

How to finance renewable energy projects – facts and trends

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Abstract: Renewable energy has a higher and higher significance, both on a national and international level. Investments and projects building on renewable energy are becoming more and more important due to the exhaustion of conventional energy sources and the increasing energy demand. However, these projects present several risks and uncertainty, regardless of the fact that they also offer countless benefits and profit. Because of the risks this field cannot be considered as a target of investors looking for a traditional, certain but moderate return. In addition to the said risks, the long payback period is another reason why it is necessary to attract other financing methods. In this study I venture to introduce the development and financing of the investments in the renewable energy sector, highlighted the main trends and facts about the area.

Keywords: renewable energy, project financing, debt financing

1. Literature background

1.1. Roles of renewable energy and projects in the economy

Exploitation and utilization of the renewable energy sources is one of today's most essential challenges. The growing demand for energy – which is down to global warming, the climate changes, the depletion of conventional energy sources, and the steadily intensifying popularity of electronic devices – places the focus on the issue of utilizing the renewable energy. Relying on the data of the World Energy Forum, in their study Kumar and his co-authors [2010] drew the attention to the expected exhaustion of the fossil fuels and the oil, coal and gas reserves in the next century. At the moment nearly 80% of the energy we're using comes from these sources, therefore their replacement is getting more and more critical.

During the past years not just the investors have been putting greater emphasis on the renewable energy sources, but the fund providers and the governments as well, which has led to a spectacular increase – both in quantity and in value – of new investments focusing on this field.

The growing utilization of renewable energy provides an opportunity to protect the environment and to lower the carbon-dioxide emission, creating more liveable and more sustainable conditions for the future generations. This way the environmental cost of the economic prosperity can be reduced [Szigeti –Tóth, 2015] and the divergence can occur, which is such a development path that does not involve a rising pressure on the environment [Szigeti –Borzán, 2015]. The usage of renewable energy sources is gaining more ground not only in the national economies but in the households too. Green thinking is getting more and more integrated into our everyday life, and we are increasingly realising the importance of green energy. Nevertheless, these sources still barely contribute to 20% of our entire energy demand. The investments into renewable energy sources showed a significant leap after the millennium, and even at the time of the crisis, as the graph below demonstrates.

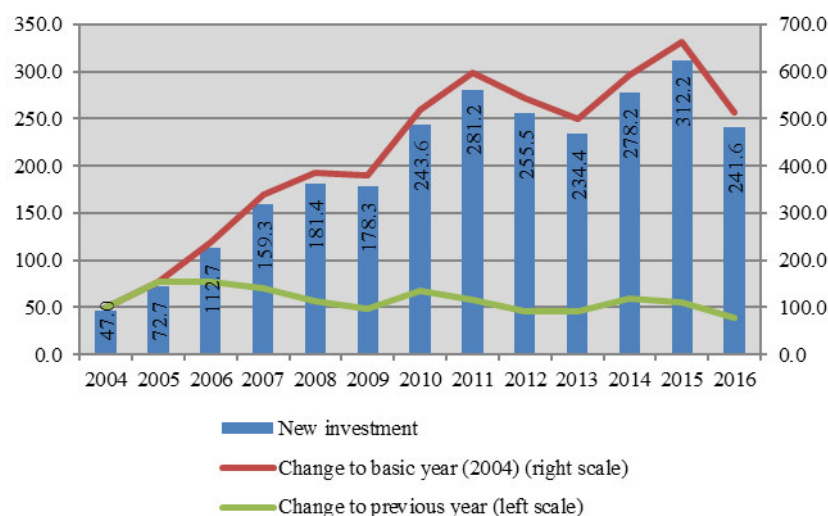


Figure 1.
New investments in the renewable energy sources (bnUSD)
Source: FS-UNEP, 2017

If we review the changes in the value of investments, we can find that it has almost quadrupled during the examined ten years, which represents a serious growth. Comparing the growth to the base-year (2005) we can establish that even the mortgage crisis could not really break the strengthening of this field, contrary to every other project and investment. There had been a little downturn in 2008

and 2009, but after that the pace of the investments expanded with a record speed. The Mediterranean crisis, on the other hand, had a much bigger impact on the investments. This crisis primarily hit Europe and the developed part of the world, which muted the incentive to invest. We can see a decrease in comparison with both the base-year and the previous year, which can be explained with the advanced risks. Every Mediterranean country is a crucial actor of the renewable energy market, so the crisis of their economy posed such a huge liability in the eyes of the investors that they were not prepared to take straight after the subprime crisis. If we compare the value of the investments to what it was in the previous year then there is a stable 14% growth. The downturns are much clearer in contrast with the previous years' data, but it can be stated that in this context the value only dropped in the years of the crisis, namely in 2009, 2012 and 2013.

