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In the period from 2010 to 2016, wind power production in Croatia increased by 15 times, one of the reasons being high state financial incentives. Investments in wind farms have proven to be profitable and involving minimal risk, and credit institutions have consequently financed between 85 and 90% of total assets (projects). The main aim of this paper is to analyse the wind power production market and to assess the financial position of companies engaged in this activity. Bearing in mind frequent electricity shortages in Croatia, the question has been raised as to why the state does not further liberalize this sector and open it for new market participants, and why the public energy company HEP does not engage in this attractive business.

Guidelines and Renewable Energy Market in the European Union

By joining the EU, the Republic of Croatia (RH) has assumed the obligation to increase the production of energy from renewable sources - wind, sunlight, geothermal and hydrothermal sources, sea, watercourses, biomass, landfill gas, gas from wastewater treatment plants and biogas.

Renewable energy sources have been replacing fuels and contributing to the reduction of greenhouse gas emissions, diversification of supply and reduction of the dependence on unreliable and unstable fossil fuel markets – in particular the oil and gas market. According to Article 194 of the Treaty on the Functioning of the EU, the objective is to promote the development of new and renewable energy sources. Another significant piece of legislation is Directive 2009/28/EC, which lays down mandatory national targets for the overall share of energy from renewable sources in gross final energy consumption and for the share of energy from renewable sources in transport. Such mandatory national targets are in line with the EU objective of meeting the target of at least 20% of renewable energy sources in the gross final energy consumption by 2020 and 10% of transport fuel production from renewable sources.

Each Member State should develop and promote energy efficiency and energy savings, and may cooperate with Member States and third countries to this end (Directive 2009/28/EC). Every two years, Member States submit to the European Commission (EC) a progress report on the promotion and use of energy from renewable sources. The Commission has set Member States' targets for share of renewable energy sources in gross final energy consumption by 2020 (see Appendix, Table A.1). Eleven Member States have already reached the set targets in 2015, while others are expected to do so by 2020.

Renewable Energy Market in the European Union

According to the latest available data from Eurostat (2017b), the total primary energy production in the EU-28 from all sources amounted to 771 million tonnes of oil equivalent in 2014, which is a decrease of 17.3% compared to the preceding ten-year period. The main cause of the decrease is high level of exploitation of limited resources. The largest share of the EU total primary energy production is held by France, followed by Germany and the United Kingdom.

Figure 1 Total energy production in EU-28 in 2015 (in %)

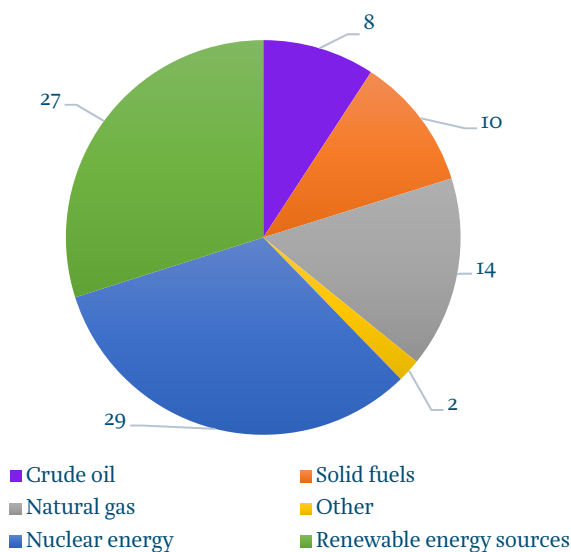
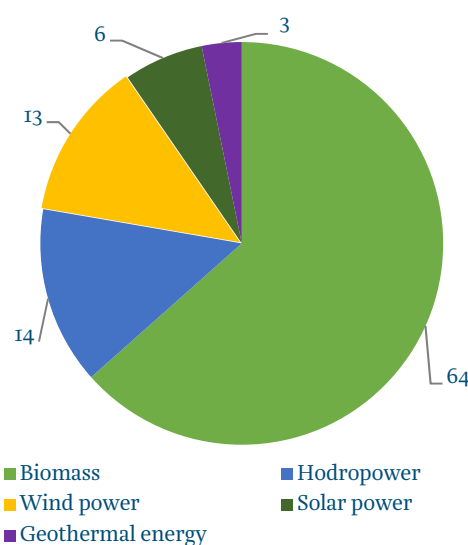


Figure 2 Share of individual renewable sources in total energy production from renewable sources (in %)



Source: Eurostat (2017)

Total renewable energy production includes biomass, hydropower, wind, solar and geothermal energy production. The share of renewable energy sources in the production of electricity in the EU has been increasing, making up almost 15% at the end of 2005, only to double to nearly 29% by 2015. The largest share of renewable energy produced in 2015 came from biomass (64%), hydropower (14%) and wind energy. The main cause of growth is the implementation of the EU guidelines on promoting the use of renewable energy sources and energy efficiency, as well as increasing investments in the sector.

Wind power generation

Wind energy now overtakes hydropower and coal as the EU's second largest form of power generation capacity. The wind power capacities in the EU have increased from 84 GW in 2010 to 153.7 GW in 2016, with an average annual growth of around 10 GW. Since 2005, the share of wind power generation has increased from 5 to 10% of total consumption in 2016 (see Table 1).

Table 1 Wind power generation and consumption in the EU from 2010 to 2016 (in TWh)

Year	Consumption	Generation	% of wind power generation in total consumption
2010	3,415	181	5.3
2011	3,328	204	6.3
2012	3,300	231	7.0
2013	3,280	257	7.8
2014	2,798	284	10.2
2015	2,770	315	11.4
2016	2,860	296	10.4

Source:
Authors' calculations based on data from WindEurope (2017)

Countries with the largest installed wind power capacity in the EU (65%) are Germany, Spain, UK and France, while Slovakia and Slovenia have the smallest installed wind power capacities (Malta has no wind power installations).

Germany and France, followed by the Netherlands, UK, Poland and Finland have the largest newly installed capacity in the EU (73%), and as many as eight Member States (Bulgaria, Cyprus, Czech Republic, Hungary, Luxembourg, Malta, Slovakia and Slovenia) had no newly installed capacity in 2016 (see Appendix, Table A.2). The growth of wind power generation may also be accounted for by an increase in investments of 12.7 billion euros in 2010 to 27.5 billion in 2015 (see Annex, Table A.3).

