

Scandinavian Investments in Renewable Energy in Developing Countries

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REPORT

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Forewords

by ZERO, The Norwegian Solar Energy Cluster (Solenergiklyngen) and Norfund

Developing countries need energy to grow out of poverty, but if they base their growth on fossil sources, it will be impossible to stop climate change that will have the most disastrous consequences in the same countries. In spite of steadier lower prices on renewables, new coal plants and diesel aggregates are still being built. Rich countries that have spent most of the world's carbon budget, have no business pointing a moral finger on countries with much lower emissions per capita. But we do have a shared obligation to offer better alternatives.



ZERO is a Norwegian environmental organization dedicated to use Norway as a tool to create the biggest possible impact in stopping climate change. We believe that investing in renewable energy in developing countries is one major way Norway can make a global difference. Norway has capital and energy competence that gives us both a great responsibility to contribute to combat climate change and poverty, and great opportunities to create new jobs and income streams, in a future where our own income from oil will fade.

This leads us on a quest to find the right mechanisms to drive further growth in these investments. The Nordic countries share many similarities in business and governance, making it useful to see what we can learn from each other. Our hope is that this report can be used to develop new policies that can contribute to further develop the emerging Norwegian cluster of businesses investing in renewables in developing countries.

The Norwegian Solar Energy Cluster consists of more than 80 industrial partners, major R&D institutions and regional and national public partners. The cluster aim to strengthen the Norwegian partners' innovation capacity and competitiveness, and to supply both markets at home and abroad with clean, renewable and sustainable solar energy.



In a world where 1 billion people - one in seven of the world's population- do not have access to electricity, we have the work cut out for us. The report suggests that Norway has the most active and mature business community investing in and developing commercial renewable energy projects in developing countries. Our long history, experience and competence in the area is considered to be relevant for partner countries, and should also be strengthened as a competitive advantage.

Norwegian energy businesses emphasize the importance of risk mitigating support. Norwegian public support to risk mitigation in the early phases of project development is available, but can be difficult to access for some, in particular for companies lacking technical or operational track-record. This limits new ventures and innovative start-ups, which is contra productive in a business where fast changes due to digitalization and technology innovation is vital.

The report shows we have something to learn from the Danish approach to portfolio risk instead of project risk, which allows higher-risk projects to access support. Pinpointing the debate on investment guarantee instrument, the report shows that although the Norwegian public offer a range of guarantees, they are risk averse and expensive. We need a guarantee mechanism dedicated to renewable energy projects in developing countries to unleash more private investments. Also there is a huge untapped potential to financing renewable energy projects if more pension funds could be mobilized.



Norfund's mandate is to contribute to economic growth and job creation through sustainable investments in developing countries. Norfund is fully funded from the Norwegian development aid budget, is completely untied, and operates on commercial terms.

Teaming up with the best commercial partners is crucial to making good investments. In our energy investments, Norfund has over time worked successfully with, among others, Nordic partners like Scatec Solar, KLP, Trønder Energi, BKK, Statkraft and Vestas, as well highly qualified consulting firms and legal advisors. A major aim of this study is to map commercial and financial companies in the Nordic countries that operate in developing countries, to get a better understanding of Nordic companies' capabilities in this area, and how we can strengthen our common contribution to development in the clean energy sector. A particularly interesting finding is that Norway has, partly due to heavy and targeted political priorities over a long time, a strong and experienced industrial cluster, well positioned for further efforts in contributing to developing the energy sector in poor countries. Another interesting finding is that we may have some lessons to learn from our neighbours, particularly with respect to mobilizing more private capital for energy investments in developing countries.

About the author



Multiconsult is one of the leading firms of consulting engineers and designers in Norway and Scandinavia, with close to 3000 permanent staff and expertise spanning a wide range of disciplines. Multiconsult's 295 highly skilled consultants dedicated to the renewable energy sector provide consultancy and design services both in Norway and internationally. Working at the intersection between experience, research and development enables us to create efficient, sustainable energy solutions for the future.

At Multiconsult, we look at the bigger picture when developing renewable energy projects, from production and distribution to consumption. Long experience with the Ministry of Foreign Affairs, the Norwegian Embassies in developing countries, Norad, Norfund, various Norwegian private Renewable Energy companies, as well as on assignments commissioned by Sida and other bilateral and multilateral donors, has provided us with the insight that creates the foundation for this report.

Multiconsult would like to thank ZERO, Norfund, and The Norwegian Solar Energy Cluster for close and good cooperation throughout the compilation of this report. A special thanks is extended to Tom Erichsen and Kjetil Røine in **Differ AS** (www.differgroup.com), who have written the sub-chapters that are specifically related to off-grid, distributed energy and the specific challenges faced by distributed energy companies.

Finally, we thank the significant number of interviewees from companies and institutions across Scandinavia, who have provided insight, data, references, and opinions that this report builds upon. Without these, there would be no report.

Oslo, November 2018

Executive Summary

This report presents a benchmark assessment of Scandinavian countries in terms of levels of activity among commercial entities related to investment in renewable energy in developing countries, and the public support mechanisms and instruments set up to promote such investments. Through this assessment, the report seeks to discuss and provide possible answers to four key questions.

A summary of the conclusions related to each question are presented below.

1 How does the level of activity in commercial investments in renewable energy in developing countries differ between the three Scandinavian countries?

- ☀ **Norway's business community is the most active in investments in and development of commercial renewable energy projects in developing countries**, compared to our neighbouring countries.
- ☀ **Norwegian renewable energy businesses have characteristics of an emerging industrial 'cluster'** – with small and big companies and financiers representing a wide array of expertise: technological solutions, equipment supply, business development, equity and portfolio investment and advisory services; and backed by industrial associations.
- ☀ Norfund's large proportion of renewable energy in the investment portfolio contrasts Swedfund and IFU's smaller shares of renewable energy.

2 What public support is offered and does it impact the actual investment level?

- ☀ **Norway, Denmark and Sweden all offer relatively comprehensive suites of mechanisms and funding approaches to support international private sector development;**
- ☀ **Norway is the country among the three that most strongly emphasises renewable energy** as target area. Norway's long history, experience and competence in the area is considered to be relevant for partner countries;
- ☀ Norway combines a strong commitment to the principle of untied aid with an explicit intention to also facilitate and encourage application of Norwegian renewable energy experience and competence. Meanwhile, **Sweden does not emphasize involvement of Swedish industry**. Danish support mechanisms on the other hand **explicitly target Danish companies and Danish exports**.
- ☀ The combination of public support available to the private sector and the leadership represented by Norfund and some other leading actors in Norway have likely been one **driving force in the emergence of a Norwegian 'cluster'**. Danish tied support has been actively used by the export industry and has promoted equipment suppliers and exports rather than encouraged *investments*.
- ☀ The various Norwegian early stage support schemes are not formed to effectively support Distributed Energy Service Companies (DESCOs) to go to scale and make them attractive for investments by DFIs.

3 What lessons can Scandinavian countries draw from each other with regard to promoting investments?

- ⚙️ Consistent Norwegian focus on energy as a target sector in development assistance and the role that the Norwegian energy sector can play has been a driving force to encourage investment activities in developing countries.
- ⚙️ The Danish approach to business support provides an interesting example in considering portfolio risk instead of project specific risk, which allows higher-risk projects to access support.
- ⚙️ Engagement of Danish pension funds to invest in commercial projects in developing countries with a focus on energy, climate and infrastructure has been made possible and strengthened through provision of guarantees to the funds' investment.
- ⚙️ Danida's *Business Finance* promotes Danish industry through concessional lending exclusively to Danish companies; while Norwegian aid is untied and grant-focused and cannot be granted on exclusive basis.
- ⚙️ While Sweden strongly emphasises guarantees, the guarantee mechanism have not in itself had any promotional effect on the investment level of Swedish businesses.
- ⚙️ Sida's piloting of a special guarantee for the TRINE platform as an approach to enable crowdfunding is an example of innovative use of support mechanisms, which also supports distributed energy solutions.

4 How can the emerging cluster be supported to ensure further growth?

- ⚙️ The Norwegian suite of support mechanisms has been relatively consistent over time. While this ensures predictability for beneficiaries, it may also indicate that Norwegian public support to Norwegian renewable energy companies is less innovative than Danish and Swedish support and potentially less adaptable to changing needs.
- ⚙️ While public support has been a driving factor for the emergence of the cluster, it is likely that more could be achieved through innovative approaches, strengthened support for early phase development and business scaling, and better access to risk mitigation measures.
- ⚙️ Norwegian energy businesses emphasize the importance of risk mitigating support. Norwegian public support to risk mitigation in the early phases of project development is available and valued, but can be difficult to access for some, in particular for companies lacking technical or operational track-record. This limits new ventures and innovative start-ups, which also limits the growth of the cluster.
- ⚙️ Distributed energy has a potential and Norway could play a leading role among the Nordic countries in making distributed energy business bankable. DESCOs are facing a different set of risks than on-grid developers, specific policy attention, budgets and a tailored set of support mechanisms should be considered.

- ⚙️ Guarantees that cover a range of different types of risks are available in Norway and internationally. Norwegian energy businesses involved in developing countries have argued that guarantees available in Norway are risk averse and expensive, and that the international instruments are difficult to access. They argue that a dedicated Norwegian guarantee mechanism for renewable energy in developing countries could be instrumental to unleash more investments.
- ⚙️ Extended scope and outreach of publicly backed guarantees or subsidies for already available but expensive guarantees could count as Norwegian climate funding under the Paris Agreement. The white paper “Common Responsibility for Common Future (Meld. St. 24 (2016–2017))” also notes that such aid could have a catalytic effect on funds mobilization for development.
- ⚙️ A full evaluation of Norwegian publicly guarantees and how they could be structured should assess what gaps Norwegian public funding could fill in terms of coverage, terms or accessibility; the related costs, funding and management structure; and the potential impact it could have on Norwegian investments in developing countries.

1 Introduction

The purpose of this report is, primarily, to assess the activity level among Scandinavian business communities related to investments in renewable energy, with a specific focus on developing countries. Secondly, it aims to assess the Scandinavian countries' level of public support that are offered to commercial businesses in this space. The level of investment identified is considered as an indicator of the mechanisms' effectiveness and whether there is room for improvement.

The report benchmarks the level of private and commercial activity in renewable energy in developing countries in Norway against Sweden and Denmark, and provides an overview of the available policies and public instruments available to commercial actors to promote and support such investments.

To assess the relevance of such instruments, the report also briefly examines the barriers that investors and developers of renewable energy projects face when investing in renewable energy in developing countries; and whether existing instruments meet the investors' needs.

Against the backdrop of investment levels and available instruments, the report summarizes policy recommendations for the further efforts to support clean energy development through promotion of commercial investment, with a particular focus on the debate around a possible additional Norwegian investment guarantee instrument.

The report does not aim at assessing the overall results that have been achieved through the respective countries' energy sector development assistance other than with respect to investment activities.

The report is based on publicly available information, such as reports from various development agencies and financial institutions, as well as internal expertise and external interviews, information from companies' websites, news articles, other reports on the subject, (SE4ALL, u.d.) etc.

Differ AS have written the sub-chapters that are specifically related to off-grid, distributed energy and the special challenges faced by companies working in this area.

1.1 Background: *SDG 7 – Affordable and Clean Energy for All*

On January 1st, 2016, the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development — adopted by world leaders in September 2015 at a historic United Nations (UN) Summit — officially came into force. Through adopting the SDGs, countries have committed to eradicate all forms of poverty, combat inequality and climate change. The SDGs are not legally binding, but governments are expected to mobilize efforts and establish national frameworks to achieve the 17 goals.



Figure 1 SDG 7

SDG number 7, “ensure access to affordable, reliable, sustainable and modern energy for all”, is not only a goal in itself: it is also a crucial factor for attaining many of the other SDGs. Be it goals related to employment, inequality, security, climate change, food production or increasing incomes; access to energy for all is essential.

More than 1 billion people globally – one in seven of the world's population – do not have access to electricity. The majority of these people is concentrated in about twenty countries in Sub-Saharan Africa and Asia. Furthermore, close to 3 billion people rely on solid “dirty” biomass such as wood, charcoal, dung and coal for cooking and heating¹.

¹ Sustainable Energy for All. (u.d.) Energy Access. Retrieved from: <https://www.seforall.org/energy-access>

According to the UN, “the world needs to triple its investment in sustainable energy infrastructure per year, from around \$400 billion now to \$1.25 trillion by 2030”². McKinsey has estimated that close to USD 500 billion would be required to meet the needs for new electricity generating capacity in Sub-Saharan Africa until 2040³. As it is increasingly recognized that Official Development Assistance (ODA) can only support a very limited part of this need, private investments are gaining importance as a means to achieve the target. Private investors in sustainable energy services can also more efficiently bring new technologies to the market quickly from a diverse supplier base.

Against this backdrop, the Norwegian development assistance strategy has specifically aimed at contributing to achieving SDG 7, while recognizing the importance of access to energy for other SDGs. These contributions are ensured both through development assistance and financing, as well as through Norwegian companies’ activities in developing countries’ energy sectors.

² United Nations. (u.d). *AFFORDABLE AND CLEAN ENERGY: WHY IT MATTERS*. Retrieved from: https://www.un.org/sustainabledevelopment/wp-content/uploads/2016/08/7_Why-it-Matters_Goal-7_CleanEnergy_2p.pdf

³ McKinsey & Company. (2015). *Brighter Africa: The growth potential of the Sub-Saharan electricity sector*. Retrieved from: https://www.mckinsey.com/~media/mckinsey/industries/retail/our%20insights/east%20africa%20the%20next%20hub%20for%20apparel%20sourcing/brighter_africa_the_growth_potential_of_the_sub%20saharan_electricity_sector.ashx

2 Level of activity in commercial investments

2.1 Overview of relevant actors

In evaluating the level of activity in renewable energy in developing countries in Norway, Sweden and Denmark, the starting point is to get an overview of the different companies and organizations in this field in the respective countries. Although the overview is not exhaustive, it gives an indication as to how developed a “cluster” in this field is in each of the countries.

The cluster overview presents companies that in some way or the other have renewable energy activity in developing countries; developing projects, investing in projects, exports, consulting services etc. The players that have been included are those that have a track-record of some activity or strategic focus on developing countries, and where information has been available to verify that this is the case. There could for instance be other players that have some indirect activity in developing countries that are not included here (i.e. suppliers in up-stream value chain that contribute with parts that end up in products that are sold to developing countries).

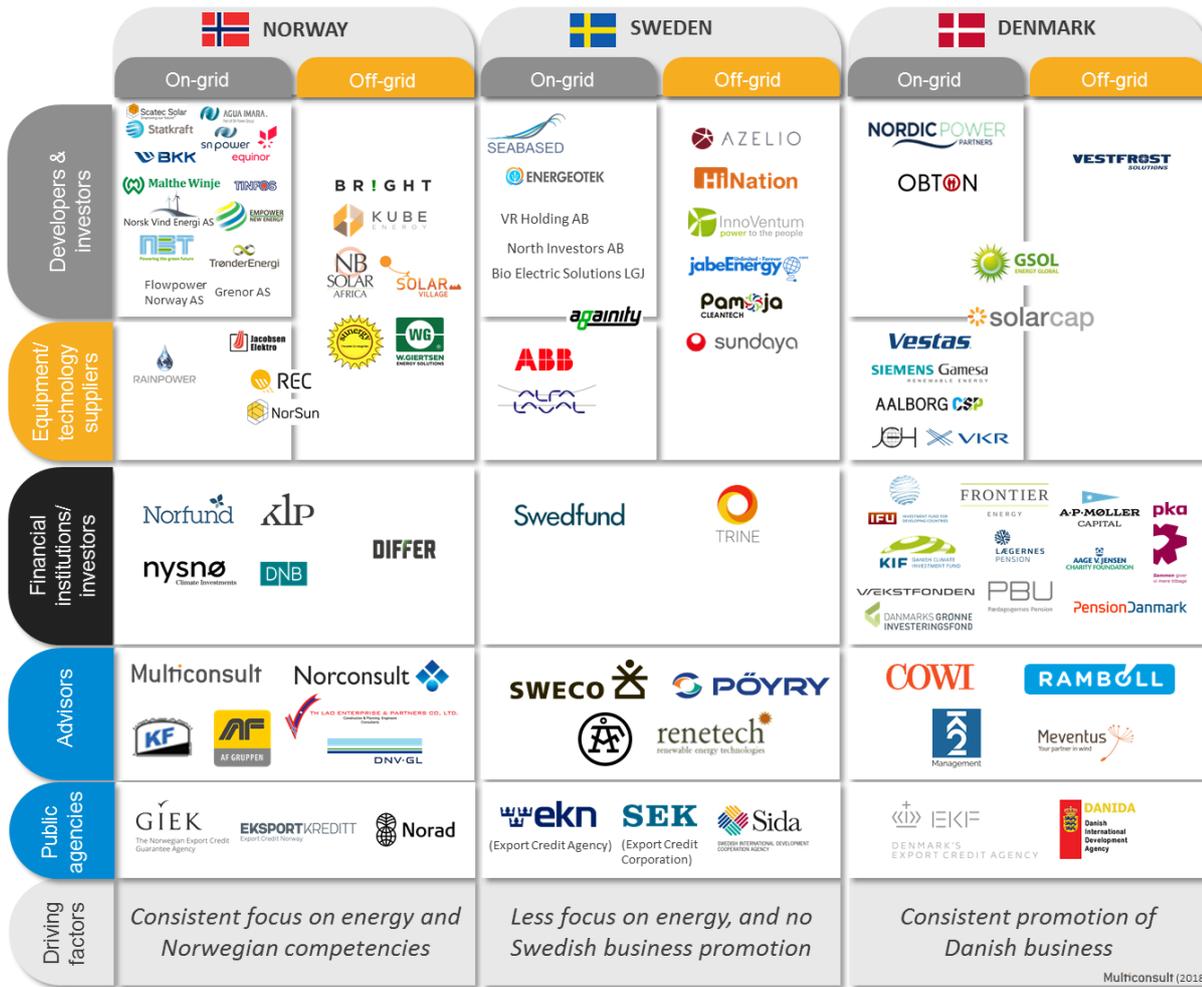
2.1.1 Definitions of types of companies

The various types of actors that make up a cluster, as defined in this report, are described below.

1. **Developer & investors.** The companies whose main activity (in this field) is to own projects and/or invest in project development.
 - **On-grid:** Companies that focus mainly on projects connected to the central grid.
 - **Distributed:** Companies that focus mainly on mini-grid, micro-grid and other off-grid systems and appliances, such as solar lamps and battery chargers.
2. **Equipment/technology suppliers.** The companies that do not necessarily provide capital to a project, but supplies equipment, products or technology of some kind that contributes to increasing capacity and access to renewable energy.
3. **Financial institutions.** Banks, funds, and other organizations/instruments whose main role is to fund projects and other players in the field, by providing capital through loans, equity and guarantees for instance.
4. **Advisors.** Companies or organizations, usually consultants, who provide services such as feasibility studies, market studies, projection of projects, etc.
5. **Public agencies.** Export Credit Agencies and other public organizations that extend credit or provide guarantees.

2.1.2 Industry Mapping

The following overview shows actors in each of the Scandinavian countries with some activity in renewable energy in developing countries. Some companies are involved in two categories, such as suppliers that supply to both on-grid and off-grid markets, and companies that both develop projects and act as suppliers.



Multiconsult (2018)

Figure 2 Mapping of active companies in the renewable energy sector in developing countries

The mapping above is not exhaustive due to data availability. Both Norway and Sweden have significantly more companies that can be categorized as developers/investors, and suppliers, both in the on-grid and off-grid space, compared to Denmark. Norway especially seems to have more active on-grid developers/investors than the other two.

Many of the names listed under Sweden is received from Sweden Business as companies that have voiced interest in business in Africa. As far as we have been informed and our research shows, many have not yet realized business or investments in developing countries, or only at a very small scale, and would not be significant on an aggregated investments overview. Furthermore, the Swedish business community does not operate as a joint interest group through a common representation, as the Norwegian example with Norwep and The Norwegian Solar Energy Cluster. Thus it appears that Norway has the most active and mature business community in this field.

Several relevant consultancy and advisory firms are identified in all three countries. Denmark stands out when it comes to institutional investors, shown by the number of pension funds that have been involved in relevant investments.

A detailed description of each company and their activities is presented in ANNEX IV.

2.2 Comparison of investment activities

In the following assessment of the level of investment activities related to renewable energy in developing countries, the focus is on developers/investors and financial institutions, as these contribute directly to promoting renewable energy with capital out of their domicile country.

To compare the activity levels across by Norway, Sweden and Denmark, we consider the following categories of activity separately:

- Investments of the countries' Development Finance Institutions
- Investments/projects of developers/investors and other financial investors

Investment level assessment methodology

The following central assumptions and limitations of scope should be noted. A fuller, detailed description of the methodology applied is provided in ANNEX II.

- In general only projects in developing countries outside Europe have been taken into consideration.
- Unless otherwise stated, only power generation facilities are taken into consideration. Auxiliary infrastructure such as power evacuation infrastructure or factories producing devices for renewable energy plants are not included.
- When it comes to **off-grid energy, investments are primarily made by the energy users and are therefore counted as "trade" or "import" rather than "investments" and thus not reflected in investment statistics.** This further implies that companies involved in off-grid activities contribute capital mainly as investments into the company, work capital etc. falls outside the scope of the investment analysis in this report. A suggestion for methodology on how this type of investments could be accounted for is presented in ANNEX II, section C, although not dealt with in this report.
- Where possible to isolate, only green-field and rehabilitation investments are taken into consideration. Investments in or loans to existing projects/companies are counted only where there are clear indications of that capital having catalysed projects that in some way add additional capacity to existing generation.
- Where possible to isolate, investments in biofuel driven power plants are not included.
- Where otherwise not stated, investments in energy efficiency are not included.
- Where planned investments⁴ are found, these are also included in the analysis. Value is included in the year of commitment.
- Identification of projects, companies and investment and the research faces a number of challenges. The information given in the following should therefore not be considered an exhaustive overview, and direct comparison may not be possible. Despite these limitations, we believe that the findings give an accurate indication of relative activity and investment level.
- Although companies that export equipment/technology and export credit agencies have been included in the mapping of players, renewable energy exports and export finance is not included in the benchmark, as this does not qualify as investments. Furthermore, it has not

⁴ Projects that have been publicly announced and have reached or are close to reaching financial close, but investments have been committed but not yet made

been possible to isolate the share of renewable energy of total exports and export finance for all the countries, thus benchmarking would not be possible.

