Framework conditions for Investments in Wind Parks in Emerging and Developing Markets

the Investors' Perspective

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"International private investment flows are essential for the transition to a low-carbon, climate-resilient future. (...) Careful and wise use of public funds in combination with private funds can generate truly transformational investments. Further work is recommended on finding the most effective use of grant funding for climate actions."[1]

[1] UN 2010, "Report of the Secretary-General's High-level Advisory Group on Climate Change Financing"

Preface

How can a growing population´s increasing demand for energy, particularly in emerging and developing countries, be reconciled with the reduction of CO_2 emissions? Answering this question is one of the key challenges of our time and therefore a core topic in global climate negotiations.

Since April 2011, the UNFCCC has been discussing the creation of a global fund **(Green Climate Fund)**. The fund will play an important role in financing the transformation of emerging and developing countries into "low carbon economies". Such transformations will be put into practice within the framework of so-on-to-be defined **Nationally Appropriate Mitigation Actions (NAMAs)**. The economically efficient and effective allocation of public money will be essential to creating this **Green Climate Fund**. How to achieve the best leverage effect on private capital for "low carbon investments" via public funding is part of these economic considerations as well. This includes the examination of conditions which are able to ensure that cost-efficient funding is provided for certain specific technologies and areas of application in suitable regions and countries.

The objective here will be to draw attention to the effective combination of a) financial instruments and fund structures aiming directly at investments, b) further specific support programmes that lead to a creation of corresponding skills and capacity building within the countries, and last but not least c) the development of necessary national – legal and economic – frameworks.

These well-orchestrated policies can support the efficiency and effectiveness of the **Green Climate Fund**. They can prove useful in defining risk-adequate structures and suitable accompanying measures. With relevant actions to lower transaction and risk-related costs, private capital can be made available on an international level.

The discussion about these financing mechanisms is the motive for this study on the evaluation of framework conditions for investments in wind parks in emerging and developing markets from the perspective of project developers representing private investors.

The study is based on the assumption that wind energy is a mature technology with the ability to contribute to low-carbon energy supply in various regions of the world. Apart from geographic and climatologic prerequisites, this requires a corresponding technical, economic, and legal framework. Wind parks have proven to be investments that can be structured easily and are therefore also suitable for large institutional investors. Despite these developments, private investments in emerging and developing markets are still far from meeting their potential. Transaction and risk-related costs are evidently too high.

This study shows relevant investment criteria from the private sector's perspective. It helps explain why the expansion of wind energy in emerging and developing markets is below its potential. The results of the study suggest that based on suitable framework conditions combining public financing (grants, loans, guarantees, equities, etc.) with private funds on a national or international level could be helpful in overcoming investment barriers. There is a large variety of mechanisms and structures possible for such Public Private Partnerships.

According to the case of investments in wind parks analyzed here, the design of the "Green Climate Fund" could include the combination of financing mechanisms and the development of further technical, legal, and economic frameworks.

If the political and the private sector's perspective can be aligned, we can achieve a rapid transformation of the energy system.

■ **Dr. Paschen von Flotow**

Sustainable Business Institute (SBI)

Preface World Wind Energy Association (WWEA)

The world urgently needs a rapid shift towards renewable energies an objective that appears increasingly realistic in our time. There are three disasters that have been attracting public attention: Deepwater Horizon, Fukushima and the consequences of climate change, and they have started to raise the awareness of many decision-makers in governments and industry.

For many people around the world, it has become obvious that renewable energies are the way to go. Wind energy utilization made tremendous progress during the past decade. According to WWEA's World Wind Energy Report 2010, the worldwide wind capacity grew from 24 GW in the year 2001 to 197 GW at the end of 2010.

A main driver of this success story, next to the environmental concerns, has certainly been the increasing burden that the expenses for importing fossil resources have put on consumers, especially for emerging and developing countries who most urgently need better access to more modern energy services.

The year 2010, however, brought a decrease in new wind installations for the very first time in two decades. While the Chinese wind market was booming and represented more than 50 percent of the world market for new wind turbines, the rest of the world saw a decrease in new installations. Emerging and developing markets are still far behind: All African countries account today for only 0,5 percent of the worldwide wind capacity. A similar situation can be found in Latin America, which accounts for only 1 percent of the global wind capacity.

Although it is expected that the year 2011 will see a major increase in new wind power investments, most of this growth will again not take place in the emerging and developing countries, except in China and India, in addition to and to a smaller degree, Brazil and Mexico. The main reason is that governments in many countries have not yet been able to introduce the right frameworks for investments in wind power and there has been a constant lack of funding.

At the same time there is also an increasing awareness in emerging and developing countries that the private sector has to play a larger role in wind energy investment in order to achieve the necessary targets. However, the private sector can only be expected to invest on a large scale when reliable frameworks are in place. Hence, these countries will obviously need international support for this major task of providing sufficient energy for their population.

Currently, governments and international organisations are discussing the establishment of a global fund (Green Climate Fund) which is supposed to support the non-industrialised countries in climate-friendly investments. It is not clear yet what such a fund will look like.

This very profound study about political frameworks in emerging and developing countries has thus come at exactly the right time in order to analyze what the most important political factors for successful wind investments are.

The results are very clear – and still not really surprising: A feed-in tariff, together with guaranteed grid access, is clearly preferred by investors. The strong message of this study will hopefully serve as a basis for better policies and frameworks, be it on the national level, in bilateral economic cooperation, or in international frameworks such as the UNFCCC. It could provide solid guidance on which decisions have to be made in order to create the necessary stable frameworks which will eventually enable large-scale investments in wind power in emerging and developing countries.

Looking into the future: In order to overcome the financial limitations of poorer countries, several organizations, among them WWEA as one of the first initiators, have suggested a global program for national feed-in tariffs to be financed by the industrialized countries[2]. This study suggests that investors would actually benefit tremendously from such a program and that it would have the potential of creating a huge investment boom in emerging and developing countries.

I would like to congratulate and thank the authors of this study for giving us very valuable and sound arguments for the forthcoming political debate with governments and international organizations.

■ **Stefan Gsänger**, Secretary General
World Wind Energy Association

[2] See also: "Global Feed-In Tariff Programme" , "Global Fund for Renewable Energy Investment", REN Alliance "GET FiT Program – Global Energy Transfer Feed-in Tariffs for Developing Countries", DB Climate Change Advisors

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Executive Summary

Generating power with wind energy is now becoming a mature technology with a global, yet hardly developed market potential. The technology is increasingly able to compete with traditional sources of energy and is becoming popular in many countries around the globe. Particularly in emerging and developing countries, there is an increasing interest in renewable energies. In addition to climate policy objectives, further indicators are, for example, energy safety (reducing the dependence on coal and oil imports), an increase in energy demand, and the objective to decentralize power generation.

This study focuses on the investor's perspective. The interest in a precise analysis of the investor's priorities derives from the capital requirements for the development of energy infrastructure. Even though energy supply especially in emerging and developing countries is a prerogative of the public sector, the cooperation with a private investor is often sought out for power generation projects. The study therefore examines how investors view the political framework for wind energy in these new growth markets. Project developers were surveyed in their role as assessors of market conditions prior to the investment and as developers of concrete projects.

The study confirms the assumption that investors have a detailed perspective about suitable framework conditions that are the foundation for theire respective investment criteria. The analysis of these criteria can support the public authorities in increasing the efficiency and effectiveness of framework conditions for investments in wind energy that they design. Hence, the study makes a methodologically secured contribution to the debate on Feed-in Tariffs and other forms of regulating renewable energy technologies in emerging and developing markets.

Based on interviews with experts, a workshop and a quantitative survey, the 20 most relevant framework conditions have been indentified and prioritized. The key results are as follows:

- The most attractive framework condition was found to be a Feed-in Tariff with fixed prices per kilowatt hour (kWh). Other support mechanisms like quota systems, international tender, and investment grants are much less attractive.
- Guaranteed grid access and priority dispatch are regarded as the second most attractive framework condition.
- In third place after the Feed-in Tariff and the guaranteed grid access is the elimination of various non-financial barriers such as a lack of transparency or the undetermined duration of the approval process. The survey shows: By eliminating these barriers, the appeal of a market to international project developers increases significantly.
- A "one-stop-shop" approval process is considered only slightly attractive. Although this aspect is often lobbied for in European countries, this mechanism seems to constitute yet another administrative barrier in emerging and developing countries, as it reduces the transparency of the approval process.
- The surveyed private-sector representatives recommend a constant and foreseeable rather than a volatile improvement of the investment framework for wind energy. The long-term security for planning will thus improve investments for local and international businesses and, at the same time, support local manufacturing. According to our qualitative research, rushing the introduction of a suitable framework may render subsequent adjustments necessary. Such adjustments might cosiderably compromise the efficiency of the planned power plants and thus jeopardize the investors' confidence in the legal framework.

The study's results are economically plausible: Investors want to reduce political investment risks (framework conditions) as much as possible. An increased risk in comparison to an ideal scenario can cause investors to hold back their investment or at least raise their return expectations correspondingly in order to compensate for the increased risk.

