried out by the Desertec foundation.	Desertec Foundation
E8	Q7	A certification system is not necessary because each individual country has to determine which criteria they accept.	By government of a certain country

5.5 Stakeholder Analysis

As a base for the stakeholder analysis, all stakeholders that were mentioned by the experts are shown in the following table.

Table 15: Stakeholders identified by the experts

Expert interview	Quote	Stakeholder
E1	Q12	Industry associations, e.g., Estella; DII; Munich RE; Desertec Foundation
E2	Q14	Political level of EU and MENA region; Industry (DII, but also companies that are not associated with the DII); Local population and civil society from north and south; existing civil society roundtables that engage with issues concerning the EU-MENA region; IRENA; World Bank; Global Environmental Facility
E3	Q14	Technical and economic project developers; Investors; Governments of the EU and MENA region
E3	Q17	Research and science
E3	Q15	IRENA
E4	Q8	DII; Desertec Foundation; NGOs from the EU and MENA region
E5	Q9	DII; local companies that are not associated with the DII; Desertec Foundation; MSP; Governments of the EU and MENA region; NGOs; Renewable Energy Agencies in target countries; TRANSGREEN
E6	Q10	Civil society; MSP; World Bank, African Development Bank
E6	Q11	IRENA
E7	Q5	NGOs
E7	Q6	Governments
E7	Q7	Desertec Foundation
E8	Q8	Governments; NGOs; Renewable energy industry
E8	Q9	IRENA; Renewable energy agencies in each country; Industrial associations; Labor unions
E8	Q10	Multilateral and bilateral financing institutions

Experts also expressed their intentions and/or interest in becoming involved with the Desertec concept. As mentioned before (see chapter 2.2.2), experts who were interviewed can partly also be described as stakeholders. Furthermore, experts attributed roles to stakeholders (e.g., the Munich Re as an opinion leader, the Desertec Foundation as a source of ideas) and also weighted the importance of several stakeholders. Table 16 (next page) contains a summary of intentions and interest to engage in the Desertec concept and roles and importance of stakeholder as stated by the experts.

Table 16: Summary of the theme "stakeholders", based on expert statements

Stakeholder			
Intentions/interest to become involved in the Desertec concept			
Expert interview	**Quote**	**Paraphrase**	**Generalization**
E1	Q13	Climate protection as a long-term goal; Economic gains	Climate protection and economic gains
E2	Q1;Q2; Q4	Promotion of renewable energy sources; Development of target region; Climate protection	Promotion of renewable energy sources, development of target region and climate protection
E3	Q16	Economically feasible implementation of Desertec concept considering sustainability criteria	Economic gains while considering sustainability criteria
E4	Q9	Development of developing countries through the Desertec concept	Development of target region
E5	Q10	Climate protection; fast transition towards the use of renewable energy sources in addition to decentralized approaches	Climate protection and promotion of renewable energy sources
E6	Q15	The Desertec concept sets the frame for a transformation of the power sector.	Promotion of renewable energy sources
E8	Q1	Promotion of renewable energy sources and enhancement of electricity grid	Promotion of renewable energy sources and enhancement of grid
Importance/role of stakeholder			
E1	Q12	Most important DII, Desertec Foundation and Munich Re	Most important DII, Desertec Foundation and Munich Re
E1	Q14	Munich Re is seen as opinion leader for the industry.	Munich Re as opinion leader
E3	Q14	Most important technical and economic project developers; Investors; Governments of the EU and MENA region	Most important technical and economic project developers; Investors; Governments
E3	Q15; Q17	IRENA should be integrated; Science could contribute.	Integration of IRENA and science
E4	Q8; Q10	Most important DII and especially Munich Re, which is seen as a representative of sustainable economic activity; Desertec Foundation; NGOs	Most important DII, Munich Re, Desertec Foundation and NGOs
E5	Q11	DII has a leading role, but is also to a certain extent a blackbox; Desertec Foundation.	Most important DII and Desertec Foundation
E6	Q10	All organizations that can provide funds, such as the World Bank or the African Development Bank, can influence the agenda.	Agenda influenced by funding organizations
E6	Q12	DII can stimulate further research, can help to develop a business model and operationalize the concept and is, therefore, very important.	Most important DII
E7	Q6	Governments are necessary to develop frameworks.	Governments for developing a framework
E7	Q7	Desertec Foundation can provide ideas, e.g., for sustainability criteria.	Desertec Foundation as source of ideas
E8	Q8	Most important at the moment are governments, NGOs and the renewable energy industry	Most important at the moment are governments, NGOs and the renewable energy industry
E8	Q9	Labor unions could be involved in the way that they ensure or monitoring the job opportunities.	Labor unions to monitor job opportunities
E8	Q10	Multilateral or bilateral financing institutions could invest in the Desertec concept, but are at the moment not as important as governments, the renewable energy industry or NGOs.	Of minor importance financing institutions compared to governments, NGOs and the renewable energy industry (at the moment)

Stakeholders were mentioned either very specifically, e.g., in case of the DII, Desertec Foundation or Munich Re or in a more general way. For example, the renewable energy industry, the civil society/NGOs, investors and

governments were mentioned often as stakeholders. However, each of these groups of stakeholders includes in reality a variety of different stakeholders, which may have differing agendas, importance and roles. As an example, one expert distinguished, when asked to evaluate the position of countries in the MENA region with regards to the Desertec concept in the following way: "You can see that Morocco, Egypt and UAE are the most aggressive on this front. But you also see countries like Lebanon, now Tunisia, are playing more and more increasingly a role in this" (E8Q11). This example should show that reality is by far more complex. Nevertheless, for the purpose of this study, whenever an expert mentioned these groups of stakeholders, the whole group was considered one stakeholder, as long as no further distinction was made by the expert. The influence, interest and importance of the stakeholders was evaluated based on the statements from the experts (see table 16). With an evaluation of the interest and the influence, in turn, stakeholders can be described with analytical categories such as key players, context setters, subjects and crowd-based players (see table 17). Furthermore, stakeholders can be attributed as more or less important[17].

Table 17: Influence, interest and importance of stakeholders (1= Can vary strongly from country to country, 2= Can vary (e.g., Photovoltaic industry vs. CSP industry), 3= Role and interest of IRENA is not yet clear)

Stakeholder	Interest	Influence		Importance
DII	+++	+++	Key player	++++
Governments	+++[1]	+++	Key player	++++
Desertec Foundation	+++	++	Subject	+++
NGOs	++	+	Subject	+++
Renewable energy industry	+++[2]	++	Subject	++
Munich Re	++	++	Context setter/subject	++
Project developers	+++	+	Subject	++
Investors	+	+++	Context setter	+/++
Financing Organizations	+	+++	Context setter	+/++
IRENA	+[3]	+	Crowd	+
Science	++	+	Crowd	+
Labor unions	++	+	Crowd	+

[17] Note: The importance of a stakeholder in this analysis is not based on the stakeholder's influence or interest, but on the statements given by the experts as summarized in table 16.

Figure 6 displays how stakeholders are affected by or are affecting the implementation of the Desertec concept.

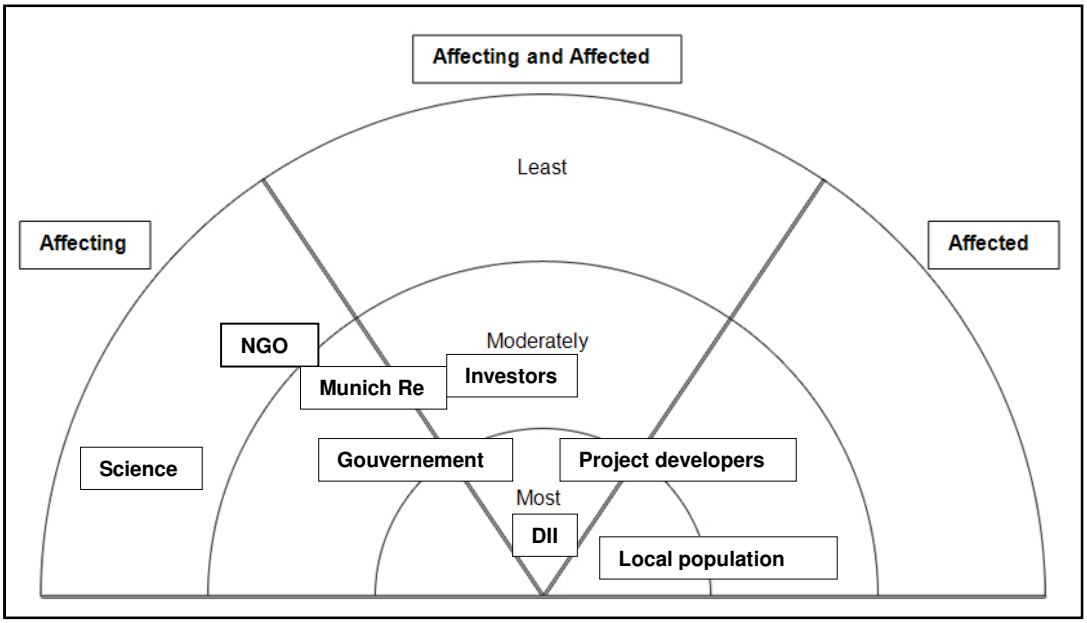

Figure 5: Rainbow diagram of stakeholders

5.6 Single Interview Summaries

The following summarized the key statements of each individual expert are summarized.

Expert interview 1 (sector: industry)[18]

The interest in dealing with Desertec concept was described as the possibility to contribute to climate protection, but, also an economic interest was expressed (E1Q13). The Desertec concept is seen as a push for the economic development of the target countries. Know-how and technology could be transferred to the target region (E1Q1). Furthermore, the build-up of infrastructure (E1Q3) and the generation of jobs were recognized as benefits (E1Q2). The big advantage of the Desertec concept lies in the use of the CSP technology, which can supply base-load (E1Q4). A challenge presents itself

[18] The sector, to which the individual expert can be assigned, is shown in brackets.

in the development of a policy framework and a business (E1Q5). The expert mentioned, the Desertec concept could fail if market competiveness was not in place in the end (E1Q6). Furthermore, attention should be paid to the water usage of CSP plants (E1Q7), which was also regarded as a sustainability criterion (E1Q8). The issue of EU dependency on foreign energy sources was not regarded as a problem, because resources are diversified compared to the present through Desertec energy (E1Q11). The role of Munich Re, as an important opinion leader for the industry, and the Desertec Foundation as key-stakeholder was emphasized (E1Q12; E1Q14).

Expert interview 2 (sector: NGO (north))

The intention of engaging in the Desertec concept includes the following: climate protection, the promotion of renewable energy sources and the development of the target countries, which viewed as a great advantage (E2Q2). The Desertec concept is understood as a chance to develop the target region based on renewable energy sources, while allowing the target countries to benefit economically (E2Q1), and the concept is seen as a contribution to the realization of the goal to reach 100% renewable electricity by 2050 (E2Q4). Furthermore, Desertec could contribute to the democratic and participatory development in the target countries (E2Q3). Aside from creating jobs in the target region (E2Q5), the Desertec concept is regarded as a unique chance to create win-win situations for two regions (EU and MENA) (E2Q6). If the concept is implemented well, it could have positive impacts on other regions of the world (E2Q6). As a precondition, electricity should firstly be allocated to the local population (E2Q7; E2Q15), and the Desertec concept should be implemented without excluding ecological aspects, such as water usage (E2Q12), land use and participation rights (E2Q8). Sustainability criteria, which are necessary to ensure social acceptance of the Desertec concept in both regions (E2Q9), could be orientated toward human rights, land use and participation and process rights (E2Q8). Criteria modules that can be applied to different conditions should be developed, while

consisting of process criteria (E2Q10). The expert questioned the necessity of a certification system and stated that a certification system would be too complex to be applied to the Desertec concept (E2Q11). The Desertec Foundation is considered incapable of monitoring of compliance of the sustainability criteria due to the complexity regarding this issue (E2Q13) (stakeholder listed by the expert can be found in table 15).

Expert interview 3 (sector: industry)

With consideration of sustainability criteria (E3Q16) that are necessary for economic and security reasons because they ensure social acceptance of the concept (E3Q7), an economic interest in the Desertec concept can be described as the intention to be engaged in the concept. The development of production capacities and resulting jobs for local population, development of know-how and education (E3Q2) as well as desalination of sea water based on renewable energy sources (E3Q3) are the benefits for the target countries. The great advantage of the CSP technology is the ability to provide base-load energy (E3Q1). A disadvantage of the Desertec concept is seen in the ownership situation of big, centralized power plants (E3Q4). Additionally, funding for projects, the lack of a sound business model and the water balance of CSP plants are mentioned as challenges. Sustainability criteria should be developed in an iterative, fault-tolerant process, where criteria are formulated as procedural criteria (E3Q8; E3Q9). The gaining of new knowledge should be regarded as one important outcome of such a process, and the process should be adapted to different, local conditions (E3Q9). Instead of a certification system, the expert suggested to adapt the Monitoring, Reporting and Verification system from the climate policy sector (E3Q11), where project operators could handle the major portion of such a system and, hence, only a minimal organization would be needed for the verification (E3Q12). Project developers, investors and the governments of the EU and MENA region were mentioned as the most important stakeholder

(E3Q14), while science and organizations like IRENA could also contribute, but play a subordinate role (E3Q7; E3Q15).

