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Olsztyn Economic Journal 8/4, 361-371

2013

OLSZTYN ECONOMIC JOURNAL
Abbrev.: Olszt. Econ. J., 2013, 8(4)

WIND POWER STATIONS AND MARKET VALUATION

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K e y w o r d s: renewable energy resource, wind energy, investment project valuation, tax, fee.

A b s t r a c t

This study presents the results of research on the market valuation of wind power stations. The valuation of wind power station projects is an individualized process and there is a growing need for systematization of the valuation theory of wind power stations as specific structures. This will enable reliable reflection of their value at each stage of the investment process, possibly due to consideration for value standards sought by different entities interested in valuation. The theoretical part presents the conditions of the development of the analysed energy sector in Poland and provides the different value categories found in valuation practice, both during project implementation and after power plant start-up. Variation in wind power station project implementation phases was then indicated, recommending the discounted cash flow method as a universal valuation tool for each stage of the project life cycle.

ELEKTROWNIE WIATROWE JAKO PRZEDMIOT I PODMIOT WYCENY

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S ł o w a k l u c z o w e: odnawialne źródła energii, energia wiatrowa, wycena projektu inwestycyjnego, opodatkowanie, opłaty.

A b s t r a k t

Celem opracowania jest prezentacja wyników badań dotyczących oceny i wyceny elektrowni wiatrowych na rynku zasobów i organizacji. Ocena i wycena projektów elektrowni wiatrowych jest procesem zindywidualizowanym i usystematyzowanie teorii wyceny specyficznych obiektów, jakimi są elektrownie wiatrowe, jest coraz bardziej pożądane. Dzięki temu możliwe będzie rzetelne odzwierciedlenie ich wartości na każdym etapie procesu inwestycyjnego. Możliwe to będzie dzięki uwzględnieniu standardów wartości poszukiwanych przez różne podmioty zainteresowane wyceną. W części teoretycznej zaprezentowano uwarunkowania rozwoju analizowanego sektora energetyki

w Polsce, a następnie zwrócono uwagę na różne kategorie wartości występujące w praktyce wyceny, zarówno podczas realizacji projektu, jak i po uruchomieniu elektrowni. Następnie wskazano na zróżnicowanie faz realizacji projektów elektrowni wiatrowych, rekomendując metodę zdyskontowanych przepływów pieniężnych jako uniwersalne narzędzie wyceny, możliwe do wykorzystania na każdym z etapów cyklu życia projektu.

Introduction

Raising public awareness is the most important task and one of the most effective lines of action for institutions participating in the transformation of the current energy system. Depletion of natural energy carriers necessitates seeking possibilities of using unconventional and semi-conventional sources. These include renewable energy sources (RES).

The use of renewable energy sources is currently one of the key subjects in discussions on energy use rationalization and climate protection and in overcoming social resistance to the use of unconventional energy sources. The 3×20% targets adopted by the European Union assume by 2020: a 20% reduction in greenhouse gases, a 20% increase in energy efficiency and raising the share of renewable energy in final energy consumption to 20%, mostly by wind power stations, which makes the subject of regulating the issue of valuation important in legislation. Moreover, the European Union directives on renewable energy sources gave special significance to wind energy. The EU Member States undertook to define and coordinate the respective responsibilities of national, regional and local administrative bodies for authorisation, certification and licensing procedures including spatial planning and determining planning and building applications.

Wind power stations are becoming one of the leading problems in spatial development. They are a sign of the environmental revolution, much as factory chimneys and mine shafts marked the landscape of the 19th–20th centuries. Wind power stations require rational location, calculation of taxes and fees, valuation and value assessment. Proper procedures for location in space must therefore be developed. A more than fortyfold increase in electricity production from wind has been recorded in Poland since 2004 – from 142 GWh to 5822 GWh in 2013 (Polish Wind Energy Association Report www.pwea.pl). Despite the dynamic growth, electricity production using wind met only 2,74% of electricity consumption in Poland in 2012 (Polish Wind Energy Association Report). As investments in wind energy enjoy high popularity among investors, significant rises can be expected in the coming years. Analyses performed by the Polish Wind Energy Association indicate that total power in installed wind turbines can reach the level of approximately 13 GWe (Gigawatt of Electric Energy) in 2020, including 11 GWe in

onshore wind power stations, 1.5 GW in offshore wind power stations and 600 MW in small wind turbines.