Wind power generation and market in Croatia

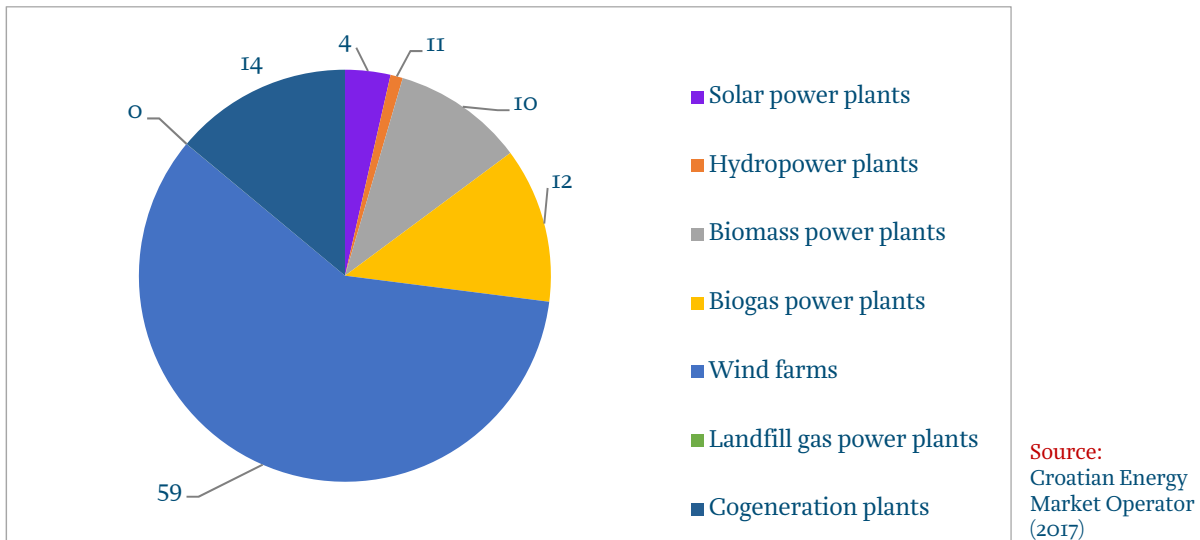
In the Republic of Croatia, wind power generation has increased by 15 times, from 0.067 TWh in 2010 to 1.01 TWh in 2016. The share of wind power generation in total electricity production increased from 0.5% in 2010 to 9% in 2016, while the share in total consumption increased from 0.4% to 5.7%. One of the reasons for such expansion are the state financial incentives for renewable energy production, as wind farms belong to a group of *eligible electricity producers*.

Eligible electricity producers

*Pursuant to Art. 11. Par. 2. of the Electricity Market Act (NN 22/13, 95/15, 102/15), the Minister of Economy, Entrepreneurship and Crafts issues the Ordinance on Acquiring the Status of Eligible Producer of Electricity (NN 132/13), eligible producer being a legal or natural person whose power production facility meets the requirements specified by the Ordinance. On the basis of the decision on acquiring the status of eligible producer, the eligible producer must produce and supply electricity from renewable sources, and observe environmental regulations as well as meet the prescribed technical requirements. The Croatian Energy Regulatory Agency (HERA) issues a decision on acquiring the status of eligible producer **for a period of 25 years** with the possibility of repeal, should the producer fail to comply with the specified requirements. The project holder must report to HERA on the production plan for the subsequent year by September 30 at the latest.*

Wind power generation accounted for the largest share in the production of eligible producers in 2016 (see Figure 4).

Figure 3 Overview of shares in the electricity production of eligible producers in 2016 by technology (in %)



The share of wind power generation in the production of all eligible producers is nearly 60%, and further growth is expected due to the introduction of new wind farms into the incentive system - Katuni and Glunča – with a total installed capacity of 62 MW.

In 2010, total electricity consumption declined due to the effects of the global crisis and negative economic trends. However, with the economic recovery in 2015, the electricity consumption has also increased (see Table 2).

Table 2 The volume of electricity trade and production in Croatia from 2010 to 2016

	2010	2011	2012	2013	2014	2015	2016	Average
Consumption (in TWh)	17.9	17.7	17.5	17.3	16.9	17.6	17.7	17.5
Total production (in TWh)	13.26	9.9	9.897	12.79	12.19	9.99	11.33	11.35
Wind power production (in TWh)	0.067	0.19	0.3	0.46	0.72	0.78	1.01	0.5
Share of wind power production in total production (in %)	0.51	1.90	3.03	3.59	5.91	7.80	8.91	4.52

Source: Authors' calculations based on data from HERA (2016)

Renewable energy production has been gradually replacing traditional solid fuel production. The EU has recorded a strong growth in wind power energy production, dominating the production of energy from renewable sources. This is the result of large investments based on



EU efforts to increase the share of environmentally-friendly electricity generation facilities. The Republic of Croatia follows the EU's trend for greater representation of renewable energy sources, so that the wind power generation in 2016 already accounted for around 9% of total electricity production in Croatia. *The future will show whether wind power generation will continue to lead in the renewable energy production or will prominence be given to an increase in the production capacity of unused hydro potential.*

Wind Power Market in Croatia

Legislative framework for renewable energy sources or electricity generation from wind power plants in Croatia has been aligned with EU policy and guidelines.¹

Pursuant to the umbrella *Energy Act*, measures for safe and reliable supply and efficient production and use of energy have been established and acts have been drawn up, defining energy policy, energy development plans and the associated business activity, pursuant to which these are also to be implemented.

The Electricity Market Act defines rules and measures for safe and reliable generation, transmission, distribution and supply, and for electricity trading and the organization of the electricity market as part of the EU electricity market. The Act lays down rules for the protection of end customers, organization and functioning of the power sector, open access to the market, definition of general service obligations and the rights of electricity customers, including the rights of end customers, separate management of business books, financial reports, network access rules, principle of reciprocity and cross-border electricity transmission.

Furthermore, the *Act on the Environmental Protection and Energy Efficiency Fund* was adopted, regulating its organization, powers, activities and sources of funding. The Fund should promote the goals and principles of environmental protection in order to achieve a systematic and integrated preservation of environmental quality, preservation of natural communities and rational use of natural resources and energy as basic conditions for sustainable development and realization of citizens' rights to a healthy environment.

Equally important are the ordinances issued by the Ministry of Economy, Entrepreneurship and Crafts. Thus, the *Ordinance on the Use of Renewable Energy Sources and Cogeneration*² has defined facilities using renewable energy sources and cogeneration plants for energy production, laid down the requirements and possibilities of using renewable energy sources and cogeneration plants and regulated other significant issues. The Ordinance has stipulated the form, content and method of keeping the Registry of projects and plants for the use of renewable energy sources and cogeneration as well as eligible producers.

¹ The key legislation includes: Energy Act (NN 120/12, 14/14, 95/15, 102/15), Electricity Market Act (OG 22/23, 95/15, 102/15), Act on the Environmental Protection and Energy Efficiency Fund (NN 107/03, 144/12), Ordinance on Acquiring the Status of Eligible Electricity Producer (NN 132/12, 132/13, 81/14, 93/14, 24/15, 110/15) and Tariff System for the Production of Electricity from Renewable Energy Sources and Cogeneration (NN 133/13, 151/13, 20/14, 107/14, 100/15).