Section A: Study Context

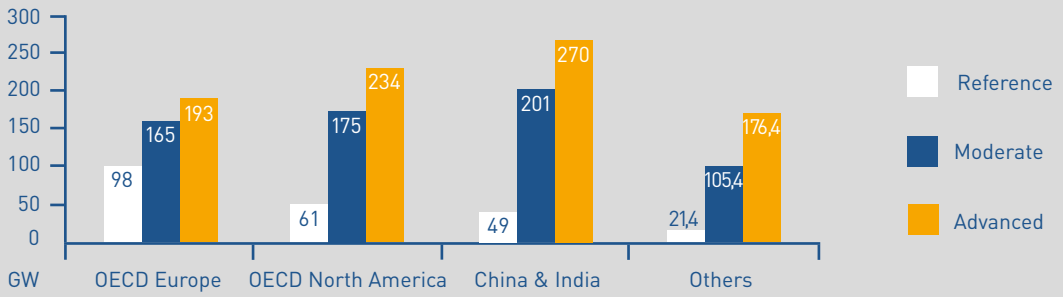
Diffusion of renewable energy technologies in emerging and developing countries

The energy demand in emerging and developing countries is increasing at a much faster rate than in developed countries. Satisfying this demand is an essential economic challenge for these countries. A relevant political option to approach this challenge is the development and implementation of effective and efficient framework conditions for private investments in a country's power plant infrastructure.
Both the perspective of the public and the private sector in emerging and developing countries will raise the question of which different objectives should be taken into consideration and how these should be weighted. In other words, it will be necessary to discuss how different interests can be combined in the best possible way. This includes, among others, the following questions:

- To what extent should renewable energies generally contribute to the country's power mix?
- Which types of renewable energy technologies are particularly favourable for the country?
- With which regulatory or financial support instruments should the national energy supply strategy be put into practice?
- Which strategy can provide the expansion of national capacities for the construction and operation of power plants for renewable energies **(Capacity Building)**?
- Which type of financing can and should be utilized for the construction of power plants and local manufacturing facilities?

This study targets the use of wind energy in emerging and developing countries. The technology to generate power from wind energy is mature and the power generation costs are competitive under suitable conditions. Compared to the large existing markets for wind energy, for example in Europe, North America, India, and China, a similarly high potential can be found in other growth markets in emerging and developing countries (Diagram 1, Others, Advanced Scenario). The Global Wind Energy Council's (GEWC) scenarios, however, show that the forcast is highly unreliable. The range between the Reference Scenario and the Advanced Scenario in emerging and developing countries is particularly large and historical market data[3] shows only a slow market development to date.

Diagram 1: Additional Capacity until 2020 based on GWEC scenarios



[3] See also: World Wind Energy Report 2010, World Wind Energy Association, April 2011

Economic studies and recommendations

Effective and efficient frameworks for (renewable) power plants should, firstly, offer a reasonable risk-return ratio to investors and, secondly, minimize the total costs[4] for society.
Paramount economic studies on the utilization of renewable energies have primarily examined the question of how much added value renewable energies can generate for a region and which external costs can be avoided using renewable energies. Some of the results[5] are as follows:

- Renewable-energy technologies are ascribed comparatively low external costs, increased energy security, the reduction of primary energy imports, a stabilizing effect on the electricity prices, and savings in subsidies for fossil and nuclear power plant technologies, as well as positive effects on the labor market.

- Regarding climate change and climate protection, a rapid and in the long run complete transition to renewable energies, if necessary with the expansi on of Carbon Capture and Storage (CCS) for fossil power plants, will gain in importance.

- Within the context of environmental and innovation-policy perspectives, economists usually plead for a uniform CO_2 tax or a market for CO_2 emissions as the primary management tool. However, experiences with these mechanisms compared to a technology-specific support mechanism are ambiguous.

Beyond these general economic studies, further research identified success factors for the deployment of renewable energies based on the analysis of the correlation between the real market development and the corresponding political framework. The major results of the studies[6] for the creation of an effective policy framework are:

- The policy framework for investments should be transparent and foreseeable.

- A technology-specific support creates a portfolio of various technologies and supply chains.

- The financial support should decrease gradually by a rate possibly determined in advance depending on the technological maturity and the costs involved for the technology.

The recommendations based on market deployment analyses especially in developed countries are only partially applicable to emerging and developing countries due to a different political and institutional framework, particularly regarding the handling of private investments. Investment risks are considered much higher than in developed countries (with considerable disparities between individual countries). This causes the financing costs, and ultimately the energy generation costs, to rise. Reducing the investment risk through suitable framework conditions is therefore generally in the public interest.
Priorities for an investor concerning investments in renewable energies have to be enquired directly for emerging and developing countries whereas, in developed markets, this can be observed indirectly through aggregated market analyses. This study makes a first contribution to the individual perception of framework conditions.

[4] The total costs consist of construction, operation, financing, and all further costs (e.g. external costs)

[5] For example: Sensfuß, F., Ragwitz, M.,2007: Analyse des Preiseffektes der Stromerzeugung aus erneuerbaren Energien auf die Börsenpreise im deutschen Stromhandel – Analyse für das Jahr 2006 –, Gutachten des Fraunhofer Instituts für System- und Innovationsforschung für das Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit. Owen, A., 2004: Environmental Externalities, Market Distortions and Economics o Renewable Energy Technologies, The Energy Journal 25 (3), 127-156. IEA, 2009: World Energy Outlook, Paris, IEA/OECD

[6] For example: Buen, J., 2006. Danish and Norwegian wind industry: The relationship between policy instruments, innovation and diffusion. Energy Policy 34, 3887–3897; Gan, L., Eskeland, G., Kolshus, H., 2007. Green electricity market development: Lessons from Europe and the US. Energy Policy 35, 144–155; Mallon, 2006. Renewable Energy Policy and Politics: A Handbook for Decision-Making. Earthscan; Ringel, M., 2006. Fostering the use of renewable energies in the European Union: the race between feed-in tariffs and green certificates. Renewable Energy 31, 1–17.

Green Climate Fund

The conclusions of this study are relevant for the design of national policy frameworks in emerging and developing countries, as well as for the design of international financing mechanisms for climate protection. In Cancún, for example, it was thus decided to create a **Green Climate Fund**, whose details are currently being discussed and negotiated. This includes sources for and allocation of the facilities as well as the question of how private capital should be raised and mixed with public funds.
Developing countries also agreed in Cancún that they are, in principle, willing to draft so-called **Nationally Appropriate Mitigation Actions (NAMAs)** as a climate protection measure on a voluntary basis.
How the financial facilities of the **Green Climate Fund** could be linked to the NAMAs is subject to further negotiations. An important criterion will definitely be the most efficient and effective utilization of these scarce funds for climate protection ("high leverage"). Furthermore, it is clear that financing the rapid expansion of renewable energies is a high priority.
Feed-in Tariffs, for example, could be (partly) funded and, in addition, guarantees for private investors could be provided with the aforementioned international mechanisms. This study offers arguments for the ongoing debate.

Initiatives

The study falls in line with previous studies and initiatives that deal with introducing and financing Feed-in Tariffs for renewable energies in emerging and developing countries. These include, among others:

- "Global Feed-In Tariff Program" and "Global Fund for Renewable Energy Investment", REN Alliance, 2009
- "GET FiT Program. Global Energy Transfer Feed-in Tariffs for Developing Countries", DB Climate Change Advisors, 2010
- "Unleashing renewable energy power in developing countries. Proposal for a global Renewable Energy Policy Fund", World Future Council, 2009
- "Feed-in Tariff Fund Emissions Trading model (FFET)", Greenpeace and European Renewable Energy Council, 2008

The arguments of the aforementioned initiatives are essentially based on expert opinions and previous experiences with policy frameworks for renewable energies in developed countries. The initiatives thus suggest different options to considerably improve the financing conditions of renewable energies in emerging and developing countries with Feed-in Tariffs and other measures. One key example, the study "Get FiT Program" defined a suitable structure for deploying local renewable energy resources from the perspective of the credit institute. They suggest to involve not only international public funds and national governments, but also local utilities as well as investors in energy infrastructure.
This study supports the debate and the given arguments with a methodologically sound empirical survey of project developers. To add to the purely financial perspective of the "GET FiT Program" or the overly aggregated perspective of the "Feed in Tariff Found Emissions Trading model", this study shows that Feed-in Tariffs and the reduction of further financial risks are merely part of the overall solution. Whereas this particular study indisputably supports the relevance and the great potential of Feed-in Tariffs, it also
shows clearly that non-financial framework conditions have a similarly high relevance for the private sector.

Section B: Study Design

Research design

Assessment of the investment framework
The identification and the evaluation of an investor's preferences for different framework conditions for investments in wind parks in emerging and developing countries are the focus of the study. A deeper understanding of the investor's perspective helps to develope a more effective and efficient policy framework. A three-staged research design was chosen for this purpose. In the beginning, four project developers were asked guiding key questions in semi-structured interviews (in person or via telephone; 40-90 minutes each):

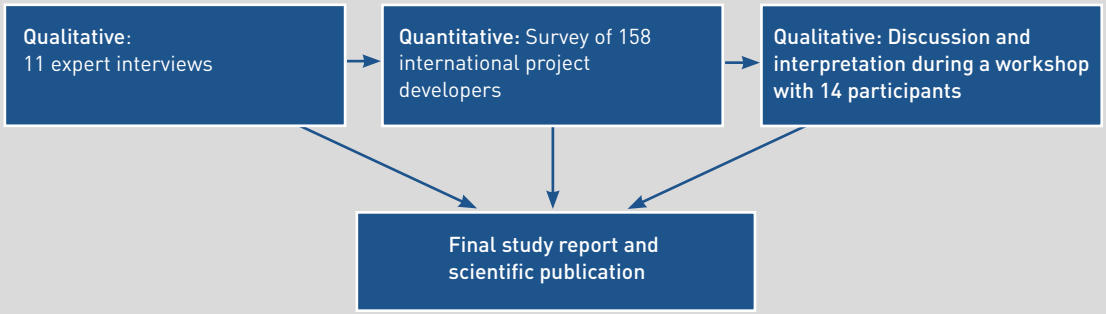
→ "What are the challenges you face in emerging countries in which you are currently active?"