Wind energy development favours increasingly numerous transactions whose objects are both operating power plants (wind turbine sets) and the documents and laws under which they can be constructed. For this reason, the subject of the study is the analysis and assessment of procedures in force in Poland, concerning the location, construction and operation, transfer of rights and calculation of taxes and fees on this account.

Conditions of wind energy development

Wind projects can be sold practically at each stage of the investment process and as operating wind power stations. Three functioning phases are distinguished for wind project valuation: design, construction, usage.

The design phase is the period in which the design documents are drawn up and completed and approvals and permits necessary to start construction are acquired. This period ends when the administrative decision is obtained – the building permit.

The construction phase is much shorter than the project preparation phase but requires considerably higher financial outlays. Some 90% of total project costs, which can be estimated at EUR 1.4–1.7 million per one MW of the installed power plant's power, are spent within fifteen weeks.

Operation phase – starts after power plant construction and obtaining the structure occupancy permit and a permit from the President of the Energy Regulatory Office (ERO) for electricity generation. For a wind power station, the permit is the document confirming energy production from renewable sources, necessary to obtain certificates of origin (green certificates), whose sale is an important source of the company's revenue.

Legal and formal conditions of the planned project

The process leading to the issue of the power plant building permit is relatively long in Poland and usually takes from 4 to 7 years (*Wind energy in Poland* 2011, p. 43).

Research carried out in communes (WASIUTA 2013) shows that fees for exclusion of land from agricultural contribute to communal budgets. There is an information gap concerning the allocation of these funds and the possibility of their use. It was also found (WASIUTA 2013) that lease contracts concluded between a farmer and an investor were not controlled. Farmers lease land

Table 1

Implementation stages of legal and formal procedures

Stage	Problem
Inclusion of the project in the study on the commune's land use conditions and directions (SUiKZP)	The commune orders the drawing up of a revision if the project was not included in the study earlier. The investor requests the inclusion of areas for wind power stations in the study.
Change in or drawing up of the local zoning plan (MPZP)	The investor requests a change in or the drawing up of MPZP. The commune orders the drawing up of MPZP.
Re-zoning fee	If the investor needs to buy the land, it must pay a zoning fee equal to 30% of the difference in prices before and after re-zoning. Valuation is required at this stage. If the investor bought the land before the change in MPZP, the fee is not calculated.
Obtaining the building permit precedes the exclusion of the land from agricultural use	Obtaining the building permit requires the exclusion of the land from agricultural use. The decision to exclude the land is issued by the starost. The owner must pay a one-off fee and yearly fees for 10 years.

Source: Own work based on legislation (the Act on Protection of Agricultural and Forest Land and the Act on Spatial Planning and Development).

for an indefinite period of time, but often not longer than 30 years. The contracts are not registered and the rent is not taxed. And this could be revenue to the commune, to the county and to other funds, which should be allocated to land reclamation. Research by A. Wasiuta (2013) shows that there is no single office to supervise all procedures and formalities related to obtaining a building permit. This could involve the energy office to check all formalities: certificates, contracts, fees before purchasing the generated energy. Should the investor not supply the proper documents – the office could not sign the electricity purchase contract. This could also involve the construction supervision authority, which issues facility operation permits.

Conditions of project implementation

Connection to the distributor

One of the most important problems in project implementation is expansion and modernization of network infrastructure for the delivery of generated energy. The ownership of land over or under the power lines and substations is another problem (Fig. 1). The specificity of linear structures is different than for enclosed structures. Linear projects are often tens or hundreds of kilo-

metres long, constructed across many communes, counties and even provinces. However, obtaining permits for such extensive projects is subject to the same regulations as enclosed projects. This requires huge effort from the investor and considerably lengthens the project preparation process. The investor is obliged to conduct negotiations with the owner of each land parcel in a planned project.