² Cogeneration is the simultaneous production of electricity and heat in a single process.

The *Ordinance on Acquiring the Status of Eligible Electricity Producer* has laid down the conditions for obtaining and repealing the decision on obtaining the status of eligible electricity producer, the rights and obligations arising therefrom, the technical and operating conditions for the production facilities, the duty to report thereon and the supervision of the production plant operations. The Tariff System for the Production of Electricity from Renewable Energy Sources and Cogeneration also applies, according to which the incentive price of electricity is determined.

In addition to the *Ministry of Economy, Entrepreneurship and Crafts* (that draws up bills and ordinances for the production of electricity from renewable sources), the Croatian Energy Market Operator – *Hrvatski operater tržišta energije d.o.o.* (HROTE) and the Croatian Energy Regulatory Agency (HERA) have significant roles.

HROTE organizes the electricity and gas market as a public service, manages the systems for stimulation of the production of electricity from renewable sources and cogeneration and the production of biofuels for transport.

HERA assumes the responsibilities and authorities set forth in the Act on the Regulation of Energy Activities, the Energy Act and other legislation regulating individual energy markets. The fundamental goals of HERA are: ensuring objectivity, transparency and impartiality in carrying out energy activities, taking care of the implementation of the principles of regulated access to the network/system, adopting methodologies for determination of tariff systems, establishing efficient energy market and market competition and protecting energy consumers and energy operators. It is funded via fees for the regulation of energy activities, in accordance with the Act on the Regulation of Energy Activities (NN 120/12).

In 2009, the Parliament adopted the *Energy Strategy of the Republic of Croatia*, which should be implemented by 2020 and whose objectives are aligned with the main objectives of the EU (security of energy supply, energy system competitiveness and sustainability of energy development). The Strategy defines specific targets and activities in terms of development of particular renewable energy sources, as well as in terms of wind energy. According to the Strategy, the Government will create a favourable investment climate and encourage the construction of wind farms so that their share in total electricity consumption shall amount to 9 to 10%, and the installed capacity up to 1,200 MW (Simeunović, 2015).

Incentives for the production of electricity from renewable sources

In line with national targets and priorities, Croatia has been promoting electricity generation from renewable sources for a longer period of time now, and one of the examples includes the *eligible electricity producers* from which HROTE purchases energy from renewable sources at incentive prices. Eligible electricity producers enter into electricity purchase contracts with HROTE for electricity produced from renewable energy sources and cogeneration for a period of 14 years.³

Given that the incentive prices are higher than the price at which HROTE sells the electricity purchased from eligible producers, the difference is compensated via the *incentive fee for promotion of electricity production from plants using renewable energy sources and cogeneration*

³ Tariff System for the Production of Electricity from Renewable Energy Sources and Cogeneration (NN 133/13, 151/13, 20/14, 107/14, 100/15 (Article 18).



plants, paid by the end customers of electricity since 2007. The amount of the incentive fee is determined by the Government, and as of August 31, 2017, it amounts to HRK 0.105/kWh. For customers who are - in accordance with the Air Protection Act – obliged to obtain greenhouse gas emission permits, 0.007 HRK/kWh.

HROTE pays incentive prices to the eligible electricity producers, the amount depending on the type of producer's plant, in accordance with tariff systems established by the Government (see Table 3).

Table 3 The amounts of tariff items for wind farms

	Consumer Price Index 2014 (-0.2%)	Incentive price 2015 HRK/kWh	Consumer Price Index 2015 (-0.5%)	Incentive price 2016 HRK/kWh (-0.5%)	Consumer Price Index 2016 (-1.1%)	Incentive price 2017 HRK/kWh
Installed capacity of ≤1 MW						
Wind farms	0.998	0.7880	0.995	0.7841	0.989	0.7744
Installed capacity of >1 MW						
Wind farms	0.998	0.8003	0.995	0.7963	0.989	0.7875

Source: Tariff System for the production of electricity from renewable energy sources and cogeneration

The incentive prices are adjusted according to the change in the consumer price index, and the incentives paid have been steadily increasing (see Table 4), as the electricity production from renewable sources grows. Although their share in total incentives is continuously decreasing, most incentives are still allocated to wind farms.

Table 4 Incentives for the production of electricity from renewable energy sources from 2010 to 2016 (in millions of HRK)

	2010	2011	2012	2013	2014	2015	2016
Total	70	182	332	553	825	1,039	1,547
for wind farms	49	141	226	366	528	609	787
% for wind farms	70	77	68	66	64	59	51

Source: Authors' calculations based on data from HERA (2016)

According to the data from HERA (2016a) – as at December 31, 2015, HROTE paid an incentive price for the delivered electricity on the basis of 1,274 purchase contracts concluded under the tariff systems for the production of electricity from renewable energy sources and cogeneration. In 2015, HROTE paid more than a billion kuna in incentives (an average of HRK 950/MWh or €127/MWh). The share of electricity production generated within the incentive system was 6.2%. According to HERA's data (2016), the average electricity price paid to eligible producers in 2015 within the incentive system was three times higher than the annual price average on the closest power exchanges (Slovenian BSP and Hungarian HUPX). The total amount of incentives has increased by around 50% (to HRK 1.5bn) in 2016 compared to 2015.

Major market participants on the wind power market

In 2016, wind energy was offered by 15 active **eligible producers** who have concluded electricity purchase contracts under the Tariff System with HROTE (see Table 5), and whose plants have been commissioned. The second group consists of 7 still inactive producers who have concluded electricity purchase contracts with HROTE, but whose plants are not yet in operation. Out of 22 companies, fifteen are in foreign and seven in domestic, private ownership. All are registered as limited liability companies.

Table 5 Active eligible producers (as at December 31, 2016)

Producer	Plant/ wind farm	Installed capacity (MW)	Location (county)	Wind turbine manufacturer
Aiolos projekt	Ogorje	42	Split-Dalmatia	Vestas
Crno brdo	Crno Brdo	10	Šibenik-Knin	Leitwind
Eko - energija	Zelengrad Obrovac	42	Zadar	Vestas
Eko	ZD2	18	Zadar	Siemens
Eko	ZD3	18	Zadar	Siemens
Eko Zadar dva	ZD4	9	Zadar	Siemens
Jelinak	Jelinak	30	Split-Dalmatia	Acciona
Končar-obnovljivi izvori	Pometeno Brdo	17.5	Split-Dalmatia	Končar
Končar-obnovljivi izvori	Pometeno Brdo (Reconstruction)	2.5	Split-Dalmatia	Končar
Orlice	Orlice	9.6	Šibenik-Knin	Enercon
Oštra stina	ST1-2	20	Split-Dalmatia	Siemens
Oštra stina	ST1-2	20	Split-Dalmatia	Enercon
Ponikve	Ponikve	34	Dubrovnik-Neretva	Enercon
RP Global Danilo	Velika glava, Bubrig and Crni vrh	43	Šibenik-Knin	Enercon
Rudine	Rudine	34.2	Split-Dalmatia	Enercon
Selan	Vrataruša	42	Lika-Senj	Vestas
Trtar-Krtolin	Trtarkrtolin	11.2	Šibenik-Knin	Enercon
Velika popina	ZD6	9	Zadar	Siemens
Total		412		

Source:
Authors'
representation,
based on data
from: HROTE
(2017)

Note: HROTE concluded electricity purchase contracts with these producers under the Tariff system.