→ "How do you decide whether, when and how you enter a new growth market?"

A preliminary framework was created based on these statements. This framework was refined and enhanced by conducting further interviews (in person or via telephone; 40-90 minutes each) with seven experts in financing and policy frameworks[7]. This led to the identification of 20 key framework conditions relevant for the decisions of project developers and investors. Based on these results, a questionnaire was created and sent to 158 international project developers (as representatives of the investment perspective) for evaluation.[8] Finally, the interview and survey results were verified and refined in a workshop with 14 experts of all areas of the supply chain.[9]

Assessment of the technical requirements
In addition to the question about different preferences regarding framework conditions, another section of the quantitative survey determines whether project developers have different technical requirements if they build a wind park in an emerging and developing country rather than in a developed country.

Diagram 2: Three-staged research design



[7] Experts at: Fraunhofer Institute for Systems and Innovation Research (ISI), International Energy Agency (IEA), European Wind Energy Association (EWEA) and two financial institutions.
[8] With regard to the participants, it makes sense to question the project developers representing the perspective of the investors rather than questioning the latter directly. The reason for this is mainly that project developers, firstly, pave the way for investors and, secondly, have extensive practical on-site experiences regarding, for example, negotiating and coordinating with national and local authorities.
[9] The names of the interviewees and the workshop participants are listed in the appendix.

Methodology

In order to determine preferences of the respondents within quantitative surveys, the application of a Likert scale is the general rule. This method, however, might cause a bias, as participants often utilize the scale differently[10]. This effect is even reinforced when those surveyed have different cultural origins. Another problem arises when the average of all answers is calculated for each question. The average results usually show only slight differences among the criteria and make the identification of the actual priority of the respondents much more difficult. One way to handle this challenge is to introduce ranking questions. This means participants are asked to rank a number of factors according to their preferences. This method can be extended so that those questioned can distribute a given number of points to the factors and weight their responses. It has become apparent that it is difficult for the participants to assess more than seven aspects at a time.
Another possibility to cope with this challenge is Maximum Difference Scaling[11], which expands a comparison in pairs. Maximum Difference Scaling confronts the participants with three to seven elements at a time. Then they are asked which of the elements is most / least important to them. In order to ensure the comparability across respondents a standard decision-making scenario at the beginning of the survey was defined:

In this study, the participants had to compare and assess 5 from a total of 20 framework conditions at a time (Diagram 3). Each participant answered a total of 12 questions.
In order to guarantee solid results in the statistical analysis, each of the 20 identified framework conditions appears three times (in different combinations). The responses are evaluated using a statistical model (Hierarchical Bayes) to calculate the relative preference of every condition.
This method's restriction, however, is that the accuracy is limited to the given scenario. Any interpretation of the results beyond this scenario, for example for considerably larger or smaller power plant projects or for other renewable energy technologies, should be treated with caution. Furthermore, it was not possible to cover different varieties, for example regarding Feed-in Tariffs. Alternatives regarding such aspects as the amount of funding, caps or the annual funding reduction rate can influence the appeal of a market substantially. As a consequence, the study should be seen as a starting point for discussions between private and public sector decision makers rather than a blueprint for the ideal support mechanisms.

Imagine that it is your responsibility to decide whether your company will develop a 30-MW wind park in an emerging or developing country or not.

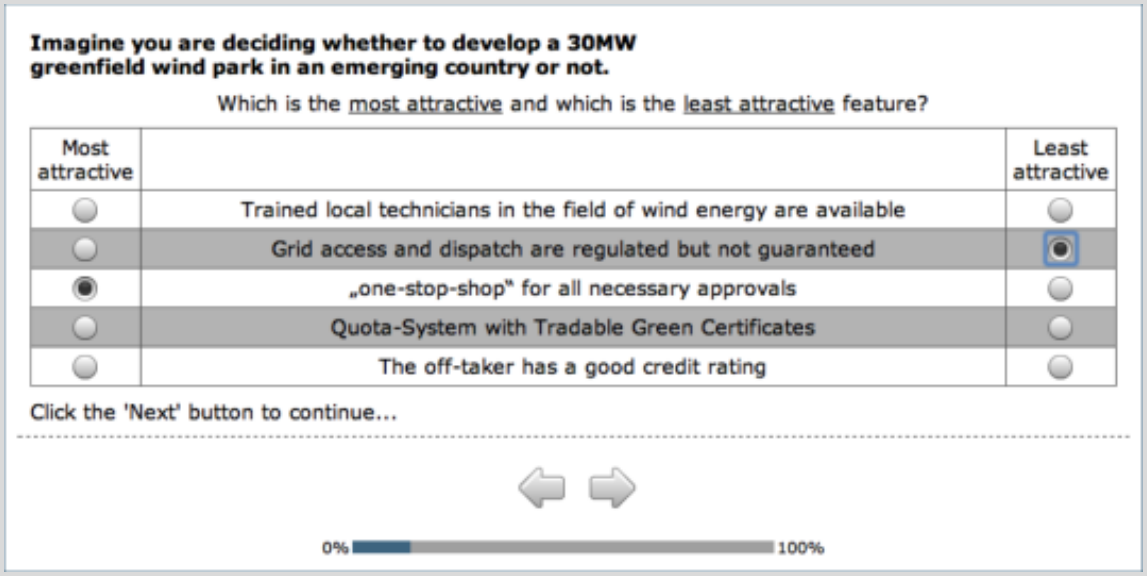
Please operate under the following assumptions:

- → The overall political situation is stable.
- → There are only few wind parks connected to the grid up to now.
- → The local authorities have already passed an ambitious long-term goal as well as financial support for wind energy.
- → First estimates regarding the internal rate of return (IRR) are promising.

[10] The participants can only use the extreme values on the scale or only the values in the neutral area. The analysis, meaning the comparison of all answers, is difficult in both cases.

[11] See also: Cohen, S., Orme, B. 2004: "What's your preference?", Marketing Research.

Diagram 3: Excerpt from the questionnaire



Imagine you are deciding whether to develop a 30MW greenfield wind park in an emerging country or not.

Which is the most attractive and which is the least attractive feature?

Most attractive		Least attractive
○	Trained local technicians in the field of wind energy are available	○
○	Grid access and dispatch are regulated but not guaranteed	◉
◉	„one-stop-shop" for all necessary approvals	○
○	Quota-System with Tradable Green Certificates	○
○	The off-taker has a good credit rating	○

Click the 'Next' button to continue...

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In addition to the question about different framework preferences, another section of questions determines whether project developers have different technical requirements if they build a wind park in an emerging and developing country rather than in a developed country. This additional issue was examined using a five-point Likert scale. Following the aforementioned limitations of this particular method, it is the distribution of responses rather than the average of all answers that has been calculated.

Survey Sample

88 international project development companies were indentified for the quantitative survey. This identification required internet research and the review of national and international wind energy association membership lists[12]. Every project development company that is planning wind parks and is, at the same time, active in at least two different countries including at least one emerging or developing country was listed[13]. The identified companies cover, with a few exceptions, at least four of six elements of the supply chain (land acquisition, technical feasibility, approval process, financing, site super-
vision/construction, operations & maintenance).
A second step consisted of the identification of up to three decision-makers per company, each with personal experience in wind energy in at least one emerging or developing country. A total of 158 persons were thus invited via email or social network (XING and LinkedIn) to participate in the survey.
Those who did not respond[14] within four weeks were invited again. The questionnaire was completed by a total of 41 persons in 36 companies (response rate: 25.9 percent).