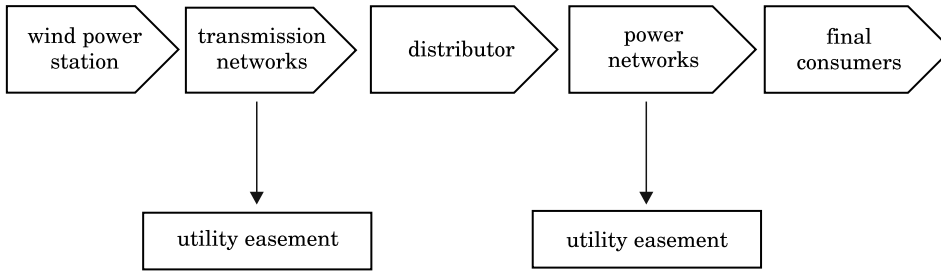

Fig. 2. Utility easement establishment model

Source: own work.

Undetermined legal status of real estate is, in many cases, a factor which sharply increases the risk of a failure in negotiations. Real estate owners often do not seek court decisions on inheritance. Out-of-date information in the land register and difficulties in determining the actual real estate holders may result in major defects of issued decisions to limit the right of ownership. The effect of the negotiations should be a contract in the form of a notarial deed, establishing a utility easement against payment. The duration of this process depends on the length of the planned transmission line and the number of parcel owners.

A transmission system operator can conclude utility easement contracts with land owners[1] and if there is no agreement, can bring the case to court. A court process is necessary if the owner refuses to establish easement, which is necessary to operate the facilities: conduct overhauls, modernization, maintenance and repair of these facilities (DOŁĘGA 2010, p. 84).

The current legal solutions lack, however, strict regulations on the method of valuation for calculating a utility easement. The owners' demands may differ considerably from the operators' financial means. The operators will try

[1] A utility easement is a legal structure, established, among others, for the benefit of a system operator after obtaining the owners' consent or by a court judgment, which has been applicable only from 3.08.2008, i.e. from the date when the amendment to the Act – the Civil Code came into force. Act of 23 April 1964 the Civil Code (Polish Journal of Laws No. 16 of 1964, item 93, as amended).

to shift the costs of such excessive financial claims to the final electricity consumers. In this situation, to facilitate negotiations with parcel owners, it is necessary to develop a uniform model of determining payments for the establishment of a utility easement depending, among others, on the line type, land type (according to the zoning plan), location within the country and land classification. This uniform model of determining payments should be regulated in an amendment to the Act (Act of 23 April 1964 the Civil Code, Polish Journal of Laws No. 16 of 1964, item 93, as amended).

Wind power stations as public utility projects

It is necessary to define the construction and maintenance of energy facilities and systems for the production of fuel and electricity as public utilities (in Art. 6 of the Act on Real Estate Management).

According to Art. 2.5 of the Act on Spatial Planning and Development, a „public utility project" is to be understood as actions with local (communal) and supralocal (county, voivodeship and national) importance, implementing the purposes mentioned in Art. 6 of the Act of 21 August 1997 on Real Estate Management. The Act on Real Estate Management indicates in Art. 6 the types of actions which can be considered public utilities. They are an exhaustive catalogue. This is reflected in the rulings of the Provincial Administrative Court[2]. „A public utility means a utility concerning all people, serving all, intended (available) for everyone. The application of the principles and procedure provided for the location of a public utility project therefore depends on whether the investment projects, requiring the obtaining of the relevant decision, have a 'public element'"

According to Art. 6.2 of the Act on Real Estate Management, „the construction and maintenance of land drains, conduits and facilities for carrying liquids, steam, gases and electricity and other structures and facilities necessary for using these conduits and facilities" is a public utility, which was confirmed in the judgement of the Provincial Administrative Court of 8 May 2008[3]. „Only facilities for electricity transmission were included among [public utility facilities], without including among them facilities for its generation, such as a wind power station..." Based on the quoted judicial decisions, a wind power station cannot be treated as a public utility project. If it were, expropriation and payment of compensation to the land owner on the basis of valuation would apply.