All wind farms are located in the coastal area in only five counties, and more than half of the plants use Siemens or Enercon wind turbines. At the end of 2016, the total installed capacity of all wind farms (which concluded purchase contracts with HROTE and which plants are included in the incentive system, active contracts, grid-connected power plants) amounted to 412 MW (HROTE, 2017a). The largest share is accounted for by Vrataruša, Zelengrad Obrovac and Ogorje, Velika glava, Bubrig and Crni Vrh (41% of total wind power capacity in Croatia).

The information on project holders with whom HROTE has concluded electricity purchase contracts under the Tariff System, whose plants have not yet been commissioned is also

noteworthy (see Table 6). Total newly installed capacity of power plants not yet in operation amounts to 326 MW, which is around 80% of the current capacity of active wind power plants.

Table 6 Project holders with whom HROTE has concluded electricity purchase contracts under the Tariff System, and whose plants have not yet been commissioned in 2016

Producer	Plant/wind farm	Installed capacity (MW)	Location (county)	Wind turbine manufacturer
C.E.M.P.	Pađene	20	Šibenik-Knin	-
C.E.M.P.	Krš Pađene	80	Šibenik-Knin	-
C.E.M.P.	Krš Pađene - expansion	42	Šibenik-Knin	-
C.E.N.S.U.R. - Zrmanja	Small wind farm complex Jasenice	10	Zadar	Nordex energy
Glunča	Glunča	23	Šibenik-Knin	Siemens
Katuni	Katuni	39	Split-Dalmatia	Enercon
Lukovac	Lukovac	48	Split-Dalmatia	Enercon
Orjak	Komorjak-Greda	10	Split-Dalmatia	Senvion
Poštak	expansion ZD6	45	Zadar	Siemens
Velika popina ⁴	ZD6	9	Zadar	Siemens
Total		326		

Source: Authors' representation, based on data from: HROTE (2017)

New capacities, i.e. plants for which contracts have been concluded with HROTE, but which still have not been commissioned, are quite significant, with the wind farm Krš Pađene d.o.o. of an installed capacity of 80 MW standing out. C.E.M.P. as a new participant will soon become the largest wind power producer.

Table 7 shows basic data on active producers (with grid-connected installations) which concluded electricity purchase contracts with HROTE.

Wind farms have a minimal number of employees - which is not surprising given the type of activity that is very capital-intensive and has no particular need for a workforce; they mostly have one employee (director), and some of them have no employees at all. While at first it might sound unbelievable that companies operate without employees, the legislative framework no longer prescribes the obligation to employ workforce for the purpose of carrying out a registered business activity - except for the activities for which the employment obligation (as well as the requirements to be fulfilled by the employees) is laid down by means of special regulations.⁵

⁴ Eligible producer whose plant is in permanent operation, and for which an annex to the purchase agreement was concluded, i.e. a part of the plant was not included in permanent operation.

⁵ According to the Decision of the Constitutional Court of the Republic of Croatia, no. U-I-646/1999, and Decision no. UI-945/1999 (NN 52/00), the provisions on compulsory employment were abolished, as they were contrary to Article 49 of the Constitution, preventing and restricting the entrepreneurs to - in accordance with their economic-based judgments - make decisions in favour of the company.

Table 7 Basic information on active wind farms in the Republic of Croatia in 2016

Producer	Founded	Commissioning date	Number of employees	Share capital (in thousands of HRK)	Owner
Aiolos projekt	2005	2005	0	24	Ogorje green
Crno brdo	2006	2016	1	10,703	Orient green power
Eko -- energija	NDA	2015	1	74	Silent meteors
Eko	2001	2000	8	20	Dalekovod professio
Eko Zadar dva	2007	2013	1	60	Vladimir Matjačić
Jelinak	2002	2014	1	91,020	Acciona Energia Internacional
Končar-obnovljivi izvori	2008	2008	4	130,312	Končar - KET d.d.
Orlice	2006	2009	0	20	WPD Europe GMBH
Oštra stina	2011	2013	3	20	Iljko Ćurić
Ponikve	2006	2013	0	20	WPD Europe BMBH
RP Global Danilo	2007	2014	1	20	RP Global Holding Croatia
Rudine	2009	2016	1	25	RP Global Holding Croatia
Selan	2006	2010	3	16,160	Selan holding GMBH
Trtar-Krtolin	2002	2006	0	11,182	WPD Europe GMBH
Velika popina	2005	2011	1	20	Dalekovod professio

Note: NDA - No Data Available.

Source: Authors' representation, based on data from companies' financial statements and websites

Analysis of the financial position of the companies

Below are the main results of the analysis of the financial position and business operations of the observed companies. The analysis of the financial position of 15 companies from 2012 to 2016 is based on the financial statements (balance sheet and income statement) and the calculated financial ratios. The source of the analysed data is the Annual Financial Statements Registry maintained by the Financial Agency.

Revenues and expenditures

The revenues of the active wind power producers have tripled in the period from 2012 to 2016 (see Table 8).

Table 8 Total revenues and expenditures of eligible producers over the period from 2012 to 2016 (in millions of HRK)

	2012	2013	2014	2015	2016
Revenue	264	414	550	681	864
Operating	245	394	535	629	797
Financial	9	20	15	52	67
Extraordinary	10	0	0	0	0
Expenditures	263	443	565	630	734
Operating	164	271	366	425	501
Financial	89	172	199	205	223
Extraordinary	10	0	0	0	0
Profit/loss before tax	0.8	-29	-15	51	130
Income tax	0.2	-1	-3	8	28
Profit/loss after tax	-1	28	-12	43	102
Incentives for wind farms (Table 5)	226	366	528	609	787
Share of incentives in total revenue (in %)	85.6	88.4	96	89.4	91.1

Source:
Companies'
financial
statements

Operating revenue (from electricity sales) accounts for over 90%, while financial (from interests and foreign exchange gains) accounts for around 8% of total revenues. Two thirds of the expenditures are operating, while the rest are financial. The share of operating and financial revenue remained almost the same, while the share of extraordinary expenditures declined. In short, operating revenue in the observed period grew due to the increase in the volume of economic activity, i.e. the increase in the production and sale of electricity.