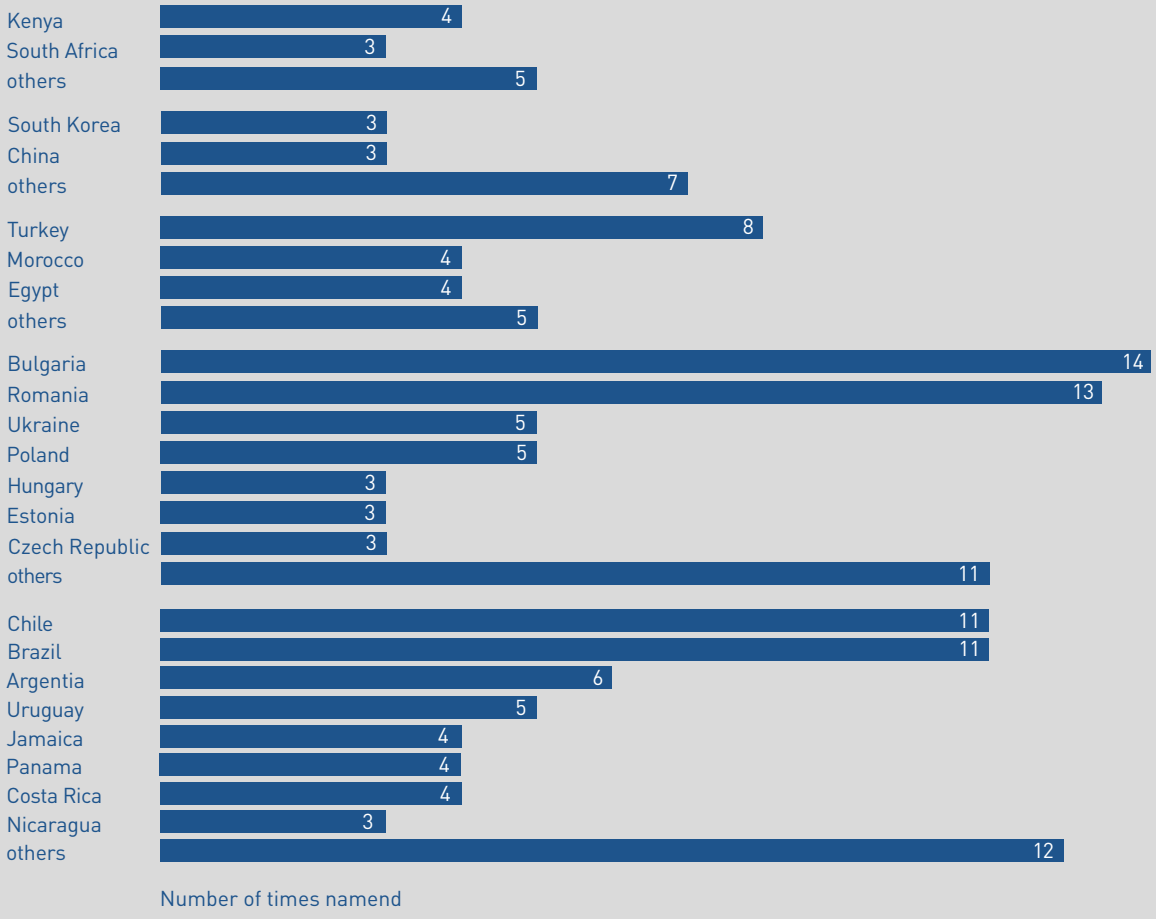
[12] The following wind energy associations were examined: European Wind Energy Association (EWEA), Latin America Wind Energy Association (LAWEA), Russian Association of Windpower Industry (RAWI), Bundesverband Wind Energie e.V. (BWE), British Wind Energy Association (BWEA), Danish Wind Industry Association (DWIA), Spanish Wind Energy Association (aeeolica).

[13] There are basically no project developers from India, China, and the USA, despite these being large wind energy markets. The reason for this is that their project developers are so far only active in their domestic markets and thus do not yet decide on entering other markets.

[14] This was considered a response: responding via email, as well as turning in the complete or incomplete questionnaire.

All participants in the study have extensive experience in potential new growth markets (Diagram 4). Please note that countries which were mentioned only once or twice were categorized per continent for the following diagram. The diagram shows that the participants are particularly familiar with Eastern European and South and Central American markets. In this survey, the main emerging markets of China and India were hardly mentioned, since local project developers in these countries focus exclusively on their respective domestic market. Diagram 4 shows a focus on little or virtually non-developed wind markets, for example when looking at the high number of "other" countries. Hence, the study covers many emerging and developing markets which have opened up only recently to international investors in wind energy.

Diagram 4: Participant experience in new potential growth markets[15]

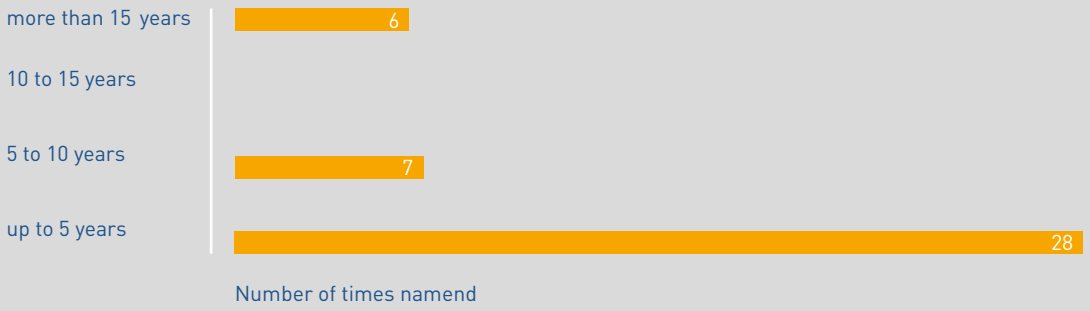


[15] Other countries are: Libya, Tunisia, Jordan, Algeria, Yemen, Russia, South Korea, Korea, Taiwan, Kazakhstan, Kyrgyzstan, Bosnia, Croatia, Latvia, Lithuania, Albania, Montenegro, Serbia, Djibouti, Ethiopia

Almost half of those surveyed (19) hold a top management position. Roughly a quarter work in business development (12) and project management (9), respectively. Only one person works exclusively in financing.

Diagram 5 depicts the participants' work experience in the wind energy sector. It is evident that pioneer wind energy experts with more than 15 years of experience as well as those with up to ten years of experience participated.

Diagram 5: Participants' work experience in the wind energy sector



Section C: Study Results

Assessment of framework conditions for wind park investments

The following describes 20 framework conditions, which were identified and defined in the first phase and compared and prioritized by the participants during the survey[16]. These 20 framework conditions can be divided into four broad groups: support mechanisms, financial aspects, non-financial aspects, and grid-access.
The framework conditions of the survey are listed below and explained briefly. The numbering of the four framework groups is also used in the following chapters and diagrams.

1. Support mechanisms

→ **Feed-In Tariff with fixed prices for 20 years**
Every kWh produced by a wind turbine will be sold to the energy utility for a price which is negotiated beforehand and remains constant throughout the duration of the project.

→ **International Tender for a framework contract for 200 MW incl. PPA for 20 years**
Several companies submit their bid for constructing the wind farm. Whoever offers the lowest price per kWh wins the bid that includes a Power Purchase Agreement.

→ **Quota System with Tradable Green Certificates**
The government determines the share of wind energy in the electricity mix. Certificates will provide proof of ownership. The energy suppliers can either purchase such certificates from the wind park operator or generate them in their own wind parks.

→ **Investment-based support (accelerated depreciation & investment tax credit)**
The investor receives a direct grant for his investment, regardless of the amount of electricity the wind turbine produces.

2. Financial aspects

→ **No inflation risk (tariff adjusted to the inflation rate)**
The negotiated tariff will be periodically adapted to reflect the inflation rate.

→ **Availability of attractive financing by development banks**
Development banks offer low-interest loans, some with a long-term deferred payment.

→ **Availability of attractive financing by local banks**
Local banks provide favorable financing conditions for domestic wind parks.

→ **The off-taker has a high credit rating**
It is unlikely that the buyer defers or stops payments to the wind park operator due to its own financial difficulties.

→ **Reduced currency risk: tariff is adapted to the exchange rate of the US dollar**
The tariff (local-currency) will be adapted periodically to any exchange-rate fluctuations against the US dollar.

→ **Bonus payment of 1$ct/kWh if major wind turbine components are procured locally**
If project developers purchase their tower elements for example from a local company, the wind park operator will receive a bonus of 1 $ct/kWh throughout the entire operations phase of the wind park.

[16] The framework elements are always phrased positively: From the project developer's perspective, it is positive if the elements are put into practice. This is necessary from a methodological point of view in order to "force" the participants to choose between several similar framework elements and thus reveal their priorities.

3. Non-financial aspecst

→ **Good legal security (contracts are easily enforceable)**
Every party involved can count on the legal enforceability of contracts.

→ **High degree of transparency in the approval process**
Every party involved can comprehend and verify at any time at which stage the approval process is and which criteria approvals are based on.

→ **Low risk of unforeseen policy changes for renewable energies**
Every party involved can rest assured that the framework conditions for wind energy will not suddenly be impaired.

→ **Maximum duration of the administrative approval procedure: 18 months**
Due to clearly defined procedures, it is certain from the very beginning of the project that all approvals can be obtained within an 18-month period.

→ **One-stop-shop for all necessary approvals**
All approval paperwork can be submitted to one administration office only.

→ **A local project developer is willing to set up a joint venture**
The project will be carried out in cooperation with a local company.

→ **Trained local technicians in the wind energy field are available**
A sufficient number of local technicians with corresponding qualifications are available and can be employed for the construction and operation of the wind park.

4. Grid Access

→ **Grid access and priority dispatch are guaranteed**
The wind park operator is guaranteed grid access and feed-in for the generated electricity.