[2] File no. IV SA/Wa 2037/06, 7 March 2007.
[3] File no. II SA/Sz 224/08, LEX 435125.

Use of wind power stations

Wind power stations as a subject of taxation

A wind power station consists of: its foundation, a mast, nacelle with a generator, rotor, gearbox, control computer, transformer, power switchboard, alarm system, remote control system and other technical equipment. The contentious issue between the tax authorities and the owners (taxpayers) is the determination of the subject and value of taxation: whether it is only the foundation and the mast or the windmill as a technical and functional whole. For a non-building structure, the tax base is its value determined by the methods recommended by the provisions of the Act on Local Taxes and Fees (Act on Local Taxes and Fees of 12 January 1991, Polish Journal of Laws No. 95 of 2010, item 613). Therefore, the establishment which power plant components actually constitute a non-building structure will determine the amount of tax. According to Art. 2.1 of the Act on Local Taxes and Fees, the subject of taxation with real estate tax are:

– land;

– buildings or their parts;

– non-building structures or their parts related to conducting business activity.

According to a judgement of the Supreme Administrative Court[4], „Real estate tax is calculated only on foundations and masts, i.e. the constructed parts of a technical plant". The court stressed in the reasons for the decision that, after an amendment to Art. 3.3 of the Construction Law (Act of 7 July 1994 on Construction Law, Polish Journal of Laws No. 89 of 1994, item 414, as amended), a wind power station was not a non-building structure but a technical plant. Only the constructed parts of a power plant should be considered a non-building structure as technically separate parts of the objects making up the functional whole.

According to the court, only the constructed parts of wind power station, as technically separate parts of the objects making up the functional whole, are subject to real estate tax liability pursuant to Art. 2.1.3 of the Act on Local Taxes and Fees. If a technical plant, such as wind power station, were considered a non-building structure, its constructed parts would not have been defined as a non-building structure. For tax purposes, a non-building structure does not have to be a functional whole because according to Art. 3.3 of the Construction Law, also the constructed parts of technical plant alone can be a non-building structure.

[4] Judgment of 30 July 2009 (II FSK 202/08).

The ruling shows that a negative definition was used, pointing out that each structure, including also a construction facility, which is not a building or an accessory structure, is a non-building structure, which indicates that the constructed parts of the technical plant and foundations for machines and equipment are always technically separate parts of machines and equipment. Therefore, machines and equipment themselves are not a non-building structure and are not liable to tax. What is more, only the constructed parts of wind power stations are liable to tax. This interpretation decreases the possibility of obtaining higher revenue from the tax, which could contribute to the communal budget.

Wind power stations as companies

The renewable energy market brings together many stakeholders who participate, or intend to participate, in the financing of wind power stations. They then make a number of estimates to determine the return on invested capital or the value of assets securing the funds engaged in the project. Both valuation theory and practice indicate the existence of different standards of value (for example: fair market value, fair value, investment value, intrinsic value, Liquidation value, going-concern value) which reflect the value of the same object of valuation (SZCZEPANKOWSKI 2007, p. 42). The standard of value to be determined should therefore be indicated when estimating the value of a specific project and matched to the client's expectations. Valuations can fulfil different purposes (*General National Valuation Principles...*, p. 5):

– advisory (decision-making) function – providing necessary information related to planned capital transactions and management decisions,

– argumentative function – providing information on the value of the object of valuation, which can strengthen the bargaining power of one party in the conducted negotiations,

– mediatory function – providing necessary information on the value of the object of valuation, for capital transactions in which the parties' views on the value diverge,

– protective function – providing information on the value of the object of valuation, among others, to protect oneself from negative effects of disputes as to the value,

– information function – providing information obtained in the valuation process for company management needs.