Table 9 Revenues, expenditures and profit/loss of eligible producers of electricity from wind farms in 2014, 2015 and 2016 (in millions of HRK)

Company	Total revenue			Total expenditure			Net profit/loss		
	2014	2015	2016	2014	2015	2016	2014	2015	2016
Aiolos projekt	1.0	19.6	78.6	2.0	21.7	78.3	-1.0	-2.1	0.4
Crno brdo	18.1	20.7	19.9	17.4	18.5	19.6	0.7	2.2	0.3
Eko – energija	21.0	76.5	74.9	45.5	59.4	66.8	-24.5	17.1	8.1
Eko	87.5	92.0	95.9	95.9	93.7	87.3	-8.5	-1.7	8.6
Eko Zadar dva	17.3	17.7	18.8	16.8	17.2	18.8	0.5	0.5	0.0
Jelinak	74.0	68.3	76.4	60.2	56.3	53.7	13.8	12.0	22.7
Končar-obnovljivi izvori	22.5	29.4	27.3	25.9	32.5	28.6	-3.5	-3.1	-1.3
Orlice	17.6	16.0	17.9	14.6	14.3	13.9	3.1	1.7	4.1
Oštra stina	81.4	80.9	83.1	81.8	79.4	77.8	-0.5	1.5	5.4
Ponikve	54.6	46.9	54.2	50.2	45.9	44.8	4.4	1.0	9.4
RP Global Danilo	29.7	78.8	88.5	33.0	74.9	75.3	-3.3	3.9	13.1
Rudine	0.0	5.8	79.9	0.5	7.7	65.3	-0.5	-1.9	14.6
Selan	84.3	83.9	101.6	83.3	71.7	68.3	1.0	12.1	33.3
Trtar-Krtolin	23.5	22.9	24.2	16.3	15.7	14.9	7.1	7.1	9.3
Velika popina	18.0	21.9	23.0	22.0	20.9	20.7	-4.0	1.0	2.3
Total	550.4	681.2	864.3	565.4	629.9	733.9	-15.0	51.3	130.3

Source:
Companies'
financial
statements

In two of the five years observed, aggregate loss has been recorded, while the remaining three years have generated profit at the level of active wind farms sector. The increase in aggregate profit indicates that the wind power production is becoming more and more profitable, as confirmed by the individual data of the companies.

In 2016, all companies, save for Končar – obnovljivi izvori d.o.o., operated at a profit. The average revenue per company was HRK 57 million, expenditures amounted to HRK 49 million and a profit to around HRK 7 million. The company Selan d.o.o. stands out with its revenue that is almost twice as high as the average, accounting for 12% of the total sector revenue.

Assets and liabilities

In the period from 2012 to 2016, total assets and liabilities grew by HRK 1.7 billion (Table 10). The assets structure is mostly composed of non-current assets. In the observed period, receivables and inventories increased, while cash at bank and in hand decreased.

Table 10 Total assets and liabilities of active wind farms from 2012 to 2016 (in billions of HRK)

	2012	2013	2014	2015	2016
Total assets	2.6	3.7	4.1	4.4	4.3
Current assets	0.5	0.4	0.4	0.4	0.5
Non-current assets	2.1	3.3	3.7	4.0	3.8
Total liabilities	2.6	3.7	4.1	4.4	4.2
Current liabilities	0.8	0.9	0.8	0.5	0.4
Non-current liabilities	1.5	2.3	2.8	3.4	3.2
Capital	0.3	0.5	0.5	0.5	0.6

Source:
Companies'
financial
statements

The company Aiolos projekt has the highest value of non-current assets, while Trtar-Krtolin has the lowest, and also records the largest single decrease in non-current assets.

Table 11 Assets of eligible producers in 2014, 2015 and 2016 (in millions of HRK)

	Non-current			Current			Total		
	2014	2015	2016	2014	2015	2016	2014	2015	2016
Aiolos projekt	152	537	516	41	33	49	202	578	572
Crno brdo	104	98	88	9	8	7	112	106	95
Eko – energija	397	377	357	48	35	34	450	413	394
Eko	342	304	266	40	44	78	386	351	348
Eko Zadar dva	104	92	80	4	9	10	109	102	91
Jelinak	363	373	357	59	42	52	422	416	410
Končar-obnovljivi izvori	235	227	215	5	3	4	240	230	218
Orlice	52	45	37	8	8	9	63	55	47
Oštra stina	419	375	331	24	26	32	443	402	364
Ponikve	270	244	218	48	40	57	327	292	280
RP Global									
Danilo	539	510	487	59	46	52	600	557	539
Rudine	152	379	369	32	36	43	184	416	414
Selan	412	399	373	14	15	30	426	414	404
Trtar-Krtolin	32	23	14	30	19	6	62	42	20
Velika popina	88	76	68	10	11	18	97	88	86
Total	3,661	4,059	3,777	429	377	480	4,123	4,462	4,283

Source:
Authors'
representation,
based on the data
from the financial
statements of the
companies



In 2016, the companies financed only 14% from their own funds, of which the largest share was made up of share capital and capital reserves, and 86% was financed from external sources - mostly long-term loans.

Total financial liabilities increased by EUR 1.2bn in the observed period (non-current by HRK 1.4 billion and current liabilities decreased by HRK 0.2 billion). Given that the increase in current assets is higher than the increase in current liabilities, it may be concluded that *there has been a rise in liquidity and a drop in debt of the entire sector.*

Table 12 Financial liabilities and interest expense from 2012 to 2016 (in billions of HRK)

	2012	2013	2014	2015	2016
A) Financial liabilities	1.7	2.5	2.9	3.0	2.9
Current	0.5	0.6	0.6	0.2	0.3
Non-current	1.2	1.9	2.3	2.8	2.6
B) Interest expense	0.0	0.1	0.2	0.2	0.2
Financing cost (B/A) in %		3.52	3.83	3.84	4.59

Source:
Companies'
financial
statements

Capital and reserves have been increasing in nearly all companies, with Končar – obnovljivi izvori d.o.o. having the highest value, while the lowest value of capital and reserves has been recorded by Aiolos project, recording also a negative capital value (loss carried forward and loss for the year). The highest amount of liabilities has been recorded by Aiolos projekt d.o.o. and RP Global Danilo d.o.o. (over half a billion kuna), and the lowest amount of liabilities has been recorded by Trtar-Krtolin d.o.o. (HRK 20 million).