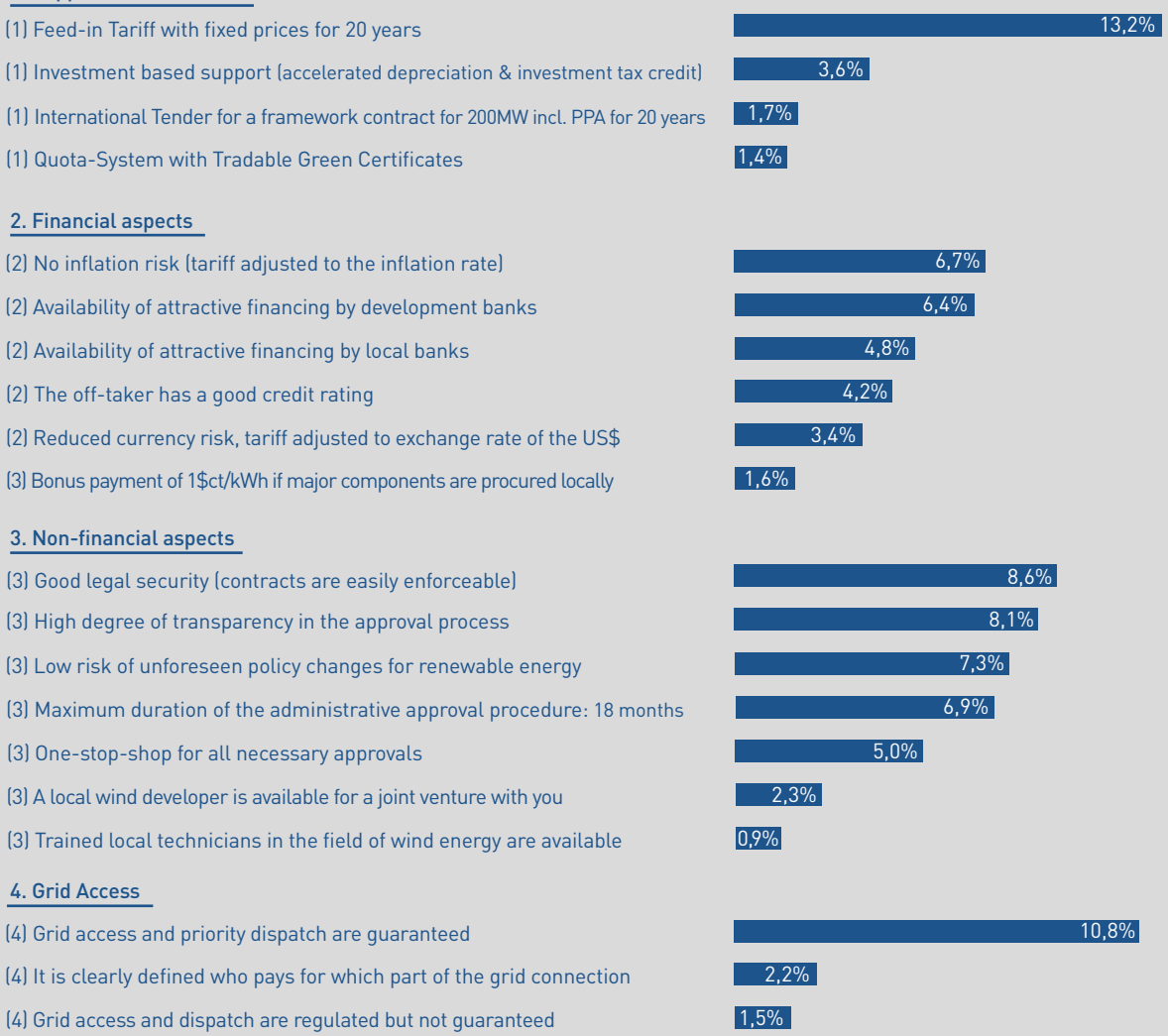
→ **Grid access and dispatch are regulated but not guaranteed**
Under certain predefined circumstances, the wind park operator is provided with grid access for his wind farm.

→ **It is clearly defined who pays for which part of the grid connection**
There are clear agreements about the financing of the cable connection from the wind park to the junction of the existing grid.

Diagram 6 shows the survey results based on the 41 participants' preferences and the predefined scenario (see also page 12). The sum of all preferences is 100 percent on the scale in which the results are displayed. For data interpretation this means that if a framework condition reached 10 percent in the assessment, it is twice as attractive as a framework condition which reached 5 percent. This assessment, however, is only valid in the context of the other 19 framework conditions.

Due to the methodology applied in this survey, different preferences are very distinct, meaning the results show high discrimination. This aspect is relevant when interpreting the data.

Diagram 6: Revealed preferences in percent



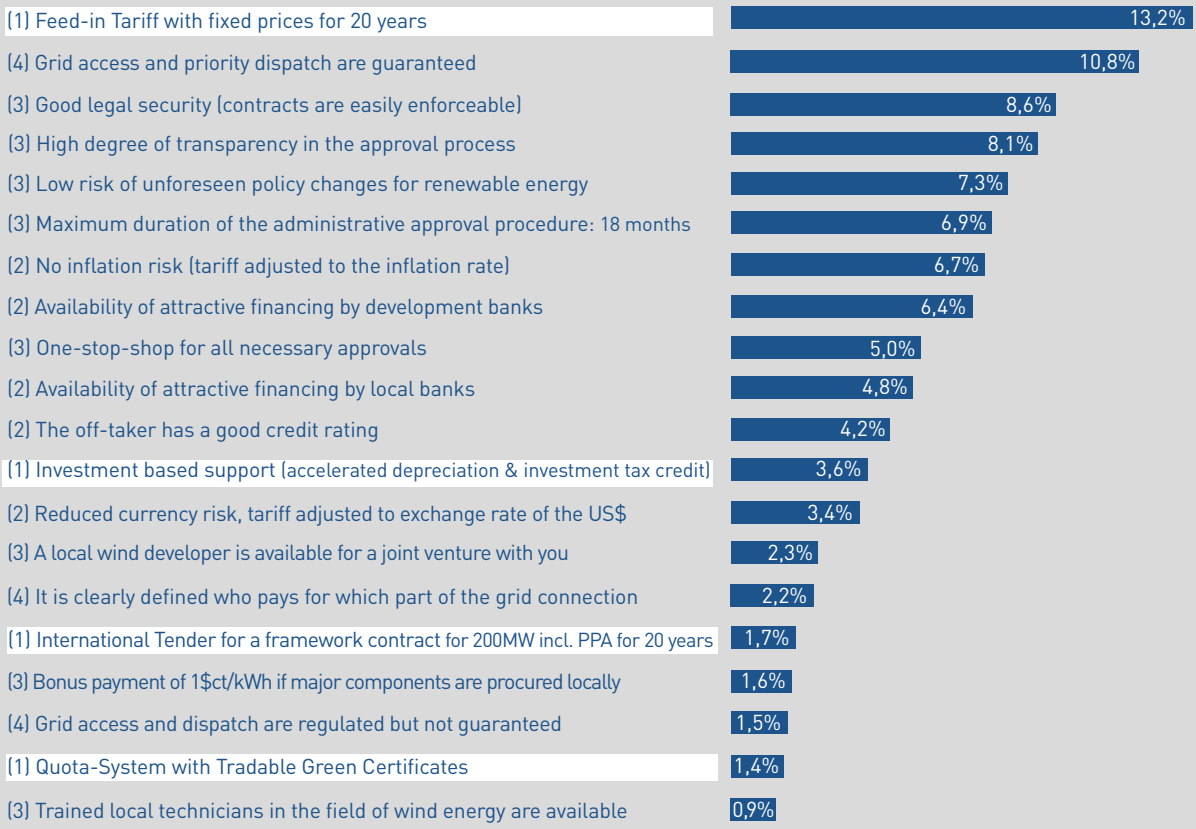
The empirical results are economically plausible: Investors want to reduce political investment risks (framework) as much as possible. An increased risk in comparison to an ideal scenario can cause investors to hold back their investment or at least raise their return expectations correspondingly in order to compensate for the increased risk.

1. Research field: support mechanisms

The following features of support mechanisms were evaluated:

- Feed-in Tariff with fixed prices for 20 years
- Investment-based support (accelerated depreciation & investment tax credit)
- International tender for a framework contract for 200 MW incl. PPA for 20 years
- Quota System with Tradable Green Certificates

Diagram 7: Preferences regarding support mechanisms



There is one fundamental difference between the support mechanisms examined in this study: On the one hand, there are mechanisms determining the price per kWh of a power plant technology (Feed-in Tariff, investment-based support) and on the other hand, there are mechanisms determining the quantity of renewable energies in the national electricity mix (quota system, tender). Diagram 7 shows that the Feed-in Tariff is perceived as a particularly positive support mechanism. In second place are investment-based mechanisms, whereas the quantity related support mechanisms are evaluated to be at the lower end of the scale. Each support mechanism is commented on in the following:

It became clear during the interviews that many project developers have a very positive experience with **Feed-in Tariffs**. A governmentally guaranteed price for every kWh generated offers great security to the investor due to a long-term stability on the income side. According to the project developers, this security not only lowers the risks in the early phase of the project but also reduces financing costs for loans. Furthermore, return expectations of the investors decrease. A simulation study for developed countries shows that the costs per kWh for identical projects and weather conditions can vary up to 30 percent depending on a choice of different policy framework conditions[17]. The positive assessment of the interviews was confirmed in the survey. Furthermore, during the workshop it was added that, beyond the study, defining the details of a support mechanism is essential for international investors. A well-coordinated Feed-in Tariff can offer excellent opportunities to attract international project developers and, as a consequence, investors.

The interviews helped indentify two types of **investment-based support:**

1. Accelerated depreciation of an investment enables large companies to reduce their profit and consequently their tax burden. Companies not making any profit for example due to the financial crisis or because they are small compared to the wind park investment, usually do not (or only indirectly) benefit from this mechanism.
2. The investment grant is usually not paid until the wind park is completed and therefore the project developer is burdened with all advance payments and corresponding risks. The bonus might also not be granted in its originally planned form when the wind park is completed.

These two framework elements were combined in the interest of clarity. In the course of the survey, it became clear that project developers consider this type of support not very attractive, partly due to its high risk in the initial phase of the project. This assessment was confirmed in the workshop.

It became apparent in the interview that **international tendering procedures** bear several challenges. This mechanism is usually only used for larger projects due to the great upfront time and effort it requires. The main challenge here is the lack of a longterm perspective beyond the tendering procedure. This explains the mechanism's low attractiveness throughout the survey, a view that was confirmed by the workshop participants. They also added that the approval process of some tendering procedures – particularly in, but not limited to, emerging and developing countries – is not transparent enough, which might increase corruption. This is the reason why international project developers are rather critical of this mechanism.