Depending on the aim of valuation and the selected value category, the valuator can use different valuation methods, though for wind power stations the spectrum of possibilities is limited by the characteristics of the object of

valuation. Four basic groups of valuation methods (approaches) (PATENA 2011, p. 67): cost, income, comparative and mixed groups are used to estimate the value of real estate.

Selection of the valuation method

The selection of the appropriate method for wind power station valuation will depend on the project implementation phase, the aim of valuation and the sought value category. In the project preparation phase, asset-based methods are applied. This group of methods includes the replacement cost method, according to which the acquisition cost of the right to land should be added to the value of the facility. The acquisition of the right to use an attractively situated real estate (good wind conditions, proximity to the connection point, favourable communications conditions) is of very significant importance from the point of view of project efficiency and often has no direct connection with an expenditure incurred on the conclusion of lease contracts. The acquisition of such land often is not reflected in the company's financial statement because the contracts were concluded other than through a notary public's services, i.e. the right to land does not increase the company's assets and the rent of lease is not included in the company's statement of liabilities. Moreover, a local zoning plan allowing the installation of wind turbines may already exist in the selected location, which does not increase capital expenditures. Book values will not reflect the actual value of a project covering such land. Valuation by the discounted cash flow method, as recommended by the provisions of the Act on the Commercialization and Privatization of State-Owned Enterprises may prove reliable in the preparatory phase, including adjustments to reflect uncertainty connected with delayed project completion.

Mixed methods based on the results of estimates made by the cost and income methods seem to provide fair value determination for securing bank loans or for purposes related to contribution-in-kind procedures.

The use of comparative methods is rather out of the question. Since power plants can use different types of rotors and turbines, the annual revenue obtained from one MW of installed power can also be in different ranges, so an individual approach to each analysed power plant is needed.

The discounted cash flow method, which can be used both in the preparatory phase and at the power plant operation stage, seems the most suitable also for the determination of the value of functioning wind power stations. In this method the most widely used method of discounting is exponential discounting, which values future cash flows as „how much money would have to be invested currently, at a given rate of return, to yield the cash flow in future". Other methods of discounting, such as hyperbolic discounting (time-inconsist-

ent model of discounting) are not generally used. The discount rate used is generally the appropriate weighted average cost of capital (WACC), that reflects the risk of the cashflows. The discount rate reflects two things: time value of money (risk-free rate) – according to the theory of time preference, investors would rather have cash immediately than having to wait and must therefore be compensated by paying for the delay; risk premium – which reflects the extra return investors demand because they want to be compensated for the risk that the cash flow might not materialize after all.

The discounted cash flow method is useful for the determination of both the intrinsic value and the investment and market values. The value of a wind power station is then determined as the net present value (NPV), calculated as the sum of free cash flows discounted as of the day of valuation (ŁAGUNA 2013). All expenses related to the project launch should be included in the project implementation phase and in the operation phase – cash flows resulting from the operations of the entity running the power plant.

Closing remarks

The obligations assumed by Poland and the prospects of growing benefits from investments in wind power stations have attracted an increasing group of stakeholders. One of the most important groups are investors providing capital support to the implementation of projects and expecting measurable gains in return. Investors can become involved in a project at different stages of its implementation. Additionally, the development stage of a given sector in the market in which they intend to invest their capital also has an unquestionable effect on a project's evaluation from an investors' point of view. The development of the renewable energy source market and, in particular, wind power stations is in the first phase. Legal and formal conditions at each stage: design, project implementation and use may hinder the development of the market. Failure to adapt legislation and procedures at each of the above-mentioned stages may lead, besides hampering the development of the wind energy market, to undesirable actions. Specific investors' expectations indicate that the method for valuation of such a project which takes their expectations into account to the highest degree is the valuation method from the income group, namely, the discounted cash flow method. Proper estimation of both outlays related to the start-up of a wind power station and later, all revenue and expenses involved, enables the accurate assessment of financial gains for a potential investor.

Translated by JOANNA JENSEN

Accepted for print 21.12.2013

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