Expert interview 4 (sector science/research)

The development of the target countries can be described as the intention to engage in the Desertec concept (E4Q9). Benefits are seen in the sustainable development of the target countries, technology transfer, the creation of jobs in the target countries and maintenance of jobs in the EU, the democratization of the target countries (E4Q1) as well as the electrification of the target countries (E4Q2). The use of waste heat for desalination is another benefit (E4Q3). Risks were mentioned in so far that there may not be an opportunity for benefit sharing for the local population and that existing energy oligopolies are strengthened (E4Q11). An maximum amount of 15% electricity that should be imported to the EU (E4Q4) and the material flow for CSP plants, which should be kept low (E4Q5), were mentioned as sustainability criteria. A certification system appears to be essential to ensure the delivering of benefits for the target countries and not only the economic benefits for project developers. The DII, especially, the Munich Re, the Desertec Foundation and NGOs from the EU and the MENA region were mentioned as important stakeholders. The Munich Re is seen as a key economic player, which pays a lot attention to the issue of sustainability (E4Q10). Furthermore, it was stated that the Desertec concept, due to its ambitious goals, could be criticized because may not deliver all promised benefits (E4Q7).

Expert interview 5 (sector: science / research)

Climate protection and the need for a transition to renewable energy resources are regarded as the intention to become involved in the Desertec concept (E5Q2; E5Q10). The expert believes that the Desertec concept is necessary to make a fast transition to renewable energy sources (E5Q2). Here the benefit is the electrification of the target region, which brings with it

the creation of jobs, economic growth and the build-up of production capacities (E5Q1). The risks include the fact that there is no knowledge about acceptance of the Desertec concept in the target regions and that, potentially, energy oligopolies and existing power structures are strengthened (E5Q3). As sustainability criteria, the expert proposes the employment rate for the social dimension and the water usage of CSP plants for the ecological dimension of sustainability (E5Q4; E5Q5). The expert suggested developing sustainability criteria with the help of reference projects (E5Q6), because at this point in time it is difficult to estimate, e.g., the ecological impact of the concept (E5Q13). Therefore, it might be too early to create a sustainability catalogue (E5Q14). It was also mentioned that it may be appropriate to think in relative terms and to compare the ecological impacts of a CSP plant to the ecological impacts of a coal or nuclear power plant (E5Q12). However, while developing sustainability criteria the integration and participation of stakeholders from the south is received as crucial (E5Q15). The establishment of a certification system for the Desertec concept is regarded as very difficult and problematic, mostly due to the potential effects from a certification system along the whole value chain in the target countries, as seen in examples from the food sector (E5Q7). The main important stakeholders are the DII and the Desertec Foundation, which both have a leading role, while it is difficult to anticipate the intentions of the DII, as it is a “blackbox” to a certain extent (E5Q11) (other stakeholders mentioned by the expert can be found in table 15).

Expert interview 6 (sector: research/science)

The promotion of renewable energy resources is probably the main driving factor for becoming involved in the Desertec concept (E6Q15). The supply of electricity at a predictable price would benefit target countries, as would the resulting economic growth of the countries and job creation (E6Q1). A challenge for the implementation of the Desertec concept are, according to the expert, that the EU may want to exploit the resources within its borders first (E6Q2). Further challenges are the lack of a sound business model

(E6Q3), the lack of a policy framework (E6Q5) and the insufficient electricity grid in the MENA region, which is not capable of dealing with a high amount of fluctuating renewable energy (E6Q4). Aside from gaining support to fulfill its renewable energy targets (E6Q15), the EU will benefit in the further cooperation with the MENA region and a reduced number of migrants (E6Q9). The expert points out that, as a precondition, governments have to allow an opportunity for benefit sharing and that this would maximize benefits for the population of the target countries (E6Q6; E6Q14). This framework has to be developed in a dialogue between project developers and local authorities (E6Q7). The expert strongly opposed a certification system because such is not how the energy sector works (E6Q8). The DII was mentioned as an important stakeholder because it can help to develop a business model and stimulates further research and, therefore, helps to operationalize the Desertec concept (E6Q12; E6Q13). Furthermore, financial institutions, such as the World Bank and MSP, were regarded as important stakeholders because they have the leverage to influence the agenda (E6Q10).

Expert interview 7 (sector: NGO (north))

Target countries could benefit from the desalination of sea water using renewable energy sources (E7Q1). Local industrialization is regarded as another benefit (E7Q2). Education is needed for the build-up of production capacities because employees must be trained (E7Q3). Water usage of CSP plants, education and local industrialization should be taken into account when developing sustainability criteria (E7Q2; E7Q3). Furthermore, sustainability criteria should be ranked in the beginning as, otherwise, local industry may be excluded (E7Q4). Stakeholders range from producers to consumers, NGOs (E7Q5) to governments. Governments are necessary to develop a framework (E7Q6). The Desertec Foundation could play a role in so far that it is regarded as a source of ideas (E7Q7).

Expert interview 8 (sector: NGO (south))

The promotion of renewable energy sources can be regarded as the intention for joining the Desertec concept (E8Q1). The Desertec concept is advantageous in that it integrates many renewable energy sources (such as CSP, PV, wind and geothermal energy), promotes the enhancement of the electricity grid, creates win-win situations (E8Q1) and promotes cooperation between countries (E8Q3). The target region would benefit from the transfer of technology, job creation and electricity supply (E8Q2). The EU benefits, in particular, from the reduction in CO_2 emissions (E8Q2). Technology and the political will, which is thought to be influenced to a great extent by the fossil fuel industry (E8Q4), pose the biggest challenges. Sustainability criteria are regarded to be very important, because they ensure the delivering of the anticipated benefits (E8Q5). Ideas for sustainability criteria are a maximum employment rate from local labor force and technology transfer in the form of technology that needs to be transferred, for example, as part of the technology transfer package (E8Q6). A certification system, in turn, is not needed because each individual country has to determine which sustainability criteria to accept (E8Q7). The most important stakeholders are the renewable energy industry, governments and NGOs (E8Q8). Other stakeholders, such as IRENA, labor unions (e.g., to ensure job opportunities), renewable energy agencies, and financial institutions could play a role, but are not as crucial as the former (E8Q9; E8Q10).

Expert interview 9[19] (sector: policy)

Advantages of the Desertec concept are the use of renewable energy resources, which are abundant in the MENA region, and the minimal environmental impact of CSP power plants compared to, e.g., bioenergy. Benefits for the target region are investments in the target countries and job creation. The electricity grid needs to be further developed before the

[19] The expert did not want to be recorded. The summary is, therefore, based on notes taken during the interview, and the expert cannot be quoted.

Desertec concept can be implemented. The water balance of the CSP plants is a sustainability criterion and, at the same time, a great challenge. Another sustainability criterion is the realization of desalination of sea water. There is a certain risk in that the Desertec concept is overstrained with requirements that it has to fulfill (e.g., democratization). Sustainability criteria should, especially, take into account environmental criteria (e.g., water usage of a CSP plant). Social criteria are important, too, but can hardly be established. Participation of the local population is deemed important, but maybe hard to establish due to the authoritarian regimes. Access rights of nomads should also be taken into account. In conclusion, the expert believes that a certification system is good in principle, but hard to develop in practice, especially, because of the complexity of the Desertec concept. The most important stakeholders are the governments and the renewable energy industry.

6. Discussion

The advantages and benefits mentioned by the experts are basically in line with the proposed advantages in the three DLR studies. No expert denied that benefits for both regions could be delivered through the implementation of the Desertec concept. Overall, the Desertec concept was received positively by the experts. The advantages of the concept and the benefits that could be delivered are summarized in figure 5.

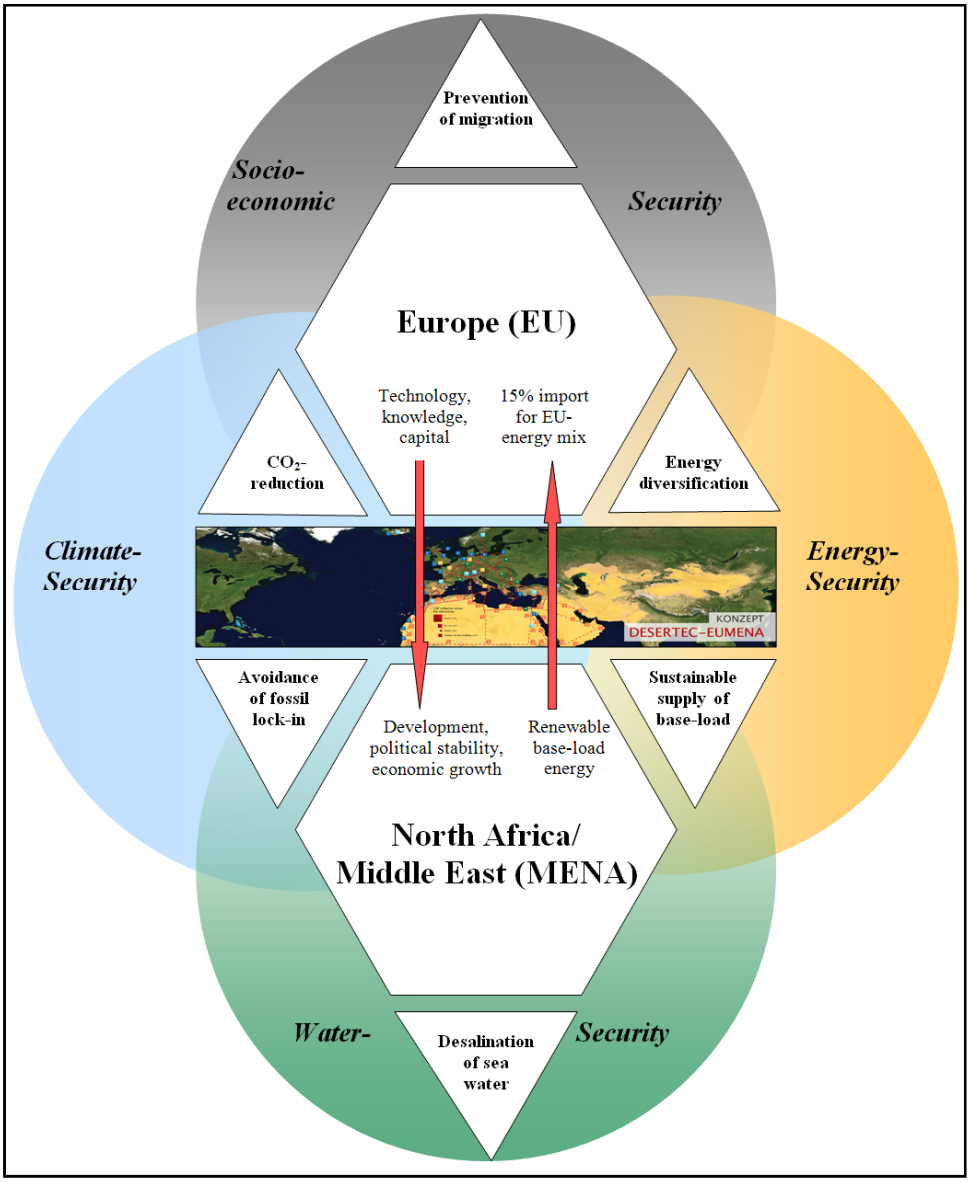

Figure 6: Advantages and benefits of the Desertec concept (Schinke and Klawitter, 2010)

However, experts also mentioned preconditions that have to be fulfilled so that benefits can be delivered. With respect to that issue, the commitment of the governments of the target countries, the addressing of the water usage of CSP plants, the desalination of sea water and the allocation of electricity, primarily, to the local population and, therefore, an enhancement of the electricity grid were mentioned. Regarding this issue one expert said: "What is very important is to set up governance that allows sharing a profit and sharing opportunities. If this is possible, than you will see that the benefit for the local population will be much higher than otherwise and that the viability of the cooperation between importers and exporters will be much stronger" (E6Q14).