The renewable energy projects can be funded in several ways. The most typical ones are asset financing¹, and financing by private investors². In most of the cases credit financing is behind these modes, since due to their high value the projects cannot be funded solely through equity. The following figure also clearly shows the methodology of the financing of renewable energy projects, introducing the possible funding sources for the certain stages from design to implementation.

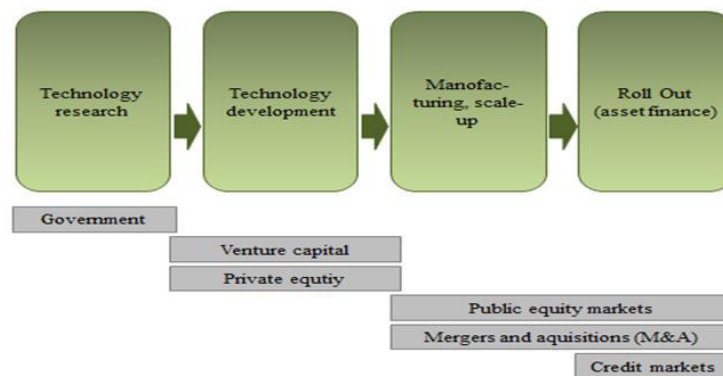


Figure 2.
The financial structure of the renewable energy projects

¹ By asset financing we mean financing of the project's total assets, including both the necessary fixed and current assets.

² Private investors are such non-institutional investors (companies, private individuals), who contribute to the project with smaller amounts, generally as secondary fund providers. The funds of private investors can equally come in the form of credit financing and share funding. The duration of financing is in line with the method of financing, and in the case of credit financing it can range from three years to a very long period of time.

Source: FS-UNEP, 2017

As the figure below explains, venture capital financing is not typical in the case of funding renewable projects, but the R+D costs are not significant either on this field, which justifies the further analysis of credit financing.

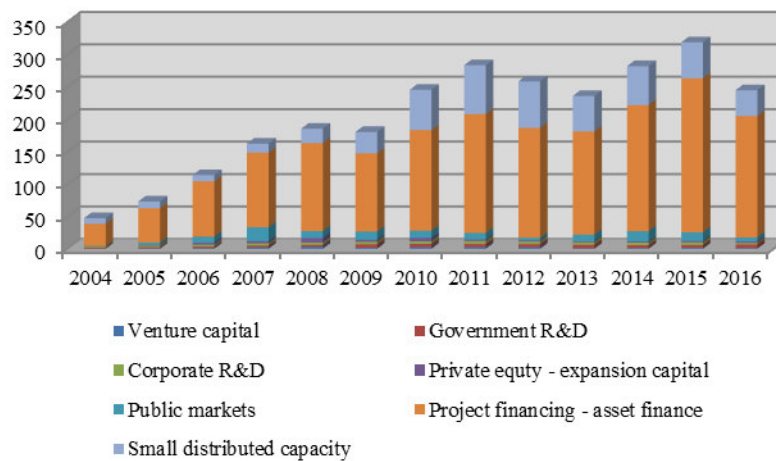


Figure 3.

New investments in the renewable energy sources by the financial structure (bnUSD)

Source: FS-UNEP, 2017

The renewable projects include numerous investment purposes, which may be the following (according to IJGlobal):

- biofuel development,
- use of biomass,
- geothermal energy projects,
- tidal power plant projects,
- offshore wind energy projects,
- onshore wind energy projects,
- photovoltaic solar energy projects,
- small hydro-electric power plant projects,
- solar collectors,
- waste recovery projects.

In the past ten years the wind and solar energy projects have accounted for the vast majority of the new investments. While between 2005 and 2008 they had represented 64% in average, from 2009 their percentage was over 80%, and what's more, from 2014 this ratio has been above 90%. Therefore we can say that the new investments focusing on this field mainly concentrate on these two energy sources, thanks to the developed technology, the experience and the more certain economic payback.