- Institutional investors, such as pension funds, portfolio investors etc. are accounted for to the extent information has been available. This information does not specify type of investments, such as project size and type of technologies.

2.2.1 Development Finance Institutions (DFIs)

The DFIs Norfund, Swedfund and IFU⁵ (in Norway, Sweden and Denmark respectively) are among the countries' main channels for commercial investments into developing countries, also when it comes to renewable energy. A more detailed description of each DFI and their roles is available in sub-chapter 4.2.

Renewable energy focus

The share of energy/power related investments within the respective DFIs' total portfolios is a useful indication of the relative importance placed on (renewable) energy.

As **Figure 4** shows, renewable energy represents 50 % of Norfund's total committed portfolio of about 2.5 billion USD as of end 2017⁶. Norfund's investments had resulted in about 5000 MW total installed renewable energy capacity in mid-2016 (**Figure 3**).

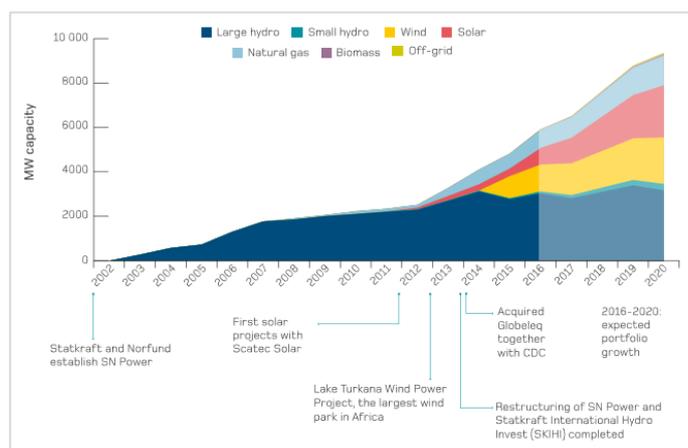


Figure 3 Development of Norfund's energy portfolio.
Source: norfund.no

In comparison, only 13.5 % of Swedfund's portfolio, with just above 500 million USD contracted amount, was invested in energy as of the end of 2017⁷. Note that this also includes some legacy of investments in non-renewable projects.

IFU's committed portfolio value is about 770 million USD⁸. 19 % of the portfolio was invested in the power sector at the end of 2017. Some of these investments are in non-renewable energy, as it has not been possible to isolate renewable energy investments. Also, there could be other renewable energy investments that are not included in the "power sector" share. In terms of installed capacity, IFU has invested in 764 MW of renewable energy in developing countries and 280 MW of fossil energy.⁹

In brief, Norfund has a substantially larger portfolio than the other two DFIs, as well as having the absolutely largest share of investments committed in power/energy.

⁵ Investment Fund for Developing Countries

⁶ Norfund. (2018). *Annual Report 2017*. Retrieved from: <https://www.norfund.no/getfile.php/138333-1534759775/Bilder/2017%20Annual%20report%20%28ID%20271534%29.pdf>

⁷ Swedfund. (2018). *Integrated Report 2017: Equation 2030*. Retrieved from: https://www.swedfund.se/media/2085/swedfund_integrated-report_2017_part-1-and-2.pdf

⁸ EDFI. (u.d.). Meet our members: IFU, Denmark. Retrieved from: <https://www.edfi.eu/member/ifu/>

⁹ IFU. (u.d.). Fact sheet: *IFU IS AN EXPERIENCED EMERGING MARKET INVESTOR*.

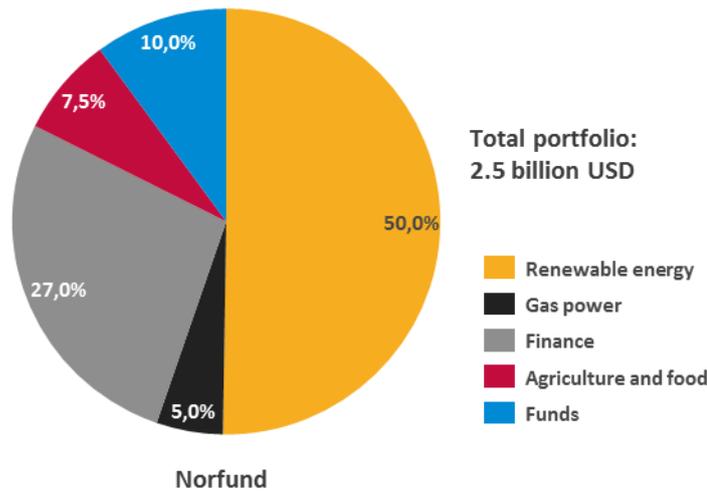


Figure 4 Norfund portfolio by sector. Source: Norfund Annual Report 2017

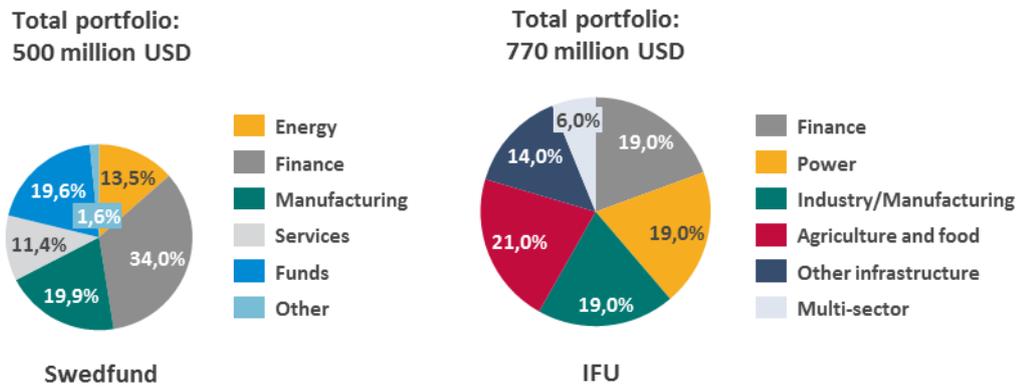


Figure 5 Swedfund and IFU portfolios by sector.

Sources: Swedfund Integrated Report 2017; EDFI web site: <https://www.edfi.eu/member/ifu/>

Commitments

With regard to renewable energy, Norfund represents the highest level of investments of the three DFIs considered. From 2013-2017 renewable energy investments accounted for a total of about 700 million USD. This is more than three times IFU’s investment in renewable energy in the same period; Swedfund is significantly below this. Investments in SN Power and projects developed by Scatec Solar represent a significant share of Norfund’s investments and commitments. Norfund’s portfolio includes investments in companies engaged in the off-grid sector. The investments into the off-grid sector are not isolated in the overview above.

IFU’s major financing source for renewable energy investment is the Danish Climate Investment Fund (DCIF). In the years between 2013 and 2017, nearly all of IFU’s renewable energy investments were financed from the DCIF¹⁰. These investments, as defined in this report¹¹, amount to about 130 million USD. The DCIF commits a significant amount of capital as loans through Nordic Power Partners¹².

¹⁰ DCIF’s total capitalization is about 1.3 billion DKK (~200 million USD), funded by the Danish state, partly through IFU, and by private investors. About 1 billion DKK was invested at the end of 2017.

¹¹ I.e. excluding biomass and projects that are not directly related to power production or distributed solutions

¹² Nordic Power Partners develops power projects and is owned by the DCIF and the Danish energy company European Energy.

Swedfund invested a total of 55 million USD in renewable energy in the period 2013-2017, but only since 2016 as a result of a dedicated sector focus following a strategic shift in Swedfund's investment strategy in 2015¹³. In 2016, 44% of the annual government allocations to Swedfund were allocated to renewable energy %, increasing to 72 % in 2017. Swedfund expects a significantly increased focus on renewable energy, and consequently increased investments (both in absolute and relative terms) in the coming years. Swedfund's investments can be grouped into platform investments (where Swedfund effectively finances a developer of renewable energy projects such as the commitment to the Berkeley Energy Asia-focused fund REAF II); long-term debt through the Interact Climate Change Facility; and smaller direct investments.

Figure 6 shows cumulative investments and loans committed by DFIs into renewable energy in developing countries in the years 2013-2017.

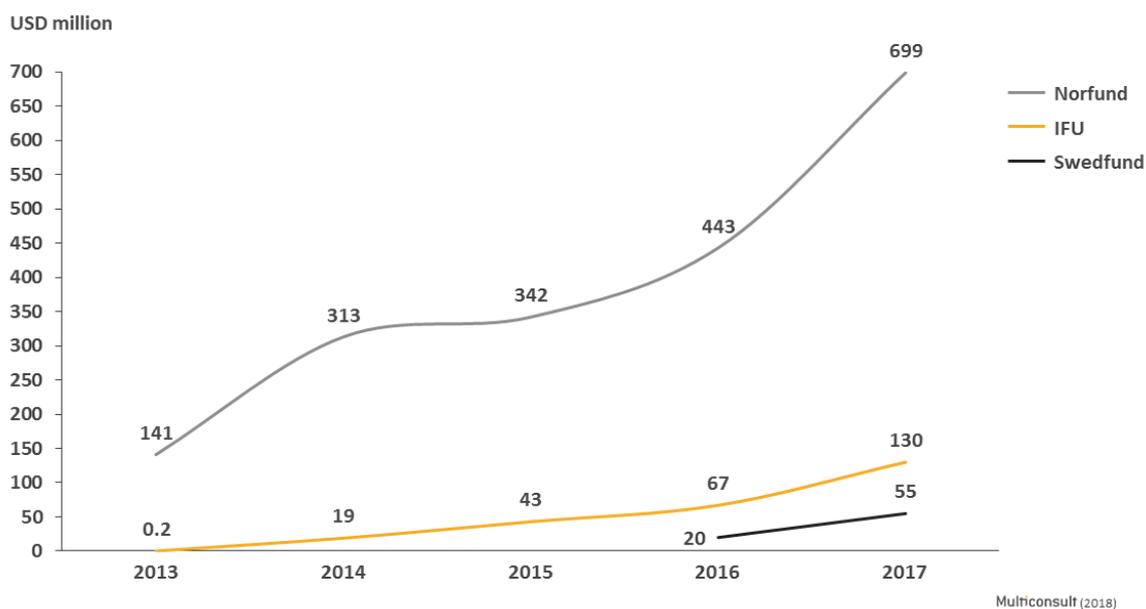


Figure 6 DFI commitments from Scandinavian countries, 2013-2017. Does not show investments before 2013, and is not equivalent to total committed value in 2017.

Source: Web sites, annual reports and reported numbers from respective DFIs.

Based on the above, it is clear that with regard to renewable energy in developing countries through DFI activity, Norway showcases a much higher level of activity than the two other countries.

2.2.2 Commercial investors and developers, and other financiers

In addition to DFI activity, commercial investments stems from private sector investors (both companies and institutional investors) and developers/IPPs^{14 15 16}. To the extent possible, we have identified investment amounts by each of these actors in order to estimate the combined value of their investments. As mentioned above, availability of this type of data and information is very limited and not easily available, and the following is based on a compilation of sources and assumptions made and is not fully comprehensive or exhaustive.

¹³ Numbers are provided by Swedfund.

¹⁴ Independent Power Producers

¹⁵ We note that in relation to stand-alone solutions, an important element that is not reflected in these figures are investments made by the end users. For a SHS, the customers themselves typically carry 30-100% of the infrastructure investment cost. The same is often the case for project developers. This is different from on-grid power plants, where the full investment is carried by the investors, while end users only pay for the usage.

¹⁶ As only project investments are accounted for, the overview does not reflect equity capital insertions in companies. This implies that e.g. off-grid business activity is under-reported, as companies engaged in this space may invest in working capital for project development, marketing and sales, and stock.

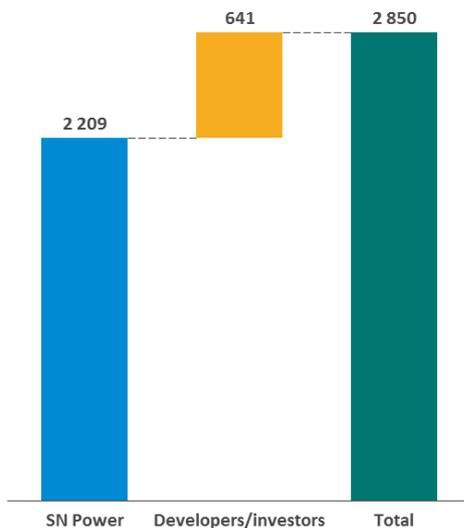
Norway

Figure 7 Investments by Norwegian companies and private investors.

The private developers and investors in Norway represent investments amounting to about 2.85 billion USD (**Figure 7**). In relation to this figure the following is noted:

- ⚙️ The estimate for SN Power's investments is based on equity investments between 2005 and 2017, as reported in the annual reports. Agua Imara's investments are assumed to be a part of SN Power's investments.
- ⚙️ In the estimate of investments by developers, both larger and smaller actors are included. Among these are Scatec Solar, Equinor, Kube Energy, Tinfos and the Nkusi project in Uganda.
- ⚙️ The investments by developers and investors also include the investments made by KLP through KNI¹⁷, their partnership with Norfund. Only KLP's part of the investments KNI is included, as Norfund's part has already been accounted for as DFI investment (section above). KNI has invested in several of Scatec Solar's projects, but the Scatec Solar numbers have been isolated to not include the KNI funding or other Norfund funding, to avoid overlap.

- ⚙️ As only project investments are accounted for, the overview does not reflect equity capital insertions in companies. This implies that e.g. off-grid business activity is under-reported, as companies engaged in this space may invest in working capital for project development, marketing and sales, and stock. A thorough assessment of the contributions from this sector would need to take a different approach, for example by assessing total sales figures in developing countries.

We emphasize that there are caveats related to estimating an aggregated level of investments, in particular related to lack of reliable data. For example, investments made by Statkraft, besides those made through SN Power, have not been included here due to lack of data. Further, many small projects – often within off-grid activities, have not been possible to account for.

While the above thus is no exhaustive overview, it can be considered as a good indication of the size of investments that have been made by Norwegian private developers and investors.

Sweden

Various developers and suppliers have been identified in Sweden, both in the on-grid and off-grid sectors. To the extent research has uncovered, and considering the likeliness that we have missed some investors or companies, there are not many Swedish developers or investors that have yet invested in or developed projects within renewable energy in Africa or other developing countries, as mentioned in Section 2.1.2. As for the Norwegian assessment, off-grid activities are not reflected as investments by the companies themselves are limited. Nevertheless, this shows that the Swedish business community in 'renewable energy in developing countries' is less vibrant than what is seen in

¹⁷ KLP Norfund Invest

Norway. This statement has been confirmed by various players who are likely to be well informed, including Swedfund, Sida and Business Sweden.

A number of activities that may be relevant but are not regarded in this context:

- ⚙️ Consultants/advisors such as Sweco are engaged in renewable energy projects, but are not investors and thus not reflected. ABB is also involved in various projects globally, including developing countries, but as they are focused more on grid and other infrastructure which is not part of generation, they fall slightly outside the scope.
- ⚙️ Some other developers/investors, such as Seabased AB¹⁸ and North Investors AB¹⁹ also have some activity, but these are either relatively small-scale projects so far, not yet realized or no investment data is available. VR Holding AB applied to build a 600 MW off-shore wind farm off the coast of Kenya²⁰, which would have made it the largest wind farm in Africa (the largest so far, the partly Norwegian owned Lake Turkana, also in Kenya, has 310 MW capacity, see *Box 1*). The Kenyan government did not approve this project, as it is too large for both institutional and infrastructure capacity to handle, thus VR Holding has set their sight on Tanzania instead, but no concrete project plans seem to have been established or approved.
- ⚙️ About 11.4 million USD has been mobilized through Trine Crowdfunding Platform, since it was established in 2015. However, as the platform is not limited to Swedish persons, the capital cannot strictly be verified to be Swedish.
- ⚙️ The energy company and developer Fortum has invested in solar power in India, in which the Swedish daughter company has been involved. However, as the mother company sits in Finland, this capital cannot be classified as Swedish either, according to the definition of this study.

Denmark

Denmark's strong and leading wind power industry, especially wind turbine manufacturers such as Vestas, has been involved in several wind projects in developing countries. However, we have not identified many Danish investors or companies that *invest in or actively develop renewable energy projects in developing countries*. Information about Vestas' role as financier of projects is not easily available, although it is known that they have invested in the Lake Turkana Wind Park along with other DFIs and private investors (see *Box 1*).

Again, the completeness of the overview is limited due to the following factors:

- ⚙️ Several other Danish companies have some presence in developing countries, but most apparently not as investors. A limitation to these findings is unavailability of data showing mobilization through Danida's support, which notably is tied to Danish companies and/or interest.
- ⚙️ Nordic Power Partners is a developer similar to SN Power in Norway, owned by the DCIF and the Danish energy company European Energy. They are involved in wind and solar power projects in Brazil. Some of these are accounted for in the Danish DFI investments; but it has not been possible to identify the total value of NPP's investments.

Denmark does, notably, distinguish itself by the relatively active engagement in renewable energy in developing countries by **institutional investors**. While some of the capital in the funds described in the following come from public funds, **Danish pension funds are significant capital providers**. This

¹⁸ Wave power company that has activity in Ghana

¹⁹ Private equity company which ventured into small hydro power in the Philippines.

Source: Gatdula, Donnabelle L. (2010, December 17). Swedish firm to invest in Phl power sector. Retrieved from: <https://www.philstar.com/business/2010/12/17/639503/swedish-firm-invest-phl-power-sector>

²⁰ Otuki, Neville. (2017, October 11). Swedish firm moves Sh253bn Malindi power plan to Tanzania. Retrieved from: <https://www.businessdailyafrica.com/news/Swedish-firm-moves-Sh253bn-Malindi-Tanzania/539546-4134062-3qyewe/index.html>

investment willingness seems to be unique to Denmark and could be explained to a great extent by the public guarantees backing the investments. Similar levels of activity from institutional investors is not evident in the two other countries, with the exception of KLP in Norway. **Figure 8** shows the investments from Danish financial investors in funds. 170 million USD has already been provided, while an unknown share of a 650 million USD planned commitment to a new infrastructure fund will go towards renewable energy in Africa.

Also referred elsewhere in this report, the DCIF is a PPP²¹ between the Danish state/IFU and private, mostly institutional, investors. Institutional investors have provided close to half of the total capital of DCIF, with a total of USD 110 million²².

Another 60 million USD is represented by the *Frontier Energy Funds*. The *Frontier Energy Funds*, targeted at investments in renewable energy and energy efficiency in Africa, has also been supported by other, international organizations such as the CDC, GEEREF²³ and DFIs.

The *A.P. Møller Capital Africa Infrastructure Fund* targets infrastructure projects within energy and power, roads, rail, airports and distribution centres. The commitment of the anchor investors, various Danish pension funds, is a total of 650 million USD, to be invested into 10 to 15 investments²⁴. The amount is reflected in the overview of Danish institutional investments as 'Announced/Planned', but it must be noted that as the fund targets many types of infrastructure, it is uncertain what portion will be invested in renewable energy. Further, no fund investments have yet been reported. The dotted border in **Figure 8** illustrates that these are still at the planning stage.

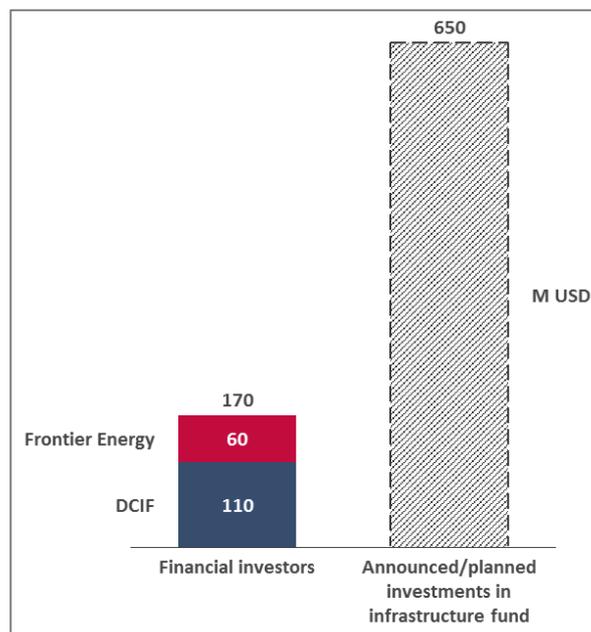


Figure 8 Committed and announced investments by Danish institutional investors. Funds are not strictly targeting renewable energy, but also other infrastructure and climate projects.

2.3 An apparent renewable energy business cluster in Norway

As the above shows, in terms of DFI investments, **Norway's Norfund has invested significantly larger amounts** towards renewable energy in developing countries **compared to both Sweden and Denmark**.

Also with regard to other private and commercial engagement, there is a clear trend that **Norway's business community has been more active in investing in or developing renewable energy projects in developing countries than the other Scandinavian countries**. Companies at various levels of the value chain are represented, small and big companies investing in small and big projects on and off-grid, suppliers and exporters, capital investors, and advisory firms. This gives the impression of a more complete 'cluster' than seen in other countries.

According to several interviewees, the active engagement of Norfund in energy has positive and catalytic effects, both through co-investments with Norwegian companies, and in terms of building significant expertise in energy project financing.

²¹ Public Private Partnership

²² Note that the DKK 110 mill shown in the figure do not represent renewable energy investments over and beyond the Danish DFI investments reported in the section above. The funds contribute to DCIF's total capitalization and may be invested both in renewable energy and other sectors.

²³ Global Energy Efficiency and Renewable Energy Fund

²⁴ A.P. Møller Capital. (u.d.). Our Africa Fund. Retrieved from: <https://www.apmollercapital.com/en/our-africa-fund>

The engagement of pension funds in Denmark relative to infrastructure investment in developing countries is interesting to note. It suggests that a huge untapped potential to financing renewable energy projects exists if more pension funds could be mobilized. The Danish experience in this regard should be followed, and could be leveraged to engage similar Norwegian resources.