According to the experts interviewed, advantages and benefits that could result from the Desertec concept have to be differentiated. Most of the experts mentioned that benefits have to be classified into benefits for the target countries (such as Morocco, Tunisia, Egypt etc.) and benefits for the EU. Aside from these, overall advantages of the concept could also be distinguished. One overall advantage of the Desertec concept is, for example, the use of abundant renewable energy resources in the target region and, therefore, the promotion of renewable energy on a large scale. The fostering of cooperation between countries in the target region as well as between Europe and the MENA region and also the creation of win-win situations were especially highlighted by experts from NGOs (e.g., expert 2 and expert 8). Also, as a technological advantage, the provision of base-load energy due to the CSP technology was mentioned. More specific benefits for the target countries are in the creation of jobs, infrastructure and the enhancement of production capacities, while it was also mentioned that it may not be possible to manufacture all components of, e.g., a CSP power plant, in the MENA region. Another benefit is the renewable electricity supply to rural and urban regions in the target countries and the further enhancement of the electricity grid that is necessary for an expansion of renewable energy resources in the region. Furthermore, the possibility of desalination using renewable energy

sources was received as very advantageous, because it would reduce the water shortage of the region while not using fossil fuels or fossil water. Technology transfer and the fostering of education are benefits which go hand in hand with the need for enhancing production capacities and trained employees in the target countries. These benefits and advantages were mentioned nearly throughout all interviews. The beginning of a democratization process, as a more subtle benefit, was also mentioned, by an expert from an NGO and by an expert from the field of science (expert 2 and expert 4, respectively). However, it remained rather unclear as to how anticipated benefits like technology transfer and education could be implemented. An expert from an NGO from the MENA region (expert 8) suggested that technology could be delivered as a part of the technology transfer package. In return, the benefits for Europe are the supply with renewable electricity and, therefore, the reduction of CO_2 emissions, the maintenance of jobs in the renewable energy sector and a reduction of migrants from NA to Europe, because it is expected that living conditions would improve in the target countries with the implementation of the Desertec concept. Furthermore, the diversification of the energy mix for Europe was mentioned as an advantage for the EU. However, it cannot be noticed that a particular group of experts, such as experts from the industry or from NGOs, had conflictive or contrary viewpoints concerning benefits or advantages or one group emphasizing one particular benefit more than the other group, because statements were overall very homogenous.

Another theme that occurred during the interviews was challenges that the Desertec concept is facing for its implementation. One big challenge is the development of a sound business model that the whole concept is lacking until now. Regarding this issue one expert from the field of science said: “It is difficult, because we do not have the right business models. In reality, we need to come up with new business models, which allow us to move from a system, which is cheap to build but expensive to run, into a system that is expensive to build but then cheap to run” (E6Q3). In this context, it has been

stated that the Desertec concept could fail, if in the end the market competiveness of CSP plants are not met. Experts from the industry (expert 1 and expert 3) emphasized the lack of a sound business model and a policy framework as challenges. This issue was also highlighted by an expert from the field of science (expert 6). The funding of projects was also viewed as challenging by an expert from the industry (expert 1). The political will to implement the Desertec concept was questioned by an expert from an NGO (expert 8). With regards to the political will of the EU, an expert from the field of science (expert 6) anticipated that Europe, first, wants to exploit the resources within its borders and minimize dependency on other regions. However, in the opinion of the author this is not contrary to another advantage mentioned by an expert from the industry (expert 1), who sees the diversification of the energy mix, resulting from the implementation of Desertec concept, as an advantage, because the expert from the field of science speaks about overall dependency from foreign energy sources. Other hurdles present themselves in the technology that is used and in the grid expansion that advances only slowly and is not sufficient (neither in Europe, in the MENA region nor between the two regions). It has also been pointed out by an expert from the field of science (expert 5) that, until now, there is no knowledge about the acceptance of the concept in the target region. Different risks are grouped under the term “risks”: For example, there is a certain risk that the Desertec concept will not be implemented sustainably, if the water usage of the CSP plants (for cooling and cleaning) is not solved in a sustainable manner. This issue was addressed, even though in other contexts such as sustainability criteria and the need for sustainability criteria, by nearly all experts and is, therefore, evaluated as very important. Furthermore an expert from an NGO (expert 2) mentioned that there are risks that local people’s land use and access rights are neglected, that people do not have the chance to participate in the process of implementation of projects and that generated electricity is not allocated first hand for people in the target countries. However, these risks can also be understood as reasons

for sustainability criteria, which should contribute to avoidance of these risks and, on the other hand, facilitate the delivering of anticipated benefits. As for disadvantages of the Desertec concept, the ownership situation of the power plants compared to decentralized approaches as well as the reinforcement of existing energy oligopolies were mentioned by an export from the industry (expert 3) and by an expert from the field of science (expert 5). It was also mentioned that decentralized approaches and the Desertec concept must not be mutually exclusive, but are complementary. It was noted, that experts from the industry put slightly more emphasize on the issue of the lack of a sound business model and a policy framework, while experts from NGOs and the field of science pay somewhat more attention to issue that benefits are actually delivered. However, this observation is enervated to a certain extent due to the fact that also experts from the industry mentioned that the Desertec concept has to be implemented in a sustainable way by addressing the water balance of CSP plants and because they mentioned that benefits for the local population have to be delivered. The latter may be due to different reasons, because if no benefits are delivered social acceptance of the concept is not given and, hence, the security of power plants would be jeopardized. Nevertheless, whether the intention of a stakeholder is to develop the target region or to ensure the security of investment, the delivering of benefits for local population (as a result or as a precondition) stays the same. Aside from this, also an expert from the field of science (expert 6) sees the biggest challenge in the establishment of a sound business model.

Advantages and disadvantages of the Desertec concept and benefits that could result from the implementation of the concept as well as challenges for its implementation were listed and explained by the experts in a straightforward manner. The topic of sustainability criteria, in contrast, remained more vague. This was so for several reasons: First, for some experts the topic of sustainability criteria was new and, hence, the experts have not thought about or dealt with the topic of sustainability criteria for the

Desertec concept in detail. Furthermore, it was mentioned that sustainability criteria are not a matter of an armchair decision, but have to be developed in a participatory way (e.g., in a dialogue) and that, until now, neither stakeholders from the north nor the south have concrete knowledge about problems that could occur during the implementation or, for example, regarding ecological impacts of CSP power plants. Therefore, it was stated by an expert from the field of science (expert 5) and an expert from the industry (expert 3) that it might be too early to suggest specific sustainability criteria. These arguments are reflected in the wide range of ideas for sustainability criteria that remained somehow unspecific. Ideas span from broad suggestions for the classification of criteria along the three dimensions of sustainability (social, ecologic and economic criteria should be taken into account) to more specific criteria like employment rate, for the social dimension, and water usage of a CSP plant, for the ecologic dimension. Classifying sustainability criteria along these three dimensions was often mentioned by the experts (e.g., by expert 3 and expert 5), while the policy expert (expert 9) emphasized that sustainability criteria should be developed rather for the ecological dimension of sustainability, because it might be very difficult in regard to the other dimensions. The maximum amount of electricity that should be transferred to Europe mentioned by an expert from the field of science (expert 4) can be regarded as a superordinate criterion. Technology transfer was also suggested as a sustainability criterion by an expert from an NGO (expert 8). Another expert from an NGO (expert 7) suggested education as a sustainability criterion. However, as mentioned before, technology transfer and education were also suggested as benefits that could result from the implementation of the Desertec concept. Furthermore, it was suggested that criteria should be locally adjusted by different experts from the field of science (expert 5), industry (expert 3) and by an expert from a NGO (expert 7), because the local and regional situation and needs of the target countries, which can be very diverse, should be taken into account. In accordance with chapter 3.6, an expert from a NGO (expert 7) mentioned that criteria should

be steplike at first, because otherwise, especially, local industry that cannot fulfill criteria ad hoc would be excluded. Another criterion suggested by an expert from the field of science (expert 4) is to take into account material flows that are necessary to build a power plant. Participation rights and access rights were also mentioned as sustainability criteria (expert 3 and expert 9). However, as mentioned before, instead of giving a full scale catalogue of sustainability criteria, experts suggest approaches to develop such a catalogue. In regard to this subtheme, the overall message here is to develop criteria in a living, iterative, fault-tolerant process where the focus is on gaining knowledge, as suggested by an expert from the industry (expert 3). Knowledge about what procedural criteria should look like could, e.g., be gained through reference projects. It was also stated by an expert from a NGO in the MENA region (expert 8) that, at the moment, there is no space for the communication that is needed to engage in a dialogue about sustainability criteria and which gives, for example, NGOs from the south a platform to communicate or address these and other issues. However, it was pointed out that also criteria modules could be developed (e.g., for specific countries or for specific situations like the building of a transmission line or the building of a CSP plant). Reasons for sustainability criteria that were mentioned are the social acceptance from the population in the target countries for economic and security reasons, because if no benefits are delivered and, hence, the concept is not accepted socially, it might, for example, be difficult to secure CSP plants. Another reason stated is, that due to sustainability criteria the delivering of benefits could be ensured and that the issue of water usage of CSP plants would be addressed. However, as mentioned before “knowledge” or ideas about sustainability criteria varied greatly among the experts. While all experts expressed a need for those criteria, there was only little knowledge about what the criteria should actually look like. The most specific criteria mentioned were employment rate and water usage of a CSP plant. Emphasize was placed on procedural instead of preliminary “fixed” sustainability criteria.

Certification systems were received as controversial issues by the experts. Nearly all experts had serious doubts about certification systems because a certification system would be too complex and too difficult to set up, and it would not have the capacity to deal with the various requirements it would have to fulfill. Also, a certification system was criticized by an expert from the industry (expert 1) because it is not clear what benefit an investor or project operator would gain through certification and that outsiders could potentially profit from certification. However, experts also pointed out that they do not regard themselves as experts for the specific topic of certification systems and do not have detailed knowledge on how a certification system actually works. Some experts, such as an expert from an NGO (expert 3) and an expert from the field of science (expert 5), had serious resentments against the term certification itself because there have been negative experiences in other sectors. The question was also raised as to what should actually be certified (e.g., the electricity or a certain power plant)? These critiques aside, experts agreed that sustainability criteria have to be verified in a way where compliance with the criteria is ensured. A suggestion was given by an expert from the industry (expert 3) that one could adapted an approach from the climate policy sector where compliance is ensured due to a system based on Monitoring, Reporting and Verification. Suggestions for structures that could control the compliance with sustainability criteria were contrary. While some experts suggested that the Desertec Foundation could fulfill this role (expert 5), others doubted this same concept (expert 2 and expert 3) due to insufficient resources of the Desertec Foundation. It was also suggested by an expert from an NGO that no organization is needed, because the governments of a certain country have to decide if compliance with sustainability criteria are met or not (expert 8). However, as also stated in the context of sustainability criteria, experts mentioned that it is too early to suggest exactly how compliance with sustainability criteria could be reached.

6.1 Discussion – Stakeholder Analysis

First of all, it should be mentioned that the results of the stakeholder analysis, especially table 17 and figure 6, are negotiable. The evaluation of the influence, interest and importance of the stakeholder, while based on the statements expressed of the experts, is affected by the knowledge and experience of the author, which is somewhat subjective. It is mentioned in the literature (e.g., Reed, 2009) that a stakeholder analysis should be carried out by a team of researchers so as to reduce any bias. However, this was, of course, not possible in this study. Also, the statements of the experts regarding the importance and influence of the stakeholders were partly conflictive and stakeholders had contrary viewpoints regarding this issue. For example, investors were seen, on the one hand, as very important and, on the other hand, to be of minor importance. Having said this, the stakeholder analysis should be regarded as a preliminary analysis on which further studies can build.

Nevertheless, it was possible to identify several common themes (see table 16). The DII is regarded as a "driving force" and a key player for the implementation of the Desertec concept by almost all experts. The leading position that the DII holds, is based on their shareholders, which were, for example, acknowledged as reliable and trusted by an expert from the field of science (expert 4). Furthermore, it was mentioned by another expert from the field of science (expert 6) that the DII has a high media coverage that strengthened the awareness for the Desertec concept and, hence, helps to shape public opinion in a favorable way. Also, the DII is considered to be capable of stimulating research, the development of policy framework and a business model. For these reasons, the DII can facilitate the operationalization of the Desertec concept. However, it was also stated by an expert of the field of science (expert 5) that the DII is to a certain extent a "blackbox." In other words, little knowledge is available on how exactly the DII wants to implement the Desertec concept and on which issues the DII

attaches great importance. Due to those arguments, the interest, influence and importance of the DII can described as very high. The Desertec Foundation is also seen as an important stakeholder with a leading function. The responsibilities of the Desertec Foundation are seen as a source of ideas and as control entity for sustainability issues. Interest and importance of the Desertec Foundation can be described as high, while the influence is hard to evaluate. In addition, the Munich Re, as a shareholder of the DII, is also regarded as responsible for the sustainable implementation of the Desertec concept, but also has, in contrast to the Desertec Foundation, an economic interest in the concept. While the Munich Re is clearly an important shareholder in the DII, it is one amongst many. Therefore, the influence of the Munich Re was evaluated to have less influence than the whole DII. The Munich Re may have strong interest in the Desertec concept (e.g., Munich Re helped set up the DII), but the Desertec concept is not the main interest of the company and is only one field of activity beneath many others. Hence, also the interest of the Munich Re was evaluated lower than the interest of the DII. Governments were seen as very important by all stakeholders, because they shape the greatly needed policy framework. While it was expressed by an expert from an NGO (expert 8) that some countries, like Morocco, Tunisia and Egypt, have a strong interest in the implementation of the Desertec concept, others may not have such a strong interest. NGOs were overall regarded as important. Some NGOs, for example, in Germany, took up the Desertec concept as a topic for investigation. However, there is little knowledge among the experts about NGOs in the MENA region. For this reason, it is hard to evaluate their interest in the topic. It was mentioned by an expert from the MENA region (expert 8) that NGOs may want to further engage in the topic if a “space for communication” (such as a platform for a dialogue) exists, because this would allow NGOs to raise and allocate resources for participating. Aside from these common themes, investors or funding organizations, such as World Bank or the Global Environmental Facility, are perceived differently by the experts. It was stated by an expert from the

industry (expert 3) that financing organizations are very important, because they can influence the agenda. Other experts, e.g., expert 3 from an NGO, attributed minor importance to financing organizations. The International Renewable Energy Agency (IRENA) was also mentioned as a stakeholder, but experts expressed that it is difficult to describe the role and the importance of this supranational organization. Mostly this is because IRENA was just recently established in 2009 and, hence, has yet to determine a clear role for itself, firstly, in the international context. Moreover, other stakeholders were partially mentioned, but no common theme was seen. In this respect, labor unions (for monitoring job opportunities), project developers, the renewable energy industry and science were mentioned. It is difficult to attribute the influence, interest and importance of these stakeholders, because the experts provided little information about these stakeholders and because agendas, e.g., for the renewable energy industry, might differ strongly. For example, companies that deal with PV technology might not support the Desertec concept. In contrast, companies that provide components for CSP or wind plants might have a strong interest in the Desertec concept.