Although the qualitative research regarding this mechanism mentioned relevant framework elements, one needs to add that the participants in the survey were mostly from small and medium-sized companies. They might not have the necessary human resources and financial capacities and therefore will have a more critical view of this mechanism than a large, financially strong energy utility.

[17] Jager, D., Rathmann, M. (2008): "Policy instrument design to reduce financing costs in renewable energy technology projects", Paris: IEA, OECD.

The **quota system with tradable certificates** was identified as the fourth relevant support mechanism. This mechanism is supposed to strengthen competition and direct the private sector's focus on particularly cost-efficient technologies and especially suitable locations. The experts who were questioned at the beginning of the study, however, emphasize that a quota system is first of all an additional risk on the income side. In spite of identical technologies, the risk for investors and lenders increases, as do the return expectations. The additional risk consists of two elements: On the one hand, it is possible that more wind turbines will be connected to the grid than intended, causing the price for generated certificates to fall. On the other hand, there might be changes to the required quota. These changes would not only affect the economic efficiency of new wind parks, but also the efficiency of existing wind parks. As a result these additional risks cause higher overall financing costs for wind energy. The reasons mentioned in the interviews explain why project developers consider this framework condition not attractive in the survey. The workshop participants share this opinion.

In the quantitative survey, the participating project developers were also asked how many projects their company had completed using the four support mechanisms. The distribution of the completed projects is similar to the preferences of the different support mechanisms (Pearson's correlation 0.94). This leads to the conclusion that the project developers reveal their true preferences in the survey.

In conclusion: The results are plausible. The statements given during the interview match the results of the quantitative survey and the statements given by experts in the workshops. The project developers ascribe greatly varying preferences to the support mechanisms. Feed-in Tariffs are by far the most attractive framework condition according to the project developers. It is important to understand that the assessment of support mechanisms on this level is not valid in every case. This needs to be taken into consideration as a restriction of the statements made in this chapter. It became especially clear during the workshop that each support mechanism can vary in effectiveness and attractiveness depending on its detailed specifications. In this context, the workshop participants recommend to ensure a healthy balance of risk and return when public authorities specify the framework conditions. A low risk rate usually leads to better financing conditions and thus to lower overall costs for the project. Experience with various support mechanisms in developed countries supports this argument. A study conducted by the International Energy Agency (IEA), for example, shows that the average support of on-shore wind energy in countries with a Feed-in Tariff was US$ 0.09-0.11/kWh in 2005, whereas countries with a quota system and tradable certificates supported wind energy with US$ 0,13-0.17/kWh on average[18].

Table 1: Total of completed projects per support mechanism

Feed-in Tariff with fixed prices for 20 years	406
Investment-based support (for example accelerated depreciation)	57
International Tender for a framework contract for 200MW incl. PPA for 20 years	48
Quota System with tradable green certificates	42

[18] IEA (2008): Deploying Renewables. Paris: International Energy Agency.

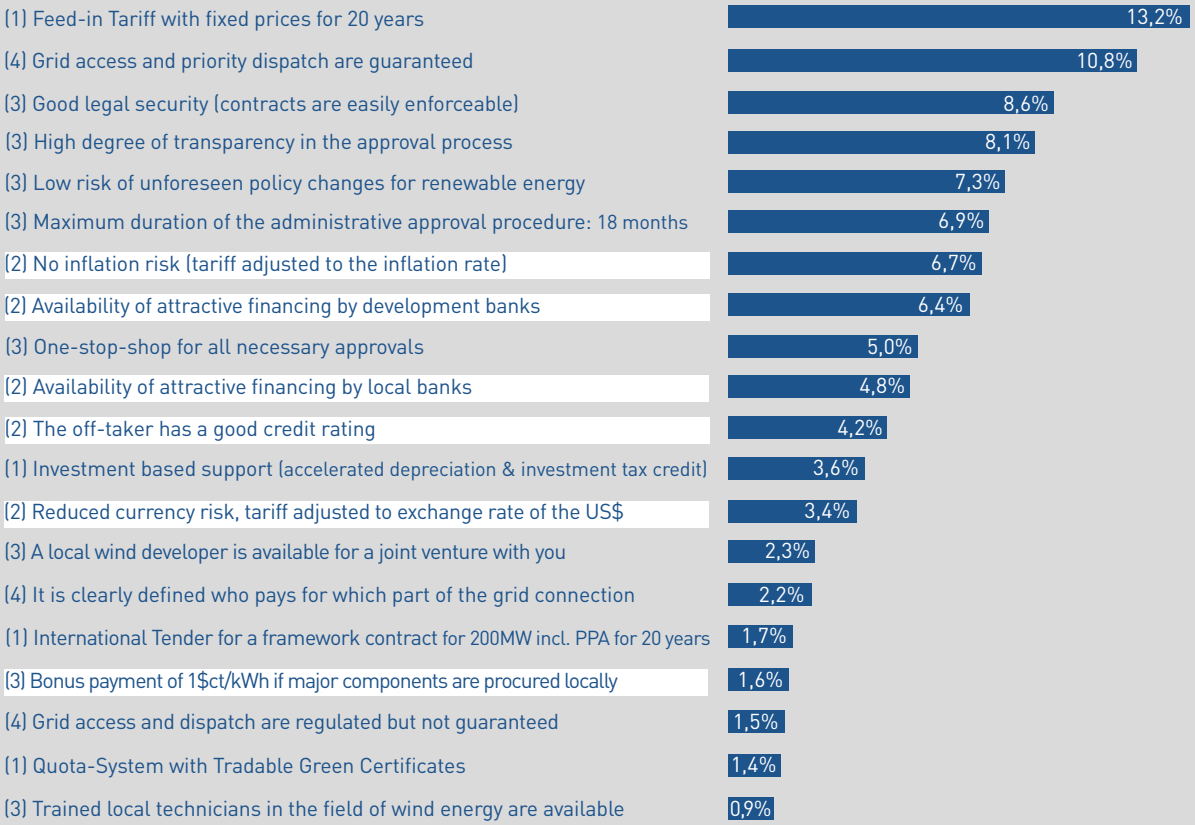
2. Research field: financial aspects

The following financial framework elements were evaluated:

- → No inflation risk (tariff adjusted to the inflation rate)
- → Availability of attractive financing by development banks
- → Availability of attractive financing by local banks
- → The off-taker has a good credit rating
- → Reduced currency risk: Tariff is adapted to the exchange rate of the US dollar
- → Bonus payment of 1$ct/kWh if major wind turbine components are procured locally

Diagram 8 shows: Framework conditions influencing the wind park's financing apart from the support mechanisms show medium relevance compared to other framework conditions. The following provides a more detailed insight:

Diagram 8: Preferences regarding financial aspects



Throughout the interviews, **inflation compensation** was identified as a relevant framework condition. The interviewees explain this as follows: Initial wind park investments are often largely provided in euros or dollars, whereas the subsequent income is generated in the local currency. If there is an unexpected increase in the local currency's inflation rate, the return (in euros or dollars) generated throughout the project duration decreases. In the survey, "no risk of inflation" was considered attractive. This assessment was confirmed in the workshop. One might add that the periodical adaption of negotiated tariffs, when put on a legal footing, can significantly increase the attractiveness of a country threatened by inflation.

Furthermore, the workshop participants stated why a reduced risk of inflation is more attractive than a **reduced currency risk**: They assume that currency risks can be transferred more easily at financial markets.

During the interviews at the beginning of the study, it became apparent that the **availability of attractive financing by international development banks and local banks** are relevant for entering a new market, even though the cooperation with development banks is, according to the project developers, linked with a comparatively high to very high administrative effort. Regarding the cooperation with local and possibly state owned banks, the interviewees emphasized the importance of having the support of local authorities when building and operating a wind park. The quantitative survey showed that favorable financing conditions provided by international development banks are considered slightly more attractive than the cooperation with local banks. According to the participants, local banks currently have little or no experience with wind park financing. In this case, international development banks or project developers would have to provide the necessary assistance in acquiring the corresponding competencies. Therefore, it was underlined that development banks can and should be the initial stepping stone in financial issues, despite the administrative costs - especially for the very first projects.

The interview showed that the **credit rating of the off-taker** in an emerging or developing country is relevant for a wind park's financing. If the credit rating does not suffice, the government has to guarantee the contract (Power Purchase Agreement, PPA). The quantitative survey shows that this framework condition is not of great importance to the participants. The reason for this assessment is - according to the workshop participants - that this framework condition is important in some countries only but does not have a general relevance.

Furthermore, project developers consider a legal obligation to purchase larger turbine components locally unattractive. A voluntary mechanism linking **local procurement to bonus payments**, however, would certainly create a much better response. Contrary to the interviews, the survey's results showed that local content (LC) requirements in combination with bonus payments are also considered unattractive. The discussion of this particular framework condition during the workshop led to the conclusion that, at least during the initial market deployment stages, there is only a small number of potential manufacturers and suppliers in the country that are able to meet the local-content requirements. The lack of competition can lead to monopolistic behaviour. The only exception is, under certain circumstances, the supply of tower elements. In the past, local steel manufacturers often met the technical requirements for this component and can usually take on the production.

During the interviews at the beginning of the study, the **Clean Development Mechanism**[19] was mentioned in addition to the surveyed framework conditions. However, it was considered virtually irrelevant and was thus not included in the survey.