There are several possible factors that may have contributed to this apparently prominent 'Norwegian renewable energy cluster'. Some probable contributing factors include

- ⚙ The energy and hydro power history of Norway
- ⚙ Political commitment to and focus on energy sector development assistance
- ⚙ Development policy emphasis on the relevance of Norwegian competency and experience, and the role that private sector can play
- ⚙ Norfund's consistent and heavy focus on renewable energy
- ⚙ Availability of private sector support for activities in developing countries, partly favouring the energy sector
- ⚙ The energy industry in Norway, including the development of a strong cluster of solar companies
- ⚙ The competency of the financial industry in Norway in relation to energy

The following question emerges from the above findings: *Given that a capable cluster with interest and willingness to invest exists, what would it take to grow and strengthen this cluster and thereby further increase investments?*

To address this question, we first explore some of the challenges associated with developing renewable energy projects. Thereafter, we provide an overview of the Scandinavian countries' policies, mechanisms and instruments offered to support business development – either specifically targeting renewable energy or private sector in general. We finally present some emerging reflections relevant for public decision-makers looking to strengthen the cluster of Norwegian businesses engaged in renewable energy development.

3 Barriers hindering Renewable Energy investments in LDCs

Renewable energy represents potential for profitable investment, and the past decade has seen a high level of activity by private companies world-wide. Further, many developing countries have huge potential energy resources as well as a need to develop more energy to satisfy economic growth and a growing population. However, various barriers and challenges facing investors limit the growth of renewable energy compared to its potential in developing countries.

The cost-structure of renewable energy projects is at the core of renewable energy-specific barriers. High investment up-front, very low marginal running costs, and often long payback periods, create a need for a secure revenue stream for the lifespan of the project. In many developing countries, such revenue streams are associated with high risk, including policy risk, currency risk, off-taker solidity, and may cause otherwise attractive projects to become too risky to attract private finance at a reasonable cost.

Many developing countries lack track-records of renewable energy development and well-functioning financial markets, are characterized by political instability and weak governance, and have heavily state-dominated and poorly regulated power sectors. Local partners and work force as a consequence do not have the skills and experience that could support international investors through establishment.

Lack of finance is often addressed as a barrier, but stems from the real and perceived risk and lack of access to bankable projects. Internationally capital is available, and investment in renewable energy increase annually, but developing markets still represent a small share of the total. Without standardized processes and commercial documentation, knowledge and capacity, small projects and developers cannot justify the transaction costs related to the time-demanding processes of structuring bankable projects to manage the risk.

IRENA’s report on risk mitigation²⁵ provides a thorough description and analysis of different types of risk at different stages of a project (**Figure 9**).

Project start-up and development	Investment risk management	Scaling-up Investment
<ul style="list-style-type: none"> • Limited experience in the financial sector • Availability of investment-ready projects • Limited access to capital 	<ul style="list-style-type: none"> • Political risk • Policy and regulatory risk • Counterparty risk (power off-taker risk) • Grid interconnection and transmission line risk • Currency risk • Liquidity and refinancing risk • Resource risk • Technology risk 	<ul style="list-style-type: none"> • Insufficient investment size and high transaction costs • Financial regulations restraining illiquid and riskier investments

Figure 9 Types of investment constraints in renewable energy. From IRENA report “Unlocking Renewable Energy Investment: Risk Mitigation and Structured Finance” (2016).

²⁵ IRENA. (2016). Unlocking Renewable Energy Investment: The Role of Risk Mitigation and Structured Finance. IRENA, Abu Dhabi.

If real or perceived risk does not altogether hinder investors and lenders’ interest, it will inevitably affect availability and cost of capital. High risk-premiums increase the cost of capital, ultimately increasing the cost of power that may be offered; financial costs may in some cases represent half of the total cost of power (**Figure 10**). This creates a vicious circle of expensive renewable energy and further aggravated risk of off-taker non-payments.

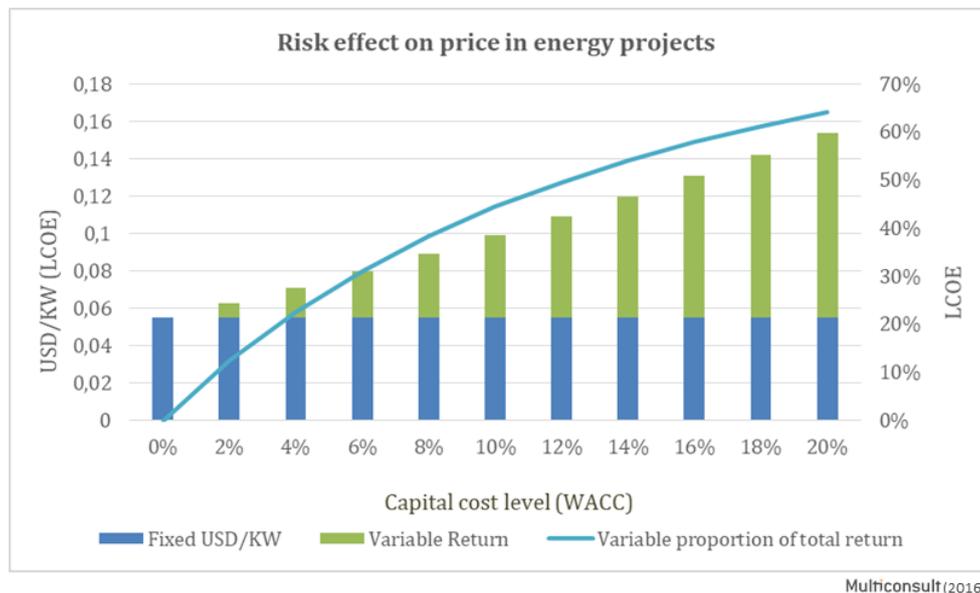


Figure 10 Weighted average cost of capital at 10 % can result in financial costs representing half of the levelized cost of energy (over the life span of a project). Source: Multiconsult 2016

3.1 Size- or technology-specific barriers

While the above mentioned risks are generally relevant for all or most renewable energy investments in developing countries, the characteristic of the project, the technology, and, naturally, the receiving country, influence the importance of the various risks.

3.1.1 Small vs. large projects

Barriers faced will vary between the nature of the projects, as well as the companies behind the projects and investments.

Larger projects, such as big hydro power plants, naturally require higher CAPEX, have longer pay-back periods, and the process from identification and conception to an investment-ready project can be very long. On the other hand, big projects may have advantages. They are often championed by large players who have long experience, are professional, have strong financial backing, and able to attract high level of interest from local governments and international developing partners, as well as from private investors.

Investors that don't have significant capital, track-record and experience behind them, and that promote small projects, often have more difficulties proving a bankable investment case and attract financing. They may not have financial muscle to handle the early-stage development process; not least development costs may be proportionally higher for small projects relative to the total investment. Start-up phase companies are often also more technology oriented and do not have the necessary experience or know-how to operate in developing countries. Working with local

governments/regulatory bodies, understanding regulation, formal processes etc. can be challenging. Accessing international mechanisms and instruments often require both a certain size and available resources (balance sheet or track-record) to be eligible, as well as capacity to go through often complicated application processes. Investors and banks may be reluctant to developers without proven experience, and may find the due diligence of small projects not worthwhile.

To ensure that smaller projects may be realised, a number of programs targeting renewable energy investments, including GET FiT, Scaling Solar, Energy and Environment Partnership, REACT, etc., offer transaction advisory, financial support for early stage development, and/or financing packages. This support specifically aims at addressing the specific risks related to small-scale project development, and to support developers to get through the challenging project development stages.

This report does not deal with the debate of whether projects that are promoted by investors without track-record, sufficient capital and experience behind them, should be backed or not, given the number of challenges they face. From a development assistance perspective, this may not be the most efficient use of resources, in terms of getting “most value for your bucks”. Nevertheless, in discussing public support also for these kind of projects and companies, in order to further advance the Norwegian ‘renewable energy in developing countries’ industrial cluster, an underlying assumption is that this is desirable from an industrial policy perspective, as all companies have to start from somewhere.

3.1.2 Technology-related risk

Hydro power

Hydro power projects generally require significant up-front investments, take long to both plan and build, may have high technological risk (geology, hydrology, etc.) and long repayment periods, typically assumed from 25 years and more.

Hydro power projects are also site-specific. This implies that there may be long distances from the location of a good site and to where power will be used, increasing connection costs and need for well-functioning grid and transmission infrastructure.

Hydro power plants often face environmental and social challenges that must be managed, including local resistance, need for resettlement of local communities, loss of biodiversity and other issues. This also adds to the cost of early phase development as well as the required investment.

Increasingly in later years, hydro power competes with solar power that is quickly getting more competitive. Benefits of hydro power related to potential for storage capacity and stabilizing reserve may not be reflected in the power price that off-takers are willing to pay.

For hydro projects, there is need for support for development studies and access to long-term capital.

Wind

While hydro power has a long history in developing countries, and solar has been expanding exponentially in the last decade, wind is still relatively new to most developing countries, particularly in Africa. There is still a general lack of experience and expertise among actors on all levels, including investors, financiers, developers, utilities, regulators, etc. Wind power generally has high up-front costs and economies of scale, which makes smaller projects more expensive. As sites may be far away from demand centres, distribution and transmission infrastructure is crucial. These factors increase the risk related to wind power projects.

Wind could also face risks related to environmental and social issues, such as hydro power. However wind could also be possible in small-scale/off-grid setting, in which case it would face the same barriers/risk as small-scale/off-grid solar projects.

Solar power

Solar power (in this case solar photovoltaic power) projects generally are faster to develop and build. The resource, in terms of solar radiation, is amply available in many developing countries, in particular in Sub-Saharan Africa.

The flexibility in terms of location enable solar projects to be situated close to connection points and to demand centres, reducing the need for infrastructure. Also environmental and social issues are generally less challenging than for example for hydro power plants.

However, solar PV is very competitive and in fast development; making prices fast outdated.

This creates an additional off-taker risk; PPAs²⁶ established may represent a relatively unattractive price of power to off-takers compared to later projects on offer. The price development is also a challenge for off-grid companies that sell to a market without PPA's, requiring them to cover the revenue risk on own books. The stiff competition in the solar

Box 1

The Lake Turkana project in Kenya

The 310 MW Lake Turkana wind farm in North Eastern Kenya is to-date the largest wind farm in Africa, making up around 15 % of the of the country's total installed capacity¹. The project was developed by an independent power producer (IPP) and the power will be bought by the Kenya Power & lighting Company (KPLC) under a 20-year PPA². The project was initially funded by KLP Norfund Investment, Finnfund, IFU, Vestas Eastern Africa, KP&P Africa B.V, Aldwych International and Sandpiper¹.

The challenges and delays related to the power evacuation solution serves as a good example of prone risks. The Kenyan Government had committed to build a high voltage transmission line to off-take the power from the wind farm. In order to reach financial close, the project had to secure that the transmission line would be built in time, to deal with the consequent power off-taker and liquidity risk for the project and its investors in the event that it was delayed². Thus, it was agreed that the KPLC would face consequences (financial penalties) in case the transmission line was not completed in time. After both the World Bank and MIGA declined to provide guarantees to the project, the AfDB came in and applied its first ever partial risk guarantee (together with the government of Kenya) to the risk of delay of the transmission line. The guarantee was crucial for reaching financial close in the project.

The wind farm initially planned to start power production in June of 2017 when installation of the 365 turbines was completed by Vestas. However, the construction of the transmission line was delayed, mainly due to the Spanish contractor in charge of building the transmission line going bankrupt and not being able to complete works. As a result, the project and its investors did not receive the agreed compensation from KPLC. The project did not bill the government as per the initial guarantee commitment, as the government had plans in place to complete the transmission line in 2018 and the penalty would affect consumers' power bill significantly. In June 2018, the project did receive a "rather sizeable amount of money" as compensation, allowing it to address minimum financial obligations³. The project has now been successfully completed and delivered the first power to the grid in September 2018.



Photo: Lake Turkana Wind Power Ltd

1) Lake Turkana Wind Power project homepage: <https://ltwp.co.ke/>, October 2018

2) Risk Mitigation and Structured Finance, IRENA 2016

3) First power at Lake Turkana, Windpower Monthly, 26 September 2018:

<https://www.windpowermonthly.com/article/1494069/first-power-lake-turkana>

²⁶ Power Purchase Agreement

market make investors very sensitive to risk premiums.

The location flexibility makes solar power particularly suitable for off-grid energy development. Off-grid projects however, face other, not less challenging risks. Risks and barriers specifically facing Distributed Off-grid energy projects is therefore discussed separately below.

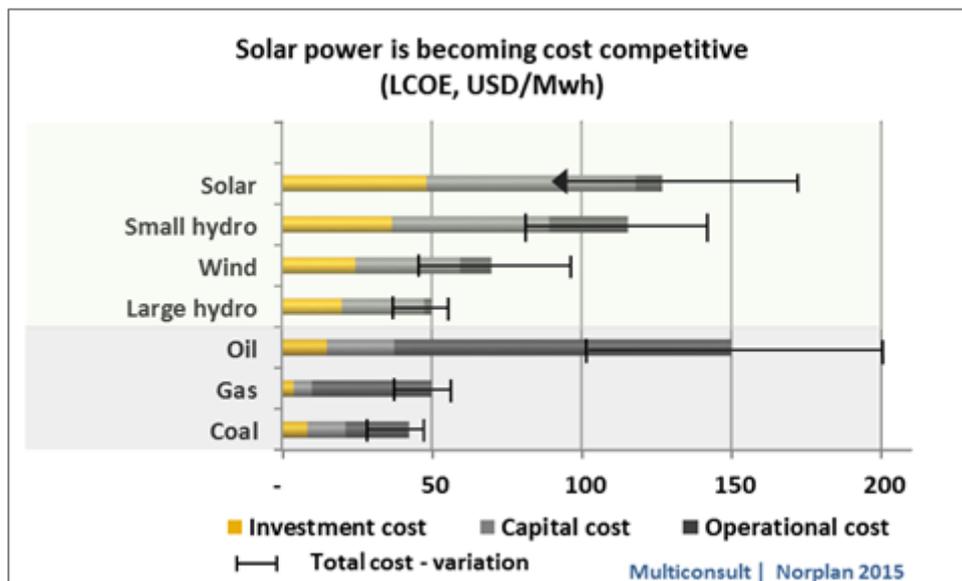


Figure 11 The figure shows how financing costs particularly impact the power price of projects that require high up-front costs. Note: Actual CAPEX values have changes, in particular for solar power. Source: Multiconsult report to Norfund, Zero and Kirkens Nødhjelp (2015).

3.2 Barriers for Distributed Energy Solutions²⁷

To understand the risks and barriers that Distributed Energy Service Companies (DESCOs) are facing, it is important to keep in mind that these operations do not only include development of generation capacity but also distribution/retail networks, retail sales & marketing and after-sale service - both in terms of on-site technical work (installation, maintenance and repairs) and customer support/call-center. In addition, the assets base and need for financing is growing incrementally as the businesses get more customers. The up-front investment costs are mainly driven by the need for establishing a local presence, integrating with mobile phone companies and mobile banks and developing a sales network (recruiting retailers and sales reps). Hence there is not one large investment, as is the case for a grid-connected power plant.

There are different business models for distributed energy solutions, with different challenges and risks associated with each:

- ☀️ DESCOs selling against cash payments have business models similar to retailers of electrical appliances, selling e.g. lanterns, solar home systems or solar water pumps against a full cash payment at the time of sale.
- ☀️ DESCOs offering financing solutions are more comparable to the national or local power utilities or grid companies. Such “PAYGO” based business models (i.e. as a service based on a financed asset) require power sales to recover the investment costs of their assets (in theory) as installments over a period of time.

²⁷ Entire sub-section courtesy of Differ AS

ANNEX III *Understanding distributed energy business models* contains more on the business models for distributed energy solutions.

Businesses selling products for cash mainly face risks related to the cost of establishing and maintaining a retail service network relative to the sales volumes achieved and revenues generated. Typically, such businesses set up shops in city centers and sell to customers when they come to town. Ensuring “last mile” reach can be costly and hence risky. EnDev, in its review of learnings to date from its RBF program²⁸, conclude that it struggles to incentivize quality players (i.e. Lighting Global certified products) to serve the last mile. This is likely due to the cost of establishing a retail business and the long distances to be covered in the after-sale service, relative to the uncertain revenue potential.

Local governments often lack understanding of distributed energy solutions and tend to prioritize budgets towards grid power and improving the power supply to urban areas. The substantial risk alleviation mechanisms put in place thus are usually suited for grid-connected power plants rather than off-grid energy. The lack of similar off-grid targeted risk mitigation support is a major barrier for bankability for business projects related to Distributed Energy and PAYGO models.

In the following we describe the key risks that DESCOs, selling electricity on a PAYGO-basis, are facing, as well as show the differences relative to on-grid generation facilities.

Customer default/off-take risk: For a DESCO selling power as PAYGO, the main risk is the predictability of the revenues from the customers. This is regardless of the project being a larger captive power project, mini-grid or stand-alone solutions for households, productive use and community functions (e.g. health posts and schools). For DESCOs, the revenue risk is carried directly by the companies themselves, and not by the national utilities – which is the case for grid-connected power plants. This means that DESCOs are directly exposed to the weak and variable purchasing power of the end customers. Careful customer selection can mitigate the risk and reduce the default rate. However, as companies target the more rural and poorer segments of the population, the default rate inevitably increases at the same time as the costs of serving these customers increase. Since the population in these segments is normally not financially included, DESCOs have no possibility to obtain independent assessments of customers’ creditworthiness. Meanwhile, stringent customer selection normally leads to both too slow growth and a focus on the more peri-urban and well off customer segments. The lack of support mechanisms as offered to grid electricity projects makes it challenging to make DESCOs profitable, bankable and attractive for investment.

Competition: The competition among distributed energy solutions is already very high in many countries. Margins are squeezed and new products and players challenge the revenue streams from DESCOs’ current and potential customer base. New products and players can surface at any point, and a good market can turn bad in a relatively short period of time. For a power plant, the margins are squeezed in the tender process and PPA negotiations, but at the time of investment, the PPA provides a protection from competition and price pressure.

Policy risk: Policy risk for distributed energy solutions is mainly linked to the risk of the arrival of the central grid or of government programs handing out free or highly subsidized systems. For a mini-grid, limited capability and interest among the utilities can make it difficult to get appropriate and bankable contracts that regulate such situations. Often, the municipalities and governments even have an interest in stretching the grid to areas that are already covered by mini-grids and household solutions, as these areas already have an established and growing electricity demand. Further, they have limited

²⁸ [https://endev.info/images/e/e4/EnDev - Results-based Financing for Energy Access%2C Lessons report.pdf](https://endev.info/images/e/e4/EnDev_-_Results-based_Financing_for_Energy_Access%2C_Lessons_report.pdf)

incentive in terms of entering or upholding agreements on co-existence or compensation to the mini-grid owners in such cases.

Lack of market regulation: DESCOS also suffer from lack of off-grid market regulation. The markets for off-grid solutions experience a large inflow of poor-quality products sold cash, with weak or non-existent warranties and after-sale services. Companies that offer poor quality products and services often also do not offer or uphold warranties or after-sale service and thus face limited market risk. The lack of both regulated quality requirements and labelling standards makes it challenging for quality services to compete, as investment decisions of poor customers often are based on short-term perspectives.

Technology: For a PAYGO company, the error rate of the hardware is of crucial importance. The DESCOS that manage to grow a substantial portfolio will have their assets distributed over a wide geographical area. The need for on-site maintenance and repair is costly and must be run efficiently to avoid high costs reducing the profitability.

Taxation of stand-alone solar and subsidies of competing alternatives: Many countries are heavily subsidizing power to the people, but subsidies are predominantly favouring the competitors of distributed renewable solutions and not distributed renewable solutions. Many countries are subsidizing diesel, making it more challenging for renewable energy solutions to compete with diesel aggregators. In addition, few LDCs are charging cost reflective tariffs for power from the grid. For low consumption users, there is often a social tariff which includes free connection and a price per kWh that is lower than what the utility pays for the power from the power plants (IPPs). In some cases, the cost of electricity access from the grid is subsidized as much as 80 %. On the other hand, many of the same countries have substantial import taxes and duties on stand-alone solar equipment and related super-efficient appliances. Despite some countries' inclusion of import tax and/or VAT exemptions on solar appliances in their tax regimes, in many cases this combination of taxing distributed solutions and subsidizing the alternatives represents a highly challenging "double whammy" for DESCOS. This makes it even more difficult to put together a bankable business case.

Maturity of the off-grid sector: The commercial viability of DESCOS has emerged over the latest decade due to technological advancements and learning curves within LED, solar PV, batteries, mobile banking and remote monitoring. To date, only a few players have managed to grow beyond 100,000 customers. As a result of the limited maturity of the sector as a whole, and the fact that demands, regulations and commercial landscape vary from country to country (and even within a country), distributed energy solutions might be most effectively delivered by a myriad of locally adapted business models – rather than through a limited number of consolidated giga-players. In any case, the current limited maturity of the sector and the limited size of the typical DESCOS is a barrier in terms of achieving bankability and accessing financing at attractive terms. In addition, the DESCOS often lack experience in project finance, and have more difficulties proving a bankable investment case.

Investor attractiveness: Many DESCOS are still the result of international start-ups with innovative technology solutions or local start-ups with a presence and understanding of local conditions. Also, as the asset base is developed through incremental growth as new customers are contracted, there is no need for the large investors in the initial phases. The size of the operations is typically also unattractive for larger investors due to the high relative transaction cost and risk. However, scaling the business from successful pilot to make it attractive for larger investors is challenging and risky. High capital cost can run many out of business, and rapid growth often happens at the expense of careful customer selection, leading to lower customer payment rates.

In summary, the two largest risks for a distributed energy company are i) insufficient sales as a consequence of competition from other energy service providers (including the grid), and ii) payment defaults or delays from the end users/customers. This is quite different from grid-connected power plants having secured a PPA, which largely protects them against both these risks.