Table 13 Liabilities of the companies in 2014, 2015 and 2016 (in millions of HRK)

	Capital and reserves			Liabilities								
				Non-current			Current			Total		
	2014	2015	2016	2014	2015	2016	2014	2015	2016	2014	2015	2016
Aiolos projekt	0	-7	-16	198	495	578	2	45	7	202	578	572
Crno brdo	5	7	7	98	83	72	9	16	15	112	106	95
Eko – energija	-8	5	11	426	382	356	30	22	23	450	413	394
Eko	85	83	91	266	235	200	35	33	57	386	351	348
Eko Zadar	7	8	8	97	85	74	5	10	9	109	102	91
Jelinak	19	29	47	253	220	311	150	157	42	422	416	410
Končar-obnovljivi izvori	121	117	116	89	76	63	30	35	38	240	230	218
Orlice	13	12	10	42	35	28	7	7	8	63	55	47
Oštra stina	81	82	81	324	285	242	38	36	41	443	402	364
Ponikve	59	59	67	228	208	185	36	21	24	327	292	280
RP Global Danilo	33	40	54	526	480	435	39	36	48	600	557	539
Rudine	23	22	33	147	381	337	14	13	42	184	416	414
Selan	-11	-14	15	0	373	326	437	54	62	426	414	404
Trtar-Krtolin	30	17	19	24	18	0	7	7	2	62	42	20
Velika popina	29	30	32	56	47	36	12	11	18	97	88	86
Total	485	491	575	2,775	3,402	3,244	852	503	436	4,123	4,462	4,283

Source: Authors' representation, based on the data from the financial statements of the companies.

The largest increase in current liabilities in 2016 was recorded by wind farms Rudine and Eko, while the largest increase in non-current liabilities was recorded by Aiolos projekt and Jelinak. The largest decrease in non-current liabilities was recorded by Selan, while Jelinak recorded the largest drop in current liabilities, clearly having refinanced a portion of current liabilities by non-current ones in 2016.

Below are the most significant financial ratios for active wind power producers (see Table 14).

Table 14 Aggregate financial ratios for 15 active eligible producers of wind power from 2012 to 2016

	2012	2013	2014	2015	2016
Current ratio	0.62	0.44	0.50	0.75	1.10
Leverage ratio	0.87	0.86	0.88	0.88	0.86
Days' sales in receivables	164.16	183.14	85.87	52.94	50.63
Net profit margin	0.27	0.20	0.23	0.28	0.31
ROA (Return on Assets)	0.03	0.02	0.03	0.04	0.06
ROE (Return on Equity)	-0.01	-0.06	-0.02	0.09	0.18

Source:
Companies'
financial
statements

Wind energy companies are liquid, and liquidity increases year after year. True, the value of the current ratio has been only above 1 since 2016, meaning that current assets at the sector level exceed current liabilities, i.e. that a portion of current assets is financed from non-current sources. The average ratio is stable, and its rather high value points to the previously established fact that wind power plants rely heavily on financing from external sources.⁶

Profitability ratios show the company's ability to generate profit. ROA shows the return on the invested property of a company, and ROE measures the return on invested capital. The return on invested capital (ROE) at sector level in 2016 stood at 18%, confirming that investing in wind farms is a highly profitable business. In addition, bearing in mind the fact that external sources (loans) prevail in the financing structure, it is easy to conclude that this business is also relatively safe (risk-free) for the owner. Banks approving loans are clearly ready to assume the risk of financing because they are aware of the long-term financial sustainability and profitability of these projects.

Table 15 shows financial ratios by individual eligible producers in 2016. The companies Trtar-Krtolin and Aiolos display especially good liquidity as their current assets are far greater than their current liabilities. However, these financial ratios should be interpreted with caution and in the context of other operating performance ratios. For instance, Aiolos projekt is in the worst position in terms of its leverage ratios and the value of its capital is negative. In other words, an enterprise may finance non-current assets through long-term loans, which improves its liquidity position, but may undermine the company's credit rating and increase the likelihood of insolvency. Current ratio for Končar-obnovljivi izvori d.o.o. amounts to only 0.1 - current assets cover only 10% of current liabilities (see Table 15).

⁶ For a more detailed overview of financial ratios at sector level (aggregate), but also for (individual) companies, see Appendix (Tables A.4 – A.9).



Table 15 Financial ratios for active companies of eligible producers in 2016

	Current liquidity ratio	Leverage ratio	Net profit margin	Return on assets	Return on Equity
Aiolos projekt	6.97	1.02	0.23	0.03	-0.02
Crno brdo	0.48	0.91	0.25	0.05	0.05
Eko – energija	1.49	0.96	0.38	0.07	0.76
Eko	1.37	0.74	0.28	0.08	0.09
Eko Zadar dva	1.03	0.92	0.19	0.04	0.00
Jelinak	1.23	0.86	0.42	0.08	0.48
Končar-obnovljivi izvori	0.10	0.46	0.14	0.02	-0.01
Orlice	1.12	0.77	0.28	0.11	0.41
Oštra stina	0.79	0.78	0.22	0.05	0.07
Ponikve	2.23	0.75	0.29	0.06	0.11
RP Global Danilo	1.09	0.90	0.41	0.07	0.24
Rudine	1.03	0.92	0.36	0.07	0.44
Selan	0.48	0.96	0.44	0.11	2.21
Trtar-Krtolin	3.98	0.08	0.34	0.41	0.50
Velika popina	0.99	0.63	0.24	0.07	0.07
Average	1.53	0.78	0.30	0.09	0.36

Source:
Authors' representation, based on the data from companies' financial statements

Nearly all eligible wind power producers are overindebted, but at the same time liquid and able to finance their current liabilities. Only Trtar-Krtolin and Končar-obnovljivi izvori are not overindebted, and finance most of their assets from their own sources. Again, here we have to interpret the results within the context of other values - for instance, Končar-obnovljivi izvori is not overindebted clearly at the expense of extremely low liquidity. Besides, one should bear in mind that Trtar Krtolin is also the smallest company in terms of size. Nearly all companies generate higher total revenues than expenditures. By comparing all the ratios of these companies, it can be seen that Trtar-Krtolin has the best ratios or ranks among the best in all groups and is an example of a successful small wind power producer.

Conclusion

The wind energy market in Croatia is dynamic and still developing. In the period from 2010 to 2016, wind power generation has increased by 15 times. One of the reasons are high prices at which HROTE purchases electricity from eligible producers. The average electricity price in 2015 paid to eligible producers in the incentive system was three times higher than the annual average of electricity prices on the power exchanges closest to Croatia.

In the Republic of Croatia, there are 22 eligible producers who have concluded electricity purchase contracts with HROTE under the Tariff System, where 15 of them are operational and 7 companies have not yet commissioned their plants. It should be noted that fifteen companies are in foreign, and seven of them in domestic, private ownership.

As much as 41% of the total capacity is accounted for by Vrataruša, Zelengrad Obrovac, Ogorje, Velika Glava, Bubrig and Crni vrh. All wind farms are registered as limited liability companies and are located in the coastal area of only five counties.