The interest and especially the importance and influence of the different stakeholder could also change over time. For example it was stated by an expert from the field of science (expert 5) that, at the moment, the DII has a leading position in the industry, but in the midterm local companies and suppliers in the target countries might gain more and more importance.

Based on the statements of the experts and the knowledge of the author, stakeholders were also displayed in the way in which they affect and in how they would be affected by the implementation of the Desertec concept (see figure 6). While, with a higher degree of confidence, it could be said that the DII and governments affect the implementation and the DII is also affected strongly by the implementation, such is more difficult to state for other stakeholders, e.g., NGOs. Nevertheless, it can be anticipated that the local

population of the target countries would be very strongly affected. It was stated in the interviews (e.g., by expert 2 and expert 9) that there could be a lack of participatory processes preventing local populations from affect the implementation. However, the positions of the stakeholders in the rainbow diagram (see figure 6) and, hence, the influence to affect the implementation of the Desertec concept and the impacts an implementation would have on them are debatable.

7. Conclusion

Experts who were interviewed for the purpose of this study expressed the need for sustainability criteria for the Desertec concept. Sustainability criteria have to fulfill two goals. These are ensuring that benefits are actually delivered (especially for the local population in the target countries) and averting anticipated "risks", such as that electricity is not firstly supplied to the population of the target countries, that the water usage of CSP plants is not examined and that participation or land use rights are neglected. At this point in time it is too early to propose a fully scaled sustainability criteria catalogue that is embedded in an overarching sustainability framework for various reasons: First of all, it is very hard to foresee particular problems that will occur during the implementation of the concept (e.g., specific ecological impacts) and, hence, knowledge about needed criteria is insufficient. While sustainability criteria from other examples, e.g., sustainability criteria developed by Labuschagne et al. (2005) (see tables 5 to 8), could provide a base for the development of sustainability criteria, those catalogues are not sufficient for the Desertec concept because they do not address the specific "needs" of the Desertec concept. Moreover, sustainability criteria should be developed in a participatory process especially with stakeholders from the south. The experts emphasized that the participation of stakeholders from the south in such a process is not an "if" but a "must". However, sustainability criteria should take into account all three dimensions of sustainability because, e.g., water usage of CSP plants was emphasized as a critical issue and other benefits claimed by the experts can be grouped under the social or economic dimension of sustainability. In the author's view, establishing a multi-stakeholder dialogue based on the Integrative Theory of Reflexive Dialogues would be the most beneficial way to approach sustainability criteria. Theory and the experts interviewed highlighted the importance of gaining knowledge and learning, as these are important cornerstones for such a process. Stakeholders for the Desertec concept include stakeholders from various backgrounds in regard to the sector they come from (such as the

industry, government, NGOs, science and research) as well as their cultural backgrounds. Therefore, stereotypes have to be overcome, and communication between the stakeholders has to be strengthened. However, trust building can be regarded as a prerequisite for a successful stakeholder dialogue. The issue of different cultural backgrounds seems important for another reason as well: Civil society, which should clearly be included in such a stakeholder dialogue, is shaped differently in the target countries. As political issues, such as democratization, and other non-political issues are interwoven within in the Desertec concept, care should be taken as to how to include and approach the civil society of the target countries. We can expect that a mixture of political and environmental issues would be critical for the (to a great extent) authoritarian governments of the target countries.

Such a process could start with the formulation of a sustainability vision, where stakeholders have to negotiate about what benefits should actually be delivered and, therefore, ensured through sustainability criteria. The benefits mentioned by the experts in this study, which can partially be regarded as stakeholders, show that there is actually an overall agreement of what can be anticipated as the resulting benefits of the Desertec concept for the target countries. However, the experts interviewed, which represent only a small part of whole range of stakeholders, do not, to a large existent, include the perspectives of stakeholders from the target countries. Therefore, the results cannot claim to provide an exhaustive list of arguments or perspectives regarding the issue of benefits, challenges and risks. Nevertheless, the process of developing sustainability criteria based on a common sustainability vision, principles and sustainable indicators, which are based on those criteria and operationalize the criteria, seems to be appropriate for the Desertec concept. However, it seems also to be clear that those criteria must be specific to the region or country they are designed for.

A further suggestion is to break down the Desertec concept into different processes that play a role in the implementation of the concept, including,

among others, the enhancement of the electricity grid, the development of a sound business model and the development of references projects. This fragmentation seems to be useful because different sustainability criteria are needed for the different processes or elements of the Desertec concept and because the importance, interest and influence of stakeholders may vary in those processes. While focusing on those processes, an in-depth stakeholder analysis may reveal a more complete picture of the stakeholders that have to be included and about the roles those stakeholders play.

Since participation can be described as a buzz word, a definition of this term is needed. Hence, it should be specified what is actually meant by this term in the context of the Desertec concept. Helpful in this respect are the questions asked by Berghöfer and Berghöfer (2006), which should be investigated and answered when possible. Participation in the Desertec concept can be divided into participation on a higher hierarchical level, such as the development of a policy framework, and the direct participation of people on site, e.g., during the construction of a CSP power plant. In the latter, procedural criteria of how to include people in such a process could play a role; yet, local customs should be acknowledged and understood.

One challenge is how to ensure compliance with sustainability criteria. A certification system might be too complex to set up and may not being capable, in the experts' view, of fulfilling the various requirements. It is, therefore, given a sharp critique. Another possibility is leaving the decision as to when compliance with the sustainability criteria is reached up to the countries and/of governments. However, this could also lead to a "race to the bottom" as observed in other examples, such as the CDM. Therefore, the best approach would be to set up minimum requirements that have to be acknowledged by all countries that take part in the Desertec concept.

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References

Aghamanoukjan, A., Buber, R., Meyer, M. (2007): Qualitative Interviews, in Buber, R., Holzmüller, H. H.: Qualitative Marktforschung. Konzepte – Methoden – Analysen. 1st ed. Betriebswirtschaftlicher Verlag Dr. Th. Gabler, Wiesbaden, pp. 417–434.

Al-Widyan, M. I., Al-Muhtaseb, M. A. (2009): Institutional Aspects of Regional Energy Systems, in Mason, M., Mor, A.: Renewable Energy in the Middle East. Enhancing Security through Regional Cooperation. Springer-Verlag, Dordrecht, pp. 177–195.

Azapagic, A. (2004): Developing a framework for sustainable development indicators for the mining and minerals industry. *Journal of cleaner production,* 12:639–662.

Berghöfer, U., Berghöfer, A. (2006): 'Participation' in Development Thinking - Coming to Grips with a Truism and its Critiques, in Stoll-Kleemann, S., Welp, M.: Stakeholder Dialogues in Natural Resources Management. Theory and Practice. Springer-Verlag, Berlin, Heidelberg, pp. 79–116.

Bhattacharyya, R., Asokan, A., Bhattacharya, P., Prasad, R. (2009): The potential of certification for conservation and management of wild MAP resources. *Biodiversity Conservation,* 18:3441–3451.

Biggs, S., Matsaert, H. (1999): An actor-oriented approach for strengthening research and development capabilities in natural resource systems. *Public Administration adn Development,* 19:231–262.

Binder, C. R., Feola, G., Steinberger, J. K. (2010): Considering the normative, systemic and procedural dimensions in indicator-based sustainability assessments in agriculture. *Environmental Impact Assessment Review,* 30:71–81.

Bohm, D. (1996): On Dialogue. Routledge, New York.

Boyd, E., Hultman, N., Roberts, J. T., Corbera, E., Cole, J., Bozmoski, A., Ebeling, J., Tippman, R., Mann, P., Brown, K., Liverman, D. M. (2009): Reforming the CDM for sustainable development: lessons learned and policy futures. *Environmental Science & Policy,* 12:820–831.

Brauch, H. G. (2006): Desertification - A new security challenge for the Mediterranean? Policy agenda for recognising and coping with fatal outcomes of global environmental change and potentially violent societal consequences, in Kepner, W. G., Rubio, J. L., Mouat, D. A., Pedrazzini, F.: Desertification in the Mediterranean Region. A Security Issue. NATO Security through Science Series. Springer Netherlands, Dordrecht, pp. 11–85.

Brauch, H. G., Spring, U. O., Grin, J., Mesjasz, C., Kameri-Mbote, P., Behera, N. C., Chourou, B., Krummenacher, H. (Eds.) (2009): Facing Global Environmental Change. Environmental, Human, Energy, Food, Health and Water Security Concepts. Springer-Verlag, Berlin, Heidelberg.

Brent, A. C., Heuberger, R., Manzini, D. (2005): Evaluating projects that are potentially eligible for Clean DevelopmentMechanism (CDM) funding in the South African context: a case study to establish weighting values for sustainable development criteria. *Environment and Development Economics,* 11:631–649.

Brooks, D. B. (2007): Fresh Water in the Middle East and North Africa, in Lipchin, C., Pallant, E., Saranga, D., Amster, A.: Integrated Water Resources Management and Security in the Middle East. Springer-Verlag, Dordrecht, pp. 33–64.

Broom, A. (2005): Using qualitative interviews in CAM research: A guide to study design, data collection and data analysis. *Complementary Therapies in Medicine,* 13:65–73.

Brown, K., Adger, W. N., Boyd, E., Corbera-Elizalde, E., Shackley, S. (2004): How do CDM projects contribute to sustainable development? Tyndall Centre Technical Report No. 16, Tyndall Centre for Climate Change Research, http://www.tyndall.ac.uk/sites/default/files/it1_13.pdf Accessed: 24.10.2010.

Brugha, R., Varvasovszky, Z. (2000): Stakeholder analysis: a review. *Health policy and planning,* 15:239–246.

Buber, R., Holzmüller, H. H. (Eds.) (2007): Qualitative Marktforschung. Konzepte – Methoden – Analysen. Betriebswirtschaftlicher Verlag Dr. Th. Gabler, Wiesbaden.

Buchholz, T., Luzadis, V. A., Volk, T. A. (2009): Sustainability criteria for bioenergy systems: results from an expert survey. *Journal of cleaner production,* 17:86–98.

Bullmann, U., Eißel, D., Grasse, A. (Eds.) (2008): Finanzmarkt ohne Grenzen? Regionalisierung in Europa, 6. VS Verlag für Sozialwissenschaften, Wiesbaden.

Castanada, F., Palmberg-Lerche, C., Vuorinen, P. (2001): Criteria and indicators for sustainable forest management: a compendium. An FAO Forestry Department working paper, http://www.fao.org/docrep/004/AC135E/ac135e00.HTM Accessed: 15.6.2010.

Chevalier, J. M., Buckles, D. J. (2008): A Guide to Collaborative Inquiry and Social Engagement. SAGE Publications, New Delhi, International Development Research Centre, http://www.idrc.ca/openbooks/418-5 Accessed: 11.06.2010.

CIFOR Center for International Forestry Research (1999): Guidelines for Developing, Testing and Selecting Criteria and Indicators for Sustainable Forest Management, Brussels, http://www.cifor.cgiar.org/Knowledge/Publications/DocumentDownloader?a=d&p=http:\\www.cifor.cgiar.org\acm\download\toolbox1.zip Accessed: 24.10.2010.

Cramer, J., Wissema, E., de Bruijne, M., Lammers, E., Dijk, D., Jager, H., van Bennekom, S., Breunesse, E., Horster, R., van Leenders, C., Wonink, S., Wolters, W., Kip, H., Stam, H., Faaij, A., Kwant, K. (2007): Testing framework for sustainable biomass. Final report from the project group "Sustainable production of biomass", http://www.lowcvp.org.uk/assets/reports/070427-Cramer-FinalReport_EN.pdf Accessed: 24.10.2010.

CTF Clean Technology Fund (2009): Clean Technology Fund Investment Plan for Concentrated Solar Power in the Middle East and North Africa Region. Inter-sessional Meeting of The CTF Trust Fund Committee, Washington, D.C., http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/mna_csp_ctf_investment_plan_111009.pdf Accessed: 17.07.2010.

De Lopez, T. T.: Stakeholder Management for Conservation Projects: A Case Study of Ream National Park, Cambodia. *Environmental Management,* 28:47–60.

Delzeit, R., Holm-Muller, K. (2009): Steps to discern sustainability criteria for a certification scheme of bioethanol in Brazil: Approach and difficulties. *Energy,* 34:662–668.