3.3 Managing risk

From an investor perspective, there are different ways to address this complex set of risks related to renewable energy transactions. Risk can be allocated, i.e. placed with the stakeholder that is best placed to managing the risk, i.e. assuming responsibility for mitigation, hedge/diversify the risk, or bear the cost/damage. Depending on the nature of the risk, stakeholders can be utilities, governments, lenders, equity investors, guarantee and insurance providers, local residents as end-users and taxpayers, or development partners.

It is important to note that redistributed risks does not mean the risk disappears; it will be there until mitigated. Risk that cannot be mitigated or redistributed must be covered at a cost (e.g. insurance). Redistribution or guarantee means that the cost or other damage of a given event will be absorbed, but is not in itself an instrument that reduces its probability. However, a guarantor or stakeholder that can mitigate the risk through avoiding, reducing or influencing the probability of occurrence, will contribute to effectively reducing the risk level. **Figure 12** illustrates the risk management process from an investor perspective.

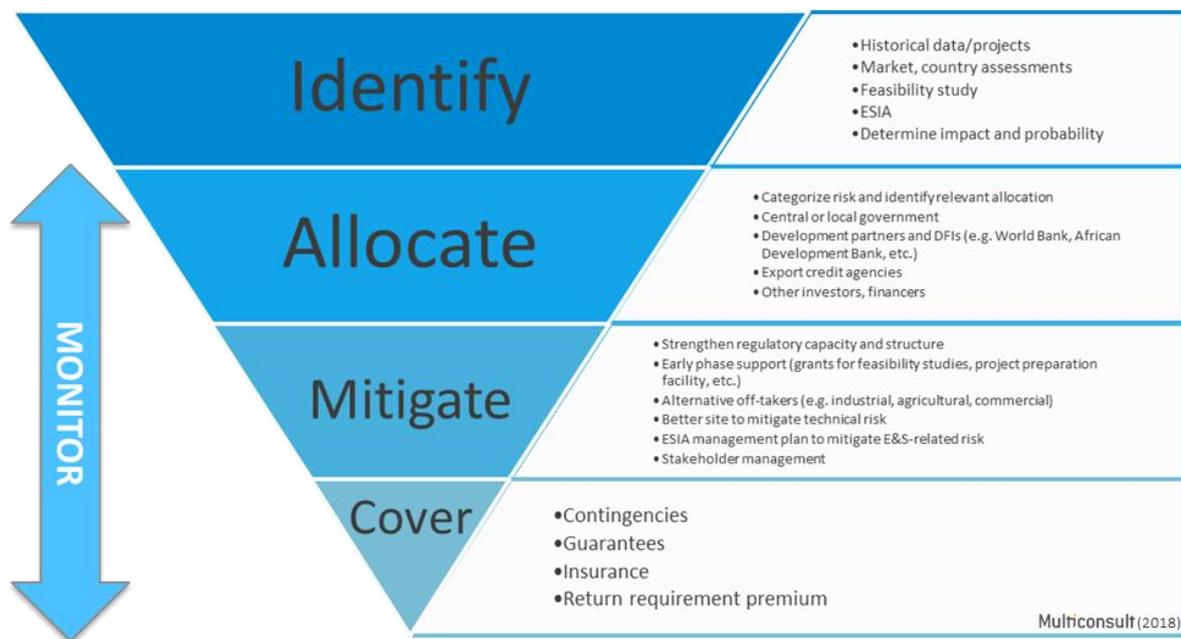


Figure 12 Risk management process (investor perspective): What cannot be allocated to other stakeholders who can effectively manage the risk, and that also cannot be effectively mitigated by the investor, must be covered at a cost, e.g. through insurance or guarantee.

3.3.1 Guarantees

Over the course of the past 10-20 years, international financial actors have developed a mature set of financial instruments that are designed to ensure efficient return-risk allocations. This includes everything from innovative forms of first-loss (mezzanine) finance to guarantee instruments.

Several of these guarantee instruments are currently offered by large multilateral institutions such as the World Bank Group and/or Africa Trade Insurance. These institutions are uniquely placed to maintain the dialogue with and influence governments and even parastatal companies. Their influence allows for effective mitigation of risks, not only redistribution. Generally, instruments offered by these institutions relate to policy risks, including the commercial obligations of utilities, as this risk primarily stems from political considerations.

The use of sovereign (government) guarantees is often solicited by developers. Developing country governments have, however, restricted ability for such guarantees²⁹. Further, even in the case where government guarantees are provided, lenders may require additional backing guarantees by multilateral institutions³⁰.

There also exist other facilities targeting specific risks that may be solicited by eligible countries independent of country of origin. These include TDX Currency fund’s local currency lending and GuarantCo’s³¹ flexible guarantees over local currency loans (partial credit and partial risk guarantees, first loss guarantees, tenor extension or liquidity guarantees). Other examples include the Regional Liquidity Support Facility, developed in partnership between KfW, the Africa Trade Insurance Agency, Africa Guarantee Fund, and IRENA.

Figure 13 displays a matrix of risk types and relevant instruments to address them.

Despite this existence of mechanisms to manage and cover most relevant risks related to renewable energy projects, the use of guarantee instruments for renewables remains limited, and where used, guarantees have mainly benefited large-scale projects. Although they are often desired, the

	Political risk	Policy and regulatory risk	Counterparty risk (power off-taker risk)	Grid interconnection and transmission line risk	Technology risk	Currency risk	Liquidity and refinancing risk	Resource risk
Government guarantee	✓	✓	✓					
Political risk insurance	✓	✓	✓	✓			✓	
Partial risk/credit guarantee	✓	✓	✓	✓	✓			
Export credit guarantee	✓	✓	✓	✓	✓			
Currency risk hedging instrument							✓	
Currency risk guarantee fund							✓	
Local currency lending							✓	
Internal/external liquidity facility				✓				✓
Liquidity guarantee								✓
Put option								✓
Grant and convertible grant								✓
Resource guarantee fund								✓
Geothermal exploration insurance								✓
Portfolio guarantee								✓

Figure 13 Financial risk mitigation tools to address investment risks. Source: IRENA (2016).

²⁹ Sovereign over-indebtedness has been the cause of balance-of-payments crises experienced by many developed countries. As a measure to avoid unsustainable debt, IMF places restrictions on the total amount of the portfolio of Government-supported guarantees.

³⁰ Example: Through the GET FIT programme in Uganda, a standard ‘Implementation Agreement’ (IA) covering eventual off-taker default was offered a part of the standard package of documentation for small-scale renewable power projects. Additionally, a Partial Risk Guarantee provided by the World Bank was developed to provide further security to the IAs.

³¹ GuarantCo is sponsored by the governments of the UK, Sweden, Switzerland and the Netherlands through the PIDG and the Dutch development bank FMO.

transaction cost and pricing related to guarantees can make them unattainable or unattractive to some, particularly private developers without strong financial muscle, and for small-scale projects. The ensuing lack of demand is reflected in limited interest by potential guarantee suppliers – and is presumably also relevant for partly explaining the under-utilization of GIEK’s “U-landsordning”. This issue is further discussed in Section 5.2.

4 Publicly financed support mechanisms and instruments

The acknowledgement of the crucial role that private business must play in order for the international community to mobilize the necessary funding for powering growth and development in developing countries, has led to many countries spending ODA to spur and enable this role. A range of international and national initiatives and programmes, support mechanisms and financial instruments have been proposed to address the various barriers that exist as shown in **Figure 14** below.

	Limited experience in financial sector	Availability of investment-ready projects	Limited access to capital
Finance policies	✓		✓
Project development and preparation facilities		✓	✓
Project initiation and facilitation tools	✓	✓	✓
On-lending structures	✓		✓
Loan syndication	✓		✓
Subordinated debt			✓
Convertible grants and loans			✓

IRENA

Figure 14 Policies and tools addressing barriers to developing and financing renewable energy projects.
Source: IRENA

The following provides an overview of the principal support mechanisms and instruments that are relevant for or directly targeting renewable energy in Norway, Sweden and Denmark. Relevant institutions and/or initiatives in each country are presented, divided into three categories: Public institutions except DFI’s and export credit agencies; development financing institutions; and export credit agencies. In addition, other relevant network organizations or innovation/business development organizations are presented.

The assessment in this section shows that Norway, Sweden and Denmark all offer a relatively comprehensive suite of support mechanisms and investment instruments, as shown in **Figure 15**. The figure compares what instruments are offered in the three countries within the different categories. Two check marks illustrate that an instrument is used to a great extent, while one check mark indicates that the instrument exists within a certain category but is used to a lesser degree. A cross indicates that the instrument is not offered. The evaluation is based on publicly available information and the interviews with and inputs from relevant stakeholders. It is accurate to the best of our knowledge and research. However, it is not always straight-forward to assess whether an instrument is offered or not and to what extent it is utilized as different names often are used for the same instrument and could have been offered at some point, off-record, so some errors may have occurred.

Development Agency	Norad	Sida	Danida
Grants	✓✓	✓✓	✓✓
Project preparation facility	✓✓	✓✓	✓✓
Subsidized loans	✗	✗	✓✓
Challenge fund/support for exploration	✗	✓	✓
Guarantee	✗	✓✓	✗
Funding for partnerships	✓	✓✓	✓✓
Development Finance Institution	Norfund	Swedfund	IFU
Equity	✓✓	✓✓	✓✓
Loan	✓	✓✓	✓
Grants, project development support	✓	✓	✓
Guarantee	✓	✗	✓
Export Credit Agency	GIEK, EK	SEK, EKN	EKF
Guarantee	✓	✓✓	✓✓
Credit line	✓✓	✓✓	✓✓
Innovation/ Business Development	Innovation Norway	Tillväxtverket	Growth Funds ¹
Grants	✓✓	✓✓	✗
Loans	✓✓	✗	✓✓

1: The Danish Growth Fund, The Danish Green Investment Fund

Multiconsult (2018)

Figure 15 Overview of support mechanisms and instruments targeting renewable energy activities in developing countries

While the countries all offer a comprehensive suite of mechanisms and instruments, this assessment will also reveal that the three countries take relatively different approaches in their efforts to support renewable energy development and facilitate commercial investment.

The following sections provide a description of the existing channels, mechanisms and instruments in the three Scandinavian countries to encourage and facilitate commercial activities in general, and renewable energy investment in particular, in developing countries.

4.1 Official Development Assistance for Energy and Public Institutions’ Support

(except DFIs and export credit agencies)

Nordic countries range among the leaders in ODA in terms of proportion of GDP. The various forms of categorizing and reporting by the key institutions make comparison of total energy sector based on collected data difficult. Figure 16 indicates energy sector proportion of total ODA as reported to OECD³².

All three Scandinavian countries have over the past decades offered support in various forms to national business engaged in developing countries, as well as in-country support to governments and other stakeholders to improve the institutional and regulatory frameworks for investment.

³² OECD. (2018). Development Co-operation Report 2018.

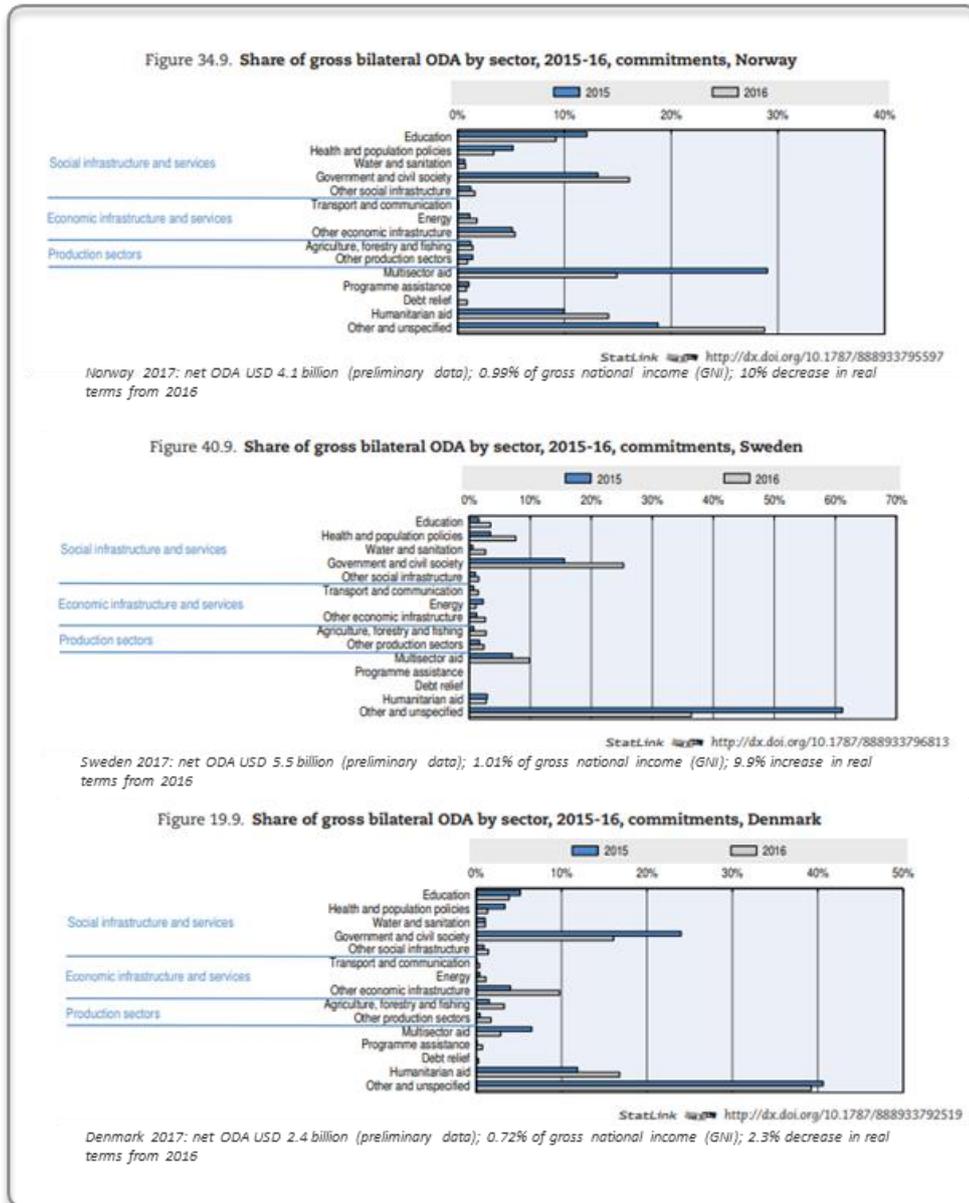


Figure 16 ODA Contributions, total and by sector

4.1.1 Norway

Norway has taken a clear commitment to the SDG 7. The Parliamentary white paper on the SDGs (2016-2017) confirms the intention to increase Norwegian contributions to renewable energy through the development assistance budget, indicating a doubling of the renewable energy budget over a few years. The proposed budget for 2019 realizes this intention, as over 1 billion NOK has been proposed for development assistance specifically related to renewable energy³³. From 2007 to 2015, Norway supported energy related development with 16.4 billion NOK (norad.no). This corresponds to approximately 6.5 % of total ODA in the same period. Commercial investments accounted or 44 % of total investments. Norfund was the leading contributor of commercial investments (6.5 billion NOK out of 7.2 billion NOK of commercial investments)³⁴.

³³ Press statement from the Norwegian government. (2018, October 10). Over en milliard til fornybar energi, Retrieved from: https://www.regjeringen.no/no/aktuelt/pm5_budsjett/id2613723/

³⁴ Norad. (2017). *The Clean Energy Initiative Results Report 2007–2015*. Retrieved from: <https://norad.no/globalassets/publikasjoner/publikasjoner-2017/the-clean-energy-initiative-results-report-20072015.pdf>

Norwegian support for renewable energy development is channelled through a number of key actors. Bilateral ODA is channelled to national governments through Norwegian Embassies, while multilateral funds are managed by the Ministry of Foreign affairs, supported by its Directorate Norad. Support to private and commercial projects is channelled through Norad and Norfund. In 2017, 1.6 % of total ODA (not specifically climate or energy related) went to private sector or public-private partnerships.³⁵

The most important channel for Norwegian bilateral development assistance are possibly the embassies. They enter into program agreements with government counterparts in donor countries. Bilateral energy sector contributions in the form of financial as well as technical assistance are mainly directed to six priority countries. Support programmes focus on establishing an enabling framework for commercial development through development and strengthening of national energy infrastructure, institutional capacity building, and improved economic and technical regulation. Bilateral assistance can also be formulated to enable private investment. Financial assistance to build infrastructure to enable connection of new power plants is one example.

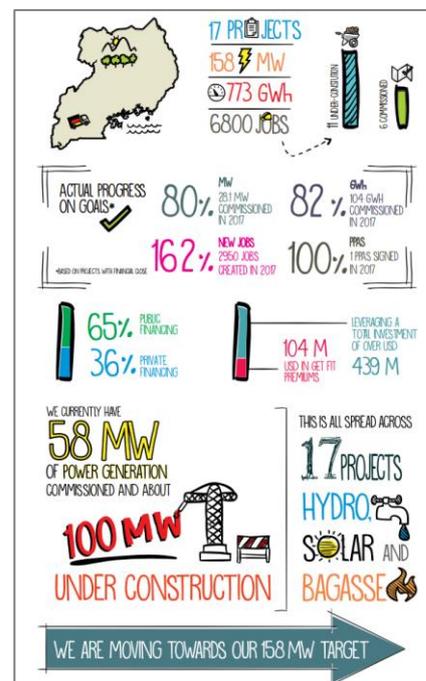
The Clean Energy for Development Initiative

The Clean Energy for Development Initiative was launched in 2007. The main objective of the initiative is to reduce poverty, stimulate economic growth and reduce pollution. The objective is reached through strengthening the production and availability of clean, reliable and affordable energy in developing countries.³⁶ The types of projects that can be supported include training and education, research, technical assistance, development of power plants and lines, home solar systems, cleaner cook stoves and institution building.

International initiatives and multi-donor programmes

A portion of Energy sector ODA is channelled through larger initiatives implemented or championed by other development partners. Several of these target private investment in renewable energy, either uniquely or as one of several objectives³⁷. Notably, Norway has been one of the major contributors to the *GET FIT Programme*, piloted in Uganda from 2013 and expanded to include Zambia and potentially other countries. GET FIT is an example of initiative that effectively has built down barriers to renewable energy investment and developed a portfolio of 17 privately promoted projects, including one Norwegian, that combined contribute a significant share of Uganda’s total power generation.

Figure 17 The GET FIT Programme in Uganda has commissioned projects of 58 MW and another 100 MW in construction, and has leveraged investments of close to 450 million USD. Source: GET FIT Uganda Annual Report 2017.



³⁵ Norad web site: www.norad.no

³⁶ Ibid.

³⁷ E.g. REEEP (Renewable Energy and Energy Efficiency Partnership), PPIAF (Public-Private Infrastructure Africa Facility), ESMAP (Energy Sector Management Assistance Program), SREP (Scaling Up Renewable Energy Program in Low Income Countries), Energizing Development etc.

Norad – Norwegian Development Agency

Norad is the Norwegian Agency for Development Cooperation. The Agency is a directorate under the Norwegian Ministry of Foreign Affairs. The five main tasks of Norad are 1) Aid advisory services, 2) Quality assurance and monitoring, 3) Grant programmes, 4) Communication and 5) Evaluation.

Clean energy is one of Norad's thematic areas. In 2017, Norad managed NOK 90 million for clean energy measures. Within support for clean energy, there are two main initiatives – Clean Energy for Development and Private Sector Development.

Norad is the secretariat for the Clean Energy for Development Programme (see above).

Private Sector Development

The Section for Private Sector Development in Norad has supported renewable energy projects in developing countries since the early 1990s with loans and grant support for feasibility studies, training and infrastructure. In 1997 Norfund was established and Norad's loan portfolio was transferred to Norfund. Over time, Norad has increasingly emphasized support for feasibility studies undertaken by companies in the private sector.

To make investment projects attractive for commercial investors, including Norfund, they must be proven financially, technically and environmentally feasible.

Norad has two funding schemes that allow for pre-investment phase financial support, for example grants for power project feasibility studies:

- 1) **Enterprise Development for Jobs:** The main objective of the grant scheme is to contribute to job creation by stimulating sustainable commercial investments. In addition, it aims to stimulate renewable energy projects that increase access to renewable energy, and consequently job creation and poverty reduction. The grant scheme can be used to fund activities related to the preparatory phase of an investment. Grants may also be awarded to interventions that contribute to project development and reduce the investment risk. The grant is only given to companies that are already "established" and have a proven track record, meaning that early phase companies are not eligible for this support³⁸.
- 2) **Cooperation on Framework Conditions for Private Sector Development in the South:** The grant scheme is primarily aimed at building and strengthening institutions and private sector actors in development countries where Norwegian and international organizations can contribute by providing technical advice and/or capacity building. The focus is on building strategic partnerships with private enterprises and non-commercial organizations. Examples of relevant framework conditions to be improved for the private sector in developing countries are: well-functioning and open markets, access to finance for SMEs, access to relevant skilled labour, technology and infrastructure³⁹.

4.1.2 Sweden

Sweden joined the **Power Africa**⁴⁰ initiative in 2014 as the second country after the United States, with Sida as implementing agent, and a commitment to mobilize USD 1 billion over 2015-2024 towards

³⁸ Norad. (2016). *Enterprise Development for Jobs Grant Scheme Rules*.

³⁹ Norad. (2012). *Cooperation on Framework Conditions for Private Sector Development in the South Grant Scheme Rules*.

⁴⁰ **Power Africa** was initiated in 2013 by US President Barack Obama and the country's aid agency USAID. The World Bank and the African Development Bank (AfDB) as well as a range of bilateral partners participate. All current partners work to involve more actors and donors, including the business sector, in support of energy development in sub-Saharan Africa, focusing exclusively on renewable energy and energy efficiency. Stimulating private and institutional investments is among Power Africa's key strategic priorities.

energy sector development in sub-Saharan Africa. No contractual bindings exists between Sida’s Power Africa initiative and the US Power Africa programme and there is little collaboration in practice. Since 2015, Swedish development cooperation strategies that include energy sector development increased from three bilateral strategies to 13 bilateral strategies and a regional strategy. The private sector and financing institutions are now to a greater degree engaged as agreement partners.

Sida – Swedish Development Agency

Sida – The Swedish International Development Cooperation Agency – is a government agency working on behalf of the Swedish parliament and government, with the mission to reduce poverty in the world.