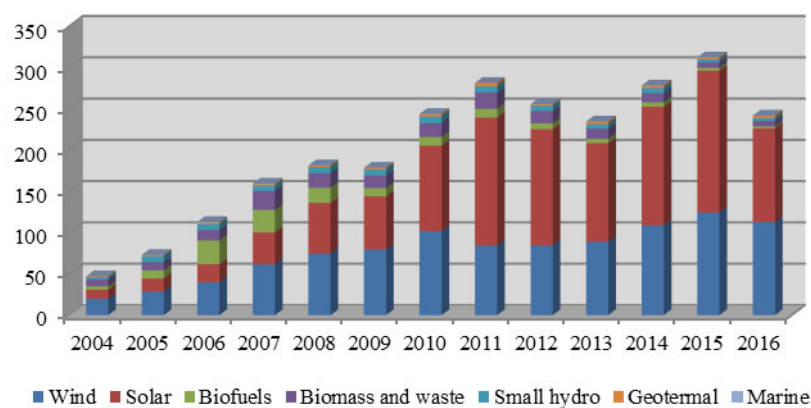


Figure 4.
New investments in the renewable energy sources by the target sector (bnUSD)
Source: FS-UNEP, 2017

In spite of their benefits the investments into renewable energy sources do carry risks as well, as the future cash flows only have a limited predictability, they are usually strongly weather-dependant and are often beyond control, and thus a strategy can only be adopted for their risk management partially or not at all [Lee – Zhong, 2015]. The challenge of the future will not only be found in the management of renewable energy projects, but more specifically in the creation of the risk management methodology too. This is particularly important for the reason to engage as many investors as possible, because the providers of funds also make decisions on the basis of future risks and returns. For the sake of the promotion of projects the governments have tried many incentives, from PPPs to interest subsidies. From here onwards we will analyse in detail one of the available financing methods of the renewable projects: project financing, a form of credit.

1.2. Project financing as the funding source of green investments

Project financing is a relatively new area among the forms of credit. When we hear the word project finance, we usually identify it with the large variety of funding projects, but the latter is a much wider category, as on top of bond financing it also includes venture capital financing and community financing, to name just a few. Project financing – despite its significance – receives little attention in the Hungarian economic literature, although international researches and articles deal with several dimensions of it. According to the literature available in our country, the essence of project financing can be described by the following definitions:

- Newitt és Fabozzi [1997]:

„The financing of a given economic entity, which is considered by the creditor as its cash flow and revenue, serves as the source to pay the credit back, its assets being the collateral.”

- Yescombe [2008]:

„Project financing is the method of long-term crediting of larger projects where the granting of loans is carried out entirely based on the cash flow of the project.”

- Nádasdy, Horváth és Koltai [2011]:

„By the concept of project financing we mean the financing of such individual business investments in which the owners and external investors primarily consider the cash flow and assets of the given investment as a basis when they examine the return of their invested capital and the opportunity of paying back the granted credit.

The key target areas of project financing are assessed by Fight [2006] as follows:

- energy sector,
- oil and gas industry,
- mining,
- construction of highways,
- telecommunications,
- other projects (paper projects, chemical industry, construction of hospitals, schools, airports, prisons).

In view of the above it can be said that project financing as a form of credit is a funding method of such projects spread out over several years where the borrower is a project company³. This project company is only entitled to carry out the project in question, it cannot have any other activities, and its lifetime is the same as the lifetime of the project. Since this SPV will be the borrower and the debtor, the loan can be separated from the balance sheet of the sponsor⁴. When the provider of the fund makes a decision about granting a credit, every single time it evaluates the future cash-flow of the project, and will only decide positively if the cash-flow is adequate. The size of the loan is a multiple of the amount of the equity, and even a 90/10% debt/equity ratio is not rare in the funded projects⁵. Because of the long term and the high bank exposure, the loan margin is quite high as well, compensating for the risk-taking. Due to the risks and the high leverage, this form of financing was influenced by the mortgage crisis and the Mediterranean crisis too, especially from the side of the banks and the bond investors [Csiszárík-Kocsir, 2016], as it has been mentioned earlier.

Consequently, the infrastructure projects, the oil and gas industry projects and the conventional energy projects are all primary target areas for project finance, since in the event of these the return is foreseeable on account of the stable market outlets [Gatti et.al, 2007]. In order to reduce the risks of project financing the loans are usually not provided by only one bank, they are granted in a joint form instead as syndicated loans. The development finance institutions⁶ also often join the syndicate. They are to point out the effects of the political hazards for the fund providers, along with financially supporting the top projects [Hainz – Kleimeier, 2012]

2. Material and method

Numerous organizations gather and examine project financing deals and transactions. The Thompson Reuters Project Finance International and the International Financing Review both measure and evaluate the transactions. In addition, the IJGlobal database run by Euromoney has an all-inclusive database as

3 Special Purpose Vehicle (SPV)

4 Normally project financing is non-recourse, which means that the sponsor does not provide guarantee in the case of default. Only limited recourse makes the sponsor's partial liability possible for the debts of the project company.