DII Desertec Industrie Initiative (2010b): Desertec: Broad support from all sectors of the economy - A further 15 companies join the Desertec Industrial Initiative as Associated Partners. press release, Munich, DII Desertec Industrie Initiative.

DII Desertec Industrie Initiative (2010a): Desertec: Enel Green Power, NAREVA Holding, Red Eléctrica de Espana and Saint-Gobain Solar become part of joint venture. press release, Munich, DII Desertec Industrie Initiative.

DII Desertec Industrie Initiative (2009): Gemeinschaftsunternehmen DII nimmt Arbeit auf. press release, Munich, DII Desertec Industrie Initiative.

DLR Deutsches Zentrum für Luft- und Raumfahrt (2005): MED-CSP. Concentrating Solar Power for the Mediterranean Region. Final Report, Stuttgart.

DLR Deutsches Zentrum für Luft- und Raumfahrt (2006): TRANS-CSP. Trans-Mediterranean Interconnection for Concentrating Solar Power. Final Report, Stuttgart.

DLR Deutsches Zentrum für Luft- und Raumfahrt (2007): AQUA-CSP. Concentrating Solar Power for Seawater Desalination. Final Report, Stuttgart.

Desertec Foundation (2009): Clean power from the deserts. The DESERTEC Concept for Energy, Water and Climate Security. WhiteBook, 4th Edition, Protext Verlag, Bonn.

École polytechnique fédérale de Lausanne (2010). Website, http://cgse.epfl.ch/page84341.html Accessed: 08.02.2010.

Flick, U., Von Kardorff, E., Steinke, I. (Eds.) (2005): Qualitative Forschung. Ein Handbuch. Rowohlt Taschenbuch Verlag, Hamburg.

Font, X. (2002): Environmental certification in tourism and hospitality: progress, process and prospects. *Tourism Management,* 23:197–205.

FSC Forest Stewardchip Council (1996): FSC International Standard. FSC Principles and Criteria for Forest Stewardship, Bonn, http://www.fsc.org/fileadmin/web-data/piblic/document_center/international_FSC_policies/standards/FSC_STD_01_001_V4_0_EN_FSC_Principles_and_Criteria.pdf Accessed: 24.10.2010.

Gasparatos, A., El-Haram, M., Horner, M. (2008): A critical review of reductionist approaches for assessing the progress towards sustainability. *Environmental Impact Assessment Review,* 28:286–311.

Gläser, J., Laudel, G. (2009): Experteninterviews und qualitative Inhaltsanalyse. als Instrument rekonstruierender Untersuchungen. VS Verlag für Sozialwissenschaften, Wiesbaden.

Gómez-Limón, J. A., Sanchez-Fernandez, G. (2010): Empirical evaluation of agricultural sustainability using composite indicators. *Ecological economics,* 69:1062–1075.

González, J. G., Schomerus, T. (2010): Der Gold Standard als Garant für die Nachhaltigkeit von CDM-Projekten in Entwicklungsländern? *Arbeitspapierreihe Wirtschaft & Recht,* 5.

Grimble, R., Wellard, K. (1997): Stakeholder Methodologies in Natural Resource Management: a Review of Principles, Contexts, Experiences and Opportunities. *Agricultural Systems,* 55:173–193.

GS Gold Standard (2010): Gold Standard in a Nutshell, http://www.cdmgoldstandard.org/About-Gold-Standard.62.0.html Accessed: 16.06.2010.

Hacking, T., Guthrie, P. (2008): A framework for clarifying the meaning of Triple Bottom-Line, Integrated, and Sustainability Assessment. *Environmental Impact Assessment Review,* 28:73–89.

Hartmuth, G., Huber, K., Rink, D. (2008): Operationalization and Contextualization of Sustainability at the Local Level. *Sustainable Development,* 16:261–270.

Haywood, L., de Wet, B. (2009): Sustainability Assessment: A Tool for Planning for Sustainability as a desired Outcome for a proposed Development, International Association for Impact Assessment (South Africa) Conference, http://researchspace.csir.co.za/dspace/bitstream/10204/3616/1/Haywood_d1_2009.pdf Accessed: 16.06.2010.

Heese, B. (2009): Die Union für das Mittelmeer. Zwei Schritte vor, einen zurück? LIT-Verl., Berlin.

Hellström, E. (2006): Science in Support of the Forest Biodiversity Programme for Southern Finland. Working from the inside, in Stoll-Kleemann, S., Welp, M.: Stakeholder Dialogues in Natural Resources Management. Theory and Practice. Springer-Verlag, Berlin, Heidelberg, pp. 241–260.

Heuberger, R. (2003): CDM Projects under the Kyoto Protocol of the UNFCCC: A Methodology for Sustainable Development Assessment and an Application in South Africa. Diploma Thesis of Renat Heuberger In cooperation with Christoph Sutter, http://e-collection.ethbib.ethz.ch/eserv/eth:26271/eth-26271-01.pdf Accessed: 24.10.2010.

Heuberger, R., Brent, A. C., Santos, L., Sutter, C., Imboden, D. (2007): CDM Projects under the Kyoto Protocol: A Methodology for Sustainability Assessment - Experiences from South Africa. *Environment, Development and Sustainability,* 9:33–48.

Hohl, J. (2000): Das qualitative Interview. *Zeitschrift für Gesundheitswissenschaft,* 8:142–148.

Hugé, J., Le Trinh, H., Hai, H. P., Kuilman, J., Hens, L. (2009): Sustainability indicators for clean development mechanism projects in Vietnam. *Environment, Development and Sustainability,* 12:561–571.

Jepsen, A. L., Eskerod, P. (2009): Stakeholder analysis in projects: Challenges in using current guidelines in the real world. *International Journal of Project Management,* 27:335–343.

Kepner, W. G., Rubio, J. L., Mouat, D. A., Pedrazzini, F. (Eds.) (2006): Desertification in the Mediterranean Region. A Security Issue. NATO Security through Science Series. Springer Netherlands, Dordrecht.

Khalifa, M. A., Connelly, S. (2009): Monitoring and guiding development in rural Egypt: local sustainable development indicators and local Human Development Indices. *Environment, Development and Sustainability,* 11:1175–1196.

Kondyli, J. (in press): Measurement and evaluation of sustainable development A composite indicator for the islands of the North Aegean region, Greece. *Environmental Impact Assessment Review*.

Kühl, S., Strodtholz, P., Taffertshofer, A. (Eds.) (2009): Handbuch Methoden der Organisationsforschung. Quantitative und Qualitative Methoden. VS Verlag für Sozialwissenschaften, Wiesbaden.

Labuschagne, C., Brent, A. C., van Erck, R. P. G. (2005): Assessing the sustainability performances of industries. *Journal of cleaner production,* 13:373–385.

Læssøe, J. (2008): Participation and Sustainable Development: The Role and Challenges of Mediating Agents, in Reid, A., Jensen, B. B., Nikel, J., Simovska, V.: Participation and Learning. Perspectives on Education and the Environment, Health and Sustainability. Springer Netherlands, pp. 144–158.

Lammerts van Bueren, E., Blom, E. (1996): Hierarchical Framework for the Formulation of Sustainable Forest Management Standards, Wageningen, http://www.piec.org/PathFinder/Pathfinder_portal/Instruments_Engl/A3-Hierarchical_framework/print/CI_framework_PF.pdf Accessed: 01.07.2010.

Lewandowski, I., Faaij, A. P. C. (2006): Steps towards the development of a certification system for sustainable bio-energy trade. *Biomass and Bioenergy,* 30:83–104.

Liebold, R., Trinczek, R. (2009): Experteninterview, in Kühl, S., Strodtholz, P., Taffertshofer, A.: Handbuch Methoden der Organisationsforschung. Quantitative und Qualitative Methoden. 1st ed. VS Verlag für Sozialwissenschaften, Wiesbaden, pp. 32–56.

Lipchin, C., Pallant, E., Saranga, D., Amster, A. (Eds.) (2007): Integrated Water Resources Management and Security in the Middle East. Springer-Verlag, Dordrecht.

Loheide, J. (2008): Interviews mit Experten – zum Methodischen Vorgehen, in Bullmann, U., Eißel, D., Grasse, A.: Finanzmarkt ohne Grenzen? 1st ed. Regionalisierung in Europa 6. VS Verlag für Sozialwissenschaften, Wiesbaden, pp. 111–134.

Lyytimäki, J., Rosenström, U. (2008): Skeletons Out of the Closet: Effectiveness of Conceptual Frameworks for Communicating Sustainable Development Indicators. *Sustainable Development,* 16:303–313.

Mascarenhas, A., Coelho, P., Subtil, E., Ramos T. B. (2010): The role common local indicators on regional sustainability assessment. *Ecological Indicators,* 10:646–656.

Mason, M., Mor, A. (Eds.) (2009): Renewable Energy in the Middle East. Enhancing Security through Regional Cooperation. Springer-Verlag, Dordrecht.

Mayring, P. (2000): Qualitative Inhaltsanalyse. *Forum: Qualitative Sozialforschung,* 1, http://www.qualitative-research.net/index.php/fqs/article/view/1089/2384 Accessed: 23.07.2010.

Meuser, M., Nagel, U. (2009): Das Experteninterview – konzeptionelle Grundlagen und methodische Anlage, in Pickel, S., Pickel, G., Lauth, H.-J., Jahn, D.: Methoden der vergleichenden Politik- und Sozialwissenschaft. Neue Entwicklungen und Anwendungen. 1st ed. VS Verlag für Sozialwissenschaften, Wiesbaden, pp. 465–479.

Mey, G., Mruck, K. (2007): Qualitative Interviews, in Naderer, G., Balzer, E.: Qualitative Marktforschung in Theorie und Praxis. Grundlagen, Methoden und Anwendungen. 1st ed. Gabler Verlag, Wiesbaden.

MPWG Montreal Process Working Group (2009): Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests, Montreal, http://www.rinya.maff.go.jp/mpci/2009p_4.pdf Accessed: 24.10.2010.

Mrosek, T., Balsillie, D., Schleifenbaum, P. (2006): Field testing of a criteria and indicators system for sustainable forest management at the local level. Case study results concerning the sustainability of the private forest Haliburton Forest and Wild Life Reserve in Ontario, Canada. *Forest Policy and Economics,* 8:593–609.

Mutersbaugh, T., Klooster, D., Renard, M.-C., Taylor, P. (2005): Certifying rural spaces: Quality-Certified Products and Rural Governance. *Journal of Rural Studies,* 21:381–388.

Naderer, G., Balzer, E. (Eds.) (2007): Qualitative Marktforschung in Theorie und Praxis. Grundlagen, Methoden und Anwendungen. Gabler Verlag, Wiesbaden.

Nardo, M., Saisana, M., Saltelli, A., Tarantola, S., Hoffman, A., Giovannini, E. (2005): Handbook on Constructing Composite Indicators. Methodology and Users Guide, http://ideas.repec.org/p/oec/stdaaa/2005-3-en.html Accessed: 09.06.2010.

Nussbaumer, P. (2009): On the contribution of labelled Certified Emission Reductions to sustainable development: A multi-criteria evaluation of CDM projects. *Energy policy,* 37:91–101.

Oels, A. (2006): Evaluating Stakeholder Dialogues, in Stoll-Kleemann, S., Welp, M.: Stakeholder Dialogues in Natural Resources Management. Theory and Practice. Springer-Verlag, Berlin, Heidelberg, pp. 117–151.

Olsen, K. H., Fenhann, J. (2008): Sustainable development benefits of clean development mechanism projects A new methodology for sustainability assessment based on text analysis of the project design documents submitted for validation. *Energy policy,* 36:2819–2830.

Olsen, K. H. (2007): The clean development mechanism's contribution to sustainable development: a review of the literature. *Climatic Change,* 84:59–73.

Pfadenhauer, M. (2007): Das Experteninterview. Ein Gespräch auf gleicher Augenhöhe, in Buber, R., Holzmüller, H. H.: Qualitative Marktforschung. Konzepte – Methoden – Analysen. 1st ed. Betriebswirtschaftlicher Verlag Dr. Th. Gabler, Wiesbaden, pp. 451–460.

Pickel, S., Pickel, G., Lauth, H.-J., Jahn, D. (Eds.) (2009): Methoden der vergleichenden Politik- und Sozialwissenschaft. Neue Entwicklungen und Anwendungen. VS Verlag für Sozialwissenschaften, Wiesbaden.

Poullikkas, A. (2009): Economic analysis of power generation from parabolic trough solar thermal plants for the Mediterranean region-A case study for the island of Cyprus. *RENEWABLE & SUSTAINABLE ENERGY REVIEWS,* 13:2474–2484.

Pretty, J. N. (1995): Participatory Learning For Sustainable Agriculture. *World Development,* 23:1247–1263.

Proforest (2005): Developing a mechanism for palm oil traceability from plantation to end user. Discussion paper1 A background review of supply chain traceability options, Oxford, http://www.proforest.net/publication-objects/RSPO_Discussion_paper1_final.pdf Accessed: 24.10.2010.

PWC PrinceWaterhouseCoopers (2010): 100% renewable electricity. A roadmap to 2050 for Europe and North Africa, http://uk.sitestat.com/pwc/uk/s?ukws.eng_issues.pdf.sustainability.100_percent_renewable_electricity&ns_type=pdf Accessed: 17.05.2010.