Development of clean energy in Africa in Sida is addressed under the framework of the **Power Africa Initiative**, as part of Sweden’s commitment in 2014 to mobilize one billion USD over the following 10 years for renewable energy and energy efficiency. The program supports expanding the national grid as well as off-grid solutions, which are expected to have a considerable effect on reaching end consumers.

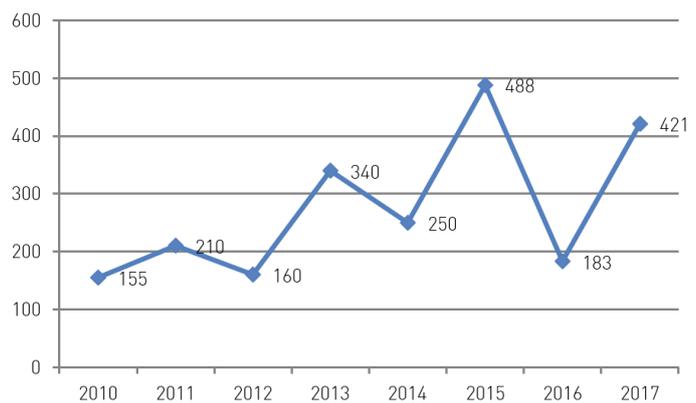


Figure 18 Swedish development assistance disbursements to energy sector development, 2010-2017. In million SEK. Source: Results Report 2017, Sida’s Power Africa Initiative

As **Figure 18** illustrates, the ODA disbursement towards energy sector development was the second highest in 2017 in the last 8 years, with total grant disbursements to energy sector development being 421 million SEK. Between 2015 and 2017, Sida has mobilized 235 million SEK of private capital⁴¹.

⁴¹ Sida. (2018). Sida Power Africa Initiative - Results Report 2017.

Sida previously worked with grant based, state owned infrastructure investments and technical assistance in support of sector reform efforts. More recently, challenge funds, results based financing, transaction advice and guarantees has been added to the toolbox. Sida also manages the Public Private Development Partnership (PPDP) programme, offering 50-50 co-funding of projects with strategic partnerships with private partners.

Infrastructure investments still account for the major part of ODA, but results based financing as a means to mobilize private investments is increasing. Furthermore, guarantees has become an increasingly important part of the toolbox and yields the highest leverage ratio. It is expected that that until 2022, guarantees will absorb the majority of the budget.

Sida Guarantee Portfolio

Sida operates a guarantee portfolio that offers guarantees aimed at ensuring competitive financing for entrepreneurs and SMEs in developing countries, as well as in high-risk environments. The size of the portfolio as of 2017 was close to 7 billion SEK⁴², which has been estimated to mobilize 19 billion SEK in private capital and 37 billion SEK loan capital. Several of the guarantees are established within existing multilateral organizations and mechanisms, such as development banks and guarantee funds.

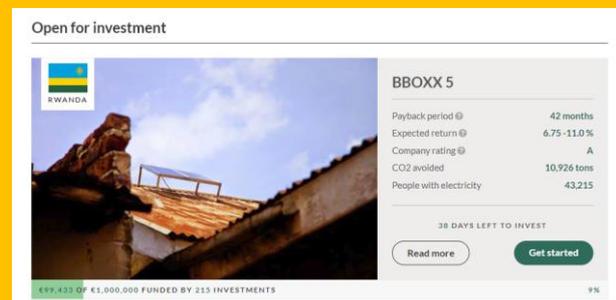
The guarantees are targeted at various sectors that are aligned with the Swedish ODA strategy, with the biggest being infrastructure, followed by lending to micro to medium enterprises and energy. However, as renewable energy capacity could be a part of infrastructure and lending to SMEs, there is some overlap between the defined target areas/sectors. As of 2017, guarantees amounting to 970 million SEK were committed to energy sector projects.

Box 2

Trine Crowdfunding Platform & Sida Crowdfunding guarantee

Crowdfunding is a way of funding a project or venture with relatively smaller contributions from a large group of people, usually through digital platforms. This allows also small investors and entrepreneurs to invest in projects, and is an alternative way of funding for (especially small) projects that struggle to secure funding in more traditional ways.

Trine is a Swedish crowdfunding platform that allows people to invest in small-scale solar off-grid projects/companies in Sub-Saharan Africa predominantly. Each project has impact targets, such as reducing greenhouse gas emissions or increasing access to energy. The investments are provided to the companies as loans that are to be re-paid with interest. Private persons can open an account and invest in projects they like and impact targets they want to support, with a chosen sum of minimum 25 EUR. The investors receive a pre-defined return on their investment, with additional return for higher investments.



Example of crowdfunding campaign on Trine; Screenshot from Trine’s webpage (www.jointrine.com)

Sida is the first to provide a guarantee of this kind from a donor that covers loans given to projects in crowdfunding campaigns. The guarantee is issued for certain projects and covers on average 60 % of the loan. In case the company does not repay its debt, Sida will cover the pre-defined share of the loan to the investors.

⁴² Guarantee Portfolio 2017, Sida 2017

The facility is supported by a combination of state backed guarantee and cash deposits. The guarantee premium can be subsidized over the ODA budget. Only operational cost related to the facility is counted as ODA, not the deposits.

The biggest type of guarantee offered is a **portfolio guarantee** (54 % of guaranteed volume), which covers several projects/loans in a financial institution's portfolio. A recent example is Private Agriculture Sector Support Trust (PASS), an organization in Tanzania which supports small agribusiness entrepreneurs. Other types include **project finance guarantee** (for a single loan between two identified parties), **volume guarantee** (related to underlying market risk linked to price and/or volume), **balance sheet guarantee** (using Sweden's credit rating to enable lender to access bigger loan by "freeing up space" in the balance sheet). Sida has also been the first to provide a guarantee for lending through crowdfunding platforms (see Box 2).

Another guarantee that has gained attention, also internationally, is the guarantee issued to the International Finance Corporation (IFC). Together, Sida and IFC cover first loss risk through a 57 million USD guarantee, which reduces the overall risk to a level that makes it attractive for institutional investors to invest. The guarantee enables 1 billion USD in private capital investments related to renewable energy and infrastructure.^{43 44 45}

4.1.3 Denmark

The Danish government's policy and strategy from 2017 for development cooperation and humanitarian action is outlined in *World 2030*. "Inclusive, sustainable growth and development" is one of four strategic objectives. This objective states that "Denmark will invest in inclusive sustainable growth and development in developing countries, focusing on energy, water, (...), and other areas where Denmark has special knowledge, resources and interests".⁴⁶ The proposed budget for 2019 highlights its *Green profile*, with "record-high funding for the Danish Climate Envelope (...)"⁴⁷

The **strategic framework for natural resources, energy and climate** (NEC, 2013) outlines Danish priorities for development cooperation for green growth. Denmark supports the SE4ALL initiative in its objectives on access to energy, energy efficiency, and renewable energy. Furthermore, Denmark assists government institutions with establishing the policy framework, developing capacities to enhance energy access and attract private investments. The support includes sector studies; innovative funding mechanisms for leveraging investments, such as the DCIF; enhancing access to knowledge on renewable energy for private sector, including bilateral support for preparation of energy programmes, among other tools and approaches.

Established in 2008, the **Danish Climate Envelope** is an integrated part of Danish development assistance. The Climate Envelope channels dedicated climate funding to mitigation and adaptation activities in developing countries through multilateral mechanisms and bilateral cooperation. The Government intends to increase funding to 540 million DKK annually in 2019 (from 350 million DKK in 2018).⁴⁸ This will amount to 3.3 % of the total Danish ODA budgeted for 2019.

⁴³ Sida. (2017). *Guarantees: Unlocking capital for development efforts*.

⁴⁴ Sida. (2017). *Crowdfunding Guarantee*.

⁴⁵ Sida. (2018). *Guarantee Portfolio 2017*.

⁴⁶ Danida web site

⁴⁷ Danish government. (2018). *Priorities for Danish Development Cooperation 2019*

⁴⁸ Ibid.

Denmark's total spending on development assistance in 2017 was about 2.4 billion USD, amounting to 0.72 % of GNI. Danida manages the development cooperation activities, including mechanisms set up to support private sector activities in developing countries. Commercial financing for development is organized under IFU.

Danida – Danish Development Agency⁴⁹

Danida Market Development Partnerships (DMDP) promotes commercially oriented partnerships building on business ideas that contribute to promoting SDG 8 (local economic growth and employment). Eligible partnerships must as a minimum include one private business and one non-commercial partner; one of these must be local. Projects shall combine knowledge, solutions and resources from companies, civil society organisations, business organisations, public authorities, and non-commercial partners.

The 2018 budget is DKK 80 million, targeting 10-12 partnerships.

Danida Business Explorer provides grants to support Danish companies in exploring specific business opportunities in developing countries. Projects must address a development need in the developing country and focus on contributing to the Sustainable Development Goals.

Danish and local authorities can establish **Strategic Sector Cooperation** in areas where “Danish businesses have special competencies and in countries that have particular strategic and commercial significance for Denmark”. Strategic Sector Cooperation is managed by sector expert counsellors posted at Danish embassies that help create market and investment opportunities for Danish businesses.

Danida instruments under IFU management

1) Project development facility

A project development facility of 50 million DKK established by IFU and Danida offers risk capital for project development, targeted at medium sized and larger Danish companies. IFU can cover up to 50 % of development costs (maximum 5 million DKK) for projects that are considered economically viable and profitable for IFU.

2) SME facility

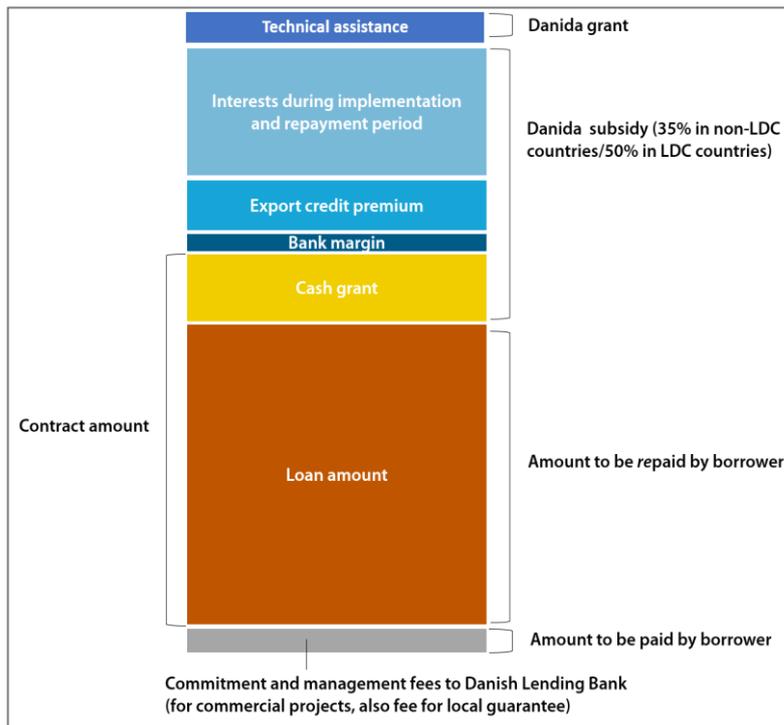
IFU and Danida provide support for project preparation and start up for projects promoted by Danish SME's in developing countries. Support can cover feasibility studies, business and organizational development, training, implementing CSR initiatives, and similar activities. Grants can amount to a maximum of 50 % of total costs, up to 1.5 million DKK to one project.

3) Danida Business Finance (mixed credit programme)

Danida Business Finance (DBF) provides subsidised loans for infrastructure projects in developing countries that contribute towards reaching the SDGs, and that would otherwise not have obtained commercial financing. The subsidy can cover interest during whole loan period, export credit premium and other financial costs and cash grant towards loan principal. Contracts must have a minimum value of 100 million DKK. The official application must come from government entities in the local country. According to Danida, DBF support is considered equivalent to sovereign state guarantees, removing the risk for other financing institutions, although they do not actually provide guarantees. This makes financing available from other banks and financing institutions that would otherwise not be offered.

⁴⁹ This section is mainly based on information on the Danida web site and the IFU web site.

DBF also offers technical assistance on grant terms related to tender procedures, monitoring, etc.



DBF has two “tracks”:

- i. **DBF Classic:**
The tender for the project is limited only to Danish companies. DBF support is approved prior to tender taking place
- ii. **DBF Fast Track:**
Internationally open tender for a project where DBF can provide support in case a Danish company is the best evaluated bidder (DBF support approved after tender evaluation)

Figure 19 Representation of Danida Business Finance.
Source: dbf.ifu.dk

4.2 Development Finance Institutions

The DFIs are one of the main channels for the commercial investment part of the ODA strategy for all three countries. The DFIs are usually fully government owned. Although we have seen in a previous section that the size and focus areas of the three vary, their roles are similar.⁵⁰

4.2.1 Norfund

The Norwegian Investment Fund for Developing Countries, Norfund, is Norway’s main instrument for leveraging commercial investments into renewable energy. Norfund’s purpose is to contribute to building sustainable commercial businesses in developing countries.

Clean energy is one of Norfund’s three focus sectors. The strategy is to invest as “strategic minority investor” with or through partners like Scatec Solar, SN Power and KLP. Norfund’s investment instruments are:

- Direct equity (up to 35 % equity financing)
- Loans to companies and financial institutions
- Indirect equity through funds
- Guarantees

The distribution of the portfolio is 70 % direct equity, 15 % loans and 15 % indirect equity (funds). Most of Norfund’s direct investments are large-scale projects (with Norfund’s equity being from 4 million USD and up), while the funds focus on smaller business projects and entrepreneurs.

⁵⁰ The information about the DFIs is mainly based on their web sites and recent annual reports.

Norfund can also issue guarantees and has used the instrument in some renewable energy projects. Norfund is a limited company, thus guarantees issued by Norfund do not have the advantages of sovereign guarantees with regard to scaling up banks' lending.

4.2.2 *Swedfund – Swedish Development Fund*

Swedfund is the DFI of Sweden, owned by the Ministry of Enterprise and Innovation and funded by the Ministry of Foreign Affairs. Its goal is to “fight poverty by investing in sustainable companies”⁵¹.

Swedfund provides 3 main types of services:

- Risk capital (equity & loans)
- Financial support through Swedpartnership (loans, convertible to grants)
- Project development support (financing preliminary studies)

The portfolio is divided into 23 % equity, 46 % in loans and 31 % in funds as of the end of 2017. More than 60% of the portfolio is in Sub-Saharan Africa.

Swedfund requires commercial return and does not provide soft money, i.e. pillar financial viability.

1) Risk Capital

Risk capital, or impact capital as they term it, is available for well-established businesses with a business ideas that have potential to be contribute to Swedfund's overall mission. Swedfund's investments are made alongside other development finance institutions and strategic investors. Instruments include direct equity, funds and loans.

Swedfund partakes as a minority owner, and does not take operational responsibility in projects, but actively follows the development of the project and often has a representative on the board of directors.

2) Swedpartnership

The financing program Swedpartnership supports small and medium-sized Swedish companies transferring know-how and investments in machinery and equipment through business partnerships with local companies in emerging markets. All funding is targeted at employees or operations of the local businesses. Loans are convertible to grants when the project has been completed. In 2017, 30 million SEK was allocated for new applications.

3) Project Development

Since 2016 Swedfund can finance early stage project preparation and development in more than 100 developing countries (DAC⁵² list). The efforts aim at helping project owners develop projects that can lead to financing and implementation of sustainable solutions applying Swedish solutions and technology.

⁵¹ Swedfund operates in accordance with its three pillars, impact on society, sustainability and financial viability. A number of indicators are listed under each pillar, i.e. number of jobs, number of women in management, CO2 emission etc. The pillars are equally considered before a decision to invest is taken, during the value creation phase and when exiting.

⁵² OECD's Development Assistance Committee

4.2.3 The Investment Fund for Developing Countries (IFU)

The Danish DFI, IFU, finances projects in developing countries as a minority investor (usually about 30 % of total investment; up to around 15-16 million USD). The remaining investment comes from Danish or local company or regional development bank.

Capital is provided as:

- Equity (around 30 % of total as a rule of thumb. 49 % max of any single project's equity)
- Mezzanine financing (equity-like loans)
- Loans
- Guarantees

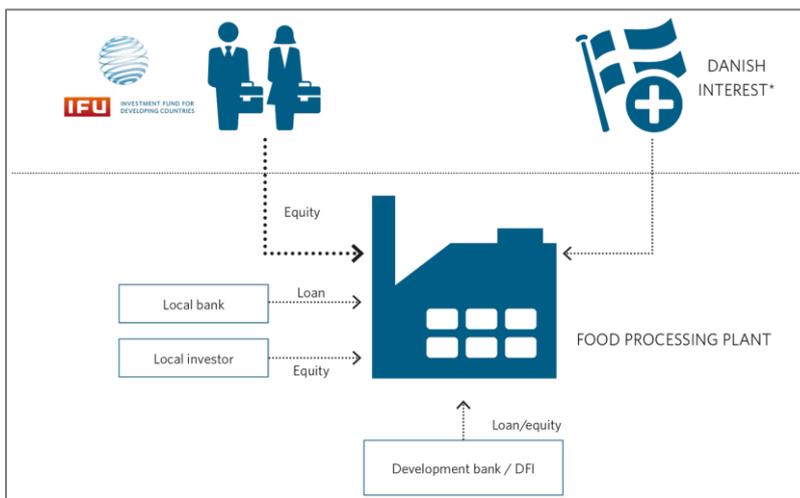


Figure 20 Illustration of IFU's role in investments. Source: ifu.dk

IFU projects must be 'in Danish interest' – i.e. Danish investor, exporter, Danish job creation, use of Danish technology etc., and contribute to development in the target countries. IFU offers advice throughout the investment process and often sits in the board of the project company.

IFU invests directly in projects/companies but is also fund manager for several special purpose funds that are public private partnerships between private investors, often institutional investors, and the state.

Danish Climate Investment Fund

IFU manages the **Danish Climate Investment Fund**, a climate and clean energy fund, established along with the Danish state, Danish pension funds and other private investors. The DCIF offers risk capital for projects that contribute to solving climate-related issues in developing countries and emerging markets. Established in 2014, commitments amount to a total of 1.3 billion DKK, including Danish state (525 MDKK) and the private sector⁵³. The DCIF participates as a minority investor, alongside other financing for projects/companies that is provided through local investors and financial institutions. Generally projects shall be commercially viable and attractive for investors, and in "Danish economic interest". The fund invests in renewable energy projects (mostly wind and solar) that contribute to reducing greenhouse gas emissions. The fund's private investors are granted first rights ("preferred return") up to a certain level. Any losses are split equally among investors; losses for the Danish state can be written off as ODA.⁵⁴

⁵³ General Partners (IFU, DKK 250 M; Danish state DKK 225 M) and Private Limited partners (PLPs) (PensionDanmark, DKK 200 M; PKA, DKK 200M; PBU, DKK 175M; Aage V Jensen Charity Foundation, DKK 50M)

⁵⁴ Norwea. (2018). *Gjennomgang av Norges eksportstøtte, låne- og garantiordninger rettet mot fornybarinvesteringer i utviklingsøkonomier, sett i lys av andre lands ordninger*. Norwep/NHO/ZERO.

Also in partnership with the Danish state, Danish pension funds and other private investors, IFU launched a new **SDG fund** in 2018, targeting 5 billion DKK. Sustainable energy is one of the prioritized sectors. 4.1 billion DKK was committed in the first closing, distributed 60/40 between private investors and IFU. The fund shall contribute to reaching the SDGs through commercial private sector investments in developing countries, but also has an objective of promoting Danish technology and competence.



Figure 21 From news article published on ifu.dk.

4.3 Export Credit and Guarantee Agencies

4.3.1 The Norwegian Export Credit Agencies

Export Credit Norway provides financing to support Norwegian exports. The financing is available for both exporters and foreign buyers of Norwegian goods and services within most industrial sectors. Credit is offered to both SMEs and large companies, and for medium- and long-term. Export credit is usually backed up by guarantees from GIEK, the sister agency to Export Credit Norway. Such guarantees provide the necessary financial assurances to buyers or financiers of Norwegian exported goods and services such that exported goods or services can be delivered at minimum risk. Scatec Solar has for instance received export financing, backed by a guarantee from GIEK, of 51.3 million USD for EPC services relating to the 60 MW Agua Fria solar park in Honduras.⁵⁵

GIEK, The Norwegian Guarantee Institute for Export Credits, is the central governmental agency responsible for providing insurance and guarantees of export credits. The mandate of GIEK is to “promote Norwegian exports and investments by providing long-term guarantees on behalf of the Norwegian state”.⁵⁶ The guarantees are adapted to the needs of Norwegian export companies and foreign buyers, and cover political and commercial risks relating to loans issued by private or public financial institutions. GIEK is a supplement to the private banking and finance market and is required to break even over time. GIEK guarantees most of Export Credit Norway’s loans to buyers of Norwegian exports. The guarantees may only be provided when Norwegian goods or services are delivered abroad, or when an export transaction promotes Norwegian value creation in some other way. GIEK guarantees financing for exports to countries worldwide issuing both buyer and seller guarantees.

There are 12 types of guarantees offered by GIEK with three of the most relevant categories being:

- **Investment guarantees** (covering political risk);
- **Contract guarantees** (covering commercial risk that protects against contract non-fulfilment by a foreign buyer and also political risk); and
- **Tender guarantee** scheme managed on behalf of Norfund (covering expenses of Norwegian companies that engage in tendering for aid-funded projects in developing countries).

GIEK’s mandate to issue these guarantees comes from the government in the form of various policy decrees or programmes (“ordninger”). The most relevant for renewable investments in developing countries is the so-called “U-landsordning”, or the “Developing Countries Programme”. The

⁵⁵ GIEK web site

⁵⁶ Ibid.

programme is aimed at cases where exports of Norwegian goods or services promote development in a particular developing country but where risk is too high for the general guarantee programme. Most of the types of guarantees GIEK offer are available in the programme. The “U-landsordning” is set up such that it can run at a loss over time (within strict limits) in contrast to the “general program” which must break even over time.