[19] The Clean Development Mechanism (CDM) allows a country with an emission-reduction or emission-limitation commitment to implement an emission-reduction project in developing countries. Such projects, e.g. renewable energy projects, can earn sellable certified emission reduction credits (CER), each equivalent to one ton of CO_2. This mechanism is supposed to translate the economic goal of reducing CO_2 emissions globally into concrete investment incentives .A project must provide emission reductions that are additional to what would otherwise have occurred. In order to actually reduce CO_2 emissions in developing countries, the financial viability of a project should only be possible using the CDM. This aspect, however, is difficult to put into practice. (for more information visit: www.unfccc.int)

During the workshop, this aspect was reintroduced into the discussion, which resulted in the following findings: On the one hand, a project developer would not run a project which would owe its profitability solely to the CDM. High administrative costs, duration of the evaluation process, and the insecurities regarding the outcome of said evaluation process were listed as the main reasons. According to the participants, projects using the CDM would have most likely been built either way. On the other hand, the CDM can apparently be an effective support mechanism for later stage investors as it could lead to an additional IRR of one percent.

In conclusion, the financial aspects used in this survey are considered to be of average attractiveness. Inflation risks are highly relevant for the decision about entering an emerging market while local content was considered less attractive, even if linked to additional bonus payments. Experts therefore recommend a thorough assessment of the advantages and disadvantages of LC protection clauses.

3. Research field: non financial aspects

The following non financial framework conditions were evaluated:

- Good legal security (contract are easily enforceable)
- High degree of transparency in the approval process
- Low risk of unforeseen policy changes for renewable energies
- Maximum duration of the administrative approval procedure: 18 months
- One-stop-shop for all necessary approvals
- A local project developer is willing to set up a joint venture
- Trained local technicians in the wind energy field are available

Diagram 9: Preferences regarding non-financial aspects

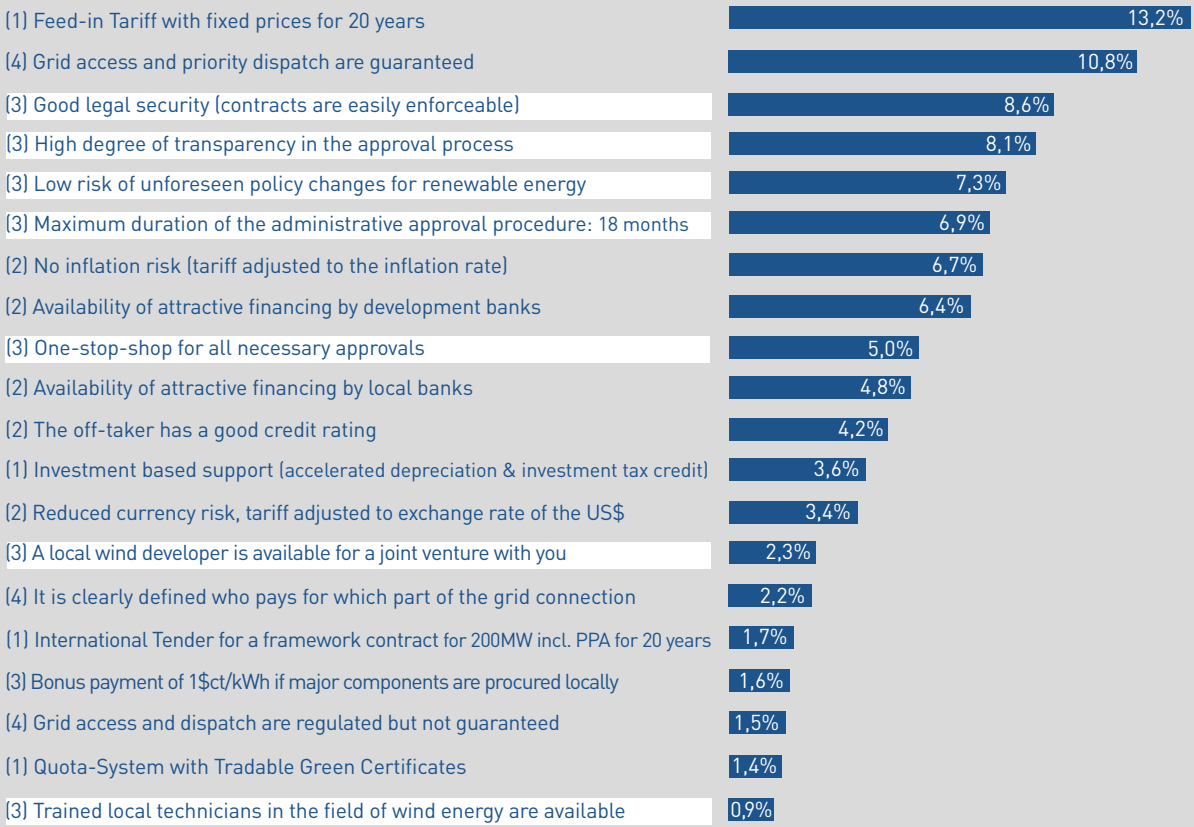


Diagram 9 shows: In the assessment of different non-financial aspects, four framework conditions stand out regarding their preference and relevance. After the Feed-in Tariff and guaranteed grid-access, they are the most appealing. Furthermore, there are big differences among other non financial framework conditions. The following provides a more detailed insight:

The interviews proved that **legal security** is an essential prerequisite for investments. Additionally, according to the interviewees, local authorities can improve the **transparency** and curb corruption by designing a suitable approval process. An unambiguous and completely implemented approval process can also determine the **maximum duration of the approval process** and thus create another incentive for international project developers. Regarding the **risk of unforeseen policy changes for renewable energies**, the interviewees emphasized that the mere discussion of changes can cause investors to hesitate. This aspect is especially relevant during the introduction period (see also chapter "Final remarks on implementing a framework"). The aforementioned non-financial aspects can therefore offer great potential to increase the appeal of a new market and also reduce the overall costs of renewable energies. These opinions were confirmed by the quantitative survey and the workshop.

During the interviews with experts for policy frameworks at the beginning of the study, a demand for a **"one-stop-shop"** approval process in developed countries was discussed. However, it remains unclear whether this demand is transferrable to emerging and developing countries. Therefore, this particular framework condition was included in the survey. The results neither show a clear preference nor a definite rejection.
The workshop participants stated that this kind of simplification could also bear certain risks for project developers. According to the experts, the following aspects need to be carefully considered:

- → Loss of transparency
- → Project developers have less influence on the approval process
- → Establishing a "one-stop-shop" might create an additional administrative burden and slow down process, but not simplify it.

Several workshop participants would, however, appreciate an official contact person to guide projects toward the successful completion of the approval process.

Whereas the first interviews with project developers created the impression that access to emerging markets can usually only be achieved by entering **Joint Ventures with local project developers**, the survey showed that this framework condition is not considered to be very attractive. There are two possible explanations: Firstly, it might be possible that the interviewees overestimated the role of joint ventures and this survey corrected this opinion. Secondly, it is also possible that a sufficient number of potential local partners is available. This would suggest that local partners are relevant for entering a market, but that finding one does not require a lot of effort. This matter could not be completely resolved in the workshop, since it was found to be very country-specific.

The overall conclusion is that non-financial framework conditions are considered indeed more important than many purely financial framework conditions. The latter can thus significantly increase the appeal of a country for international project developers. Legal security and a transparent approval process are particularly important. Regarding the introduction of a "one-stop-shop" for all required approvals, an explicit recommendation based on the survey and expert discussion cannot be made.

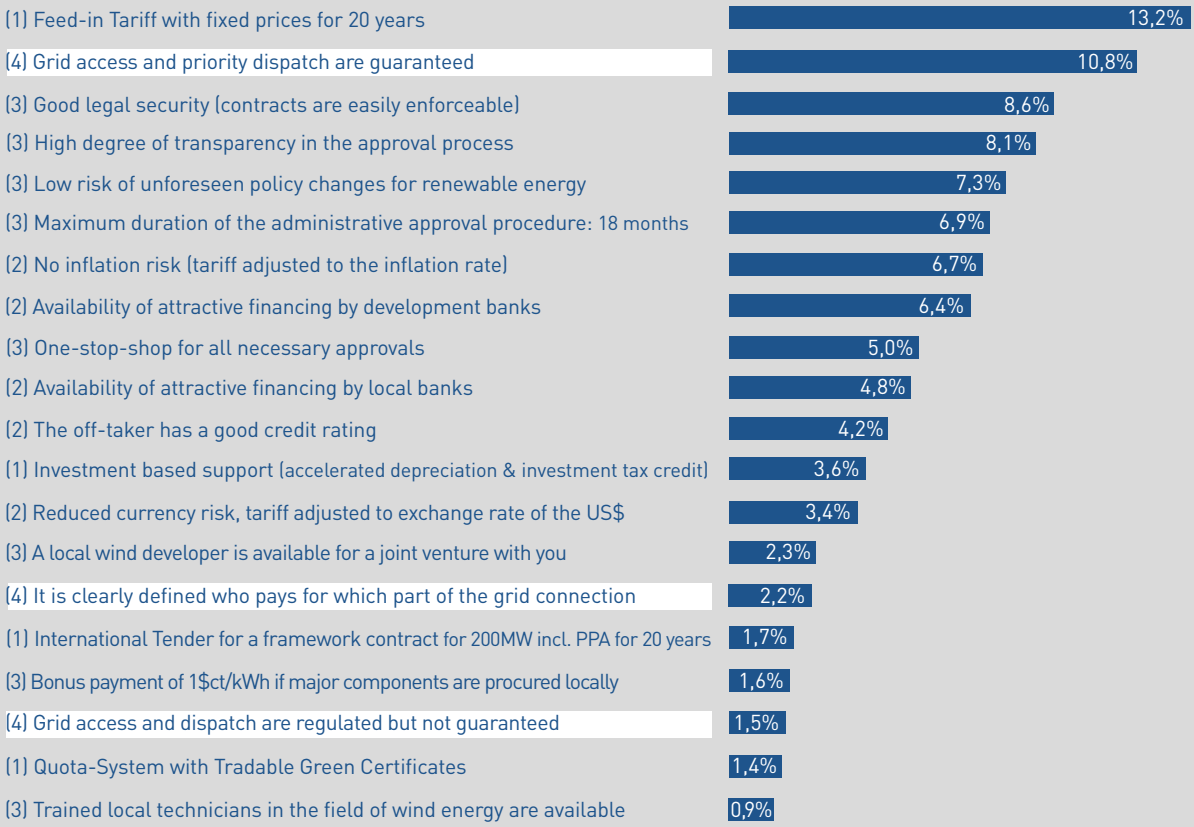
4. Research field: grid access

The following framework conditions regarding grid access were evaluated:

- → Grid access and priority dispatch are guaranteed
- → Grid access and dispatch are regulated but not guaranteed
- → It is clearly defined who pays for which part of the grid connection

Regarding grid access and dispatch, diagram 10 shows clearly that a guarantee is considered one of the most attractive policy frameworks evaluated in this survey. In contrast, regulations without an explicit guarantee are regarded as unattractive by the surveyed project developers. The following provides a more detailed insight:

Diagram 10: Preferences regarding grid-access



It became apparent in the interviews at the beginning of the study that clear regulations with transparent criteria for the connection of wind parks are an attractive framework condition as opposed to non-existing regulation. It was, however, unclear, how big the difference is between a guarantee and regulation (without a guarantee). The two principally positive framework elements were therefore compared in the quantitative study. The results show that these elements are at opposite ends of the scale measuring the appeal to project developers. It was also mentioned in the workshop that this aspect needs further clarification. On the one hand, the assessment of both **grid access and power dispatch** together seems to be an oversimplification. On the other hand, a detailed policy is essential for a regulated grid access. It can be concluded that a clear recommendation based on the survey can be given for guaranteed grid access with priority dispatch only. A definite statement regarding regulated grid access and dispatch, however, cannot be made.

The interviews showed that the question of **grid-access financing** or an expansion of the existing grid to connect the wind park is often very vague. This could not be confirmed in the quantitative survey. The workshop participants explained that this issue is usually the exception rather than a general challenge in emerging countries.

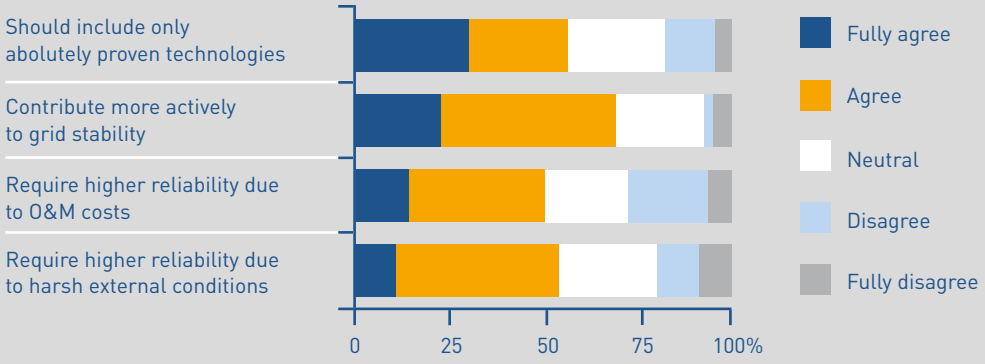
All of the above lead to the conclusion that guaranteed grid access and priority dispatch are particularly appealing to international project developers. According to the workshop participants, priority dispatch can be regulated in so-called "take or pay"-clauses in the Power Purchase Agreement (PPA)[20].
Project developers consider the different guarantees as a proof of strong political support for renewable energies and thus a very positive aspect.

Technical requirements

In addition to the assessment of preferences according to Maximum Difference Scaling, technical requirements for wind turbines in emerging or developing countries as opposed to requirements in industrialized countries were examined.

Some interviewees emphasized that focusing on proven turbine technologies lowers the risk for project development and financing. This is particularly relevant for international financial institutions. The workshop participants added that new manufacturers in the wind energy field often use emerging markets to introduce their new turbines. The main reason for this is an initially low requirement of grid stability by wind turbines. As soon as the market begins to grow, the requirements for wind turbines to support grid stability usually grow just as rapidly.
The reliability of a wind turbine, for example with regard to often difficult climate conditions and higher maintenance costs, was mostly considered a relevant factor.
Overall, it becomes apparent that technical requirements of wind turbines are rated high in comparison to developed countries.

Diagram 11: Technical wind turbine requirements in emerging and developing countries



[20] A take-or-pay contract between utilities and wind farm operators means that the utility either takes the electricicty from the wind farm operator or pays a penalty.

Final remarks on implementing a framework

The purpose of the study results is to support political decision-makers in the development of framework conditions for investments in wind energy as part of a national (and international) energy infrastructure strategy. The study can also be seen as a contribution to the discussion about **NAMAs** and the **Green Climate Fund** as an international financing mechanism of such measures. To this end, the study identified the essential frameworks of such strategies – using the example of financing wind parks – from the perspective of international project developers and potential investors respectively.

Throughout the workshop, further aspects of successfully implementing these strategies were discussed. This included most importantly the questions of creating suitable know-how within a country and of providing concrete advice regarding the implementation of renewable energy policies.

The creation of national capacities (know-how and local production) is particularly crucial for economic reasons in the respective country and thus for a sustainable market development. Every country has a legitimate interest in realizing an appropriate share of value generated domestically. If there is a lack of experts on-site, this know-how has to be purchased internationally at a comparatively high cost. According to the workshop participants, these costs are not justifiable beyond the initial market deployment phase.

Regarding the introduction phase of new regulations for wind energy, it must be ensured that the wind energy market in emerging and developing countries is gradual and constant. It is furthermore important that the elimination of administrative and financial barriers is not only enforced on a legislative and administrative level, but that it is accompanied by a concrete implementation process. Some emerging countries, e.g. in Eastern Europe, were quick to introduce attractive support mechanisms. Consequently, many international project developers started their initial activities in these countries, but they eventually failed due to a number of unanswered questions regarding the implementation. Some of these questions are:

- "Which criteria determine whether a project is approved?"
- "Who decides on the different neccessary approvals for one project?"
- "Which documents and preparation must be provided by project developers in order to complete the process in due time?"

The workshop participants advocate a step-by-step development process of a national investment framework for wind energy which will require all public authorities, as well as local project developers, energy utilities, and grid operators to undergo a learning process. In a country that is at the very beginning of deploying its wind resources, national energy utilities, for example, could initially build and operate several wind turbines. This would give them a better understanding of how a wind turbine works when connected to their particular grid, as well as which technical aspects require extra attention. In a second step, individual wind parks could be developed as Independent Power Producers (IPP). Promising regions in the country could be opened up to the construction of these wind parks. Based on the acquired experience during the process, a national regulatory framework could be implemented.
It is important to keep in mind that it would be counterproductive to punish local and international project developers and investors for their early initiativ with unexpected negative changes in the political framework. It is furthermore possible to establish a local supply chain, if the authorities stick to their policies. Local project developing companies will be created, possibly with the initial support of international project developers, which leads to a long-term local supply infrastructure for foundations, tower elements, logistics, cranes, etc.

Section D: Appendix 1

The participants in the interviews

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Appendix 2

Information on the project "CFI – Climate Change, Financial Markets and Innovation"

CFI Climate Change, Financial Markets and Innovation

As part of the research project "CFI - Climate Change, Financial Markets and Innovation", funded by the Federal Ministry for Education and Research (BMBF), the Sustainable Business Institute (SBI) carries out a series of studies regarding the role of financial services in the context of adaptation to climate change as well as the financing innovations for climate protection.

Among the studies are i.a.:

- Challenge of climate change expertise: customer expectations regarding financial services - results of a survey of private and business customers (available in German language)
- Demans on the Climate Services Centre (CSC) from the viewpoint of the financial sector (available in German language)
- Advancing adaptation through climate information services – Results of a global survey on the information requirements of the financial sector
- Sustainability and shareholder value from the perspective of listed companies (available in German language)

The financial institutions are, according to their regional orientation and depending on their respective focus, affected in very different ways by these issues.

For further information about the project and other publications see also www.cfi21.org.

The CFI project also contributes to the research policy dialogue between the "Climate Change Finance Forum Germany" and the Federal Ministry for Education and Research (BMBF).

CLIMATECHANGE Finance Forum Germany

Members of the "Climate Change Finance Forum Germany" are: Altira AG, Axa Versicherung AG, BayernLB, Bundesverband der Deutschen Volksbanken und Raiffeisenbanken e.V., Bundesverband Deutscher Kapitalbeteiligungsgesellschaften e.V., Commerzbank AG, Deutsche Bank AG, Deutsche Postbank AG, Deutscher Sparkassen- und Giroverband e.V., Gesamtverband der Deutschen Versicherungswirtschaft e.V., Munich Re and UniCredit Bank AG (HypoVereinsbank).

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