Reed, M. S. (2008): Stakeholder participation for environmental management: A literature review. *Biological Conservation,* 141:2417–2431.

Reed, M. S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., Prell, C., Quinn, C. H., Stringer, L. C. (2009): Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management,* 90:1933–1949.

Reid, A., Jensen, B. B., Nikel, J., Simovska, V. (Eds.) (2008): Participation and Learning. Perspectives on Education and the Environment, Health and Sustainability. Springer Netherlands.

Richter, C., Teske, S., Short, R. (2008): Sauberer Strom aus den Wüsten. Globaler Ausblick auf die Entwicklung solarthermischer Kraftwerke 2009, Greenpeace International (Amsterdam); Solar Paces (Tabernas); Estela (Brussels), http:/www.solarpaces.org/Library/docs/CSP2009_German.pdf Accessed: 12.06.2010.

RSB Roundtable on Sustainable Biofuels (2009): RSB Principles & Criteria for Sustainable Biofuel Production, http://energycenter.epfl.ch/webdav/site/cgse/shared/Biofuels/Version One/Version 1.0/09-11-17 RSB PCs Version 1 (clean).pdf Accessed: 01.02.2010.

RSB Roundtable on Sustainable Biofuels (2010): The Roundtable on Sustainable Biofuels - Website, http://energycenter.epfl.ch/page65660.html Accessed: 12.06.2010.

Saisana, M., Tarantola, S. (2002): State-of-the-art Report on Current Methodologies and Practices for Composite Indicator Development. Joint Research Center, Italy, http://composite-indicators.jrc.ec.europa.eu/Document/state-of-the-art_EUR20408.pdf Accessed: 24.10.2010.

Scheffran, J. (2006): Tools for Stakeholder Assessment and Interaction, in Stoll-Kleemann, S., Welp, M.: Stakeholder Dialogues in Natural Resources Management. Theory and Practice. Springer-Verlag, Berlin, Heidelberg, pp. 153–185.

Scheffran, J. (2007): Dimensionen der Evaluation transdisziplinärer Nachhaltigkeitsforschung am Beispielt der USA, in Stoll-Kleemann, S., Pohl, C.: Evaluation inter- und transdisziplinärer Forschung: Humanökologie und Nachhaltigkeitsforschung auf dem Prüfstand. Ökom, München, pp. 137–154.

Schinke, B., Klawitter, J. (2010): DESERTEC - Baustein einer neuen Sicherheitsarchitektur innerhalb des MENA-Eu-Raums?, Bonn, Germanwatch, http://www.krium.de/images/stories/hintergrundpapier_desertec.pdf Accessed: 10.04.2010.

Schmeer, K. (1999): Guidelines for Conducting a Stakeholder Analysis. Abt Associates Inc., http://www.who.int/management/partnerships/overall/GuidelinesConductingStakeholderAnalysis.pdf Accessed: 25.07.2010.

Schmidt, C. (2005): Analyse von Leitfadeninterviews, in Flick, U., Von Kardorff, E., Steinke, I.: Qualitative Forschung. Ein Handbuch. Rowohlt Taschenbuch Verlag, Hamburg, pp. 447–456.

Schnatbaum, L. (2009): Solar thermal power plants. *European Physical Journal - Special Topics,* 176:127–140.

Sharpe, A. (2004): Literature Review of Frameworks for Macro-Indicators. Centre for the Study of Living Standards, Ottawa, http://ideas.repec.org/p/sis/resrep/0403.html Accessed: 08.07.2010.

Sherry, E., Halseth, R., Fondahl, G., Karjala, M., Leon, B. (2005): Local-level criteria and indicators: an Aboriginal perspective on sustainable forest management. *Forestry,* 78:514–539.

Steinberg, G. (2009): Deutsche Nah-, Mittelost- und Nordafrikapolitik. Interessen, Strategien, Handlungsoptionen. Stiftung Wissenschaft und Politik, Berlin, http://www.swp-berlin.org/common/get_document.php?asset_id=5977 Accessed: 24.08.2010.

Stoll-Kleemann, S., Pohl, C. (Eds.) (2007): Evaluation inter- und transdisziplinärer Forschung: Humanökologie und Nachhaltigkeitsforschung auf dem Prüfstand. Ökom, München.

Stoll-Kleemann, S., Welp, M. (Eds.) (2006): Stakeholder Dialogues in Natural Resources Management. Theory and Practice. Springer-Verlag, Berlin, Heidelberg.

Stoll-Kleemann, S., Welp, M. (2006): Towards a More Effective and Democratic Natural Resources Management, in Stoll-Kleemann, S., Welp, M.: Stakeholder Dialogues in Natural Resources Management. Theory and Practice. Springer-Verlag, Berlin, Heidelberg, pp. 17–39.

Sutter, C. (2003): Sustainability Check-Up for CDM Projects. How to assess the sustainability of international projects under the Kyoto Protocol. Wissenschaftlicher Verlag Berlin, Berlin,

http://www.up.ethz.ch/publications/documents/Sutter_2003_Sustainability_Check-Up_for_CDM_Projects_e-book.pdf Accessed: 24.10.2010.

Sutter, C., Parreno, J. C. (2007): Does the current Clean Development Mechanism (CDM) deliver its sustainable development claim? An analysis of officially registered CDM projects. *Climatic Change,* 84:75–90.

Ticona, J. M., Frota, M. N. (2008): Assessment of the economic impact of product certification: A significant area of application of measurement. *Measurement,* 41:88–104.

Trieb, F., Krewitt, W., May, N. (2009): Solar Energy as a Key for Power and Water in the Middle East and North Africa, in Brauch, H. G., Spring, U. O., Grin, J., Mesjasz, C., Kameri-Mbote, P., Behera, N. C., Chourou, B., Krummenacher, H.: Facing Global Environmental Change. Environmental, Human, Energy, Food, Health and Water Security Concepts. Springer-Verlag, Berlin, Heidelberg.

Trieb, F., Mueller-Steinhagen, H. (2007): Europe-Middle East-North Africa cooperation for sustainable electricity and water. *SUSTAINABILITY SCIENCE,* 2:205–219.

UN United Nations (2008): Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, *World Population Prospects: The 2008 Revision*, Website, http://esa.un.org/unpp, Accessed: 10.02.2010.

Valentin, A., Spangenberg, J. H. (2000): A guide to community sustainability indicators. *Environmental Impact Assessment Review,* 20:381–392.

Vallentin, D., Viebahn, P. (2009): Ökonomische Chancen für die deutsche Industrie resultierend aus einer weltweiten Verbreitung von CSP (Concentrated Solar Power) - Technologien. Projektbericht, Wuppertal, Wuppertal Institut, http://www.greenpeace.de/fileadmin/gpd/user_upload/themen/energie/Greenpeace_CSP_DeutscheWertschoepfung_Projektbericht_final_v2.psf Accessed: 12.01.2010.

van Cauwenbergh, N., Biala, K., Bielders, C., Brouckaert, V., Franchois, L., Garcia Cidad, V., Hermy, M., Mathijs, E., Muys, B., Reijnders, J., Sauvenier, X., Valckx, J., Vanclooster, M., van der Veken, B., Wauters, E., Peeters, A. (2007): SAFE - A hierarchical framework for assessing the sustainability of agricultural systems. *Agriculture, Ecosystems and Environment,* 120:229–242.

van Dam, J., Junginger, M., Faaij, A., Jürgens, I., Best, G., Fritsche, U. (2008): Overview of recent developments in sustainable biomass certification. *Biomass and Bioenergy,* 32:749–780.

van de Kerkof, M. (2006): Making a difference: On the constraints of consensus building and the relevance of deliberation in stakeholder dialogues. *Policy Science,* 39:279–299.

van Son, P.: Dii – Desertec Industrial Initiative. Bringing the Desertec concept into reality. 17. Handelsblatt Jahrestagung Energiewirtschaft 2010, Berlin.

Varis, O., Abu-Zeid, K. (2009): Socio-Economic and Environmental Aspects of Water Management in the 21st Century: Trends, Challenges and Prospects for the MENA Region. *International Journal of Water Resources Development,* 25:507–522.

WCED World Commission on Environment and Development (1987): Our Common Future. Oxford University Press, Oxford.

Welp, M., de la Vega-Leinert, A. C., Stoll-Kleemann, S., Fürstenau, C. (2006): Science-based Stakeholder Dialogues in Climate Change Research, in Stoll-Kleemann, S., Welp, M.: Stakeholder Dialogues in Natural Resources Management. Theory and Practice. Springer-Verlag, Berlin, Heidelberg, pp. 213–240.

Welp, M., de la Vega-Leinert, A. C., Stoll-Kleemann, S., Jaeger, C. C. (2006a): Science-based stakeholder dialogues: Theory and tools. *Global Environmental Change,* 16:170–181.

Welp, M., Stoll-Kleemann, S. (2006): Integrative Theory of Reflexive Dialogues, in Stoll-Kleemann, S., Welp, M.: Stakeholder Dialogues in Natural Resources Management. Theory and Practice. Springer-Verlag, Berlin, Heidelberg, pp. 43–78.

Werenfels, I., Westphal, K. (2009): Solarstrom aus der Wüste. Sinnvoll und machbar? Stiftung Wissenschaft und Politik, Berlin, http://www.swp-berlin.org/produkte/swp_aktuell_detail.php?id=10984&PHPSESSID=dd660c4db383e4d0bcaf294cbff0efb9 Accessed: 23.03.2010.

Worrall, R., Neil, D., Brereton, D., Mulligan, D. (2009): Towards a sustainability criteria and indicators framework for legacy mine land. *Journal of cleaner production,* 17:1426–1434.

WWI Worldwatch Institute (2006): Biofuels for Transportation. Global Potential and Implications for Sustainable Agriculture and Energy in the 21st Century - extended summary, Washington, D.C., http://www.worldwatch.org/system/files/EBF038.pdf Accessed: 24.10.2010.

Appendices

Appendix I – Quotes

Remarks to further understand the context of the quotes are written in brackets, e.g., [...].

E1 – Quotes from expert interview 1

Q1	Für die Target-Länder ist ganz klar wirtschaftlicher Aufschwung, Technologie und Know-How, dass sie sich aneignen.
Q2	Der Input oder der Benefit für diese Region, den sehe ich insbesondere darin, dass Arbeitsplätze geschaffen werden.
Q3	Da hängen eben auch viele Sachen dran und es geht sicher auch nicht von heute auf morgen. Straßen, Schiene, Zulieferwege auch Siedlungen – also da wird sich eben ganz viel auch mit dem Thema mit bewegen in der Region.
Q4	Und das ist für mich eben der große Vorteil von DESERTEC, dass die Leittechniktechnologie eine grundlastfähige Technologie ist mit CSP, die mir es eben erlaubt, dass Strom immer produziert werden kann und immer da ist.
Q5	Die politischen Rahmenbedingungen müssen gesetzt sein. Es muss bekannt sein für den Investor wer denn den Strom abnimmt für welchen Preis abnimmt. Also das Geschäftsmodell muss auf dem Tisch liegen.
Q6	Also natürlich könnte Desertec auch scheitern, wenn sich herausstellt, dass die Wettbewerbsfähigkeit nicht erreicht wird.
Q7	Die Wasserthematik ist natürlich nicht zu unterschätzen. […] Weil ich würde eben gerne das Desertec Konzept nachhaltig umgesetzt sehen. Und da ist für mich die Wasserthematik ein sehr wichtige Voraussetzung für die Umsetzung sehen.
Q8	Die Wasserproblematik […] Also das wär für mich ein Thema was man zwingendermaßen in so einem Desertec-Index, was dann für Nachhaltigkeitskriterien und ein entsprechendes Zertifizierungssystem berücksichtig werden muss.
Q9	Also aus meiner Perspektive habe ich die Befürchtung, wenn man zertifiziert, dass es da immer viele gibt die daran mitverdienen.
Q10	Die Frage ist was nützt mir so ein Siegel? Was nützt das Siegel zunächst einem Anlagenbetreiber oder einem Investor der sagt, ich möchte gern ein Kraftwerk bauen, ich gebe Geld dafür und dann vermutlich mehr Geld, wenn ich so ein Siegel kaufe.
Q11	Sehr häufig kommt das Thema Abhängigkeit. […] Und da entgegne ich dann immer drauf: Wir diversifizieren ja viel weiter! Die Anzahl der Erzeugerländer wird viel größer und die individuelle Abhängigkeit wird viel geringer.
Q12	Es gibt Industrieverbände, die da auch drin sind, z.B. Estella. […] Die DII und die Foundation und [die Münchener Rück] würde ich da auf jeden Fall sehen.
Q13	Und unser Zugangspunkt, um nochmal auf die Ausgangsfrage zu kommen, war natürlich der Klimaschutz. Das ist natürlich eher ein langfristiges Ziel. Aber wir sind natürlich schon auch auf der Geschäftsseite interessiert daran.
Q14	Und die Aufgabe [der Münchener Rück] ist jetzt […] sowas wie eine Meinungsführerschaft aus der Wirtschaft heraus beizubehalten […]