As for renewable energy’s share of GIEKs guarantees, in 2017, only 2.7 % of GIEK’s commitments went to the sector, while about 80 % went to oil and gas. The programme was not fully utilized in 2017, as **Table 1** shows. However, the industry has voiced that there is an unreleased potential for investments that could be released through greater risk coverage and adjusting criteria to make more projects eligible in the guarantee mechanism than what is the case today.⁵⁷

Table 1 GIEK’s “U-landsordning” in figures.

Source: GIEK Annual Report 2017

GIEK’s “U-landsordning” in figures	
Base capital	450 MNOK
Total window (7 times gearing)	3150 MNOK
Commitments as per 2017*	1078 MNOK
Share of total window utilized, 2017	34 %



Figure 22 GIEK’s commitments by sector.

Source: GIEK Annual Report 2017

4.3.2 Swedish Export Credits

Swedish Export Credits are managed by the Swedish Export Credit Agency (EKN) and Swedish Export Credit Corporation (SEK).

SEK provides long term funding for Swedish export-related transactions. With the help of SEK’s financing, international buyers can obtain loans to purchase Swedish goods and services. SEK also provides loans to Swedish exporters. SEK can also arrange loans provided jointly with one or more banks.

EKN offers guarantees to for lenders to Swedish exporters or investors, and importers of Swedish products. The guarantees ensures international customers competitive financing terms, and lower the risk for Swedish exporting companies and commercial banks. As guarantor EKN take on repayment risk (95 %), with the remainder (5 %) retained by the arranging bank.

The mandate of EKN is not limited strictly to Swedish export contracts, and also accepts investments that are of “Swedish interest”.

⁵⁷ Norwea, 2018

4.3.3 The Danish Export Credit Agency

The Danish Export Credit Agency, EKF, assists Danish companies in raising funds and insuring against political and financial risks when trading with other countries. To qualify for EKF, a deal should create value for Denmark, for example in terms of revenues or job creation. The guarantees include project finance guarantee (non-payment in default of the loan agreement in event of commercial, political and documentation risks), capital expenditure guarantee, investment guarantee (covers political risk), and contract guarantee (commercial and political risk and protects against loss if a company is unable to deliver a project to a foreign buyer due to conditions in the country or if the customer defaults on the contract).

EKF is planning to offer portfolio level guarantees towards IFU's investments, instead of for each single project. According to EKF themselves, they interpret their mandate as to also support the "countries of the East-policy and development assistance" to develop and promote new markets.⁵⁸ Losses on guarantees from EKF for investments through the DCIF can be written off on the development assistance budget.⁵⁹



Figure 23 MW installed capacity financed with support from EKF

4.4 Other Relevant Organizations/Institutions

4.4.1 Norway

Innovation Norway

Innovation Norway is a government organization for "innovation and development of Norwegian enterprises and industry", helping companies to develop and promoting Norwegian business abroad. Their services include advice and information, guarantees to help alleviate risk and find better financing options, grants for developing business, low-risk loans to secure long-term financing, and innovation loans in early phase of project.

NORWEP

Norwegian Energy Partners, NORWEP, is a network-based organization to promote the Norwegian energy industry internationally. Their purpose is "to support and assist in the internationalization of the Norwegian energy industry". NORWEP provides advice and information to both Norwegian companies and international partners, and platform for knowledge sharing to bring together relevant parties. They produce market reports and provide market information, hold network meetings, client seminars and workshops, provide local advisors in prioritized markets and promote capabilities of Norwegian companies to mention some main activities.

⁵⁸ Norwea, 2018

⁵⁹ Ibid

Nysnø AS

Nysnø is a recently established Norwegian sovereign wealth fund targeted at climate investments, as one of the government's tools towards reaching Norway's obligations in the Paris Climate Agreement. The mandate of the fund is to contribute towards the reduction of emissions, by investing in unlisted companies and primarily in new technology (the development to commercialization phase). In order to be eligible, the companies must have a link to Norway and have minimum 50 % ownership, and the investments must be profitable. The fund will invest in projects or companies in the areas of renewable energy, energy efficiency, sustainable consumption/behavior, mobility, carbon capture and storage, circular economy, and other "enabling" technology such as the grid, storage/batteries, etc. Nysnø may invest in projects targeted at both Norwegian and international markets, but does not specifically indicate its strategy vis-à-vis developing countries. In its first investment, Nysnø has invested in the solar technology company Otovo, who has set up a platform for facilitating sales and installations of solar panels for homes in Norway. The investment, which has been made along with other investors, is to help fund Otovo's expansion to other European markets.

4.4.2 Sweden

Tillväxtverket – Swedish Agency for Economic and Regional Growth

Tillväxtverket, The Swedish Agency for Economic and Regional Growth, is a government agency under the Ministry of Enterprise and Innovation. It promotes economic growth in Sweden by increasing the competitiveness of companies. Knowledge, networks and funding are the main tools to achieve it.

Tillväxtverket manages the Sida financed **Demo Environment Program (DEP)** since 2007.

DEP aims at innovative and proven solutions including technology, knowledge and partnerships that contribute to a better environment, new business opportunities and poverty reduction in the project country. The program operates in 14 countries in Africa, Asia, Latin America, Western Balkans, Eastern Europe, with renewable energy as one of 5 focus areas.

DEP offers Planning Activities grants to help entrepreneurs explore new markets and research their technology's impact on the environment and poverty reduction. Grants for Demonstration Projects are provided to local actors importing technologies that address local environmental challenges. Applications from small and medium-sized enterprises are particularly encouraged for both schemes.

Business Sweden – The Swedish Trade & Invest Council

Business Sweden offers Swedish companies strategic advice, support with sales and operation in international markets. They run an "Energy for Africa" program that aims to support Swedish energy companies targeting Sub-Saharan Africa. According to Business Sweden, this program is meant to complement the Sida Power Africa Initiative, as well as supporting Swedish companies with access to information, networks, etc. In addition to Business Sweden, other government agencies, finance institutions and other "promotional" organizations, altogether the so-called "Team Sweden", work together in a focused approach with key projects to facilitate Swedish companies to do business in this field.

4.4.3 Denmark

Danish Trade and Network Organizations

The Danish Wind Industry Association (DWIA) is a trade and network organization for Danish companies in both on-shore and off-shore wind sectors. In addition to gathering the industry in relevant fora and enabling knowledge sharing and exchange, they support promotion of member

interests nationally and internationally. **The Danish Wind Export Association (DWEA)** is a sub-organization of DWIA, owned together with the Danish Export Association. DWEA is focused on networking, market intelligence and export promotion for Danish companies with international activity. **The Danish Export Association** is the largest export organization in Denmark and work to promote Danish companies within various sectors, through providing a forum for exporters and buyers to meet, international trade fairs and exhibitions, etc.

The Danish Trade Council

The Trade Council in Denmark also works to promote Danish exports, in addition to promoting business in Denmark for international companies. The export promotion services include “export guidance as well as innovation and internationalization solutions for Danish companies looking to expand abroad”.

On the innovation side, the Trade Council offers advisory support, capacity building (training, etc.) and access to data, technology and intelligence. There are 7 Danish Innovation Centres around the world, among them in India and Brazil. The centres offer guidance to the local markets and access to networks and partners.

Danish Growth Funds

The Danish Growth Fund (Vækstfonden) is a state investment fund targeted at supporting new companies with capital and expertise. The fund provides equity, loans and guarantees for SMEs, together with other partners, such as Danish financial institutions and other private partners. The fund has for instance provided part of the public capital for the DCIF.

The Danish Green Investment Fund, an independent state loan fund, provides co-financing for projects within environmental saving, renewable energy sources and resource efficiency. The projects have to be economically viable and have sustainable impact on society. They provide green loans and enable or engage in partnerships that further the sustainable development of the society.

Although the Growth Funds do not explicitly offer support for projects in developing countries, they can support companies that offer technology or services that can also be taken to such markets.

4.5 Stakeholder Opinions and Perceptions

In the various interviews and research of secondary information sources undertaken for this report, stakeholders expressed a number of opinions and comments related to public support and mechanisms available in their respective countries, which may serve to add perspectives of the users they are targeted at. The boxes below represent a selection of these.

NORWAY

- ⚙️ *Norad targets SME and supports them directly, mostly through grants for pre-financial close activities and advise, because it is the development stage that requires most support.*
- ⚙️ *Norfund focuses on large Norwegian players due to 'economies of scale' (processing a small project is not cost-efficient in terms of cost-impact ratio, and human resources are limited) and established relations and network (cooperating with Norwegian players is easier, and there is a benefit of having strong Norwegian developers)*
- ⚙️ *GIEK promotes Norwegian export and has limited focus on supporting renewable energy investments in developing countries. The mentioned window is a good initiative but is not sufficient. There is only a small band of companies/projects that are eligible in practice. It is hard to get guarantees for small companies. The major company in the renewable in developing countries industry making use of guarantees is Scatec Solar.*
- ⚙️ *Increased human resources could increase GIEK's capacity to make guarantees more accessible to small projects.*
- ⚙️ *Innovation Norway supports innovative SMEs that create value for Norway, and not to projects where value creation primary happens outside of Norway*

SWEDEN

- ⚙️ *EKN/SEK is focused on investments of Swedish interest. A weaknesses is that they do 1 project in 1 country at a time, which means evaluating specific risks each time. It is difficult to access EKN guarantees for small companies. ABB and Eltel dominate as recipients of support for renewable projects. However, they do not have a development agenda and do not focus particularly on developing countries.*
- ⚙️ *Swedfund does not focus on Swedish companies*

DENMARK

- ⚙️ *Danida's aid is tied. Funds management have been outsourced to IFU, while Danida provides guidelines, framework and partnerships.*
- ⚙️ *IFU is the major player in Denmark. IFU mostly invests through equity together with Danish companies. The guarantee facility is less active at IFU. One of the barriers is that there is a limited amount of projects that could attract capital.*
- ⚙️ *EKF is interesting in terms of its focus on and expertise in wind power, as well as several relevant guarantees.*
- ⚙️ *Denmark is special in terms of its strong focus on supporting Danish companies. It has a stronger government guarantee system and closer collaboration between Development organizations, with IFU manging the most of initiatives. Like in Sweden, there is less focus on grants and more on risk capital. There are not so many renewable developers, the majority of companies are suppliers. The system is heavy on institutional and fund investments.*

4.6 Nordic cooperation

Nordic countries jointly support and finance to various projects through four channels. Among these, NDF is the most relevant with regard to the objective of supporting business development and investment in developing countries.

NDF – The Nordic Development Fund (NDF) is the joint development finance established by Denmark, Finland, Iceland, Norway and Sweden in 1988. The objective of NDF's operations is to facilitate climate change investments primarily in low-income countries. NDF finances projects usually in cooperation with bilateral, multilateral and other development institutions. The operations mirror the Nordic countries' priorities in the areas of climate change and development. NDF's capital is provided from the development cooperation budgets of the five Nordic countries. The original subscribed and paid-in capital by the Nordic countries is equivalent to approximately EUR 1 billion. NDF's total assets are around EUR 860 million of which 85 % are tied to concessional loans with long maturities. The reflow from these assets combined with NDF's liquid assets form the basis for NDF's operations.

NDF manages the multi-donor EEP Africa programme which particularly targets projects related to clean energy access and sustainable and inclusive green growth. Since the start in 2010, EEP has channelled more than EUR 57 million to 200+ pioneering projects in this space. Naturally, EEP is accessible for companies from all Scandinavian countries as well as other countries on equal footing.

Nopef – The Nordic project fund (Nopef) was established by the Nordic countries in 1982, with an aim to strengthen the competitiveness of Nordic companies through support for feasibility studies. Nopef currently funds feasibility studies related to green growth for Nordic small and medium-sized companies (SMEs) and administers a portfolio of 150 active projects. Nopef is administered by the Nordic Environment Finance Corporation (NEFCO) and is financed through an annual budget from the Nordic Council of Ministers.

(NIB – Nordic Investment Bank is an International Financial Institution. The Bank was established by the five Nordic countries in 1975 to overcome investment barriers and attract commercial lending. NIB's mission is to finance projects that improve productivity and benefit the environment of the Nordic and Baltic countries rather than ODA eligible developing countries.)

(NEFCO - The Nordic Environment Finance Corporation is an international financial institution established by the Nordic governments in 1990. NEFCO provides results-based green financing. NEFCO was created in order to support the Nordic countries' efforts to increase environmental awareness by providing financing to projects that reduced emissions harmful to the environment. NEFCO targets Eastern and Central Europe.)

4.7 Lessons

Norway, Sweden and Denmark each offer relatively comprehensive suites of support mechanisms and investment instruments that are relevant for or directly targeting renewable energy in developing countries. However, the preceding assessment shows that the countries assume very different approaches in their efforts to support renewable energy development and facilitate commercial investment.

Each country has interesting experiences with regard to promoting renewable energy, which other countries could take note of and learn from:

With regard to sector orientation, **Norway is the country among the three that most strongly and consistently emphasizes renewable energy. Norway also most explicitly emphasizes the potential role that Norwegian private sector can play as a driving force to encourage investments in**

developing countries. Sweden focuses on activities in and for the recipient countries rather than on engaging the Swedish renewable energy sector through ODA.

While Norway and Sweden show clear commitments to the principle of untied aid, Denmark goes relatively far in tying support mechanisms to Danish interest.

Norway differs from Sweden and Denmark in that the suite of instruments available to support investors mainly come in the form of grants; concessional financing (loans) is not provided, and provision of guarantees through GIEK's U-landsordning and Norfund's activities is limited.

Sida's schemes focus less on grants and more on guarantees and result based financing, without evidence of any promotional effect on Swedish business.

Denmark's schemes include a range of support schemes providing grants, loan subsidies, guarantees and investment activities that is aimed mainly at promoting Danish industry abroad. Concessional lending through Danida's Business Finance is but one example. It is evident that the instruments have been valued and used by Danish industry, and has contributed to developing the export industry. The Danish approach also provides an interesting example of how risk can be evaluated on portfolio level instead of individual projects, allowing for some higher-risk projects to also access support.

In Denmark, the explicit ambitions in energy sector development seem to have been overshadowed by other priorities. Regardless, new or adjusted mechanisms to promote private sector activities regardless of sector, are introduced. Danish public support has also been used innovatively by utilizing blended finance and provision of guarantees to attract institutional investors to invest in infrastructure projects, as evidenced by the public private partnership that has resulted in the DCIF.

While the Swedish and Danish approaches are interesting, it must be noted that these experiences are not directly applicable for Norway because of i) the tied nature of the Danish mechanisms; and ii) Sweden's apparent acceptance of state guarantees and the fact that cash deposits to support the guarantee facility are not registered as ODA.

With reference to the Norwegian suite of support mechanisms changing only to a limited extent over the past decade, a number of interviewees have indicated that Norway is less innovative than the other countries. In contrast, both Denmark and Sweden have regularly developed and introduced new approaches. The Swedish result-based financing and the current guarantee facility are examples; Sida's piloting of a special guarantee for the Trine platform to enable crowdfunding in off-grid solar projects is viewed as particularly innovative. It should nevertheless be noted that flexible approaches have also been applied in Norway. There are several examples where UD, Norad and Norfund have shown flexibility and innovation to unlock investments⁶⁰.

In terms of shortcomings of the Norwegian system, the lack of application based financing instruments and the limited availability of guarantees is highlighted by most of the interviewees. Small companies also emphasize the difficulty in accessing support due to low capacity and requirements of proven track-records, and call for simple procedures and support windows specifically targeting small and new companies.

⁶⁰ E.g. Norad's support to Mount Coffee in Liberia; combination of state-to-state ODA and Norfund's creative use of guarantees related to investments as in the case of the Mocuba Solar project in Mozambique; and the establishment of a specific Project Development Facility for Renewable Energy in Norfund.

5 Strengthening the Norwegian cluster

In summary, the research and assessments shown in the preceding chapters show that Norway has a relatively active business community investing in and developing commercial renewable energy projects in developing countries, with several characteristics of an industrial ‘cluster’.

This Norwegian energy business community generally finds public support mechanisms relevant for their further development, and in particular value the availability of early-phase grants appear to be valued and used.

It seems clear that the combination of public support available to private sector and the leadership represented by Norfund and some other leading actors have been one driving force in the emergence of a Norwegian ‘cluster’. In particular, Norfund’s long term focus on renewable energy as a major investment area combined with their active ownership and competency acts like a ‘locomotive’ for the business interests of the energy cluster when it comes to developing country investments.

This builds a case for leveraging the achievements so far to further developing the Norwegian ‘cluster’ in number and magnitude. There is significant interest to invest, but there is also no doubt that many companies still face high barriers and require support. The Norwegian suite of support mechanisms has been relatively consistent over time. **It is likely that more could be achieved through innovative approaches, strengthened support for early phase development and business scaling, and better access to risk mitigation measures.** This also includes a way to combine different instruments in a holistic view aimed at making projects bankable.

It is beyond the scope of this report to provide a full set of recommendation as to formulating a strategy for Norway’s future public support to renewable energy development, and previous work by other consultants have also presented various recommendations to this effect that we can subscribe to. We thus provide a number of reflections related to a few recent proposals and initiatives directly targeting the Norwegian public support mechanisms.

5.1 Policy recommendations to strengthen the Clean Energy for Development initiative

In 2017, as a response to the Parliamentary white paper on the SDGs (2016-2017), a working group from Norad and Norfund set forth a set of recommendations to Ministry of Foreign Affairs on how to operationalize the promised increased support and efforts of Norwegian energy sector development assistance. The working group particularly emphasized the potential gains that could be achieved from improved coordination and cooperation between the different channels and mechanisms in the Norwegian energy sector development assistance.

Overall Recommendations of Norad-Norfund working group

- ⚙️ Set clear priorities and better targeted efforts
- ⚙️ Prioritize efforts based on Norway’s history as energy nation and competencies
- ⚙️ Establish an overall coordination mechanism to ensure synergies between the different channels and public stakeholders, and ensure that the respective mechanisms and instruments mutually strengthen the efforts toward common goals.
- ⚙️ Establish an information and dialogue forum with private sector, civil organizations, educational and research environments.
- ⚙️ Work within international and multilateral institutions to ensure that their efforts support and supplement Norwegian priorities, with particular focus on the institutions’ support to private sector (funds, guarantee programs, etc.)
- ⚙️ Strengthen goal and result management and follow-up

The working group had given particular focus on how Norway could be more effective in engaging private sector and leveraging private capital, thus increasing renewable energy production capacity. In this regard, the group emphasized the following action points:

Recommended Action Points:

- ☀ Establish more flexible mechanism for project development and risk sharing. This could be done by means of an ‘energy fund’ targeting LDCs and high-risk countries. The fund should be used for particularly prioritized projects that would require support through a variety of tools and engagement by both Norfund, Norad, and other players as relevant.
- ☀ Increase the budget for support to renewable energy projects in Norad’s Private Sector Development program
- ☀ Follow up the work related to establishing a possible guarantee mechanism within GIEK, through expansion of the existing Developing countries program (“U-landsordningen”).
- ☀ Establishing a “one-stop-shop” in Norad for potential developers and investors
- ☀ Supporting programs proven to be effective in mobilizing investments, such as the German development bank KfW’s GET FiT schemes.
- ☀ Investing in international funds and guarantee instruments that are complementary and in line with Norwegian priorities.

It is not expected that the parliamentary provisions for 2019 fully take these and other recommendations into account. Still, the government has almost doubled support to the renewable energy sector, from 570 million NOK in 2018 to over one billion NOK in 2019 in the proposed ODA budget for 2019, as previously mentioned. In addition, the budget also includes increased support for Norfund’s investments in renewable energy. The Minister for Development has also recognized that the Norwegian business community is highlighting the need for instruments and mechanisms that reduce and cover risks, such as guarantees, to unleash some of the investment potential. The most recent budget negotiations in November 2018 concluded that the Parliament will be requested to evaluate a guarantee mechanism for renewable energy in developing countries⁶¹. These are positive signals to the business community engaged in energy sector development, emphasizing their importance and potential role, creating expectations of further support and encouraging continued work to strengthen efforts.

5.2 Suitability of existing suite of instruments for DESCOS

On a general level, there are several good and accessible Norwegian support mechanisms in place in the feasibility and start-up phases. Both NORAD and Innovation Norway have relevant and accessible instruments for partial cost coverage in the feasibility and start-up phases. Enterprise Development for Jobs and Vision 2030 are examples of this. However, these commonly have a financial eligibility threshold for applicants (10mNOK), which creates a need to secure external investors before applying for funding. This is challenging for many, given that investors will want to see the solutions tested in a developing country setting before they invest. A public-private partnership whereby public capital and private investors jointly select and invest in early-stage ventures could be one way to reduce this problem. A different approach could be R&D programmes more specifically targeting on-the-ground energy solutions in developing countries, to complement the numerous R&D initiatives and programmes supporting Nordic/European power sector developments.

In the scaling/commercialization and operational phases suitable mechanisms are weaker and not easily accessible. If we look at the mechanisms available for the scale-up and operational phases, the private sector mechanisms of NORAD and Innovation Norway are less relevant. The mechanisms are not tailored to finance working capital and assets, nor mitigate/alleviate risk in these phases.

⁶¹ Press statement from government on proposed ODA budget for renewable energy in 2019. Retrieved from: https://www.regjeringen.no/no/aktuelt/pm5_budsjett/id2613723/

In terms of debt financing, GIEK and Eksportkreditt (EK) have mechanisms intended for supporting international customers with financing for purchasing Norwegian solutions. For DESCOS, the customers are often individual households or smaller businesses. These are not eligible for this type of financing from EK. In addition, the requirements for Norwegian content is often a barrier for DESCOS that often source components and products from Asia and use African manpower for the local operations. As such, GIEK and EK are more suited to support Norwegian technology providers – which are explicitly excluded from this analysis.

Regarding DFI equity investments, the mandate and investment practice of Norfund is not a good match with the nature of distributed energy solutions. As of now, investing in distributed energy solutions involves smaller investments (due to the maturity of the sector and the variety of locally adapted business models) and higher risk on single investments (due to the direct exposure to off-taker risks). On the other hand, with limited support, many DESCOS can become highly profitable businesses and attractive investment opportunities. This indicates the need for a mechanism or mandate that allows either for making many small investments or for investing in funds investing in such businesses. The newly established Nysnø could be a better match in terms of targeting DESCOS in the commercialization phase.