Total newly installed capacity not yet in operation amounts to 326 MW, which is around 80% of the current capacity of active wind farms. In 2018, the company G.E.M.P. will become the largest individual wind power producer in Croatia.

Wind farms employ a minimal number of employees as this activity is very capital-intensive, with no particular need for a workforce, and usually have one employee (commonly a director), while some have no employees at all.

The analysis of financial ratios has revealed that companies are overindebted and finance most of their assets (over 80%) from external sources. The exceptions are Trtar-Krtolin and Končar-obnovljivi izvori. Trtar-Krtolin, followed by Aiolos project, stand out with their good liquidity, whereas Končar-obnovljivi izvori stands out due to its illiquidity. By comparing these companies, Trtar-Krtolin has the best ratios and is an example of a successful small wind power producer.

Despite the over-indebtedness, the companies are capable of meeting their financial obligations. Investing in wind farms is profitable and safe, and incentives paid to eligible producers are generous and high, and concentrate on a relatively small number of market participants. Moreover, as the financing structure is dominated by external financing sources (loans), it may be concluded that this business is relatively risk-free for the owner.

The question remains, though, why the state does not further liberalize the wind power generation and open it to new entrepreneurs. Banks are clearly ready to assume the risk of financing because they are aware of the long-term financial sustainability and profitability of these projects. Finally, it is not clear why the public company HEP is not actively involved in wind power generation, particularly as all this time it has been under the obligation to purchase electricity (purchased from eligible producers) from HROTE, in proportion to the market share at a regulated purchase price.

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Appendix

Table A.1 National overall targets for the share of energy from renewable sources in the gross final energy consumption 2020 (in %)

Country	2005	2015	2020
Austria	23.3	33.6	34
Belgium	2.2	7.3	13
Bulgaria	9.4	18.4	16
Cyprus	2.9	9.1	13
Czech Republic	6.1	13.6	13
Denmark	17.0	30.6	30
Estonia	18.0	27.9	25
Finland	28.5	39.5	38
France	10.3	14.5	23
Greece	6.9	15.5	18
Croatia	12.8	27.5	20
Ireland	3.1	8.6	16
Italy	5.2	17.1	17
Latvia	3.6	39.2	40
Lithuania	15.0	24.3	23
Luxembourg	0.9	5	11
Hungary	4.3	9.4	13
Malta	0.0	5.3	10
Netherlands	2.4	6	14
Germany	5.8	14.5	18
Poland	7.2	11.8	15
Portugal	20.5	27.8	31
Romania	17.8	24.7	24
Slovakia	6.7	11.9	14
Slovenia	16.0	21.8	25
Spain	8.7	15.6	20
Sweden	39.8	54.1	49
United Kingdom	1.3	8.2	15

Source: Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

**Table A.2 New and total installed capacity of wind farms
in EU-28 in 2016 (in MW)**

Country	Installed capacity	Total	% of installed capacity in total capacity
Austria	228	2,632	8.66
Belgium	177	2,386	7.42
Bulgaria	-	691	-
Croatia	34	422	8.06
Cyprus	-	158	-
Czech Republic	-	281	-
Denmark	220	5,227	4.21
Estonia	7	310	2.26
Finland	570	1,539	37.04
France	1561	12,065	12.94
Germany	5443	50,019	10.88
Greece	239	2,374	10.07
Hungary	-	329	-
Ireland	384	2,830	13.57
Italy	282	9,257	3.05
Latvia	2	63	3.17
Lithuania	178	493	36.11
Luxembourg	-	58	-
Malta	-	-	-
Netherlands	887	4,328	20.49
Poland	682	5,782	11.80
Portugal	268	5,316	5.04
Romania	52	3,028	1.72
Slovakia	-	3	-
Slovenia	-	3	-
Spain	49	23,075	0.21
Sweden	493	6,519	7.56
United Kingdom	736	14,542	5.06
Total EU-28	12,490	153,730	8.12

Source:
Authors' representation, based on data from WindEurope (2017)



Table A.3 Investments in wind farms in 2016

Country	Investments in MEUR	(in %)
United Kingdom	12,684	46.19
Germany	5,328	19.40
Belgium	2,300	8.37
Norway	1,773	6.46
Denmark	1,083	3.94
France	1,073	3.91
Ireland	891	3.24
Sweden	679	2.47
Finland	656	2.39
Italy	538	1.96
Other	458	1.67
Total	27,463	100.00

Source:
Authors' representation, based on data from WindEurope (2017)

Table A.4 Financial ratios of wind power producers from 2012 to 2016

	2012	2013	2014	2015	2016
LIQUIDITY RATIOS					
Cash ratio	0.39	0.19	0.22	0.35	0.34
Quick ratio	0.52	0.38	0.35	0.51	0.58
Current ratio	0.62	0.44	0.50	0.75	1.10
Financial stability ratio	1.16	1.17	1.12	1.04	0.99
LEVERAGE RATIOS					
Debt ratio	0.87	0.86	0.88	0.88	0.86
Equity ratio	0.12	0.14	0.12	0.12	0.13
Gearing ratio	7.28	6.19	7.47	7.96	6.40
Interest coverage ratio	0.01	-0.26	-0.11	0.34	0.77
Debt factor	-93.75	99.78	84.45	92.11	25.34
Equity to fixed assets ratio – level I	0.15	0.15	0.13	0.12	0.15
Equity to fixed assets ratio – level II	0.86	0.85	0.89	0.96	1.01
ACTIVITY RATIOS					
Total assets turnover	0.10	0.11	0.13	0.15	0.20
Current assets turnover	0.53	1.10	1.28	1.81	1.80
Accounts receivable turnover ratio	2.22	1.99	4.25	6.89	7.21
Collection period	164.16	183.14	85.87	52.94	50.63
EFFICIENCY RATIOS					
Total operating efficiency	1.00	0.93	0.97	1.08	1.18
Sales efficiency	1.34	1.20	1.30	1.30	1.54
Funding efficiency	0.10	0.12	0.08	0.25	0.30
PROFITABILITY RATIOS					
Net profit margin	0.27	0.20	0.23	0.28	0.31
Return on Assets	0.03	0.02	0.03	0.04	0.06
Return on Equity	-0.01	-0.06	-0.02	0.09	0.18