E2 – Quotes from expert interview 2

Q1	Stromerzeugung in einem Sonnenintensiven Land und durch erneuerbare Energien und die Stromnutzung in diesem Land und aber gleichzeitig halt auch die Möglichkeit […] diesen Strom auch zu exportieren und da auch noch für die Wirtschaft eine Gewinnkomponente dabei zu haben.
Q2	Also einmal bietet es eine Entwicklungspolitische Chance in den Ländern, weil in vielen Entwicklungsländern die Stromversorgung ein ganz gravierendes Problem ist - gerade im ländlichen Bereich, aber auch in den Städten zu einem großen Problem geworden ist. Und Strom ist der Motor Wirtschaft und Entwicklung. Sei es dass du Schulen und Unternehmen mit Strom versorgen kannst, damit da überhaupt eine Wirtschaftsdynamik entstehen kann.
Q3	[Desertec] Als Chance für die Entwicklung für die demokratische, partizipative Entwicklung der Länder begreifen.
Q4	Die Chance für Europa ist, dass wir das ambitionierte Ziel 100% erneuerbaren Strom im Jahr 2050 aus unserer Sicht nur sehr schwer ohne Großprojekte oder Großproduktionen erneuerbarer Energien im Süden, aber auch im Norden, da aber eher Wind, schaffen werden.
Q5	Ich glaube nicht, dass alle technischen Teile, die man für den Kraftwerkspark oder auch die Stromnetze benötigt, in Europa oder Deutschland […] produziert werden sollten oder dass das überhaupt machbar ist […]. Sondern, dass gewisse Sachen dann auch in der Region gemacht werden sollte.
Q6	Es ist eine einmalige Gelegenheit, diese verschiedenen Herausforderungen und Probleme zu lösen und dann nicht nur für einen, sondern für zwei Kontinente. Du hast also eine Win-Win-Situation, wenn du es gut konzipierst und das hat eine unheimliche Strahlkraft, wenn man es gut macht, auf andere Regionen der Welt.
Q7	Also, das birgt die Gefahr, dass die erzeugte Energie nicht zu erst für die Bürger in dem Land zur Verfügung gestellt wird […] [und] dass dort, wo die Anlagen gebaut oder auch dort wo die Stromnetze gelegt werden, Bevölkerungen nicht beteiligt werden und ihre Beteiligungs- und Zugangsrechte und ihre politischen Rechte vernachlässigt werden.
Q8	Und dann haben wir überlegt, dass man danach geht, welche Menschenrechte sind betroffen, bei der menschenrechtlichen Dimension. Also welche Grundrechte und auch Kriterien dementsprechend entwickelt. Recht auf Nahrung, Recht auf Landnutzung, Recht auf Wasser, Zugangsrechte zu Land und Wasser, dann politische und Zivilrechte - also werden Menschen dort vertrieben oder sind die halt sozusagen in ihrer normalen Lebensform nicht mehr lebensfähig […] und Prozess und Partizipationsrechte […].
Q9	Die Notwendigkeit Nachhaltigkeitskriterien zu entwickeln liegt ganz klar auf der Hand, weil du brauchst sowohl aus den Ländern wo die Investitionen kommen als auch aus den Ländern die dann den Strom produzieren, eine soziale Akzeptanz.
Q10	Dass man dann einen Katalog hat oder Module, Kriterienmodule, die man dann auf verschiedene Gegebenheiten anpassen kann oder zusammenstellen kann. Und, dass diese Kriterien eher Prozesskriterien sind.
Q11	Grundsätzlich weis ich nicht, ob das notwendig ist oder ob das sozusagen der Komplexität der Sache, die Desertec einfach bedeutet, genüge trägt und ob das überhaupt funktioniert. Ich glaube auch, dass so ein Zertifizierungsprozess enorm aufwendig ist und gewissen Sachen nicht gerecht wird, wie z.B. die klimapolitische Dringlichkeit der Sache oder gesamtwirtschaftlicher Nutzen.
Q12	Ein weiteres Problem könnte sein, wenn du das Ganze nicht nachhaltig ökologisch konzeptionierst, du ein absolutes Wasserproblem bekommst in einer Region, die ja schon von Wasserknappheit betroffen ist […].
Q13	Und ich kann mir z.B. nicht vorstellen dass eine Organisation, wie jetzt z.B. die Desertec Foundation, die Überprüfung all dieser verschiedenen, komplexen Bereiche übernehmen kann.
Q14	Die politische Ebene auf europäischer Ebene und in den MENA-Staaten. Dann die Unternehmensebene, da würde ich erstmal sagen DII, aber auch andere, […] die sind ja nicht in der DII drin sind, aber trotzdem Kraftwerksanlagen […] planen. Dann hast du Zivilgesellschaft auf beiden Seiten. […] Eine Ebene, die man mit einbeziehen sollte: Es gibt zivilgesellschaftliche Foren, der mediterranen Region oder Nordafrika und Europa, die sich mit verschiedensten Themen auseinandersetzen und vielleicht auch an die Mittelmeerpartnerschaft gekoppelt sind. […] Und ich glaube wichtige Player, wie IRENA, Worldbank, GEF [sollten mit einbezogen werden].
Q15	Unter der Voraussetzung, dass sie nicht nur ihr Land zur Verfügung stellen, damit dort Strom produziert wird, was dann in riesigen Stromtrassen wegtransportiert wird, sondern dass man gleichzeitig auch Mittel- und Niederspannungsnetze baut, um die Bevölkerung im Umkreis auch an diesem Strom zu beteiligen - also diese Voraussetzung sollte schon gegeben sein.

E3 – Quotes from expert interview 3

Q1	Der Hauptvorteile von solarthermischen Kraftwerken ist der, dass man einen Lastfolgebetrieb gewährleisten kann.
Q2	Man muss also vor Ort Produktionskapazitäten entwickeln. Das bedeutet dass vor Ort Arbeitsplätze entstehen. Das bedeutet aber auch, dass vor Ort Know-How entsteht und man den Bildungsaspekt sozusagen aus wirtschaftlichen Gründen mit erledigt.
Q3	[…] dass man nämlich nicht mehr mit fossilen Energien Meerwasserentsalzung betreibt, sondern mit erneuerbaren Energien. Den kriegt man mit dem Desertec Konzept erschlagen.
Q4	Der Nachteil, dass man halt wieder eine sehr zentrale Struktur hat. Der Vorteil, den die dezentrale Energieerzeugung nach dem Eurosolargedanken bspw. hat, ist der, dass sich natürlich auch die Machtsituation, die Eigentumssituation dezentralisiert.
Q5	Es gibt sicher ein paar Punkte, da kann man harte Kriterien ansetzen bspw. der Wasserhaushalt.
Q6	Aber viele andere Kriterien wären weiche Kriterien: wie bindet die Menschen vor Ort ein, wie ist der Bildungsaspekt, wie ist der Mitspracheaspekt, wie sind Eigentumsaspekte zu bewerten, Sicherungsaspekte.
Q7	D.h. du musst wenn du wirtschaftliche Kraftwerke betreiben willst, die Ownership von den Menschen vor Ort haben. Du musst Situationen kreieren in der die Menschen vor Ort das wollen. Es macht aus wirtschaftlichen und sicherheitsrelevanten Gründen Sinn, die Leute vor Ort einzubinden und zu gucken was die an Vorstellungen haben, was sie an Vorteilen sehen und wo sie Nachteile sehen und diese müssen dann eben evtl. ausbalanciert werden.
Q8	Das sind alles so Themen die kann man […] nicht am grünen Tisch entwickeln. Die muss man iterativ mit den Menschen entwickeln. D.h. mein großes Plädoyer ist, wenn man Kriterien entwickeln möchte was ein nachhaltiges Desertec Projekt ist und was nicht, dann sollen die Kriterien sehr prozessual gestaltet sein.
Q9	[…] sondern, dass Erkenntnisgewinne, die es geben muss und die es geben wird in diesen Prozess mitgedacht werden. Dass der Prozess fehlertolerant aufgesetzt wird und das so ein Prozess sich iterativ entwickelt, aber auch dass so ein Prozess eben nicht weltweit gleich ablaufen kann.
Q10	Nachhaltige Kriterien definiert in den drei Dimensionen: wirtschaftlich sinnvoll, ökologisch und sozial verträglich.
Q11	Ich glaube dass wir am Ende zu sowas kommen müssen, das nennen wir im Klimabereich monitoring, reporting und verification. […] Dass wir zu irgendwas kommen müssen, dass auch wirklich überwachbar ist, berichtbar ist und verifizierbar ist.
Q12	Ich denke da müssen wir ein System entwickeln, wo die Projektbetreiber selber sehr viele Aufgaben übernehmen können. […] Also sie selber sind verpflichtet eine unabhängige Verifizierung ihrer Tätigkeiten zu organisieren. […] D.h. man dezentralisiert da auch. Dann kann es eine sehr schlanke Organisation geben, die dann einfach nur diese verifizierten Projekte verwaltet.
Q13	Also ich glaube, wenn man das Desertec Konzept wirklich so umsetzen möchte wie es jetzt in den Visionen und den Gedanken von den Desertec Befürwortern vorherrscht, dann wird man es nicht schaffen eine [Einhaltung der Nachhaltigkeitskriterien] mit einer zentralen Organisation zu machen
Q14	Die wichtigsten Stakeholder sind für mich die technisch-wirtschaftlichen Projektierer und Firmen, die eben Technologien zur Verfügung stellen. Dann die Investoren […] Dann natürlich die Regierungen […] von EU und MENA.
Q15	Ich glaube man sollte IRENA sehr intensiv mit einbinden. Obwohl IRENA aus einem anderen Mindset kommt. […]. Aber genau deshalb sollte man wahrscheinlich in einen Dialog gehen.
Q16	Was mich interessiert, persönlich, ist die wirtschaftliche Umsetzung des Desertec Konzepts unter Berücksichtigung nachhaltiger Kriterien.
Q17	Ich denke, dass so ein Umfeld in dem man arbeiten muss und wo auch Wissenschaft und die Akademia sozusagen auch ihren Teil beitragen können […]
Q18	Einen großen Knackpunkt sehe ich auf der Finanzierungsseite.
Q19	Dann ist die nächste Barriere eine technologische: Wie kriegt man diesen Wasserhaushalt hin.
Q20	Was mich dann noch zu einem nächsten, meines Erachtens ganz wichtigen Thema bringt: Die Geschäftsmodelle sind noch nicht vorhanden.

E4 – Quotes from expert interview 4

Q1	Nachhaltige Entwicklung in Nordafrika, Beseitigung der drastischen Unterschiede zw. Arm und Reich, Technologietransfer vom Norden in den Süden, Schaffung von Arbeitsplätzen im Süden, […] Erhaltung und Vermehrung der Arbeitsplätze im hochindustrialisierten Norden, Friedensdividende, Demokratisierung.
Q2	[Vorteile sind] die Entwicklung in der Region, d.h. von Inselnetzen zu einem echten elektrischen Netz zur Versorgung jeglicher Stadt und kleinerer Ortschaften mit Strom, denn das schafft den Handwerkern Chancen, das schafft dem Kleingewerbe Chancen
Q3	Die Abwärme dieser Kraftwerke kann ja zur Wasserentsalzung verwendet werden oder für andere Aktivitäten wie z.B. zum Betrieb von Industrieanlagen, die Prozesswärme brauchen.
Q4	Ja, ein ganz primitives Kriterium wäre das, was Desertec ja selbst gesagt hat: Max. 15% des Stroms zu uns. Das ist ein einfaches Kriterium. Es beinhaltet aber automatisch die Entwicklung der Region.
Q5	Denn jedes dieser solarthermischen Kraftwerke ist ja auch ein Eingriff in den natürlichen Ressourcen. […] Muss man weiterhin bedenken, dass die [Stoffflüsse] gering gehalten werden.
Q6	Zertifizierung halte ich für sehr wichtig. Damit von vornerein klar wird: Dies ist nicht Manchesterkapitalismus und die Vorteile auch ankommen in Region!
Q7	Deswegen wird es sehr schwer werden, die ganz hochtrabenden Ziele von Desertec voll zu erreichen. Es wird immer einige geben, die übel über Desertec reden, weil die Blütenträume nicht reifen. Denn was alles wird dem Desertec aufgeladen?
Q8	Die DII, die Foundation, die Münchener Rück, die NGOs in allen Regionen […]
Q9	[…] eine Entwicklung der Entwicklungsländer durch DESERTEC - das ist mein Wunsch.
Q10	[…] wenn man über Nachhaltigkeit redet, dass die Gruppe, die Industrieinitiative, auch Firmen enthält, die dem nachhaltigen Wirtschaften hohen Wert zu gestehen, wie z.B. die Münchener Rück […]
Q11	Und ich möchte nicht, dass man da Solarbarone bekommt, die das wieder völlig unter sich aufteilen sowie unsere großen Elektroversorger, die jetzt ja ihre Macht schwinden sehen und dann auch Desertec als eine Möglichkeit sehen ihre Macht zu erhalten.