In terms of risk alleviation and direct ODA support, NORAD has not to date provided ODA support to the distribution of off-grid electricity to the same extent as they do in the distribution of grid electricity. EnDev represents a good initiative for stimulating distributed energy solutions, but is still relatively limited in terms of budgets. NORAD is frequently financing grid development projects, e.g. carrying the cost of connecting the new Mocuba plant in Mozambique to the main grid. Similar ODA risk and cost reduction support would be of large value also to DESCOS. A different example is the GET FiT ODA support of Feed-in-Tariffs to boost the profitability of commercially financed grid-connected power plants. A “GET-FiT-like” mechanism could be explored also for DESCOS.

In summary, distributed energy solutions lack support in the scaling and operational phases – both from local governments, from Norwegian and international support mechanisms and from ODA budgets. Given the enormous potential of distributed energy solutions in achieving the SDG7 on universal access while staying within IPCC’s 1.5-degree target, as well as for progress on many other SDGs, Norway could play a leading role in making DESCOS bankable, rather than await that they become bankable.

5.3 A case for a Norwegian guarantee mechanism

Norwegian business leaders and other institutions engaged in international renewable energy project development have, on several occasions, encouraged more effective policy support mechanisms to mitigate risks associated with projects in developing countries. These calls have been recognised by certain actors in Parliament and government (see box below).

Box 3

The Norwegian business community's call for Norwegian guarantees to support renewable energy investments

- ⚙ Norwegian business leaders and other institutions engaged in international renewable energy project development (Including several renewable energy companies, Scatec Solar, SN Power, Statkraft, as well as NHO, Zero, Norfund and NORWEP) have, on several occasions, voiced their desire for more effective policy support mechanisms to mitigate risks associated with projects in developing countries, and encouraged Parliament and the Government to consider this.
- ⚙ In mid-2016 a proposal was put forward by a group of companies within NORWEP. The proposal encouraged Parliament to request the Government to establish a dedicated guarantee fund for clean energy projects in developing countries – a so-called Clean Energy Guarantee Facility – that would issue guarantees to reduce political, regulatory and commercial risk in relation to infrastructure projects for clean energy in developing countries. The grouped indicated that a fund with a capital insertion of 500 MNOK annually for 10 years, allocated from the state budget, could leverage up to 80 billion NOK in investments. The Facility could be established within GIEK, and draw on competency and experience from Norfund, Norad, etc. Further, accrediting the fund through the UN Green Climate Fund could allow it to access funds from UN programs and projects.
- ⚙ A majority in Parliament passed a resolution in December 2016 asking the Government to put forward a new guarantee mechanism within GIEK that would cover both political and commercial risk in renewable energy investments in developing countries. In the budget for 2018 the government rejected this, referring to available tools as sufficient («anser dagens virkemidler som dekkende»).
- ⚙ The Government has reportedly concluded that increased guarantees for renewable energy investments in developing countries were possible, as long as they remain *untied*. Alternatively, a mechanism “reserved” for companies with business in Norway, could potentially be categorized as climate financing (considering subsidies as compensation for positive externalities of climate change mitigation) and notified to the ESA¹⁾
- ⚙ In response to these encouragements, some minor adjustments have already been made to the GIEKs “U-landsordning” program.
- ⚙ In the beginning of 2018 the new Minister for International Development emphasized the absolute need to leverage more private capital in order to achieve the SDGs. He signalled that while existing national and international mechanisms were relevant and effective, the Government was open to considering additional mechanisms or further adjustment of the existing ones.
- ⚙ Budget negotiations in November 2018 concluded that the Government will be requested to consider a guarantee mechanism for renewable energy in developing countries and present this to Parliament at the latest with the Revised National Budget 2019.

1) EFTA Surveillance Authority

As reflected by these renewable energy companies' engagement, there is a clear perception that a revised or new Norway based guarantee scheme would offer real advantages over any similar international schemes.

It is beyond the scope or mandate of this report to recommend the establishment, or propose a specific solution (or solutions) for a new guarantee mechanism. Nevertheless, we hereby summarize what we view as the primary arguments in favour of such a scheme:

1. **Proximity.** Financing is an iterative and intensive process, requiring multiple meetings between parties and their advisors such as banks and law firms. For borrowers/exporters in Norway, being able to obtain financial support in-country rather than elsewhere would lower their transaction costs significantly. This is particularly relevant for SME businesses seeking to expand overseas. The possibility of interacting with Norwegian institutions could thus improve availability and reduce transaction cost.
2. **Ease of doing business.** The business culture – the Scandinavian model – puts trust at its centre. The upshot of this is less paperwork, less corruption, less litigation and more efficiency. Today, the World Bank ranks Norway 8th in the world in terms of ease of doing business (2017)⁶². By focusing on 'doing things right' and securing finance in Norway, Norwegian (and international) companies reduce risk for their investors and the risk of costly time delays.
3. **Energy and infrastructure financing competence.** For several decades Norway has been one of the leading destinations in Europe for oil, gas and power infrastructure investments, giving rise to a highly developed domestic legal and financial services industry for energy & infrastructure project and corporate finance. Companies looking to access renewable energy guarantees from GIEK will inevitably need to draw on these ancillary services (for example when drawing up contracts, loan agreements, obtaining debt and equity finance). Similarly, given a clear mandate, GIEK can itself draw on this competency when it comes to establishing the programme, securing staff and analysing applications.

These arguments, taken together, could potentially provide a case in favour of the establishment of such a mechanism and provide the foundation for significant uptake. At the same time, there are several costs and risks associated with such an establishment and it is important to be clear about weighing these against the real value added of a Norwegian scheme. In the next section, the range of issues that must be considered, in an objective and systematic manner, in order to have a clear of the costs and benefits of such a scheme are summarized.

Next Steps towards a comprehensive assessment

If the initiative related to a strengthened or new Norwegian guarantee scheme is taken forward, the precise objectives, design, size, terms and legality of such a mechanism would need to be carefully evaluated and progressed by the relevant government and non-governmental stakeholders. Careful steering and "championing" by a single organisation with clear authority, as well as a formal evaluation and decision making process employing the right and sufficient expertise, would be required.

In the following recommendations, a number of elements that would need to be subject to detailed assessment are noted. Note that this is a non-exhaustive list of issues:

- ✿ Ultimately, the scheme's popularity and level of uptake would depend on the type of risks covered, the quantity of funds available, guarantee terms, application criteria and application process.

⁶² https://data.worldbank.org/indicator/IC.BUS.EASE.XQ?year_low_desc=false

- ⚙️ The **value for the Norwegian business community and the expected leverage** in terms of real investments in renewable energy in developing countries would also have to be carefully assessed in an evaluation process.
- ⚙️ The **costs and value added of a Norwegian-specific scheme** would need to be assessed. A Norwegian scheme should look to add value vs the relatively comprehensive set of guarantees covering a range of risks are available internationally. An assessment should explicitly assess complementarity and added value for the Norwegian business community of a Norwegian scheme, for example through the guarantee terms, application criteria and application process, and also estimate the costs related to offering these.
 - As an example of alternatives, the World Bank MIGA guarantees have the full political weight of the World Bank Group behind them and may be appropriate for very large projects in high risk locations where there is little Norwegian diplomatic presence. An alternative to ‘competing’ with these, offering subsidies for high premiums, or support to mitigate transaction costs, could be an alternative.
 - To cover risk related to PPAs and off-taker credit worthiness, it may be that Norwegian cooperation with existing guarantee mechanisms, for example the African Trade Insurance Agency (ATI), may better address moral hazard than using Norwegian institution. ATI has the capacity to both diversifying risk across a portfolio of projects and – potentially – influence the subject⁶³.
 - Multi-country initiative among ‘likeminded’ donors to improve access to guarantees specifically for smaller projects could be considered. The Nordic Government network have agreed that there is a need to provide risk mitigation to mobilize capital for the SDGs, and that export guarantees and insurance can play an important role in blended finance. However, while the history and experience among Nordic countries with joint approaches speaks in favour of common approaches, the different attitudes among the Nordic countries shown in this study indicate that securing such cooperation is not a likely solution for the short-term.
- ⚙️ **The right host institution must be selected.** The administrative process of selecting the right host institution and structuring the mechanism would require careful assessment of fund size, exposure, type and level of risk to cover. The administration of the fund would need the right expertise and a strong mandate and incentives to develop the mechanism and grow a portfolio of projects.
- ⚙️ Finally, the evaluation would need to ensure that the structure and set-up effectively manages a number of specific practical and legal challenges. These must be addressed to the satisfaction of key stakeholders such as the Norwegian Ministry of Finance, EFTA Surveillance Authority (ESA) and the OECD Export Credits Division. Some evident challenges that should be included in an eventual full evaluation process include:
 - **Avoidance of Moral Hazard.** First and foremost, it must be acknowledged that a Norwegian guarantee issuer would have limited direct influence over some of the risks it is set up to cover. Reference is made to Section 0, which describes the advantage of distributing risk to actors that can influence the result (i.e. the probability that the risk materializes) and thus reduce moral hazard. This is an important first principle of insurance providers. For example, if a guarantee covers risk of non-payment by an energy

⁶³ See for example GIEK's reinsurance offered via ATI to builders of two power plants in Tanzania in 2011. <http://www.ati-aca.org/ati-reinsures-a-100-million-power-project-lessening-the-impact-of-tanzanias-energy-crisis/>

off-taker, GIEK and Norwegian government would typically have very limited “influence” over an off-taker that refuses to pay up, especially if the offtake contract is with a sovereign organisation or outside Norwegian jurisdiction. Thus the guarantee introduces a moral hazard i.e. an increased risk that payments are not made in the knowledge that payment is already (wholly or partially) guaranteed. A better solution in this case might be to rely on mechanisms with greater institutional weight behind them (e.g. MIGA issued guarantees)

- **Compliance with the OECD Arrangement on Export Credits.** The OECD Arrangement is a non-binding gentlemen’s agreement for the orderly use of officially supported export credits. In practice, this means providing for a level playing field whereby competition is based on the price and quality of the exported goods and not the financial terms provided. The Agreement also seeks to eliminate subsidies and trade distortions related to officially supported export credits. It does this mainly by setting lower limits to the fees, interest rates and insurance premiums charged by export credit agencies on export credit products (& guarantees) based on a commonly adopted risk classifications for each country. The Norwegian Export Credit Agency and GIEK are full members of the OECD Arrangement and any publicly provided guarantee product would thus need to adhere to it. The OECD Export Credit Division is cognizant of the desire of many of its members to support international climate change mitigation finance and, in 2012, reached a common “sector understanding” for concessionary financial terms and conditions to officially supported export credits relating to renewable energy (e.g. 18 years financing tenor for certain projects)⁶⁴.
- **EU & EEA rules on state aid.** In a similar manner the EU and EEA (of which Norway is a member) set strict rules on state aid for domestic companies in member states. State aid can take many forms, for example cash grants, tax breaks or favourable loans. The ESA ensures that EEA member states do not breach these rules as well as managing exceptions to wider EU state aid rules. Again, any guarantee would have to follow EEA state aid rules.
- **Set aside of non-ODA funds.** Public funds set aside as base capital in any Norwegian institution are not recognized as ODA under OECD rules, and would thus not count towards the one percent-goal for Norwegian official development assistance. Consequently, policy-level support for such funds has traditionally been challenging.
- **Support for Small Projects.** As mentioned above, small projects have traditionally had difficulty passing through GIEK’s “needle eye” while seeking to qualify under the U-landsordning. Further, the resources required by GIEK for due diligence are not proportional to the size of project and the guarantee required.
- **Support for foreign SPVs.** In contrast to typical contracts for export of Norwegian goods, the costs of developing larger renewable energy projects are almost always channelled through locally registered (or offshore) special purpose vehicles (SPVs) that may or may not be majority Norwegian owned and have very few, if any, assets on their balance sheets prior to construction. Further, the costs associated with project development “services” do not entail provision of physical goods (e.g. solar panels) but payments for land, licences, engineering and construction services. This creates challenges when Norwegian entities seek export credits and/or GIEK guarantee for their projects in developing countries.

⁶⁴ [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=tad/pg\(2012\)7&doclanguage=en](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=tad/pg(2012)7&doclanguage=en)

6 Conclusions

This report culminates in the following key take-aways that policy-makers should consider, going forward:

- ⚙️ Norway has a **relatively active business community investing in and developing commercial renewable energy projects in developing countries**; with a higher level of activity than in our neighbouring countries
- ⚙️ **The Norwegian renewable energy business community focused on developing countries has characteristics of an emerging industrial ‘cluster’** – with small and big companies and financiers representing a wide array of expertise: technological solutions, equipment supply, business development, equity and portfolio investment, and advisory services; and backed by industrial associations
- ⚙️ Norfund’s large proportion of renewable energy in the investment portfolio contrasts Swedfund and IFU’s smaller shares of renewable energy.
- ⚙️ **Norway, Denmark and Sweden all offer relatively comprehensive suites of mechanisms and funding approaches to support international private sector development;**
- ⚙️ **Norway is the country among the three that most strongly and consistently emphasise renewable energy** as a target area. Norway’s long history, experience and competence in the area is considered to be relevant for partner countries;
- ⚙️ Norway combines a strong commitment to the principle of untied aid with an explicit intention to also facilitate and encourage application of Norwegian renewable energy experience and competence. Meanwhile, **Sweden does not emphasize involvement of Swedish industry**. Danish support mechanisms on the other hand are **explicitly targeting Danish companies and Danish exports**.
- ⚙️ The combination of public support available to private sector and the leadership represented by Norfund and some other leading industrial actors have likely been one **driving force in the emergence of a Norwegian ‘cluster’**. Danish tied support has been actively used by the export industry and has promoted equipment suppliers and exports rather than encouraged *investments*.
- ⚙️ Consistent Norwegian focus on energy as a target sector in development assistance and the role that the Norwegian energy sector can play has been a driving force to encourage investment activities in developing countries.
- ⚙️ Engagement of Danish pension funds to invest in commercial projects in developing countries with a focus on energy, climate and infrastructure made possible through provision of guarantees to the funds’ investment is a lesson to learn for the other countries.
- ⚙️ Danida’s Business Finance promotes Danish industry through concessional lending to Danish companies exclusively, which Norwegian untied and grant-focused ODA-financed aid does not allow.
- ⚙️ Sweden’s strong emphasis on guarantees has not in itself had a promotional effect on development of Swedish businesses.
- ⚙️ Sida’s piloting of a special guarantee for the TRINE platform as an approach to enable crowdfunding is an example of innovative use of support mechanisms.

- ⚙️ The Norwegian suite of support mechanisms has been relatively consistent over time. While this ensures predictability for beneficiaries, it may also indicate that Norwegian public support is less innovative than Danish and Swedish support and potentially less adaptable to changing needs.
- ⚙️ Norwegian energy businesses emphasize the importance of risk mitigating support. Norwegian public support to risk mitigation in the early phases of project development is available, but can be difficult to access for some, in particular for companies lacking technical or operational track-record. This limits new ventures and innovative start-ups, which also limits the growth of the cluster. The Danish approach to business support provides an interesting example in considering portfolio risk instead of project specific risk, which allows higher-risk projects to access support.
- ⚙️ Guarantees covering a range of different types of risks are available in Norway and internationally. Norwegian energy businesses involved in developing countries have argued that guarantees available in Norway are risk averse and expensive, and that the international instruments are difficult to access. They argue that a dedicated Norwegian guarantee mechanism for renewable energy in developing countries could be instrumental to unleash more investments.
- ⚙️ Extended scope and outreach of publicly backed guarantees or aid subsidies for already available but expensive guarantees could count as Norwegian climate funding under the Paris Agreement. The white paper “Common Responsibility for Common Future (Meld. St. 24 (2016–2017)) also notes that such aid could have a catalytic effect on funds mobilization for development”.
- ⚙️ A full evaluation of Norwegian publicly guarantees and how they could be structured should assess what gaps Norwegian public funding could fill in terms of coverage, terms or accessibility; the related costs, funding and management structure; and the potential impact it could have on Norwegian investments in developing countries.

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8 APPENDIX

ANNEX I. List of Abbreviations

African Development Bank	AfDB
African Trade Insurance Agency	ATI
Capital Expenditure	CAPEX
Danida Business Finance	DBF
The Danish Climate Investment Fund	DCIF
Danish Export Credit Agency	EKF
Danish International Development Agency	Danida
Danish Kroner	DKK
Demo Environment Program	DEP
Development Assistance Committee	DAC
Development Finance Institution	DFI
Distributed Energy Service Company	DESCO
EFTA Surveillance Authority	ESA
Energizing Development	EnDev
Energy Performance Contract	EPC
European Economic Area	EEA
European Union	EU
Gross Domestic Product	GDP
Global Energy Efficiency and Renewable Energy Fund	GEEREF
International Finance Corporation	IFC
Investment Fund for Developing Countries	IFU
Independent Power Producer	IPP
International Renewable Energy Agency	IRENA
KLP Norfund Invest	KNI
Less developing countries	LDCs
Megawatt	MW
Multilateral Investment Guarantee Agency	MIGA
The Nordic Project Fund	Nopef
Nordic Development Fund	NDF
Nordic Environment Finance Corporation	NEFCO
Nordic Investment Bank	NIB

Norwegian Agency for Development Cooperation	Norad
Norwegian Guarantee Institute for Export Credits	GIEK
Norwegian Kroner	NOK
Organisation for Economic Co-operation and Development	OECD
Official Development Assistance	ODA
Pay-As-You-Go	PAYGO
Power Purchase Agreement	PPA
Public Private Partnership	PPP
Small and Medium Enterprises	SMEs
Special Purpose Vehicle	SPV
Swedish International Development Cooperation Agency	Sida
Swedish Export Credit Agency	EKN
Swedish Export Credit Corporation	SEK
Sustainable Development Goals	SDGs
Swedish Kronar	SEK
United Nations	UN

ANNEX II. Methodology and Limitations

Overview of companies/organizations that have been interviewed or provided input

- Norad
- Sida
- Norfund
- Swedfund
- Solar Village
- Kube Energy
- NB Solar
- Norwep
- IFU
- Advisors in the Foreign Ministry and Ministry of Energy, Utility and Climate in Denmark
- Business Sweden
- Fortum Energy, Sweden
- EKF, Denmark
- Energiforetagen Sverige
- Swedish Hydropower Association

Investment level assessment methodology

In order to assess “level of investment activity” of domestic companies, as a basis to benchmark countries, the following describes the approaches and elements/sources considered:

A. Project identification and selection

- Most investment figures and project information is found in the annual reports of the relevant companies and institutions.
- Some project information has also been found in news articles or similar.
- Primary data has also been collected through interviews and conversations with the institutions to verify and/or add details and accuracy.
- DFI (Development Finance Institutions) investments include Norfund, Swedfund and IFU’s direct investments as well as loans to projects in development.
- Norfund reports annual investment commitments themselves.
- IFU channels most of their investments in renewable energy through the Danish Climate Investment Fund (DCIF). Figures are taken from the IFU annual report and the DCIF annual report.
- GlobalData’s Project database⁶⁵ over power construction projects has been used to identify some projects with Nordic investors, including information about ownership and financing structure of each project.
- In general only projects in developing countries outside Europe have been considered.
- Unless otherwise stated, only the power generation facilities are considered. Auxiliary infrastructure such as power evacuation infrastructure or factories producing devices for renewable energy plants are not included.
- Investment figures do not reflect companies with engagement in marketing of projects, business model development, equipment and service suppliers to power projects.
- Where possible to isolate, only green-field and rehabilitation investments is considered. Investments in or loans to existing projects/companies are counted only where there are clear indications of that capital having catalysed projects that in some way add new or additional capacity to existing generation.
- Where possible to isolate, investments in biofuel driven power plants are not included.
- Where otherwise not stated, investments in energy efficiency are not included.
- Where planned investments⁶⁶ are found, these are also included in the analysis. Value is included in the year of commitment.

⁶⁵ <https://www.globaldata.com/>

⁶⁶ Planned investments are commitments that have been publicly announced to be made some time in the future, but not yet “physically” committed.

B. Investment value evaluation methodology:

- Total value of projects in the DFI's investment portfolio is used as a proxy for the capital mobilized through investments. The shares of equity/loans by the institutions is not always possible to isolate based on publicly available information.
- For other investors, the equity share of the investment is counted as far as possible
- Scatec Solar's portfolio has been identified based on their website as well as in GlobalData, while invested amounts are based on GlobalData primarily, complemented by some other research of secondary information and interviews. In the cases where the investment amount is not publicly available, it is assumed that equity investments represent 10 % of the total project cost. This is an approximation of Scatec's average share of total project cost based on the projects where we do have reliable information.
- All figures are in USD. Norges Bank's spreadsheet on exchange rates between NOK and all currencies back to 1960 has been used to find exchange rates between all currencies. In the sheet, the annual mean is found through the mean of the daily listings. 67 Annual exchange rates have been used where we have data for different years. The values have not been transferred into 2018 USD after this but have been added together with different yearly references.

C. Methodology for accounting for private investments in distributed energy solutions:

- In order to account for total private investments in distributed energy solutions the same way as for grid-connected projects, we cannot only look at the equity investments in the DESCOS. This would be comparable to looking only at the equity invested in e.g. Scatec Solar ASA, rather than the total equity invested in their portfolio of projects. Similarly, the private sector invests equity as working capital into DESCOS. However, this working capital is turned around for new sales several times a year.
- In addition, most off-grid investments are made by the energy users and are therefore not counted as "investments" in this comparison or public statistics, but as "trade" or "import". If we look at each household as a separate project, the project cost is normally financed 30-90 % by the end user and only the remaining project investment is financed through the working capital of the DESCO. As such, a private sector investment in a DESCO is redeployed many times per year to release the private financing from the end users over and over. Therefore, the total private investment in distributed energy projects is in practice many times higher than the initial equity investment made into the DESCO by an investor.
- Counting correctly would increase private sector investments in distributed energy substantially compared to the initial equity investments but would not change the overall dominance of investments in grid-connected plants to date. Counting correctly will be more important going forward as distributed energy market continue to grow, and when assessing the leverage factor of public funds on private investments. As there are now equally many getting new electricity access through distributed energy solutions as through the grid, the total investment in distributed energy in developing countries is already large even if Norwegian public and private investments are limited to date.