5 According to the 2015 data, the average debt/equity ratio was 83/17%.

6 Development Finance Institutions (DFI)

well, which gathers the deals by not just financial characteristics but by target areas, regions and actors too. The IJGlobal also collects the detailed financing data of the recorded transactions, to see if they were fulfilled via project loan, with PPP help or through corporate financing. The present study relies on this latter database. Its characterisation concerns every transaction that was made, failed or is currently running within the framework of project financing. The figures and tables clearly illustrate the regions that are the key target areas of project financing. The study introduces six geographical regions: Europe, North and South America, Asia, Middle East and North Africa (MENA), and finally Black Africa (Sub-Saharan Africa). The analysis focuses on the financing details of the renewable energy projects, and more precisely the details of the projects carried out through project finance, checking the examined ten years by regions. Apart from the IJGlobal database (as the figures above have showed) I used the FS-UNEP database too, highlighting the data regarding the new investments.

The analysis of funding renewable energy projects executed via project financing follows. There are four known statuses of the projects carried out through project financing as a form of credit.

- The pre-financing stage, which finances the projects from the very beginning, from step zero. Here there are no investments yet in assets of any kind, and the project is still at the planning stage, or at the end of the planning stage.
- The projects under funding are the ones in which the banks have not made returns on their capital yet, meaning that the loan is not closed and therefore the outcome of the project is not certain either.
- In the case of the financially closed projects the credit transaction can be deemed closed too.
- The cancelled projects are the failed projects, where the banks have either stopped the disbursement of the loan, or subsequent to the disbursement of the loans they have failed to recover their investment.

After discussing the stages we need to analyse the types of financing. There are seven possible types:

- Primary financing, which finances the project first, normally in the form of syndicated loan, when the project has not received any other funding yet, apart from sponsorship contributions and State aids;
- Additional financing, which is used for a project when the primary financial sources are not sufficient due to unforeseeable costs or design faults;
- Re-financing, which is taken into consideration when the primary fund providers abandon the project, or if the project proves to be unsuccessful, and thus the primary providers of funds are replaced by someone else;

- Portfolio financing, which is chosen by the financiers for investment purposes to yield a larger profit, and it is present in the project as a loan capital;
- Financing of equipment purchases⁷ that provides an additional financial source to acquire machinery and assets;
- Share financing is implemented by the investors when the project promises a high enough return and – contrary to portfolio financing – they are willing to give the fund over as an equity capital; and
- Privatisation financing – which helps with placing the state projects into private hands.

3. Results

Lending for renewable energy projects is one of the most important areas of project financing. Due to environmental degradation and environmental damage, it is no coincidence that renewable energy projects have come to the fore. This is also seen by the financiers as shown in the table below. Based on the data of IJGlobal, the total number of the renewable energy projects is 5 963, of which nearly 80% have been implemented through project financing. The value of project-financed renewable energy projects is similar in value, accounting for more than 70% of the total. The debt-equity ratio is also high, as in the case of project-financed investments, banking activity is 83% on average instead of 71% of the total. This shows banks' and financiers' courage to take on risk, so they trust the return on projects as well.

Table 1.
Project financing in the renewable energy market
Source: IJGlobal, 2017

	Renewable energy projects	Renewable energy projects with project financing	Ratio
Number of projects	5.963	4.737	79,44%
Total deal value (million USD)	1.134.497	799.198	70,45%
Debt/equity ratio	71/29	83/17	-

⁷ The financing of equipment purchases does not provide for the possibility of financing a property. It only offers help for the purchase of capital goods that are machines or tools.

Hereinafter, I would like to present investments in renewable energy sources by region according to the amount invested, the number of projects and the debt-equity ratio. First, have a look at the number of projects that are shown in the figure below.