E5 – Quotes from expert interview 5

Q1	D.h. entweder werden die Länder etwas autarker oder können die Stromversorgung besser aus eigenen Mitteln sicherstellen. Zudem entstehen natürlich Arbeitsplätze, Regionaleinkommen in den jeweiligen Regionen wo diese Kraftwerke gebaut werden, was sicher ganz positive Effekte haben sollte. Absehbar werden dann natürlich auch Produktionskapazitäten in diesen Ländern aufgebaut.
Q2	Ich glaube halt, dass es [das DESERTEC Konzept] unabdingbar ist um auch einen schnellen Wandel hinzu erneuerbaren Energien zu bekommen.
Q3	[…] es gibt wieder Energieversorgungsoligopole, weil die großen Firmen dran beteiligt sind, Machtstrukturen werden evtl. wieder zementiert, man weis nicht, wie solche Kraftwerke in nordafrikanischen Ländern aufgenommen werden, wie dort die Akzeptanz ist.
Q4	Die müsste man natürlich auch unterteilen in soziale oder humane Nachhaltigkeitsindikatoren und dann eben auch physische, Umwelt- oder ökologische Nachhaltigkeitsindikatoren.
Q5	Über einige der Nachhaltigkeitsindikatoren auf der humanen Seite haben wir schon gesprochen, z.B. die Nachhaltigkeit von Arbeitsplätzen. Auf der ökologischen Seite ist das sicher am engsten verknüpft mit dem Thema Wasser.
Q6	Ich glaube, man sollte da auch die Zeit geben, dass ein paar Referenzprojekte in Nordafrika gebaut werden. Man sollte sich diese anschauen. Den Ausbau anschauen und darauf aufbauen und dann halt auch Kriterien bilden.
Q7	Ich weis eben auch was Zertifizierungsstrategien bei Nahrungsmitteln entlang der ganzen Wertschöpfungskette in den Erzeugerländern teilweise auslösen können. Es gab halt auch viele Publikationen dazu, dass das Ganze nicht so unproblematisch ist wie wir uns das vorstellen.
Q8	Ich glaube schon das muss von Extern kommen. Die Hoffnung […], ist, dass das hoffentlich die Desertec Foundation übernehmen könnte.
Q9	DII und die Foundation habe ich schon genannt. Dann gibt es den Solarplan der Mittelmeerunion. Es gibt die nationalen Regierungen. Es gibt supranationale Organisationen. Die EU. Nachbarschaftspolitik der EU ist sehr wichtig. Es gibt in fast jedem nordafrikanischen Land eine Agentur für erneuerbare Energien […]. Es gibt lokale Firmen, die Interesse haben dort mitzuarbeiten, die nicht unbedingt in der DII integriert sind. Es gibt einige NGOs die da dranhängen, was ich sehr wichtig und sehr hilfreich finde […]und Transgreen gibt es natürlich noch.
Q10	Was hinsichtlich der anstehenden Verknappung von Ölressourcen und dem Klimawandel absolute Priorität haben muss. Ich glaube halt, dass es [das DESERTEC Konzept] unabdingbar ist um auch einen schnellen Wandel hinzu erneuerbaren Energien zu bekommen. Da reicht der Ausbau dezentraler Energien, Photovoltaik usw., eben nicht aus.
Q11	Mit Abstand die wichtigsten sind glaube ich die Leute von der DII oder die Shareholder von der DII, die sicher am weitesten sind, die aber auch auf der anderen Seite eine Blackbox sind. […] Desertec Foundation und DII haben da eine Führungsrolle übernommen.
Q12	Ich glaube, wenn es um Energieversorgung geht, dann muss man auch ein wenig relativ denken. Es gibt wohl keine Energieversorgungsstruktur, die nicht irgendwie einen Input auf die Umwelt hätte. Ich glaube, man sollte dann schon mal gucken was passiert beim Kohlekraftwerk und beim Atomkraftwerk. Welche ökologischen Auswirkungen hat das denn im Vergleich zu CSP.
Q13	Da ist es noch sehr schwer abzuschätzen, wie da die ökologischen Auswirkungen sein werden.
Q14	Aber nicht eine vollständige Liste jetzt schon entwickeln. Das halte ich für verfrüht.
Q15	Es würde mich sehr wundern wenn das nicht geschehen würde, wenn man das also ohne Partizipation machen würde. Ich halte Partizipation für selbstverständlich! Dass man also die Stakeholder hinzunimmt und sie einbezieht.

E6 – Quotes from expert interview 6

Q1	Then you will see that you have electricity to meet the local demand at a predictable price. […] The clear target of developing a renewable power sector will guarantee that lots of the components of the supply chain will be produced locally. Potentially there is job creation in the region that maybe will not as clearly for direct jobs, but a large impact on the overall economy on the micro economy.
Q2	First of all you want to eliminate your dependency. You want to exploit your national resources as much as possible.
Q3	It is difficult, because we do not have the right business models. In reality, we need to come up with new business models, which allow us to move from a system, which is cheap to build but expensive to run, into a system that is expensive to build but then cheap to run.
Q4	Another very important reason is that the total demand of the countries is so low in comparison, that it is not possible to develop that amount of fluctuating renewables without expanding the grid substantially.
Q5	And one reason is definitely […] that we don't have the right policy framework, but one other is, because we don't understand how to deal with them and they do not really understand us, or not yet…What is the strategy on that?
Q6	What is very important is to set up governance that allows sharing a profit and sharing opportunities.
Q7	So this has to be in a dialogue between the project developers and the local authorities. And this has to be in interest of the project developers to make that happened!
Q8	This is not the way the energy sector works. If you want to mainstream the renewable energy sector, you don't do it through a certification system.
Q9	For Europe, entering a cooperation with northern Africa is interesting for another reason, which is emigration, which could be reduced.
Q10	Yes, as I said, civil society and I think MSP can play role, the Worldbank, the African development bank – I mean all the institutions that provide funds for development are very important stakeholders, because they influence the agenda!
Q11	IRENA could definitely play a role, once it has decided what its role is.
Q12	And I think the Desertec Industrial Initiative can play a role in that [to develop a business model], a very important role. […] Because at least they can stimulate further research in that. Also from consultants and so on.
Q13	The Desertec Industrial Initiative was a big step, because the Desertec concept started to be operationalized.
Q14	What is very important is to set up governance that allows sharing a profit and sharing opportunities. If this is possible, than you will see that the benefit for the local population will be much higher than otherwise and that the viability of the cooperation between importers and exporters will be much stronger.
Q15	[…] because it [the DESERTEC concept] sets the frame on how do we deal with the transformation of the power sector in Europe to so that we can have it fully decarbonized and possible 100% renewable by 2050.

E7 – Quotes from expert interview 7

Q1	Mit erneuerbaren Energien kann man diesen Wassermangel reduzieren, in dem man mehr Wasser produziert aus dem Meer.
Q2	Ja, ganz genau die Wasserkomponente mitdenken. Das ist ein Kriterium und das andere ist die lokale Industrialisierung.
Q3	Ja, natürlich, z.B. Ausbildung [ist ein Nachhaltigkeitskriterium], denn mit der Industrialisierung und mit dem Aufbau von erneuerbaren Energieanlagen müssen auch Leute da sein, die das bedienen können und die das konzipieren können und warten können.
Q4	Ja, Abstufungen [für Nachhaltigkeitskriterien] wären vielleicht sinnvoll am Anfang, weil nicht alle sofort die allerhöchste Qualität erreichen können. Das wäre sonst eine Behinderung des Ganzen für diejenigen, die das nicht einhalten können aber sich trotzdem beteiligen wollen.
Q5	Wir haben die Gruppe der Erzeuger und die Gruppe der Verbraucher. Aber jetzt haben wir noch eine andere Gruppe uns zwar die Gruppe der NGOs, die das eigentlich alles ins Rollen gebracht haben.
Q6	Die Regierungen brauchen wir ja immer, wenn wir solche Regelwerke machen.
Q7	Die Foundation könnte insofern eine Rolle spielen, als dass sie die Ideen dafür [für Nachhaltigkeitskriterien] gibt.

E8 – Quotes from expert interview 8

Q1	For me the advantages of course are promoting and pushing renewable energies forward and replacing the traditional fossil fuel. Why believe it is better? It integrates the potential of the whole region together on different technologies from PV to CSP, to wind, to geothermal – all potentials. It is also creating the network. We do see it as benefiting all parties engaged from all countries.
Q2	The countries that established the projects in their country benefit a lot from technical experience, technology transfer, job creating and of course electrical input. But also helps others to reduce their CO2 emissions, even they do not have the renewable resources in their country.
Q3	Getting countries together, get them work together, cooperating, trying to solve a common problem – this is also very important.
Q4	I think the biggest challenge is based in the technology and political will, which being influenced a lot by fossil fuel industry.
Q5	This [sustainability criteria] is one of the issues we need to develop and identify. I think this is very important, to ensure the benefits. But there should be a formal meeting for this discussion. And I think there were for example the MENAREC conferences earlier, which should be revived again, to have a space to communicate these ideas. […] I think we should further engage in a dialogue in this issue.
Q6	These things ok, you can put general concepts on them, that it should ensure maximum employment from local labor force and technology needs to be given to the government as part of the technology transfer package.
Q7	I don't think that this is necessary, no. I think each country has to determine which criteria they accept. So it is case by case.
Q8	At this moment I think it is governments and NGOs and renewable energy industry.
Q9	There is IRENA, there are renewable energy agencies in each country. Of course the, involvement of some industrial associations getting on board and see their opportunity in this, labor unions could also be involved in the way that they ensure or monitoring the job opportunities and these issues.
Q10	All multilateral or bilateral financing institutions could invest in the concept, but there are not as crucial.
Q11	You can see that Morocco, Egypt and UAE are the most aggressive on this front. But you also see countries like Lebanon, now Tunisia is playing more and more increasingly a role in this.

Appendix II - Cover Letter

Sehr geehrte Frau XXX,

in Kooperation mit der Universität Hamburg und der Hochschule für nachhaltige Entwicklung Eberswalde führe ich zur Zeit eine Expertenbefragung zum Thema Desertec durch.

In dieser Untersuchung geht es vor allem darum zu ergründen wie man die Vorteile, die sich durch Desertec für die lokale Bevölkerung in der MENA-Region ergeben könnten, sicherstellen kann, wie dazu benötigte Nachhaltigkeitskriterien aussehen könnten, wie ein mögliches Zertifizierungssystem für Desertec gestaltet werden könnte und welche Stakeholder einbezogen werden sollten.

Ich würde mich sehr freuen, wenn Sie Zeit für ein solches Gespräch hätten. Sollte Sie weitere Fragen hierzu haben, stehe ich Ihnen gerne telefonisch (XXX) als auch per Email (XXX) zur Verfügung.

Auf Ihre Bereitschaft hoffend, werde ich mich in den nächsten Tagen telefonisch mit Ihnen in Verbindung setzen.

Mit freundlichen Grüßen,

Jens Klawitter

Appendix III – Interview Outline

Einleitender Teil

Bitte stellen Sie sich kurz vor und erklären Sie kurz in wieweit Sie sich mit DESERTEC beschäftigen.

Hauptteil

Einstellung gegenüber dem DESERTEC-Konzept

Wie sehen sie das DESERTEC-Konzept?

Was ist das Neuartige am DESERTEC-Konzept?

Welcher Nutzen entsteht durch das DESERTEC-Konzept?

Wer profitiert vom DESERTEC-Konzept?

Gibt es auch Gefahren die vom DESERTEC-Konzept ausgehen könnten?

Lokale Ebene

Was für Vorteile / Nachteile ergeben sich für die lokale Bevölkerung vor Ort in der MENA-Region?

Wie könnte man diese Vorteile maximieren / Nachteile minimieren?

Wie sollte die lokale Bevölkerung in der MENA-Region bei der Umsetzung des DESERTEC-Konzepts beteiligt sein?

Wie trägt das DESERTEC-Konzept zur nachhaltigen Entwicklung (der MENA-Region) bei?

Zertifizierung / Nachhaltigkeitskriterien

Was für Bedingungen muss das DESERTEC-Konzept erfüllen, damit es erfolgreich umgesetzt wird?

Wie muss das DESERTEC-Konzept umgesetzt werden, damit es erfolgreich wird?

Wie stehen Sie einer Zertifizierung von DESERTEC gegenüber?

Was für Erfordernisse sollten erfüllt sein, um erfolgreich zertifiziert zu werden?

Was für eine Institution sollte die Zertifizierung übernehmen?

Werden Nachhaltigkeitskriterien für das DESERTEC-Konzept benötigt?

Wie könnten diese Kriterien aussehen?

Wie muss man vorgehen um diese Kriterien zu entwickeln?

Könnten „zu harte“ Kriterien auch eine Gefahr für die Beteiligung von lokalen Stakeholdern bedeuten?

Stakeholder Analysis

Können Sie mir wichtige Stakeholder, die bei der Umsetzung des DESERTEC-Konzepts beteiligt sind, nennen?

Sind bisher Stakeholder aus der MENA-Region ausreichend mit einbezogen?

Abschließender Teil

Was würden Sie gerne noch ergänzen?

Worüber denken Sie haben wir nicht ausführlich genug gesprochen?

Declaration of independent work on Master Thesis

With this statement, I declare that this Master thesis was prepared by me, only using the given references in this paper. The connections with companies, governmental organizations and similar was only made with the agreement of my Master thesis adviser.

(Signature)

Hamburg, 8. September 2010