Limitations and reservations

Identification of projects, companies and investment and the research faces a number of challenges. The information given in the following should therefore not be considered an exhaustive overview, and direct comparison may not be possible. Despite these limitations, we believe that the findings give an accurate indication of relative activity and investment level.

- The Consultant has better developed networks in Norway than in Sweden and Denmark, and have a profound knowledge of Norwegian mechanisms and players, as well as projects with Norwegian involvement. Swedish and Danish information is based on interviews and web research in addition to a certain amount of existing internal knowledge. This means that the research is less granular for Sweden and Denmark. In particular we cannot guarantee that all companies that invest in developing countries

⁶⁷ <https://www.norges-bank.no/Statistikk/Valutakurser/valuta/USD>

are included; in particular the report may not give fairness to Swedish and Danish activity versus Norwegian.

- Lack of primary data availability and consistency in reporting periods and measuring parameters between actors, reduce the accuracy and relevance of direct comparison. Further, much of the information in the report is provided based on interviews with individuals, whose personal views may influence the information given.
- A number of institutions requested for interview or provision of information have not been possible to reach or refused to share information.
- The assumptions made in the calculation methodology (ref. A and B above) influence the results.

ANNEX III. Understanding distributed energy business models⁶⁸

A Distributed Energy Service Company (DESCO) has an integrated business model, which is fundamentally different from that of a developer of grid-connected power plants. In fact, the DESCOs are more comparable to the business model of the utilities responsible for the grid and sale of the electricity to the end users. Similarly to the DESCOs, the utilities that develop the grid need to sell power to recover the costs of the grid infrastructure. One could say that the main challenges of a DESCO starts where the responsibility of the IPPs ends.

For grid-connected power plants involving the private sector, their responsibility ends at the point where electricity is fed to the grid. The distribution, transmission, retail sale and payment collection for the power generated are normally managed by national or local utilities. Hence, while the grid-connected plants are focused first on winning licences and then on the construction and operation of the plants, they are not concerned with the pricing, sale and the delivery of the power to the end users – households and businesses.

A DESCO, however, covers the entire value chain from planning to final delivery of energy services to the end-customer. The main concern of the DESCO business is the pricing strategy, retail sales, after-sale service and payment collection from the end users.

Distributed energy companies offer solutions that vary in size, from small lanterns (e.g. Bright) to large captive power projects or mini-grids. Generally, the distributed energy businesses can be divided into three main categories in terms of the solutions they deliver:

- ⚙ Stand-alone solutions for household use
- ⚙ Stand-alone solutions for productive and communal use (captive power projects, residential roof-top solar, heath posts and e.g. RE-driven water pumps)
- ⚙ Mini-grids
- ⚙ Within each of the different categories, there are generally two revenue models:
- ⚙ Cash-based sales
- ⚙ Pay-As-You-Go/Asses finance-based sales (Credit sale/leasing or Fee-for-service/perpetual lease)

The second revenue model category encompasses the new business models that are gaining traction across Sub-Saharan Africa and Asian developing countries. On the back of technological advancements allowing mobile payments and remote management of assets, new business models aiming to bring down the up-front investment cost for low income populations and SMBs are emerging. These Pay-As-You-Go (PAYGO) business models involve a financing solution for the customer. This means that the customer only pays a fraction of the cost of the system at installation, and that the rest of the cost is

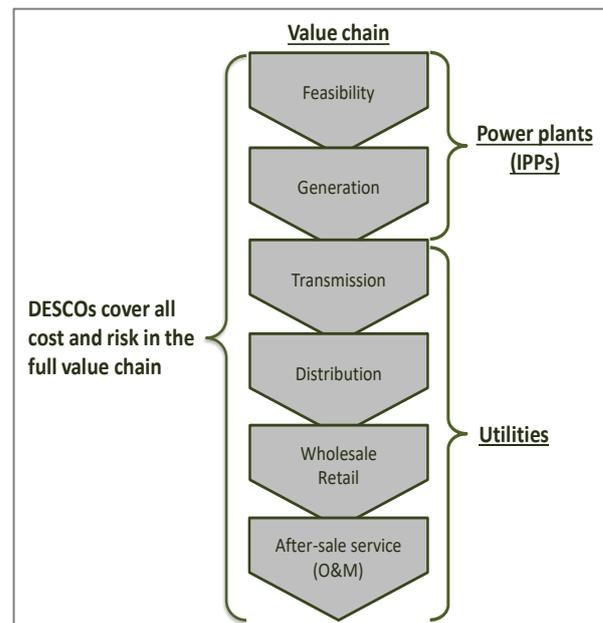


Figure 24 DESCOs cover all cost and risk in the full value chain

⁶⁸ Annex in its entirety courtesy of Differ AS

to be paid back to the DESCO over a predefined time. As such, PAYGO-businesses are exposed directly to the ability of the end users to pay for the electricity provided. Whereas a grid-connected power plant normally has a Power Purchase Agreement (PPA) - whereby it has contracted a right to sell all power generated to the utility for a period of 20 years or longer - a DESCO will always need to make sure to have a payment rate above the threshold for commercial viability. This payment rate is a function of how many payments customers fail to pay on time for their electricity and how many of them default completely on their contracts.

The graph below illustrates that the expected payment rate from new customers is expected to be lower the more rural and the poorer the end user is. The challenge for a DESCO is hence to develop a customer base quickly enough and with a sufficiently high payment rate.

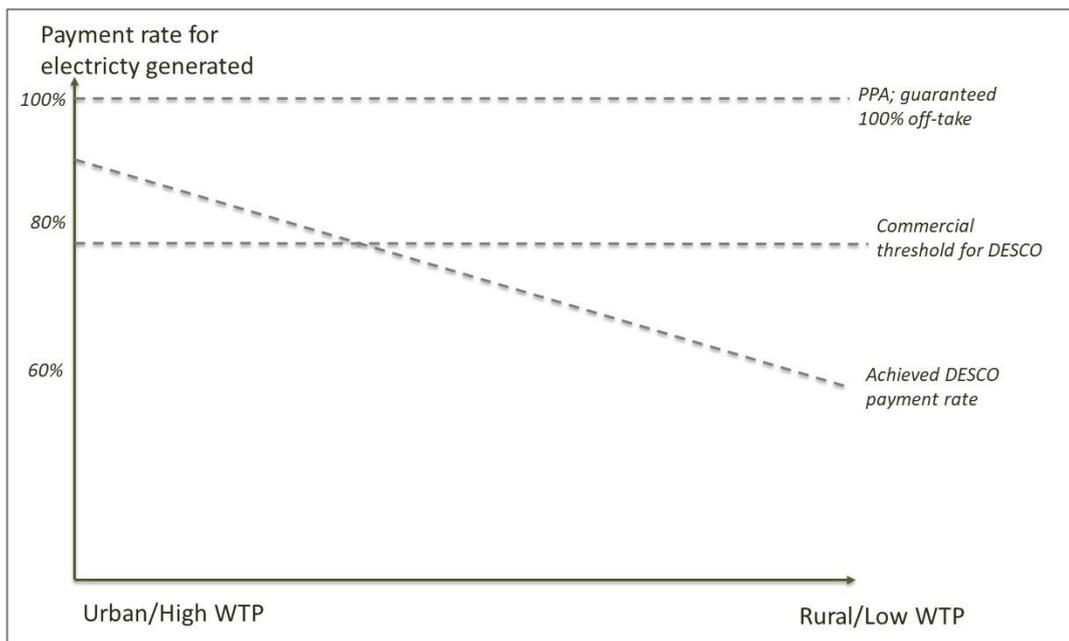


Figure 25 Decreasing expected payment rates as new customers become poorer and/or more rural

For a DESCO, the critical success factors are hence e.g. establishing effective retail networks, retail price strategy, appropriate customer selection and efficient money collection and after-sale service. These are very different from the success factors of a grid-connected project. As such, a DESCO bears more resemblance to businesses such as telecom, which needs to recover its mobile network expenses through the sale of subscriptions, or micro-finance enterprises that manage a portfolio of loans with collateral in consumer goods – or, as mentioned, the utilities responsible for the grid. Just like most utilities in LDCs, many DESCOs struggle to maintain a cost-reflective revenue stream. While public funds today cover the losses in the grid utilities, commercial investors have been taking the losses for off-grid solutions.

As the grid-connected and distributed energy business models are fundamentally different, it is crucial to keep this in mind when developing support mechanisms. Some of the mechanisms might be the same, but some are likely to be different.

ANNEX IV. Detailed overview of Scandinavian companies engaged in renewable energy in developing countries

Company	Country	Category	On-grid/Off-grid	Renewable Energy Source	Description of activities/markets
AF Gruppen	Norway	Advisor/Consultant	Unspecified	All	Consultancy for energy in developing countries.
DNV GL	Norway	Advisor/Consultant	Unspecified	All	Consultancy for energy in developing countries.
KF Gruppen	Norway	Advisor/Consultant	Unspecified	All	Consultancy. Has among other projects been involved in the building of the Manipi power plant in Indonesia with Tinfos.
Multiconsult	Norway	Advisor/Consultant	Unspecified	All	Consultancy for energy in developing countries.
Norconsult	Norway	Advisor/Consultant	Unspecified	All	Consultancy for energy in developing countries.
Agua Imara	Norway	Developer/investor	On-grid	Hydropower	Agua Imara is a subsidiary of SN Power. Previously also owned by BKK and TrønderEnergi. Several projects in Zambia and Panama.
BKK	Norway	Developer/investor	On-grid	Hydropower	Was part owner of Agua Imara.
Equinor	Norway	Developer/investor	On-grid	Solar, Wind	Has entered into solar with Scatec Solar in Brazil and Argentina.
Flowpower Norway AS	Norway	Developer/investor	On-grid	Hydropower	Developed/operates the Nkusi hydro power plant in Uganda.
Jacobsen Electro	Norway	Developer/investor	On-grid	Renewable energy	Large in gas-fired thermal power plants in Tanzania, but has also looked into renewable energy.
Malthe Winje	Norway	Developer/investor	On-grid	Hydropower	Develops small to medium-sized hydro power plants in Kenya, Uganda, Tanzania, Rwanda and Angola.
NBT AS	Norway	Developer/Investor	On-grid	Wind power	Develops projects in China/Inner Mongolia: 150 MW existing + pipeline of 1000 MW project opportunities.

Norsk Vind Energi AS	Norway	Developer/investor	On-grid	Wind	Developing the Makambako wind farm (100 MW) in Tanzania.
Scatec Solar	Norway	Developer/investor	On-grid	Utility-scale Solar PV	Integrated solar power producer, utility-scale. Africa, Americas, Asia and the Middle East.
SN Power	Norway	Developer/investor	On-grid	Hydropower	Power company owned by Norfund (previously also by Statkraft) with hydro power plants in the Philippines, Laos, Zambia, Panama and Uganda and more.
Statkraft	Norway	Developer/investor	On-grid	Hydropower, Solar, Wind	State-owned power company within hydro, wind, solar; has projects in India, Brazil, Chile and Peru.
Th Lao Enterprise & Partners Co Ltd.	Norway	Developer/investor	On-grid	Hydropower, Solar PV	Engineering, consultancy, construction and project management company, focused on Laos.
Tinfos AS	Norway	Developer/investor	On-grid	Hydropower	Has built 10 MW hydro power plant (Manipi) in Indonesia.
TrønderEnergi	Norway	Developer/investor	On-grid	Hydro	Financed the Bugoye hydro power plant in Uganda, but sold out after deciding to focus on local markets in Norway. Previously also part-owner of Agua Imara.
Empower New Energy	Norway	Developer/investor	Both/unspecified	Solar PV, Hydro	Portfolio investor in distributed solar and small hydro projects.
Grenor AS	Norway	Developer/investor	Both/unspecified	Hydro power	Part of Entro Group. Develops/invests in hydro power (and gas-fired power) in Cameroon through subsidiary.
Bright Products	Norway	Developer/supplier	Off-grid	Solar PV	Supplies lamps, chargers, home systems powered by solar power. Targeting African markets.
Kube Energy	Norway	Developer/Supplier	Off-grid	Solar PV	Off-grid solar solutions, for example for refugee camps for instance in South Sudan and Kenya.
NB Solar	Norway	Developer/supplier	Off-grid	Solar PV	Joint Venture between Norconsult and Bigen Africa. Develops solar PV plants in Southern Africa. Targets industrial customers.

SunErgy	Norway	Developer/supplier	Off-grid	Solar PV	Off-grid, Turn-key small solar PV plants shipped in containers. Active in Cameroon.
W. Giertsen Energy Solutions	Norway	Developer/supplier	Off-grid	Solar PV	Distributed solar solutions: solar systems, lights, water pumps, cooling solutions, etc. Present in various parts of Africa.
Solar Village	Norway	Developer/supplier	Off-grid	Solar PV	Targeting farmers in Africa. Supplies various products, for instance the Solar Battery Stick for powering pesticide sprayers. Active in Zambia.
KLP	Norway	Financial institutions/investor	Unspecified	All	Pensionfund. Investing in partnership with Norfund.
Norfund	Norway	Financial institutions/investor	Unspecified	All	Norwegian DFI.
Nysnø	Norway	Financial institutions/investor	Unspecified	All	State climate fund for investing in climate friendly technologies
Differ	Norway	Financial institutions/investor	Off-grid	Solar PV and energy efficiency	Investing in start-ups, Developing own concepts/projects, Advisory, Analysis
Eksportkreditt	Norway	Public Agency	Unspecified	All	Norwegian Export Credit Financing
GIEK	Norway	Public Agency	Unspecified	All	Guarantee Agency
Norad	Norway	Public Agency	Both	All	Norwegian Agency for Development Cooperation
NorSun	Norway	Supplier	Unspecified	Solar PV	Manufactures mono-crystalline silicon ingots and wafers for the global solar energy industry
REC	Norway	Supplier	Unspecified	Solar PV	Vertically integrated solar energy company; from silicon to panels
Rainpower	Norway	Supplier	Both/unspecified	Hydro power	Supplies turbines, valves and other components for hydro power plants. Has for instance supplied power plant in Bolivia.
Pöyry	Sweden	Advisor/Consultant	Unspecified	All	Consultancy for energy in developing countries.
Sweco	Sweden	Advisor/Consultant	Unspecified	All	Consultancy for energy in developing countries.
Åf Consult	Sweden	Advisor/Consultant	Unspecified	All	Consultancy for energy in developing countries.

Bio Electric Solutions LGJ AB	Sweden	Developer	Unspecified	Biomass	Lead projects in Zambia. Focus markets: Namibia, Tanzania, Zambia. Member of Business Sweden's "Energy for Africa" program.
North Investors AB	Sweden	Developer/Investor	On-grid	Small hydro power	Has been involved in several small hydro power projects in the Philippines.
Seabased AB	Sweden	Developer/investor	On-grid	Wavepower	Has built pilot project of 400 kW in Ghana. Signed contract for 100 MW plant in March 2018 with TC's Energy, a Ghanaian renewable energy production company. Member of Business Sweden's "Energy for Africa" program.
VR Holding AB	Sweden	Developer/Investor	On-grid	Off-shore wind	First applied for 600 MW off-shore wind project in Kenya, but turned to Tanzania when application was not approved by government.
Renetech AB	Sweden	Developer/Research/Consultancy	Both	Solar, Bioenergy, Hydropower	Focus markets in SSA are Kenya, Uganda, Rwanda, Tanzania and South Africa. Member of Business Sweden's "Energy for Africa" program
Energeotek International AB	Sweden	Developer/supplier	Unspecified	Geothermal	Focus markets Kenya, Tanzania, South Africa, Namibia. Member of Business Sweden's "Energy for Africa" program.
Azelio (formerly Cleanergy)	Sweden	Developer/supplier	Off-grid	Concentrated solar power	Has office in China, and setting up office in Morocco to work towards African market. Member of Business Sweden's "Energy for Africa" programMember of Business Sweden's "Energy for Africa" program.
InnoVentum	Sweden	Developer/supplier	Off-grid	Solar PV, wind, hybrid	Few installations in various African countries. Member of Business Sweden's "Energy for Africa" program.
Jabe Energy AB	Sweden	Developer/Supplier	Off-grid	Hydro	Provides floating hydro power plant with vertical turbine for off-grid power supply. Works in Colombia. Member of Business Sweden's "Energy for Africa" program.

Pamoja Cleantech AB	Sweden	Developer/supplier	Off-grid	Biomass Gasification, Solar PV	Works in Uganda (hybrid solar PV and biomass gasification). Member of Business Sweden's "Energy for Africa" program.
Sundaya Nordic AB	Sweden	Developer/Supplier	Off-grid	Solar home systems	Focus markets are Burkino Faso, Ghana, Benin, Kenya, Tanzania, South Africa. Member of Business Sweden's "Energy for Africa" program.
Againity AB	Sweden	Developer/Supplier	Both/unspecified	Waste heat to electricity	Conversion of low-grade heat to electricity; heat source can be waste heat, municipal waste, biomass in power plant etc. 20 kW and up. Looking into Africa, possibly some opportunities in Kenya. Member of Business Sweden's "Energy for Africa" program.
ABB	Sweden	Developer/supplier	Both	Transmission and distribution	Member of Business Sweden's "Energy for Africa" program.
Swedfund	Sweden	Financial institutions/investor	Unspecified	All	Swedish DFI
Trine	Sweden	Financial institutions/investor	Off-grid	Solar	Crowdfunding platform for off-grid projects in developing countries.
Exportkreditnämnden (EKN) - Export Credit Agency	Sweden	Public Agency	Unspecified	All	Provides export credit guarantees.
Svensk Exportkredit (SEK) - Export Credit Corporation	Sweden	Public Agency	Unspecified	All	Provides export credit financing.
Sida	Sweden	Public Agency	Both/unspecified	All	Swedish Development Agency.
HiNation	Sweden	Supplier	Off-grid	Solar products	Focuses on Kenya, Tanzania, Nigeria. Member of Business Sweden's "Energy for Africa" program.
Alfa Laval	Sweden	Supplier	Both/unspecified	Solar, biomass, (wind & hydro)	No track-record of activity yet, but member of Business Sweden's "Energy for Africa" program.
Cowi	Denmark	Advisor/Consultant	Unspecified	All	Consultancy for energy in developing countries.
Rambøll	Denmark	Advisor/Consultant	Unspecified	All	Consultancy for energy in developing countries.

K2 Management	Denmark	Advisor/Consultant	Unspecified	Wind, Solar	Consultancy for energy in developing countries.
Meventus	Denmark	Advisor/Consultant	Both	Wind	Consultancy services for wind energy, with projects in Brazil, Kenya, Chile, among others.
SolarCap	Denmark	Developer/investor/supplier	Both	Solar	Delivers solar systems. Subsidiary in India; EMMVEE Solar systems.
Nordic Power Partners	Denmark	Developer/investor		Solar PV, Wind	Owned by the Danish energy company European Energy and the Danish Climate Investment fund. Developing solar and wind projects in Brazil, among others.
Obton	Denmark	Developer/investor	On-grid	Solar PV, Wind	Investment and development company that develops, funds and manages solar and wind energy projects.
Gsol Energy	Denmark	Developer/supplier	Both	Solar PV	Offers Solar PV solutions (roof systems, appliances, etc.) in East Timor, Eritrea, Libya and Namibia. LTA with UNDP.
VKR Energy	Denmark	Developer/supplier	Unspecified	Solar thermal	VKR Holding owns VKR Energy that manufactures and markets large-scale solar heating solutions for industrial companies and energy industry in Central and South America (main market in Europe).
A.P. Møller Capital	Denmark	Financial institutions/investor	Unspecified	All	Established the Africa Infrastructure Fund.
Aage V. Jensen Charity Foundation	Denmark	Financial institutions/investor	Unspecified	Unspecified	Investing in the A.P. Møller Infrastructure Fund.
Danish Climate Investment Fund	Denmark	Financial institutions/investor	Unspecified	All	Managed by IFU. Partly owned by Danish state and partly by Danish pension funds. Invests in climate-friendly projects in developing countries.
Frontier Energy	Denmark	Financial institutions/investor	Unspecified	All	Fund manager with two funds investing in renewable energy in developing countries. Investors in funds are Danish pension funds, CDC, GEEREF, among others.
IFU	Denmark	Financial institutions/investor	Unspecified	All	Danish DFI

Lægernes Pension	Denmark	Financial institutions/investor	Unspecified	Unspecified	Danish Pensionfund. Investing through other climate/renewable energy funds
PBU	Denmark	Financial institutions/investor	Unspecified	Unspecified	Danish Pensionfund. Investing through other climate/renewable energy funds
PensionDanmark	Denmark	Financial institutions/investor	Unspecified	Unspecified	Danish Pensionfund. Investing through other climate/renewable energy funds
PKA	Denmark	Financial institutions/investor	Unspecified	Unspecified	Danish Pensionfund. Investing through other climate/renewable energy funds
The Danish Green Investment Fund	Denmark	Financial institutions/investor	Unspecified	Unspecified	Independent state loan fund. Co-finances projects that contribute to sustainable development. Projects must be related to environmental savings, renewable energies, resource efficiency.
Vækstfonden - The Danish Growth Fund	Denmark	Financial institutions/investor	Unspecified	Unspecified	Danish state investment fund supporting new SMEs with capital and expertise.
Danida	Denmark	Public Agency	Unspecified	All	Danish International Development Agency
EKF	Denmark	Public Agency	Unspecified	All	Export credit financing
Siemens Gamesa	Denmark	Supplier	On-grid	Wind power	Big player in global wind market
Vestfrost Solutions	Denmark	Supplier	Off-grid	Solar PV	Supplies refrigerators and freezers powered by solar power.
Aalborg CSP	Denmark	Supplier	Both	Solar CSP	Supplier of steam generator technologies for CSP plants and integrated CSP systems. Has supplied to projects in China, India, also has office in Kenya.
Vestas	Denmark	Supplier/developer	On-grid	Wind power	Has been part investor and supplier for Lake Turkana wind farm in Kenya, and supplier for several other projects
Johs. Gram-Hanssen A/S	Denmark	Supplier/Distributor	Both	Solar PV	Distributor of various goods and provides procurement support. Projects in several developing countries all over the world.



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