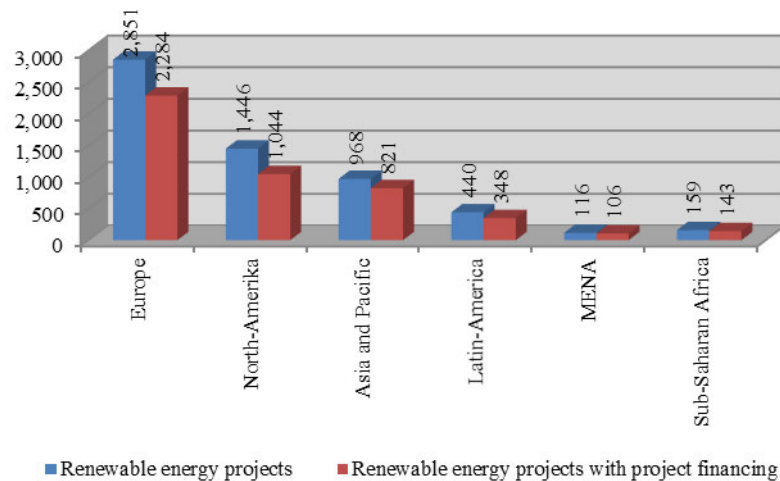


Figure 5.
Renewable energy projects by the region according to the number of project
Source: IJGlobal, 2017

As the figure shows, Europe is the first according to the number of renewable projects, both in terms of total project numbers and project financed projects. In Europe, 80% of the registered projects have been funded by project financing. North-America is ranked second, but the proportion of project-financed investments is only 72%. It is not a surprising thing, that the two mentioned regions are the first, as most of the resources are limited to these two continents. The proportion of project finance projects in the Asian region is the highest, 85%, and it is interesting that the African region is on the latest places in the queue, though its capacity in renewable energy sources is huge, but it can not be exploited in the absence of financing. However, in the two African regions, the share of renewable energy projects implemented with project financing is the highest, around 90%. After it, I would like to present the picture according to project value.

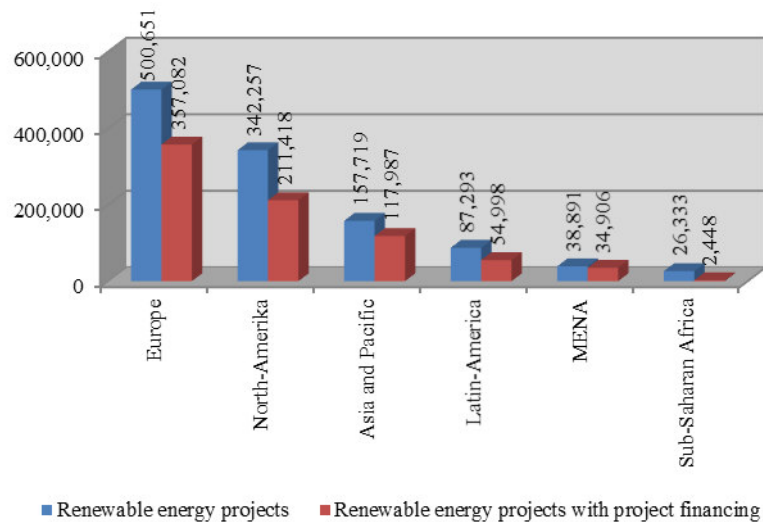


Figure 7.
Renewable energy projects by the region according to the deal value
Source: IJGlobal, 2017

Similarly to the value of the projects, it seems that Europe is again the first, and the second in the line is again North America, and Africa is again the last according to the deal value. If we measure Europe by the deal value, it can be seen that 71% of the total value invested in renewable energy projects financed by project financing, in North America this is only 62%, and in the Asian region this ratio is relatively high, 74%. The MENA region boasts the highest project financing rate, which is 90%, although it is just 1% of the European project-financed value.

It can be stated, that Europe and North America are the leaders in project financing for renewable energy projects. This caused partly by the funding sources and the recognition of the importance of renewable energy sources. It is also clear that the potential of the African region is not exploited, so there are still plenty of opportunities to finance.

4. Summary

In light of the information above it can be established that from the perspective of project finance the renewable energy projects are getting more and more significant, because the future demand for them is becoming more and more definite. Due to the economic priorities and the criticism against the conventional

energy sources, the renewable projects are given more emphasis nowadays than the previously favored fields. According to the figures cited above, North America and Europe are both at the forefront of financing, thanks to the number of the banks, their capital intensity and the financial knowledge. The African and Asian regions have huge potential, and they could be the future targets of the project financing transactions with the help of American and European capital allocation. Nevertheless, because of the long payback period project financing requires a stable economic and political environment, which is an indispensable precondition for allocating resources. This is why it is important that the financiers could plan ahead in terms of not just the resources but the economy of the targeted region too. Still, Europe and the developed world will have to face many potential crises – and hopefully with lesser impact than the subprime or the Mediterranean crises – (migrant, brexit and frexit crises), which will inevitably slow down project financing again. In view of the importance and necessity of this capital form we have to trust the forethought of the fund providers and the political actors, which hopefully will rather boost than hinder the project financing of renewable resources in the future.

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