Source:
Companies' financial statements

Table A.5 Liquidity ratios of wind power producers for 2016

	Liquidity ratios			
	Cash ratio	Quick ratio	Current ratio	Financial stability ratio
Aiolos projekt	5.83	6.85	6.97	0.92
Crno brdo	0.16	0.48	0.48	1.11
Eko – energija	0.19	1.49	1.49	0.97
Eko	0.06	1.37	1.37	0.92
Eko Zadar dva	0.15	1.02	1.03	0.98
Jelinak	0.02	1.17	1.23	1.00
Končar-obnovljivi izvori	0.03	0.10	0.10	1.20
Orlice	0.43	1.12	1.12	0.97
Oštra stina	0.08	0.79	0.79	1.03
Ponikve	0.73	1.39	2.33	0.87
RP Global Danilo	0.61	1.09	1.09	0.99
Rudine	0.49	1.03	1.03	1.00
Selan	0.27	0.48	0.48	1.09
Trtar-Krtolin	2.73	3.98	3.98	0.76
Velika popina	0.02	0.99	0.99	1.00
Average	0.79	1.56	1.63	0.99

Source:
Authors' calculations based on the data from the financial statements of the companies

Table A.6 Activity ratios of wind power producers in 2016

	Turnover ratios			Collection period (in days)
	Total Assets	Current assets	Accounts receivable	
Aiolos projekt	0.14	1.60	9.86	37.03
Crno brdo	0.21	2.75	10.56	34.58
Eko – energija	0.19	2.23	4.35	83.84
Eko	0.28	1.24	5.77	63.22
Eko Zadar dva	0.21	1.97	11.79	30.95
Jelinak	0.19	1.46	6.23	58.55
Končar-obnovljivi izvori	0.13	7.36	8.98	40.67
Orlice	0.38	2.10	14.87	24.55
Oštra stina	0.23	2.59	10.69	34.14
Ponikve	0.19	0.95	3.11	117.35
RP Global Danilo	0.16	1.71	17.88	20.41
Rudine	0.19	1.85	9.84	37.08
Selan	0.25	3.39	7.22	50.58
Trtar-Krtolin	1.19	3.99	12.53	29.14
Velika popina	0.27	1.28	8.14	44.84
Average	0.28	2.43	9.45	47.13

Source:
Authors' calculations based on the data from the financial statements of the companies



Table A.7 Leverage ratios of wind power producers for 2016

	Leverage ratios			Interest coverage ratio	Debt factor	Equity to fixed assets ratio – level I	Equity to fixed assets ratio – level I
	Debt ratio	Equity ratio	Gearing ratio				
Aiolos projekt	1.02	-0.03	-36.82	0.02	17.34	-0.03	1.09
Crno brdo	0.91	0.08	11.95	0.07	6.92	0.08	0.90
Eko – energija	0.96	0.03	35.45	0.35	19.10	0.03	1.03
Eko	0.74	0.26	2.83	0.43	6.81	0.34	1.09
Zadar dva	0.92	0.08	11.02	0.00	5.61	0.09	1.02
Jelinak	0.86	0.12	7.45	1.66	22.49	0.13	1.00
Končar-obnovljivi izvori	0.46	0.53	0.87	-0.25	7.87	0.54	0.83
Orlice	0.77	0.21	3.66	2.22	4.72	0.26	1.03
Oštra stina	0.78	0.22	3.50	0.39	6.06	0.24	0.98
Ponikve	0.75	0.24	3.12	1.14	8.18	0.31	1.16
RP Global Danilo	0.90	0.10	8.87	0.51	16.84	0.11	1.01
Rudine	0.92	0.08	11.54	0.87	21.56	0.09	1.00
Selan	0.96	0.04	25.81	2.16	14.98	0.04	0.92
Trtar-Krtolin	0.08	0.92	0.08	11.28	0.17	1.32	1.32
Velika popina	0.63	0.37	1.69	0.60	2.75	0.47	1.00
Average	0.78	0.22	6.07	1.43	10.76	0.27	1.03

Source: Authors' calculations based on the data from the financial statements of the companies.

Table A.8 Efficiency ratios of wind power producers for 2016

	Efficiency ratios:		
	Total operating efficiency	Sales efficiency	Funding efficiency
Aiolos projekt	1.00	1.73	0.22
Crno brdo	1.02	1.26	0.34
Eko – energija	1.12	1.67	0.12
Eko	1.10	1.39	0.21
Eko Zadar dva	1.00	1.24	0.02
Jelinak	1.42	2.28	0.40
Končar-obnovljivi izvori	0.95	1.00	0.41
Orlice	1.29	1.47	0.35
Oštra stina	1.07	1.30	0.06
Ponikve	1.21	1.45	0.41
RP Global Danilo	1.17	1.87	0.40
Rudine	1.22	1.39	0.46
Selan	1.49	1.82	0.29
Trtar-Krtolin	1.63	1.71	0.43
Velika popina	1.11	1.18	0.23
Average	1.19	1.52	0.29

Source:
Authors' calculations based on the data from the financial statements of the companies

Table A.9 Profitability ratios of wind power producers for 2016

	Net profit margin	ROA	ROE
Aiolos projekt	0.23	0.03	-0.02
Crno brdo	0.25	0.05	0.05
Eko – energija	0.38	0.07	0.76
Eko	0.28	0.08	0.09
Eko Zadar dva	0.19	0.04	0.00
Jelinak	0.42	0.08	0.48
Končar-obnovljivi izvori	0.14	0.02	-0.01
Orlice	0.28	0.11	0.41
Oštra stina	0.22	0.05	0.07
Ponikve	0.29	0.06	0.11
RP Global Danilo	0.41	0.07	0.24
Rudine	0.36	0.07	0.44
Selan	0.44	0.11	2.21
Trtar-Krtolin	0.34	0.41	0.50
Velika popina	0.24	0.07	0.07
Average	0.30	0.9	0.36

Source:
Authors' calculations based on the data from the financial statements of the companies



Fiscus


Fiscus is an analytical serial publication of the Institute of Public Finance. It aims at analyzing current economic issues that affect the stability of public finances or are related to the production of goods and the provision of services of broader public interest. The topics concerned have not received adequate attention in the academic and professional community and relate to economic sectors in which the public interest is concerned, directly or indirectly. On scientific and professional foundations, Fiscus seeks to empower and encourage public debate on the establishment and preservation of the stability of Croatian public finances and the economy in general by promoting transparent, prudent and responsible management. Therefore, the topics focus on the identification and quantification of potential risks that could threaten the stability of public finance, market development, the competitiveness of the Croatian economy and the economic position of the citizens.

The vision of Fiscus is to become a reliable source of sectoral analyses through the prism of interaction between the public and private sector.

The mission of Fiscus is to identify the key challenges faced by certain economic sectors and offer suggestions for the improvement and preservation of the long-term stability of the Croatian economy.

The main objectives are:

- to provide in-depth analysis of the financial operations of public sector institutions and those institutions that are in any way associated with the production of goods and the provision of services of a broader public interest;
- to improve understanding of the financial consequences of their operations and increase accountability;
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- to contribute to the removal of administrative barriers to the development of competitiveness and the market economy.



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